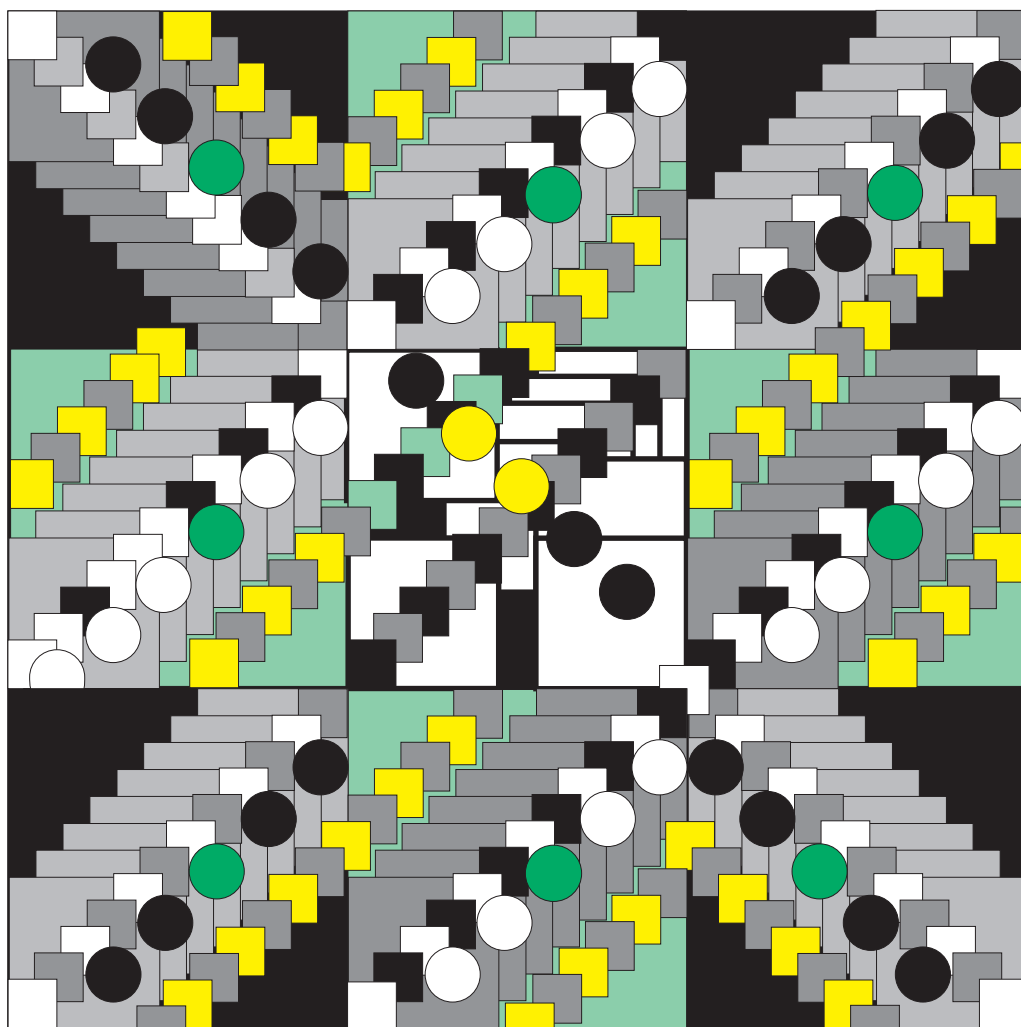


2220 Nways BroadBand Switch
Models 300, 500, and 501



Service Guide



2220 Nways BroadBand Switch
Models 300, 500, and 501



Service Guide

Note|

Before using this information and the product it supports, be sure to read the general information under "Notices" on page xi.

First Edition (June 1998)

The information contained in this manual is subject to change from time to time. Any such changes will be reported in subsequent revisions.

Order publications through your IBM representative or the IBM branch office serving your locality. Publications are not stocked at the address given below.

A form for readers' comments appears at the back of this publication. If the form has been removed, address your comments to:

IBM France
Centre d'Etudes et Recherches
Service 0798 - BP 79
06610 La Gaude
France

- FAX: 33 4 93 24 77 97
- IBM Internal Use: LGERCF at IBMFR
- Internet: lgercf@fr.ibm.com

When you send information to IBM, you grant IBM a non-exclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

© **Copyright International Business Machines Corporation 1998. All rights reserved.**

Note to U.S. Government Users — Documentation related to restricted rights — Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corp.

Contents

Figures	vii
Tables	ix
Notices	xi
European Union (EU) Statement	xii
Electronic Emission Notices	xii
Safety Notices for United Kingdom	xiii
Safety Notice for Australia	xiii
Telecommunication Connectivity Notices	xiii
Notice to Users of Machines Installed in the U.S.	xiii
Notice to Users of Machines Installed in Canada	xv
Trademarks and Service Marks	xvi
General and Product Safety	xvii
Service Inspection Safety Procedures	xvii
Safety and Disposal Instructions for Batteries	xvii
Service Inspection Safety Procedures	xviii
Introduction	xviii
Sicherheitsüberprüfungen	xxv
Einführung	xxv
Safety Label Locations	xl
Safety Label Identifications	xliv
About this Manual	xliv
Aim of this Manual	xliv
Who Should Read this Manual	xliv
How this Manual is Organized	xliv
Chapter 1. START - Finding a Service Procedure	1-1
Service Operation via Nways Switch Administration Station	1-2
Chapter 2. Introduction / Overview	2-1
Typical Broadband Network Based on 2220	2-1
2220 Models	2-2
2220 Control Panel Functions	2-3
Chapter 3. Nways Switch Administration Station Functions	3-1
How to Start on the Local 2220	3-1
How to Logon to the Remote 2220	3-1
Nways Switch Administration Station Windows Overview	3-5
How to Display the CMIP Status	3-8
How to Display the Alarm Desk	3-11
How to Display the Nways Switch Configuration	3-13
How to Display the Test Event Desk	3-18
How to Find a TCP/IP Address	3-20
How to Display the Nways Switch Control Program Inventory and Level	3-22
How to Remove a Line or Trunk Cable	3-24
How to Perform the Emergency Trunk Unlock	3-26

Chapter 4. 2220 Diagnostics	4-1
2220 Diagnostics Available from the NAS	4-1
All Switch to Line Interface Tests	4-2
Switch to Line Interface Test	4-2
Line Interface Test	4-4
Line Wrap Plug Test	4-5
Line Loopback Test	4-6
2220 Trunk Loopback Test	4-6
Loop Line and Loop Trunk	4-7
How to Run the All Switch to Line Interface Test	4-8
How to Run the Switch to Line Interface Test	4-10
How to Run the Line Interface Test	4-12
How to Run the Line Loopback Test	4-15
How to Test an ACDC Power and Battery	4-25
 Chapter 5. 2220 Problem Determination	 5-1
MAP 0500: 2220 Basic Verification	5-2
 Chapter 6. 2220 FRU Exchange	 6-1
MAP: Before Exchanging an FRU	6-1
Opening The Doors And Covers	6-6
2220 Component Locations	6-7
Locating System Components in the 2220	6-7
Format of Location Identifier	6-7
Module Connector Positions	6-8
2220 Model 300/500/501 Rack Example	6-9
2220 Model 300/500 Unit Identification Examples	6-10
2220 Front View	6-12
2220 Rear View	6-13
Identify the ACDC Power Type	6-14
Identify the DC48 Power Type	6-15
Identify the APC Type	6-16
Exchange an ACDC	6-17
Exchange an APC	6-22
Exchange an ARC	6-24
Exchange a Battery	6-25
Exchange a Board	6-29
MAP: Prerequisite to Exchange a Clock	6-34
Exchange a Clock	6-38
MAP: Prerequisites for Exchanging a Clock Redrive	6-40
Exchange a Clock Redrive	6-45
Exchange a DC48 Power Input	6-46
Exchange a DCD1 or DCD2	6-48
Exchange a Fan Box	6-50
Exchange an LCEE	6-51
Exchange an LCEB	6-53
Exchange an LCPB	6-55
Exchange an LCPE	6-57
Exchange a LIC	6-59
Exchange a Control Panel	6-61
MAP: Prerequisite to Exchange a Switch or Switch Redrive	6-62
Exchange a Switch or Switch Redrive	6-64
After Exchanging a Switch or Switch Redrive	6-66
Exchange a TPA	6-67

Exchange a Voice Server Adapter	6-68
Exchange a Voice Server Extension	6-69
Ending the Exchange Procedure	6-70
Leaving Procedure	6-70
Appendix A. Schematics	A-1
Power and Control Cables (With APC Type A)	A-2
Power 48 V DC Distribution (With APC Type A)	A-3
Power Control (With APC Type A)	A-4
Control Panel and FAN Control (With APC Type A)	A-5
Power and Control Cables (With APC Type B)	A-6
Power 48 V DC Distribution (With APC Type B)	A-7
Power Control (With APC Type B)	A-8
Control Panel and FAN Control (With APC Type B)	A-9
Clock Cables	A-10
Appendix B. Maintenance Aids	B-1
Clock Module LED Segment Reference	B-1
Shipping Group Tools	B-2
Appendix C. 2220 Power Consumption	C-1
2220 Power Limits	C-1
2220 Base Machine and Modules Power Consumption	C-1
Appendix D. Parts Catalog	D-1
How to Use This Parts Catalog	D-2
Part Listing Glossary	D-3
Visual Index	D-4
Visual Index	D-5
Catalog Section	D-6
Assembly 1: 2220 Enclosure Assembly, Models 300, 500, and 501	D-8
Assembly 2: 2220 Control Panel and FAN Box Assembly	D-10
Assembly 3: 2220 AC/DC and DC Power Supply Assembly	D-12
Assembly 4: 2220 Board Assembly	D-14
Assembly 5: 2220 Modules	D-16
Assembly 6: LCBB and LCBE Assembly	D-18
Assembly 7: Internal Cables Assembly	D-20
Assembly 8: RACK Assembly	D-22
Assembly 9: Power Attachment Cord Assembly	D-24
Appendix E. Part Number Index	E-1
Bibliography	X-1
Nways Switch Publications	X-1
Nways 2220 Switch Manager Publications	X-1
Related Publications	X-1
World Wide Web	X-1
Glossary	X-3
Index	X-13

Figures

0-1.	2220 Ground Wire A	xix
0-2.	2220 Ground Wire B Between 2220-500 and 2220-501	xx
0-3.	2220 Ground Pin on Mainline ac/dc Power Cable	xxi
0-4.	2220 Ground Straps (Former Machine)	xxi
0-5.	2220 Ground Straps	xxi
0-6.	LCB Grounding via Screws	xxii
0-7.	LCB Grounding via Ground Wire	xxiii
0-8.	Standard Connection	xxiii
0-9.	Bellcore Specification Connection	xxiii
0-10.	Schutzleiter A am 2220	xxvii
0-11.	2220 Schutzleiter B zwischen 2220-500 und 2220-501	xxviii
0-12.	Schutzleiterkontakt am Hauptnetzkabel des 2220	xxix
0-13.	Schutzleiter am 2220 (vorheriges Modell)	xxix
0-14.	2220 Schutzleiter	xxix
0-15.	Erdung des Verteilerkastens über Schrauben	xxx
0-16.	Erdung des Verteilerkastens über Schutzleiter	xxx
0-17.	Standardanschluß	xxxi
0-18.	Anschluß nach Bellcore-Norm	xxxi
0-19.	Safety Labels on Internal Front Cover	xl
0-20.	Safety Labels on Internal Rear Board Cover	xl
0-21.	Safety Labels on Internal Front Board Cover	xli
0-22.	Safety Labels on Rear of the 2220 Rack	xli
0-23.	Safety Label on LCB	xlvi
0-24.	Safety Labels on Battery	xlvi
0-25.	Power Label (PN 57G7919 and PN 57G7976)	xlv
0-26.	Board Labels (PN 57G7920)	xlv
0-27.	Other Labels	xlv
0-28.	Labels Used for Europe, Taiwan, and Brazil (PN 57G7959)	xlv
0-29.	Labels Used for Other Countries (PN 57G7958)	xlvi
0-30.	Power Rating Label for DC48	xlvi
0-31.	Power Rating Label for ACDC	xlvi
0-32.	Label for 2220 Rack (PN 80G3929)	xlvii
0-33.	Label for LCB (PN 80G3928)	xlvii
3-1.	Nways Switch Desktop Display	3-1
3-2.	Example of Expanded Tree	3-4
3-3.	Example of Expanded Tree	3-6
3-4.	Example of Options Available for a Selected Resource	3-7
3-5.	Example of Options Available for a Switch	3-7
3-6.	Example of Expanded Tree	3-9
3-7.	Search Options in the Alarm Desk Window	3-12
3-8.	Nways Switch Desktop Window	3-20
3-9.	Nways Switch Installation Window	3-20
3-10.	Installation Program Main Menu	3-20
3-11.	Example of TCP/IP address	3-21
3-12.	Example of Nways Switch Control Program Software Inventory	3-23
4-1.	Area Tested by Switch to Line Interface Test	4-2
4-2.	Area Tested by Switch to Line Interface Test on LIC511	4-2
4-3.	Area tested by Switch to Line Interface Test with a Wrap Plug	4-3
4-4.	Area tested by Switch to Line Interface Test with a Wrap Plug on LIC511	4-3

4-5.	Area Test by the Line Interface Test	4-4
4-6.	Area Tested by the Line Interface Test on LIC511	4-4
4-7.	Area Tested by the Line Wrap Plug Test	4-5
4-8.	Area Tested by the Line Wrap Plug Test on LIC511	4-5
4-9.	Area Tested by the Line Loopback Test	4-6
4-10.	Area Tested by the 2220 Trunk Loopback Test	4-6
4-11.	Loop Trunk and Loop Line on Remote 2220	4-7
4-12.	Example of Test Selection	4-19
6-1.	2220 CPx Powering	6-2
6-2.	2220	6-2
6-3.	Module Locations	6-3
6-4.	Front, Rear Door And Side Cover Latches	6-6
6-5.	2220 Component Location	6-9
6-6.	2220 Identification	6-10
6-7.	2220 Front View Location with NAS Type 7585 Installed	6-12
6-8.	2220 Rear View Location	6-13
6-9.	APC Type Identification	6-16
6-10.	2220Front View	6-34
6-11.	2220Front View	6-40
6-12.	2220 Rear View	6-62
6-13.	Display Power ON/OFF Switch	6-70
6-14.	Display Power ON/OFF Switch	6-71
B-1.	Clock Module LED Segment Reference	B-1

Tables

4-1.	Resources and Available Diagnostics	4-1
6-1.	FRU Exchange	6-4
6-2.	Examples of Location for the 2220-200/2220-500	6-11
C-1.	Maximum total consumption allowed.	C-1
C-2.	Base Machine and Module Power Consumption	C-1

Notices

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any of IBM's intellectual property rights may be used instead of the IBM product, program, or service. Evaluation and verification of operation in conjunction with other products, except those expressly designated by IBM, is the user's responsibility.

IBM may have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to the IBM Director of Licensing, IBM Corporation, 500 Columbus Avenue, Thornwood, New York 10594, U.S.A. Commercial Relations, IBM Corporation, Purchase, NY 10577, U.S.A.

European Union (EU) Statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM can not accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

Electronic Emission Notices

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Compliance Statement

This Class A digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Avis de conformité aux normes d'Industrie Canada

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Japanese Voluntary Control Council For Interference (VCCI) Statement

This equipment is in the 1st Class category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment aimed at preventing radio interference in commercial and industrial areas.

Consequently, when used in a residential area or in an adjacent area thereto, radio interference may be caused to radios and TV receivers, and so on.

Read the instructions for correct handling.

Power Line Harmonics (JEIDA) Statement

The guidelines of power line harmonics required by JEIDA are satisfied.

Korean Communications Statement

Please note that this device has been approved for business purpose with regard to electromagnetic interference. If you find this is not suitable for your use, you may exchange it for a non-business one.

New Zealand Radiocommunications (Radio) Regulations

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Safety Notices for United Kingdom

1. The IBM 2220 Nways BroadBand Switch is manufactured according to the International Safety Standard EN 60950 and as such is approved in the UK under the General Approval Number NS/G/1234/J/100003 for indirect connection to the public telecommunication network.
2. The network adapter interfaces housed within the IBM 2220 Nways BroadBand Switch are approved separately, each one having its own independent approval number. These interface adapters, supplied by IBM, do not use or contain excessive voltages. An excessive voltage is one that exceeds 42.4 V peak ac or 60 V dc. They interface with the IBM 2220 Nways BroadBand Switch using Safety Extra Low Voltages (SELV) only. In order to maintain the separate (independent) approval of the IBM adapters, it is essential that other optional cards, not supplied by IBM, do not use mains voltages or any other excessive voltages. Seek advice from a competent engineer before installing other adapters not supplied by IBM.

Safety Notice for Australia

In Australia, the LIC545 and LIC546 must be connected only to Safety Extra Low Voltage (SELV) networks.

If an attachment to a Telephone Network Voltage (TNV) network is required, you must use a LIC515 instead of a LIC545, and a LIC516 instead of a LIC546.

Telecommunication Connectivity Notices

Notice to Users of Machines Installed in the U.S.

This equipment complies with Part 68 of the FCC rules. On the LIC module of this equipment is a label that contain, among other information, the FCC registration number. If requested, this information must be provided to the telephone company.

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

If you experience trouble with this equipment, please contact (800) IBM-SERV for repair and warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you to remove the equipment from the network until the problem is resolved.

No repair can be done by you, customer. Please contact (800) IBM-SERV.

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

Equipment Ordering Information for U.S. Machines

This section provides information about Facility Interface Codes and Service Order Codes that are needed to order the corresponding services to the carrier company. Please refer to "Notice to Users of Machines Installed in the U.S." on page xiii for the legal information related to the connection of this equipment to the telephone network.

LIC514

Facility Interface Code	Service Order Code	Module type
04DU9-BN	6.0F	LIC514
04DU9-DN	6.0F	LIC514
04DU9-1KN	6.0F	LIC514
04DU9-1SN	6.0F	LIC514

The standard connecting arrangement code for this equipment is:

Connector type 8-position miniature
Connector model RJ48C
Cable length 30 m (98 ft) maximum
R.E.N Not applicable.

LIC544

Facility Interface Code	Service Order Code	Module type
04DU9-BN	6.0P	LIC544
04DU9-DN	6.0P	LIC544
04DU9-1KN	6.0P	LIC544
04DU9-1SN	6.0P	LIC544

The standard connecting arrangement code for this equipment are:

Connector type 8-position miniature
Connector model Not Applicable
Cable length 30 m (98 ft) maximum
R.E.N Not applicable

or,

Connector type	15-position
Connector model	DB15F
Cable length	30 m (98 ft) maximum
R.E.N	Not applicable

Notice to Users of Machines Installed in Canada

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain 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.

Equipment Ordering Information for Canadian Machines

LIC514: The standard connecting arrangement code for this equipment is:

Connector type	15-position or 8-position miniature
Connector model	CA81A or CA48C
Cable length	30 m (98 ft) maximum
Load number	Not applicable

Please refer to "Notice to Users of Machines Installed in Canada" for the legal information related to the connection of this equipment to the telephone network.

LIC544: The standard connecting arrangement code for this equipment is:

Connector type	15-position or 8-position miniature
Connector model	CA81A or CA48C
Cable length	30 m (98 ft) maximum
Load number	Not applicable

Please refer to "Notice to Users of Machines Installed in Canada" for the legal information related to the connection of this equipment to the telephone network.

Trademarks and Service Marks

The following terms, denoted by an asterisk (*), used in this publication, are trademarks or service marks of IBM Corporation in the United States or other countries:

IBM	Nways	OS/2
AT	XGA	NetView
RETAIN	Presentation Manager	

The following terms, denoted by a double asterisk (**), used in this publication, are trademarks of other companies:

Hayes	Hayes Microcomputer Products, inc.
-------	------------------------------------

General and Product Safety

This product meets the safety standards. For more information, see the *2220 Nways BroadBand Switch Models 300, 500, and 501; Safety Information*, GA33-0401 (P/N 80G4908), manual.

Service Inspection Safety Procedures

Service Inspection Safety Procedures - English

xviii

Sicherheitsüberprüfungen - Deutsch

xxv

服务检查安全程序—简体中文版

xxiv

Safety and Disposal Instructions for Batteries

When disposing of the batteries, follow procedures in accordance with your national or local regulations for recycling the materials. If no regulation of this kind exists, return the batteries to your equipment seller or to IBM.

Service Inspection Safety Procedures

Introduction

A safety inspection procedure for the 2220 should be performed:

- When it is inspected for an IBM agreement
- When IBM service is requested and no service has recently been performed by IBM
- When an alterations and attachments review is performed
- When changes have been made to the equipment that might affect its safety.

If the inspection indicates unacceptable safety conditions, the conditions must be corrected before IBM services the equipment.

Note: The correction of any unsafe condition is the responsibility of the owner of the equipment.

The 2220 areas and functions checked through these procedures are:

1. External covers
2. Safety labels
3. Grounding (earthing)
4. Circuit breaker and circuit protector rating
5. Input power voltage
6. Power ON indicators
7. Emergency power OFF of the board
8. Cooling

Steps 1 through 8 must be performed **Power OFF**, as follows:

- **Main CBs switched OFF** on the 2220.
- **All the equipment installed in the 2220 rack or connected to it is OFF.**
- **Power supplies at customer premises are switched OFF.**

On the 2220 do not remove the power cords and ground wire **A** in order to maintain the ground protection (see Figure 0-1 on page xix).

1. External Covers

Check that:

- All external covers are present on the 2220.
- Appropriate service clearances and accesses are provided around the racks with external covers opened.

Leave all external covers opened to allow further inspection steps.

2. Safety Labels

Check that:

- All the safety labels are at the places indicated by letters in "Safety Label Locations" on page xl.
- Each label corresponds to the correct model as indicated by the letter as shown in "Safety Label Identifications" on page xlv.

To check the labels on the ACDC and/or DC48 power input and on the battery (if present) you must remove these FRUs. Refer to Chapter 6, “2220 FRU Exchange” on page 6-1 for detailed instructions.

3. Grounding (Earthing)

Note

In this book "ground", means that the equipment must be connected to the earth.

a. Grounding of the 2220, NAS, display, and modem to the Premises Grounding System

- Electrical continuity is assured between their frame ground and premises grounding system, through their power cords.
- For the 2220-300 and the 2220-500, an additional ground wire **A** is also used.
- The 2220-501 is connected to the 2220-500 via a ground wire **B** (see Figure 0-2 on page xx).

1) 2220 Model 300 and 500 Ground Wire

Check the presence of ground wire **A** on the 2220 (see Figure 0-1).

The ground wire **A** can also be installed on the top of the 2220 Model 300/500 frame if necessary.

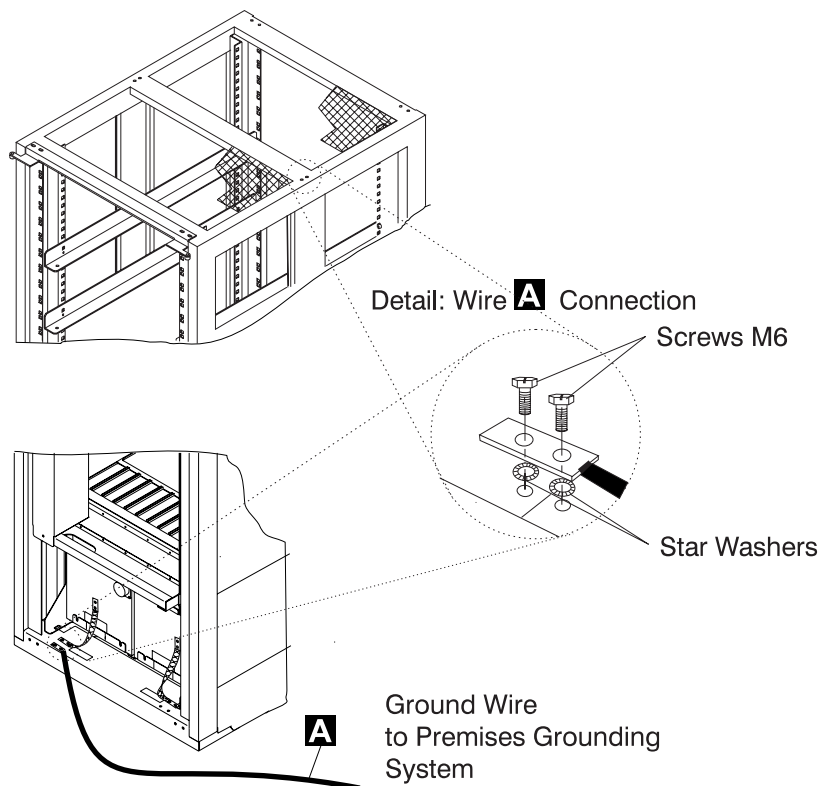


Figure 0-1. 2220 Ground Wire A

Notes:

- a) **A** Wire (PN 80G3815)
- b) Screws (PN 43G3084)
- c) Star washers (PN 1622348)

2) 2220 Model 501 Ground Wire

When a 2220-501 is installed, check the presence of ground wire **B** between the 2220-500 and the 2220-501 (see Figure 0-2).

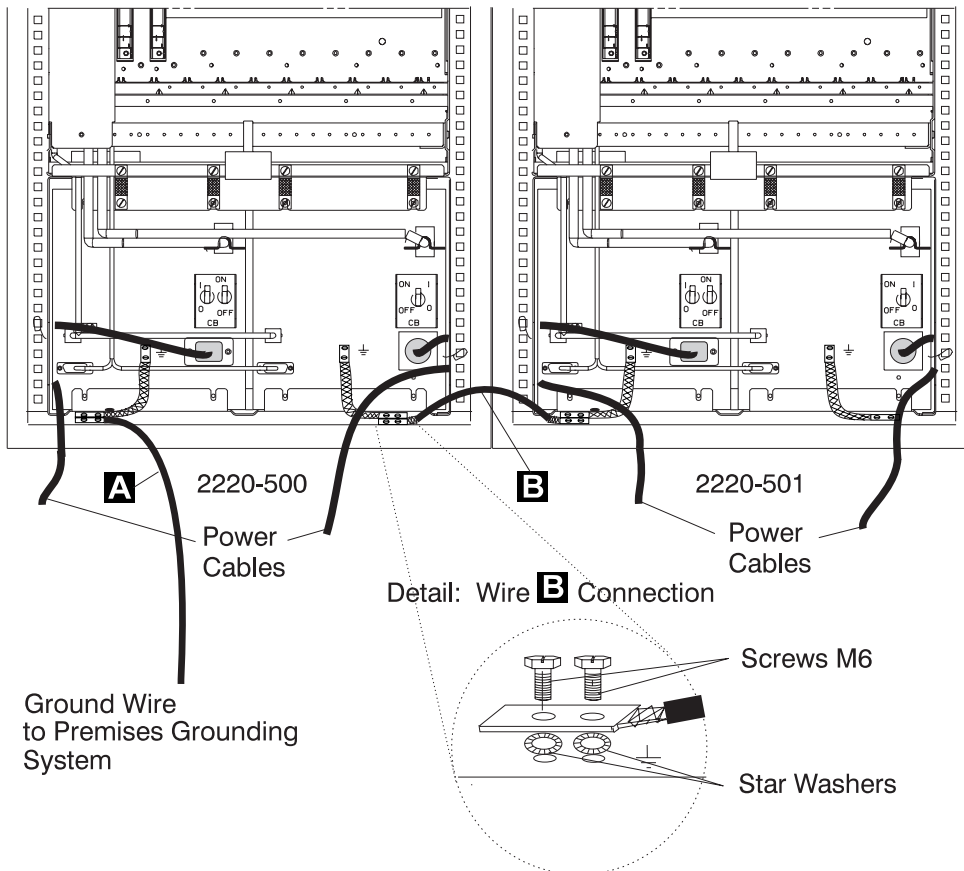


Figure 0-2. 2220 Ground Wire B Between 2220-500 and 2220-501

Notes:

- a) **B** Wire (PN 80G3715)
- b) Screws (PN 43G3084)
- c) Star washers (PN 1622348)

3) ac/dc Power Cable Ground Wire

- Check the mainline ac/dc power cable for damaged or burned pins and broken insulation on **all units**.
- Measure the resistance of the disconnected mainline ac/dc power cable from ground pin on one end to the ground pin on the other end.

The reading should be 0.1 ohm or less.

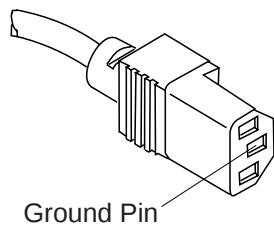


Figure 0-3. 2220 Ground Pin on Mainline ac/dc Power Cable

b. Internal Grounding in the 2220

Check that:

- Electrical continuity is assured within each rack, between the rack ground and the installed power supplies via ground straps **1**.

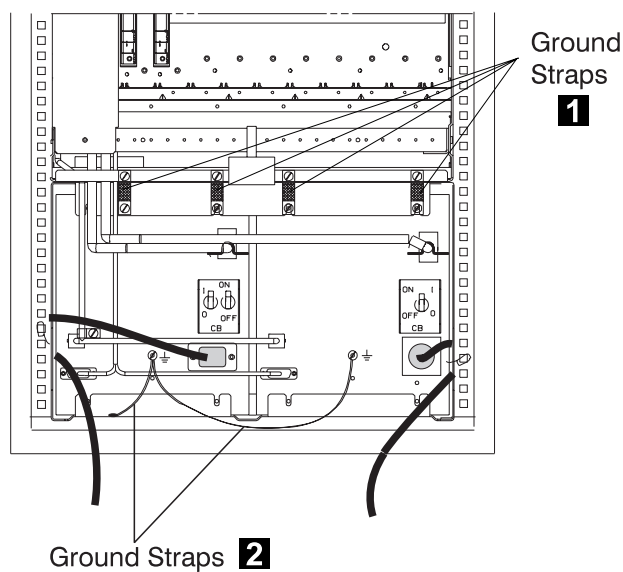


Figure 0-4. 2220 Ground Straps (Former Machine)

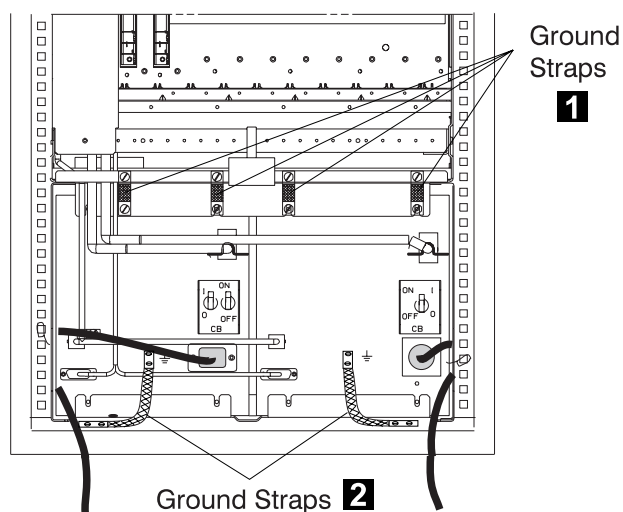


Figure 0-5. 2220 Ground Straps

- Electrical continuity is assured, between the rack ground and the power supply receptacle via ground straps **2**.
- Electrical continuity is assured, between the rack ground and the Line Connection Box (LCB), if LCBs are present. This operation must be performed before any network connection (see Figure 0-6).

c. **Grounding of Line Connection Boxes (LCBs) not Installed in 2220**

Check that electrical continuity is assured between the LCB housing and the premises grounding system.

There are two ways to insure a proper grounding of the LCB, according to where it is installed:

- 1) Grounding is insured by the four screws (which secure the LCB on the rack) if the frame of the rack is connected to the premises ground system.

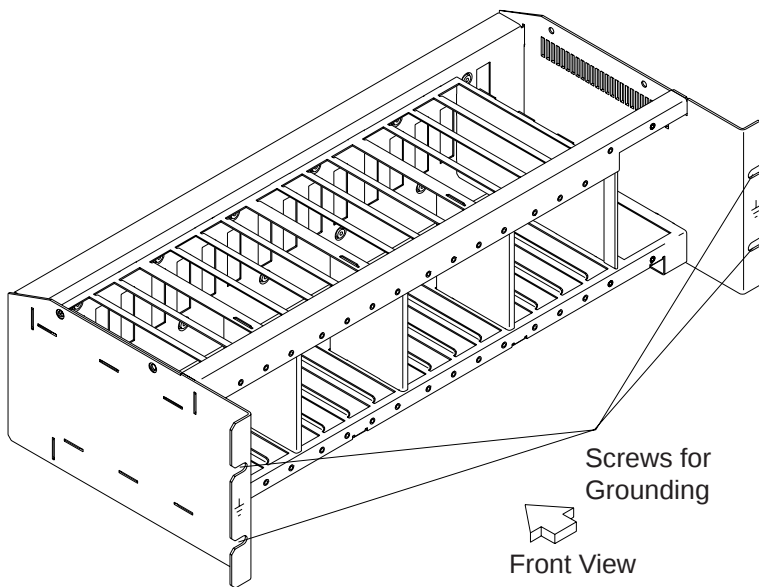


Figure 0-6. LCB Grounding via Screws

- 2) Grounding is insured by a wire connected from the LCB to the premises ground system, when the LCB is installed in a rack with frame **not** connected to the premises ground system.

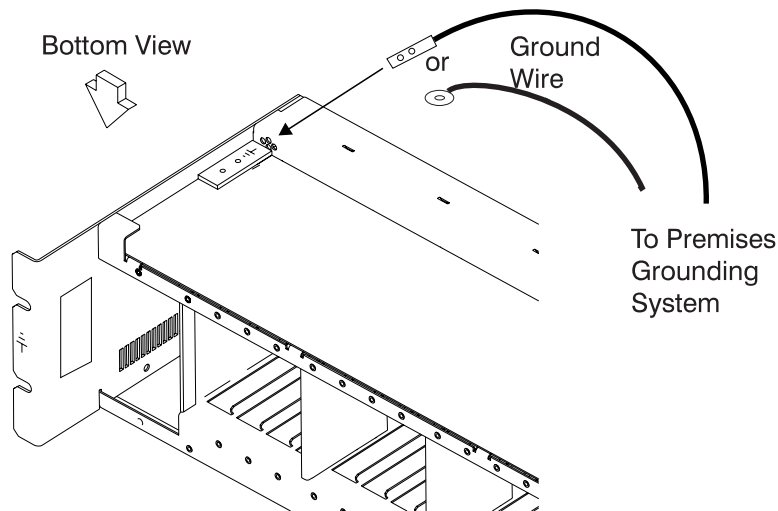


Figure 0-7. LCB Grounding via Ground Wire

Ground Wire Connection on LCB

There are two ways to secure the ground wire on the LCB.

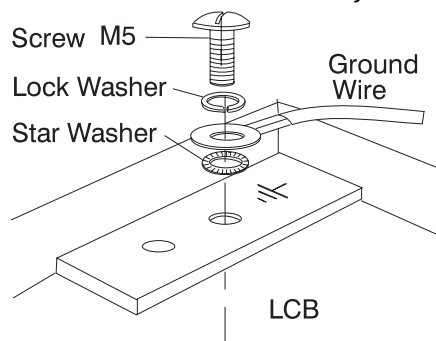


Figure 0-8. Standard Connection

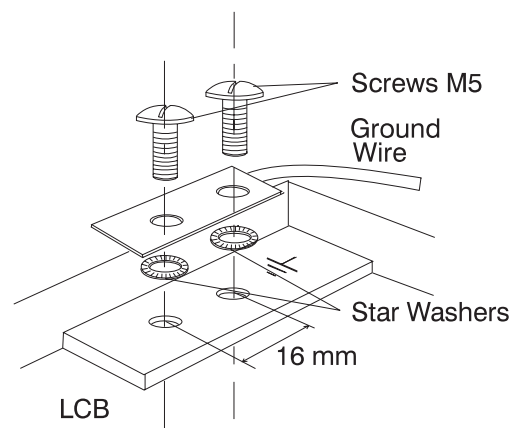


Figure 0-9. Bellcore Specification Connection

This operation must be performed before any network connection.

Note: All the previous checking should indicate 0.1 ohm or less.

d. Building Grounding

Check there is less than 1 V ac between the metal housings of plugs, connectors, receptacles, and so on, and any grounded point in the building. This can be any grounded metal structure, such as the stanchions of a raised floor (if they are electrically connected to building ground), a metal water pipe, building steel, and so on.

Notes:

- 1) When probing a painted metal part, be sure that the meter probe tip penetrates the paint.
- 2) Also check the plugs metal housing of incoming cables.

4. Circuit Breaker and Circuit Protector Rating

Each power box has one circuit breaker (CB) and six circuit protectors (CPs).

Power Box	CB/CP	Rating
ACDC / DC48	CP1 to CP5 CP6	8A dc 4A dc
ACDC	CB	12A ac
DC48	CB	40A dc

The CB and all CPs are in the sealed ACDC or DC48 power box.

Check the PN on the input power box, refer to the parts catalog. In the case of a discrepancy, contact your support structure.

5. Input Power Voltage

Two types of power boxes can be installed on 2220 family machines:

- **ACDC Power:** The input power voltage is from an ac voltage (200-240 V and 50 or 60 Hz).
- **DC48 Power:** The input power voltage is from a dc source (39-60 V).

In the 2220 family, the **ACDC** and **DC48** power boxes can be mixed on each machine model.

6. Power ON Indicators

Ask the customer to:

- Connect the power cords to the customer's energy supplies
- Put the CBs ON
- Turn the power ON/STANDBY switch to ON (position I on the control panel).

Once the 2220 is powered ON, using the following table, check the status of each element.

Element	Status
Control Panel	• The green LED(s) POWER SUPPLY 1 and 2 on the 2220 control panel are ON (if you have two power boxes installed in the 2220). • The APC green LED blinks during power on self test (POST), and then comes ON. • The yellow LEDs FAN BOX and ALARM are OFF.
ACDC Power	• The green LEDs AC GOOD and DC/HW GOOD are ON. • The yellow LED BATTERY EXCHANGE REQUIRED is OFF.
DC48 Power (if installed on your machine)	• The green LED (DC/HW GOOD) is ON.
On top of Modules installed in your 2220	Green LEDs are ON.

7. Emergency Power OFF of the Board

Turn the power ON/STANDBY switch to STANDBY (position  on the control panel) and check that:.

- The **POWER SUPPLY 1** and **2** LEDs on the control panel are OFF.
- The fans are stopped.

8. Cooling

Be sure that all the modules and dummy modules are properly installed to ensure proper cooling.

Sicherheitsüberprüfungen

Einführung

Die Sicherheit des 2220 sollte in folgenden Fällen überprüft werden:

- Bei einer Prüfung nach Absprache mit IBM
- Wenn eine IBM Wartung angefordert wird, und in der letzten Zeit keine Wartung durch IBM durchgeführt worden war.
- Wenn Änderungen am Gerät oder Anschlüsse überprüft werden.
- Wenn Änderungen am Gerät vorgenommen worden sind, die möglicherweise die Sicherheit beeinträchtigen.

Wenn bei der Überprüfung ein unzureichender Sicherheitszustand festgestellt wird, müssen die Mängel behoben werden, bevor IBM das Gerät wartet.

Anmerkung: Für die Behebung von Sicherheitsmängeln ist der Besitzer des Geräts verantwortlich.

Folgende Bereiche und Funktionen des 2220 werden im folgenden geprüft:

1. Äußere Abdeckungen
2. Sicherheitsaufkleber
3. Erdung
4. Sicherungsautomat und Überstromschutzschalter
5. Netzeingangsspannung
6. Betriebsanzeigen
7. Notausschalter der Platine
8. Kühlung

Vor der Prüfung der oben genannten Punkte muß die Stromzufuhr folgendermaßen **unterbrochen** werden:

- Am 2220 die **Hauptsicherungsautomaten öffnen**.
- **Alle im Einschub des 2220 installierten Geräte oder damit verbundenen Geräte ausschalten**.
- **Stromversorgung beim Kunden ausschalten**.

Netzkabel und Schutzleiter **A** am 2220 nicht entfernen, damit die Erdung gewährleistet ist (siehe Figure 0-10 on page xxvii).

1. Äußere Abdeckungen

Prüfen, ob

- alle äußeren Abdeckungen am 2220 angebracht sind.
- die Einschübe genügend Raum und Zugänge für Wartungsarbeiten haben, wenn die äußeren Abdeckungen geöffnet sind.

Alle äußeren Abdeckungen für weitere Überprüfungen offen lassen.

