Tadiran Telecom

Coral IPx 500

Installation Procedure and Hardware Reference Manual

CoralIPx

The flexible way to communicate

Federal Communications Commission

Rules Part 68 Compliance Statement

This equipment complies with Part 68 of the FCC rules. On this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.

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

An FCC compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack which is Part 68 compliant.

This equipment cannot be used on telephone company-provided coin service. Connection to Party Line Service is subject to state tariffs.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice is not practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If trouble is experienced with this equipment, please contact the supplier at (516)-632-7200 for repair and/or warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.

The following repairs can be done by the customer: No repairs allowed.

This equipment is hearing-aid compatible.

It is recommended that the customer install an AC surge arrestor in the AC outlet to which this device is connected. This is to avoid damaging the equipment caused by local lightning strikes and other electrical surges.

This equipment is capable of providing user's access to interstate providers of operator services through the use of equal access codes. Modifications by aggregators to alter these capabilities may be a violation of the telephone operator consumer services improvement act of 1990 and part 68 of the FCC Rules.

Canadian DOT Compliance Statement

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

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

NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

UL Safety of Information Technology Equipment Compliance

This equipment has been tested and complied with the following:

USL Compliance

USL indicates Listing to U.S. Standard for Information Technology Equipment Including Electrical Business Equipment, UL60950, Third Edition.

CNL Compliance

CNL indicates Certification to Canadian Standard for Information Technology Equipment Including Electrical Business Equipment, CSA C22.2 No.60950-00.

CE Compliance Statement

The Coral system complies with the requirements of the following standards:

EN60950	EN55022
ACA-TS001	EN55024
AS/NZS 3260	AS/NZS 3548 CISPR22
AS/NZS 60950	

The Coral system may include a CLASS I laser product.

All laser transmitters integrated within the Coral systems are approved CLASS I laser units. Coral systems that include such laser transmitters comply with EN60825-1.

Federal Communications Commission
Part 15
The FCC Wants you to Know

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

a) Reorient or relocate the receiving antenna.

b) Increase the separation between the equipment and the receiver.

c) Connect the equipment on an outlet on a circuit different from that to which the receiver is connected.

d) Consult with the dealer or an experienced radio/TV technician.

To ensure continued compliance with specified radio energy emissions limits of FCC Rules, the following precautions must be observed while installing and operating the equipment:

1. Install the equipment in strict accordance with the manufacturer's instructions.
2. Verify that the power supply and associated A.C. powered equipment are connected to a properly grounded electrical supply, and that power cords, if used, are unmodified.
3. Verify that the system grounding, including Master Ground, D.C. power system, and equipment cabinets, is in accordance with the manufacturer's instructions and connected to an approved earth ground source.
4. Always replace the factory-supplied cover or keep the cabinet doors closed when not servicing the equipment.
5. Make no modification to the equipment that would affect its compliance with the specified limits of FCC Rules.
6. Maintain the equipment in a satisfactory state of repair.
7. Verify that emissions limiting devices, such as ferrite blocks and radio frequency interference modules, are properly installed and functional.

If necessary the operator should consult their supplier, or an experienced radio/television engineer for additional suggestions. The following booklet prepared by the Federal Communications Commission (FCC) may be of assistance: "How to Identify and Resolve Radio-TV Interference Problems."
This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402,
Stock No. 004-000-00345-4.

FCC Warning

Modifications not expressly approved by the manufacturer could void the user authority to operate the equipment under FCC rules.

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Chapter 1

Introduction

Coral

1.1 About this Manual

1 Document Description

The *Coral IPx 500 Installation Guide and Hardware Reference Manual,* is designed for field use by Coral system installation and service personnel. It describes the installation of the Coral IPx 500 system.

This manual is divided into two primary parts:

- A systematic installation procedure
- A complete hardware reference

Chapters 2, 3, 4, 5, and 6 include all installation procedures. These chapters listed below, outline the step-by-step process of performing a complete, new Coral IPx 500 system installation. Peripheral devices can be installed at any time after system installation. For peripheral device installation, refer to the *Coral Terminal Equipment Installation Manual.*

Where is it?	What is it about?	When to use it?
Chapter 2	Hardware Installation Procedure	Start the installation process with this chapter. Follow its instructions to ensure that the Coral IPx 500 system will be properly unpacked, installed and ready for operation.
Chapter 3	Initial Power Up	After completing installation, use this chapter to enable the Coral IPx 500 system to process calls.
Chapter 4	Software Installation Procedure	Use this chapter to upgrade the Coral IPx 500 software and save the database.
Chapter 5	External Connections	The pinout tables for MDF connections are found here. The tables are used during the installation procedure performed in Chapter 2. Also, surge arrestors are installed here.

Chapters 6, 7, 8, 9 and 10 describe the hardware reference. These chapters offer detailed technical information about Coral IPx 500 system hardware, including cage specifications, internal power supplies, and interface circuit operation:

Where is it?	What is it about?	When to use it?
Chapter 6	Cabinet Description	To learn about the main and expansion cages
Chapter 7	Power Supply Description	Whenever reference information about power supplies is required, or whenever adding or re-installing a power supply item
Chapter 8	Control Cards	For general information, installation procedures and card handling advice regarding the common control card set
Chapter 9	Shared Service	For reference material
Chapter 10	Peripheral Interface Cards	For reference material or if you are installing a peripheral interface card. Also, see the *Coral Service and Peripheral Cards Installation Manual*.

2 Related Documentation

For further information not in the scope of this manual about Coral service cards Coral peripheral cards, voice terminals, VoIP devices, etc., consult the following documentation:

Table 1-1 **Related Documentation**

Item	Subject	Manual
Coral systems	General description and specifications for marketing	Coral IPx and FlexiCom Product Description
All FlexSet types	Description	Coral IPx and FlexiCom Product Description
Coral Database	Programming	1) PI - Program Interface and Database Reference Manual 2) CVA -CoralVIEW Administrator User Manual 3) CVD -CoralVIEW Designer Guide
	Backup	1) PI - Program Interface and Database Reference Manual, Chapter 21 2) Database Binary Backup PC Utility
Coral Software	Installation and Upgrade	FMprog PC-Utility Reference Manual
Coral FlexAIR (Wireless)	Descriptions and Installation Procedure	Coral FlexAIR (Wireless Systems) Installation Manual
IP device (VoIP) UGW card, FlexSet-IP 280S, Coral Teleport, FlexIP SoftPhone	Installation	Coral VoIP Installation Manual
IPG card	Descriptions and Installation Procedure	VoIP Gateway (IPG) card Installation Manual
IPx 800X Expansion Cages for IPx 500M	Descriptions and Installation Procedure	Coral IPx 800 Installation Manual.
Peripheral cards	Descriptions and Installation Procedure	Coral Service and Peripheral Cards Installation Manual
Peripheral device	Installation and Trouble-shooting	Coral Terminal Equipment Installation Manual
Shared Service cards	Descriptions and Installation Procedure	Coral Service and Peripheral Cards Installation Manual

3 Special Symbols Used in this Document

This manual includes information that requires special attention, or is distinguished from the main texts in some significant way. These are indicated by the use of symbols and text formatting. This is illustrated in the following examples:

WARNING!

*There is a risk of danger to **life** or personal injury.*

CAUTION!

There is a risk of damage to Coral system.

NOTE:

Indicates important information demanding special attention.

Tip:

Advice that makes it easier to follow the steps of a procedure.

NOTES: *NOTES:*

A page that is intentionally left blank, and may be used for reader information.

This manual includes information for the Coral configurations in all geographic market areas. Much of the information is relevant for all hardware configurations and all market areas.

4 List of Abbreviations

16SFTipx ....16 digital Station FlexSet Terminal/Telephones interface card

16SLSipx ....16 Single Line Telephones interface card

2SKWsl...........CoralAIR Wireless Extension Interface card with support for 2 RBS (Radio Base Stations)

30Tsl ....30 channel, E1/CEPT digital trunk interface card

30Tipx.............30 channel, E1/CEPT digital trunk interface card

4SKWsl...........CoralAIR Wireless Extension Interface card with support for 4 RBS (Radio Base Stations)

4T-Csl ....4 Analog Loop/Ground-Start Trunk Line with power fail circuits card

4T-Cipx, 4T-Csl4 Analog Loop/Ground-Start Trunk Line with power fail circuits card

4T-CIDsl..........Same as 4T-Csl card with 4CID module

4T-CIDipx........Same as 4T-Cipx card with 4CID module

4TBRsl............4 Trunk BRI circuit card

4TBRipx..........4 Trunk BRI circuit card

4TBRPsl ....4 Trunk BRI circuit card with external power option (discontinued)

4TEMsl ....2/4 wire inter-exchange Tie Trunk interface card

4TEMipx ....2/4 wire inter-exchange Tie Trunk interface card

4TMR-PFsl-G .4 Analog Trunk Line with Metering and Power Fail circuits card

4TMR-PFipx-G4 Analog Trunk Line with Metering and Power Fail circuits card

4TPFsl ....4 Analog Trunk Line with power fail circuits card

4TWLsl ....4 Analog Trunk Line 2-Wire 2-Way Loop (DDI/DD) circuit card

4TWLipx ....4 Analog Trunk Line 2-Wire 2-Way Loop (DDI/DD) circuit card

8SFTipx ....8 digital Station FlexSet Terminal/Telephones interface card

8SKKsl............FlexAir Wireless Extension Interface card with support for 8 RBS (Radio Base Stations)

8SKKipx..........FlexAir Wireless Extension Interface card with support for 8 RBS (Radio Base Stations)

8SLSipx ....8 Single Line Telephones interface card

8T-Csl ....8 Analog Loop/Ground-Start Trunk Line with power fail circuits card

8T-Cipx ....8 Analog Loop/Ground-Start Trunk Line with power fail circuits card

8T-CIDsl..........Same as 4T-Csl card with 8CID module

8T-CIDipx........Same as 4T-Cipx card with 8CID module

8TBRsl............8 Trunk BRI circuit card

8TBRipx..........8 Trunk BRI circuit card

8TBRPsl ....8 Trunk BRI circuit card with external power option

8TBRPipx ....8 Trunk BRI circuit card with external power option

8TPFsl .... 8 Analog Trunk Line card with power fail circuits card

8T-Gipx .... 8 Analog Trunk Line card

PS500 AC ...... AC Power Supply (main and expansion units)

PS500 DC ...... DC Power Supply (main and expansion units)

IPx 500M .... Main Unit of the Coral IPx 500, uses small factor XXXipx peripheral cards

IPx 500X .... Expansion Unit of the Coral IPx 500, uses small factor XXXipx peripheral cards

IPx 800X .... Optional Expansion Unit of the Coral IPx 500, uses standard Coral FlexiCom ,300,400,5000,6000 and IPx 800,3000,4000 peripheral cards

IMC8 .... Flash Module for generic software and database backup (PCMCIA format PC-CARD)

iCMC-200 .... Integrated Coral Message Center circuit card

IPC/uCMC ...... uCMC (Unified Coral Messaging Center) enables accessing e-mail, voicemail and fax messages anywhere in the world.

IPC/SFC .... SFC (Simplicity For Coral) is a complete voice mail and automated attendant system.

iVMFipx .... Integrated Voice Mail Flash (iVMF), 8 (fixed) voice mail ports

MCP-IPx .... Main Control Processor Card

MDFipx .... MDF supplied by the factory, specially designed for Coral IPx 500 systems

MSBipx .... Main Service Board of the main cage IPx 500M

MSPipx .... Main Service Board of the expansion cage IPx 500X

PRI-23sl .... 23 channel, PRI (Primary Rate Interface) digital trunk card

PRI-23ipx .... 23 channel, PRI (Primary Rate Interface) digital trunk card

PRI-30sl .... 30 channel, PRI (Primary Rate Interface) digital trunk card

PRI-30ipx .... 30 channel, PRI (Primary Rate Interface) digital trunk card

T1sl .... 24 channel, T1 digital trunk interface card

T1ipx .... 24 channel, T1 digital trunk interface card

UDTipx .... Universal Digital Trunk (T1ipx or PRI-23ipx) interface card

UGWipx .... Universal Gateway VoIP interface card

XXXsl .... Standard Coral FlexiCom 200 peripheral cards that can be installed in slots 1,2,3 of the Coral IPx 500M main cage. XXXsl cards are no longer produced.

XXXipx .... Standard Coral IPx 500 peripheral cards that are installed in the Coral IPx 500M main cage and in the Coral IPx 500X expansion cage. XXXipx cards replace the discontinued XXXsl cards, which are no longer produced.

1.2 About the Coral IPx 500

1 System Description

Capacity

The Coral IPx 500 is a small wall or rack-mounted PABX, designed to fit in the low to medium range of the private PBX telephone market. Coral IPx 500 supports all the Coral FlexiCom and Coral IPx family features. The Coral IPx 500 is a communications platform offers Voice over IP and all the features and capabilities required in today's business environment.

The Coral IPx 500 configuration supports up to 448 wired stations and 300 wireless stations.

The Coral IPx 500 can be expanded using an additional expansion unit. Up to two expansion units (combination of IPx 500X and IPx 800X) can be connected to one IPx 500M main cage. The IPx 800X expansion cage uses standard Coral FlexiCom 300,400,5000,6000 and Coral IPx 800,3000,4000 peripheral cards. The IPx 500X expansion cage uses the special form factor XXXipx cards.

The Coral IPx 500 operates from a standard wide input 100-240VAC, 47-63Hz source or from a -48VDC source. AC powered units can be supplied with a built-in backup battery for 1 hour of operation.

Circuitry

The Coral IPx 500 is a digital communications switching system is based on Pulse Code Modulation (PCM) switching technology. The active circuitry of the system is contained on a backplane and removable cards.

The active circuitry of the Coral IPx 500 system is divided into two major functions; common control and peripheral. The common control circuitry directs call traffic through the system, establishing audio connections between peripheral ports. The peripheral circuitry provides the hardware necessary to establish those connections. Instructions from the common control to the peripheral circuitry, and status information from the peripheral circuitry to the common control are passed through the group controller, which provides driver and time slot interchange functions for the PCM highways and the HDLC channels.

The common control is further divided into shared service, group controller, and the main central processor.

The shared service circuitry is integrated into the IPx 500M backplane; it provides the equipment necessary to establish calls between peripheral interfaces.

The Peripheral Interface circuitry provides standardized electrical connections to external telephone station equipment and network facilities.

Major Features

The cage houses all hardware components of the Coral IPx 500 system including the power supply unit, control cards, peripheral cards, and I/O connections. In addition, the cage:

- Provides all the features, capabilities, interfaces, and terminals of the Coral communication server
- Provides built-in voice/data convergence
- Provides built-in functions. See *page 9-1, Shared Service Circuitry*
- Optimizes space utilization through extensive configuration flexibility
- Fits into 19" and 23" racks, including racks designed to earthquake specifications
- Enables installation into standard racks. See *page 2-29, Rack Mounted Installations*.
- Can be mounted on the wall. See *page 2-18, Wall Mounted Installations*
- Enables AC or DC input power supply in every cage. See *page 7-35, BATTipx Battery Pack*.
- Enables internal power supply/battery chargers and battery backup through BATTipx with AC input power supply in every cage. See *page 7-35, BATTipx Battery Pack*.
- Enables connection to E1, T1, PRI, and LAN interface through top-panel RJ45 connectors. See *page 6-16, Top Section*.
- Includes simple Input/Output (I/O) cable routing from the rear panel
- Includes simple assembly procedures
- Can be mounted on the same rack as customer-supplied cages
- Includes a traffic capacity of 50,000 busy hour call attempts (BHCA)
- Includes a system capacity (IPx 500M and two 500X) for growth to 448 wired stations and a system capacity (IPx 500M and two 800X) for growth to 656 wired stations (the maximum totals listed may be exclusive of other ports and do not include FlexAir handsets and IP ports). See *page 6-41, System Configuration Options*.
- Includes up to 384 ports in use, simultaneously per system. See *page 6-55, Suggestions for Peripheral Card Distribution*.
- Includes up to three cages per system. See *page 6-41, System Configuration Options*.
- Includes free ventilation without fans
- Includes full RFI protection
- Supports all of the features, interfaces, and terminals of Coral FlexiCom products
- Supports the insertion of peripheral cards under power conditions
- Can facilitate expansion cages of the Coral IPx 800 system
- Can be integrated (IPx 500X) within the Coral IPx 800 system

Table 1-2 ***Coral IPx 500 System Specifications***

Specification *	***Coral IPx 500M Main Cage***	***Coral IPx 500X Expansion Cage***	***Coral IPx 800X Expansion Cage***
MCP-IPx Card Slots	1	—	—
PX Card Slots †	—	—	1 or 0
Shared Service Card Slots	MSBipx ‡	—	0 or 1
Peripheral Interface Card Slots	8	10	11
Ports per Slot (See *Coral Service and Peripheral Cards Installation Manual*)	4, 8, 23, 24, 30 trunks, 8 RBS (FlexAir wireless), 8 or 16 stations, 240 IP ports XXXipx Cards See *page 10-7, Peripheral Card Description*		4, 8, 23, 24, 30 trunks, 8, 16 RBS (FlexAir), 8, 16 or 24 stations, 240 IP ports
Maximum Combined Trunk and wired Station Ports **	128	160	264
Maximum Ports In Use Simultaneously	See *page 6-55, Suggestions for Peripheral Card Distribution*		
Size	See *page 2-5, Coral IPx 500 Dimensions*		
Weight	See *page 2-6, Coral IPx 500 Weights*		
Space Requirements	See *page 2-6, Coral IPx 500 Clear Space Requirements*		
Power Input	See *page 2-13, Electrical Requirements*		
Operating Temperature	32-104°F (0-40°C)		
Operating Humidity	20-80% Relative, Non-Condensing		
Maximum Power Consumption ††	460 Watt	460 Watt	575 Watt
Heat Dissipation	700 BTU/Hr	700 BTU/Hr	1070 BTU/Hr

* For a full list of specifications, refer to the *Coral IPx and FlexiCom Product Description*.

† A PX card occupies slot 1 of the first IPx 800X expansion cage in an IPx 500M+800X+800X system configuration.

‡ See *page 9-1, Shared Service Circuitry* for the built in functions included in each system.

**The maximum totals listed may be exclusive of other ports and do not include FlexAir handsets and IP ports.

†† Maximum power consumption and heat dissipation are worst-case projections based on fully populated cages. The figures do not include power consumption and heat dissipation caused by stationary batteries in a high rate of charge.

2 Recommended Tools

The following tools are needed in order to install and maintain the Coral IPx 500 system:

Required Tools:

- 4 mm (max.) flat blade screwdriver for installation and removal of the door
- 3/16", 1/4", and 5/16" straight-blade screwdrivers
- #1 and #2 Phillips screwdrivers
- Diagonal wire cutters
- Long-nosed pliers
- Electrician's pliers
- Slip-joint pliers
- Adjustable wrench
- Wrench for ground cable hex nuts (3.2 mm x 7 mm)
- Telephone cable cutters
- Standard crimping tool
- Telephone cable insulation strippers
- 16 ft (5m) measuring tape
- Punch tool matching all telephone cable terminal blocks used at the installation site
- Digital Volt/Ohm/Amp meter
- Telephone line test set capable of pulse and DTMF dialling
- Static dissipating wrist strap
- Portable (laptop) personal computer with a PCMCIA slot, capable of emulating an asynchronous ASCII data terminal and approved by the manufacturer to run the binary database save and restore utility, portable asynchronous ASCII data terminal, or permanently installed on-site personal computer or ASCII data terminal.

Optional Tools:

- Modular line polarity tester
- Flashlight
- Tone/continuity/talk battery generator
- Tone detector/amplifier probe
- Telephone line test set with MF tone signalling capability
- Alligator clip leads
- AMP™ Champ™ installation tool
- Soldering iron and high quality, rosin-core solder
- 3/16" and 1/2" cable staple gun
- Analog line transmission analyzer
- Portable DS1/E1 analyzer, Bit Error Rate tester, and channel demultiplexer

Chapter 2

Hardware Installation Procedure

Coral

2.1 Site Inspection

1 Installation Environment

The Coral IPx 500 system should be installed in restricted access areas (dedicated equipment rooms, equipment closets, or the like) in accordance with articles 110-16, 110-17, and 110-18 of the national electric code, ANSI/NFPA 70.

Access to the system should be limited and controlled to prevent unauthorized tampering. The system uses hazardous working voltages and extremely high short circuit currents, and the area must be protected against damage by, and injury to, unqualified personnel.

Due to these considerations, an installation area must be chosen in accordance with the following guidelines:

1. Verify that the installation area is clean, dry, and protected from weather extremes.
2. Verify that the floor of the installation area is covered with linoleum, vinyl, ceramic, wooden flooring, or polished sealed concrete. Carpeting is not acceptable.
3. For wall mounted installations, verify that the wall mounting surfaces of the installation area are painted or sealed plywood with a minimum thickness of 3/4 inch (2 cm) or a similar material capable of supporting equipment attached to the wall.
4. Verify that the ceiling of the installation area is finished or treated to prevent particle discharge.
5. Verify that the installation area is well lit, and that the light is uniformly diffused without shadows. Adequate lighting should provide a comfortable reading level and allow wire insulator color identification without undue eye fatigue.

   Lighting should be comparable to an office work environment, with a minimum level of 70 foot-candles at each work surface. As a general rule, in a room with an 8 ft (2.5m) ceiling, one 48 inch fluorescent tube provides sufficient illumination for 20-25 sq. ft. (1.9-2.4 m^2).
6. Verify that ventilation of the installation area is capable of maintaining an ambient temperature of 32°-104°F (0°-40°C), and a relative humidity of 20-80% non-condensing, considering the system nominal heat dissipation 700 BTU/hr. (These figures are for each cage only, and do not take into account heat generated by other equipment.)

7. Verify that the installation area is free of caustic or corrosive liquids, substances, or materials. Check local building codes for additional requirements.
8. Verify that the installation area is located no closer than 20 ft (6.1m) from electric devices that produce large electro-magnetic fields or high levels of radio frequency energy. Possible sources are radio transmitters, electric arc welding machines, copying machines, electric motors, refrigeration units, power transformers, electric load centers, and main circuit breaker panels.
9. Verify that the installation area provides reasonable security to the system. Room construction should include solid, reinforced walls and a locking door.

2 Space Requirements

General

This section describes the Coral IPx 500 space requirements.

1. Verify that there is sufficient space for the Coral IPx 500 system components.
2. The dimensions and weights of the various components are provided in *Figure 2-1*, *Table 2-1* and *Table 2-2*.
3. A minimum clearance, as detailed in *Table 2-3*, must be provided around the the various components. For more detailed information, see:
   - *Space Above and Below the IPx 500 Cage, on page 2-9*
   - *Space between the Wall Mounted Cage and the MDFipx, on page 2-9*
   - *Space in Front of Wall Mounted Systems, on page 2-10*
   - *Space in Front and Behind Rack Mounted IPx 500 Cages, on page 2-11*
   - *Space between Cages Rack Mounted Back to Back, on page 2-12*
4. *Figure 2-2* displays a schematic diagram of all installation orientation options.
5. The cage must be mounted horizontally.
6. It is recommended to mount the first expansion cage above the main cage. However, any position around the main cage is acceptable.
7. It is recommended to mount the second expansion cage above the first expansion cage. However, any position around the first expansion cage is acceptable.
8. The mounting of an optional expansion cage should be taken into consideration when mounting the Coral IPx 500 equipment.
9. When an expansion cage is mounted above or below the main cage, a gap of 3.5" (9 cm) 2U to 31.4" (80 cm) must be left between the expansion cage and the main cage. This clear space is reserved for the various cables that connect the two units and for ventilation purposes.
10. For safety reasons, the top cover of the IPx 500 cage should not exceed 80" (2 m) from the floor.
11. Sufficient space must be reserved for any additional equipment related to the Coral IPx 500 system, such as the Program Interface terminal or personal computer, voice mail system, external public address system, etc.
12. Sufficient space must be reserved for a technician's desk or work table.

MDF

1. Sufficient space must be reserved for the Main Distribution Frame (MDF), in addition to the space required by the cage. The MDF should be located immediately adjacent to the Coral cage. The floor space in front of the MDF must be clear for a minimum of 3 feet (1m) due to the variety of cable termination hardware at the MDF.

NOTE:

The MDFipx (IPx Main Distribution Frame) may be factory supplied in some countries. Please check with the manufacturer's representative.

2. The space to the right of the wall-mounted Coral IPx 500 cage is reserved for the MDFipx, if an MDFipx has been ordered from the manufacturer. The MDFipx should be positioned immediately adjacent to the cage, at the same height, and at a distance of 2" (5 cm) from the Coral IPx 500 cage.

Power Backup

1. Sufficient space must be reserved for power backup equipment, if it will be provided as a part of the installation. Due to the great variety of Power Backup Equipment that is available, no specific requirements can be detailed in this procedure.

NOTE:

The BATTipx battery pack (power backup) may be factory supplied in some countries. Please check with the manufacturer's representative.

2. The BATTipx may be wall-mounted or rack-mounted as required.

Table 2-1 **Coral IPx 500 Dimensions**

Item	*Dimension*	*Inches*	*Centimeters (cm)*
IPx 500M, 500X Cage Rack-Mounted	Width	19	48
	Depth	8	20.4
	Height - 8.7U	15.2	39
IPx 500M, 500X Cage Wall-Mounted	Width	18.5	47
	Depth	9.2	23.3
	Height - 8.7U	15.2	39
IPx 800X Cage Rack-Mounted	Width	19	48
	Depth	13	33
	Height - 8.7U	16	40
1MDFipx Wall-Mounted	Width	7.3	18.5
	Depth	9	22.6
	Height	15.3	39
2MDFipx Wall-Mounted	Width	14.5	37
	Depth	9	22.6
	Height	15.3	39
BATTipx	Width	17	43
	Depth	7.6	19.4
	Height	2.8	7

Table 2-2 **Coral IPx 500 Weights**

Item	*Pounds*	*Kilograms*
IPx 500M, 500X Cage (Fully loaded)*	30	13.5
IPx 800X Cage (Fully loaded)	57	26
1MDFipx	15	6.8
2MDFipx	20.3	9.2
BATTipx	31	14

**The weight provided is typical and can significantly differ depending on the type of cards installed.*

Table 2-3 **Coral IPx 500 Clear Space Requirements**

Item	*Dimension*	*Inches*	*Centimeters (cm)*
IPx 500 Cage Rack-Mounted	Front	36	100
	Rear	3.5	9
	Top - 2U	3.5	9
	Bottom - 1U	1.75	4.5
IPx 500 Cage Wall-Mounted, 1MDFipx, 2MDFipx	Front	36	100
	Top - 2U	3.5	9
	Bottom - 1U	1.75	4.5
	Right	2	5
	Left	2	5
BATTipx	Top - 2U	3.5	9
	Right	2	5
	Left	2	5

Figure 2-1 ***Coral IPx 500 Sizes and Weights***

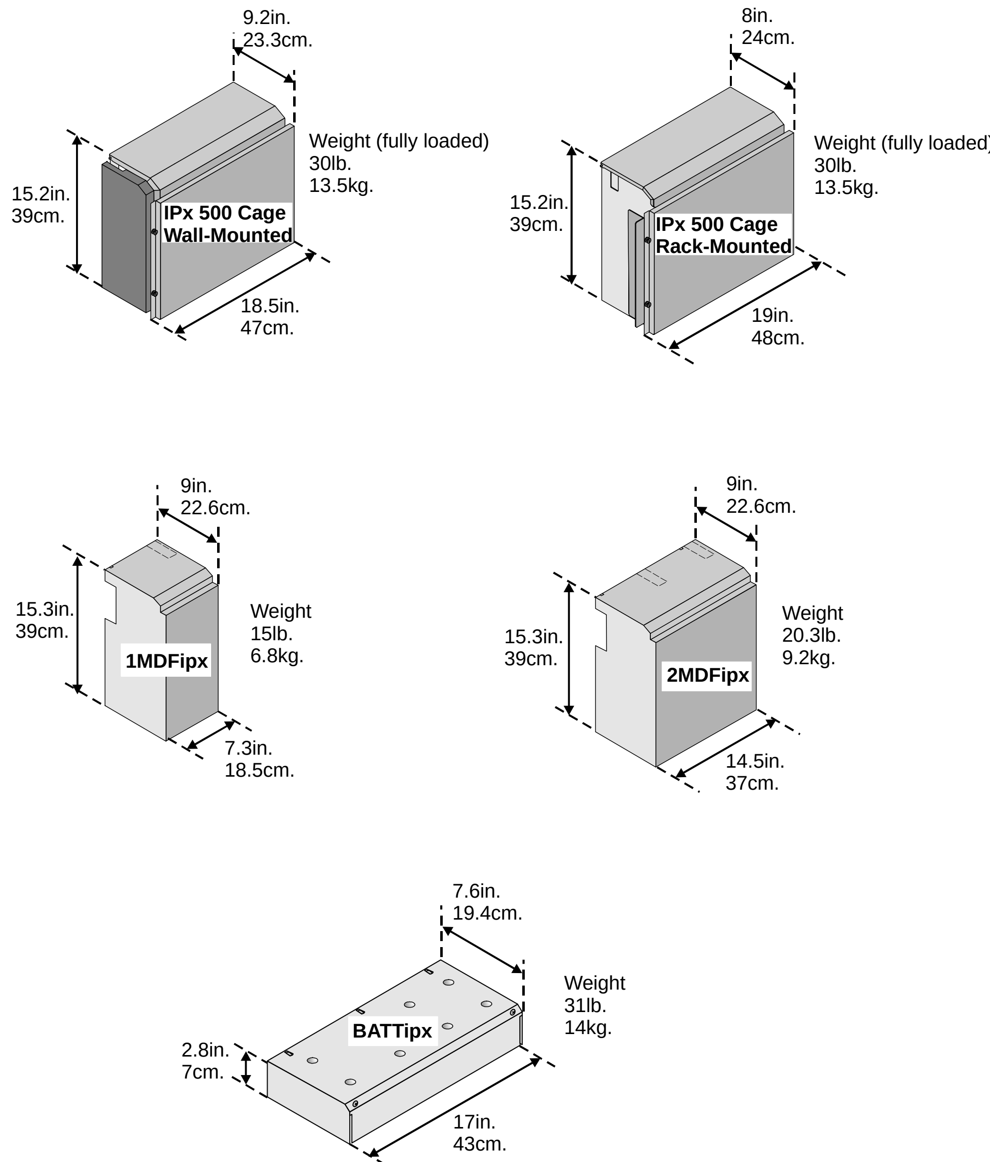
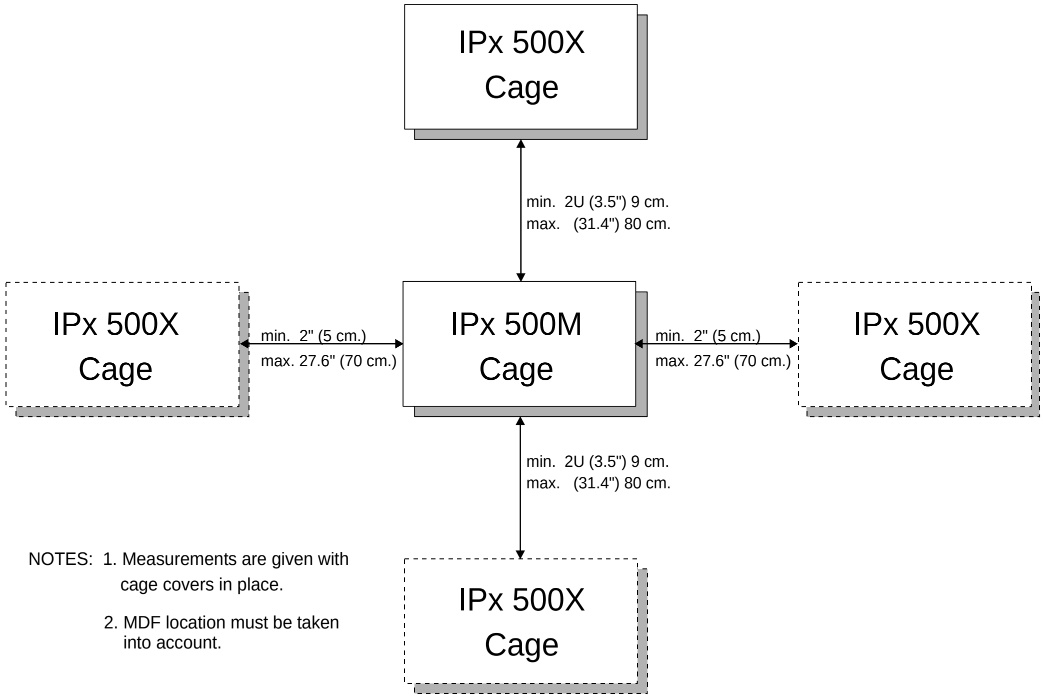


Figure 2-2 ***Coral IPx 500 Distance between the Expansion Cage and the Main Cage***



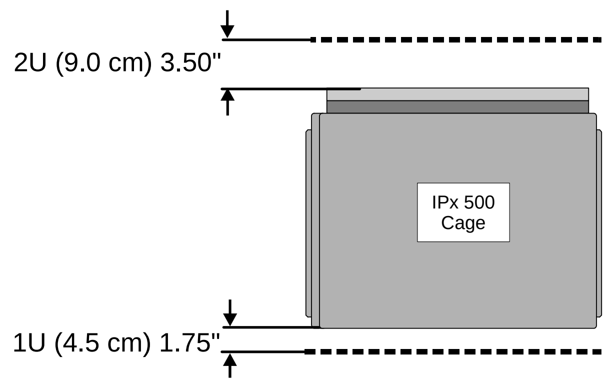
Space Above and Below the IPx 500 Cage

The Coral IPx 500 cage requires a minimum space of 2U (3.5" or 9cm) above the top cover in order to allow space for maintenance purposes (that is, adequate space for opening the top cover and routing the cables via the rear slots). A minimum space of 1U (1.75" or 4.5cm) must be maintained to allow cool ambient air to reach the perforations at the bottom panel. See *Figure 2-3*.

NOTE:

The minimum spaces specified in Figure 2-3 do not take into consideration heat transfer from other equipment to the Coral IPx 500. If other heat dissipating equipment is installed above or below the Coral IPx 500 cages, you will need to increase the space.

Figure 2-3 ***Coral IPx 500 Space Required Above and Below the Cage***

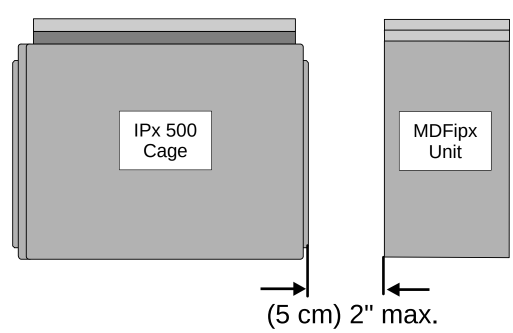


Space between the Wall Mounted Cage and the MDFipx

You can order an MDFipx unit from the manufacturer. If the MDFipx unit is to be positioned 2.5” (5cm) from the right panel of the cage, you can order an MDFipx unit with the cables already attached. Otherwise, you need to order an MDFipx unit without cables.

Figure 2-4 displays the space between the Coral IPx 500 cage and the MDFipx.

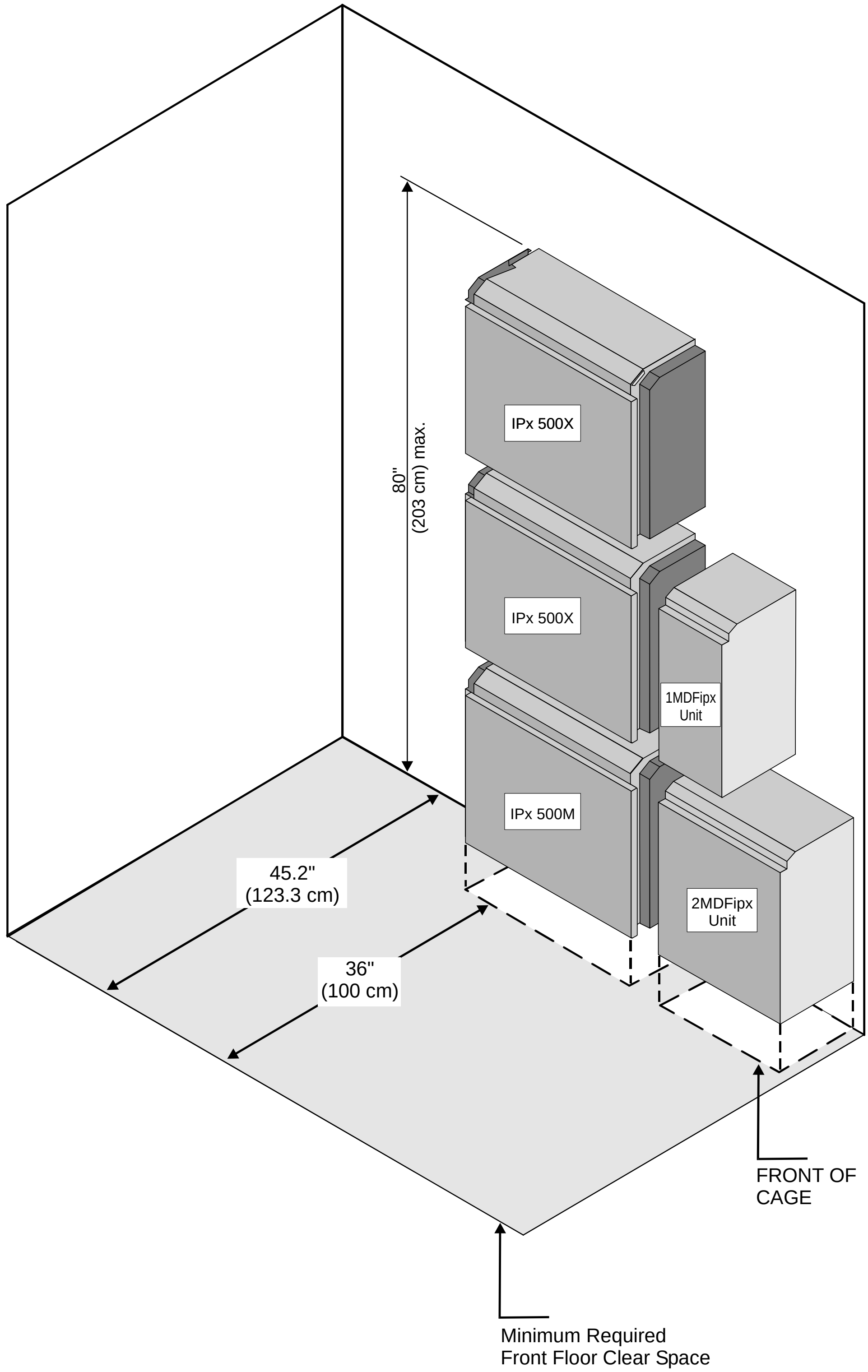
Figure 2-4 ***Coral IPx 500 Space Required Between the Cage and the MDFipx***



Space in Front of Wall Mounted Systems

A minimum of 36” (1 meter) must be left free in front of the system. *Figure 2-5* displays a typical wall mounted system configuration.

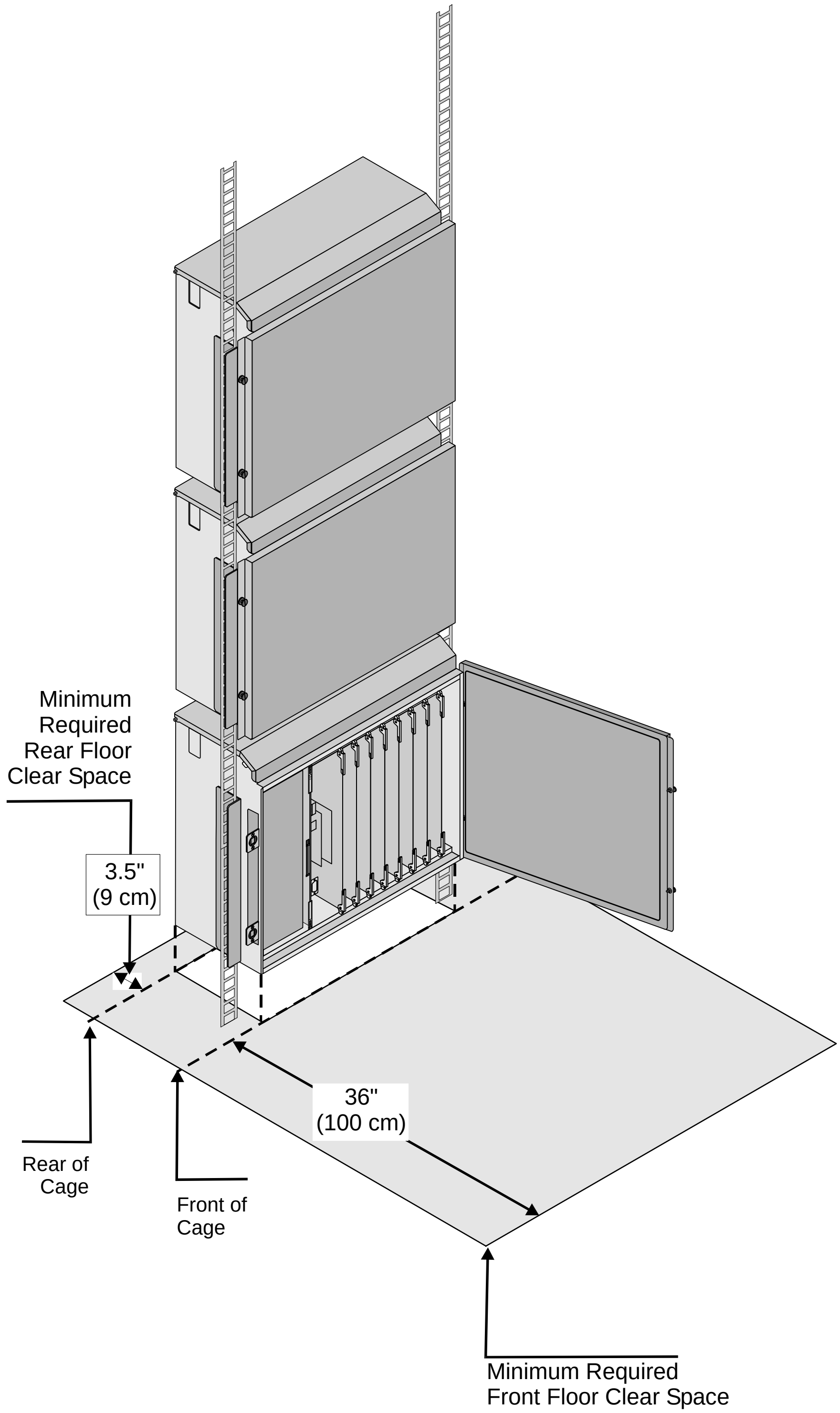
Figure 2-5 **Coral IPx 500 Space Required in Front of Wall-Mounted System**



Space in Front and Behind Rack Mounted IPx 500 Cages

When cages are mounted onto a rack with the rear panel exposed (that is, not facing the wall or the rear panel of other cages), 36” (1 meter) must be left free in front of the system and 3.5” (9cm) must be left free behind the rack mounted cages. See *Figure 2-6*.

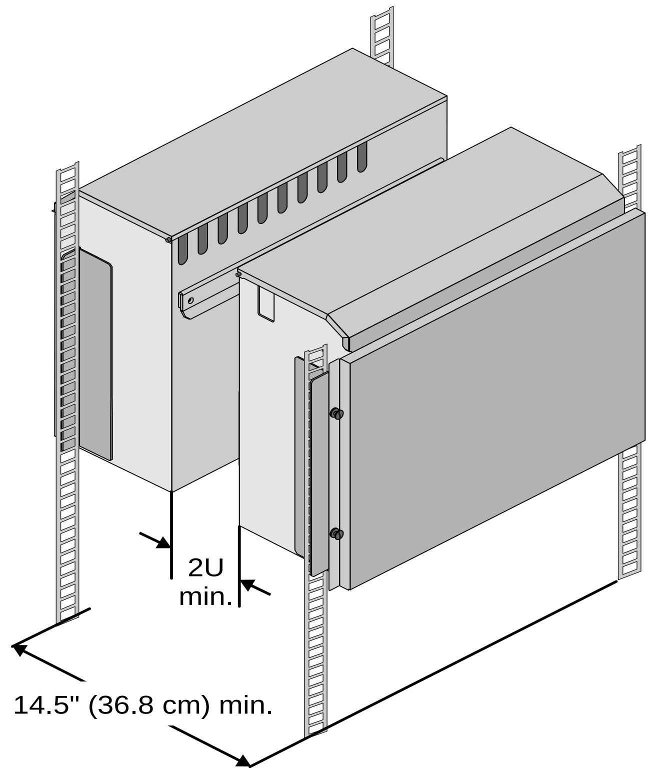
Figure 2-6 ***Coral IPx 500 Space Required in Front and Behind the Rack-Mounted System***



Space between Cages Rack Mounted Back to Back

If racks are mounted with cages mounted back to back, a minimum space of 2U (3.5" or 9cm) must be maintained between the rear panels of the cages. Or a minimum of 14.5” or 36.8cm must be maintained between the racks. See *Figure 2-7*.

Figure 2-7 **Coral IPx 500 Space between two Cages Rack-Mounted Back to Back**



3 Electrical Requirements

General Requirements

The Coral IPx 500 operates from a standard wide input 100-240VAC, 47-63Hz source or from a -48VDC source. AC powered units can be supplied with a built-in backup battery for 1 hour of operation.

1. Verify that electrical service is sufficient and located in close proximity to the system. Coral IPx 500 system requires at least one dedicated branch circuit with at least two receptacles: one for the cage, and one for ancillary equipment such as data terminals or personal computers, external paging equipment, or test instruments, etc.
2. For 115VAC or 230VAC power, a 1.85mm^2 or 14AWG wire must be used in the circuit branch.
3. Each branch circuit must be independently protected by a fuse or circuit breaker, and must not be controlled by a switch. C-type fuses should be used where required by local authorities.
4. The receptacle for the Coral system branch circuit must be located within 4 feet (1.2m) of the cage for AC operated systems, or within 4 feet (1.2m) of the 48VDC power supply for DC operated systems.
5. Auxiliary branch circuit receptacles should be located conveniently for ancillary equipment, and should allow data terminals, personal computers, or test instruments to be operated near the system.
6. *Table 2-4* lists the voltages and current requirements for each cabinet

Table 2-4 ***Coral IPx 500 Maximum Power Requirements***

*Configuration**	*115VAC*	*230VAC*	*-48VDC*
IPx 500M	6A	3A	10A
IPx 500X	6A	3A	10A
IPx 800X	6A	3A	12A
IPx 500M+500X	12A	6A	20A
IPx 500M+800X	12A	6A	22A
IPx 500M+500X+500X	18A	9A	30A
IPx 500M+500X+800X	18A	9A	30A
IPx 500M+800X+800X	18A	9A	30A

*Maximum power requirement is a maximum case projection based on fully populated systems. The total number may be defined per actual system.

DC Electrical Requirements

DC units must comply with the following instructions:

1. *Restricted Access Area*: The DC powered equipment should only be installed in a Restricted Access Area.
2. *Installation Codes*: The equipment must be installed according to country national electrical codes. For North America, equipment must be installed in accordance with the US National Electrical Code, Articles 110-16, 110-17 and 110-18 and the Canadian Electrical Code, Section 12.
3. *Overcurrent Protection*: A readily accessible listed branch circuit overcurrent protective device rated "30A/60VDC minimum slow blow" must be incorporated in the building wiring for every four cages.
4. *CAUTION*: This equipment is designed to permit connection between the grounded conductor of the DC supply circuit and the grounding conductor at the equipment. See installation instructions below.
5. The equipment shall be connected to a properly grounded supply system.
6. All equipment in the immediate vicinity shall be grounded the same way, and shall not be grounded elsewhere.
7. The DC supply system is to be local, i.e. within the same premises as the equipment.
8. A disconnect device is not allowed in the grounded circuit between the DC supply source and the frame/grounded circuit connection.

NOTES:

2.2 Equipment Installation

1 Introduction

All Coral IPx 500 cage descriptions are covered in *Chapter 6 - Cage Description*. The cage mounting and installation procedure includes the following stages:

- Mounting the cage onto the wall or the rack, including one of the following:

  a. *Wall Mounted Installations, on page 2-18*

  b. *Rack Mounted Installations, on page 2-29*

- *Main Distribution Frame (MDF) Mounting and Installation, on page 2-36*
- *Battery Pack (BATTipx) Mounting and Installation, on page 2-40*
- *Ground Wiring, on page 2-46*
- *Circuit Card Partial Installation, on page 2-55*
- *Interconnecting the Main and Expansion Cages, on page 2-65*
- *Setting the Configuration Jumpers, on page 2-66*
- *Power Supply (PS500) Installation, on page 2-68*
- *Connecting the Power Wires, on page 2-70*

WARNING!

General Hazard. Installation and maintenance activities carried out by unqualified personnel could lead to death, serious injury, or damage to equipment. Only qualified service technicians certified by the manufacturer may install and maintain the Coral IPx 500.

Wall Mounted Installations

The process of mounting and installing the wall-mounted cage includes the following stages:

- *Unpacking the Shipping Container, on page 2-18*
- *Checking the Space and Positioning Requirements, on page 2-20*
- *Removing the Cage Door and Top Cover, on page 2-20*
- *Installing the Cable Support Bracket, on page 2-20*
- *Assembling the Left Decorative Cover, on page 2-21*
- *Assembling the Right Decorative Cover, on page 2-22*
- *Fastening the Bottom Panel Support Bracket, on page 2-23*
- *Attaching the Wall Mounting Bracket onto the Wall, on page 2-24*
- *Mounting the Cage onto the Wall Mounting Bracket, on page 2-27*

Unpacking the Shipping Container

1. Inspect the shipping container for evidence of physical damage or mishandling. Report any damage to the carrier immediately.
2. If it is necessary to make a damage claim to the carrier, do not move the container until it has been examined by a representative of the carrier. Otherwise, before opening, move the container as close as possible to the installation area.
3. Using a utility knife, carefully cut the tape securing the top flaps of the container and open the flaps.
4. Remove any parts in the depressions of the top foam insert.
5. Remove the top foam insert and set aside.
6. Using an assistant to prevent personal injury (for the MDF, no assistant is necessary), grasp the ends of the cage / MDF and lift it out of the container. Place the cage / MDF on a stable surface.
7. Inspect the cage and MDF covers for shipping damage.
8. Check the part list and verify that all the items are present. *Table 2-5* lists the components that are supplied with the wall-mounted Coral IPx 500 system.
9. Remove any other cage items from the shipping container, and move the container so that it does not interfere with the remaining installation procedures.

Table 2-5 **Part List (Items per Wall-Mounted IPx 500 Cage)**

Item Description	*Quantity*
Main cage (IPx 500M), including one MCP-IPx card or Expansion cage (IPx 500X), including one H-500/1 expansion cable with male-female D-type 50-pin connectors	1
Power supply unit; PS500 AC or DC (ordered by customer)	1
Peripheral Interface cards (ordered by customer)	As required
Cable support bracket	1
M4 Phillips screw for cable support bracket	2
M4 curved spring washer for cable support bracket	2
Left decorative cover	1
Right decorative cover	1
3mm nylon snap rivet for left and right decorative covers	10 (including 2 spare)
Bottom panel support bracket	1
M3 Phillips screw for bottom panel support bracket	2
M3 flat washer for bottom panel support bracket	2
M3 curved spring washer for bottom panel support bracket	2
Installation blueprint	1
Wall mounted bracket	1
4.2X32 Slotted tapped screw for wall mounted bracket	4
Flanged wall plug (anchor) for wall mounted bracket	4

Checking the Space and Positioning Requirements

Verify that the Coral IPx 500 cage will be positioned in accordance with local and system requirements. The spacing requirements as described in *"Space Requirements"* starting *on page 2-3* ensure system operation and maintenance.

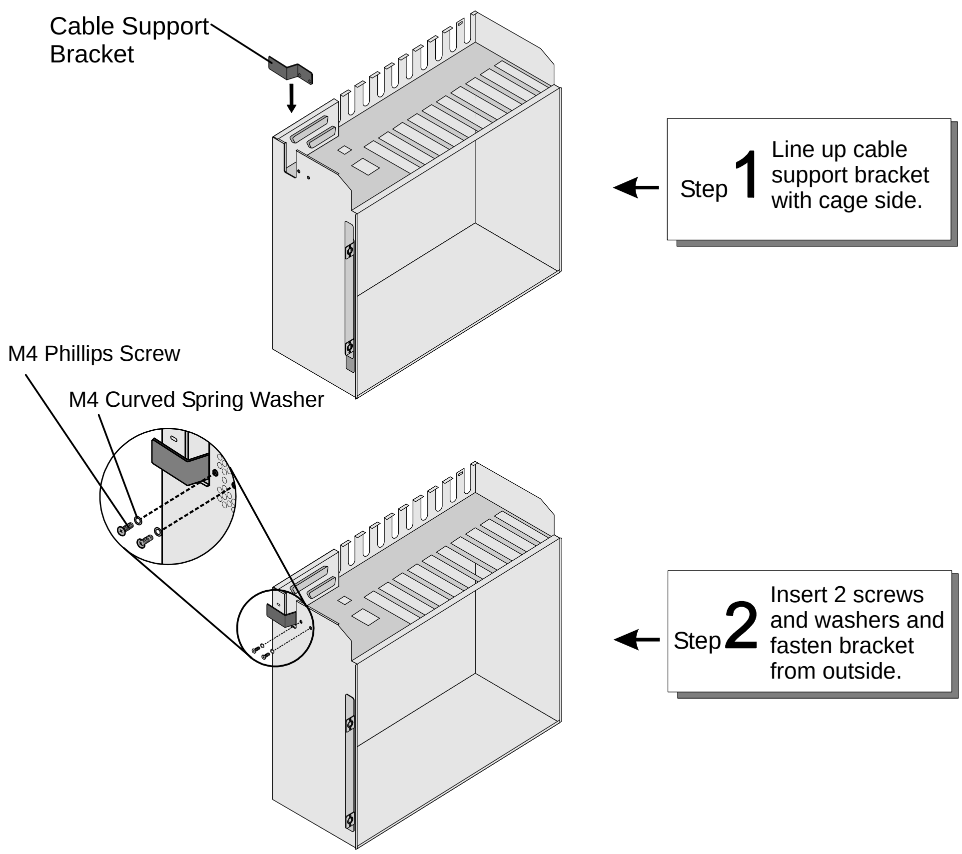
Removing the Cage Door and Top Cover

1. Remove the cage door and set it aside. See *page 6-9, Removing the Door*.
2. Remove the top cover of the cage and set it aside. See *page 6-11, Removing the Top Cover*.

Installing the Cable Support Bracket

1. Insert the cable support bracket into the inner top left section as shown in *Figure 2-8*.
2. Fasten the bracket to the cage with the two M4 Phillips screws and the two M4 curved spring washers provided.

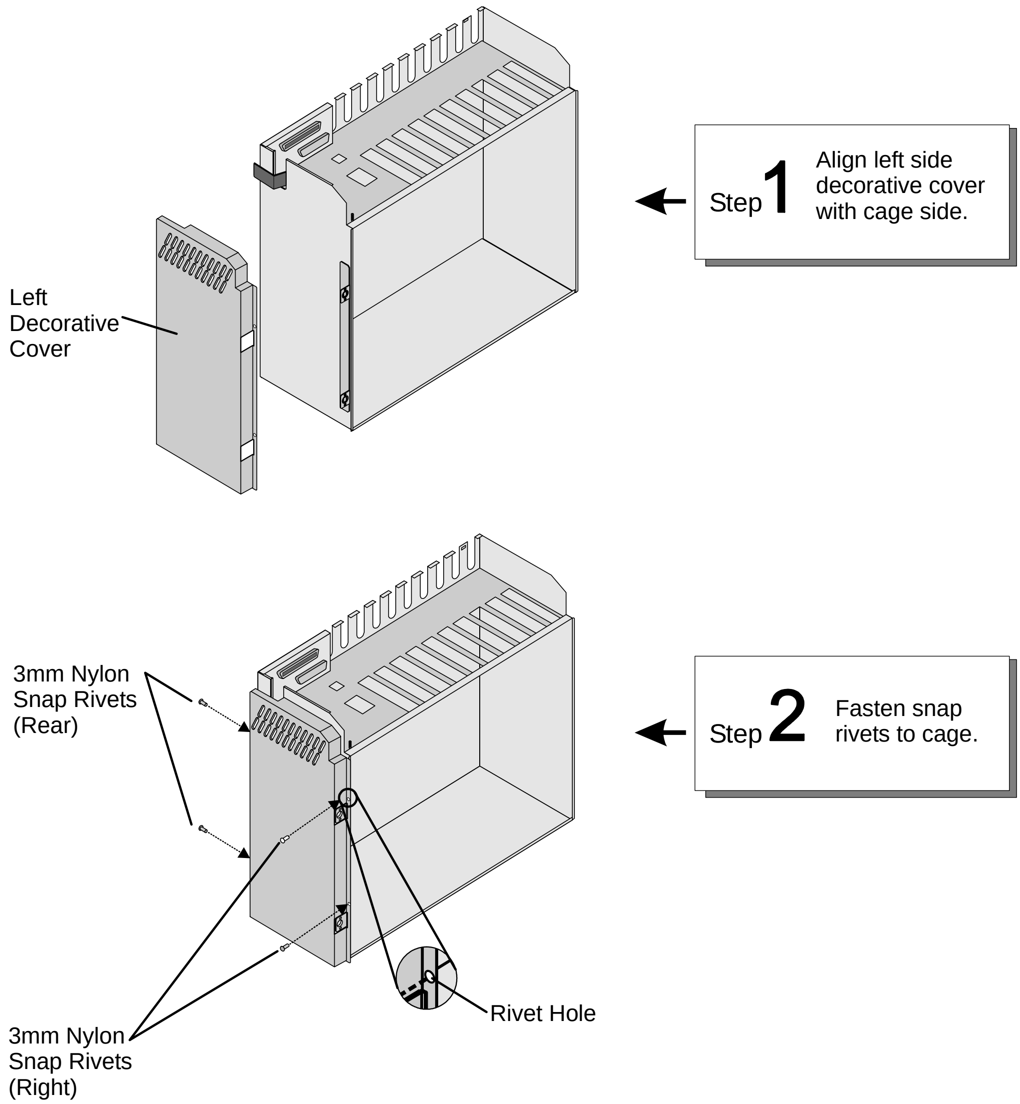
Figure 2-8 **Installing the Cable Support Bracket**



Assembling the Left Decorative Cover

1. Assemble the left decorative cover to the cage as shown in *Figure 2-9*.
2. Fasten the left decorative cover to the cage with four of the 3mm nylon snap rivets provided.

Figure 2-9 ***Left Side Decorative Cover Assembly***



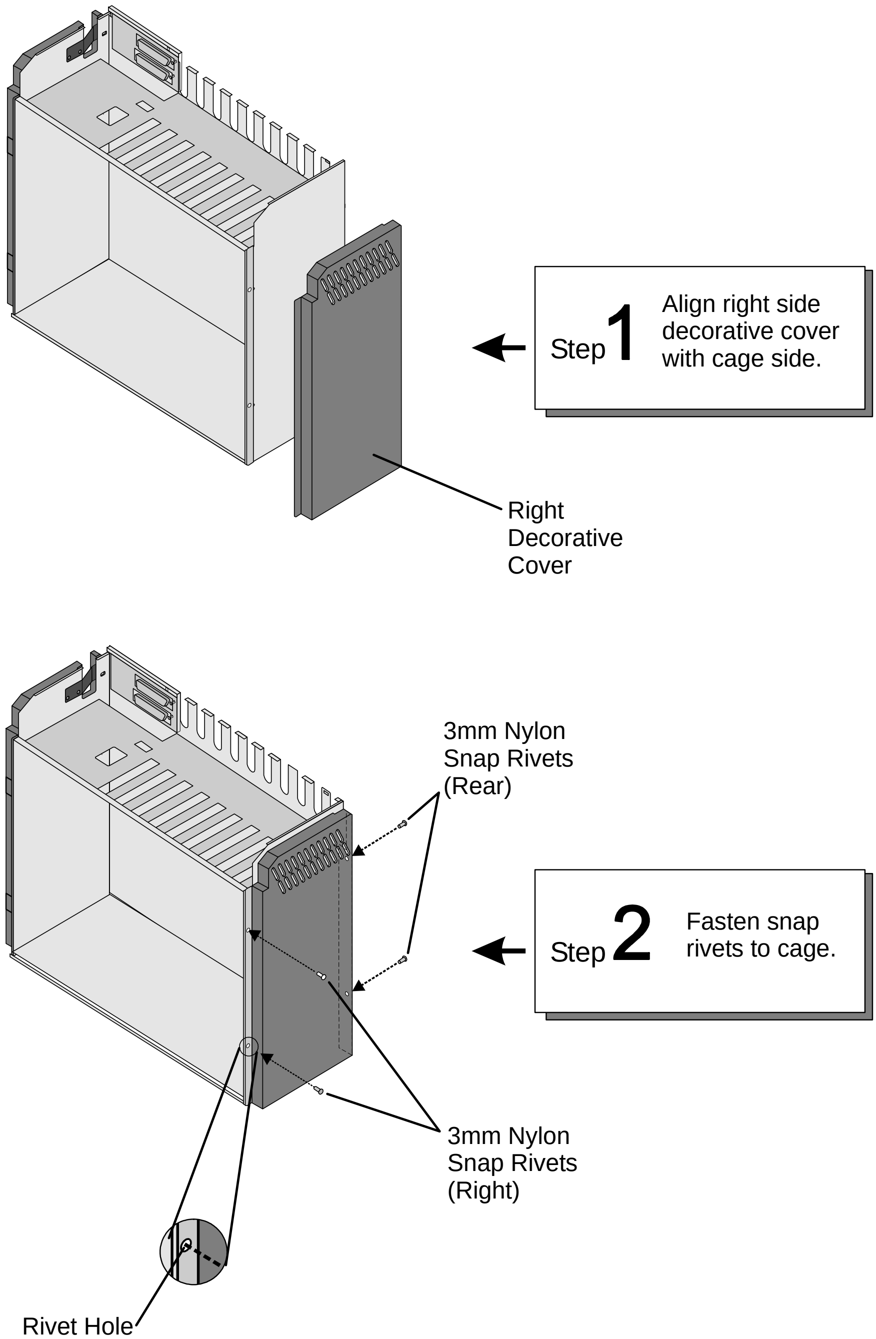
Equipment Installation

2

Assembling the Right Decorative Cover

1. Assemble the right decorative cover to the cage as shown in *Figure 2-10*.
2. Fasten the right decorative cover to the cage with four of the 3mm nylon snap rivets provided.

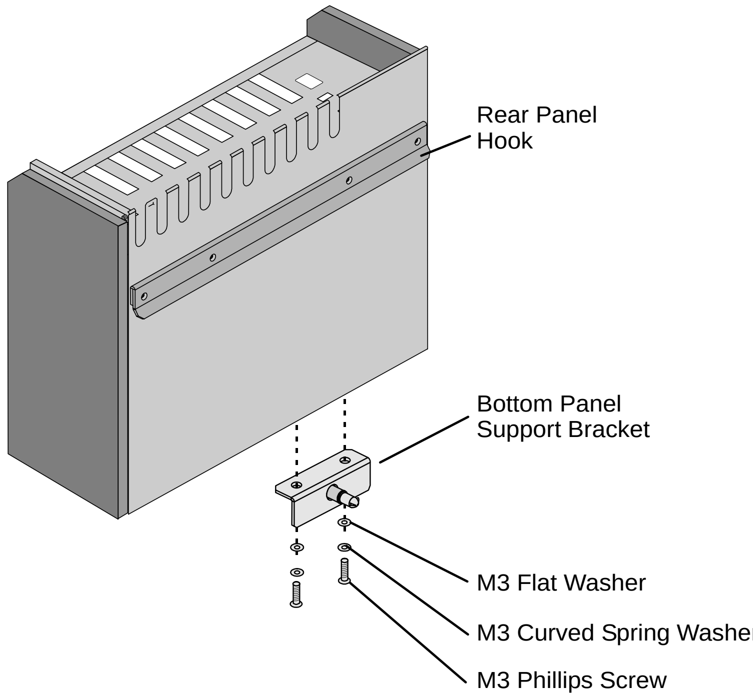
Figure 2-10 **Right Side Decorative Cover Assembly**



Fastening the Bottom Panel Support Bracket

1. Insert the M3 curved washers onto the M3 Phillips screws.
2. Insert the M3 flat washers onto the M3 Phillips screws.
3. Insert the two screws into the bottom panel support bracket and fasten it to the bottom of the cage. See *Figure 2-11*.

Figure 2-11 **Mounting the Bottom Panel Support Bracket**



Equipment Installation

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Attaching the Wall Mounting Bracket onto the Wall

1. Verify that the wall mounted surfaces of the installation area are painted or sealed plywood with a minimum thickness of 3/4 inch (2 cm) or a similar material capable of supporting equipment attached to the wall.

2. Verify the cage mounting position on the wall. In addition to customer requirements, heat dissipation factors must be taken into account. See *page 2-9, Space Above and Below the IPx 500 Cage*.

3. Using a carpenter's level to ensure that the system is installed levelly, orient the provided blueprint on the wall, and:

   - Mark the position of the four mounting holes of the wall mounting bracket. See *Figure 2-12*.

   - If you are installing an MDFipx unit within your system, mark the position of the four mounting holes of the bracket. See *Figure 2-13* or *Figure 2-21 on page 2-39*.

Figure 2-12 **Coral IPx 500 Cage Wall Mounting Bracket Blueprint (not in scale)**

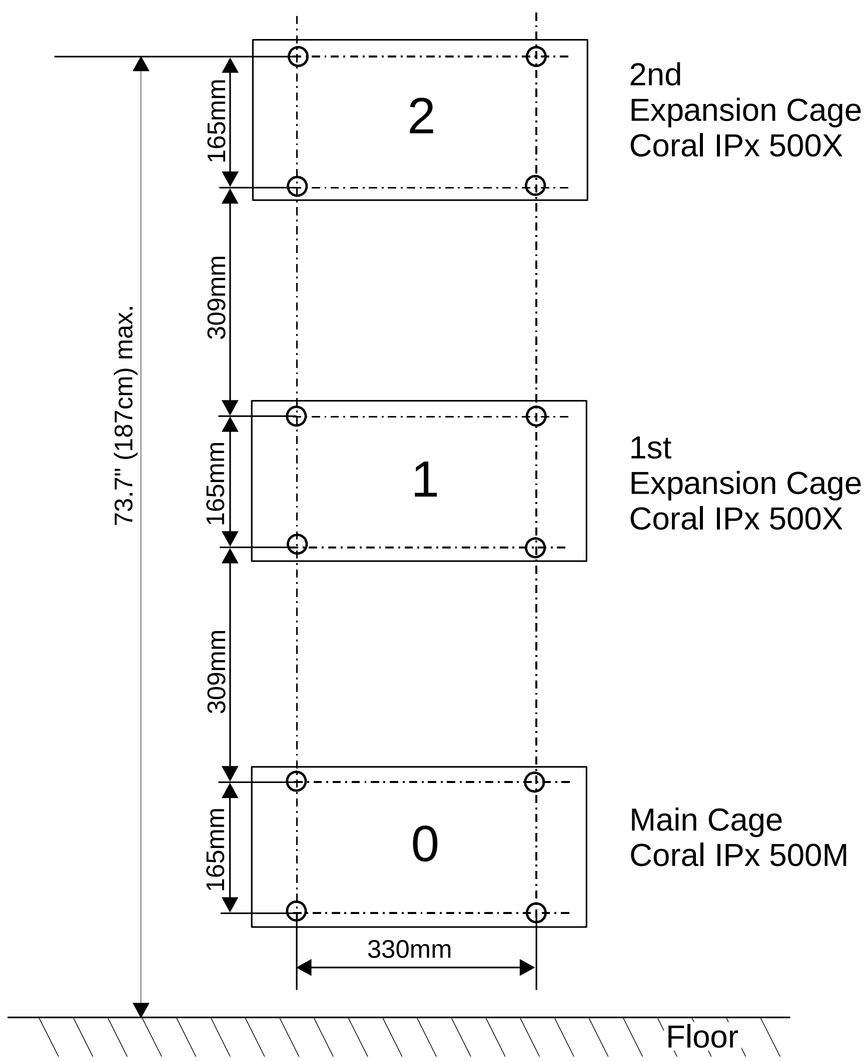
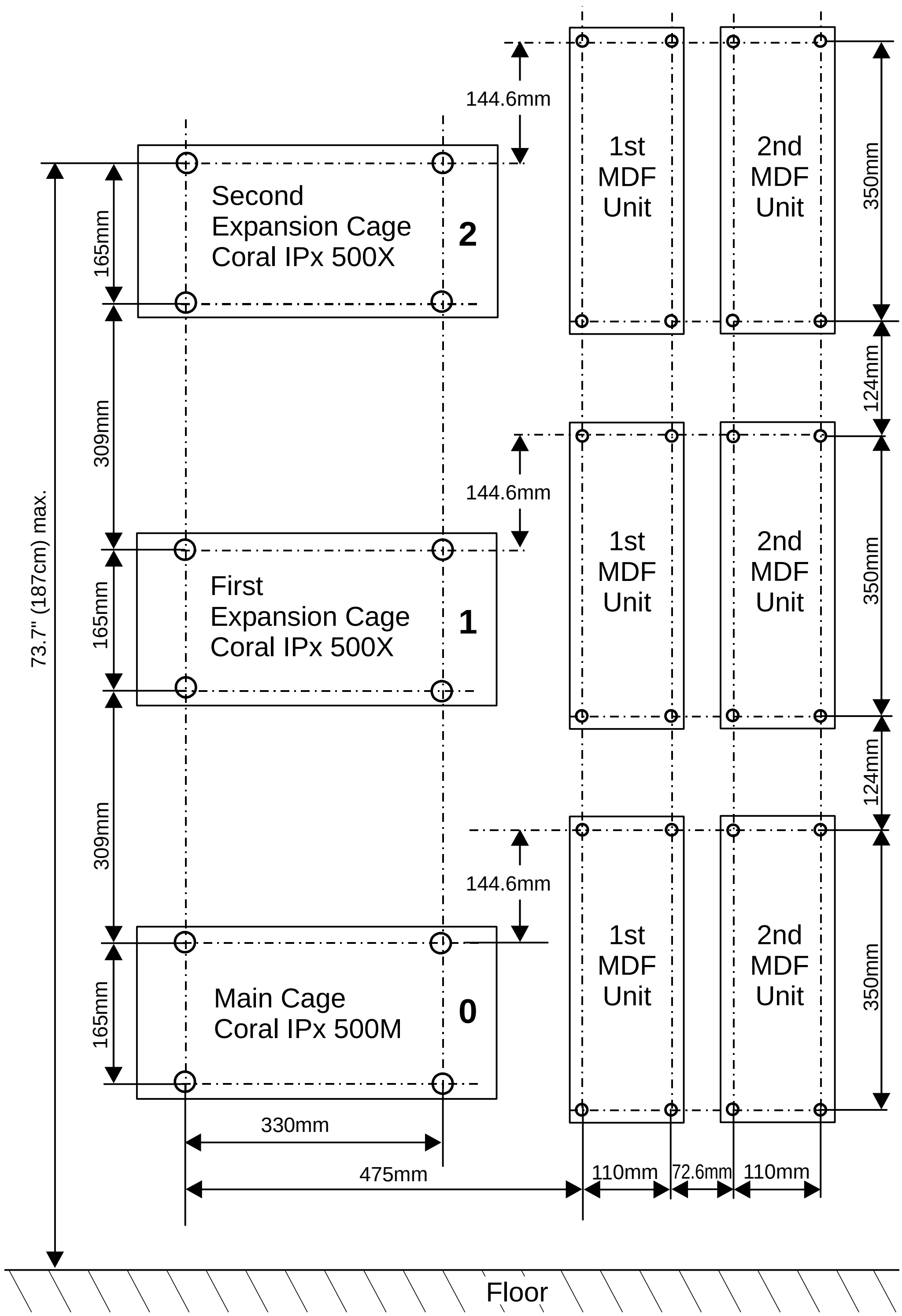


Figure 2-13 ***Coral IPx 500 System Blueprint (not in scale)***



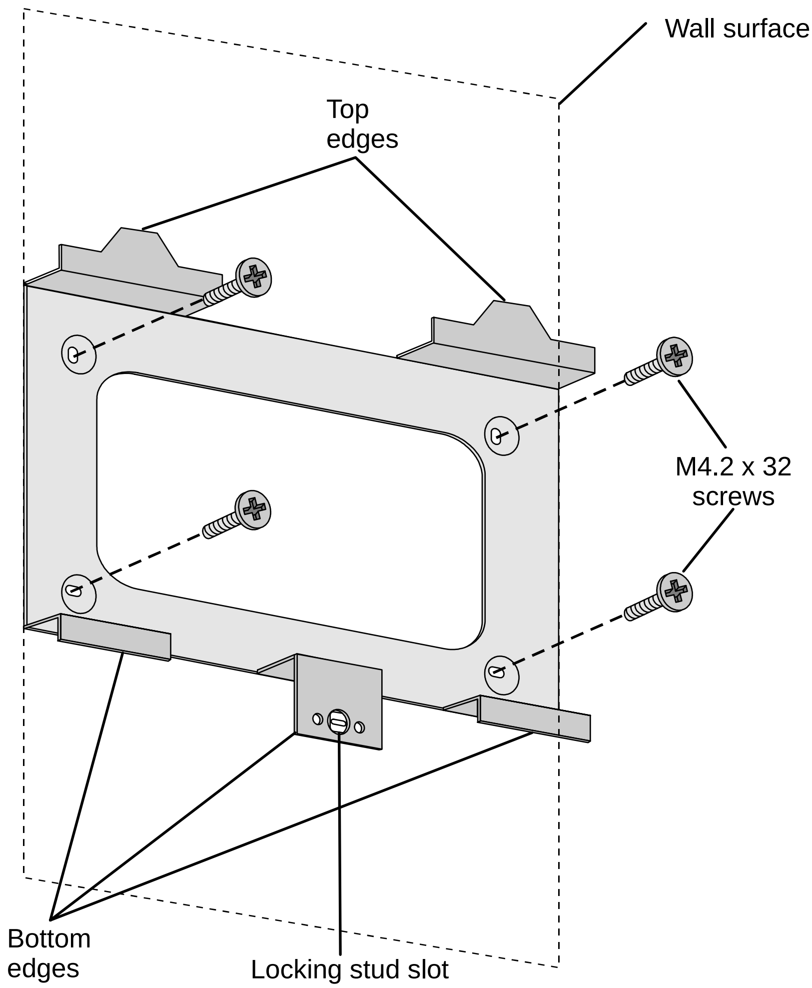
4. Drill the holes for the cage and the MDFipx as follows:

   - For wooden walls, use a 5/64" (2mm) drill bit to drill appropriate holes into the wall for the provided mounting screws. Skip to *step 6*.
   - For walls constructed from concrete, brick, or sheet rock, use a 15/64" (6mm) masonry drill bit to drill the holes.

5. Insert four wall plugs provided (for each cage and each MDFipx) into the drilled holes.

6. Fasten the cage mounting bracket to the wall with the four slotted tapped screws M4.2X32 provided. See *Figure 2-14*.

Figure 2-14 ***Coral IPx 500 Cage Wall Mounting Bracket***

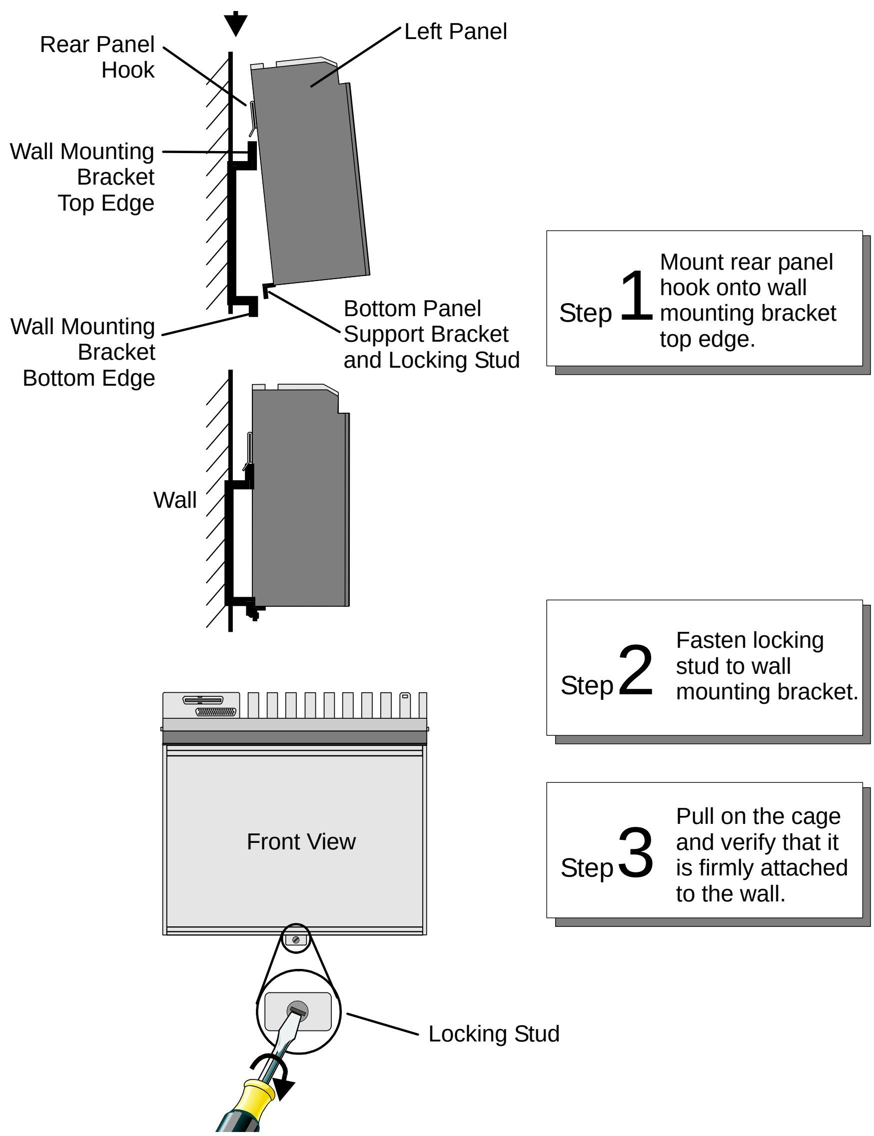


7. For instructions on how to fasten the MDFipx, see *page 2-36, Main Distribution Frame (MDF) Mounting and Installation*.

Mounting the Cage onto the Wall Mounting Bracket

1. With the help of an assistant, grasp each end of the cage and lift it over the wall mounting bracket as shown in *Figure 2-15*. Tilt the card cage back slightly, so that the rear panel hook mates with the top edge of the wall mounting bracket. Carefully let the card cage come to rest against the wall mounting bracket, and verify that the top edge of the bracket fully supports the rear panel hook of the cage and the bottom edge of the wall mounting bracket and that the bottom panel support are aligned.
2. Fasten the locking stud on the cage bottom panel support bracket to the wall mounting bracket with a straight blade screwdriver (half a turn clockwise).
3. Pull the cage and verify that it is firmly attached to the wall.
4. Skip to *page 2-36, Main Distribution Frame (MDF) Mounting and Installation*.

Figure 2-15 ***Mounting the Cage onto the Wall-Mounted Bracket***



Dismounting the Cage from the Wall

1. Do one of the following:
   - For DC powered systems, turn OFF the power switch and shut down the facilities power supply unit that supplies power to the cage.
   - For AC powered systems, disconnect the AC power cable.

WARNING!

Electrical Hazard. This procedure requires handling power wires. Contact with live cables could cause shock, burn, or death. Verify that no power cables are connected to the system before handling and that the main power switch supplying the system is switched OFF.

2. Disconnect the ground wire from the cage ground terminal. *Do not* disconnect the ground connection from the MDF terminal or from the master ground.
3. Disconnect all I/O cables from the top section.
4. Release the locking stud on the cage support bracket to the wall mount bracket with a straight blade screwdriver (half a turn counter-clockwise).

WARNING!

Ergonomic Hazard. The cage weights are provided in Table 2-2 on page 2-6. Serious back injury could result as a result of improper handling. Use proper lifting techniques to remove the cage from the wall.

5. Remove the cage from the wall using proper lifting techniques.

3 Rack Mounted Installations

The process of mounting and installing the rack mounted cage includes the following:

- *Unpacking the Shipping Container, on page 2-29*
- *Checking the Space and Positioning Requirements, on page 2-31*
- *Removing the Cage Door and Top Cover, on page 2-31*
- Preparing the cage for one of the following configurations:

  a. *Preparing the Cage for 19" Rack-Mounted Configuration, on page 2-31*

  b. *Preparing the Cage for 23" Rack-Mounted Configuration, on page 2-32*
- *Mounting the Cage onto the Rack, on page 2-33*

Unpacking the Shipping Container

1. Inspect the shipping container for evidence of physical damage or mishandling. Report any damage to the carrier immediately.
2. If it is necessary to make a damage claim to the carrier, do not move the container until it has been examined by a representative of the carrier. Otherwise, before opening, move the container as close as possible to the installation area.
3. Using a utility knife, carefully cut the tape securing the top flaps of the container and open the flaps.
4. Remove any parts in the depressions of the top foam insert.
5. Remove the top foam insert and set aside.
6. Using an assistant to prevent personal injury, grasp the ends of the cage and lift it out of the container. Place the cage on a stable surface.
7. Inspect the cage covers for shipping damage.
8. Check the parts list and verify that all the items are present. *Table 2-6* lists some of the components that are supplied with the Rack-mounted Coral IPx 500 system.
9. Remove any other cage items from the shipping container, and move the container so that it does not interfere with the remaining installation procedures.

Table 2-6 ***Part List (Items per Rack-Mounted IPx 500 Cage)***

Item Description	*Quantity*
Main cage (IPx 500M), including one MCP-IPx card or Expansion cage (IPx 500X), including one H-500/1 expansion cable with male-female D-type 50-pin connectors	1
Power supply unit; PS500 AC or DC	1
Peripheral Interface cards	As required
Rack Mounting Kit:	
Right mounting bracket	1
Left mounting bracket	1
Phillips screw M3 (for securing bracket to cage)	6

Checking the Space and Positioning Requirements

Verify that the Coral IPx 500 cage will be positioned in accordance with local and system requirements. The spacing requirements as described in *“Space Requirements”* starting *on page 2-3* ensure system operation and maintenance.

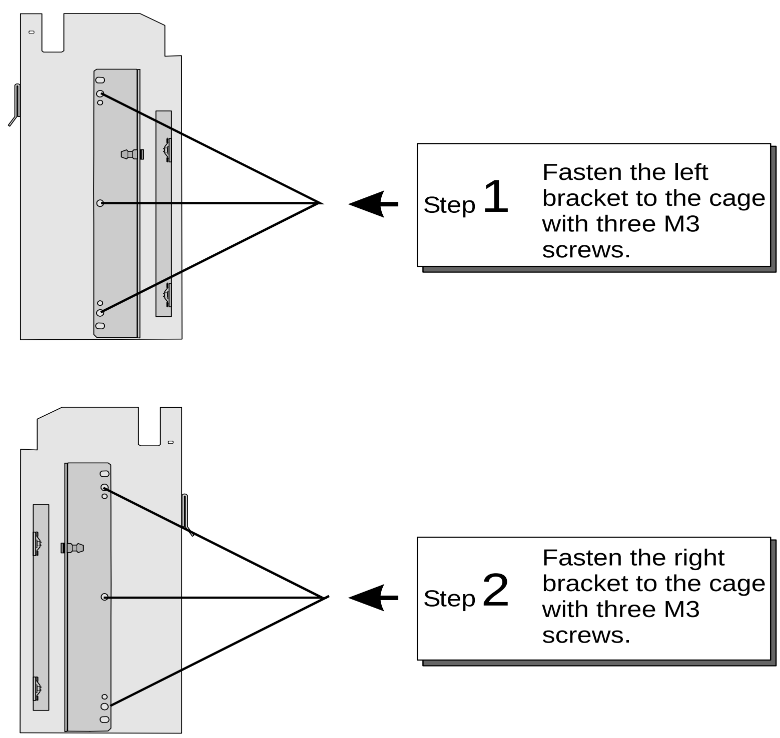
Removing the Cage Door and Top Cover

1. Remove the cage door and set it aside. See *page 6-7, Opening the Door*.
2. Remove the top cover of the cage and set it aside. See *page 6-11, Removing the Top Cover*.

Preparing the Cage for 19" Rack-Mounted Configuration

1. Fasten the left bracket to the cage with the three M3 screws provided as shown in *Figure 2-16*.
2. Fasten the right bracket to the cage with the three M3 screws provided as shown in *Figure 2-16*.

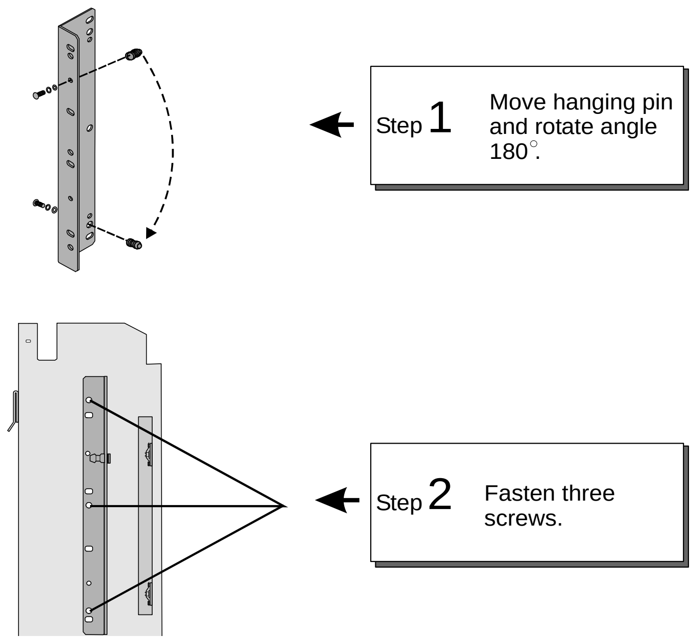
Figure 2-16 ***Preparing the Mounting Bracket of the Cage for 19" Rack Assembly***



Preparing the Cage for 23" Rack-Mounted Configuration

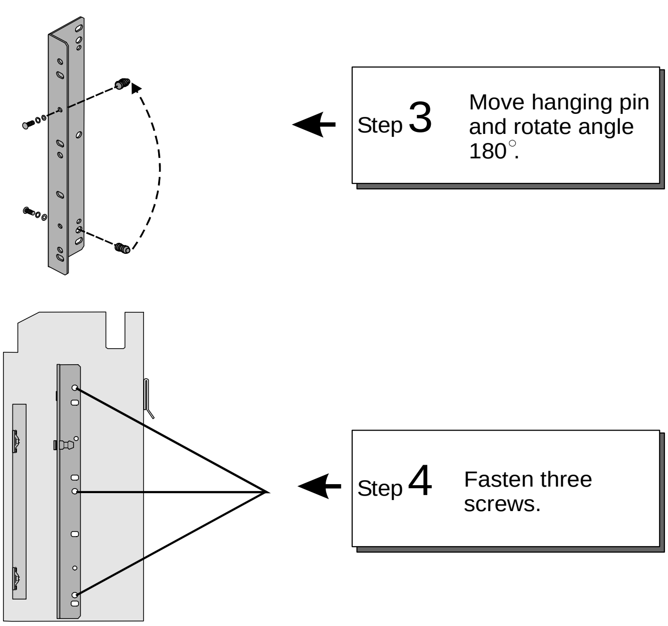
1. Reposition the hanging pin assembly on the left bracket as depicted in step 1 of *Figure 2-18* and align the bracket with the cage such that the narrow edge of the bracket is adjacent to the cage.
2. Fasten the bracket to the cage with the three screws.

Figure 2-17 **Preparing the Left Mounting Bracket of the Cage for 23" Rack Assembly**



3. Reposition the hanging pin assembly on the right bracket as depicted in step 1 of *Figure 2-18* and align the bracket with the cage such that the narrow edge of the bracket is adjacent to the cage.
4. Fasten the bracket to the cage with the three screws.

Figure 2-18 **Preparing the Right Mounting Bracket of the Cage for 23" Rack Assembly**



WARNING!

Mechanical Hazard. Insecure mechanical loads could result in injury or death. It is the customer's responsibility to ensure that the cage is tightly secured to the frame and that the cage cannot be inadvertently released from the rack.

1. Verify the cage mounting position on the rack. In addition to customer requirements, requirements for heat dissipation need to be taken into account. See *page 2-11, Space in Front and Behind Rack Mounted IPx 500 Cages*.
2. With the help of an assistant, grasp each end of the cage and lift it to the mounting position on the rack.

WARNING!

Ergonomic Hazard. The cage weight is provided in Table 2-2 on page 2-6. Serious back injury could result due to improper handling. Use proper lifting techniques to mount the cage onto the rack.

3. Insert the hanging pins (*Figure 2-19* and *Figure 2-20*) into the two square inserts positioned on the rack holes (supplied by the customer). This ensures that the cage remains in position while it is fastened to the rack. ***Do not*** let go of the cage after you have inserted the hanging pins. The hanging pins are not designed to support the weight of the cage and are to be used only for assistance.

WARNING!

Ergonomic Hazard. The hanging pins are not designed to support the weight of the cage. ***Do not*** *rest the weight of the cage on the hanging pins. Continue to support the cage until it has been securely fastened to the rack.*

4. Fasten the cage to the rack by inserting the six fasteners (three into the left side and three into the right side) into the inserts of the mounting bracket.

NOTE:

The fasteners that secure the cage to the rack are not included in the rack-mounting kit.

5. Skip to *page 2-36, Main Distribution Frame (MDF) Mounting and Installation*.

Figure 2-19 ***Left Side View of Coral IPx Cage Mounted onto 19" Rack***

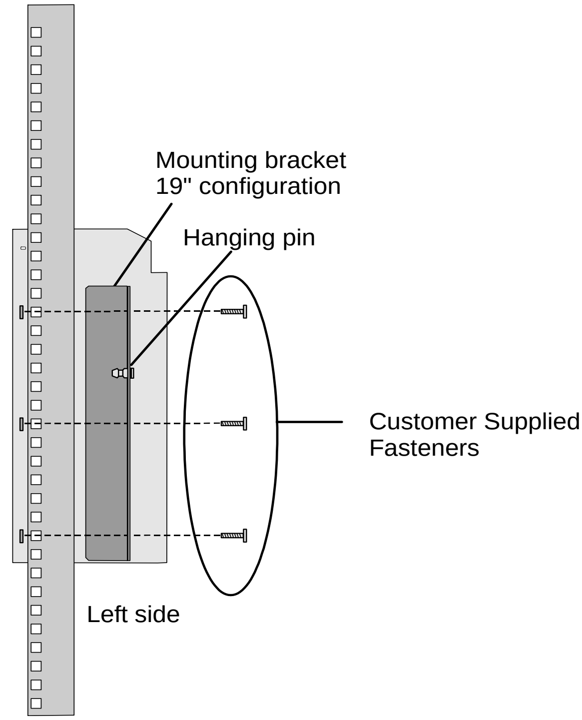
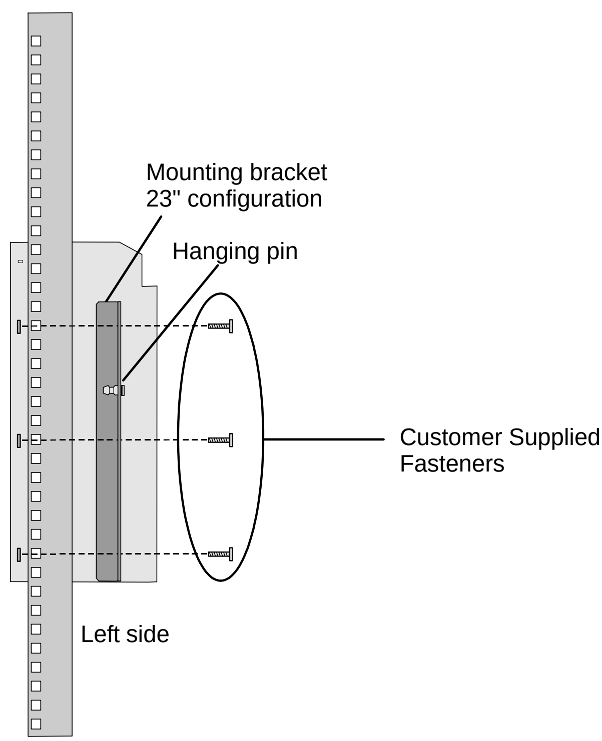


Figure 2-20 ***Left Side View of Coral IPx Cage Mounted onto 23" Rack***



Equipment Installation

2

Dismounting the Cage from the Rack

1. Do one of the following:
   - For DC powered systems, turn OFF the power switch and shut down the facilities power supply unit that supplies power to the cage.
   - For AC powered systems, disconnect the AC power cable.

WARNING!

Electrical Hazard.. This procedure requires handling power wires. Contact with live cables could cause shock, burn, or death. Verify that no power cables are connected to the system before handling and that the main power switch supplying the system is switched OFF.

2. Disconnect the ground wire from the cage ground terminal. *Do not* disconnect the ground connection from the MDF terminal or from the master ground.
3. Disconnect all I/O cables from the top section.
4. For 19" cages, remove the front door to obtain access to the cage bracket. See *page 6-9, Removing the Door*.
5. Unfasten the three screws that secure the cage to the rack on each side of the cage

WARNING!

Ergonomic Hazard. The cage weights are provided in Table 2-2 on page 2-6. Serious back injury could result as a result of improper handling. Use proper lifting techniques to remove the cage from the wall.

6. Remove the cage from the rack using proper lifting techniques.

4 Main Distribution Frame (MDF) Mounting and Installation

The Coral IPx 500 can operate with an MDFipx unit that has been supplied with the system or with an MDF unit that has been supplied separately by the customer.

If the system includes a customer-supplied MDF, skip to *page 2-40, Battery Pack (BATTipx) Mounting and Installation*.

MDFipx Configurations

The MDFipx can be supplied in any one of the configurations provided in *Table 2-7*.

Table 2-7 **MDFipx Configurations**

Configuration	*for Cage Type*	*Space from Cage*	*Description*
1MDFipx	IPx 500M	2.5” (5 cm)	Includes Krone™ blocks, cables, and Champ connectors attached.
1MDFipx	IPx 500X	2.5” (5 cm)	Includes Krone blocks, cables, and Champ connectors attached.
2MDFipx	IPx 500M	2.5” (5 cm)	Includes Krone blocks, cables, and Champ connectors attached.
2MDFipx	IPx 500X	2.5” (5 cm)	Includes Krone blocks, cables, and Champ connectors attached.
1MDFipx w/o cables	IPx 500M/ IPx 500X	N/A	Includes Krone blocks, and Champ connectors provided separately. (Cables are provided by the customer.)
2MDFipx w/o cables	IPx 500M/ IPx 500X	N/A	Includes Krone blocks, and Champ connectors provided separately. (Cables are provided by the customer.)

Unpacking the Shipping Container

1. Inspect the shipping container for evidence of physical damage or mishandling. Report any damage to the carrier immediately.
2. If it is necessary to make a damage claim to the carrier, do not move the container until it has been examined by a representative of the carrier. Otherwise, before opening, move the container as close as possible to the installation area.
3. Using a utility knife, carefully cut the tape securing the top flaps of the container and open the flaps.
4. Remove any parts in the depressions of the top foam insert.
5. Remove the top foam insert and set aside.
6. Grasp the ends of the MDF and lift it out of the container. Place the MDF on a stable surface.
7. Inspect the MDF covers for shipping damage.
8. Check the parts list and verify that all the items are present. *Table 2-8* through *Table 2-9* list some of the components that are supplied with the wall-mounted MDFipx unit.
   - *Table 2-8* - MDFipx unit components supplied with accessories
   - *Table 2-9* - MDFipx unit components supplied without accessories
9. Remove any other MDF items from the shipping container, and move the container so that it does not interfere with the remaining installation procedures.

Table 2-8 **Part List for MDFipx Fully Assembled**

Item Description	*Quantity*
Wall mounting kit, including four 4.2X32 screws and four wall plugs	1
MDF frame	1
MDF cover	1
MDF mounting template	1
Cable tie-wraps	13

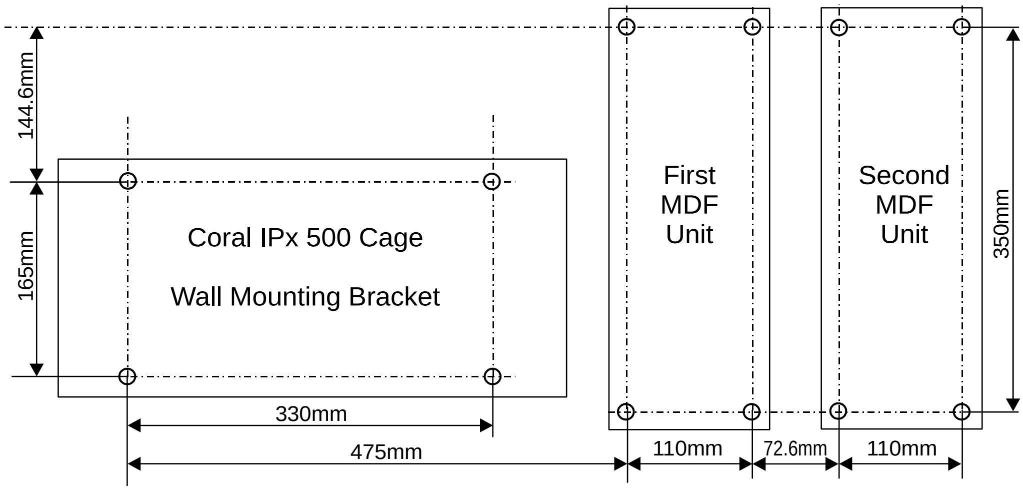
Table 2-9 **Part List for MDFipx without Accessories Attached**

Item Description	*Quantity*
Wall mounting kit, including four 4.2X32 screws and four wall plugs	1
MDF frame	1
MDF cover	1
MDF mounting template	1
Cable tie-wraps	13
MDF surge protection magazines	15 per main cage 16 per expansion cage
I/O Champ connectors	9 per main cage 10 per expansion cage

Mounting the MDFipx onto the Wall

1. Verify that four holes have been drilled (for each MDFipx unit) into the wall, as described on *page 2-24, Attaching the Wall Mounting Bracket onto the Wall*, using the installation template provided. See *Figure 2-21*.

Figure 2-21 **Coral IPx 500 MDFipx Unit Blueprint Position (not in scale)**

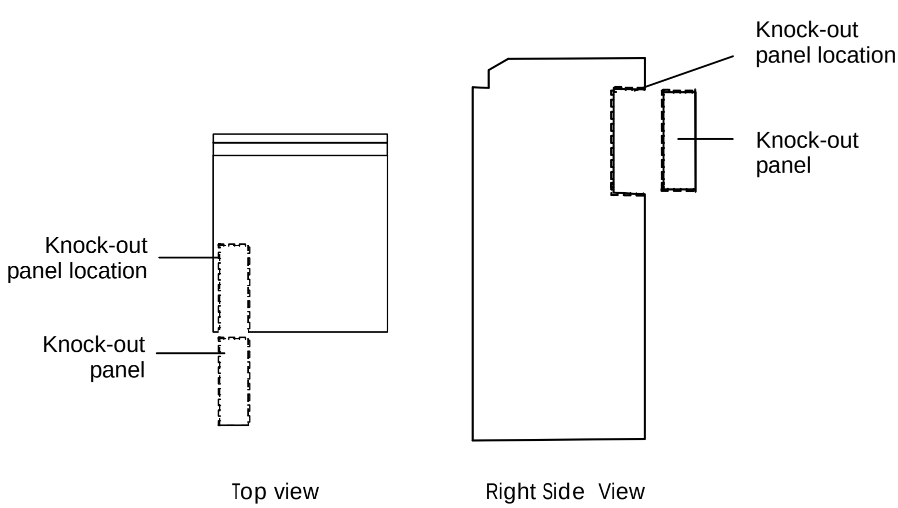


2. Remove the MDFipx Cover. See *page 5-27, Removing the MDFipx Cover*.
3. Secure the MDFipx unit onto the wall with four M4 screws provided.
4. If the MDFipx unit does not include the cables attached:

   a. Determine the best route for the I/O cables. If either the opening on the top cover or on the right panel of the MDFipx is the best route, remove the knock-out panel so that the cables can be inserted. See *Figure 2-22*. To remove the panel, position a cutter adjacent to the perforated section, and cut your way through the perforation until the part drops free.

   b. Attach the I/O cables to MDFipx unit as described on *page 5-30, MDFipx Field Assembly for Units without I/O Cables Supplied*

Figure 2-22 **Top View and Right Side View of MDFipx Cover Knock-Out Panel Removal**



5 Battery Pack (BATTipx) Mounting and Installation

The BATTipx unit provides backup power to AC powered systems and is ordered separately by the customer if desired.

If the installation is DC powered system or does not include the BATTipx units, skip to *page 2-46, Ground Wiring*.

Installation of the BATTipx unit includes the following stages:

- *Unpacking the Shipping Container, on page 2-41*
- *Preparing for Installation, on page 2-41*
- One of the following:

  a. *Mounting the Battery Pack onto the Wall, on page 2-42*

  b. *Mounting the Battery Pack onto the Rack, on page 2-44*
- *Connecting the Battery Pack to the LTU/CSU Unit, on page 2-45*

Unpacking the Shipping Container

1. Inspect the shipping container for evidence of physical damage or mishandling. Report any damage to the carrier immediately.
2. If it is necessary to make a damage claim to the carrier, do not move the container until it has been examined by a representative of the carrier. Otherwise, before opening, move the container as close as possible to the installation area.
3. Using a utility knife, carefully cut the tape securing the top flaps of the container and open the flaps.
4. Remove the foam inserts and discard.
5. Using an assistant to prevent personal injury, grasp the ends of the BATTipx and lift it out of the container. Place the BATTipx on a stable surface.
6. Inspect the BATTipx covers for shipping damage.
7. Check the part list and verify that all the items are present. *Table 2-10* lists some of the components that are supplied with the BATTipx unit.
8. Remove any other BATTipx items from the shipping container, and move the container so that it does not interfere with the remaining installation procedures.

Table 2-10 **Part List (Items per BATTipx Battery Pack Unit)**

Item Description	*Quantity*
Battery pack base	1
Battery	4
Bracket A (See *Figure 2-23* and *Figure 2-26*)	1
Bracket B (See *Figure 2-23* and *Figure 2-26*)	1
M4 fastening screws	4

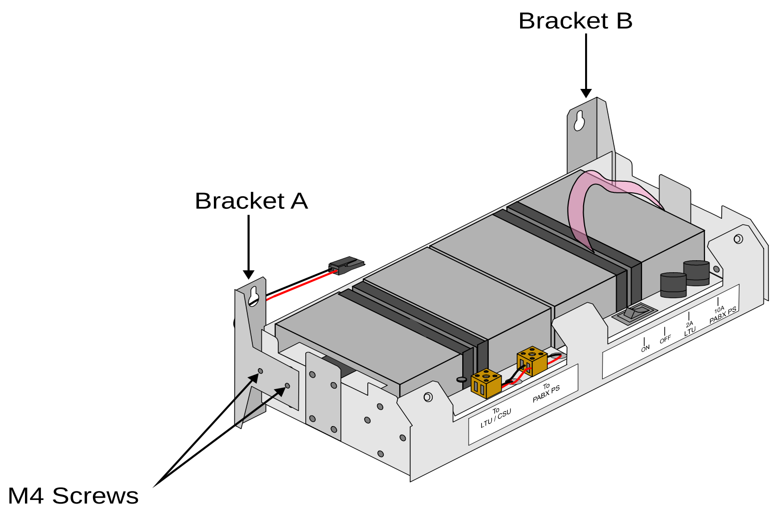
Preparing for Installation

1. Remove the battery pack cover. See *page 7-55, Removing the Battery Pack Cover*.
2. Verify that the BATTipx *Power* switch is turned OFF (turned downwards on right side).
3. Check to see whether or not an LTU/CSU cable is required. See *page 7-42, LTU/CSU*.

Mounting the Battery Pack onto the Wall

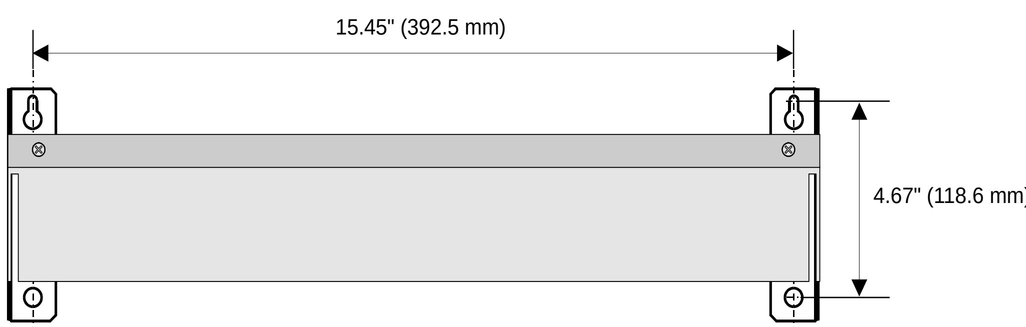
1. Fasten brackets A and B to the battery pack with the four M4 screws provided as shown in *Figure 2-23*.

Figure 2-23 **Bracket Mounting for Wall Configuration**



2. Using the dimensions in *Figure 2-24*, drill four holes into the wall. Verify that the holes are drilled such that the cage will be mounted level to the floor. Use a carpenter's level, if necessary.

Figure 2-24 **Battery Mounted onto Wall with Dimensions between Mounting Holes (not in Scale)**



3. Insert four wall plugs into the wall.

4. Insert two slotted screws into the top two wall plugs, and partially tighten them to the wall.

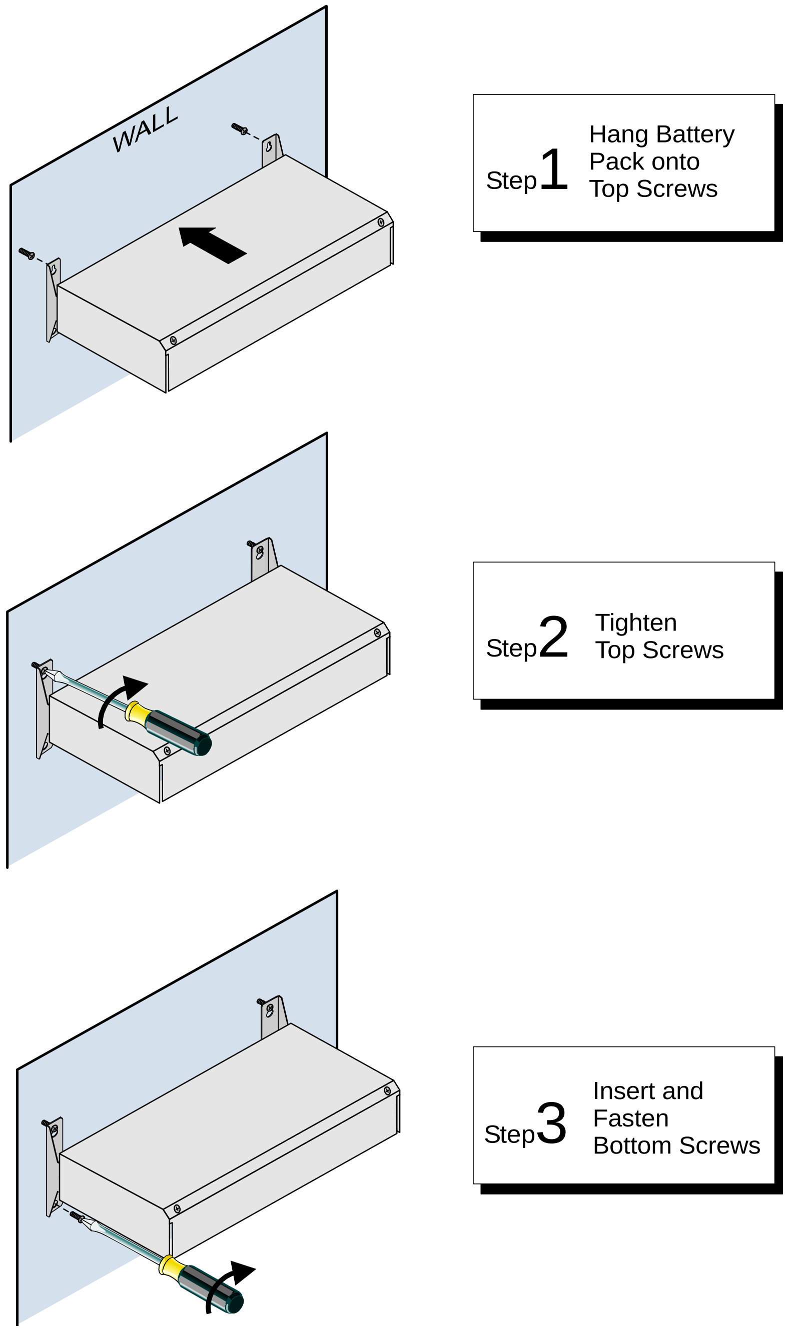
5. Lift the BATTipx unit to the partially fastened screws on the wall. See *Figure 2-25*.

WARNING!

Ergonomic Hazard. The BATTipx unit is heavy and could cause injury if not lifted properly or if dropped. Exercise extreme caution when lifting the unit.

6. Insert the top two holes of the brackets on the battery pack over the screws and allow the unit to hang on the screws, while supporting the weight of the battery pack.
7. Tighten the top two screws completely.
8. Insert the bottom two screws through the bottom two holes, and fasten the lower part of the battery pack to the wall.

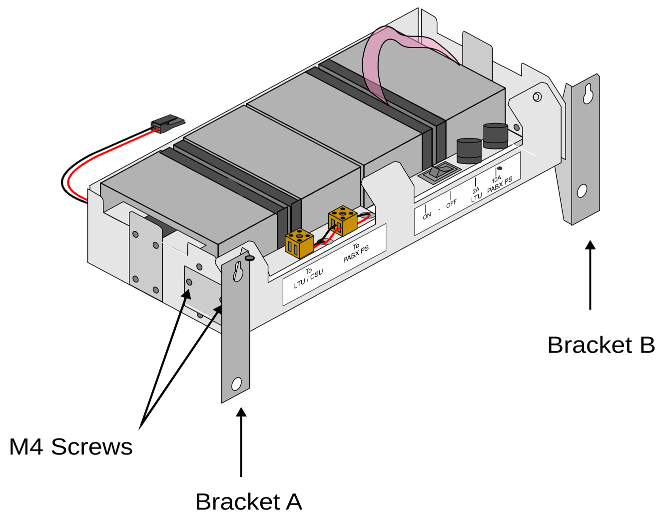
Figure 2-25 ***Mounting the BATTipx Unit onto the Wall***



Mounting the Battery Pack onto the Rack

1. Fasten brackets A and B to the battery pack with the four M4 screws provided as shown in *Figure 2-26*.

Figure 2-26 **Bracket Mounting for Rack Configuration**



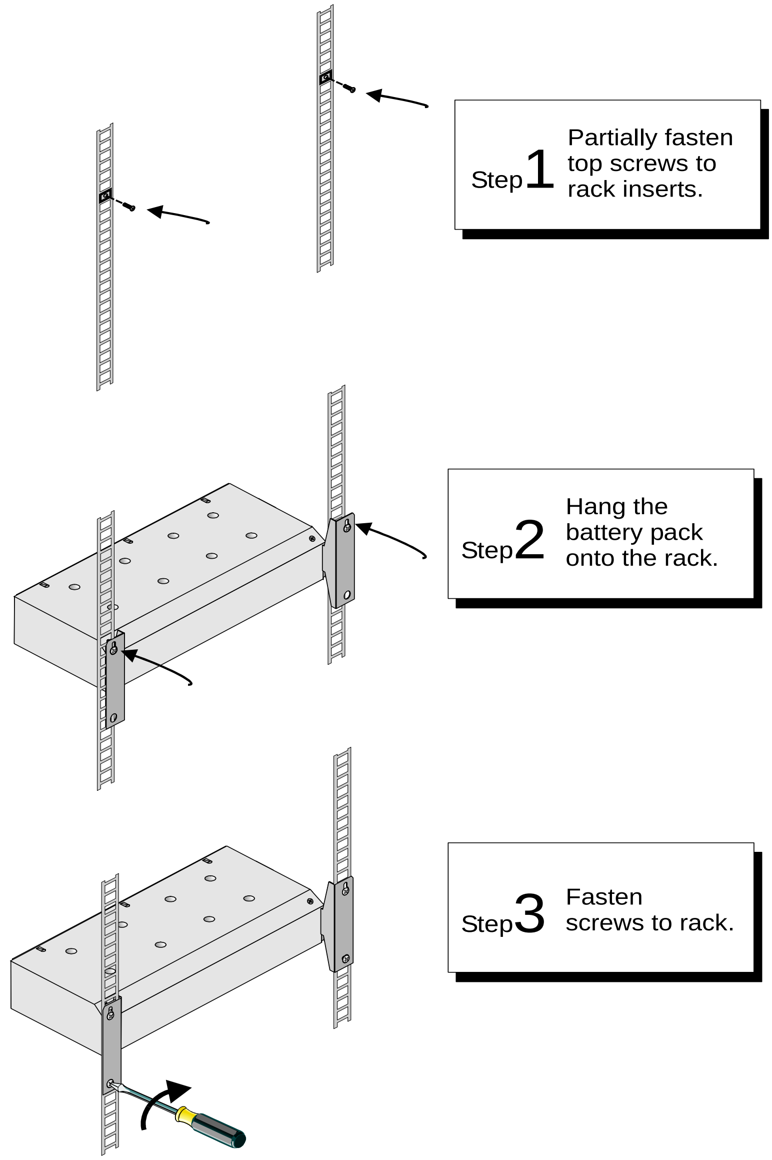
2. Insert screws (supplied by the customer) into the top two floating inserts within the rack (supplied by the customer), and partially tighten them to the rack.

WARNING!

Ergonomic Hazard. The BATTipx unit is heavy and could cause injury if not lifted properly or if dropped. Exercise extreme caution when lifting the unit.

3. Insert the top two holes of the brackets on the battery pack over the screws and continue to support the unit. Tighten the top two screws completely.
4. Insert the bottom screws into two inserts on the rack, and fasten them to the rack.

Figure 2-27 **Mounting the BATTipx Unit onto a Rack**



Connecting the Battery Pack to the LTU/CSU Unit

1. Connect the LTU / CSU power cable to the LTU / CSU unit. See *page 7-46, Connecting the Battery Pack to the LTU/CSU Unit*.

Closing the Battery Pack Cover

1. Verify that all wires are snugly connected.

2. Close the battery pack cover as described on *page 7-57, Closing the Battery Pack Cover*.

3. Skip to *page 2-46, Ground Wiring*.

6 Ground Wiring

Proper system grounding is critical to reliable system operation. System grounding is only as effective as the ground point itself. To ensure adequate protection from interference by radio frequency energy, electrical impulse noise, and lightening or power line surge, the building electrical ground point must comply with grounding recommendations of the National Area Code, Article 800, and/or applicable local building and electrical codes.

The object of ground circuit design is to establish a low resistance path to the groundground, and to conduct a multitude of currents in such a way as to minimize the interaction of any two or more currents. In essence, the ground connection is used as a common conductor for many circuits: some carrying wanted signals, and others carrying unwanted signals. The same ground that carries small networking currents must also carry unwanted radio frequency energy, impulse noise, and lightening surges that might otherwise interfere with system operation.