2. Sicherheitsaufkleber

Prüfen, ob

- sich alle Sicherheitsaufkleber an den mit Buchstaben gekennzeichneten Stellen befinden, wie unter "Safety Label Locations" on page xl beschrieben.
- jeder Aufkleber dem richtigen Modell entspricht, wie anhand der Buchstaben unter "Safety Label Identifications" on page xlv angegeben ist.

Für die Prüfung der Aufkleber am ACDC-Eingang (Gleichstrom-Wechselstrom) und/oder DC48-Eingang (48Volt Gleichstrom) und an der Batterie (sofern vorhanden) müssen Sie diese Funktionseinheiten entfernen. Unter Chapter 6, "2220 FRU Exchange" on page 6-1 sind ausführliche Anweisungen zu finden.

3. Erdung

a. Schutzleiterverbindung von 2220, NAS, Bildschirm und Modem an das Erdungssystem des Gebäudes

- Der elektrische Durchgang zwischen Gehäuseerdung und dem Erdungssystem des Gebäudes wird über die Netzkabel sichergestellt.
- Beim 2220-300 und 2220-500 wird zusätzlich ein Schutzleiter **A** verwendet.
- Der 2220-501 wird über ein Schutzleiter **B** an den 2220-500 angeschlossen (siehe Figure 0-11 on page xxviii).

1) Schutzleiter des 2220 Modell 300 und 500

Prüfen, ob am 2220 ein Schutzleiter **A** vorhanden ist (siehe Figure 0-10).

Der Schutzleiter **A** kann gegebenenfalls auch oben am Rahmen des 2220 Modell 300/500 installiert sein.

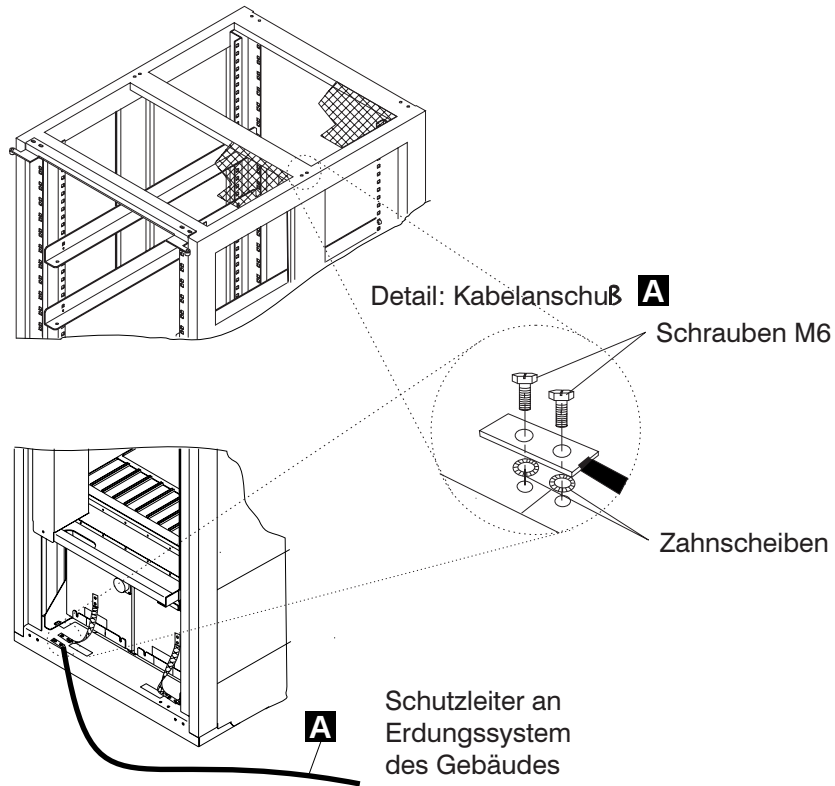


Figure 0-10. Schutzleiter A am 2220

Notes:

- a) Kabel **A**: (Teilenummer 80G3815)
- b) Schrauben: (Teilenummer 43G3084)
- c) Zahnscheiben: (Teilenummer 1622348)

2) Schutzleiter am 2220 Modell 501

Wenn ein 2220-501 installiert ist, prüfen, ob sich ein Schutzleiter **B** zwischen 2220-500 und 2220-501 befindet. (siehe Figure 0-11).

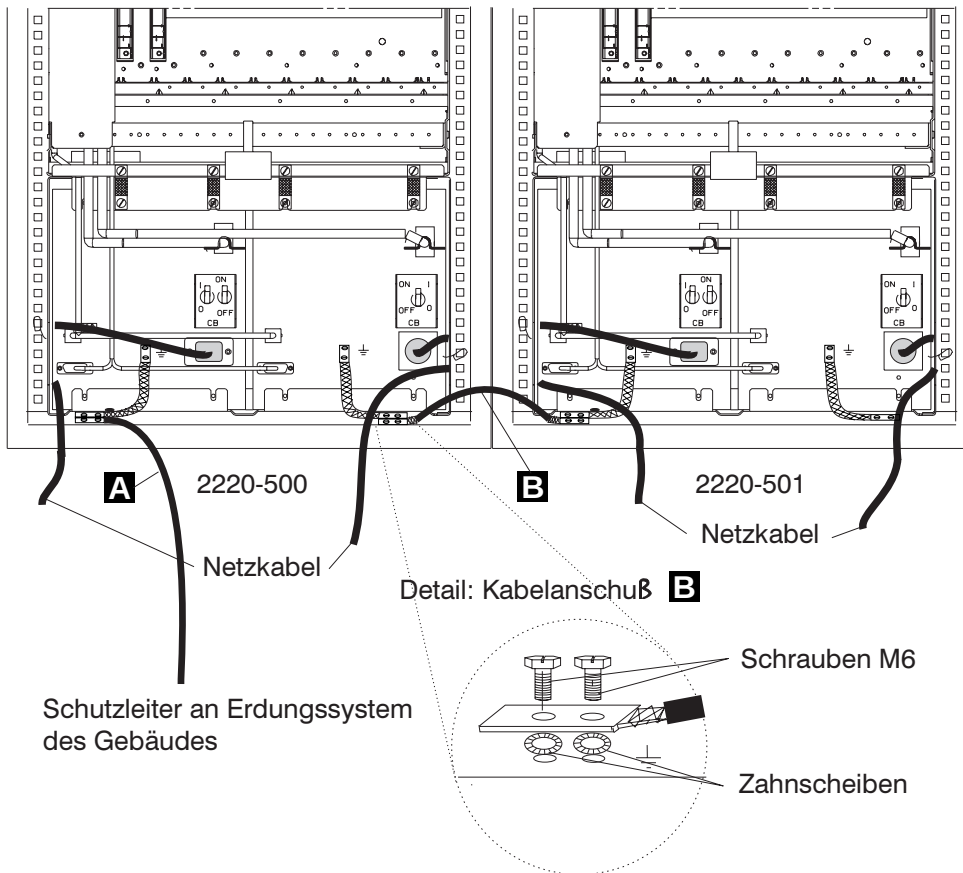


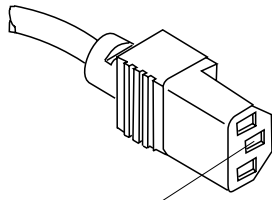
Figure 0-11. 2220 Schutzleiter B zwischen 2220-500 und 2220-501

Notes:

- Kabel **B** (Teilenummer 80G3715)
- Schrauben (Teilenummer 43G3084)
- Zahnscheiben (Teilenummer 1622348)

3) Schutzleiter des Netzkabels

- Hauptnetzkabel **aller Geräte** auf beschädigte oder verbrannte Kontakte und beschädigte Isolierung prüfen.
- Den Widerstand des nicht angeschlossenen Hauptnetzkabels zwischen dem Schutzleiterkontakt am einen und dem Schutzleiterkontakt am anderen Ende messen.
Der Widerstand darf maximal 0,1 Ohm betragen.



Schutzleiterkontakt

Figure 0-12. Schutzleiterkontakt am Hauptnetzkaabel des 2220

b. Interne Erdung im 2220

Prüfen, ob

- der elektrische Durchgang innerhalb eines jeden Gehäuses über Schutzleiter **1** zwischen dem Gehäuseschutzleiteranschluß und den installierten Netzteilen gewährleistet ist.

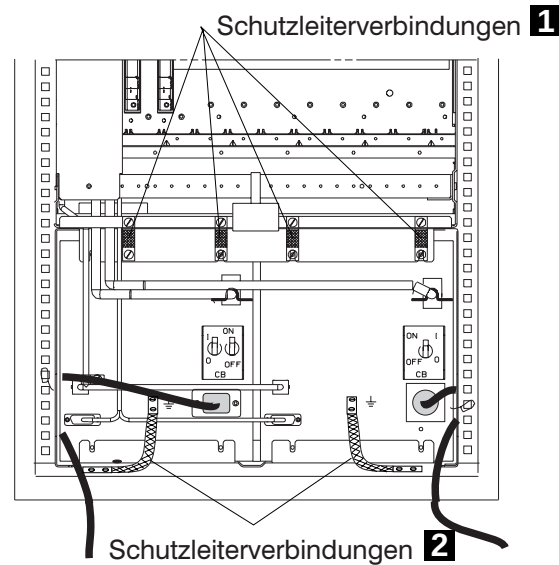
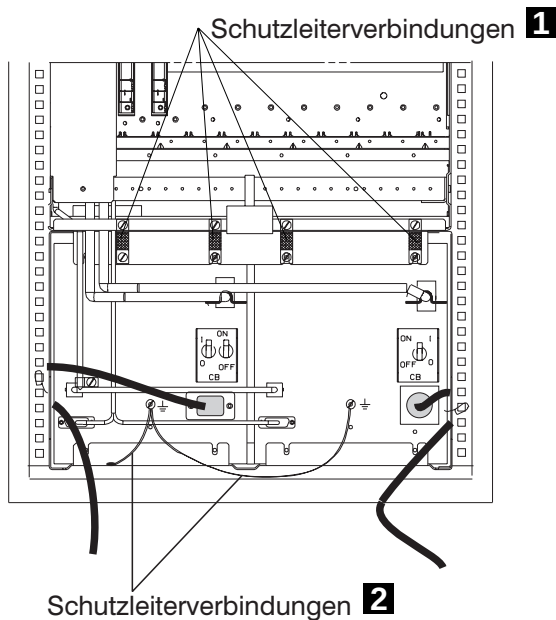


Figure 0-14. 2220 Schutzleiter

Figure 0-13. Schutzleiter am 2220 (vorheriges Modell)

- der elektrische Durchgang über Schutzleiter **2** zwischen dem Gehäuseschutzleiteranschluß und dem Schutzleiterkontakt gewährleistet ist.
- der elektrische Durchgang zwischen dem Gehäuseschutzleiteranschluß und dem Verteilerkasten, sofern vorhanden, gewährleistet ist. Dieser Schritt muß vor dem Anschluß von Signalkabeln erfolgen (siehe Figure 0-15 on page xxx).

c. Erdung der nicht im 2220 installierten Verteilerkästen

Prüfen, ob der elektrische Durchgang zwischen dem Gehäuse des Verteilerkastens und dem Erdungssystem des Gebäudes gewährleistet ist.

Je nach Installationsort kann der Verteilerkasten auf zweierlei Arten geerdet werden:

- 1) Erdung über die vier Schrauben (mit denen der Verteilerkasten am Gehäuse befestigt ist), falls der Gehäuserahmen mit dem Erdungssystem des Gebäudes verbunden ist (siehe Figure 0-15 on page xxx).

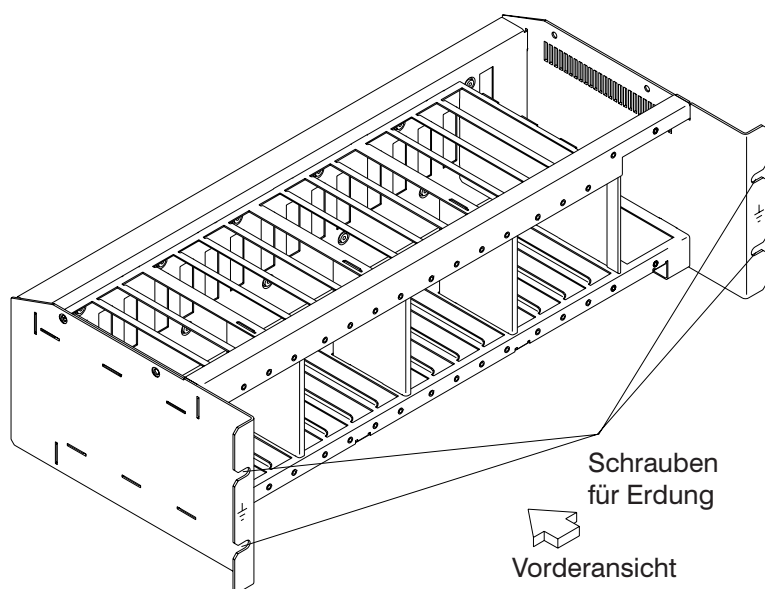


Figure 0-15. Erdung des Verteilerkastens über Schrauben

- 2) Erdung über ein Kabel, das den Verteilerkasten mit dem Erdungssystem des Gebäudes verbindet, wenn der Verteilerkasten in einem Gehäuse installiert ist, dessen Rahmen **nicht** mit dem Erdungssystem des Gebäudes verbunden ist.

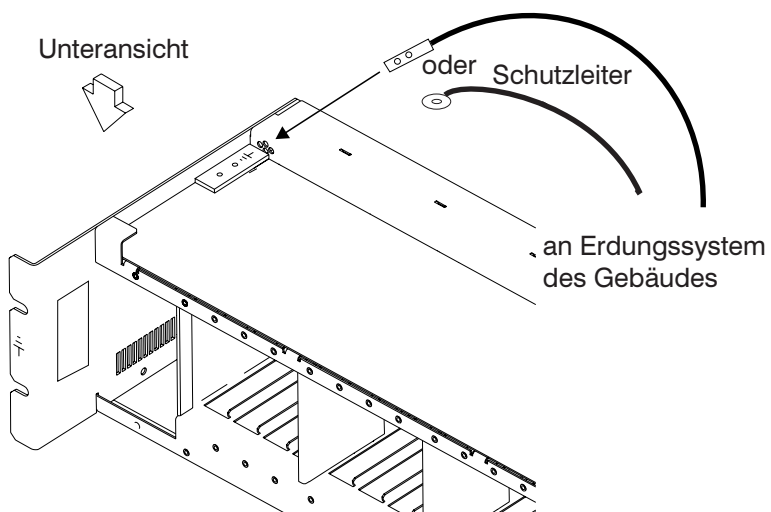


Figure 0-16. Erdung des Verteilerkastens über Schutzleiter

Schutzleiteranschluß am Verteilerkasten

Der Schutzleiter kann auf zweierlei Arten am Verteilerkasten angeschlossen werden.

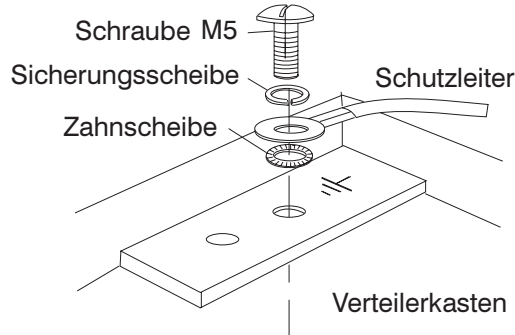


Figure 0-17. Standardanschluß

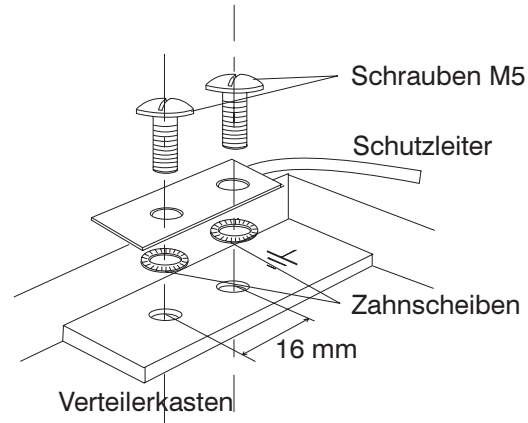


Figure 0-18. Anschluß nach Bellcore-Norm

Dieser Schritt muß vor dem Anschluß jeglicher Signalkabel erfolgen.

Anmerkung: Bei allen vorherigen Prüfungen sollten maximal 0,1 Ohm gemessen werden.

d. Erdung des Gebäudes

Sicherstellen, daß zwischen den Metallgehäusen von Steckern, Buchsen usw. und jeder geerdeten Stelle im Gebäude eine Wechselspannung von weniger als 1 V anliegt. Dies kann jedes geerdete Metallteil sein, wie z. B. die Stützen eines Doppelbodens (wenn sie mit dem Gebäudeerder verbunden sind), ein metallisches Wasserrohr, Baustahl usw.

Anmerkung:

- 1) Beim Prüfen an einem lackierten Metallteil sicherstellen, daß die Prüfspitze die Farbe durchbohrt.
- 2) Auch Metallgehäuse der anzuschließenden Kabel überprüfen.

4. Sicherungsautomat und Überstromschutzschalter

Jeder Energieversorgungsblock verfügt über eine Sicherung und sechs Sicherungsschalter.

Energieversorgungsblock	Sicherungsautomat Überstromschutzschalter	Nennstrom
ACDC, DC48	Überstromschutzschalter 1 bis 5 Überstromschutzschalter 6	8 A Gleichstrom 4 A Gleichstrom
ACDC	Sicherungsautomat	12 A-Wechselstrom
DC48	Sicherungsautomat	40 A-Gleichstrom

Der Sicherungsautomat und die Überstromschutzschalter befinden sich in dem versiegelten Energieversorgungsblock (ACDC bzw. DC48).

Die Teilenummer des Eingangsenergieversorgungsblocks prüfen, siehe Teilekatalog. Falls Unstimmigkeiten auftreten, an das KD-Unterstützungspersonal wenden.

5. Eingangsspannung

In die Geräten der 2220-Familie können zweierlei Energieversorgungsblöcke installiert werden.

- **ACDC:** Bei der Eingangsspannung handelt es sich um Wechselspannung (200-240 V, 50 oder 60 Hz).

- **DC48:** Bei der Eingangsspannung handelt es sich um Gleichspannung (39-60 V).

Bei der 2220-Familie können gleichzeitig der **ACDC**- und der **DC48-Energieversorgungsblock** in jedem Modell installiert sein.

6. Betriebsanzeigen

Den Kunden um folgendes bitten:

- Netz kabel an das Netz des Kunden anschließen.
- Sicherungen EINSCHALTEN.
- Den Betriebsschalter des Geräts auf EIN stellen. (Position I am Bedienungsfeld).

Sobald der 2220 eingeschaltet ist, anhand der folgenden Tabelle den Status eines jeden Elements prüfen.

Element	Status
Bedienungs-feld	• Die grünen LEDs (STROMVERSORGUNG 1 und 2) am Bedienungsfeld des 2220 LEUCHTEN (wenn im 2220 zwei Energieversorgungsblöcke installiert sind). • Die grüne LED APC blinkt während des Selbsttests beim Einschalten und LEUCHTET dann dauerhaft. • Die gelben LEDs (VENTILATOR und ALARM) LEUCHTEN NICHT.
ACDC	• Die grünen LEDs (AC GOOD und DC/HW GOOD) LEUCHTEN. • Die gelbe LED (BATTERY EXCHANGE REQUIRED) LEUCHTET NICHT.
DC48 (sofern installiert)	• Die grüne LED (DC/HW GOOD) LEUCHTET.
Oben auf den im 2220 installierten Modulen	Grüne LEDs LEUCHTEN.

7. Notausschalter der Platine

Den Betriebsschalter auf BEREITSCHAFT stellen. (Position  am Bedienungsfeld) und sicherstellen, daß:

- die LEDs **STROMVERSORGUNG 1** und **2** am Bedienungsfeld NICHT LEUCHTEN.
- die Lüfter nicht laufen.

8. Kühlung

Prüfen, ob alle Module und Dummy-Module richtig installiert sind, damit eine ausreichende Kühlung gewährleistet ist.

服务检验过程：

介绍：

2220 的服务检验安全过程必须进行：

- 当它是因 IBM 协定而检验
- 当要求 IBM 服务而至近来 IBM 仍没有进行任何服务
- 当进行变更及附件再检查时
- 当对设备进行有可能影响其安全的改变

假如检验指出不接受的安全状态，此状态必须于 IBM 对设备进行服务前更正。

注意：对于任何不安全环境的更正是设备拥有者的责任。

2220 可以经这过程检验以下的范围与功能：

1. 外壳
2. 安全标签
3. 接地
4. 断路器及线路保护器额定
5. 输入电源电压
6. 电源开启指示器
7. 底板紧急电源关闭
8. 冷却

下列各项，在步骤 1-8 中必须关闭电源：

- 在 2220 上的主要 CBs 要关闭电源
- 所有安装在 2220 机架上或连接至它的设备要关闭电源
- 客户地点的电源供应要关闭

在 2220 上，请勿拆除电源线机接地线 **A** 以维持接地保护
(参看第二页的图 1 - 1)

1 外壳

检查：

- 所有外壳都存在在 2220 上
- 在外壳打开的情形下，机架四周应提供适当的清洁及存取服务。

保持外壳打开以容许其他检验步骤进行。

2 安全标签

检查：

- 所有安全标签都在有 "Safety Label Identifications" 字样指示的地方。
- 每一个标签相应于指示在 "Safety Label Identifications" 上字样所显示的正确型号。

如果要检查在 ACDC 或 DC48 电源输入和在电池上（假如存在）的标签，您必须拆除这些 FRUs。请参看 "Chapter: 2220 FRU Exchange" 以获得更详细的指令。

3 接地

注意：在这书中，“接地”是指那一个设备必须连接至地面。

- a 利用地点接地系统把 2220, NAS,显示器及调制解调器接地。
- 通过它们的电线以保证在它们的框架接地及地点接地系统之间的电力能继续。
 - 对于 2220-300及2220-500, 虽要多用一条附加的接地线 **A**。
 - 2220-501是经接地线 **B** 连接至 2220-500 (参看在第 3 页的图 1-2)

1. 2220型号 300 和 500 接地线：

检查在 2220 上的接地线 **A** 是否存在 (参考图 1-1)

有需要时, 接地线 **A** 亦可以安装至 2220 型号 300/500 框架的顶部。

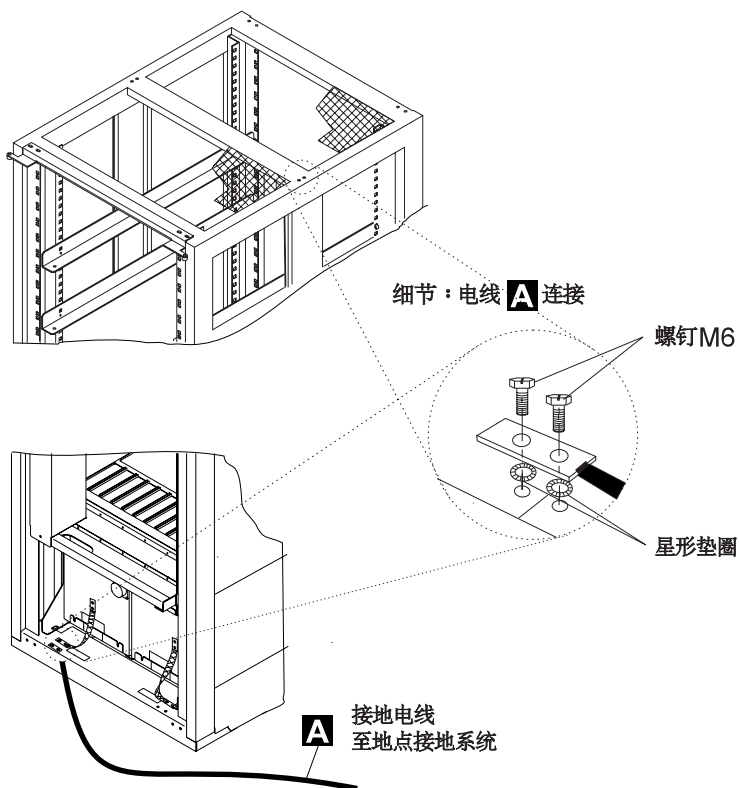


图 1-1. 接地线 A

注意：

- a) 电线 **A** (P/N 80G3815)
- b) 螺钉 (P/N 43G3084)
- c) 星形垫圈 (P/N 1622348)

2. 当 2220 型号 501 接地线

当 2220-501 安装后，请检查在 2220-500 及 2220-501 之间有接地线 **B** 的存在（参考图 1-2）

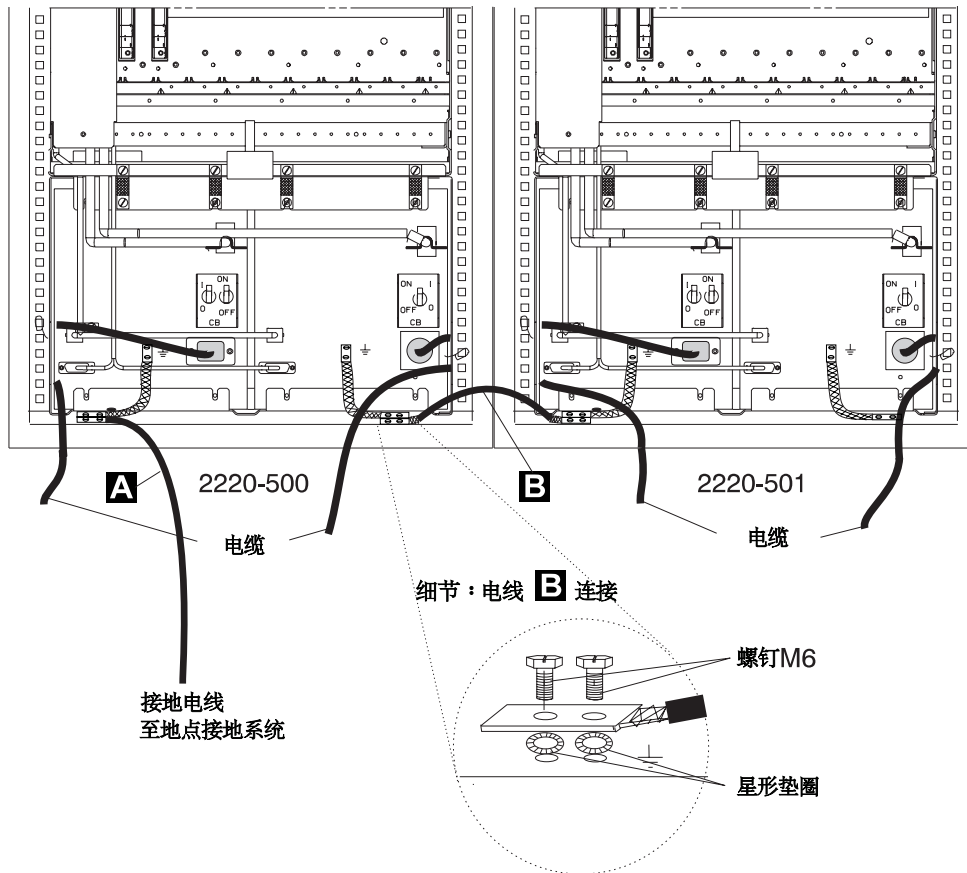


图 1-2. 2220-500 和 2220-501之间的 2220 接地线 B

注意：

- a) 电线 **B** (P/N 80G3715)
- b) 螺钉 (P/N 43G3084)
- c) 星形垫圈 (P/N 1622348)

3 ac/dc 电缆接地线

- 检查在所有单位的 ac/dc 电缆主线上有否损坏或烧坏了的管脚（插头）及断开的绝缘体。
 - 从一端的接地管脚至另一端的接地管脚计算没有连接的 ac/dc 电缆主线之间的电阻。
- 读数应该为 0.1 ohm 或以下。

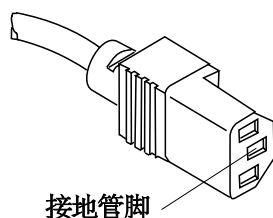


图 1-3. 在 ac/dc 电缆主线的 2220 接地管脚

b 2220 的内部接地

检查：

- 经过接地母线 **1**，可以保证在接地机架和已安装的电源供应之间的电力能在每一机架之中继续。

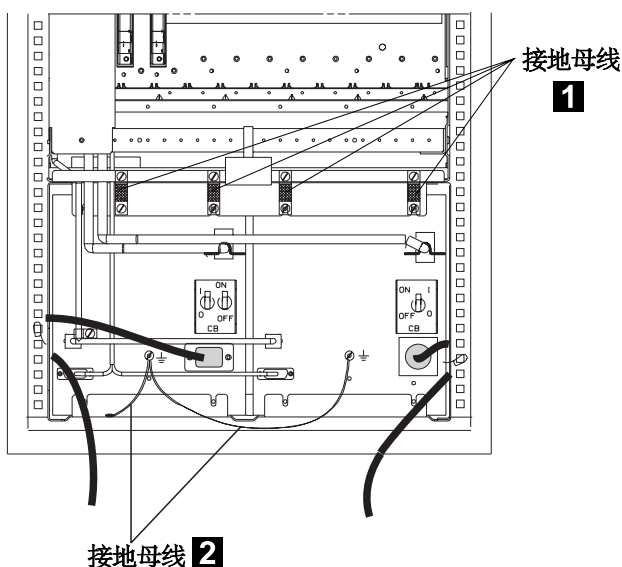


图 1-4. 2220 接地母线（原来的机器）

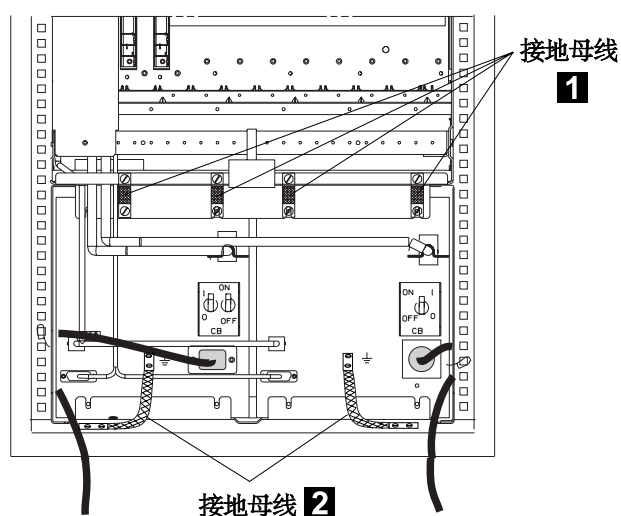


图 1-5. 2220 接地母线

- 经过接地母线 **2**，可以保证在接地机架和电源供应插座之间的电力能继续。
- 假如 LCBs 存在，则可以保证在接地机架和 Line Connection Box (LCB) 之间的电力能继续。此操作一定要在任何网络连接之前进行。（参看在第 5 页的图 1-6）

c 把没有安装在 2220 中的 LCB 接地

检查是否能保证电力于 LCB 的壳及地点接地系统之间继续。

根据 LCB 所安装的地方，有两个方法可以确保 LCB 已适当的接地：

- 1) 假如机架的框架已连接至 PGS，则可以用四口螺钉（用来把 LCB 牢固在机架上）来确保接地。（参看在第 5 页的图 1-6）

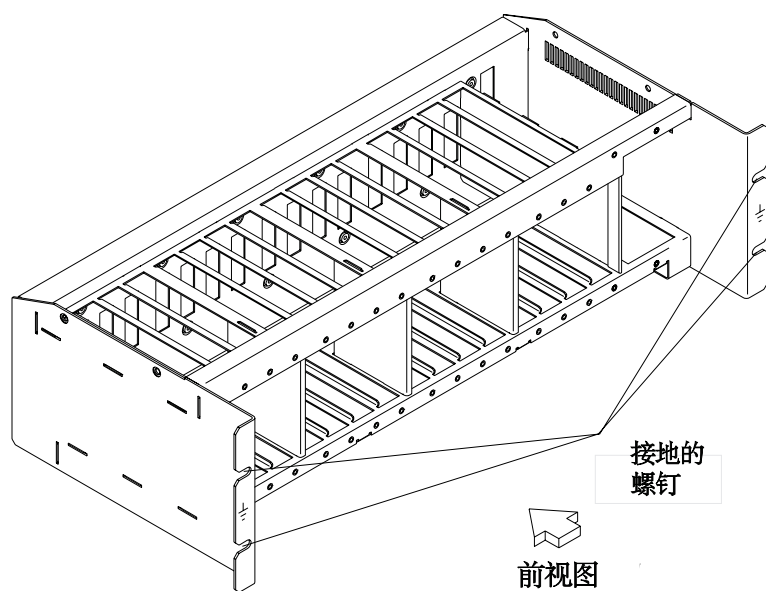


图1-6. LCB 经螺钉接地

2)当已在机架里安装LCB，而其框並沒有与地点接地系统连接时，由 LCB 连接至地点接地系统的电线可保证接地。

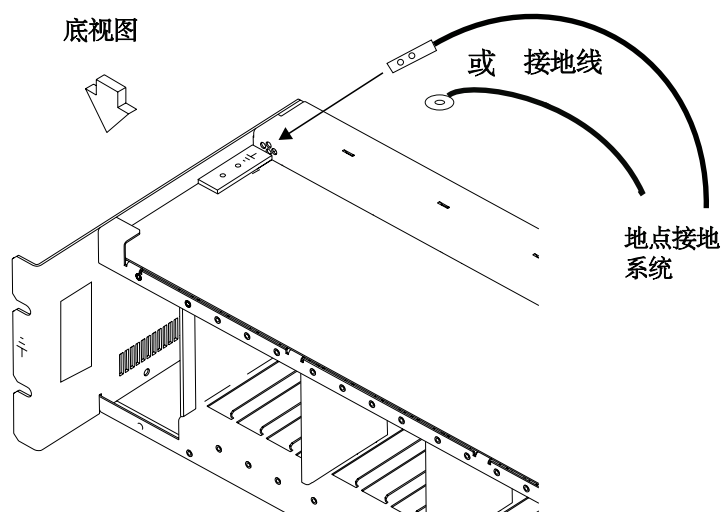


图1-7. LCB 经接地线接地

在 LCB 上连接接地线

有两个方法保接 LCB 上的接地线：

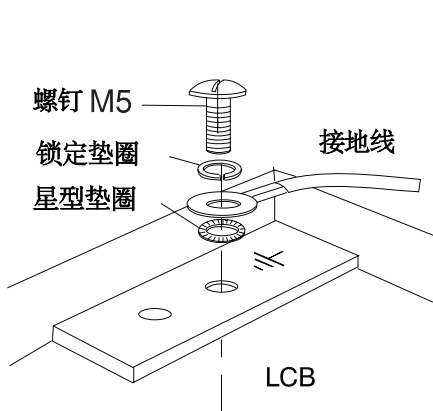


图 1-8. 标准连接

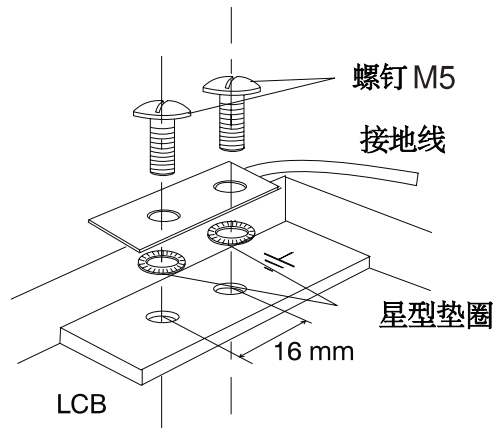


图 1-9. Bellcore Specification Connection

这些手续要在连接任何网络前进行。

注意：所有过去的检查应表示为 0.1 ohm 或以下。

d 建立接地

检验在插头、连接器、插座等的金属外壳和任何建筑物里的接地点间的 ac 小于 1 V。此接地点可以是任何已接地的金属构造，例如上升地板的支柱（若它们已与该建筑物地面接电）、一条金属水管、建筑物钢材等。

注：

- 1) 探测已涂漆的金属部分时，得肯定计量器探测末端透过油漆。
- 2) 输入电缆得插头的金属外壳也要检查。

4 断路器和电路保护器额定

每个电源箱都有一个断路器 (CB) 和六个电路保护器 (CP)。

电源箱	CB/CP	额定
ACDC/DC48	CP1 to CP5 CP6	8 A dc 4 A dc
ACDC	CB	12 A ac
DC48	CB	40 A dc

CB 和所有 CP 都藏在密封的 ACDC 或 DC48 电源箱里。

检查输入电源箱的部件号码，参见部件目录。若有不一致的情况出现，请与您的支持组织联系。

5 输入电源电压

2220 系列机器可装入两种电源箱：

- ACDC 电源：输入电源的电压来自 ac 电压 (200-240 V 和 50 或 60 Hz)
- DC48 电源：输入电源的电压来自 dc 电源 (39-60 V)

在 2220 系列机器里，各型号机器均可混合使用 ACDC 和 DC48 电源箱。

6 电源开启指示器

用户需要：

- a. 连接电源线至用户的能源供应处
- b. 开启 CBs
- c. 转动电源 "ON/STANDBY" 开关至 "ON"（控制面板上的位置）。

当 2220 开启后，使用以下图表检查各单元的状态：

单元	状态
控制面板	• 2220 控制面板上的绿色 LED（能源供应 1）或 2 已开启（若在 2220 里已装入 2 个电源箱）。 • 电源开始自测试时 APC 绿色 LED 闪烁（POST），然后开启。 • 黄色 LED（风扇箱和警报）关闭。
ACDC 电源	• 绿色 LED（AC GOOD 和 DC/HW GOOD）开启。 • 黄色 LED（需要更换电池）关闭。
DC/48 电源 （假如已装入机器里）	• 绿色 LED（DC/HW GOOD）开启。
已装入 2220 内 模块的顶端	绿色 LEDs 开启

7 板上紧急关闭电源

转动电源 "ON/STANDBY" 开关至 "STANDBY"（控制面板上的位置），并检查：

- 控制面板上“能源供应 1 和 2 的 LEDs 关闭。
- 风扇已停止。

8 冷却

校验所有模板和虚模板均已适当地装入以保证适当的冷却。

Safety Label Locations

In the following figures, labels are designated by letters. A particular wording corresponds to each letter (see “Safety Label Identifications” on page xlv).