The ground connection includes an M4 threaded terminal pole that is fixed onto the surface of the top section (by the manufacturer), a serrated washer between each terminal connection, a flat washer, and an M4 nut.

WARNING!

Electrical Hazard. Incorrect ground wire connections to the system can cause shock, burn, or death.

- *Verify that the ground wires are 10 AWG stranded conductor.*
- *Verify that all ground connections of **locally supplied MDF units** are made directly from the cage ground connection to the master ground.*
- ***Do not** interconnect cage ground terminals between Coral IPx cages.*
- *Ring terminals retain wires onto the terminal lug when the connection is loosened. Verify that all ground wires include ring terminals at both ends.*
- *Verify that the ring terminals connecting to the cage and to the MDFipx are suitable for M4 fasteners.*
- *Connect only a Protective Earth (PE) to the Coral IPx system.*
  ***Do not** connect a separate Telecommunications Reference Conductor (TRC).*
- *Resistance from the master ground or MDFipx to the building electrical ground should never exceed 1.0 ohm. The master ground bar should be located in the switching room as close as possible to the Coral system. Any ground connection of equipment related to the switching Coral system should ultimately connect to the master ground.*

The cage ground wire is connected to the cage in the top section, as described on *page 2-47, Connecting the Ground Wire to the Cage*.

The system ground connection procedure varies depending on whether an MDFipx unit has been supplied with the system or whether an MDF is supplied separately by the customer:

- If the system includes an MDFipx, see *page 2-48, Ground Connection for Systems that Include an MDFipx*.
- If the system includes a customer-supplied MDF, see *page 2-52, Ground Connection for Systems that Include a Customer-Supplied MDF*.

Connecting the Ground Wire to the Cage

The cage ground connection includes one serrated washer, a flat washer, and one hexagonal nut assembled on the terminal connection. See *Figure 2-28*.

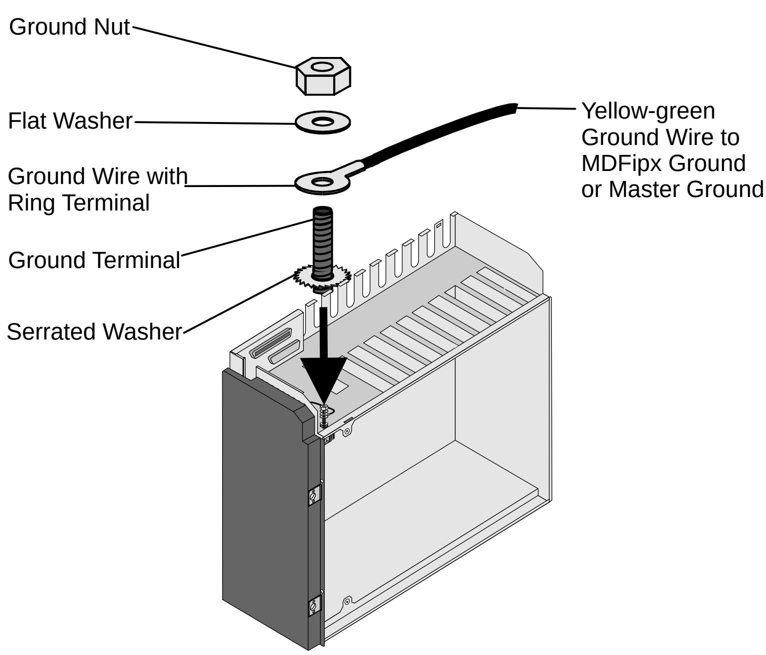
Connect the ground wire to the cage as follows:

1. Remove (and keep aside)
   the hexagonal nut and flat washer from the ground terminal.
2. Insert the serrated washer onto the ground terminal.
3. Insert the ground wire ring terminal over the serrated washer.
4. Insert the flat washer onto the ground wire ring terminal.
5. Fasten the hexagonal nut.

NOTE:

The hexagonal nut can be fastened or unfastened only with a closed 7 mm hexagonal socket wrench with a 1/4" drive and an adaptor. An open wrench cannot be maneuvered in the restricted space around the nut.

Figure 2-28 ***Coral IPx 500 Cage Ground Assembly***



Ground Connection for Systems that Include an MDFipx

If the Coral IPx 500 system includes an MDFipx unit, it can function as a master ground, and no additional master ground needs to be used. See *Figure 2-29*, *Figure 2-30*, and *Figure 2-31*. The system ground connection is fabricated as follows:

1. If necessary, open the cage door and remove the top cover of the cage. See *page 6-7, Opening the Door* and *page 6-11, Removing the Top Cover*.
2. If necessary, remove the MDFipx cover. See *page 5-27, Removing the MDFipx Cover*.
3. Verify that the ground wire is 10AWG stranded conductor, is the proper length and includes two ring terminals fitted onto the two ends of the wire.
4. Route the ground wire between the cage and the MDFipx. See *Figure 2-29*.
5. Connect the ground wire to the IPx 500 cage as described on *page 2-47, Connecting the Ground Wire to the Cage*.
6. The MDFipx ground connection includes three serrated washers and two M4 hexagonal nuts. See *Figure 2-29*. Connect the MDFipx ground wires to the MDF connection as follows:

   a. Insert a serrated washer onto the ground terminal.

   b. Insert the first ground wire ring terminal over the serrated washer.

   c. Fasten the first M4 hexagonal nut.

   d. Insert the second serrated washer onto the ground terminal.

   e. Insert the second ground wire ring terminal over the serrated washer.

   f. Insert the third serrated washer onto the ground terminal. If there are no more MDFipx connections, skip to *step h*.

   g. Insert the third ground wire ring terminal over the serrated washer.

   h. Fasten the second M4 hexagonal nut.

NOTE:

If a 2MDFipx is installed in the system, verify that there no more than three wires per ground terminal are connected. See Figure 2-31.

7. Repeat *step 1* through *step 6* for all cages and MDFipx units in the system. Verify that the system ground wire connection between the different cages and MDFipx units is identical to the schematic diagram displayed in *Figure 2-30* and *Figure 2-31*.

WARNING!

When an IPx 800 expansion cage is installed within the system, do not interconnect the ground connections of Coral IPx 500 cages and IPx 800 cage. The Coral IPx 800 cage must connect directly to a master ground unit. See Figure 2-32.

8. Skip to *page 2-55, Circuit Card Partial Installation*.

Figure 2-29 **Coral IPx 500 MDFipx Ground Assembly**

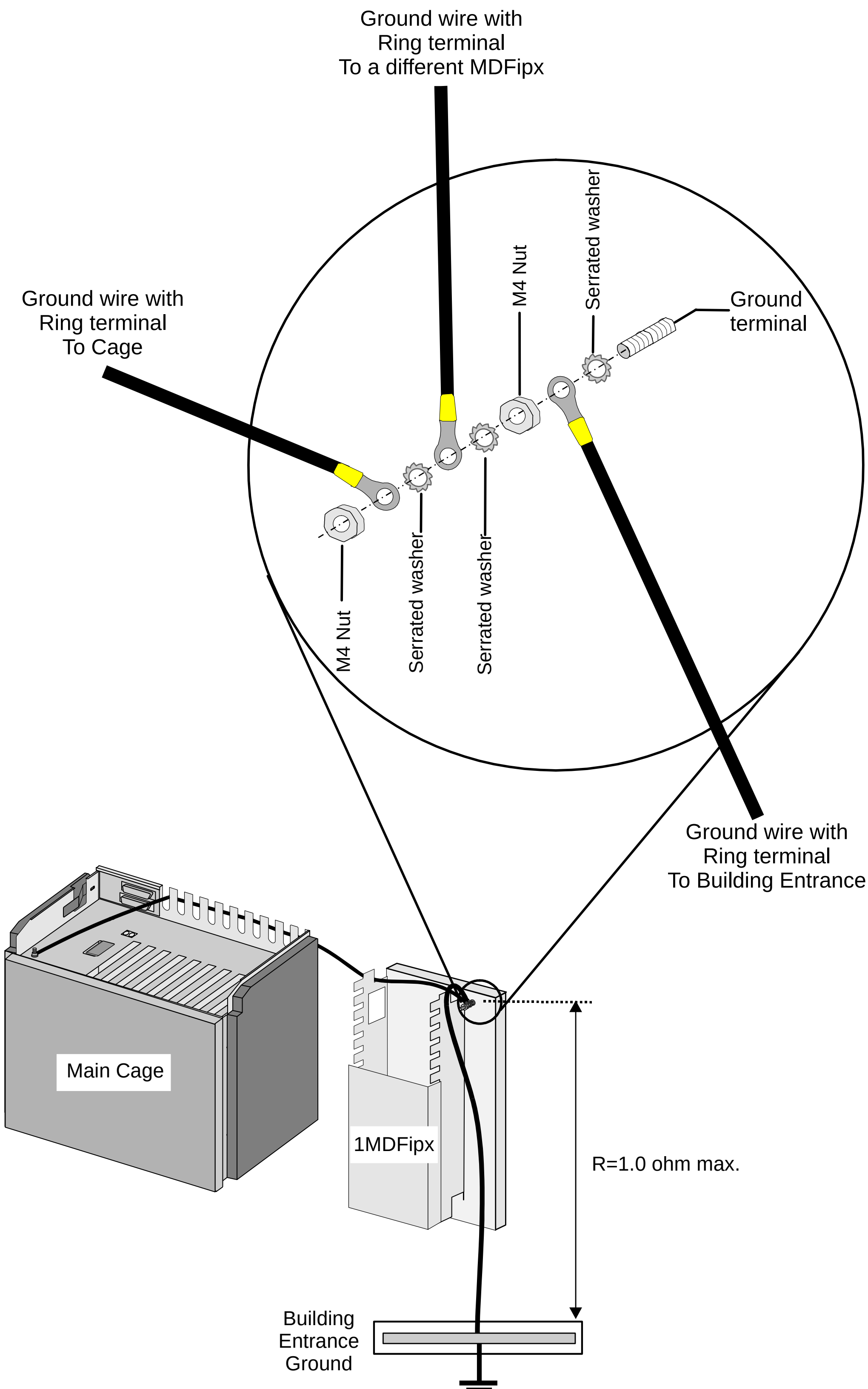


Figure 2-30 ***Coral IPx 500 Ground Connection for 1MDFipx Units***

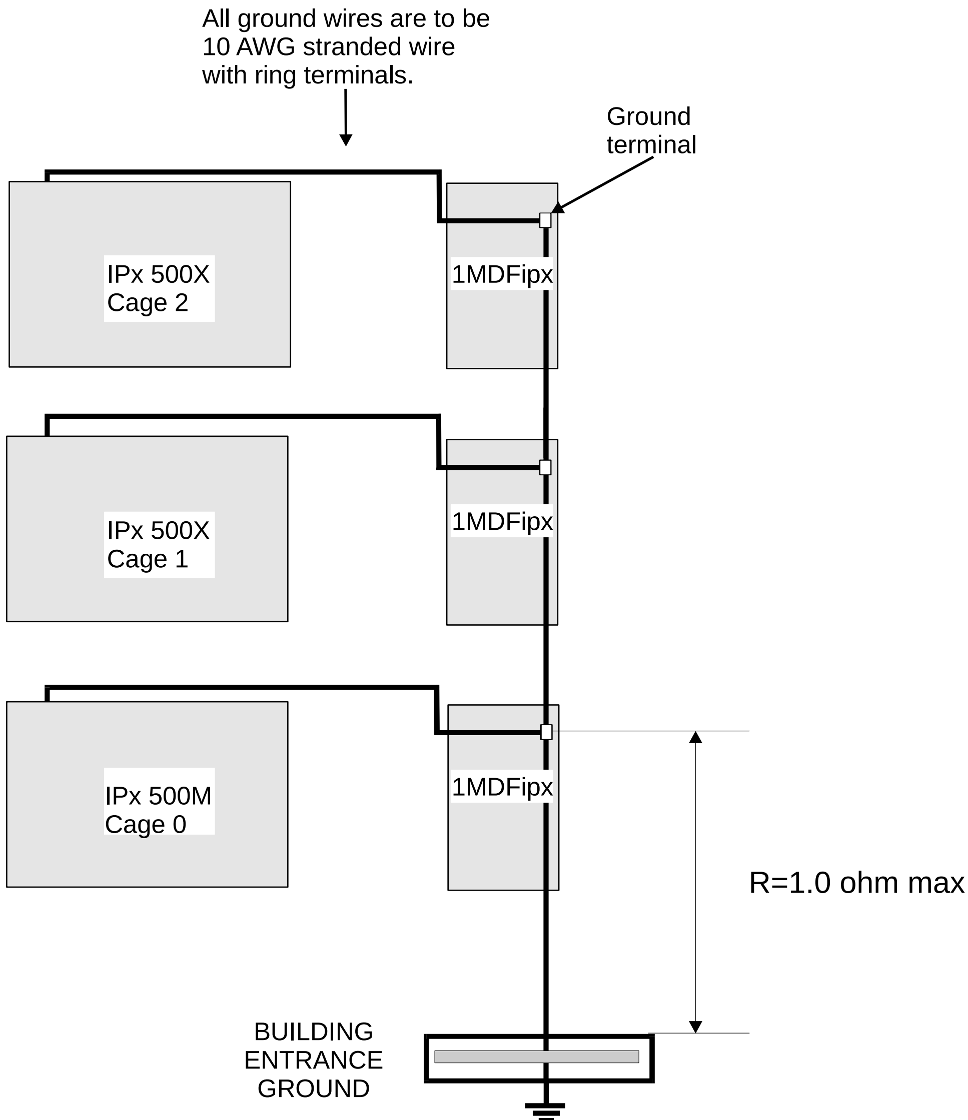
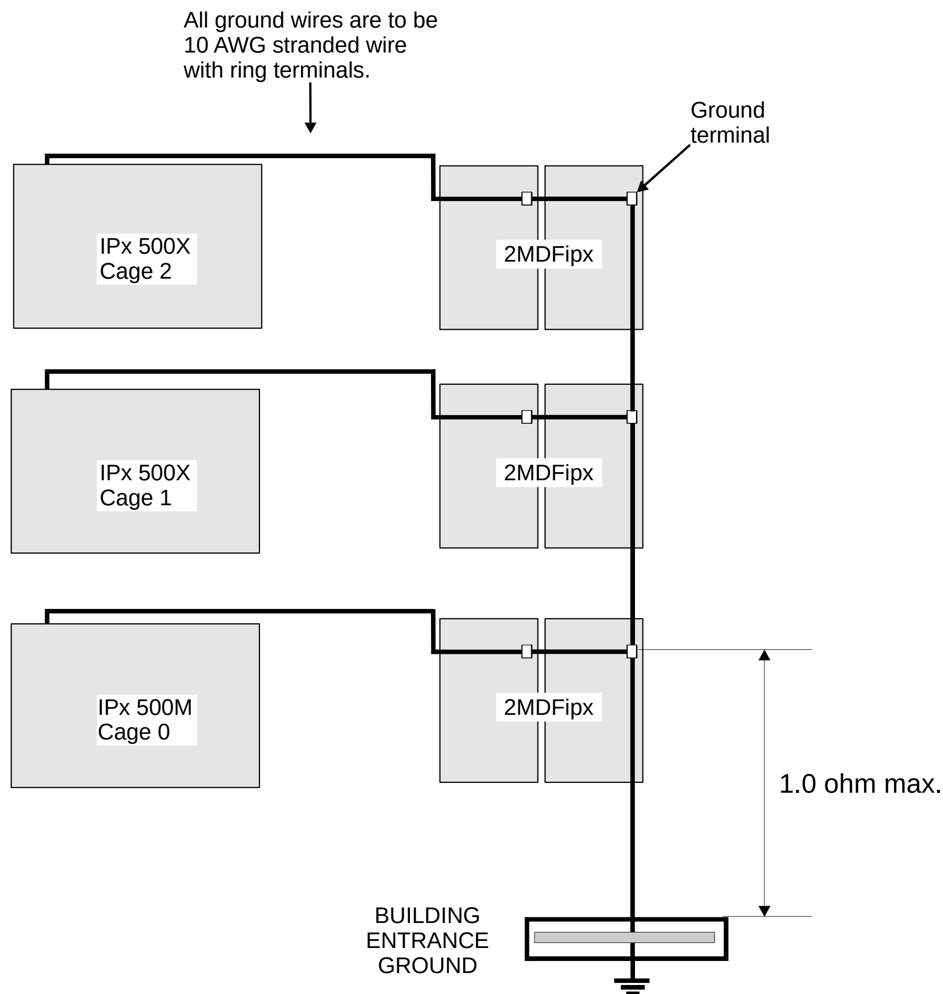


Figure 2-31 ***Coral IPx 500 Ground Connection for 2MDFipx Units***



Equipment Installation

2

Ground Connection for Systems that Include a Customer-Supplied MDF

If the Coral IPx 500 system *does not* include an MDFipx unit, or if the system includes IPx 800X cages, a master ground must be included within the system. See *Figure 2-32*, *Figure 2-33* and *Figure 2-34*. The system ground connection is fabricated as follows:

1. The master ground unit must have the following specifications. See *Figure 2-32*:

Dimensions:.......................Minimum of 5.5” x ¼” x 1” (140 mm x 6 mm x 25 mm)

Material:............................Brass or Copper

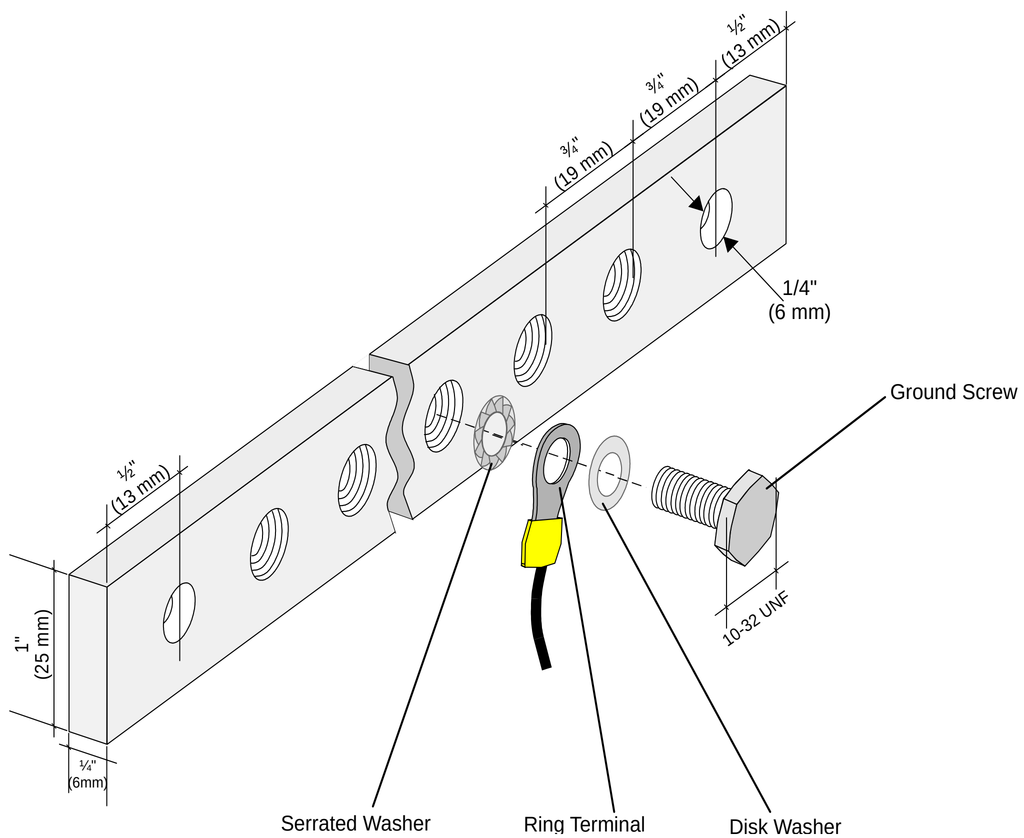
Mounting holes:................¼” (6 mm) diameter, ½” (13 mm) distance from edges

Ground screws:.................10-32 UNF

Washers..............................One serrated washer above the ring terminal

Distance between screws:.....¾" (19 mm)

Figure 2-32 **Master Ground Unit**



2. Verify that the ground wire is 10AWG stranded conductor, is the proper length and includes two ring terminals fitted onto either end of the wire that are suitable for connecting to the master ground and to the MDF.

3. Route the ground wire between the cage and the master ground.

4. Connect the ground wire to the IPx 500 cage as described on *page 2-47, Connecting the Ground Wire to the Cage*.

5. Connect the cage ground wire to the master ground unit as follows:

a. Unfasten one of the 10-32 UNF screws connected to the master ground unit and retain the screw and serrated washer. See *Figure 2-32*.

b. Insert the 10-32 UNF screw such that the ground wire ring terminal is positioned between the serrated washer and the threaded hole of the master ground unit.

c. Position the wire ring terminal over the threaded hole of the master ground unit, and fasten. Tighten until snug. See *Figure 2-32*.

6. Repeat *step 1* through *step 5* for all cages and MDFipx units in the system. Verify that the system ground wire connection between the different cages and MDFipx units is identical to the schematic diagram displayed in *Figure 2-33* or *Figure 2-34*.

7. Connect the MDF to the master ground according to the manufacturer's recommendations.

8. Skip to *page 2-55, Circuit Card Partial Installation*.

Figure 2-33 ***Ground Connection for System Including Customer Supplied MDF***

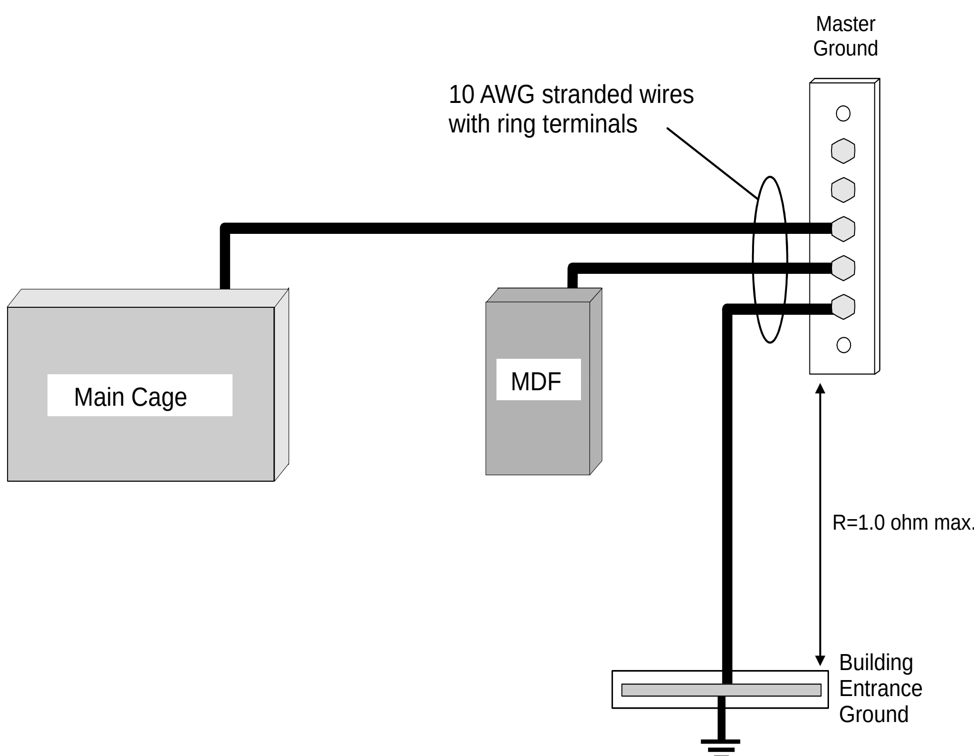
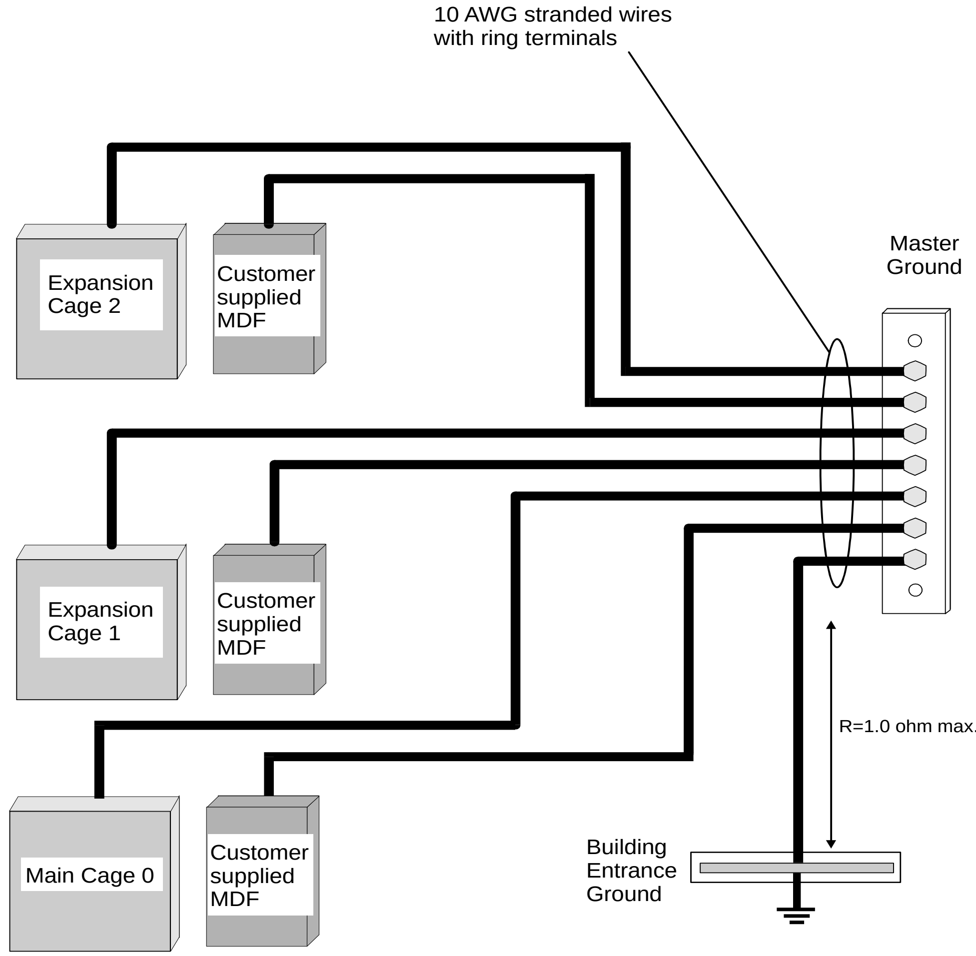


Figure 2-34 ***Ground Connection for System with Three Cages Including Customer Supplied MDF Units***



7 Circuit Card Partial Installation

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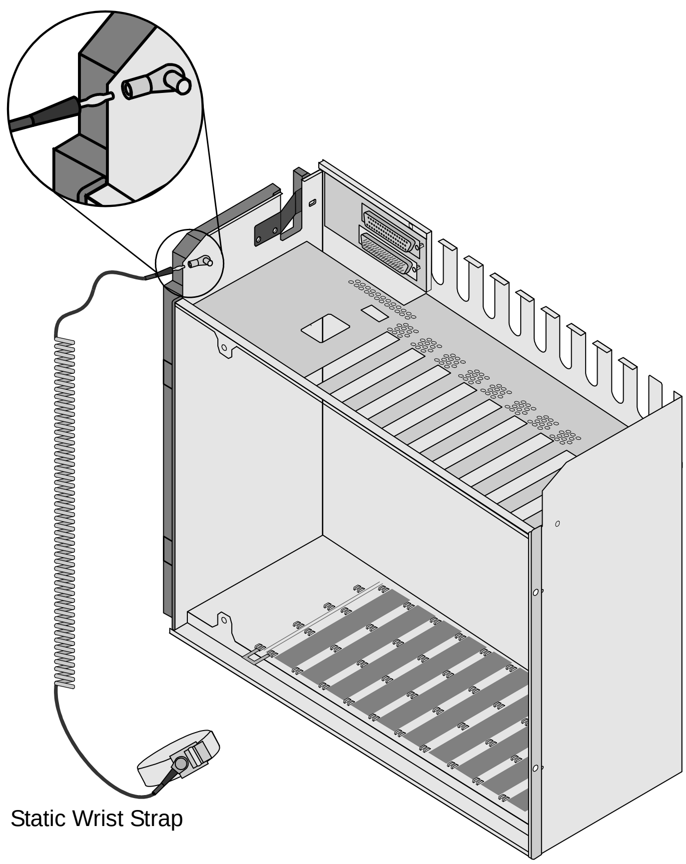
CAUTION!

Circuit cards contain static-sensitive circuitry and may be damaged or destroyed by electro-static discharge (ESD). Always wear the static dissipating wrist strap connected to the cage while handling circuit cards. See Figure 2-35. Hold circuit cards by their edges and avoid touching contact surfaces. Handle with care and do not drop.

Inserting a Coral Circuit Card

1. Connect the static dissipating wrist strap connector to the cage and put on the strap.

Figure 2-35 ***ESD Strap Connection to Cage***



2. To insert a circuit card into a card slot, grasp the card with both hands, fingers on the edge of the card near the front side, and thumbs against the ejectors at the top and bottom of the front panel.

3. Verify that the card is oriented correctly (red diagnostic indicator on front side toward top of card).
4. Align the edges of the circuit card with the card edge guides in the card cage, and gently slide the card straight into the card slot.
5. A slight resistance will be felt as the multi-pin connectors on the circuit card meet mating connectors on the backplane and engage. Push against the ejectors until the front panel of the card is flush with the front frame of the card cage.

CAUTION!

Do not force the circuit card into the slot. If more than slight resistance is encountered, remove the circuit card and examine the connectors for bent pins or interfering debris.

Never place a card in a slot other than the dedicated one. Refer to Table 2-11 to determine peripheral interface card types.

Common Control Card Installation (Main Cage)

Refer to *Figure 2-36* for common control cards locations in the Coral IPx 500M cage.

1. Verify that the IMC8 Flash Memory card, is properly installed in its connector on the front side of the MCP-IPx card. For more information about IMC8 card installation, see *page 8-23, IMC8 Card*.
2. Install the SAU plug on its corresponding connector on the front side of the MCP-IPx card.
3. Verify that the MCP-IPx common control card is partially inserted into its card slot. This card is normally shipped already inserted in its card slot. Partially extract the card from its card slot, so that the card protrudes from the card cage by approximately 1 inch (2.5 cm).

Peripheral Interface Card Installation

Table 2-11 lists the peripheral interface card types that may be inserted into each card slot in the Coral IPx 500 system. The discontinued XXXsl and XXX-200 cards are for use in slots 1 through 3 of the main cage only. For more details, see *page 10-7, Peripheral Card Description*.

NOTE:

Peripheral Interface cards listed in *Table 2-11* may require changes to jumpers on the card that determines the electrical characteristic or operation of each interface circuit. Refer to specific card descriptions *in "Coral Service and Peripheral Cards Installation Manual"*, for details.

1. Determine the position of peripheral interface cards that will be inserted into card slots 1 through 8 in the main cage and 1 through 10 in the expansion cage. Observe any order previously directed by a system designer or any established convention of the distributor. The card placement diagrams, *Figure 2-36* through *Figure 2-38*, may be used as a worksheet by the system designer to establish card placement prior to installation. Refer to *Table 2-11* to determine peripheral interface card types.
   - See *page 6-55, Suggestions for Peripheral Card Distribution* for timeslot/PCM distribution among the slots. The timeslots are evenly divided into three groups of 128 timeslots for each of the slot sets. Therefore, slots 1-4 share 128 time slots, slots 5-8 share an additional 128 timeslots, and slots 9-10 share the last 128 timeslots. Distribute *heavy consumer* cards (cards with a large number of ports: 30Tipx, PRI-30ipx, T1ipx, PRI-23ipx, UDTipx, or UGWipx with MG-30 or MG-60 units) among the PCM groups evenly.
   - Distribute trunk interface cards (4T-Cipx, 8T-Cipx, 4T-CIDipx, 8T-CIDipx, 4TEMipx, 4TMRipx, 4TWLipx, 4TBRipx, 8TBRipx, 30Tipx, 30Tipx, PRI-30ipx, UDTipx, PRI-23ipx, and T1ipx) evenly among all cages in the system, rather than concentrate trunk interface cards in one cage. This practice ensures that the failure of a single cage will have minimal impact to trunk service.
   - Place Digital Trunk Interface cards in card slots 4 and/or 5. Slots 4 and 5 are wired as the primary and secondary external clock source, respectively. The cards inserted in these slots can be used to synchronize the Coral IPx system clock with a network clock signal derived from a digital trunk circuit.
   - If no other convention exists, refer to *page 10-1, Peripheral Card Installation* and *Coral Service and Peripheral Cards Installation Manual.*
2. If IPx 800X expansion cages are installed determine the position of service and peripheral interface cards that will be inserted into card slots 1 through 12. Observe any order previously directed by a system designer or any established convention of the distributor. The card placement diagrams, *Figure 2-39* through

Figure 2-40, may be used as a worksheet by the system designer to establish card placement prior to installation. Refer to *Coral IPx 800 Installation Manual - Section-2* and *Coral Service and Peripheral Cards Installation Manual*. If no other convention exists, plan the card placement as follows:

- In a system with one expansion cage, insert a shared service card into slot 1 of the expansion cage.
- In a system with two expansion cages; insert a PX card into slot 1 of the first expansion cage, and insert a shared service card into slot 1 of the second expansion cage.
- Insert the digital trunk interface cards into slots 4 and 5 of the designated cage(s). Slots 4 and 5 are wired as the secondary and primary external clock source, respectively. The cards inserted in these slots can be used to synchronize the Coral system clock with a network clock signal via a digital trunk circuit. Refer to *page 10-15, Digital Trunk Synchronization* and *Coral Synchronization via Digital Trunks* section in the *Coral Service and Peripheral Cards Installation Manual*, for more information on synchronization.
- Insert peripheral cards into slots 2 through 12 of the expansion cages.

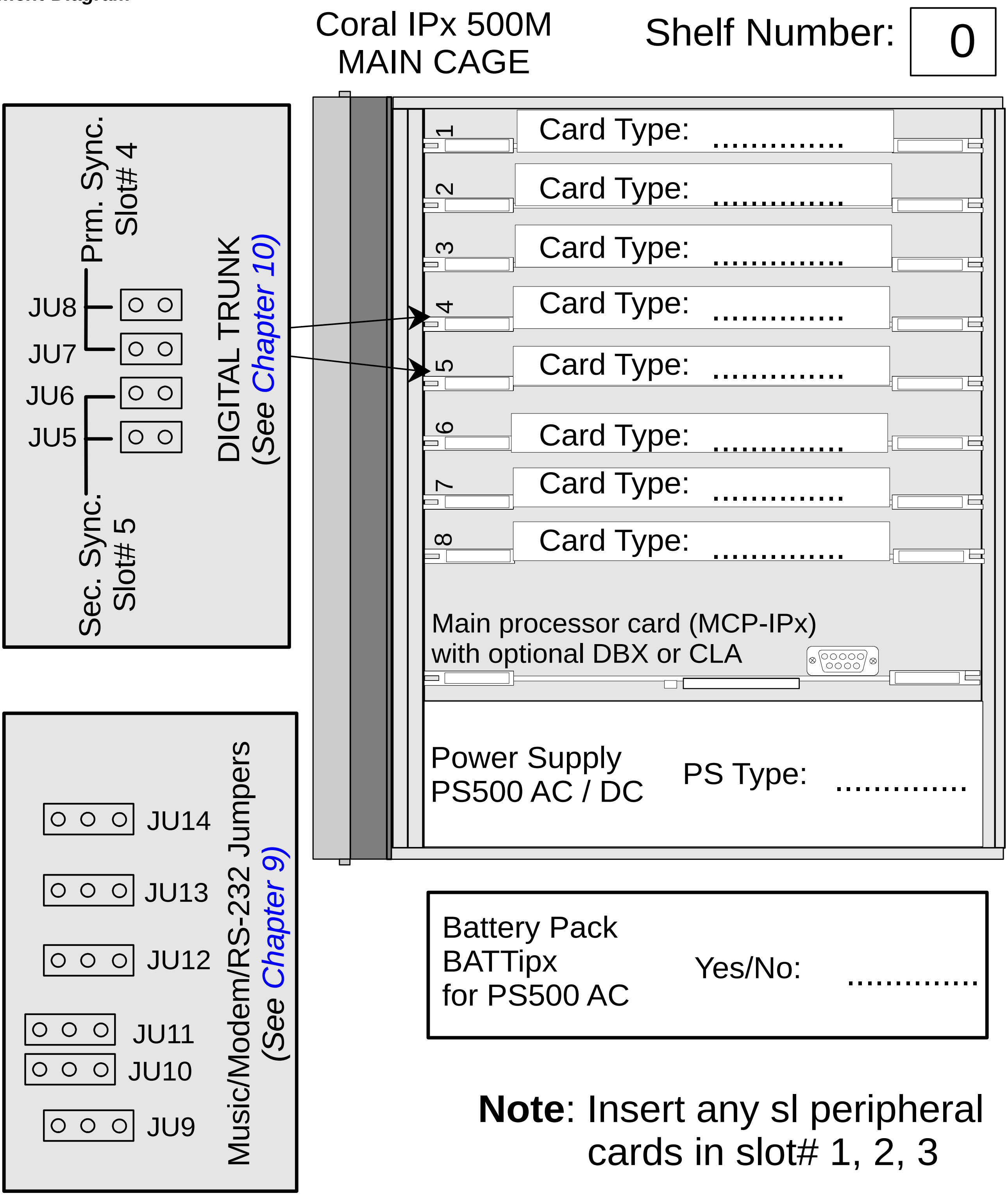
3. Remove the peripheral interface cards from their shipping containers and partially insert them into the card slots as determined above. Allow the cards to protrude from the card cage by approximately 1 inch (2.5 cm).
4. Skip to *page 2-65, Interconnecting the Main and Expansion Cages*.

Table 2-11 ***Coral IPx 500 card Types***

Card Type	Card Names	Slot Allocation
Peripheral Analog Trunk Interface	4T-Cipx*, 4T-CIDipx*, 8T-Cipx*, 8T-CIDipx*, 8T-Gipx*, 4TMR-PFipx-G*, 4TEMipx*, 4TWLipx	All Slots
	4T-Csl*, 4T-CIDsl*, 8T-Csl*, 8T-CIDsl*, 8TPFsl*, 4TMR-PFsl-G*, 4TPFsl*, 4TEMsl*, 4TWLsl	Main Cage Slot# 1, 2, 3
Peripheral Digital Trunk Interface	4TBRipx, 8TBRipx, 8TBRPipx, PRI-23ipx*, T1ipx*, UDTipx* PRI-30ipx*, 30Tipx*	All Slots
	4TBRsl, 4TBRPsl, 8TBRsl, 8TBRPsl, PRI-23sl*, T1sl* PRI-30sl*, 30Tsl*	Main Cage Slot# 1, 2, 3
Peripheral Wired Station Interface	8SLSipx*, 16SLSipx*, 8SFTipx, 16SFTipx	All Slots
Peripheral Wireless Station Interface	8SKKipx*	All Slots
	8SKKsl*, 2SKWsl*, 4SKWsl*	Main Cage Slot# 1, 2, 3
Integrated Coral Message Center/ Voice Mail / Unified Messaging	iVMFipx, IPCipx/SFC, IPCipx/uCMC	All Slots
	iCMC-200	Main Cage Slot# 1, 2, 3
VoIP Universal Gateway	UGWipx	All Slots

* *These cards may require changes to option straps which affect interface characteristics or operation. For reference material see the* ***Coral Service and Peripheral Cards Installation Manual****.*

Figure 2-36 ***Coral IPx 500 Main Cage 500M - Card Placement Diagram***



Note: Insert any sl peripheral cards in slot# 1, 2, 3

Figure 2-37 ***Coral IPx 500 1st Expansion Cage 500X - Card Placement Diagram***

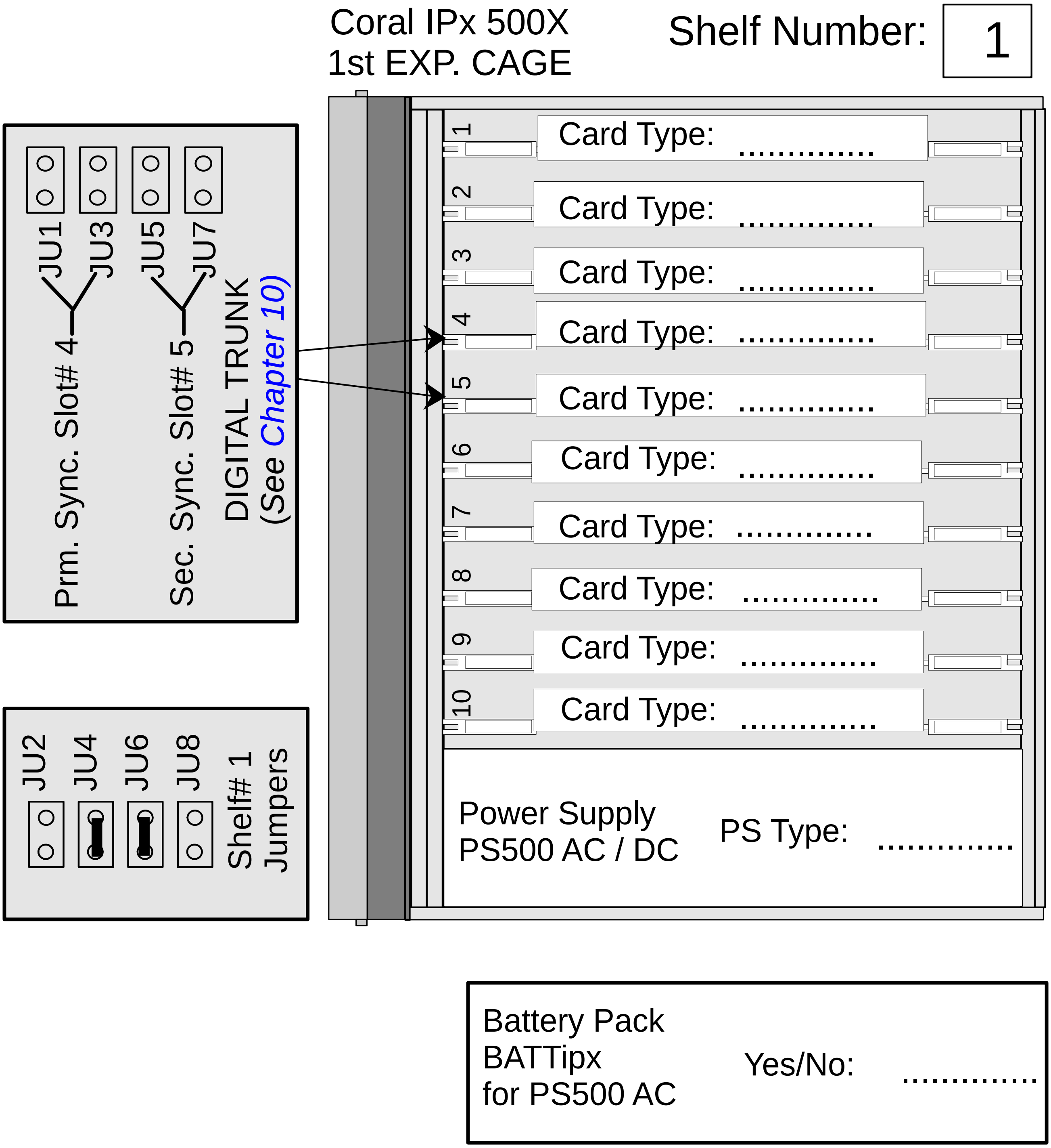


Figure 2-38 ***Coral IPx 500 2nd Expansion Cage 500X - Card Placement Diagram***

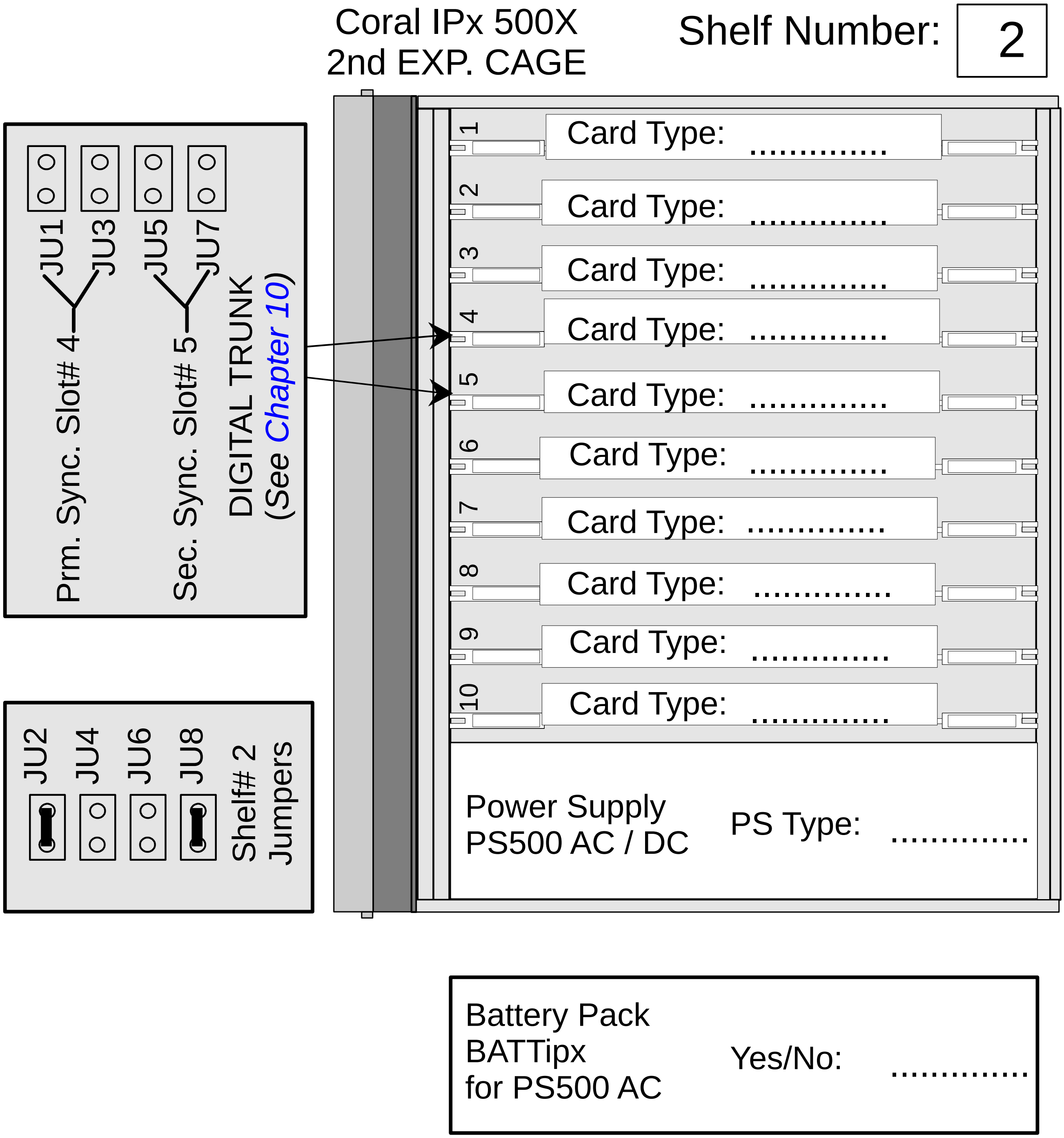
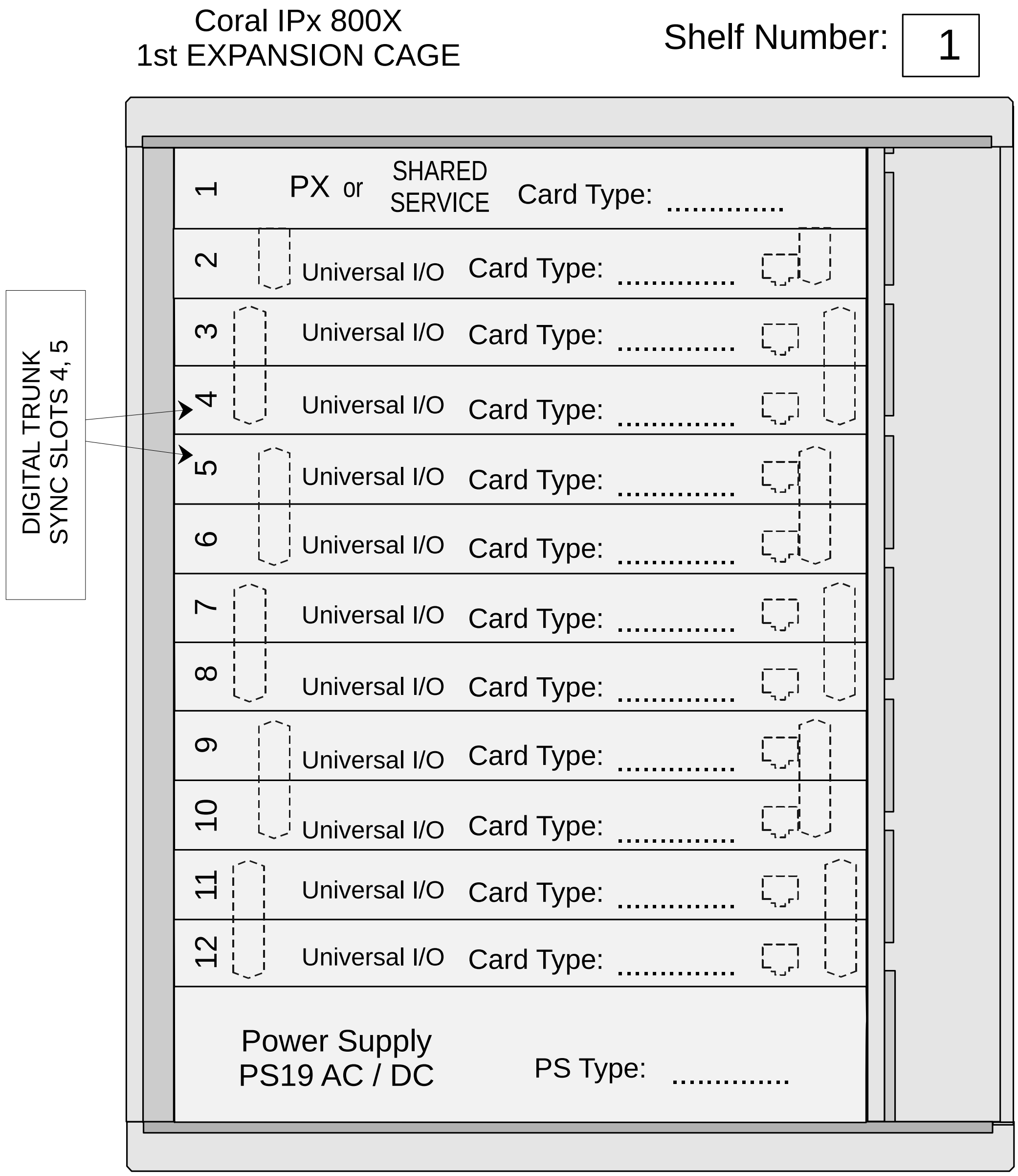
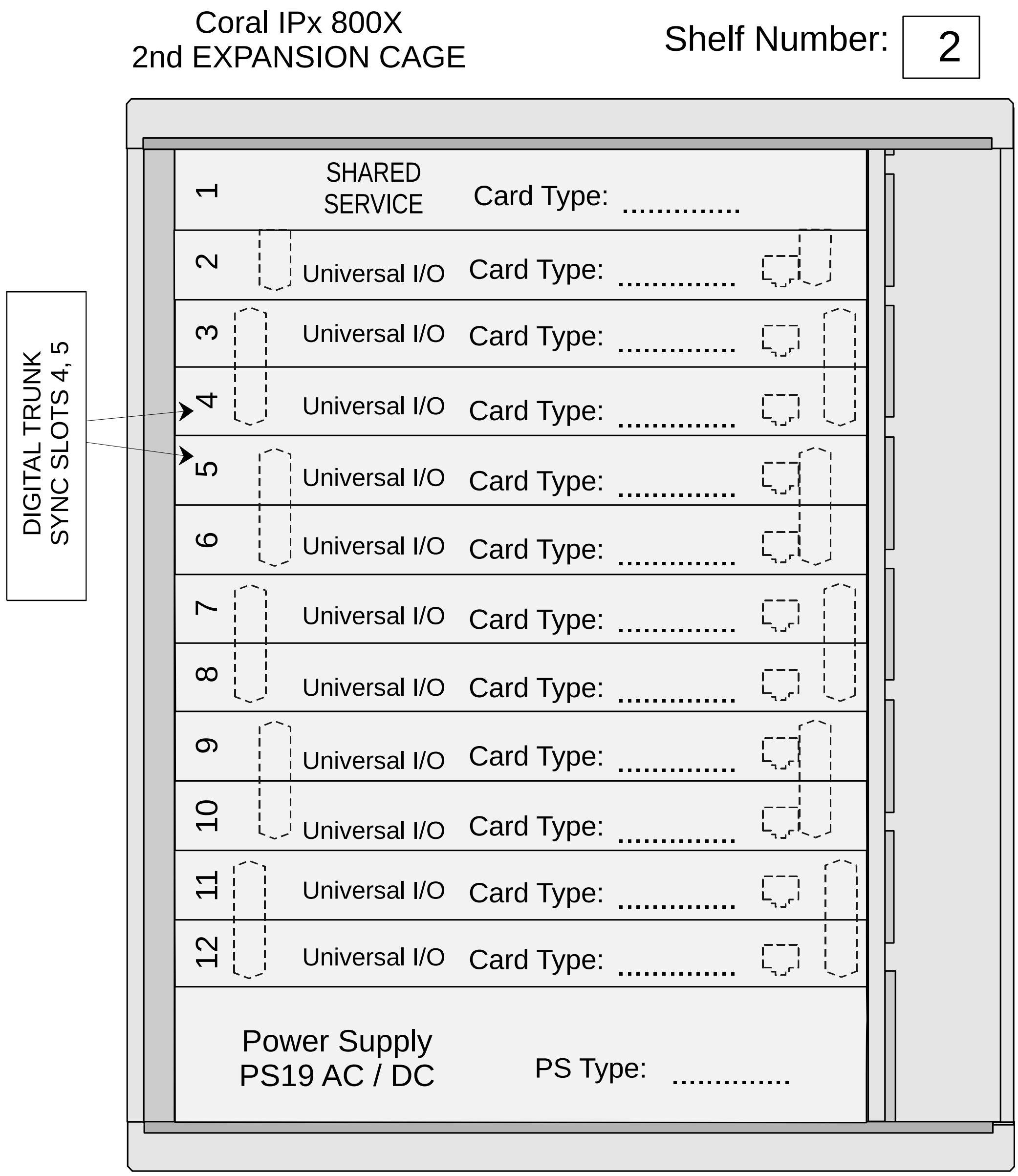


Figure 2-39 ***Coral IPx 500 1st Expansion Cage 800X - Card Placement Diagram***



Note:
Requires a PX card in slot# 1 if a second expansion cage is installed.

Figure 2-40 ***Coral IPx 500 2nd Expansion Cage 800X - Card Placement Diagram***



8 Interconnecting the Main and Expansion Cages

This section describes how to interconnect the cages within the Coral IPx 500 system. For a full description of the different system configurations, see *page 6-49, Interconnecting the Main and Expansion Cages*.

An H500-1 cable is supplied with the IPx 500X and 800X expansion cages and is used to connect the backplanes of the cages.

The H500-1 cable has two D-Type 50-pin terminations: a male connector at one end and a female connector at the other end.

Connecting the H500-1 Cable between the Main Cage and 1st Expansion Cage

1. Plug the male end of the H500-1 cable into the female D-type connector labeled TO EXPANSION CAGE located in the top section of the main cage.
2. Plug the female end of the H500-1 cable into the lower connector labeled FROM CONTROL UNIT OR FIRST EXPANSION UNIT in the top section of the first expansion cage.
3. Tighten the screws on both sides of the cable to secure it.

Connecting the H500-1 Cable between the 1st Expansion cage and 2nd Exp.cage

1. Plug the male end of the H500-1 cable into the female D-type connector labeled TO SECOND EXPANSION UNIT located in the top section of the first expansion cage.
2. Plug the female end of the H500-1 cable into the male D-type connector labeled FROM CONTROL UNIT OR FIRST EXPANSION UNIT located in the top section of the second expansion cage.
3. Tighten the screws on both sides of the cable to secure it.

Defining Expansion Cage Numbers

1. Skip to *page 2-66, Setting the Configuration Jumpers* and refer to *Table 2-13* for cage number setting jumpers JU2, JU4, JU6 and JU8.

9 Setting the Configuration Jumpers

In the Coral IPx 500 system, part of the motherboard (Main Service Board), performs the shared service function. The motherboard

- MSBipx of the main cage IPx 500M
- MSPipx of the expansion cage IPx 500X

may require changes to jumpers on the card. For a specific card description, see *Chapter 9 - Shared Service Circuitry*. This must be done before inserting the power supply unit.

This section describes how to remove and insert the shorting plugs of the various jumpers that are present on the backplanes of the Coral IPx 500 main and expansion cages. For information on how to set the jumpers, see *page 6-25, Configuration Jumpers*, *page 6-36, Configuration Jumpers*, and *page 9-8, Configuration Jumpers*.

1. Connect the static dissipating wrist strap connector to the cage and put on the strap.

CAUTION!

Circuit cards contain static-sensitive circuitry and may be damaged or destroyed by electro-static discharge (ESD). Always wear the static dissipating wrist strap connected to the cage while handling circuit cards. See Figure 2-35 on page 2-55. Hold circuit cards by their edges and avoid touching contact surfaces. Handle with care and do not drop.

2. Remove the power supply unit from the cage if has been inserted thus far.
3. In the main cage, configure the following jumpers:

Table 2-12 **Jumpers in the Main Cage**

Jumpers	*Subject*	*Refer to*
JU5, JU6 JU7, JU8	Synchronization slots	*page 6-26, Digital Trunk Synchronization Slots* *page 10-16, Synchronization Slot Selection*
JU9	Music 1 source	*page 9-63, Configuring the Music M1 Jumper to External or Internal*
JU10 JU11	Modem	*page 9-46, Modem Jumpers - Enable/Disable*
JU12 JU13 JU14	RS-232 Serial ports	*page 9-55, Configuring the CTS Jumper "Handshaking" Option*

4. In the IPx 500X expansion cages, configure the following jumpers:

Table 2-13 ***Jumpers in the Expansion Cage***

Jumpers	*Subject*	*Refer to*
JU1 JU3 JU5 JU7	Synchronization slots	*page 6-38, Digital Trunk Synchronization Slots* *page 10-16, Synchronization Slot Selection*
JU2 JU4 JU6 JU8	1st expansion shelf	■ *page 6-37, Expansion Shelf Number* ■ First expansion cage is defined by jumpers JU4 and JU6, see *Figure 2-37 on page 2-61*.
	2nd expansion shelf	■ *page 6-37, Expansion Shelf Number* ■ Second expansion cage is defined by jumpers JU2 and JU8, see *Figure 2-38 on page 2-62*.

5. In the IPx 800X expansion cages, configure the jumpers as described in the *Coral IPx 800 Installation Manual*.

6. Skip to *page 2-68, Power Supply (PS500) Installation*

Equipment Installation

2

10 Power Supply (PS500) Installation

WARNING!

The power supply card is heavy. Handle with care and do not drop.

This section describes how to insert the power supply card into its slot. The power supply card is inserted only after the system has been completely grounded and the jumpers configured.

CAUTION!

Circuit cards contain static-sensitive circuitry and may be damaged or destroyed by electro-static discharge (ESD). Always wear the static dissipating wrist strap connected to the cage while handling circuit cards. See Figure 2-35 on page 2-55. Hold circuit cards by their edges and avoid touching contact surfaces. Handle with care and do not drop.

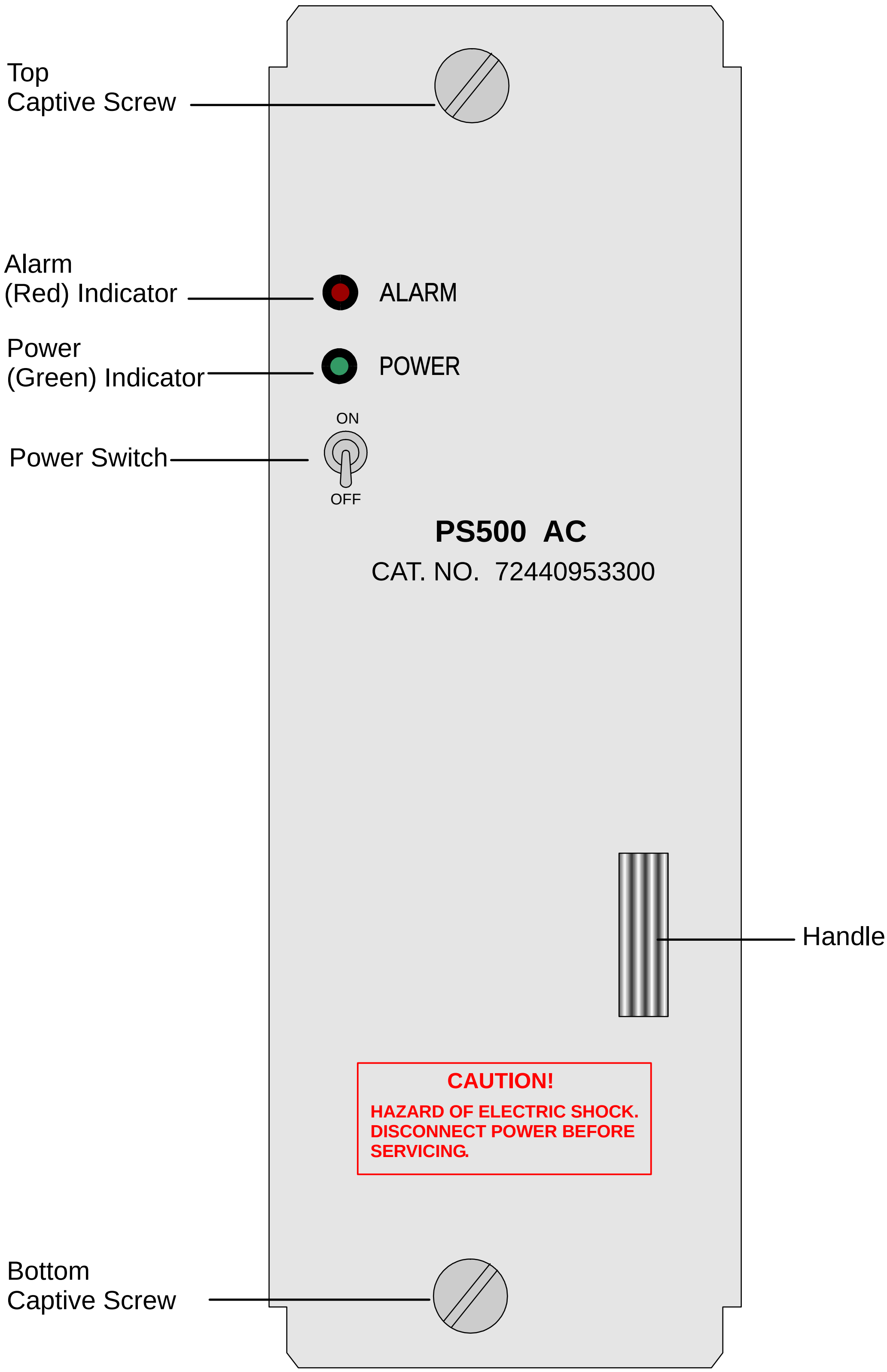
The power supplies used in the Coral IPx 500 consist of an AC powered PS500 AC or a -48VDC powered PS500 DC power supply unit. Refer to *Figure 2-36 on page 2-60*, *Figure 2-37 on page 2-61* and *Figure 2-38 on page 2-62* for power supply placement in the card cage.

1. Verify that the cage ground wire is connected and the ground nut is tightened. See *page 2-46, Ground Wiring.*
2. Verify that the PS500 power switch is in the OFF position (turned downwards), see *Figure 2-41*.
3. Grasp the power supply with both hands, fingers near the top and bottom of the power supply near the front panel.
4. Align the two guide ridges located on the right panel of the power supply (top and bottom) in the card edge guides corresponding to the POWER SUPPLY marking at the bottom of the card cage. Slide the power supply gently but firmly, until fully inserted into the card cage.
5. Fasten the two captive screws located on the top and bottom of the power supply front panel, thus securing the card to the cage as well as grounding the unit.

WARNING!

Do not proceed until the captive screws have been fastened to the cage. If the screws are not fastened, the power supply unit will not be grounded, and could be subject to hazardous voltages.

Figure 2-41 ***PS500 Front Panel***



6. Skip to *page 2-70, Connecting the Power Wires*

11 Connecting the Power Wires

The Coral IPx 500 can operate as an AC powered system or as a DC powered system. For AC powered systems, skip to *page 2-73, AC Powered Systems*.

DC Powered Systems

This section describes how to connect the power wires to the Coral IPx 500 cage for DC powered systems (that is, when the PS500 DC power supply card is installed in the cage).

Figure 2-42 shows one IPx 500 cage installed in the system, and

Figure 2-43 shows three cages installed within the system.

NOTE:

The DC power wires provided with the system are 6.6ft (2m) long. Verify that the connection to the facilities power source is made according to local requirements.

1. The PS 500 DC power supply unit is supplied with a 6.6ft (2m) long pair of 14 AWG wires (one red and one black). If this is not long enough to connect the facilities power source to the cage, fabricate an extension at the customer's site with two wires that are identical to the ones above.
2. Route each power wire through one of the slots at the rear panel of the top section of the cage. Take care not to let the free end of the cable cause damage by swinging loose or making contact with another electrical connection. Leave approximately 12" (30cm) of wire length within the cage to reach the DC power input connection.
3. Do not insert the DC power input connector at this time. Leave the DC power input connector unplugged on the cage top section.
4. Connect the other ends of the wires to the -48VDC facilities power source and a circuit breaker as shown in *Figure 2-42* and *Figure 2-43* and according to local regulatory requirements.
   - Negative (black) wire to the circuit breaker or -48V busbar panel
   - Positive (red) wire to the +48VDC terminal or +48V busbar panel
5. Skip to *Chapter 3 - Initial Power-up Tests*.

Figure 2-42 ***DC Power Wiring for One Coral IPx 500 Cage***

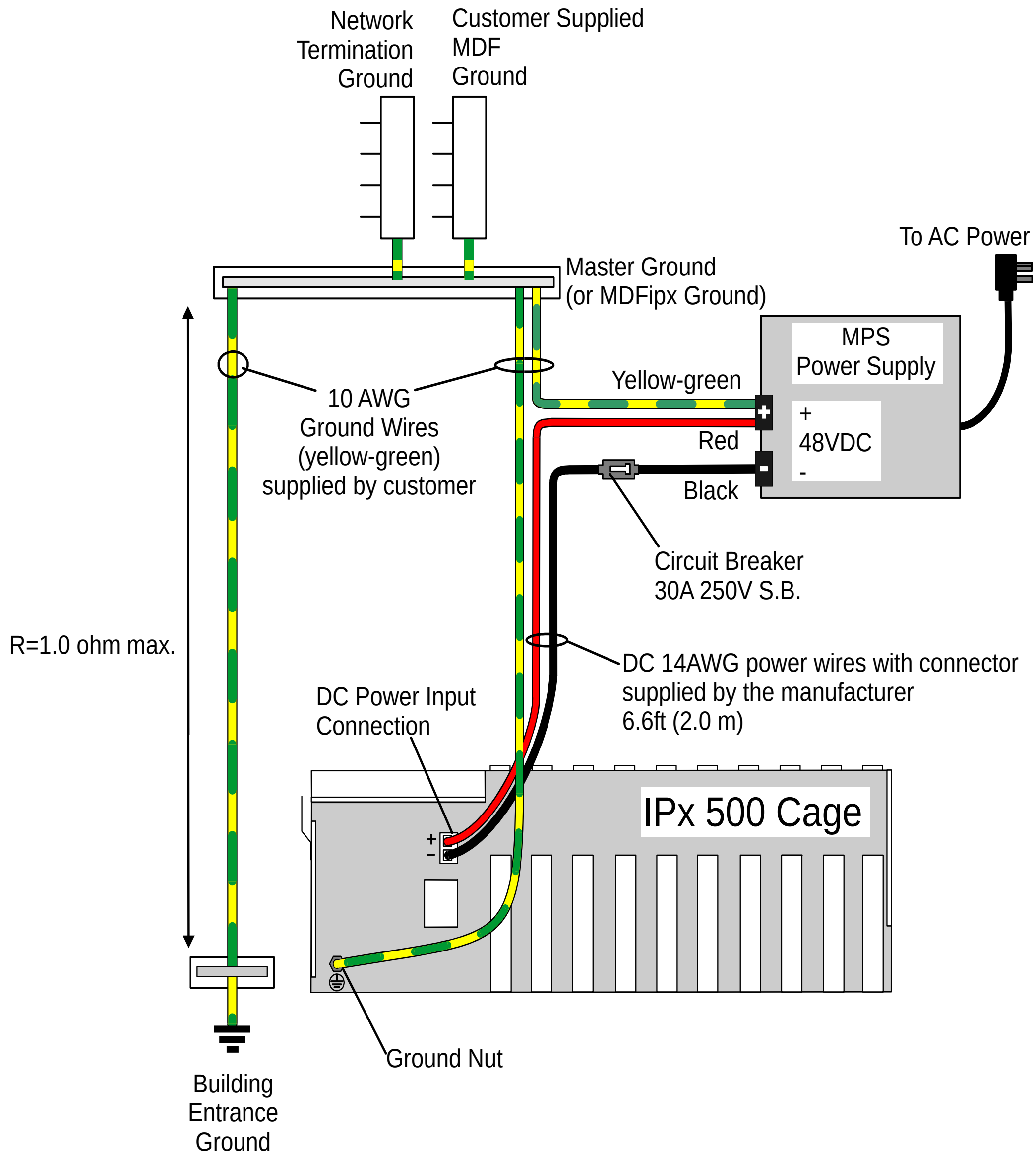
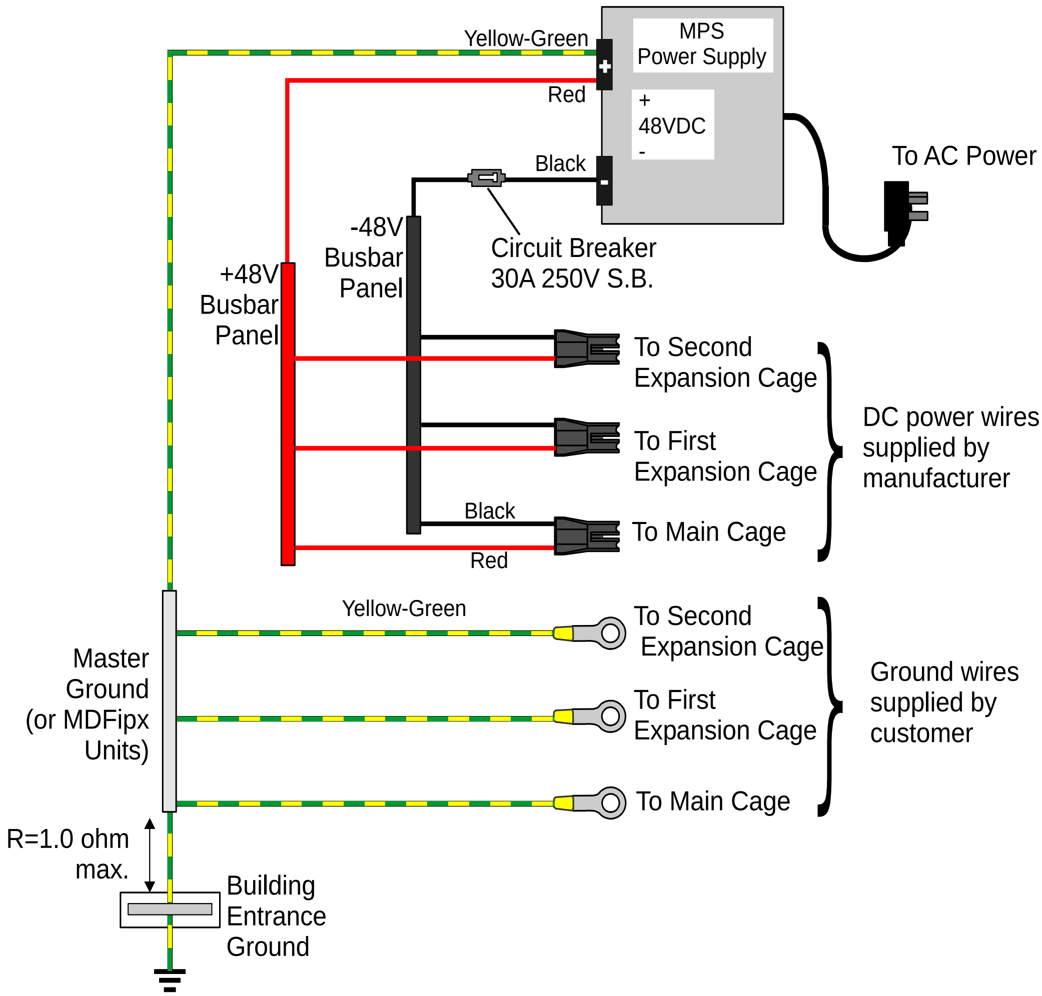


Figure 2-43 ***DC Power Wiring for Three Coral IPx 500 Cages***



AC Powered Systems

This section describes how to connect the power wires to the Coral IPx 500 cage for AC powered systems (that is, when the PS500 AC power supply card is installed in the cage).

Figure 2-44 shows the AC power wiring for the IPx 500 cage and the DC power wiring for the BATTipx.

Routing the AC power cord

1. Route the AC power cord from the AC power receptacle through one of the slots at the rear panel of the top section of the cage.
   Take care not to let the free end of the cable cause damage by swinging loose or making contact with another electrical connection. Leave approximately 12" (30cm) of cord length within the cage to reach the AC power input connection.

NOTE:

***For 115 volt operation**, when the power supply cord is not factory-supplied the cord should be selected as follows:*

Use a UL Listed/CSA Labeled Cord Set consisting of a minimum 18 AWG, Type SVT or SJT three-conductor cord, terminating in a molded connector body. The cord should have an IEC CEE-22 female configuration on one end, and a molded-on parallel blade grounding type attachment plug rated 15A, 125V configuration (5-15P), at the other end.

2. Do not insert the power cord into the AC receptacle at this time.

WARNING!

Electrical Hazard. Verify that the AC power strip or outlet supplying the cage is easily accessible and can be easily disconnected in the event of emergency. Verify that the power strip or outlet is no higher than 63" (160 cm) from the floor.

Connecting the Battery Pack BATTipx to the PS500 AC Unit

NOTE:

If an AC power failure occurs, the PS500 AC power supply is powered by the optional backup batteries, enabling the Coral IPx 500 system to operate continuously. The backup batteries installation is described on *page 2-40, Battery Pack (BATTipx) Mounting and Installation*.

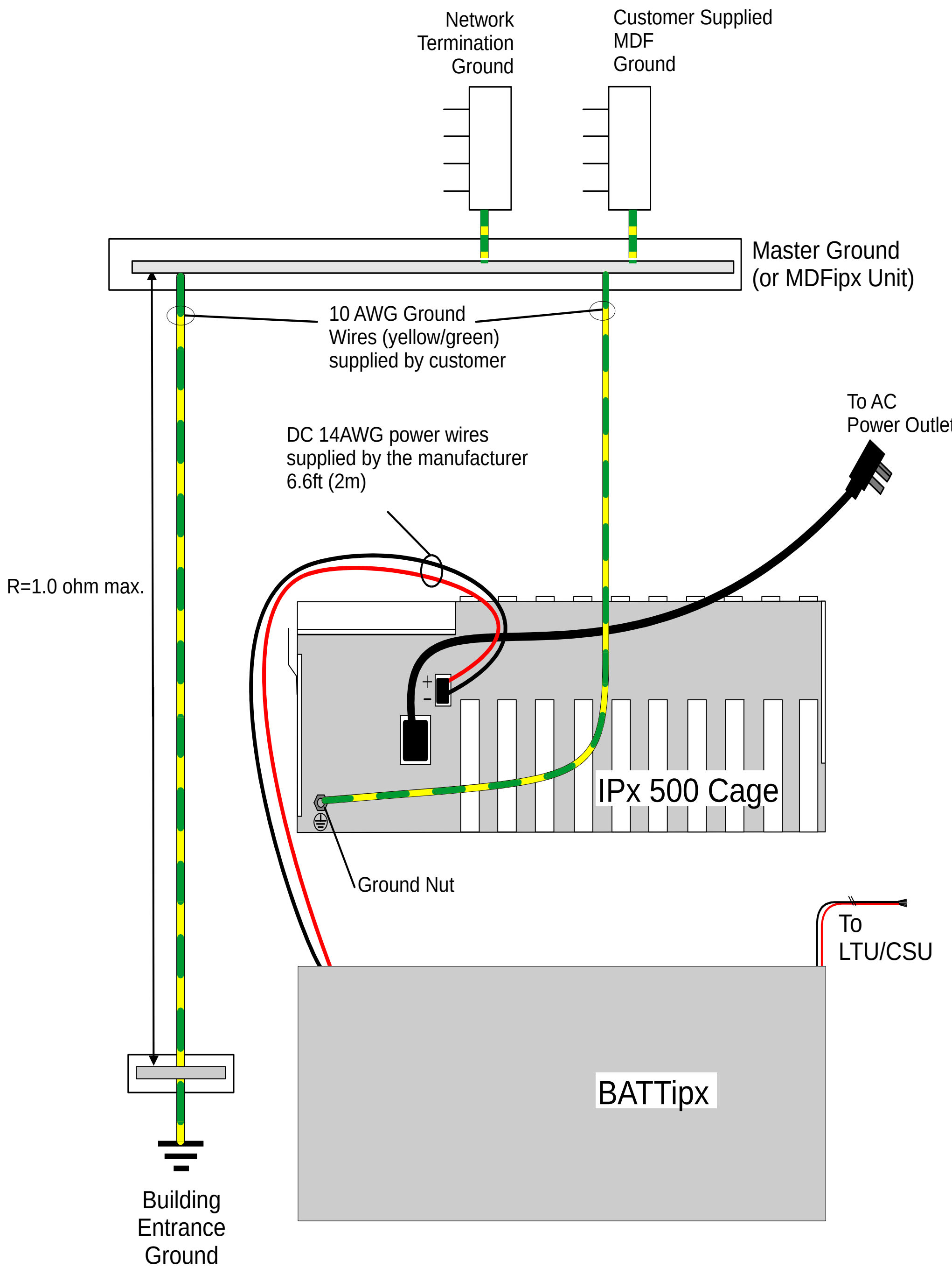
1. Verify that the PS500 AC *Power* switch is in the OFF position (turned downwards).

2. Verify that the BATTipx *Power* switch is in the OFF position (turned downwards on right side).

3. Insert the PABX/PS connector of the DC power wire pair into the upper panel socket of the PS500 AC power supply. See *Figure 2-44*.

4. Skip to *Chapter 3 - Initial Power-up Tests*.

Figure 2-44 ***AC Power Wiring for One coral Cage and Battery Pack***



2.3 Program Interface Device Connection

NOTE:

The data terminal or personal computer that will be used as the Program Interface (PI) device must be equipped with an RS-232E asynchronous serial data interface that can be configured for a data rate of 19200, 9600, 4800, 1200, or 300 bps, 8 data bits, 1stop bit, and no parity bit or EVEN, ODD, mark, space, and parity. A data rate of 38,400 is also recommended. Data rates of 57600 and 115200 are optional. The PI device must use the ASCII character set. The ground connection to the PI device must be the same ground connection supplied to the Coral system.

1. Unpack the PI device and prepare it for operation. Set the interface for a data rate of 9600 bps, 8 data bits, 1 stop bit, and no parity bit. These are the default settings for all serial programming ports of the Coral system.
2. Determine the connector type and pin assignments for the data interface of the PI device. *Figure 2-45* shows the connections for using data terminals with a 25 pin DB-25P (male) or DB-25S (female) connector. *Figure 2-46* shows the connections for using personal computers with a DA-9P connector for the serial interface.
3. Obtain or prepare a serial data cable to connect the PI device to the KB0 serial programming port on the front side of the MCP-IPx card. The KB0 port end of the serial programming cable requires a male DA-9P style connector, wired as shown in either *Figure 2-45* or *Figure 2-46*.
4. If the PI device uses a DB-25P or DB-25S connector, wire the connectors according to *Figure 2-45*. If the PI device is a personal computer equipped with a DA-9P connector, wire the connectors according to *Figure 2-46*.
5. For installations with a permanent PI device, route the serial data cable from the PI device to the front cover of the cage and connect it to the KB0 connector.

Figure 2-45 ***25 Pin Program Interface Device Connections to KB0***

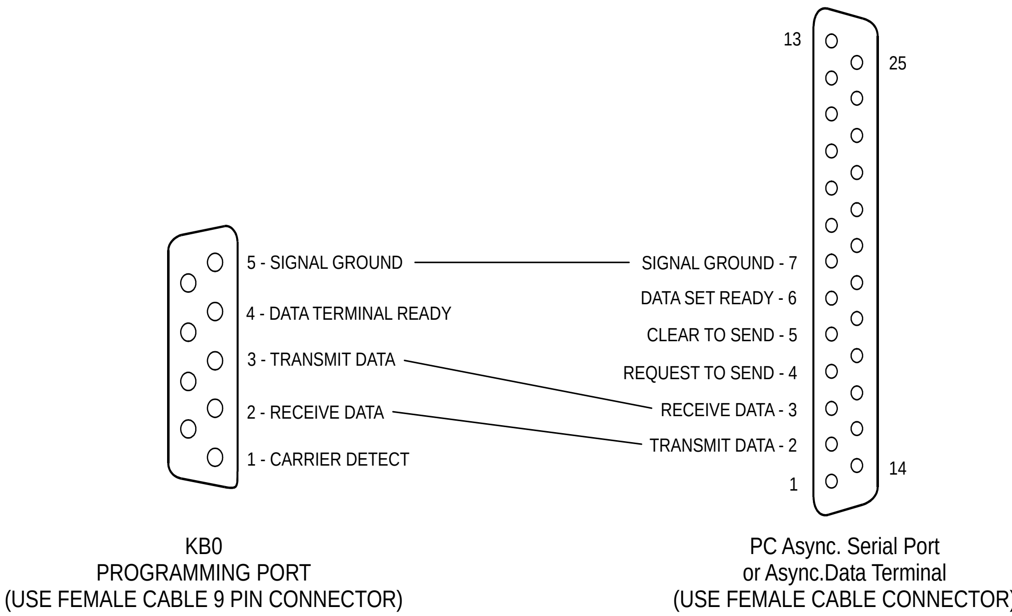
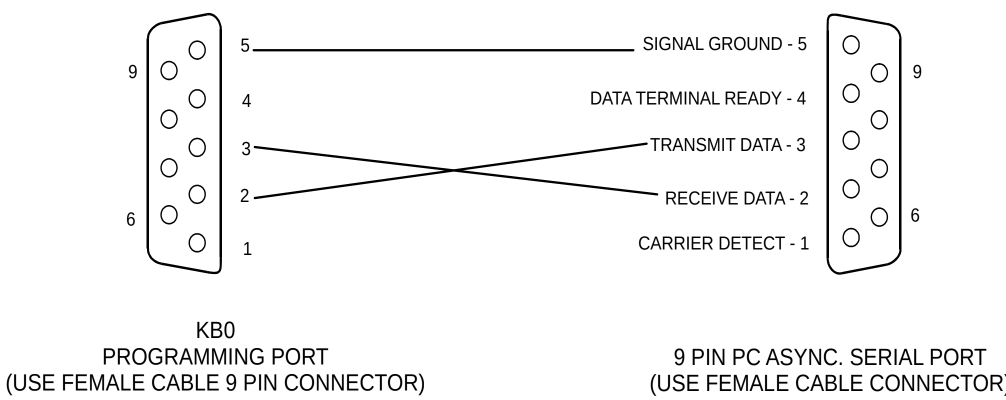


Figure 2-46 ***9 Pin Program Interface Device Connections to KB0***



Chapter 3

Initial Power-up Tests

Coral

3.1 Power Supply Test

This chapter provides information about the connection of the backup battery and the power supply. In addition, information is provided about the initial tests that must be performed when first installing a Coral IPx 500 system.

CAUTION!

Before proceeding, verify that the circuit cards in the Coral IPx 500 system are only partially inserted into their respective card slots, with the front side protruding approximately 1 inch (2.5 cm) from the front of the card cage.

The Coral IPx 500 can operate as an AC powered system or as a DC powered system.

- For DC powered systems, skip to *page 3-2, DC Powered Systems*.
- For AC powered systems, skip to *page 3-4, AC Powered Systems*.

1 DC Powered Systems

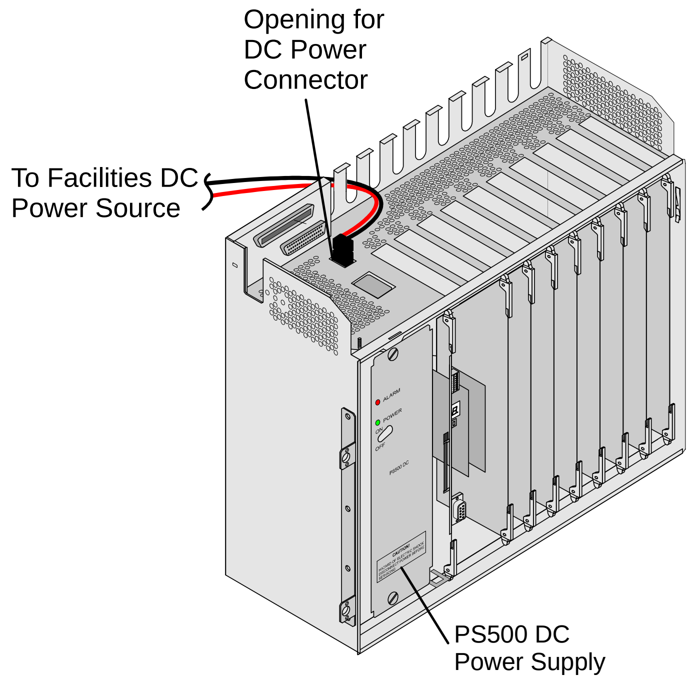
1. Verify that the cage ground wire is connected and the ground nut is tightened. See *page 2-46, Ground Wiring.*
2. Verify that the PS500 DC unit has been properly installed and the two captive screws on the upper and lower parts of the PS500 DC front panel are tightened.
3. Verify that the PS500 DC *power* switch is turned OFF (downwards).
4. Turn ON the facilities 48VDC Main Power Supply (MPS) or battery charger and close any fuse or circuit breaker required to supply 48VDC to the Coral IPx 500 cage.
5. Measure the DC voltage entering the power input connector. See figures on *page 2-71, DC Power Wiring for One Coral IPx 500 Cage* and on *page 2-72, DC Power Wiring for Three Coral IPx 500 Cages*.
   Connect the positive lead of the DMM to the positive (red) terminal and the negative lead to the negative (black) terminal. The reading must be +48 volts.

NOTE:

If a minus sign (–) appears in the meter display, the polarity of the 48VDC power to the cage is reversed. Verify the meter settings and connections. If the meter is properly set and connected, carefully examine the wiring between the external 48VDC main power supply and/or batteries, determine the location of the polarity reversal, and correct the wiring error before continuing.

6. Insert the DC power input connector into the receptacle of the PS500 DC unit via the opening in the top section.
7. Repeat *Step 1* through *Step 6* for all cages.
8. Skip to *page 3-7, Common Control Test*.

Figure 3-1 ***Coral IPx 500 Cage with PS500 DC Unit and Power Connections Installed***



2 AC Powered Systems

1. Verify that the cage ground wire is connected and the ground nut is tightened. See *page 2-46, Ground Wiring.*
2. Verify that the PS500 AC unit has been properly installed and the two captive screws on the upper and lower parts of the PS500 AC front panel are tightened.
3. Verify that the PS500 AC *Power* switch is turned OFF (downwards).
4. When a battery pack is used:
   - Verify that the BATTipx power switch is turned OFF (pressed down to the right).
   - Insert the battery pack connector of the DC power cable into the upper panel socket of the PS500 AC power supply. See *Figure 3-2* below.

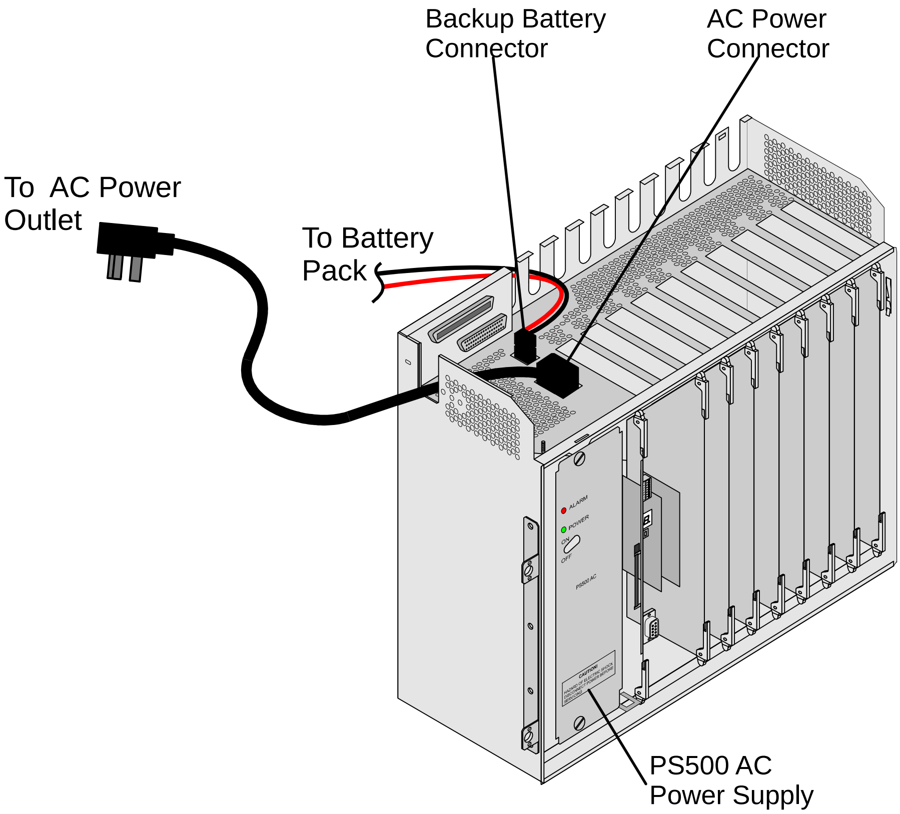
WARNING!

The backup battery connector is dedicated to the BATTipx unit, only. ***Do not*** *connect any ancillary equipment to this connection. Doing do could cause catastrophic failure to the PS500 AC power supply. Unauthorized use of the backup battery connector will void the warranty from the manufacturer for the entire installation, as it is viewed as an illegal modification of FCC registered equipment.*

The PS500 AC power supply is designed to support the Coral IPx 500 system, only.

5. Insert the female right-angled connector of the AC power cord into the upper panel socket of the PS 500 AC power supply (see *Figure 3-2*).
6. Insert the male plug of the AC power cord into the AC line outlet or primary power receptacle designated for the system.
7. Repeat *Step 1* through *Step 6* for all cages.

Figure 3-2 ***Coral IPx 500 Cage with PS500 AC Unit and Power Connections Installed***



NOTES:

3.2 Common Control Test

This section deals with the Common Control Test.

CAUTION!

Circuit cards contain static-sensitive circuitry and may be damaged or destroyed by electrostatic discharge (ESD). Always wear the static dissipating wrist strap connected to the cage while handling circuit cards. See *Figure 2-35 on page 2-55**. Hold circuit cards by their edges and avoid touching contact surfaces. Handle with care and do not drop.*

1 Control Card Initialization

The MCP-IPx control card layout is shown in *Figure 3-3*.

1. In the main cage and in the expansion cages, verify that the PS500 power switch is in the OFF position (turned downwards).

CAUTION!

Inserting the MCP-IPx card into a cage that has been powered will damage the card. Verify that the power supply unit is switched OFF before inserting the MCP-IPx.

Coral IPx 500 systems that are supplied with a PS500 AC unit ***and*** *a battery pack are still subject to voltage when the AC power cord is disconnected. To remove power from the Coral IPx 500 system, turn the ON/OFF switch on the PS500 AC unit OFF.*

2. Connect the static dissipating wrist strap connector to the cage and put on the strap.
3. Verify that all peripheral cards in the main cage and expansion cages protrude from the cage by approximately 1 inch (2.5 cm).
4. Remove the MCP-IPx card from its slot.

5. Verify that the DBX and CLA baby cards are *not* attached to the MCP-IPx interface connector J1. See *Figure 3-3* for the location of the memory interface connectors. See *Figure 3-4* for the CLA and DBX cards. See *Chapter 8 - Control Cards*, for details on the DBX and CLA baby cards. If installed, remove the CLA and/or the DBX baby cards.

6. Carefully remove the plastic insulation from under the top contact of the lithium battery holder on the MCP-IPx card. See *Figure 3-3*.

7. Attach the SAU to the connector on the MCP-IPx card. See *Figure 3-3*.
   Use a #2 ($^{1}/_{8}$" or 4mm) straight-blade screwdriver to tighten the two screws securing the SAU to the MCP-IPx until just snug. Ignoring the last digit, verify that the serial number of the SAU matches the serial number on the IMC8. Contact your Coral manufacturer's representative if the numbers do not match.

8. Insert the MCP-IPx card fully into its card slot.

9. Insert the IMC8 flash memory card into the drive located on the MCP-IPx card left printed side for details about the IMC8 card. See *Figure 8-6, on page 8-23* for details.

NOTE:

Insert the IMC8 flash memory card into the MCP-IPx card with its data label facing outwards.This ensures that the label can be read without removing the card and disrupting the operation of the system.

10. Check the positions of the DIP switches on the front panel of the MCP-IPx to ensure that they are set in the right positions.

11. Attach the Program Interface (PI) device cable to the KB0 programming port connector on MCP-IPx front side. Verify that the PI device is configured to match the data rate, word length, parity, and stop bits of KB0. Default settings for KB0 are 9600 bps, 8 data bit, no parity, and 1 stop bit, respectively.

12. Turn ON the power switch on the PS500 unit of the main cage.

13. On the front panel of the PS500 unit, verify that the green *Power* indicator is lit, while the red *Alarm* indicator is not lit.

14. On the front side of the MCP-IPx, verify that the 7-segment decimal point (*green* LED) in the numeric display illuminates.

15. If the following message appears on the PI device and is repeated continuously:

    For SERVICE/SOFTWARE installation menu HIT <CTRL I> NOW
    ****
    CHK RAM
    END CHK RAM
    Custom Init Code...
    NO CCS VERSION

The line that reads *NO CCS VERSION* indicates that no generic feature software was detected in the IMC8 card. To load generic feature software into the IMC8 card, follow the procedure in *Chapter 4 - Upgrade*.

16. If the following message appears on the PI device during system start-up:

For SERVICE/SOFTWARE installation menu HIT <CTRL I> NOW

****

CHK RAM

END CHK RAM

Custom Init Code...

CHECKING PROG-MEM

PROG-MEM IS O.K

CHECKING CODING MEMORY

CODING MEMORY IS O.K.

END CHECKING CODING MEMORY

CHECKING MEX CONTROLS

END CHECKING MEX CONTROLS

CHECKING SAU #

END CHECKING SAU #

Patch Loaded... !

CHECKING CODING MEMORY

CODING MEMORY IS O.K.

END CHECKING CODING MEMORY

CHECKING MEX CONTROLS

END CHECKING MEX CONTROLS

CHECKING SAU #

END CHECKING SAU #

CHECK CHECKSUM...

END CHECK CHECKSUM

And the following second message appears after two or three minutes, following several short messages that appear during system start-up:

Initializing CCS...

Partial initialization phase starting

System configuration identified......

CCS is on the air......
(ROOT)
CCS xx.xx.xx

Copyright (c) 2001-yyyy...............
NAME - (site name)
SAU # -

Do the following:

a. If the second message appears, the system initialized properly and is capable of processing calls. The version number of the generic feature software is indicated where the x's appear in the line that reads *CCS xx.xx.xx*.

b. If the version number shown in the PI does not match the version number printed on the IMC8 flash card supplied with the system, perform the procedure described in *Chapter 4 - Upgrade* to install a new generic software version on the IMC8 card.

17. If CLA and/or DBX cards are not used in the system, skip to *Step 29*.

18. Shut down power from the Coral IPx 500 system by positioning the PS500 power switch to the OFF position (turned downwards).

19. Remove the MCP-IPx card from its slot and place it on a static protective surface.

20. Some Coral systems may require a DBX baby card to provide additional database memory storage for a large or complex configuration.

    a. If a DBX card is supplied with the system, install the DBX baby card on the MCP-IPx card. See *page 8-29, Database Expansion Memory Unit* for details.

    b. Carefully remove the plastic insulation from under the top contact of the lithium battery holder on the DBX card See *Figure 3-4* and*page 8-29, Database Expansion Memory Unit*.

21. If a CLA card is supplied with the system, install the CLA baby card. See *Figure 3-4* and *page 8-37, CoraLINK Adapter*.

22. Check again that the plastic insulator from under the top contact of the battery holder on the MCP-IPx and DBX cards are removed. Refer to *Figure 3-3* and *Figure 3-4*.

23. Insert the MCP-IPx card fully into its slot.

24. Verify the positions of the DIP switches on the front panel of the MCP-IPx are set to the right.

25. Attach the Program Interface (PI) device cable to the KB0 programming port connector on front panel of MCP-IPx.

26. Turn ON the power switch on the PS500 unit of the main cage.

27. On the front panel of the PS500 unit - verify that the green *Power* indicator is lit, while the red *Alarm* indicator is not lit.

28. On the front side of the MCP-IPx - verify that the 7-segment decimal point (*green* LED) in the numeric display illuminates.

29. Verify that the following two messages appear on the PI device:

    For SERVICE/SOFTWARE installation menu HIT <CTRL I> NOW

****
CHK RAM
END CHK RAM
Custom Init Code...
.
.
.

The second message may appear after two or three minutes, following several short messages that appear during system start-up:

CCS is on the air......
(ROOT)
CCS xx.xx.xx
Copyright (c) 2001-yyyy.........................
NAME - (site name)
SAU # -

The second message indicates that the system has initialized properly and is capable of processing calls. After entering the password, the version level of the generic feature software is indicated where the x's appear in the line that reads CCS xx.xx.xx.

Figure 3-3 ***MCP-IPx Card Layout***

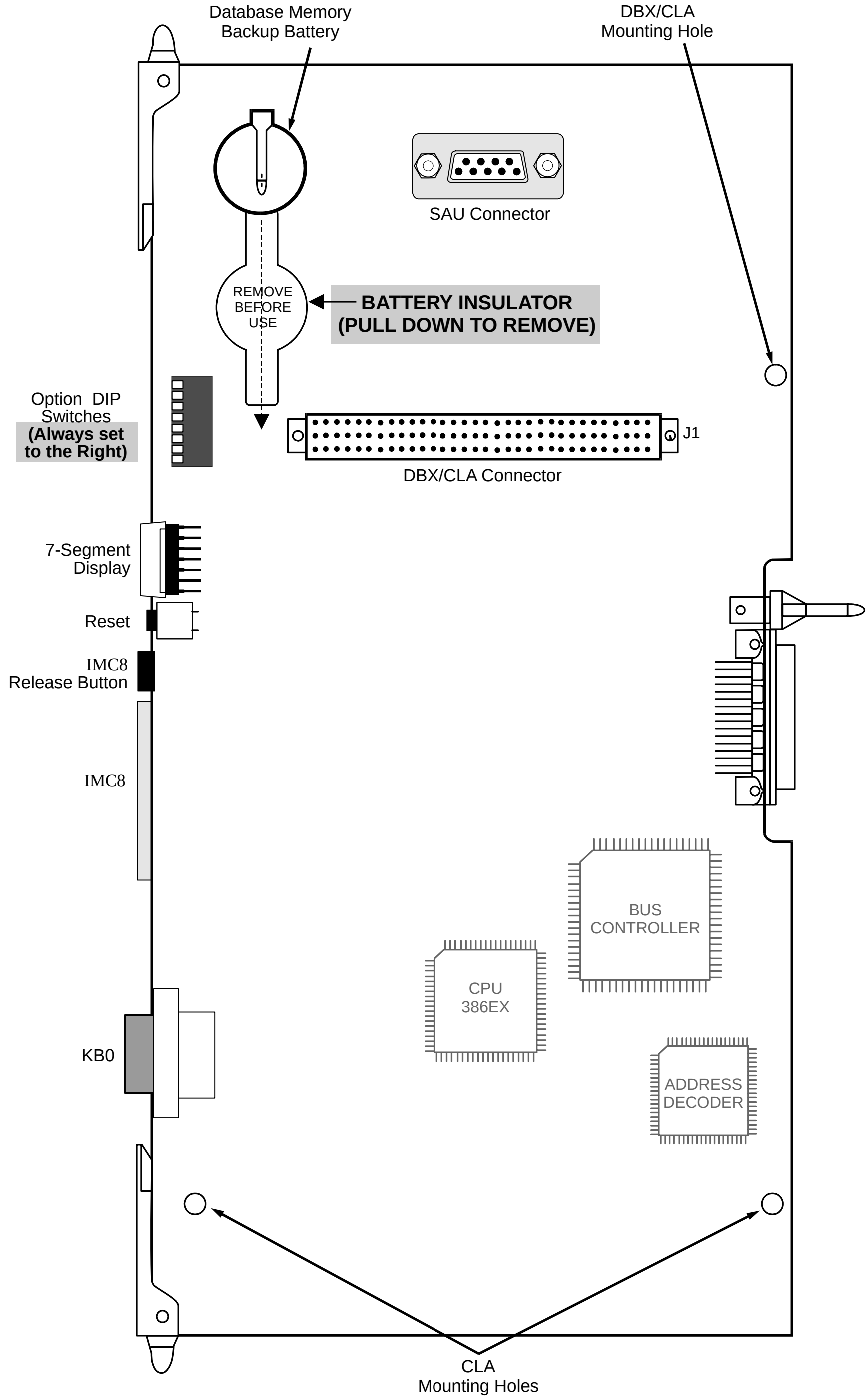
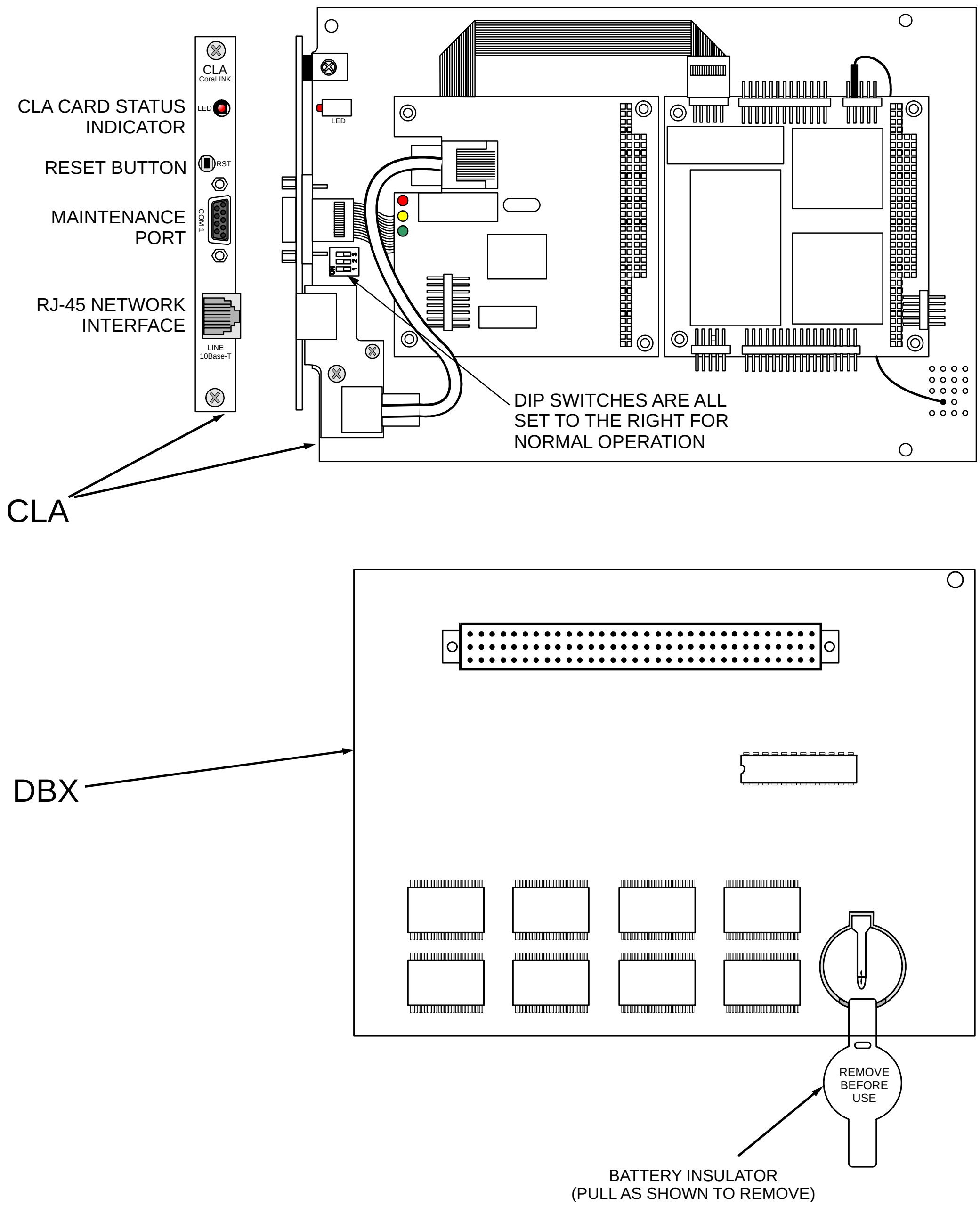


Figure 3-4 ***CLA and DBX baby cards layout***



2 Memory Lithium Battery Condition Test

If the start-up tests detect that the voltage level of a lithium backup battery on the MCP-IPx or DBX card is insufficient to reliably maintain the memory contents in the event of power failure, one of the following messages will appear:

MCP-IPx - BATTERY LOW
or
J1 DOWN BATTERY LOW

These messages indicate that the MCP-IPx card or DBX card battery has an insufficient voltage level. The first message indicates that the battery located on the MCP-IPx card has an insufficient voltage level, while the second message indicates that the battery on a DBX baby card (in this case, the card attached to memory connector J1) should be replaced. In this event the Coral system database is in jeopardy of being lost during a power failure. If this message appears, the database should be saved and the batteries replaced at the first opportunity.

To ensure that the system database is not lost, save the database to the IMC8 via the database controls branch of the system database *(ROUTE: ROOT, 0, 10, 2, 2, 0)*. For details, see *page 4-5, System Database Control*. If the system loses power or is reset for any reason and the database is lost from memory, the system will copy the database from the IMC8 card into database memory as the system restarts.

Once the system database is safely saved on the IMC8 card, power to the Coral system may be turned off at a time that will cause the least disruption of service to the user. At that time, the battery (or batteries) on the MCP-IPx may be replaced and the system restarted.

NOTE:

To replace the lithium battery, carefully raise the battery holder clip and then insert the new battery with the + (positive) symbol appearing on top. Do not apply too much pressure to the battery holder clip as this could cause the clip to snap.

WARNING!

Explosion and Environmental Hazards.

There is a danger of explosion if the battery is replaced incorrectly.

Replace the battery only with the same or equivalent type recommended by the manufacturer.

Dispose of used batteries according to requirements specified by the battery manufacturer and/or local regulatory agencies.

3.3 Peripheral Interface Card Initialization

1 Introduction

This section describes how to initialize the peripheral cards. Perform this section only after the MCP-IPx control card in the main cage has been initialized properly. If the peripheral cards are inserted before the MCP-IPx control card, they will not initialize properly.

The card installation is described on *page 3-16, Rules for Inserting a Coral Circuit Card*.

The Coral IPx 500 system peripheral cards installation and initialization procedure includes the following steps:

Rules for Inserting a Coral Circuit Card

1. Connect the static dissipating wrist strap connector to the cage and put on the strap. See *Figure 2-35 on page 2-55*.

CAUTION!

Circuit cards contain static-sensitive circuitry and may be damaged or destroyed by electro-static discharge (ESD). Always wear the static dissipating wrist strap connected to the cage while handling circuit cards. Hold circuit cards by their edges and avoid touching contact surfaces. Handle with care and do not drop.

2. To insert a circuit card completely into its slot, gently slide the card straight into the card slot. A slight resistance will be felt as the multi-pin connectors on the circuit card meet mating connectors on the backplane and engage.
3. Push against the ejectors until the front panel of the card is flush with the front frame of the card cage.

CAUTION!

Do not force the circuit card into the slot. If more than slight resistance is encountered, remove the circuit card and examine the connectors for bent pins or interfering debris.

Never place a card in a slot other than the dedicated one. Refer to Table 2-11 on page 2-59 to determine peripheral interface card types.

4. On the front panel of the PS500 unit, verify that the green *power* indicator is lit, while the red *alarm* indicator is not lit.
5. On the front panel of the peripheral card, verify that the red diagnostic LED (near the top of the card) illuminates. The LED remains illuminated continuously until the card receives its database from the system. After a few seconds, verify that the LED extinguishes. An extinguished diagnostic LED indicates that the card has initialized properly.

   If the LED remains on continuously for more than two or three minutes, either there is a conflict between the system database and its authorizations, or the card may be faulty. See *page 10-4, Diagnostic LED Indication*, or refer to the *Coral Service and Peripheral Cards Installation Manual* for further details on LED indication.
6. Attach the Program Interface (PI) device cable to the KB0 programming port connector on the front panel of the MCP-IPx if not already attached. The installation of shared service and peripheral interface cards into a Coral system has considerable impact on the system database. Refer to *Chapter 6* of the *Program*

Interface & Database Reference Manual for more information. Using the PI, verify that each of the parameters detailed below contain the appropriate information.

7. Access the card list branch of the PI (Route: CLIS) to verify that the cards are properly recognized and initialized by the Coral IPx 500 main cage MCP-IPx processor.

   The following table appears on the PI terminal:

shelf/slot	*I_TYPE*	*P_TYPE*	*CDB*	*version*	*subversion*	*status*
0 / SLOT No.	CARD_NAME	CARD_NAME	XXX	XXX	XXX	ACTIVE

The following is an explanation of the CLIS fields:

Shelf Number............ In Coral IPx 500, the main cage is designated shelf # 0; the first expansion cage is labeled shelf #1; the second expansion cage is labeled shelf #2.

Slot Number.............. Identifies the slot location of the indicated card for display. In the main cage, the range of slot numbers is 1-8; in the expansion cage, the range of slot numbers is 1-10.

I_TYPE........................ This field should show the required card name.

If the I_Type lists a different card type this indicates that the card slot has been previously initialized by a different card type. That card must be relocated to a clear card slot (where the I_Type field shows NO_CARD) or the current card slot assignment must be cleared throughout the PI.

P_TYPE....................... Shows the card type currently located in the slot.

CDB............................ Allows modifying the card database set assigned by the system. When not applicable for the card, --- is displayed in this field.

Version, Subversion.. Provides information on the card software set loaded. For display purposes only.

Status .... The information provided in this field helps you to troubleshoot card initialization problems. See *Table 3-1*.

8. Verify that the cards are identified properly in the card list branch of the system database *(Route: CLIS)*. The different card slot STATUS messages are described below in *Table 3-1*.

9. Verify that the STATUS field indicates ACTIVE for each of the cards installed. If another message is displayed, see *Table 3-1*. For a complete list of card slot status messages, see *Chapter 6* of the the *Program Interface & Database Reference Manual*.

Table 3-1 **Card Slot Status Messages**

Displayed Message	***Description***	***Technical Recommendations***
ACTIVE	Initialization was successfully completed.	None
ACTIVE/P	Card is partially active because there are not enough resources to support the other sub circuits on an 8DRCM/8DRCF card or not all tone generators are being used on the iDSP card.	Readjust SIZES to support unsupported sub circuits for 8DRCM/8DRCF card. Partial Active for the iDSP card is not critical. Readjust the parameter value only when needed.
REPLACED	P_TYPE and I_TYPE are not compatible. Both i_type and p_type fields should show the required card name. The card slot has previously been initialized by a different card type (see the entry for I_TYPE field, as well).	Install proper card or enter NO_CARD in the I_TYPE option.
WAIT_DB	Card has not received database, or has not reported initialization.	Continue waiting
NO_RESOURCES	Insufficient system memory to initialize card.	Check SIZES
FAULT	HDLC problem	Check HDLC wiring
UNAUTHORIZED	The SAU ports are limited and therefore the card is not authorized for use in this system.	Install an updated version of the SAU with the appropriate amount of ports added. Ask your dealer for an authorized upgrade.

2 System Initialization

Preparing for Initialization

After the software has been installed and initialized:

1. In the expansion cages, verify that the PS500 or PS19 power switch is in the OFF position (turned downwards).

NOTE:

Before proceeding, verify that all power supply units within the expansion cages are turned OFF. If the expansion cages are turned on before the main cage, the peripheral cards within the expansion cages will not initialize properly.

2. Check the position of shared service and peripheral interface cards that will be inserted into the system card cage. Observe any order previously directed or any established convention of the distributor. See *page 2-57, Peripheral Interface Card Installation* and use the Card Placement Diagram, as described on:
   - *page 2-60, Coral IPx 500 Main Cage 500M - Card Placement Diagram*
   - *page 2-61, Coral IPx 500 1st Expansion Cage 500X - Card Placement Diagram*
   - *page 2-62, Coral IPx 500 2nd Expansion Cage 500X - Card Placement Diagram*
   - *page 2-63, Coral IPx 500 1st Expansion Cage 800X - Card Placement Diagram*
   - *page 2-64, Coral IPx 500 2nd Expansion Cage 800X - Card Placement Diagram*
3. Verify that all peripheral cards in the main cage and expansion cages protrude from the cage by approximately 1 inch (2.5 cm).
4. Attach the Program Interface (PI) device cable to KB0 programming port connector on the front side of the MCP-IPx.

Main Cage Initialization

1. Verify that the MCP-IPx control card has been initialized properly.
2. Insert the peripheral cards completely into their card slots. See *page 3-16, Rules for Inserting a Coral Circuit Card*.
   Insert the cards fully, one by one, from right to left (slot# 1-8) in adjacent card slots, so that the installation corresponds with the uniform numbering plan.

First Expansion Cage Initialization

1. Turn ON the power supply unit in the first expansion cage.

NOTE:

Turn on the power supply unit within the expansion cage only after powering the main cage and verifying that the control card has initialized properly, otherwise the cards in the expansion cages may not initialize properly.

2. Insert the peripheral cards completely into their card slots. See *page 3-16, Rules for Inserting a Coral Circuit Card*.

   Insert the cards fully, one by one, from right to left (slot# 1-10) in adjacent card slots, so that the installation corresponds with the uniform numbering plan.

3. On the front panel of the PS500 unit, verify that the green *power* indicator is lit, while the red *alarm* indicator is not lit.

Second Expansion Cage Initialization

1. Turn ON the power supply unit in the second expansion cage.

NOTE:

Turn on the power supply unit within the expansion cage only after powering the main cage and the first expansion cage and verifying that the control card has initialized properly, otherwise the cards in the expansion cages may not initialize.

2. Insert the peripheral cards completely into their card slots. See *page 3-16, Rules for Inserting a Coral Circuit Card*.

   Insert the cards fully, one by one, from right to left (slot# 1-10) in adjacent card slots, so that the installation corresponds with the uniform numbering plan.

3. On the front panel of the PS500 unit, verify that the green *power* indicator is lit, while the red *alarm* indicator is not lit.

3.4 Battery Backup (BATTipx) Test

The BATTipx unit provides backup power to AC powered systems and is ordered separately by the customer if desired.

If the installation does not include BATTipx units, skip to *page 3-23, I/O Cable Installation*.

BATTipx unit for AC Powered Systems

This section describes how to operate and test the BATTipx backup battery pack unit (supplied by the manufacturer) on systems that use AC power. This test ensures that the BATTipx battery pack will provide power in the event of a power failure.

To check the internal batteries, BATTipx, operation (after installation of the PS500 AC power supply and initialization of the system), disconnect the power connection from the PS500 unit, make some calls, and verify that the Coral IPx 500 system still operates.

This operation should be done with fully charged batteries, or batteries that have been charged for 24 hours. The battery voltage with no load should be a minimum of 48VDC. This should be checked with a DVM.

The batteries in the battery pack are fully charged when they leave the factory. However, they discharge slowly when kept in storage. If a battery is defective, the entire battery pack should be replaced as described on *page 7-56, Replacing the Batteries*.

CAUTION!

*Output voltages exists even if the AC power cord is disconnected from the AC mains receptacle. Turn the PS500 AC **power** switch to the OFF (downward) position before disconnecting the power cord connector from the PS500 AC power supply AC voltage receptacle.*

For each system cage, follow the battery backup procedure including the following stages:

- *Operating the Battery Pack, on page 3-22*
- *Charging the Battery Pack, on page 3-22*
- *Testing the Battery Pack, on page 3-22*

1 Operating the Battery Pack

1. Verify that the PS500 AC unit has been properly installed and initialized.
2. Verify that the PABX/PS connector is connected into the DC power connection of the PS500 AC power supply. See *Figure 3-2 on page 3-5*.
3. If required, verify that the other wire pair is connected to the LTU/CSU.
4. Turn the BATTipx *power* switch ON (pressed down on the left side).
5. Verify that the PS500 AC *power* switch is turned ON (upwards) and that the green *power* indicator is lit, while the red *alarm* indicator is not lit.
6. Close the battery pack cover, as described on *page 7-57, Closing the Battery Pack Cover*.

CAUTION!

The batteries must be fully charged before proceeding. Allow at least 24 hours of system operation and call processing with batteries installed before continuing.

2 Charging the Battery Pack

1. After connecting the backup batteries and after the system initializes properly, allow 24 hours of constant operation to charge the batteries.
2. After charging, use a DVM to determine the output voltage of the battery pack by connecting the DVM probes to either terminal block. See *page 7-53, Maintenance*

3 Testing the Battery Pack

1. To check the battery pack operation after charging, follow the procedure described on *page 7-51, Testing the Battery Pack*.

CAUTION!

The batteries must be fully charged before proceeding. Allow at least 24 hours of system operation and call processing with batteries installed before testing the batteries.

3.5 I/O Cable Installation

The I/O cables are connected to the cage when all the corresponding cards are in place. I/O connections are divided between circuit cards and auxiliary equipment.

The Coral IPx 500 system I/O cables connection procedure varies depending on whether an MDFipx unit has been supplied with the system or whether an MDF is supplied separately by the customer.

- If the system includes an MDFipx, skip to *page 3-24, I/O Connection for Systems with a Wall Mounted MDFipx*.
- If the system includes a customer-supplied MDF, skip to *page 3-28, I/O Connection for Systems with a Customer-Supplied MDF*.

1 I/O Connection for Systems with a Wall Mounted MDFipx

The MDFipx unit that is supplied by the manufacturer includes one of the configurations defined in *Table 2-7* on *page 2-36, MDFipx Configurations*:

1. For MDFipx units supplied without I/O cables (which are supplied by the customer) the technician needs to assemble the Krone blocks, Champ connectors and cables.
   For detailed installation instructions on how to attach the I/O cables to MDFipx units, see *page 5-30, MDFipx Field Assembly for Units without I/O Cables Supplied*.
   In this configuration, the I/O cables are fabricated at the customer's site, and the MDFipx is supplied with sixteen Krone blocks for both main and expansion cages.
2. Verify that the MDFipx unit, whether assembled by the manufacturer or at the customer's site, has been wired as described in *page 5-23, MDFipx with I/O Cables Supplied* and that the Champ connections have been fabricated. See *Figure 3-5*.
3. Carefully route the connector end of the first cable through the I/O cable slot at the top of the rear panel of the cage. See *Figure 3-6*. For each installed card, insert the cable connector firmly onto the Coral IPx 500 I/O connector and tighten the screws. See *Figure 3-7* for the cage-MDF connection.

NOTE:

Each I/O cable has been fabricated such that it is long enough to reach its designated card connection on the top section of the cage. Verify that each cable is attached to the correct connection.

4. Mark each I/O cable near the connector on the card cage with the corresponding I/O connector identification on the Coral IPx 500 system (1-8 and auxiliary in the main cage; 1-10 in the expansion cage).
5. For information on external connections for peripheral card connection information (pinouts), refer to *page 5-44, MDFipx Unit Supplied by the Manufacturer*.
6. For information on protection devices, refer to *page 5-9, Protection Devices* for the surge arrestor mounting procedure.
7. For information about peripheral device hardware connections, refer to *Coral Terminal Equipment Installation Manual.*
8. Repeat *Step 1* through *Step 7* for all cages.
9. Skip to *page 3-30, Auxiliary Connections (IPx 500M)*.

Figure 3-5 ***MDFipx I/O Cables Ready for Connection to Coral IPx 500 Cage***

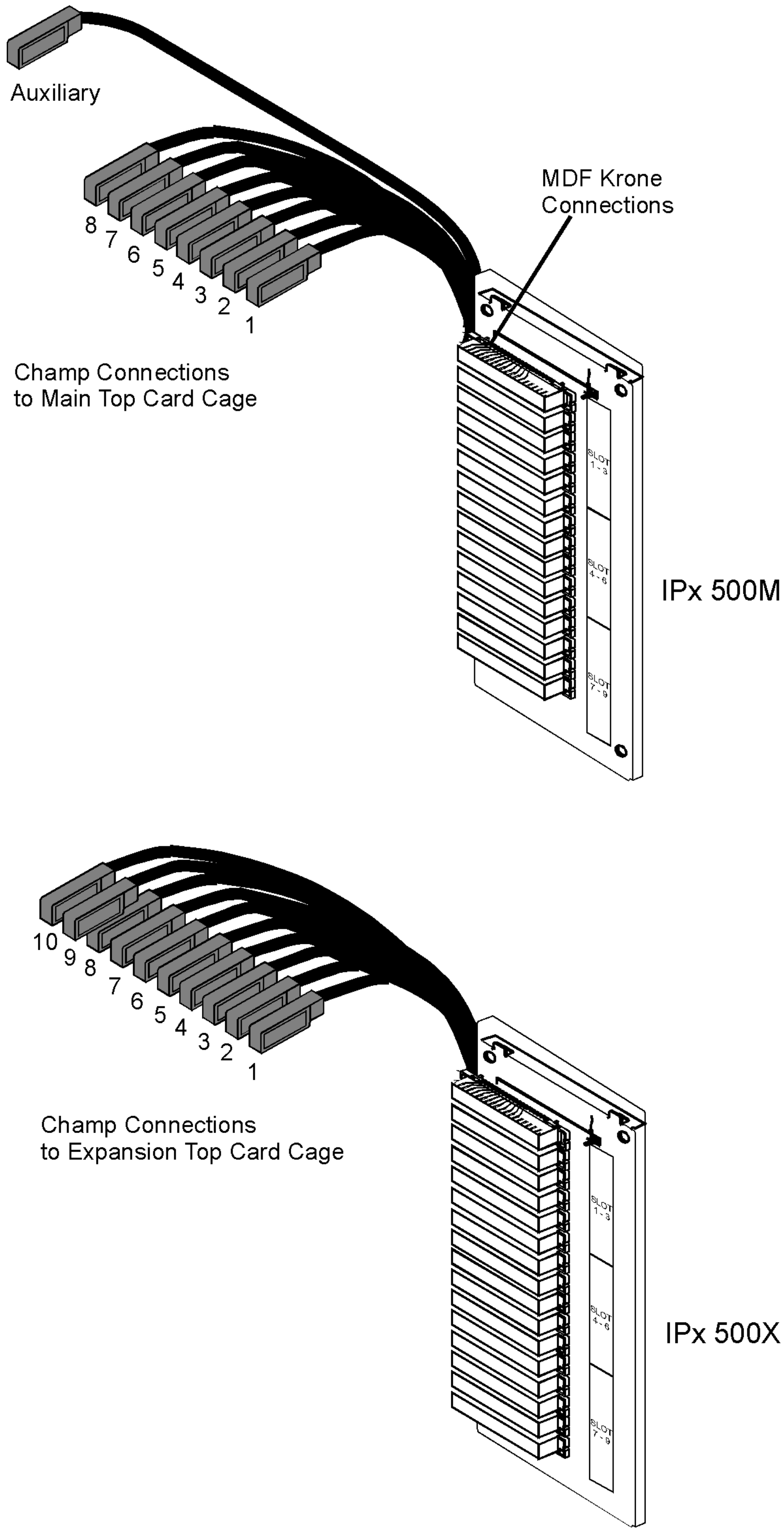


Figure 3-6 **Champ Fastening to Top Section of the Cage**

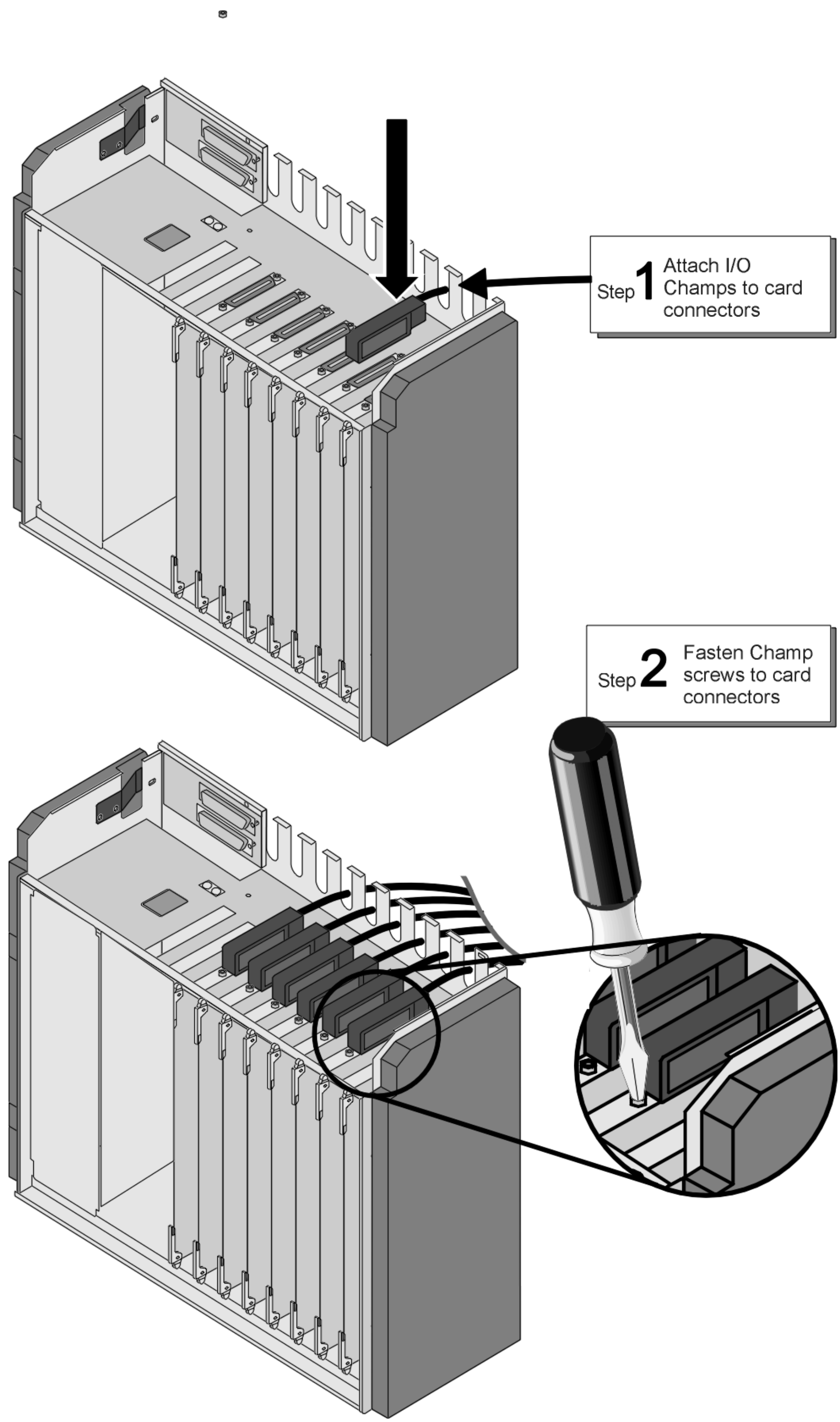
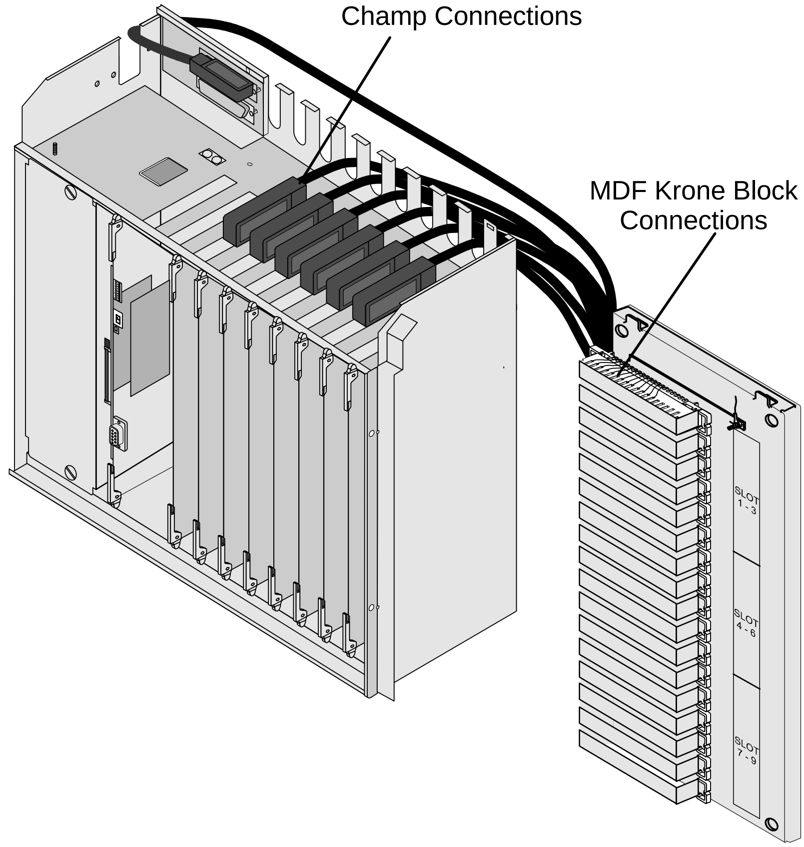


Figure 3-7 ***MDFipx Connector Configuration Right View***



2 I/O Connection for Systems with a Customer-Supplied MDF

1. Determine the route of Input/Output (I/O) cables from the MDF to the I/O connectors of the relevant peripheral cards. If required, measure the longest distance from an I/O connector on the card cage to the corresponding cable punch block (if such blocks are installed) on the MDF. See *Figure 3-7* to identify the I/O connector location from right to left.
2. Fabricate nine or ten cables of the length determined above with a male 25 pair connector on one end, for each I/O connector on the cards.

NOTE:

A 16-pair cable can facilitate the I/O connection. The remaining pins of the connector are not used.

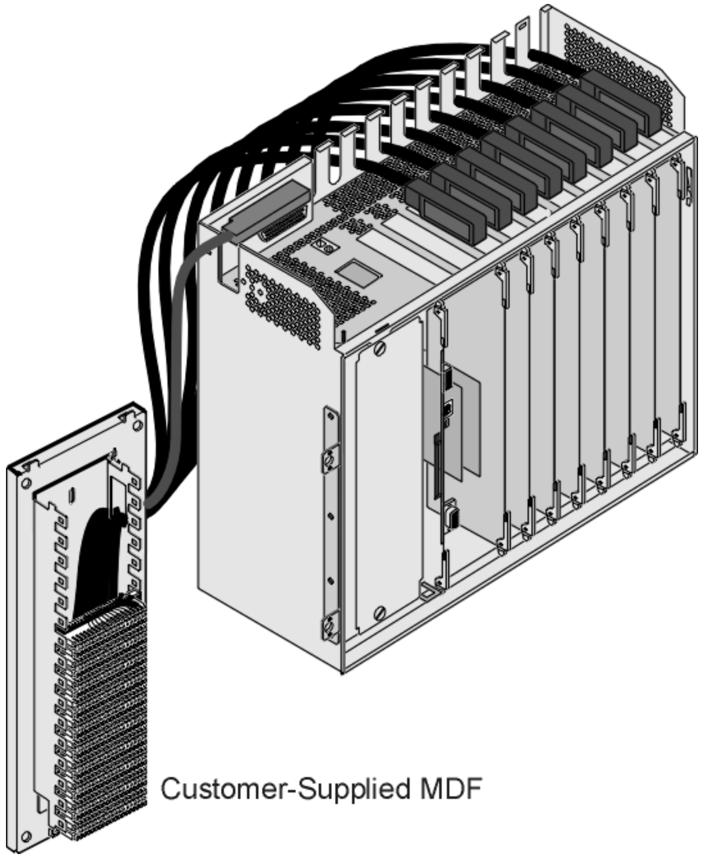
3. Carefully route the connector end of the first cable through the I/O cable slot at the top of the rear panel of the cage. See *Figure 3-6*. For each installed card, insert the cable connector firmly onto the Coral IPx 500 I/O connector and tighten the screws. See *Figure 3-8* for the cage-MDF connection.

NOTE:

Each I/O cable must be fabricated such that it is long enough to reach its designated card connection on the top section of the cage. Verify that each cable is attached to the correct connection.

4. Mark each I/O cable near the connector on the card cage with the corresponding I/O connector identification on the Coral IPx 500 system (1-8 and auxiliary in the main cage; 1-10 in the expansion cage).
5. After the MDF connections to the I/O cards of the cage are completed, connect the blocks to the MDF in accordance with the instructions provided by your MDF manufacturer.
6. For information on external connections for peripheral card connection information (pinouts), refer to:
   - *Direct Pinout of the Champ/Card Connection, on page 5-36* or
   - *Block 66 MDF Connections, on page 5-40*.
7. For information on protection devices, refer to *page 5-9, Protection Devices* for the surge arrestor mounting procedure.
8. For information about peripheral device hardware connections, refer to *Coral Terminal Equipment Installation Manual*.
9. Repeat *Step 1* through *Step 8* for all cages.

Figure 3-8 ***MDF Connector Configuration Left View***



3 Auxiliary Connections (IPx 500M)

1. The auxiliary connection is relevant for the main cage only.

The connections to the auxiliary optional equipment are performed with a connector located at the top left of the main cage. For more information, see *page 9-11, Auxiliary Connector*.

The following options are available:

- KB1, KB2, KB3 (RS-232E)
- P1 - Voice paging output option and Relay-1
- UNA and Relay-2
- Accessory or alarm Relay-3
- M1 / M2 - Musical input option

If internal music-1 is used, then set JU9 to INTERNAL (1, 2). Otherwise set JU9 to EXTERNAL (2, 3). See *Figure 9-1 , on page 9-10* and *page 9-63, Music*.

3.6 Installation Wrap-up

This section describes how to close all equipment and prepare the system for normal operation.

1. Assemble the top cover of the cage. See *page 6-12, Assembling the Top Cover*.
2. Assemble the cage front door. See *page 6-10, Assembling the Door*.
3. Close the cage front door. See *page 6-8, Closing the Door*.
4. Close the battery pack cover, as described on *page 7-57, Closing the Battery Pack Cover*.
5. Close the MDF cover. See *page 5-28, Closing the MDFipx Cover*.
6. Repeat *Step 1*to *Step 5* for all system cages.
7. Remove any other items from the shipping containers.
8. Remove all empty packages, crates, and debris.
9. Verify that you have provided all of the necessary instructions and documentation to the system operator.

NOTE:

Once the system is completely installed and operating, it is no longer necessary to keep the shipping containers.

10. Allow 24 hours of constant operation to charge the batteries.
    Check the battery pack operation after charging, as described on *page 3-22, Charging the Battery Pack* and *Testing the Battery Pack*.

NOTES:

Chapter 4

Software Installation Procedure

Coral

4.1 Generic Feature Software Upgrade

1 Introduction

The Coral IPx 500 is delivered to the site with factory-loaded software on IMC8 card. The IMC8 card is a 8MB flash memory card. See *page 8-23, IMC8 Card* for details. The IMC8 card is installed on the MCP-IPx card.

The software initialization procedure is described in *page 3-7, Common Control Test*.

The IMC8 card contains three types of data:

- Generic Feature Software Version and Boot Code
- Authorization
- Database Backup

The IMC8 card can be inserted into a PC slot using any PCMCIA application adapter for loading a new Coral software version.

Whenever an updated version of the Coral IPx 500 software is released, the upgrade is delivered to the sites either on 3.5” diskettes, e-mail, or via other electronic media file transfer. The upgrade is contained in a self-extracting compressed file that is specific for the site.

The upgraded generic feature software must be extracted by a PC using the FMprog tool, and then written from the PC hard disk into the IMC8 card. The FMprog is a tool for Coral dealers who install, upgrade and maintain Coral systems using flash memory cards. See the *FMprog PC-Utility Reference Manual*. This reference manual describes how to install and operate the FMprog-Utility.

2 Upgrading Using the FMprog PC-Utility

NOTE:

Use FMprog version 5.xx and above. Otherwise, the Coral will not initialize.

The upgrade of the generic feature software involves three main steps:

1. Installing the FMprog-Utility (version 5.xx and later)
2. Extracting the new Coral generic feature software file into the PC hard disk
3. Programming the new generic software upgrade to the IMC8 card

The FMprog-utility can be used to backup the Coral software into PCMCIA cards. The backup file is in a binary format and includes all the software components of the specific Coral system from which it was copied, including the Coral generic software version, the switch authorization, and the database. Copies should be made and maintained at every customer site. Each site has its unique set of software configuration, including its main software version, switch authorization and database, as well as its specific Software Authorization Unit (SAU) information. Copies of all system files exist and are available for use via the FMprog-Utility, if they are needed.

Use the FMprog-Utility to:

- Manage your new database versions
- Load the Coral generic version, authorization and database information on to flash memory cards
- Extract version, authorization, and database information from source files

Removing the IMC8 Card

CAUTION!

Before each installation or removal of an IMC8 card from the Coral IPx 500, press the RESET button on the MCP-IPx card.

Do not remove the IMC8 card from the MCP-IPx when “P” is illuminated. The MCP-IPx numeric status display indicates various operating and error states of the Coral IPx 500 system. A “P” appears during software installation or backup.

To remove the IMC8 card from the Coral IPx 500 system:

1. Press the Reset button on the MCP-IPx card.
2. Press the Release button on the MCP-IPx card to remove the IMC8 card.

3 Installing an Upgraded IMC8 Card

This section provides instructions on inserting the IMC8 flash memory card after it has been programmed with a new or upgraded software version.

Creating a Binary Backup of the Database

Before installing an IMC8 card with a new generic software version, it is strongly recommended that you make a binary backup of the database. The binary backup must be done by a PC using the Binary Backup PC-Utility. The Binary Backup is a tool for Coral technicians who install, upgrade and maintain Coral systems. See the *Database Binary Backup PC Utility Reference Manual* for further details.

Installing the IMC8 Card

CAUTION!

Before each installation or removal of an IMC8 card from the Coral IPx 500, press the RESET button on the MCP-IPx card.

Do not remove the IMC8 card from the MCP-IPx when "P" is illuminated. The MCP-IPx numeric status display indicates various operating and error states of the Coral IPx 500 system. A "P" appears during software installation or backup.

1. Press the Release button on the PCMCIA drive of the PC to remove the new IMC8 card.
2. Press the Reset button on the MCP-IPx card.
3. Press the Release button on the MCP-IPx card to remove the old IMC8 card.
4. Verify that the Write-Protect tab (if provided) on the new IMC8 card is in the Write-Enable position. The IMC8 card should not be write-protected. See *Figure 8-7 on page 8-24*.
5. Insert the new IMC8 card containing the upgraded generic software version.
6. Press the *Reset* button on the MCP-IPx card.
7. Verify that the following two messages appear on the PI device:

   For SERVICE/SOFTWARE installation menu HIT <CTRL I> NOW
   ****
   CHK RAM
   END CHK RAM
   Custom Init Code...
   .
   .
   .

The second message may appear after two or three minutes, following several short messages that appear during system start-up:

CCS is on the air......
(ROOT)
CCS xx.xx.xx
Copyright (c) 2001-xxxx..............
NAME - (site name)
SAU # -

After the second message appears, the system has initialized properly and is capable of processing calls. After entering the password, the version level of the generic feature software is indicated where the x's appear in the line that reads *CCS xx.xx.xx*.

8. The new IMC8 card does not include a backup of the current database. To make a backup of the database, perform the procedure described in *page 4-6, Saving to IMC8*.

CAUTION!

The Coral system automatically ceases call processing after 14 days for any of the following reasons:

The SAU serial number does not match the corresponding IMC8 SAU serial number.

The Coral generic version contained in the IMC8 is higher than the version that is authorized by the SAU.

An SAU is removed from the MCPipx component side.

Relevant system messages appear on the PI automatically warning that the system will not operate without the proper SAU.

The program contained on the IMC8 permits the generic software to function even if the serial number of the SAU is incorrect, or the SAU is absent entirely. If, however, the Coral determines that the SAU is missing or not correct, a message appears during the procedure warning that the system will not operate without the proper SAU. This provision allows the generic feature software and/or feature authorizations to be upgraded on an IMC8 card in another distant system, then installed at the proper system by replacing the existing IMC8 card from the other distant system containing the upgrade.

4.2 System Database Control

During normal system operation, the configuration database may be saved to a file on the IMC8 card for permanent storage. The system may also be programmed to save the database to IMC8 automatically on a daily basis, at a particular time.

A saved database file may be loaded at any time into the system database memory. This is a way to restore the database into the RAM of a new MCP-IPx (and DBX) memory card.

Once the database in the system has been constructed, copy the database onto the IMC8 card. For more detailed information, see *Chapter 21* of the *Program Interface Reference Manual*.

1 Accessing the Database Flash Menu

1. If a session has not already been established, establish a PI programming session by entering a PI password.
2. Select the Database Flash Menu (Route: ROOT,0,10,2,2) branch. The Database Flash menu appears, as follows:

   FLASH -MENU

```
0 - SAVE
1 - LOAD DBS
2 - SHOW FILE INFO
3 - AUTO BACKUP
4 - ERASE
```

2 Saving to IMC8

The Database Save feature allows the system database to be copied to IMC8 at any time. The procedure is as follows:

1. Verify that the system time and date are correct (press Control-T to check). Update through the Time and Date branch (Route: TIME) of the system database if necessary.
2. From the Database Flash menu press 0 to save the database to a file on the IMC8 card. The system prompts for the selection of a destination file number, either DB0.DEF or DB1.DEF, with:

   DEST FILE (0,1) - [0]

   The DB0.DEF file may be saved automatically at a preset time each day and so is usually more up-to-date than the DB1.DEF file. See *page 4-11, Automatic Daily Backup*. The DB1.DEF file is referred to as the technician's copy of the database, and should be saved each time installation or maintenance personnel make changes to the database.
3. Press 0 or 1, according to the table below, to begin saving the system database to a file. The default entry is 0 or DB0.DEF.

Database File Name	*PI Entry*	*File Description*
DB0.DEF	0	Backup automatically at a preset time
DB1.DEF	1	Manual backup, typically used by a technician

4. When the prompt *EXECUTE (Y/N)* **-** *[N]* appears, type *Y* to begin the save process, or *N* to cancel and return to the Database IMC8 menu. The PI command prompt (*:) will return immediately, but the system will process the command as a background (low priority) task.

NOTE:

Saving the database to a file generally takes several seconds. While the database is being saved, it is important to note that changes to the system configuration (such as: changing the system to Night Service, setting a Call Forward or Do Not Disturb instruction at a station, even turning on or off Background Music at a key set) are disabled until the database save process is completed.

If the system is unable to save the database, one of several messages will be generated by the system.

When the flash memory space is insufficient for saving the database (DBS), the following message will appear:

```
NO SPACE FOR SAVING DATA BASE
```

When at least one of the flags cannot be recognized, the following message will appear:

CORRUPTED
DBS

5. When the backup is valid, the save operation continues with:

Caution: Previous backup will be lost:
Proceed with backup (Y/N) [N]

Type *Y* to continue the save operation. The following message appears:

SAVING........

If the backup file is saved successfully, the following message appears:

SAVE OK.....

If the backup file save operation fails, the following message appears:

SAVE FAILED!!

During the save operation, no database updating will occur.

3 Loading (Restoring) from IMC8

A system database stored in IMC8 can be loaded into the database memory on the MCP-IPx card at any time.

NOTE:

Loading the database from IMC8 generally takes several minutes. During this process, the Coral system is non-operational.

Loading a database can be useful for installing the database of an existing system into the database memory of another system that will have a substantially similar configuration. Similarly, a database can be created by programming a system off-line at another location (perhaps at the distributor's facilities). The database can then be loaded at a convenient time at the intended site.

CAUTION!

Loading a database from IMC8 into the system database memory destroys the original database information stored in the database memory and overwrites it with information in the IMC8 database file. Once overwritten, the original database cannot be recovered.

1. From the Database Flash Menu, press *1* to load a database from IMC8.

   The system will display the following message:

   ```
   CAUTION: Database contents will be lost & system will restart !!!
   Proceed with restore (Y/N) ? [N]
   ```

2. If *Y* is selected, the system prompts to select a source file number, either DB0.DEF or DB1.DEF with:

   ```
   FILE (0/1) - [0]
   ```

3. Press *0* or *1*, according to the table below, to begin loading the database stored in IMC8.

Database File Name	*PI Entry*	*File Description*
DB0.DEF	0	Daily backup automatically at a preset time
DB1.DEF	1	Technician copy for manual backup

   The following prompt appears:

   ```
   EXECUTE (Y/N) - [N]
   ```

4. If you type *Y*, the system goes through the following retrieval conditions check sequence:

   a. Verify that the internal flags are present in the database to be loaded.

b. Verify that the database is not corrupted (the system executes the checksum test procedure).

If the procedure checking the database (DBS) retrieval conditions found the above conditions fulfilled, the following message will appear:

`Restore DBS.......`

Upon finishing the restoring procedure, the system reports:

`Restore Successful`

Next, the system will execute the partial initialization.

If the conditions mentioned above were not met, one of the following messages will be displayed:

`Operation denied DB0.DEF is not O.K.`

or

`Operation denied DB1.DEF is not O.K.`

If only one backup file was present when the technician requested DB1.DEF retrieval, the following message appears:

`Operation denied, Load DBS available only to DB0.DEF`

5. Press *Y* to begin loading the database, or press *N* to return to the Database menu.

Loading the database from a file generally takes several minutes. When the database has been loaded, the system performs a partial initialization and begins processing calls.

4 Show File Information

This option displays the list of backed up files stored on the IMC8 card.

From the Database Flash menu, press *2* to display the list of backed up files. The following prompt appears:

```
Execute (Y/N)? - [N]
```

Type *Y*. A report appears with the following columns:

File Name	Displays a list of the DB0.DEF and DB1.DEF files
	If only one file is present, DB0.DEF will appear
Version	File version
Last Date	Last backup date
Last-Time	Last backup time
File-Status	*OK* - the backed up file is valid
	Invalid - the backed up file is invalid

5 Automatic Daily Backup

The system configuration database can be automatically saved to a database file on the IMC8 at a preset time each day. Use AutoBackup to automatically save the database. During automatic daily backup the database is saved to DB0.DEF.

1. From the Database Menu, press *3* to set the Auto Backup time. The following prompt appears:

NUMBER OF DAYS BETWEEN BACKUPS [1..to..255, N]

Set the number of days between automatic backups. The default is set to 7 days between backups, so that an automatic backup file is created every week. If no automatic backups are needed, enter N for creating manual backups.

Selection of the backup type is required; either a manual backup performed by the technician or an automatic daily backup. The default after First Initialization is automatic daily backup every week.

2. Enter *N* to enable the manual backup or number between *1 to 255* to enable a daily backup.

The system prompts for the time of day with:

SET AUTO BACKUP TIME:
TIME:

3. Enter the time of day to automatically save the system database in the 24 hour, military time format. Use 24:00 for midnight and 24:01 to 24:59 for times between midnight and 1:00 a.m. The default time is 01:30, or 1:30 a.m.

4. The system will return to the Database Backup menu. Press *0* to return to the Database menu.

6 Erasing Flash Memory

This function enables erasing of backed up files stored on the IMC8 card:

CAUTION!

Performing the following procedure will erase the Flash DBS backup. Before erasing, verify that the database is no longer needed.

1. From the Database menu, press 4 to erase the flash memory.

The following prompt appears:

`Proceed with Erase (0/1/A/N/) ? [N]`

2. Specify one of the options, as follows:

0 - erases DB0.DEF.

1 - erases DB1.DEF.

A - erases both DB0.DEF and DB1.DEF.

N - cancels the operation.

After you specify 0, 1, or A, the following message appears:

`Erasing ..`

Upon completion of the erasing the following message appears:

`Erase Completed ....`

If the erasing operation was not successful the following message appears:

`Erase failed !!`

4.3 MCP-IPx Status Display Codes

Numeric Status Display

The MCP-IPx numeric status display indicates various operating and error states of the Coral IPx 500 system, and it can provide valuable information to assist in the maintenance of the system. *Table 4-1* lists the various status indications and their corresponding meaning.

A "." (dot) appears during normal system operation.

A *"0"* appears on the status display whenever the system is off-line for maintenance testing, or to install or update the generic software.

A "*b"* in the status display indicates that a backup battery on the MCP-IPx or on a DBX card no longer has sufficient energy to maintain the memory circuitry in the event system power is lost. Each time a programming session is started from the Program Interface (PI), any faulty battery is identified. The system database should be saved as soon as possible to an FM unit, and the faulty battery must be replaced as soon as the system can be shut down, to ensure continued system reliability.

An "*f"* indicates that the main processor has been interrupted to prevent database corruption during a power fluctuation. This condition should clear itself momentarily.

A "*P*" appears during software installation or backup.

CAUTION!

Do not remove the IMC8 card from the MCP-IPx when "P" is illuminated.

All other error status indications generally indicate a more serious problem, and they are likely to be accompanied by considerable system malfunction. If an error indication does not appear to affect system operation, save the database to DB0.DEF immediately. Follow the instructions in *Saving to IMC8 on page 4-6*.

When the system can be restarted without disrupting service, press the ***RESET*** push button on the front panel of the MCP-IPx.

CAUTION!

Pressing RESET interrupts all calls in progress and causes the system to initialize, possibly discarding the database information stored in the database memory and reloading the database from IMC8.

Other error symptoms will assist maintenance personnel in finding the cause of the fault.

Table 4-1 ***MCP-IPx Status Display Code***

Status Display	System Status
.	Normal System Operation
0	Off-Line Monitor/Diagnostics Mode
1,2,3,4,5,6	Appear Briefly During Initialization
b	Lithium Backup Battery (MCP-IPx or DBX) Low
C	Flash Memory (IMC8) Checksum Error
E	Map RAM, Coding PROM, or Memory Configuration Error
F	AC Fail Active (System halted due to power fluctuation)
L	Software Authorization Unit (SAU) Missing or Malfunctioning
P	Programming the flash memory during software installation and backup

Chapter 5

External Connections

Coral

5.1 Main Distribution Frame (MDF)

This chapter describes the MDF and the pinout connections to the cage and external equipment. For hardware installation instructions, refer to *Hardware Installation Procedure*.

NOTE:

The MDF may be factory supplied by the manufacturer and installed in some countries only. For more information, see *page 5-21, MDFipx Units*.

The MDF is often located adjacent to other signaling systems, such as:

- Paging and public address systems
- Voice messaging systems
- Alarm and monitoring systems
- Closed circuit television
- Property management systems
- Building and energy management systems

Therefore, care should be taken to plan the MDF layout before fastening components to the wall or mounting surface, such as:

- Trunk circuits
- Wired and wireless station equipment
- Database programming terminals
- Report printers
- Music and/or audio sources
- External public address or paging equipment
- Recording devices

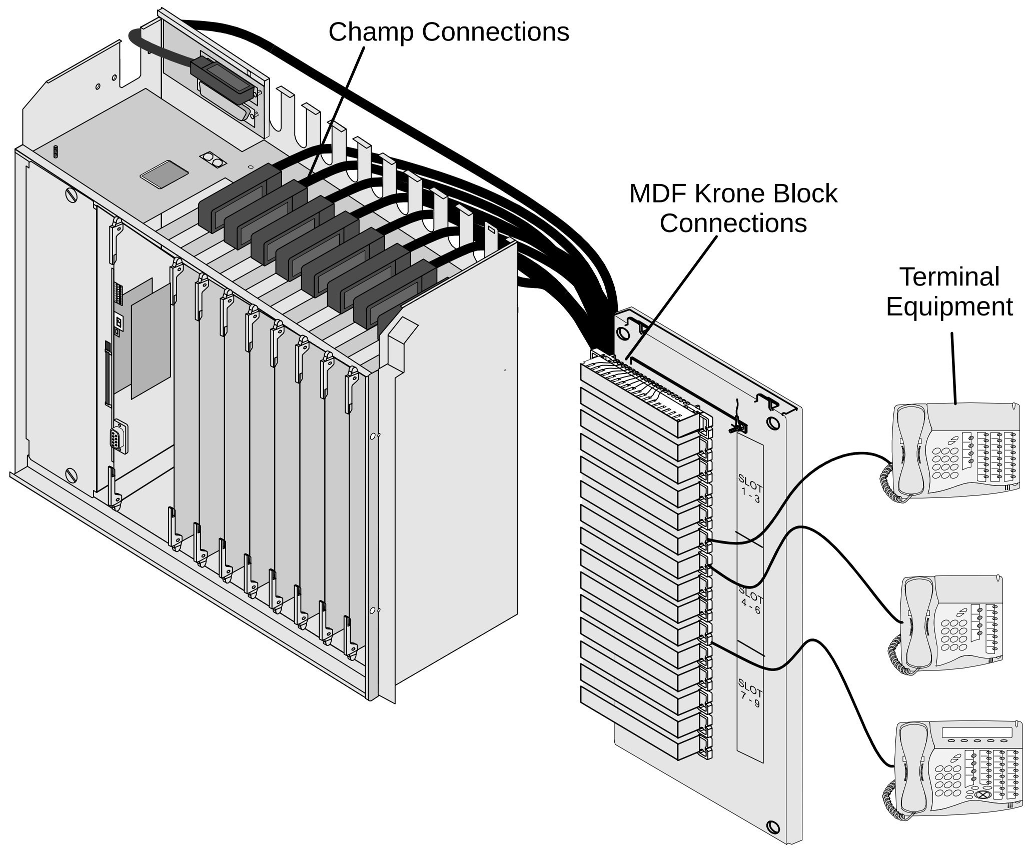
Connections to most telecommunications interfaces of the Coral IPx 500 cabinet are made via standard 25 pair Input/Output (I/O) connectors located on the top panel of the peripheral cards. Individual trunk and station interface circuits may then be cross-connected from the Coral IPx 500 I/O punch blocks to other punch blocks that terminate trunk circuits, station wiring, and other external equipment. See *Figure 5-1*.

In some cases, connections are made via RJ-45 or DA-15S connectors onto the top panel of a Coral circuit card (for example, the UGWipx, UDTipx, PRI-23ipx, T1ipx, PRI-30ipx, and 30Tipx digital trunk interfaces). See *page 5-73, Peripheral Card with RJ-45 DA-15S Connections*. Similarly, the KB0 database Programming Interface (PI) port appears on a DB9 connector on the MCP-IPx Common Control card. Plan for permanent wiring to these card types accordingly.

Tip:

It is recommended to terminate all the I/O connectors available in the system on punch blocks at the MDF even if some cables are not initially used. This saves time and effort when the system expands.

Figure 5-1 **Connecting via the MDFipx**



5.2 External Equipment

1 Station Equipment

Wired Stations

Connections to Coral IPx 500 system station equipment are established by cross-connecting the station circuit from the appropriate Coral IPx 500 I/O cable punch block to the corresponding station wiring punch block.

Table 5-1 lists the various station interface cards available for the Coral IPx 500 system, the type of station equipment that the card supports, and the number of wire pairs required by the station interface.

Station wiring between the Coral IPx 500 system MDF and the station equipment should contain at least two, and preferably three wire pairs to ensure adequate wiring capacity. At the station location, the station wiring should be terminated with a modular, six position, telephone jack, containing at least four conductors (pins 2, 3, 4, and 5).

Figure 5-2 illustrates typical jack configurations with wire designations for four station types:

- 2-wire single-line telephones SLT and digital station sets (FlexSet, APDL, CPA, GKT, DKT, DST) need only connect Tip [T] and Ring [R] or <UpA> and <UpB> as shown.
- FlexSet 280 series or FlexSet APDL units with PEX or PEX+APA, DKT 2000 sets with PEX or APA; need an extra 2 wires when power is supplied through the line connector. The polarity of this connection is irrelevant. When using the TPS (single unit Telephone Power Supply), no additional wires are required.

For peripheral device installation, refer to the *Coral Terminal Equipment Installation Manual*".

To prevent a potential shock hazard to station users and damage to the system, make sure that station circuits extended over cables that exit the building are adequately protected from lightning and surge currents. See *page 5-9, Protection Devices* for protective device specifications.

Table 5-1 ***Station Interface Wire Pair Requirements***

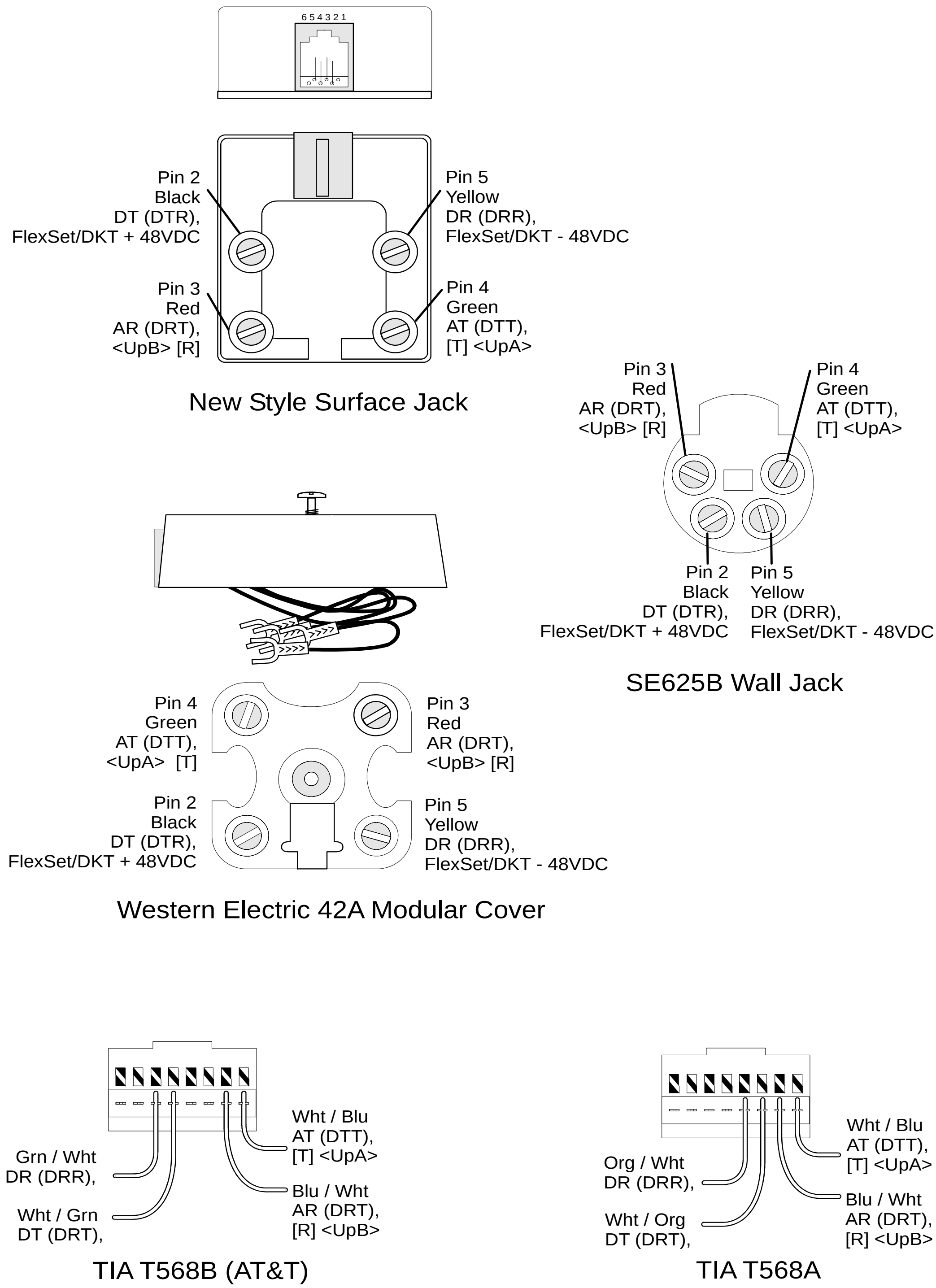
Station Interface Card Type	*Supported Station Equipment*	*Pairs Required*
8SLSipx, 16SLSipx	Standard Single-Line Telephone (SLT) Sets, SLT Sets with Message Waiting Lamp	1
8SFTipx, 16SFTipx	FlexSet, APDL, CPA, GKT, DKT*, DST*, APA, PEX, PEX+APA	1
	FlexSet 280 series with PEX, FlexSet 280S/APDL with PEX or PEX+APA, * DKT 2000/APDL with PEX or APA, CPA; for optional external power via line connector pins 2 and 5 (see *Coral Terminal Equipment Installation Manual*).	2
2SKWsl*, 4SKWsl*	RBS (Radio Base Station) for CoralAIR* wireless handset	2
8SKKsl, 8SKKipx	RBS (Radio Base Station) for Coral FlexAir wireless handset	1
FlexSet-IP 280S, Coral Sentinel	LAN connection	2
	with power over LAN type-A	4

* discontinued, no longer available

NOTE:

2SKWsl, 4SKWsl, and 8SKKsl cards with the suffix "sl" are for use in slots 1,2,3 of the Coral IPx 500M main cage only.

Figure 5-2 ***Modular Station Jack Wiring Diagram***



Wireless and VoIP Stations

The FlexAir handset and the FlexSet-IP 280S models are not connected via the MDF.

Related Documentation

For further information about Coral voice terminals not covered by this section, consult the following documentation.

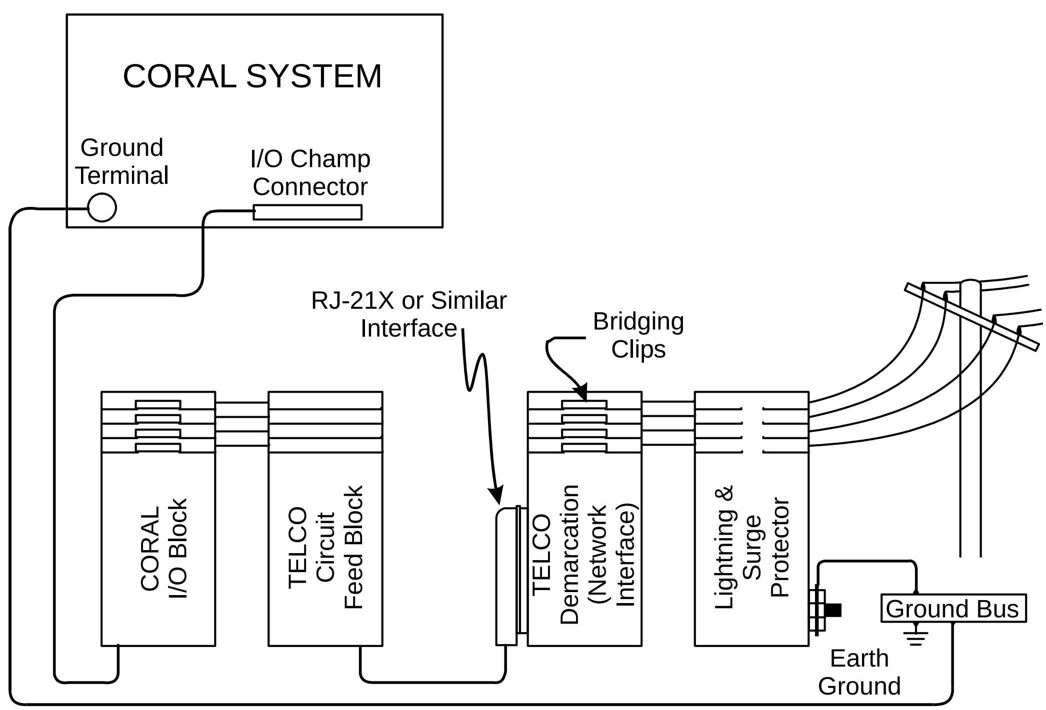
Station Type	*Manual*
CoralAIR (wireless) handset, SKW, RBS	CoralAIR (Wireless Systems) Installation Manual CN7245-7131301
FlexAir (wireless) handset, SKK, RBS	FlexAir (Wireless Systems) Installation Manual
IP device FlexSet-IP 280S, Coral Teleport FlexIP SoftPhone	Coral VoIP Installation Manual
Peripheral device DKT/DST/DPEM	Coral I, II, III Installation Manual, Chapter 11, CN7244-7182604
Peripheral device FlexSet 120/280/APDL series	Coral Terminal Equipment Installation Manual

2 Trunk Circuits

Generally, trunk circuits are connected to the Coral IPx 500 system simply by cross-connecting the trunk interface circuit of a Coral IPx 500 trunk card to the point of demarcation where the trunk circuits from the Telephone utility Company (TELCO) appear. For more specific data regarding all trunk types supported by the Coral IPx 500 systems, refer to *page 10-7, Peripheral Card Description*. Refer also to the *Coral Service and Peripheral Cards Installation Manual.*

Protective devices are regularly provided by the TELCO on circuits originating outside the building. Determine if the TELCO protective devices meet the specifications provided in *page 5-9, Protection Devices*, and if necessary, install secondary protector devices which meet these specifications. To be effective, the protective devices, whether TELCO or customer provided, must be grounded to the same ground point as the Coral IPx 500 system. *Figure 5-3* illustrates typical trunk circuit wiring from building entrance to the Coral IPx 500 system.

Figure 5-3 ***Typical Trunk Circuit Wiring Diagram***



External Equipment

5

3 Auxiliary Connections

Table 5-2 lists the auxiliary connection pinout. The auxiliary connector is located at the top left of the Coral IPx 500M main cage. Connections to the auxiliary are made with a standard 25 pair Input/Output Champ™ connector. Individual auxiliary interface circuits may then be cross-connected from the Coral IPx 500 I/O punch blocks to other punch blocks that terminate music circuits and relay wiring, etc.

Table 5-2 ***Auxiliary and Resources Connector***

Connector	*Remarks*
Expansion	Used with Coral IPx 500X/800X Expansion cages, only
KB1, KB2, KB3	See *Table 9-4*, *on page 9-58* for pinout
Music	See *Figure 9-13*, *on page 9-64* for details
Page	See *Figure 9-17* and *Figure 9-17*, *on page 9-74* for details
Relays	See *Table 9-4*, *on page 9-58* for relays definition

5.3 Protection Devices

1 Introduction to Primary and Secondary Protection Devices

WARNING!

Any circuit connected to the Coral system that is exposed to lightning or electrical hazards must be protected with approved lightning and surge protection devices to avoid potentially lethal hazards to all users.

CAUTION!

Secondary protection devices should be installed on any circuit requiring primary lightning protection, which connects electrically to an interface of the Coral system.

Lightning and over-voltage arrestors are used to protect the user and the system from lightning and other electrical hazards that may occur on external circuits connected to the system.

Any cable that passes through open air, under open ground (i.e. across parking lots, fields, road beds, etc.), across a bridge, or along the exterior or under the non-metallic roof of a building, is exposed to lightning and electrical hazards.

Telephone circuit protection devices fall into two distinct design categories:

- Primary (lightning) protection devices that limit voltages on a telephone circuit below levels which do not present a hazard to the user. (*Table 5-3* lists minimum specifications).
- Secondary (surge and impulse) protectors that further limit voltages on a telephone circuit to prevent damage to electronic equipment. *Table 5-4* lists the specifications.

Primary protection absorbs the major impact of infrequent, but dangerous, catastrophic surges, while secondary protection suppresses constantly occurring impulses. These impulses, while not dangerous, can cripple valuable, and in many cases, essential, communication facilities.

Generally, leased or switched circuit facilities provided by the local telephone utility company are equipped with primary protection devices installed with the circuit. However, privately owned aerial or buried cable feeding from one building to another may not be equipped with protection devices. Always consult with whomever provided the circuits to determine whether protection devices are present, and if so, what type. Never assume that protection devices have been provided by another party, or that existing protection devices are adequate.

The secondary protection must include a leakage current protector in series with every wire, tip and ring, on every port that is either connected to the public telephone network, or to any cable located outdoors. The requirement is in accordance with UL® Specification 60950, Third Edition or CSA C22.2 No. 60950. The required protectors can be mounted directly on a 66 block in the MDF.

Table 5-3 ***Telephone Circuit Primary Lightning / Surge Arrestor Device Specifications***

Specification	*Measurement*
Construction Primary Element Fail-safe Metallic Shunt Vent Safe Spark Gap Heat Coil (recommended)	 3 Electrode Gas Tube 1.0Ω to Ground Max. Per UL 497 1.0A 100 Sec. Max.
Clamp Points (per REA PE-80) DC. 2kV/S. 100V/µS 10kV/µS Vent Safe @ 100V/µS	 350VDC Max. 400VDC Max. 500VDC Max. 800VDC Max. 1600VDC Max.
DC Impulse Current (8x20µS wave)	10KA Nom.
AC Discharge Current (60Hz/1S)	10A Nom.
DC Holdover (per IEEE 465.1)	160VDC Max.

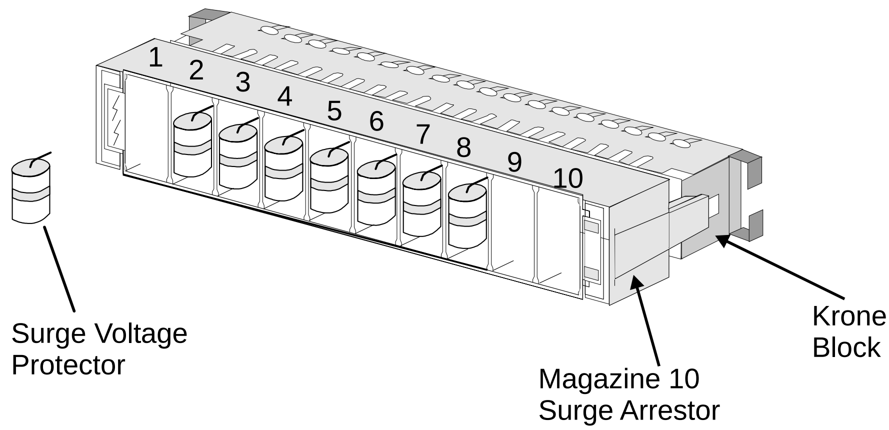
Table 5-4 ***Telephone Circuit Secondary Protection Device Specifications***

Device Type	*Specification*	*Measurement*
Surge/Impulse Protector	Clamp Points DC. 2kV/S 100V/µS 10kV/µS	 230VDC Max. 230VDC Max. 100VDC Max 30VDC Max.
	Response Time	5nS Max.
	Series Resistance	15Ω Max.
Sneak Current Protector	Acceptance	UL Listed
	Voltage Rating	600VDC Min.
	Current Rating	350mA Max.
	Fusing Time Characteristics 100% of Rating 150% of Rating	 4 Hr. Min. 10 Sec. Nom., 210 Sec. Max.

2 Surge Arrestor Magazine Mounting

To prevent serious damage to the Coral IPx 500 system, the analog trunk and station circuits, whose cables are laid outside the building, must be protected from the electrical peaks caused by lightning. Magazine 10 surge arrestors must be mounted on the MDF where telephone circuits are cross-connected.

Figure 5-4 ***Magazine with 10 Surge Arrestor and Voltage Protector Units***



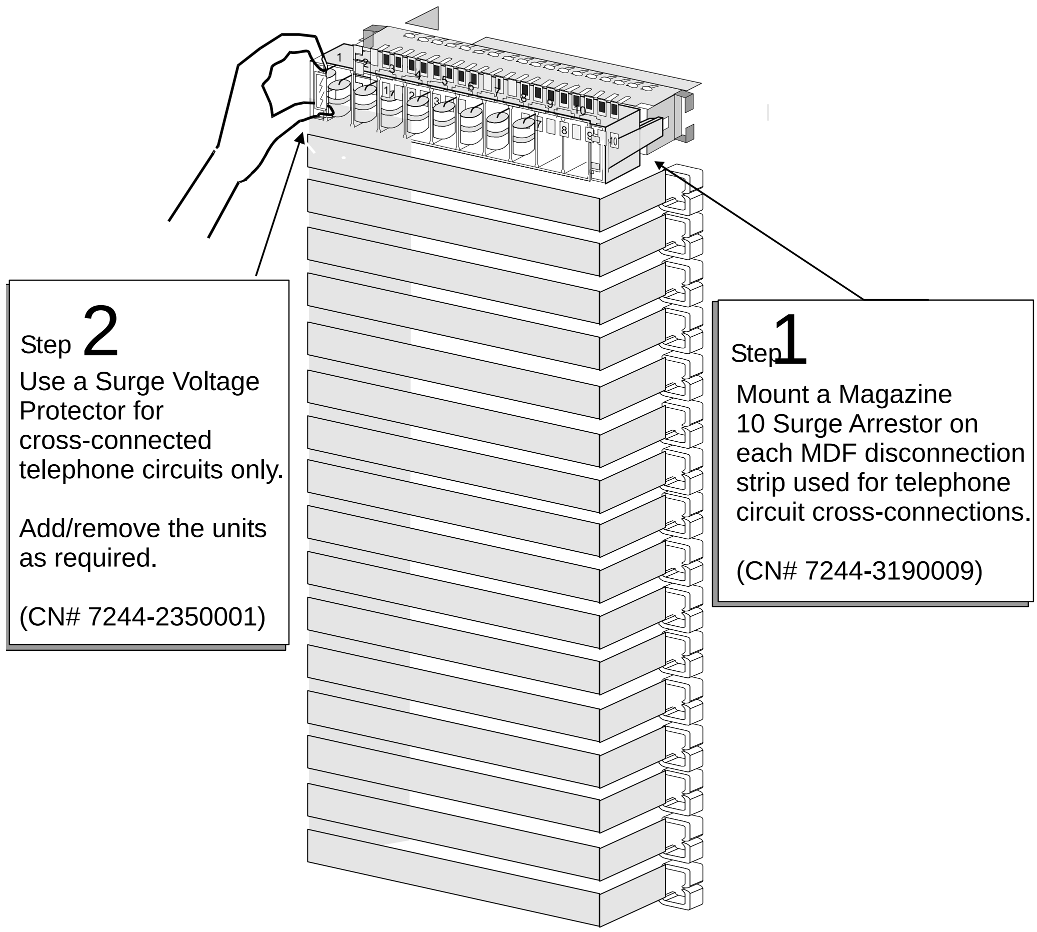
The mounting procedure is as follows:

1. Identify the MDF disconnecting strips used for telephone connections.
2. Place a magazine 10 surge arrestor (catalog no. 7244-3190009) on each MDF strip used for telephone. See Step 1 in *Figure 5-5*.
3. Use the relevant tables found on *page 5-44, MDFipx Unit Supplied by the Manufacturer* to identify the MDF cross connection points that are used for each telephone. The connecting cables will be visible.
4. Insert a surge voltage protector (catalog no. 7244-2350001) in the magazine 10 surge arrestor where a telephone is connected. See step 2 in *Figure 5-5*.

Protection Devices

5

Figure 5-5 ***Connecting Surge Arrestor Magazine to the MDFipx***



NOTES:

5.4 Power Fail (PF) Transfer Circuits

With the installation of trunk cards to support the PF (Power Fail) transfer option, four trunks per trunk card (two trunks per 8TPFsl) may be directed to station sets if power to the Coral IPx 500 system is interrupted. This arrangement, referred to as power failure transfer, completely bypasses the system, allowing specific stations to originate outgoing calls and / or continue answering incoming calls.

1 Physical Connection

Stations

The SLT (single line telephone) set can be used as a power failure station. *Figure 5-6* illustrates wiring interconnections between the trunk card, station card, and a single line station set.

NOTE:

Coral FlexSet, GKT, DKT, and DST cannot be used as power failure stations.

Trunks

In the Coral IPx 500 system, the following analog trunk peripheral cards support power fail transfer:

- The following four-trunk cards, each provide four (4) ports with PF transfer connections:
  4T-Cipx, 4T-CIDipx, 4TMR-PFipx, 4TMR-PF-Gipx, 4TMR / S-50 / 16-PF-Gipx
  (and 4T-Csl, 4T-CIDsl, 4TPFsl, 4TMR-PFsl in slots 1,2,3 of the main cage)
- The following eight-trunk cards, each provide four (4) ports with PF transfer connections:
  8T-Cipx, 8T-CIDipx
  (and 8T-Csl, 8T-CIDsl in slots 1,2,3 of the main cage)
  NOTE: only circuits 2, 3, 4, and 5 support power failure transfer connections.
- The 8TPFsl card (in slots 1, 2, and 3 of the main cage), provides two (2) ports with power failure (PF) transfer circuits.
  NOTE: only circuits 4 and 5 support power failure transfer connections.
  For further Information on these trunk interface cards, see the *Coral Service and Peripheral Cards Installation Manual.*

2 Database Programming

To use the power fail transfer features of the Coral system, the station dial numbers, to which power fail trunks are transferred, must be entered in the system database. Refer to Power Fail Trunk Definition in *Chapter 8* of the *Program Interface Reference Manual* for more information.

Power Failure Trunk Definition (Route: TRK, 4)

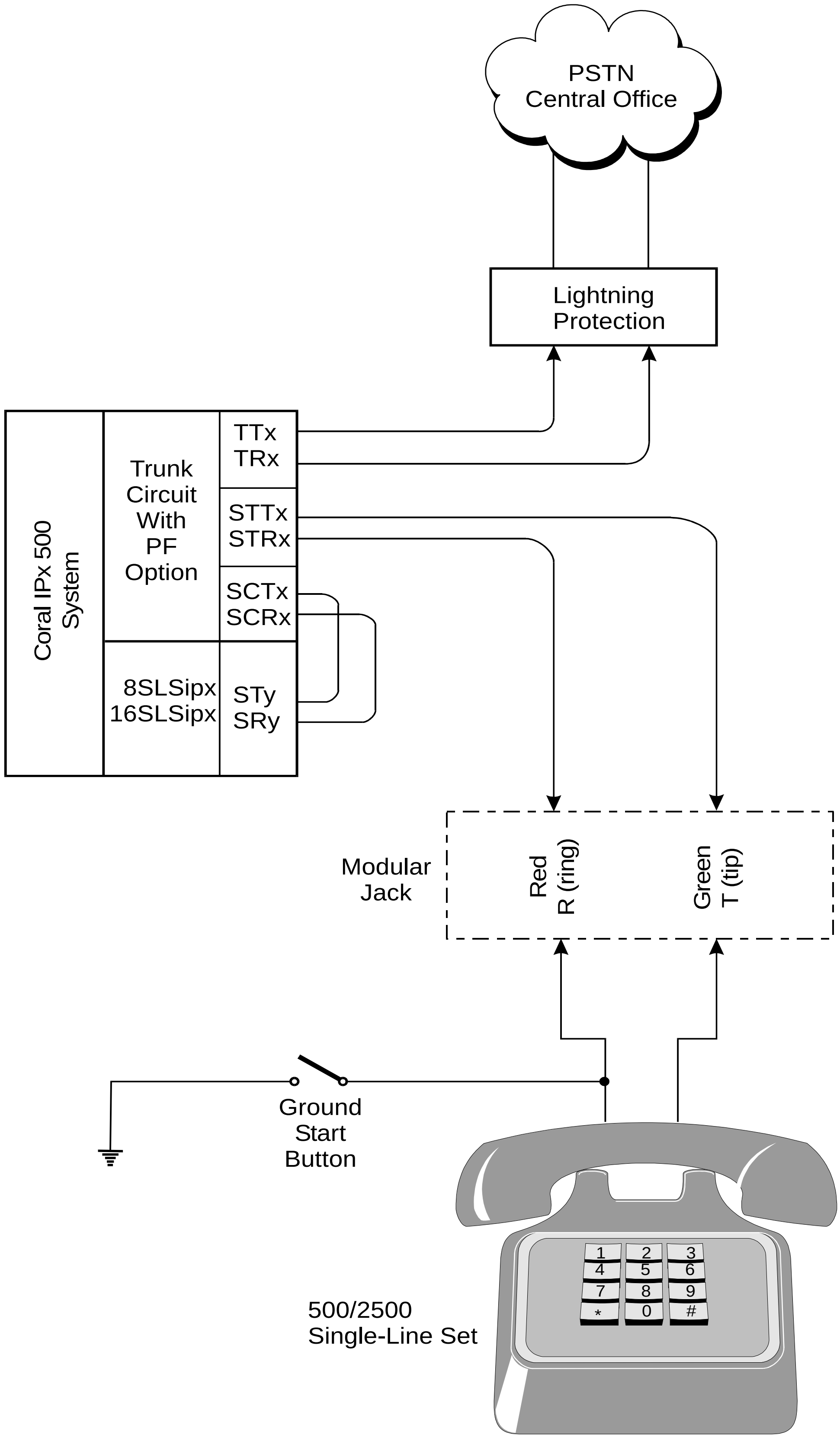
FROM/TO DIAL#

Enter the required range of Loop Start / Ground Start analog trunks.

DEST

Set this parameter to determine the power fail station system dial number to be connected to the trunk during power failure.

Figure 5-6 ***Power Fail Wiring to Single-Line (500/2500) Telephone Set***



NOTES:

5.5 Data Communication Ports

RS-232E

The Coral IPx 500 switching system is capable of switching digital data information as well as voice signals.

Coral IPx 500 system data communication devices are available for packet switched data for low volume applications. The packet data communication devices are provided using the APA (Application Processor Adapter) or APDL (Applications Processor Data Link). The data communication devices provide a serial interface wired as Data Communication Equipment (DCE). That is, transmit data is data that is sent to the APA / APDL, and receive data is data that is received from the device.

The APA provides a proprietary data link to an external applications processor. The link uses an asynchronous RS-232E (V.24) serial data interface, operating at a data rate of up to 19.2Kbps. The interface appears at a DB-25S connector on the rear panel of the APDL and DKT2000 with APA, or at a RJ-45 jack connector on the rear panel of the GKT and FlexSet 280S / APDL with APA or PEX+APA.

Through the link, a proprietary signaling protocol allows the Coral system master processor to send call status messages to the applications processor, and the applications processor to send call control instructions to the APA / APDL. Application processors available for the Coral system include the Computerized Attendant Position (CAP), the ACD group supervisor and management position, Coral CallMaster (CCM), Coral World Wide Office (WWO), TAPIdriver, GKT PC-Utility, or any other application that complies with proprietary API products.

Use the following RS-232 cables:

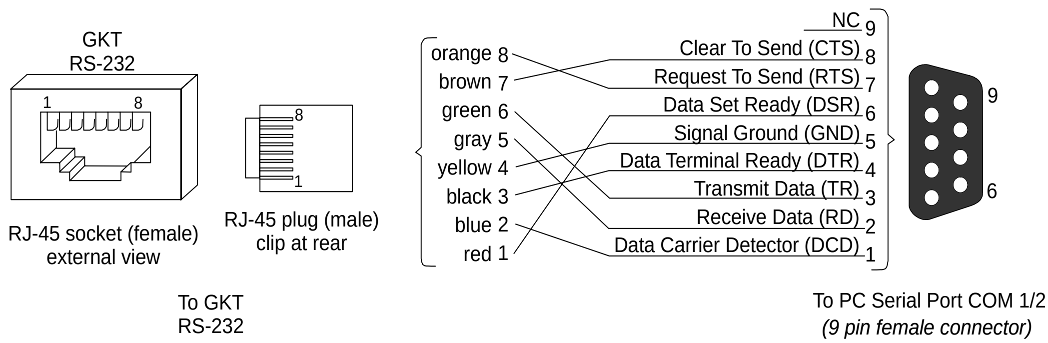
- Catalog no. 7244-8001195 for DKT2000 with APA or APDL.
- Catalog no. 7244-6914055 for FlexSet 280S / APDL with APA or PEX+APA with APA or FlexSet 80 (GKT).

Table 5-5 lists the pin designations for the RS-232 interface module of the APA / APDL.

Table 5-5 **DKT2000 with APA/APDL RS-232E (V.24) Interface Module Pin Functions**

Pin Designation	*Pin #*	*Function*
Transmit Data	2	Input to APA/APDL
Receive Data	3	Output from APA/APDL
Request to Send	4	Input to APA/APDL
Clear to Send	5	Output from APA/APDL
Data Set Ready	6	Output from APA/APDL
Signal Ground	7	
Carrier Detect	8	Output from APA/APDL
Data Terminal Ready	20	Input to APA/APDL

Figure 5-7 **FlexSet 80 (GKT) or FlexSet 280S/APDL with APA or PEX+APA RS-232E (v.24) Pin Functions**



5.6 MDFipx Units

Supplied by the Manufacturer

1 MDFipx Configurations

The MDFipx can be supplied in any one of the configurations provided in *Table 5-6*.

NOTE:

The MDFipx is installed in some countries only. For more information, please contact the manufacturer's representative.

Table 5-6 ***MDFipx Configurations***

Configuration	*for Cage Type*	*Description*
1MDFipx	IPx 500M	Includes Krone blocks, cables, and Champ connectors attached.
1MDFipx	IPx 500IPx 500X	Includes Krone blocks, cables, and Champ connectors attached.
2MDFipx	IPx 500M	Includes Krone blocks, cables, and Champ connectors attached.
2MDFipx	IPx 500X	Includes Krone blocks, cables, and Champ connectors attached.
1MDFipx w/o cables	IPx 500M/ IPx 500X	Includes Krone blocks and Champ connectors provided separately.
2MDFipx w/o cables	IPx 500M/ IPx 500X	Includes Krone blocks and Champ connectors provided separately.

Figure 5-8 and *Figure 5-9* display the single and double MDFipx units with the cover attached. *Figure 5-3 on page 5-7* illustrates typical circuit wiring from building entrance to the Coral IPx 500 system.

- 1MDFipx - single unit, used for Coral I/O block.
- 2MDFipx - double unit, used for TELCO circuit feed block.

Figure 5-8 ***1MDFipx Cover***

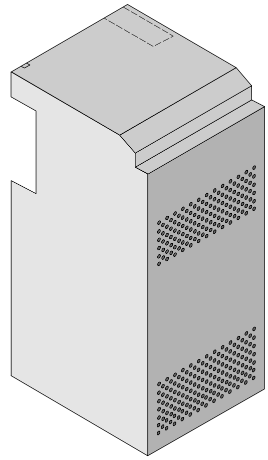
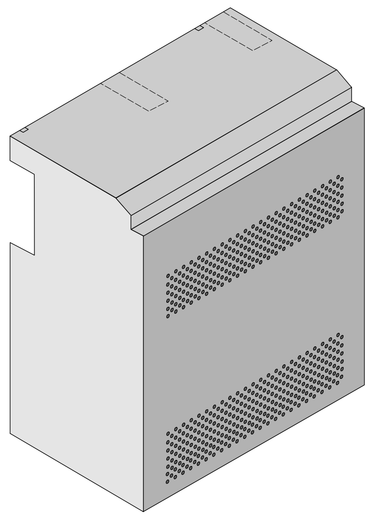


Figure 5-9 ***2MDFipx Cover***



2 MDFipx with I/O Cables Supplied

Figure 5-10 and *Figure 5-11* illustrate the I/O cable connections between the MDFipx and the I/O connectors. The top two blocks are connected to slot #1 and the bottom two blocks are connected to the auxiliary connector in the main cage and to slot #10 in the expansion cage.

Table 5-7 and *Table 5-8* show the general Champ-Krone connections between the I/O Champ connector on the Coral peripheral card and the MDFipx blocks. The MDFipx units are provided with cables and Krone™ blocks for all peripheral cards.

The color codes for the Champ-Krone bar connections are provided in *Table 5-7*, for the main cage, and in *Table 5-8* for the expansion cage.

For detailed pinout information for all peripheral card types, refer to *page 5-44, MDFipx Unit Supplied by the Manufacturer*.

NOTE:

Each Krone MDFipx block is a disconnecting strip comprised of 10 junctions.

Figure 5-10 ***Coral IPx 500 Main Cage Connected to MDFipx***

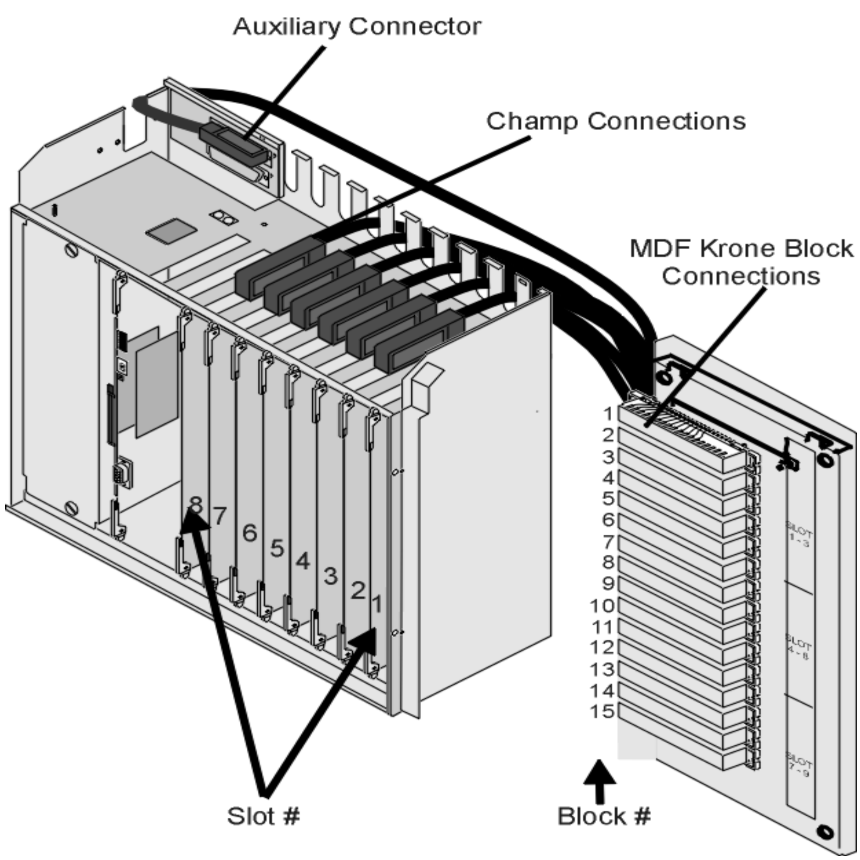


Figure 5-11 ***Coral IPx 500 Expansion Cage Connected to MDFipx***

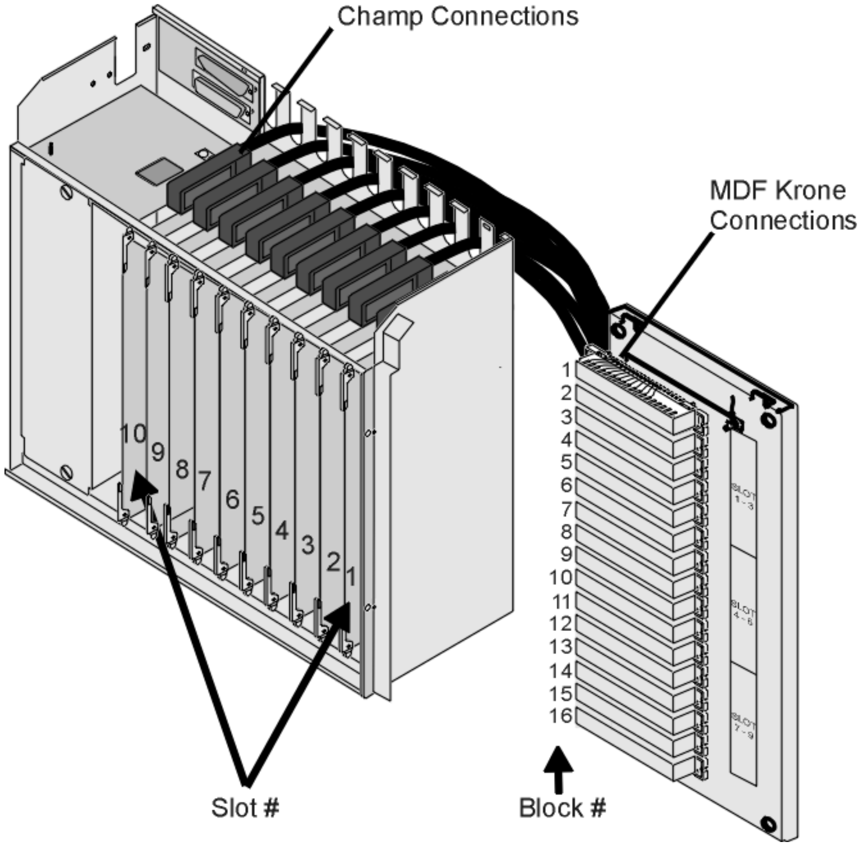


Table 5-7 ***Main Cage - Champ to Krone Connections and Color Codes***

Main Cage																					
Block	Slot	Krone Block Pairs																			
		1		2		3		4		5		6		7		8		9		10	
1	1	bl	w	o	w	gn	w	br	w	gy	w	bl/w	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w
		25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43	17	42	16	41
2	1/2	o/w	w	o/gn	w	o/br	w	o/gy	w	gn/w	w	gn/br	w	bl	w	or	w	gn	w	br	w
		15	40	14	39	13	38	12	37	11	36	10	35	25	50	24	49	23	48	22	47
3	2	gy	w	bl/w	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w	o/wh	w	o/gn	w	o/br	w	o/gy	w
		21	46	20	45	19	44	18	43	17	42	16	41	15	40	14	39	13	38	12	37
4	2/3	gn/w	w	gn/br	w	bl	w	o	w	gn	w	br	w	gy	w	bl/w	w	bl/o	w	bl/gn	w
		11	36	10	35	25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43
5	3	bl/br	w	bl/gy	w	o/wh	w	o/gn	w	o/br	w	o/gy	w	gn/w	w	gn/br	w				
		17	42	16	41	15	40	14	39	13	38	12	37	11	36	10	35				
6	4	bl	w	o	w	gn	w	br	w	gy	w	bl/br	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w
		25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43	17	42	16	41
7	4/5	o/w	w	o/gn	w	o/br	w	o/gy	w	gn/w	w	gn/br	w	bl	w	or	w	gn	w	br	w
		15	40	14	39	13	38	12	37	11	36	10	35	25	50	24	49	23	48	22	47
8	5	gy	w	bl/w	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w	o/wh	w	o/gn	w	o/br	w	o/gy	w
		21	46	20	45	19	44	18	43	17	42	16	41	15	40	14	39	13	38	12	37
9	5/6	gn/w	w	gn/br	w	bl	w	o	w	gn	w	br	w	gy	w	bl/w	w	bl/o	w	bl/gn	w
		11	36	10	35	25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43
10	6	bl/br	w	bl/gy	w	o/wh	w	o/gn	w	o/br	w	o/gy	w	gn/w	w	gn/br	w				
		17	42	16	41	15	40	14	39	13	38	12	37	11	36	10	35				
11	7	bl	w	o	w	gn	w	br	w	gy	w	bl/w	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w
		25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43	17	42	16	41
12	7/8	o/w	w	o/gn	w	o/br	w	o/gy	w	gn/w	w	gn/br	w	bl	w	or	w	gn	w	br	w
		15	40	14	39	13	38	12	37	11	36	10	35	25	50	24	49	23	48	22	47
13	8	gy	w	bl/w	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w	o/wh	w	o/gn	w	o/br	w	o/gy	w
		21	46	20	45	19	44	18	43	17	42	16	41	15	40	14	39	13	38	12	37
14	8/Aux	gn/w	w	gn/br	w	bl	w	o	w	gn	w	br	w	gy	w	bl/w	w	bl/o	w	bl/gn	w
		11	36	10	35	25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43
15	Aux	bl/br	w	bl/gy	w	o/w	w	o/gn	w	o/br	w	o/gy	w	gn/w	w	gn/br	w				
		17	42	16	41	15	40	14	39	13	38	12	37	11	36	10	35				

bl- blue

w - white

o - orange

gn - green

br - brown

gy - grey

Table 5-8 ***Expansion Cage - Champ to Krone Connections and Color Codes***

Expansion Cage																					
Block	Slot	Krone Block Pairs																			
		1		2		3		4		5		6		7		8		9		10	
1	1	bl	w	o	w	gn	w	br	w	gy	w	bl/br	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w
		25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43	17	42	16	41
2	1/2	o/w	w	o/gn	w	o/br	w	o/gy	w	gn/w	w	gr/br	w	bl	w	or	w	gn	w	br	w
		15	40	14	39	13	38	12	37	11	36	10	35	25	50	24	49	23	48	22	47
3	2	gy	w	bl/w	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w	o/wh	w	o/gn	w	o/br	w	o/gy	w
		21	46	20	45	19	44	18	43	17	42	16	41	15	40	14	39	13	38	12	37
4	2/3	gn/w	w	gn/br	w	bl	w	o	w	gn	w	br	w	gy	w	bl/w	w	bl/o	w	bl/gn	w
		11	36	10	35	25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43
5	3/10	bl/br	w	bl/gy	w	o/wh	w	o/gn	w	o/br	w	o/gy	w	gn/w	w	gn/br	w	gn/w	w	gr/br	w
		17	42	16	41	15	40	14	39	13	38	12	37	11	36	10	35	11	36	10	35
6	4	bl	w	o	w	gn	w	br	w	gy	w	bl/br	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w
		25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43	17	42	16	41
7	4/5	o/w	w	o/gn	w	o/br	w	o/gy	w	gn/w	w	gr/br	w	bl	w	or	w	gn	w	br	w
		15	40	14	39	13	38	12	37	11	36	10	35	25	50	24	49	23	48	22	47
8	5	gy	w	bl/w	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w	o/wh	w	o/gn	w	o/br	w	o/gy	w
		21	46	20	45	19	44	18	43	17	42	16	41	15	40	14	39	13	38	12	37
9	5/6	gn/w	w	gn/br	w	bl	w	o	w	gn	w	br	w	gy	w	bl/w	w	bl/o	w	bl/gn	w
		11	36	10	35	25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43
10	6/10	bl/br	w	bl/gy	w	o/wh	w	o/gn	w	o/br	w	o/gy	w	gn/w	w	gn/br	w	o/br	w	o/gy	w
		17	42	16	41	15	40	14	39	13	38	12	37	11	36	10	35	13	38	12	37
11	7	bl	w	o	w	gn	w	br	w	gy	w	bl/br	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w
		25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43	17	42	16	41
12	7/8	o/w	w	o/gn	w	o/br	w	o/gy	w	gn/w	w	gr/br	w	bl	w	or	w	gn	w	br	w
		15	40	14	39	13	38	12	37	11	36	10	35	25	50	24	49	23	48	22	47
13	8	gy	w	bl/w	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w	o/wh	w	o/gn	w	o/br	w	o/gy	w
		21	46	20	45	19	44	18	43	17	42	16	41	15	40	14	39	13	38	12	37
14	8/9	gn/w	w	gn/br	w	bl	w	o	w	gn	w	br	w	gy	w	bl/w	w	bl/o	w	bl/gn	w
		11	36	10	35	25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43
15	9/10	bl/br	w	bl/gy	w	o/wh	w	o/gn	w	o/br	w	o/gy	w	gn/w	w	gn/br	w	o/w	w	o/gn	w
		17	42	16	41	15	40	14	39	13	38	12	37	11	36	10	35	15	40	14	39
16	10	bl	w	o	w	gn	w	br	w	gy	w	bl/br	w	bl/o	w	bl/gn	w	bl/br	w	bl/gy	w
		25	50	24	49	23	48	22	47	21	46	20	45	19	44	18	43	17	42	16	41

bl- blue

w - white

o - orange

gn - green

br - brown

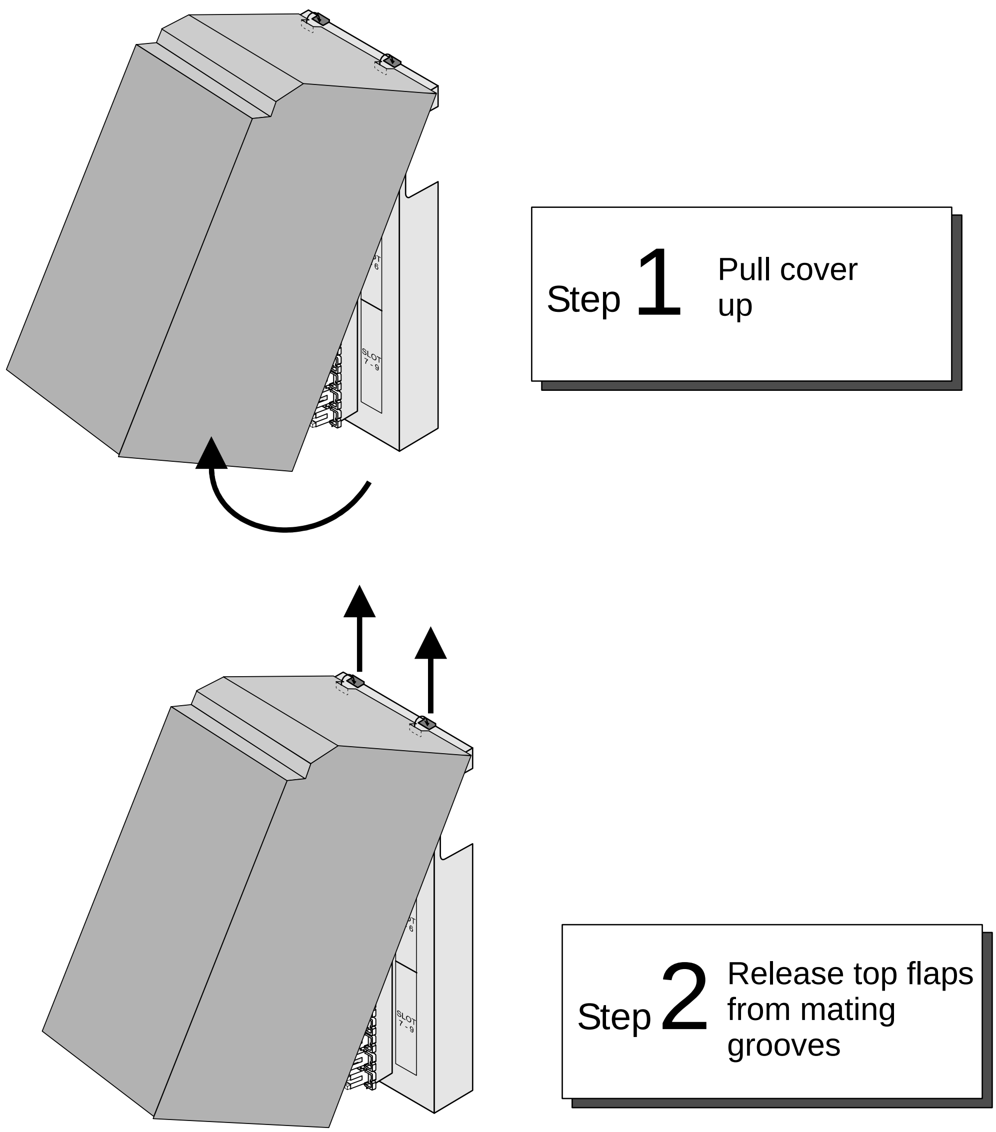
gy - grey

3 Removing and Closing the MDFipx Cover

Removing the MDFipx Cover

1. Pull MDFipx cover upwards, as shown in *Figure 5-12*.
2. Release flaps from grooves.
3. Remove MDFipx cover.

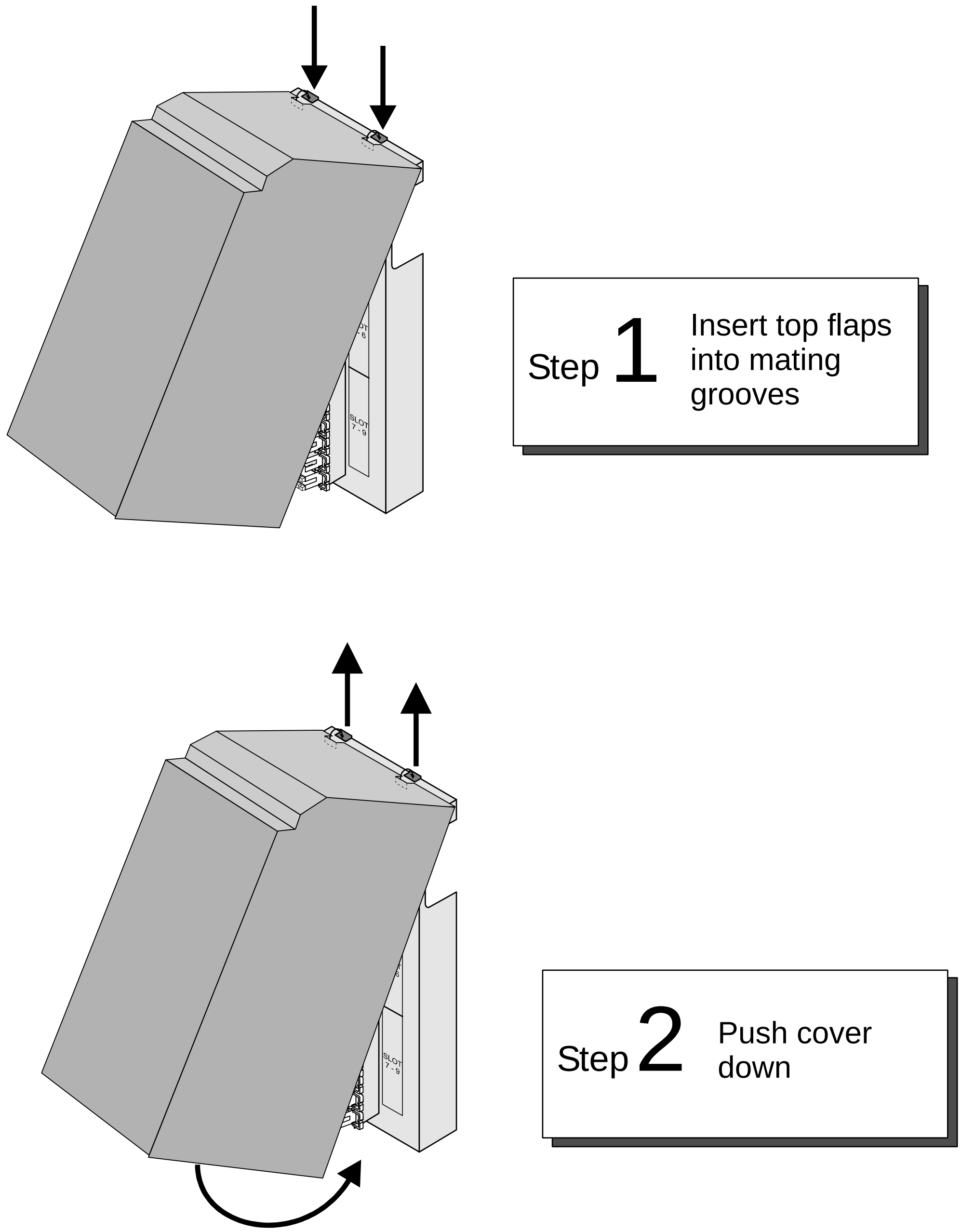
Figure 5-12 ***1MDFipx Cover Removal***



Closing the MDFipx Cover

1. Insert the top flaps of the MDFipx cover into the mating grooves of the MDF frame.
2. Push the MDFipx cover down until it snaps shut.

Figure 5-13 ***1MDFipx Cover Closing***



4 Mounting the MDFipx Unit onto the Wall

The MDFipx supplied by the manufacturer is mounted onto the wall, as described on *page 2-36, Main Distribution Frame (MDF) Mounting and Installation*.

Installation of the MDFipx unit includes the following stages:

- Preparing four holes in the wall according to the blueprint provided or according to customer specification. See *page 2-24, Attaching the Wall Mounting Bracket onto the Wall*.
- Mounting the MDFipx unit onto the wall. See *page 2-39, Mounting the MDFipx onto the Wall*.
- If the MDFipx does not include the cables attached:

  a. Determining the best route of the I/O cables and removing the correct knock-out panel on the MDFipx cover. See *page 2-39, Mounting the MDFipx onto the Wall*.

  b. Attaching the I/O cables to MDFipx unit as described on *page 5-30, MDFipx Field Assembly for Units without I/O Cables Supplied*

- Connecting the I/O cables from the MDFipx to the card cage

5 MDFipx Field Assembly for Units without I/O Cables Supplied

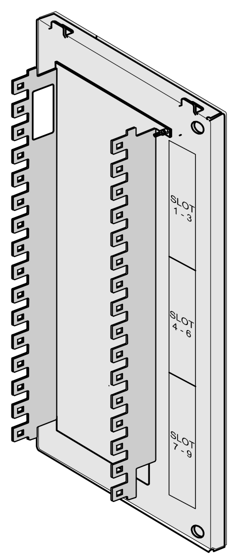
The MDFipx kit includes Krone blocks and Champ connectors provided in separate bags. There are two configurations:

- 1MDFipx for IPx 500M and 500X
- 2MDFipx for IPx 500M and 500X

This section describes how to attach the I/O cables (supplied by the customer) to MDFipx units. In this configuration, the I/O cables are fabricated by the customer at the customer's site, and the MDFipx is supplied with sixteen Krone blocks for both main and expansion cages.

Figure 5-14 displays the MDFipx frame supplied without Krone blocks or cables attached.

Figure 5-14 **MDFipx Frame**



1. Fabricate nine I/O cables for the main cage or ten I/O cables for the expansion cage as follows (see *Figure 5-15*):

   a. Determine the route of each I/O cable from the MDFipx to the relevant peripheral card connection on the top section of the cage. Measure the longest route taken by each cable.

   b. Fabricate the Champ cable connection according to the color code provided in *Table 5-7 on page 5-25* (for the main cage) and *Table 5-8 on page 5-26* (for the expansion cage).

2. Route the other end of the I/O cables through the MDF opening. See *Figure 5-15*.
3. Attach the end of the cable that includes the Krone blocks to the MDFipx frame.

- *Attaching the disconnecting strips:* The Krone block disconnecting strip is attached to the MDF frame by easing it onto the two metal tabs protruding from the MDF frame. The disconnecting strip will snap into place when inserted completely into the slot.
- *Removing the disconnecting strips:* To remove the disconnecting strips (if necessary), insert a thin screw driver between the MDF chassis and the outer side of the disconnecting strip tab. Apply slight pressure to release the tab and slide the strip out.

4. Extract the individual wires of the cable(s) such that they protrude over the Krone blocks.
5. For each peripheral card, connect the individual wires of the Champ cables to the Krone block with a punch tool according to the color code provided in *Table 5-7* and *Table 5-8*. For the main cage, connect the individual wires of the auxiliary connector to the Krone block with a punch tool according to the color code provided in *Table 5-7*.
6. Verify that the final MDFipx cable assembly is identical to the configuration displayed in *Figure 5-16*.

Figure 5-15 ***MDFipx Field Assembly***

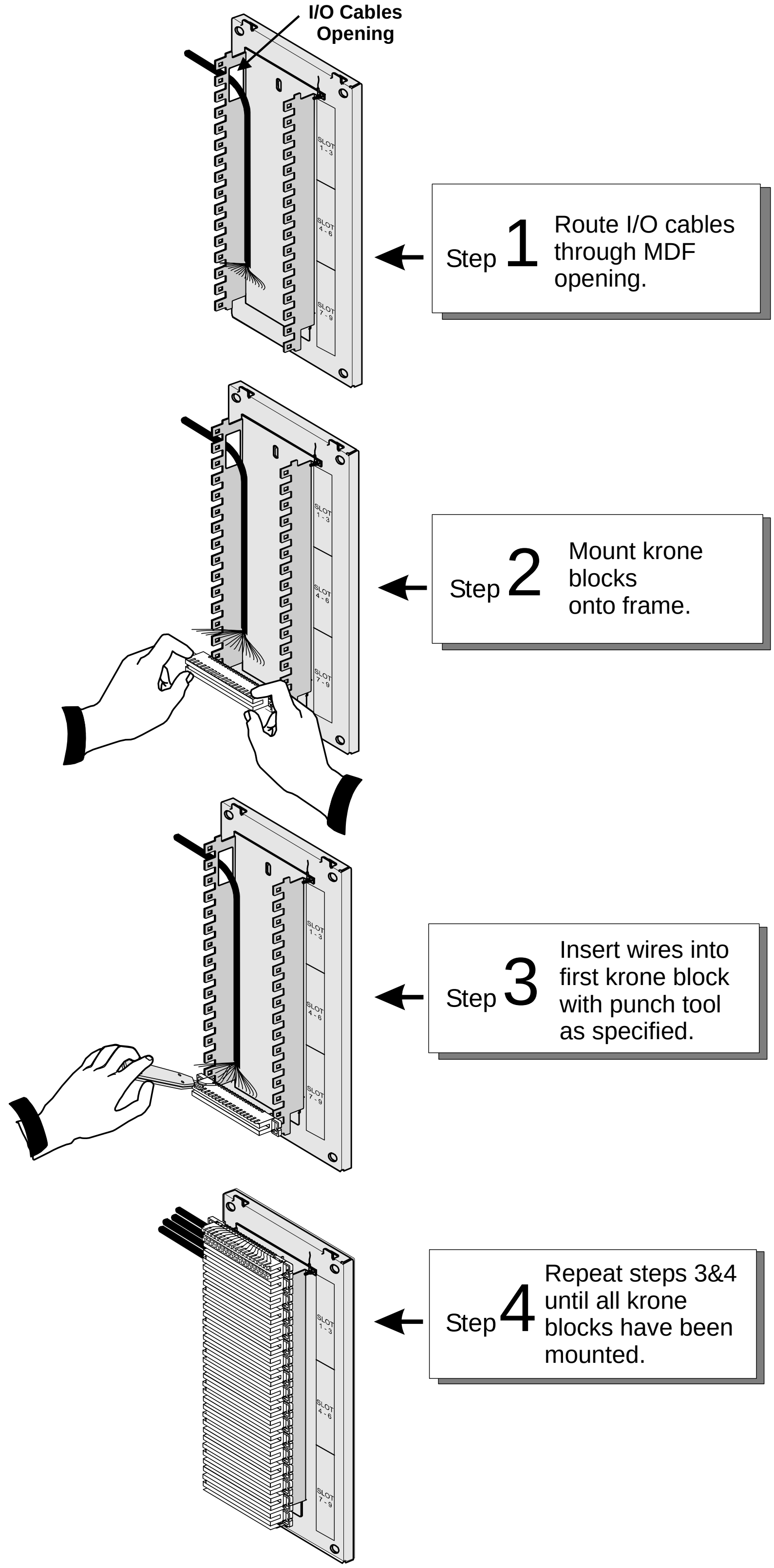
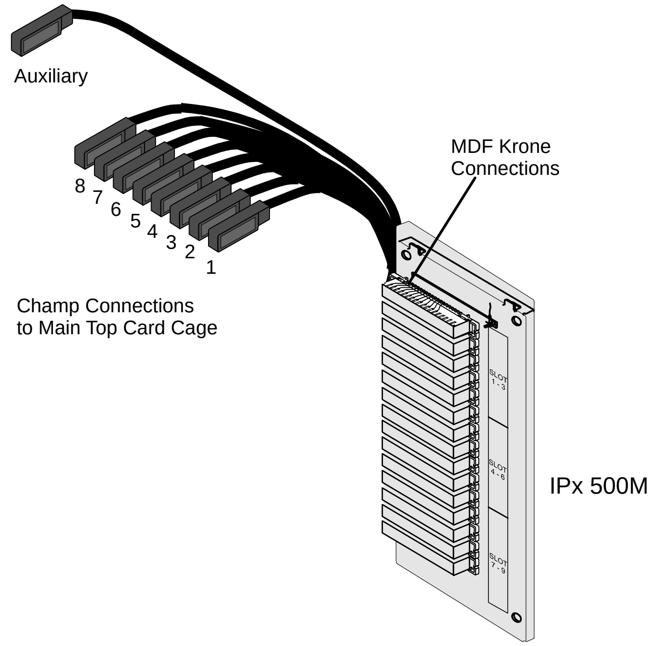
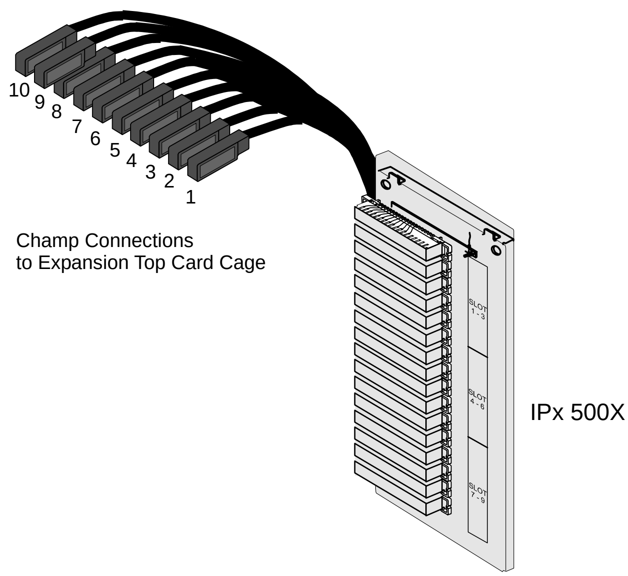


Figure 5-16 ***I/O Cables Routed from the Coral IPx 500 Cage to the MDFipx***





NOTES:

5.7 Peripheral Card with Champ Connections

For Coral Interface Cards

The following tables display the pinout, the wire colors, and the signals of the I/O Champ connectors for each card and each optional connection.

Table 5-9 **Peripheral Card Connection Information**

MDF Type	Tables Starting	Information Provided
Champ 50 connector	on page 5-36	These tables show the direct pinout of the (I/O) connector (Champ 50) connected to the card.
Block 66 MDF	on page 5-40	These tables show the Block 66 MDF connections.
MDFipx	on page 5-44	These tables show the pinout of the MDFipx.

1 Direct Pinout of the Champ/Card Connection

Peripheral Cards Index

Table 5-10 through *Table 5-10* display the pinout connection directly on the Champ/card connection for all currently available peripheral cards.

Card Name	Table	Page
8SLSipx, 8SFTipx, 16SLSipx, 16SFTipx	*Table 5-10*	*on page 5-37*
4TBRipx, 4T-Cipx, 4T-CIDipx, 4TEMipx, 4TMR-PFipx, 4TWLipx, 8T-Cipx, 8T-CIDipx, 8TBRipx, 8TBRPipx	*Table 5-11*	*on page 5-38*
4TBRsl, 4TBRPsl, 4T-Csl, 4T-CIDsl, 4TEMsl, 4TMR-PFsl, 4TPFsl, 4TWLsl, 8TBRsl, 8TBRPsl, 8T-Csl, 8T-CIDsl, 8TPFsl	*Table 5-12*	*on page 5-39*
PRI-23/30 ipx/sl	Via top panel RJ-45 or DA-15S connectors	*on page 5-74*
T1 ipx/sl, 30T ipx/sl		*on page 5-78*
UGW ipx		*on page 5-81*
8SKK ipx/sl		*on page 5-83*

Table 5-10 **Champ 50 Connector - Wired Station Interface Card Pinout**

Pin	8SLSipx	16SLSipx	8SFTipx,	16SFTipx
25 50	ST0 SR0	ST0 SR0	B0 A0	B0 A0
24 49	ST1 SR1	ST1 SR1	B1 A1	B1 A1
23 48	ST2 SR2	ST2 SR2	B2 A2	B2 A2
22 47	ST3 SR3	ST3 SR3	B3 A3	B3 A3
21 46	ST4 SR4	ST4 SR4	B4 A4	B4 A4
20 45	ST5 SR5	ST5 SR5	B5 A5	B5 A5
19 44	ST6 SR6	ST6 SR6	B6 A6	B6 A6
18 43	ST7 SR7	ST7 SR7	B7 A7	B7 A7
17 42		ST8 SR8		B8 A8
16 41		ST9 SR9		B9 A9
15 40		ST10 SR10		B10 A10
14 39		ST11 SR11		B11 A11
13 38		ST12 SR12		B12 A12
12 37		ST13 SR13		B13 A13
11 36		ST14 SR14		B14 A14
10 35		ST15 SR15		B15 A15
9 34				
8 33				
7 32				
6 31				
5 30				
4 29				
3 28				
2 27				
1 26				

Table 5-11 ***Champ 50 Connector - Trunk Interface Card Pinout***

Pin	4T-Cipx, 4T-CIDipx, 4TMR-PFipx	4TEMipx	8T-Cipx, 8T-CIDipx	4TBRipx	8TBRipx, 8TBRPipx	4TWLipx
25 50		ETT0 ETR0	TT0 TR0	T(-) 0 T(+) 0	T(-) 0 T(+) 0	
24 49		ERT0 ERR0	TT1 TR1	R(+) 0 R(-) 0	R(+) 0 R(-) 0	
23 48	TT0 TR0	E0 SG0	TT2 TR2	T(-) 1 T(+) 1	T(-) 1 T(+) 1	TT0 TR0
22 47	STT0* STR0*	M0 SB0	STT2* STR2*	R(+) 1 R(-) 1	R(+) 1 R(-) 1	
21 46	SCT0* SCR0*	ETT1 ETR1	SCT2* SCR2*	T(-) 2 T(+) 2	T(-) 2 T(+) 2	
20 45	TT1 TR1	ERT1 ERR1	TT3 TR3	R(+) 2 R(-) 2	R(+) 2 R(-) 2	TT1 TR1
19 44	STT1* STR1*	E1 SG1	STT3* STR3*	T(-) 3 T(+) 3	T(-) 3 T(+) 3	
18 43	SCT1* SCR1*	M1 SB1	SCT3* SCR3*	R(+) 3 R(-) 3	R(+) 3 R(-) 3	
17 42	TT2 TR2	ETT2 ETR2	TT4 TR4		T(-) 4 T(+) 4	TT2 TR2
16 41	STT2* STR2*	ERT2 ERR2	STT4* STR4*		R(+) 4 R(-) 4	
15 40	SCT2* SCR2*	E2 SG2	SCT4* SCR4*		T(-) 5 T(+) 5	
14 39	TT3 TR3	M2 SB2	TT5 TR5		R(+) 5 R(-) 5	TT3 TR3
13 38	STT3* STR3*	ETT3 ETR3	STT5* STR5*		T(-) 6 T(+) 6	
12 37	SCT3* SCR3*	ERT3 ERR3	SCT5* SCR5*		R(+) 6 R(-) 6	
11 36		E3 SG3	TT6 TR6		T(-) 7 T(+) 7	
10 35		M3 SB3	TT7 TR7		R(+) 7 R(-) 7	
9 34						
8 33						
7 32						
6 31						
5 30						
4 29						
3 28						
2 27						
1 26						

* STT, STR, SCT and SCR are power failure transfer connections. See *Section 5.4 on page 5-15* for power failure transfer wiring interconnections diagram and database programming.

Table 5-12 ***Champ 50 Connector - Trunk Interface Card Pinout (Main Cage Slot# 1,2,3)***

Pin	**4T-CsI, 4T-CIDsl, 4TPFsl, 4TMR-PFsl**	**4TEMsl**	**8TPFsl**	**8T-Csl, 8T-CIDsl**	**4TBRsl, 4TBRPsl**	**8TBRsl, 8TBRPsl**	**4TWLsl**
25 50		ETT0 ETR0	TT0 TR0	TT0 TR0	T(-) 0 T(+) 0	T(-) 0 T(+) 0	
24 49		ERT0 ERR0	TT1 TR1	TT1 TR1	R(+) 0 R(-) 0	R(+) 0 R(-) 0	
23 48	TT0 TR0	E0 SG0	TT2 TR2	TT2 TR2	T(-) 1 T(+) 1	T(-) 1 T(+) 1	TT0 TR0
22 47	STT0* STR0*	M0 SB0		STT2* STR2*	R(+) 1 R(-) 1	R(+) 1 R(-) 1	
21 46	SCT0* SCR0*	ETT1 ETR1		SCT2* SCR2*	T(-) 2 T(+) 2	T(-) 2 T(+) 2	
20 45	TT1 TR1	ERT1 ERR1	TT3 TR3	TT3 TR3	R(+) 2 R(-) 2	R(+) 2 R(-) 2	TT1 TR1
19 44	STT1* STR1*	E1 SG1		STT3* STR3*	T(-) 3 T(+) 3	T(-) 3 T(+) 3	
18 43	SCT1* SCR1*	M1 SB1		SCT3* SCR3*	R(+) 3 R(-) 3	R(+) 3 R(-) 3	
17 42	TT2 TR2	ETT2 ETR2	TT4 TR4	TT4 TR4		T(-) 4 T(+) 4	TT2 TR2
16 41	STT2* STR2*	ERT2 ERR2	STT4* STR4*	STT4* STR4*		R(+) 4 R(-) 4	
15 40	SCT2* SCR2*	E2 SG2	SCT4* SCR4*	SCT4* SCR4*		T(-) 5 T(+) 5	
14 39	TT3 TR3	M2 SB2	TT5 TR5	TT5 TR5		R(+) 5 R(-) 5	TT3 TR3
13 38	STT3* STR3*	ETT3 ETR3	STT5* STR5*	STT5* STR5*		T(-) 6 T(+) 6	
12 37	SCT3* SCR3*	ERT3 ERR3	SCT5* SCR5*	SCT5* SCR5*		R(+) 6 R(-) 6	
11 36		E3 SG3	TT6 TR6	TT6 TR6		T(-) 7 T(+) 7	
10 35		M3 SB3	TT7 TR7	TT7 TR7		R(+) 7 R(-) 7	
9 34							
8 33							
7 32							
6 31							
5 30							
4 29							
3 28							
2 27							
1 26							

* STT, STR, SCT and SCR are power failure transfer connections. See *Section 5.4* on page 5*on page 5-15* for power failure transfer wiring interconnections diagram and database programming.

2 Block 66 MDF Connections

Peripheral Cards Index

Table 5-13 through *Table 5-15* display the pinout connection directly on the block 66 MDF connection for all currently available peripheral cards.

Card Name	Table	Page
8SLSipx, 8SFTipx, 16SLSipx, 16SFTipx	*Table 5-13*	*on page 5-41*
4TBRipx, 4T-Cipx, 4T-CIDipx, 4TEMipx, 4TMR-PFipx, 8T-Cipx, 8T-CIDipx, 8TBRipx, 8TBRPipx	*Table 5-14*	*on page 5-42*
4TBRsl, 4TBRPsl, 4T-Csl, 4T-CIDsl, 4TEMsl, 4TMR-PFsl, 4TPFsl, 8TBRsl, 8TBRPsl, 8T-Csl, 8T-CIDsl, 8TPFsl	*Table 5-15*	*on page 5-43*
PRI-23/30 ipx/sl, UDTipx(PRI-23)	Via top panel RJ-45 or DA-15S connectors	*on page 5-74*
T1 ipx/sl, UDTipx(T1) 30T ipx/sl		*on page 5-78*
UGW ipx		*on page 5-81*
8SKK ipx/sl		*on page 5-83*

Table 5-13 **Block 66 MDF - Wired Station Interface Pinout**

Pin/Color	8SLSipx	16SLSipx	8SFTipx	16SFTipx
1/26 White/Blue				
2/27 White/Orange				
3/28 White/Green				
4/29 White/Brown				
5/30 White/Slate				
6/31 Red/Blue				
7/32 Red/Orange				
8/33 Red/Green				
9/34 Red/Brown				
10/35 Red/Slate		S15		A/B15
11/36 Black/Blue		S14		A/B14
12/37 Black/Orange		S13		A/B13
13/38 Black/Green		S12		A/B12
14/39 Black/Brown		S11		A/B11
15/40 Black/Slate		S10		A/B10
16/41 Yellow/Blue		S9		A/B9
17/42 Yellow/Orange		S8		A/B8
18/43 Yellow/Green	S7	S7	A/B7	A/B7
19/44 Yellow/Brown	S6	S6	A/B6	A/B6
20/45 Yellow/Slate	S5	S5	A/B5	A/B5
21/46 Violet/Blue	S4	S4	A/B4	A/B4
22/47 Violet/Orange	S3	S3	A/B3	A/B3
23/48 Violet/Green	S2	S2	A/B2	A/B2
24/49 Violet/Brown	S1	S1	A/B1	A/B1
25/50 Violet/Slate	S0	S0	A/B0	A/B0

Table 5-14 **Block 66 MDF - Trunk Interface Card Pinout**

Pin/Color	4T-Cipx, 4T-CIDipx, 4TMR-PFipx	4TEMipx	8T-Cipx, 8T-CIDipx	4TBRipx	8TBRipx, 8TBRPipx
1/26 White/Blue					
2/27 White/Orange					
3/28 White/Green					
4/29 White/Brown					
5/30 White/Slate					
6/31 Red/Blue					
7/32 Red/Orange					
8/33 Red/Green					
9/34 Red/Brown					
10/35 Red/Slate		M3/SB3	T7		R7
11/36 Black/Blue		E3/SG3	T6		T7
12/37 Black/Orange	SC3	ERT3/ERR3	SC5		R6
13/38 Black/Green	ST3	ETT3/ETR3	ST5		T6
14/39 Black/Brown	T3	M2/SB2	T5		R5
15/40 Black/Slate	SC2	E2/SG2	SC4		T5
16/41 Yellow/Blue	ST2	ERT2/ERR2	ST4		R4
17/42 Yellow/Orange	T2	ETT2/ETR2	T4		T4
18/43 Yellow/Green	SC1	M1/SB1	SC3	R3	R3
19/44 Yellow/Brown	ST1	E1/SG1	ST3	T3	T3
20/45 Yellow/Slate	T1	ERT1/ERR1	T3	R2	R2
21/46 Violet/Blue	SC0	ETT1/ETR1	SC2	T2	T2
22/47 Violet/Orange	ST0	M0/SB0	ST2	R1	R1
23/48 Violet/Green	T0	E0/SG0	T2	T1	T1
24/49 Violet/Brown		ERT0/ERR0	T1	R0	R0
25/50 Violet/Slate		ETT0/ETR0	T0	T0	T0

Table 5-15 ***Block 66 MDF - Trunk Interface Card Pinout (Main Cage Slot# 1,2,3)***

Pin/Color	4T-CsI, 4T-CIDsI, 4TPFsI, 4TMR-PFsI	4TEMsI	8TPFsI	8T-CsI, 8T-CIDsI	4TBRsI 4TBRPsI	8TBRsI, 8TBRPsI
1/26 White/Blue						
2/27 White/Orange						
3/28 White/Green						
4/29 White/Brown						
5/30 White/Slate						
6/31 Red/Blue						
7/32 Red/Orange						
8/33 Red/Green						
9/34 Red/Brown						
10/35 Red/Slate		M3/SB3	T7	T7		R7
11/36 Black/Blue		E3/SG3	T6	T6		T7
12/37 Black/Orange	SC3	ERT3/ERR3	SC5	SC5		R6
13/38 Black/Green	ST3	ETT3/ETR3	ST5	ST5		T6
14/39 Black/Brown	T3	M2/SB2	T5	T5		R5
15/40 Black/Slate	SC2	E2/SG2	SC4	SC4		T5
16/41 Yellow/Blue	ST2	ERT2/ERR2	ST4	ST4		R4
17/42 Yellow/Orange	T2	ETT2/ETR2	T4	T4		T4
18/43 Yellow/Green	SC1	M1/SB1		SC3	R3	R3
19/44 Yellow/Brown	ST1	E1/SG1		ST3	T3	T3
20/45 Yellow/Slate	T1	ERT1/ERR1	T3	T3	R2	R2
21/46 Violet/Blue	SC0	ETT1/ETR1		SC2	T2	T2
22/47 Violet/Orange	ST0	M0/SB0		ST2	R1	R1
23/48 Violet/Green	T0	E0/SG0	T2	T2	T1	T1
24/49 Violet/Brown		ERT0/ERR0	T1	T1	R0	R0
25/50 Violet/Slate		ETT0/ETR0	T0	T0	T0	T0

3 MDFipx Unit Supplied by the Manufacturer

For detailed information about MDFipx units, refer to *page 5-21, MDFipx Units*.