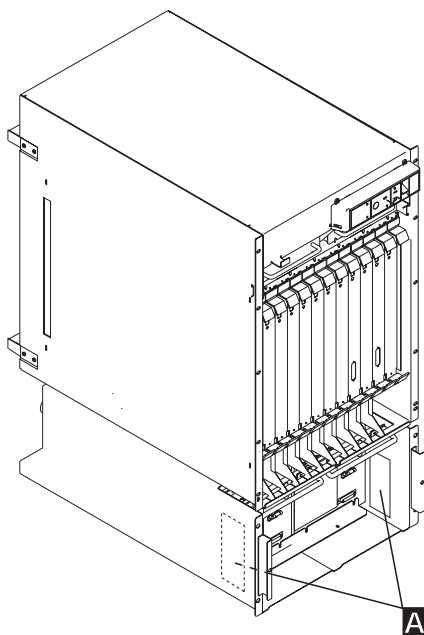


Figure 0-19. Safety Labels on Internal Front Cover

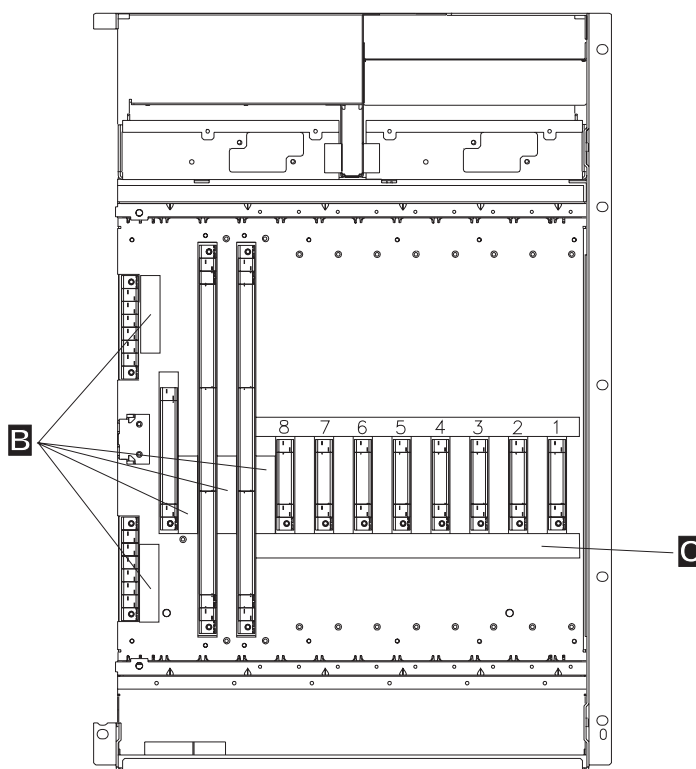


Figure 0-20. Safety Labels on Internal Rear Board Cover

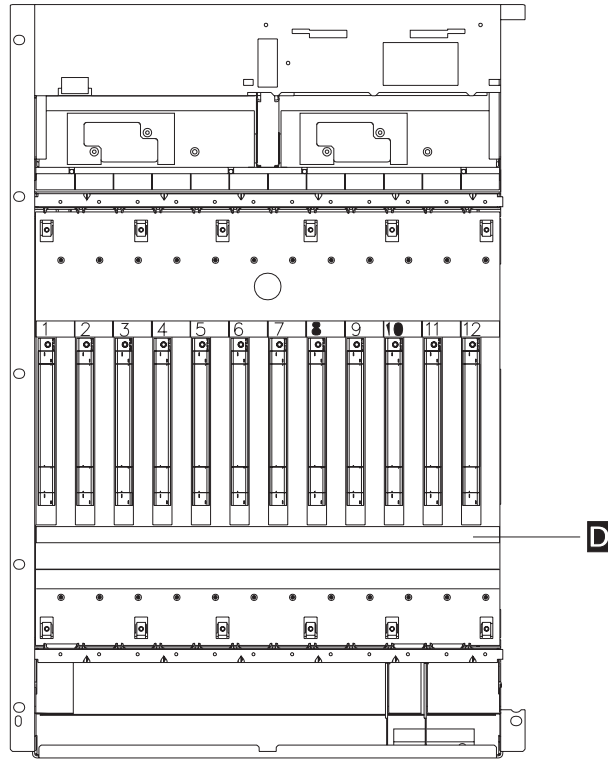


Figure 0-21. Safety Labels on Internal Front Board Cover

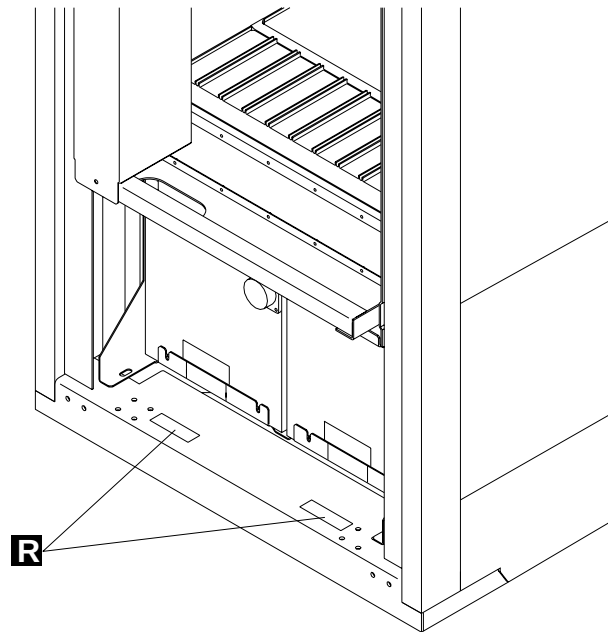


Figure 0-22. Safety Labels on Rear of the 2220 Rack

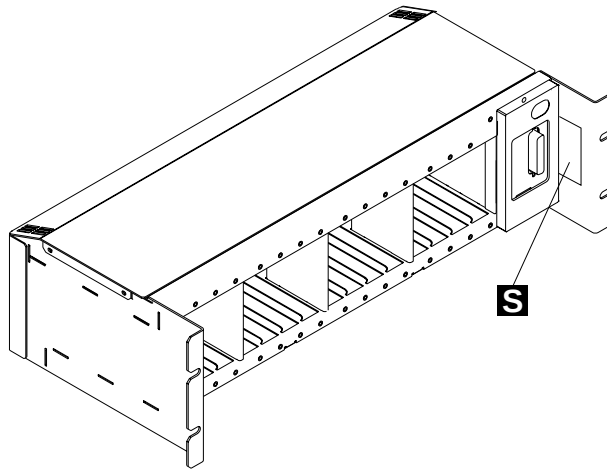
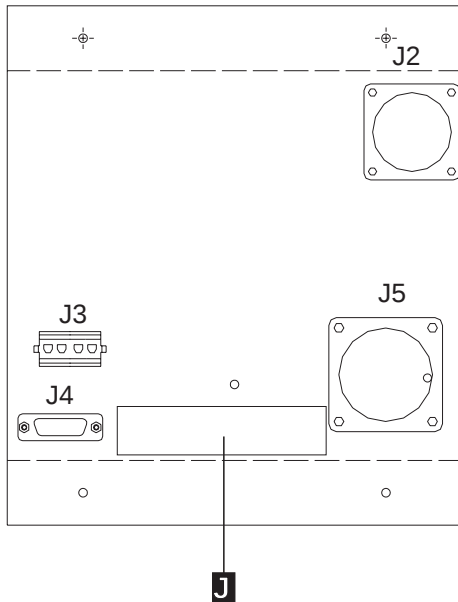
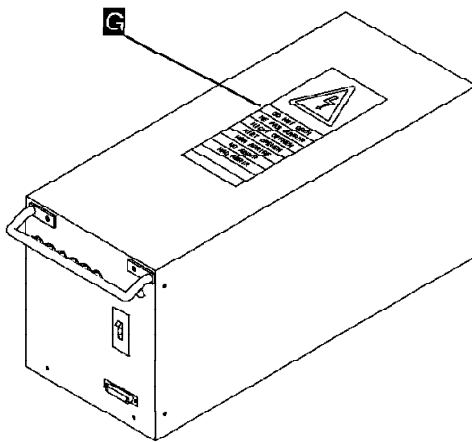
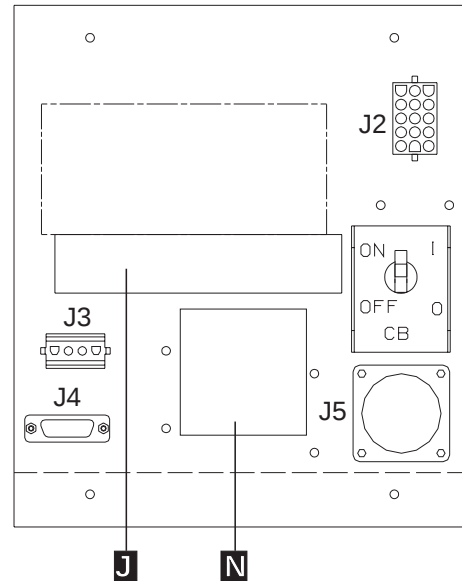
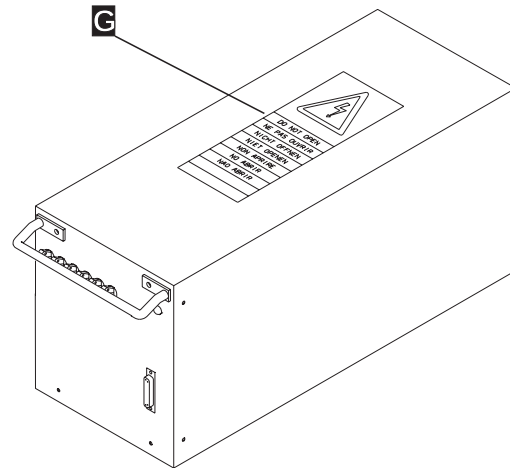


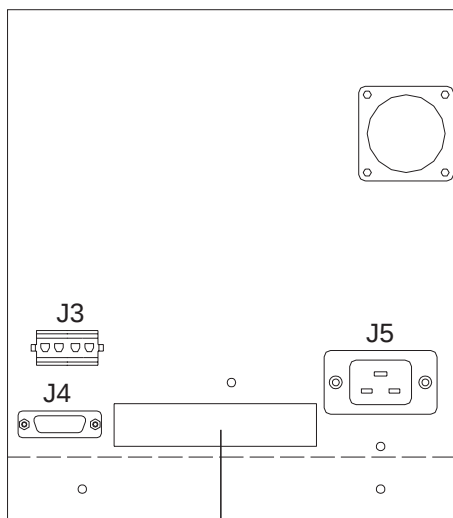
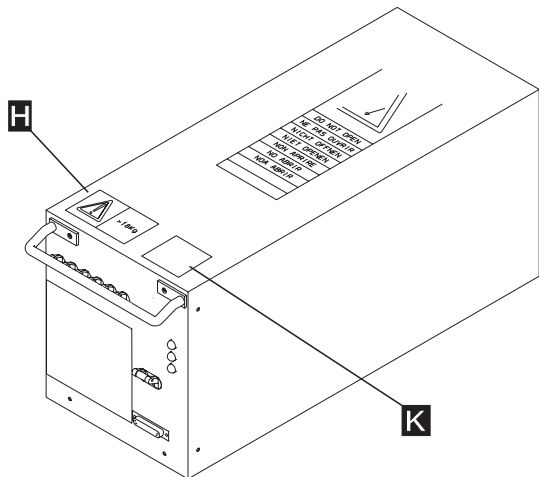
Figure 0-23. Safety Label on LCB



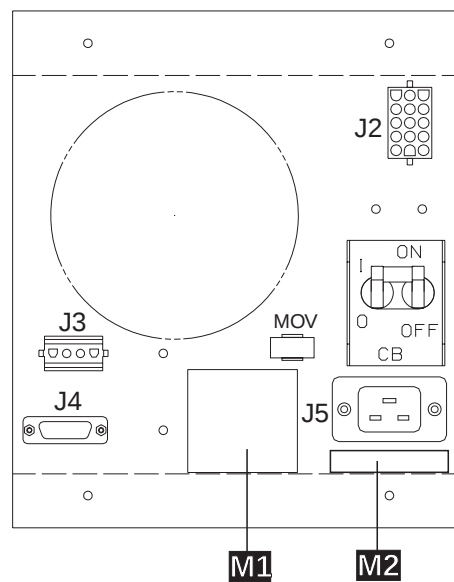
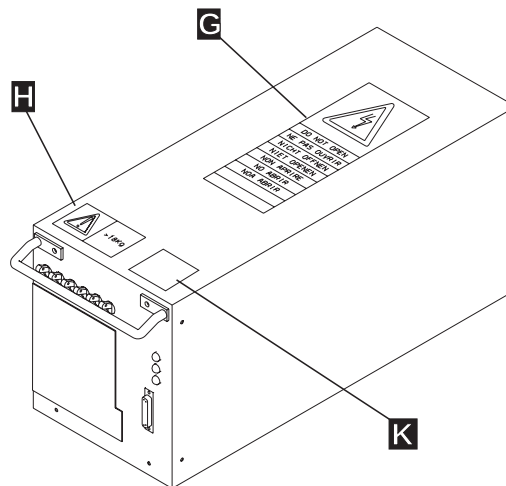
Safety Labels on DC48 Power (Old Model)



Safety Labels on DC48 Power (New Model)



Safety Labels on ACDC Power (Old Model)



Safety Labels on ACDC Power (New Model)

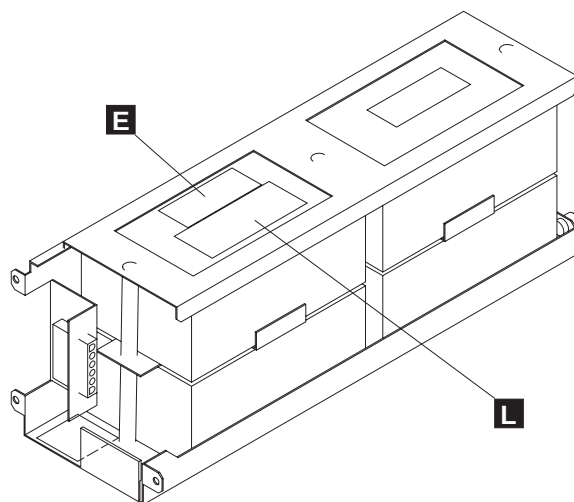


Figure 0-24. Safety Labels on Battery

Safety Label Identifications

LABEL A

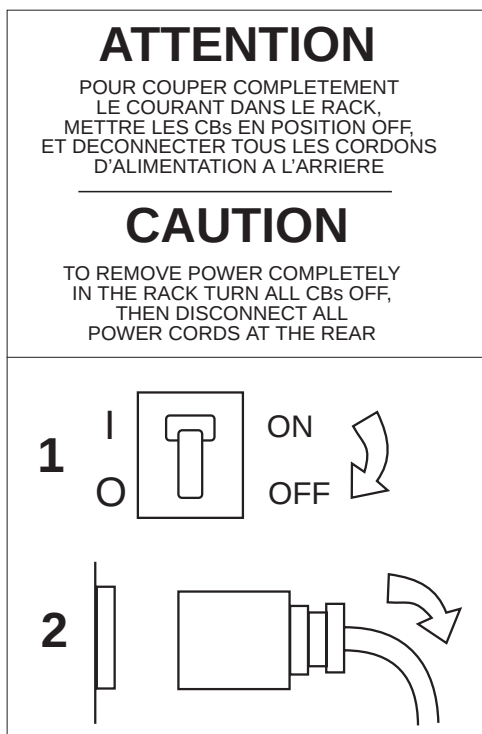


Figure 0-25. Power Label (PN 57G7919 and PN 57G7976)

Note: Depending on the machine configuration you may have one or two power supplies installed. Based on that, one or two power cords may be present. Only a part of this label is shown. This label installed on the machine is translated into 14 languages.

LABEL B



LABEL C

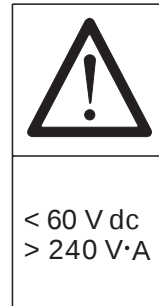


LABEL D



Figure 0-26. Board Labels (PN 57G7920)

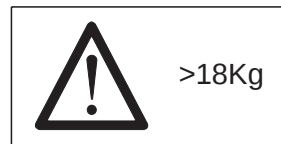
LABEL E



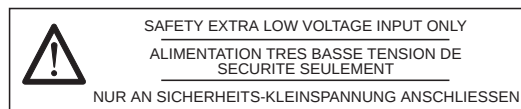
LABEL G



LABEL H



LABEL J



LABEL P

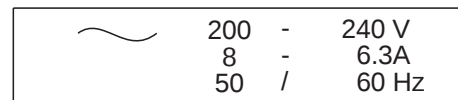
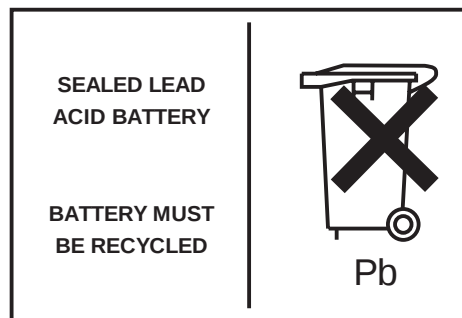


Figure 0-27. Other Labels

LABEL L



LABEL K

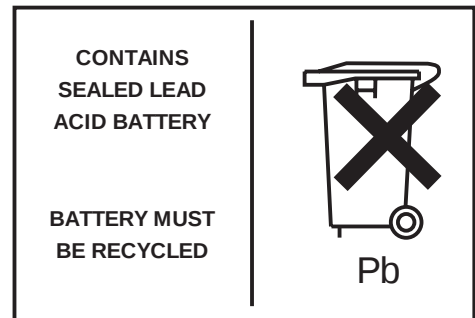
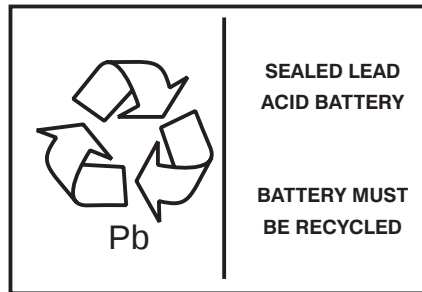


Figure 0-28. Labels Used for Europe, Taiwan, and Brazil (PN 57G7959)

LABEL L



LABEL K

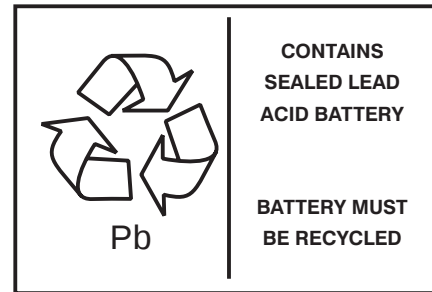


Figure 0-29. Labels Used for Other Countries (PN 57G7958)

LABEL N

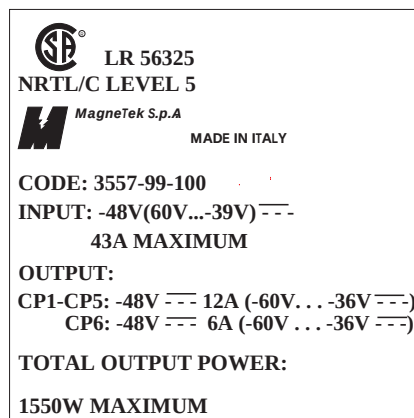


Figure 0-30. Power Rating Label for DC48

LABEL M1 and M2

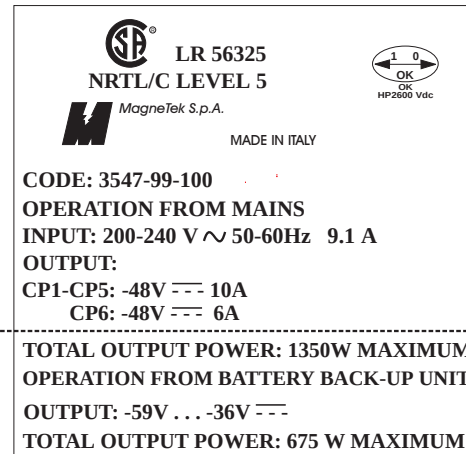


Figure 0-31. Power Rating Label for ACDC

LABEL R

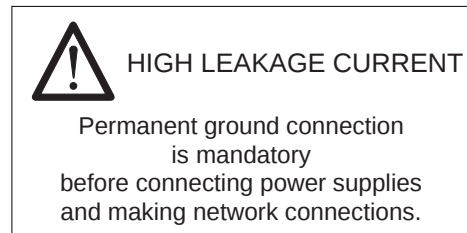


Figure 0-32. Label for 2220Rack (PN 80G3929)

LABEL S



Figure 0-33. Label for LCB (PN 80G3928)

About this Manual

Aim of this Manual

The service guide gives the service representative the information needed to:

- Exchange all the FRUs of the 2220
- Run diagnostics on the 2220.

It is expected that the 2220 problem determination has been done by the remote support center (RSC).

Who Should Read this Manual

The person using this manual should be:

- Trained to service the 2220.
- Familiar with the configuration and operation of the 2220.
- Familiar with the configuration and operation of the Nways Switch administration station.

The intended audience for this manual is Product-Trained Customer Engineers (PT-CE). The Product-Support Customer Engineer (PST-CE) is also expected to refer to the manual when required to perform the same tasks as the PT CE.

How this Manual is Organized

This manual is organized as follows:

Safety information is at the beginning of this book.

Chapter 1	Gives page number references for starting various service and troubleshooting procedures.
Chapter 2	Gives an introduction and an overview of the 2220.
Chapter 3	Gives an overview of the functions available on Nways Switch administration station, and how to invoke some of them.
Chapter 4	Gives the diagnostics available for 2220, and how to invoke these diagnostics.
Chapter 5	Gives the MAPs to be used for problem determination on the 2220.
Chapter 6	Gives the procedure to exchange the FRU on 2220.
Appendixes A to E	Give:

- Schematics
- Maintenance aids
- 2220 Power Consumption
- Parts catalog

Appendix X

- Part number index

Gives:

- Bibliography
- Glossary
- Index.

Chapter 1. START - Finding a Service Procedure

Select the first entry point that fits your situation.

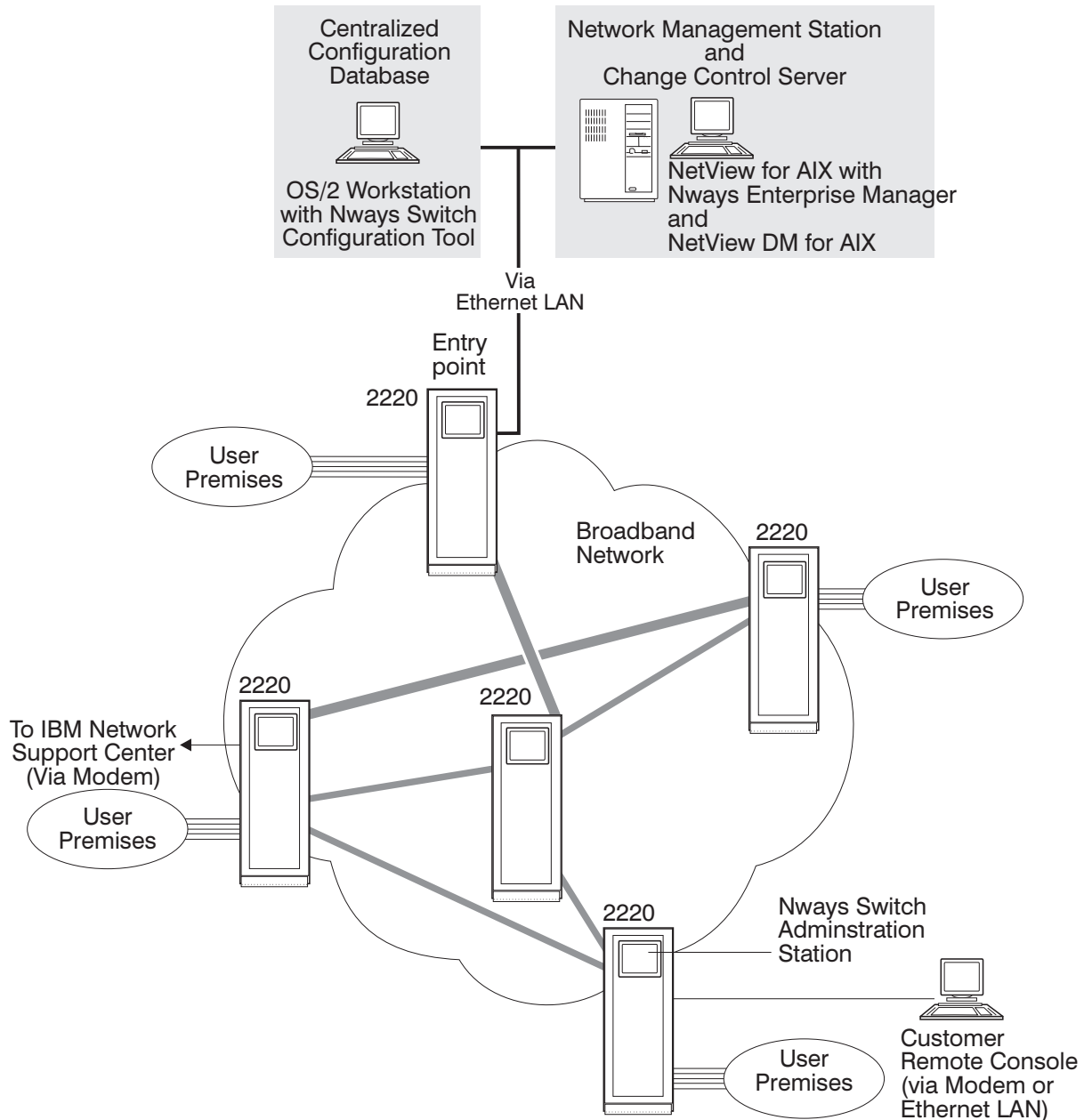
If You Have	Description	Go to
<i>GENERAL SYMPTOM</i>	2220 power symptom	"MAP 0500: 2220 Basic Verification" on page 5-2.
	2220 control panel symptom	"MAP 0500: 2220 Basic Verification" on page 5-2.
	Nways Switch administration station symptom	Refer to the Nways Switch administration service guide.
<i>MAINTENANCE ACTION</i>	2220 Basic verification	"MAP 0500: 2220 Basic Verification" on page 5-2.
	2220 FRU to exchange	Chapter 6, "2220 FRU Exchange" on page 6-1.
	Nways Switch administration station FRU to exchange	Refer to the Nways Switch administration service guide.
	Run diagnostics on the 2220 or	"Service Operation via Nways Switch Administration Station" on page 1-2.
	2220 Service operation via the Nways Switch administration station	"Service Operation via Nways Switch Administration Station" on page 1-2.
	Run diagnostics on the Nways Switch administration station	Refer to the Nways Switch administration service guide.
	Test the Nways Switch administration station links	Refer to the Nways Switch administration service guide.
<i>MISCELLANEOUS INFORMATION</i>	2220 In broadband network	"Typical Broadband Network Based on 2220" on page 2-1.
	2220 model overview	"2220 Models" on page 2-2.
	Nways Switch administration station windows overview	"Nways Switch Administration Station Windows Overview" on page 3-5.
	2220 control panel functions	"Nways Switch Administration Station Windows Overview" on page 3-5.
	2220 schematics	Appendix A, "Schematics" on page A-1.
	2220 parts catalog	Appendix D, "Parts Catalog" on page D-1.

Service Operation via Nways Switch Administration Station

Service Action	Go to
Logon to the 2220 (Local)	"How to Start on the Local 2220" on page 3-1
Logon to the 2220 (Remote)	"How to Logon to the Remote 2220" on page 3-1
Display the Nways Switch configuration	"How to Display the Nways Switch Configuration" on page 3-13
Display the TCP/IP addresses	"How to Find a TCP/IP Address" on page 3-20
Display the Nways Switch Control Program Inventory	"How to Display the Nways Switch Control Program Inventory and Level" on page 3-22
Display the test event desk	"How to Display the Test Event Desk" on page 3-18
Display CMIP Status	"How to Display the CMIP Status" on page 3-8
Display the Alarm Desk	"How to Display the Alarm Desk" on page 3-11
Run diagnostics on the 2220	Chapter 4, "2220 Diagnostics" on page 4-1.
Run diagnostics on the Nways Switch administration station	Refer to the Nways Switch administration service guide.
Test the link between the Nways Switch administration station and the NSC	Refer to the Nways Switch administration service guide.
Test the Nways Switch administration station links	Refer to the Nways Switch administration service guide.
Find machine and module power consumption	Appendix C, "2220 Power Consumption" on page C-1.
Emergency trunk unlock	"How to Perform the Emergency Trunk Unlock" on page 3-26.
Removing a line or trunk cable on operational 2220	"How to Remove a Line or Trunk Cable" on page 3-24.

Chapter 2. Introduction / Overview

Typical Broadband Network Based on 2220

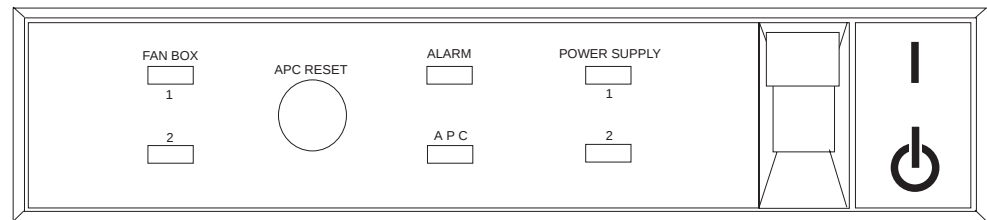


2220 Models

This manual covers the following 2220 models:

- 2220 Model 300 (low-end unit)
- 2220 Model 500 (base unit)
- 2220 Model 501 (expansion to 2220 Model 500)

2220 Control Panel Functions



The front panel contains:

- The power ON/STANDBY switch, which is used to power ON (position I on the control panel) or STANDBY (position  on the control panel) the 2220 (see note).
- The APC RESET button, which resets the APC (but does not disturb the data traffic).
- Six LEDs that indicate different status:

POWER SUPPLY 1 and 2 Each of these two green LEDs reflects the status of one power supply (1 or 2). Each LED is ON when the associated power supply is ON.

APC This green LED is ON when the alarm and power control (APC) module inside the 2220 is running error free. It is blinking during the power on self test (POST), or when an adapter has been disabled.

ALARM This yellow LED is ON when an error has been detected in the 2220.

FAN BOX 1 and 2 Each of these two yellow LEDs reflects the status of one FAN box. They are ON as soon a FAN problem has been detected.

Note: When the power ON/STANDBY switch is on the STANDBY position  on the control panel), the 2220 board is powered OFF while the power-supplies are still in **Stand-by** mode (energized).

Chapter 3. Nways Switch Administration Station Functions

How to Start on the Local 2220

To log on:

1. Be sure that the 2220 and the Nways Switch administration station are powered ON.
2. In the **Nways Switch Desktop** window, select the desired icon by clicking on the left button of the mouse (left button is used to select an icon or resource, and the right button displays the associated menu).

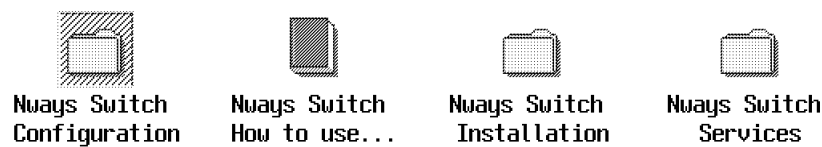


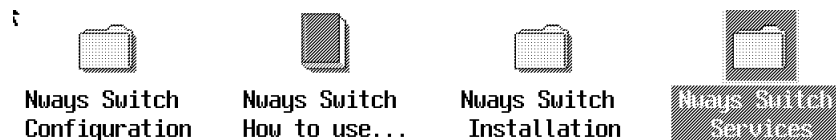
Figure 3-1. Nways Switch Desktop Display

3. For detail refer to the “Nways Switch Administration Station Windows Overview” on page 3-5.

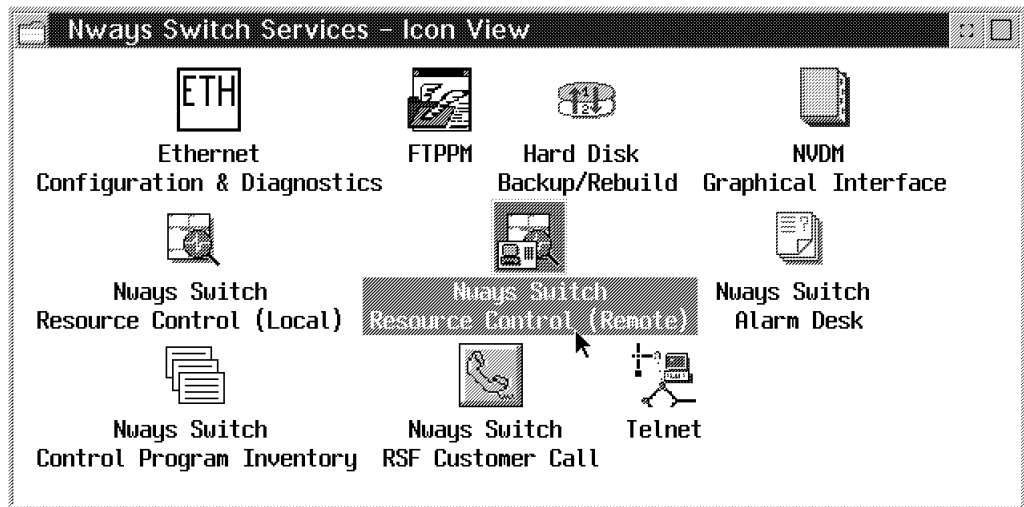
How to Logon to the Remote 2220

When the Nways Switch administration station is powered ON and initialized the **Nways Switch Desktop** window is displayed:

1. Double click on the **Nways Switch Services** icon.

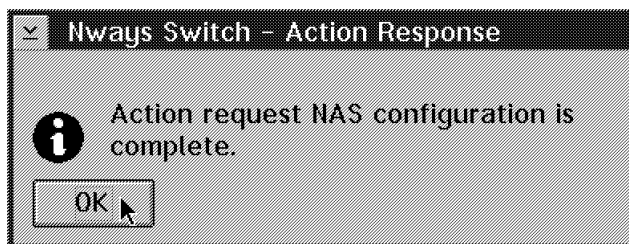


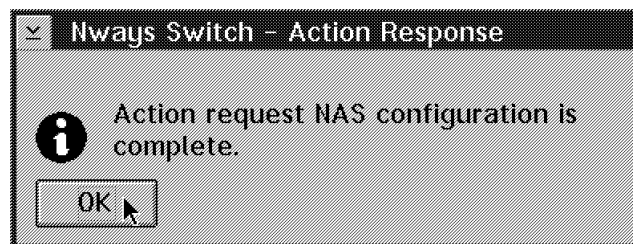
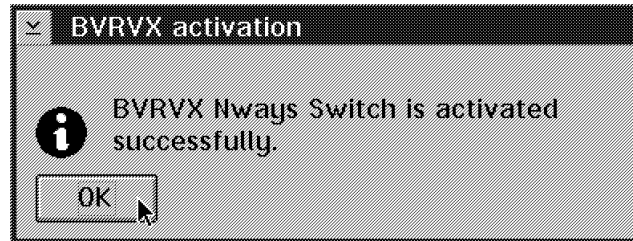
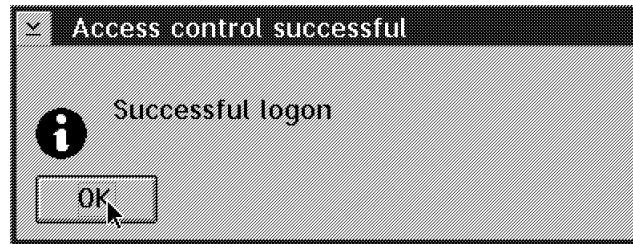
2. In the **Nways Switch Services** window, double click on the **Nways Switch Resource Control (Remote)** icon.



The **Logon Remote NAS** window is displayed.

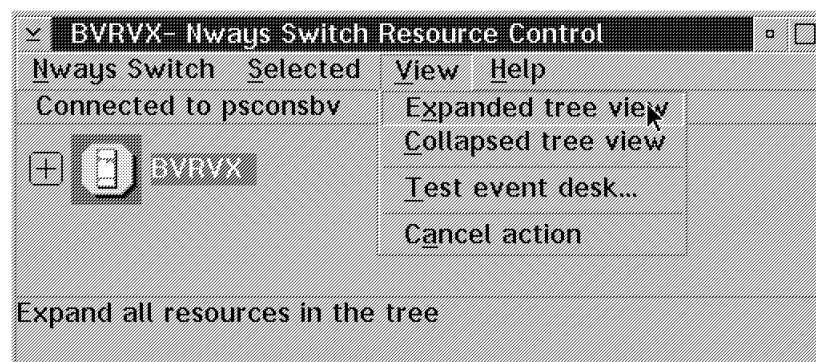
3. Enter the requested information then click on **Logon**.
4. The following windows are displayed. Click on **OK** on each of them.





The **Nways Switch Resource Control** window of the remote NAS is displayed.

5. In the **Nways Switch Resource Control** window, click on **View** then on **View, Expanded Tree View**.



6. Wait until all icons are displayed.

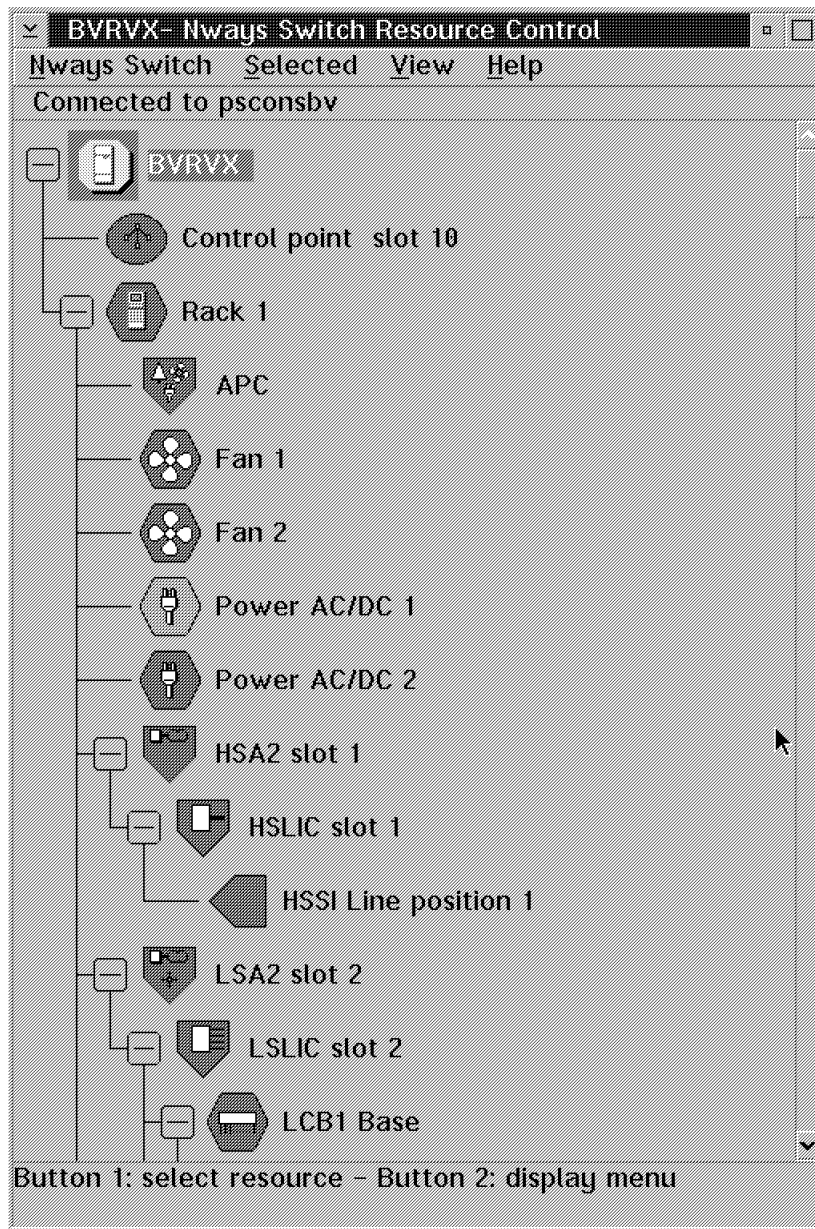


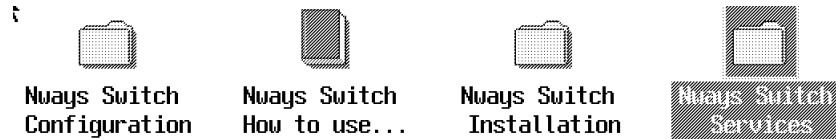
Figure 3-2. Example of Expanded Tree

7. Perform the desired action on the window.

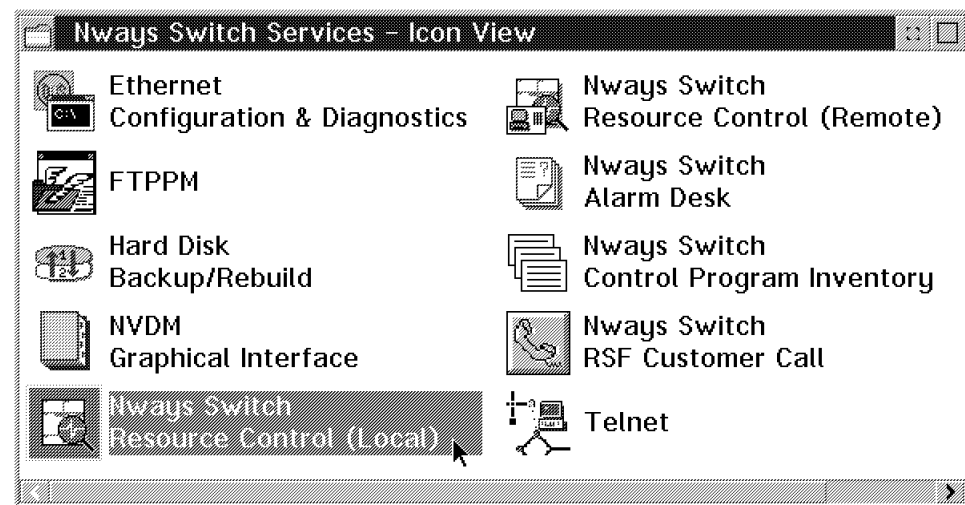
Nways Switch Administration Station Windows Overview

When the Nways Switch administration station is powered ON and initialized the **Nways Switch Desktop** window is displayed.