Krone Blocks

Krone blocks are provided with the MDFipx units. Krone blocks that are to be installed in the system together with their respective peripheral cards need to be connected properly to the MDFipx for all peripheral cards.

Each Krone block includes a disconnecting strip that includes 10 junctions. Refer to *page 5-12, Surge Arrestor Magazine Mounting*.

Peripheral Cards Index

Table 5-16 through *Table 5-32* display the pinout connection directly on the Krone blocks of the MDFipx for all currently available peripheral cards on both main and expansion cages.

Card Name	*Table*	*Page*
16SFTipx	*Table 5-17*	*on page 5-48*
16SLSipx	*Table 5-19*	*on page 5-52*
4TBRipx	*Table 5-24*	*on page 5-62*
4T-Cipx	*Table 5-21*	*on page 5-56*
4T-CIDipx	*Table 5-21*	*on page 5-56*
4TEMipx	*Table 5-20*	*on page 5-54*
4TMR-PFipx	*Table 5-21*	*on page 5-56*
4TWLipx	*Table 5-22*	*on page 5-58*
8SFTipx	*Table 5-16*	*on page 5-46*
8SLSipx	*Table 5-18*	*on page 5-50*
8TBRipx	*Table 5-25*	*on page 5-64*
8TBRPipx	*Table 5-25*	*on page 5-64*

Card Name	Table	Page
8T-Cipx	Table 5-23	on page 5-60
8T-CIDipx	Table 5-23	on page 5-60
4TBRsl	Table 5-28	on page 5-68
4TBRPsl	Table 5-28	on page 5-68
4T-Csl	Table 5-32	on page 5-72
4T-CIDsl	Table 5-32	on page 5-72
4TEMsl	Table 5-27	on page 5-67
4TMR-PFsl	Table 5-32	on page 5-72
4TWLsl	Table 5-29	on page 5-69
8TBRsl	Table 5-26	on page 5-66
8TBRPsl	Table 5-26	on page 5-66
8T-Csl	Table 5-31	on page 5-71
8T-CIDsl	Table 5-31	on page 5-71
8TPFsl	Table 5-30	on page 5-70
PRI-23/30 ipx/sl	Via top panel RJ-45 or DA-15S connectors	on page 5-74
T1 ipx/sl, 30T ipx/sl		on page 5-78
UGW ipx		on page 5-81
8SKK ipx/sl		on page 5-83

Table 5-16 ***8SFTipx MDFipx Pinout***

Main Cage - 8SFTipx

Block	Slot	*Krone Block*																			
		1		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*		*10*	
1	1	0		1		2		3		4		5		6		7					
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A				
2	2													0		1		2		3	
														B	A	B	A	B	A	B	A
3	2	4		5		6		7													
		B	A	B	A	B	A	B	A												
4	3					0		1		2		3		4		5		6		7	
						B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
5																					
6	4	0		1		2		3		4		5		6		7					
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A				
7	5													0		1		2		3	
														B	A	B	A	B	A	B	A
8	5	4		5		6		7													
		B	A	B	A	B	A	B	A												
9	6					0		1		2		3		4		5		6		7	
						B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
10																					
11	7	0		1		2		3		4		5		6		7					
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A				
12	8													0		1		2		3	
														B	A	B	A	B	A	B	A
13	8	4		5		6		7													
		B	A	B	A	B	A	B	A												
14	Aux					KB1						KB2						MUSIC1		MUSIC2	
						RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux	KB3						RELAY1		RELAY2		RELAY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Expansion Cage - 8SFTipx																					
Block	Slot	Krone Block																			
		1		2		3		4		5		6		7		8		9		10	
1	1	0		1		2		3		4		5		6		7					
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A				
2	2													0		1		2		3	
														B	A	B	A	B	A	B	A
3	2	4		5		6		7													
		B	A	B	A	B	A	B	A												
4	3					0		1		2		3		4		5		6		7	
						B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
5																					
6	4	0		1		2		3		4		5		6		7					
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A				
7	5													0		1		2		3	
														B	A	B	A	B	A	B	A
8	5	4		5		6		7													
		B	A	B	A	B	A	B	A												
9	6					0		1		2		3		4		5		6		7	
						B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
10																					
11	7	0		1		2		3		4		5		6		7					
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A				
12	8													0		1		2		3	
														B	A	B	A	B	A	B	A
13	8	4		5		6		7													
		B	A	B	A	B	A	B	A												
14	9					0		1		2		3		4		5		6		7	
						B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
15																					
16	10	0		1		2		3		4		5		6		7					
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A				

Table 5-17 ***16SFTipx MDFipx Pinout***

Main Cage - 16SFTipx																					
Block	Slot	Krone Block																			
		1		2		3		4		5		6		7		8		9		10	
1	1	0		1		2		3		4		5		6		7		8		9	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
2	1/2	10		11		12		13		14		15		0		1		2		3	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
3	2	4		5		6		7		8		9		10		11		12		13	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
4	2/3	14		15		0		1		2		3		4		5		6		7	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
5	3	8		9		10		11		12		13		14		15					
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A				
6	4	0		1		2		3		4		5		6		7		8		9	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
7	4/5	10		11		12		13		14		15		0		1		2		3	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
8	5	4		5		6		7		8		9		10		11		12		13	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
9	5/6	14		15		0		1		2		3		4		5		6		7	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
10	6	8		9		10		11		12		13		14		15					
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A				
11	7	0		1		2		3		4		5		6		7		8		9	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
12	7/8	10		11		12		13		14		15		0		1		2		3	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
13	8	4		5		6		7		8		9		10		11		12		13	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
14	8/Aux	14		15		KB1						KB2						MUSIC1		MUSIC2	
		B	A	B	A	RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux	KB3						RELAY1		RELAY2		RELAY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Expansion Cage - 16SFTipx																					
Block	**Slot**	**Krone Block**																			
		1		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	
1	1	0		1		2		3		4		5		6		7		8		9	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
2	1/2	10		11		12		13		14		15		0		1		2		3	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
3	2	4		5		6		7		8		9		10		11		12		13	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
4	2/3	14		15		0		1		2		3		4		5		6		7	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
5	3/10	8		9		10		11		12		13		14		15		14		15	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
6	4	0		1		2		3		4		5		6		7		8		9	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
7	4/5	10		11		12		13		14		15		0		1		2		3	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
8	5	4		5		6		7		8		9		10		11		12		13	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
9	5/6	14		15		0		1		2		3		4		5		6		7	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
10	6/10	8		9		10		11		12		13		14		15		12		13	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
11	7	0		1		2		3		4		5		6		7		8		9	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
12	7/8	10		11		12		13		14		15		0		1		2		3	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
13	8	4		5		6		7		8		9		10		11		12		13	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
14	8/9	14		15		0		1		2		3		4		5		6		7	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
15	9/10	8		9		10		11		12		13		14		15		10		11	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
16	10	0		1		2		3		4		5		6		7		8		9	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A

Table 5-18 ***8SLSipx MDFipx Pinout***

Main Cage - 8SLSipx																					
Block	Slot	Krone Block																			
		1		2		3		4		5		6		7		8		9		10	
1	1	0		1		2		3		4		5		6		7					
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR				
2	2													0		1		2		3	
														ST	SR	ST	SR	ST	SR	ST	SR
3	2	4		5		6		7													
		ST	SR	ST	SR	ST	SR	ST	SR												
4	3					0		1		2		3		4		5		6		7	
						ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
5																					
6	4	0		1		2		3		4		5		6		7					
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR				
7	5													0		1		2		3	
														ST	SR	ST	SR	ST	SR	ST	SR
8	5	4		5		6		7													
		ST	SR	ST	SR	ST	SR	ST	SR												
9	6					0		1		2		3		4		5		6		7	
						ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
10																					
11	7	0		1		2		3		4		5		6		7					
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR				
12	8													0		1		2		3	
														ST	SR	ST	SR	ST	SR	ST	SR
13	8	4		5		6		7													
		ST	SR	ST	SR	ST	SR	ST	SR												
14	Aux.					KST1						KST2						MUSIC1		MUSIC2	
						RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux.	KST3						RELSRY1		RELSRY2		RELSRY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Peripheral Card with Champ Connections For Coral Interface Cards

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Expansion Cage - 8SLSipx											
Block	Slot	Krone Block									
		1	2	3	4	5	6	7	8	9	10
1	1	0 ST SR	1 ST SR	2 ST SR	3 ST SR	4 ST SR	5 ST SR	6 ST SR	7 ST SR		
2	2							0 ST SR	1 ST SR	2 ST SR	3 ST SR
3	2	4 ST SR	5 ST SR	6 ST SR	7 ST SR						
4	3			0 ST SR	1 ST SR	2 ST SR	3 ST SR	4 ST SR	5 ST SR	6 ST SR	7 ST SR
5											
6	4	0 ST SR	1 ST SR	2 ST SR	3 ST SR	4 ST SR	5 ST SR	6 ST SR	7 ST SR		
7	5							0 ST SR	1 ST SR	2 ST SR	3 ST SR
8	5	4 ST SR	5 ST SR	6 ST SR	7 ST SR						
9	6			0 ST SR	1 ST SR	2 ST SR	3 ST SR	4 ST SR	5 ST SR	6 ST SR	7 ST SR
10											
11	7	0 ST SR	1 ST SR	2 ST SR	3 ST SR	4 ST SR	5 ST SR	6 ST SR	7 ST SR		
12	8							0 ST SR	1 ST SR	2 ST SR	3 ST SR
13	8	4 ST SR	5 ST SR	6 ST SR	7 ST SR						
14	9			0 ST SR	1 ST SR	2 ST SR	3 ST SR	4 ST SR	5 ST SR	6 ST SR	7 ST SR
15	10										
16	10	0 ST SR	1 ST SR	2 ST SR	3 ST SR	4 ST SR	5 ST SR	6 ST SR	7 ST SR		

Table 5-19 ***16SLSipx MDFipx Pinout***

		Main Cage - 16SLSipx																			
Block	***Slot***	***Krone Block***																			
		1		***2***		***3***		***4***		***5***		***6***		***7***		***8***		***9***		***10***	
1	1	0		1		2		3		4		5		6		7		8		9	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
2	1/2	10		11		12		13		14		15		0		1		2		3	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
3	2	4		5		6		7		8		9		10		11		12		13	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
4	2/3	14		15		0		1		2		3		4		5		6		7	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
5	3	8		9		10		11		12		13		14		15					
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR				
6	4	0		1		2		3		4		5		6		7		8		9	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
7	4/5	10		11		12		13		14		15		0		1		2		3	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
8	5	4		5		6		7		8		9		10		11		12		13	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
9	5/6	14		15		0		1		2		3		4		5		6		7	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
10	6	8		9		10		11		12		13		14		15					
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR				
11	7	0		1		2		3		4		5		6		7		8		9	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
12	7/8	10		11		12		13		14		15		0		1		2		3	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
13	8	4		5		6		7		8		9		10		11		12		13	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
14	8/Aux	14		15		KST1						KST2						MUSIC1		MUSIC2	
		ST	SR	ST	SR	RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux	KST3						RELAY1		RELAY2		RELAY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Expansion Cage - *16SLSipx*																					
Block	Slot	*Krone Block*																			
		1		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*		*10*	
1	1	0		1		2		3		4		5		6		7		8		9	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
2	1/2	10		11		12		13		14		15		0		1		2		3	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
3	2	4		5		6		7		8		9		10		11		12		13	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
4	2/3	14		15		0		1		2		3		4		5		6		7	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
5	3/10	8		9		10		11		12		13		14		15		14		15	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
6	4	0		1		2		3		4		5		6		7		8		9	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
7	4/5	10		11		12		13		14		15		0		1		2		3	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
8	5	4		5		6		7		8		9		10		11		12		13	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
9	6	14		15		0		1		2		3		4		5		6		7	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
10	6/10	8		9		10		11		12		13		14		15		12		13	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
11	7	0		1		2		3		4		5		6		7		8		9	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
12	7/8	10		11		12		13		14		15		0		1		2		3	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
13	8	4		5		6		7		8		9		10		11		12		13	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
14	8/9	14		15		0		1		2		3		4		5		6		7	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
15	9/10	8		9		10		11		12		13		14		15		10		11	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR
16	10	0		1		2		3		4		5		6		7		8		9	
		ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR	ST	SR

Table 5-20 ***4TEMipx MDFipx Pinout***

Main Cage - 4TEMipx																					
		Krone Block																			
Block	**Slot**	***1***		***2***		***3***		***4***		***5***		***6***		***7***		***8***		***9***		***10***	
1	1	0								1								2			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
2	1/2	2				3								0							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
3	2	1								2								3			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
4	2/3	3				0								1							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
5	3	2								3											
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB				
6	4	0								1								2			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
7	4/5	2				3								0							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
8	5	1								2								3			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
9	5/6	3				0								1							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
10	6	2								3											
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB				
11	7	0								1								2			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
12	7/8	2				3								0							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
13	8	1								2								3			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
14	8/Aux	3				KB1						KB2						MUSIC1		MUSIC2	
		E	SG	M	SB	RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux	KST3						RELAY1		RELAY2		RELAY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Expansion Cage - 4TEMipx																					
Block	Slot	*Krone Block*																			
		1		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*		*10*	
1	1	0								1								2			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
2	1/2	2				3								0							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
3	2	1								2								3			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
4	2/3	3				0								1							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
5	3.10	2								3								3			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	E	SG	M	SB
6	4	0								1								2			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
7	4/5	2				3								0							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
8	5	1								2								3			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
9	5/6	3				0								1							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
10	6.10	2								3								3			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
11	7	0								1								2			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
12	7/8	2				3								0							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
13	8	1								2								3			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
14	8/9	3				0								1							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
15	9.10	2								3								2			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	E	SG	M	SB
16	10	0								1								2			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR

Table 5-21 ***4T-Cipx, 4T-CIDipx, 4TMR-PFipx MDFipx Pinout***

Main Cage - 4T-Cipx, 4T-CIDipx, 4TMR-PFipx

Block	***Slot***	***Krone Block***																			
		1		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*		*10*	
1	1					0						1						2			
						TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
2	1/2	2		3														0			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR									TT	TR	STT	STR
3	2	0		1						2						3					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
4	3									0						1					
										TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
5	3	2						3													
		TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR								
6	4					0						1						2			
						TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
7	4/5	2		3														0			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR									TT	TR	STT	STR
8	5	0		1						2						3					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
9	6									0						1					
										TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
10	6	2						3													
		TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR								
11	7					0						1						2			
						TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
12	7/8	2		3														0			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR									TT	TR	STT	STR
13	8	0		1						2						3					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
14	Aux					KB1						KB2						MUSIC1		MUSIC2	
						RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux	KST3						RELAY1		RELAY2		RELAY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Expansion Cage - 4T-Cipx, 4T-CIDipx, 4TMR-PFipx

Block	Slot	Krone Block 1		2		3		4		5		6		7		8		9		10	
1	1					0						1						2			
						TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
2	1/2	2		3														0			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR									TT	TR	STT	STR
3	2	0		1						2						3					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
4	2/3									0						1					
										TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
5	3/10	2						3													
		TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR								
6	4					0						1						2			
						TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
7	4/5	2		3														0			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR									TT	TR	STT	STR
8	5	0		1						2						3					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
9	6									0						1					
										TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
10	6/10	2						3													
		TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR								
11	7					0						1						2			
						TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
12	7/8	2		3														0			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR									TT	TR	STT	STR
13	8	0		1						2						3					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
14	8/9					0						1						2			
						TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
15	9/10	2		3														0			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR									TT	TR	STT	STR
16	10	0		1						2						3					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR

* STT, STR, SCT and SCR are power failure transfer connections. See *page 5-15, Power Fail (PF) Transfer Circuits*, earlier in this chapter.

Table 5-22 ***4TWLipx MDFipx Pinout***

Main Cage - 4TWLipx											
Block	**Slot**	**Krone Block**									
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	1			0 TT TR			1 TT TR			2 TT TR	
2	1/2		3 TT TR							0 TT TR	
3	2		1 TT TR			2 TT TR			3 TT TR		
4	3					0 TT TR			1 TT TR		
5	3	2 TT TR			3 TT TR						
6	4			0 TT TR			1 TT TR			2 TT TR	
7	4/5		3 TT TR							0 TT TR	
8	5		1 TT TR			2 TT TR			3 TT TR		
9	6					0 TT TR			1 TT TR		
10	6	2 TT TR			3 TT TR						
11	7			0 TT TR			1 TT TR			2 TT TR	
12	7/8		3 TT TR							0 TT TR	
13	8		1 TT TR			2 TT TR			3 TT TR		
14	Aux			KB1 RxD TxD	CTS RTS	DSR DTR	KB2 RxD TxD	CTS RTS	DSR DTR	MUSIC1 A B	MUSIC2 A B
15	Aux	KB3 RxD TxD	CTS RTS	DSR DTR	RELAY1 A B	RELAY2 A B	RELAY3 A B	PAGE A B	GND		

Expansion Cage - 4TWLipx											
Block	Slot	Krone Block									
		1	2	3	4	5	6	7	8	9	10
1	1			0 TT TR			1 TT TR			2 TT TR	
2	1/2		3 TT TR							0 TT TR	
3	2		1 TT TR			2 TT TR			3 TT TR		
4	3					0 TT TR			1 TT TR		
5	3	2 TT TR			3 TT TR						
6	4			0 TT TR			1 TT TR			2 TT TR	
7	4/5		3 TT TR							0 TT TR	
8	5		1 TT TR			2 TT TR			3 TT TR		
9	6					0 TT TR			1 TT TR		
10	6	2 TT TR			3 TT TR						
11	7			0 TT TR			1 TT TR			2 TT TR	
12	7/8		3 TT TR							0 TT TR	
13	8		1 TT TR			2 TT TR			3 TT TR		
14	9					0 TT TR			1 TT TR		
15	9/10	2 TT TR			3 TT TR						3 TT TR
	10			0 TT TR			1 TT TR			2 TT TR	

Table 5-23 ***8T-Cipx, 8T-CIDipx MDFipx Pinout for Main Cage***

Main Cage - 8T-Cipx, 8T-CIDipx																					
Block	**Slot**	***Krone Block***																			
		1		***2***		***3***		***4***		***5***		***6***		***7***		***8***		***9***		***10***	
1	**1**	**0**		**1**		**2**						**3**						**4**			
		TT	TR	TT	TR	TT	TR	STT	STR	SCT	STR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
2	**1/2**	**4**		**5**						**6**		**7**		**0**		**1**		**2**			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR
3	**2**	**2**		**3**						**4**						**5**					
		SCT	SCR	TT	TR	STT	STR	SCT	STR	TT	TR	STT	STR	SCT	STR	TT	TR	STT	STR	SCT	SCR
4	**2/3**	**6**		**7**		**0**		**1**		**2**						**3**					
		TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR	SCT	STR	TT	TR	STT	STR	SCT	SCR
5	**3**	**4**						**5**						**6**		**7**					
		TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR				
6	**4**	**0**		**1**		**2**						**3**						**4**			
		TT	TR	TT	TR	TT	TR	STT	STR	SCT	STR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
7	**4/5**	**4**		**5**						**6**		**7**		**0**		**1**		**2**			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR
8	**5**	**2**		**3**						**4**						**5**					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
9	**5/6**	**6**		**7**		**0**		**1**		**2**						**3**					
		TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
10	**6**	**4**						**5**						**6**		**7**					
		TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR				
11	**7**	**0**		**1**		**2**						**3**						**4**			
		TT	TR	TT	TR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
12	**7/8**	**4**		**5**						**6**		**7**		**0**		**1**		**2**			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR
13	**8**	**2**		**3**						**4**						**5**					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
14	**8/Aux**	**6**		**7**		**KB1**						**KB2**						**MUSIC1**		**MUSIC2**	
		TT	TR	TT	TR	RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	**Aux**	**KB3**						**RELAY1**		**RELAY2**		**RELAY3**		**PAGE**		**GND**					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Expansion Cage - 8T-Cipx, 8T-CIDipx

Block	Slot	Krone Block 1		2		3		4		5		6		7		8		9		10	
1	1	0		1		2						3						4			
		TT	TR	TT	TR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
2	1/2	4		5						6		7		0		1		2			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR
3	2	2		3						4						5					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
4	2/3	6		7		0		1		2						3					
		TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
5	3/10	4						5						6		7		6		7	
		TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR	TT	TR	TT	TR
6	4	0		1		2						3						4			
		TT	TR	TT	TR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
7	4/5	4		5						6		7		0		1		2			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR
8	5	2		3						4						5					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
9	5/6	6		7		0		1		2						3					
		TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
10	6/10	4						5						6		7		5		5	
		TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR	STT	STR	SCT	SCR
11	7	0		1		2						3						4			
		TT	TR	TT	TR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
12	7/8	4		5						6		7		0		1		2			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR
13	8	2		3						4						5					
		SCT	SCR	TT	TR	STT	STR	SCT	STR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
14	8/9	6		7		0		1		2						3					
		TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
15	9/10	4						5						6		7		4		5	
		TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR	SCT	SCR	TT	TR
16	10	0		1		2						3						4			
		TT	TR	TT	TR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR

Table 5-24 ***4TBRipx MDFipx Pinout***

Block	Slot	*Main Cage - 4TBRipx*																			
		Krone Block																			
		1		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*		*10*	
1	1	0				1				2				3							
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)				
2	2													0				1			
														T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
3	2	2				3															
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)												
4	3					0				1				2				3			
						T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
5																					
6	4	0				1				2				3							
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)				
7	5													0				1			
														T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
8	5	2				3															
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)												
9	6					0				1				2				3			
						T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
10																					
11	7	0				1				2				3							
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)				
12	8													0				1			
														T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
13	8	2				3															
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)												
14	Aux					KB1						KB2						MUSIC1		MUSIC2	
						RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux	KST3						RELAY1		RELAY2		RELAY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Expansion Cage -- 4TBRipx											
Slot	Block	Krone Block 1	2	3	4	5	6	7	8	9	10
1	1	0		1		2		3			
		T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)		
2	2							0		1	
								T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)
3	2	2		3							
		T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)						
4	3			0		1		2		3	
				T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)
5											
6	4	0		1		2		3			
		T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)		
7	5							0		1	
								T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)
8	5	2		3							
		T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)						
9	6			0		1		2		3	
				T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)
10											
11	7	0		1		2		3			
		T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)		
12	8							0		1	
								T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)
13	8	2		3							
		T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)						
14	9			0		1		2		3	
				T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)
15											
16	10	0		1		2		2			
		T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)	T(-) T(+)	R(+) R(-)		

Table 5-25 ***8TBRipx, 8TBRPipx MDFipx Pinout***

Block	Slot	Main Cage - 8TBR-ipx																			
		Krone Block																			
		1		2		3		4		5		6		7		8		9		10	
1	1	0				1				2				3				4			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
2	1/2	5				6				7				0				1			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
3	2	2				3				4				5				6			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
4	2/3	7				0				1				2				3			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
5	3	4				5				6				7							
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)				
6	4	0				1				2				3				4			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
7	4/5	5				6				7				0				1			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
8	5	2				3				4				5				6			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
9	5/6	7				0				1				2				3			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
10	6	4				5				6				7							
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)				
11	7	0				1				2				3				4			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
12	7/8	5				6				7				0				1			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
13	8	2				3				4				5				6			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
14	8/ Aux	7				KB1						KB2						MUSIC1		MUSIC2	
		T(-)	T(+)	R(+)	R(-)	RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux	KST3						RELAY1		RELAY2		RELAY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Expansion Cage - 8TBR-ipx																					
Block	Slot	Krone Block																			
		1		2		3		4		5		6		7		8		9		10	
1	1	0				1				2				3				4			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
2	1/2	5				6				7				0				1			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
3	2	2				3				4				5				6			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
4	2/3	7																			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
5	3/10																	7			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
6	4	0				1				2				3				4			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
7	4/5	5				6				7				0				1			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
8	5	2				3				4				5				6			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
9	5/6	7				0				1				2				3			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
10	6/10	4				5				6				7				6			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
11	7	0				1				2				3				4			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
12	7/8	5				6				7				0				1			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
13	8	2				3				4				5				6			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
14	8/9	7				0				1				2				3			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
15	9/10	4				5				6				7				5			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
16	10	0				1				2				3				4			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)

Peripheral Card with Champ Connections For Coral Interface Cards

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Table 5-26 ***8TBRsl, 8TBRPsl MDFipx Pinout for Main Cage Slot# 1,2,3***

Main Cage - 8TBR-sl, 8TBRP-sl																					
		Krone Block																			
Block	Slot	1		2		3		4		5		6		7		8		9		10	
1	1	0				1				2				3				4			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
2	1/2	5				6				7				0				1			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
3	2	2				3				4				5				6			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
4	2/3	7																			
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)
5	3																				
		T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)	T(-)	T(+)	R(+)	R(-)				
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14	Aux					KB1						KB2						MUSIC1		MUSIC2	
						RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux	KST3						RELAY1		RELAY2		RELAY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Table 5-27 ***4TEMsl MDFipx Pinout for Main Cage Slot# 1,2,3***

Main Cage - 4TEMsl																					
Block	Slot	***Krone Block***																			
		1		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*		*10*	
1	1	0								1								2			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
2	1/2	2				3								0							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
3	2	1								2								3			
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR
4	2/3	3				0								1							
		E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB
5	3	2								3											
		ETT	ETR	ERT	ERR	E	SG	M	SB	ETT	ETR	ERT	ERR	E	SG	M	SB				
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14	Aux					KB1						KB2						MUSIC1		MUSIC2	
						RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux	KST3						RELAY1		RELAY2		RELAY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Table 5-28 ***4TBRsl, 4TBRPsl MDFipx Pinout for Main Cage Slot# 1,2,3***

Main Cage - 4TBR-sl, 4TBRP-sl																					
Block	***Slot***	***Krone Block***																			
		1		***2***		***3***		***4***		***5***		***6***		***7***		***8***		***9***		***10***	
1	**1**	**0**				**1**				**2**				**3**							
		T(-)	**T(+)**	**R(+)**	**R(-)**	**T(-)**	**T(+)**	**R(+)**	**R(-)**	**T(-)**	**T(+)**	**R(+)**	**R(-)**	**T(-)**	**T(+)**	**R(+)**	**R(-)**				
2	**1/2**													**0**				**1**			
														T(-)	**T(+)**	**R(+)**	**R(-)**	**T(-)**	**T(+)**	**R(+)**	**R(-)**
3	**2**	**2**				**3**															
		T(-)	**T(+)**	**R(+)**	**R(-)**	**T(-)**	**T(+)**	**R(+)**	**R(-)**												
4	**3**					**0**				**1**				**2**				**3**			
						T(-)	**T(+)**	**R(+)**	**R(-)**	**T(-)**	**T(+)**	**R(+)**	**R(-)**	**T(-)**	**T(+)**	**R(+)**	**R(-)**	**T(-)**	**T(+)**	**R(+)**	**R(-)**
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14	**Aux**					**KB1**						**KB2**						**MUSIC1**		**MUSIC2**	
						RxD	**TxD**	**CTS**	**RTS**	**DSR**	**DTR**	**RxD**	**TxD**	**CTS**	**RTS**	**DSR**	**DTR**	**A**	**B**	**A**	**B**
15	**Aux**	**KST3**						**RELAY1**		**RELAY2**		**RELAY3**		**PAGE**		**GND**					
		RxD	**TxD**	**CTS**	**RTS**	**DSR**	**DTR**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**						

Table 5-29 ***4TWLsl MDFipx Pinout for Main Cage Slot# 1,2,3***

Main Cage - 4TWLsl											
		Krone Block									
Block	Slot	1	2	3	4	5	6	7	8	9	10
1	1			0 TT TR			1 TT TR			2 TT TR	
2	1/2		3 TT TR							0 TT TR	
3	2		1 TT TR			2 TT TR			3 TT TR		
4	3					0 TT TR			1 TT TR		
5	3	2 TT TR			3 TT TR						
6	4										
7	4/5										
8	5										
9	6										
10	6										
11	7										
12	7/8										
13	8										
14	Aux			KB1 RxD TxD	KB1 (cont.) CTS RTS	KB1 (cont.) DSR DTR	KB2 RxD TxD	KB2 (cont.) CTS RTS	KB2 (cont.) DSR DTR	MUSIC1 A B	MUSIC2 A B
15	Aux	KB3 RxD TxD	KB3 (cont.) CTS RTS	KB3 (cont.) DSR DTR	RELAY1 A B	RELAY2 A B	RELAY3 A B	PAGE A B	GND		

Table 5-30 ***8TPFsl MDFipx Pinout for Main Cage Slot# 1,2,3***

Main Cage - 8TPFsl																					
Block	Slot	Krone Block																			
		1		2		3		4		5		6		7		8		9		10	
1	1	0		1		2						3						4			
		TT	TR	TT	TR	TT	TR					TT	TR					TT	TR	STT	STR
2	1/2	4		5						6		7		0		1		2			
		SCT	SCR	TT	TR	STT	STR	SCT	STR	TT	TR	TT	TR	TT	TR	TT	TR	TT	TR		
3	2			3						4						5					
				TT	TR					TT	TR	STT	STR	SCT	STR	TT	TR	STT	STR	SCT	SCR
4	2/3	6		7		0		1		2						3					
		TT	TR	TT	TR	TT	TR	TT	TR	TT	TR					TT	TR				
5	3	4						5						6		7					
		TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR				
6	4																				
7	5																				
8	5																				
9	6																				
10																					
11	7																				
12	8																				
13	8																				
14	Aux					KB1						KB2						MUSIC1		MUSIC2	
						RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux	KST3						RELAY1		RELAY2		RELAY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Table 5-31 ***8T-Csl, 8T-CIDsl MDFipx Pinout for Main Cage Slot# 1,2,3***

Main Cage - 8T-Csl, 8T-CIDsl

Block	Slot	*Krone Block* 1		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*		*10*	
1	1	0		1		2						3						4			
		TT	TR	TT	TR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
2	1/2	4		5						6		7		0		1		2			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR
3	2	2		3						4						5					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
4	2/3	6		7		0		1		2						3					
		TT	TR	TT	TR	TT	TR	TT	TR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
5	3	4						5						6		7					
		TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	TT	TR				
6	4																				
7	5																				
8	5																				
9	6																				
10																					
11	7																				
12	8																				
13	8																				
14	Aux					KB1						KB2						MUSIC1		MUSIC2	
						RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux	KST3						RELAY1		RELAY2		RELAY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

Table 5-32 ***4T-CsI, 4T-CIDsI, 4TMR-PFsI MDFipx Pinout for Main Cage Slot# 1,2,3***

Main Cage - 4T-CsI, 4T-CIDsI, 4TMR-PFsI																					
Block	**Slot**	**Krone Block**																			
		1		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	
1	1					0						1						2			
						TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR
2	1/2	2		3														0			
		SCT	SCR	TT	TR	STT	STR	SCT	SCR									TT	TR	STT	STR
3	2	0		1						2						3					
		SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
4	3									0						1					
										TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR
5	3	2						3													
		TT	TR	STT	STR	SCT	SCR	TT	TR	STT	STR	SCT	SCR								
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14	Aux					KB1						KB2						MUSIC1		MUSIC2	
						RxD	TxD	CTS	RTS	DSR	DTR	RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B
15	Aux	KB3						RELAY1		RELAY2		RELAY3		PAGE		GND					
		RxD	TxD	CTS	RTS	DSR	DTR	A	B	A	B	A	B	A	B						

* STT, STR, SCT and SCR are power failure transfer connections. See *page 5-15, Power Fail (PF) Transfer Circuits*, earlier in this chapter.

5.8 Peripheral Card with RJ-45 DA-15S Connections

For Coral Interface Cards

1 Peripheral Cards Index

The I/O connections of the following interface cards are performed via cables connected to their top panel RJ-45 or DA-15S connectors.

Card Name	Page
UDTipx(PRI-23), PRI-23ipx, PRI-23sl PRI-30ipx, PRI-30sl	on page 5-74
UDTipx(T1), T1ipx, T1sl 30Tipx, 30Tsl	on page 5-78
UGWipx	on page 5-81
8SKKipx, 8SKKsl	on page 5-83

NOTE:

PRI-23sl, PRI-30sl, T1sl, 30Tsl, 2SKWsl, 4SKWsl and 8SKKsl cards with the suffix "sl" are for use in slots 1,2,3 of the Coral IPx 500M main cage only.

NOTE:

8SKKsl and 8SKKipx cards include front panel I/O options. However, there are various factors involved. Therefore, their description is not included in this section. For details, see the FlexAIR Installation Procedure and Hardware Reference Manual.

NOTE:

2SKWsl and 4SKWsl cards include front panel I/O options. However, there are various factors involved. Therefore, their description is not included in this section. For details, see the CoralAIR Installation Procedure and Hardware Reference Manual.

2 UDTipx/PRI-23ipx, PRI-23sl, PRI-30ipx, and PRI-30sl Cards

The external network connections to the PRI-23/30sl and PRI-23/30ipx digital circuit are made via one of the two connectors available at the top panel:

- DA-15S, 15 pin female D-type connector (*Table 5-33* and *Figure 5-17*)
- RJ-45 telephony connector (*Table 5-33* and *Figure 5-18*)

CAUTION!

Do not use both connectors at the same time.

NOTE:

For further information, on how to make the connection, refer also to the Coral Service and Peripheral Cards Installation Manual.

Figure 5-19 describes the connection from the top panel to the PSTN/LTU/CSU.

Table 5-33 ***PRI-23, PRI-30 Network Interface Connections***

DA-15S Pin #	RJ-45 Pin #	Nomination	Functions
Pin 11	Pin 1	RxB	Receive Data (ring) from Network
Pin 3	Pin 2	RxA	Receive Data (tip) from Network
Pin 8	Pin 3,6	Shield	Cable Shield, 48VDC Return
Pin 9	Pin 4	TxB	Transmit Data (ring) to Network
Pin 1	Pin 5	TxA	Transmit Data (tip) to Network
Pin 13	Pin 7	-48VDC	Power for CSU/LTU
Pin 15	Pin 8	GND	Cable Shield, 48VDC Return
2,4,5,6,7,10,12,14		Not Used	Not Used

Figure 5-17 ***PRI-23, PRI-30 RJ-45 Interface Connector PIN Assignment***

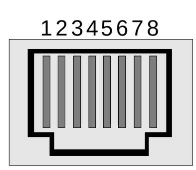
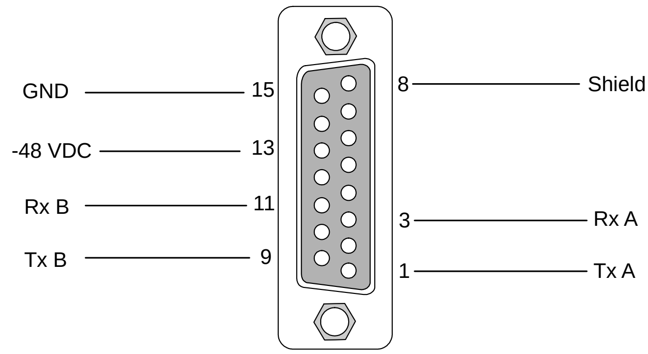


Figure 5-18 ***PRI-23, PRI-30 DA-15S Interface Connector PIN Assignment***



DA-15S D-TYPE Connector

Peripheral Card with RJ-45 DA-15S Connections For Coral Interface Cards

5

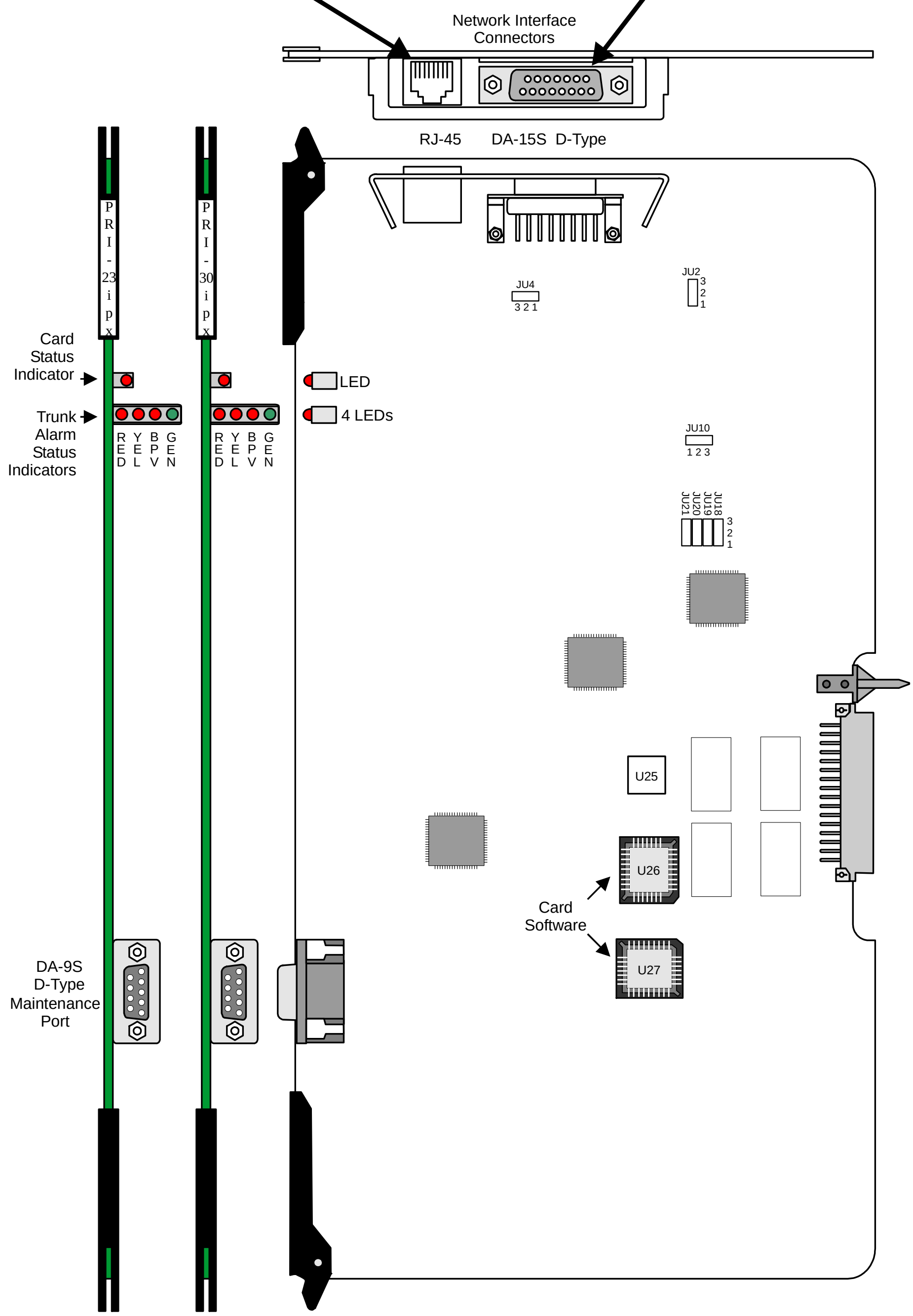
Figure 5-19 ***PRI (layout UDTipx) Interface Connections to the PSTN/LTU/CSU***

RJ-45

Pin #	Nomination
Pin 1	RxB
Pin 2	RxA
Pin 3	Shield
Pin 4	TxB
Pin 5	TxA
Pin 6	Shield
Pin 7	-48VDC
Pin 8	Ground

DA-15S D-Type

Pin #	Nomination
Pin 11	RxB
Pin 3	RxA
Pin 8	Shield
Pin 9	TxB
Pin 1	TxA
Pin 13	-48VDC
Pin 15	Ground
Pin 2,4,5,6, 7,10,12,14	Not Used



PRI I/O Cables

Two factory pre-wired cables are available for PRI-23/30sl and PRI-23/30ipx I/O connections:

- PRI-23/30/sl/ipx to LTU/CSU cable, towards PSTN, CN# 7244-6914056.
- PRI-23/30/sl/ipx to PRI, PRI-23/30/sl/ipx or compatible card cable, for network connections, CN# 7244-8000901.

Figure 5-20 ***PRIsl and PRIipx DA-15S Interface Connectors and Wiring***

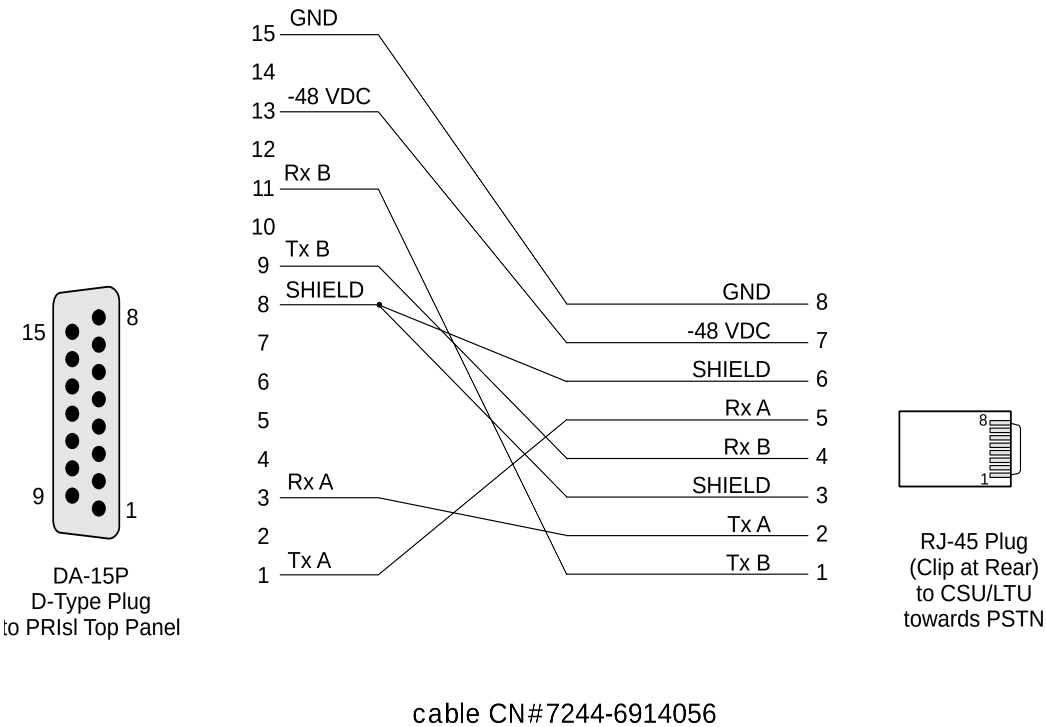


Table 5-34 ***Cable (CN# 7244-6914056) Connections***

DA-15P Pin #	*RJ-45 Pin #*	*Nomination*
Pin 11	Pin 1	Pair #1
Pin 3	Pin 2	Pair #1
Pin 8	Pin 3	Shield Pair #1
Pin 9	Pin 4	Pair #2
Pin 1	Pin 5	Pair #2
Pin 8	Pin 6	Shield Pair #2
Pin 13	Pin 7	-48VDC
Pin 15	Pin 8	GND
2,4,5,6,7,10,12,14		Not Used

3 UDTipx/T1ipx, T1sl, 30Tipx, and 30Tsl Cards

The external network connections to the T1sl, T1ipx, 30Tsl, and 30Tipx digital circuit are made via one of the two connectors available at the top panel:

- DA-15S, 15 pin female D-type connector (*Table 5-35* and *Figure 5-21*).
- RJ-45 telephony connector (*Table 5-35* and *Figure 5-22*).

CAUTION!

Do not use both connectors at the same time. Doing so will damage the card.

NOTE:

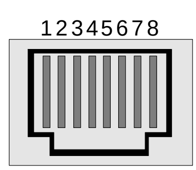
For further information on how to make the connection, refer to the Coral Service and Peripheral Cards Installation Manual.

Figure 5-23 describes the connection from the top panel to the PSTN/LTU/CSU.

Table 5-35 ***T1 and 30T Network Interface Connections***

DA-15S Pin #	*RJ-45 Pin #*	*Nomination*	*Functions*
Pin 11	Pin 1	Rx Ring	Receive Data from Network
Pin 3	Pin 2	Rx Tip	Receive Data from Network
Pin 8	Pin 3,6	Shield	Cable Shield, 48VDC Return
Pin 9	Pin 4	Tx Ring	Transmit Data to Network
Pin 1	Pin 5	Tx Tip	Transmit Data to Network.
Pin 13	Pin 7	-48VDC	Power for CSU/LTU
Pin 15	Pin 8	GND	Cable Shield, 48VDC Return
2,4,5,6,7,10,12,14		Not Used	Not Used

Figure 5-21 ***T1 and 30T RJ-45 Interface Connector PIN Assignment***



RJ-45
Connector

1 - Rx Ring
2 - Rx Tip
3 - Shield
4 - Tx Ring
5 - Tx Tip
6 - Shield
7 - -48VDC
8 - GND

Figure 5-22 ***T1 and 30T DA-15S Interface Connector PIN Assignment***

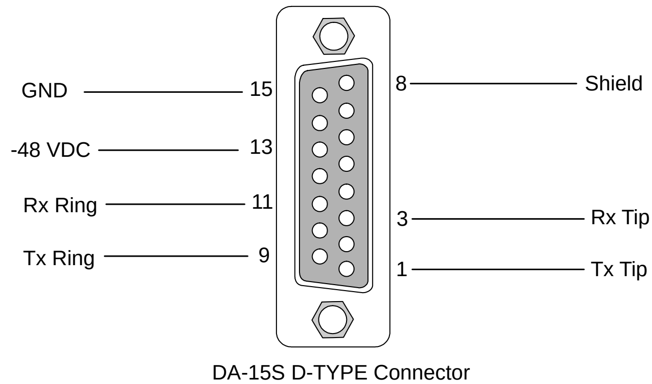


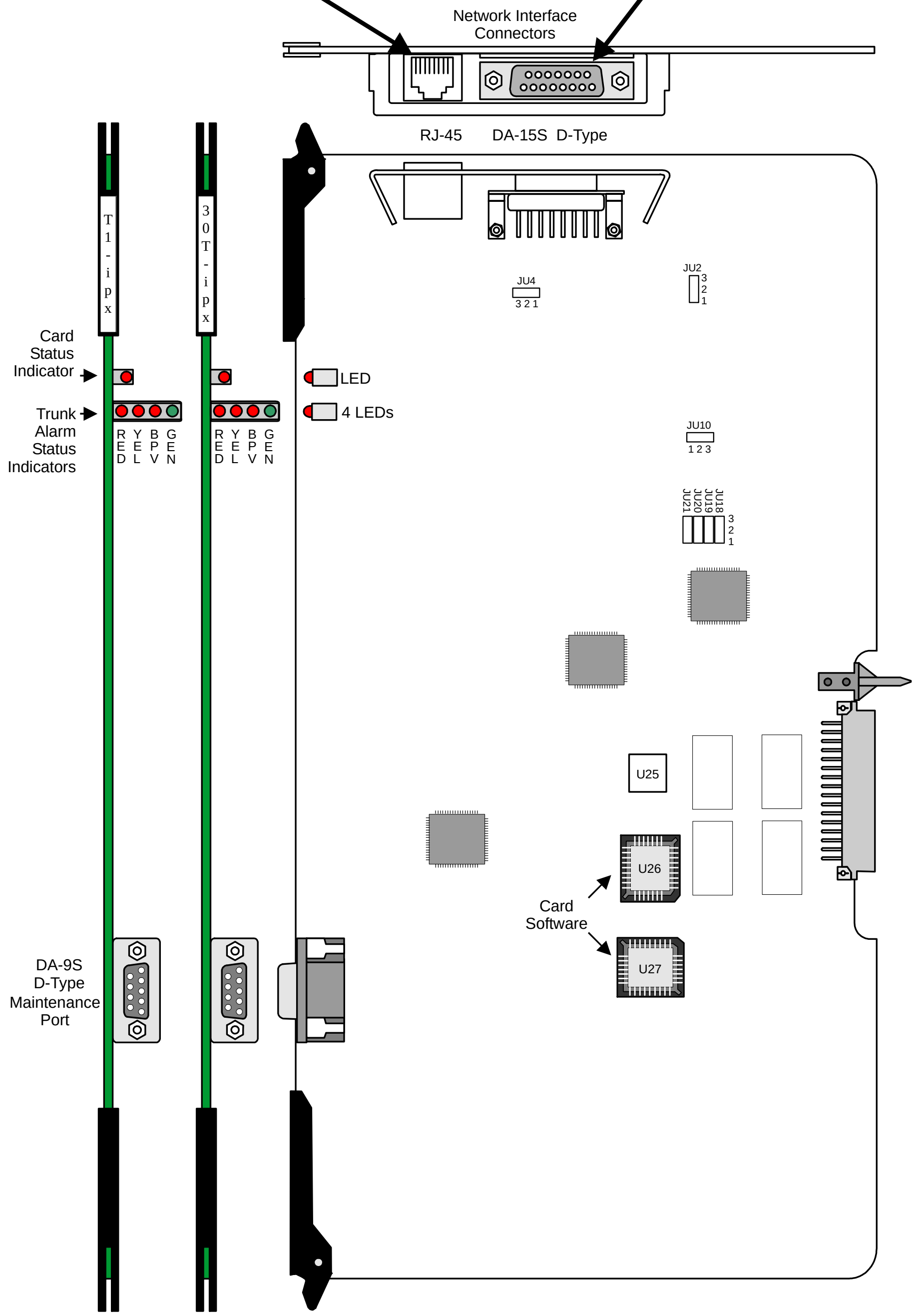
Figure 5-23 ***T1 and 30T Interface Connections to the PSTN/LTU/CSU***

RJ-45

Pin #	Nomination
Pin 1	Rx Ring
Pin 2	Rx Tip
Pin 3	Shield
Pin 4	Tx Ring
Pin 5	Tx Tip
Pin 6	Shield
Pin 7	-48VDC
Pin 8	Ground

DA-15S D-Type

Pin #	Nomination
Pin 11	Rx Ring
Pin 3	Rx Tip
Pin 8	Shield
Pin 9	Tx Ring
Pin 1	Tx Tip
Pin 13	-48VDC
Pin 15	Ground
Pin 2,4,5,6, 7,10,12,14	Not Used



4 UGWipx

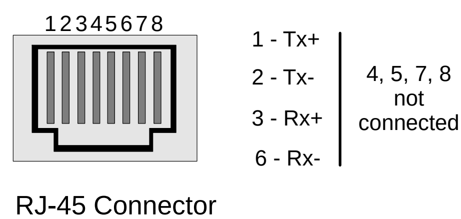
Table 5-36 and Figure 5-24 show the interface connections of the pins on the UGWipx RJ-45 connectors.

Figure 5-25 describes the connection from the top panel to the LAN/WAN.

Table 5-36 ***UGWipx Network Interface Connections***

Pin #	*Nomination*	*Function*
Pin 1	Tx(+)	Transmit Data (+) to Network.
Pin 2	Tx(-)	Transmit Data (-) to Network
Pin 3	Rx(+)	Receive Data (+) from Network
Pin 4	not used	not connected
Pin 5	not used	not connected
Pin 6	Rx(-)	Receive Data (-) from Network
Pin 7	not used	not connected
Pin 8	not used	not connected

Figure 5-24 ***UGWipx Network Interface Connector PIN Assignment***

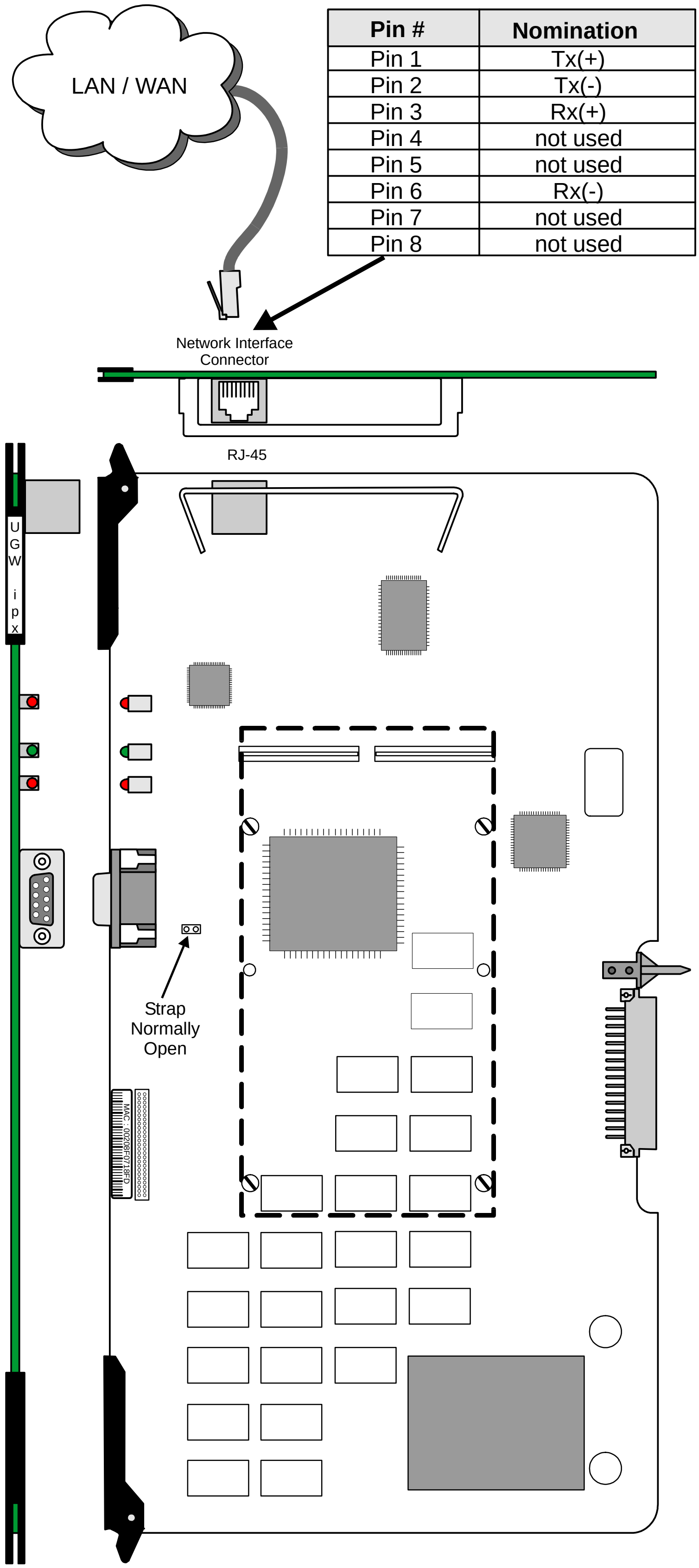


NOTE:

For further information on how to make the connection, refer to the Coral Voice over IP Installation Manual.

Figure 5-25 ***UGWipx Card Connection to the LAN/WAN***

Pin #	Nomination
Pin 1	Tx(+)
Pin 2	Tx(-)
Pin 3	Rx(+)
Pin 4	not used
Pin 5	not used
Pin 6	Rx(-)
Pin 7	not used
Pin 8	not used



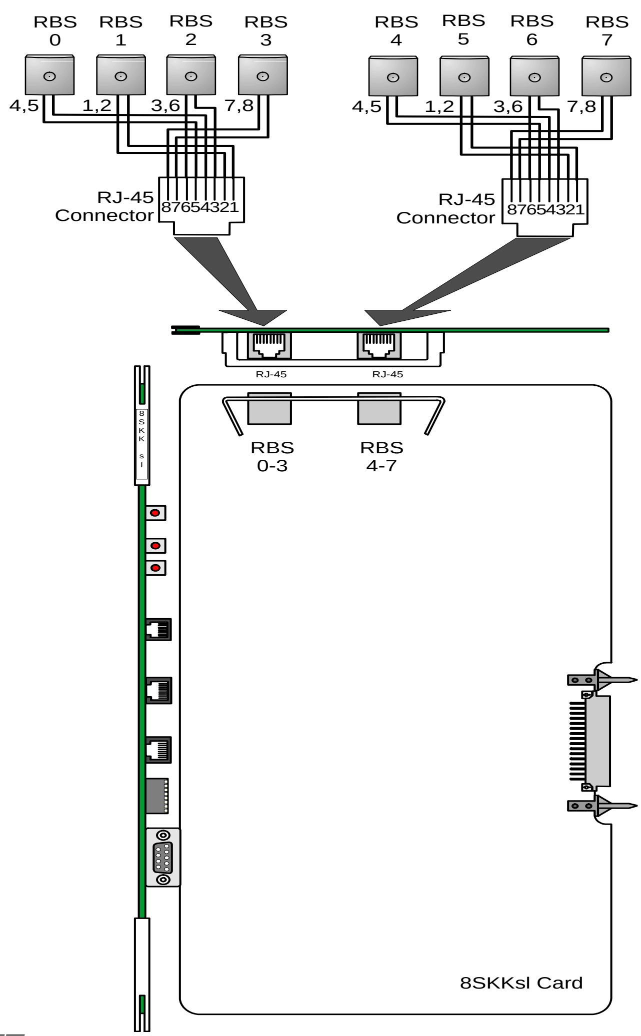
5 8SKKipx and 8SKKsl Cards

The external RBS (Radio Base Station) connections to the 8SKKsl and 8SKKipx digital circuit are made via one of the two connectors available at the top panel:

Table 5-37 **8SKKsl, 8SKKipx I/O Interface Connections**

RJ-45 Pin	Connector	
	RBS 0-3	RBS 4-7
4, 5	0	5
1, 2	1	5
3, 6	2	6
7, 8	3	7

Figure 5-26 **8SKKsl, 8SKKipx RJ-45 Interface Connectors and Wiring**



NOTE:

For further information on how to make the connection, refer also to the "Coral FlexAir Installation and Reference Manual".

NOTES:

Chapter 6

Cage Description

Coral

6.1 General System Description and Installation

This section describes the Coral IPx 500 cage components. Upon completing this section, you will be familiar with cage components and the general procedure of how the cage is installed. The actual instructions for installing the cage are found in *Chapter 2, Hardware Installation Procedure*.

The Coral IPx 500 system is housed in one or more rack-mounted or wall-mounted cages. Each system consists of one main cage that contains the common control cards and peripheral cards, as well as one or two optional expansion cages. Main cages are equipped with peripheral card slots in addition to the common control cards. Expansion cages are equipped with additional peripheral card slots.

1 Cage Exterior

The Coral IPx 500 cage is designed to provide a simple, reliable method for installing and removing the printed circuit cards and assemblies that contain the active circuitry of the system. The Coral IPx 500 cage includes slots for control and peripheral cards, a slot for the power supply unit, door locking studs, free space at the top of the cage designed for cool air outflow and cable connection, holes on the side and top panels for ventilation, I/O cable routing from the top section of the cage through the rear panel, and a door release mechanism on the right side of the cabinet adjacent to the door hinge.

Front of Wall-Mounted Configuration

The Coral IPx 500 can be mounted onto the wall at the customer's site. The wall-mounted cage includes decorative side panels, cage door, top cover, and ventilation holes. The Coral IPx 500 includes a kit that is ordered separately by the customer for cages that are to be mounted on a wall.

Figure 6-1 displays the Coral IPx 500 cage mounted onto the wall. Instructions on how to mount the cage onto the wall can be found on *page 2-18, Wall Mounted Installations*

Front of Rack-Mounted Configuration

The Coral IPx 500 is a versatile unit that can be mounted onto either a 19" or a 23" rack located at the customer's site. The rack-mounted cage includes mounting brackets, cage door, top cover, and ventilation holes. The Coral IPx 500 includes a kit that is ordered separately by the customer for cages that are to be mounted in a rack. Figure 6-2 displays the rack configuration for the Coral IPx 500 cage mounted onto a 19" rack. Instructions for mounting the cage onto the rack can be found on page 2-33, Mounting the Cage onto the Rack.

Figure 6-1 ***Front View of the Wall-Mounted Coral IPx 500 Cage***

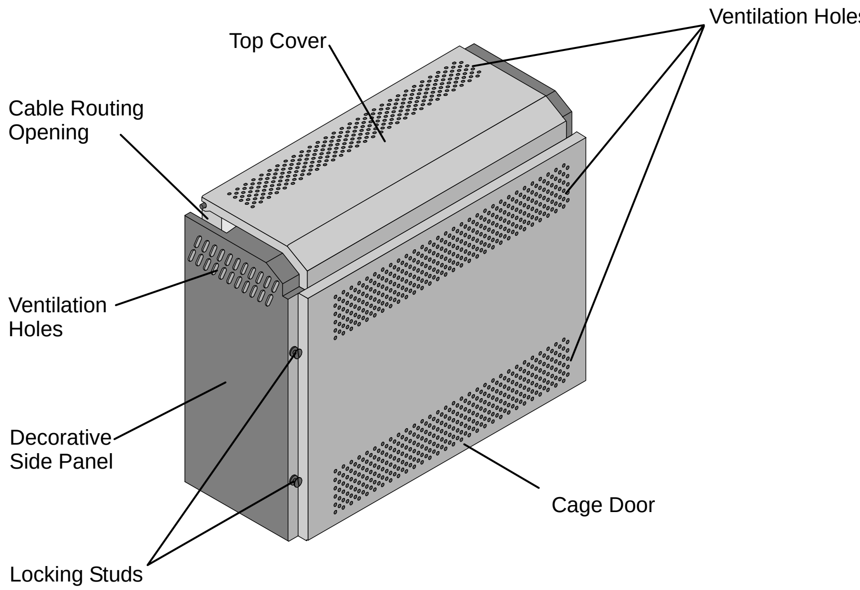
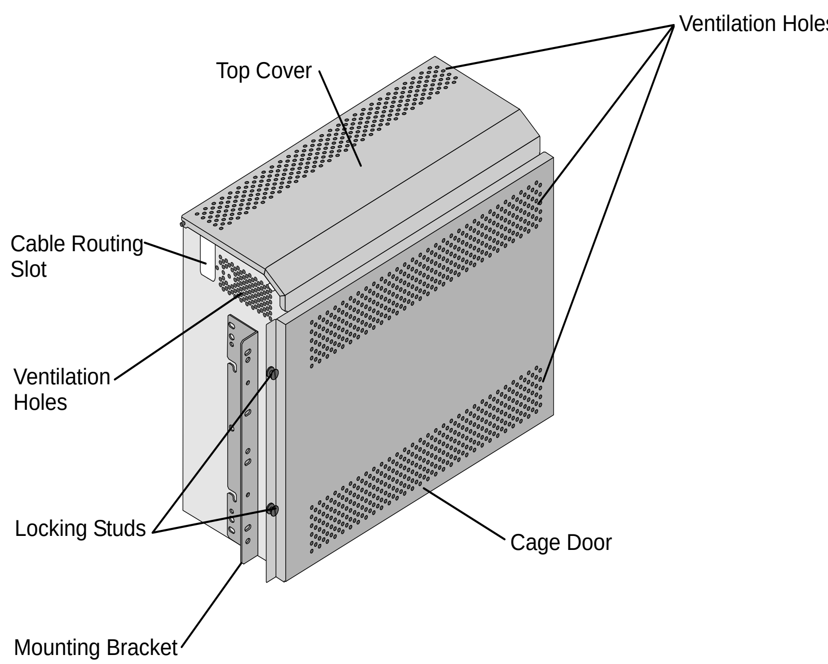


Figure 6-2 ***Front View of the Rack-Mounted Coral IPx 500 Cage***



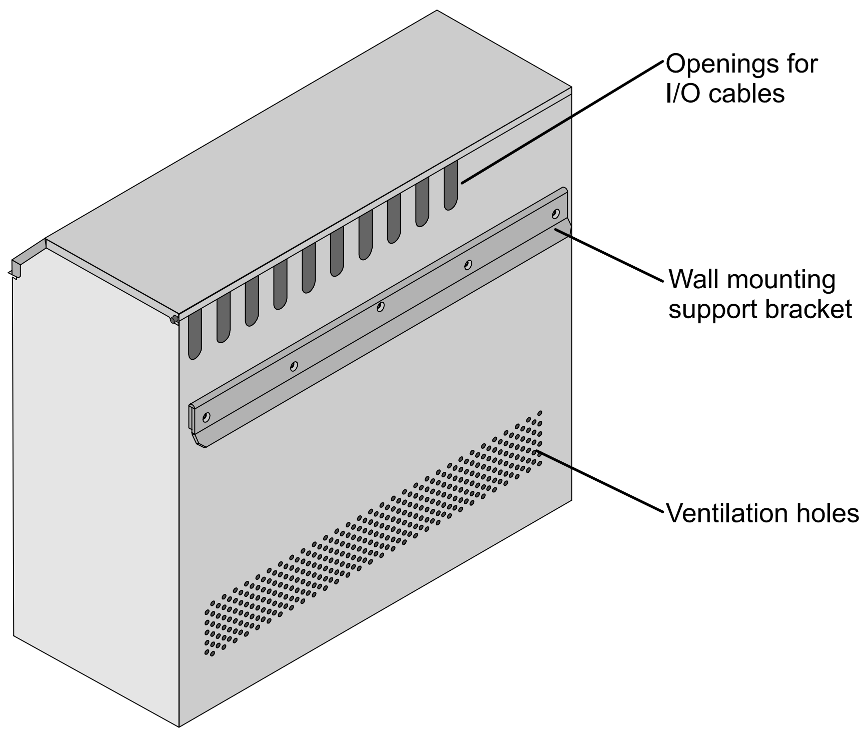
Rear Panel

The rear panel (see *Figure 6-3*) includes:

- Ventilation holes on the lower section to allow the inflow of cool air. Do not block the rear panel of the cage, as this area must be left clear to allow the inflow of cool air.
- Openings behind the top section for routing the card I/O cables to the MDF
- A wall mounting support bracket that runs across the length of the rear panel
- Safety labels (not shown in *Figure 6-3*). See *Figure 6-19 on page 6-19*.

For information on space requirements in back-to-back installations, see *page 2-3, Space Requirements*.

Figure 6-3 **Rear View of the Coral IPx 500 Cage**



General System Description and Installation

6

Side Panels

The left panel of the cage includes an opening for routing the expansion and auxiliary cables. The left panel of the cage also includes door fasteners and ventilation holes.

In wall-mounted configurations, both left and right panels include a plastic decorative cover. See *Figure 6-4*. The cables are routed through the slot on the left panel between the side panel and the cover. The rear mounting hook is also displayed, it is used for wall-mounted configurations, only.

In rack-mounted configurations, the right and left panels include the cage mounting bracket used to attach the cage to the rack. See *Figure 6-5*.

Figure 6-4 ***Left Side of Cage for Wall-Mounted Configurations***

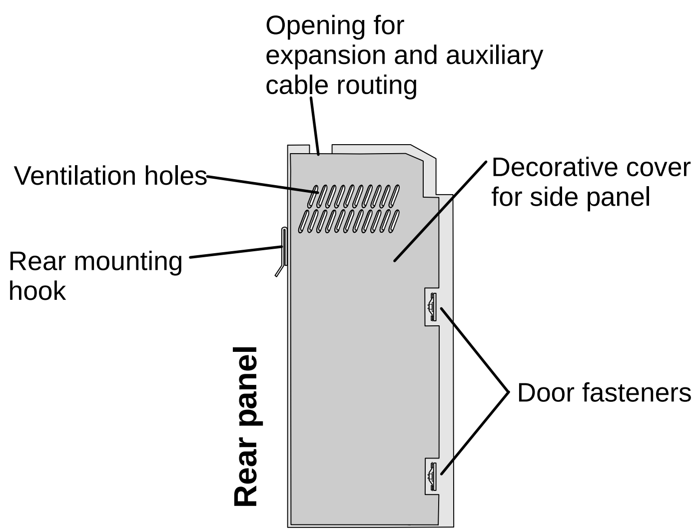
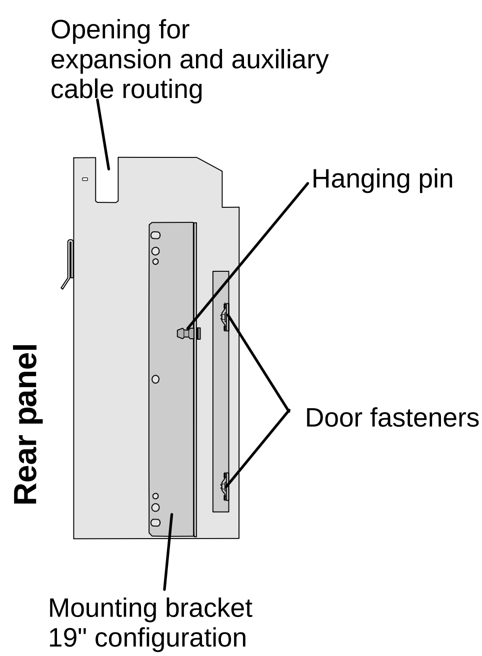


Figure 6-5 ***Left Side of Cage for Rack-Mounted Configurations***



General System Description and Installation

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Top Cover

The top cover is installed above the top section. A space of 2U must be maintained above the top cover and the equipment above it for maintenance purposes. See *page 2-3, Space Requirements*.

Bottom Panel

The bottom panel includes ventilation holes that allow cool air flow into the cage. If these holes are blocked, cool air cannot enter the cage. Heat build-up could cause a fire. Do not block the bottom panel of the cage. For more information, see *page 2-3, Space Requirements*.

Wall Mounting Kit

The cage can be supplied with a kit for mounting the cage onto the wall. Left and right plastic covers are assembled onto the cage. The left panel includes space on the top rear side for routing the expansion cable and the auxiliary cable. The bottom panel support bracket supports the cage from rear section of the bottom panel. See *Figure 6-1 on page 6-2*. For more information, see *page 2-18, Wall Mounted Installations*.

Rack Mounting Kit

The cage can be supplied with a kit for mounting the cage onto a rack. The rack mounting brackets for the rack can be fitted to interface with both 19" and 23" racks. See *Figure 6-2 on page 6-2*. For more information, see *page 2-29, Rack Mounted Installations*.

Door

The door on the front of the cage (see *Figure 6-6* and *Figure 6-7*) protects internal circuitry during normal operation from damage and RFI while still allowing access to the interior for maintenance activities. The cage door includes:

- Ventilation holes near the bottom and the top
- Locking studs on the left side of the door that prevent the door from opening during normal operation
- A grounding wire connection designed to ground the door
- Door hinge mounts that are mounted onto the hinges on the right side of the cage
- A door release mechanism (located on the right side of the cage) that locks the door onto the cage

Figure 6-6 ***External View of the Coral IPx 500 Door***

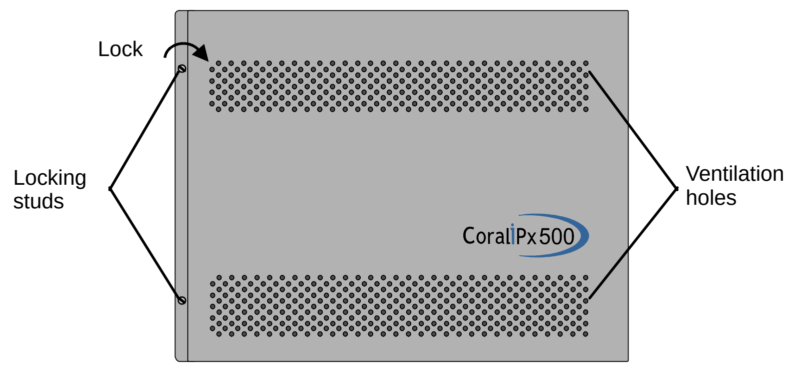
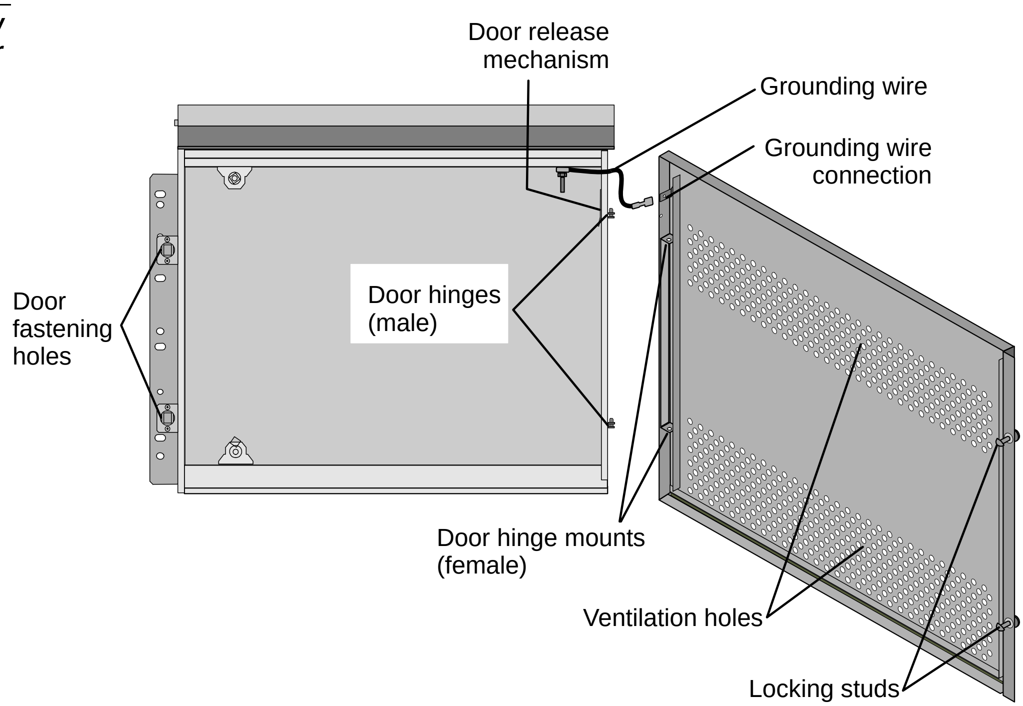


Figure 6-7 ***Internal View of the Coral IPx 500 Door with the Cage***



2 Accessing the Cage Interior

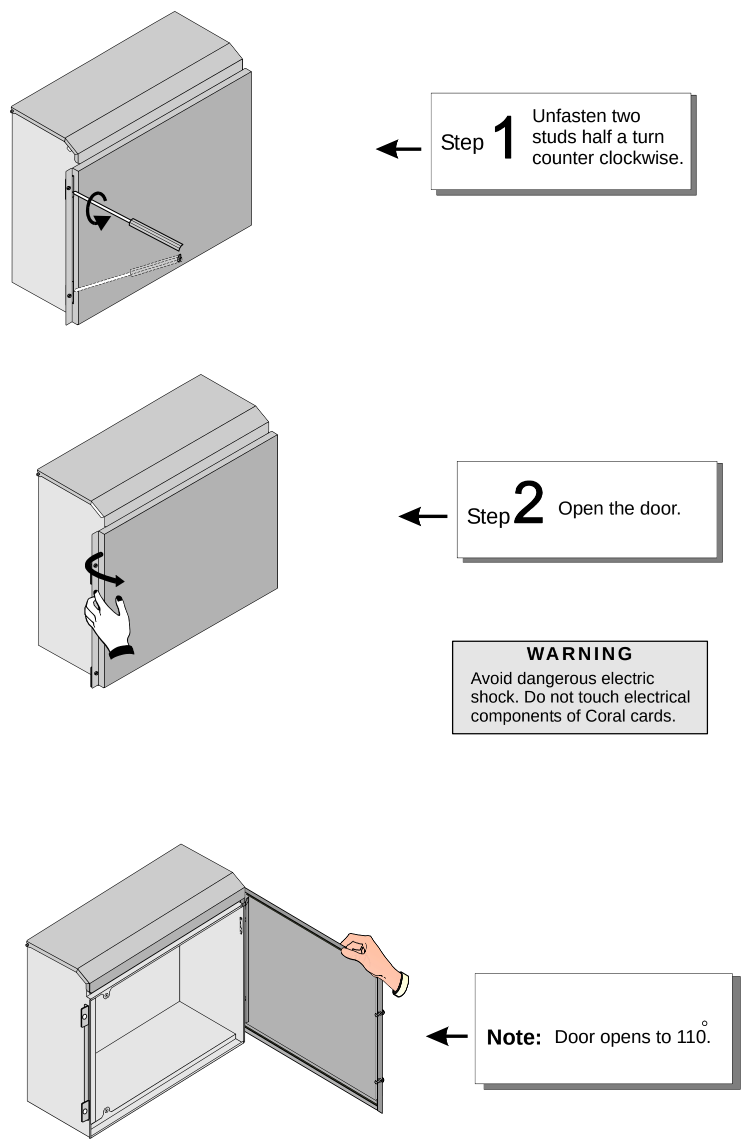
Opening the Door

1. Unfasten the two locking studs on the left side of the door with a straight blade screwdriver (half a turn counter-clockwise).
2. Pull the door open using moderate force. The door opens to 110°.

WARNING!

Electrical Hazard. During normal system operation, the cage door must remain closed at all times. Exercise extreme caution while handling the internal components of the cage.

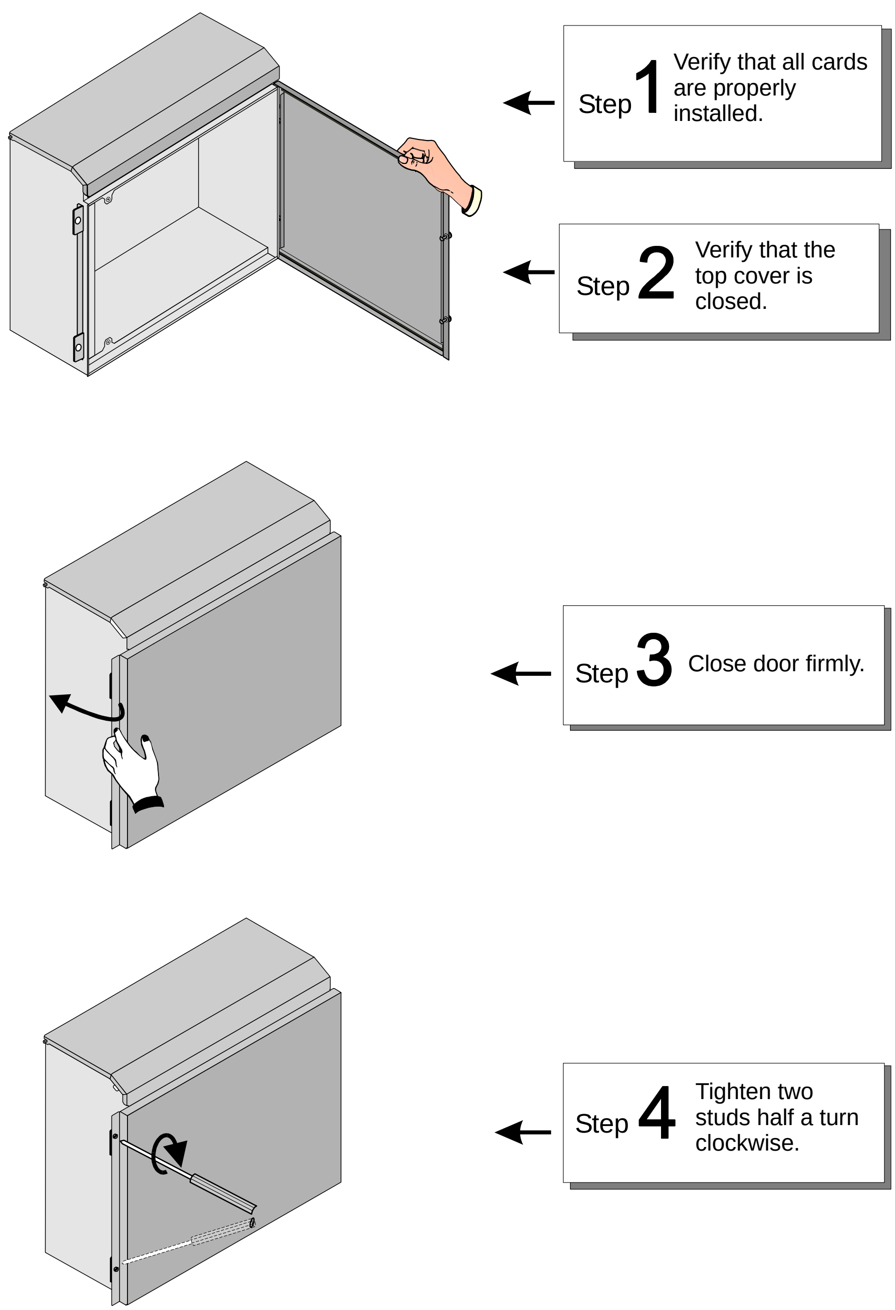
Figure 6-8 ***Opening the Door***



Closing the Door

1. Verify that all cards and power supply unit are properly installed and that all cables are properly connected.
2. Verify that the top section of the cage is free of objects (with the exception of cables routed from the rear and left of the cage).
3. Close the top cover. See *page 6-12, Assembling the Top Cover*.
4. Close the door firmly.
5. Fasten the locking studs with a straight blade screwdriver (half a turn clockwise).

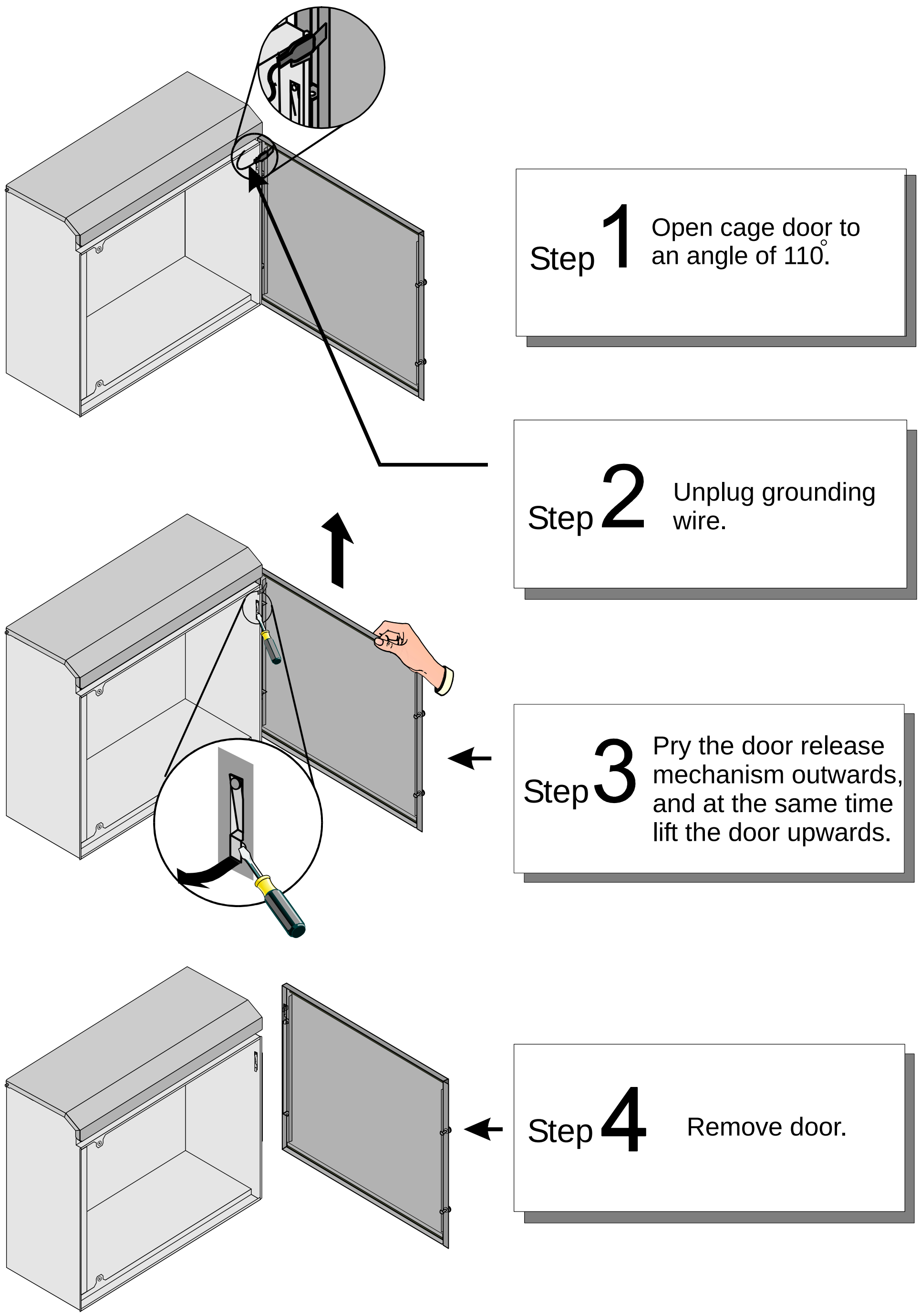
Figure 6-9 **Closing the Door**



Removing the Door

1. Open the door to an angle of at least 110°.
2. Disconnect the grounding wire from the door by pulling the connector at the end of the grounding wire from the connection on the door. See *Figure 6-7 page 6-6*.
3. Insert a straight blade screwdriver between the door release mechanism and the right panel of the cage, and pull it away from the right side.
4. At the same time, lift and remove the door.

Figure 6-10 **Removing the Door**



General System Description and Installation

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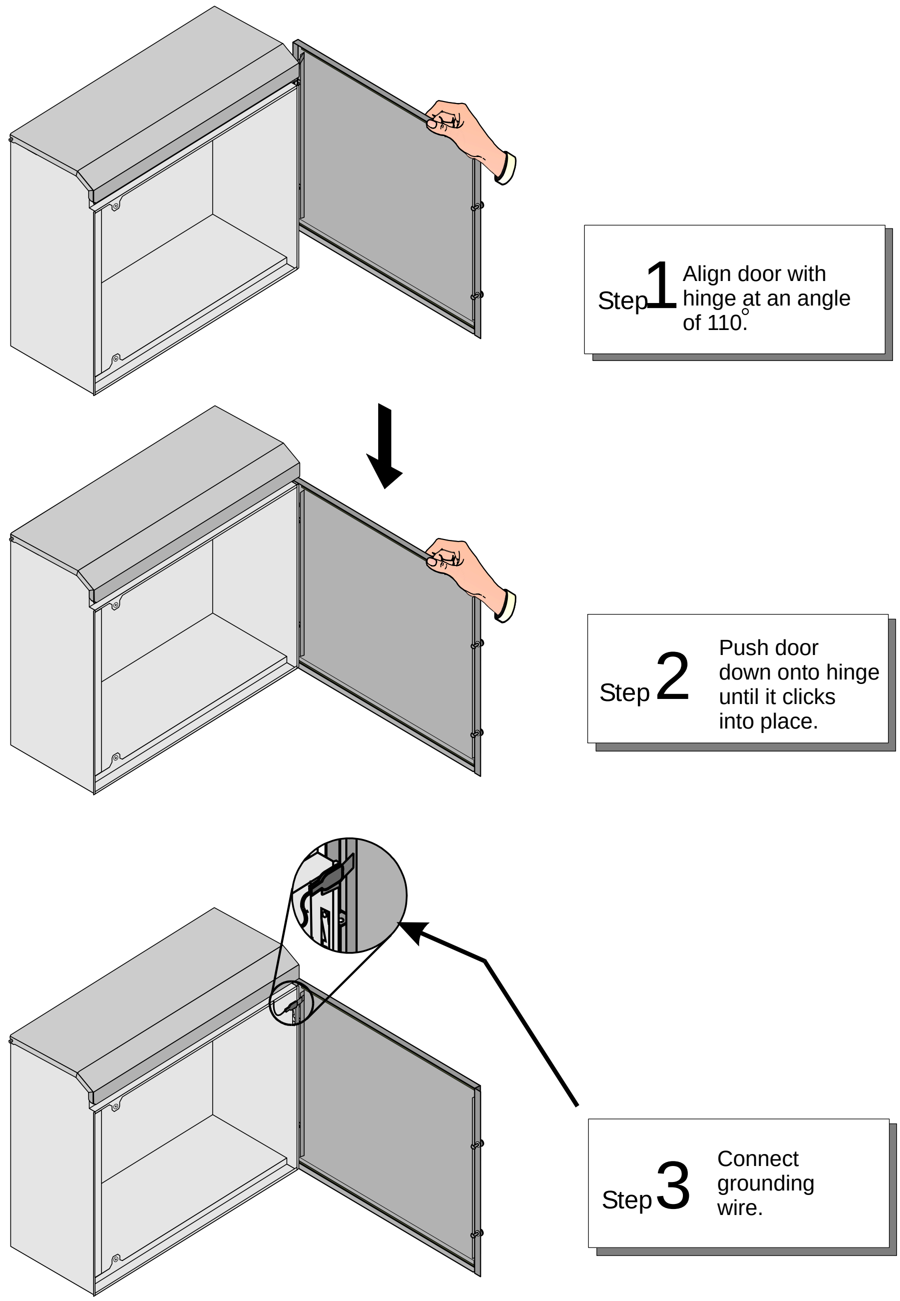
Assembling the Door

1. Align the door hinge mounts above the cage hinges, such that the door and the cage form an angle that is greater than 110°.
2. Lower the door onto the hinges and push down until the door clicks into place.
3. Connect the ground wire from the top right of the cage to the door by connecting the plug of the grounding wire to the door grounding connection. See *Figure 6-7 page 6-6*.

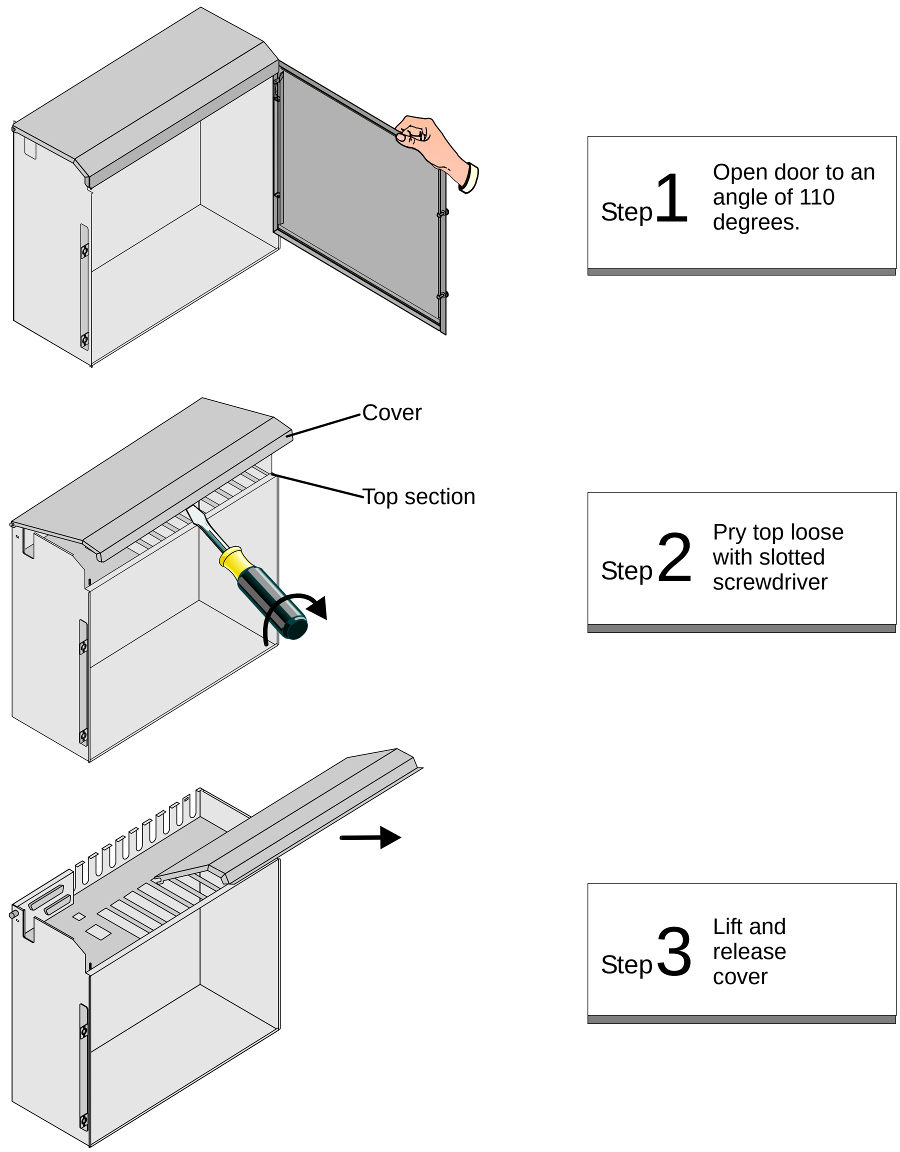
Figure 6-11 **Assembling the Door**



Removing the Top Cover

1. Open the door. See *page 6-7, Opening the Door*.
2. Insert a slotted screwdriver between the cover and the top section of the cage and twist until the cover is released from the cage.
3. Lift and remove the cover from the cage. See *Figure 6-12*.

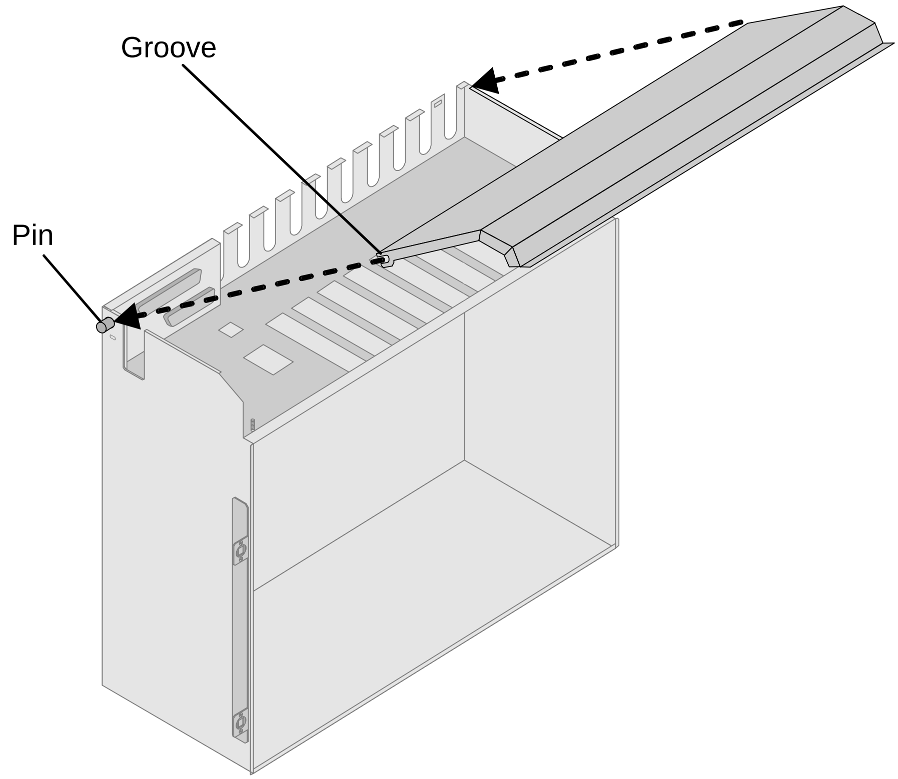
Figure 6-12 ***Removing the Top Cover***



Assembling the Top Cover

1. Open the door. See *page 6-7, Opening the Door*.
2. Insert the groove at the end of the top panel over the mating pin at the left and right side of the cage near the rear panel. See *Figure 6-13*.
3. Push down on the cover until it snaps into place on the cage.

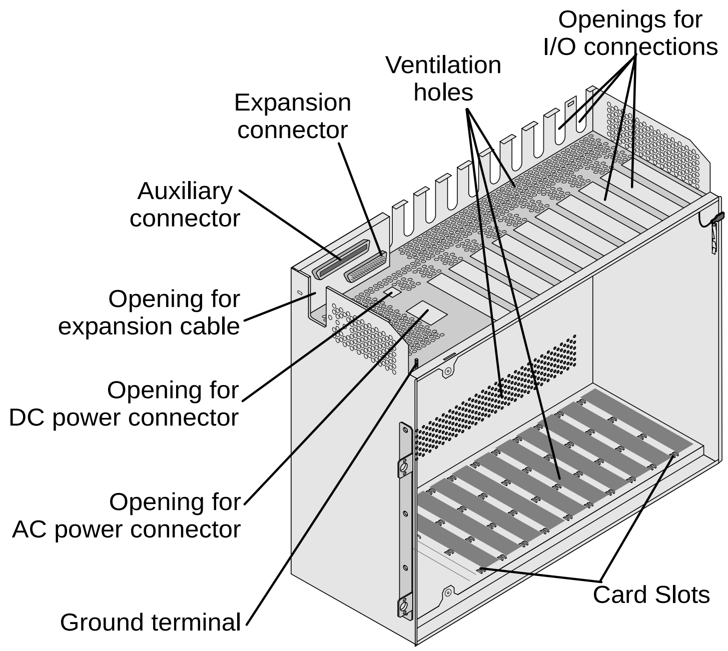
Figure 6-13 **Assembling and Removing the Protective Cover**



3 Cage Interior

The cage houses the power supply unit and all peripheral and control cards. On the left side of the cage, the PS500 power supply unit is installed. The remaining cards displayed are either peripheral cards or control cards. *Figure 6-14* displays the interior of the cage.

Figure 6-14 ***Coral IPx 500 Cage Interior***



Main Cage IPx 500M

The main cage is designated as the common control cage and is used to house the common control cards. The Coral IPx 500M houses eight peripheral card slots as well. The Coral IPx 500 system includes one IPx 500M main cage for all configurations. *Figure 6-15* displays the internal view of the main cage. For more detailed information about the main cage, refer to *page 6-21, Coral IPx 500M Main Cage*.

Expansion Cage IPx 500X

The expansion cage is used to house ten peripheral cards. The Coral IPx 500 system can include up to two expansion cages. *Figure 6-16* displays the internal view of the expansion cage. For more detailed information about the expansion cage, refer to *page 6-33, Coral IPx 500X Expansion Cage*.

Card Slots

Guides at the top and bottom of the card cage align the cards and assemblies during their insertion with multi-pin connectors mounted on the card cage backplane. The guides and associated connectors comprise a card slot. See *Figure 6-14*.

The connectors provide metallic paths from the cards to the various power and signal busses of the system and for peripheral cards, to the Input/Output (I/O) connectors.

Power Supply Unit

The Coral IPx cage includes one PS500 AC or DC power supply unit located on the left side of the cage. The power supply unit is attached to the cage with two spring-mounted, captive screws that ensure that the unit is grounded. These power supply units are described in detail in *Chapter 7, Power Supply*.

Control Card

The control card is housed in the left side of the IPx 500M main cage next to the power supply. This card is described in detail in *Chapter 8, Common Control Cards*.

Peripheral Cards

Coral IPx 500 includes eight peripheral cards in the main cage and ten peripheral cards in the expansion cage. These card types are described in *page 10-7, Peripheral Card Description*, and in greater detail in the *Coral Service and Peripheral Card Manual*.

Configuration Jumpers

The configuration jumpers in the main cage are located near the left side of the backplane. See *Figure 6-15*. For further information see *page 6-21, Coral IPx 500M Main Cage*.

The configuration jumpers in the expansion cage are located near the left side of the backplane. See *Figure 6-16*. For further information, see *page 6-33, Coral IPx 500X Expansion Cage*.

Figure 6-15 ***Front and Internal Views of Empty Coral IPx 500M Cage without Top Cover***

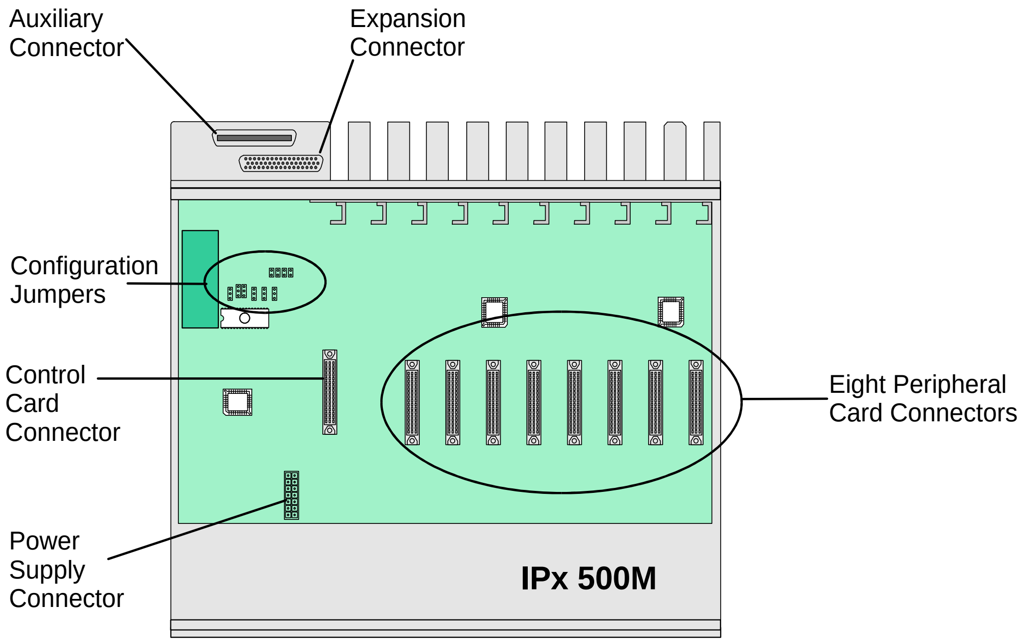
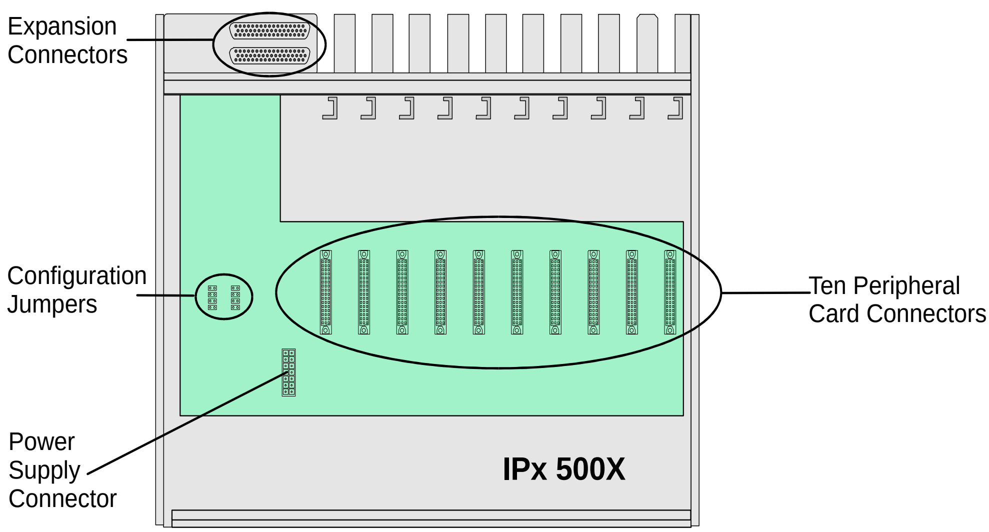


Figure 6-16 ***Front and Internal Views of Empty Coral IPx 500X Cage without Top Cover***



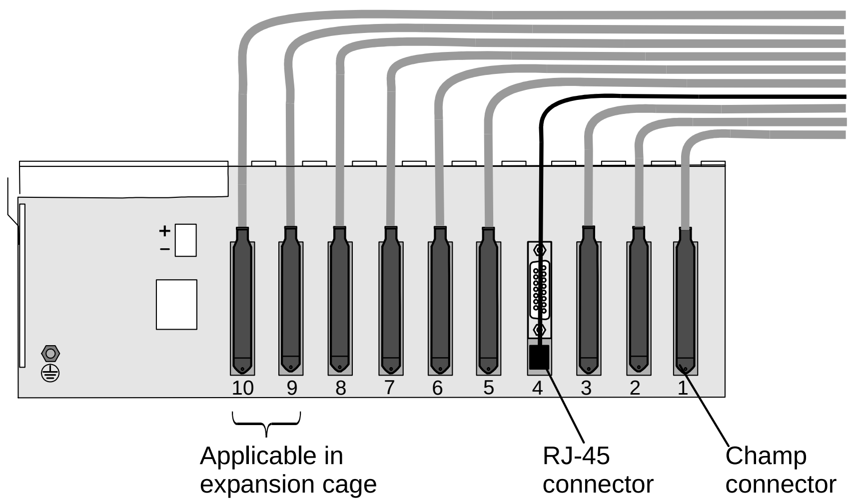
4 Top Section

The top section (see *Figure 6-14 on page 6-13*, *Figure 6-17*, and *Figure 6-18*) includes the openings for the I/O cable connections (Champ™ and RJ-45), openings for the AC power receptacle and DC power receptacle, and the cage ground terminal. The top section includes the auxiliary connector (in the main cage, only) and the expansion connector. All other connections (power and I/O) are made on the top panel of the cards through the slots in the top section.

I/O Connectors

Every peripheral card slot includes an opening on the top of the cage to allow I/O connectors to interface with the MDF. These connectors are routed from the free space between the top section and the top cover, through openings at the top of the rear panel. See *Figure 6-17*.

Figure 6-17 ***Top View of Cage with I/O Connectors***



The I/O connections for each peripheral card slot are provided directly from the top of the card to the MDF via eight connectors (in the main cage) or ten connectors (in the expansion cage). Each connector provides the I/O connections for one peripheral card. The I/O connectors are either Champ or RJ-45:

- *Champ connectors* include female, 25 pair AMP™ Champ™, or Amphenol® Microribbon® type connectors that appear on top of many peripheral cards (for example, 8SLSipx, 16SFTipx, 8T-Cipx, etc.)
- *RJ-45 jacks* are mounted at the top of many of the peripheral cards (for example, the UDTipx, T1ipx, UGWipx, PRI-30ipx cards, etc.) Mating male RJ-45 connectors should be industry standard.

Refer to the specific card tables in *Chapter 5, External Connections* for I/O connector pin assignments. There are no I/O connector pin assignments for either the power supplies or the common control cards.

Expansion Connectors

Each cage includes one or two expansion connectors that join that cage to another cage or cages. The main cage includes one expansion connector. The expansion cage includes two expansion connectors. See *Figure 6-18* and *page 6-39, Connections to Other Cages*.

Auxiliary Connector

The auxiliary connector is found in the main cage, only and is used for KB interface, music, and relay circuits. See *Figure 6-18*. *Table 6-3 on page 6-31* provides the pinout interface of the auxiliary connector.

AC Power Connector Opening

The AC power cord is attached to the AC power receptacle on the top panel of the PS500 AC unit. See *Figure 6-18.* The AC power connection slot in the top section of the cage is directly above the AC power receptacle when an PS500AC unit is installed. If the system runs on a PS500 DC unit, this slot is not used.

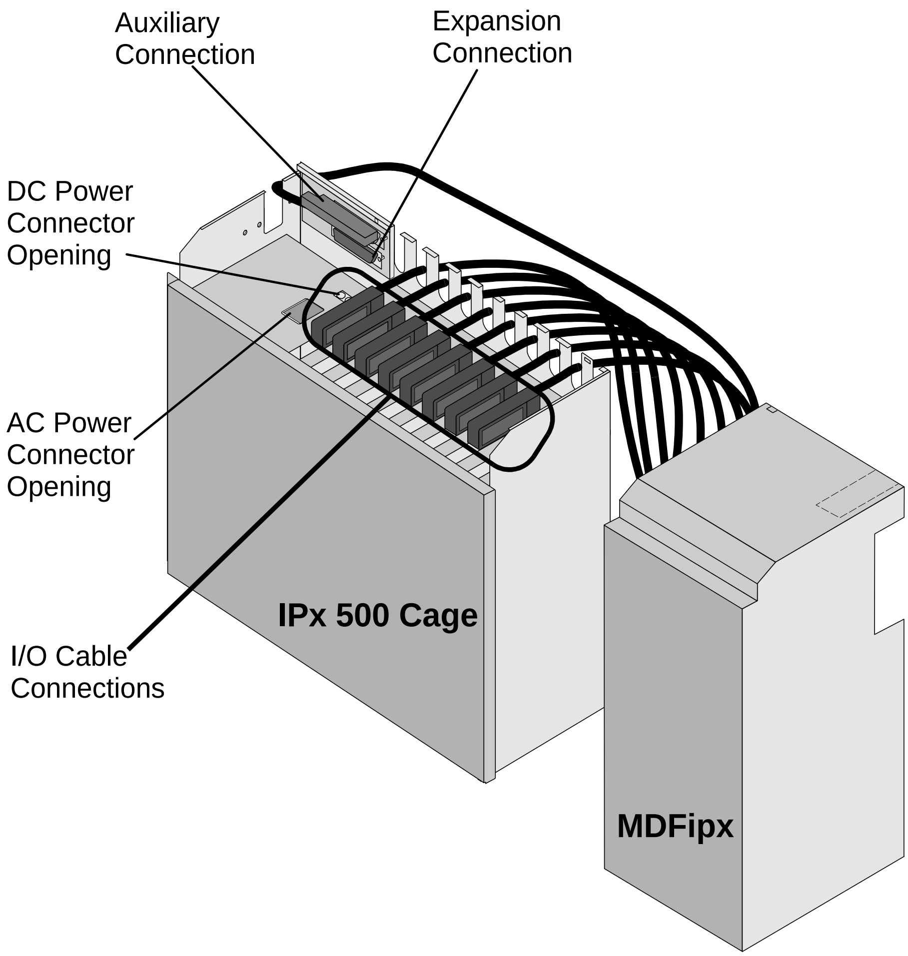
DC Power Connector Opening

The DC power connector is attached to the DC power receptacle on the top of all PS500 units. See *Figure 6-18.* In PS500 DC units, it is used to supply DC power from the facilities power supply to the cages. In PS500 AC units, this slot is used to connect to the battery pack. See *page 7-35, BATTipx Battery Pack* and *page 6-10,* for more details. The DC power connection opening in the top section of the cage is directly above the DC power receptacle in every PS500.

Cage Ground Terminal

The ground connection is used to connect the cage to the master ground unit. See *page 6-13, Coral IPx 500 Cage Interior* for more details.

Figure 6-18 ***Top section of Coral IPx 500 Cage with Cards Installed***



5 Safety Labels

There are five safety labels located on the IPx 500 cage that provide safety information pertaining to the IPx 500 cage.

Power Rating Label

One power rating label is located on the rear panel of the cage. This label reminds the user to verify the power rating of the cage. See *Figure 6-19*. For the power rating of each power supply unit, see:

page 7-33, Specifications PS500 DC (DC Power Supply) and

page 7-58, Specifications PS500 AC (AC Power Supply).

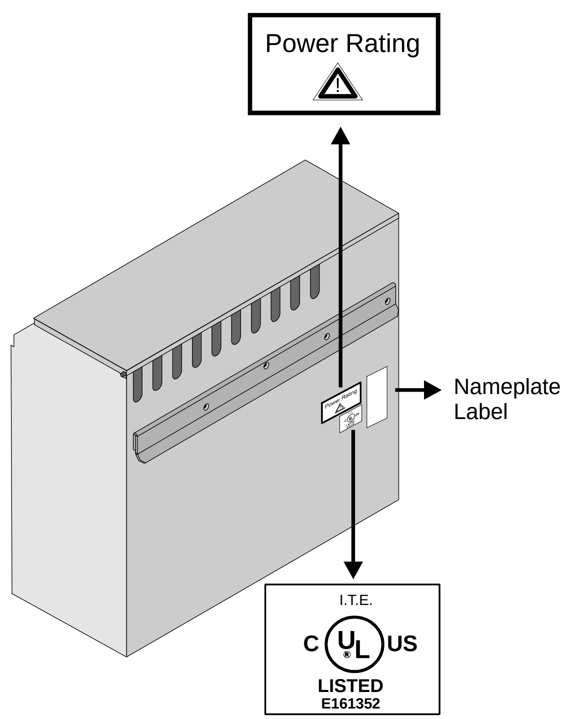
UL Label

The UL label provides the UL registration number (E1613652). See *Figure 6-19*.

Nameplate Label

The nameplate label provides the product name, the FCC compliance statement and conditions of use, and the CE trademark. See *Figure 6-19*. This label can vary depending on your local regulations. See the Compliance Information at the beginning of this manual.

Figure 6-19 ***Rear Panel Safety Labels***



Warning Label

Two warning labels are located on the inside of the Coral IPx 500 door and inside the cage beneath the card slots facing outwards. See *Figure 6-20*.

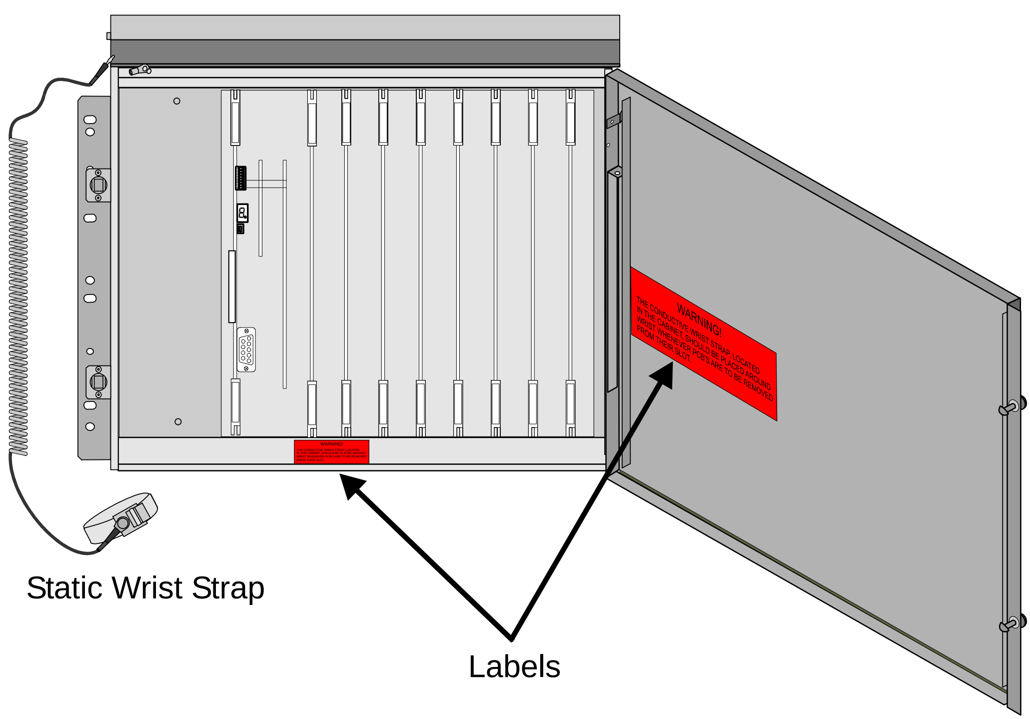
The Coral IPx 500 cage is equipped with an static dissipating wrist strap at the top left, above the card cage. This wrist strap should be worn while inserting, removing, or handling *any* card in the system. For further information, see *page 2-55, Inserting a Coral Circuit Card*. Each card is shipped inside an anti-static plastic bag. Cards should be kept in this bag whenever handling is not required.

These labels warn the user to connect the static dissipating wrist strap connector to the cage and put on the strap before handling the cards.

CAUTION!

All circuit cards, including Shared Service cards, Common Control cards, and Peripheral cards, contain static-sensitive circuitry and may be damaged or destroyed by Electrostatic Discharge (ESD). Always wear the static dissipating wrist strap connected to the cage while handling circuit cards. See Figure 6-20. Hold circuit cards by their edges and avoid touching contact surfaces. Handle with care and do not drop.

Figure 6-20 **Warning Labels and ESD Strap Connection to Coral IPx 500 Cage**



6.2 Coral IPx 500M Main Cage Description

This section describes the main features of the Coral IPx 500M (main) cage. For a general description of the Coral IPx 500 system, see *page 6-1, General System Description and Installation*. For information on how to configure the system, see *page 6-41, System Configuration Options*.

The IPx 500M main cage is the "nerve center" of the Coral IPx 500 system. It includes the MCP-IPx main control card (in addition to the other peripheral cards), the auxiliary connector, and the system configuration jumpers. The main cage includes nine card slots: eight peripheral slots and one card slot for the main processor card. The slot at the extreme left of the cage is reserved for the power supply unit. The top shelf of the cage includes the expansion connector, which is connected to an expansion cage, and the auxiliary connector, which is connected via the MDF to external systems.

The basic 0x0 IPx 500M system is supplied with an MCP-IPx control card. The power supply, software, trunk, and station cards must be ordered separately.

1 Circuit Card Slots

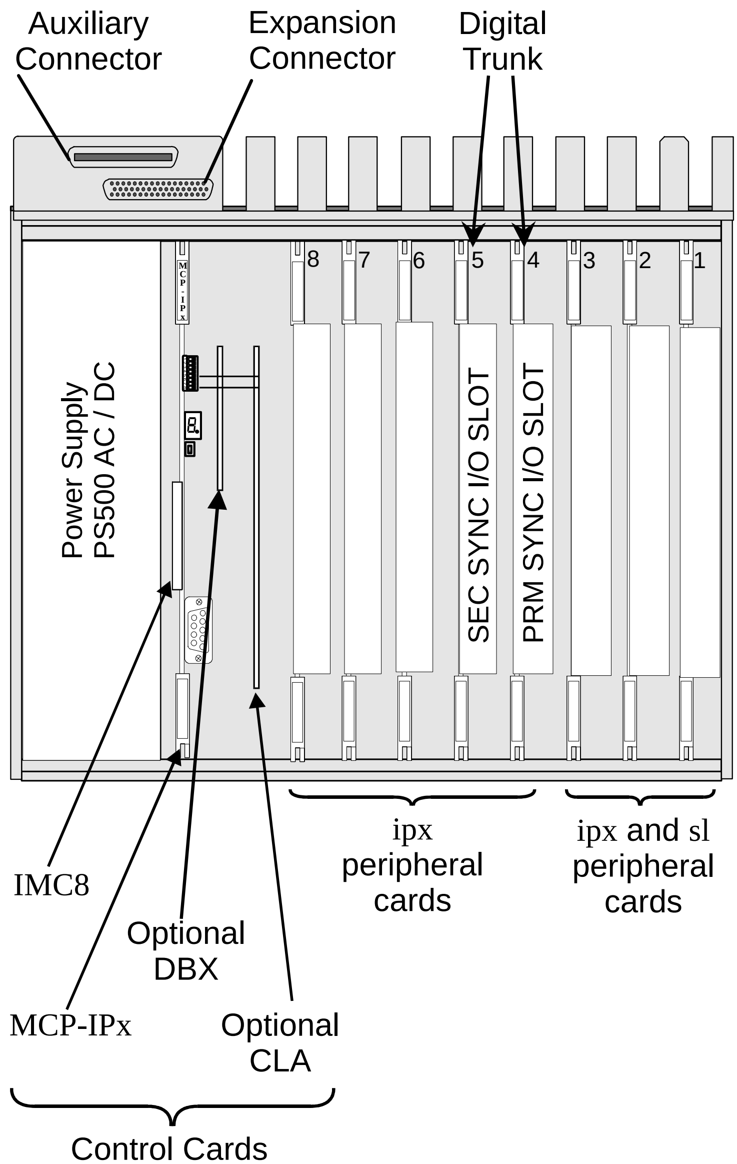
The card section of the main cage includes nine card slots and one power supply unit slot, the auxiliary connector and the expansion connector. See *Figure 6-21*. The first eight slots (numbered 1 through 8 from right to left) are universal I/O slots and are reserved for the peripheral cards. Slots 4 and 5 are configured by the manufacturer to house primary and secondary clock synchronization digital trunk cards. The tenth slot is reserved for the MCP-IPx control card. A daughter board can be attached (DBX or CLA) to the MCP-IPx card. The MCP-IPx controller card is responsible for controlling the system. For further information, see *Chapter 8, Common Control Cards*. The slot at the extreme left side is reserved for the power supply unit.

Table 6-1 describes the cards that are inserted into the card slots for Coral IPx 500M.

Table 6-1 ***Coral IPx 500M Card Slot Configuration for Main Cage***

<table>
<tr><th>Slot</th><th>Contains</th><th></th></tr>
<tr><td>Slot 1-3</td><td rowspan="2">Peripheral cards</td><td>Any XXXipx, XXXsl, or XXX200 cards
<u>NOTE</u>:
8F8Ssl, 8D8Ssl, 8SFTsl, 16SFTsl, 8SDTsl, 16SDTsl, 8SLSsl and 16SLSsl cards are not used in the Coral IPx 500 system.</td></tr>
<tr><td>Slot 4-8</td><td>Only XXXipx cards.
<u>CAUTION</u>:
XXX200 and XXXsl cards are not to be installed in slots 4-8 of the main cage.</td></tr>
<tr><td>Slot 9</td><td colspan="2">Not in use</td></tr>
<tr><td>MCP</td><td colspan="2">Main processor card MCP-IPx (with optional DBX or CLA card)</td></tr>
<tr><td>POWER SUPPLY</td><td colspan="2">PS500 DC or AC unit</td></tr>
</table>

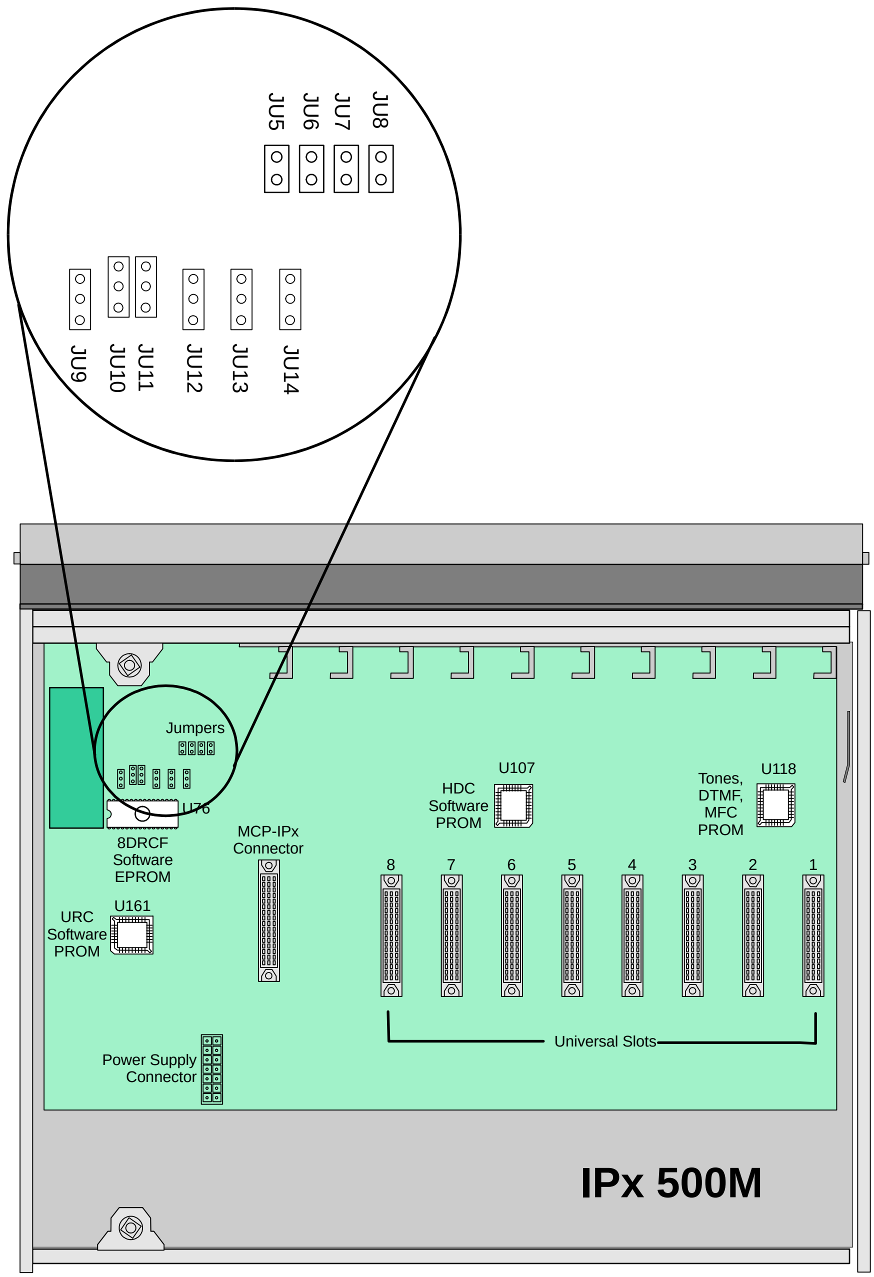
Figure 6-21 ***Coral IPx 500M Card Cage (Front View)***



2 Backplane Description

The backplane of the main cage includes the eight peripheral card connections and one control card connection, service card components, and the configuration jumpers. The backplane is displayed in *Figure 6-22*.

Figure 6-22 **Coral IPx 500M Backplane**



3 Configuration Jumpers

The configuration jumpers of the main cage:

- Configure the main cage to house the primary and/or secondary synchronization card.
- Designate whether the system uses internal or external music.
- Activate and deactivate the Receive and Transmit function of the modem.
- Designate the "handshaking" protocol of the serial RS-232 interface.

Table 6-2 displays each jumper setting and its description.

Table 6-2 ***Configuration Jumpers for Coral IPx 500M***

Jumper	*Setting*	*Description*
JU 5, 6	On (Connected)	Secondary synchronization card in slot 5
JU 5, 6	Off (Disconnected)	Secondary synchronization card not in slot 5
JU 7, 8	On (Connected)	Primary synchronization card in slot 4
JU 7, 8	Off (Disconnected)	Primary synchronization card not in slot 4
JU9	Pins 1-2 Connected	Internal Music Source M1
JU9	Pins 2-3 Connected	External Music Source M1
JU10	Pins 1-2 Connected	Modem can receive data
JU10	Pins 2-3 Connected	Modem cannot receive data
JU11	Pins 1-2 Connected	Modem can transmit data
JU11	Pins 2-3 Connected	Modem cannot transmit data
JU12	Pins 1-2 Connected	UART1 CTS - On
JU12	Pins 2-3 Connected	UART1 CTS - Off
JU13	Pins 1-2 Connected	UART2 CTS - On
JU13	Pins 2-3 Connected	UART2 CTS - Off
JU14	Pins 1-2 Connected	UART3 CTS - On
JU14	Pins 2-3 Connected	UART3 CTS - Off

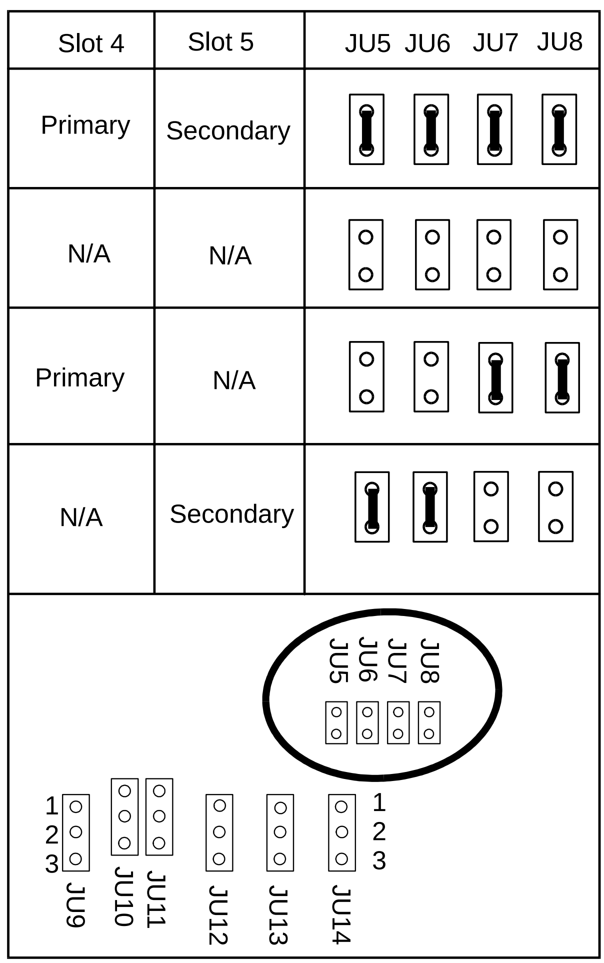
Digital Trunk Synchronization Slots

Two synchronization sources may be defined for the Coral IPx 500 system. One serves as the primary source, and the other serves as a secondary synchronization signal source. A total of six slots are factory set to accept digital trunk cards to operate in slave clock mode. Two slots are located in the IPx 500 main cage and the additional four slots are pre-wired in each of the IPx 500/800 expansion cages. Card slot # 4 in all cages is wired to operate as the primary external clock synchronization source (marked SYNC-PRIME). Card slot # 5 in all cages is wired as the secondary external clock synchronization source (marked SYNC-SECOND). The expansion cage can house the primary and/or secondary synchronization card in slot 4 and 5, respectively. *Figure 6-23* displays the jumper configuration for clock synchronization. For further information, see *page 10-15, Digital Trunk Synchronization*.

NOTE:

The primary and secondary card slots may be housed in the same cage.

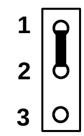
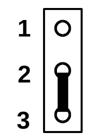
Figure 6-23 ***Jumper Configuration for Synchronization Slots in the Main Cage***



Music (M1) to External or Internal

The system music source M1 may be either from an internal or an external source. *Figure 6-24* displays the jumper settings for the source type. For further information, see *page 9-63, Configuring the Music M1 Jumper to External or Internal*

Figure 6-24 ***Jumper Configuration for Music M1 Settings***

Function	JU9
Internal Music	
External Music	

Remote Maintenance Modem - Enable or Disable

The Coral IPx 500 modem can be configured to enable or disable. This is useful when maintenance from a remote workstation is necessary. During normal system operation, it is advisable to set the modem transmit and receive function to OFF for more secure system operation *Figure 6-25* displays the jumper settings for the modem. For further information, see *page 9-46, Modem Jumpers - Enable/Disable*.

.

CAUTION!

Setting the Transmit or Receive function of the modem to ON during normal system operation exposes the Coral IPx 500 system to penetration by unauthorized parties.

Figure 6-25 ***Jumper Configuration for Modem Reception***

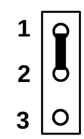
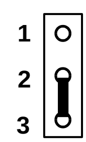
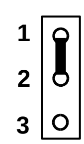
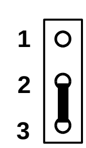
Function	JU10
RX Modem - On	
RX Modem - Off	

Figure 6-26 ***Jumper Configuration for Modem Transmission***

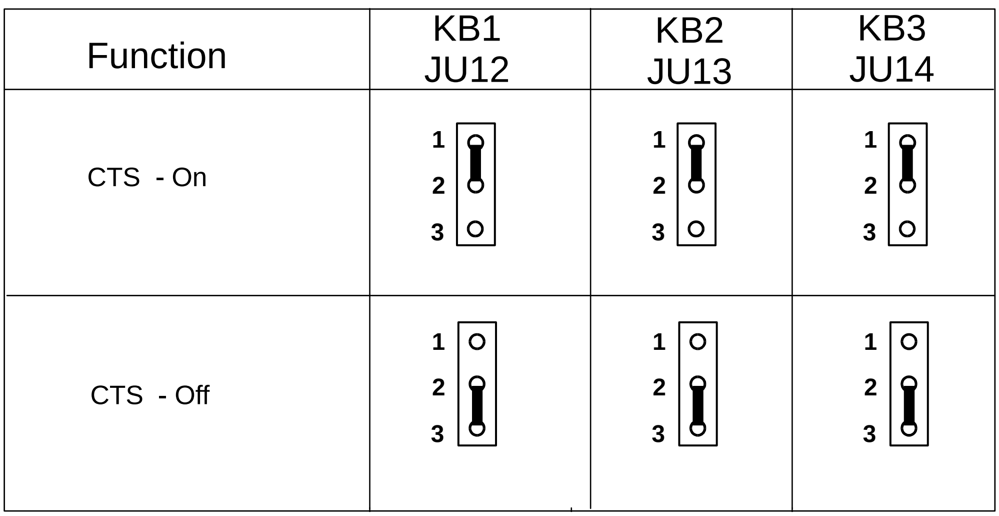
Function	JU11
RX Modem - On	
RX Modem - Off	

Handshaking is the process whereby two communicating devices acknowledge and recognize each other and open channels for communication.

The Coral IPx 500 system can be managed by three local workstations. Each local workstation handshaking protocol can be ON or OFF. *Figure 6-27* displays the jumper settings and describes the jumper configuration for each serial port: KB0, KB1, and KB3. An ON setting indicates an enabled handshaking protocol; an OFF setting indicates a disabled handshaking protocol. For further information, see *page 9-55, Configuring the CTS Jumper "Handshaking" Option*.

The local workstations communicate with the Coral IPx 500 system via the auxiliary connection and the MDF. For information on the connection from the MDF, see *Table 6-3*, *page 6-31*.

Figure 6-27 ***Jumper Configuration for RS-232 Maintenance Port Handshaking Option***

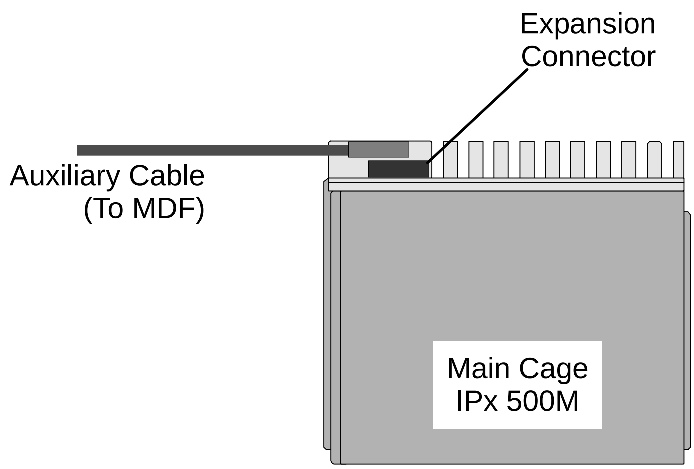


4 Connections to Expansion Unit

When more than one cage is present in the system, the main cage includes one port 50-pin female connection for this purpose and it is used to connect to the first expansion cage. See *Figure 6-21on page 6-23* and *Figure 6-28* below. The connection is made with an H500-1 cable with a D-type 50-pin connector that is 55" (140 cm) long, supplied with the expansion cage.

For further information, see *page 6-39, Connections to Other Cages* and *page 6-49, Interconnecting the Main and Expansion Cages*.

Figure 6-28 ***Auxiliary Connection to the MDF and Expansion Unit Connection for Coral IPx 500M***



5 Auxiliary Connector

The auxiliary connector is located beneath the expansion connector, see *Figure 6-21 on page 6-23* and *Figure 6-28*.

The auxiliary connector provides three RS-232 interfaces, music, paging, and relay circuits. *Table 6-3* provides the pinout connection for the auxiliary connection.

For further information, see *page 9-11, Auxiliary Connector*.

Table 6-3 ***Auxiliary Pinout Connection to the MDF***

Pin	Function
25	RXD1
50	TXD1
24	CTS1
49	RTS1
23	DSR1
48	DTR1
22	RXD2
47	TXD2
21	CTS2
46	RTS2
20	DSR2
45	DTR2
19	Music 1A
44	Music 1B
18	Music 2A
43	Music 2B
17	RXD3
42	TXD3
16	CTS3
41	RTS3
15	DSR3
40	DTR3
14	RLY1A
39	RLY1B
13	RLY2A
38	RLY2B
12	RLY3A
37	RLY3B
11	PAGE 1A
36	PAGE 1B
10	SGRND
35	Not Used
9	N.C.
34	
8	N.C.
33	
7	N.C.
32	
6	N.C.
31	
5	N.C.
30	
4	N.C.
29	
3	N.C.
28	
2	N.C.
27	
1	N.C.
26	

NOTES:

6.3 Coral IPx 500X Expansion Cage

Description

This section describes the main features of the Coral IPx 500X (expansion) cage. For a general description of the Coral IPx 500 system, see *page 6-1, General System Description and Installation*. For information on how to configure the system, see *page 6-41, System Configuration Options*.

The expansion cage expands the Coral IPx 500 system capacity by adding ports to the system. The expansion cage includes I/O card slots for peripheral cards and a slot for the power supply unit. The top section of the cage includes two expansion connectors that are used to connect the expansion cage to other cages. The bottom connector is connected to the main cage or the first expansion cage and the top connector is connected to the second expansion cage, if installed.

The basic 0x0 IPx 500X system is supplied with an H500-1 cable. It is the customer's responsibility to order the power supply, trunk, and station cards.

1 Circuit Card Slots

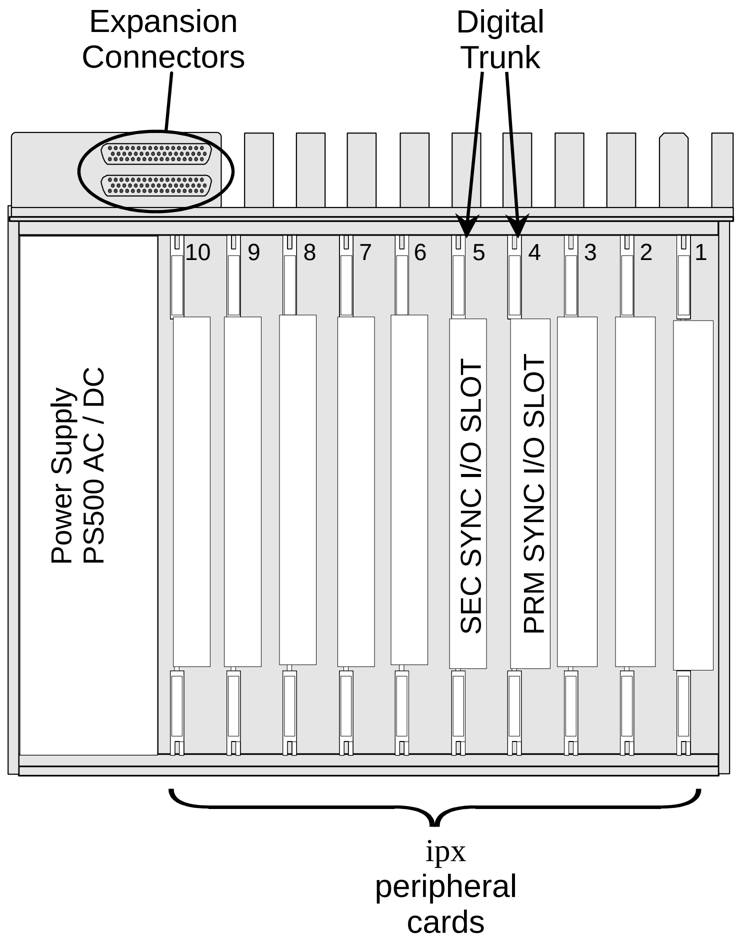
Up to two expansion cages may be installed in any IPx 500 system configuration. See *Figure 6-29*. The expansion cage contains ten card slots that are numbered 1 through 10 from right to left. Slot 1 through slot 10 are universal I/O slots, and may house any peripheral cards. Slots 4 and 5 may be configured to house primary or secondary clock synchronization trunk cards. See *page 6-39, Connections to Other Cages*. The extreme slot on the extreme left side is reserved for the power supply unit.

Table 6-4 identifies the cards that are inserted into the card slots for the Coral IPx 500X cage.

Table 6-4 ***Coral IPx 500X Card Slot Configuration for Expansion Cage***

Slot	*Contains*
Slot 1-10	Peripheral cards, only XXXipx cards. **CAUTION:** XXX200 and XXXsl cards are not to be installed in the expansion cage.
POWER SUPPLY	PS500 DC or AC unit

Figure 6-29 **Coral IPx 500X Card Cage (Front View)**

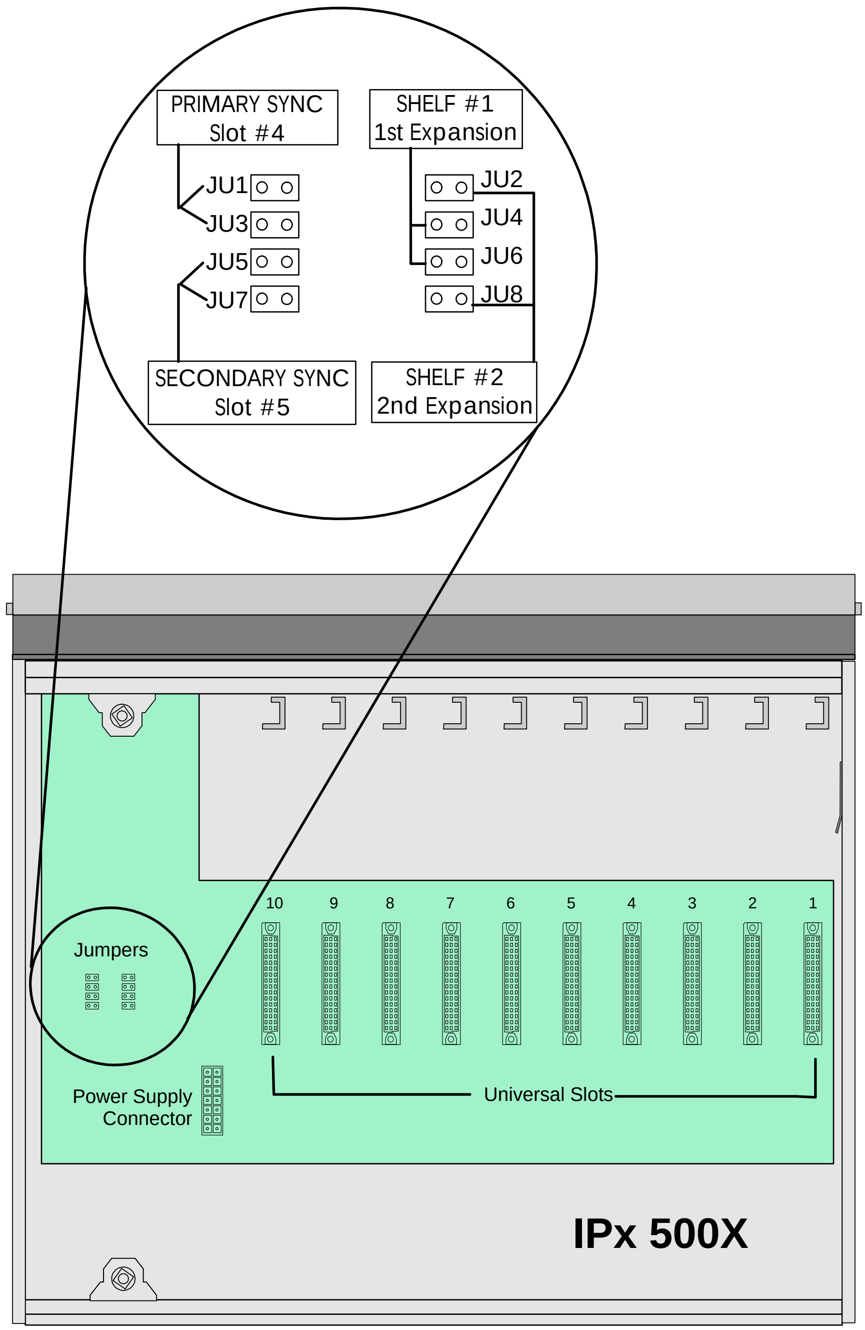


2 Backplane Description

The only feature that distinguishes the expansion cage from the main cage is the backplane. The backplane of the expansion cage includes the ten peripheral card connections, two expansion connections, service card components, the power supply connector, and the configuration jumpers.

The backplane is displayed in *Figure 6-30*.

Figure 6-30 ***Coral IPx 500X Backplane***



3 Configuration Jumpers

The configuration jumpers of the expansion cage:

- Define the cage that houses the primary and/or secondary synchronization card.
- Designates the cage number within the system (shelf 1 or shelf 2)

Table 6-5 displays the settings of each jumper its definition.

Table 6-5 ***Jumper Configuration for Coral IPx 500X***

Jumper	*Setting*	*Definition*
JU 1, 3	On (Connected)	Primary synchronization card in slot 4
JU 1, 3	Off (Disconnected)	Primary synchronization card not in slot 4
JU 5, 7	On (Connected)	Secondary synchronization card in slot 5
JU 5, 7	Off (Disconnected)	Secondary synchronization card not in slot 5
JU 2, 8	On (Connected)	Expansion cage designated "Shelf 2"
JU 2, 8	Off (Disconnected)	Expansion cage not designated "Shelf 2"
JU 4, 6	On (Connected)	Expansion cage designated "Shelf 1"
JU 4, 6	Off (Disconnected)	Expansion cage not designated "Shelf 1"

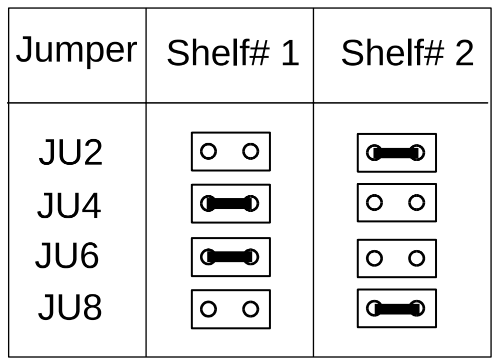
Expansion Shelf Number

NOTE:

The term “shelf” is used in this section in order to retain consistency with Program Interface terminology. The terms “shelf” and “cage” are identical.

Each peripheral card must be recognized by the main shelf. Therefore, Coral IPx 500 must be able to distinguish between the first and second expansion shelves. The main shelf is designated 0 by the manufacturer. The first expansion shelf is designated 1. The second expansion shelf is designated 2. Jumpers are used to configure the shelf number. *Figure 6-31* displays the jumper configuration for each cage designation.

Figure 6-31 ***Jumper Configuration for Shelf Designation***



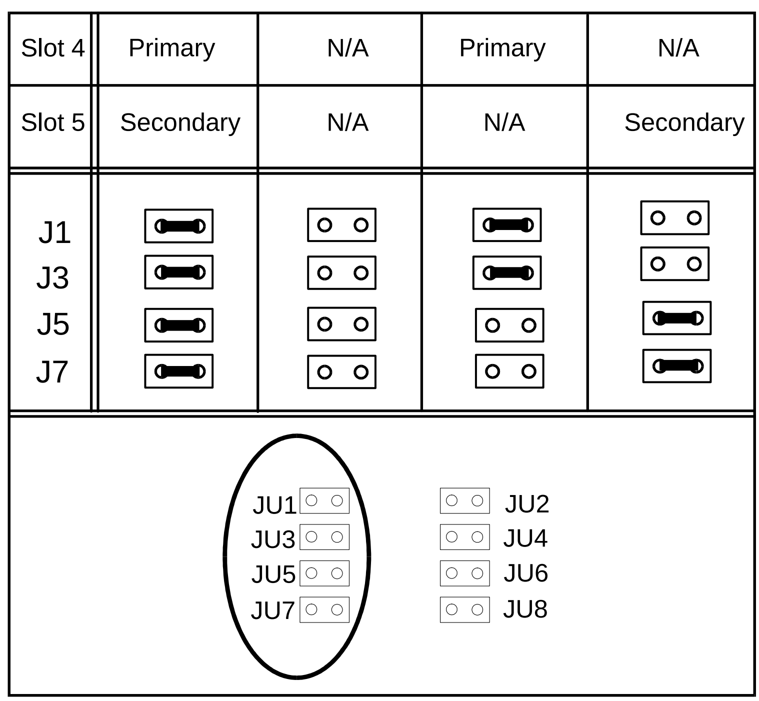
Digital Trunk Synchronization Slots

Two synchronization sources may be defined for the Coral IPx 500 system. One serves as the primary source, and the other serves as a secondary synchronization signal source. A total of six slots are factory set to accept digital trunk cards to operate in slave clock mode. Two slots are located in the Coral IPx 500 main cage and the additional two slots are pre-wired in each of the IPx 500 expansion cages. Card slot # 4 in all cages is wired to operate as the primary external clock synchronization source (marked SYNC-PRIME). Card slot # 5 in all cages is wired as the secondary external clock synchronization source (marked SYNC-SECOND). The cage is shipped from the manufacturer with the primary and secondary synchronization cards assembled in slots 4 and 5 of the main cage. The expansion cage can house the primary and/or secondary synchronization card in slot 4 and 5, respectively. *Figure 6-32* displays the jumper configuration for clock synchronization. For further information, see *page 10-15, Digital Trunk Synchronization*.

NOTE:

The primary and secondary card slots may be housed in the same cage.

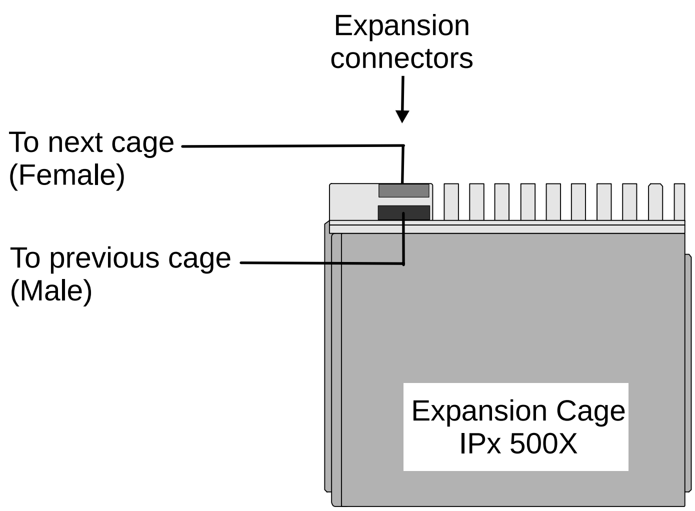
Figure 6-32 ***Jumper Configuration for Primary and Secondary Synchronization Slots in the Expansion Cage***



4 Connections to Other Cages

The expansion cage includes two serial port 50-pin female connections for connecting to other cages. See *Figure 6-29 on page 6-34* and *Figure 6-33* below. The connection is made with an H500-1 expansion cable with a D-type 50-pin connector that is 55" (140 cm) long, supplied with the expansion cage. For further information, see *page 6-30, Connections to Expansion Unit* and *page 6-49, Interconnecting the Main and Expansion Cages*.

Figure 6-33 ***Expansion Unit Connection to other Cages for Coral IPx 500X***



Coral IPx 500X Expansion Cage Description

6

NOTES:

6.4. System Configuration Options

Coral IPx 500

This chapter describes the layout and configuration of the Coral IPx 500 system. For a general description of the Coral IPx 500 cage, see *page 6-1, General System Description and Installation*. For a more detailed description of the main cage, see *page 6-21, Coral IPx 500M Main Cage*. For a more detailed description of the expansion cage, see *page 6-33, Coral IPx 500X Expansion Cage*.

1 General Description

The Coral IPx 500 can operate as a system in any one of the following configurations:

- One main IPx 500M cage. See *Figure 6-34*.
- One main IPx 500M cage and one IPx 500X expansion cage. See *Figure 6-35*.
- One main IPx 500M cage and two IPx 500X expansion cages. See *Figure 6-36*.
- One main IPx 500M cage and one IPx 800X expansion cage. See *Figure 6-37*.
- One main IPx 500M cage, one IPx 500X cage, and one IPx 800 cage. See *Figure 6-38*.
- One main IPx 500M cage and two IPx 800X expansion cages. See *Figure 6-39*.

The main cage includes control cards and peripheral cards. The expansion cage or cages include peripheral cards.

Main Cage (IPx 500M)

The main cage is designated as the common control cage, and is used to house the common control cards. For further information, refer to *Chapter 8, x Common Control Cards*. In addition, the main cage houses eight universal peripheral special form-factor cards as well. Each of the Coral IPx 500 configurations includes one IPx 500M cage. For more detailed information about the main cage, refer to *page 6-21, Coral IPx 500M Main Cage*.

Expansion Cage (IPx 500X)

The expansion cage may house ten universal peripheral special form-factor cards. These card types are described in detail in the *Coral Service and Peripheral Cards Manual*, and *Chapter 10, Peripheral Cards*. For more detailed information about the expansion cage, refer to *page 6-33, Coral IPx 500X Expansion Cage*.

Expansion Cage (IPx 800X)

One IPx 800X cage may house up to twelve cards. Slot 2 through slot 12 are universal I/O slots, and may house any combination of shared service and peripheral CORAL cards. Slot 1 is used to house a shared service card, or a PX card. Refer to *page 6-57, PX Card*.

Table 6-6 **Number of Universal I/O Slots per System Configuration**

System Configuration	*Main Cage*	*1st Expansion Cage*	*2nd Expansion Cage*	*Total System Universal I/O Slots*
1 Main Cage	8	—	—	8
1 Main Cage and 1 IPx 500 Expansion Cage	8	10	—	18
1 Main Cage and 2 IPx 500 Expansion Cages	8	10	10	28
1 Main Cage and 1 IPx 800 Expansion Cage	8	11	—	19
1 Main Cage, 1 IPx 500 Expansion Cage, and 1 IPx 800 Expansion Cage	8	10*	11**	29
1 Main Cage and 2 IPx 800 Expansion Cages	8	11	11	30

* IPx 500 Cage

**IPx 800 Cage

Figure 6-34 ***Coral IPx 500 System with One Cage (IPx 500M)***

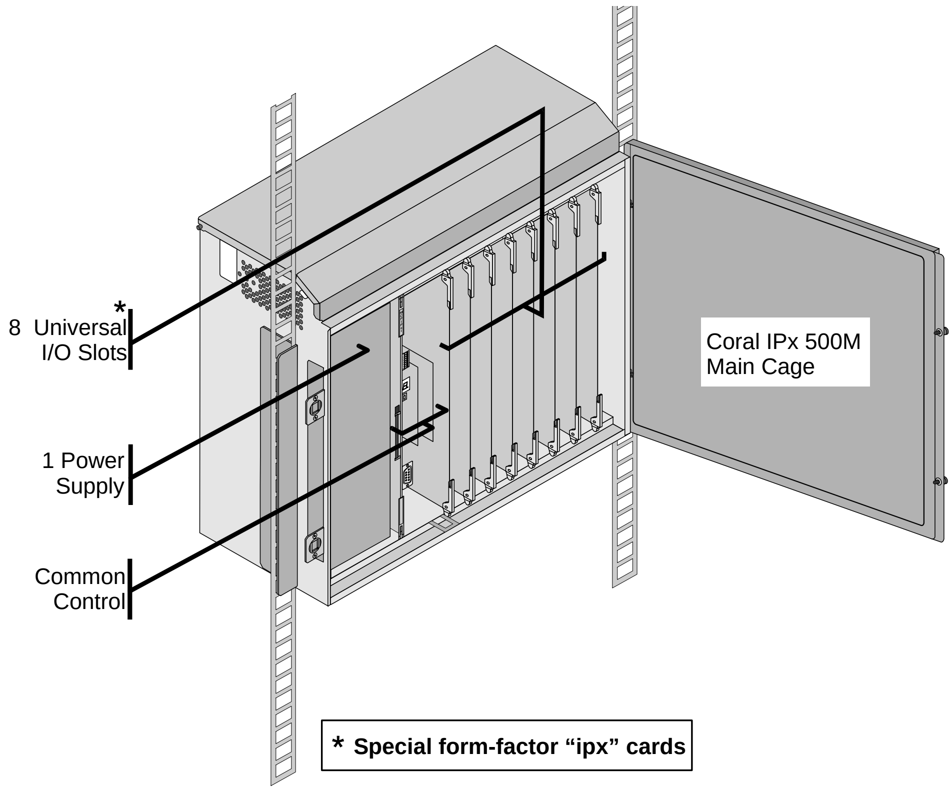


Figure 6-35 ***System with Two Cages (IPx 500M and IPx 500X)***

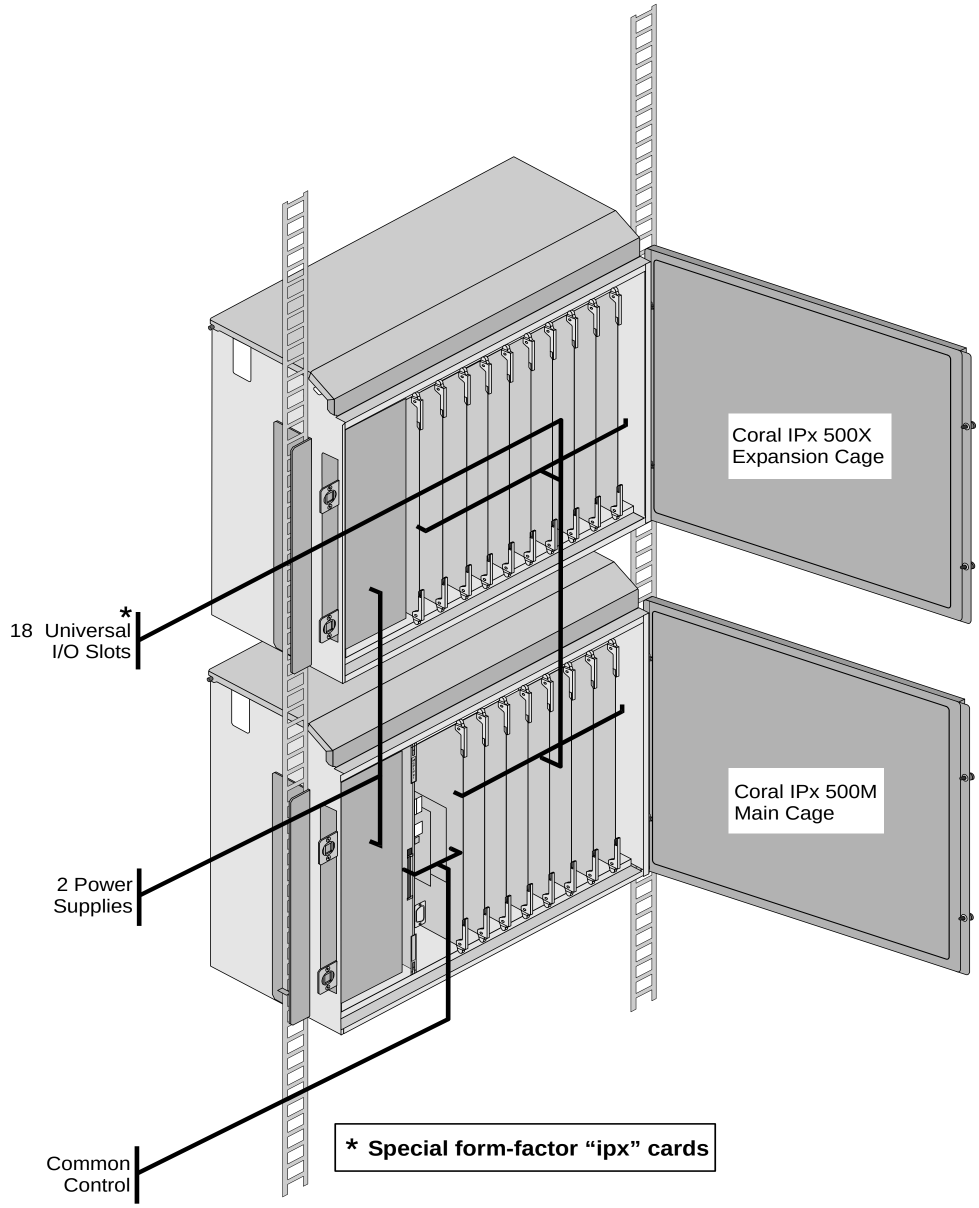
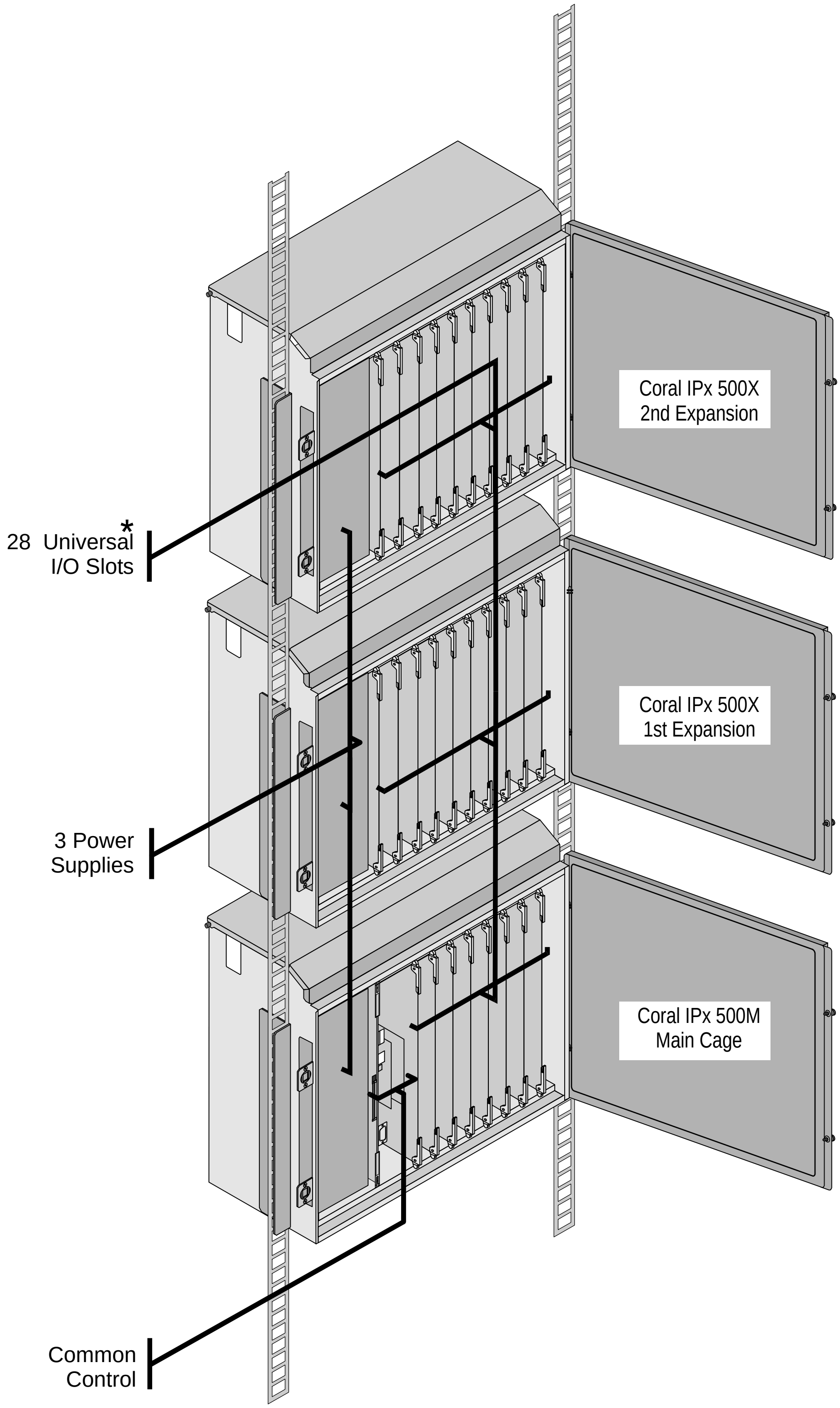


Figure 6-36 ***System with Three cages (IPx 500M, and Two IPx 500X Cages)***



*** Special form-factor “ipx” cards**

Figure 6-37 ***System with Two Cages (IPx 500M and IPx 800X)***

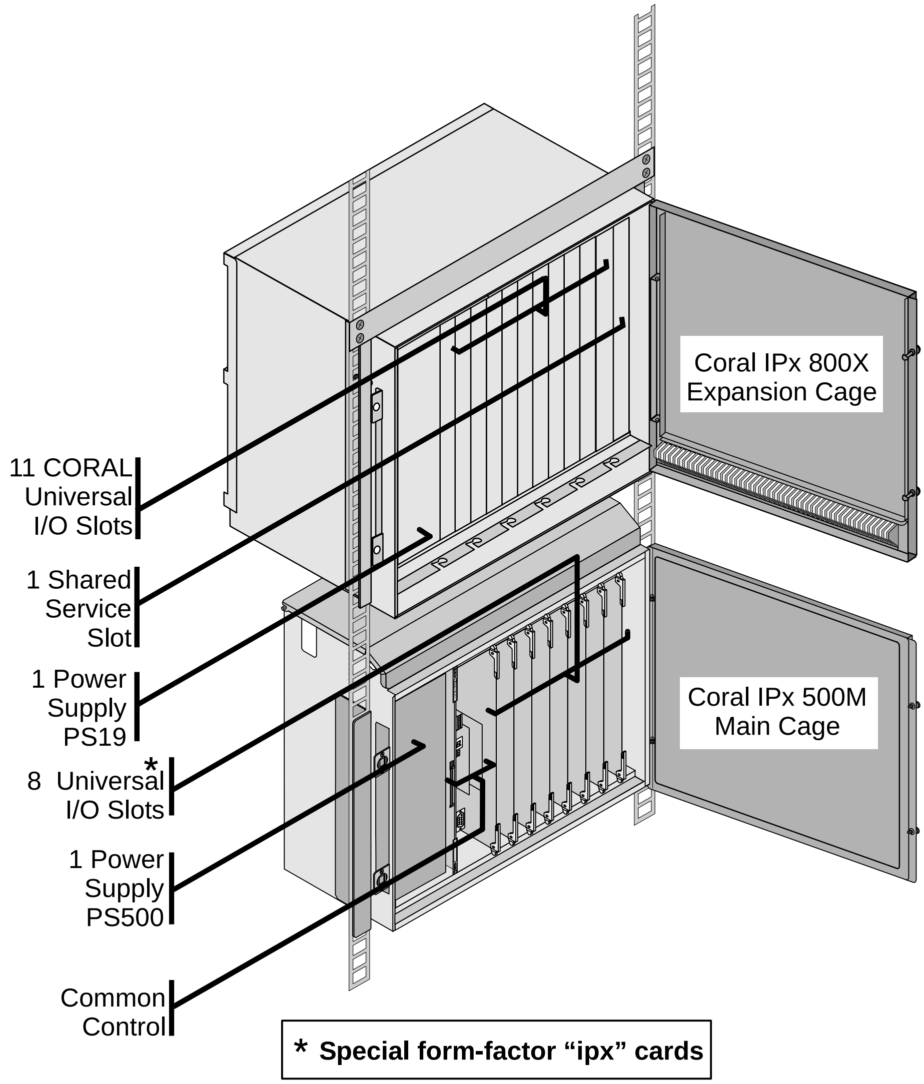


Figure 6-38 ***System with Three Cages (IPx 500M ,IPx 500X, and IPx 800X)***

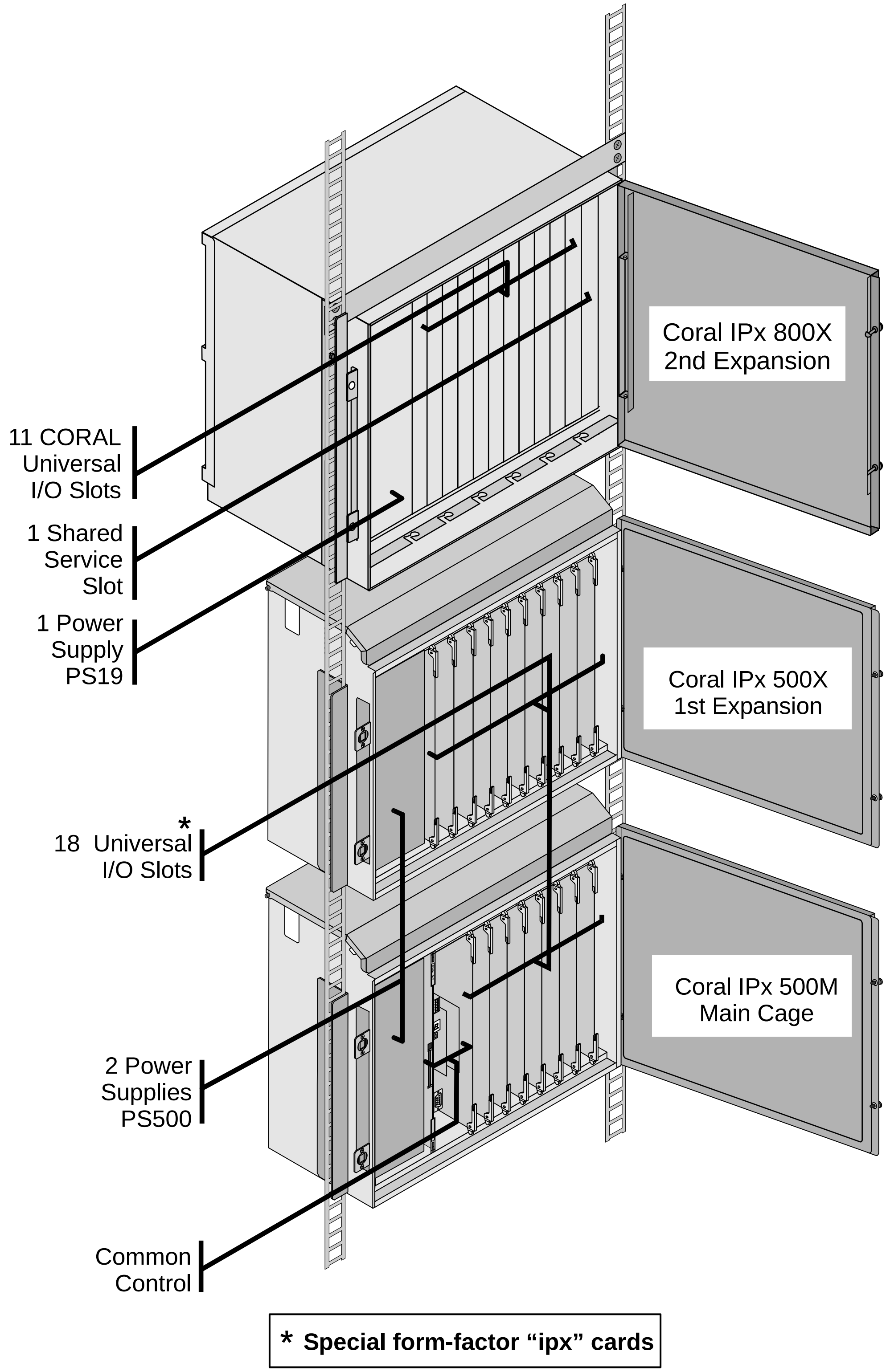
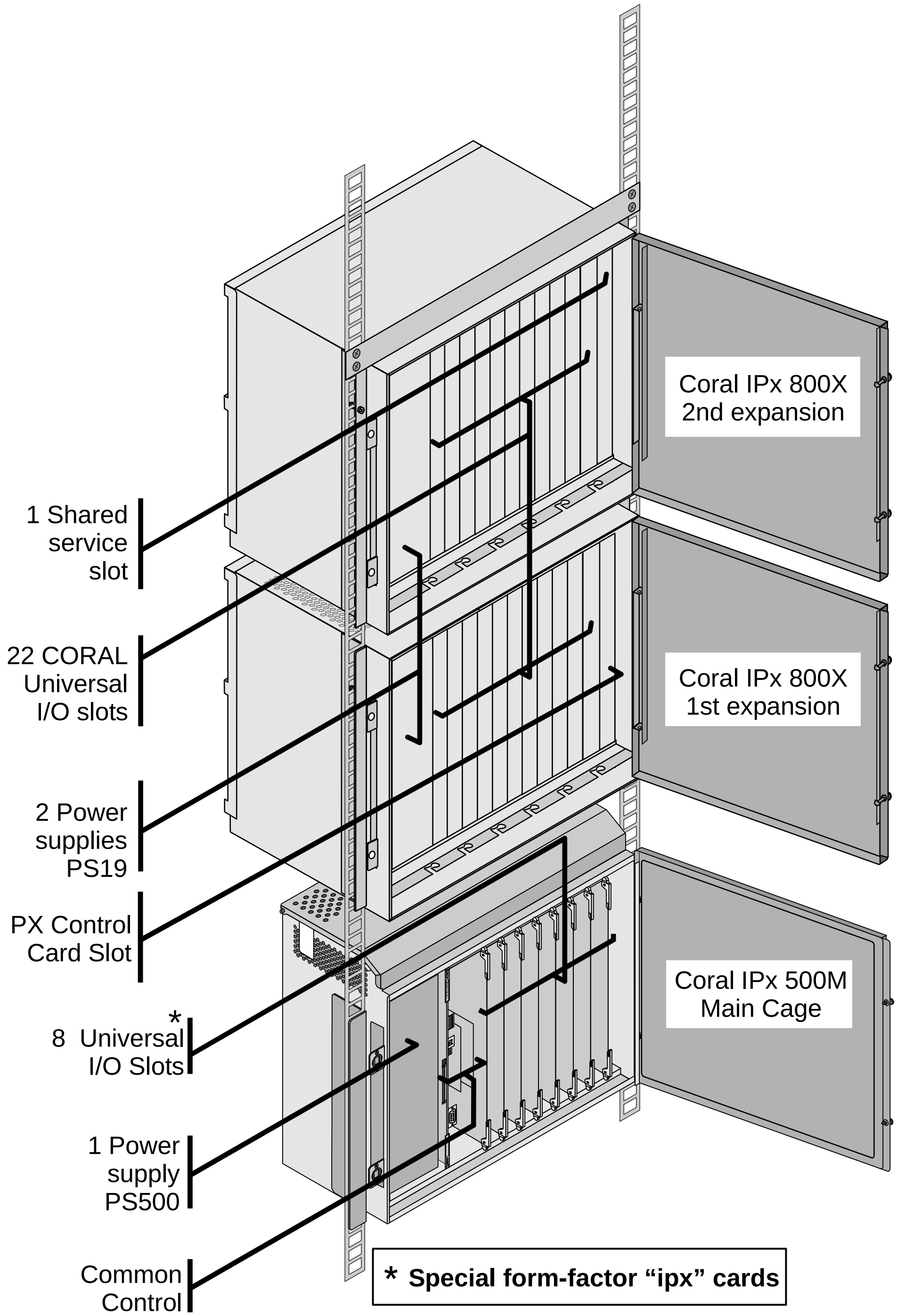


Figure 6-39 ***System with Three Cages (IPx 500M and Two IPx 800X Cages)***



2 Interconnecting the Main and Expansion Cages

The Coral IPx 500 can be expanded in any one of the following configurations:

- One main IPx 500M cage and one IPx 500X expansion cage. See *Figure 6-40*.
- One main IPx 500M cage and two IPx 500X expansion cages. See *Figure 6-41*.
- One main IPx 500M cage, one IPx 500X cage and one IPx 800 cage. See *Figure 6-42*.
- One main IPx 500M cage and one IPx 800X expansion cage. See *Figure 6-43*.
- One main IPx 500M cage and two IPx 800X expansion cages. See *Figure 6-44*.

The Coral IPx 500 main cage and its expansion cages maintain a continuous "conversation". HDLC and PCM highways, clock and synchronization signals as well as alarms are constantly exchanged between the cages. All data transfer is carried out via the H500-1 cable.

The H500-1 cable is connected from the main cage to the first expansion cage. If an additional expansion cage is connected, an additional H500-1 cable is connected from first expansion cage to second expansion cage.

One H500-1 male/female cable, 55" (140 cm) long, is supplied with each IPx 500X cage or IPx 800X cage.

The IPx 500 cages include cable connections that allow the expansion cages to be added. The main cage includes one 50-pin female connection that connects to the first expansion cage with an H500-1 male/female cable. When there is only main cage in the system, this connection is not used. The second expansion cage includes two 50-pin connections: the top connection is female; the bottom connection is male. The top female connection connects to the first expansion cage. The lower connection connects either to the female connection on the main cage or to the female connection on the second expansion cage.

The IPx 800X cages include cable connections that allow the expansion cages to be added. The main cage includes one 50-pin female connection that connects to the first expansion cage with an H500-1 male/female cable. The expansion cage includes two 50-pin connections: the top connection is male; the bottom connection is female. The top male connection connects either to the lower female connection on the expansion cage or the female connection on the main cage. The lower connection connects either to the female connection on the main cage. The figures below show how to interconnect IPx 500M with IPx 800X cages.

Figure 6-40 ***Connection between Two IPx 500 Cages (IPx 500M and 500X)***

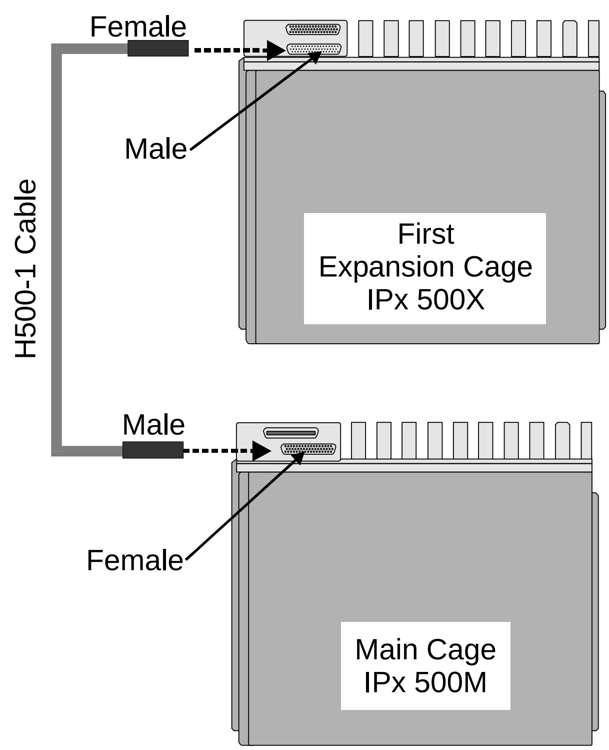


Figure 6-41 ***Connection between Three IPx 500 Cages (IPx 500M and two 500X)***

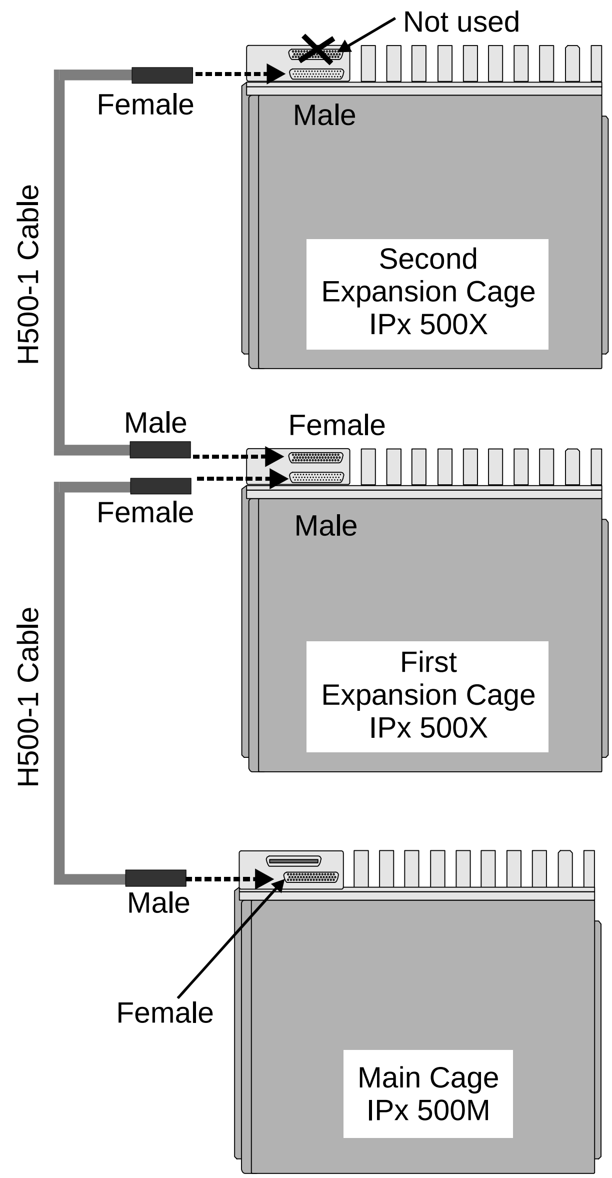


Figure 6-42 ***Connection between Three Cages (IPx 500M, 500X and 800X)***

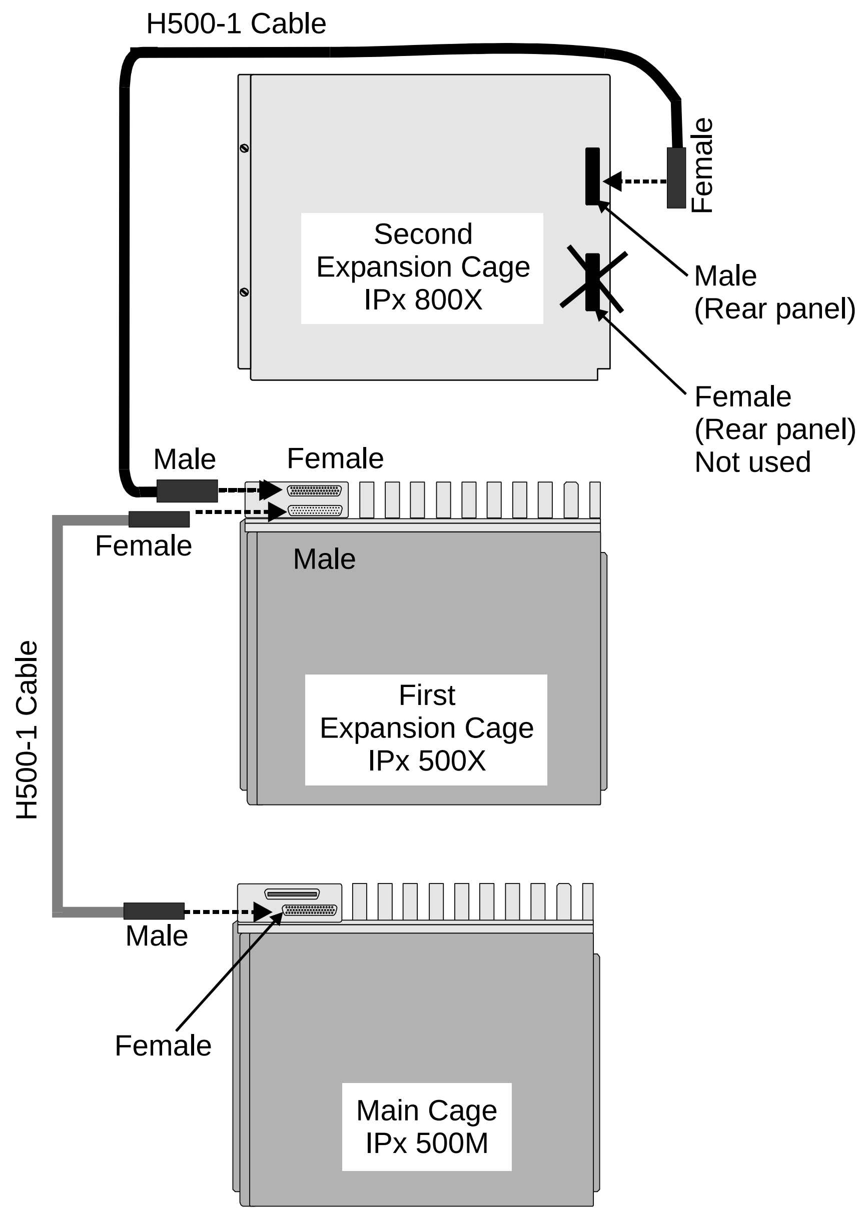


Figure 6-43 ***Connection between Two Cages (IPx 500M and 800X)***

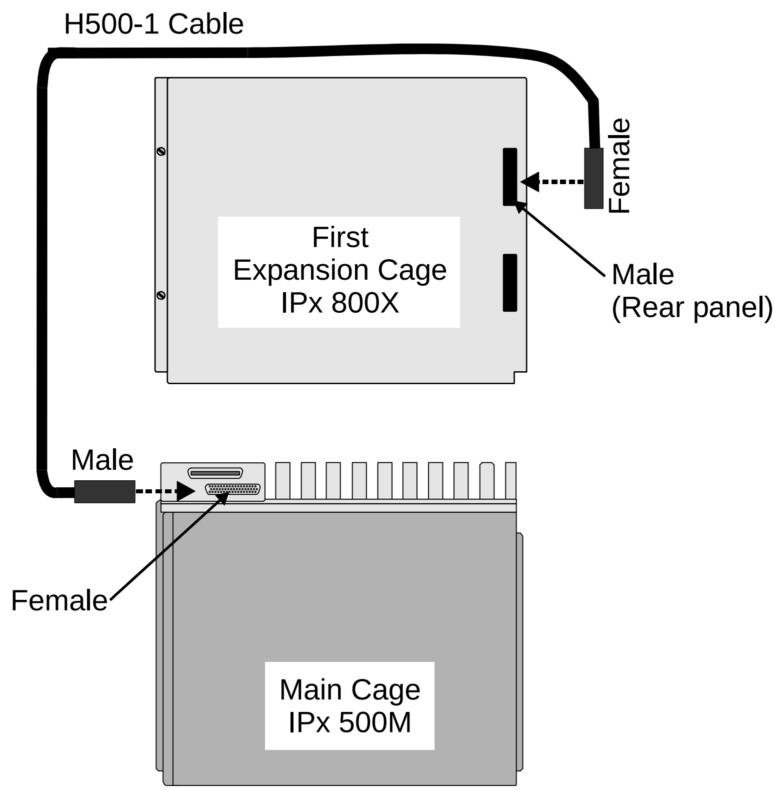
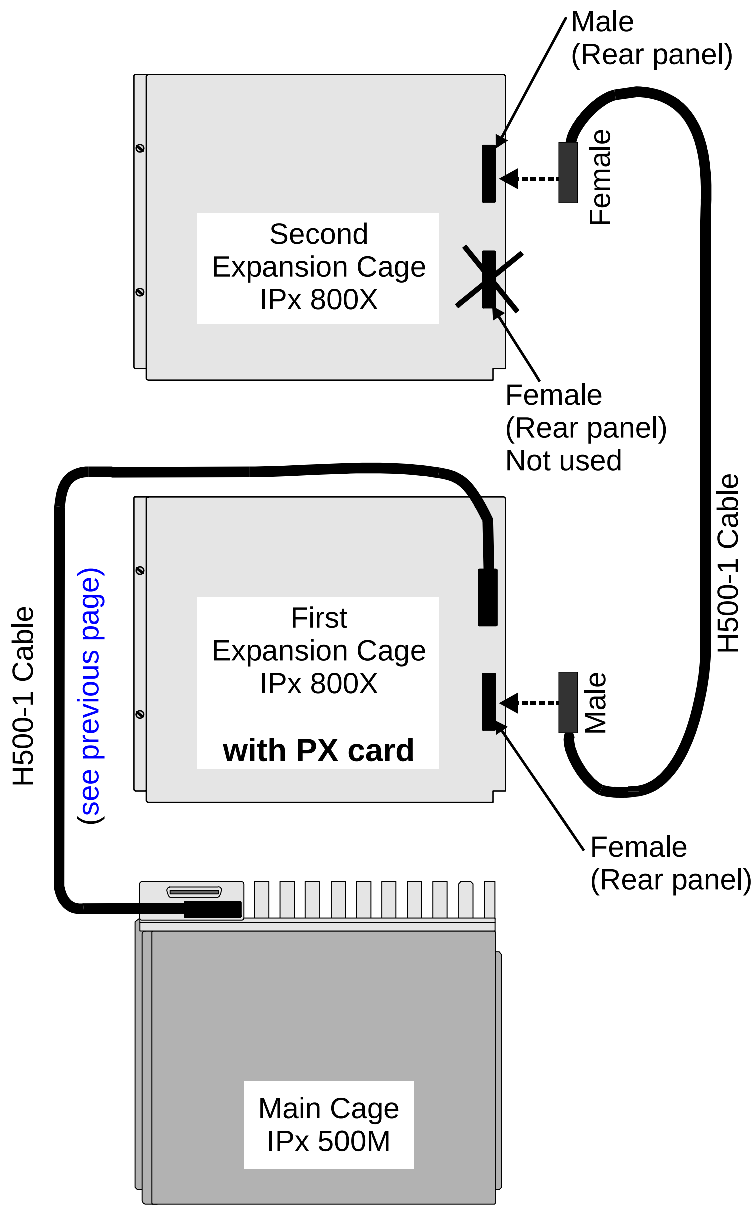


Figure 6-44 ***Connection between Three Cages (IPx 500M and two 800X)***



3 Suggestions for Peripheral Card Distribution

When installing a new Coral IPx 500 system, it is recommended to take into account the timeslot (PCM highway) distribution among the cages and slots when planning the peripheral interface cards location.

The Coral IPx 500 system (main cage and two expansion cages) is supplied with a total of 384 timeslots between a maximum of 28 card slots. The timeslots are evenly divided to 3 groups of 128 timeslots and distributed between *slot sets*, as detailed in *Table 6-7*. Therefore, slots 1-4 of cages 0, 1 and 2 share 128 timeslots; slots 5-8 of cages 0, 1 and 2 share 128 timeslots; and slots 9-10 of cages 1 and 2 share an additional 128 timeslots. *Figure 6-45* illustrates the distribution of PCM highways in Coral IPx 500 systems.

To ensure efficient use of timeslots, it is recommended to distribute *heavy consumer* cards (cards with a large number of ports: 30Tipx, T1ipx, PRI-30ipx, PRI-24ipx, or UGWipx with MG-30 or MG-60 units) evenly among the slot sets, i.e. one heavy consumer card per slot set. The least blocking sets are the slot sets that have the highest ratio of *Number of Timeslots* to *Number of Peripheral Slots* in *Table 6-7*.

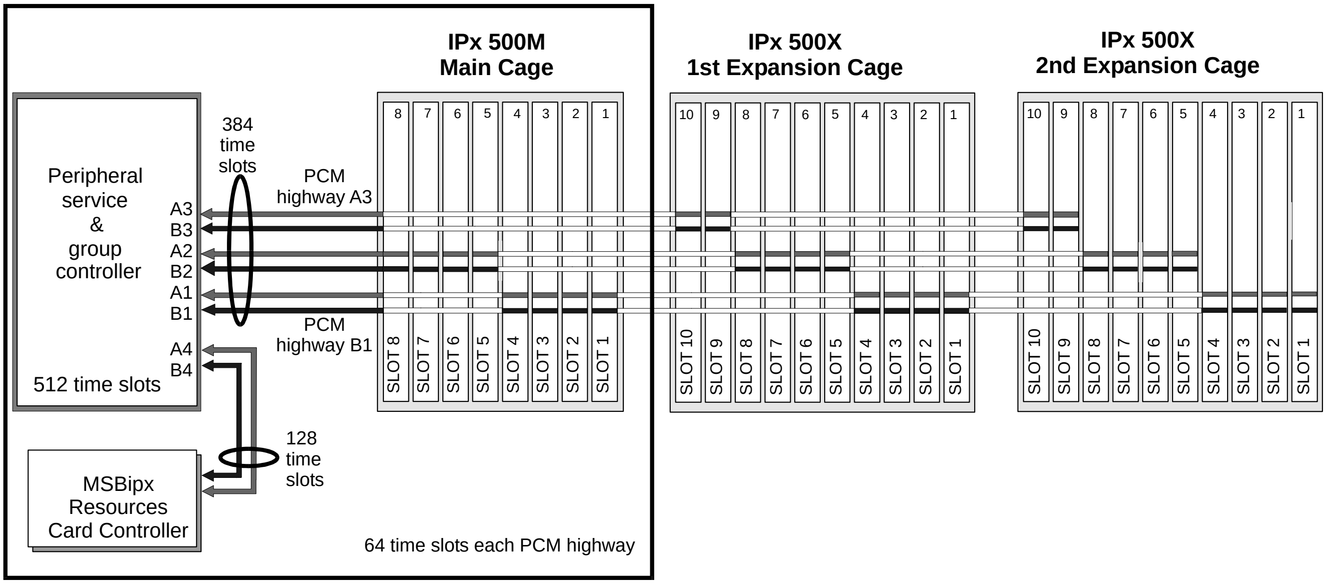
Example:

If three PRI-30 cards are installed, it is recommended to install one of them in any one of slots 1-4, the second card in any one of slots 5-8, and the last card in any one of slots 9-10.

Table 6-7 ***Timeslot Distribution in Coral IPx 500***

Peripheral Shelf #	*Card Slot Sets*	*Number of Peripheral Slots*	*Number of Timeslots*
0, 1, 2	1, 2, 3, 4	12 slots	128
0, 1, 2	5, 6, 7, 8	12 slots	128
1, 2	9, 10	4 slots	128

Figure 6-45 ***Coral IPx 500, PCM Highway Distribution***



4 Optional Coral IPx 800X Expansion Cage

General

The Coral IPx 800X expansion cage is a small, wall-mounted extension to the Coral IPx 800M or Coral IPx 500M cage. It supports any of the FlexiCom 300,400,5000,6000 and IPx 800,3000,4000 family standard shared service and peripheral cards (iDSP, 8DRCF, 24SLS, 24SFT, IPG, 30T, etc.). Any combination of up to two IPx 500X and IPx 800X expansion cages can be connected to one IPx 500M cage. The key features of the IPx 800X cage capacity and functions are described below.

Card Slots

One IPx 800X cage can hold up to twelve cards. Slot 2 through slot 12 are universal I/O slots, and may house any combination of shared service and peripheral cards. Slot 1 is used either to house a shared service card if there is only one expansion cage in the system, or a PX card if the IPx 800X cage supports a second expansion cage.

These card types are described in detail in the *Coral Service and Peripheral Cards Manual*.

Port Capacity

One IPx 800X cage supports up to 264 combined trunk and wired station ports.

Power Supply

The expansion unit is compatible with 48VDC or 115/230VAC power. Like the IPx 800M cage, the expansion cage is either powered by the PS19 AC, PS19 DC, or PS19 DC-D power supply unit. There is no option to install a backup battery for the IPx 800X cage.

MDF

The MDFipx may *not* be used with the IPx 800X cage. For this reason, whenever an IPx 800X cage is included within the system, it must be connected directly to the building master ground.

PX Card

The PX (Peripheral eXpansion) buffer card occupies slot 1 of the first IPx 800X expansion cage in an IPx 500M+IPx 800X+IPx 800X system configuration.

When an IPx 800X Expansion Cage is Used in an IPx 500 System

There are situations where it is worthwhile to include an IPx 800X cage in an IPx 500 system:

- To allow the use of Coral features not supported by Coral IPx 500 cage interface cards (XXXsl and XXXipx), such as iDSP, IPG, 8DRCF, magneto stations (8SM), Long Loop SLT, VIC, etc.
- To allow the use of IPx 800X cages or standard CORAL cards that are already in stock.
- See *page 9-2, Additional Shared Service Cards in the Optional IPx 800X Cage*.

Setting the Configuration Jumpers

For information on setting the configuration jumpers on Coral IPx 800X cages, refer to the *Coral IPx 800, 3000 Installation Manual, Chapter 6*.

Connecting the IPx 800X Cage to the IPx 500M Cage

All IPx 500 and IPx 800 cages are interconnected with an H500-1 cable.

For systems that include one IPx 500X cage and one IPx 800X cage, always connect the IPx 500X cage directly to the IPx 500M cage. If an IPx 800X cage is installed between the IPx 500M cage and an IPx 500X cage, a PX card will have to be installed in slot 1 of the IPx 800X cage. This slot could otherwise be used for a service card.

Related Documentation

- *Coral IPx 800, 3000 Hardware and Installation Manual*
- *Coral FlexiCom and IPx Product Description*

Chapter 7

Power Supply

Coral

7.1 PS500 DC Power Supply Unit

1 General Description

The PS500 DC card's component side power supply unit provides internal operating voltages for the Coral IPx 500 system. The PS500 DC operates from a nominal input of –48VDC, typically supplied by an external 48VDC rectifier or stationary battery plant. Actual input may vary from –40VDC to –60VDC, allowing operation:

- From a battery power source while the batteries are charged at an equalized charge rate
- Under power failure, until the batteries are completely discharged

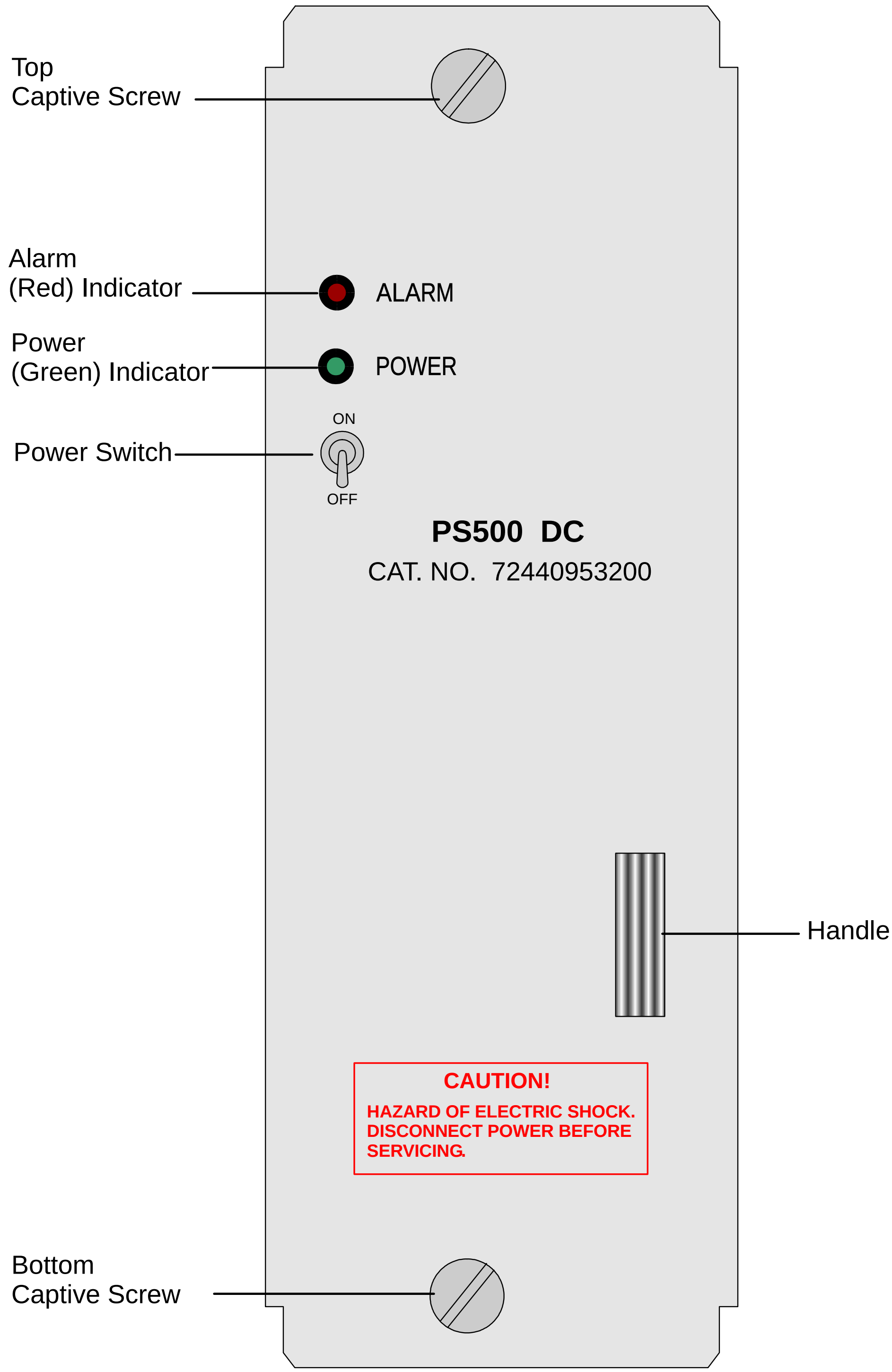
PS500 DC Front Panel

Figure 7-1 displays the front panel of the PS500 DC. The components located on the front panel are described in the following table:

Feature	*Description*
Alarm (red) Indicator	Lights when there is any failure within the PS500 DC
Power (green) Indicator	Lights when the power switch is turned on
ON/OFF Power Switch	Turns the unit ON or OFF. **CAUTION!** *Do not insert or remove the power supply unit from the cage when turned ON. Sudden power surges could damage system components. Before inserting or extracting the power supply unit, verify that the power switch is turned OFF.*
Handle	Used to pull the unit out of the card cage

Feature	*Description*
Top and Bottom Captive Screws	Used to secure the unit to the cage. These screws also ground the unit to the cage and safeguard the unit against malfunction.

Figure 7-1 ***PS500 DC Front Panel***

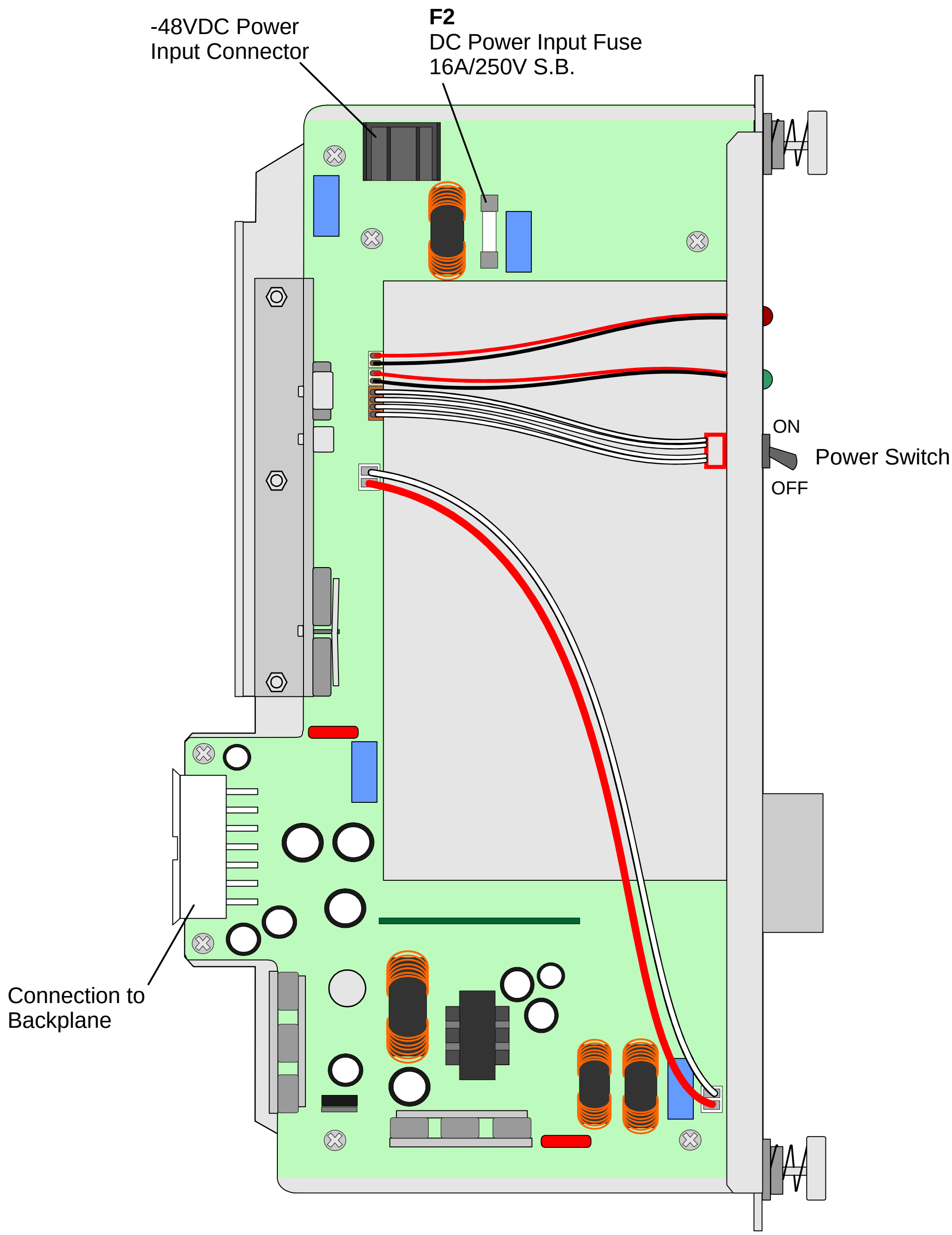


PS500 DC Card Layout

The PS500 DC card's component side is shown in *Figure 7-2*. Three components are described in the following table:

Feature	*Description*
F2 DC Power Input Fuse	A 16A/250V, slow blow fuse that protects the unit's voltage. See *page 7-13, PS500 DC Fuse*. The entire 48VDC input circuitry, including the power supply, is protected by a slow blow 16A/250V fuse within the power supply. See *Figure 7-3*.
DC Input Power Connector	Connects the PS 500 DC power supply to the -48VDC power source
Connection to Backplane	Connects the power supply to the cage backplane

Figure 7-2 ***PS500 DC Card Layout***



2 Circuit Description

Figure 7-3 presents a block diagram of the PS500 DC power supply.

Power Input Section

The DC input includes a passive filter, inrush current, and an ON/OFF power switch. The DC input is protected against reverse polarity.

DC Output Power

The DC to DC converters convert the –48VDC power to the following outputs:

- +5VDC
- –5VDC
- +12VDC

-48VDC Output Power

The PS500 DC also filters and limits the -48VDC input to feed the peripheral card slots.

Ripple and Noise

Filtering circuitry minimizes ripple and noise on the –48VDC feed to the peripheral cards. The filtering circuitry produces an output voltage that is approximately 0.5V to 1.0V lower than the input voltage -VIN to the PS500 DC.

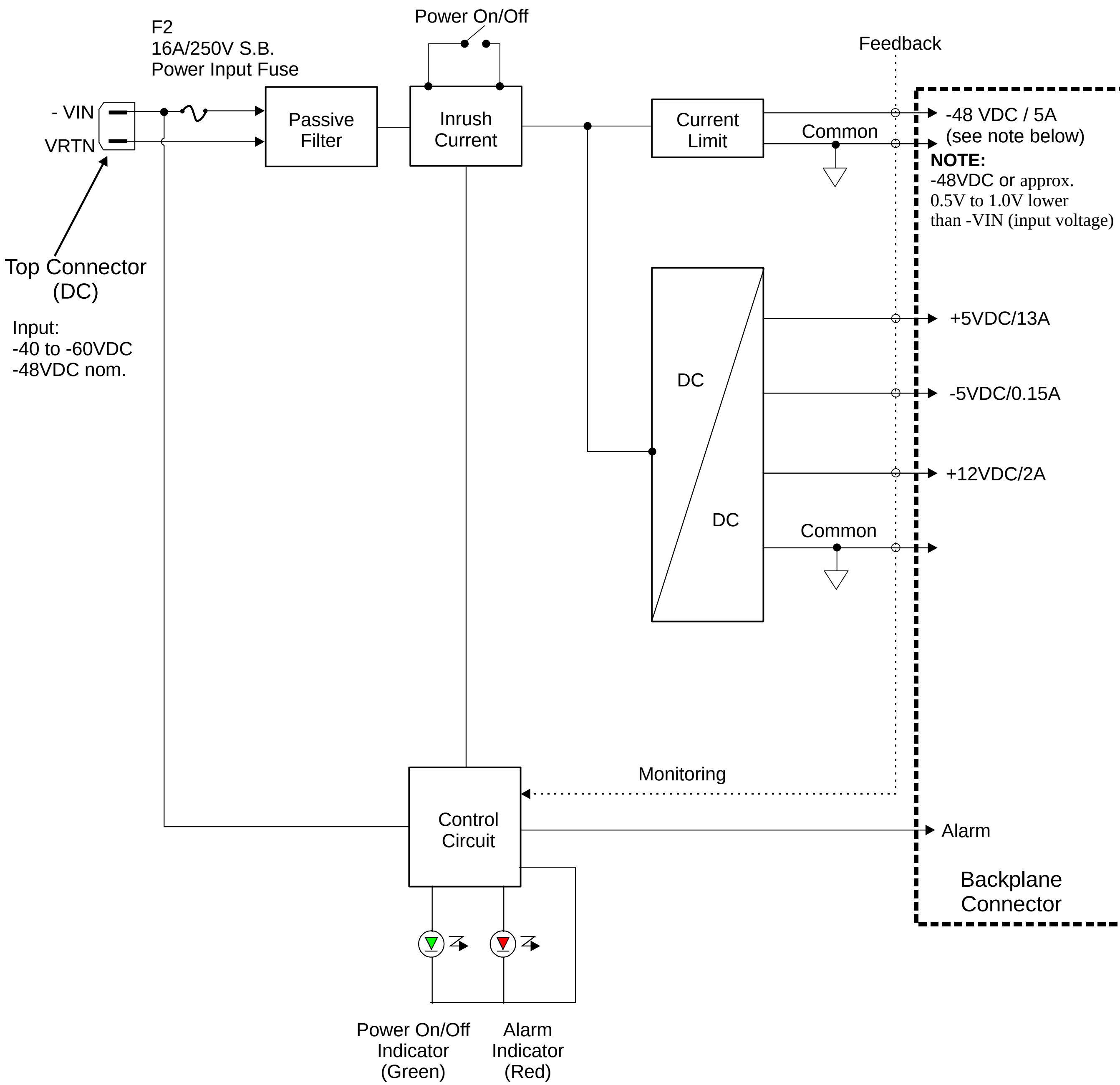
Monitoring Circuitry

All outputs, with the exception of the –48VDC output, are regulated. Voltage and current level monitoring circuitry check each output of the PS500 DC, and produce an alarm signal to the Coral system main processor in the event of malfunction.

Monitoring circuitry verifies that each voltage output (with the exception of the –48 VDC output) is within specification. If any voltage deviates from specification, the monitoring circuitry produces an alarm signal to the Coral system processor, causing the red **Alarm** indicator to illuminate. Note that the green **Power** indicator remains illuminated at the same time as the red alarm indicator.

If the voltage input is less than –38±0.5VDC or greater than –62±0.5VDC, then the power supply shuts down. The power supply will turn on when the voltage is less than –58±0.5VDC or greater than –45±0.5VDC.

Figure 7-3 ***PS500 DC Block Diagramed***



3 SLT Message Lamp and Ringer Frequency

The PS500 DC does not employ ring and message generators for industry standard, single-line telephones (SLT) station ports. These generators are provided in Coral IPx 500 systems by the 8/16SLSipx peripheral cards. The peripheral cards are described in detail in the *Coral Service and Peripheral Cards Installation Manual*.

Each 8/16SLSipx card is capable of generating ringing up to 6 ports simultaneously at 20Hz or at 25Hz. See *Chapter 6* of the *Program Interface and Database Reference Manual* for details.

4 Installation

The power supply unit is inserted into the Coral IPx 500 cage in the extreme left slot of the card cage.

Installing the Power Supply

1. Verify that the cage ground wire is connected and the ground nut is tightened. (see *Figure 7-4*).

2. Verify that the power switch is turned OFF.

CAUTION!

Inserting the power supply card into the cage when the power switch is ON could result in a sudden surge voltage that could damage the Coral IPx system. Before inserting the power supply unit, verify that the power switch is turned OFF.

3. Position the two guide ridges (located on the right panel of the power supply, at the top and bottom) into the card edge guides corresponding to the **POWER SUPPLY** slot labeled on the bottom of the card cage.

4. Slide the power supply gently but firmly, until fully inserted into the card cage. A slight resistance should be felt as the multi-pin connectors engage at the rear of the power supply and backplane.
Do not force the power supply into the card cage. Irreparable damage may occur if the multi-pin connectors misalign while attempting to insert the unit into the card cage. If more than slight resistance is encountered, partially slide out the card from the cage and verify the alignment of the guide ridges with the card edge guides. If alignment appears to be correct, remove the card from the slot and inspect the multi-pin connectors for bent pins and debris in the pin holes.

5. Secure the power supply unit to the cage with the two captive screws on the top and bottom of the front panel. See *Figure 7-1*.

WARNING!

*The screws on the front panel **must** be tightened properly to prevent dangerous electrical shock.*

CAUTION!

The power supply is regulated with a minimum load of backplane and MCP-IPx card or one peripheral card.

***Do not** insert or remove the MCP-IPx card under power.*

Follow these steps:

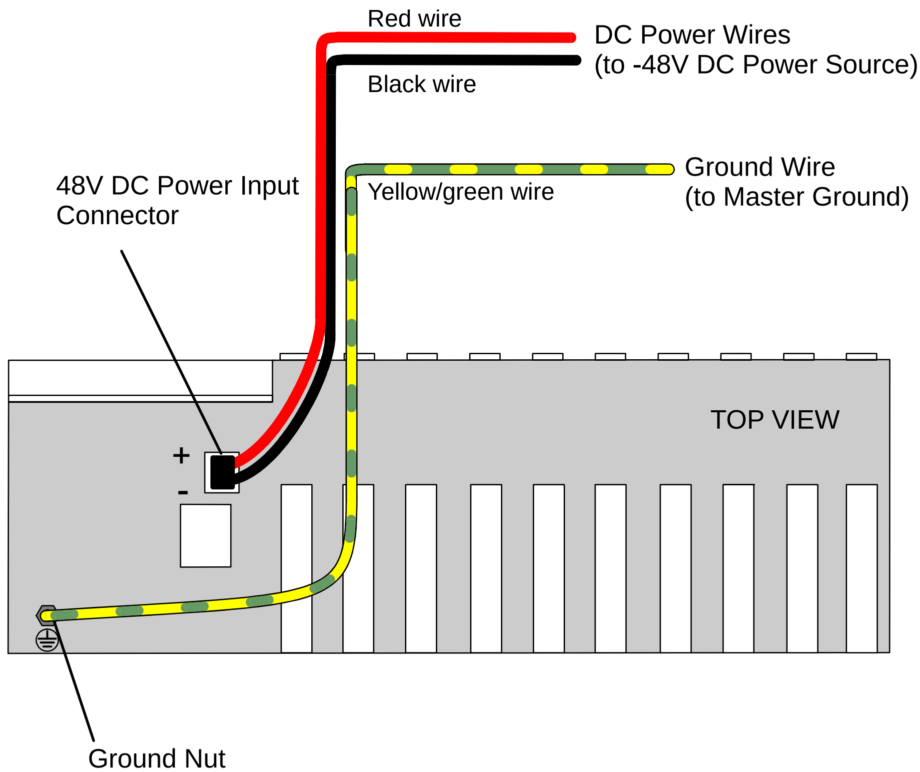
1. Verify that the cage ground wire is connected and the ground nut is tightened. (see *Figure 7-4*).
2. Verify that the **Power** switch is in the OFF position (turned downwards).
3. Verify that the two captive screws on the upper and lower parts of the front panel are tightened.
4. Connect the DC cable (supplied) to the customer's DC power source, as described on *page 2-70, DC Powered Systems*.
5. Insert the DC power input connector into the receptacle of the PS500 DC unit via the opening in the top section. (see *Figure 7-4*).
6. In main cages make sure that MCP-IPx and the IMC8 cards are fully installed.
7. In expansion cages make sure that at least one peripheral card is fully installed.

CAUTION!

Turn on the power supply units in the expansion cages only after powering the main cage and verifying that the main cage has initialized properly and the alarm indicator does not illuminate. Otherwise the cards in the peripheral expansion cages might not initialize.

8. Turn the PS500 DC power switch ON.
9. Verify that the green **Power** indicator is lit, while the red **Alarm** indicator is not lit
10. Turn the PS500 DC power switch OFF (downwards) before inserting or removing any common control cards in the system.
11. Peripheral cards may be inserted or removed from the system with power applied.

Figure 7-4 ***PS500 DC Power Connections***



Removing the Power Supply

1. Locate a desk or table top that can support 50lb (23kg). If the surface can be damaged by sharp objects, place a protective sheet of cardboard or similar material over the top surface.
2. Place an anti-static sheet (the card's plastic shipping bag will suffice) over a desk or a table top.
3. Turn the PS500 DC power switch OFF (turn the switch downwards).

CAUTION!

Do not remove the power supply unit from the cage when turned ON. Sudden power surges could damage system components. Before extracting the PS500 DC card, verify that the power switch is turned OFF.

4. Remove the DC power input connector (see *Figure 7-4*).
5. Unfasten the two captive screws located at the top and bottom of the unit's front panel and set aside.
6. Carefully remove the PS500 DC from its slot.
7. Place the PS500 DC over the anti-static material with the component side facing upwards.

5 Troubleshooting

Power supply failure generally results in the loss of one or more output voltages. However, protection circuitry in the power supply regulator may shut down a regulator due to a current overload caused by an external fault.

The red **Alarm** indicator on the front panel of the power supply indicates any failure within the unit.

NOTE:

*The red **Alarm** indicator illuminates if any voltage supplied by the power supply is outside of specification. This could be caused by an internal or external fault. If the alarm indicator illuminates in a replaced power supply, the fault is not within the unit.*

All maintenance activities are to be carried out by a qualified service technician.

The red **Alarm** indicator can be activated by malfunctions in the backplane, the power supply, in any of the cards inserted into the cage, or in any of the above in a connected cage.

If the power supply is turned ON and the green power indicator is OFF check the following:

1. DC power input connector (see *Figure 7-4*)
2. DC power supply interruption
3. Blown main or circuit fuse/breaker in the building electrical panel
4. Blown fuse F2 within the PS500 DC. Replace fuse as described on *page 7-13, PS500 DC Fuse*
5. Faulty PS 500 DC. Insert a different PS500 DC unit as described on *page 7-8, Installation*.

PS500 DC Fuse

The PS500 DC employs one fuse (F2) to protect the cage circuitry and the DC main input. If the F2 fuse blows, the PS500 DC **Power** green indicator and **Alarm** red indicator do not illuminate.

To replace the DC Power Input Fuse within the PS500 DC:

1. Remove the power supply unit from its slot and place it over the anti-static material with the component side facing upwards, as described on *page 7-11, Removing the Power Supply*.

CAUTION!

Do not *insert or remove the power supply unit from the cage when turned ON. Sudden power surges could damage system components.*

2. Replace only with the same type and rating of fuse. See the PS500 DC card layout in *Figure 7-2 on page 7-4*.
3. Reinstall the power supply unit as described on *page 7-8, Installation*.

Determining the Cause of the Alarm Indicator

1. Turn the PS500 DC power switch OFF (turn the switch downwards).
2. Disconnect the expansion cable(s) connected to the relevant cage.
3. Remove all cards from the relevant cage so that they protrude from the cage by approximately 1 inch (2.5 cm).
4. Turn ON the PS500 DC and check the red **Alarm** indicator.
   - If the **Alarm** indicator is lit, either the PS500 DC is malfunctioning (replace as described on *page 7-8, Installation*.) or the problem is caused by the backplane (contact the manufacturer).
   - If the **Alarm** indicator is not lit, the unit is functioning properly and the alarm is being caused by one of the cards.
5. For main cages, IPx 500M that include a MCP-IPx card:
   Turn the PS500 DC power switch OFF again (turn the switch downwards) and re-insert the MCP-IPx card. Then turn the PS500 DC power switch ON and check the red **Alarm** indicator. If the red **Alarm** indicator is lit, the MCP-IPx card is causing the problem and should be replaced.
6. To determine which shared service and peripheral card is causing the problem, insert the cards into their appropriate slots, one at a time, beginning from the right side of the cage. Ensure that the card's rear panel connectors engage properly with the backplane and that they initialize properly.
   - If the Alarm indicator lights when one of the cards is inserted, then that card is faulty.

6 Specifications

PS500 DC (DC Power Supply)

Coral systems:.................................. IPx 500M, 500X

Input:... -40VDC to -60VDC, 10A max.

Power Consumption: .... Continuous 460W

Outputs: .... +5VDC nom. regulated 13.0A max.
–5VDC nom. regulated 0.15A max.
+12VDC nom. regulated 2.0A max.
–48VDC unregulated (or approx.0.5V to 1.0V lower than input voltage) 5.0A max.

Alarm:... Signaling malfunction
Front panel LED indicator (red)

Indicators: .... Power ON/OFF (green)
ALARM (red)

Fuses:...

Input (-48VDC)............ 16A/250V S.B.
Output .... None

Controls and Adjustments: .... ON/OFF Power switch

Weight:... 0.8 kg

External Connection: ....

DC Input.......................... Molex™ connector TBD

PS500 DC (E)

Specifications: .... TBD

PS500 DC Power Supply Unit

7

NOTES:

7.2 PS500 AC Power Supply Unit

1 General Description

The PS500 AC power supply unit provides operating voltages for the Coral IPx 500 system.

Power Source

The PS500 AC operates from a nominal input of 100-240VAC/47-63Hz.

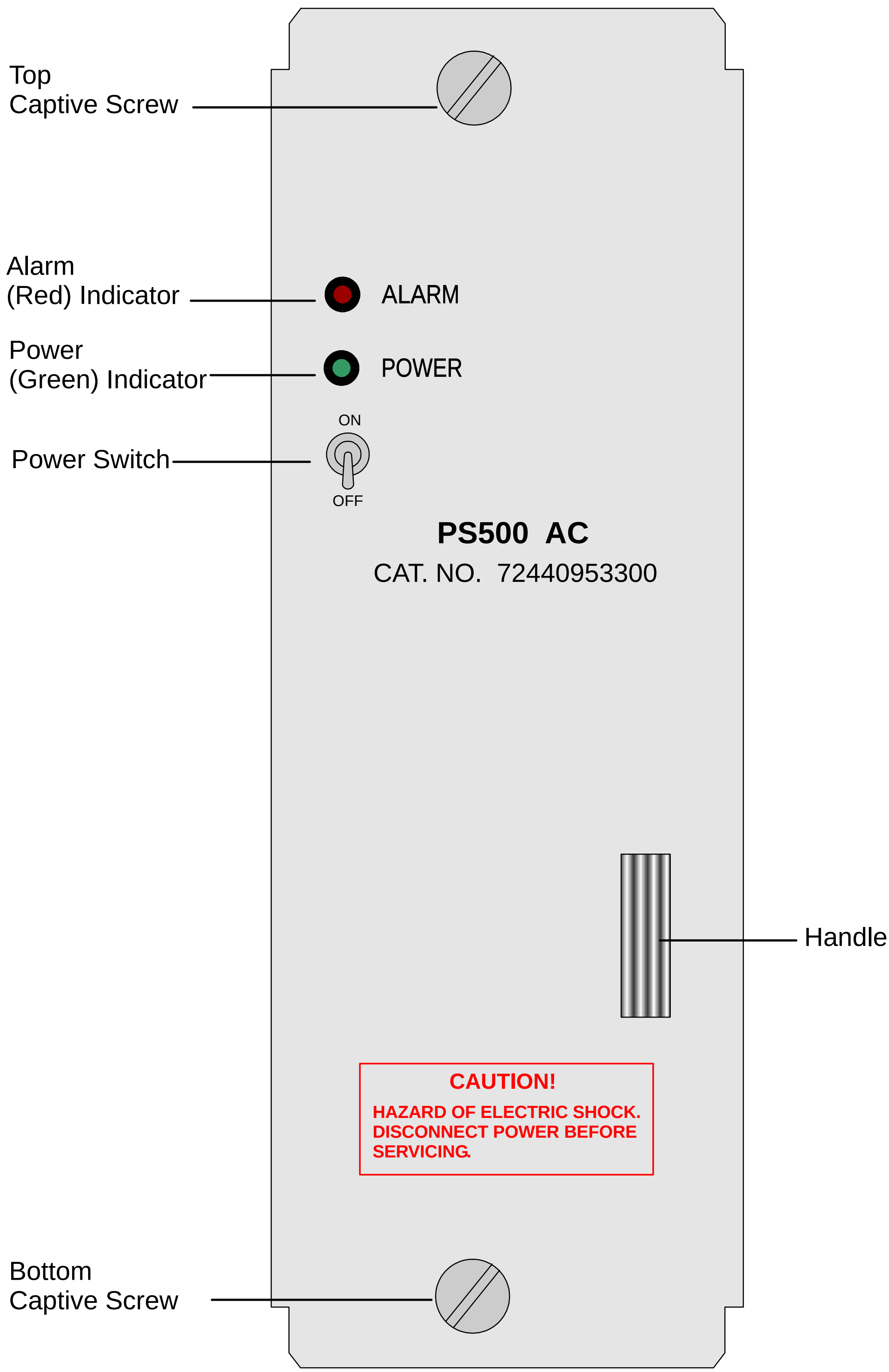
During power failure, the unit automatically switches over to 48VDC backup batteries. See *page 7-35, BATTipx Battery Pack*.

PS500 AC Front Panel

Figure 7-5 displays the front panel of the PS500 AC. The components located on the front panel are described in the following table:

Feature	*Description*
Alarm (red) Indicator	Lights when there is any failure within the PS500
Power (green) Indicator	Lights when the power switch is turned on
ON/OFF Power Switch	Turns the unit ON or OFF. **CAUTION!** *Do not insert or remove the power supply unit from the cage when turned ON. Sudden power surges could damage system components. Before inserting or extracting the power supply unit, verify that the power switch is turned OFF.*
Handle	Used to pull the unit out of the card cage
Top and Bottom Captive Screws	Used to secure the unit to the cage. These screws also ground the unit to the cage and safeguard the unit against malfunction.

Figure 7-5 ***PS500 AC Front Panel***

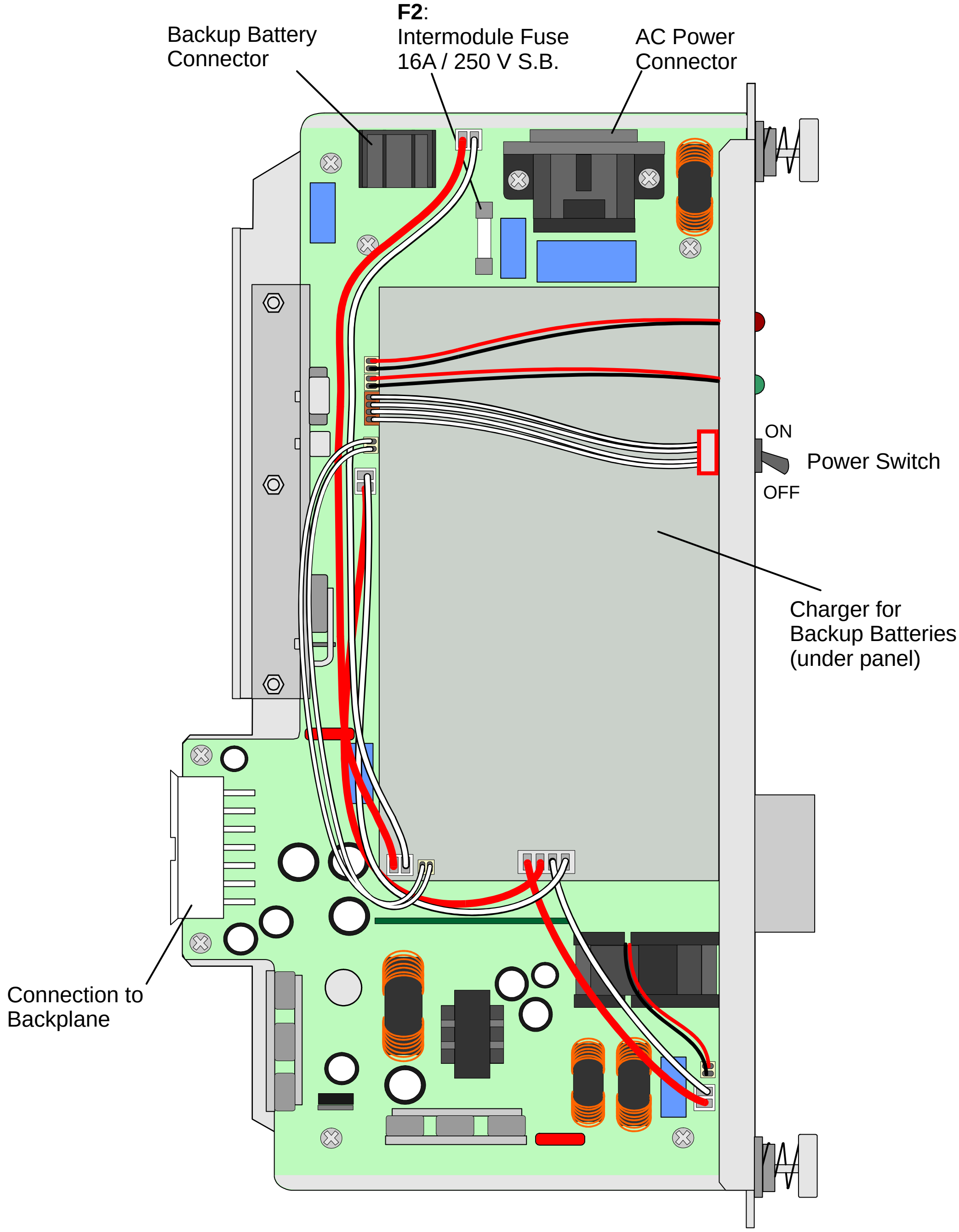


PS500 AC Card Layout

The PS500 AC card's component side is shown in *Figure 7-6*. Five components are described in the following table:

Feature	*Description*
Battery Pack Connector	Connects the power supply unit to the battery pack. In the event of the AC power failure the PS500 AC power supply operates from the battery. See the warning *on page 7-28*.
F2 Intermodule Fuse	A 16A/250V, slow blow fuse that protects the unit's voltage. See *page 7-31, PS500 AC Fuses*.
AC Input Power Connector	Connects the PS500 AC power supply to the AC power outlet
Charger for Battery Pack (under panel)	Charges the battery pack during normal operation and powers the system during AC power failure
Connection to Backplane	Connects the power supply to the cage backplane

Figure 7-6 ***PS500 AC Circuit Board***



2 Circuit Description

The PS500 AC is an Uninterrupted Switch-mode Power Supply (USPS). It contains a pulse-width modulated (PWM) switch-mode converter to produce the +5VDC, -5VDC, +12VDC, -48VDC operating voltages for the Coral IPx 500 internal circuitry and 54VDC for batteries charging. All outputs are regulated. Voltage and current monitoring circuitry produce alarm signaling to the Coral IPx 500 system main processor in the event of abnormal operation. An internal mounted battery fuse protects the PS500 AC circuitry from current overload.