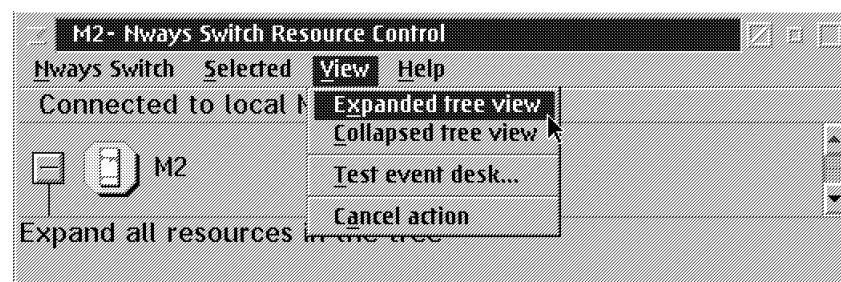
1. Double click on the **Nways Switch Services** icon.



2. In the **Nways Switch Services** window, double click on the **Nways Switch Resource Control (Local)** icon.



3. Click on **OK** in the **Product Information** window.
4. In the **Nways Switch Resource Control** window, click on **View, Expanded Tree View**.



5. Wait until all icons are displayed.

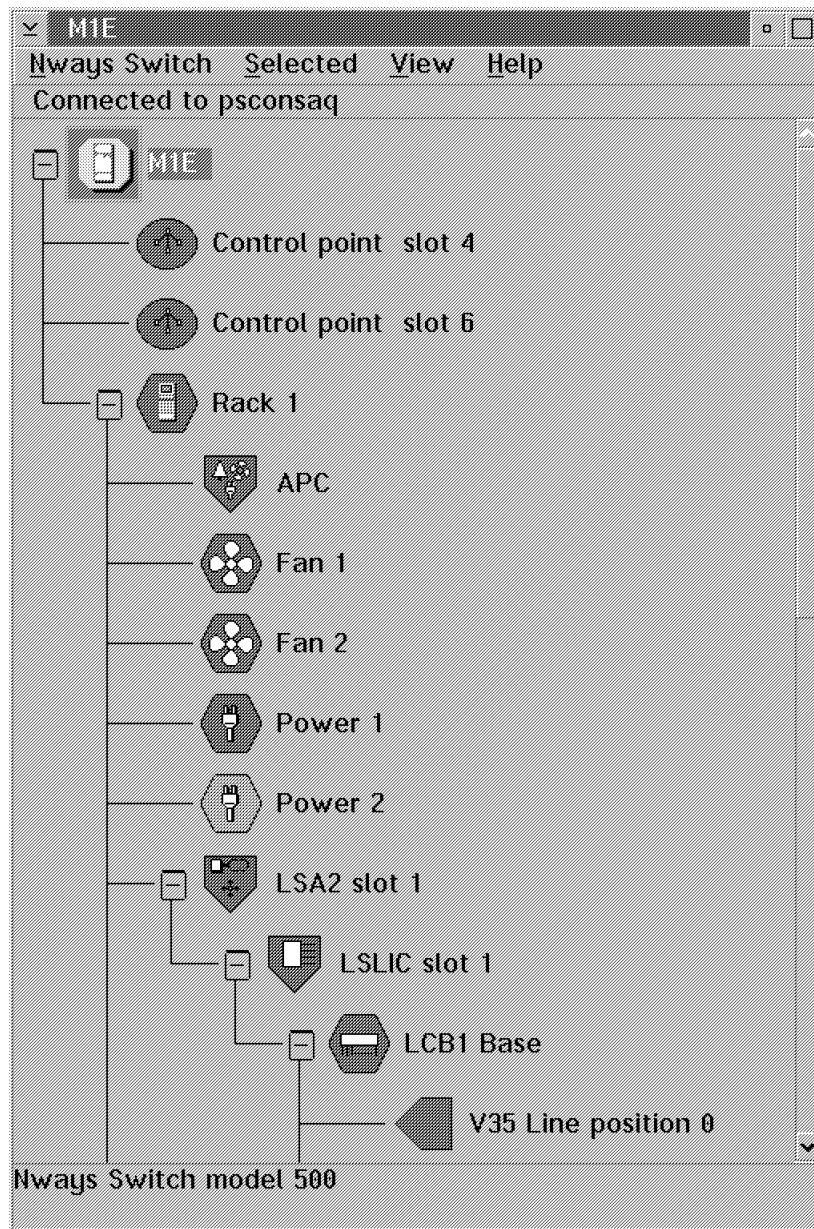


Figure 3-3. Example of Expanded Tree

6. In the **Node Resources** window, using the right key on the mouse, click on the icon of the resource that you want to select, then using the left button on the mouse, click again on the resource to display a popup window with all options available for the resource.

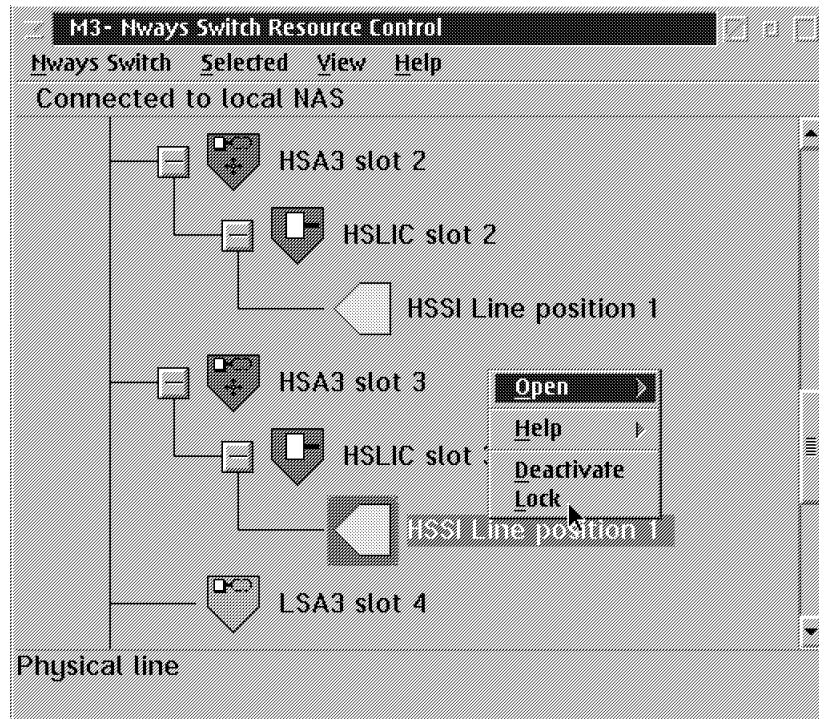


Figure 3-4. Example of Options Available for a Selected Resource

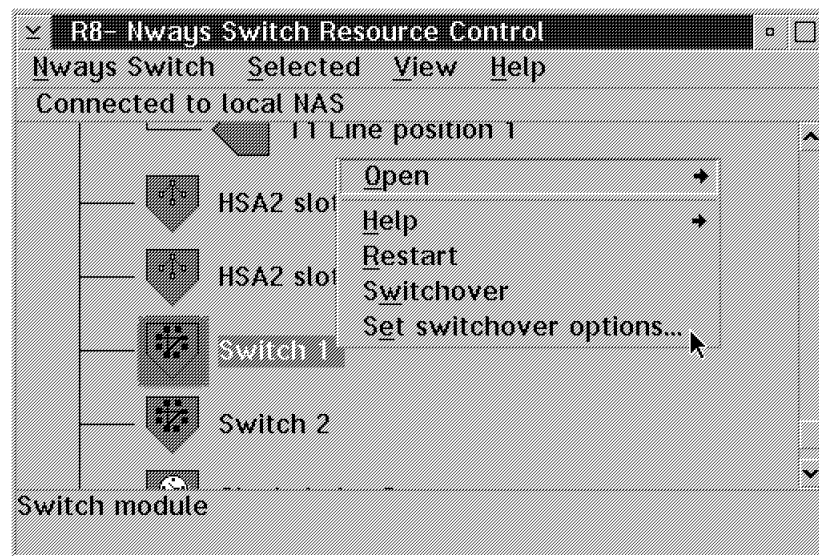
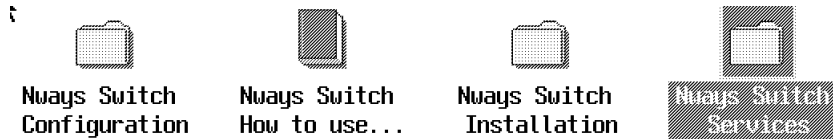


Figure 3-5. Example of Options Available for a Switch

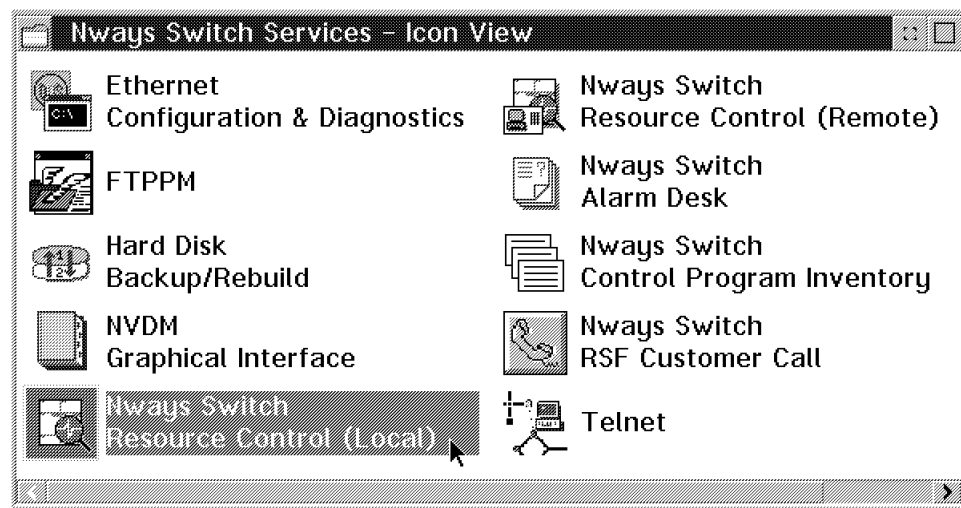
How to Display the CMIP Status

When the Nways Switch administration station is powered ON and initialized the **Nways Switch Desktop** window is displayed.

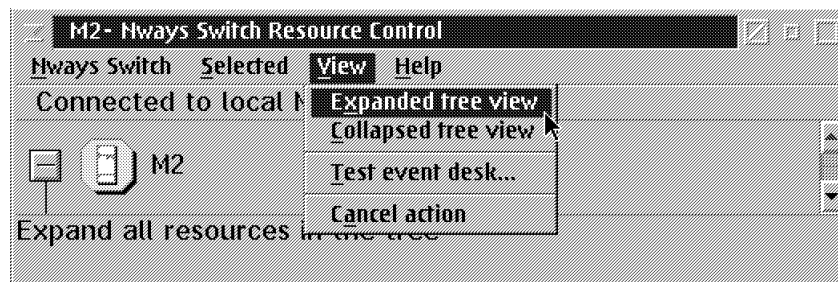
1. Double click on the **Nways Switch Services** icon.



2. In the **Nways Switch Services** window, double click on the **Nways Switch Resource Control (Local)** icon.



3. In the **Nways Switch Resource Control** window, click on **View, Expanded Tree View**.



4. Wait until all icons are displayed.

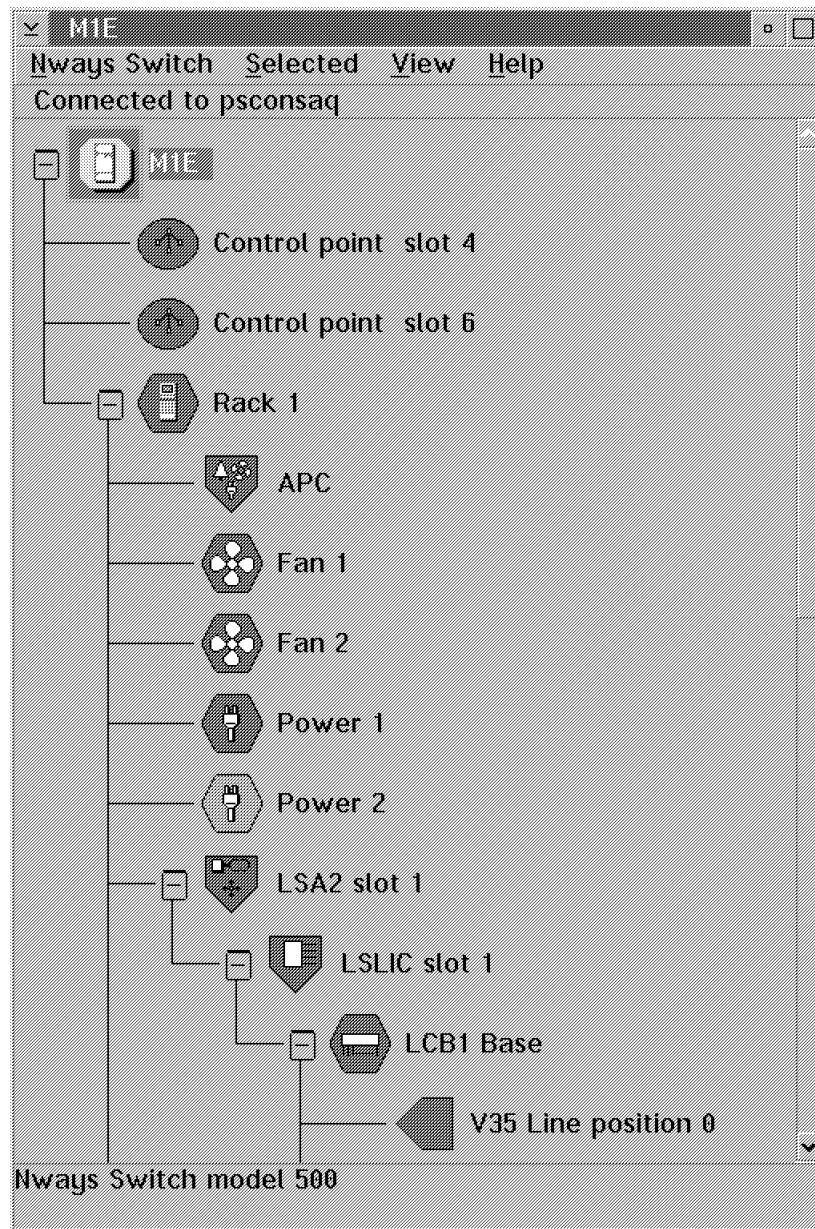
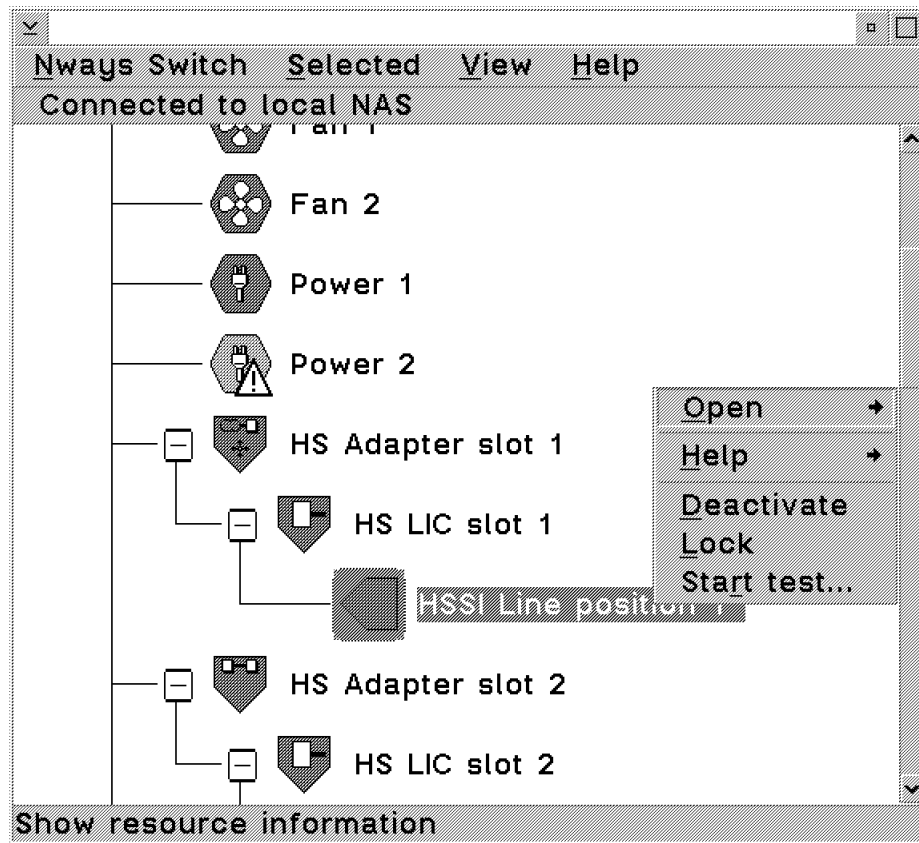


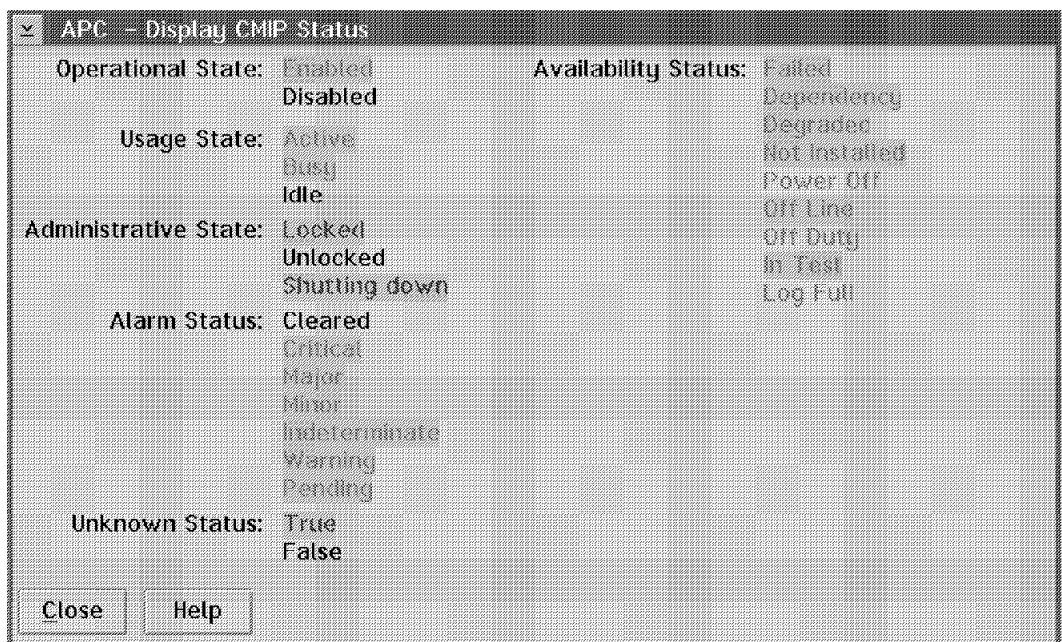
Figure 3-6. Example of Expanded Tree

5. In the **Node Resources** window, using the right key on the mouse, click on the icon of the resource that you want to select. A popup window with all options available for the resource is displayed.



6. Click on the **Open** the on the **Status** option.

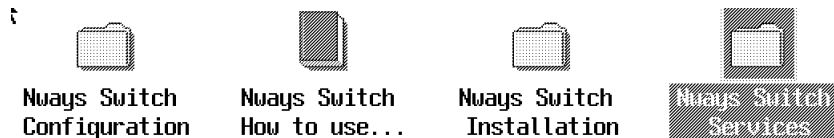
The **Display CMIP Status** window is displayed with the current status highlighted.



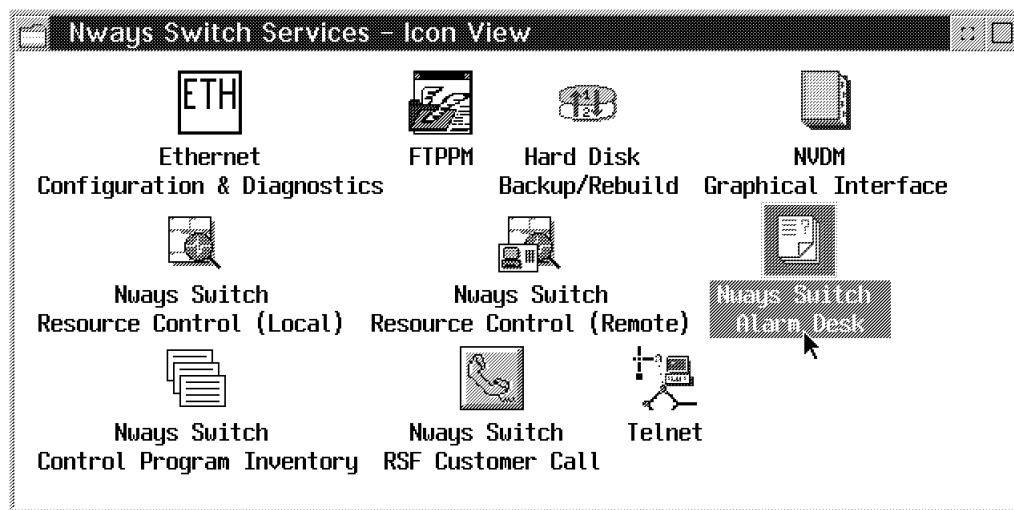
How to Display the Alarm Desk

When the Nways Switch administration station is powered ON and initialized the **Nways Switch Desktop** window is displayed.

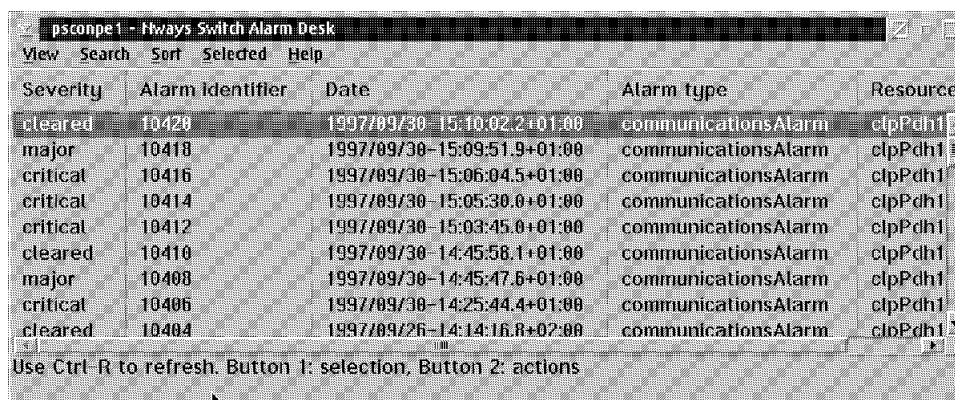
1. Double click on the **Nways Switch Services** icon.



2. In the **Nways Switch Services** window, double click on the **Nways Switch Alarm Desk** icon.



The **Alarm Desk** window is displayed.



3. By clicking on the **Search** option in the menu bar you have all the facilities for selecting a specific alarm.

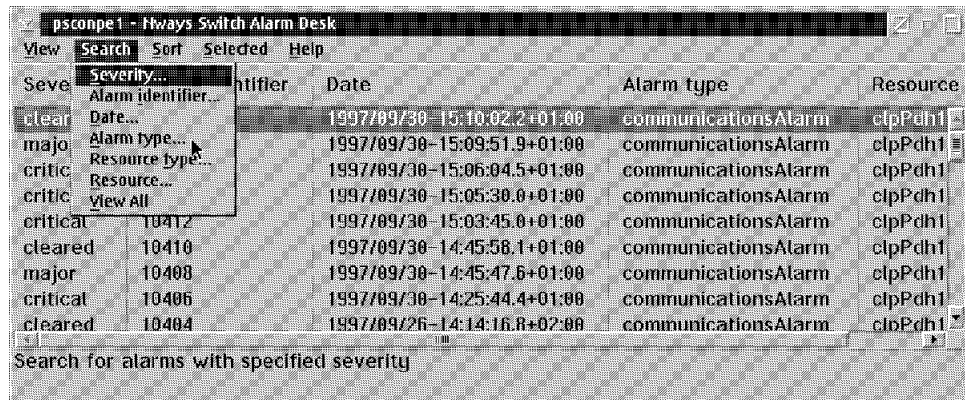
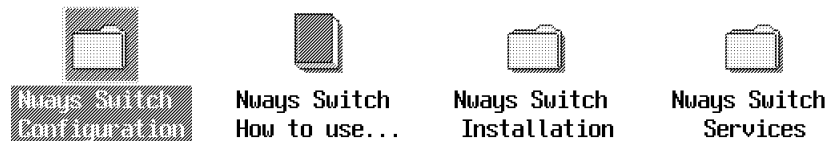


Figure 3-7. Search Options in the Alarm Desk Window

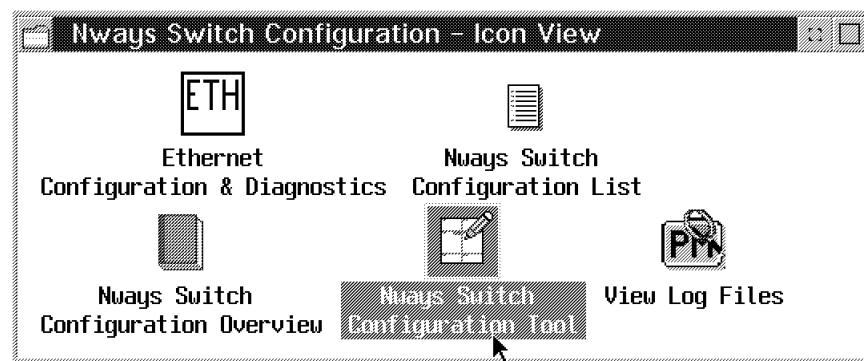
How to Display the Nways Switch Configuration

When the Nways Switch administration station is powered ON and initialized the **Nways Switch Desktop** window is displayed.

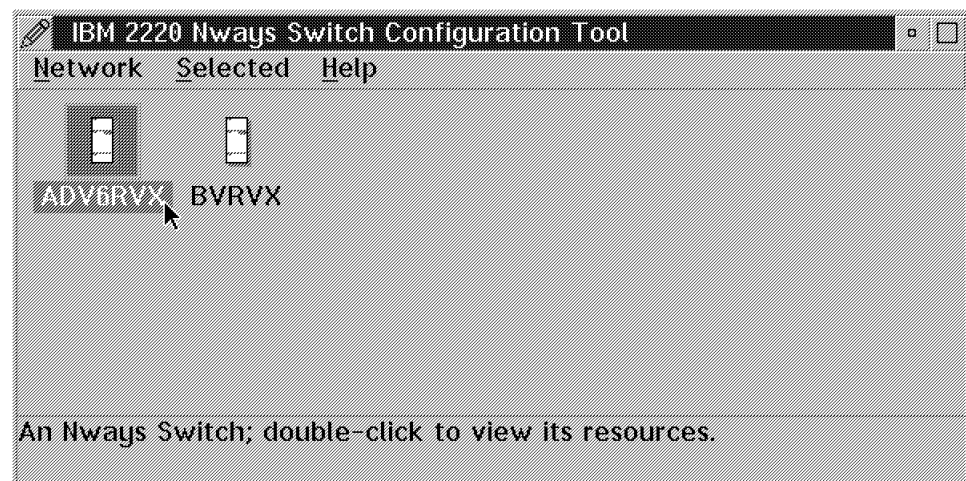
1. In the **Nways Switch Desktop** window, double click on the **Nways Switch Configuration** icon.



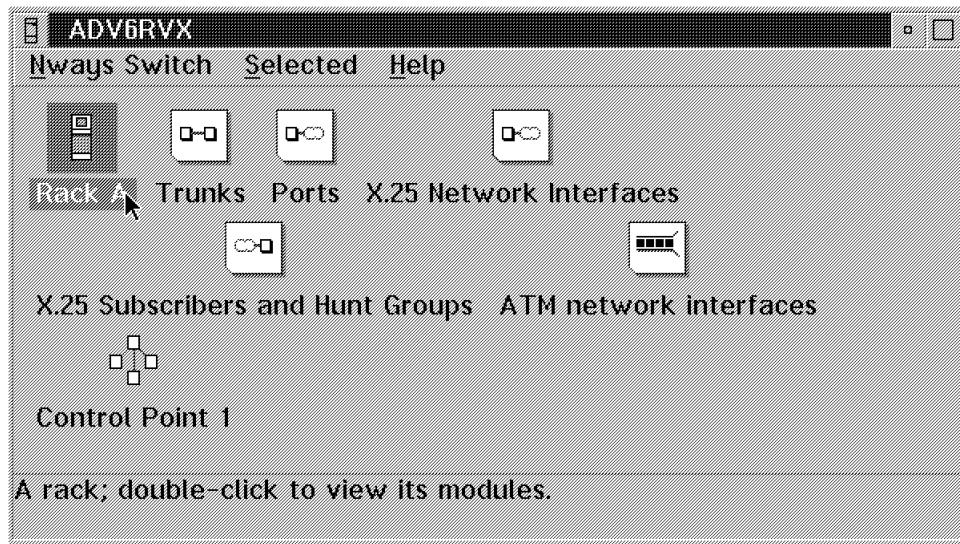
2. Double click on the **Nways Switch Configuration Tool** icon.



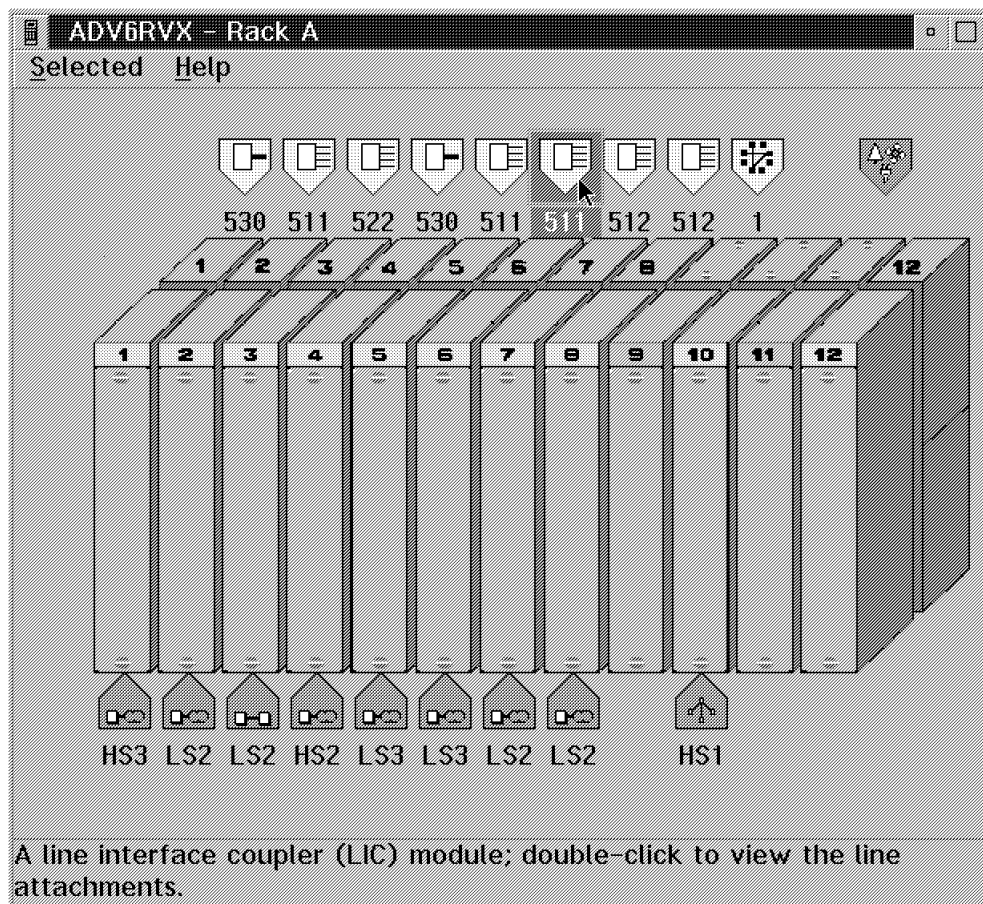
3. A **Nways Switch Configuration Tools** window is displayed.



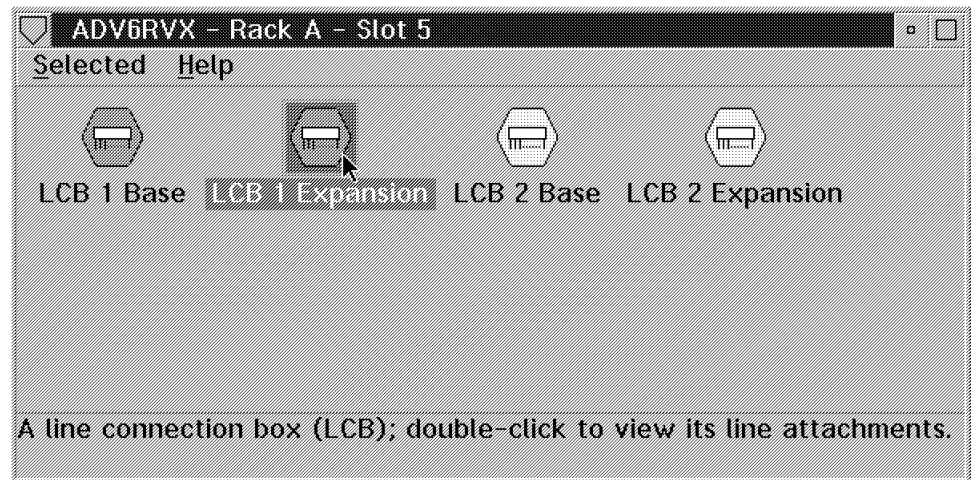
4. Double click on the rack icon that you want to know the configuration.



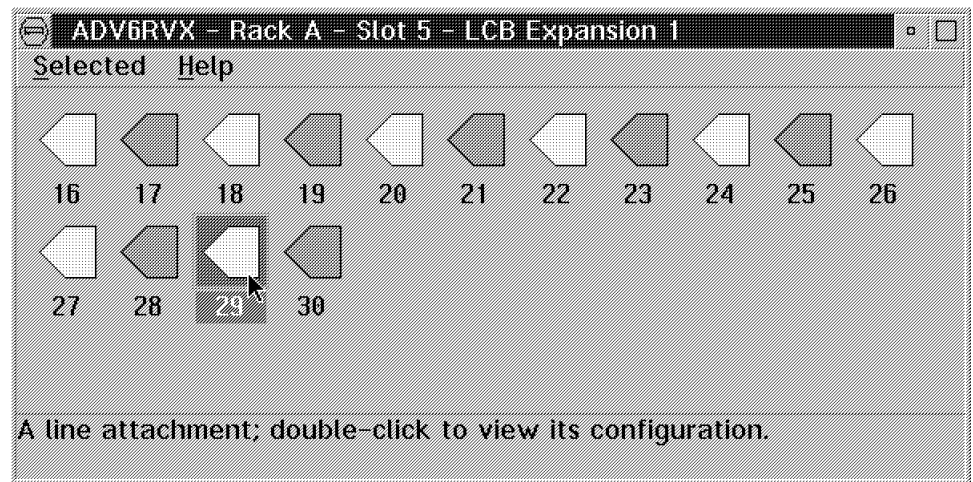
5. Different icons are displayed. Double click on the selected icon. According to the icon selected you have different window displayed. For **example** if you click on the **Rack A** the following window is displayed.



6. If you double click on the **LIC511** the following window is displayed.



7. Double click on the **LCB 1 Expansion** icon the following window is displayed.



8. Double click on the **29** line icon. The following window is displayed showing the line configuration

ADV6RVX – Rack A – Slot 5 – Line Attachment 1 Configuration

Type

Clock Role ☒ Internal ☐ External

Interface Role ☒ DCE ☐ DTE

Clock Speed Kbps

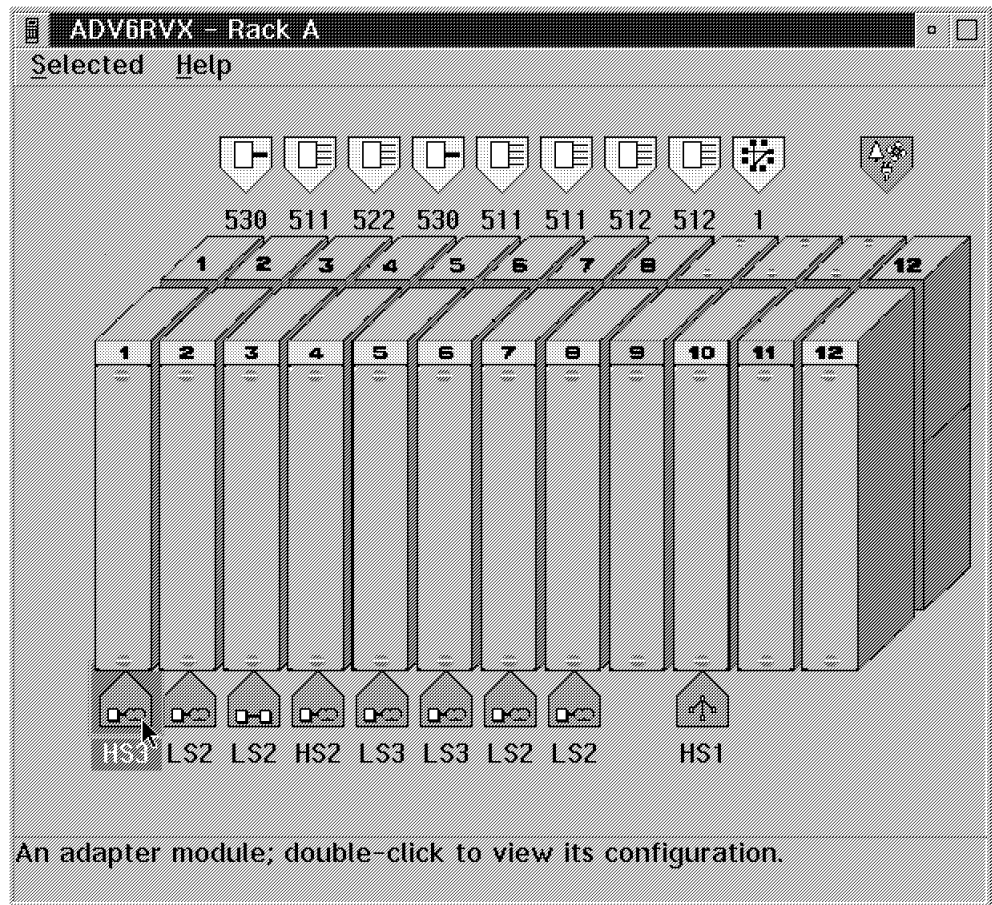
Access Rate Kbps

NRZI ☐ Yes ☒ No

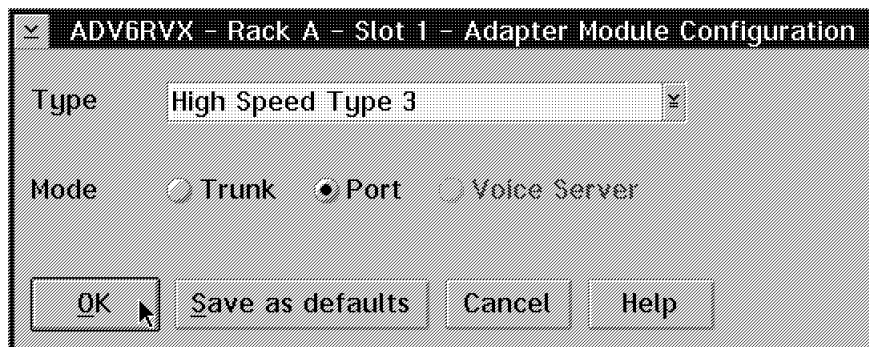
Device-Ready Timeout ms

Ready-For-Sending Timeout ms

9. From the rack configuration window you also can select an adapter.



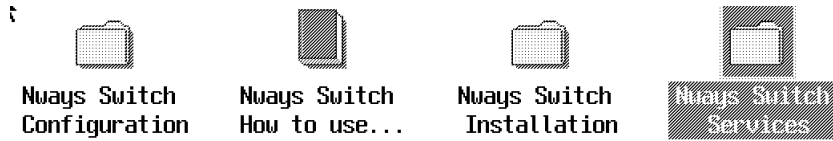
10. Double click on a adapter icon the following window is displayed showing the adapter configuration.