Figure 7-7 displays a block diagram of the PS500 AC power supply.

DC Output Power

The PS500 AC includes one AC-DC converter and one switch-mode DC-DC converter that converts 100-240VAC/47-63Hz input power to:

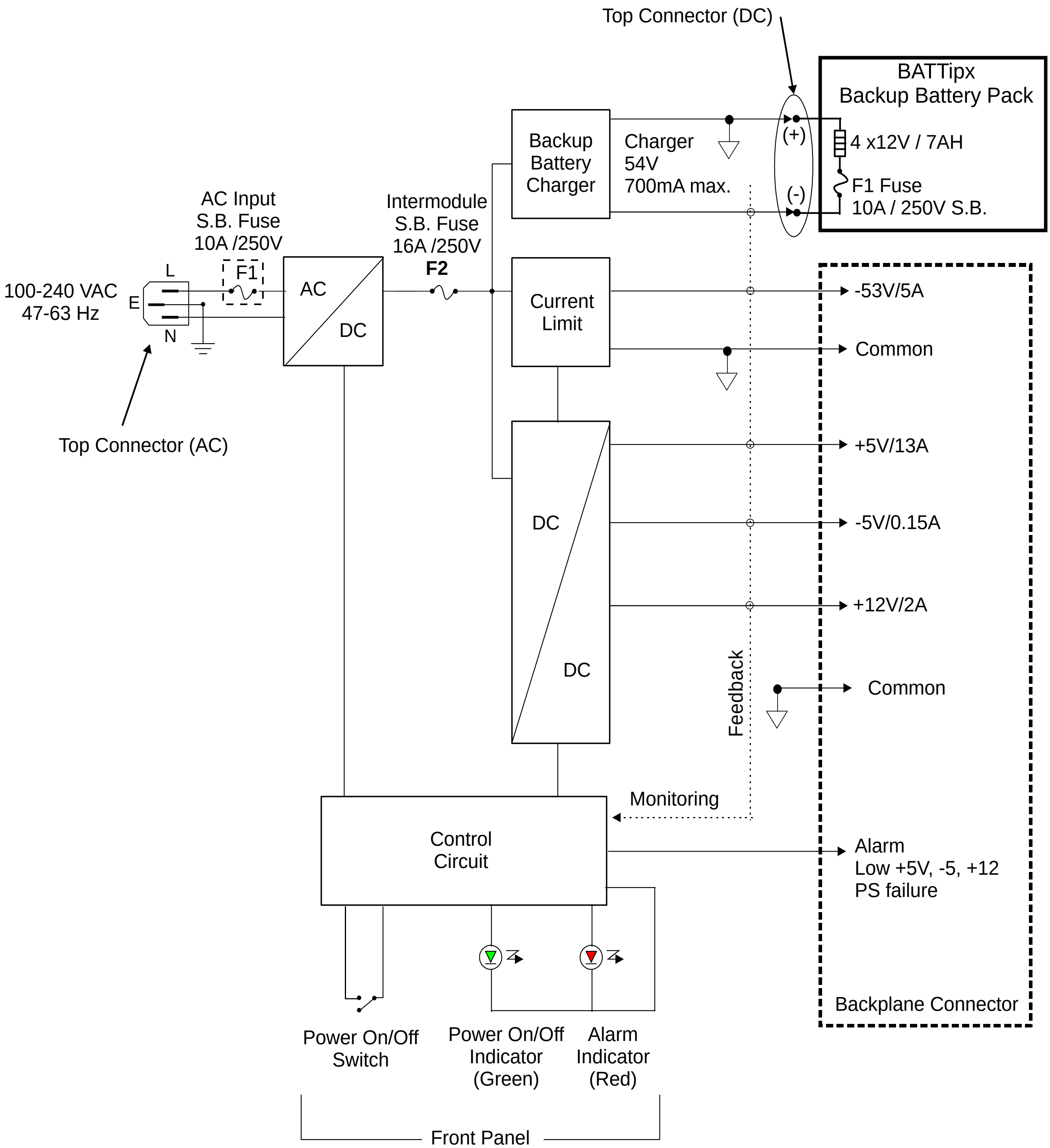
- -48VDC
- +5VDC
- –5VDC
- +12VDC

Normal Operation - When AC Power Source is Available

The AC input passes through the AC input fuse (F1) via an RFI filter, into the AC to DC converter circuit. The converter circuit produces an output of 54VDC. The 54VDC is fed, via the intermodule fuse (F2), into the following circuits:

- Battery Charge circuit - The charging current is limited to 700mA. The output passes via an internal mounted battery fuse to charge the four 12V batteries. As long as the AC input is operational, the batteries are charged.
- Current Limit - This circuit produces an output of -53VDC/5A.
- DC/DC converter - This circuit produces three outputs: +5VDC/13A, +12VDC/2A and -5VDC/0.15A.
- During normal operation, the green **Power** indicator on the front panel is illuminated to indicate that the output power voltages are being produced. It means that all the circuitry of the PS500 AC is working properly.

Figure 7-7 ***PS500 AC Block Diagramed***



Battery Pack function In Case of Power Failure

The DC input consists of: battery wires, internal mounted battery fuse and charge current limit.

The DC input consists of: battery pack wires and battery pack fuse.

Should the AC power interrupt, and properly charged battery pack is installed, the PS500 AC automatically operates from the battery. The DC input is protected against reverse polarity. The battery discharge current is limited by a slow blow 10A fuse.

The power provided by the battery pack is fed into the current limit circuit as well as the DC/DC converter, thus replacing the DC power usually provided from the AC/DC circuit. See *Figure 7-7*.

When the battery voltage drops below 44VDC, the alarm circuit generates a signal towards the Coral IPx 500 common control MCP-IPx, indicating that the shutdown procedure is to be started by the operator. When the battery voltage drops below 42VDC, the systems shuts down completely.

The power supply automatically restarts when the AC power returns. The battery pack is recharged as soon as the AC/DC converter provides over 50VDC.

Disconnecting the AC Power Cord from the AC Power Mains

Disconnecting the AC power cord from the AC power mains will not cause normal operation to discontinue. The battery pack takes over and provide the DC inputs necessary for the DC/DC converter circuitry. All output voltages will remain active. The best way to disable the output voltages is by turning OFF the power switch.

Turning the Power Switch OFF

Turning the power switch off allows you to shut down all power to the Coral IPx 500 system and to discontinue battery charging. It is used for maintenance purposes.

Monitoring Circuitry

The PS500 AC also limits the –48VDC output to feed the peripheral card slots.

All outputs, with the exception of the –48 VDC output, are regulated.

Voltage and current level monitoring circuitry checks each output of the PS500 AC and produces an alarm signal to the Coral system main processor in the event of malfunction.

Monitoring circuitry verifies that each voltage output is within specification. If any voltage deviates from specification, the monitoring circuitry produces an alarm signal to the Coral system processor, causing the red **Alarm** indicator to illuminate. Note that the green **Power** indicator of a PS500 AC remains illuminated at the same time as the red alarm indicator.

Alarm signals

All the circuitry on the PS500 AC board is connected to an alarm circuit to provide the Coral IPx 500 system with warnings when necessary. The following situations cause alarm signals:

- **DC Output Power Deviation** - When the output voltages, generated either by the batteries or the AC source, deviates from specification, an alarm signal is generated.
- **Low Battery** - When the battery voltage drops below 44VDC, an alarm signal is generated, giving the operator the time needed to perform shutdown procedures.
- **Power supply Failure**.

3 SLT Message Lamp and Ringer Frequency

The PS500 AC does not employ ring and message generators for industry standard, single-line telephones (SLT) station ports. These generators are provided in Coral IPx 500 systems by the 8/16SLSipx peripheral cards. The peripheral cards are described in detail in the *Coral Service and Peripheral Cards Installation Manual*.

Each 8/16SLSipx card is capable of generating ringing up to six ports simultaneously at 20Hz or at 25Hz. See *Chapter 6* of the *Program Interface and Database Reference Manual* for details.

4 Installation

The power supply unit is inserted into the Coral IPx 500 cage in the extreme left slot.

Installing the Power Supply

1. Verify that the cage ground wire is connected and the ground nut is tightened. (see *Figure 7-8*).

2. Verify that the power switch is turned OFF.

CAUTION!

Inserting the power supply card into the cage when the power switch is ON could result in a sudden surge voltage that could damage the Coral IPx system. Before inserting the power supply unit, verify that the power switch is turned OFF.

3. Position the two guide ridges (located on the right panel of the power supply, at the top and bottom) into the card edge guides corresponding to the **POWER SUPPLY** slot labeled on the bottom of the card cage.

4. Slide the power supply gently but firmly, until fully inserted into the card cage. A slight resistance should be felt as the multi-pin connectors engage at the rear of the power supply and backplane.
Do not force the power supply into the card cage. Irreparable damage may occur if the multi-pin connectors misalign while attempting to insert the unit into the card cage. If more than slight resistance is encountered, partially slide out the card from the cage and verify the alignment of the guide ridges with the card edge guides. If alignment appears to be correct, remove the card from the slot and inspect the multi-pin connectors for bent pins and debris in the pin holes.

5. Secure the power supply unit to the cage with the two captive screws on the top and bottom of the front panel. See *Figure 7-5 on page 7-18*.

WARNING!

The screws on the front panel <u>must</u> be tightened properly to prevent dangerous electrical shock.

CAUTION!

The power supply is regulated with a minimum load of backplane and MCP-IPx card or one peripheral card.

***Do not** insert or remove the MCP-IPx card under power.*

Follow these steps:

1. Verify that the cage ground wire is connected and the ground nut is tightened. (see *Figure 7-8*).
2. Verify that the **Power** switch is turned OFF (downwards).
3. Verify that the two captive screws on the upper and lower parts of the front panel are tightened.
4. When a battery pack is used:
   - Verify that the BATTipx power switch is turned OFF (pressed down to the right).
   - Insert the battery pack connector of the DC power cable into the upper panel socket of the PS500 AC power supply. See *Figure 7-8* and the warning *on page 7-28*.
5. Route the AC power cable to the customer's AC power outlet, as described on *page 2-73, AC Powered Systems*.
6. Insert the female connector of the AC power cable into the upper panel socket of the PS500 AC power supply. See *Figure 7-8.*
7. Insert the male plug of the AC power cord into the line outlet or primary power receptacle designated for the system.
8. In main cages, verify that MCP-IPx and the IMC8 cards are fully installed.
9. In expansion cages, verify that at least one peripheral card is fully installed.

CAUTION!

Turn on the power supply units in the expansion cages only after powering the main cage and verifying that the main cage has initialized properly and the alarm indicator does not illuminate. Otherwise the cards in the peripheral expansion cages might not initialize.

10. Turn the PS500 AC power switch ON.

11. Verify that the green **Power** indicator is lit, while the red **Alarm** indicator is not lit

12. Turn the PS500 AC power switch OFF (downwards) before inserting or removing any common control cards in the system. Peripheral cards may be inserted or removed from the system with power applied.

13. If a battery pack is used:

    a. Turn the BATTipx power switch ON.

CAUTION!

The batteries must be fully charged before proceeding. Allow at least 24 Hours of system operation and call processing with batteries installed before next step.

b. Remove AC input power from the system.

c. Verify that the green **Power** indicator is lit, while the red **Alarm** indicator is not lit.

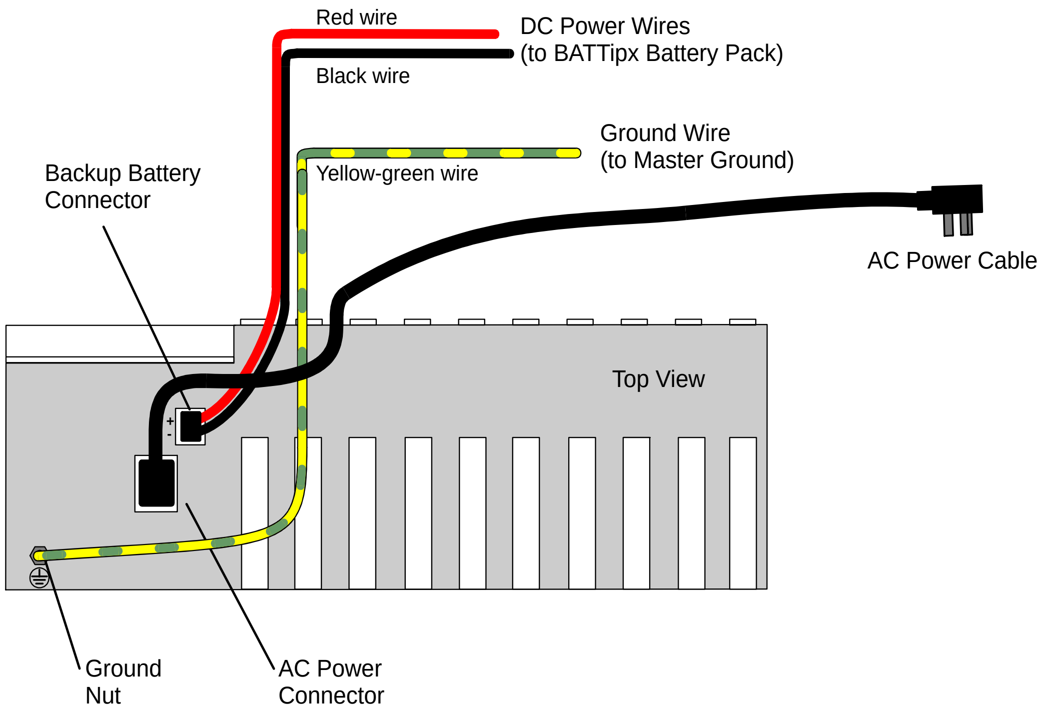
d. Restore the AC input power to the system.

e. Verify that the green **Power** indicator is lit, while the red **Alarm** indicator is not lit.

WARNING!

*Disconnecting the AC power cord from the AC power mains will not cause the PS500 AC to discontinue power if a battery pack is installed. The battery pack will take over and provide the DC power input. All voltages will remain active. The only way to disable the output voltages is by turning OFF the **Power** switch on the PS500 AC front panel.*

Figure 7-8 ***PS500 AC Power Connections***



WARNING!

The backup battery connector is dedicated to the BATTipx unit, only. ***Do not*** *connect any ancillary equipment to this connection. Doing so could cause catastrophic failure to the PS500 AC power supply. Unauthorized use of the backup battery connector will void the warranty from the manufacturer for the entire installation, as it is viewed as an illegal modification of FCC registered equipment.*

The PS500 AC power supply is designed to support the Coral IPx 500 system, only.

Removing the Power Supply

1. Locate a desk or table top that can support 50lb (23kg). If the surface can be damaged by sharp objects, place a protective sheet of cardboard or similar material over the top surface.
2. Place an anti-static sheet over a desk or a table top (the card's plastic shipping bag will do).
3. Turn the PS500 AC power switch OFF (downwards).

CAUTION!

Do not remove the power supply unit from the cage when turned ON. Sudden power surges could damage system components. Before extracting the PS500 AC card, verify that the power switch is turned OFF.

4. Remove the battery pack connector. See *Figure 7-8*.
5. Remove the AC input connector. See *Figure 7-8*.
6. Unfasten the two captive screws on the front panel of the PS500 AC. See *Figure 7-5*.
7. Carefully remove the PS500 AC from its slot.
8. Place the PS500 AC over the anti-static material with the component side facing upwards.

5 Troubleshooting

Power supply failure generally results in the loss of one or more output voltages. However, protection circuitry in the power supply regulator may shut down a regulator due to a current overload caused by an external fault.

The red **Alarm** indicator on the front panel of the PS500 AC lights when any of the output voltages are outside of specification.

NOTE:

*The red **Alarm** indicator illuminates if any voltage supplied by the power supply is outside of specification. This could be caused by an internal or external fault. If the alarm indicator illuminates in a replaced power supply, the fault is not within the unit.*

All maintenance activities are to be carried out by a qualified service technician.

The red **Alarm** indicator can be activated by malfunctions in the backplane, the power supply, in any of the cards inserted into the cage, or in any of the above in a connected cage.

If the power supply is turned ON and the green power indicator is OFF, check the following:

1. AC power cord. See *Figure 7-8*.
2. AC power failure
3. Blown main or circuit fuse/breaker in the building electrical panel
4. Blown fuse F2 within the PS500 AC. Replace fuse as described on *page 7-31, PS500 AC Fuses*.
5. Faulty PS500 AC. This includes the possibility of a blown F1 AC fuse in the power supply. **Do not** replace the AC fuse. Insert a different PS500 AC unit as described on *page 7-25, Installation*.

In the event of a power failure, when battery pack BATTipx is installed, check the following:

1. Battery discharged.
2. Blown fuse within the BATTipx. See *page 7-35, BATTipx Battery Pack*.
3. Faulty PS500 AC.

PS500 AC Fuses

The PS500 AC employs two fuses:

- If the F1 fuse blows, the PS500 AC **Power** green indicator and **Alarm** red indicator do not illuminate. Do not replace the AC input fuse. It is not replaced in the field.
  Insert a different PS500 AC unit.
- If the F2 fuse blows, the PS500 AC **Power** green indicator and **Alarm** red indicator are lit. Intermodule fuse F2 can be replaced in the field.

To replace the F2 Intermodule Fuse within the PS500 AC:

1. Remove the power supply unit from its slot and place it over the anti-static material with the component side facing upwards, as described on *page 7-29, Removing the Power Supply*.

CAUTION!

Do not insert or remove the power supply unit from the cage when turned ON. Sudden power surges could damage system components.

2. Replace only with the same type and rating of fuse. See the PS500 AC card layout in *Figure 7-6 on page 7-20*.

3. Reinstall the power supply unit as described on *page 7-25, Installing the Power Supply*.

Determining the Cause of the Alarm Indicator

1. Turn the PS500 AC power switch OFF (turn the switch downwards).
2. Disconnect the expansion cable(s) connected to the relevant cage.
3. Disconnect the battery pack connector from the cage top panel.
4. Remove all cards from the relevant cage so that they protrude from the cage by approximately 1 inch (2.5 cm).
5. Turn ON the PS500 AC and check the red **Alarm** indicator.
   - If the **Alarm** indicator is lit, either the
     PS500 AC is malfunctioning (replace as described on *page 7-25, Installation*.)
     or the problem is caused by the backplane (contact the manufacturer).
   - If the **Alarm** indicator is not lit, the unit is functioning properly and the alarm is being caused by one of the cards.
6. For main cages, IPx 500M that include a MCP-IPx card:
   Turn the PS500 AC power switch OFF again (turn the switch downwards) and re-insert the MCP-IPx card. Then turn the PS500 AC power switch ON and check the red **Alarm** indicator. If the red **Alarm** indicator is lit, the MCP-IPx card is causing the problem and should be replaced.
7. To determine which peripheral card is causing the problem, insert the cards into their appropriate slots, one at a time, beginning from the right side of the cage. Ensure that the card's rear panel connectors engage properly with the backplane and that they initialize properly.
   - If the Alarm indicator lights when one of the cards is inserted, then that card is faulty.

6 Specifications

PS500 AC (AC Power Supply)

Coral systems:.................................. IPx 500M, 500X

Input:... 100-240VAC 47-63Hz

Power Rating: .... 115VAC / 60Hz / 6A (Range: 98 to 126VAC)
230VAC / 50Hz / 3A (Range: 198 to 253VAC)

Power Consumption: .... Continues 460W

Outputs: ....

Main output:................. +5VDC nom. regulated 13.0A max.
–5VDC nom. regulated 0.15A max.
+12VDC nom. regulated 2.0A max.
–53VDC unregulated 5.0A max.

Battery Charger:........... 54VDC 0.7A max.

Alarm .... Signaling malfunction, low battery voltage,
DC out of range
Front panel LED indicator (red)

Indicators: .... Power ON/OFF (green)
ALARM (red)

Fuses: ....

Input (AC).................... F1 - 10A/250V S.B. non-replaceable
Intermodule.................. F2 - 16A/250V S.B. replaceable
Output .... None

Controls and Adjustments: .... ON/OFF power switch

Weight:... 1.8 kg

External Connection: ....

AC Input....................... female right-angled connector
DC Battery Backup...... Molex™ connector including:

■Sabre terminal (for crimping) cat. no. 43375

■Sabre receptacle cat no. 44441

PS500 AC (E)

Specifications: .... TBD

PS500 AC Power Supply Unit

7

NOTES:

7.3 BATTipx Battery Pack

for AC Powered System

1 General Description

The BATTipx unit is a battery pack that can be mounted either on a wall or on a rack. The BATTipx unit includes four 12V gel-cell batteries (7Ah) and a case as a single unit and is charged by the PS500 AC power supply. The BATTipx unit supports a single Coral IPx 500 cage for at least half an hour at maximum capacity during an AC power failure. Each cage is backed up by its own BATTipx unit.

The supplied battery pack kit includes two brackets that can be mounted onto the rear side of the battery pack for wall mounting configurations or onto the front side of the battery pack for rack-mounted configurations. See *Chapter 2, Hardware Installation Procedure*.

The BATTipx includes a connector to power -48VDC for an external LTU (Line Terminating Unit) or CSU (Channel Service Unit).

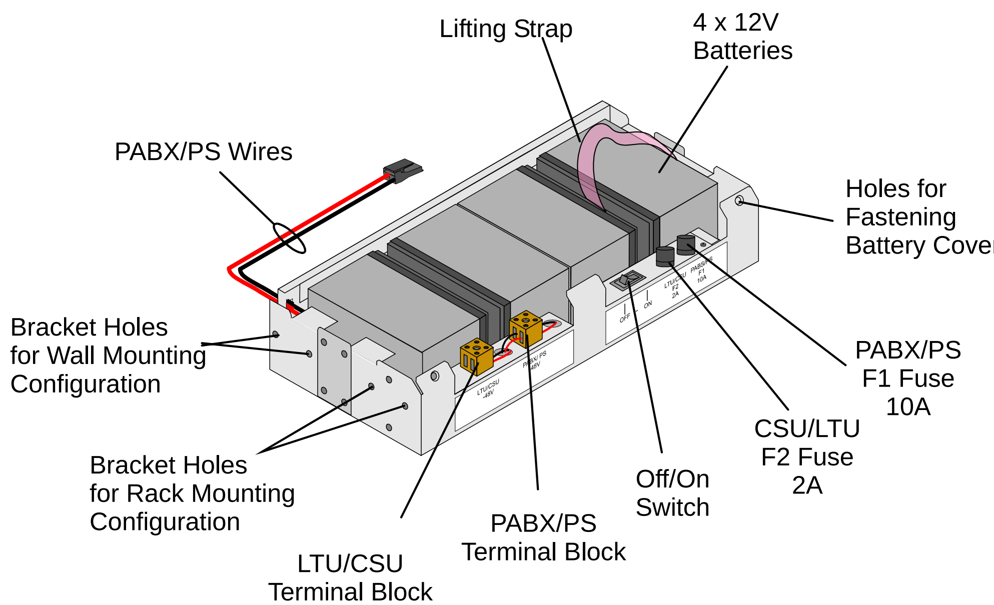
BATTipx Components

Figure 7-9 displays the components of the BATTipx. The components are described in the following table:

Feature	*Description*
LTU/CSU Terminal Block	Connects the BATTipx unit to the LTU/CSU. Supplies 48VDC at 200mA max to a customer's LTU/CSU via the customer's supplied wire pair. LTU/CSU power is available during normal AC power and during power failure. See the warning *on page 7-44*.
PABX/PS Terminal Block	Connects the BATTipx unit to the Coral IPx 500 system. Supplies 48VDC at 10A max to the PS500 AC power supply, via the the PABX/PS wires, when the AC power flow from the mains is discontinued.

Feature	*Description*
ON/OFF Switch	Turns the BATTipx unit on and off, enabling maintenance
F2 - LTU/CSU Fuse	Protects the batteries from a short circuit within the LTU/CSU wires or within the LTU/CSU unit.
F1 - PABX/PS Fuse	Protects the batteries from a short circuit within the PABX/PS wires or within the PS500 AC.
Batteries	Four 12V gel-cell batteries (7Ah). See *page 7-58, Specifications*.
Right and left side panel holes for fastening bracket	Holes used to mount the battery pack on the rack or on the wall. See *Chapter 2, Hardware Installation Procedure*.
Right and left side panel holes for fastening battery cover	Holes above the front panel used to fasten the cover to the battery pack
Lifting Strap	Lifting strap attached to each of the four batteries enabling easy removal
PABX/PS Wires	PABX/PS wires extruding from the rear panel of the battery pack including a connector for the PS500 AC unit.

Figure 7-9 ***View of BATTipx without Cover***



BATTipx Battery Pack for AC Powered System

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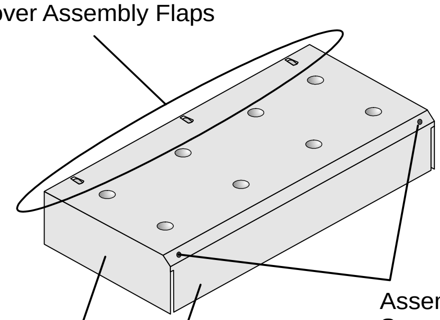
The battery pack is protected by a decorative cover that includes four panels: top, left, right, and front. See *Figure 7-10*. The front panel (near the top) includes two holes for inserting the assembly screws that fasten the decorative cover to the battery pack frame. The top panel (on the rear edge) includes three assembly flaps that are inserted into mating slots on the frame of the battery pack.

Figure 7-10 ***Battery Pack Cover***



BATTipx Battery Pack for AC Powered System

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2 Circuit Description

Figure 7-11 on page 7-40 presents a block diagram of the BATTipx and the power circuitry that enables the IPx 500M and IPx 500X cages.

The PS500 AC is normally fed by AC power input from which it produces the DC outputs required for normal card operation. It also produces charging voltage to the battery pack. The PS500 AC and the battery pack are connected via two wires.

If a power fail occurs, the battery pack feeds the PS500 AC, allowing it to produce the DC outputs.

DC Output Power

- The PABX/PS terminal block supplies power to the Coral IPx 500 cage only in the event of a power failure.
- The LTU/CSU terminal block supplies the LTU or CSU when power is functional and when there is a power failure.

Normal Operation - When an AC Power Source is Available

The AC input passes through the PS500 AC input into the AC to DC converter circuit. The converter circuit produces an output of 54VDC. The 54VDC is fed into the battery charger circuit.

The current is reduced to charging current of 300-700mA. The output passes via the PS500 AC internal mounted battery fuse to charge the four 12V batteries. As long as the AC input is operational, the batteries are charged.

During normal operation, the green **Power** indicator on the front panel of the PS500 AC is illuminated to indicate that the output power voltages are being produced. It means that all the circuitry of the PS500 AC is working properly.

Battery Pack Operation in the Event of a Power Failure

The DC input to the PS500 AC consists of battery wires, a 10A battery fuse, and a charge current limit.

If the AC power is discontinued, the PS500 AC automatically operates from the battery pack. The power provided by the battery pack is fed into the current limit circuit as well as the DC/DC converter, thus replacing the DC power usually provided from the AC/DC circuit.

When the battery voltage drops below 44VDC, an alarm signal is generated, giving the operator the time needed to perform shutdown procedures.

The power supply automatically restarts when the AC power returns. The battery pack is recharged as soon as the AC/DC converter provides over 50VDC.

Disconnecting the AC Power Cord from the PS500 AC

Disconnecting the AC power cord from the AC power mains will not cause call processing and Coral system operations to discontinue. The battery pack takes over and provides the DC inputs necessary for the DC/DC converter circuitry. All output voltages will remain active. The only way to disable the output voltages is by turning OFF the PS500 AC power switch.

Turning the BATTipx Power Switch OFF

During normal PABX operation:

- Battery charging will stop
- LTU/CSU power is supplied by the PS500 AC power supply (54VDC/700A max.)

During AC power failure:

- The Coral IPx 500 system shuts down
- LTU/CSU power is discontinued

Turning the PS500 AC Power Switch OFF

Turning the power switch off allows you to shut down all power to the Coral IPx 500 system as well as to stop charging the batteries. It is used for maintenance purposes.

The batteries will be discharged by the LTU/CSU if connected. To stop the battery from discharging, turn the BATTipx switch OFF.

Monitoring Circuitry

Monitoring circuitry in the PS500 AC verifies that each voltage output is within specification. If any voltage deviates from specification, the monitoring circuitry produces an alarm signal to the Coral system processor, causing the red **Alarm** indicator to illuminate. Note that the green **Power** indicator of a PS500 AC remains illuminated at the same time as the red alarm indicator.

Alarm signals

All the circuitry on the PS500 AC board is connected to an alarm circuit to provide the Coral IPx 500 system with warnings when necessary.

Low Battery - When the battery voltage drops below 44VDC, an alarm signal is generated, giving the operator the time needed to perform shut down procedures.

Figure 7-11 ***BATTipx (Issue-1) Block Diagram***

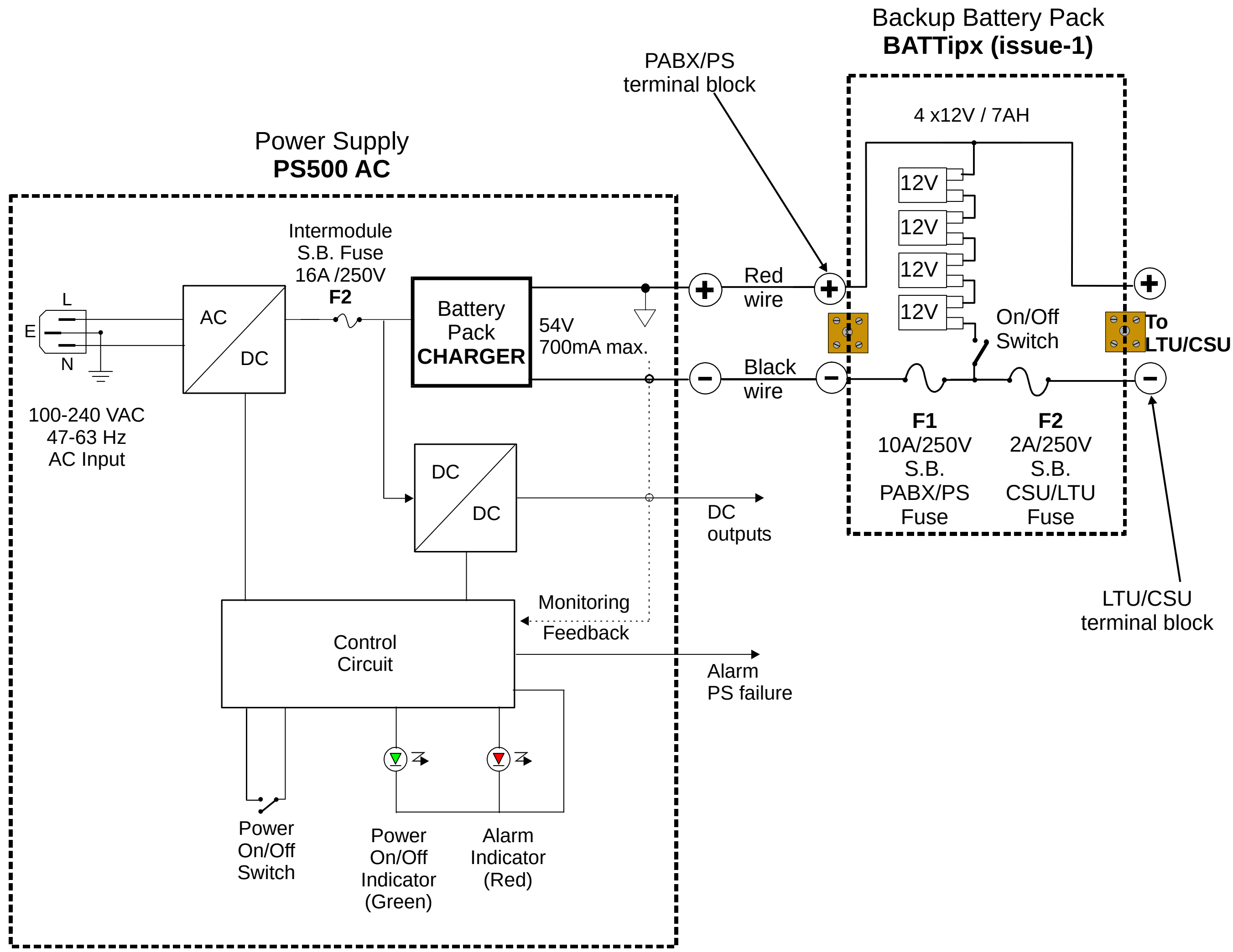
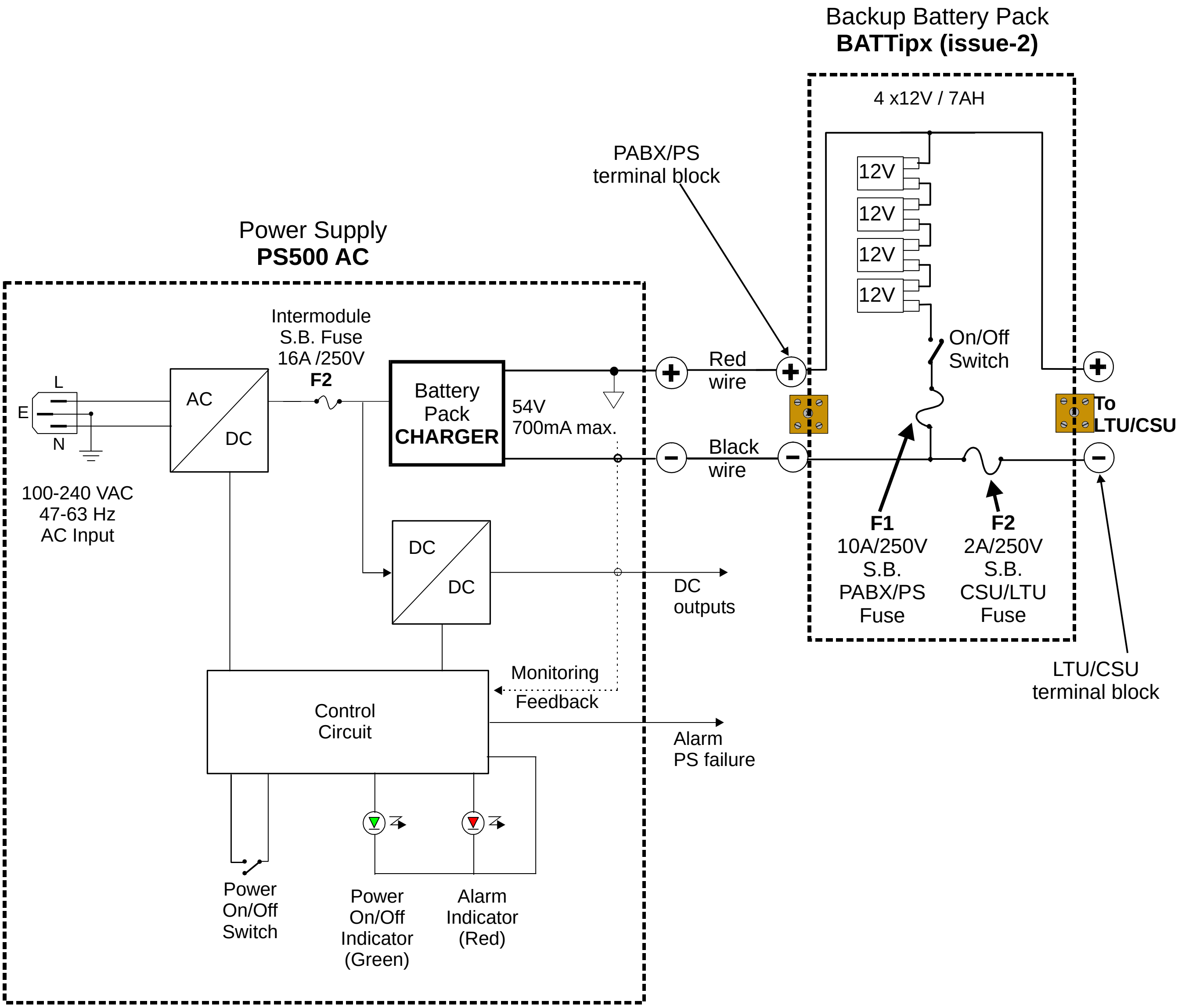


Figure 7-12 ***BATTipx (Issue-2) Block Diagram***



BATTipx Battery Pack for AC Powered System

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3 External Connections

The battery pack includes two DC output power terminal blocks that provide power to the Coral IPx 500 and the LTU/CSU. See *Figure 7-13*.

Coral IPx 500 cage

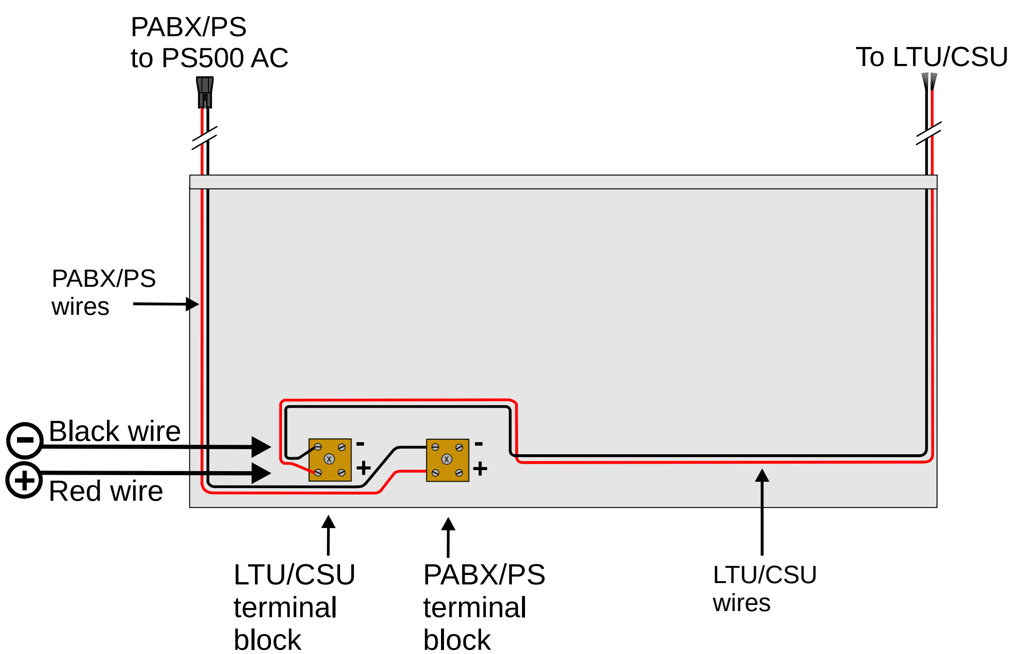
The right terminal block (labelled PABX/PS) supplies power (-48VDC at 10A max.) to the Coral IPx 500 system. The connection from the terminal block to the connector is fabricated by the manufacturer.

LTU/CSU

The left terminal block (labelled LTU/CSU) supplies power (-48V at 200mA max.) to the Channel Service Unit (CSU) or Line Service Unit (LSU). The connection from the terminal block to the LTU/CSU is fabricated by the customer. See *page 7-46, Connecting the Battery Pack to the LTU/CSU Unit*.

See the warning *on page 7-44*.

Figure 7-13 ***Top View of BATTipx Battery Pack***



4 Troubleshooting

BATTipx Fuses

The battery pack employs two fuses (see *Figure 7-9*) that can be replaced in the field:

- F1 protects the battery against short circuit in the PABX/PS connection and is rated 10A/250V.
  If fuse F1 blows, the batteries will no longer charge, and in the event of an AC power failure the system will shut down.
  - Issue 2 - The LTU/CSU will shut down immediately in the event of an AC power failure.
  - Issue 1 - The LTU/CSU will stop functioning once the batteries have discharged.
- F2 protects the battery against short circuit in the LTU/CSU connection and is rated 2A/250V.
  If fuse F2 blows, the LTU/CSU will no longer function.

LTU/CSU

If fuse F2 blows, the LTU/CSU will no longer function.

If fuse F1 blows, the LTU/CSU will shut down:

- Issue 2 - Only in the event of an AC power failure, see *Figure 7-12 on page 7-41*.
- Issue-1 - In normal operation (when an AC power source is available) once the batteries have discharged, see *Figure 7-11 on page 7-40*.

5 LTU/CSU Connection

To afford some protection and increase reliability to a PRI/T1/E1 digital trunk facility, the network interface of the digital trunk card should not connect directly to the network. The LTU or CSU is generally required for connections to the public network, and is strongly recommended for private network facilities as well.

Typically, the LTU/CSU is a small, wall or rack mounted box. The LTU/CSU is Customer Premises Equipment (CPE) in most countries and is available from several different manufacturers.

See *Coral Service and Peripheral Cards Installation Manual*, *Chapter 3 - Digital Trunks* for additional information.

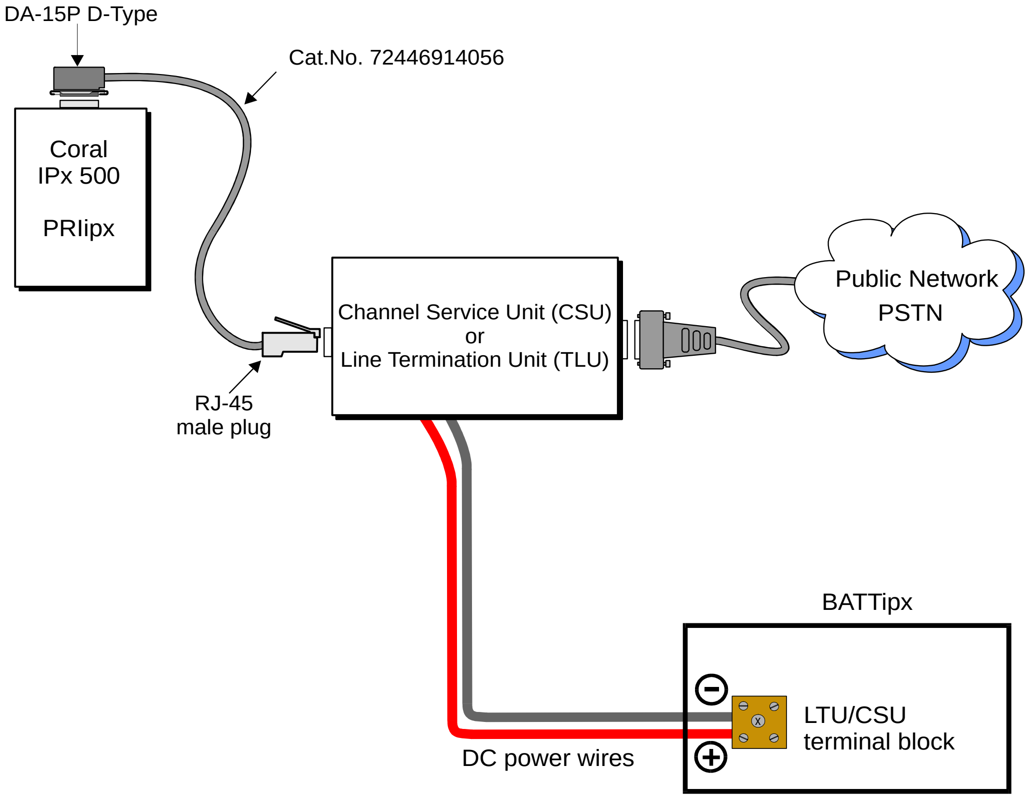
WARNING!

The LTU/CSU terminal block is dedicated to the LTU/CSU, only. ***Do not*** *connect any ancillary equipment to this connection, it could cause catastrophic failure to the PS500 AC power supply. Unauthorized use of the LTU/CSU terminal block will void the warranty from the manufacturer for the entire installation, and it is viewed as an illegal modification of FCC registered equipment.*

The LTU/CSU terminal block is designed to support the LTU/CSU unit, only.

Figure 7-14 describes the connection between the BATTipx and the LTU/CSU.

Figure 7-14 ***BATTipx Connection to the LTU/CSU***



Connecting the Battery Pack to the LTU/CSU Unit

The BATTipx is supplied with a dedicated 2 pole terminal block for connecting the 48VDC to the LTU/CSU. It is the customer’s responsibility to fabricate the wire connection between the battery pack and the LTU/CSU unit.

1. Verify that the PABX/PS wires are disconnected from the PS500 AC.

2. Remove the battery pack cover. See *Figure 7-16 on page 7-55*.

3. Verify that the BATTipx power switch is turned OFF (pressed down to the right).

4. Remove the batteries from the battery pack. See *Figure 7-17 on page 7-56*.

5. Determine the longest route between the LTU/CSU unit and the battery pack leaving approximately 70 cm of wire within the battery pack to reach the LTU/CSU terminal block.

6. Fabricate a wire pair (two 14 AWG wires - one red and one black) for the connection between the LTU/CSU unit and the battery pack.

7. Route the wires from the LTU/CSU through the cable entry hole 1 at the rear corner of the BATTipx, and up and out through hole 2. See *Figure 7-15*.

8. Connect the wires routed from hole 2 to the terminal block labelled LTU/CSU (red to "+" and black to "-"). See *Figure 7-13*.

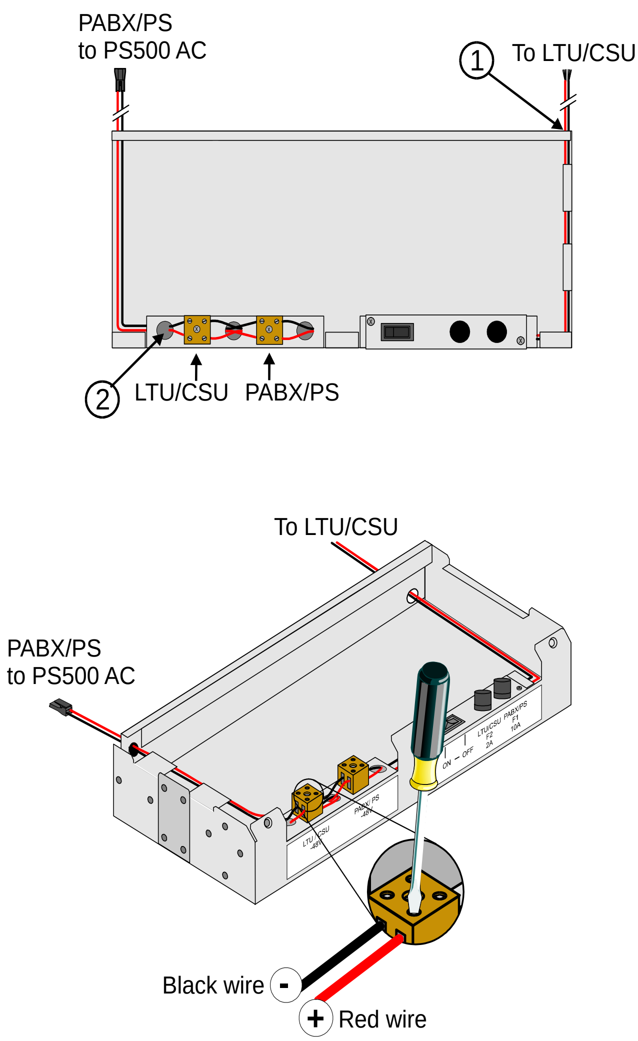
9. Push the wires towards the front and right panels of the battery pack so that they will not positioned beneath the batteries.

10. Replace the batteries inside the battery pack. See *page 7-56, Replacing the Batteries*.

11. Connect the other end of the wire pair to the LTU/CSU unit according to the manufacturer’s instructions.

12. Reconnect the PABX/PS wires to the PS500 AC.

Figure 7-15 ***Battery Pack Connection to LTU/CSU***



Step 1 Route the LTU/CSU wires through holes 1 and 2.

Step 2 Attach the wires to the LTU/CSU terminal block.

6 Installing the Battery Pack

The supplied battery pack kit includes two brackets that can be mounted onto the rear side of the battery pack for wall mounting configurations or onto the front side of the of the battery pack for rack-mounted configurations.

See *Chapter 2, Hardware Installation Procedure*.

Installation of the BATTipx unit includes the following stages:

- One of the following:
  - Mounting the Battery Pack onto the Wall
    OR
  - Mounting the Battery Pack onto the Rack
- Connecting the Battery Pack to the PS500 AC Unit
- Connecting the Battery Pack to the LTU/CSU Unit

7 Operating the Battery Pack

1. Verify that the PS500 AC **Power** switch is turned ON (upwards) and that the green **Power** indicator is lit, while the red **Alarm** indicator is not lit.
2. Verify that the battery pack power switch is turned OFF (pressed down to the right).
3. If required, connect the other wires to the LTU/CSU unit. See *page 7-46, Connecting the Battery Pack to the LTU/CSU Unit*.
4. Insert the PABX/PS wire into the upper panel socket of the PS500 AC power supply. See *Figure 7-8 on page 7-28*.
5. Turn the BATTipx power switch ON.

CAUTION!

The batteries must be fully charged before proceeding. Allow at least 24 hours of system operation and call processing with batteries installed before continuing.

8 Charging the Battery Pack

1. After connecting the backup batteries and after the system initializes properly, allow 24 hours of constant operation to charge the batteries.
2. After charging, use a DVM to determine the output voltage of the battery pack by connecting the DVM probes to either terminal block. See *page 7-53, Maintenance*.

9 Testing the Battery Pack

To check the battery pack operation after charging, follow the procedure described below.

CAUTION!

The batteries must be fully charged before proceeding. Allow at least 24 hours of system operation and call processing with batteries installed before testing the batteries.

1. Verify that the PABX/PS connector is connected into the DC power connection of the PS500 AC power supply. See *Figure 7-8 on page 7-28*.
2. If required, verify that the other wire pair is connected to the LTU/CSU.
3. Verify that the BATTipx **power** switch is turned ON (the switch is pressed down on the left side).
4. Verify that the PS500 AC **Power** switch is turned ON (upwards) and that the green **Power** indicator is lit, while the red **Alarm** indicator is not lit.
5. Remove the AC power input from the IPx 500 cage by disconnecting the AC power connector from the AC power receptacle. See *Figure 7-8 on page 7-28*.
6. Check the LTU/CSU functionality according to instructions provided by the manufacturer.
7. Verify that the green **Power** indicator on the front panel of the PS500 AC power supply is lit, while the red **Alarm** indicator is not lit.
8. Verify that the IPx 500 unit is still capable of processing calls by testing the trunks and stations connected to its card circuits.
9. After verification, restore the AC input power to the system.
10. Verify that the green **Power** indicator is lit while the red **Alarm** indicator is not lit.
11. If the battery pack fails the test, check the 10A fuse on the BATTipx front panel. See *Figure 7-9 on page 7-36*. If the fuse is faulty, replace it. Repeat the test to verify that the battery pack now works properly. If the test fails again, the battery pack must be replaced. Refer to *page 7-53, Maintenance*.

WARNING!

*Disconnecting the AC power cable from the AC power mains will not cause it to discontinue normal operation. The battery pack will will take up and provide the DC input. All output voltages will remain active. The only way to disable the output voltage is by turning OFF the **Power** switch on the PS500 AC front panel.*

10 Maintenance

WARNING!

Explosion and Environmental Hazards.

There is a danger of explosion if the battery is replaced incorrectly.

Replace the battery only with the same or equivalent type recommended by the manufacturer.

Disposal/Recycling

Dispose of used batteries according to requirements specified by the battery manufacturer and/or local regulatory agencies.

Battery safety

Danger

Batteries are electrically live at all times. Take great care never to short circuit the battery terminals.

Danger

High DC voltages are more dangerous than the mains.

Warning

Batteries are heavy. Take care when lifting and transporting batteries. For weights above 24 kilos, lifting aids should be used.

Warning

Do not attempt to remove battery lid or tamper with the battery internal workings.

When the Battery Pack Needs to be Replaced

The optimal voltage measured between the positive and the negative wires of the battery pack must be 48VDC. If the voltage measured is less than 42VDC, the battery is failed and the set must be replaced. If the voltage measured is between 48 and 42VDC, the battery is discharged.

1. If the battery fails to operate when the AC power source is disconnected, try recharging it for 24 hours.
2. If, after recharging, the battery pack provides less than 42VDC, replace it.

Measuring the Battery Pack Voltage under Load

1. Remove the AC power cable from the PS 500 AC.
2. Measure the output voltage. If the voltage measured by the DVM is lower than 42VDC, replace the batteries. See *page 7-53, Maintenance*.
3. Reconnect the AC power cord to the PS500 AC.

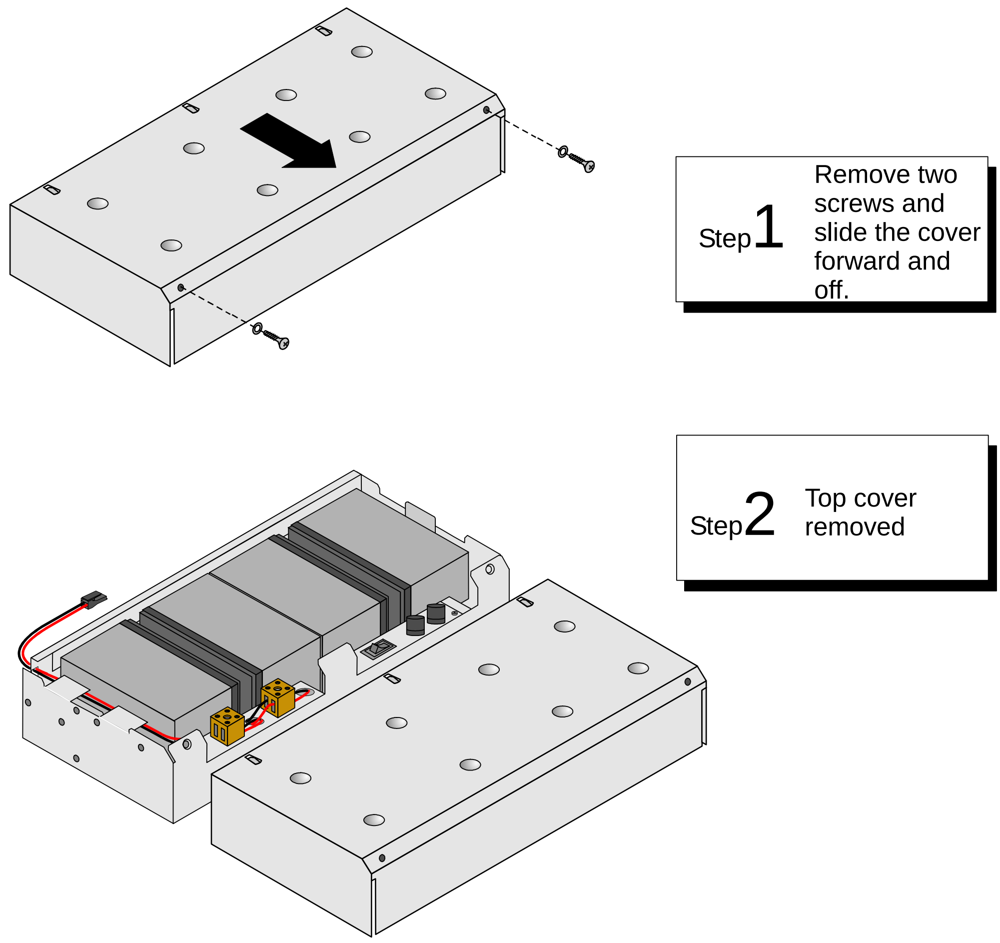
Measuring the Battery Pack Voltage under Zero Load

1. Turn the battery pack power switch OFF.
2. Disconnect the PABX/PS wires from the PS 500 AC and the LTU/CSU.
3. Turn the battery pack power switch ON.
4. Measure the output voltage. The battery pack voltage at zero load must be at least 48VDC. If the voltage measured is less than 48VDC, replace the batteries. See *page 7-53, Maintenance*.
5. Turn the battery pack power switch OFF.
6. Reconnect the PABX/PS wires to the PS500 AC and to the LTU/CSU.
7. Turn the battery pack power switch ON.

Removing the Battery Pack Cover

1. Unfasten and remove the two screws that secure the battery pack cover to the battery pack.
2. Slide the cover off of the battery pack and remove it.

Figure 7-16 ***Battery Pack Cover Removal***



BATTipx Battery Pack for AC Powered System

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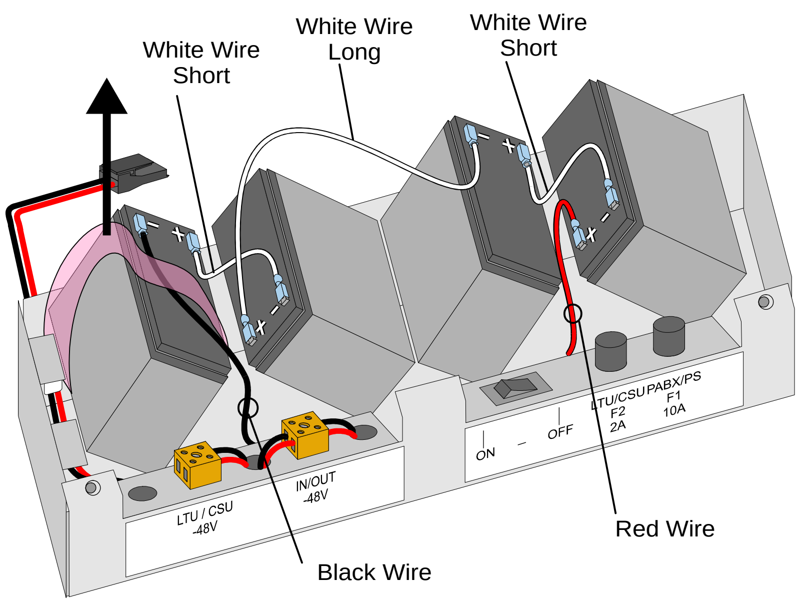
Replacing the Batteries

NOTE:

Do not replace one battery at a time. Whenever a battery needs to be replaced, replace all of the other batteries as well.

1. Remove the battery pack cover.
2. Verify that the battery pack power switch is turned OFF (pressed down to the right).
3. Lift the battery out of the battery pack with the supplied strap.
4. Disconnect the wires from the pins on the battery that is to be replaced. See *Figure 7-17*.
5. Replace the battery with a new battery that meets the specifications found on *page 7-58, Specifications*.
6. Reconnect the wires to the replaced battery. See *Figure 7-17*.

Figure 7-17 ***Battery Pack Internal Wiring***



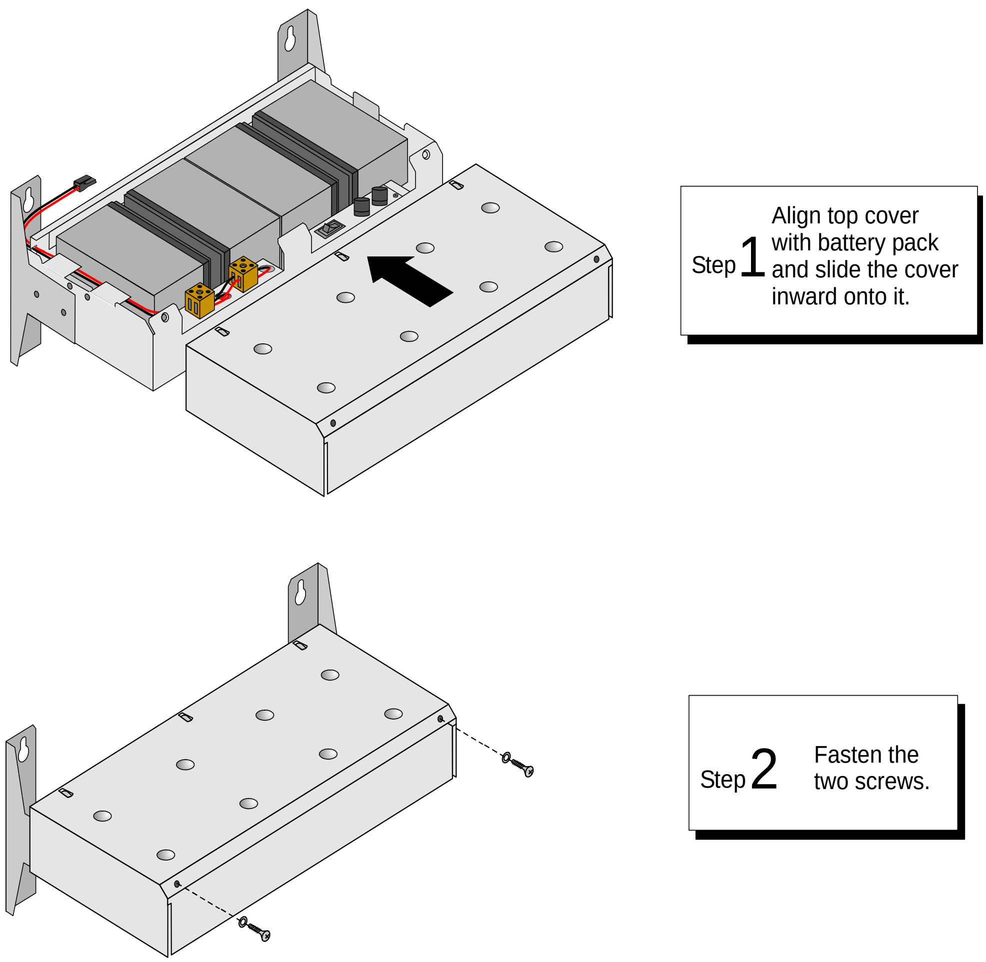
Replacing a fuse

1. Remove the battery pack cover.
2. Turn OFF the power switch.
3. Replace the fuse with fuse that has the same rating.
4. Turn ON the battery pack power switch.
5. Replace the battery pack cover.

Closing the Battery Pack Cover

1. Turn ON the BATTipx power switch.
2. Insert the three flaps on the edge of the top panel of the decorative panel into the mating slots on the battery pack frame. See *Figure 7-10 on page 7-37*.
3. Push the cover inwards to engage the flaps into the slots.
4. Fasten the two screws into the front panel of the decorative cover until it is clamped snugly onto the battery pack.

Figure 7-18 ***Assembling the Battery Pack Cover***



11 Specifications

Battery:

Four UL approved batteries with the following specifications:

Type	Lead-Acid
Nominal Voltage	4 X 12V = 48V
Nominal Capacity	7Ah
Dimensions	2.5"(6.3 cm) X 3.6"(9.3 cm) X 5.9"(15 cm)
Weight	6.17lb (2.64 Kg)

Battery pack unit (with batteries)

Dimensions	17"(43) X 7.6"(19.4 cm) X 2.8"(7cm)
Weight	31lb (14Kg)

LTU/CSU Power Source:................. -48VDC at 200mA max.

Fuses:...

F1 - PABX/PS	10A/250V S.B.
F2 - LTU/CSU	2A/250V S.B.

Controls: .... ON/OFF switch

External Connection: ....

PABX/PS	Cable with connector 6.6ft (2m) long
LTU/CSU	Terminal block

Chapter 8

Common Control Cards

Coral

8.1 Control Cards

1 General Description

The common control portion of the Coral IPx 500 system provides the control mechanism for establishing audio and data connections or calls between peripheral I/O ports in the system via the PCM bus. Common control is divided into the following functions:

- Main processor
- Generic feature memory
- Database memory
- IMC8 control
- Peripheral bus interface or group controller

The Coral IPx 500 common control card set consists of an MCP-IPx main processor and database memory, one IMC8 generic feature memory baby card, an optional DBX database memory expansion and an optional CLA card.

The MCP-IPx card resides in a designated card slot in the card cage; the CLA and DBX cards are smaller baby cards that are mounted on the MCP-IPx card. The IMC8 card resides in a special slot in front of the MCP-IPx card. The card slot designation appears below each card slot on the front of the card cage. Refer to *Chapter 6 - Cage Description*, for more information.

The MCP-IPx card is the "core" of the Coral IPx 500 common control. The card contains the main processor circuitry, memory management circuitry, local bus interface and database memory (protected against power loss by a long-life lithium standby battery). It also provides a real-time clock and hosts the system authorization unit (SAU). Additionally, the MCP-IPx acts as a mother card to one CLA card or up to two DBX cards. The main processor receives status messages from ports in the system and determines the appropriate response based on programming entries contained in the system database.

The IMC8 card provides memory space for the generic feature software of the Coral IPx 500 system. The generic feature software determines the operation of telephony functions of the system. The IMC8 uses flash memory technology to provide high-reliability, non-volatile storage for the generic software and system database, combined with the capability of field software upgrade.

The DBX is an optional card that expands the database memory space which stores the system's configuration. The DBX is generally not required in Coral IPx 500 systems. It is likely to be required in special applications. or when the CoraLINK with CLA card is implemented. See *page 8-31, When is a DBX card required?*.

The optional CLA (CoraLINK Adapter) card is used for FlexCT CTI (Computer Telephone Interface) applications. The CLA card incorporates the application processor and Ethernet 10Base-T interface circuitry for the CoraLINK computer-telephony integration (CTI) link. CoraLINK uses TCP/IP protocol and complies with ECMA 179 and 180 standards. CoraLINK also supports the Novell TSAPI protocol, the Intel Dialogic CT-connect, and IBM Callpath. The CLA attaches to an expansion connector on the MCP-IPx card in piggyback fashion. The 10Base-T Ethernet interface appears at a RJ-45 connector on the front panel of the CLA card. Refer to the following sections for detailed information on each common control card.

2 Card Handling Procedures

CAUTION!

All circuit cards, including common control cards, backplane cards, and peripheral cards, contain static-sensitive circuitry and may be damaged or destroyed by electrostatic discharge (ESD). Always wear the static dissipating wrist strap connected to the cage while handling circuit cards. See *Figure 2-35 on page 2-55**. Hold circuit cards by their edges and avoid touching contact surfaces. Handle with care and do not drop.*

***Never** place a common control card in a slot other than the one designated for that card.*

***Never** insert a common control card with power applied. Irreparable damage may occur if a common control card is placed in an incorrect slot with power applied.*

The system cabinet is equipped with an ESD strap at the top left, above the top card cage. This wrist strap should be worn while inserting, removing, or handling *any* card in the system. Each card is shipped inside an anti-static plastic bag. Cards should be kept in this bag whenever handling is not required.

To insert a circuit card into a card slot, grasp the card with both hands, fingers on the edge of the card near the front panel, and thumbs against the extractor levers at the top and bottom of the front panel. Verify that the card is oriented correctly (red diagnostic indicator on front panel toward top of card). Align the edges of the circuit card with the card edge guides in the card cage or shelf, and gently slide the card straight into the card slot. A slight resistance will be felt as the multi-pin connectors on the circuit card meet mating connectors on the backplane and engage. Push against the extractor levers until the front panel of the card is flush with the front frame of the card cage. Do not force the circuit card into the slot. If more than slight resistance is encountered, remove the circuit card and examine the connectors for bent pins or interfering debris. See *page 2-56, Common Control Card Installation (Main Cage)*.

NOTES:

8.2 MCP-IPx Card

Main Processor Unit

1 General Information

This section describes the features and functions of the MCP-IPx controller card.

CAUTION!

Inserting or removing the MCP-IPx control card when power is applied could damage the card. Before inserting or removing the MCP-IPx control card, verify that the PS500 unit power toggle switch is turned OFF.

The MCP-IPx card is the control processor card for Coral IPx 500 systems. The MCP-IPx card provides RS-232E programming and maintenance interface, Software Authorization Unit (SAU) and IMC8 interface. See *Figure 8-1*. The MCP-IPx contains a multi-pin connector and support circuitry for the addition of CLA and DBX baby cards. It integrates the main processor, memory management circuitry, local bus interface, real-time clock, generic feature software memory, and database memory.

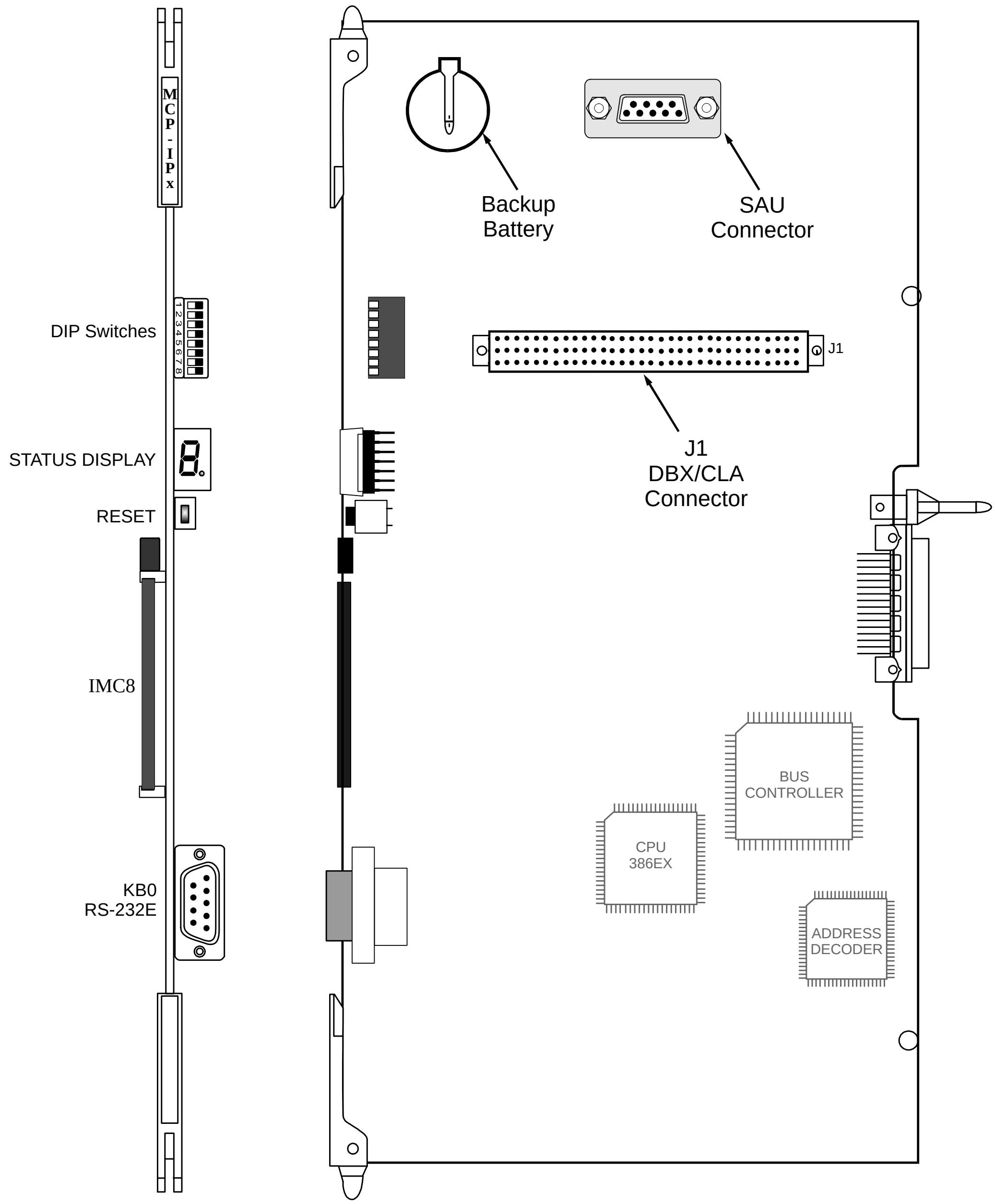
The MCP-IPx supervises overall system operation by executing system-wide processes. These processes include port connection management, feature management, generic feature software installation, feature authorization, configuration database management, database backup and restoration, program interface input/output and diagnostic testing.

Port Management

In order to manage port connections and feature operation, the main processor communicates through the MSBipx (backplane) card via the HDLC buses., Communication is enabled with the local card processors on every peripheral card both in the main and in the expansion cabinets.

The main processor receives status messages from the card processors regarding port activity. It determines the appropriate response based on the programming entries contained in the system database. The main processor then instructs the appropriate card processor what action to take with each port.

Figure 8-1 ***MCP-IPx Card***



Memory Management

All system memory resides on the MCP-IPx card. Random Access Memory (RAM) is located directly on the MCP-IPx card. The MCP-IPx also acts as a mother card to baby CLA and DBX memory cards. The DBX contains 1MB of Static Random Access Memory (SRAM) expansion memory.

Flash memory, located on the IMC8 card, stores the generic feature software which determines the operation of the system. RAM, both on the MCP-IPx and on the DBX expansion cards, stores the system configuration database, and is used as a run memory for general purposes.

Database memory and real-time clock functions in the Coral system are protected against power loss by long-life lithium backup batteries. A battery is installed both on the MCP-IPx and on each DBX card. A monitoring circuit on each card constantly measures the voltage level of its battery. It signals the main processor when the remaining energy stored in any battery approaches the point that it can no longer provide sufficient power to maintain the memory circuitry.

The generic feature software and feature authorization information is installed and updated into the IMC8 using FMprog PC-utility. Similarly, the system database is regularly backed up to, and may be transferred and restored from, an IMC8 card kept in the IMC8 drive.

The Program Interface Facility

The PI (Program Interface) and CoralVIEW CVA / CVD provides a text-based facility for reviewing and changing the system configuration and database. It enables the performance and monitor of diagnostic routines. The PI can be accessed either via a simple data terminal or by a personal computer.

The PI and CoralVIEW CVA / CVD / CVT can be accessed via an RS-232E data terminal port (KB0) provided on the MCP-IPx front panel (see *Figure 8-3*), or via an additional RS-232E ports (KB1, KB2, KB3) provided at the top left of the IPx 500M main cage via the Auxiliary connector. See *Chapter 9 - Auxiliary Connector on page 9-11*.

2 Software Authorization Management

The MCP-IPx supervises the feature authorization using the SAU (Software Authorization Unit) lock device. The SAU is a small, encapsulated device, which is plugged into a component side connector on the MCP-IPx. *Figure 8-2* illustrates four views of the SAU.

The SAU enables a set of permissions and feature authorizations associated with its unique identification number. The Coral software detects and verifies the permission settings of the SAU on the Control card (MCP-IPx) enabling the system to function properly.

The SAU provides the system identification number (i.e. a serial number). Each system identification number is unique. In addition, the SAU stores a market identification number, which indicates the general geographical area in which the Coral system is installed. The system identification number is used to identify a particular Coral system installation site.

During software installation, the SAU serial number is compared with the features authorization data, to verify the authorized use of enhanced Coral system features. During regular system operation, the SAU is checked to ensure it remains attached to the MCP-IPx card. However, if necessary, the SAU can be removed for short periods (a maximum of two weeks) without interrupting system operation. If the SAU is removed for more than two weeks, the system ceases to process calls.

CAUTION!

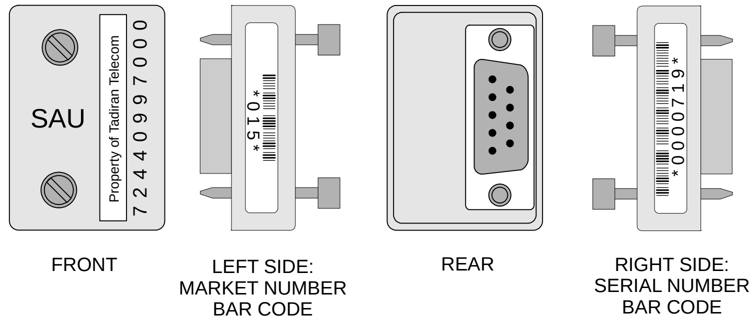
The Coral system automatically ceases call processing after 14 days for any of the following reasons:

- *The SAU serial number does not match the corresponding IMC8 SAU serial number.*
- *The Coral generic version contained in the IMC8 is higher than is authorized by the SAU.*
- *An SAU device is removed from the MCP-IPx front panel.*

Relevant system messages appear on the PI, warning that the system will not operate without the proper SAU.

Replacing an MCP-IPx card necessitates removing the SAU from the old card and installing it on the replaced MCP-IPx card.

Figure 8-2 ***Software Authorization Unit (SAU) Detail***



When starting up the Coral system, ensure that there are no SAU fault messages during startup or SAU Alarms (PI Branch: Root, 1, 1, 15-Controls) due to any one of the following three reasons:

- A missing SAU device
- Inappropriate SAU software for this type of system
- Mismatched SAU serial numbers on the IMC8 and SAU device

SAU Unique Serial Numbers

Each SAU is assigned a unique, factory set, system identification serial number, which enables the feature authorizations and Coral generic software version for the Coral system. *Figure 8-2* illustrates the four views of the SAU, including sample ID numbers. The left side includes the country code, while the right side includes the unique serial number. The last digit of the serial number is a verification digit. Any leading zeros, as well as the verification digit do not appear in the SAU number reported in the PI root menu.

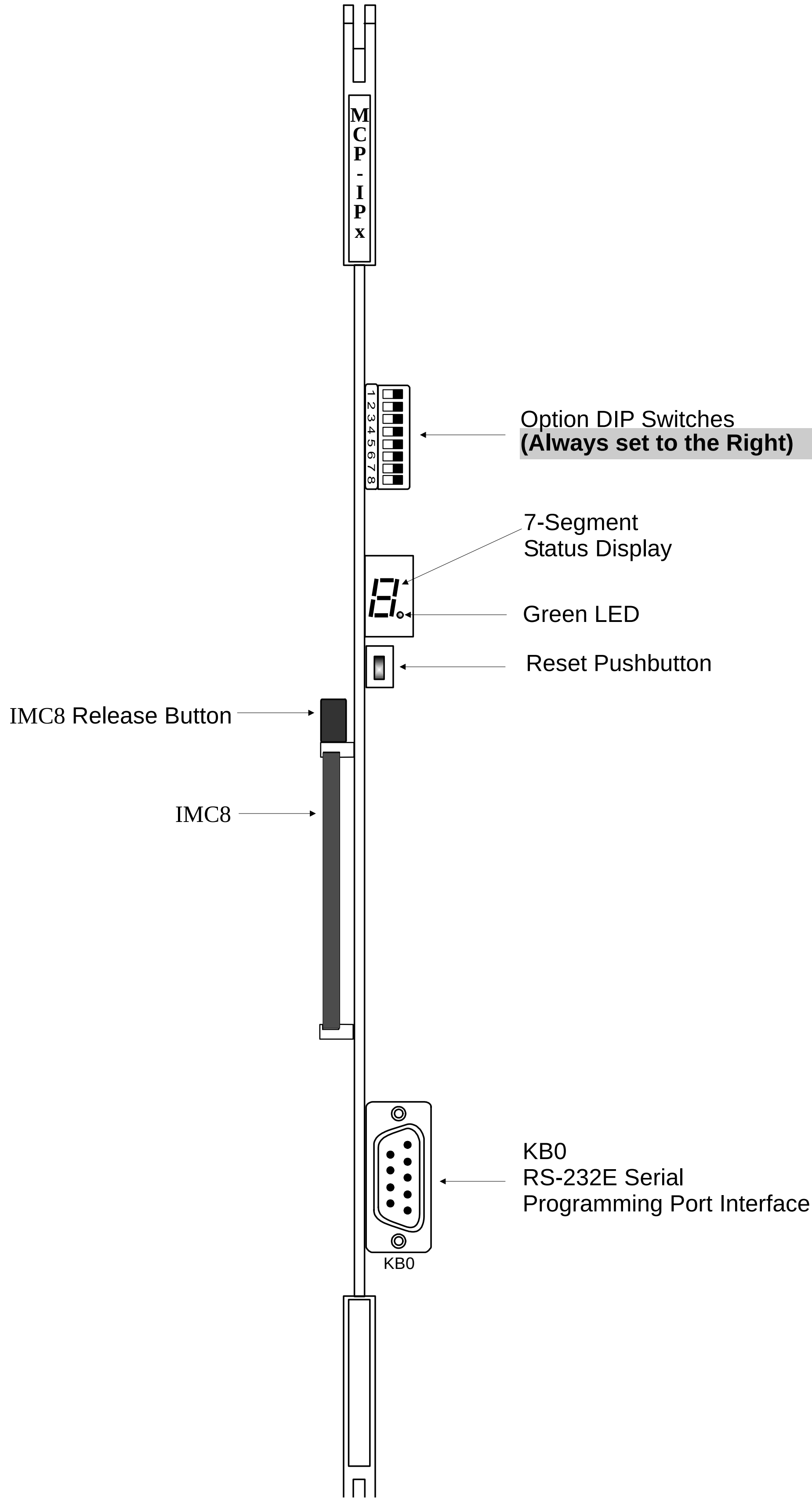
3 Front Panel Features

Figure 8-3 illustrates the front panel of the MCP-IPx card. The front panel contains various elements. The following table is a listing of the various functions and what they are for.

Table 8-1 ***MCP-IPx Control Card Functions***

Function	*What is it for?*
Option DIP switches	All switch should be set to OFF (right) so that the system will respond after a power failure.
Status Display	7-segment display, used for alarms and diagnostic functions. A full list of possible displays is provided later on in this chapter. See page 8-20, MCP-IPx Status Display Codes.
Green LED	Lit on to indicate normal system operation.
RST - CPU Reset Push Button	Forces the Coral system to restart. Used to partially initialize the system (cause a *warm restart* procedure), simulating the procedure that occurs automatically when power is applied to the system. Forcing initialization by pressing RST immediately disconnects all calls in progress but does not default the database. However, resetting the Main Processor while the database is being programmed, may corrupt the database. If this happens, the database must be restored. **CAUTION!** *Pressing the RST button will cause a partial initialization.* *All calls in progress will be terminated.*
IMC8 Release Button	Used to release the IMC8 card.
IMC8 Flash Memory card	Used to save and restore the database as well as to store the Generic feature software.
KB0	Data Terminal Port, DTE Interface, used to connect an RS232-E serial cable, providing access to the PI or CoralVIEW CVA/CVD/CVT. Default configuration: 9600 bps, No parity, 8 data bits, 1 stop bit, VT-100. See page 8-13, KB0 RS-232E Programming Port.

Figure 8-3 ***MCP-IPx Front Panel***



4 IMC8 Memory Card

The IMC8 is an integrated memory card with a 8 MB flash memory capacity. It contains the generic software of the Coral and is used to store the system database. See *page 8-23, IMC8 Card* for details.

The IMC8 is used by the main control during run-time. The memory management on the MCP-IPx allows part of the code to use portions of the IMC8 memory for run-time. Therefore, the IMC8 card must not be removed from its drive during system operation. If removed, the system will crash.

CAUTION!

Do not Remove the IMC8 card form its drive during system operation. Removing the IMC8 while the system is ON AIR will cause the system to shut down.

The MCP-IPx numeric status display indicates various operating and error states of the Coral system, and can provide valuable information to assist in the maintenance of the system. A "P" appears during software installation or backup, to indicate data programming to the flash memory of the IMC8 card.

CAUTION!

*Do not remove the IMC8 card from the MCP-IPx when **"P"** is illuminated. Before each installation or removal of an IMC8 card from the Coral cabinet, press the RST button on the MCP-IPx card.*

5 KB0 RS-232E Programming Port

The serial interface of the KB0 programming port on the MCP-IPx conforms to the EIA RS-232E specification. It is wired as a Data Terminal Equipment (DTE) device using a popular 9-pin, male, D type connector. The interface allows connection of a common, asynchronous, ASCII data terminal, personal computer or external modem for programming the various features of the Coral IPx 500 system and monitoring diagnostic information.

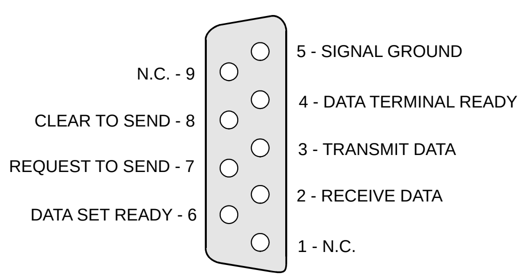
Figure 8-4 illustrates the pin assignments of the DB-9S.

Table 8-2 lists the pin functions. See *Chapter 2 - Hardware Installation Procedure* for detailed connection information and terminal setup.

Table 8-2 ***KB0 RS-232E Interface Pin Functions***

Pin Designation	*Pin #*	*Function*
Receive Data	2	Input to MCP-IPx
Transmit Data	3	Output from MCP-IPx
Data Terminal Ready	4	Output from MCP-IPx
Signal Ground	5	Signal return
Data Set Ready	6	Input to MCP-IPx
Request to Send	7	Output from MCP-IPx
Clear to Send	8	Input to MCP-IPx

Figure 8-4 ***KB0 Pin Assignment***



KB0 Setup

The baud rate is set during first initialization at 9600 bps, No parity, 8 data bits, 1 stop bit, VT-100.

The baud rate can be set from 300 bps to 19,200 bps.

Consult the *Program Interface Reference Manual* (Chapter-17 Terminal Setup - Route: TERM,0) for instructions on the database programming required.

6 DBX Memory Card Installation

The DBX card is an expansion card of memory. It adds an additional 1 MB SRAM to the Coral main control. The card is equipped with an extension connector on its top side allowing for another DBX or CLA card to be connected on top of it.

The MCP-IPx supports up to two DBX cards.

The DBX cards use a lithium battery to operate. When the battery voltage is low, the diagnostic software displays a warning message, stating that the battery of either the upper or the lower memory card needs to be replaced. The DBX connected directly to the MCP-IPx is the "lower" memory card, while the DBX connected on top of the first one is referred to as the "upper" memory card.

CAUTION!

Once the system database has been installed, the position of DBX cards ("upper" and/or "lower") on the MCP-IPx card must not be changed.
Doing so will cause the Coral system to malfunction.

Before installing the MCP-IPx card, verify that the battery insulator between the top contact of the battery and the battery holder has been removed on both the MCP-IPx battery and the battery of any DBX baby card installed on the MCP-IPx card. *Figure 8-5* identifies the location of the battery holder and illustrates the insulator removal. See *page 8-14, DBX Memory Card Installation* for detailed information about the DBX card.

MCP-IPx Card Main Processor Unit

8

7 CLA Card Installation

The CLA card may be installed using the memory card interface connector J1 on the MCP-IPx card. The CLA is installed as the “upper” card at the memory extension connector on the first DBX. See *page 8-37, CLA Card* for details.

8 MCP-IPx Card Installation

The MCP-IPx card is installed in a reserved slot.

CAUTION!

Do not insert or remove the MCP-IPx card when power is on.

All switches should be set to OFF (right) so that the system will respond after a power failure. See *page 8-10, Front Panel Features*.

1. Remove power from the Coral IPx 500 system by positioning the PS500 power supply power toggle switch to the OFF position (turned downwards).
2. Carefully remove the protective battery insulator from under the top contact of the lithium battery holder on the MCP-IPx card. See *Figure 8-5 on page 8-19*.
3. Verify that all slide switches (on the MCP-IPx front panel) are set to OFF (to the right).
4. If a DBX card(s) is / are supplied with the system, carefully remove the protective battery insulator from under the top contact of the lithium battery holder on the DBX card
5. Insert the MCP-IPx fully into its card slot.

9 Removal of the CLA and/or DBX from the MCP-IPx

Locate a desk or table capable of supporting 50 pounds (23kg). If the top surface might be damaged by sharp objects, place a protective sheet of cardboard or similar material over the top surface. Next, place an anti-static sheet (the card's plastic shipping bag will suffice) over the desk or tabletop. Now place the MCP-IPx on the anti-static material.

CLA Removal

The CoraLINK hardware (when required) consists of a CLA card. If used, the CLA card should be located at MCP-IPx memory connector J1. Three (3) nylon machine screws secure the CLA to standoff spacers on the MCP-IPx.

1. Remove these three screws and set them aside.
2. Place the MCP-IPx on a flat surface with the component side facing upwards.
3. Place thumbs on the MCP-IPx card, on either side of the CLA near the MCP-IPx component side. Use your fingers to lift the edge of the CLA card on both sides, gently disengaging the multi-pin connector on the CLA from the MCP-IPx connector J1.

DBX Removal

Most Coral systems do not require a DBX card. If equipped, one (1) nylon machine screw secure the DBX to standoff spacers on the MCP-IPx. Using the same procedure described above, remove the DBX from the MCP-IPx connector.

10 Lithium Battery Condition Testing

A new lithium battery can maintain power to the MCP-IPx memory circuitry and real-time clock for approximately 90 days. The battery is *not* recharged by the system power. Thus, if the battery has powered the memory and real-time clock for an extended period and near depletion is suspected, the contents of the memory must be backed up, and the battery must be replaced. The internal diagnostic procedure will cause a "b" to appear on the 7 segment display of the MCP-IPx front panel, indicating that the battery should be replaced.

The battery voltage, tested under load, can be used to determine its state of charge. Voltage measured across an unused battery connected to the memory circuitry should fall between 3.30 and 3.35 volts. If the voltage measured across a battery is less than 2.50 volts, the battery must be replaced.

For first time use, release the protective battery insulator. See *Figure 8-5*.

Replacing the Lithium Battery

In the following procedure, do not apply too much pressure to the battery clasp as this could cause it to snap.

1. Carefully raise the battery clasp.

CAUTION!

Do not use any metal tool to release or insert the battery. Doing so could result in a short circuit and damage the battery.

2. Insert the new battery with the + (positive) symbol appearing on top.

WARNING!

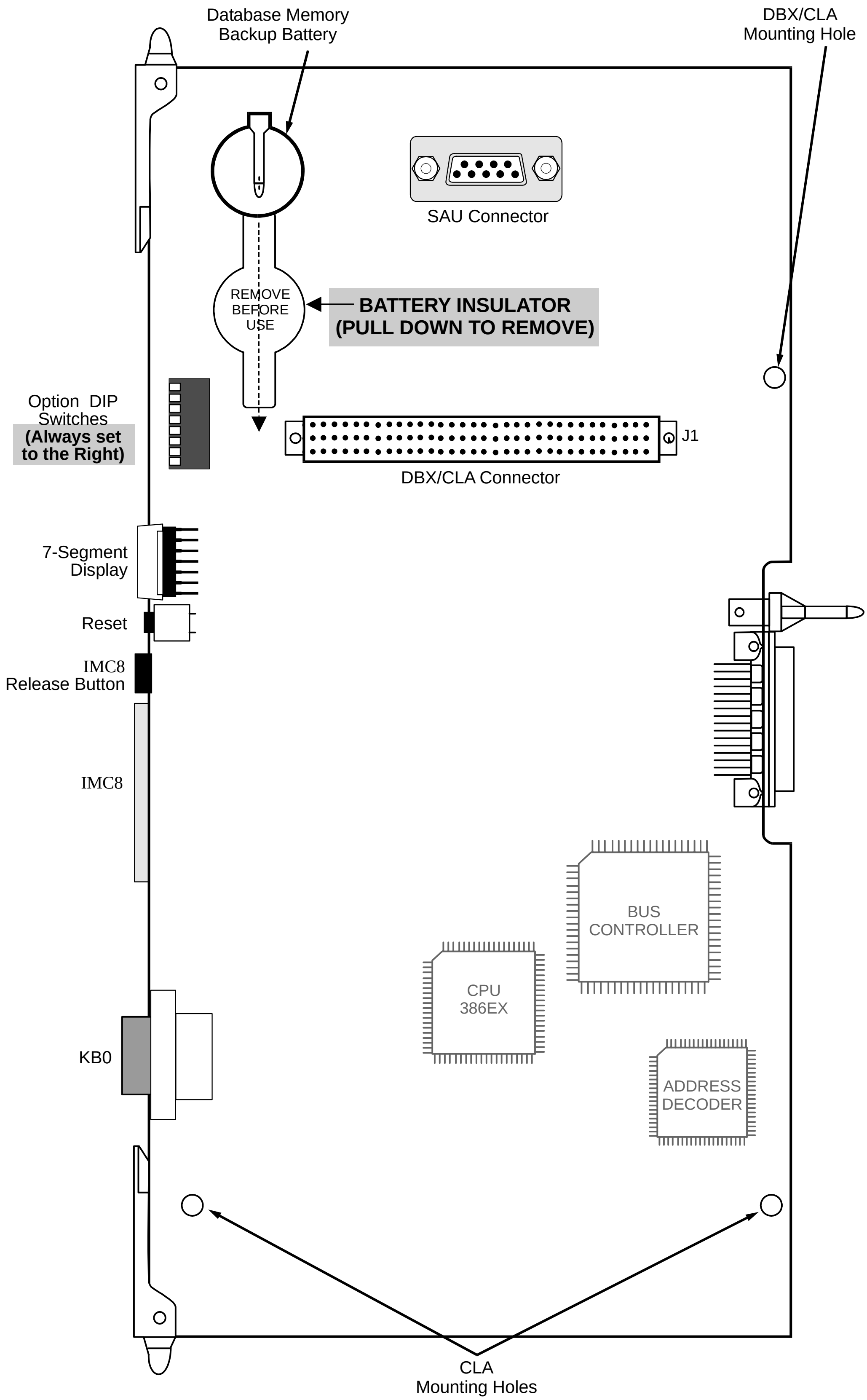
Explosion and Environmental Hazards.

There is a danger of explosion if the battery is replaced incorrectly.

Replace the battery only with the same or equivalent type recommended by the manufacturer.

Dispose of used batteries according to requirements specified by the battery manufacturer and/or local regulatory agencies.

Figure 8-5 ***MCP-IPx Memory Interface Card Layout***



11 MCP-IPx Status Display Codes

The MCP-IPx numeric status display indicates various operating and error states of the Coral IPx 500 system, and can provide valuable information to assist in the maintenance of the system. *Table 8-3* lists the various status indications and their corresponding meaning.

A “.” (dot) appears during normal system operation.

A "0" appears on the status display whenever the system is off-line for maintenance testing, or to install or update the generic software.

A "b" in the status display indicates that a backup battery on the MCP-IPx or on a DBX card no longer has sufficient energy to maintain the memory circuitry if system power is lost. Each time a programming session is started from the PI, any faulty battery is identified. The system database should be saved as soon as possible to an IMC8 unit, and the faulty battery must be replaced as soon as the system can be shut down, to ensure continued system reliability.

An "E" indicates that the Main Processor has been interrupted to prevent database corruption during a power fluctuation. This condition should clear itself momentarily.

An “L” indicates that the SAU cannot be detected at the SAU port on the top right side of the MCP-IPx. Usually, this indicates that the device is no longer present or is not securely fastened to the MCP-IPx.

A “P” appears during software installation or backup.

CAUTION!

Do not remove the IMC8 card from the MCP-IPx when “P” is illuminated. Doing so might damage the IMC8 data.

All other error status indications generally indicate a more serious problem, and are likely to be accompanied by considerable system malfunction. Should an error indication appear not to affect system operation, save the database to DB0.DEF immediately. For further details, see *Chapter 4 - Software Installation Procedure*.

When the system can be restarted without disrupting service, press the RST push button on the front panel of the MCP-IPx.

CAUTION!

Pressing RST interrupts all calls in progress and causes the system to initialize, possibly discarding the database information stored in the database memory and reloading the database from IMC8.

Should other symptoms of system malfunction also be present with an error indication, the error indications will assist maintenance personnel in determining the nature of the fault.

Table 8-3 ***MCP-IPx Status Display Codes***

Status Display	*System Status*
.	Normal System Operation
0	Off-Line Monitor/Diagnostics Mode
1,2,3,4,5,6	Appear Briefly During Initialization
b	Lithium Backup Battery (MCP-IPx or DBX) Low
C	Flash Memory (IMC8) Checksum Error
E	Map RAM, Coding PROM, or Memory Configuration Error
F	AC Fail Active (System halted due to power fluctuation)
L	The Software Authorization Unit (SAU) cannot be detected at the SAU port on the top right side of the MCP-IPx. Generally, this indicates that the device is no longer present or is not securely fastened to the MCP-IPx **CAUTION!** If the SAU is removed from the MCP-IPx, the Coral system automatically ceases call processing after 14 days. Relevant messages appear on the PI, warning that the system will not operate without the proper SAU. See *page 8-8, Software Authorization Management* for details.
P	Programming the flash memory during software installation and backup

12 Specifications - MCP-IPx

Microprocessor: .... Intel™ 80386EX

CPU Clock Rate:.................... 32 MHz

Memory Addressing:............ 16 MB

Data Bus Structure:............... 16 Bit; Shared with DBX, CLA, IMC8 and MSBipx

RAM Storage Capacity: .... 2M Bytes with battery backup (90 days typically)

Memory Device: .... 512kb 4bit SRAM

RAM Backup Battery: LF1/2W, 2430, 2430B

Voltage .... 3.0 VDC Nom.

Capacity............................ 250 mA/H

Dimensions:

Diameter .... 0.965 in. (24.5 mm)

Width.......................... 0.118 in. (3 mm)

NEDA Equivalent........... 5011L

Baby Cards: .... Up to two (one DBX and one CLA or two DBX)

KB0: RS-232E, DB-9S

Baud rate .... 300 bps to 19,200 bps

Parity................................. None, Odd, Even

Number of bits 7, 8

Stop bit.............................. 1

Default .... 9600 bps, No parity, 8 data bits, 1 stop bit, VT-100

MCP-IPx2

Specifications:.................................. TBD

8.3 IMC8 Card

Flash-Erasable Software Memory Unit

1 General Information

The IMC8 Flash Memory card is a removable component of the Coral IPx 500 Common Control section. Installed on the MCP-IPx, it incorporates 8 MB of Erasable, Programmable, Read-Only Memory (flash EPROM), used to store the generic feature software version of the Coral IPx 500 system. The generic feature software determines the feature operation of the Coral IPx 500 system. In addition, the IMC8 is used to store the database backup as well as the Boot Code. *Figure 8-6* illustrates the IMC8 flash memory card.

Figure 8-6 **IMC8 Flash Memory Card - Left side**

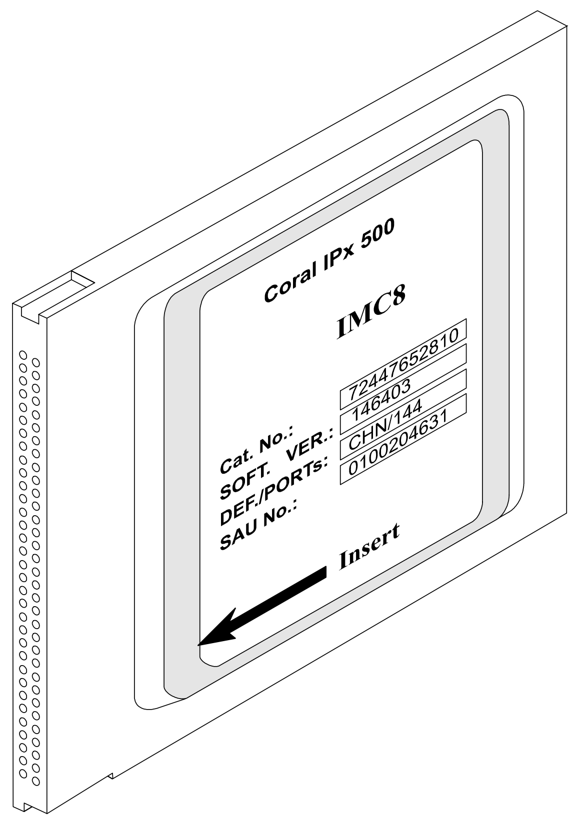
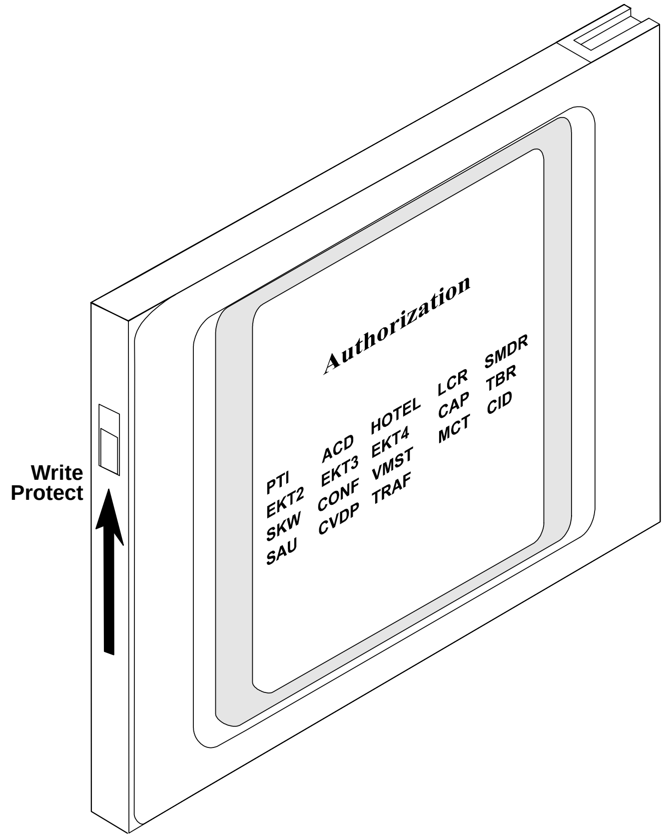


Figure 8-7 **IMC8 Flash Memory Card - Right Side**



IMC8 provides an extremely reliable and non-volatile storage medium, yet allows field software update capability. Once programmed, the flash EPROM memory retains its contents indefinitely without power. However, by using a precisely controlled erase procedure, the entire EPROM contents can be flash cleared and then reprogrammed to update the operating software of the system.

IMC8 FlashLite Linear PC Card provides an easy, simple data storage in a standard PCMCIA Type I form factor. The FlashLite PC Card provides a rugged, removable linear flash data storage solution for mobile, embedded systems and Telecom applications.

The card can also be inserted into a PC slot using any PCMCIA application adapter for loading a new Coral software version.

2 IMC8 Installation

The IMC8 does not occupy a card slot within the Coral IPx 500 system cabinet. It is installed on the PCM-CIA connector on the MCP-IPx card print side. The IMC8 release button enables the removal of the IMC8 card. An arrow on the foil attached to the front side of the IMC8 card indicates the insertion direction. The IMC8 card position on the MCP-IPx card is shown in *Figure 8-8*.

CAUTION!

In order to avoid damage to the IMC8 card, press very gently during the card insertion.

CAUTION!

Before each installation or removal of an IMC8 card, press the RESET button.

NOTE:

Insert the IMC8 *card with its label side facing left, as* shown in *Figure 8-6*.

The IMC8 card contains three types of data:

- Generic Feature Software Version
- Database Backup
- Boot Code

When replacing an IMC8 card with another card that contains upgraded software, the new card will not contain a database. It is therefore important to make a binary backup of the database before removing the card. See the *Database Binary Backup PC Utility Reference Manual* for further details.

Make sure that the IMC8 card being installed is not write-protected. *Figure 8-7* illustrates the IMC8 write-protect knob.

After a new card is installed, verify that the PI starts up properly, and then save the database in accordance with the procedure provided in *page 4-5, System Database Control*.

3 IMC8 Removal

The IMC8 release button enables the removal of the IMC8 card.

CAUTION!

Before each removal of an IMC8 card, press the RESET button.

CAUTION!

Do not remove the IMC8 card from the MCP-IPx when “P” is illuminated on the numeric status display.

When replacing an IMC8 card with another card that contains upgraded software, the new card will not contain a database. It is therefore important to make a binary backup of the database before removing the card. See the *Database Binary Backup PC Utility Reference Manual* for further details.

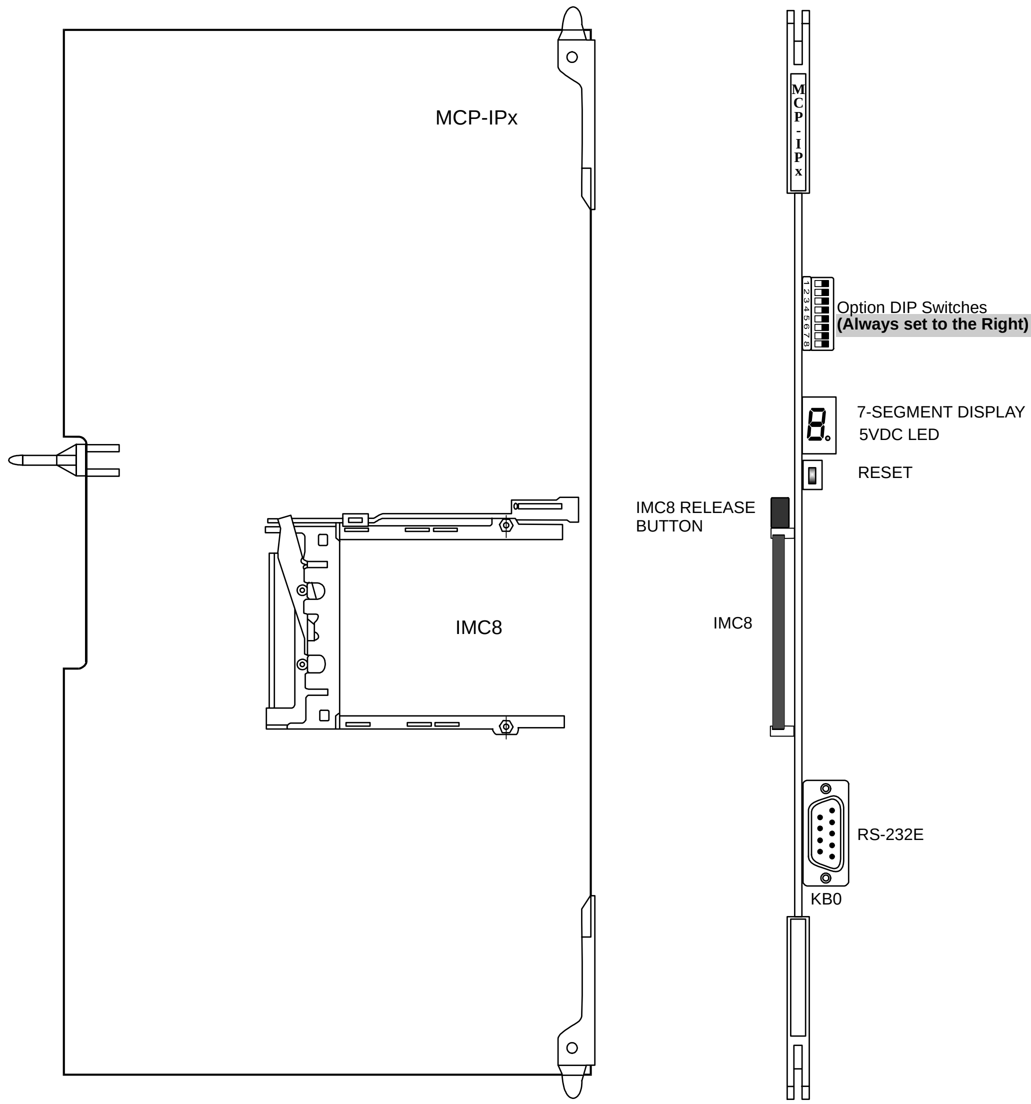
4 Specifications

Storage Capacity: .... 8,388,608 Bytes (8MB)

Memory Configuration: .... 16 bits

PCMCIA: .... Standard Compatible

Figure 8-8 ***IMC8 Card Position on MCP-IPx Card***



NOTES:

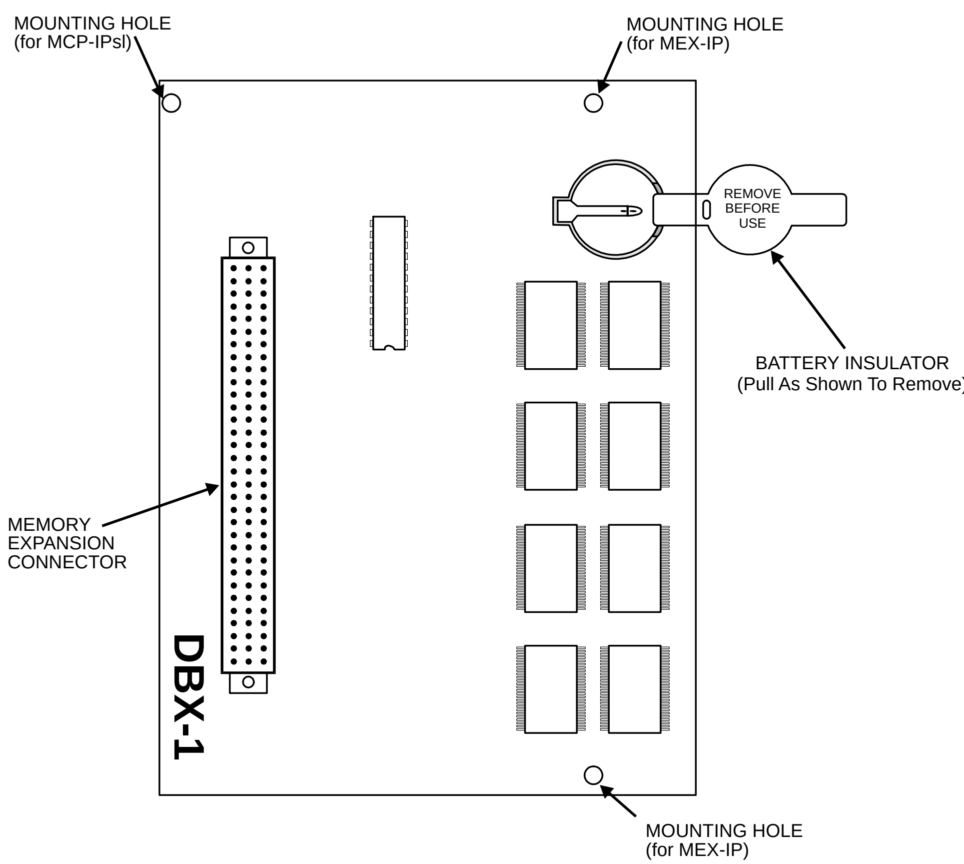
8.4 DBX Card

Database Expansion Memory Unit

1 General Information

The DBX memory expansion card is a component of the Coral IPx 500 Common Control section. The DBX incorporates 1 MB of Static Random Access Memory (SRAM), used to store the configuration database of a Coral IPx 500 system. The DBX is an optional card that expands the database memory space. The configuration database determines the individual characteristics of a particular installation site. *Figure 8-9* illustrates the DBX card layout.

Figure 8-9 **DBX Card Layout**



SRAM devices require a constant source of power to retain their contents. Power to maintain the memory is ordinarily provided by the Coral IPx 500 system in which the DBX is installed. However, the DBX also contains an on-board lithium battery that provides continuous power to the memory circuitry during the absence of system power. A battery monitor circuit signals the Main Processor when the remaining Electrical Power stored in the lithium backup battery has exhausted to a level that can no longer support the memory circuitry.

The DBX does not occupy a card slot within the Coral IPx 500 system cabinet. Rather, it is installed as a baby card onto a memory interface connector on the MCP-IPx Main Processor card. DBX cards are installed on the J1 connector on the MCP-IPx card. *Figure 8-5*.

The DBX card is equipped with an extension connector on the top side that extends the memory interface connector from the MCP-IPx card. The J-1 connector can support two DBX cards by stacking one memory card onto the extension connector of another. When a DBX card is installed in the extension connector of another memory card, the memory card installed on the MCP-IPx is referred to as the "lower” memory card, and the DBX installed on the extension connector is referred to as the "upper" memory card.

The CLA, when installed, is “stacked” on top of the DBX card at J1.

If required, DBX may be installed as either the lower and upper memory card at J1.

Up to two DBX cards, or one DBX card and one CLA card can be installed on the MCP-IPx card.
Most Coral IPx 500 systems do not require a DBX at all. Special applications may require a single DBX, and rarely would any system configuration require more than one DBX card.

CAUTION!

Once the system database has been installed, the position of DBX cards (“upper” and/or “lower”) on the MCP-IPx card must not be changed.
Doing so will cause the Coral system to malfunction.

When is a DBX card required?

A DBX card is required when:

- Coral systems with a CLA card installed for CoraLINK
- The Coral Directory feature is used

Consult the *Program Interface Reference Manual* (Chapter-4 Size Definition, Route: SIZ, CHECK MEMORY?) to display the database memory status.

Card Model	*MCP-IPx Location*	*Comments*
1st DBX	J1 Lower	Must be installed for the CLA
2nd DBX	J1 Upper	Not available when CLA is required
CLA	J1 Upper	

2 DBX Installation

The DBX is secured to the MCP-IPx or to the memory interface extension connector of another DBX card by a threaded nylon spacer.

Preparing for Installation

1. Locate a desk or table top that will support 50 lb (23 kg). If the surface can be damaged by sharp objects, place a protective sheet of cardboard or similar material over the top surface.
2. Place an anti-static sheet (the card's plastic shipping bag will suffice) over the desk or table top.
3. Remove power from the Coral IPx 500 system by turning OFF the power toggle switch on the front panel of the PS500 unit.
4. Carefully remove the MCP-IPx card from its slot and lay it flat, over the anti-static material.

Installing the Lower DBX

1. Remove the nylon screw from the top of the spacer associated with the memory interface connector.
2. Carefully align the multi-pin connector on the bottom side of the DBX card with the MCP-IPx memory interface connector.
3. Gently but firmly press the DBX connector into the MCP-IPx connector until the DBX card rests on the nylon spacer. A slight resistance will be felt as the connectors engage.
4. Insert the nylon screw through the mounting hole of the DBX card and thread the screw into the nylon spacer until snug. Do not over-tighten the nylon screw or it may be damaged.
5. Remove the plastic battery insulator tab from between the battery holder upper contact and the lithium battery. Refer to *Figure 8-9* which illustrates the location of the battery insulator.

Installing “upper” DBX

If the DBX is to be stacked over another DBX card:

6. Remove the screw from the top of the nylon spacer associated with the MCP-IPx memory interface connector. This screw secures the “lower” card.
7. Thread the extension spacer provided with the DBX into the existing spacer on the MCP-IPx.

8. Carefully align the multi-pin connector on the bottom side of the DBX card with the memory interface extension connector.

9. Gently but firmly press the DBX connector into the extension connector until the DBX card rests on the new nylon spacers.

10. Insert the nylon screw through the mounting hole of the “upper” DBX card and thread the screw into the new nylon spacer until snug. Do not over-tighten the nylon screw or it may be damaged.

11. Remove the plastic battery insulator tab from between the battery holder upper contact and the lithium battery. Refer to *Figure 8-9* which illustrates the location of the battery insulator.

3 DBX Removal

1. Repeat steps *Step 1* through *Step 4* on *page 8-32, Preparing for Installation*.
2. Remove the nylon machine screw that secures the DBX card to the standoff spacer on the MCP-IPx card.
3. Place thumbs on the MCP-IPx card, on either side of the DBX near the MCP-IPx front side. Use your fingers to lift the edge of the DBX card on both sides, gently disengaging the multi-pin connector on the DBX from MCP-IPx connector J1.

4 Lithium Battery Condition Testing

A new lithium battery has sufficient energy to maintain power to the DBX memory circuitry for approximately 90 days. The battery is not recharged however, when system power returns. Thus, if the battery has powered the memory for an extended period and low battery capacity is suspected, the contents of the memory should be backed up and the battery replaced.

The battery voltage, tested under load, can be used to determine its state of charge. Voltage measured across a new battery connected to the memory circuitry should fall between 3.30 and 3.35 volts. If the voltage measured across a cylindrical battery is less than 2.50 volts, the battery should be replaced.

Replacing the Lithium Battery

In the following procedure, do not apply too much pressure to the battery holder clip as this could cause the clip to snap.

1. Carefully raise the battery holder clip.
2. Insert the new battery with the + (positive) symbol appearing on top.

WARNING!

Explosion and Environmental Hazards.

There is a danger of explosion if the battery is replaced incorrectly.

Replace the battery only with the same or equivalent type recommended by the manufacturer.

Dispose of used batteries according to requirements specified by the battery manufacturer and/or local regulatory agencies.

5 Specifications - DBX

Storage Capacity: .... 1,048,576 Bytes (1.0MB)

Memory Configuration: ..... 524,288 16 bits

Memory Device: .... 128kb 8 bit SRAM

Battery: LF1/2W, 2430, 2430B

Voltage .... 3.0 VDC Nom.