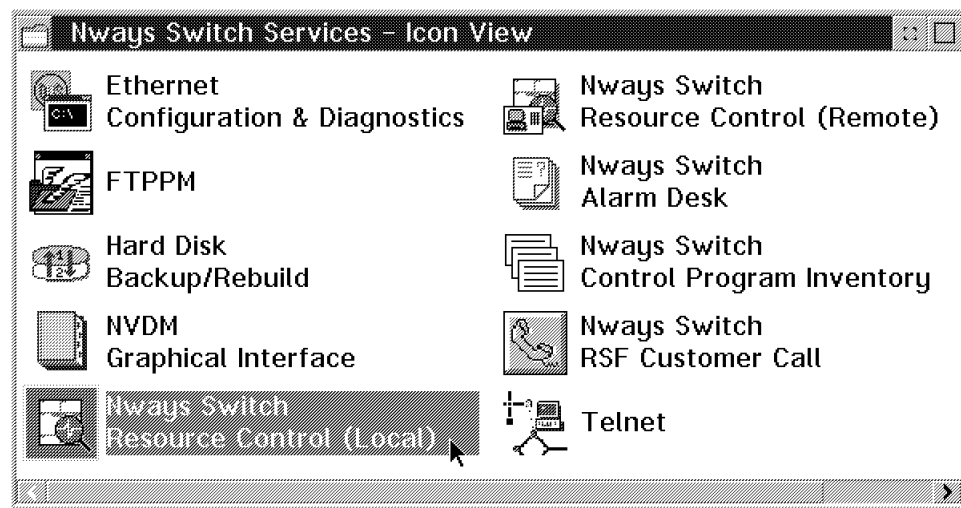
How to Display the Test Event Desk

When the Nways Switch administration station is powered ON and initialized the **Nways Switch Desktop** window is displayed.

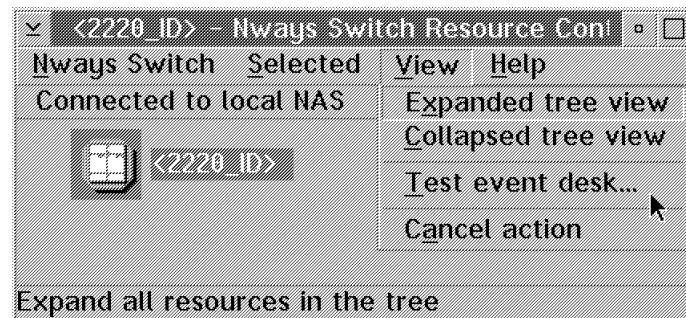
1. Click on the **Nways Switch Services** icon.



2. In the **Nways Switch Services** window, click on the **Nways Switch Resource Control (Local)** icon.



3. In the **Nways Switch Resource Control** window, click on **View** and then on the **Test Event Desk** option.



The following window is displayed.

Test Event Desk				
Resource type	Status	Loop count	Error count	Local date and time
Rack A	Complete	1		1994/11/02-14:00:43

How to Find a TCP/IP Address

The Nways Switch Installation Program is used to customize the IP parameters from the data imported with the configuration file.

1. Double click on the **Nways Switch Installation** icon.

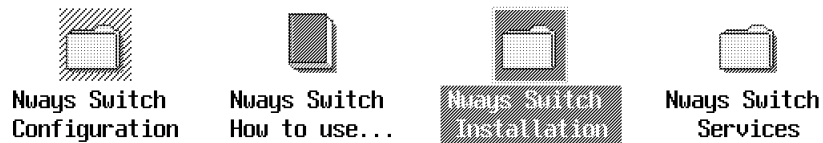


Figure 3-8. Nways Switch Desktop Window

2. Double click on the **Nways Switch Installation Program** icon.

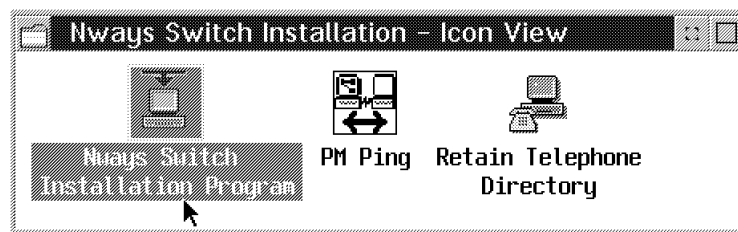


Figure 3-9. Nways Switch Installation Window

3. Select option 5 and press Enter.

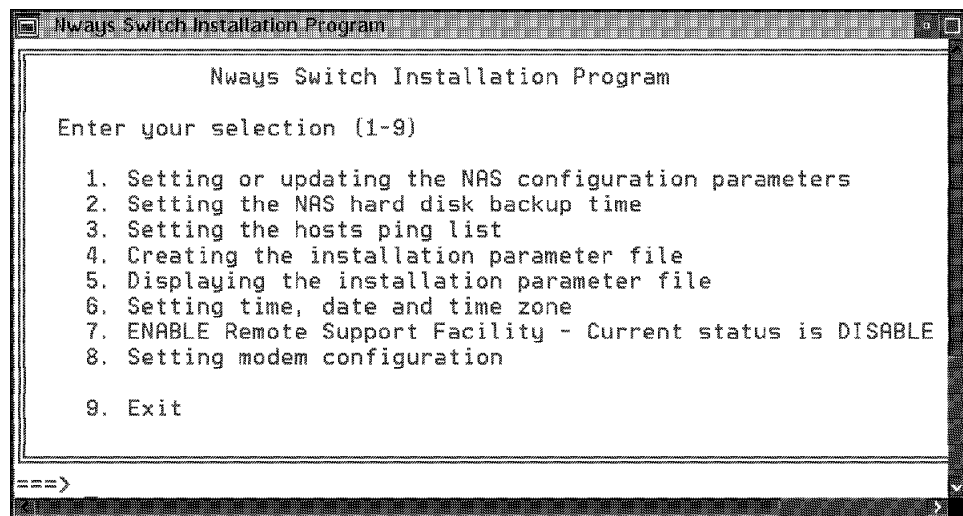


Figure 3-10. Installation Program Main Menu

4. In the window displayed search for the required TCP/IP address. See Figure 3-11 on page 3-21.

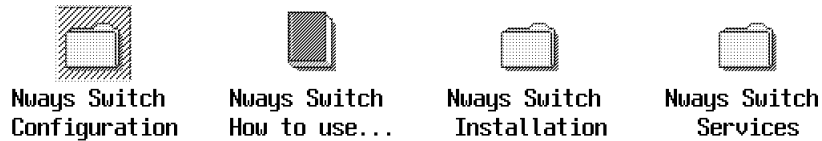
```
Nways Switch Installation Program
Fvp F:\SP_RW\M22.INS Line 1 of 18; Column 1 of 68
COMMAND ==>
Machine Type/Model: IBM 2220 Model 500+501
Base rack Serial Number: 55-12345
Expansion Rack Serial Number: 55-12345
Node ID/Workstation name: M22
NAS IP Address on Service Bus: 128.4.0.159
Service Bus IP Network Mask: 255.255.0.0
Primary Adapter Gateway Number: 2
Secondary Adapter Gateway Number: 3
NAS Switched Line Telephone Number: 9999
Caller IP Address on Switched Attachment: 128.4.0.160
NAS IP Address on Switched Attachment: 128.4.255.254
NAS Domain Name: LAGAUE.IBM.COM
Change Control Server Name: atlanta.lagaude.ibm.com
Change Control Server IP Address: 9.100.19.72
Change Code Server TCP/IP Port: 729
Automatic Backup Time: 5:0
Customer Contact Name:
Customer Contact Phone:

1Help 2Page 3Quit 4↑↑↑↑ 5RFnd 6REnd 7L+ 8R+ 9↓↓↓↓ 10Text 11R+++ 12L+++
```

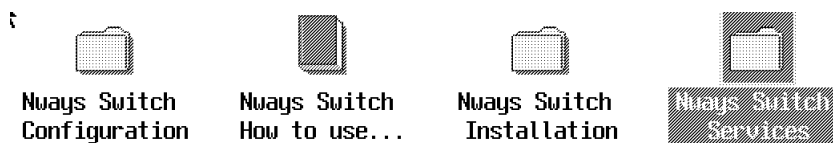
Figure 3-11. Example of TCP/IP address

How to Display the Nways Switch Control Program Inventory and Level

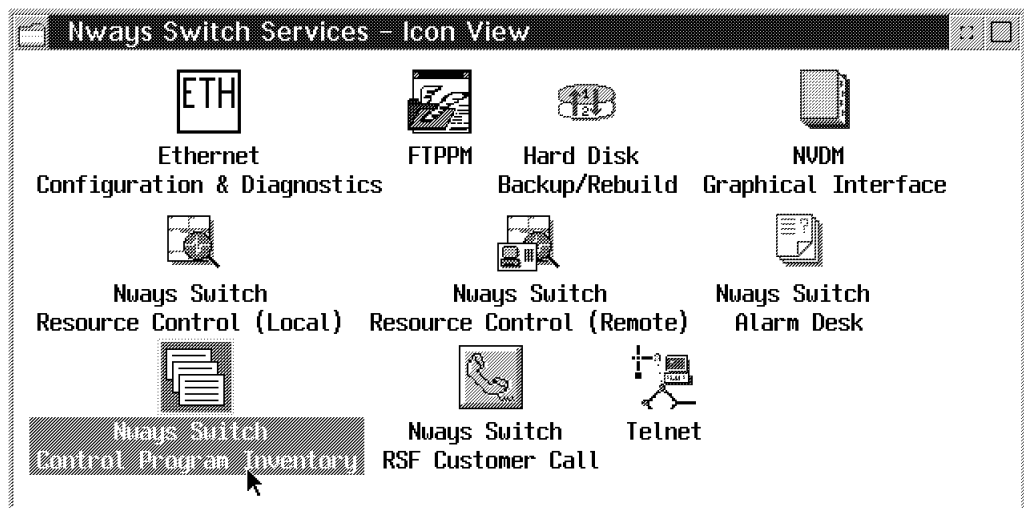
When the Nways Switch administration station is powered ON and initialization is completed the following window is displayed:



1. Double click on the **Nways Switch Services** icon.



2. In the **Nways Switch Services** window, double click on the **Nways Switch Control Program Inventory** icon.



3. A **Nways Switch Control Program Software Inventory** window is displayed with the file name and the date of changes.

Nways Switch Control Program Software Inventory		
Install Date/Time	Change file name	Change file description
	IBM.NBBSCPA.REF.40000000	IBM Nways Switch Ctl Pgm Part A V4.0
	IBM.NBBSCPB.REF.51000000	IBM Nways Switch Ctl Pgm Part B V5.R10
	IBM.NBBSCPD.REF.10100201	(IBM Nways Switch Ctl Pgm Part D V1.R1.0
30 Jul 1997 13:51:11	IBM.NBBSCPF.REF.20120000	IBM Nways Switch Ctl Pgm Part E V2.R1.2
30 Jul 1997 14:04:41	IBM.NBBSCPF.REF.40100000	IBM Nways Switch Ctl Pgm Part F V4.R1.0
30 Jul 1997 14:10:29	IBM.NBBSCPG.REF.20100000	IBM Nways Switch Ctl Pgm Part G V2.R1.0
30 Jul 1997 14:19:43	IBM.NBBSGPS.REF.30307000	IBM Nways Switch Ctl Pgm SVGA S386x/S3Tr1064U V3.03.07
30 Jul 1997 14:24:49	IBM.NBBSGPS.UPD.30307000.30307001	IBM Nways Switch Ctl Pgm SVGA S386x/S3Tr1064U V3.03.07
22 Sep 1997 17:31:59	IBM.NSCPWAS.REF.20103071	IBM Nways Switch Ctl Pgm NWS, V2.R01.L0 03/L07

Figure 3-12. Example of Nways Switch Control Program Software Inventory

How to Remove a Line or Trunk Cable

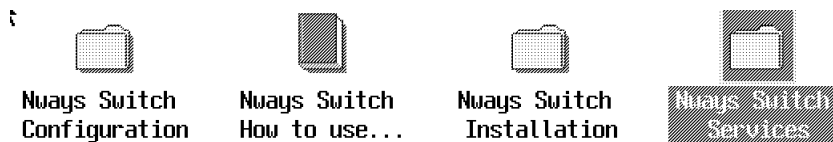
Important

Before removing a line or trunk cable attached to an active LIC, lock the corresponding line or trunk using the following procedure.

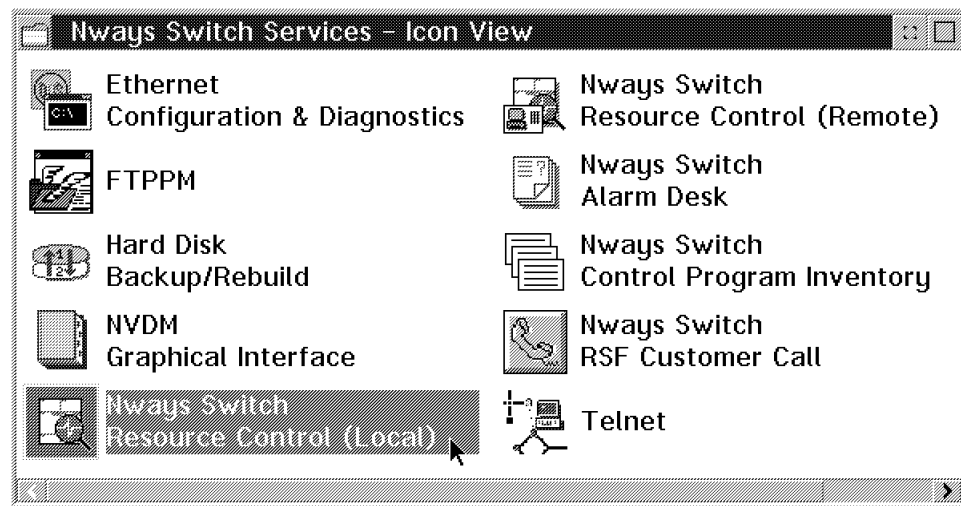
The following procedure is an example of how to **Lock a Line**. The window contents may be different on your screen.

When the Nways Switch administration station is powered ON and initialized the **Nways Switch Desktop** window is displayed.

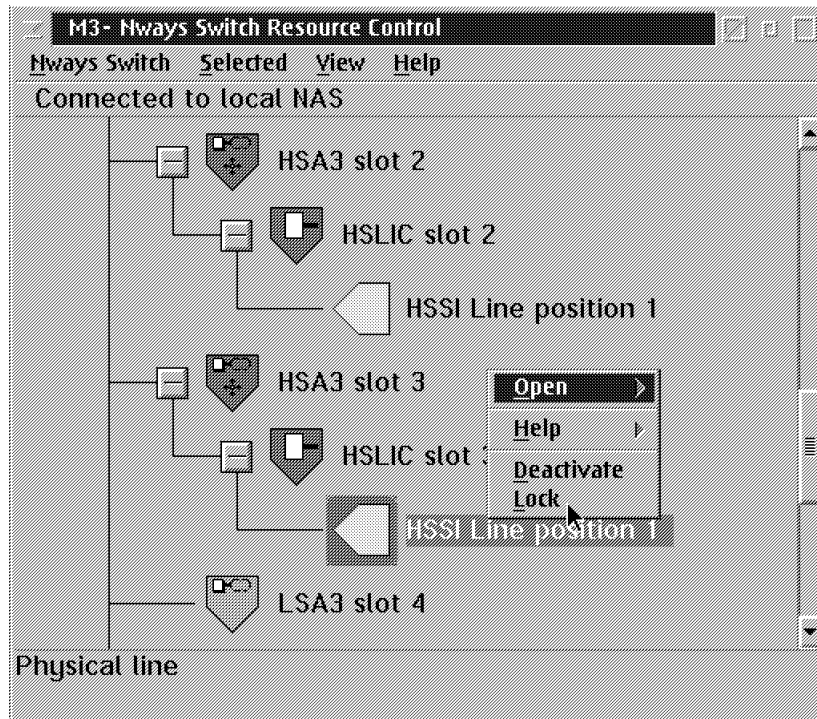
1. Click on the **Nways Switch Services** icon.



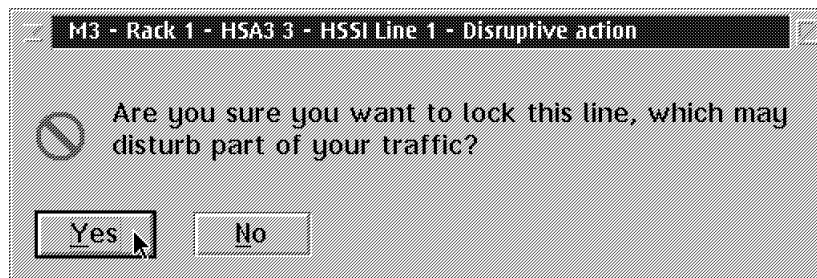
2. In the **Nways Switch Services** window, click on the **Nways Switch Resource Control (Local)** icon.



3. In the **Nways Switch Resource Control** window, using the left or bottom button on the mouse, click on the **Line** that you want to lock. Then using the right or top button on the mouse, click again on the resource.
4. The following window is displayed. Click on the **Lock** option.

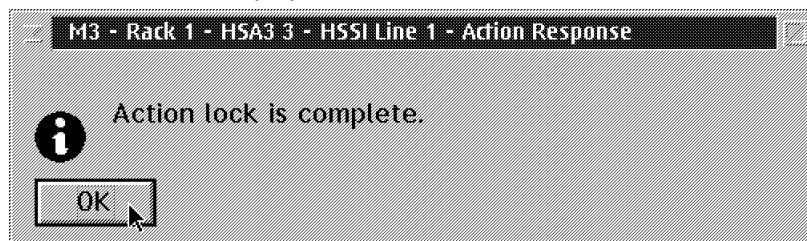


5. A warning **Disruptive action** window is displayed with the following message.



6. Click on **Yes**

7. A new window is displayed. Click on **OK**.



Remove the cable.

If you re-install a new cable, using the same procedure, do not forget to unlock the line .

How to Perform the Emergency Trunk Unlock

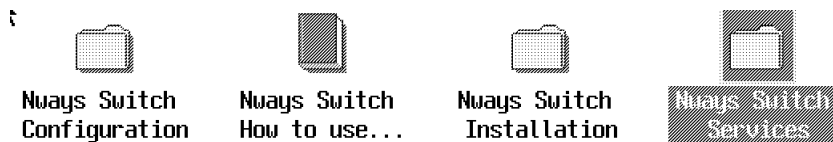
Important

The emergency trunk unlock must be performed when the trunk has been locked inadvertently from the NSM.

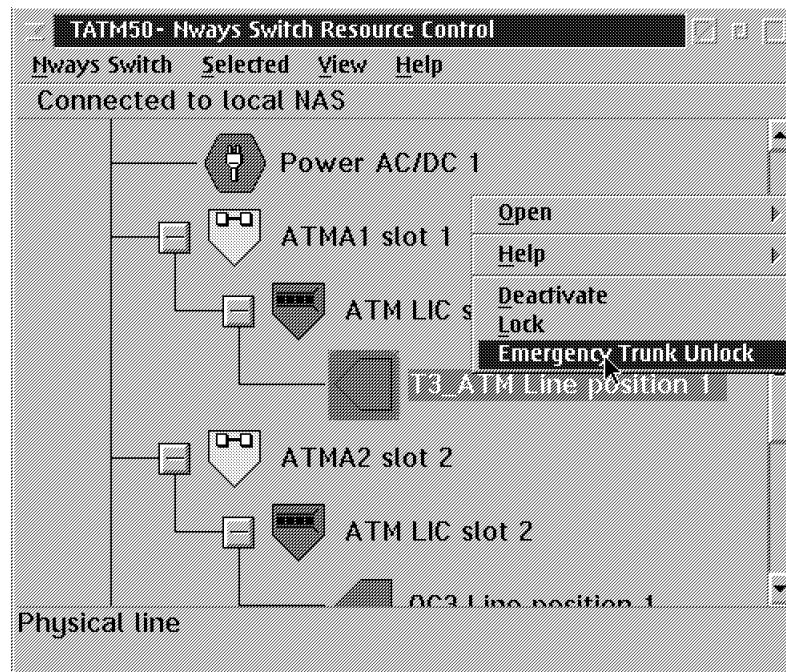
The following procedure is an example of how to **Unlock a Trunk**. The window contents may be different on your screen.

When the Nways Switch administration station is powered ON and initialized the **Nways Switch Desktop** window is displayed.

1. Click on the **Nways Switch Services** icon.



2. In the **Nways Switch Resource Control** window, using the left or bottom button on the mouse, click on the **trunk** that you want to unlock. Then using the right or top button on the mouse, click again on the resource.
3. The following window is displayed. Click on the **Emergency Trunk Unlock** option.



Chapter 4. 2220 Diagnostics

2220 Diagnostics Available from the NAS

Several diagnostics are available from the Nways Switch administration station. These diagnostics are automatically displayed as soon as the resource has been selected and diagnostics invoked

The following table gives the resources that have associated diagnostics

Table 4-1. Resources and Available Diagnostics.			
Resource Name	Name of Diagnostics Available	Diagnostics Description	How to Run Diagnostics
Rack	All Switch to Line Interface	See "All Switch to Line Interface Tests" on page 4-2	Go to "How to Run the All Switch to Line Interface Test" on page 4-8.
Adapter	Switch to Line Interface	See "Switch to Line Interface Test" on page 4-2	Go to "How to Run the Switch to Line Interface Test" on page 4-10.
Line or Trunk	Line Interface Test	See "Line Interface Test" on page 4-4.	Go to "How to Run the Line Interface Test" on page 4-12.
	Line wrap plug test	See "Line Wrap Plug Test" on page 4-5.	
	Line loopback test	See "Line Loopback Test" on page 4-6.	Go to "Line Loopback Test" on page 4-6.
	2220 trunk loopback test	See "2220 Trunk Loopback Test" on page 4-6	Not yet available.
	Line loop	See "Loop Line and Loop Trunk" on page 4-7.	The line loop must be done on the remote site before starting a line loopback test. See "Line Loopback Test" on page 4-6.
	Trunk loop	See "Loop Line and Loop Trunk" on page 4-7.	The trunk loop must be done on the remote side before starting a 2220 trunk loopback test.
Power	Battery test	Test the loading of the battery on 24 hours.	Go to "How to Test an ACDC Power and Battery" on page 4-25.

All Switch to Line Interface Tests

This diagnostic performs a power on self test (POST) and loopback on **all** adapters of the rack (see “Switch to Line Interface Test”) equivalent test for one adapter.

Attention:

During an **All Switch to Line Interface Test** the Nways Switch traffic is stopped.

Switch to Line Interface Test

This diagnostic performs a power on self test (POST) and loopbacks on the selected adapter.

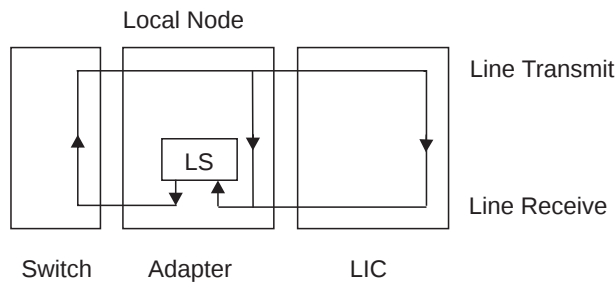


Figure 4-1. Area Tested by Switch to Line Interface Test

Note:

If the lines are attached through line connection boxes (LCBs) and active remote connectors (ARCs), tests are also performed on the LCBs and top ARCs (see...)

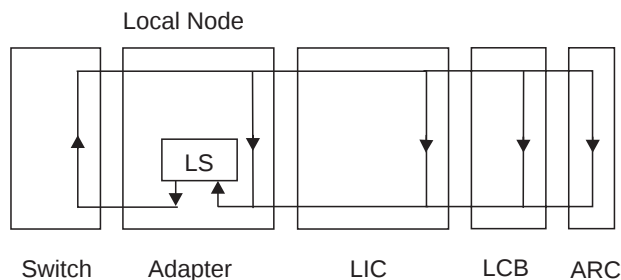


Figure 4-2. Area Tested by Switch to Line Interface Test on LIC511

Attention:

The **Switch to Line Interface Test** stops the traffic of all the attached lines.

When you start the **Switch to Line Interface Test** you have the possibility to specify a wrap plug presence. In this case your test will take in account the wrap plug (that you must install) and you will have the following area tested.

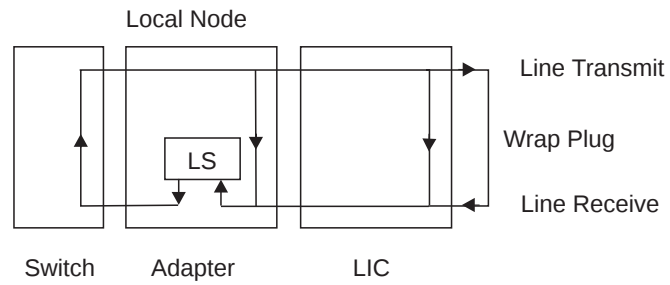


Figure 4-3. Area tested by Switch to Line Interface Test with a Wrap Plug

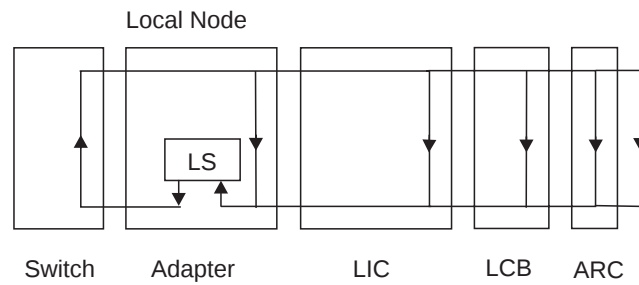


Figure 4-4. Area tested by Switch to Line Interface Test with a Wrap Plug on LIC511

Line Interface Test

This test performs a predefined loopback which is activated according to the adapter selected

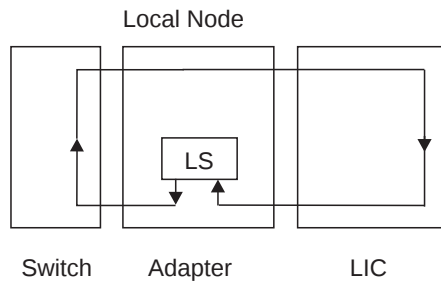


Figure 4-5. Area Test by the Line Interface Test

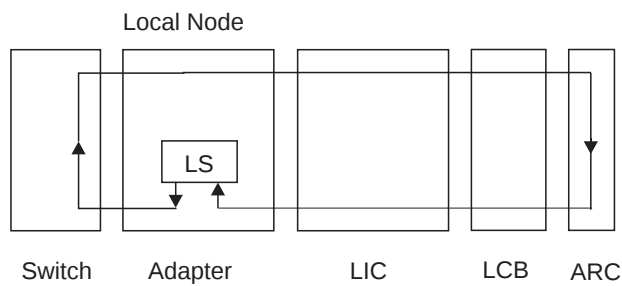


Figure 4-6. Area Tested by the Line Interface Test on LIC511

Attention:

The **Line Interface Test** stops the traffic of the selected adapter

Line Wrap Plug Test

This test performs a predefined loopback which is activated according to the adapter selected

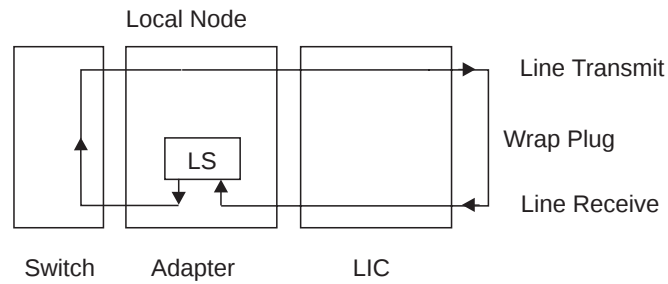


Figure 4-7. Area Tested by the Line Wrap Plug Test

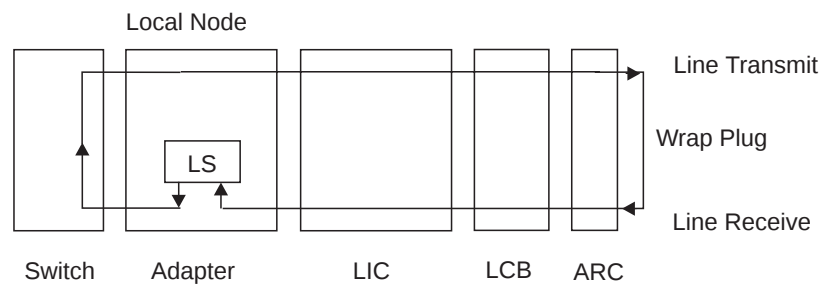


Figure 4-8. Area Tested by the Line Wrap Plug Test on LIC511

Attention:

The Line Wrap Plug Test stops the traffic of the selected adapter.

Line Loopback Test

This test sends on a line a predefined sequences of data. These data are looped back and checked when they are received.

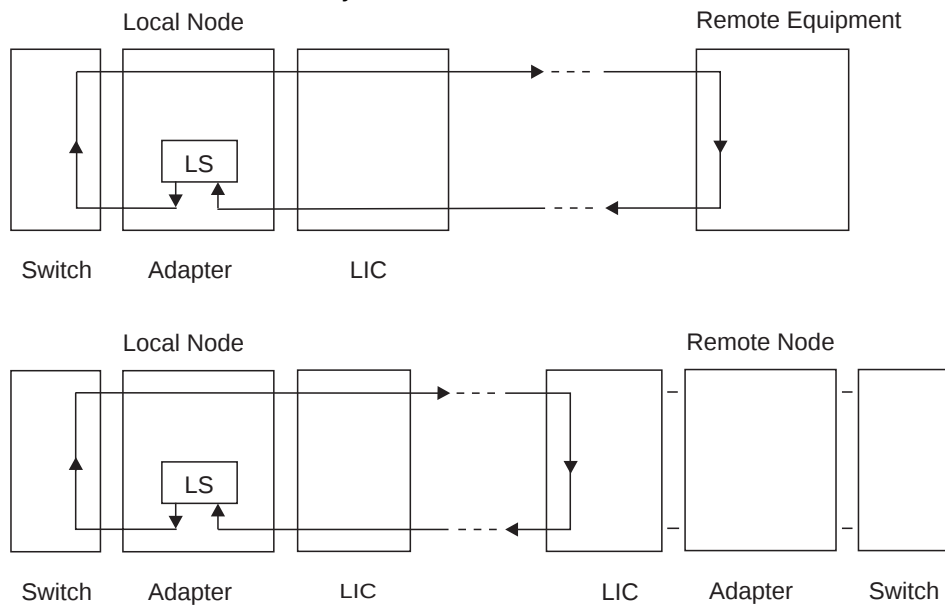


Figure 4-9. Area Tested by the Line Loopback Test

Attention:

Before starting the **Line Loopback Test**, the remote line attachment must be set in wrap mode by starting **Line Loop**. The **Line Loopback Test** locks the selected line and stops its traffic. However, it is not disruptive on other lines of the LIC (if any).

2220 Trunk Loopback Test

This test sends on a trunk predefined sequences of data. These data are looped back and checked when they are received.

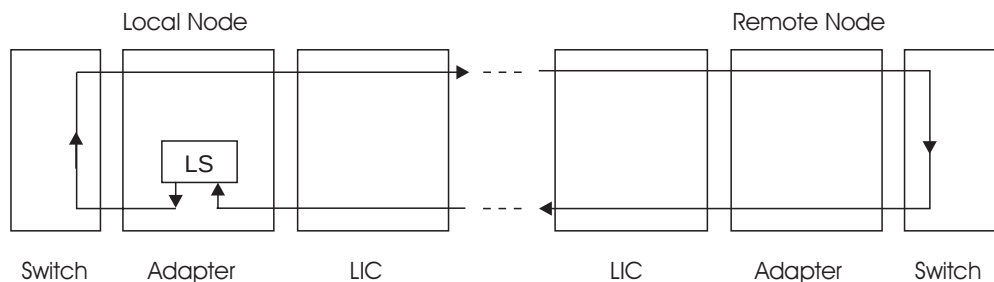


Figure 4-10. Area Tested by the 2220 Trunk Loopback Test

Attention:

Before starting the **2220 Trunk Loopback Test**, the remote trunk attachment must be set in wrap mode by starting **Trunk Loop**. The **2220 Trunk Loopback Test** locks the selected trunk and stops its traffic. However, it is not disruptive on other trunks of the LIC (if any).

Loop Line and Loop Trunk

Only the followings LICs have the capability to redirect received signals onto transmit signals (loops):

LIC 513/523/514/515/516/517/544/545/546/551/552/553/554/555/556.

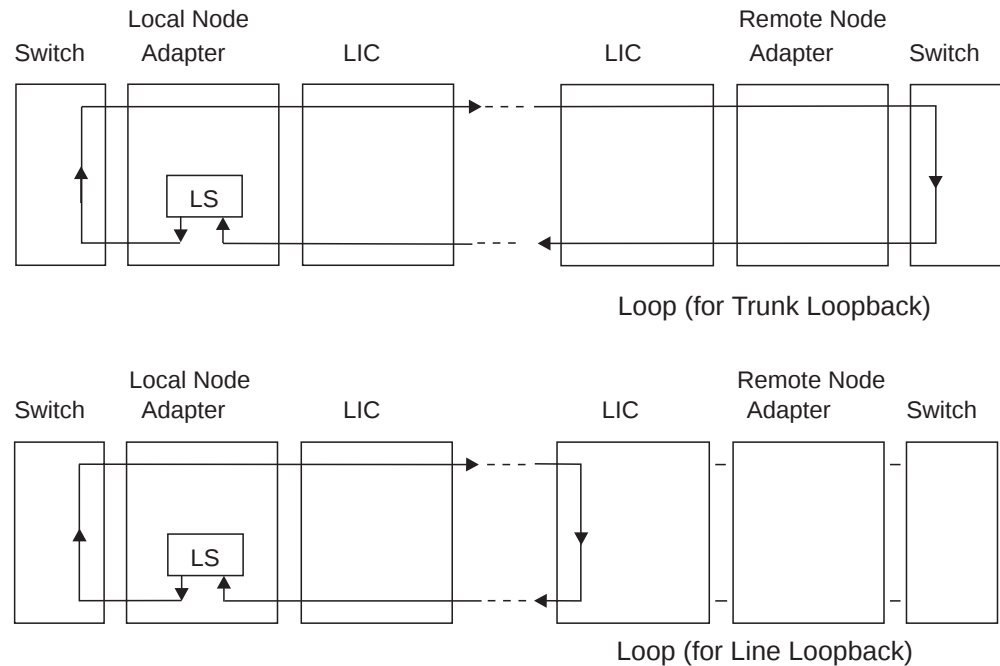


Figure 4-11. Loop Trunk and Loop Line on Remote 2220

Attention:

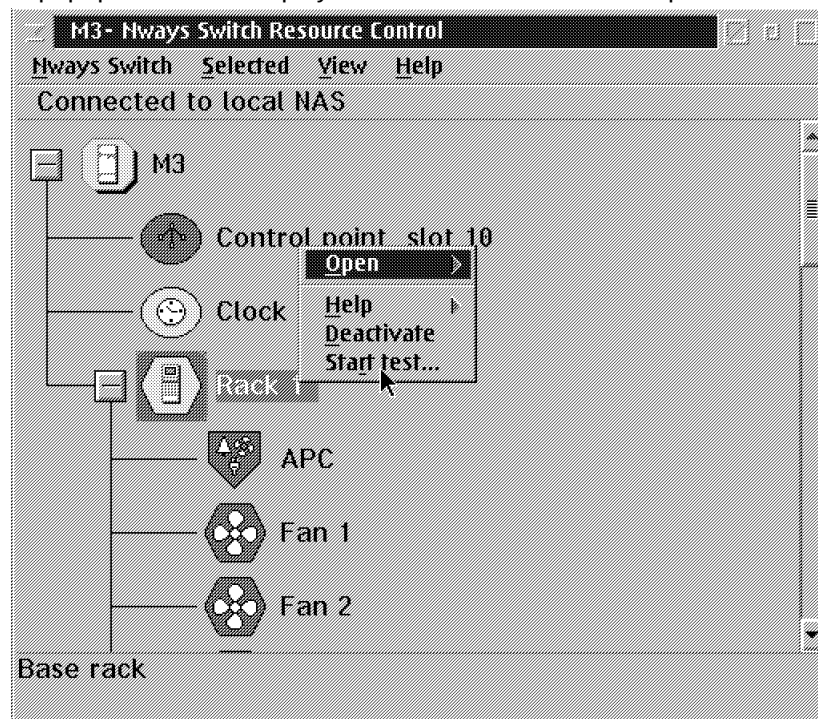
On the 2220 remote node, the remote line attachment must be set in wrap mode by starting **Loop Line** (for line loopback) or **Loop Trunk** (for 2220 trunk loopback) before starting test from the local NAS.

How to Run the All Switch to Line Interface Test

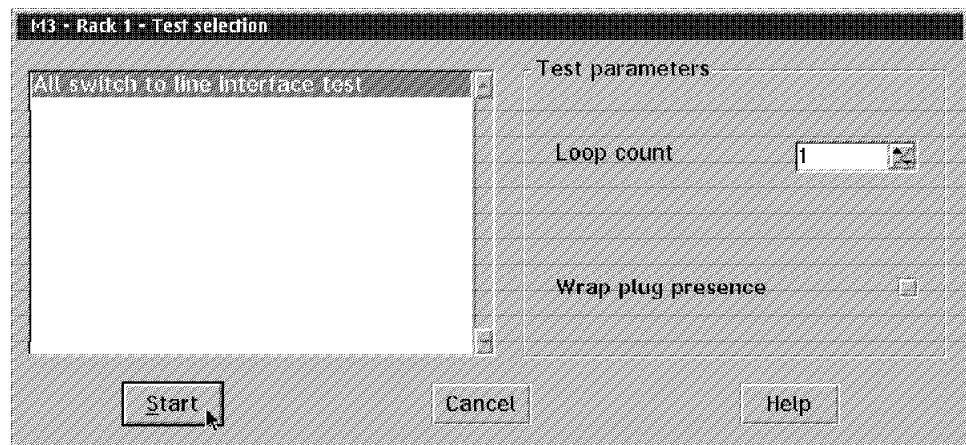
Note

The following procedure is an example of how to run **All Switch to Line Interface Test**. The window contents may be different on your screen.

1. In the **Nways Switch Resource Control** window, using the left or bottom button on the mouse, click on the **rack** resource icon that you want to test. Then using the right or top button on the mouse, click again on the resource.
2. A popup window is displayed. Click on the **Start test** option.

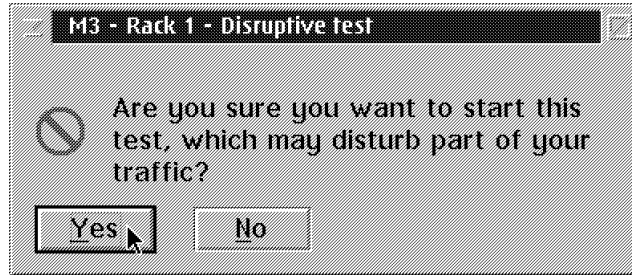


3. A **Test selection** window is displayed with the diagnostics available according to the resource tested.



4. Do not specify Wrap plug presence, this option is reserved for manufacturing. Modify the loop count if you want. Click on **Start**.

5. A warning **Disruptive test** window is displayed with the following message:



6. Click on **Yes**.
7. The Test Event Desk window is displayed, showing:
- The resource selected
 - The status of the test (proceeding, failed, or complete)
 - The Loop count

The diagnostic stops at the end of the cycle count or in case of error.

Test Event Desk				
Resource	Test	Status	Loop count	Error count. Not used for
Rack 1 - Rack 1	Switch to line interface test	Complete	1	

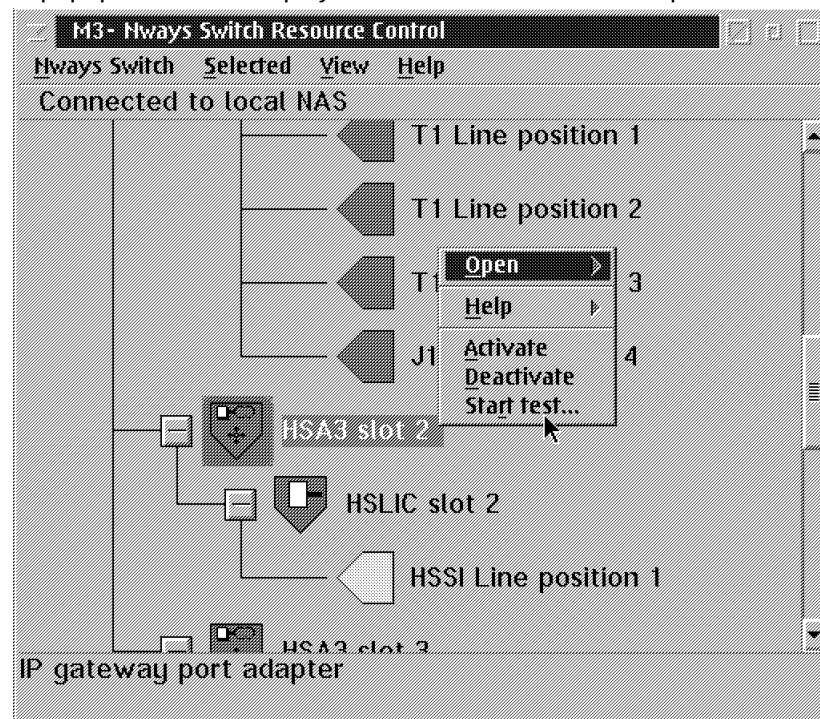
8. Wait for the status **Complete**. If there is any error, call the Network Support Center to inform them and follow their instructions.

How to Run the Switch to Line Interface Test

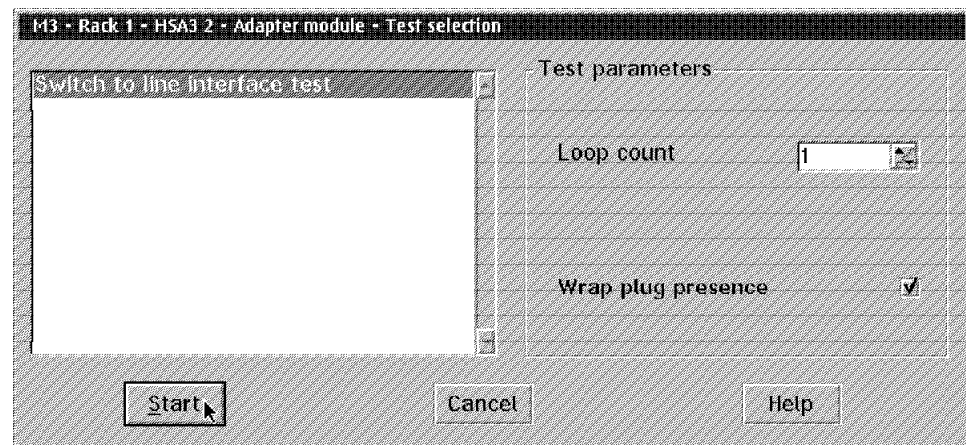
Note

The following procedure is an example of how to run **The Switch to Line Interface Test**. The window contents may be different on your screen.

1. In the **Nways Switch Resource Control** window, using the left or bottom button on the mouse, click on the **adapter** resource icon that you want to test. Then using the right or top button on the mouse, click again on the resource.
2. A popup window is displayed. Click on the **Start test** option.

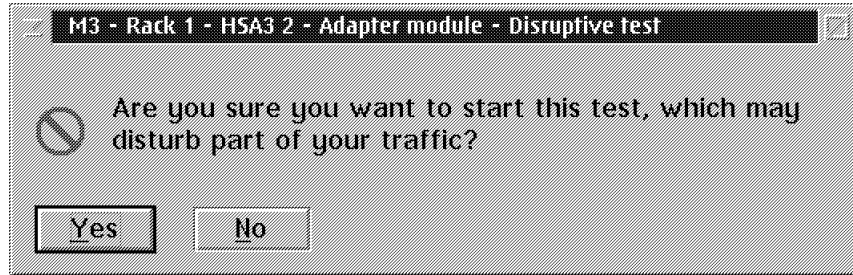


3. A **Test selection** window is displayed with the diagnostics available according to the resource tested.

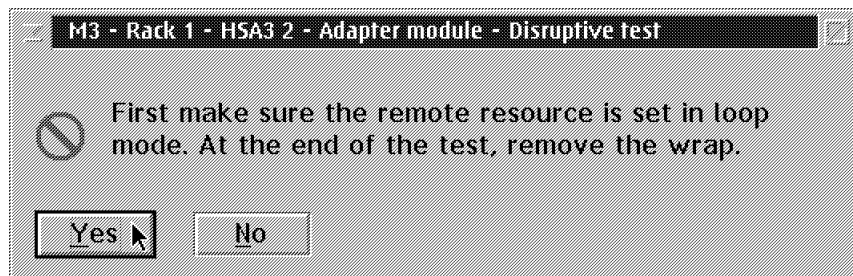


4. In this window you can modify the loop count and specify that you want run the test with a wrap plug by clicking on **Wrap plug presence**. Click on **Start**.

5. A warning **Disruptive test** window is displayed with the following message:



6. If you have specified wrap plug continue with the following Step. Otherwise go to Step 8.
7. If you have specified wrap plug the following window is displayed asking you to install the wrap plug. Click on **Yes** when that has been done.



8. Click on **Yes**.
9. The Test Event Desk window is displayed, showing:
- The resource selected
 - The test selected
 - The status of the test (Proceeding, failed, or complete)
 - The Loop count

The diagnostic stops at the end of the cycle count or in case of error.

A screenshot of a window titled "Test Event Desk" containing a table with test results. The table has five columns: Resource, Test, Status, Loop count, and Error count. Not used fo. The first row of data shows "Rack 1 - HSA3 slot 2" as the resource, "Switch to line interface test" as the test, "Complete" as the status, and "1" as the loop count. The error count is empty.

Resource	Test	Status	Loop count	Error count. Not used fo
Rack 1 - HSA3 slot 2	Switch to line interface test	Complete	1	

10. Wait for the status **Complete**. If there is any error, call the Network Support Center to inform them and follow their instructions.

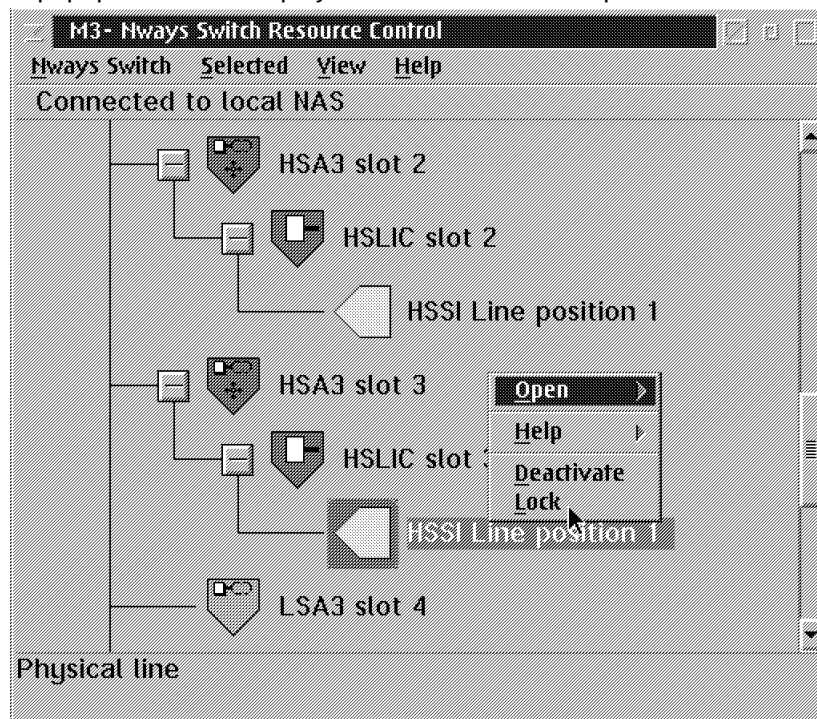
Note: During this test alarms are reported.

How to Run the Line Interface Test

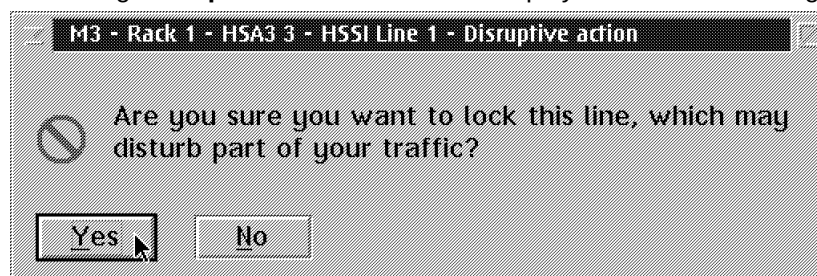
Note

The following procedure is an example of how to run **The Line Interface Test**. The window contents may be different on your screen.

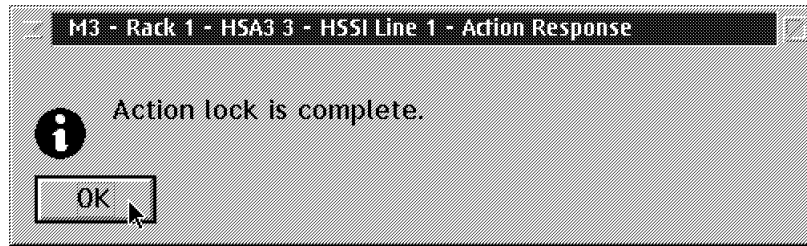
1. In the **Nways Switch Resource Control** window, using the left or bottom button on the mouse, click on the **line** resource icon that you want to test. Then using the right or top button on the mouse, click again on the resource.
2. A popup window is displayed. Click on the **lock** option.



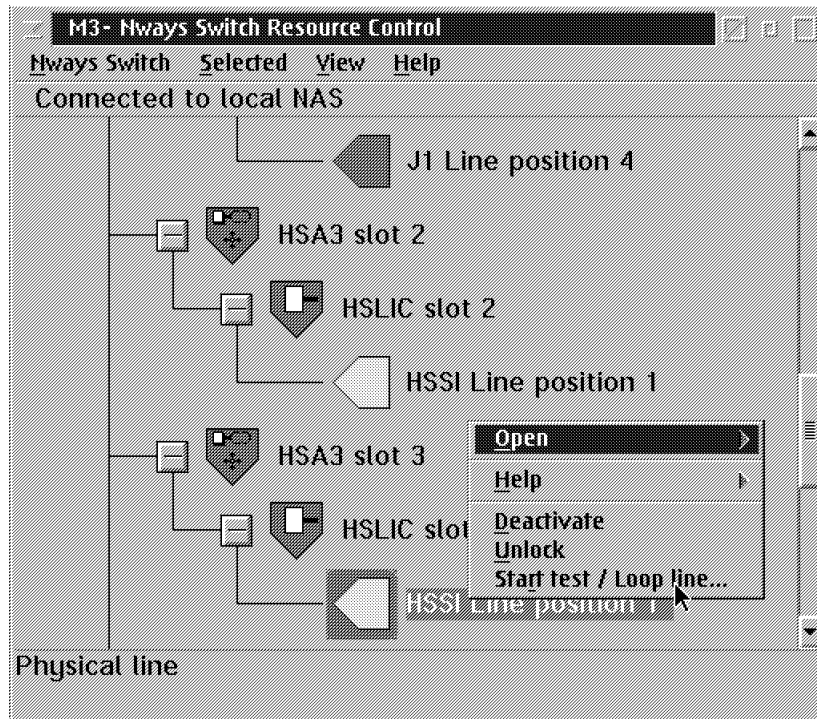
3. A warning **Disruptive action** window is displayed with the following message:



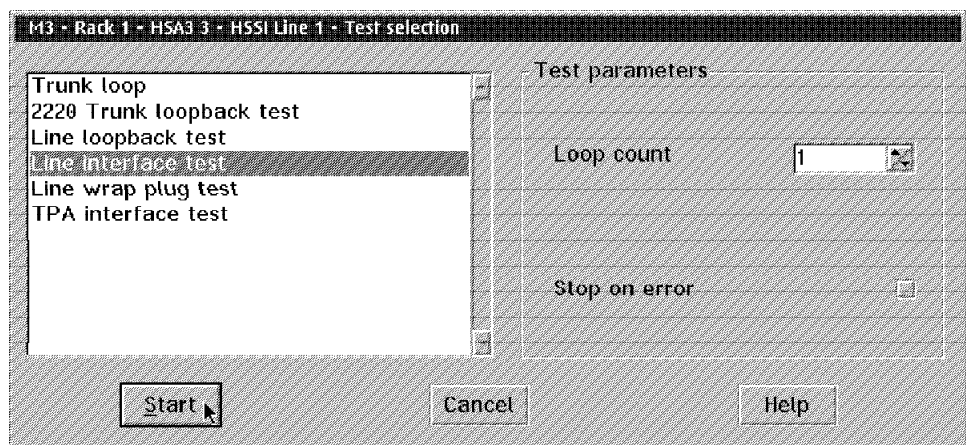
4. Click on **Yes**.
5. A new warning window is displayed. Click on **OK**.



6. In the **Nways Switch Resource Control** window, using the left or bottom button on the mouse, click on the **line** resource icon that you want to test. Then using the right or top button on the mouse, click again on the resource.
7. A popup window is displayed. Click on the **Start test** option.



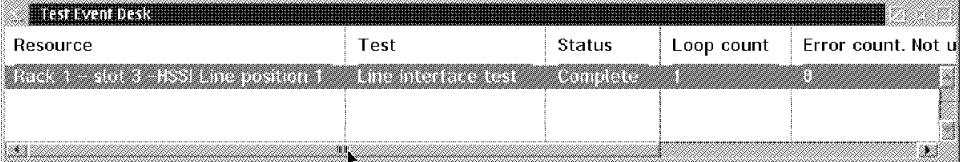
8. A **Test selection** window is displayed with the diagnostics available according to the resource tested.



9. Select **Line interface test**, and click on **Start**.
10. The Test Event Desk window is displayed, showing:

- The resource selected
- The test selected
- The status of the test (proceeding, failed, or complete)
- The Loop count

The diagnostic stops at the end of the cycle count or in case of error.



Resource	Test	Status	Loop count	Error count. Not u
Rack 1 - slot 3 - HSSI Line position 1	Line interface test	Complete	1	0

- 11.
12. Wait for the status **Complete**. If there is any error, call the Network Support Center to inform them and follow their instructions.

How to Run the Line Loopback Test

Important

Only the followings LICs have the capability to redirect received signals onto transmit signals (loops): LIC 513/523/514/515/516/517/544/545/546/551/552/553/554/555/556.

If your remote equipment is not an IBM 2220, set the line on this equipment in loop and go directly to the Step 4 on page 4-19

Note

The following procedure is an example of how to run the **Line Loopback Test**. Depending on the link tested the content of the windows displayed may be different on your screen.

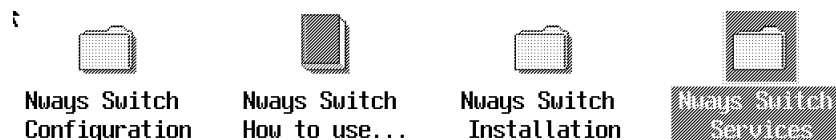
1. Identify the Front-end node:

- Node name
- IP address
- IPR address
- Get the PSN number for the front-end node.

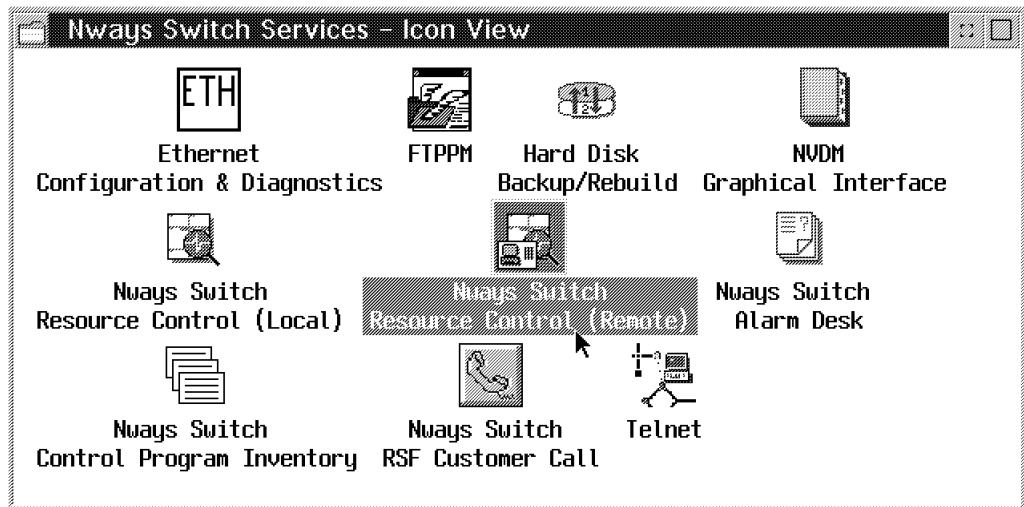
2. Open a remote FEUI session to operate on the front-end node from the local NAS using the following procedure.

When the Nways Switch administrations station is powered ON and initialized the **Nways Switch Desktop** window is displayed.

- a. Double click on the **Nways Switch Services** icon.

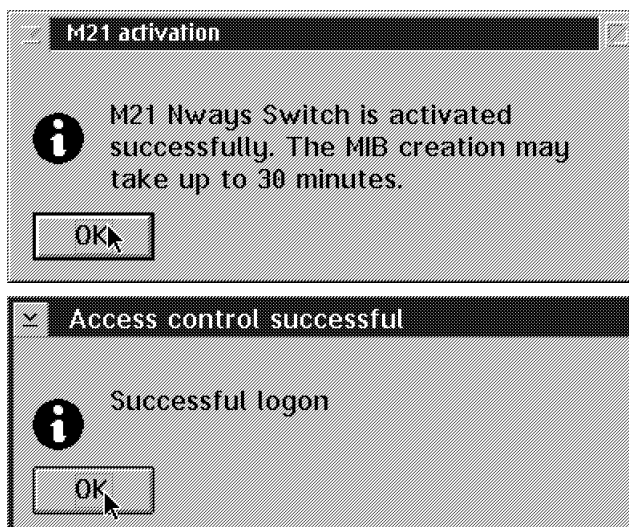


- b. In the **Nways Switch Services** window, double click on the **Nways Switch Resource Control (Remote)** icon.



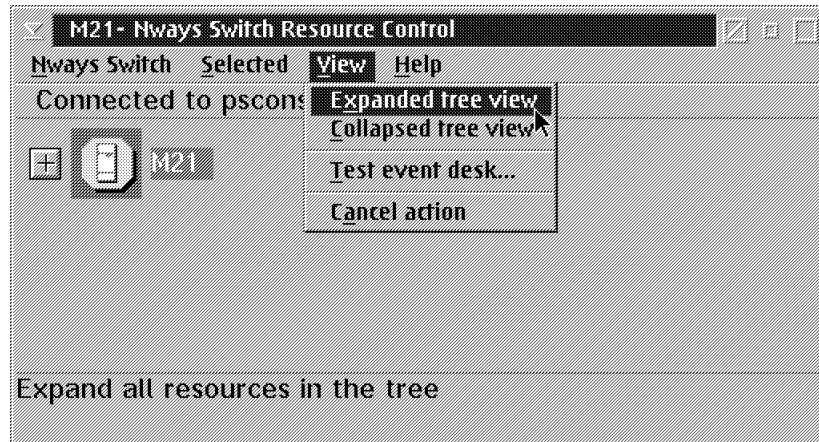
- c. A **Loading in Progress** message is displayed, then the **Logon Remote NAS** window is displayed.

- d. Enter the request information then click on **Logon**.
- e. The following windows are displayed. Click on **OK** on each of them.

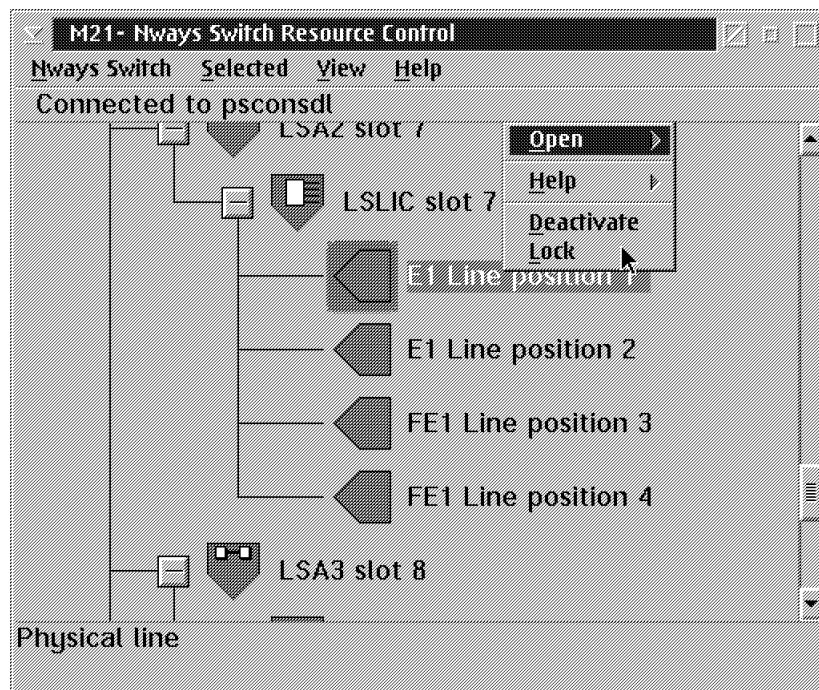


The **Nways Switch Resource Control** window of the remote NAS is displayed, continue with Step 3 on page 4-17.

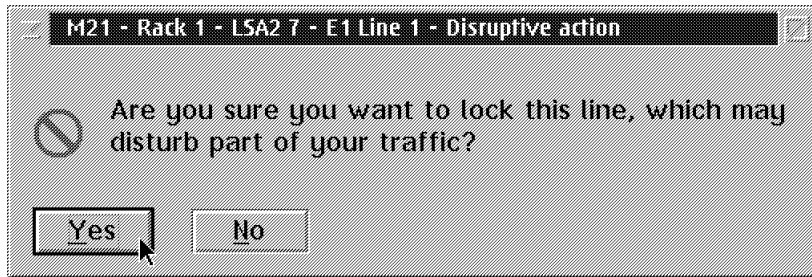
3. Put the line of the remote NAS in loop.
 - a. In the **Nways Switch Resource Control** window, click on **View** then on **View** and **Expand Tree View**.



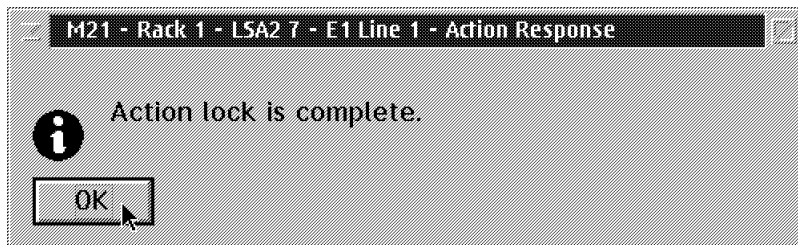
- b. In the **Nways Switch Resource Control** window, using the left or bottom button on the mouse, click on the **line** resource icon that you want to put in loop for test. Then using the right or top button on the mouse, click again on the resource.
 - c. A popup window is displayed. Click on the **Lock** option.



- d. A warning **Disruptive action** window is displayed with the following message.

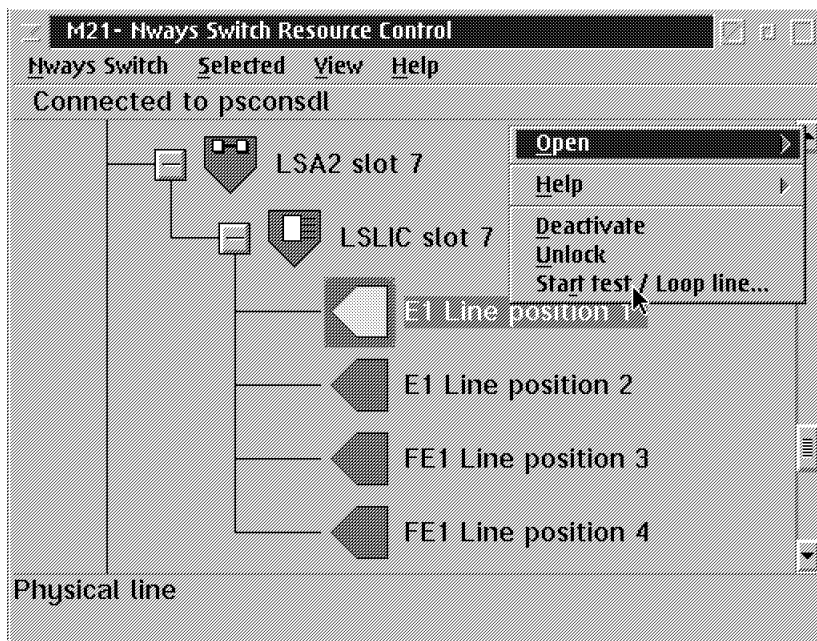


e. When the line has been locked, a popup window is displayed. Click on **OK**.



f. In the **Nways Switch Resource Control** window, using the right or top button on the mouse, click again on the resource.

g. A popup window is displayed. click on the **Start Test** option.



h. A **Test Selection** window is displayed with the diagnostics available according to the line selected.

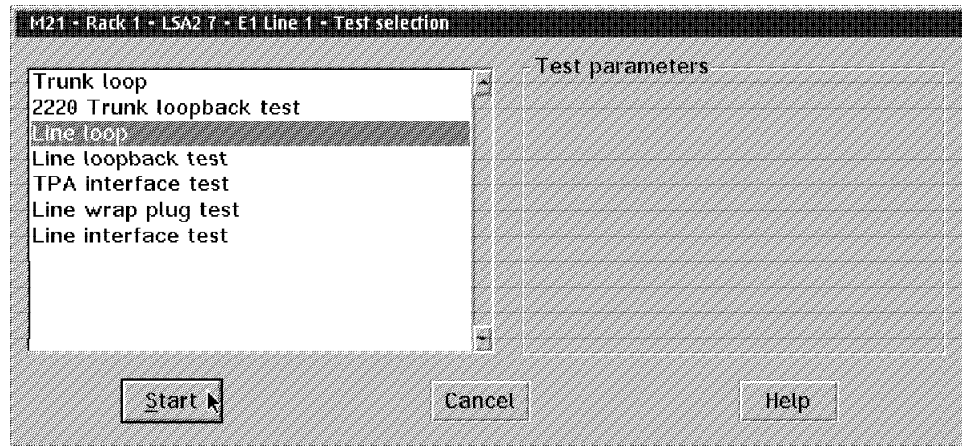


Figure 4-12. Example of Test Selection

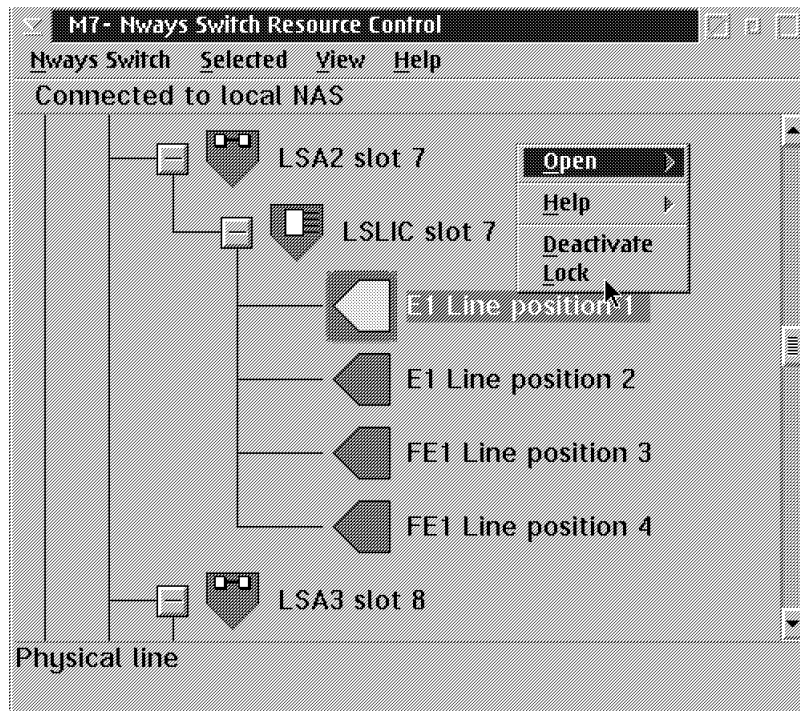
- i. Select the **Line Loop**, then click on **Start**.
- j. The **Test Event Desk** window is displayed, showing:
 - The resource selected
 - The status of the test (Proceeding, failed, or complete)
 - The loop count
 - The diagnostic stops at the end of the cycle count or in case of error.

Test Event Desk				
Resource	Test	Status	Loop count	Error count. Not used for Run
Rack 1 - slot 7 -E1 Line position 1	Line loop	Complete	1	0

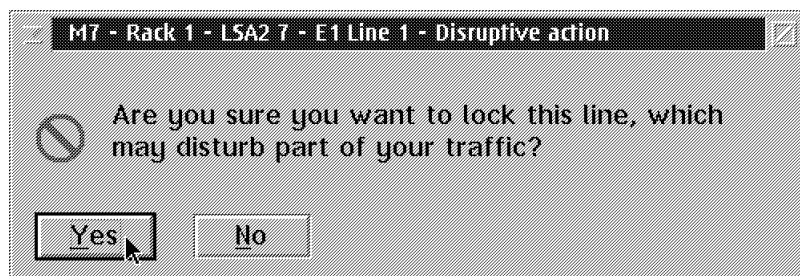
- k. Wait for the status complete. if there is any error, call the Network Support Center to inform them and follow their instruction. Otherwise continue with Step 4.

4. Start the test on the local NAS

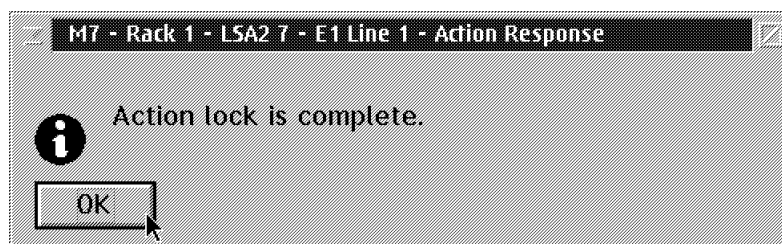
- a. In the **Nways Switch Resource Control** window, using the left or bottom button on the mouse, click on the line resource icon that you want to test. Then using the right or top button on the mouse, click again on the resource.
- b. A popup window is displayed. Click on the **Lock** option.



c. Click on **OK**.



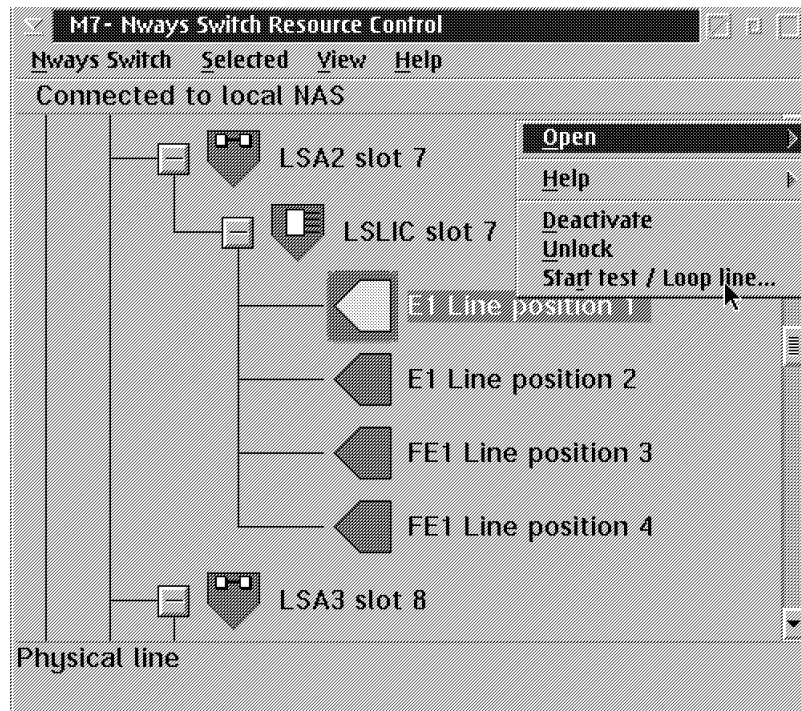
d. When the line has been locked, a popup window is displayed.



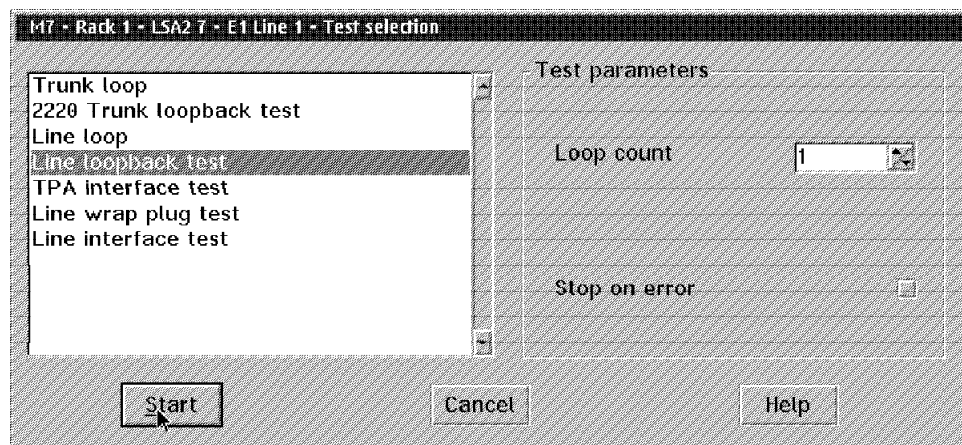
e. Click on **OK**.

f. In the **Nways Switch Resource Control** window, using the right or top button on the mouse, click again on the resource.

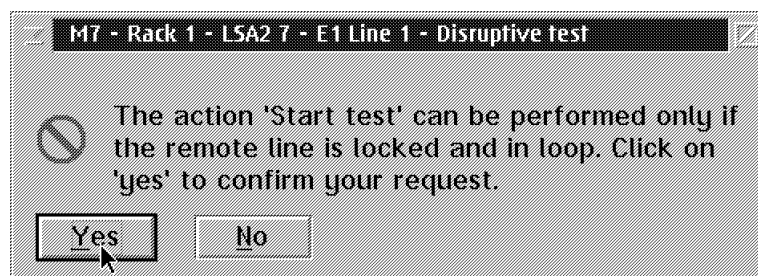
g. A popup window is displayed. Click on the **Start Test** option.



- h. A **Test Selection** window is displayed with the diagnostics available according to the line selected.



- i. Select the **Line Loopback Test**, then click on **Start**.
- The following warning is displayed:

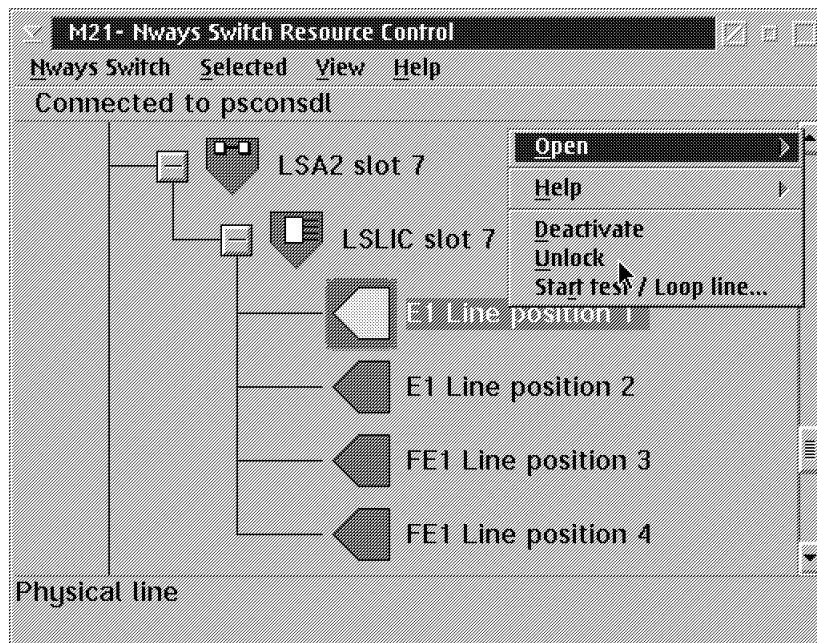


- Click on **Yes**.
- The Test Event Desk window is displayed, showing:
 - The resource selected
 - The status of the test (proceeding, failed, or complete)

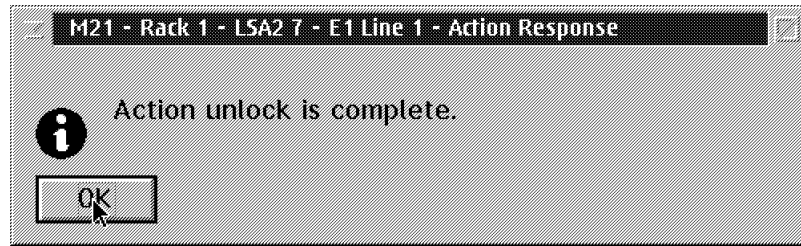
The diagnostic stops at the end of the cycle count or in case of error.

Test Event Desk				
Resource	Test	Status	Loop count	Error count. Not use
Rack 1 - slot 7 -E1 Line position 1	Line loopback test	Complete	1	1

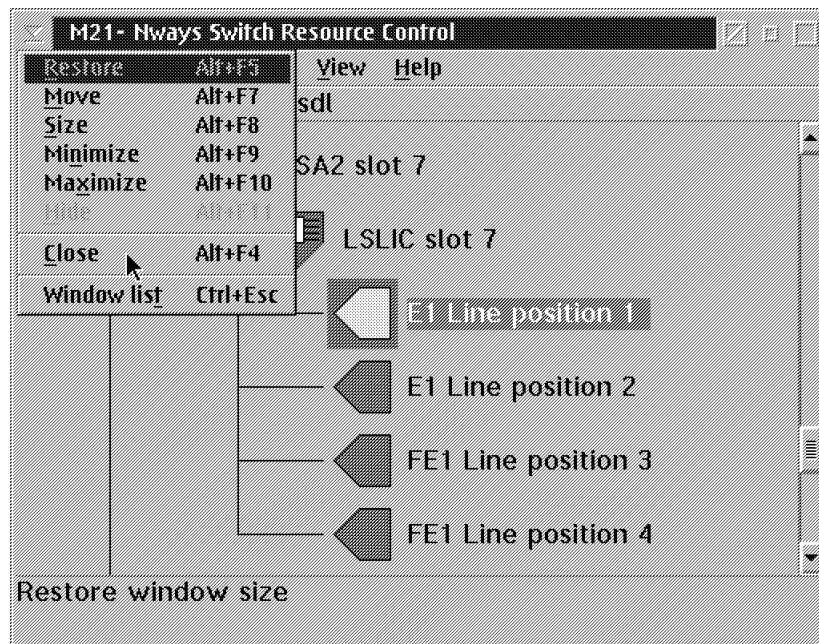
- Wait for the status **Complete**.
5. If there is any error, call the Network Support Center to inform them and follow their instructions.
 6. Otherwise on the **remote NAS, unlock** the line and close the remote FEUI session using the following procedure:
 - a. In the remote **Nways Switch Resource Control** window, using the left or bottom button on the mouse, click on the line resource icon that you want to unlock. Then using the right or top button on the mouse, click again on the resource.
 - b. A popup window is displayed. Click on the **unlock** option.



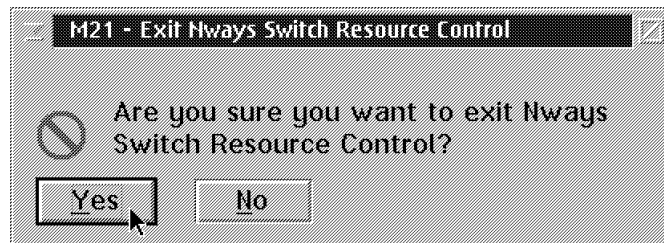
- c. On the following window click on **OK**.