Capacity .... 250 mA/H

Dimensions

Diameter .... 0.965 in. (24.5 mm)

Width .... 0.118 in. (3 mm)

NEDA Equivalent ... 5011L

NOTES:

8.5 CLA Card
CoraLINK Adapter

1 General Description

The CLA (CoraLINK Adapter) appears in various configurations:

- CLA 386 (10Base-2 via Coax) [this type is discontinued]
- CLA 486 (10Base-T via RJ-45)
- F-CLA 686 (10/100Base-T via RJ-45) with a Compact Flash memory card

The CLA cards are shown in *Figure 8-10 and Figure 8-11*.

The CoraLINK is a Computer-Telephony Integration (CTI) Link for the Coral system that provides an Open Architecture Interface (OAI) to the call processing and management circuitry. CoraLINK enables external computer applications to monitor call activity, and establish, manipulate, and disconnect calls through the Coral system. Coral systems installed with the CLA card enable the system to function as a universal communications switching platform for specialized communications applications. The CoraLINK OAI interface enables connection of the Coral's control circuits to an external Ethernet LAN computer network.

The CoraLINK module is physically connected to the Coral's control system and provides an Ethernet 10/100Base-T via RJ-45 output connector for interfacing with the external computer network.

CoraLINK is implemented by installing a CLA card “piggy-back” as a baby card on the MCP-IPx card. The CLA is installed at the J1 memory expansion connector on the MCP-IPx card. Refer to the *CoraLINK Reference Manual* and *Coral FlexiCom & Coral IPx Product Description* for detailed information on the CLA.

The CLA module is composed of a base card and two mini modules mounted on it.

The CLA module provides the physical connection, through the J-BUS, to the MCP-IPx card, the call processor of the Coral system, and provides the front panel RJ-45 connection to the network. Its front panel also contains a LED indicator, which when lit indicates that the CLA card is active and properly working, a reset push button and an RS-232 COM port.

The CoraLINK software is contained in two different cards: IMC8 and CLA.

The CLA contains the memory required for the card’s software and the shared memory used for information transfer on the bus interface circuit.

Figure 8-10 ***CLA 486 Card***

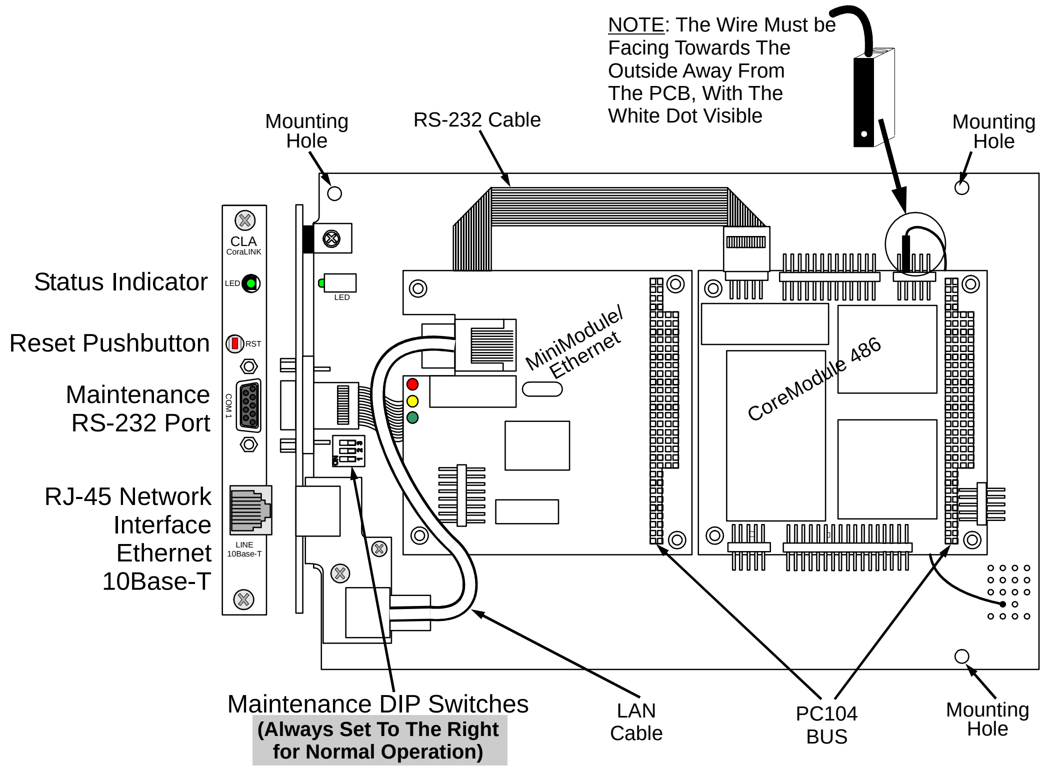
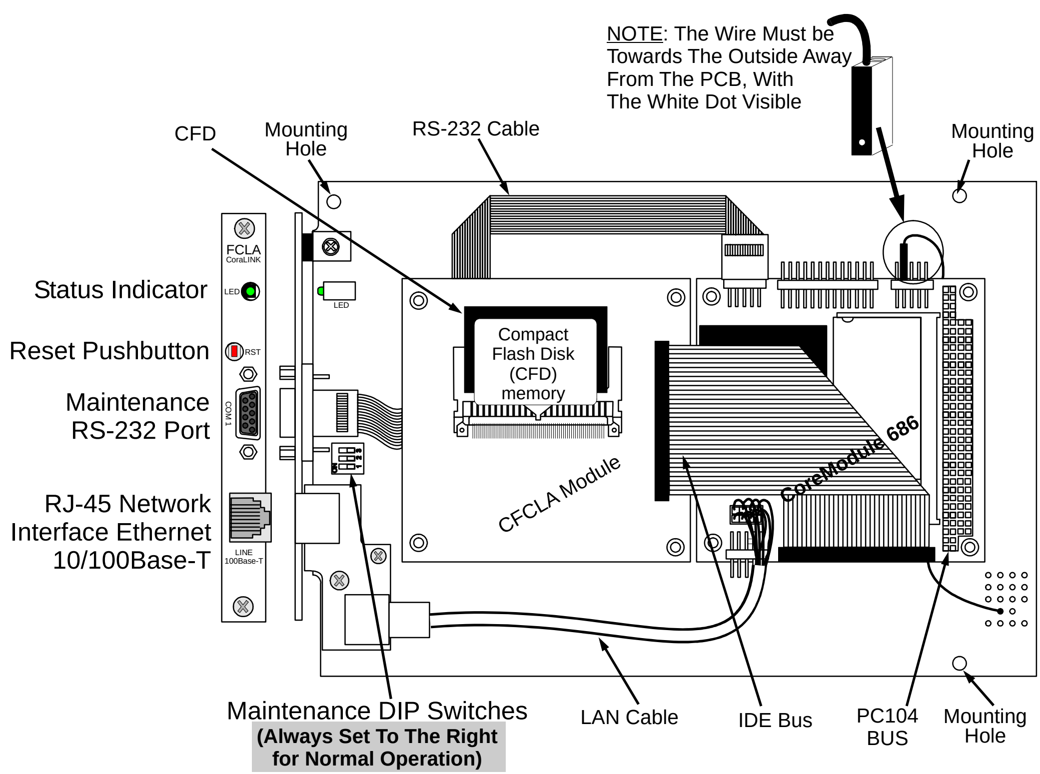


Figure 8-11 ***F-CLA 686 Card***



The DIP switch located on the right side of the CLA can be set to the following modes:

- All the switches "Right" provides the mode for the normal working condition of the CLA card.
- Switches 1 through 3 "Left", provides the debug mode. This mode is used during software installation or for the use of technicians for software debugging.

Card Front Panel

The CLA front panel, depicted in *Figure 8-10 and Figure 8-11*, contains the following items:

- Green **LED** - indicates that the CLA card is active and properly working when lit
- *Reset* button - causes the CLA to drop all CTI calls and resets the card. The card automatically reestablishes a network connection.
- *COM1* Connection - Maintenance port NOT USED
- *LINE* Connection - RJ-45 Ethernet interface

CLA Functional Block Diagram

The functional block diagram is shown in *Figure 8-12 and Figure 8-13*.

The Ethernet Network Interface (LAN Communication Controller) is an adapter for interconnecting the system with the Ethernet LAN external computer network. The CoreModule 32-bit CPU compatible incorporates the elements of a PC compatible computer and provides the processing power needed to control the CoraLINK adapter.

The CLA base card contains a PC104 BUS to interconnect the mini modules. The PC104 BUS is electrically identical to the ISA BUS.

The communication in this configuration is controlled by an intelligent CPU controller. The communications software and part of the application software is run on the card by the local CPU and is not loaded to the exchange call processor (MCP-IPx).

The base card contains a 256 Kbyte static RAM memory, shared between the CLA and the MCP-IPx. The shared memory is accessed from the CLA card via the PC104 BUS and via the J-bus from the MCP-IPx.

In the CLA 486 card, the 2MB flash memory EPROM on the base card contains the card's software, which is burnt into memory during the regular software installation procedure. The flash stores code for the card's program. The flash EPROM is connected to the PC104 BUS.

In the CLA 686 card, the CFD (Compact Flash Disk) memory on the CFCLA mini module contains the CLA card's software and programming code, which is factory loaded. The CFD is connected to the PC104 BUS via the IDE BUS.

The CLA card also contains an NMI/watchdog circuit, providing a reset signal to the CoreModule if it detects a failure in the software cycle.

The communication protocol implemented in the network is TCP/IP. The connection to the computer network is made with a RJ-45 connector type in accordance with the 10/100Base-T protocol and is located on the front panel of the CLA base card.

Figure 8-12 ***CLA 486 Card - Functional Block Diagram***

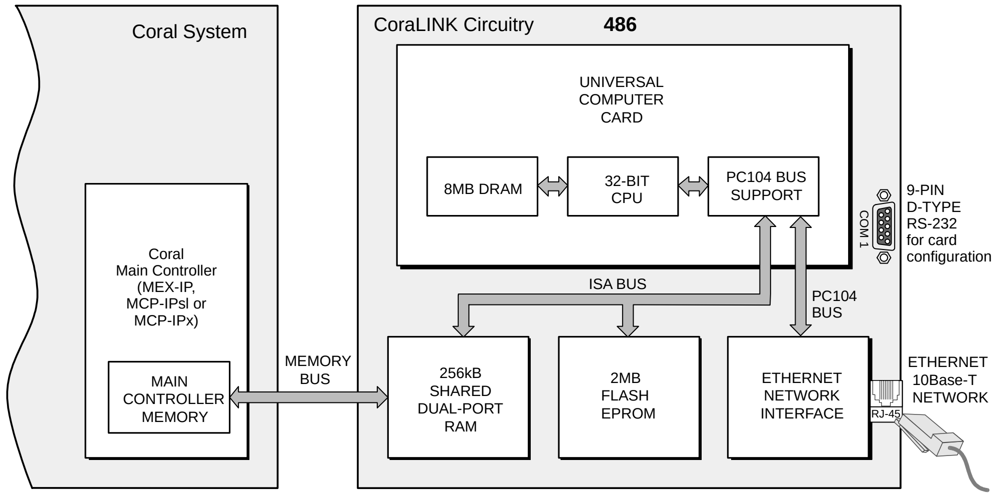
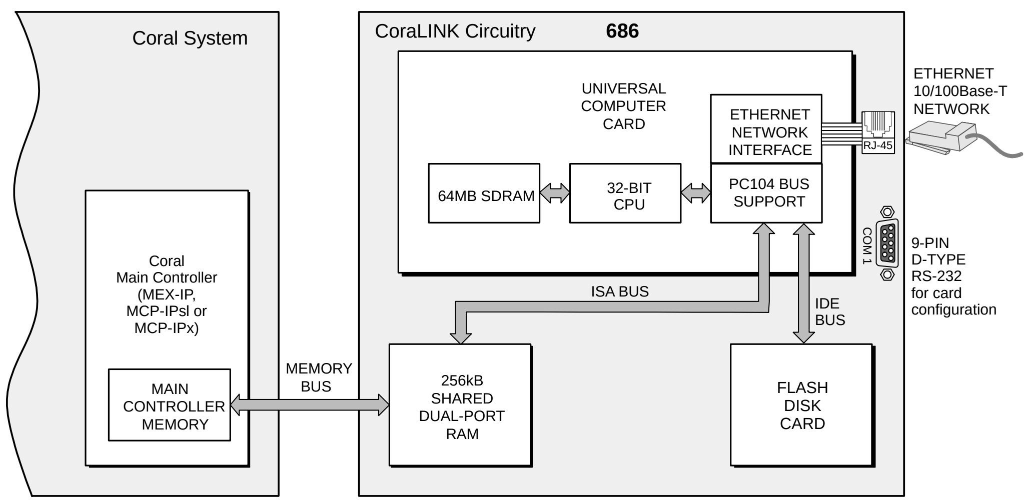


Figure 8-13 ***F-CLA 686 Card - Functional Block Diagram***



2 CLA Installation

This section details the CoraLINK adapter hardware installation procedure.

CoraLINK software installation is detailed in *Chapter 4* of this manual.

NOTE:

The hardware installation procedure necessitates shutting off the Coral IPx 500 input power, which halts all normal system call processing and disconnects all calls in progress. If this procedure is performed on an existing installation that is already processing calls, it should be done at a time that causes the least disruption to call traffic.

The CoraLINK hardware for Coral IPx 500 consists of a CLA card mounted on the MCP-IPx card. Installing the CLA card is a quick and simple process requiring a small flat head screwdriver.

The CLA does not occupy a card slot within the Coral IPx 500 system cage. Rather, it is installed as a baby card onto a memory interface connector on the MCP-IPx card. *Figure 8-5 on page 8-19* displays the location of the interface connector on the MCP-IPx card.

Unlike the DBX memory card, the CLA card is not equipped with an extension connector on the top side. The MCP-IPx J-bus interface connector can support two DBX memory cards or one DBX card and one CLA card, by stacking one card onto the extension connector of another DBX memory card. When a CLA card is installed in the extension connector of another DBX memory card, the DBX memory card installed on the MCP-IPx is referred to as the "lower" card, and the CLA installed on the extension connector is referred to as the "upper" card.

The CLA can be stacked on top of the DBX card or may be installed as the lower card without any DBX card.

The CLA is secured to the MCP-IPx or to the memory interface extension connector of another DBX card by threaded nylon spacers. See *Figure 8-14*.

1. Locate a desk or table top that will support 50 lb (23 kg). If the surface may be damaged by sharp objects, place a protective sheet of cardboard or similar material over the top surface.
2. Place an anti-static sheet (the card's plastic shipping bag will suffice) over the desk or table top.
3. Turn off Coral IPx 500 system power by turning OFF the power toggle switch on the front panel of the PS500 unit.
4. Carefully remove the MCP-IPx card from its slot and place it on a static protective surface.

5. If DBX card is installed, skip to step 7. Install three type A spacers (see *Figure 8-14*) provided with the CLA card into the three mounting holes on the MCP-IPx. See *Figure 8-5*.
6. Remove the three nylon screws threaded into the top of the three standoff spacers if you have not already done so, and save them for further use. Refer to *Figure 8-5* for the location of the memory interface connector on the MCP-IPx card.
7. If the CLA is to be stacked over another DBX card, install the four spacers (two of each, types A and B) provided with the CLA, into the two mounting holes (see *Figure 8-14*) on the MCP-IPx to secure the CLA.
8. Carefully align the multi-pin plug on the bottom of the CLA card with the mating J1 connector on the MCP-IPx card, or on the extension connector of the "lower" DBX.

CAUTION!

Verify that the pins of the CLA plug are aligned with the pin sockets of the MCP-IPx or the DBX connector.

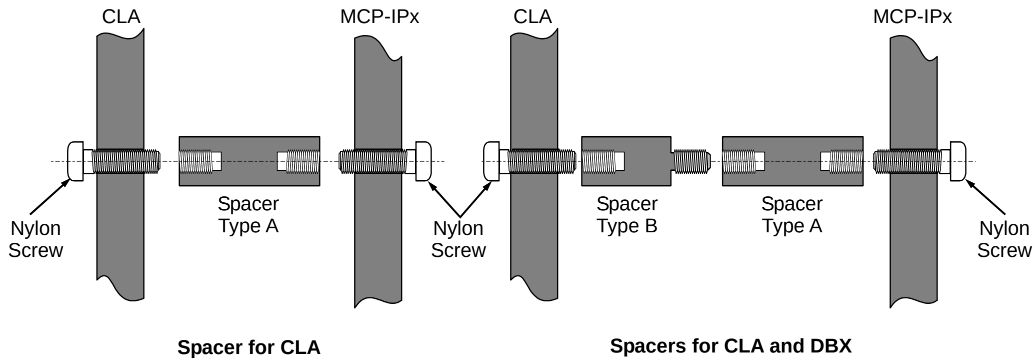
9. Gently but firmly press the CLA plug into the MCP-IPx or the DBX connector until the CLA card rests on the nylon spacers. A slight resistance will be felt as the connectors engage.
10. Reinsert the nylon screws through the mounting holes of the CLA card and thread the screws into the nylon spacers until snug.

CAUTION!

Do not over-tighten the nylon screws or they may be damaged.

11. For F-CLA 686 card type, if not already inserted, insert the appropriate CLA compact flash memory disk (CFD) into the drive on the CFCLA mini module. See *Figure 8-11*.
12. Verify that all slide switches (on the CLA right side) are set to OFF (right).
13. Install the MCP-IPx as described on *page 8-16, MCP-IPx Card Installation*.

Figure 8-14 ***MCP-IPx Spacers for CLA and DBX***



3 CLA Removal

1. Repeat steps 1 through 3 above.
2. Disconnect the RJ-45 connector from the CLA card via the top of the Coral IPx 500 main cage.
3. Carefully remove the MCP-IPx card from its slot and lay it flat, over the anti-static material.
4. Remove the nylon machine screws that secure the CLA card to the standoff spacers on the MCP-IPx card. Set the screws aside.
5. Place the MCP-IPx card on the flat surface with the component side facing upwards. Place thumbs on the MCP-IPx card, on either side of the CLA near the MCP-IPx front side. Use your fingers to lift the edge of the CLA card on both sides, gently disengaging the multi-pin connector on the CLA from the MCP-IPx or DBX connector.

4 Network Connections (RJ-45)

Connection to the LAN

The front panel of the CLA module contains a RJ-45 adapter for connection to the Ethernet computer network. The CLA is designed to operate over Ethernet LAN with a connection of less than 100 meters to the local switch or computer network when using Category 5 UTP (unshielded twisted pair), accordance with the 10/100Base-T protocol.

Interface Connections

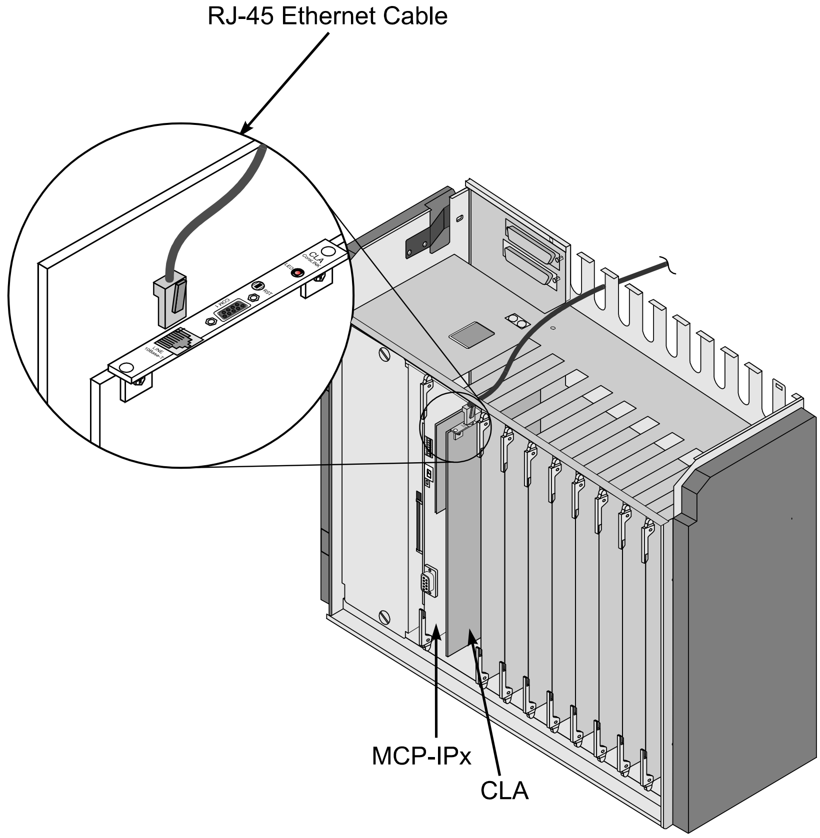
The following table shows the interface connections of the pins on the CLA RJ-45 connectors.

Table 8-4 ***CLA Interface Connections (DTE)***

Pin #	*Power*
Pin 1	Tx(+)
Pin 2	Tx(-)
Pin 3	Rx(+)
Pin 4	not used
Pin 5	not used
Pin 6	Rx(-)
Pin 7	not used
Pin 8	not used

The RJ-45 connector of the LAN cable is routed and connected at the top of the Coral IPx 500 cage (*Figure 8-15*).

Figure 8-15 ***CLA (with RJ-45) Connection***



5 Database Programming

The installation of a CLA card to a Coral IPx 500 system affects the system database. For further information, refer to *Chapter 27* in the *Program Interface Reference Manual*.

6 Applications

In Coral CTI applications, CoraLINK is connected to the Ethernet backbone along with the telephony server, as shown in *Figure 8-16*.

The CoraLink acts as an interface between the Coral system and any CTI server application for all the services (call, transfer, etc.) and events (monitoring functions) of the network. The CTI application together with the CTI telephony server manipulate numerous different call commands from the agent network and translate them into logical data. The CTI telephony server communicates with the CoraLINK through a single connection. The CoraLINK then translates that data into logical information for the Coral system, which processes the calls.

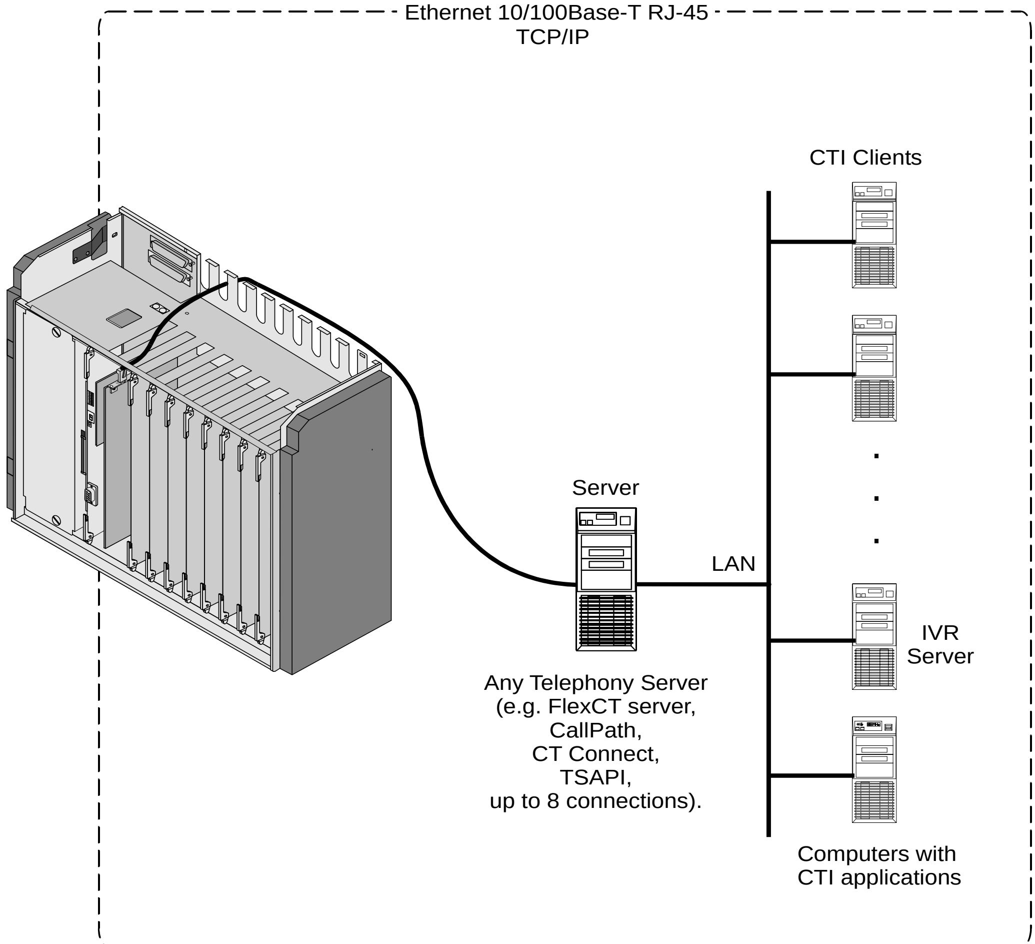
CoraLINK can support up to eight different multiple CTI applications on the network, any or all of which may be simultaneously directing service requests to, and receiving status events at any time.

CoraLINK uses TCP/IP protocol, complies with the ECMA 179 and 180 standards. CoraLINK also supports the Novell TSAPI protocol, the Intel Dialogic CT-connect, and IBM's Callpath.

NOTE:

The CLA should be accompanied by an appropriate software application. Please contact the manufacturer for the required CTI application and/or price list. See Chapter 2 in the Coral FlexiCom & Coral IPx Product Description, for more details.

Figure 8-16 ***CoraLINK Application Telephony Server***



7 Specifications - CLA

CLA 486

Application Interface:	Complies with ECMA 179, 180 and CSTA III
Access Protocol:	ITU X.217 / X.227 (ACSE), X.219 / X.229 (ROSE)
Network Type:	IEEE 802.3 Ethernet
Network Topology:	10Base-T
Network Interface Connector:	RJ-45
Flash Memory:	2 MB EPROM
Network Transport Protocol:	TCP / IP (BSD 4.3 socket Interface)
Coral Common Control:	MEX-IP, MCP-IPx, MCP-IPx

F-CLA 686

Application Interface:	Complies with ECMA 179, 180 and CSTA III
Access Protocol:	ITU X.217 / X.227 (ACSE), X.219 / X.229 (ROSE)
Network Type:	IEEE 802.3 Ethernet
Network Topology:	10 / 100Base-T
Network Interface Connector:	RJ-45
Flash Memory:	32, 64 MB Compact Flash Disk
Network Transport Protocol:	TCP / IP (BSD 4.3 socket Interface)
Coral Common Control:	MEX-IP, MCP-IPx, MCP-IPsl

NOTES:

Chapter 9

Shared Service Ports

Coral

9.1 Shared Service Circuitry
Installation

1 General Description

The shared service circuits provide functions such as media gateway (MG) channels, dial and call progress detection, MF tone dialing reception, multi-party conferencing, etc. Shared service circuits reside on the peripheral bus, but do not provide a physical interface to external devices such as stations and trunks.

2 Embedded Shared Service Circuits in the IPx 500M Main Cage

Shared service circuits in the Coral IPx 500 system are embedded in the Coral IPx 500M main cage on the MSBipx (Main Service Board) card. Shared service circuits are located in the 8DRCF/RMI-F unit and the URC unit. Each shared service circuit and function is described in detail in the following subsections. Refer to these subsections for more information.

3 Database Programming

Card List *(Route: CLIS)*

In the PI system database, the main cage shared service circuits are displayed as:

- **8DRCF or RMI-F-** *Location:* **Shelf #0, Slot #13**
  (**see** *page 9-19, 8DRCF/RMI-F EPROM (U76)*
- **URC -** *Location:* **Shelf #0, Slot #14**
  (**see** *page 9-26, URC PROM (U161)***)**

NOTE:

These slots do not physically exist, but are embedded onto the MSBipx card. These slot numbers are recognized as such by the PI, only.

Refer to the *Program Interface and Database Reference Manual - Chapter 6, Card List*, for further details.

4 Additional Shared Service Cards

Additional shared service cards may be installed in the main cage and in the optional Coral IPx 500X and 800X expansion cage.

The additional cards include, but are not limited to:

Card	***Cage***	***Description***
MRC	IPx 800X w/PUGW	MRC-8, 16, 32 or 64 provides SIP and MGCP media channels. Requires Coral version 15.xx
	IPx 500M/X w/PUGWipx	
MG	IPx 800X w/UGW-E	MG-24, 48, 72, 96 or 120 provides 24, 48, 72, 96 or 120 MGCP media channels.
	IPx 500M/X w/UGW-Eipx	
4VSN	IPx 800X	[*discontinued*] 4 ports used to deliver prerecorded announcement messages.
8DRCF	IPx 800X	Includes the following functions: ■ 8 DTD circuit dialTone detector and call progress tone analyzer ■ 8 DTR circuit DTMF receiver and decoder card ■ 6 x 3-way conference ■ 1 x 6-party conference ■ 1 internal or external music interface ■ 1 external music interface ■ 1 external voice paging interface or public address) and relay contacts ■ 1 auxiliary or major/minor alarm relay contacts ■ 1 universal night answer or central bell relay contacts ■ 3 RS-232E programming/maintenance interfaces 300 to 115,200 bps ■ 1 remote maintenance modem, (V.92 ITU-T standard up to 56Kbps)
8DRCM	IPx 800X	[*discontinued*] Same as 8DRCF but with Bell 103/212A or ITU V.21/V.22, 300/1200bps remote maintenance modem.
8DTD	IPx 800X	[*discontinued*] 8 circuit DialTone Detector and call progress tone analyzer.
8DTR	IPx 800X	8 circuit DTMF Receiver and decoder card.

Card	Cage	Description
CNF	IPx 800X	Dual 15 party or eight 3-way, digital Conference Bridge card. One card required for each mode (2 x 15-party or 8 x 3-way).
iDSP	IPx 800X	FSK tone generator card. Required for displaying Caller ID for SLT users.
16MFR	IPx 800X	16 MFC tone dialing Receiver circuits.
RMI	IPx 800X	[*discontinued*] Includes the following functions: ■ 1 internal or external music interface ■ 1 external music interface ■ 1 external voice paging interface or public address and relay contacts ■ 1 auxiliary or major/minor alarm relay contacts ■ 1 universal night answer or central bell relay contacts ■ 3 RS-232C programming/maintenance interfaces 300 to 9,600 bps ■ 1 Bell 103/212A or ITU V.21/V.22, 300/1200bps remote maintenance modem.

These cards are described in the *Coral Service and Peripheral Cards Installation Manual*.

Shared Service cards may be installed in any available peripheral card slot in the optional Coral IPx 800X expansion unit.

- In the PI system database, the expansion units are shown as:
- The first IPx 500X expansion unit includes:shelf #1, slot #1 to slot #10
- The second IPx 500X expansion unit includes:shelf #2, slot #1 to slot #10
- The first IPx 800X expansion unit includes:shelf #1, slot #1 to slot #12
- The second IPx 800X expansion unit includes:shelf #2, slot #1 to slot #12

Refer to *Chapter 6* of the *Program Interface (PI) and Database Reference Manual* for additional details.

NOTES:

9.2 IPx 500M Backplane

Main Service Board inside the IPx 500M Cage

1 General Description

Figure 9-1 on page 9-10 illustrates the MSBipx card circuits layout. The MSBipx card main shared service functions are described in *page 9-1, Embedded Shared Service Circuits in the IPx 500M Main Cage*.

In the PI system database, the main cage shared service circuits are displayed as:

- **8DRCF or RMI-F-** *Location:* **Shelf #0, Slot #13** (see *page 9-19, 8DRCF/RMI-F EPROM (U76)*
- **URC -** *Location:* **Shelf #0, Slot #14** (see *page 9-26, URC PROM (U161)*)

NOTE:

These slots do not physically exist, but are embedded onto the MSBipx card. These slot numbers are recognized as such by the PI, only.

Refer to the *Program Interface (PI) and Database Reference Manual*, *Chapter 6 - Card List*, for further details.

Shared Service circuits in the Coral IPx 500 system are embedded in the Coral IPx 500M main cage on the MSBipx (Main Service Board) card. Each shared service circuit and function are described below.

The MSBipx card houses:

- Shared Service components
- Configuration jumpers. See *page 9-8, Configuration Jumpers*.
- Auxiliary connector. See *page 9-11, Auxiliary Connector*.
- HDC software. See *page 9-15, HDC (U107) High Density Control*.
- HDC indicator (red LED LD1)
- 8DRCF/RMI-F software. See *page 9-19, 8DRCF/RMI-F EPROM (U76)*.
- URC software. See *page 9-26, URC PROM (U161)*.
- Power supply connector for the PS500 unit
- Extender circuit that links to “IPx 500X” or “IPx 800X” expansion cabinets

- MCP-IPx2 connector for system central processor
- 8 universal connectors for peripheral cards

The intelligent backplane MSBipx incorporates:

- A 384 time slot matrix for switching calls
- A 512 time slot matrix
  (384 for switching calls and 128 for shared service resources)
- A built-in remote maintenance access modem (V.92 ITU-T standard; up to 56Kbps)
- An external music on hold and background music port
- An internal/external music on hold and background music port
- A paging output port
- Three relay contacts
- Synchronization circuit required for digital trunks

MSBipx (hardware issue 0100X1000 and before) incorporates:

- An eight port tone detector for enhanced dialing, such as busy outside number auto-redial
- An eight port tone detector for decoding touch-tone DTMF digits
- Six 3-way conferences for digital trunks (3-way for stations and analog lines is standard), support for silent monitoring and the Coral message center's silent record feature
- One meet-me bridge conference for 6 parties

MSBipx (hardware issue 0200X1000 and above) with Coral software version 14.67 and above incorporates:

- Eight (max: 24*) 3-way conferences/Consultation/Broker service for digital trunks (3-way for stations and analog lines is standard), support for Silent Monitoring and the Coral Message Center's Silent Record feature
- Two (max: 6*) meet-me bridge conference for 14 parties
- 16 (max: 32*) port tone detector and call progress tone analyzer for enhanced dialing (busy outside number auto-redial). Use a self-contained table of call progress tone profiles to identify standard dial, busy, and ringback tone signals
- 24 (max: 24*) port DTMF receivers and decoders for touch-tone digits
- 16 (max: 32*) Caller ID circuit transmitters adapted to Bellcore standards which includes the time and Caller Name/Num display

NOTE:

Seperate authorization is required to allocate the DTMF, CLID, 3way and CONF circuits supported by the MSBipx Issue-0200X1000 or higher).
*(max: *) The max. number is dependant on the number of URC time slots. Therefore, increasing one of these resources requires decreasing another.*

2 Auxiliary and Maintenance Functions

The maintenance and auxiliary functions include:

- Modem for remote maintenance. See *page 9-71, Remote Maintenance Modem*.
- Three RS-232E local maintenance terminals. See *page 9-75, Data Serial Ports (RS-232E)*.
- Three relay contacts for:
  - External voice paging (PAGE). See *page 9-91, Voice Paging (Public Addres) and Relay-1*.
  - Universal Night Answer (UNA) Central Bell. See *page 9-97, UNA/Bell and Relay-2*.
  - Dial operated accessory/alarm (RELAY). See *page 9-101, Accessory or Alarm Relay-3*.
- One page output. See *page 9-91, Voice Paging (Public Addres) and Relay-1*.
- Two music inputs. See *page 9-85, Music*.

Figure 9-2 illustrates the auxiliary connector located on the top left of the MSBipx card. *Table 9-1* provides the pinout connection for the auxiliary connection.

3 Configuration Jumpers

The IPx 500M backplane is equipped with jumpers (JU5 - JU14) that enable or disable various functions. The enabling or disabling is accomplished by jumper straps. Before installing the PS500 power supply, the jumpers on the MSBipx card are set to their correct positions. See *Figure 9-1*.

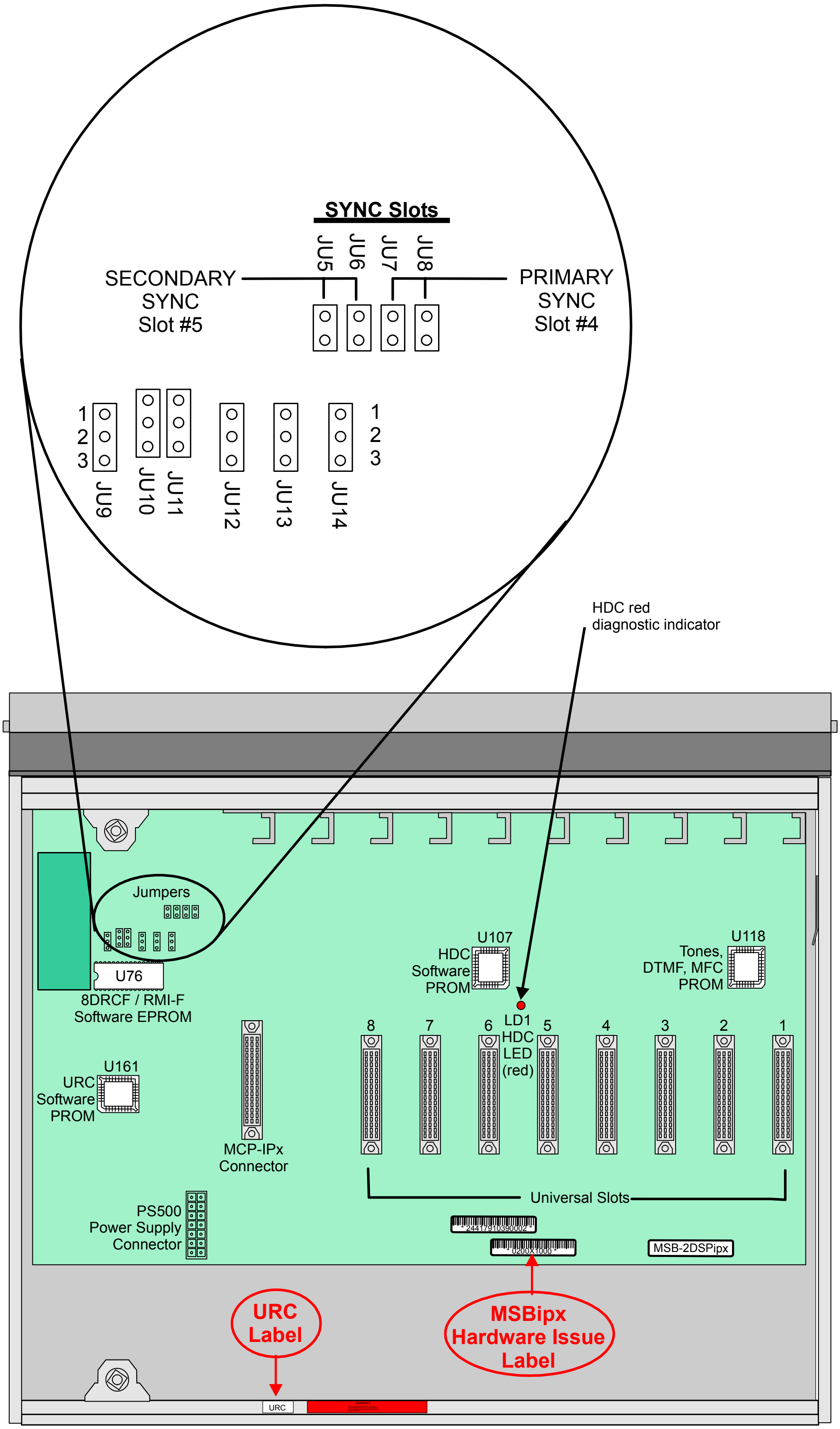
Jumper	*Purpose*
JU5, JU6, JU7, JU8	Synchronization jumpers. See *page 10-15, Digital Trunk Synchronization*.
JU9	Enables selection of the M1-Music source as internal or external. Applying the jumper between terminals 1 and 2 sets the system to internal music. Applying the jumper between terminals 2 and 3 sets the system to external music. See *page 9-85, Configuring the Music M1 Jumper to External or Internal*
JU10, JU11	Enable or disable the modem, by means of connecting or disconnecting the Tx and Rx analog lines. Applying each jumper between terminals 1 and 2 enables the modem. Applying each jumper between terminals 2 and 3 disables the modem. See *page 9-71, Modem Jumpers - Enable/Disable*.
JU12	Used when connecting a printer, terminal, etc. to KB1 using RS-232E cable. Applying the jumper between terminals 1 and 2 requires a five-lead cable (Rx, Tx, CTS, RTS and SGND). Applying the jumper between terminals 2 and 3 requires a three-lead cable (Rx, Tx and SGND). See *page 9-79, Configuring the CTS Jumper "Handshaking" Option*.
JU13	Same as JU12 but for KB2.
JU14	Same as JU12 but for KB3.

4 Indicators

The MSBipx card is equipped with one LED (LD1), located above the universal slot# 5 and 6 connectors (see *Figure 9-1*). Before closing the front door, the LED should be extinguished.

Indicator	*Purpose*
LD1	HDC red diagnostic LED. The LED remains illuminated steadily after turning on the PS500 unit. After a few seconds, the LED should extinguish. The extinguished diagnostic LED indicates that the HDC software has been properly initialized. If the LED remains on steadily for more than two or three minutes, a problem may exist with the MSBipx card.

Figure 9-1 ***MSBipx Card Circuits Layout and Jumpers***



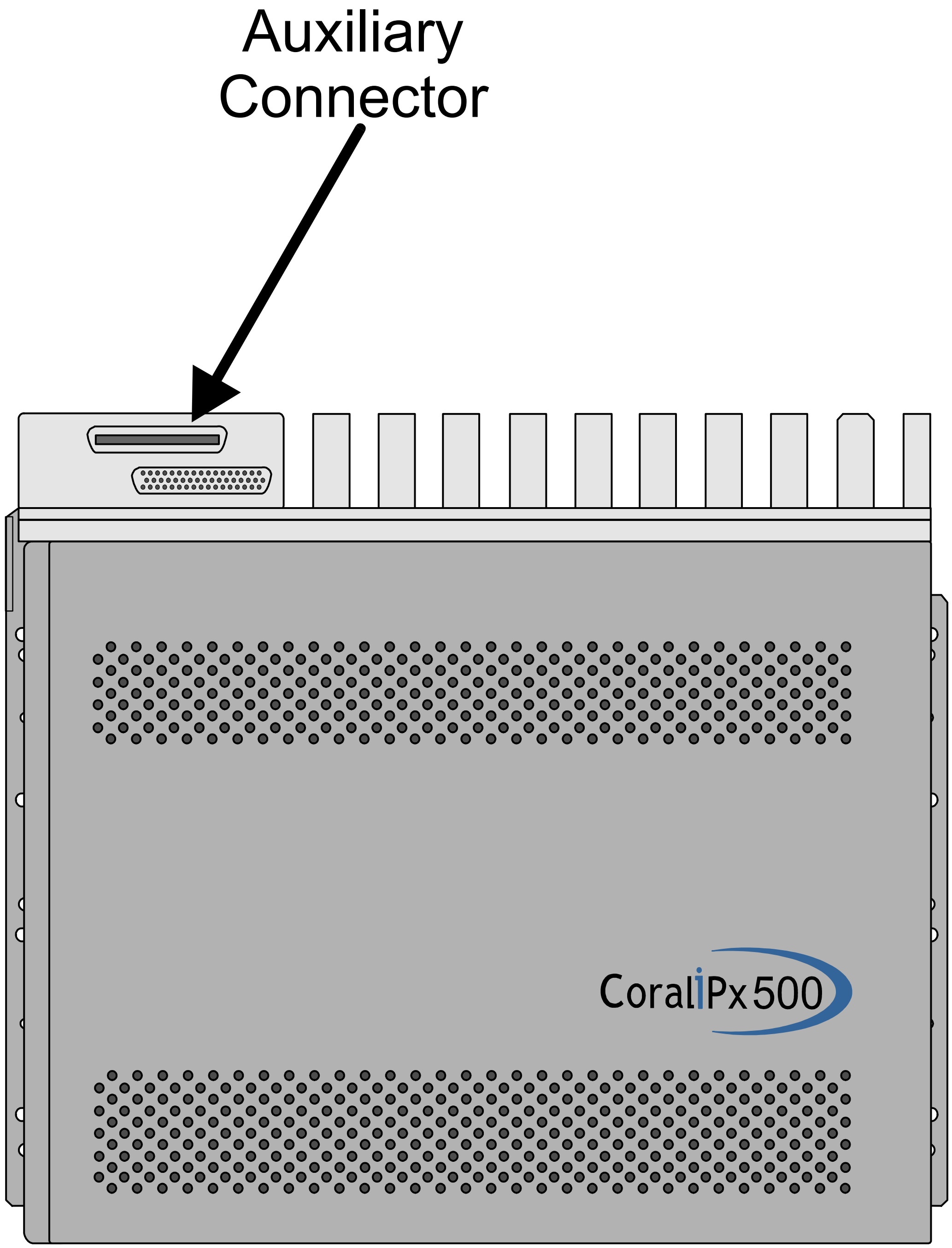
5 Auxiliary Connector

The auxiliary connector *Figure 9-2*, provides three RS-232 interfaces KB1-3, music, paging connection, and relay circuits. *Table 9-1* provides the pinout connection for the auxiliary connection.

Table 9-1 ***Auxiliary Pinout - Champ 50 Connection to the MDF***

Pin	Connection	Function	Description
25 50	RXD1 TXD1	KB1	RS-232E Data Port
24 49	CTS1 RTS1		
23 48	DSR1 DTR1		
22 47	RXD2 TXD2	KB2	RS-232E Data Port
21 46	CTS2 RTS2		
20 45	DSR2 DTR2		
19 44	Music 1A Music 1B	Music 1	Audio Music Input (Internal/External))
18 43	Music 2A Music 2B	Music 2	Audio Music Input (External only)
17 42	RXD3 TXD3	KB3	RS-232E Data Port
16 41	CTS3 RTS3		
15 40	DSR3 DTR3		
14 39	RLY1A RLY1B	Relay 1	External Paging Contact
13 38	RLY2A RLY2B	Relay 2	UNA Bell Contact
12 37	RLY3A RLY3B	Relay 3	System Alarm or Dial-Operated Contact
11 36	PAGE 1A PAGE 1B	Page	Audio Output
10 35	SGRND Not Used	Ground	RS-232E Data Ports
9 34	N.C.	Not Connected	
8 33	N.C.		
7 32	N.C.		
6 31	N.C.		
5 30	N.C.		
4 29	N.C.		
3 28	N.C.		
2 27	N.C.		
1 26	N.C.		

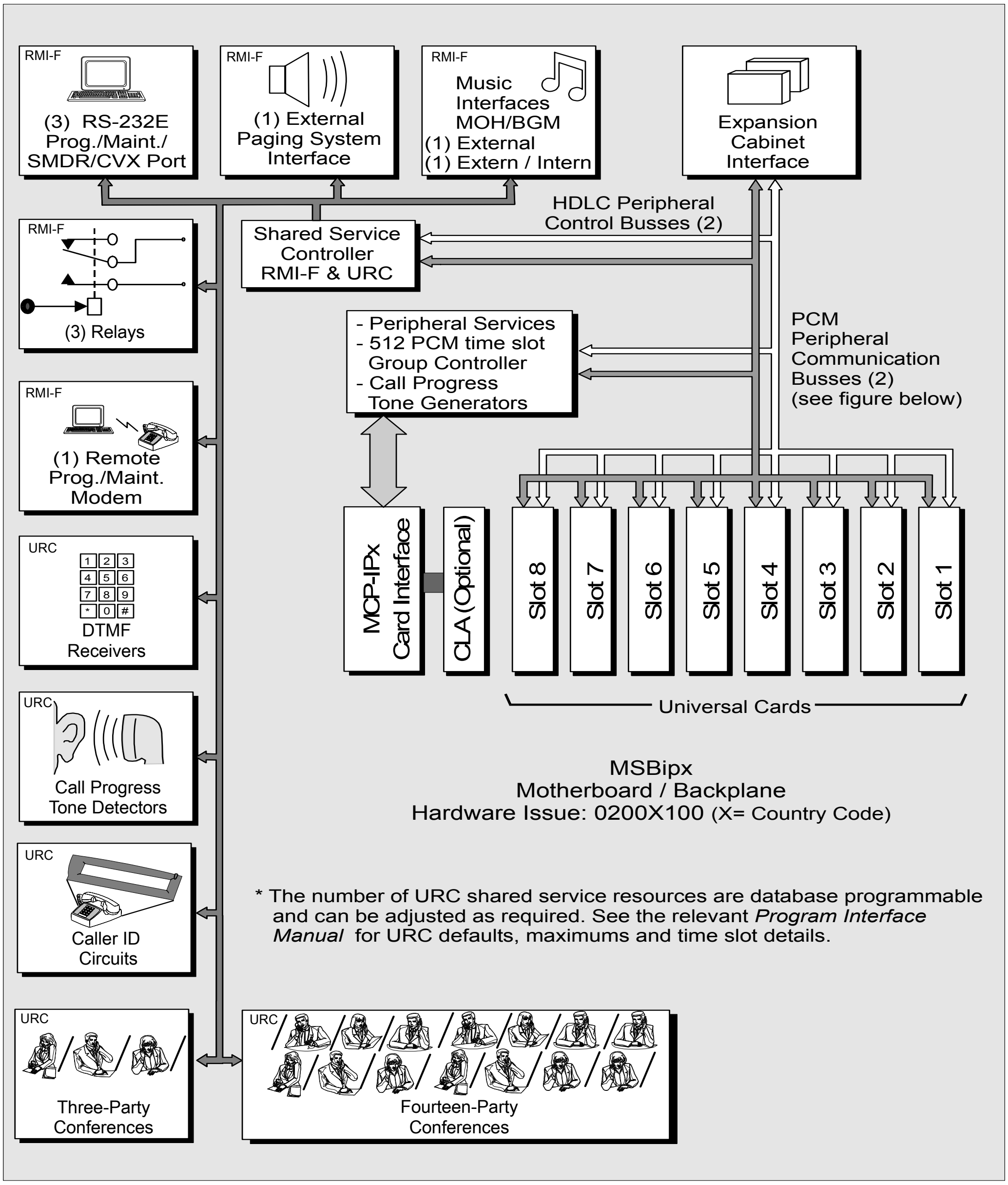
Figure 9-2 ***Coral IPx 500M Auxiliary Connector Location (Top Left View)***



6 Voice Switching in the Coral IPx 500

Figure 9-3 displays the Coral IPx 500 architecture. The dual-bus architecture of the Coral IPx 500 backplane incorporates a 512 Time slot matrix within the MSBipx. Up to 384 ports in use, simultaneously per system, as described in *Figure 9-4*. This high speed, high capacity switching matrix can support heavy traffic loads. The dual PCM and dual HDLC busses are extended from the main to the expansion cage.

Figure 9-3 ***Coral IPx 500M Main Cage Architecture***

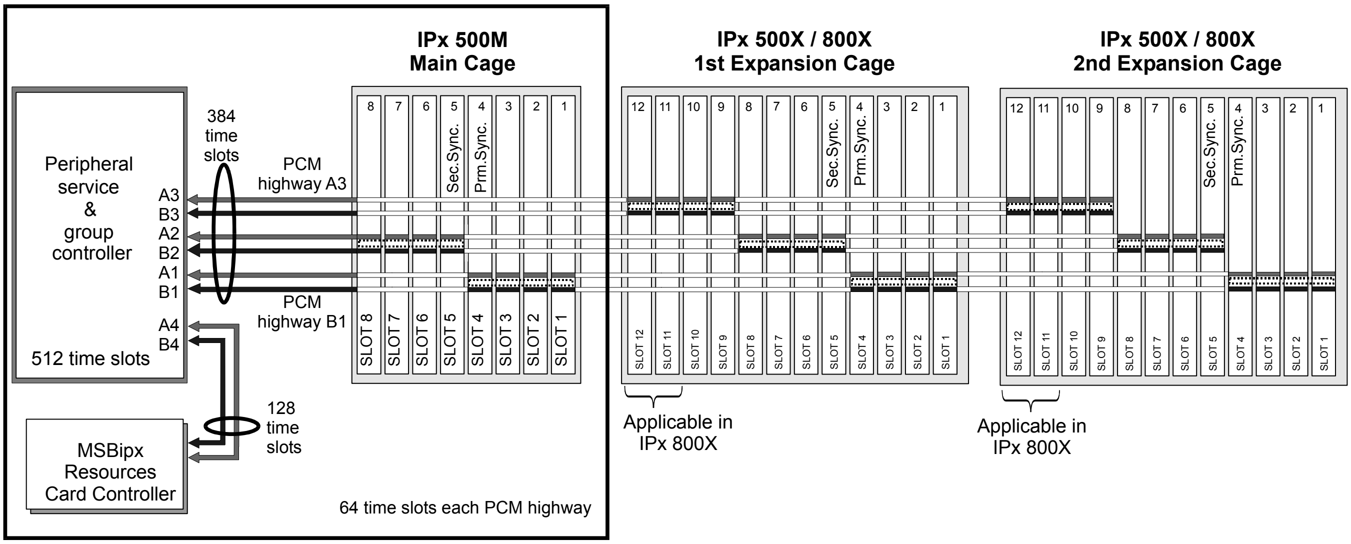


The main cage has several buses for data and digitized voice. Each bus type is duplicated using the same dual-bus LAN architecture pioneered by the manufacturer with the larger Coral chassis. This technology is one of the Coral IPx 500 inner strengths that allow it to meet the requirements of high-demand applications. The dual-bus design has fault-tolerance and disaster avoidance built-into it along with an ability to handle large call volumes.

The distributed processing design extends down to the digital station level. Each set has its own processor for handling station specific functions. This high degree of processing power adds a level of flexibility not found in this size range. With this flexibility, the Coral IPx 500 is qualified for traditional PBX, hybrid, key system, ACD and Centrex environments; with a host of multi-line features and a wide selection of key telephone sets.

The Coral IPx 500 group controller provides eight PCM highways, two HDLC channels, and all peripheral services functions. *Figure 9-4* illustrates the distribution of PCM highways in Coral IPx 500 systems. Each pair of PCM highways support a different group of four peripheral cards. Each system, main cage and two expansion cages, support up to 384 ports in simultaneous use.

Figure 9-4 ***Coral IPx 500, PCM Highway Distribution***



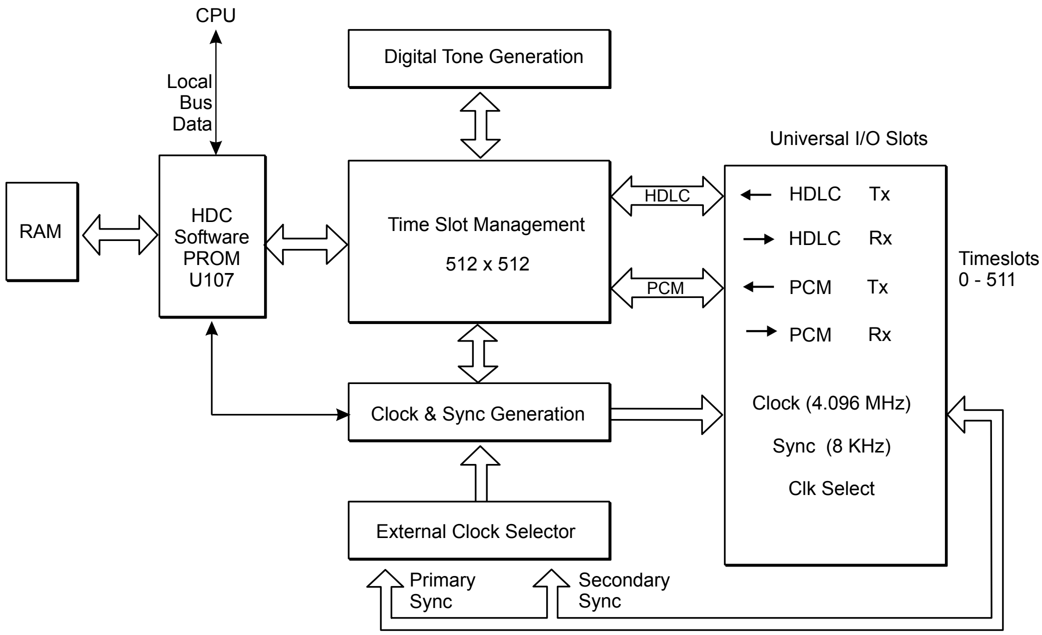
7 HDC (U107) High Density Control

Figure 9-1 illustrates the HDC PROM (U107) location on the MSBipx card. *Figure 9-5* illustrates the four major circuit areas of the HDC circuitry in a block diagram.

The HDC serves as a communication link between the MCP-IPx2 and the peripheral cards. The HDC includes four distinct spatially divided functions:

- External Synchronization (ES) circuit
- Digital tone generators (dial, busy, ringing, ringback, DTMF, MFC, and test; programmed on U118 PROM)
- High-Level Data Link Control (HDLC) bus drive circuitry
- Pulse Code Modulation (PCM) bus drive circuitry with a matrix for 512 time slot switching calls

Figure 9-5 ***HDC Circuit Block Diagram***



Clock Selection

The external clock selector monitors the two inputs for the presence of an 8.0 kilohertz (kHz) clock signal that may be obtained from the incoming data stream of a digital trunk card. A primary and secondary clock source may be defined in the system database to synchronize the

PCM clock of the HDC with the digital trunk. In the absence of an external clock source, the HDC always reverts to an internal clock.

The HDC contains phase-lock circuitry to synchronize the Coral PCM clock to a signal derived from one of two digital trunk interface cards (PRI23, PRI30, 4TBR, 8TBR, 30T, 30T/x or T1), designated the primary and secondary external clock source. This feature, called “slaved clock” or “loop-timed” operation, enables the Coral system to integrate with any digital telephone network in the world. The HDC monitors external clock signal integrity and switches the system between the primary and secondary external clock sources or internal HDC clock, as necessary. See *page 9-18, External Synchronization (ES) Circuit* below for more information.

Digital Tone Generator

The digital tone generator generates the audio call progress tones (dial, busy, ringback, etc.) that are used to notify the caller of the status of the call. In addition, tones used during Keyset (FlexSet, GKT, DKT, DST, EKT, VDK, etc.) ringing (except for mute ring, which is a function of the telephone set itself), DTMF and MFC dialing tones, and test tone patterns used by diagnostics are also generated by the HDC. These tones are stored in digital PCM form, in a programmable PROM, and the stored tone patterns are output directly to the digital PCM bus when required. See *page 9-43, Locally Defined Tone PROM (U118)* below for more information.

Time Slot Management

The HDC supports *two* HDLC and *eight* PCM highways (each PCM highway provides 64 time slot,) and drives the peripheral buses directly.

Each HDLC and PCM bus operates at a fundamental data rate of 4.096 Mbps. This data rate allows each HDLC bus sufficient bandwidth to simultaneously control up to 64 peripheral bus controller circuits located on the peripheral cards.

Every PCM highway consists of a transmit bus and a receive bus, each of which are divided into 64 time slots. Each time slot is eight bits wide, sampled every 125 microseconds (mS), or 8,000 times per second. This rate matches both American and European PCM voice transmission rates that are designed to facilitate complete digital integration with the local telephone network.

The time slot manager, acting on command by the MCP-IPx2 system processor, is responsible for forwarding PCM voice samples from an incoming transmit time slot assigned to one port to a complementary outgoing receive time slot for the recipient port. Traffic handling capacity of the HDC circuitry is maximized through the use of a very sophisticated algorithm to avoid time slot usage conflict.

Using Time Slots

A call between two ports requires one transmit and one receive time slot on a single peripheral highway. Therefore, the HDC circuitry is capable of establishing a call between 64 ports on each of the eight peripheral highways to any other 64 ports, with a maximum of 384 simultaneously busy ports, using the six of the eight peripheral highways.

The HDC 512 x 512 time switch interfaces with the Coral IPx 500 cabinet with eight receive and eight transmit PCM highways. Each PCM highway carries 64 Time Slots. The total number of Time Slots for the Coral IPx 500 is 512 for Receive and 512 Transmit PCM highways. The Coral backplane, is designed to have two Receive and two Transmit PCM highways for every four (card) slots.

Figure 9-4 illustrates the distribution of PCM highways in Coral IPx 500 systems. Each pair of PCM highways support a different groups of four peripheral cards. Each Coral IPx 500 system (main cage and two expansion cages together) supports up to 384 ports in simultaneous use.

Clock and Sync Generator

The Clock signal is strobed at 4.096 MHz to identify the bit period of the HDLC and PCM buses. The Sync signal is strobed at 8.0 KHz, appearing once every 125mS to identify the start of time slot 0 on each of the two PCM buses.

8 External Synchronization (ES) Circuit

The MSBipx contains circuitry that synchronize the Coral IPx 500 peripheral clock to an external clock derived from a digital trunk interface cards such as the 30Tipx, T1ipx, PRI23ipx, PRI30ipx, 4TBRipx, 8TBRipx, or 8TBRPipx card.

The External Synchronization circuit (ES), with the HDC software, constitutes a PLL circuit with 8 kHz external input. It provides the sensing and synchronization circuitry used to lock the Coral IPx 500 system peripheral clock to two of the six possible external sources.

Jumpers JU5, JU6, JU7, and JU8 (see *Figure 9-1* for possible options) are used to select two of six possible slots (two in the main cage, two in the first expansion cage and two more in the second expansion cage).

Before installing the PS500 power supply, the jumpers on the MSBipx card are set to their correct positions.

NOTE:

If Digital trunk interface cards are available in the Coral IPx 500 expansion cage, it is very important to determine which cards should be set as primary and secondary synchronization source. See page 10-15, Digital Trunk Synchronization.

9 8DRCF/RMI-F EPROM (U76)

The RMI-F is a compact version of the 8DRCF including only specific resource circuits.

The RMI-F and the URC (*page 9-26, URC PROM (U161)*) units, together, essentially replace the 8DRCF while adding CLID resources.

The RMI-F unit software is provided with MSBipx Hardware Issue-0200X1000 and above (X= Country Initial), and requires Coral software version 14.67.

The RMI-F is displayed in PI CLIS in Shelf 0, Slot 13 of the IPx 500 as `RMI-F`.

NOTE:

Slot 13 does not physically exist, but is embedded onto the MSBipx card. This slot number is recognized as such by the PI, only.

See *"Features" on page 9-20*

Table 9-2 ***CLIS Card Type for IPx 500 - Shelf 0, Slot 13 "RMI-F or 8DRCF"***

Coral Version	MSBipx Hardware Issue	
	0100X1000 and before	0200X1000 and above
14.66	8DRCF	NA
14.67 and later	8DRCF	RMI-F

NOTE:

To distinguish between the different MSBipx card layouts, see the "URC" and Hardware Issue" labels as shown in Figure 9-1 on page 9-10.

Features

Figure 9-1 illustrates the 8DRCF/RMI-F EPROM (U76) location on the MSBipx card.

The 8DRCF and RMI-F software includes the following shared service functions:

Notation	***Function***	***8DRCF***	***RMI-F***
D	■ An 8 DTD circuit dialtone detector and call progress tone analyze for enhanced dialing. An 8 port tone detector for enhanced dialing, such as busy outside number Auto Call Number Redial. See *page 9-59, Dial Tone Detector (DTD)*.	Yes	No
R	■ An 8 DTR circuit DTMF signaling receiver and decoder. An 8 port tone detector for decoding touch-tone DTMF digits. See *page 9-55, DTMF Receiver (DTR)*.	Yes	No
C	Conference functions: ■ Six 3-way conference bridge units for digital trunks (3-way for stations and analog lines is standard), support for silent monitoring and the Coral message center silent record feature. See *page 9-45, Three-Way Conference (3-Way)*. ■ One 6-party conference bridge. See *page 9-49, Multi-Party Conference (CONF)*.	Yes	No
F	Feature-rich for maintenance and auxiliary functions: ■ A remote maintenance access modem (V.92 ITU-T standard). See *page 9-71, Remote Maintenance Modem*. ■ Three RS-232E interfaces (300 to 115,200 bps), for connecting the Coral system to application processors and programming/maintenance terminals. See *page 9-75, Data Serial Ports (RS-232E)*. ■ One external music interface for music on hold and background music. See *page 9-85, Music*. ■ One internal or external music interface (jumper selection), for music on hold and background music. See *page 9-85, Music*. ■ One external voice paging interface for public address. See *page 9-91, Voice Paging (Public Addres) and Relay-1*. ■ Three relay contacts. See *page 9-107, Relay Contacts*.	Yes	Yes

See:

- *"RMI-F Database Programming (MSBipx hardware issue 0200X1000 and above)" on page 9-21*
- *"8DRCF Database Programming (MSBipx hardware issue 0100X1000)" on page 9-23*

RMI-F Database Programming (MSBipx hardware issue 0200X1000 and above)

The RMI-F provides the features listed in *Table 9-3*.

The RMI-F in a Coral system has considerable impact on the system database. Use the PI to verify that each of the parameters detailed in this chapter is defined correctly. Refer to *Program Interface (PI) and Database Reference Manual, Chapter 6, System Port List* for more details.

Sizes Def (Route: SIZ)

- 8DRCF/8DRCM/RMI/ASU parameter shows
  the current capacity for U-RMI Office, U-MR Office, RMI Office, MR Office, 8DRCF, 8DRCM, RMI or ASU cards (and MSBipx backplane card in the Coral IPx 500).

Card List (Route: CLIS)

Card type must show RMI-F in the P_TYPE field of **Shelf #0, Slot #13**.

The card status can be one of the following:

- ACTIVE
- INACTIVE
- P_ACTIVE (partially active).

The partially active message will appear when any of the sub-circuits is not activated.

The Port List supplies detailed information on which port is active or inactive.

Port List (Route: PLIS)

Use this option to assign a short/full name to RMI-F ports, see *Table 9-4*.

If P_ACTIVE is displayed in CLIS, the PLIS will show which of the subcircuits did not initialize, and why.

Use this option to assign a short/full name to RMI-F ports, see *Table 9-4*.

Table 9-3 **RMI-F Features**

Circuit	Purpose	Circuit No.	Default Name	Default Dial No.
NA	NA	0-22	—	—
PAGE & Relay-1	External Voice Page (Public Address)	23	PAGE0	7074
UNA & Relay-2	Universal Night Answer/BELL	24	BELL0	7050
RELAY Relay-3	Auxiliary or Major/Minor Alarm Relay	25	BLANK	7086
MODEM	MODEM Connection	26	MODM0	7070
Music 1	1st Music Background and Music On Hold Internal or External Source	N/A	N/A	N/A
Music 2	2nd Music Background and Music On Hold External Source	N/A	N/A	N/A

Table 9-4 **RMI-F PI (Route: PLIS)**

Shelf/Slot/Ckt			Type	Dial No.	Name Short :	Full
0	13	0-22	None	—	—	—
0	13	23	PAGE	7074	PAGE0	BLANK
0	13	24	UNA	7050	BELL0	BLANK
0	13	25	RELAY	7086	BLANK	BLANK
0	13	26	MODEM	7070	MODM0	BLANK

8DRCF Database Programming (MSBipx hardware issue 0100X1000)

The 8DRCF provides the features listed in *Table 9-5*.

The 8DRCF in a Coral system has considerable impact on the system database. Use the PI to verify that each of the parameters detailed in this chapter is defined correctly. Refer to *Program Interface (PI) and Database Reference Manual, Chapter 6, System Port List* for more details.

Sizes Def (Route: SIZ)

- 8DRCF/8DRCM/RMI/ASU parameter shows the current capacity for U-RMI Office, U-MR Office, RMI Office, MR Office, 8DRCF, 8DRCM, RMI or ASU cards (and MSBipx backplane card in the Coral IPx 500).
- CONF_CKTS parameter. one (1) port required for the 8DRCF card.

Sizes TAB (Route: SYSGEN,2)

- RESOURCES parameter. Twenty-two (22) ports required for each 8DRCF unit.

Card List (Route: CLIS)

Card type must show 8DRCF in the P_TYPE field of **Shelf #0, Slot #13**.

The card status can be one of the following:

- ACTIVE
- INACTIVE
- P_ACTIVE (partially active).

The partially active message will appear when any of the sub-circuits is not activated.

The Port List supplies detailed information on which port is active or inactive.

Port List (Route: PLIS)

Use this option to assign a short/full name to 8DRCF ports, see *Table 9-6*.

If P_ACTIVE is displayed in CLIS, the PLIS will show which of the subcircuits did not initialize, and why.

Use this option to assign a short/full name to 8DRCF ports, see *Table 9-6*.

Table 9-5 ***8DRCF Features***

Circuit	Purpose	Circuit No.	Default Name	Default Dial No.
DTR	Eight DTMF signaling receivers	0-7	—	—
DTD	Eight dial and progress tone detectors	8-15	—	—
CONF	Meet me bridge conference call for 6 parties	16	BLANK	7098
C3WAY	Six circuits of 3-way conference calls	17-22	—	—
PAGE & Relay-1	External Voice Page (Public Address)	23	PAGE0	7074
UNA & Relay-2	Universal Night Answer/BELL	24	BELL0	7050
RELAY Relay-3	Auxiliary or Major/Minor Alarm Relay	25	BLANK	7086
MODEM	MODEM Connection	26	MODM0	7070
Music 1	1st Music Background and Music On Hold Internal or External Source	N/A	N/A	N/A
Music 2	2nd Music Background and Music On Hold External Source	N/A	N/A	N/A

Table 9-6 ***8DRCF PI (Route: PLIS)***

Shelf/Slot/Ckt			Type	Dial No.	Name Short :	Full
0	13	0	DTR	—	—	—
0	13	1	DTR	—	—	—
0	13	2	DTR	—	—	—
0	13	3	DTR	—	—	—
0	13	4	DTR	—	—	—
0	13	5	DTR	—	—	—
0	13	6	DTR	—	—	—
0	13	7	DTR	—	—	—
0	13	8	DTD	—	—	—
0	13	9	DTD	—	—	—
0	13	10	DTD	—	—	—
0	13	11	DTD	—	—	—
0	13	12	DTD	—	—	—
0	13	13	DTD	—	—	—
0	13	14	DTD	—	—	—
0	13	15	DTD	—	—	—
0	13	16	CONF	7098	BLANK	BLANK
0	13	17	C3WAY	—	—	—
0	13	18	C3WAY	—	—	—
0	13	19	C3WAY	—	—	—
0	13	20	C3WAY	—	—	—
0	13	21	C3WAY	—	—	—
0	13	22	C3WAY	—	—	—
0	13	23	PAGE	7074	PAGE0	BLANK
0	13	24	UNA	7050	BELL0	BLANK
0	13	25	RELAY	7086	BLANK	BLANK
0	13	26	MODEM	7070	MODM0	BLANK

10 URC PROM (U161)

The URC (Universal Resource Card) unit software is provided with MSBipx Hardware Issue-0200X1000 and above (X= Country Initial),
and requires Coral software version 14.67.

The URC is displayed in PI CLIS in Shelf 0, Slot 14 of the IPx 500 as `URC2`.

NOTE:

Slot 14 does not physically exist, but is embedded onto the MSBipx card. This slot number is recognized as such by the PI, only.

Table 9-7 ***CLIS Card Type for IPx 500 - Shelf 0, Slot 14 "URC2"***

Coral Version	MSBipx Hardware Issue	
	0100X1000 and before	0200X1000 and above
14.66	NA	NA
14.67 and later	NA	URC2

NOTE:

To distinguish between the different MSBipx card layouts, see the "URC" and Hardware Issue" labels as shown in *Figure 9-1 on page 9-10***.**

Tip:

Seperate authorization is required to allocate the DTMF, CLID, 3way and CONF circuits supported by the MSBipx Issue-0200X1000 or higher. See *Table 9-8 on page 9-27**.*

Features

Figure 9-1 on page 9-10 illustrates the URC PROM (U161) location on the MSBipx card. The URC and the RMI-F (*on page 9-19*), together, essentially replace the 8DRCF while adding CLID resources. The URC software includes the following shared service functions:

Table 9-8 ***URC2 Features and SAU Requirements***

Notation	***Function***	***SAU Required***
D	Tone Detectors (DTD) detects all necessary call progress tones. 16 (max: 32*) port dial tone detector and call progress tone analyzer for enhanced dialing (such as busy outside number auto-redial). Use a self-contained table of call progress tone profiles to identify standard dial, busy, and ringback tone signals. See *page 9-59, Dial Tone Detector (DTD)*.	No
R	DTMF Receivers (DTR). 24 (max: 24*) DTR circuit DTMF signaling receiver and decoder for touch-tone digits and cellular features. See *page 9-55, DTMF Receiver (DTR)*.	Yes
C	3-way Conference functions. Eight (max: 24*) 3-way conferences/Consultation/Broker service bridge units for digital and IP channels, FlexSet-IP, and Wireless sets (3-way for stations and analog lines is standard), support for Silent Monitoring and the Coral Message Center's Silent Record feature. See *page 9-45, Three-Way Conference (3-Way)*.	Yes
	14 party Conference Bridge (Meet Me). Enables a conference of a maximum of 84 participants. Two (max: 6*) meet-me bridge conference for 14 parties See *page 9-49, Multi-Party Conference (CONF)*.	Yes
iDSP	Caller ID transmitters: 16 (max: 32*) Caller ID circuit transmitters adapted to Bellcore standards which includes the time and Caller Name/Num display	Yes

NOTE:

*(max: *) The maximum number for the embedded resources is dependant on the number of URC time slots. Therefore, increasing one of these resources requires decreasing another.*

URC2 Database Programming (MSBipx hardware issue 0200X1000 and later)

The URC provides the features listed in *Table 9-8*. The URC in a Coral system has considerable impact on the system database. Use the PI to verify that each of the parameters detailed in this chapter is defined correctly. Refer to *Program Interface (PI) and Database Reference Manual* for more details.

Maximum URC Resources

Each system resource circuit uses Coral times slots. The Coral enables a maximum of 120 time slots per URC2. *Table 9-9* lists the time slots needed per circuit and enables the technician to plan accordingly when configuring the URC configurations.

A maximum of 120 Time Slots is allowed per URC2 card. Therefore, the Full Assembly is never used. Allocate your resources such that you use a maximum of 120 Time Slots. For example, increasing the number of 3-way circuits, forces you to decrease one or more of the other resources.

Table 9-9 ***PI defaults per URC2 Resource***

Resource Type	Max Circuits per URC2 (Full Assembly)	Time Slots Needed per Circuit (CKT)	Default Configuration		See Table
			Max CKTs	Time Slots Needed	
DTMF Receiver (DTR)	24	1	24	1x24	*Table 9-11 on page 31*
CONF (Meet Me)	6	16	2	16x2	*Table 9-12 on page 33*
3-WAY	24	4	8	4x8	*Table 9-14 on page 34*
Caller ID (CID)	32	1	16	1x16	*Table 9-15 on page 35*
DTD	32	1	16	1x16	*Table 9-16 on page 36*
TOTAL	118		66	120	

Feature Authorization (Route: FEAT,1)

- URC DTMF
- URC CLID
- URC 3WAY
- URC CONF

Separate Software Authorization is required to allocate the URC resources. Refer to *Program Interface (PI) and Database Reference Manual, Chapter 3, Feature Authorization*.

URC Configuration - NUMBER OF RESOURCES (Route: CDB,11)

- DTMF
- Meet Me
- 3WAY
- CID
- DTD

URC Card DB - GAIN (Route: CDB,11,2)

The Gains may be adjusted in this branch and not in the Feature Control branch as with other cards.

- DTMF GAIN
- DTD GAIN

URC Card DB - Meet Me Conference (Route: CDB,11,2)

- CONF MEMBERS
- CONF SWITCH DELAY

Sizes Def (Route: SIZ)

- CONF_CKTS parameter. Between 1 to 6 ports required for the URC.

Sizes TAB (Route: SYSGEN,2)

- RESOURCES parameter. Between 64 to112 ports required for the URC.

Card List (Route: CLIS)

Card type must show URC2 in the P_TYPE field of **Shelf #0, Slot #14**.

The card status can be one of the following:

- ACTIVE
- INACTIVE
- P_ACTIVE (partially active).

The partially active message will appear when any of the sub-circuits is not activated.

The Port List supplies detailed information on which port is active or inactive, see *Table 9-10 on page 9-30*.

Port List (Route: PLIS)

Use this option to assign a short/full name to URC Meet-Me Multiparty Conference ports, see *Table 9-12 on page 9-33*.

If P_ACTIVE is displayed in CLIS, the PLIS will show which of the subcircuits did not initialize, and why.

Table 9-10 ***URC2 Features***

Circuit Type	Purpose	Circuit No. (Ckt)	Default Name	Default Dial No.	See Table
DTR	DTMF signaling receivers	0-23 URC2 0-47 URC4	—	—	*Table 9-11 on page 31*
CONF	Meet me bridges conference call for 14 parties	48-53	BLANK	7098-7099	*Table 9-12 on page 33*
Spare	Not used in this version	54-55	—	—	*Table 9-13 on page 33*
C3WAY	Circuits of 3-way conference calls	56-79	—	—	*Table 9-14 on page 34*
iDSP	FSK transmitters for displaying CID (Caller ID) for SLT users	80-111	—	—	*Table 9-15 on page 35*
DTD	Dial and progress tone detectors	112-143	—	—	*Table 9-16 on page 36*

Table 9-11 ***URC DTR/DTMF PI Cofiguration***

URC Configuration PI Route: DTB,11		PI Route: PLIS							
DTMF URC2 0-24 URC4 0-48	Total Time Slots Needed	Shelf/Slot/Ckt			Type	Dial No.	Name Short : Full	
1	1	0	14	0	DTR /DTMF	—	—	—
2	2	0	14	1	DTR /DTMF	—	—	—
3	3	0	14	2	DTR /DTMF	—	—	—
4	4	0	14	3	DTR /DTMF	—	—	—
5	5	0	14	4	DTR /DTMF	—	—	—
6	6	0	14	5	DTR /DTMF	—	—	—
7	7	0	14	6	DTR /DTMF	—	—	—
8	8	0	14	7	DTR /DTMF	—	—	—
9	9	0	14	8	DTR /DTMF	—	—	—
10	10	0	14	9	DTR /DTMF	—	—	—
11	11	0	14	10	DTR /DTMF	—	—	—
12	12	0	14	11	DTR /DTMF	—	—	—
13	13	0	14	12	DTR /DTMF	—	—	—
14	14	0	14	13	DTR /DTMF	—	—	—
15	15	0	14	14	DTR /DTMF	—	—	—
16	16	0	14	15	DTR /DTMF	—	—	—
17	17	0	14	16	DTR /DTMF	—	—	—
18	18	0	14	17	DTR /DTMF	—	—	—
19	19	0	14	18	DTR /DTMF	—	—	—
20	20	0	14	19	DTR /DTMF	—	—	—
21	21	0	14	20	DTR /DTMF	—	—	—
22	22	0	14	21	DTR /DTMF	—	—	—
23	23	0	14	22	DTR /DTMF	—	—	—
24*	24	0	14	23	DTR /DTMF	—	—	—
25	25	0	14	24	DTR /DTMF	—	—	—
26	26	0	14	25	DTR /DTMF	—	—	—

URC Configuration PI Route: DTB,11		PI Route: PLIS							
DTMF URC2 0-24 URC4 0-48	Total Time Slots Needed	Shelf/Slot/Ckt			Type	Dial No.	Name Short : Full	
27	27	0	14	26	DTR /DTMF	—	—	—
28	28	0	14	27	DTR /DTMF	—	—	—
29	29	0	14	28	DTR /DTMF	—	—	—
30	30	0	14	29	DTR /DTMF	—	—	—
31	31	0	14	30	DTR /DTMF	—	—	—
32	32	0	14	31	DTR /DTMF	—	—	—
33	33	0	14	32	DTR /DTMF	—	—	—
34	34	0	14	33	DTR /DTMF	—	—	—
35	35	0	14	34	DTR /DTMF	—	—	—
36	36	0	14	35	DTR /DTMF	—	—	—
37	37	0	14	36	DTR /DTMF	—	—	—
38	38	0	14	37	DTR /DTMF	—	—	—
39	39	0	14	38	DTR /DTMF	—	—	—
40	40	0	14	39	DTR /DTMF	—	—	—
41	41	0	14	40	DTR /DTMF	—	—	—
42	42	0	14	41	DTR /DTMF	—	—	—
43	43	0	14	42	DTR /DTMF	—	—	—
44	44	0	14	43	DTR /DTMF	—	—	—
45	45	0	14	44	DTR /DTMF	—	—	—
46	46	0	14	45	DTR /DTMF	—	—	—
47	47	0	14	46	DTR /DTMF	—	—	—
48	48	0	14	47	DTR /DTMF	—	—	—

*The ports listed above the double line indicate the default range. See *Table 9-9 on page 9-28*.

Table 9-12 ***URC Meet-Me Multiparty Conference PI Cofiguration***

URC Configuration PI Route: DTB,11		PI Route: PLIS							
Meet-Me (0-6)	Total Time Slots Needed	Shelf/Slot/Ckt			Type	Dial No.	Name Short : Full	
1	16	0	14	48	CONF	7098	BLANK	BLANK
2*	32	0	14	49	CONF	7099	BLANK	BLANK
3	48	0	14	50	CONF		BLANK	BLANK
4	64	0	14	51	CONF		BLANK	BLANK
5	80	0	14	52	CONF		BLANK	BLANK
6	96	0	14	53	CONF		BLANK	BLANK

*The ports listed above the double line indicate the default range. See *Table 9-9 on page 9-28*.

Table 9-13 ***URC Spare ports (not used)***

URC Configuration PI Route: DTB,11		PI Route: PLIS						
Spare (2)	Total Time Slots Needed	Shelf/Slot/Ckt			Type	Dial No.	Name Short : Full	
1	0	0	14	54		—	—	—
2	0	0	14	55		—	—	—

IPx 500M Backplane Main Service Board inside the IPx 500M Cage

9

Table 9-14 ***URC Three-Way Conference (C3WAY) PI Cofiguration***

URC Configuration PI Route: DTB,11		PI Route: PLIS						
C3WAY (0-24)	Total Time Slots Needed	Shelf/Slot/Ckt			Type	Dial No.	Name Short	: Full
1	4	0	14	56	C3WAY	—	—	—
2	8	0	14	57	C3WAY	—	—	—
3	12	0	14	58	C3WAY	—	—	—
4	16	0	14	59	C3WAY	—	—	—
5	20	0	14	60	C3WAY	—	—	—
6	24	0	14	61	C3WAY	—	—	—
7	28	0	14	62	C3WAY	—	—	—
8*	32	0	14	63	C3WAY	—	—	—
9	36	0	14	64	C3WAY	—	—	—
10	40	0	14	65	C3WAY	—	—	—
11	44	0	14	66	C3WAY	—	—	—
12	48	0	14	67	C3WAY	—	—	—
13	52	0	14	68	C3WAY	—	—	—
14	56	0	14	69	C3WAY	—	—	—
15	60	0	14	70	C3WAY	—	—	—
16	64	0	14	71	C3WAY	—	—	—
17	68	0	14	72	C3WAY	—	—	—
18	72	0	14	73	C3WAY	—	—	—
19	76	0	14	74	C3WAY	—	—	—
20	80	0	14	75	C3WAY	—	—	—
21	84	0	14	76	C3WAY	—	—	—
22	88	0	14	77	C3WAY	—	—	—
23	92	0	14	78	C3WAY	—	—	—
24	96	0	14	79	C3WAY	—	—	—

*The ports listed above the double line indicate the default range. See *Table 9-9 on page 9-28*.

Table 9-15 ***URC iDSP CID (Caller ID) Transmitters PI Cofiguration***

URC Configuration PI Route: DTB,11		PI Route: PLIS						
CID (0-32)	Total Time Slots Needed	Shelf/Slot/Ckt			Type	Dial No.	Name Short : Full	
1	1	0	14	80	iDSP	—	—	—
2	2	0	14	81	iDSP	—	—	—
3	3	0	14	82	iDSP	—	—	—
4	4	0	14	83	iDSP	—	—	—
5	5	0	14	84	iDSP	—	—	—
6	6	0	14	85	iDSP	—	—	—
7	7	0	14	86	iDSP	—	—	—
8	8	0	14	87	iDSP	—	—	—
9	9	0	14	88	iDSP	—	—	—
10	10	0	14	89	iDSP	—	—	—
11	11	0	14	90	iDSP	—	—	—
12	12	0	14	91	iDSP	—	—	—
13	13	0	14	92	iDSP	—	—	—
14	14	0	14	93	iDSP	—	—	—
15	15	0	14	94	iDSP	—	—	—
16*	16	0	14	95	iDSP	—	—	—
17	17	0	14	96	iDSP	—	—	—
18	18	0	14	97	iDSP	—	—	—
19	19	0	14	98	iDSP	—	—	—
20	20	0	14	99	iDSP	—	—	—
21	21	0	14	100	iDSP	—	—	—
22	22	0	14	101	iDSP	—	—	—
23	23	0	14	102	iDSP	—	—	—
24	24	0	14	103	iDSP	—	—	—
25	25	0	14	104	iDSP	—	—	—
26	26	0	14	105	iDSP	—	—	—

URC Configuration PI Route: DTB,11		PI Route: PLIS							
CID (0-32)	Total Time Slots Needed	Shelf/Slot/Ckt			Type	Dial No.	Name Short : Full	
27	27	0	14	106	iDSP	—	—	—
28	28	0	14	107	iDSP	—	—	—
29	29	0	14	108	iDSP	—	—	—
30	30	0	14	109	iDSP	—	—	—
31	31	0	14	110	iDSP	—	—	—
32	32	0	14	111	iDSP	—	—	—

*The ports listed above the double line indicate the default range. See *Table 9-9 on page 9-28*.

Table 9-16 ***URC DTD PI Cofiguration***

URC Configuration PI Route: DTB,11		PI Route: PLIS						
DTD (0-32)	Total Time Slots Needed	Shelf/Slot/Ckt			Type	Dial No.	Name Short : Full	
1	1	0	14	112	DTD	—	—	—
2	2	0	14	113	DTD	—	—	—
3	3	0	14	114	DTD	—	—	—
4	4	0	14	115	DTD	—	—	—
5	5	0	14	116	DTD	—	—	—
6	6	0	14	117	DTD	—	—	—
7	7	0	14	118	DTD	—	—	—
8	8	0	14	119	DTD	—	—	—
9	9	0	14	120	DTD	—	—	—

URC Configuration PI Route: DTB,11		PI Route: PLIS							
DTD (0-32)	Total Time Slots Needed	Shelf/Slot/Ckt			Type	Dial No.	Name Short : Full	
10	10	0	14	121	DTD	—	—	—
11	11	0	14	122	DTD	—	—	—
12	12	0	14	123	DTD	—	—	—
13	13	0	14	124	DTD	—	—	—
14	14	0	14	125	DTD	—	—	—
15	15	0	14	126	DTD	—	—	—
16*	16	0	14	127	DTD	—	—	—
17	17	0	14	128	DTD	—	—	—
18	18	0	14	129	DTD	—	—	—
19	19	0	14	130	DTD	—	—	—
20	20	0	14	131	DTD	—	—	—
21	21	0	14	132	DTD	—	—	—
22	22	0	14	133	DTD	—	—	—
23	23	0	14	134	DTD	—	—	—
24	24	0	14	135	DTD	—	—	—
25	25	0	14	136	DTD	—	—	—
26	26	0	14	137	DTD	—	—	—
27	27	0	14	138	DTD	—	—	—
28	28	0	14	139	DTD	—	—	—
29	29	0	14	140	DTD	—	—	—
30	30	0	14	141	DTD	—	—	—
31	31	0	14	142	DTD	—	—	—
32	32	0	14	143	DTD	—	—	—

*The ports listed above the double line indicate the default range. See *Table 9-9 on page 9-28*.

NOTES:

9.3 IPx 500X Backplane

Main Service Peripheral Board inside the IPx 500X Cage

1 General Description

Figure 9-6 illustrates the MSPipx card circuits layout. The MSPipx card does not provide shared service functions. The MSPipx card uses the main shared service functions provided by the MSBipx card as described in *page 9-1, Embedded Shared Service Circuits in the IPx 500M Main Cage*.

In the PI system database, the expansion cages are shown as:

- *First expansion - Location:* **Shelf #1, Slot #1-10**
- *Second expansion - Location:* **Shelf #2, Slot #1-10**

Refer to the *Program Interface (PI) and Database Reference Manual*, *Chapter 6 - Card List*, for further details.

The MSPipx card houses:

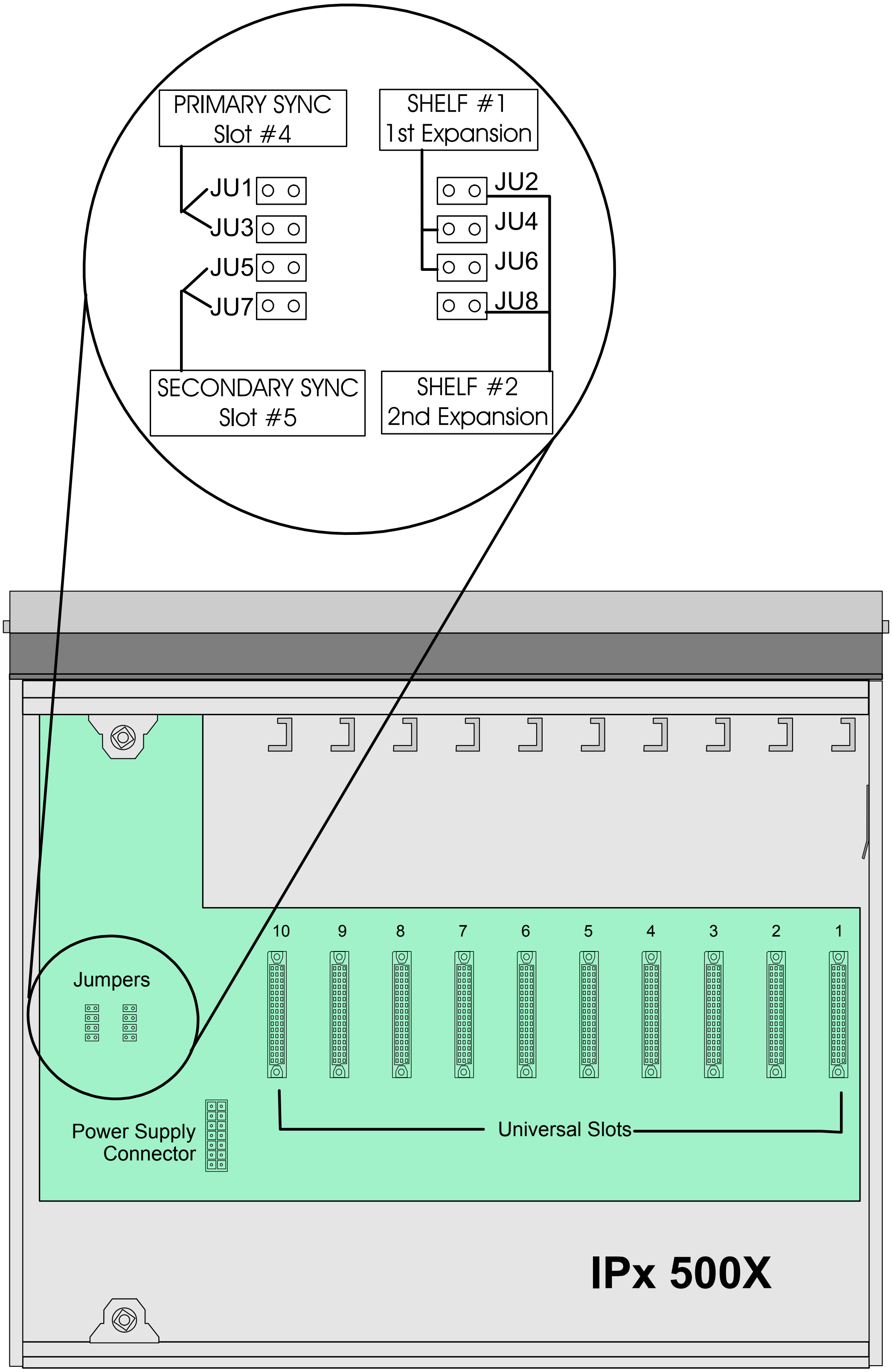
- Configuration jumpers
- Power supply connector for the PS500 unit
- Expansion circuit that links to IPx 500M or second IPx 800X cages
- Ten universal connectors for peripheral cards

2 Configuration Jumpers

The MSPipx card is equipped with jumper straps (JU1 - JU8) that enable various functions. Before installing the PS500 power supply, the jumpers on the MSPipx card are set to their correct positions (see *Figure 9-6*).

Jumper	***Purpose***
JU1, JU3, JU5, JU7	Synchronization jumpers. See *page 10-15, Digital Trunk Synchronization*
JU2, JU4, JU6, JU8	Shelf number jumpers. See *page 6-37, Expansion Shelf Number*

Figure 9-6 ***MSPipx Card Circuits Layout and Jumpers***



3 Voice Switching in the Coral IPx 500

Figure 9-3 on page 9-13 illustrates the Coral IPx 500 architecture. The dual-bus architecture of the Coral IPx 500 backplane incorporates a 384 time slot matrix within the MSPipx. This high speed, high capacity switching matrix can support heavy traffic loads. The dual PCM and dual HDLC busses are extended from the MSBipx to the MSPipx in the Expansion cage.

The Coral IPx 500 has several buses for data and digitized voice. Each bus type is duplicated, to meet the requirements of high-demand applications. The dual-bus design has fault-tolerance and disaster avoidance built-into it along with an ability to handle large call volumes.

The Coral IPx 500 Group Controller provides to the MSPipx six PCM highways, two HDLC channels, and all Peripheral services functions. *Figure 9-4 on page 9-14* illustrates the distribution of PCM highways in Coral IPx 500 systems. Each pair of PCM highways support a different group of four peripheral cards. Up to 384 ports can be used simultaneously when either one or two Coral IPx 500 expansion cages are installed in the system.

4 External Synchronization (ES) Circuit

The MSPipx contains circuitry designed to synchronize the Coral IPx 500 peripheral clock to an external clock derived from a digital trunk interface cards such as the 30Tipx, T1ipx, PRI23ipx, PRI30ipx, 4TBRipx, 8TBRipx, or 8TBRPipx card.

The External Synchronization (ES) circuit, with the HDC software located on the MSBipx (*page 9-15, HDC (U107) High Density Control*), constitutes a PLL circuit with 8 kHz external input. It provides the sensing and synchronization circuitry used to lock the Coral IPx 500 system peripheral clock to two of the six possible external sources.

Jumpers JU1, JU3, JU5 and JU7 (see *Figure 9-6* for possible options) are used to select two of six (two in the main cage, two in the first expansion cage and two more in the second expansion cage) possible slots.

Before installing the PS500 power supply, the jumpers on the MSPipx card are set to their correct positions.

NOTE:

If Digital Trunk Interface cards are available in the Coral IPx 500X expansion cage, it is very important to determine which card should be set as primary and secondary synchronization source. See page 10-15, Digital Trunk Synchronization.

9.4 Locally Defined Tone PROM (U118)

1 General Description

The MSBipx includes one tone PROM (Programmable Read-Only Memory circuit). The HDC circuitry located on the MSBipx generates the following tones:

- Audio call progress tones used to notify the caller of the status on the call
- Tones used during Keyset (FlexSet, GKT, DKT, DST, EKT, VDK, etc.) ringing (except for mute ring, which is a function of the telephone set itself)
- Dual Tone Multi-Frequency (DTMF) dialing tones
- Multi-FrequenCy (MFC) dialing tones
- Test tone patterns used by diagnostics

These tones are stored in digital PCM form, in PROM U118. The stored tone patterns are sent directly to the digital PCM bus when required.

Two methods of encoding audio sounds into a digital PCM form are in common use. The A-Law method is frequently used throughout Europe, Africa, Asia, South America, and many countries in other continents. The μ-Law (pronounced M-YOO Law, sometimes spelled Mu-Law) method is used in North America. Neither method has any particular advantage over the other.

The Coral IPx 500 switching system may operate using either encoding method. By default, the database uses the μ-Law method for systems shipped to North America and the A-Law for all other locations.

See the *Program Interface (PI) and Database Reference Manual* (Chapter-6 System Features - Tones, Route: SFE, 8, M_LAW) for instructions on the database programming.

In order to operate a system using the non-default encoding method, the database must be programmed accordingly and the tone PROM (U118) located on the MSBipx card must be changed to a PROM circuit that contains the system tones stored in the appropriate encoding method.

The encoding method is only significant when the Coral IPx 500 system interfaces with another switching system through a digital trunk interface such as a 30Tipx, T1ipx, PRI23ipx, PRI30ipx, 4TBRipx, 8TBRipx, or 8TBRPipx card. In this case, the encoding method of both systems must match, so that audio signals encoded by one system can be properly decoded by the other.

When the Coral IPx 500 system interfaces with a digital trunk interface to the North American public telephone network (the digital trunk provides public network service), the system must be operated using the μ-Law encoding method.

2 Country Of Use

Referring to *Figure 9-1*, integrated circuit socket U118 contains the tone PROM. This PROM contains DTMF and MFC dialing tones and other system tones such as dial tone, ringback tone, and busy tone. The tone PROM present in the MSBipx card socket varies according to the country of use. The correct tone PROM for each country is supplied by the manufacturer.

3 Database Programming

See the *Program Interface (PI) and Database Reference Manual*, *Chapter-6 System Features - Tones*, Route: SFE, 8, M_LAW) for instructions on the database programming.

The A-Law or μ-Law method requires the appropriate definition in the database.

The following parameter must be set to determine the Pulse Code Modulation (PCM) encoding standard used by the system to digitize voice signals.

System Features - Tones *(Route: SFE,8)*

M_LAW parameter. Yes (M_LAW) / No (A_LAW) / Yes (USA)

9.5 Three-Way Conference (3-Way)

Conference Circuitry

1 General Description

The MSBipx card provides up to 24 independent 3-way (conferences/Consultation/Broker service) conversation circuits. They can be used for:

- Digital voice ports, such as SKK, IPG, UGW, PRI-23, PRI-30, 4TBR, 8TBR, 8TBRP, T1 or 30T/x; to participate in a **3-way conference call** (3-way for SLT stations and analog lines is standard)
- The **Silent Monitor** feature
- The **Coral Message Center's Silent Record** feature

MSBipx (hardware issue 0100X1000 and before) incorporates:

- Six 3-way conferences

MSBipx (hardware issue 0200X1000 and above) with Coral software version 14.67 and above incorporates:

- Eight (max: 24*) 3-way conferences

NOTE:

Seperate authorization is required to allocate the 3way circuits supported by the MSBipx Issue-0200X1000 or higher).
*(max: *) The max. number is dependant on the number of URC time slots.*

The 3-way conference circuitry is completely digital. During the conferencing session, each participant hears the voices of other participants.

2 Database Programming

The 3-WAY circuit requires some database settings. Consult the *Program Interface (PI) and Database Reference Manual* for instructions on the database programming required for C3WAY.

The following parameters must be set for **3-way** conference and **Silent Monitoring**.

Sizes TAB *(Route: SYSGEN)*

RESOURCES

Class of Service *(Route: COS,0)*

BROKER/CONSULT/3-WAY/ALL

SILENT_MONITOR

Numbering Plan *(Route: NPL,0)*

SILENT_MONITOR - field 9, index 171

*MSBipx (hardware issue 0**1**00X1000 and before) includes:*

When the 3-way conference exists and is initialized, the PI shows:

Card List *(Route: CLIS)*

Card type must show 8DRCF in the P_TYPE field of **Shelf #0, Slot #13**.

Port List *(Route: PLIS,0)*

Port type must show C3WAY in the TYPE field of **Shelf #0, Slot #13, Ckt #17-22**.

Refer to *Program Interface (PI) and Database Reference Manual, Chapter 6, System Port List* for more details.

*MSBipx (hardware issue 0**2**00X1000 and above) includes:*

URC Feature Authorization (*Route: FEAT,1)*

- URC 3WAY

URC Configuration (*Route: CDB,11,1)*

- 3WAY

Defines the maximum number of 3-way Conference bridge resources to be enabled by the system URC cards. Each 3-way conference circuit requires 4 card time slots (therefore, eight 3-way circuits require 32 TS).

When the 3-way conference exists and is initialized, the PI shows:

Card List *(Route: CLIS)*

Card type must show:

RMI-F in the P_TYPE field of **Shelf #0, Slot #13**.

URC2 in the P_TYPE field of **Shelf #0, Slot #14**.

Port List *(Route: PLIS,0)*

Port type must show:

C3WAY in the TYPE field of **Shelf #0, Slot #14, Ckt #56-79(max.)**.

See *Table 9-14 page 9-34, URC Three-Way Conference (C3WAY) PI Cofiguration*.

Refer to *Program Interface (PI) and Database Reference Manual, Chapter 6, System Port List* for more details.

3 Additional 3-Way Circuits

Additional digital Conference Bridge cards may be installed in the optional Coral IPx 800X expansion cage. The additional cards include:

Card	*Cage*	*Description*
CNF	IPx 800X	Includes one of the following functions: ■ Eight 3-way conference (**8 x 3-way**), or ■ Dual 15-party conference (2 x 15-party) One card is required for each mode, and is database selectable (2 x 15-party or 8 x 3-way).
8DRCF	IPx 800X	Includes, but is not limited to, the following conference functions: ■ Six 3-way conference (**6 x 3-way**), and ■ One x 6-party conference (1 x 6-party)

These cards are described in the "*Coral Service and Peripheral Cards Installation Manual*".

4 Specifications - 3-Way Conference

Number of Circuits:...................... 6 fixed (MSBipx hardware issue 0100X1000 and before)

.... 24 max. 8 default (MSBipx issue 0200X1000 and above)

9.6 Multi-Party Conference (CONF)

Meet Me Conference Circuitry

1 General Description

MSBipx (hardware issue 0100X1000 and before) incorporates:

- One meet-me bridge conference for 6 parties

MSBipx (hardware issue 0200X1000 and above) with Coral software version 14.67 and above incorporates:

- Two (max: 6*) meet-me bridge conference for 14 parties

NOTE:

Seperate authorization is required to allocate the CONF circuits supported by the MSBipx Issue-0200X1000 or higher).
*(max: *) The max. number is dependant on the number of URC time slots.*

The Meet Me bridge manages conferences talk for up to 6/14/84 participants. Any combination of trunks or stations can participate. The circuitry is completely digital. During the conferencing session, each participant hears the voices of other participants as their amplitude voices are added.

The Meet Me bridge allows the establishment of a conference call at an appointed hour by dialing a special conference destination number.

The multi-party conference feature allows a conference of up 6/14/84 simultaneous conversations in a conference mode.

The conference bridge is a Meet Me feature. Station users can dial the programmable access code and/or transfer or be transferred to the conference call.

Access to the conference bridge may be defined through the Tenant feature.

2 Feature Descriptions

The Meet Me Bridge Conference Circuit (CONF) in the Coral IPx 500 system enables:

- Group Call
- Multiparty conference

URC Chained Meet Me Groups

The URC has 6 circuits that may be allocated as Conference ports. Each of these ports can enable one conference of 14 participants. Alternatively, these conference ports can be chained together internally by the URC, without using extra time slots, so that a conference with a maximum of 84 participants can be created. The “chain” definition is created via the PDB branch, see *page 9-53, Special Port Facilities (Route: PDB,3)*.

NOTE:

84 participants requires URC Software Versions 2.xx or higher.
The conference number is displayed on the user’s keyset. However, different members in the same chained conference may see different conference numbers on their display.

URC Meet Me Conference Modes

The Meet-Me conference can be defined to operate in one of two different modes:

- **Summation**:
  Enables all conference participants to be heard simultaneously during the conference.
- **Strongest Win**:
  Enables only the loudest speaker to be heard during the conference.

The technician is able to define a maximum number of participants when using the Summation mode. When this maximum is exceeded, the system automatically switches the conference to the Strongest Win mode (see PI Branch: CDB,11,2; *“CONF MEMBERS”* and *“CONF SWITCH DELAY”* on *page 9-53, URC Card DB - Meet Me Conference (Route: CDB,11,2)*.

3 Database Programming

The Meet Me Bridge Conference Circuit (CONF) requires the appropriate definitions in the database. Consult the *Program Interface (PI) and Database Reference Manual* for instructions on the database programming required for CONF.

The following parameters must be set, to enable **Multi-party** conferencing and **Group Calls**.

Special Port Facilities *(Route: PDB,3)*

Use this field for the following:

- To assign this port to a specific tenant group.
- To determine whether the conference participants will be notified when a member joins or leaves the conversation.

Refer to *Chapter 23 - Conference* in the *Program Interface and Database Reference Manual* for details.

Class of Service *(Route: COS,0)*

CONF

CONF_RELEASE

CONF_LOCK

Feature Timers *(Route: FE.T)*

This branch may be used to determine time intervals for multi-party conference call features. The related parameters are:

CONF_SUPV_RECALL

GRP_CALL_RING

Refer to *Chapter 6 - System Features* in the *Program Interface and Database Reference Manual* for details.

Group Calls *(Route: CALL)*

This branch may be used to assign various multi-party conference call features.
Refer to *Chapter 10 - Groups*, in the *PI and Database Reference Manual* for details.

Feature Timers *(Route: FE.T)*

GRP_CALL_RING

Gains Table *(Route: ROOT,0,1,3)*

Entry #12 of the gains table can be used to set gain parameters to the conference. For more information see Chapter 19 in the Program Interface (PI) and Database Reference manual.

*MSBipx (hardware issue 01**1**00X1000 and before) includes:*

***Feature Authorization** (Route: FEAT,1)*

- CONF

***Sizes** (Route: SIZ)*

- CONF_CKTS parameter - enter 1 port.

When the Meet Me Bridge exists and is initialized, the PI shows:

***Card List** (Route: CLIS)*

Card type must show 8DRCF in the P_TYPE field of **Shelf #0, Slot #13**.

***Port List** (Route: PLIS)*

Port type must show CONF in the TYPE field of **Shelf #0, Slot #13, Ckt #16**.

Use the NAME fields to assign a short/full name to the authorized CONF ports.

If you choose **0 - Physical Location**, type (Shelf #0, Slot #13, Ckt #16).

If you choose **1 - Dial Number**, select field [All].

Refer to *Program Interface (PI) and Database Reference Manual, Chapter 6, System Port List* for more details.

***Numbering Plan** (Route: NPL,0)*

CONFERENCE RELEASE **-** field 9, index 173.

CONFERENCE LOCK - field 9, index 190.

CONFERENCE DIAL NUMBERS **-** field 30 (Shelf #0, Slot #13, Ckt #16).

*MSBipx (hardware issue 0**2**00X1000 and above) includes:*

***Feature Authorization** (Route: FEAT,1)*

- URC CONF
- CONF

Separate Software Authorization is required to allocate the URC resources. Refer to *Program Interface (PI) and Database Reference Manual, Chapter 3, Feature Authorization* for more details.

***Sizes** (Route: SIZ)*

- CONF_CKTS parameter - enter 1 to 6 ports as required .

URC Configuration *(Route: CDB,11,1)*

- 3WAY - defines the maximum number of 3-way Conference bridge resources to be enabled by the system URC cards. Each 3-way conference circuit requires 4 card time slots (therefore, eight 3-way circuits require 32 TS).

Card List *(Route: CLIS)*

Card type must show:

RMI-F in the P_TYPE field of **Shelf #0, Slot #13**.

URC2 in the P_TYPE field of **Shelf #0, Slot #14**.

Port List *(Route: PLIS,0)*

Port type must show:

CONF in the TYPE field of **Shelf #0, Slot #14, Ckt #48-53(max.)**.

See *Table 9-12 page 9-33, URC Meet-Me Multiparty Conference PI Cofiguration*.

Use the NAME fields to assign a short/full name to the authorized CONF ports.

If you choose **0 - Physical Location**, type (Shelf #0, Slot #14, Ckt #48-53).

If you choose **1 - Dial Number**, select field [All].

Refer to *Program Interface (PI) and Database Reference Manual, Chapter 6, System Port List* for more details.

Numbering Plan *(Route: NPL,0)*

CONFERENCE RELEASE **-** field 9, index 173.

CONFERENCE LOCK - field 9, index 190.

CONFERENCE DIAL NUMBERS **-** field 30 (Shelf #0, Slot #14, Ckt #48-53).

URC Configuration *(Route: CDB,11,1)*

- Meet Me - defines the maximum number of Multi-Party (Meet-Me) conference bridge resources to be enabled by the system URC cards. Each Meet Me conference circuit requires 16 card time slots.

URC Card DB - Meet Me Conference *(Route: CDB,11,2)*

- CONF MEMBERS
- CONF SWITCH DELAY

Special Port Facilities *(Route: PDB,3)*

- LINKED TO CONF DIAL# -

Refer to *Chapter 23 - Conference* in the *Program Interface and Database Reference Manual* for details.

4 Additional Multi-Party Conference Circuits

Additional digital Conference Bridge cards may be installed in the optional Coral IPx 800X expansion cage. The additional cards include:

Card	*Cage*	*Description*
CNF	IPx 800X	Includes one of the following functions: ■ Dual 15-party conference (**2 x 15-party**) ■ Eight 3-way conference (8 x 3-way), or One card is required for each mode, database selectable (2 x 15-party or 8 x 3-way).
8DRCF	IPx 800X	Includes the following conference functions, among others: ■ One x 6-party conference (**1 x 6-party**) ■ Six 3-way conference (6 x 3-way), and

These cards are described in the "*Coral Service and Peripheral Cards Installation Manual*".

5 Specifications - Multi-Party Conference

Number of Circuits:...................... 1 fixed (MSBipx hardware issue 0100X1000 and before)

.... 6 max. 2 default (MSBipx issue 0200X1000 and above)

Participants per Circuit:................ 6 max.(MSBipx hardware issue 0100X1000 and before)

.... 14 max.(MSBipx issue 0200X1000 and above)

9.7 DTMF Receiver (DTR)

1 General Description

*MSBipx (hardware issue 0**1**00X1000 and before) incorporates:*

- 8 port DTMF receivers and decoders for touch-tone digits

*MSBipx (hardware issue 0**2**00X1000 and above) with Coral software version 14.67 and above incorporates:*

- 24 (max: 24*) port DTMF receivers and decoders for touch-tone digits

NOTE:

Seperate authorization is required to allocate the DTMF circuits supported by the MSBipx Issue-0200X1000 or higher).
*(max: *) The max. number is dependant on the number of URC time slots.*

The MSBipx includes the DTR circuits. The DTR provides up to 24 circuits, which receive and decode Dual Tone Multi-Frequency (DTMF) dialing tones. The DTR is required to support telephone station apparatus or trunks that send DTMF tones to the Coral IPx 500 system to activate system features or select other ports.

DTMF signaling is commonly used by industry standard, single line telephone (SLT) sets, as well as E&M tie trunks and Direct Inward Dialing (DID) central office trunks. Loop-start and ground-start central office trunks, which are defined in the system database as IRSS (Freedom) or DISA, require a DTR to be installed in the system.

The DTR uses industry standard DTMF receiver circuitry to decode DTMF dialing tones. The audio side of each DTMF receiver circuit is directly coupled through a CODEC to the Pulse Code Modulation (PCM) switching matrix of the Coral IPx 500 system. Decoded digital data is passed through the peripheral bus to the system processor.

2 How many DTMF receiver circuits (DTRs) are required?

To provide adequate DTMF dialing Quality Of Service in the system the number of DTMF receivers should match the anticipated traffic volume. The following table provides the amount of DTR ports required for several different DTMF dialing port sizes.

Number of DTMF Dialing Ports	*Number of DTR Receiver Circuits*
100	8
500	16
1000	24

NOTE:

This table assumes standard office traffic (medium traffic volume of 0.3Eg per port). Higher traffic volumes should increase DTMF service accordingly.
Additional DTMF service should be used when features as FlexiCall, IRSS, Freedom and DISA are used.

3 Additional DTR Circuits

Additional DTR resources cards may be installed in the optional Coral IPx 800X expansion cage. The additional cards include:

Card	*Cage*	*Description*
8DTR	IPx 800X	8 circuit DTMF Receiver and decoder card
8DRCF	IPx 800X	Includes 8 DTR circuit DTMF receiver and decoder functions, among other functions

These cards are described in the *Coral Service and Peripheral Cards Installation Manual*.

4 Database Programming

The DTR requires the appropriate definitions in the database. Consult the *Program Interface (PI) and Database Reference Manual* for instructions on the database programming required for the DTR. The following parameters must be set, to enable the **DTR**:

Sizes TAB *(Route: SYSGEN)*

RESOURCES

*MSBipx (hardware issue 0**1**00X1000 and before) includes:*

When the DTR exists and is initialized, the PI shows:

Card List *(Route: CLIS)*

Card type must show 8DRCF in the P_TYPE field of **Shelf #0, Slot #13**.

Port List *(Route: PLIS,0)*

Port type must show DTR in the TYPE field of **Shelf #0, Slot #13, Ckt #0-7**.

Refer to *Program Interface (PI) and Database Reference Manual, Chapter 6, System Port List* for more details.

*MSBipx (hardware issue 0**2**00X1000 and above) includes:*

URC Feature Authorization (*Route: FEAT,1)*

- URC DTMF

Separate Software Authorization is required to allocate the URC resources. Refer to *Program Interface (PI) and Database Reference Manual, Chapter 3, Feature Authorization* for more details.

URC Configuration (*Route: CDB,11,1)*

- DTMF

Defines the maximum number of DTMF Receiver (DTR) resources to be enabled by the system URC cards. Each DTMF receiver requires one card time slot.

URC Card Database *(Route: CDB,11,2)*

- DTMF GAIN

The gain may be adjusted in this branch and not in the Feature Control branch as with other cards.

When the DTR exists and is initialized, the PI shows:

Card List *(Route: CLIS)*

Card type must show:

RMI-F in the P_TYPE field of **Shelf #0, Slot #13**.

URC2 in the P_TYPE field of **Shelf #0, Slot #14**.

Port List *(Route: PLIS,0)*

Port type must show:

DTR in the TYPE field of **Shelf #0, Slot #14,**
Ckt #0-23(max. for URC2) or **0-47(max. for URC4)**

See *Table 9-11 page 9-31, URC DTR/DTMF PI Cofiguration*.

Refer to *Program Interface (PI) and Database Reference Manual, Chapter 6, System Port List* for more details.

5 Specifications - DTR

Number of Circuits:...................... 8 fixed (MSBipx hardware issue 0100X1000 and before)

.... 24 max. (URC2, MSBipx issue 0200X1000 and above)

.... 48 max. 24 default (URC4, MSBipx issue 0200X1000)

Detection Level: .... -28 to 0 dBm

Detection Threshold: .... -32 dBm Min.

Signal Duration: .... 50 ms Min.

Interdigit Time:............................. 50 ms Min.

Frequency Tolerance: .... Less than ±1.5%

Frequency Reject:......................... More than ±3.5%

Tip:

Sizing the number of DTR receivers must take into account the use of DISA, FlexiCall and (IRSS) Freedom features as well as the number of DTMF phones.

9.8 Dial Tone Detector (DTD)

1 General Description

The MSBipx provides up to 32 DTD (Dial Tone Detector) circuits for enhanced dialing, such as busy outside number auto-redial.

MSBipx (hardware issue 0100X1000 and before) incorporates:

- 8 detectors.

MSBipx (hardware issue 0200X1000 and above) with Coral software version 14.67 and above incorporates:

- 16 (max: 32*) detectors.

NOTE:

*(max: *) The max. number is dependant on the number of URC time slots.*

The DTD circuits are used to detect and identify standard call progress tones such as dial tone, busy tone, reorder (fast busy) tone and ringback tone. The DTD is required to support system features such as Automatic Called Number Redial (ACNR, also called Scanner).

The DTD may also be utilized to force a station user to wait for a dial tone before dialing to the central office. This increases the effectiveness of the toll restriction by prohibiting users from dialing an unrestricted code before the central office is ready, and then making a toll call when the dial tone is heard.

Each tone detection circuit of the DTD consists of a sophisticated audio noise level detector. This circuit monitors audio signals and determines a constant or ambient level, and then determines the presence of noise above ambient.