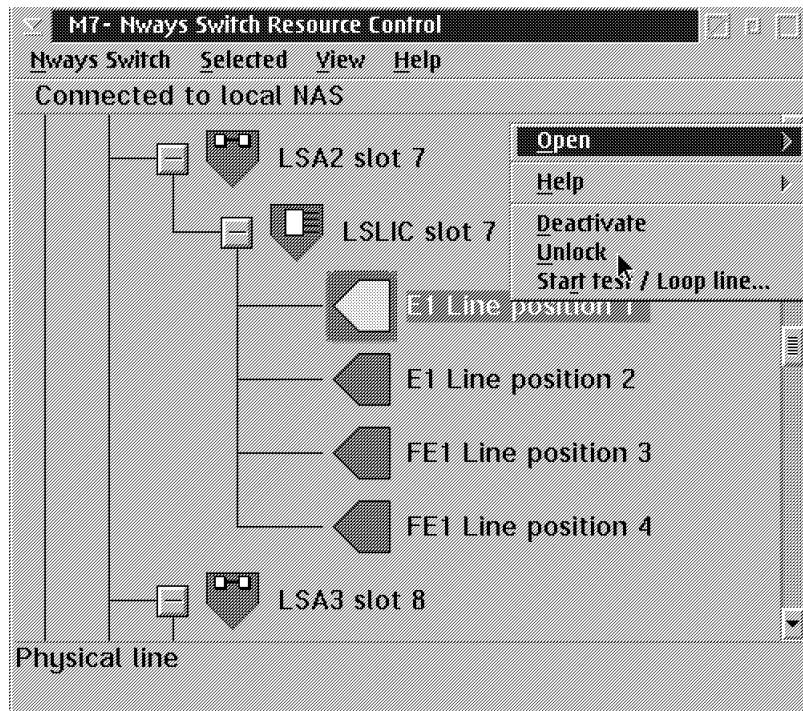
- d. Click on the top left corner of the window to have a menu selection, then click on **Close**.



- e. On the following window click on **Yes**, to close the remote FEUI session.



7. On the local NAS unlock the line using the following procedure:
 - a. In the local **Nways Switch Resource Control** window, using the left or bottom button on the mouse, click on the line resource icon that you want to unlock. Then using the right or top button on the mouse, click again on the resource.
 - b. A popup window is displayed. Click on the **unlock** option.



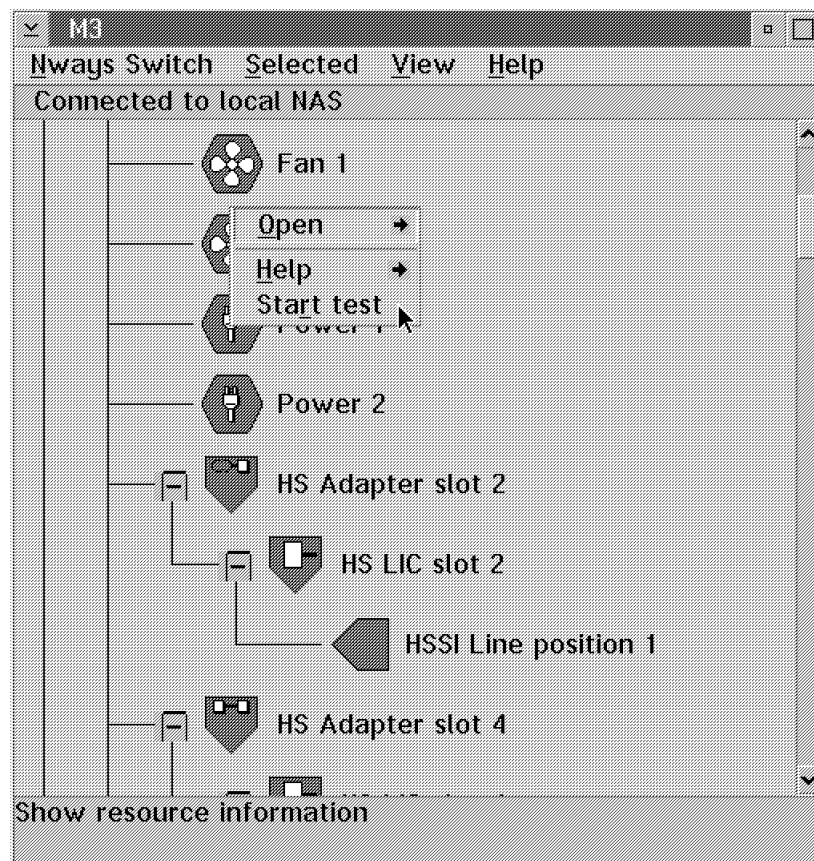
How to Test an ACDC Power and Battery

Note

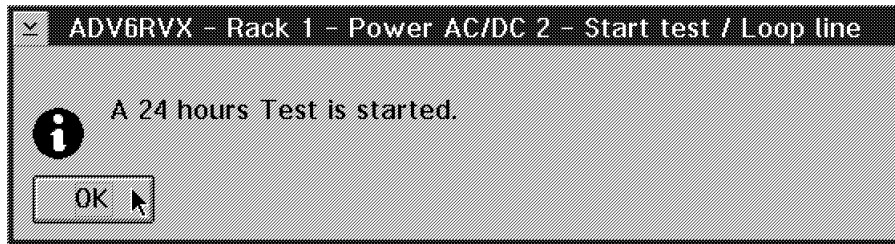
The following procedure is an example of how to run **The ACDC Power and Battery Test**. The window contents may be different on your screen.

This test has two purposes:

- Reset the **Battery Intervention Required** LED to OFF if it was ON.
 - Test the battery through a long period of 24 hours.
1. In the **Nways Switch Resource Control** window, using the right or top button on the mouse, click on the power resource icon where is located the battery that you want to test, then using the left or bottom button on the mouse, click again on the resource.
 2. A popup window is displayed. Click on the **Start Test** option.



3. This test start without displaying a **Test Selection** window, and the following window appears.



4. Click on **OK**.

5. As soon as this test is started check that.

- The LED **Battery Intervention Required** is turned OFF if it was ON.
- The power resource icon changes its color from green to yellow. The power resource icon stays yellow until test termination (about 24 hours).

Note: During this test the ACDC power is operational except the battery. At the end of the test, the power resource icon come green again if no error is detected. If error is detected an alarm is generated.

Chapter 5. 2220 Problem Determination

MAP 0500: 2220 Basic Verification

Important

If you need to power OFF or power ON the 2220-501 while the 2220-500 is active ensure that the two switches have their "Set Switchover Options" set to "Inhibit". See "Nways Switch Administration Station Windows Overview" on page 3-5

001

On the 2220 control panel turn the power **ON/STANDBY** switch to ON.

On the 2220 control panel check the status of the LEDs.

The LEDs on the 2220 control panel should have the following status:

LED	Status	Comments
POWER SUPPLY LED 1 and 2	ON	The two LEDs are ON if you have two powers supplies installed in your machine.
FAN BOX LED 1 and 2	OFF	The two LEDs should be OFF; otherwise, you have a fan problem.
APC LED	ON	The APC LED is blinking during power on self test (POST); then it comes permanently ON.
ALARM LED	OFF	The ALARM LED should be OFF; otherwise, you have a solid error in the 2220.

Is the status of the control panel OK?

Yes No

002

Go to Step 004

003

Go to Step 037 on page 5-7

004

On the following table select the symptom that fits your situation.

LED Status	Action
POWER SUPPLY LED 1 and 2 are OFF	Perform power verification on each power supply installed in your machine. Go to Step 005 on page 5-3
Only one POWER SUPPLY LED is ON but your machine has two power supplies installed	Perform power verification for the suspected power supply installed on your machine. Go to Step 005 on page 5-3
One or two FAN BOX LEDs are ON	Step 012 on page 5-5
The APC LED is not permanently ON	Step 015 on page 5-5
The ALARM LED is ON	Step 020 on page 5-6

005

– On the suspected power supply check that:

- The CB(s) and CPs are ON.
- The power supply is properly connected to the power source(s) J5.
- The DC cables are properly connected to the J2 connector.
- The control panel cable and signal cables are properly connected to the J3 and J4 connectors, respectively.

Is everything correct?

Yes No

006

Are all CPs ON?

Yes No

007

Go to Step 032 on page 5-7.

008

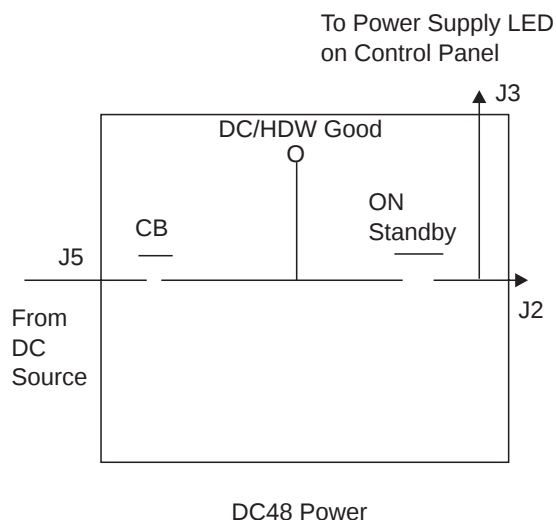
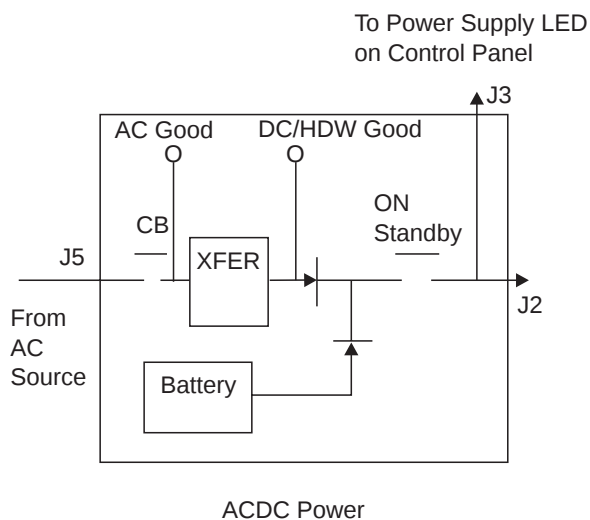
Correct the problem and restart the verification procedure. Go to Step 001 on page 5-2.

009

-
- Using the following table, check the power LED status on the suspected power supply, then select the symptom that fits your situation and perform the action specified.

MAP 0500 (continued)

Type of Power	Power LED Status	Action
ACDC Power	The DC/HDW GOOD LED is ON.	Suspect: - LEDs on the control panel. - A connection problem between the ACDC and the control panel. Refer to Appendix A, "Schematics" on page A-1. - Power ON/STANDBY switch - ACDC power
	The AC GOOD LED is ON and the DC/HDW GOOD LED is OFF .	Suspect: ACDC power
	The AC GOOD LED is OFF	Check the customer's installation. If it is correct, suspect an ACDC power problem.
DC48 power	The DC/HDW GOOD LED is ON.	Suspect: - LEDs on the control panel. - A connection problem between the DC48 and the control panel. Refer to Appendix A, "Schematics" on page A-1. - Power ON/STANDBY switch - DC48 power
	The DC/HDW GOOD LED is OFF	Check the customer's installation. If it is correct, suspect a DC48 power problem.



Did you find the problem and the power supply is now ON?

Yes No

010

Call your support for assistance.

011

Restart the verification procedure. Go to Step 001 on page 5-2.

012

- On the front side of the machine check that the cables are correctly plugged in to:
 - Connector J1 of the the DCD1 and DCD2 (if present)
 - Connector J2 of APC.

Did you find the problem and the fan box LED is now OFF?

Yes No

013

- First suspect a fan box problem, then an APC problem.
- If that does not solve your problem, call the Network Support Center to inform them and follow their instructions.

014

Restart the verification procedure. Go to Step 001 on page 5-2.

015

Is the APC LED blinking?

Yes No

016

- Suspect an APC problem.

017

- On the control panel of the machine, press the APC RESET button.
- The green APC LED should normally be ON after the POST (a few seconds).

Is the green APC LED permanently ON?

Yes No

018

- Suspect an APC problem or an adapter problem

If that does not solve your problem, call the Network Support Center to inform them and follow their instructions.

019

Restart the verification procedure. Go to Step 001 on page 5-2.

020

Do you have two power supplies installed in your machine?

Yes No

021

Go to Step 025.

022

– Check the status of the **DC/HDW GOOD** LED on the both power supplies.

Is a **DC/HDW GOOD** LED OFF?

Yes No

023

Go to Step 025.

024

Go to Step 009 on page 5-3.

025

– Check that **all** CPs (1 to 6) are ON on the power supply.

Are all CPs ON?

Yes No

026

- Set On the CP(s) tripped.
- Restart the verification procedure. Go to Step 001 on page 5-2

027

- A solid 2220 error has been detected.
- Remove the external covers (if not already done) and check that all the adapters and LICs installed have their green LED ON.

Is there an adapter or a LIC with its LED OFF?

Yes No

028

Run the 2220 diagnostics to identify the defective FRU. Refer to Chapter 4, “2220 Diagnostics” on page 4-1.

029

(Step 029 continues)

029 (continued)

- Unplug and replug the suspected adapter or LIC in the machine.
- During the POST its green LED should be blinking (few seconds), and then permanently ON.

Is the adapter or LIC's LED now ON?

Yes No

030

The adapter or the LIC is defective.

031

Restart the verification procedure. Go to Step 001 on page 5-2.

032

Is the "DC/HDW GOOD" LED ON?

Yes No

033

- Switch OFF the main CB of the power supply.
- Set ON the CP tripped.
- Switch ON the main CB of the power supply.

Is the "DC/HDW GOOD" LED ON?

Yes No

034

You have a power supply problem.

035

Restart the verification procedure. Go to Step 001 on page 5-2

036

- Set On the CP(s) tripped.
 - Restart the verification procedure. Go to Step 001 on page 5-2
-

037

The 2220 is operational. If you want run diagnostics on the 2220 refer to Chapter 4, "2220 Diagnostics" on page 4-1.

Chapter 6. 2220 FRU Exchange

Important

Almost all FRUs are **hot pluggable** and can be exchanged without powering OFF the 2220. Follow carefully the procedure described.

Nevertheless if you need to power OFF the 2220-501 while the 2220-500 is active ensure that the two switches have their "Set Switch Options" set in "Inhibit" state. (see "Nways Switch Administration Station Windows Overview" on page 3-5).

Each time you change an FRU, carefully record its location and check that the attached cables are correctly labeled.

The exchange procedures are documented with illustrations of ACDC type B, DC48 type B, and APC type B: However the procedures are identical for type A and type B units.

The differences between type A and type B units are shown in the following sections:

- "Identify the ACDC Power Type" on page 6-14.
- "Identify the DC48 Power Type" on page 6-15.
- "Identify the APC Type" on page 6-16.

Note

The external front and rear covers of the machine are removed by pulling them out. The following procedures assume that these covers have already been removed. Otherwise see "Opening The Doors And Covers" on page 6-6. The front of the machine can be identified by the location of the control panel.

MAP: Before Exchanging an FRU

001

Is the machine on which you have to exchange the FRU powered ON?

Yes No

002

Go to Step 020 on page 6-4.

003

Check if one or more CP(s) are tripped on the power supply.

Is a CP tripped?

Yes No

004

Go to Step 020 on page 6-4.

005

MAP (continued)

Using the following schematic check whether the FRU that you have to exchange is power-controlled by the tripped CP (see Figure 6-1).

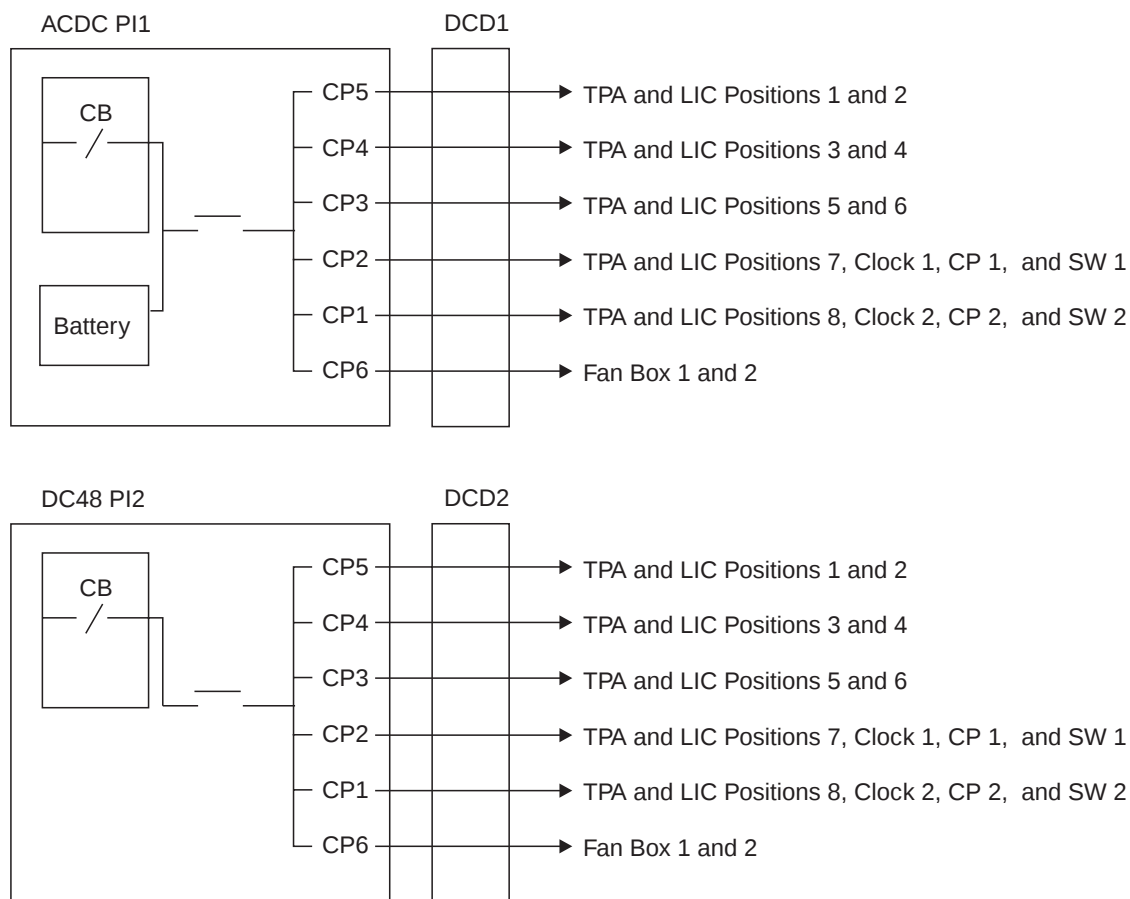


Figure 6-1. 2220 CPx Powering

Note: In this schematic the two kinds of power supply are represented but on your machine you may have another combination of power supplies (see Figure 6-2).

Figure 6-2. 2220

						Control Panel					
Fan Box 2						Fan Box 1					
1	2	3	4	5	6	7	8	9	10	11	12
Power Input 2						Power Input 1					

Fan Box 1						Fan Box 2					
12	11	10	9	8	7	6	5	4	3	2	1
Power Input 1						Power Input 2					

2220 Front View (TPA Side)

2220 Rear View (LIC Side)

Figure 6-3. Module Locations

Does the tripped CP control the FRU that you have to exchange?

Yes No

006

Check that the location that is power-controlled by the CP tripped, is empty.

Is the location empty?

Yes No

007

Go to Step 010.

008

Go to Step 020 on page 6-4.

009

Go to Step 015 on page 6-4.

010

Turn the CP ON.

Does the CP stay ON?

Yes No

011

You have another problem on the 2220. Call the Network Support Center to inform them.

012

Test the suspected FRU(s) (Refer to Chapter 4, "2220 Diagnostics" on page 4-1 to run the appropriate diagnostic).

(Step **012** continues)

MAP (continued)

012 (continued)

Is the FRU error free?

Yes **No**

013

You have another problem on the 2220. Call the Network Support Center to inform them.

014

Go to Step 015

015

Turn the CP ON.

Does the CP stay ON?

Yes **No**

016

Exchange the FRU; go to Step 020.

017

Test the suspected FRU (Refer to Chapter 4, “2220 Diagnostics” on page 4-1 to run the appropriate diagnostic).

Is the FRU error free?

Yes **No**

018

Exchange the FRU; go to Step 020.

019

Go to “Leaving Procedure” on page 6-70.

020

In the following table, find the FRU you want to exchange and go to the procedure indicated.

<i>Table 6-1 (Page 1 of 2). FRU Exchange</i>		
Select FRU	FRU Name	Go to
ACDC	AC to DC power input	“Exchange an ACDC” on page 6-17
APC	alarm and power control	“Exchange an APC” on page 6-22
ARCxxx	ARC type xxx	“Exchange an ARC” on page 6-24
BBU	battery backup unit	“Exchange a Battery” on page 6-25
BOARD	board subrack assembly	“Exchange a Board” on page 6-29
CLK	clock	“MAP: Prerequisite to Exchange a Clock” on page 6-34
CLKRD	clock redrive	“MAP: Prerequisites for Exchanging a Clock Redrive” on page 6-40

Table 6-1 (Page 2 of 2). FRU Exchange

Select FRU	FRU Name	Go to
DCDX	DC distribution type x (top or bottom position)	"Exchange a DCD1 or DCD2" on page 6-48
DC48	DC -48V power input	"Exchange a DC48 Power Input" on page 6-46
FANBX	fan box	"Exchange a Fan Box" on page 6-50
HSAX	high-speed TPA	"Exchange a TPA" on page 6-67
LCEB	line connection enclosure base	"Exchange an LCEB" on page 6-53
LCEE	line connection enclosure expansion	"Exchange an LCEE" on page 6-51
LCPB	line connection power base	"Exchange an LCPB" on page 6-55
LCPE	line connection power expansion	"Exchange an LCPE" on page 6-57
LICxxx	LIC type xxx	"Exchange a LIC" on page 6-59
LSAX	low-speed TPA	"Exchange a TPA" on page 6-67
PANEL	control panel	"Exchange a Control Panel" on page 6-61
VSA	voice server adapter	"Exchange a Voice Server Adapter" on page 6-68
SWxx	switch type xx	"MAP: Prerequisite to Exchange a Switch or Switch Redrive" on page 6-62
SWRD	switch redrive	"MAP: Prerequisite to Exchange a Switch or Switch Redrive" on page 6-62
VSEx	voice server extension type x	"Exchange a Voice Server Extension" on page 6-69

Opening The Doors And Covers

To open the front and rear doors see Figure 6-4 detail B, to remove the side covers see detail A.

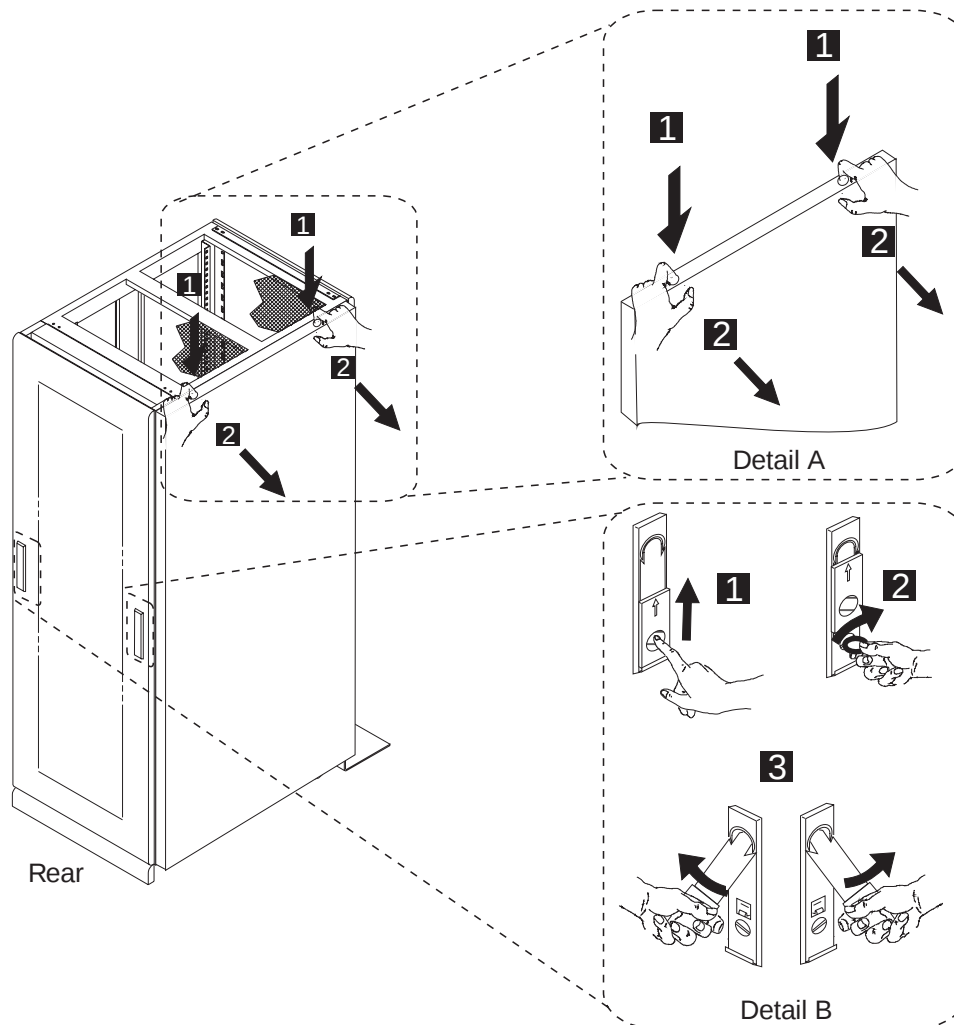


Figure 6-4. Front, Rear Door And Side Cover Latches

2220 Component Locations

Locating System Components in the 2220

Each component is located using:

- **Rack identification**

(RR) Letter A, or B for rack. The rack identifier is installed at the top of each rack at installation time.

Examples:

2220-500: rack A

2220-501: rack B

- **Front or rear location** of the rack (S) Letter F or R.

Examples:

2220-500, front (adapter side): A-F

2220-501, rear (LIC side): B-R

- **Vertical location** (UU) The vertical location uses EIA Units (**U-units**). A vertical label divided into U-units is affixed to the front and rear of each rack to indicate the vertical locations.

Examples:

2220-500, front, logic subrack: A-F-06

2220-501, rear, logic subrack: B-R-06

- **Horizontal location** (HH)

- For modules: **1 to 12** (label already existing)

- For power supplies and fans, number **1 or 2**

Examples:

2220-500, front, adapter position 4: A-F-06-04

2220-501, rear, fan box 2: B-R-19-2

- **Cable and connector location** (JJJ) 3 digits are used (for example, **J01**).

Example: 2220-501, rear, LIC position 1, connector J03: B-R-06-01-J03

See “Module Connector Positions” on page 6-8.

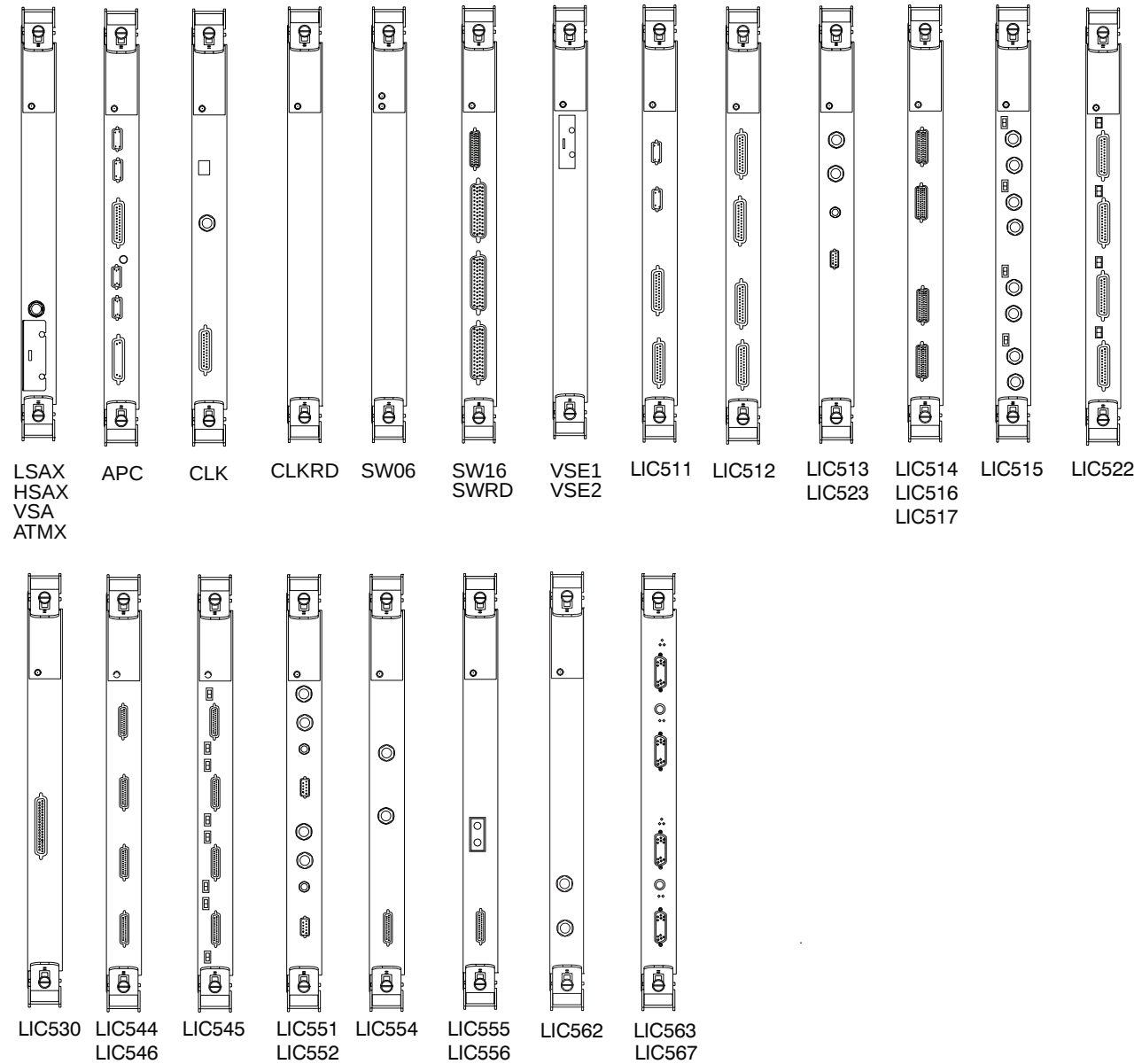
Note: Specific unit numbering is used to identify a unique unit, when the unit can not be identified using the previous system (starting from 99, 98, 97, and so on).

Format of Location Identifier

RR	S	UU	HH	JJJ
----	---	----	----	-----

This label format is used to identify external cables.

Module Connector Positions



2220 Model 300/500/501 Rack Example

Note: For 2220 Model 501, the rack identification is 'B'.

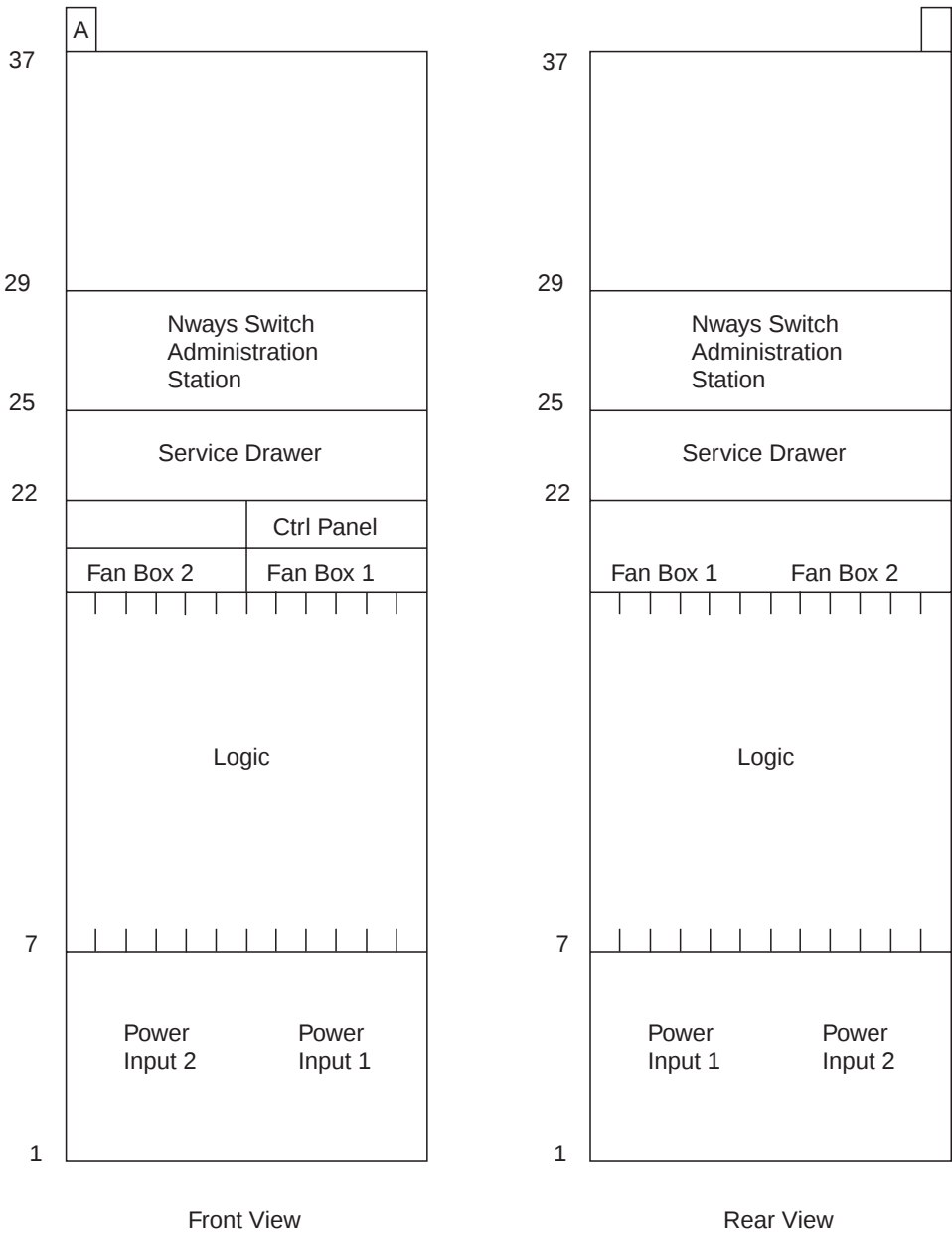


Figure 6-5. 2220 Component Location

2220 Model 300/500 Unit Identification Examples

Note: For 2220-501 a subset of this identification is used because some units in this model are missing. The rack identification is 'B'.

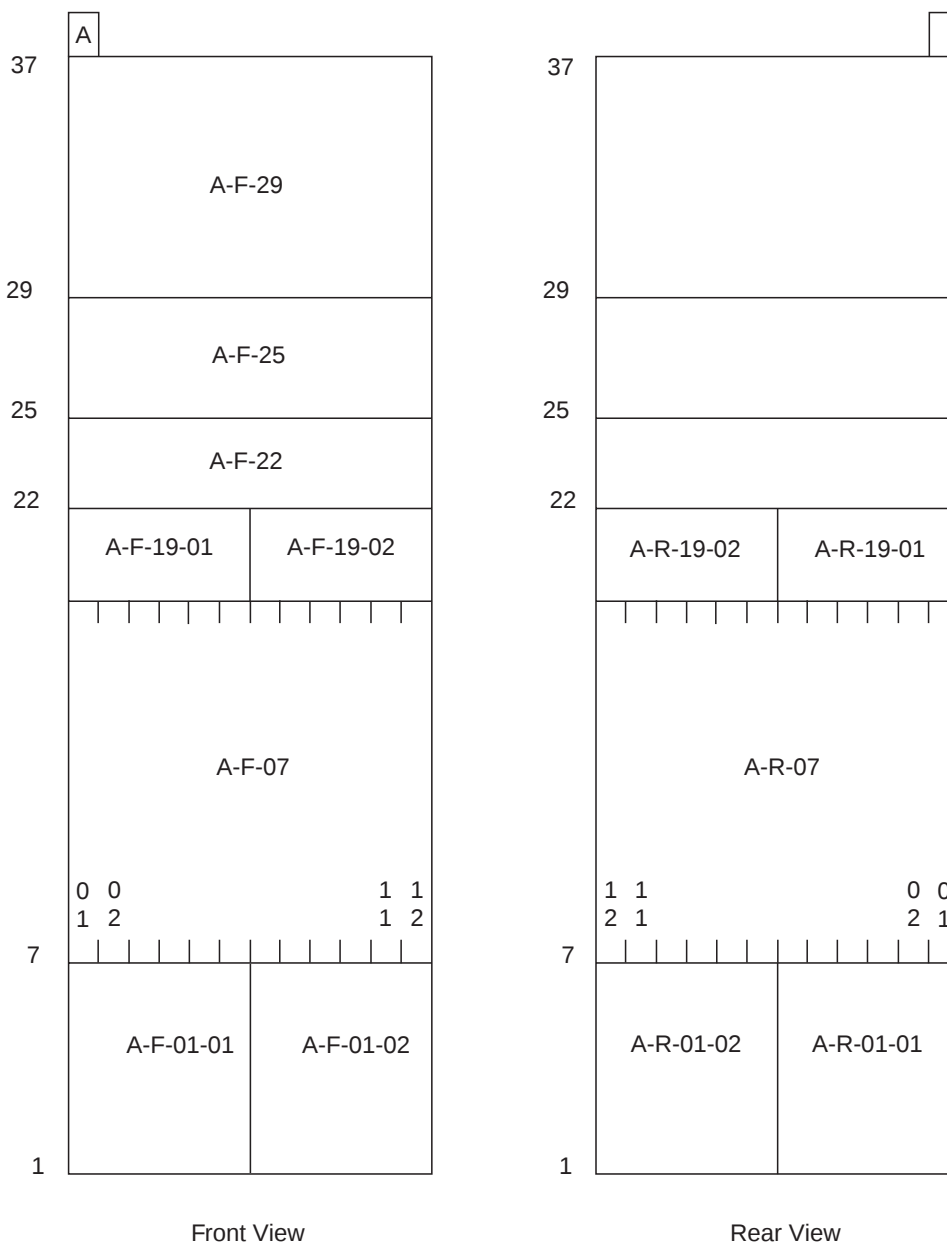


Figure 6-6. 2220 Identification

<i>Table 6-2. Examples of Location for the 2220-200/2220-500</i>					
Component	Location				
	RR	S	UU	HH	JJJ
Power input 1	A	F	01	02	
Fan box 2	A	F	19	01	
TPA position 2	A	F	07	02	
LIC position 4	A	R	07	04	
Connector on LIC type 515 in slot 5	A	R	07	05	004