During operation, the system passes digitized voice signals from a port to be monitored, through the Pulse Code Modulation (PCM) switching matrix to one of the noise level detection circuits of the DTD. The presence of a call progress tone is typically characterized by a sustained, non-fluctuating noise level.

The DTD then multiplies the periods that the tone is present and the periods of silence. The durations of tone and silence are assembled to form a cadence (or rhythm pattern) that is compared with an internal list of call progress tones and their associated cadence. By matching the cadence of the monitored tone with the one contained in the list, the DTD identifies the tone and reports the tone type via the peripheral bus to the system processor.

2 Additional DTD Circuits

Additional DTD resources cards may be installed in the optional Coral IPx 800X expansion cage. The additional cards include:

Card	***Cage***	***Description***
8DTD	IPx 800X	[*discontinued*] 8 circuit DialTone Detector and call progress tone analyzer.
8DRCF	IPx 800X	Includes 8 DTD circuit dialtone detector and call progress tone analyzer functions, among other functions.

These cards are described in the *Coral Service and Peripheral Cards Installation Manual*.

3 Database Programming

The DTD requires the appropriate definitions in the database. Consult the *Program Interface (PI) and Database Reference Manual* for instructions on the database programming required.

The following parameters must be set, to enable **DTD**.

Sizes TAB *(Route: SYSGEN)*

RESOURCES

*MSBipx (hardware issue 0**1**00X1000 and before) includes:*

When the DTD exists and is initialized, the PI shows:

Card List *(Route: CLIS)*

Card type must show 8DRCF in the P_TYPE field of **Shelf #0, Slot #13**.

Port List *(Route: PLIS,0)*

Port type must show DTD in the TYPE field of **Shelf #0, Slot #13, Ckt #8-15**.

Refer to *Program Interface (PI) and Database Reference Manual, Chapter 6, System Port List* for more details.

*MSBipx (hardware issue 0**2**00X1000 and above) includes:*

URC Configuration *(Route: CDB,11,1)*

- DTD

Defines the maximum number of Dial Tone Detector (DTD) resources to be enabled by the system URC cards. Each DTD circuit requires 1 card time slot.

URC Card Database *(Route: CDB,11,2)*

- DTD GAIN

The gain may be adjusted in this branch and not in the Feature Control branch as with other cards.

When the DTD exists and is initialized, the PI shows:

Card List *(Route: CLIS)*

Card type must show:

RMI-F in the P_TYPE field of **Shelf #0, Slot #13**.

URC2 in the P_TYPE field of **Shelf #0, Slot #14**.

Port List *(Route: PLIS,0)*

Port type must show:

DTD in the TYPE field of **Shelf #0, Slot #14, Ckt #112-143(max.)**

See *Table 9-16 page 9-36, URC DTD PI Cofiguration*.

Refer to *Program Interface (PI) and Database Reference Manual, Chapter 6, System Port List* for more details.

4 Specifications - DTD

Number of Circuits:...................... 8 fixed (MSBipx hardware issue 0100X1000 and before)

.... 32 max. 16 default (MSBipx issue 0200X1000 and above)

Detection Level: .... -28 to 0 dBm

Rejection Level: .... -32 dBm Minimum

9.9 Caller ID for SLT (iDSP)

1 General Description

The MSBipx provides up to 32 circuit FSK (Frequency Shift Keying) tone generator.

MSBipx (hardware issue 0100X1000 and before) incorporates:

- Not available

MSBipx (hardware issue 0200X1000 and above) with Coral software version 14.67 and above incorporates:

- 16 (max: 32*) Caller ID circuit transmitters adapted to Bellcore standards which includes the time and Caller Name/Num display

NOTE:

Seperate authorization is required to allocate the iDSP circuits supported by the MSBipx Issue-0200X1000 or higher).
*(max: *) The max. number is dependant on the number of URC time slots.*

The iDSP is required for displaying CID (Caller ID) for SLT users. The iDSP application converts ASCII text information, received from the Coral main processor, into FSK tone:

- BellCore GR-30, or
- ETSI 300-659-1 para. 6.1.1

The FSK tones are supplied for direct injection onto the Coral PCM highways. The iDSP application provides up to 32 individual FSK tones simultaneously, each on a different PCM channel and call.

The CID display feature for SLT requires Authorization for SLT-CID, and an FSK compatible display unit installed on the SLT port.

The following information modulated in FSK is sent to an SLT interface by the iDSP application, between the 1st and 2nd ring:

- Date,
- Time,
- Number (the last 10 digits),

- Name (the first 15 characters); enabled through programming in the configuration database.

The CID display unit detects this information and transforms it back into ASCII codes. Up to 32 SLT sets can receive CID information simultaneously from a single URC iDSP application. Multi-appearance and waiting call's information is not supported.

2 Additional CID Circuits

Additional CID resources cards may be installed in the optional Coral IPx 800X expansion cage. The additional cards include:

Card	***Cage***	***Description***
iDSP	IPx 800X	64 circuit FSK (Frequency Shift Keying) tone generator card.

These cards are described in the *Coral Service and Peripheral Cards Installation Manual*.

3 Database Programming

The CID requires the appropriate definitions in the database. Consult the *Program Interface (PI) and Database Reference Manual* for instructions on the database programming required.

The following parameters must be set, to enable **CID**.

URC Feature Authorization *(Route: FEAT,1)*

- URC CLID
- SLT-CID

URC Configuration *(Route: CDB,11)*

- CID

Defines the maximum number of Caller ID (CID) transmitter resources to be enabled by the system URC cards. Each CID transmitter circuit requires 1 card time slot.

When the CID exists and is initialized, the PI shows:

Card List *(Route: CLIS)*

Card type must show:

RMI-F in the P_TYPE field of **Shelf #0, Slot #13**.

URC2 in the P_TYPE field of **Shelf #0, Slot #14**.

Port List *(Route: PLIS,0)*

Port type must show:

CID in the TYPE field of **Shelf #0, Slot #14, Ckt #80-111(max.)**

See *Table 9-15 page 9-35, URC iDSP CID (Caller ID) Transmitters PI Cofiguration*.

Refer to *Program Interface (PI) and Database Reference Manual, Chapter 6, System Port List* for more details.

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4 Specifications - CID

Number of Circuits: ....0 (MSBipx hardware issue 0100X1000 and before)

....32 max. 16 default (MSBipx issue 0200X1000 and above)

NOTES:

9.10 MFC Receiver (MFR)

Multi-Frequency Code Receiver Circuit

1 General Description

The MSBipx does not provide circuits for MFC (Multi-Frequency Code) Receiver.

It is required to support telephone equipment or trunks which send MFC-R2 inter-office tone dial signaling to the Coral system for the purpose of activating system features or selecting other ports.

2 Available MFR Circuits

MFR resources cards may be installed in the optional Coral IPx 800X expansion cage. The cards include:

Card	*Cage*	*Description*
16MFR	IPx 800X	16 circuit Multi-Frequency Code (MF or MFC tone) Receiver and decoder card.

These cards are described in the *Coral Service and Peripheral Cards Installation Manual*.

NOTES:

9.11 Media Channels (MG/MRC)

For VoIP

1 General Description

Media channels are used to convert PCM calls to IP Packets and vice versa. Media channels are also required when one of the calling parties is not an IP host. No media channels are required for pure IP-to-IP connections (direct-connects).

The MSBipx does not provide circuits for media channels.
Media channels are provided by an MG or MRC module, which is a daughterboard attached to the VoIP gateway card in piggyback fashion.

2 Available Media Channel Circuits

Media gateway cards may be installed in the main cage and in the optional Coral IPx 500X and 800X expansion cage. The cards include:

Card	*Cage*	*Description*
PUGW w/MRC	IPx 800X	MRC-8, 16, 32 or 64 provides SIP and MGCP media channels. Requires Coral version 15.xx
PUGWipx w/MRC	IPx 500M/X	
UGW-E w/MG	IPx 800X	MG-24, 48, 72, 96 or 120 provides 24, 48, 72, 96 or 120 MGCP media channels. Requires Coral version 14.xx
UGW-Eipx w/MG	IPx 500M/X	

These cards are described in the *Coral VoIP (Voice Over IP) Installation Manual*.

9.12 Remote Maintenance Modem

1 General Description

The Coral IPx 500M provides an auto-answer data modem via the MSBipx. A full duplex, asynchronous, ASCII modem, for remote programming the system database, diagnostics and system maintenance, and/or for displaying various reports.

The modem operates at up to 56Kbps, using the ITU-T V.92 standard.

The modem answers an incoming call in Originate mode (no answer tone). To establish a connection, the originating modem must initiate the call in answer mode (by sending answer tone). This feature may be used as an added security measure to protect the system database from intrusions.

2 Modem Jumpers - Enable/Disable

The MSBipx card is equipped with jumper straps JU10 and JU11 (see *Figure 9-1*) that enable and disable the modem. These jumpers, when removed, disable the on-board modem, without affecting the other programming interfaces. Thus, a local programming terminal or an external modem incorporating more sophisticated security features may be operated while the MSBipx modem is disabled.

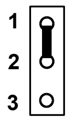
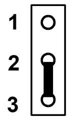
The modem requires no external connections to function. The data side of the modem circuitry directly accesses the peripheral data bus to communicate with the system processor. The audio side of the modem circuitry directly accesses the switching matrix, is assigned a dial number in the system database and may answer incoming calls in virtually the same manner as any other port in the system.

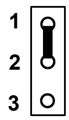
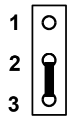
The Coral IPx 500 modem can be configured to transmit or receive data. This is useful when maintenance from a remote workstation is necessary. During normal system operation, it is advisable to set the modem transmit and receive function to “Off” for more secure system operation. *Figure 9-7* displays the jumper settings for the modem.

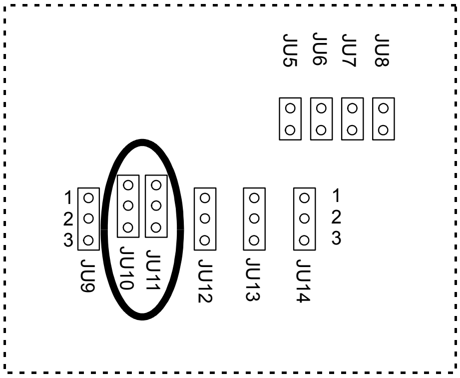
CAUTION!

Setting the Transmit or Receive function of the modem to “On” during normal system operation exposes the Coral IPx 500 system to penetration by unauthorized parties.

Figure 9-7 ***Modem - Jumper Configuration***

Function	JU10
Rx Modem - On	
Rx Modem - Off	

Function	JU11
Tx Modem - On	
Tx Modem - Off	



CAUTION!

The modem may only be used to communicate with the system processor for programming and maintenance purposes, or for retrieving station message detail recording (SMDR) data or wake-up reports. It may not be used as a switched data port.

3 Database Programming

NOTE:

This function requires installation of an additional jumpers (JU10, JU11 pins 1 and 2 must be connected) on the MSBipx card. Described *on page 9-71**.*

The Modem requires the appropriate definitions in the database. Consult the *Program Interface (PI) and Database Reference Manual* for instructions on the database programming required for the modem.

When the modem exists and is initialized, the PI shows:

1. Card List (Route: CLIS)

Card type must show RMI-F or 8DRCF in the P_TYPE field of **Shelf #0, Slot #13**.

2. Port List (Route: PLIS**)**

Port type must show MODEM in the TYPE field of **Shelf #0, Slot #13, Ckt #26**.

Use this field to assign a short/full name to this port.

If you choose **0 - Physical Location**, type (Shelf #0, Slot #13, Ckt #26).

If you choose **1 - Dial Number**, choose field [5] MODEM.

Refer to *Chapter 6 - System Port List*, in the *Program Interface (PI) and Database Reference Manual*, for more details.

2. General Numbering Plan (Route: NPL,0) [13] (Ckt #26)

Use the 13-MODEM field of the Update Menu, to designate dial numbers to the modem ports in the system. Refer to Chapter 5 - Numbering Plan, in the Program Interface (PI) and Database Reference Manual, for more details.

3. Special Port Facilities (Route: PDB,6)

Use this field to assign this port to a specific tenant group.

Refer to *Chapter 23 - RMI Modem*, in the *Program Interface (PI) and Database Reference Manual*, for more details.

4. Class Of Service (Route: COS,0) [MODEM]

Use the MODEM parameter to determine whether a specific station user is allowed to dial to the MODEM. Refer to *Chapter 7 - Station and Trunk COS*, in the *Program Interface (PI) and Database Reference Manual*, for more details.

5. Terminal Setup (Route: TERM,0)

Use this field to set up the communication parameters for the data applications.

Refer to *Chapter 17* in the *Program Interface (PI) and Database Reference Manual* for more details.

6. **Gains Table** (Route: ROOT,0,1,3)

   Entry #10 of the gains table can be used to set gain parameters to the modem. These parameters set the transmission value levels of the modem while in CONNECT state with any possible port in the system. For more information see *Chapter 19* in the *Program Interface (PI) and Database Reference And Database Manual*.

4 Additional Modem in the Optional IPx 800X Cage

Additional modem ports may be installed in the optional Coral IPx 800X expansion cage. The additional cards include:

Card	*Description*
8DRCF	Includes the ITU-T V.92 (up to 56Kbps) remote maintenance modem, among other functions.

These cards are described in the *Coral Service and Peripheral Cards Installation Manual*.

Shared service cards may be installed in any available peripheral card slot in the optional Coral IPx 800X Expansion Unit.

5 Specifications - Modem

Modem Operating Modes: (V.92 ITU-T) up to 56Kbps

Client-to-Server .... DataComm: supports V.92 or K56flex

Modem Compatibility .... ITU V.92, K56flex

NOTE:

Data communications via the modem use the 7 bit, American Standard Code for Information Interchange (ASCII) character set, although each port may be programmed to send and receive a "dummy" 8th character bit. Data is exchanged in asynchronous character transmission mode.

9.13 Data Serial Ports (RS-232E)

KB1, KB2, KB3

1 General Description

The Coral IPx 500M provides three EIA RS-232E Asynchronous, ASCII serial data interfaces (KB1, KB2 and KB3) via the MSBipx, for the following functions:

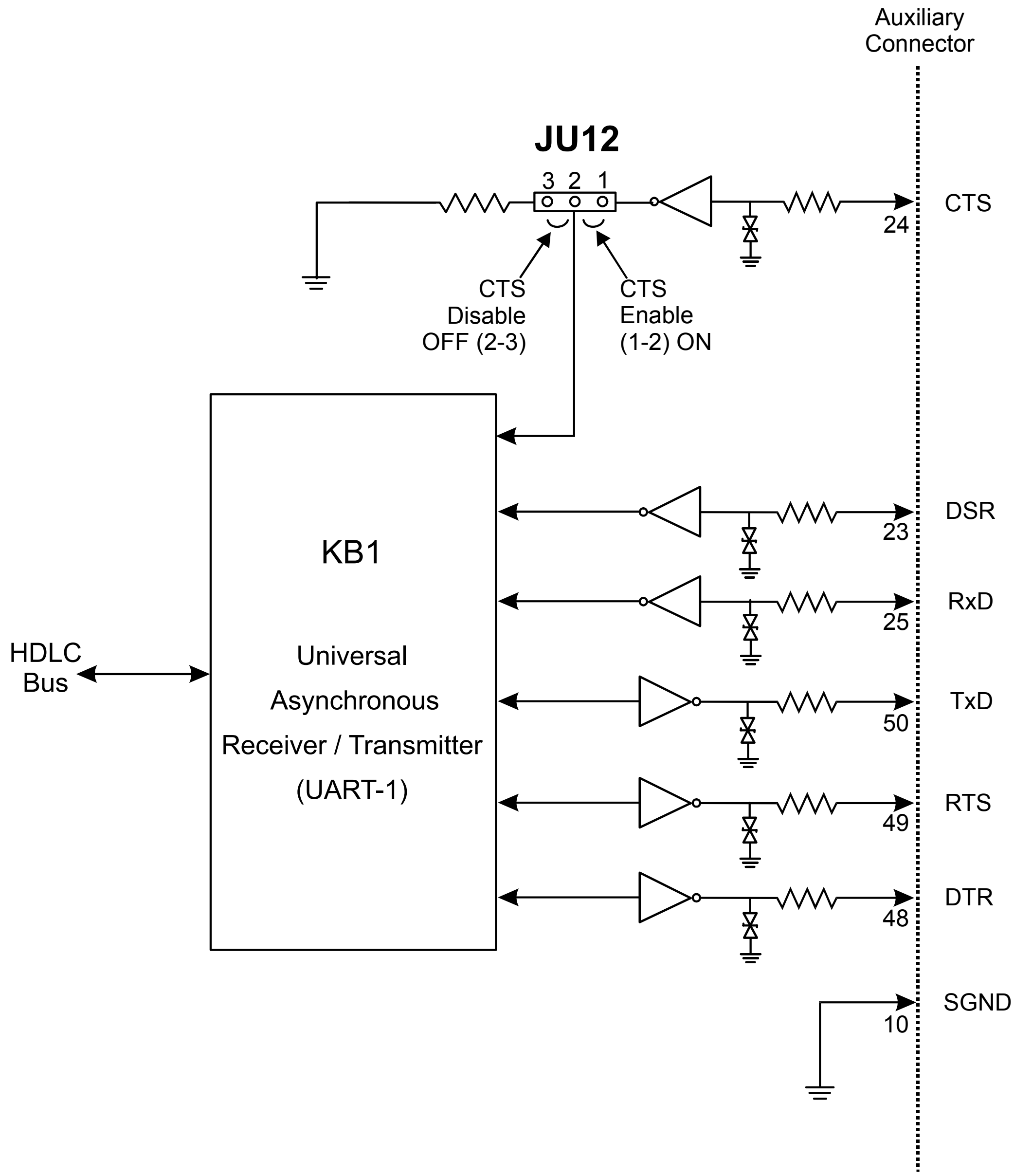
- System database programming
- Diagnostics and system maintenance
- Displaying reports such as Station Message Detail Recording (SMDR)

Figure 9-8, *Figure 9-9*, and *Figure 9-10* are simplified circuit diagrams of the data interfaces.

Serial data originating from the system processor is formatted with start, parity, and stop bits by the Universal Asynchronous Receiver/Transmitter (UART). The data is then translated from TTL level to RS-232E level voltages or vice versa by an external transceiver.

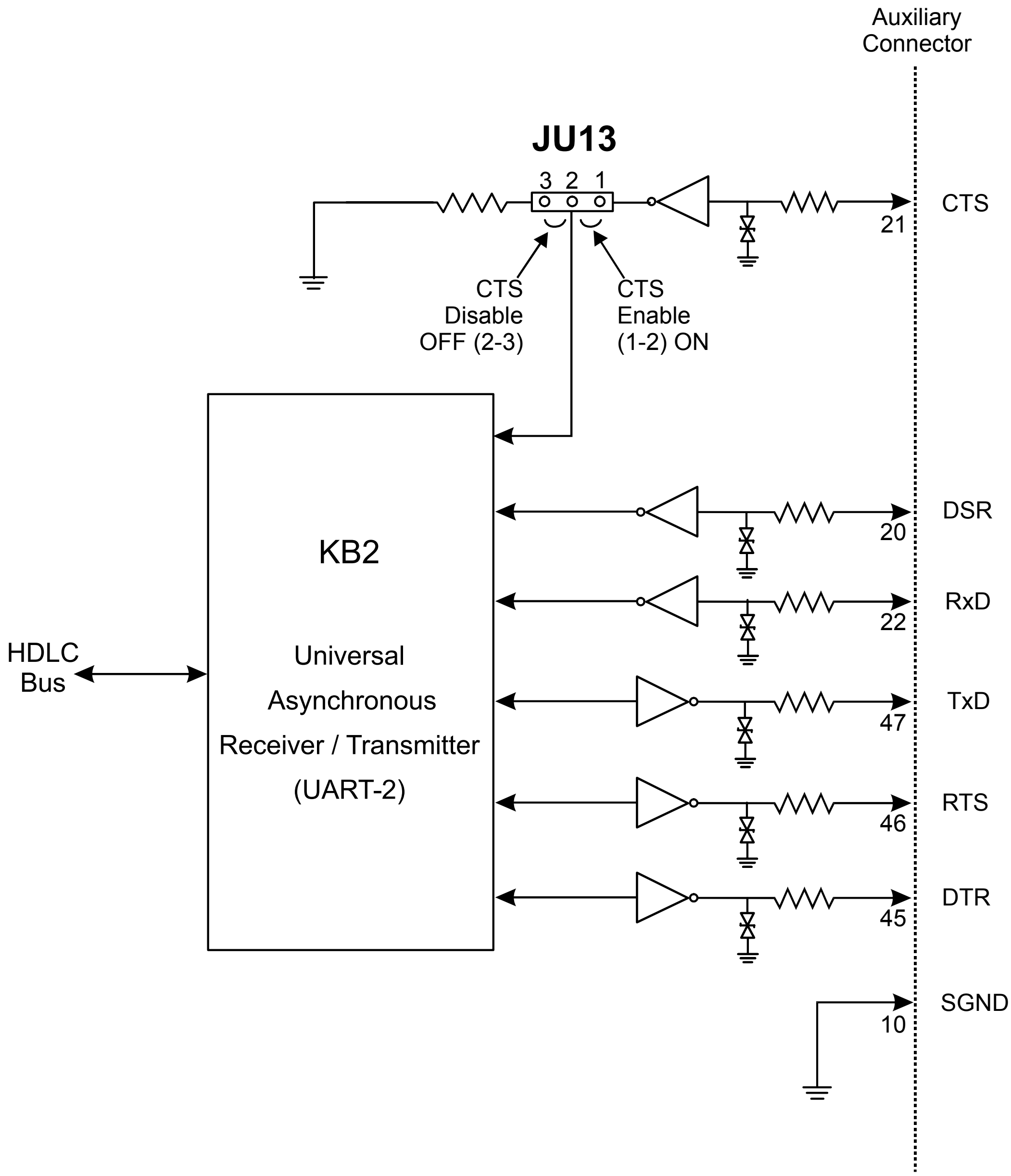
The baud rate (up to 115,200), word length, and parity of the RS-232E data port is independently defined in the system database (see *page 9-81, Database Programming*).

Figure 9-8 ***KB1 (RS-232E) Simplified Interface Diagram***



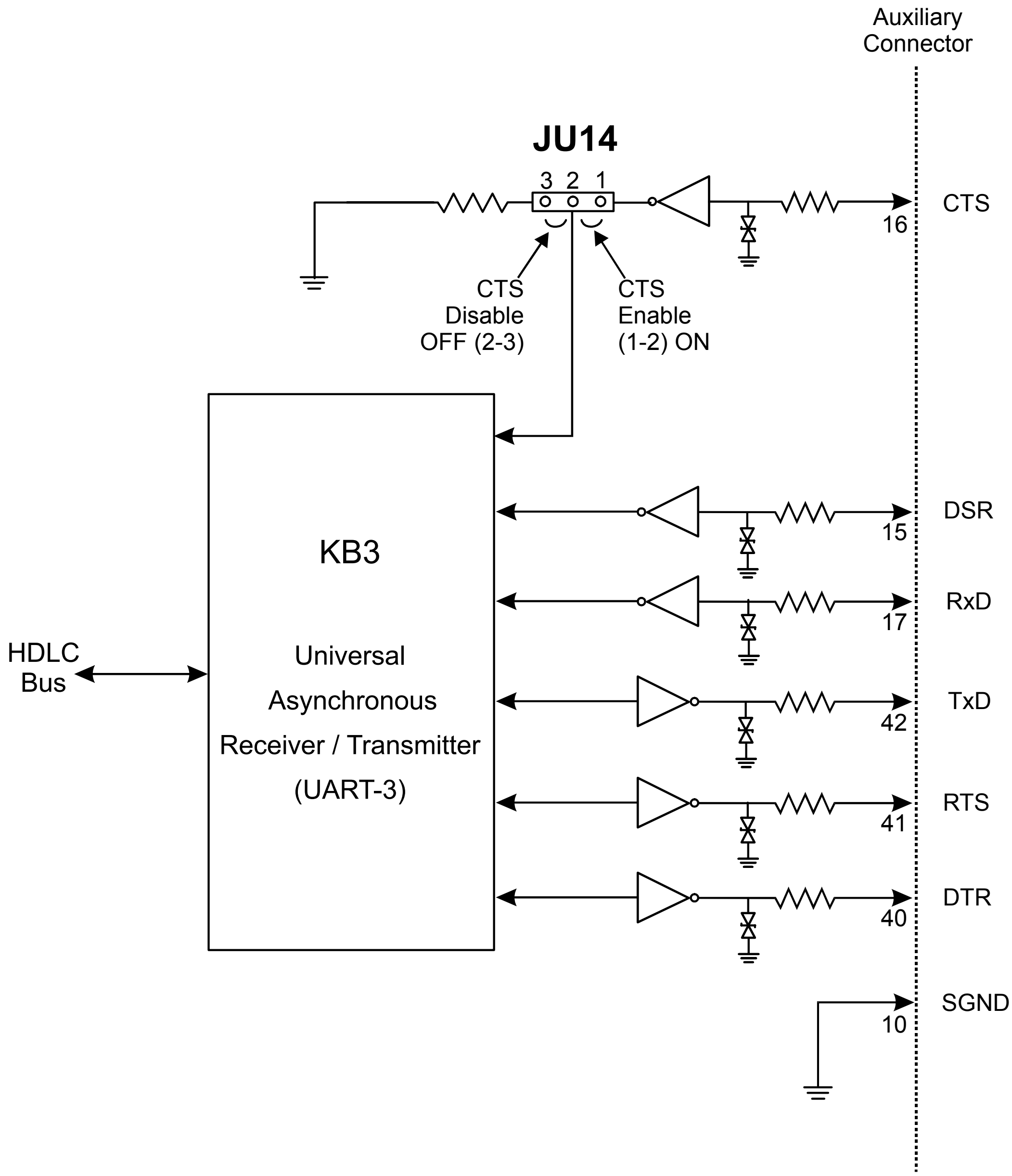
<u>RS-232 Cable</u>
JU12 On (1-2) - Use a 5-wire cable (RxD, TxD, CTS, RTS, and SGND)
JU12 Off (2-3) - A 3-wire cable is acceptable (RxD, TxD, and SGND)

Figure 9-9 ***KB2 (RS-232E) Simplified Interface Diagram***



<u>RS-232 Cable</u>
JU13 On (1-2) - Use a 5-wire cable (RxD, TxD, CTS, RTS, and SGND)
JU13 Off (2-3) - A 3-wire cable is acceptable (RxD, TxD, and SGND)

Figure 9-10 ***KB3 (RS-232E) Simplified Interface Diagram***



<u>RS-232 Cable</u>
JU14 On (1-2) - Use a 5-wire cable (RxD, TxD, CTS, RTS, and SGND)
JU14 Off (2-3) - A 3-wire cable is acceptable (RxD, TxD, and SGND)

2 Configuring the CTS Jumper "Handshaking" Option

The MSBipx card is equipped with jumpers (JU12, JU13, JU14). Before installing the PS500 power supply, the jumpers on the MSBipx card are set to their correct positions. See *Figure 9-1* and *Figure 9-11*.

Jumpers JU12 (KB1)/ JU13 (KB2)/ JU14 (KB3) connect the ground to the Clear-To-Send (CTS) input of KB1, KB2 and KB3 data ports. When set to ON, the CTS option is enabled.

The CTS is enabled by the customer whenever a printer or terminal is connected to KB1/KB2/KB3 with a RS-232E cable.

RS-232 Cable

Applying the jumper between terminals 1 and 2 requires a five-lead cable (Rx, Tx, CTS, RTS, and SGND).

Applying the jumper between terminals 2 and 3 requires a three-lead cable (Rx, Tx, and SGND)

- CTS On (1-2) - Use a 5-wire RS-232E cable (RxD, TxD, CTS, RTS, and SGND).
- CTS Off (2-3) - A 3-wire RS-232E cable is acceptable (RxD, TxD, and SGND).

CAUTION!

The KB1, KB2 and KB3 data ports may only be used to communicate with the system processor for programming and maintenance purposes, or for retrieving station message detail recording (SMDR) data or wake-up reports. It may not be used as switched data ports.

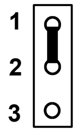
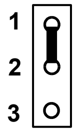
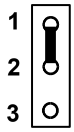
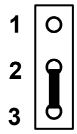
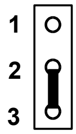
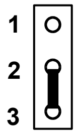
Configuring the "Handshaking" Option

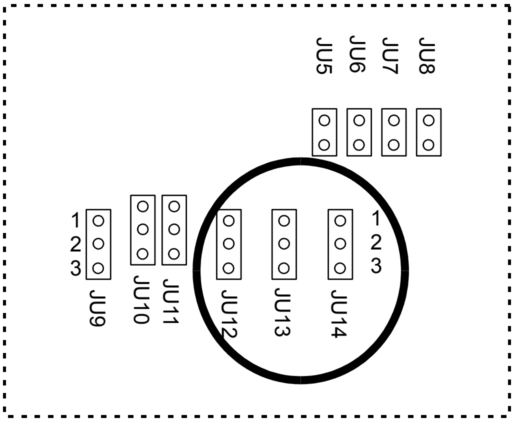
Handshaking is the process whereby two communicating devices acknowledge and recognize each other and open channels for communication.

The Coral IPx 500 system can be managed by three local workstations. Each local workstation can be adjusted to a high or low level of handshaking protocol. *Figure 9-11* displays the jumper settings and describes the jumper configuration for each local terminal: UART1, UART2, and UART3. An On setting indicates a high level of handshaking protocol; an Off setting indicates a low level of handshaking.

The local workstations communicate with the Coral IPx 500 system via the auxiliary connection and the MDF.

Figure 9-11 ***KB1,2,3 (RS-232E) Jumper Configuration for CTS***

Function	KB1 JU12	KB2 JU13	KB3 JU14
CTS - On			
CTS - Off			



<u>RS-232 Cable</u>
CTS On (1-2) - Use a 5-wire cable (RxD, TxD, CTS, RTS, and SGND)
CTS Off (2-3) - A 3-wire cable is acceptable (RxD, TxD, and SGND)

3 Database Programming

The RS-232 serial port requires the appropriate definitions in the database. Consult the *Program Interface (PI) and Database Reference Manual* for instructions on the database programming required for RS-232.

Terminal Setup *(Route: TERM,0)*

Use this field to setup the communication parameters for the data applications.

Refer to *Chapter 17* in the *Program Interface (PI) and Database Reference Manual* for more details.

NOTE:

Data communications via the RS-232E interface use the 7 bit, American Standard Code for Information Interchange (ASCII) character set, although the port may be programmed to send and receive a "dummy" 8th character bit. Data is exchanged in asynchronous character transmission mode.

4 RS-232 Cable - External Connections

The RS-232E data ports are wired as data terminal devices (DTE). *Figure 9-12* illustrates the connection to a typical data terminal. *Table 9-1 on page 9-11* and *Table 9-17* below lists the function of each interface pin, as they appear on the Auxiliary I/O connector located on the left top main cage, *Figure 9-2 on page 9-12* illustrates that connector.

Settings of the KB1, KB2 and KB3 Program Interface ports are defined in the Terminal Port Programming (Route: TERM) branch of the system database. This includes parameters such as baud rate, terminal type and parity settings. Refer to *Chapter 17* in the *Program Interface (PI) and Database Reference Manual* for instructions on Program Interface port settings.

Table 9-17 ***KB1,2,3 (RS-232E) Interface Pin Functions via the Auxiliary Connector***

KB1 Pin#	***KB2 Pin#***	***KB3 Pin#***	***Signal***	***Function***
25	22	17	Receive (RxD) Data	Input To KB1,2,3
50	47	42	Transmit (TxD) Data	Output From KB1,2,3
48	45	40	Data Terminal Ready (DTR)	Output From KB1,2,3
10	10	10	Signal Ground (GND)	Common Return For All Data Signals
23	20	15	Data Set Ready (DSR)	Input To KB1,2,3
49	46	41	Request To Send (RTS)	Output From KB1,2,3
24	21	16	Clear To Send (CTS)	Input To KB1,2,3

Jumpers JU12, JU13, and JU14 for the CTS signal enable (in the OFF position) to set the signal to ACTIVE. In this situation, KB1, KB2 and KB3 data ports can be connected with three wires (pins RxD, TxD, GND) only.

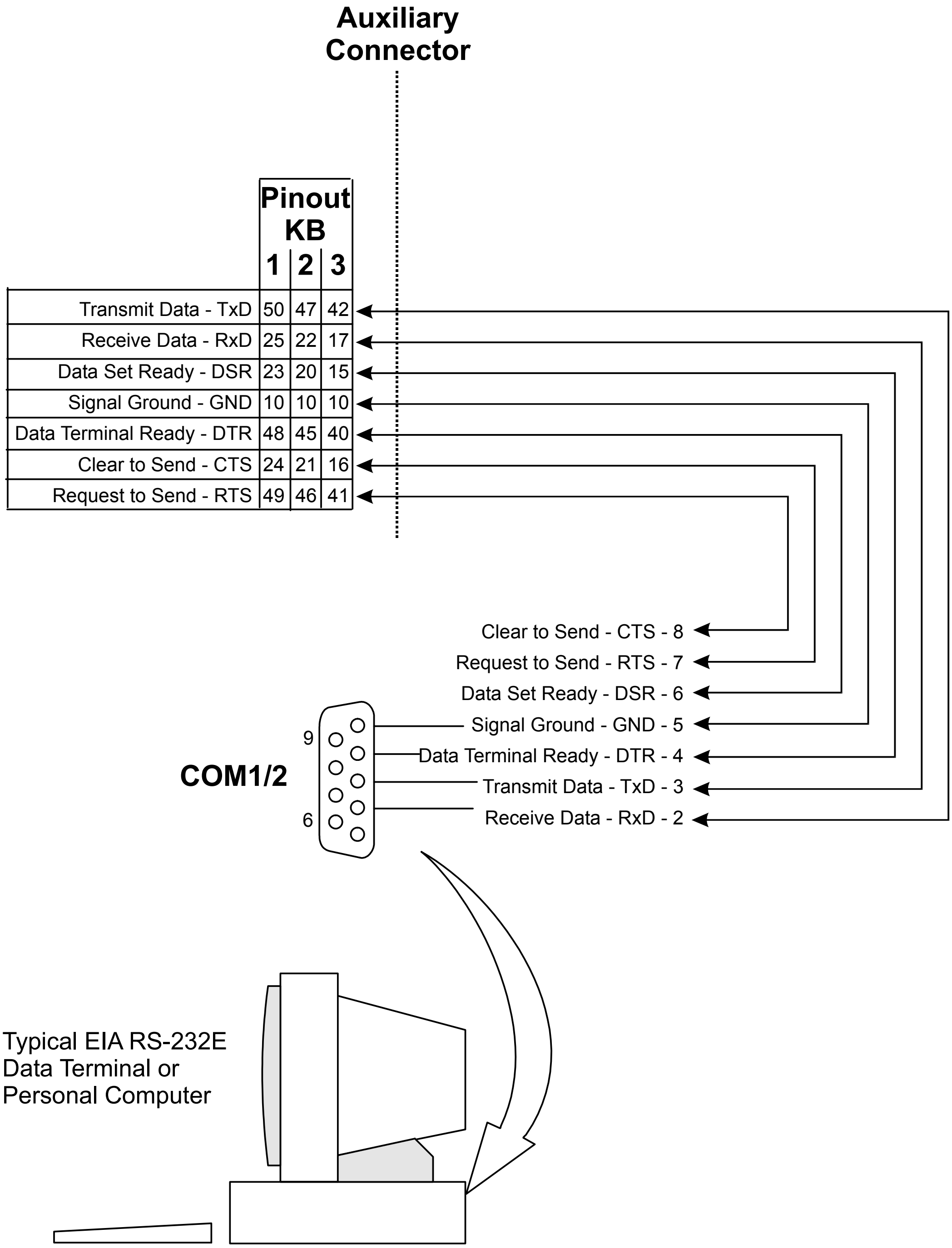
NOTE:

In this situation, printer problems are not notified.

Applying the jumper between terminals 1 and 2 requires a five-lead cable (Rx, Tx, CTS, RTS, and SGND). Applying the jumper between terminals 2 and 3 requires a three-lead cable (Rx, Tx, and SGND).

- CTS On (1-2) - Use a 5-wire RS-232E cable (Rx, Tx, CTS, RTS, and SGND).
- CTS Off (2-3) - A 3-wire RS-232E cable is acceptable (Rx, Tx, and SGND).

Figure 9-12 ***KB1,2,3 (RS-232E) Data Port Wiring to Data Terminal***



5 Additional RS-232 ports in the Optional IPx 800X Cage

Additional RS-232 Serial ports may be installed in the optional Coral IPx 800X expansion cage. The additional cards include:

Card	*Cage*	*Description*
8DRCF	IPx 800X	Includes three RS-232E programming/maintenance interfaces (300 to 115,200 bps), among other functions.

These cards are described in the *Coral Service and Peripheral Cards Installation Manual*.

6 Specifications - RS-232E

RS-232E Data Terminal Port (KB1, KB2 and KB3):

Date Rates .... 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200bps

Word Length... 7 or 8 bits

Parity.. Even, Odd, Mark, Space or None

Stop Bits 1

Signal Level .... ±9 VDC (per EIA RS-232E)

CTS.. Input to KB1, KB2 or KB3

DSR .... Input to KB1, KB2 or KB3

DTR .... Output from KB1, KB2 or KB3

RTS.. Output from KB1, KB2 or KB3

RXD... Input to KB1, KB2 or KB3

TXD .... Output from KB1, KB2 or KB3

NOTE:

The Data terminal ports operating mode is programmed in the Terminal Port Definition (Route: TERM) branch of the system database. (Refer to the Program Interface (PI) and Database Reference Manual, Chapter 17).

9.14 Music
Background and Music-On-Hold (M1/M2)

1 Introduction

The Coral IPx 500M provides, via the MSBipx, the following common system functions:

- Two music inputs, one of which can be internal.
- Music-on-hold interface (two ports).
- Key telephone background music interface (two different sources)

2 Circuit Description

Figure 9-13 is a simplified circuit diagram of the two Music Interfaces.

The external music (M1,M2) interfaces are electrically identical. Audio signals to the system are passed through the audio coupling transformer to the interface. A direct current (DC) blocking capacitor protects the secondary winding of the audio coupling transformer from conducting DC energy. As a music input the circuit operates as an input only, and so it can be used to play but not record music.

Internal music (M1) is available in some countries. The selection between the internal or external source is accomplished by JU9 jumper located on the MSBipx card. See *Figure 9-1*. *Table 9-18* defines the position of JU9 for the music selection.

3 Configuring the Music M1 Jumper to External or Internal

The system music source M1 may be either from an internal or an external source. *Figure 9-14* displays the jumper settings for the source type.

Table 9-18 ***Music M1 Internal/External Selection JU9 Jumper Setting***

JU9	*1-2*	*2-3*
M1	Internal	External
M2	External	External

Figure 9-13 ***Music - Simplified Diagram***

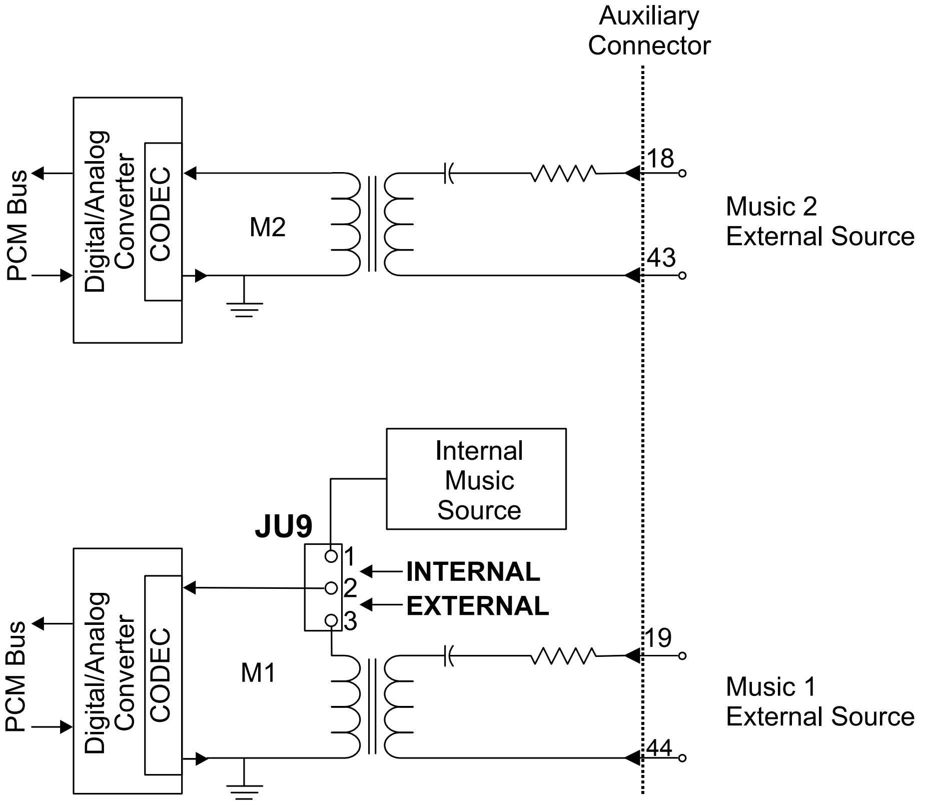
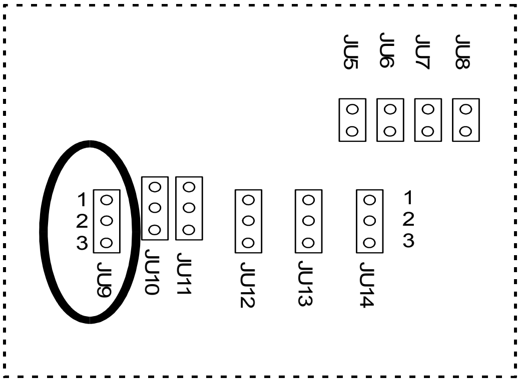


Figure 9-14 ***Music M1 Internal/External Selection JU9 Jumper Setting***

Function	JU9
Internal Music	1 2 3
External Music	1 2 3



4 Database Programming

Each Coral IPx 500 main cage provides two music sources; M1 (External/Internal selectable) and M2 (External).

The Music feature requires the appropriate definitions in the database. Consult the *Program Interface (PI) and Database Reference Manual* for instructions on the database programming required for Music.

The following parameters must be set, to enable the Music feature.

1. **Card List (**Route: CLIS)

   Card type must show RMI-F or 8DRCF in the P_TYPE field of **Shelf #0, Slot #13**.

2. **Music Sources** (Route: SYSGEN,4)

   Use this field to determine the number and the location of music sources in the system. Refer to *Chapter 4 - Music Sources*, in the *Program Interface and Database Reference Manual*, for more details.

3. **Page-Q** (Route: ROOT,0,7)

   Use this field to determine which music source will be used when a call is placed on a specific queue. Refer to *Chapter 23 - Page_Q Music*, in the *Program Interface (PI) and Database Reference Manual*, for more details.

4. **SLT_Def** (Route: SLT)

   Use the **MUSIC_ON_HOLD/TRANSFER** field to determine which music source will be used when a call is placed on hold by the relevant port.

5. **E&M_Def** (Route: TRK,1)

   Use the **MUSIC_ON_HOLD/TRANSFER** field to determine which music source will be used when a call is placed on hold by the relevant port.

6. **KEYSET_Def** (Route: KEY)

   Use the **MUSIC** field to activate or cancel background music for a specific keyset.

   Use the **MUSIC_NUM** field to determine which music source will sounded.

   Use the **MUSIC_ON_HOLD/TRANSFER** field to determine which music source will be used when a call is placed on hold by the relevant port.

7. **Hunt Group** (Route: HUNT)

   Use the **MUSIC_SOURCE** field to determine which music source will sounded for callers that queue on the group.

   Use the **RETAIN_HUNT_MUSIC_SOURCE** field as described in *Chapter 9*, in the *Program Interface (PI) and Database Reference Manual*.

8. **Gains Table** (Route: ROOT,0,1,3)

   Entry #11 of the gains table can be used to set gain parameters to the music sources. These parameters set the transmission value levels of the music while in CONNECT state with any possible port in the system. For more information see *Chapter 19* in the *Program Interface (PI) and Database Reference manual*.

9. **WAIT_QUE** (Route: ROOT, 7, 3)

   The following three fields **MUSIC/TONE, MUSIC_SOURCE#** and **RETAIN_WAIT_Q__SOURCE** are used to activate WAIT_Q features. For more information see *Chapter 27 - CoraLINK* in the *Program Interface (PI) and Database Reference manual*.

5 External Connections

Figure 9-15 illustrates the connection of customer-supplied music sources. The first music source is passed to any port in a hold state and may also be selected as background music over the speaker of idle key telephone sets. The second music source may be defined in the system database as a second music source for multiple background music sources.

The music source should have a line-level (-10dBm or 50 to 100mV), 600Ω, balanced output, with an adjustable output level. In some cases, an 8Ω speaker level output from a portable radio or tape player may be used with satisfactory results, if the volume is set relatively low and background noise is not objectionable.

Figure 9-15 ***Music - Wiring to External Music Source***

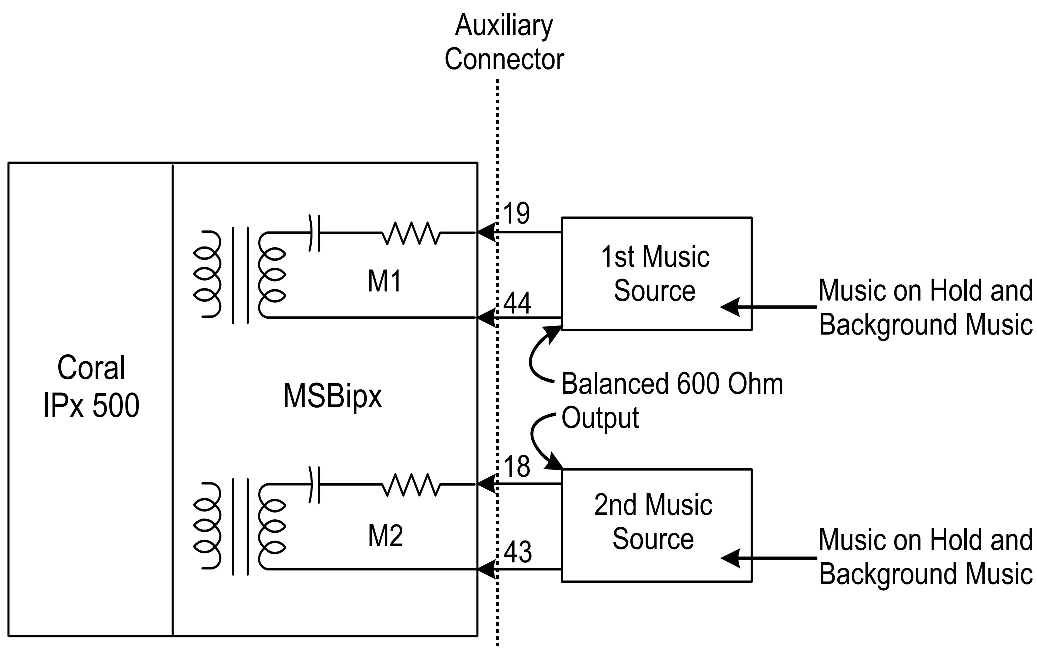


Table 9-1 on page 9-11 lists the function of each interface pin, as they appear on the Auxiliary I/O connector located on the left top main cage, *Figure 9-2 on page 9-12* illustrates that connector.

6 Additional Music Interfaces in the Optional IPx 800X Cage

Additional Music ports may be installed in the optional Coral IPx 800X expansion cage. The additional cards include:

Card	*Cage*	*Description*
8DRCF	IPx 800X	Includes the following functions, among others: ■ 1 internal or external music interface ■ 1 external music interface

These cards are described in the *Coral Service and Peripheral Cards Installation Manual*.

7 Specifications - Music

M1/M2 (Music-On-Hold and Background Music):

Uses .... Music-On-Hold (MOH), Background Music

Termination.. Capacitor-coupled transformer, non-grounded

Impedance.. 600Ω Nominal

Input Level .... -15 dBm Nominal

9.15 Voice Paging (Public Addres) and Relay-1

Public Address

1 Introduction

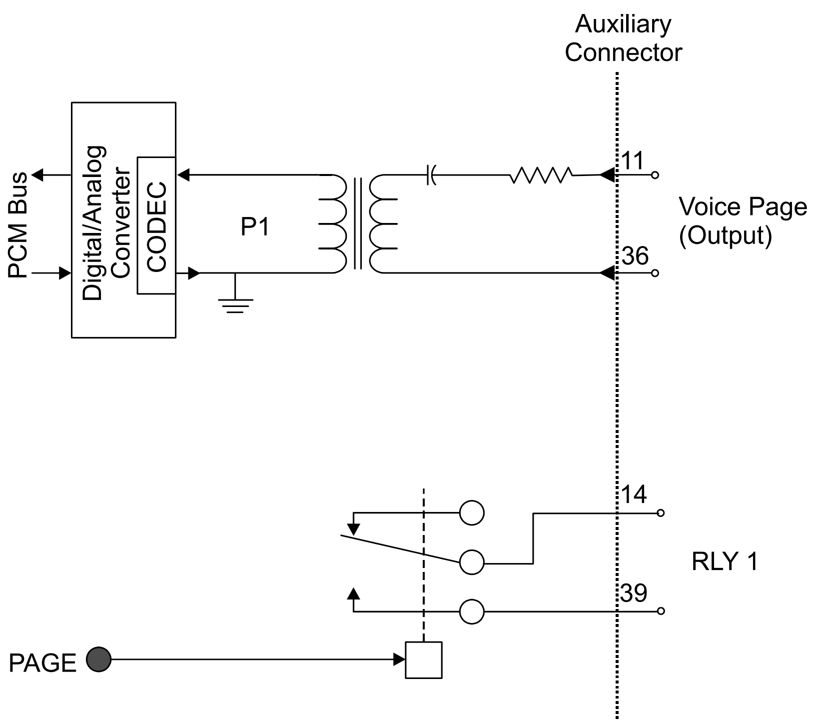
The Coral IPx 500M provides one external paging interface via the MSBipx card (public address, one port). Station users can access an external voice paging system connected to the Coral by dialing access code.

2 Circuit Description (P1 and RLY 1)

Figure 9-16 is a simplified circuit diagram of the Paging Interfaces and the relay contacts.

Each Coral IPx 500 main cage provides one paging output: the external voice paging port operates by using both the relay circuit (RLY1) and the P1 circuit. The P1 circuit is used for public address.

Figure 9-16 ***Paging & Relay - Simplified Diagram***



The External Paging (P1) Interface is electrically identical to the Music interfaces. Audio signals from the system are passed through the audio coupling transformer to the interface. A direct current (DC) blocking capacitor protects the secondary winding of the audio coupling transformer from conducting DC energy. As a music input the circuit operates as an input only, and so it can be used to play but not record music.

The relay provides form A (single pole, single throw and normally open) contacts for activating external circuitry and devices. Contacts RLY1 are designated to operate in conjunction with audio interface P1 for external paging applications. Care must be taken not to exceed the contact ratings listed in the specifications.

3 Database Programming

Each Coral IPx 500M main cage provides one paging output: the external voice paging port operates by using both the relay circuit (RLY1) and the P1 circuit.

The paging feature requires the appropriate definitions in the database. Consult the *Program Interface (PI) and Database and Database Reference Manual* for instructions on the database programming required for Paging.

The following parameters must be set, to enable the paging feature.

1. **Card List (**Route: CLIS)

   Card type must show RMI-F or 8DRCF in the P_TYPE field of **Shelf #0, Slot #13**.

2. **General Numbering Plan** (Route: NPL,0) **[12] (Ckt #23)**

   Use the **12-Page** field of the PI in the Update Menu to designate dial numbers to the Public Address Page in the system. Refer to *Chapter 5 - Numbering Plan*, in the *Program Interface (PI) and Database Reference Manual*, for more details.

3. **Port List** (Route: PLIS)

   Port type must show PAGE in the TYPE field of **Shelf #0, Slot #13, Ckt #23**.

   Use this field to assign a short/full name to this port.

   If you choose **0 - Physical Location**, type (Shelf # 0, Slot # 13, Ckt # 23).

   If you choose **1 - Dial Number**, choose field [6] PAGE.

   Refer to *Chapter 6 - System Port List*, in the *Program Interface and Database Reference Manual*, for more details.

4. **Special Port Facilities** (Route: PDB,5)

   Use this field to assign this port to a specific tenant group.

   Refer to *Chapter 23 - Public Address/Page*, in the *Program Interface and Database Reference Manual*, for more details.

5. **Class Of Service** (Route: COS,0) **[PAGE]**

   Use the PAGE parameter to determine whether a specific station user is allowed to dial and access the External Voice Paging system. Refer to *Chapter 7 - Station and Trunk COS*, in the *Program Interface and Database Reference Manual*, for more details.

4 External Connections

The Coral IPx 500 system provides a voice page interface for external paging and public address. The interface supplies a line-level (-10dBm or 50 to 100mV), 600Ω, balanced audio output, and a Single Pole, Single Throw, Normally Open or SPST - NO (form A) relay RLY1 contact. *Figure 9-17* and *Figure 9-18* illustrate connections to two typical examples of voice paging systems.

The audio output of the voice page interface may drive amplified speakers directly. The number of speakers which may be driven varies from manufacturer to manufacturer. See speaker manufacturer documentation for specific details.

Figure 9-17 ***Page - Wiring To Paging Amplifier***

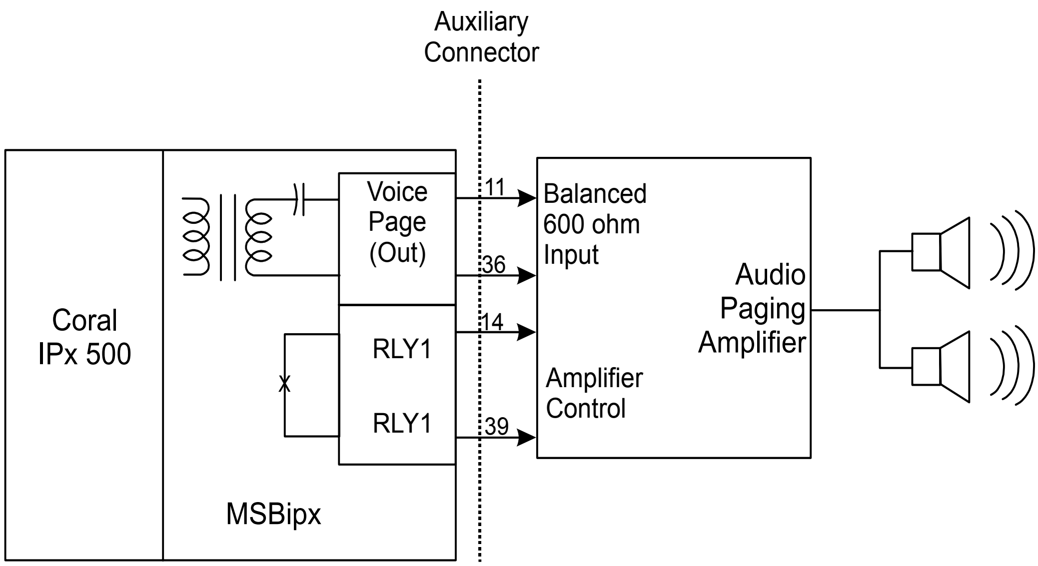
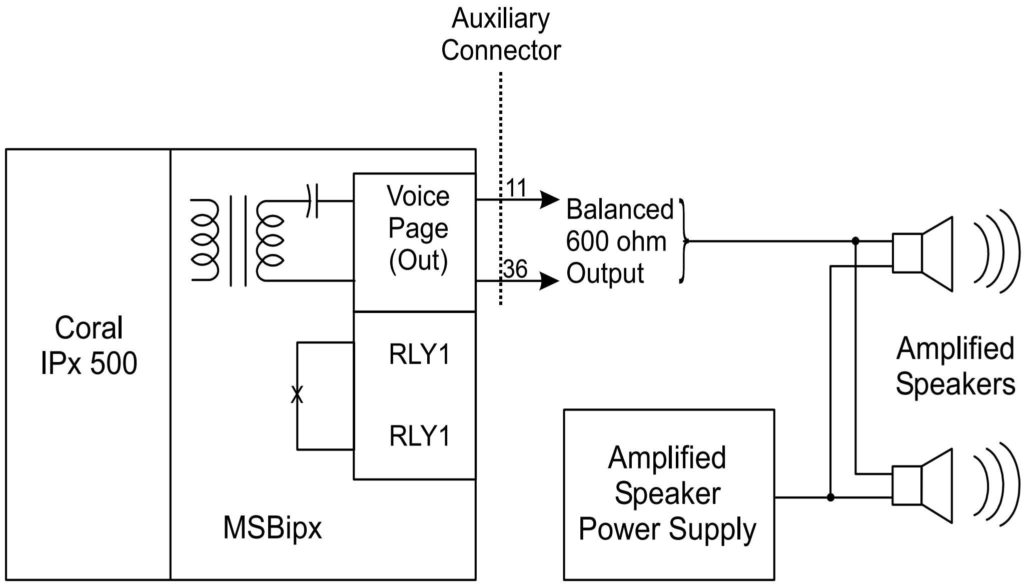


Figure 9-18 ***Page - Wiring To Amplified Speakers***



The relay contact closes continuously during access to the voice page interface. Although not always required, the relay contact is often utilized for "Mac Precedence" or "Mute Control" to mute background music during voice pages. The control of high voltage, high current, or inductive loads should be avoided.

Table 9-1 on page 9-11 lists the function of each interface pin, as they appear on the Auxiliary I/O connector located on the left top main cage, *Figure 9-2 on page 9-12* illustrates that connector.

5 Relay Electrical Limitations

The RLY1 relay contacts have specific electrical limitations which are described in detail in *page 9-107, Relay Contacts*. These limitations must not be exceeded. In addition, the type of load the relay contact operates can have a great significance.

6 Additional Paging Interface in the optional IPx 800X Cage

Additional Paging ports may be installed in the optional Coral IPx 800X expansion cage. The additional cards include:

Card	*Cage*	*Description*
8DRCF	IPx 800X	Includes the following functions, among others: ■ 1 external voice paging interface (or public address) ■ 1 paging relay contacts

These cards are described in the *Coral Service and Peripheral Cards Installation Manual*.

7 Specifications - Paging

P1 (External Paging):

Output Termination .... Capacitor-coupled transformer, non-grounded

Output Level... -15 dBm Nominal

External Device .... 10,000Ω Minimum

Relay Contacts (RLY1):

Contact Type .... Isolated (Dry) Form A (SPST-NO)

Voltage Limit.. 50 VDC Maximum

Current Limit.. 0.5A Maximum non-inductive

Power Limit.. 30 VA Maximum

9.16 UNA/Bell and Relay-2
(Universal Night Answering/Central Bell)

1 Introduction

The Coral IPx 500M provides, via the MSBipx, relay contacts for central ringing bell interface.

An incoming call may be automatically directed to a central bell. When the bell rings, anyone within that group may dial the feature code to pick up that call.

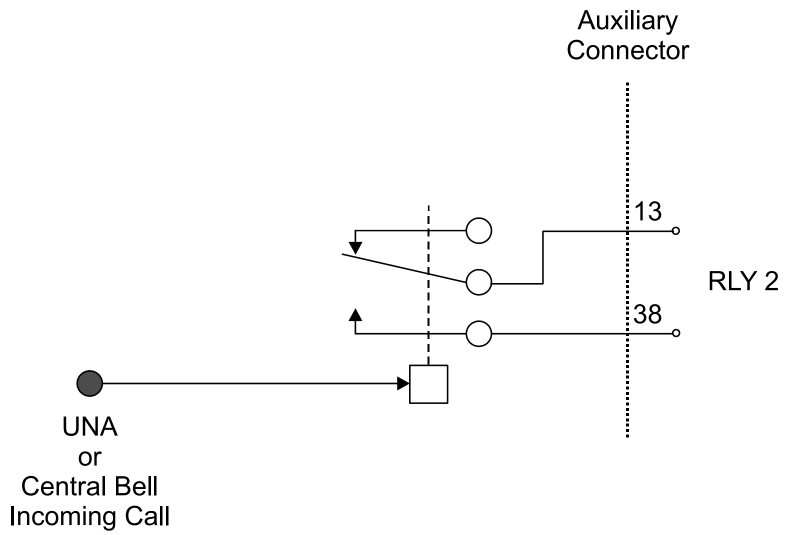
Calls may be answered after the attendant leaves or when a central bell is ringing. Normally this feature is activated for incoming calls during the night answering period. There are two ways to do this: group pickup and directed pickup.

2 Circuit Description

Figure 9-19 is a simplified circuit diagram of the UNA and RLY2 relay contacts.

The relay provides form A (single pole, single throw and normally open) contacts for activating external circuitry and devices. Operation of the relay is determined by the system database. Contacts RLY2 are designated to operate in conjunction with UNA for central ringing applications.

Figure 9-19 ***UNA & Relay - Simplified Diagram***



3 Database Programming

The Central Bell (UNA) requires the appropriate definitions in the database. Consult the *Program Interface (PI) and Database Reference Manual* for instructions on the database programming required for the feature.

The following parameters must be set, to enable the paging feature.

1. **Card List (**Route: CLIS)

   Card type must show RMI-F or 8DRCF in the P_TYPE field of **Shelf #0, Slot #13**.

2. **General Numbering Plan** (Route: NPL,0) [11] (Ckt #24)

   Use the field **11-Bell** of the Update menu to designate dial numbers to the UNA bell ports in the system.

   Refer to *Chapter 5 - Numbering Plan*, in the *Program Interface (PI) and Database Reference Manual*, for more details.

3. **Port List** (Route: PLIS)

   Port type must show UNA in the TYPE field of **Shelf #0, Slot #13, Ckt #24**.

   Use this field to assign a short/full name to this port.

   If you choose **0 - Physical Location**, type (Shelf # 0, Slot # 13, Ckt # 24).

   If you choose **1- Dial Number**, choose field [7] BELL.

   Refer to *Chapter 6 - System Port List*, in the *Program Interface (PI) and Database Reference Manual*, for more details.

4. **Special Port Facilities** (Route: PDB,7)

   Use this field to assign this port to a specific tenant group.

   Refer to *Chapter 23 - Bell/UNA*, in the *Program Interface (PI) and Database Reference Manual*, for more details.

5. **Class Of Service** (Route: COS,0) [**UNA]**

   Use the UNA parameter to determine whether a specific station user is allowed to dial the Bell port.

   Refer to *Chapter 7 - Station and Trunk COS*, in the *Program Interface (PI) and Database Reference Manual*, for more details.

6. **Sizes Def** (Route: SIZ) [BELL/UNA**]**

   Use the BELL/UNA parameter to determine the number of Bell/Universal Night Answering (UNA) groups.

4 External Connections

Incoming trunk calls may be directed to activate a relay contact at certain times of the day (typically after normal business hours). The relay contact sounds a tone over a paging or public address system, or operate a mechanical bell. Upon hearing the tone or bell, the trunk is then answered by dialing a specific feature code at any station allowed to answer calls.

Figure 9-20 and *Figure 9-21* illustrate connections to a contact operated tone signal and to a mechanical bell. Note that due to electrical limitations, the contact may not be used to switch loads requiring high voltage or high current. See *page 9-107, Relay Contacts*, for complete specifications. To operate a highly inductive load such as a mechanical bell, the relay should operate an external, AC powered or non-inductive relay with an appropriately rated contact, which in turn operates the mechanical bell.

Figure 9-20 ***UNA Bell - Wiring to Tone Generator***

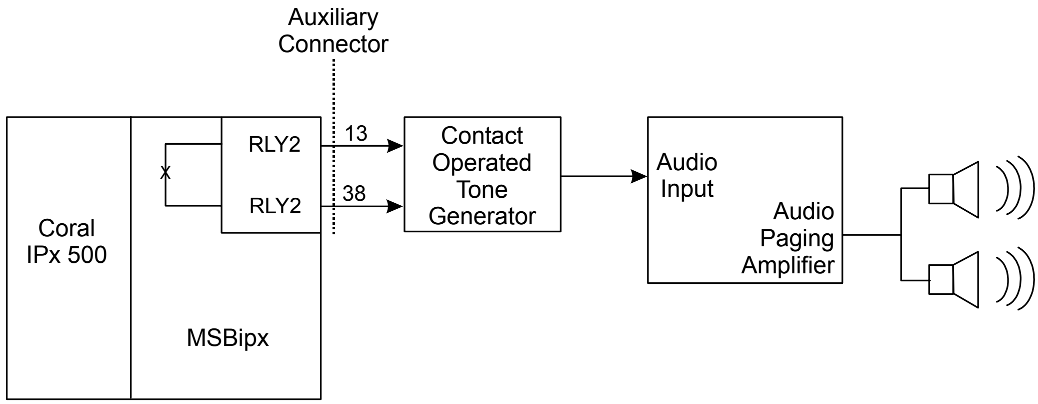


Figure 9-21 ***UNA Bell - Wiring to Mechanical Bell***

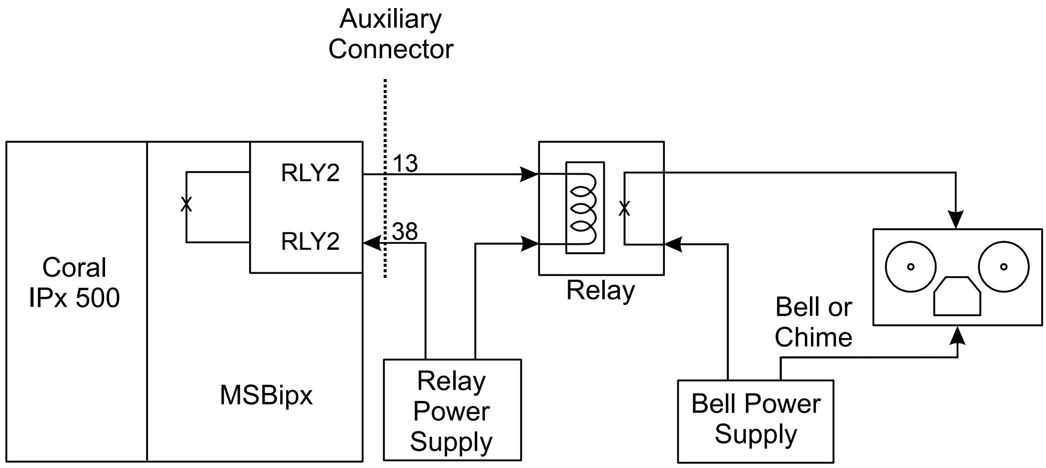


Table 9-1 on page 9-11 lists the function of each interface pin, as they appear on the auxiliary I/O connector located on the left top main cage. *Figure 9-2 on page 9-12* illustrates that connector.

5 Relay Electrical Limitations

The relay contacts have specific electrical limitations. For further detail, see *page 9-107, Relay Contacts*. These limitations must not be exceeded. In addition, the type of load the relay contact operates can have a great significance. Do not exceed the contact ratings listed in the specifications.

6 Additional UNA and Relay Contacts in the Optional IPx 800X Cage

Additional relay contacts for central ringing bell interface may be installed in the optional Coral IPx 800X expansion cage. The additional cards include:

Card	*Cage*	*Description*
8DRCF	IPx 800X	Includes the following functions, among others: ■ 1 universal night answer or central bell ■ 1 bell relay contacts

These cards are described in the *Coral Service and Peripheral Cards Installation Manual*.

7 Specifications - Relay-2

Relay Contacts (RLY2):

Contact Type .... Isolated (Dry) form A (SPST-NO)

Voltage Limit.. 50 VDC maximum

Current Limit.. 0.5A maximum, non-inductive

Power Limit... 30 VA maximum

9.17 Accessory or Alarm Relay-3

Major/Minor Alarm

1 Introduction

The Coral IPx 500M provides, via the MSBipx, one relay contact for major/minor alarm or accessory interface.

The Coral IPx 500 system provides a multipurpose relay contact that can function as an On/Off control of external equipment such as a door latch or light control. It can also be programmed to operate during an alarm condition of the system, signaling a malfunction.

Dial Operated Accessory

The Coral IPx 500 system can operate the relay contacts assigned by a specific dialed number. Users can use this feature to switch external devices on and off.

A station user can switch the relay On or Off in order to activate certain external devices, such as external alarm or electric locks.

Major/Minor Alarm Relay

The Coral IPx 500 system reports failures, as they occur, on the PI screen. A list of alarms can be retrieved by the Coral technician when needed.

A major or a minor system alarm can be programmed to appear on designated display telephones and/or operate a relay and hence an external alert device.

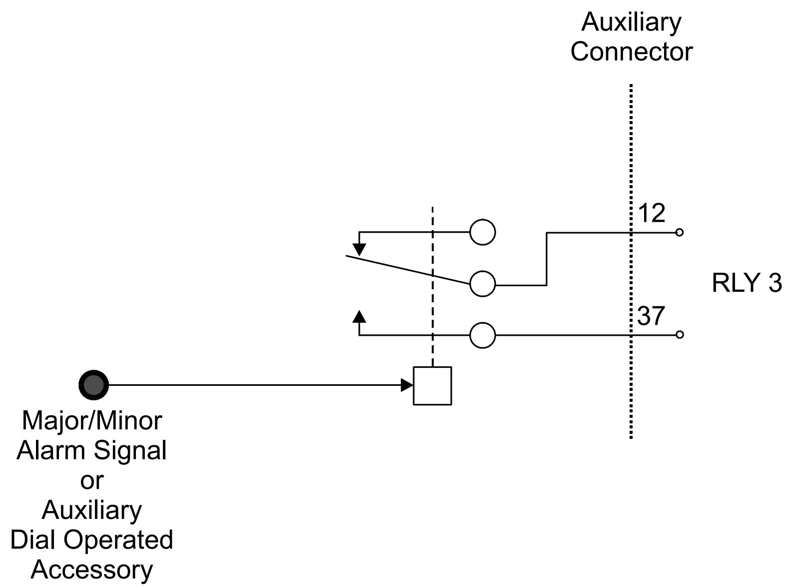
2 Circuit Description

Figure 9-22 is a simplified circuit diagram of the relay contacts.

The relay provide form A (single pole, single throw and normally open) contacts for activating external circuitry and devices. Operation of the relays is configured at the PI system database.

Contacts RLY3 are designated for use as either a major or minor system alarm, signal, or an auxiliary dial-operated relay contact. Do not exceed the contact ratings listed in the specifications.

Figure 9-22 ***Relay-3 Simplified Diagram***



3 Database Programming

The major and minor alarm or accessory interface feature requires the appropriate definitions in the database. Consult the *Program Interface (PI) and Database Reference Manual* for instructions on the database programming required.

Dial Operated Accessory

The following parameters must be set, to enable the Dial Operated Accessory feature.

1. **Card List (**Route: CLIS)

   Card type must show RMI-F or 8DRCF in the P_TYPE field of **Shelf #0, Slot #13**.

2. **General Numbering Plan** (Route: NPL,0) [21] (Ckt #25)

   Use the **21-Relay** field of the Update menu to designate dial numbers to the dial select/alarm relay ports in the system. Refer to *Chapter 5 - Numbering Plan*, in the *Program Interface and Database Reference Manual*, for more details.

3. **Port List (**Route: PLIS**)**

   Port type must show RELAY in the TYPE field of **Shelf #0, Slot #13, Ckt #25**.

   Use this field to assign a short/full name to this port.

   If you choose **0 - Physical Location**, type (Shelf # 0, Slot # 13, Ckt # 25).

   If you choose **1 - Dial Number**, choose field [8] RELAY.

   Refer to *Chapter 6 - System Port List*, in the *Program Interface and Database Reference Manual*, for more details.

4. **Class Of Service (**Route: COS,0**)** [RELAY]

   Use the RELAY parameter to determine whether a specific station user is allowed to switch the Relay ON and OFF. Refer to *Chapter 7 - Station and Trunk COS*, in the *Program Interface and Database Reference Manual*, for more details.

Major/Minor Alarm Relay

1. **System Features - Diagnostics (**Route: SFE, 9**)**

   MINOR_RLY

   Use this parameter to define the relay dial number as the minor alarm situation destination.

   MAJOR_RLY

   Use this parameter to define the relay dial number as the major alarm situation destination.

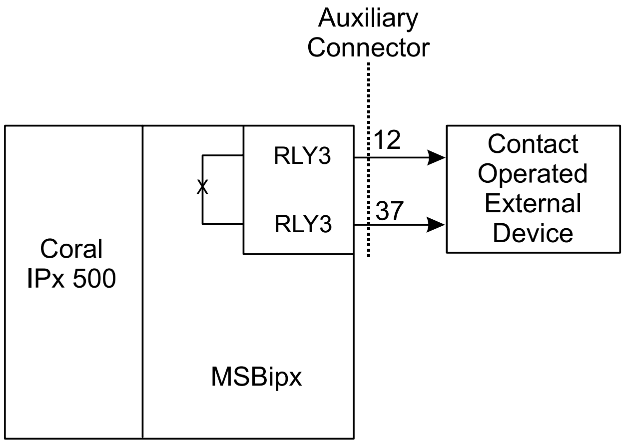
4 External Connections

Table 9-1 on page 9-11 lists the function of each interface pin, as they appear on the Auxiliary I/O connector located on the left top main cage. See Figure 9-2 on page 9-12.

Dial Operated Accessory

To operate external equipment, the relay is assigned a dial access code. Successive accesses alternately toggle the relay on and off. *Figure 9-23* illustrates a sample application.

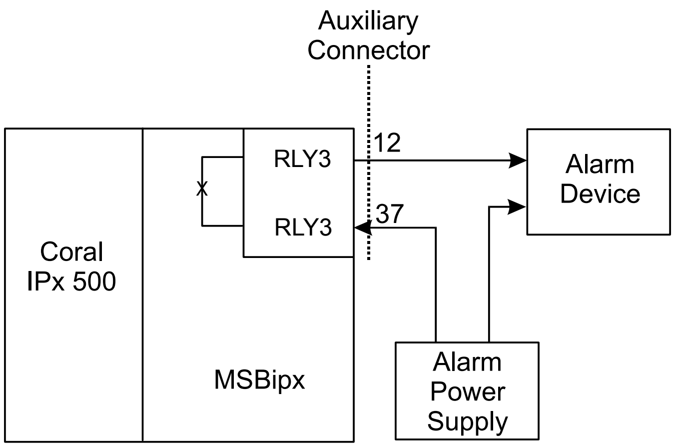
Figure 9-23 ***Dial Operated Relay Connections***



Major/Minor Alarm Relays

When programmed as a minor or major alarm indication, the relay operates if the system fails to pass a diagnostic test. This test falls under the corresponding alarm category. The relay is released when the relay dial access code is dialed or when a subsequent execution of the diagnostic test that is issued the alarm is successfully passed. *Figure 9-24* illustrates a sample application.

Figure 9-24 ***Alarm Relay Connections***



5 Relay Electrical Limitations

The relay contacts have specific electrical limitations. See *page 9-107, Relay Contacts*. Do not exceed these limitations. In addition, the type of load the relay contact operates can have a great significance.

6 Additional Relay-3 Contacts in the Optional IPx 800X Cage

Additional relay contacts for major and minor alarm or accessory interface may be installed in the optional Coral IPx 800X expansion cage. The additional cards include:

Card	***Cage***	***Description***
8DRCF	IPx 800X	Includes one auxiliary or major/minor alarm relay contacts, among other functions.

These cards are described in the *Coral Service and Peripheral Cards Installation Manual*.

7 Specifications - Relay-3

Relay Contacts (RLY3):

Contact Type .... Isolated (Dry) Form A (SPST-NO)

Voltage Limit .... 50 VDC Maximum

Current Limit .... 0.5A Maximum, non-inductive

Power Limit .... 30 VA Maximum

NOTES:

9.18 Relay Contacts

RLY1, RLY2, RLY3

1 General Information

The MSBipx incorporates three relay contacts:

- External voice paging (PAGE). See *page 9-91, Voice Paging (Public Addres) and Relay-1*.
- Universal Night Answer (UNA) Central Bell. See *page 9-97, UNA/Bell and Relay-2*.
- Dial operated accessory/alarm (RELAY). See *page 9-101, Accessory or Alarm Relay-3*.

The applications described in the sections above describe several examples of the control of external devices through relay contacts on the MSBipx card. A limited description of most of the external devices is listed herein. In each application, however, several important factors should be considered.

The relays provide form A (single pole, single throw, normally open, or SPST-NO) contacts for activating external circuitry and devices. Operation of the relays is determined by the system database.

- Contacts RLY1 are designated to operate in conjunction with audio interface P1 for external paging applications.
- Contacts RLY2 are designated as a UNA Bell destination.
- Contacts RLY3 are designated for use as either a major or minor system alarm signal, or an auxiliary dial-operated relay contact.

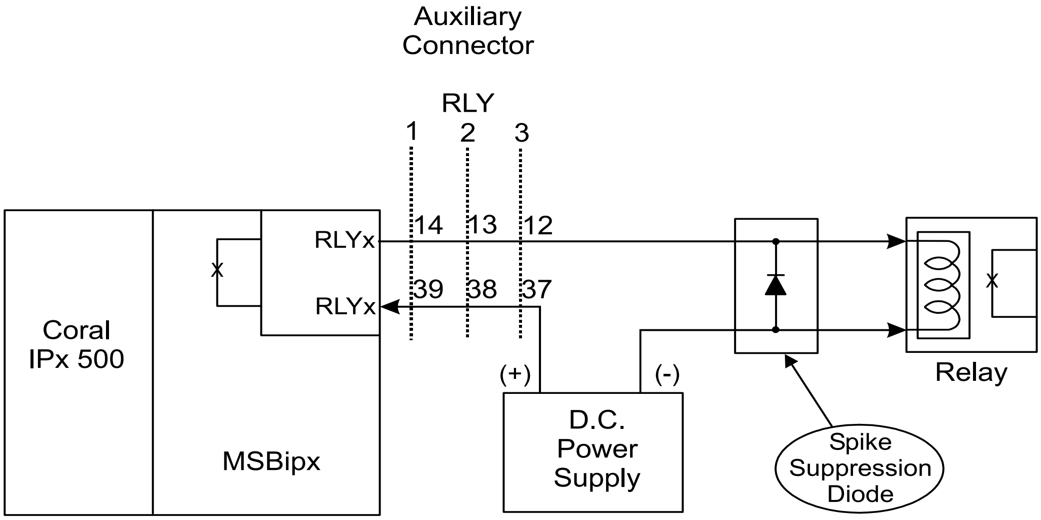
The relay contacts provided on the MSBipx card have specific electrical limitations. See *page 9-108, Specifications - Relays*. Do not exceed these limitations. In addition, the type of load the relay contact operates can have a great significance.

Ideally, the contact should operate a low voltage, low current, non-inductive load such as a light bulb or solid state device. When the voltage or current increases, or when an inductive load such as a relay coil or solenoid is connected, the likelihood of arching across the contact increases. Contact arching occurs while the contact is opening and burns away the precious metal surface, increasing the chance of the contact being "welded" closed or failing completely. Arching also generates high frequency energy that may be coupled to any one of the data busses of the Coral IPx 500, causing unreliable or unpredictable system behavior.

If the contact is to operate a relay or solenoid, use an alternating current (AC) operated device and an AC power source, if at all possible. AC operated inductive loads produce much lower arc levels than direct current (DC) operated loads.

If the contact must operate a DC powered inductive load, the contact must be adequately protected by arc suppression devices. *Figure 9-25* illustrates the use of a common rectifier diode as a simple arc suppression device. The diode is normally reverse biased (not conducting) with the cathode (top side in the drawing) connected to the positive side of the power source.

Figure 9-25 ***DC Arc Suppression for MSBipx Relays***



When the inductive load is powered, a magnetic field is created around the coil windings. When power is removed, the magnetic field quickly deteriorates, producing a reverse polarity voltage (counter EMF) across the windings. This reverse polarity voltage is typically many times the voltage which originally powered the coil, providing enough potential to arc across the open relay contacts.

By placing the diode in the circuit, the reverse polarity current is conducted by the diode, shunting the energy around the contacts. A rectifier rated at 1.0 ampere forward current (1.0A I_F) and a peak inverse (reverse) voltage of at least 250 volts (250V, PIV, PRV, or V_{RM}) should be sufficient in most cases.

2 Specifications - Relays

Relay Contacts (RLY1, RLY2, RLY3):

Contact Type .... Isolated (Dry) Form A (SPST-NO)

Voltage Limit.. 50 VDC Max.

Current Limit.. 0.5A Max. non-inductive

Power Limit.. 30 VA Max.

Chapter 10

Peripheral Cards

Coral

10.1 Peripheral Card Installation

1 General Information

The Coral IPx 500 system divides Peripheral Interface functions among several different station and trunk card types. Each card contains 4, 8 or 16 similar circuits.

Some analog trunk peripheral cards support power fail transfer, as described on *page 5-15, Power Fail (PF) Transfer Circuits*.

Peripheral trunk, VoIP Gateway, voice mail, wired station and wireless station cards may be installed in any I/O card slots, as described in *page 2-17, Equipment Installation*.

Coral IPx 500 systems convention suggests that the first two digital trunk interface cards (30Tipx, T1ipx, PRIipx or TBRipx) be installed in selected slots 4 or 5, assigned PRM SYNC and SEC SYNC, respectively, since these are pre-wired for slaved clock (loop timed) operation. See *page 10-15, Digital Trunk Synchronization* in this section.

Each Peripheral card is described in detail in the *Coral Service and Peripheral Cards Installation Manual*.

2 Card Handling Procedures

Each of the Coral IPx 500 cards contains circuitry sensitive to electrostatic discharge (ESD). Failure to observe safe handling procedures for static-sensitive circuitry may result in permanent damage to a card.

An anti-static wrist strap, connected to the ground terminal pole and tightened with the wing nut should be worn while inserting, removing, or handling any card in the system. Each card is shipped inside an anti-static plastic bag. Cards should be kept in this bag whenever handling is not required.

NOTE:

Before removing a peripheral card, the I/O connector must first be disconnected.

NOTE:

After a peripheral card is removed, there must be a waiting period of at least 2 seconds before re-inserting the card; if not, the card will not function properly.

3 General Installation Procedure

Card installation and initialization is done through automatic identification by the hardware application called "Plug and Play" (plug in and start working). All the technician has to do is to install the card into the required slot and connect its respective I/O cable. The MCP-IPx will identify the card, define it for the system and display all details on the PI screen. The PI Card List branch (Route: CLIS), Snap Mode, shows details of every new card that is installed or removed. There is a short delay between installation/removal of the card and PI screen display.

All Peripheral cards may be inserted into a card slot only if the card slot has not been previously initialized by another card type. Before installing the card into a card slot which has been initialized by another card type, the previous card name must be cleared first.

To clear an initialized card slot:

1. Select the Card List branch (Route: CLIS) in the system database.
2. If the I_TYPE for the card slot shows a card type other than the card currently installed, enter NO_CARD to clear the slot. Refer to *Program Interface and Database Reference Manual* - *Chapter 6*, for further details.

4 Diagnostic LED Indication

Each plug-in card is equipped with a red diagnostic indication LED on the front side, near the top of the card. This LED can assume one of three states of illumination: OFF, ON, or FLASHING. The illumination state of the LED indicates the card's operating condition. *Table 10-1* lists the indication provided by each of the three LED states.

During normal operation, the card diagnostic LED should be extinguished. However, the LED routinely illuminates steadily whenever power is first applied to the system, the entire system is initializing, or the card is first inserted into a card slot. The LED remains illuminated steadily until the card receives a card database from the system.

LED Constantly Lit

If the LED stays lit for more than two or three minutes, a problem may exist within the card. The most likely problem is a conflict with the system database, although it also may be an actual malfunction of the card circuitry.

Table 10-1 ***Card Diagnostic LED Indications***

LED State	*Indication*
Extinguished Off	No problem with the card, it is operating OK.
Steadily lit - ON	Card has not received a card database from system.
Flashing	Diagnostic test failed by circuitry on card.

The system database will prevent a card from initializing:

- When the card is inserted into a card slot that has been initialized with another card type.
  Check the Card List branch (Route: CLIS) in the database, to determine whether the card slot has been previously initialized with a different card type. If the STATUS field shows CARD REPLACED, and the I_TYPE for the card slot shows a different card type, enter NO_CARD to clear the slot.
- There are insufficient system resources allocated in the System Sizes Definition to support the new card. The STATUS field in the Card List branch (Route: CLIS) shows NO RESOURCES. Check the Sizes branch (Route: SIZ) in the database to determine the maximum number of ports of the type provided by the problematic card, and then determine how many of these ports are already installed. If the additional ports provided by the new card exceed the maximum number allocated in Sizes, the card cannot initialize.
  This situation can be rectified only through restructuring the memory allocation of the system. Initializing the database and reprogramming the system restructures the memory allocation.

LED Flashing

The Coral IPx 500 system continuously runs diagnostic routines to monitor the performance and integrity of its database and circuitry. When the circuitry on a particular card fails to perform as expected the system instructs the card to flash its diagnostic LED. If, on a subsequent execution of the same routine that reported a failure, the circuitry passes the test, the card is instructed to extinguish the LED.

Occasionally, circuitry may fail a diagnostic test, even though it is not truly defective. If a card diagnostic LED is observed flashing but no problem is apparent, wait 60 minutes and check the card again. If the LED is no longer flashing, the test failure was probably insignificant. If the flashing continues however, the card is likely to be malfunctioning, even if no problem can be identified.

NOTES:

10.2 Peripheral Card Description

XXXipx and XXXsl Cards

1 General Description

Peripheral interface cards are described in the *Coral Service and Peripheral Cards Installation Manual*. Peripheral card slots in the IPx 500M main cage and in the IPx 500X expansion cage are universal.

Table 10-2 lists the Peripheral Interface card types that may be inserted into each card slot in the Coral IPx 500 system.

The discontinued XXXsl and XXX-200 cards are for use in slots 1 through 3 of the main cage only. See conditions for *page 10-11, Using XXXsl and XXX200 Peripheral Cards in the Coral IPx 500* below.

NOTE:

8F8Ssl, 8D8Ssl, 8SFTsl, 16SFTsl, 8SDTsl, 16SDTsl, 8SLSsl and 16SLSsl cards are not used in the Coral IPx 500 system. These cards are for use in the Coral FlexiCom 200 system only.

Table 10-2 **Coral IPx 500 Peripheral Card Types**

Card Type	***Card Slot***	***Description***
8SFTipx, 16SFTipx	All	8 or 16 port, 2-wire SFT (Station FlexSet Terminal) interface card. Each of the circuits support Coral FlexSet, GKT, CPA, DKT, DST and APDL.
8SLSipx, 16SLSipx	All	8 or 16 port 2-wire SLT (2500 type device, Single-Line Telephone) interface card.
8SDTsl, 16SDTsl 8SFTsl, 16SFTsl 8SLSsl, 16SLSsl 8D8Ssl, 8F8Ssl	**N/A**	**Not for use** in the Coral IPx 500. Used in the Coral FlexiCom 200 only.
30T/Xipx (X varies by Market)	All	30 channel, E1 digital trunk interface card. Provides a 4-wire, digital multiplexed, CEPT compatible trunk interface at 2.048Mbps rate. ***NOTE****: 30T/Xsl and 30T/Xipx are not for use in the North American market.*
30T/Xsl (*discontinued*), (X varies by Market)	1, 2, 3 IPx 500M	
8TBRPipx	All	Same specifications as 4TBRipx, 4TBRsl, 8TBRipx and 8TBRsl with an additional software controlled –42VDC or -48VDC phantom power source on each 4-wire circuit for ISDN terminal equipment (TE) devices.
4TBRPsl (*discontinued*), 8TBRPsl (*discontinued*)	1, 2, 3 IPx 500M	
4TBRipx, 8TBRipx	All	4 or 8 port BRI multiplexed, digital trunk card. ISDN compatible. Each port provides (2B+D), 4-wire digital interface at 144 Kbps rate. Supports European ETSI (Euro ISDN) ISDN signaling protocols.
4TBRsl (*discontinued*), 8TBRsl (*discontinued*)	1, 2, 3 IPx 500M	
4T-CIDipx, 8T-CIDipx	All	Same as 4T-Csl, 8T-Csl, 4T-Cipx and 8T-Cipx with an additional 4/8CID card in piggyback fashion. The 4/8CID card is used for detecting Caller ID information.
4T-CIDsl (*discontinued*), 8T-CIDsl (*discontinued*)	1, 2, 3 IPx 500M	

Card Type	***Card Slot***	***Description***
4T-Cipx, 8T-Cipx	All	4 or 8 port Loop-Start/Ground-Start trunk interface card. Includes 4 ports with power failure (PF) transfer.
4T-Csl (*discontinued*), 8T-Csl (*discontinued*)	1, 2, 3 IPx 500M	
4T-Cipx FJ, 8T-Cipx FJ	All	4 or 8 port Loop-Start trunk interface card. Includes 4 ports with power failure (PF) transfer.
4TEMipx	All	4 port general purpose 2W/4W E&M trunk interface card.
4TEMsl (*discontinued*)	1, 2, 3 IPx 500M	
4TMR-PF-Gipx, 4TMR-PFipx 4TMR/S-12/16-PF-Gipx	All	4 port Loop-Start/Ground-Start trunk interface card. Includes 4 ports with power failure (PF) transfer. MR denotes optional 12kHz or 16kHz metering detection.
4TMR-PFsl-G (*discontinued*) 4TMR-PFsl (*discontinued*),	1, 2, 3 IPx 500M	
4TPFsl (*discontinued*)	1, 2, 3 IPx 500M	4 port Loop-Start/Ground-Start trunk interface card. Includes four (4) ports with power failure (PF) transfer.
4TWLipx	All	4 port trunk for Two Way Loop.
4TWLsl (*discontinued*)	1, 2, 3 IPx 500M	
8SKKipx	All	8 port RBS (Radio Base Station) for the FlexAir wireless system.
8SKKsl,	1, 2, 3 IPx 500M	
8TPFsl (*discontinued*)	1, 2, 3 IPx 500M	8 port Loop-Start/Ground-Start trunk interface card. Includes two (2) ports with power failure transfer circuits.
iVMFipx, uCMCipx	All	Voice mail.
iCMC-200	1, 2, 3 IPx 500M	

Card Type	***Card Slot***	***Description***
PRI-23ipx	All	23 channel, PRI (Primary Rate Interface) digital trunk card. ISDN compatible digital interface, North America ANSI standard (23B+D) at 1.544Mbps DS1 rate.
PRI-23sl (*discontinued*)	1, 2, 3 IPx 500M	
PRI-30ipx	All	30 channel, PRI (Primary Rate Interface) digital trunk card. ISDN compatible digital interface, European ETSI standard (30B+D) at 2.048Mbps E1 rate. ***NOTE****: PRI-30ipx and PRI-30sl are not for use in the North American market.*
PRI-30sl (*discontinued*)	1, 2, 3 IPx 500M	
T1ipx	All	24 channel, T1 digital trunk interface card.
T1sl (*discontinued*),	1, 2, 3 IPx 500M	
UDTipx	All	Universal Digital Trunk card. It can function as a T1ipx or PRI-23ipx application card, jumper selection.
UGWipx	All	VoIP Universal Gateway.

2 XXXipx, XXXsl, and XXX200 Peripheral Cards

XXXipx Cards

Peripheral cards with the suffix "ipx" are special form-factor cards for use in the Coral IPx 500 system. These cards include *one* guide pin and two *black* ejectors, as shown in *Figure 10-1*. The XXXipx cards (except 8/16SLSipx and 8/16SFTipx cards) are for use in the Coral FlexiCom 200 system as well.

XXXsl Cards

Peripheral cards with the suffix "sl" or "200" are special form-factor cards for use in the Coral FlexiCom 200 Base cabinet only. These cards include *two* guide pins and two *red* ejectors, as shown in *Figure 10-2*.

The XXX-200 and XXXsl cards (except 8/16SLSsl, 8/16SFTsl, 8/16SDTsl and 8F8Ssl cards) may be installed in the Coral IPx 500M main cage (slots #1-3) as described in *page 10-11, Using XXXsl and XXX200 Peripheral Cards in the Coral IPx 500* below.

3 Using XXXsl and XXX200 Peripheral Cards in the Coral IPx 500

All of the cards used in the Coral FlexiCom 200 base unit slots #1-3 are small form-factor Coral cards that can migrate to the Coral IPx 500M main cage. All of the telephones are common to the Coral family and there is no need to replace any set when migrating from the Coral FlexiCom 200 to the larger Coral IPx 500 system. The net result is a migration path that will allow a small company to grow to over 448 ports while retaining a high percentage of their original investment.

Peripheral cards with the suffix "sl" or "200" may be used in slots 1-3 of the Coral IPx 500M main cage, if all of the following conditions are met:

- The card is not any one of the following cards:
  8SLSsl, 16SLSsl, 8SFTsl, 16SFTsl, 8SDTsl, 16SDTsl, 8D8Ssl or 8F8Ssl.
- The lower guide pin is extracted (see *page 10-11, Removing the lower Guide Pin* below).
- The card is not installed in the Coral IPx 500X expansion cage.
- The card is installed in the Coral IPx 500M main cage in slots #1-3 only.

Removing the lower Guide Pin

1. Manually pull apart the flaps that hold the lower guide pin onto the card. See *Figure 10-2*.

2. Remove the lower guide pin from the card.

Figure 10-1 ***XXXipx Peripheral Card Layout***

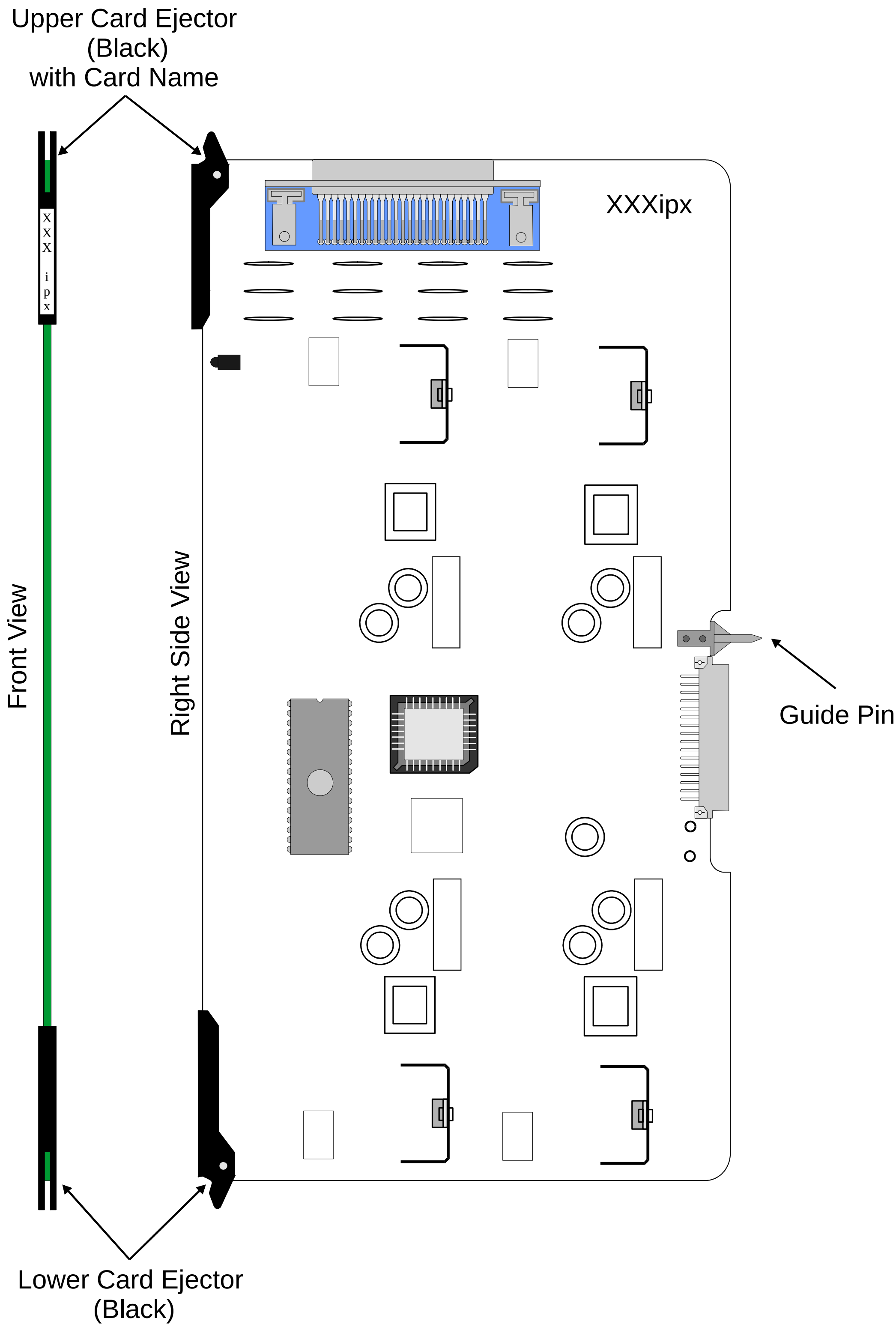
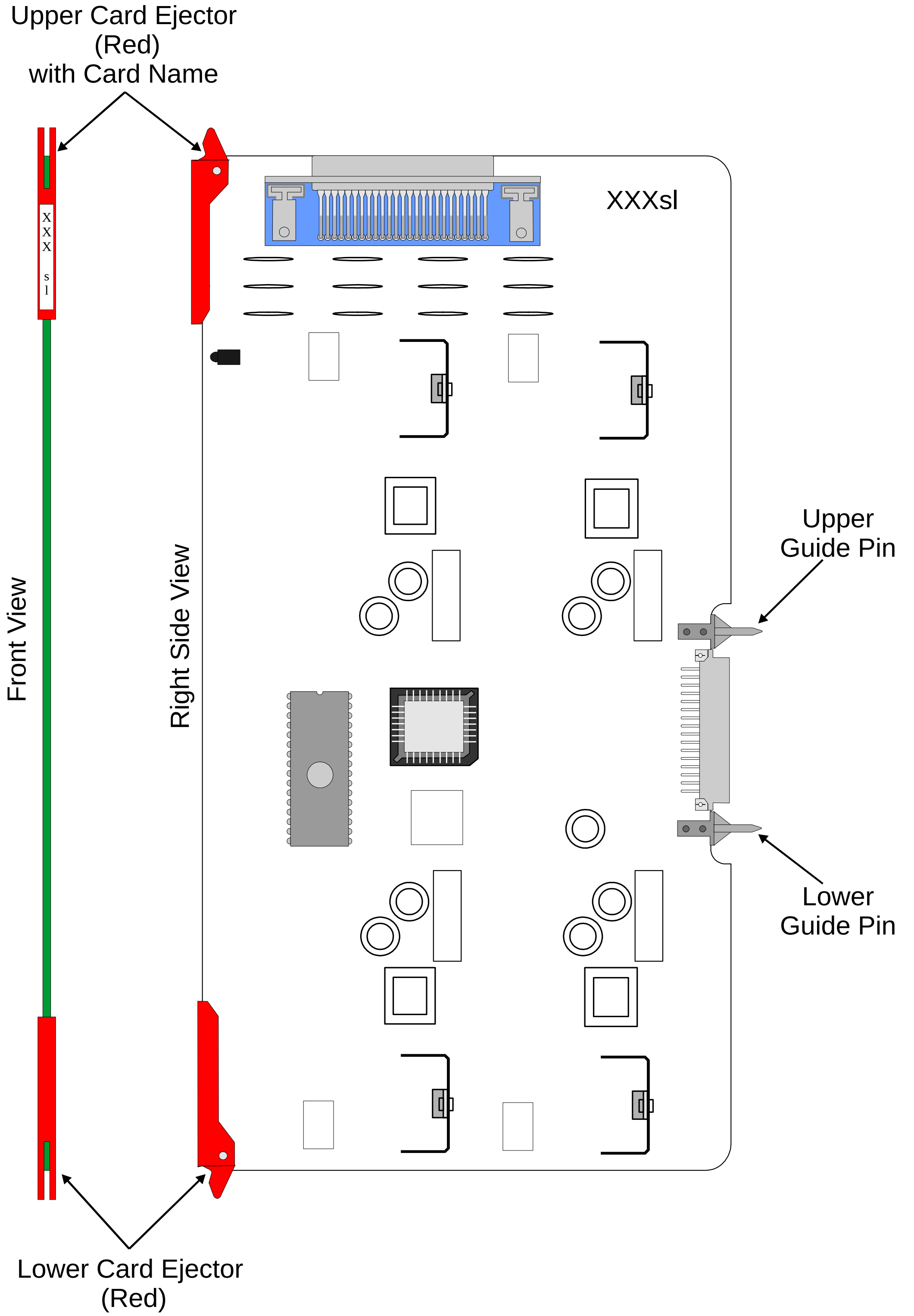


Figure 10-2 ***XXXsl and XXX-200 Peripheral Card Layout***



NOTES:

10.3 Digital Trunk Synchronization

1 Slave Clock Mode Operation

The Coral IPx 500 system is capable of operating in either master clock mode or slave clock mode. The selection between modes is made via the PI software.

How The System Derives The External Clock Signal

The Coral IPx 500 uses digital trunk interface cards to synchronize its internal clock with the PSTN clock or with another switching system clock. When operating in slave-clock mode, the data stream transferred on the digital trunk is fed into the MSBipx (Main Service Board of the main cage IPx 500M), incorporating the external clock rate into the Coral internal clock.

To allow the clock signal to be fed into the Coral IPx 500 internal clock, the digital trunk interface cards must be inserted into specific slots within the unit that are specifically wired to accept those signals.

Two synchronization sources may be defined for a system. One serves as the primary source, and the other serves as a secondary synchronization signal source.

The following digital trunk cards can retrieve synchronization signals in the Coral IPx 500M and 500X cages: 30Tipx, T1ipx, PRI-23ipx, PRI-30ipx, 4TBRipx and 8TBRipx. More Coral FlexiCom 300,400,5000,6000 and IPx 800,3000,4000 digital trunk cards (30T, T1, PRI-23, PRI-30, 4TBR, 8TBR) are available for synchronization purposes through the Coral IPx 800X Expansion unit.

2 Synchronization Slots in the Main and Expansion Cages

A total of six slots are factory set to accept digital trunk cards to operate in slave clock mode. Two slots are located in the Coral IPx 500M main cage, two slots are located in the Coral IPx 500X first expansion cage and the additional two slots are pre-wired in the Coral IPx 500X second expansion cage.

Two slots in each cage of the Coral IPx 500 system are factory set to accept digital trunk cards to operate in slave clock mode:

- Card slot # 4 in both the main and the expansion cage is wired to operate as the primary external clock synchronization source (marked PRM SYNC).
- Card slot # 5 in both the main and the expansion cage is wired as the secondary external clock synchronization source (marked SEC SYNC).

Figure 10-3 identifies the synchronization slots, both in the main cage and in the expansion cages.

Synchronization Slot Selection

Any combination of primary and secondary synchronization sources, either in the main or in the expansion cage is valid.

The hardware selection between the main cage and the expansion cages synchronization slots is determined by jumper settings on the MSBipx (main cage) and in the MSPipx (expansion cages).

In addition, a software selection must take place. The system must be notified, via the PI facility, of the synchronization cards shelf/slot location. See *page 10-19, Choosing the Best Synchronization Source*.

Conditions for Slave Clock Mode Operation

The following conditions are necessary for the Coral IPx 500 to retrieve external clock signals:

- The digital trunk synchronization cards must be installed in the synchronization slots.
- The PI parameters must be properly set.

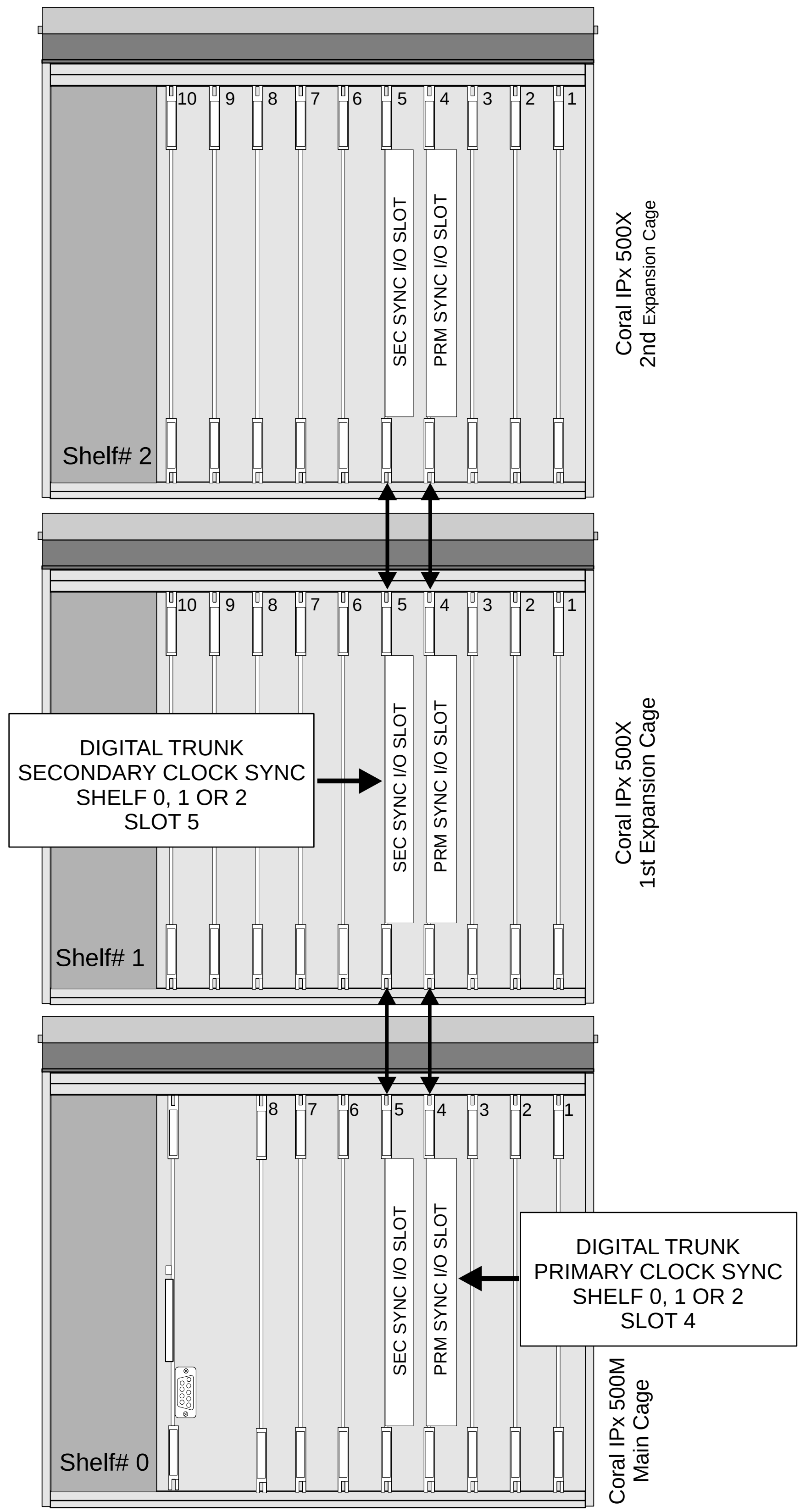
System Switch from Slave Clock Mode to Master Clock Mode

When a digital trunk card is initialized in the appropriate slot, the jumper settings on the MSBipx (Main Service Board of the main cage IPx 500M) and on the MSPipx (Main Service Board of the expansion cage IPx 500X) are properly set and the Shelf/Slot combination has been entered as a primary external clock source, the system determines if the digital trunk card in the indicated position is properly synchronized with the network. If the system is functioning properly, the MSBipx card locks onto the primary external clock source.

If the primary digital trunk card issue a LOS or Red alarm, and a secondary external clock source be defined, the system determines if the secondary digital trunk card is functioning properly, and the MSBipx locks onto the secondary external clock source.

If no secondary clock source is defined, or the secondary clock is also in LOS or Red alarm, the Coral IPx 500 system uses its internal clock source, and the system free runs.

Figure 10-3 ***Coral IPx 500 External Clock Sync Card Slots***



3 Choosing the Best Synchronization Source

Optional Synchronization Cards

In the IPx 500M main cage:

- PRI-23ipx, PRI-30ipx, UDTipx(PRI-23)
- T1 - T1ipx, UDTipx(T1)
- E1 - 30Tipx
- BRI - 4TBRipx, 8TBRipx

In the IPx 500X expansion cage:

- PRI-23ipx, PRI-30ipx, UDTipx(PRI-23)
- T1 - T1ipx, UDTipx(T1)
- E1 - 30Tipx
- BRI - 4TBRipx, 8TBRipx

In the IPx 800X expansion unit:

- PRI-23, PTRI-30, UDT(PRI-23)
- T1 - T1, UDT(T1)
- E1 - 30T/x
- BRI - 4TBR, 8TBR

NOTE:

If an IPx 800X Expansion cage is installed and Coral FlexiCom 300, 400, 5000, 6000 or IPx 800, 3000, 4000 digital trunk interface cards are available, refer to the Coral IPx 800 Installation Guide.

CAUTION!

30Tsl, T1sl, PRI-23sl, PRI-30sl, 4TBRsl, 8TBRsl, 4TBRPsl, 8TBRPsl, 4TBRP, 8TBRP, 4TBRPipx, and 8TBRPipx cards cannot be used in the synchronization slots.

NOTE:

BRI Lines for Synchronization

1) BRI lines used for synchronization must be defined in the PI (Route: DTDB, 4) SYNC - YES. See ***PI Manual Chapter 26 - ISDN*** *for more information.*

2) It is not recommended to use BRI lines defined as PERMANENTLY_ACTIVE_CHANNEL - NO as synchronization sources.

NOTE:

It is not recommended to use a PRI card with IPAT IC (hardware issue 4) chip as a synchronization source.

Order of Preference

The possible digital trunk synchronization sources are listed in order of preference:

1. PRIipx, PRI or T1/E1 card connected to PSTN type stratum #3 - TANDEM switch (North America only).
2. PRIipx, PRI or T1/E1 card connected to PSTN type stratum # 4 (End office).
3. PRIipx, PRI or T1/E1 card connected to a private network. There are three possibilities listed in order of preference.

   a. The network is synchronized on PSTN stratum #4 (or less).

   b. The private network contains a stable internal clock.

   c. The private network is synchronized to the Coral - *do not use for synchronization*.

CAUTION!

When the Coral operates in Master Clock mode and the private network is synchronized by the Coral, it is prohibited to insert Digital Trunk cards in the synchronization slots.

4. 4TBR, 8TBR, 4TBRipx, 8TBRipx, 4TBRsl and 8TBRsl card connected to the PSTN.
5. 4TBR, 8TBR, 4TBRipx, 8TBRipx, 4TBRsl and 8TBRsl card connected to a private network. The three possibilities are the same as listed in order of preference in possibilities 3.a - 3.c above.

4 Synchronization Instructions

1. See the selection of the digital trunk cards available at the Coral site, given on *page 10-19, Choosing the Best Synchronization Source* above, to determine which cards will be used as the primary and secondary synchronization sources.
2. Determine into which slots the card chosen in *Step 1* should be inserted. See *Figure 10-3 on page 10-18*.
3. Verify that the IPx 500M backplane card is properly strapped. See *Figure 10-4* and *Figure 6-22 on page 6-24*.

CAUTION!

If straps must be changed, verify that the system power is OFF before removing the PS500 power supply unit.

4. Verify that the IPx 500X backplane is properly strapped. See *Figure 10-5* and *Figure 6-30 on page 6-35*.
5. Use the PI facility to inform the system of the synchronization slot selection.

   Access the synchronization branch (*Route: DTDB, 3*) to set the following parameters:

   ADDR - PRM, SEC

   Enter the appropriate (shelf, slot) combination of your choice
   PRM (shelf#,4), SEC (shelf#,5).
   For more information, refer to *Chapter 8* of the *Program Interface reference Manual*.
6. If BRI lines are used for synchronization, access the ISDN branch *(Route: DTDB, 4)* to set the following parameters:

   SYNC

   Set this parameter to *YES*.

   PERMANENTLY active Channel

   Set this parameter to *YES*.

   For more information, refer to *Chapter 26* of the *Program Interface reference Manual*.
7. Verify that the system is synchronized upon your settings:

   Access the PI Synchronization branch *(Route DTDB, 3)*, check the following parameter:

   CURR_CLK

   Verify that the value 1 is displayed, indicating that the system is synchronized by the primary synchronization source.

Figure 10-4 ***Coral IPx 500M (Main Cage) Jumper Settings for synchronization***

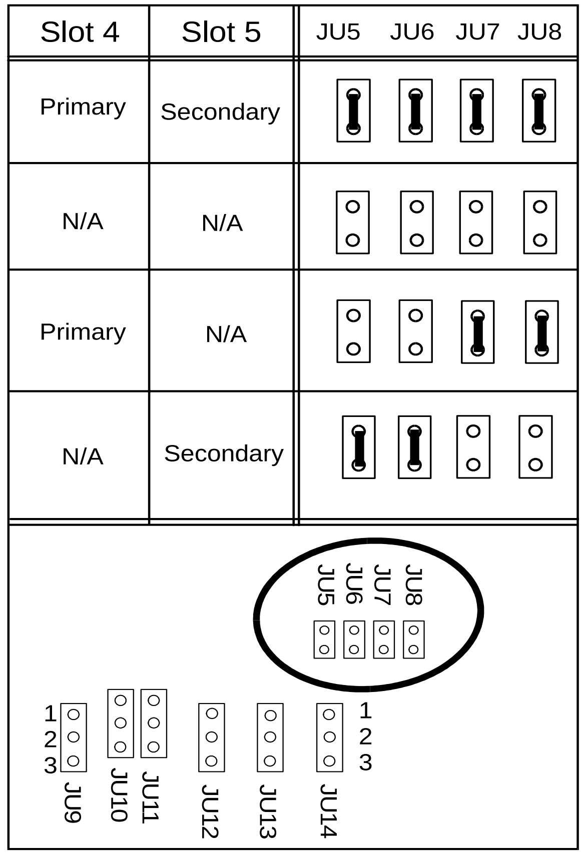
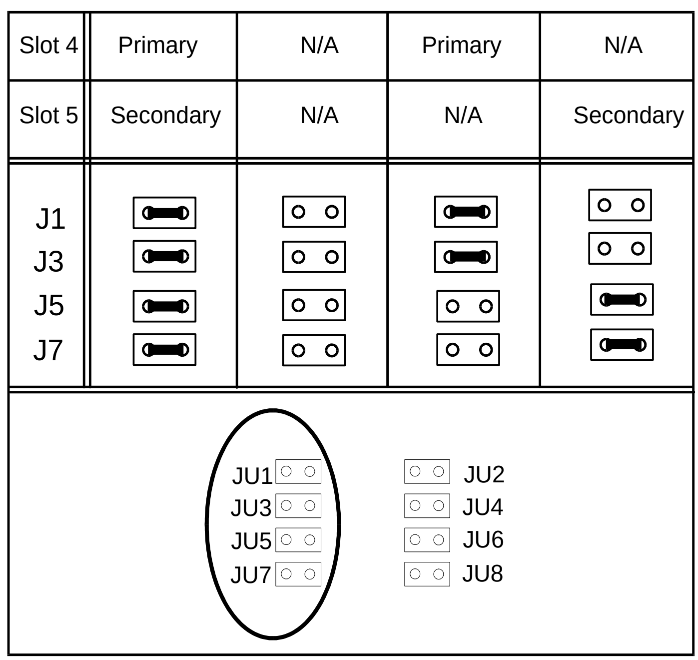


Figure 10-5 ***Coral IPx 500X (Expansion Cage) Jumper Settings for synchronization***



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Coral™ IPx 500
Installation Procedure and Hardware Reference Manual
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