2220 Front View

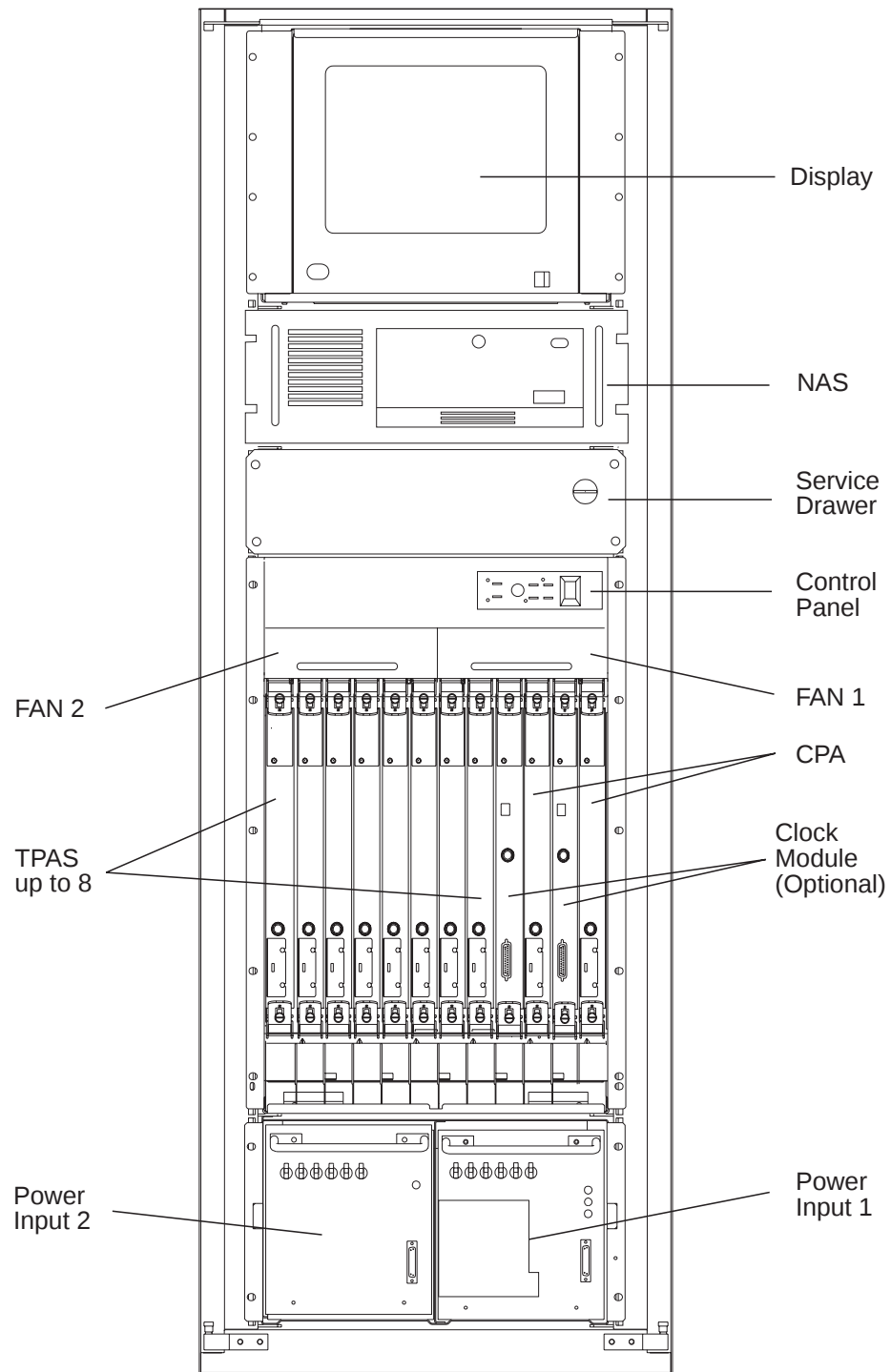


Figure 6-7. 2220 Front View Location with NAS Type 7585 Installed

2220 Rear View

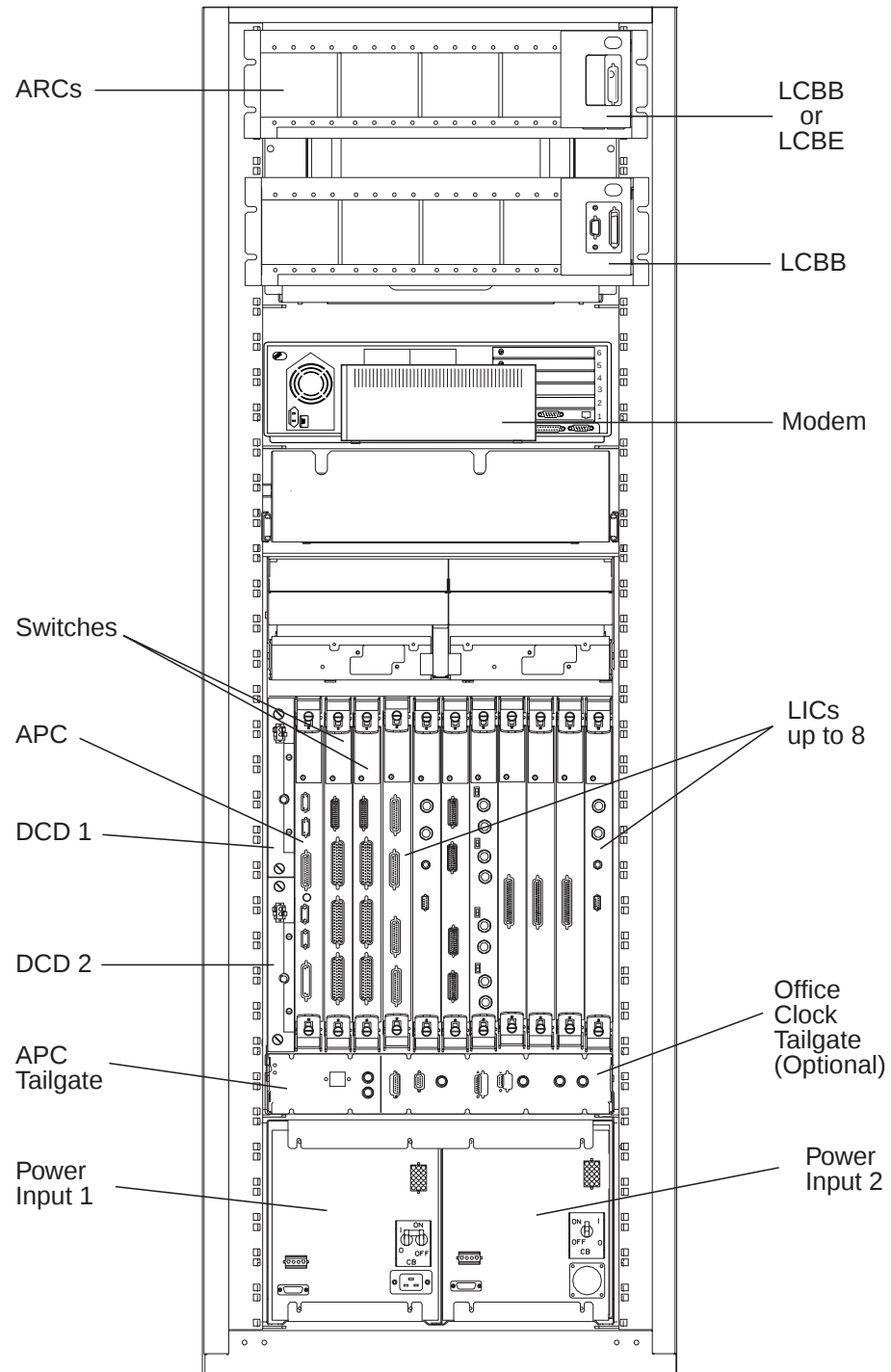
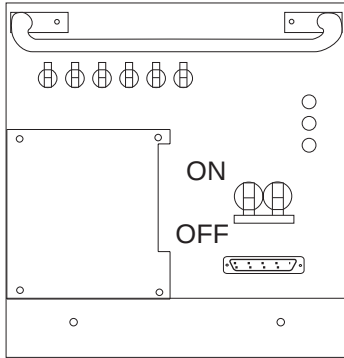
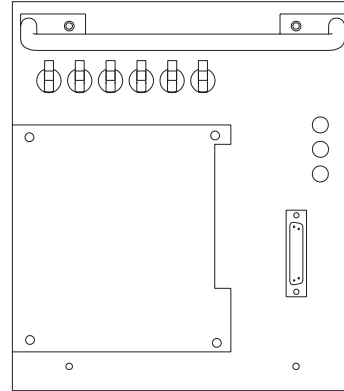


Figure 6-8. 2220 Rear View Location

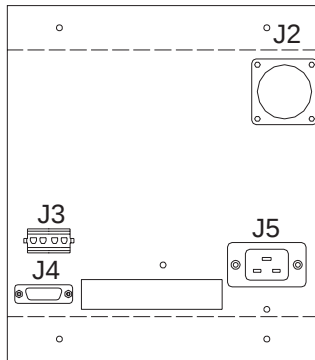
Identify the ACDC Power Type



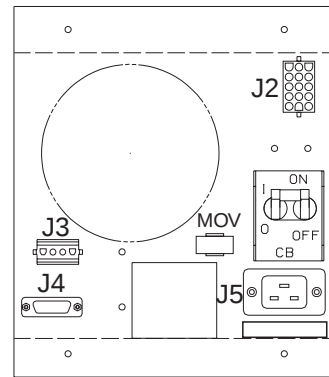
ACDC Power Type A Front



ACDC Power Type B Front

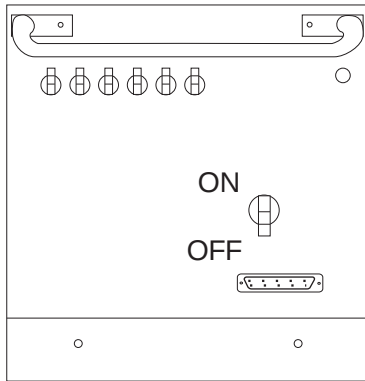


ACDC Power Type A Rear

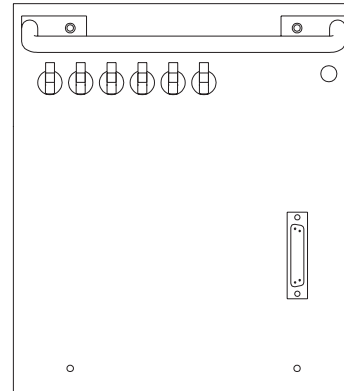


ACDC Power Type B Rear

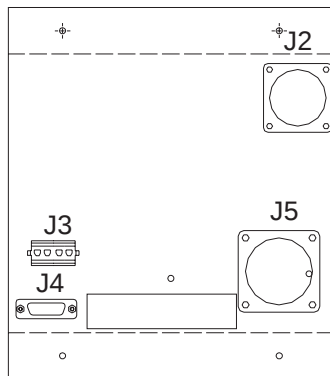
Identify the DC48 Power Type



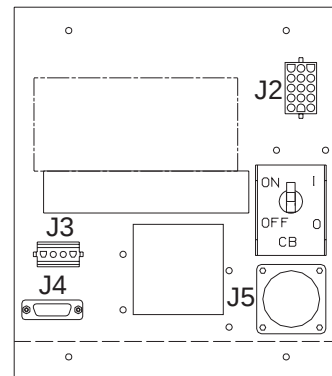
DC48 Power Type A Front



DC48 Power Type B Front



DC48 Power Type A Rear



DC48 Power Type B Rear

Identify the APC Type

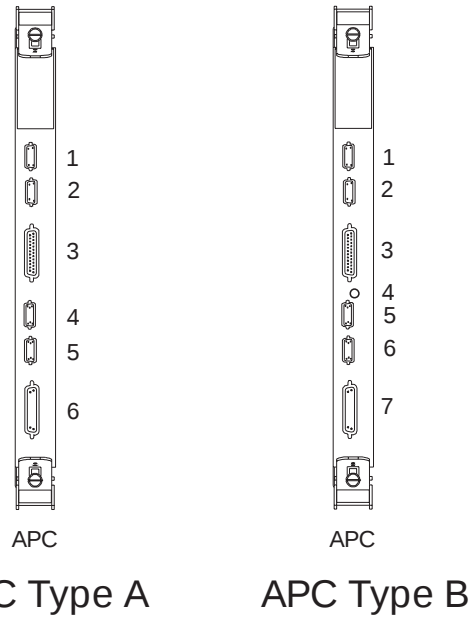


Figure 6-9. APC Type Identification

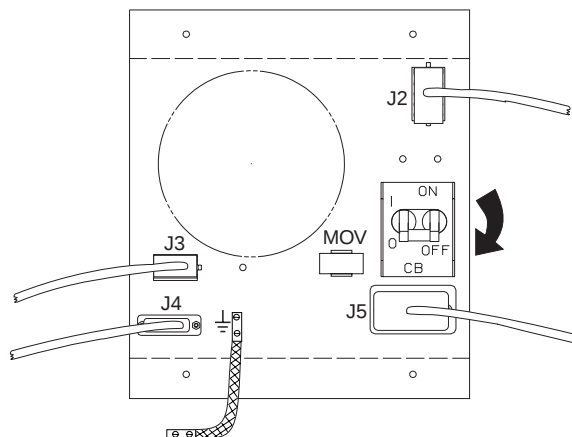
Exchange an ACDC

Important

The ACDC exchange procedure is documented with the illustrations of ACDC type B, but the procedure is identical for ACDC types A and B.

The differences between ACDC types A and B are shown in “Identify the ACDC Power Type” on page 6-14.

- 1
 - Locate the ACDC that you have to exchange using “2220 Front View” on page 6-12.
 - At the rear of the machine, on the ACDC that you want to exchange, switch the main CB OFF.

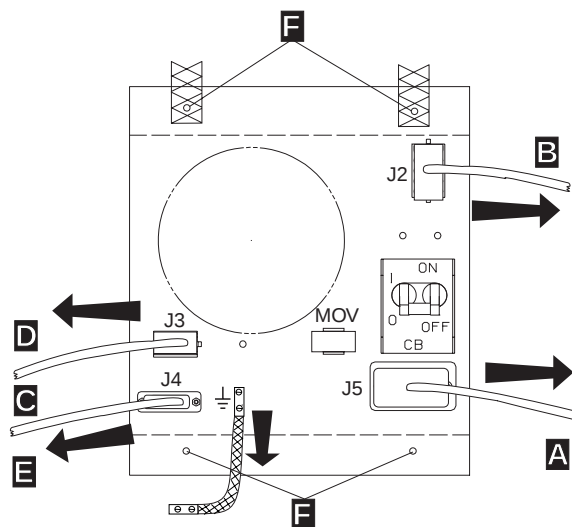


- 2
 - Remove the cables in the following order:
 1. AC cable from AC plug **A**
 2. DC cable from the J2 connector **B**
(remove the cable retention bracket on the J2 connector)

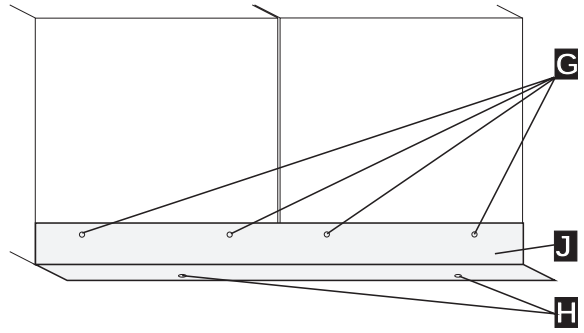
Warning

Energy transfer hazard may be present on the connector pins.

3. Signal cable from the J4 connector **C**
4. Control panel cable from the J3 connector **D**
- Disconnect the earth strap **E** from the ACDC.
- Remove the four screws **F** that secure the ACDC, and connect the earth straps.



- 3
- At the front of the machine, remove the screws **G** that secure the ACDC on the bracket.
 - Remove the screws **H** that secure the bracket and remove the bracket **J**.
 - Pull out the ACDC.

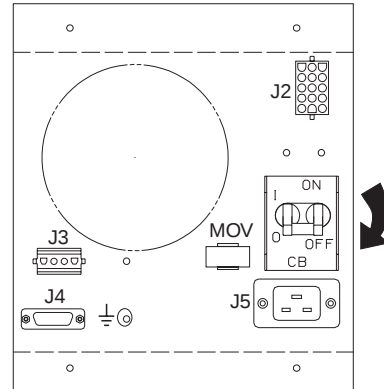


- 4
- Unpack the new ACDC.

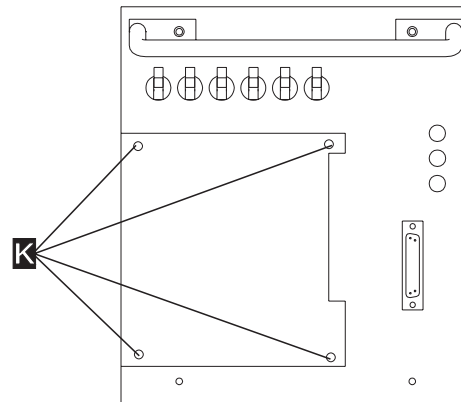
Note

Be sure that the new ACDC that you want to install has its CB in the OFF position.

- If you are installing the new ACDC on IBM 2220 model 300 do **not** install the battery. Go to Step 10
- Otherwise continue with Step 5

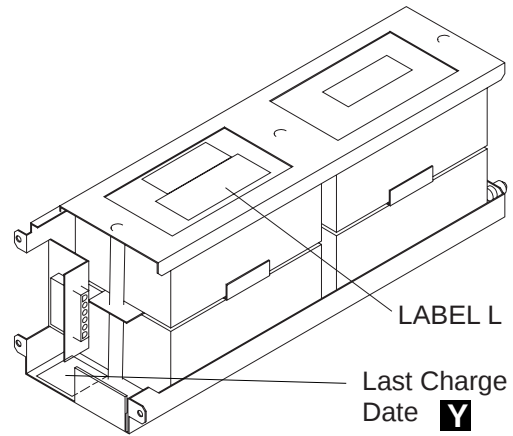


- 5
- Remove the four screws **K** and the grid.



6

- Before installing the battery, check the last charge date **Y**. If this date is older than 6 months, order a new battery, otherwise continue the procedure to install the battery.
- On the new battery, glue one of the labels provided according to your country requirement.



LABEL L

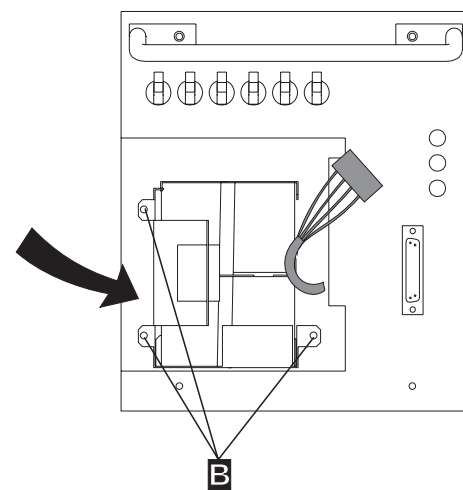


OR

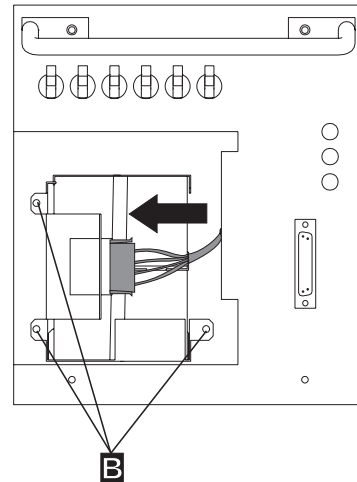


7

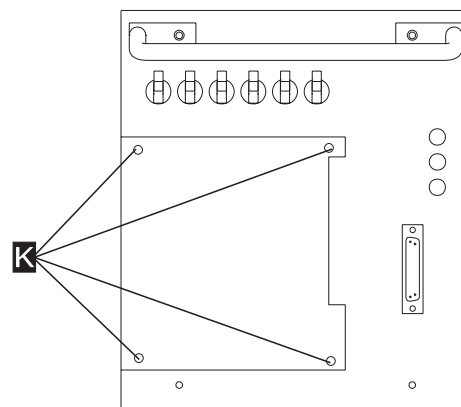
- Install the battery shipped with the ACDC in the ACDC.
- Slide the battery into the ACDC.



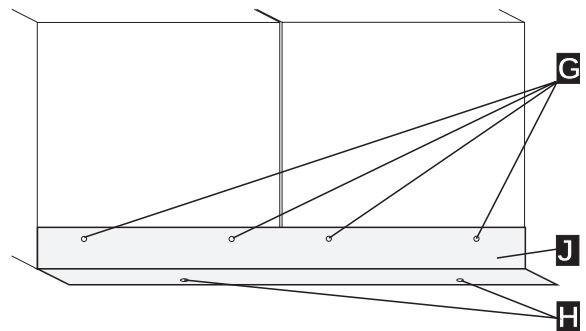
- 8
- Secure the battery with the three screws **B**.
 - Connect the cable to the battery.



- 9
- Reinstall and secure the grid using the four screws **K**.



- 10
- At the front of the machine, insert the new ACDC.
 - Reinstall the bracket **J** and secure it with the two screws previously removed **H**.
 - Secure the ACDC to the bracket with the two screws previously removed **G**.

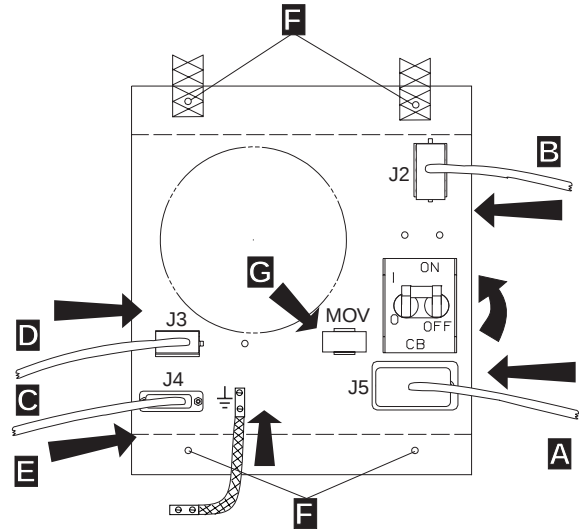


- 11
- If you are replacing an ACDC power type A with an ACDC power type B, replace the DCDx provided (refer to "Exchange a DCD1 or DCD2" on page 6-48), then continue with the next Step.
 - Otherwise continue with the next Step.

- 12
- At the rear of the machine secure the ACDC and connect the earth straps using the four screws previously removed **F**.
 - Connect the earth strap to the ACDC **E**.
 - Connect the cables previously removed in the following order:
 1. Control panel cable to the J3 connector **D**.
 2. Signal cable to the J4 connector **C**.
 3. DC cable to the the J2 connector **B**.
 4. AC cable to AC plug **A**.
 - On the ACDC that you have installed, check that the MOV connector **G** is installed.

Important

The MOV connector must be connected for lightning protection.



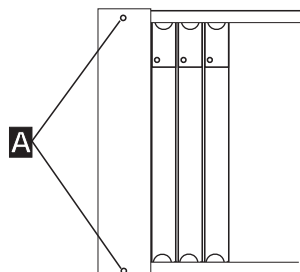
- Switch the main CB ON.
- Check on the ACDC that:
 1. The green LEDs **AC GOOD** and **DC/HDW GOOD** are ON.
 2. The yellow LED **BATTERY EXCHANGE REQUIRED** can be ON or OFF.
- Check that the corresponding green LED on the control panel is ON. If not, check the ACDC installation. If the problem persists call the Network Support Center. Otherwise continue with the next bullet.
- Perform the power test, refer to “How to Test an ACDC Power and Battery” on page 4-25. This test must reset the yellow LED **BATTERY EXCHANGE REQUIRED** to OFF if after ACDC exchanging, this LED was ON.
- If the yellow LED **BATTERY EXCHANGE REQUIRED** do not turn OFF call the Network Support Center. Otherwise continue with the procedure.
- Go to “Ending the Exchange Procedure” on page 6-70.

Exchange an APC

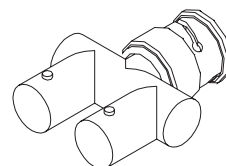
Important

Follow carefully the procedure. You **MUST** remove the cables before removing the APC module.

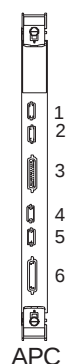
- 1
 - Locate the APC module using “2220 Rear View” on page 6-13.
 - At the rear of the machine loosen the two screws **A** that secure the cover and remove the cover.



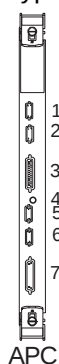
- 2
 - Loosen the screws that secure the APC cables.
 - Note:** To unscrew the screws of connectors in position, 3 and 5 (if Model 501 is connected) on an APC module type B, first disconnect the two coax cables from the T-connector in position 4.
 - Unplug the APC cables.
 - Unplug the T-connector (if present on the APC module type B).



T-Connector installed on APC type B

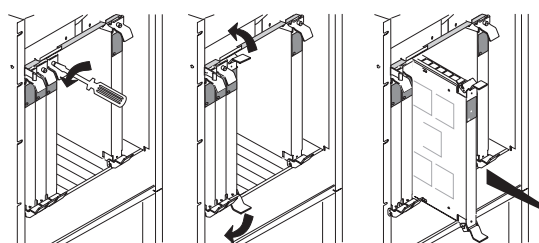


APC Type A

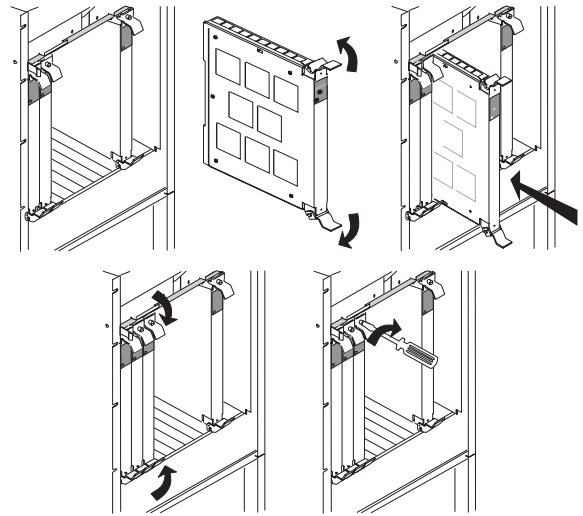


APC Type B

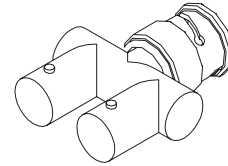
- 3
 - Loosen the screws on the latches.
 - Unlock the latches as shown, then remove the module from its location.



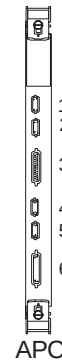
- 4
- Exchange the APC module.
 - Insert the new APC module into the machine:
 - Position the latches, then slide the module into its location.
 - Secure the module by locking the latches, then tighten the screws on the latches.



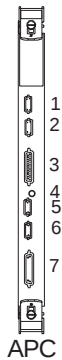
- 5
- Plug the T-connector onto the new APC module in position 4 (if you have changed an APC module type B with a T-connector).
 - Replug the removed APC cables, then tighten the screws.
- Note:** If you have a T-connector installed on your APC module, first install the cables in position, 3 and 5, before connecting the coax cable onto the T-connector in position 4.
- Check that the green LED **APC** (on the control panel) is ON after completion of the Power ON Self Test (POST). If not, check the APC plugging and if the problem persists call the Network Support Center. Otherwise, continue with the next step.



T-Connector installed on APC type B

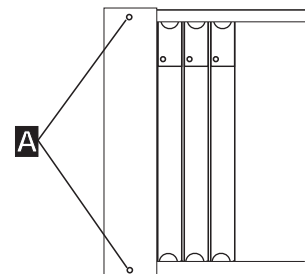


APC Type A



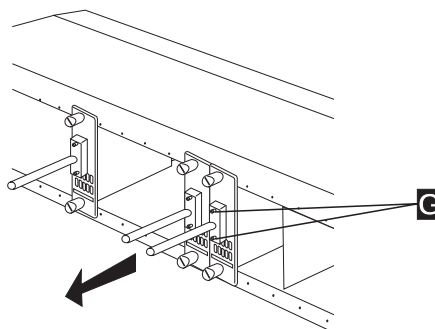
APC Type B

- 6
- Install and secure the cover using the screws **A**.
 - Go to "Ending the Exchange Procedure" on page 6-70

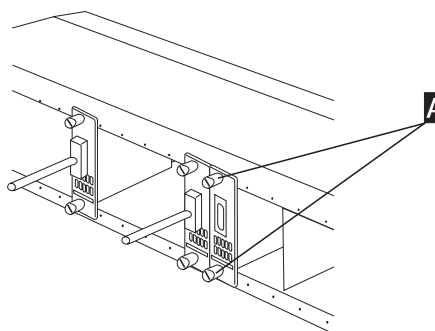


Exchange an ARC

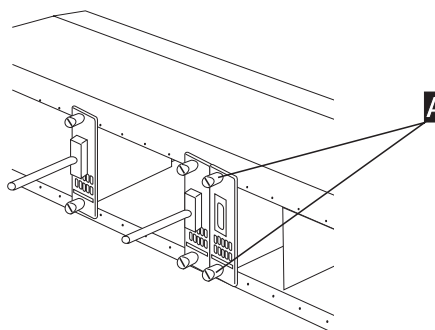
- 1
 - Locate the line connection box (LCB) where the ARC is installed.
 - Locate the ARC that you have to exchange.
 - Loosen the two screws **G** that secure the ARC cable to the ARC.
 - Unplug the ARC cable from the ARC.



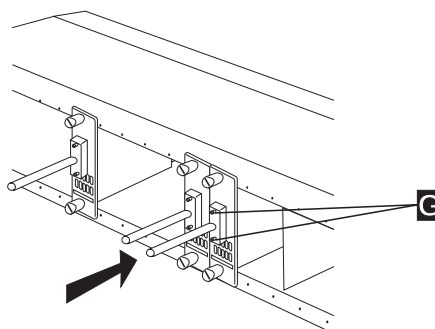
- 2
 - Loosen the two knobs **A** that secure the ARC into the LCB.
 - Remove the ARC from the LCB.



- 3
 - Exchange the ARC.
 - Insert the new ARC into the LCB, and secure the ARC with the two knobs **A**.



- 4
 - Plug the ARC cable into the ARC. Secure the cable using the screws **G**.
 - Go to "Ending the Exchange Procedure" on page 6-70



Exchange a Battery

Important

The battery exchange procedure is documented with the illustrations of ACDC type B, but the procedure is identical for ACDC types A and B.

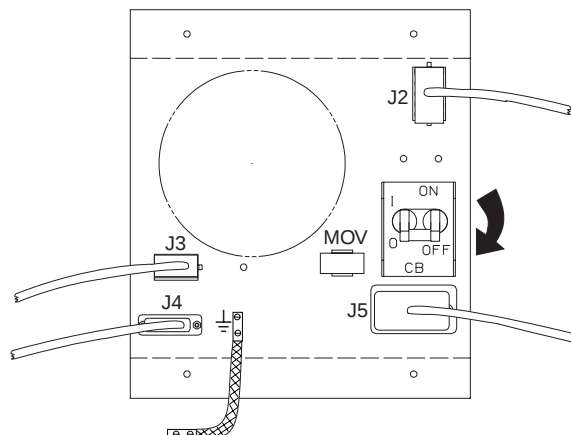
The differences between ACDC types A and B are shown in “Identify the ACDC Power Type” on page 6-14.

1

Warning

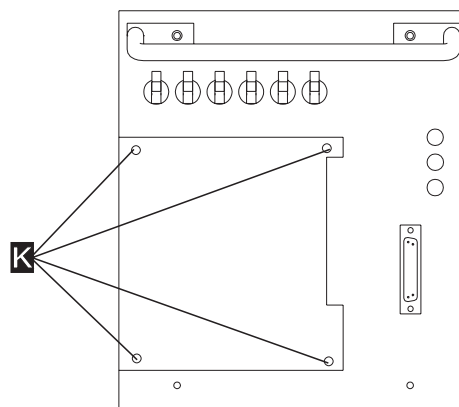
Before working on a battery read carefully the safety statements. Go to “General and Product Safety” on page xvii to select safety statements in your language.

- Locate the ACDC on which you want to exchange the battery using “2220 Front View” on page 6-12.
- At the rear of the machine, on the ACDC selected, switch the main CB OFF.



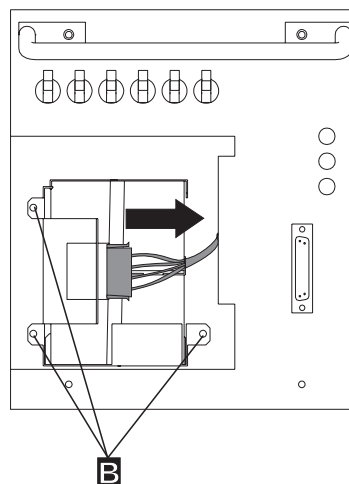
2

- At the front of the machine, remove the four screws **K** and the grid.



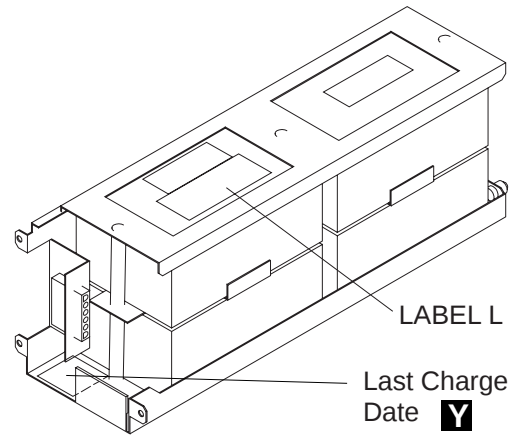
3

- Disconnect the cable from the battery.
- Remove the three screws **B** that secure the battery to the ACDC.
- Using the handle, slide the battery out of the ACDC.



4

- Before installing the battery, check the last charge date **Y**. If this date is older than 6 months, order a new battery, otherwise continue the procedure to install the battery.
- On the new battery, glue one of the label provided according to your country requirement.



LABEL L

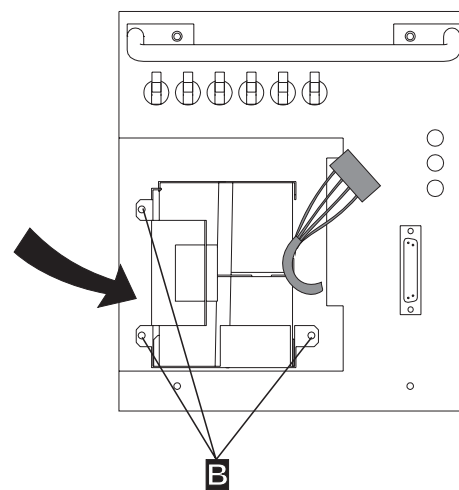


OR

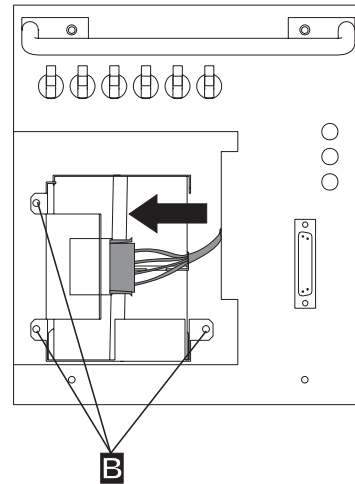


5

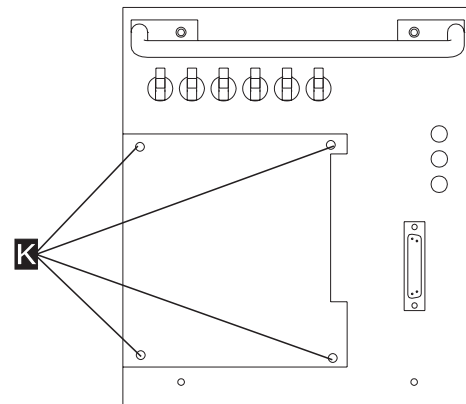
- Exchange the battery.
- Slide the battery into the ACDC.



- 6
- Secure the battery with the three screws previously removed **B**.
 - Connect the cable to the battery.

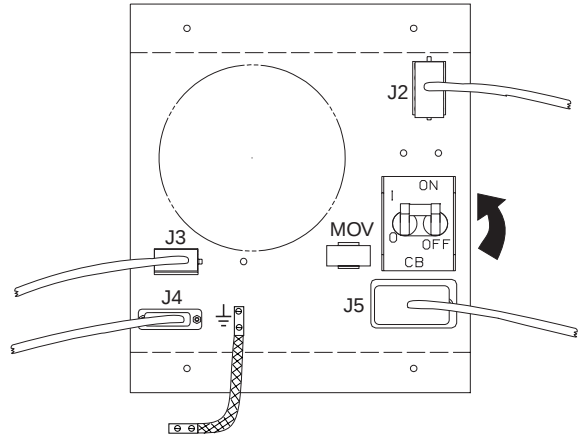


- 7
- Reinstall and secure the grid using the four screws **K**.



8

- On the ACDC, switch the main CB ON.
- Check on the ACDC that:
 1. The green LEDs **AC GOOD** and **DC/HDW GOOD** are ON.
 2. The yellow LED **BATTERY EXCHANGE REQUIRED** can be On or OFF.
- Check that the corresponding green LED on the control panel is ON. If not, check the ACDC and battery installation. If the problem persists call the Network Support Center. Otherwise continue with the next step.
- Perform the power test, refer to “How to Test an ACDC Power and Battery” on page 4-25. This test must reset the yellow LED **BATTERY EXCHANGE REQUIRED** to OFF if after ACDC exchanging, this LED was ON.
- If the yellow LED **BATTERY EXCHANGE REQUIRED** do not turn OFF call the Network Support Center. Otherwise continue with the procedure.
- Go to “Ending the Exchange Procedure” on page 6-70.



Exchange a Board

Important

The board exchange procedure is documented with the illustrations of ACDC type B, DC48 type B, but the procedure is identical for ACDC types A and B and for DC48 types A and B.

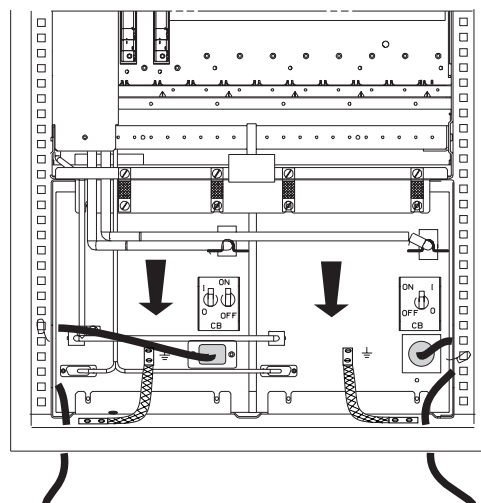
The differences between types A and B are shown in the following sections:

- “Identify the ACDC Power Type” on page 6-14.
- “Identify the DC48 Power Type” on page 6-15.

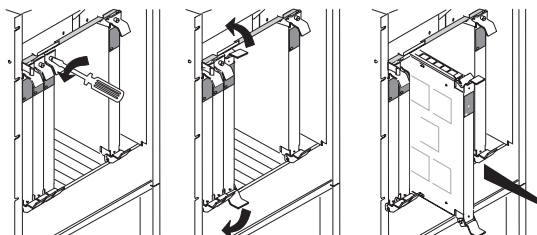
Important

For exchanging a board you need the complete machine. Prior starting this procedure contact the network operator and inform him (her) of your action and wait for his (her) agreement.

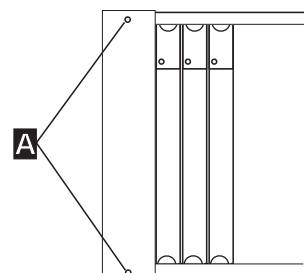
- 1
 - Locate the areas of the machine using “2220 Rear View” on page 6-13.
 - At the rear of the machine, switch the main CBs OFF on both ACDC and DC48 power supplies.



- 2
 - On the front of the machine, **record carefully** on each front module its position in the machine.
 - Remove all the modules:
 - For each module, loosen the screws on the latches.
 - Unlock the latches as shown, then remove the module from its location.



- 3
 - At the rear of the machine, loosen the screws **A** that secure the cover and remove the cover.



4

- **Record carefully:**

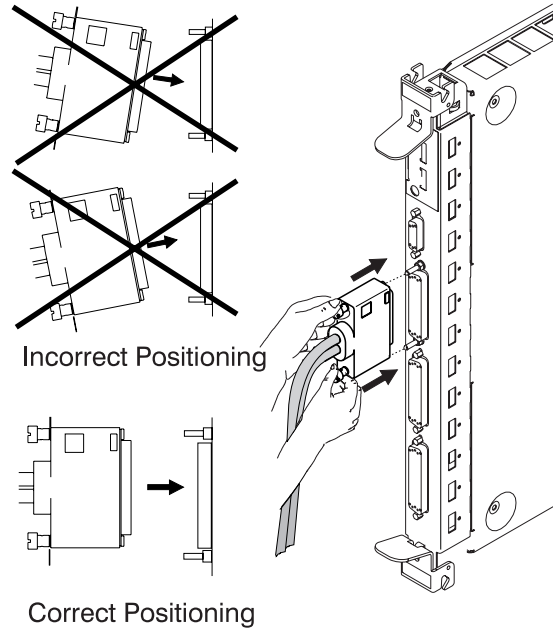
- The position of each module installed at the rear of the machine.
- The cable positions and check labels for easy reinstallation.

- Removing cables.

Important

Cable connectors can be damaged when removing cables on **switch** or **switch redrive** module. Maintain the cables firmly while removing the cables from the connectors to avoid any effort which can damage the connectors.

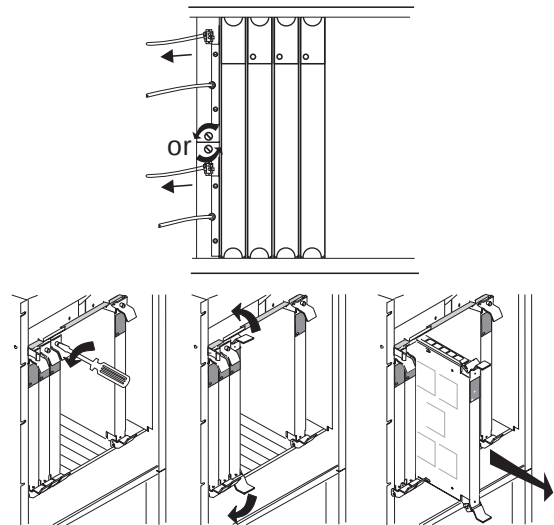
- Loosen the screws that secure the cables progressively and alternatively on top and bottom.
- Remove the cables.



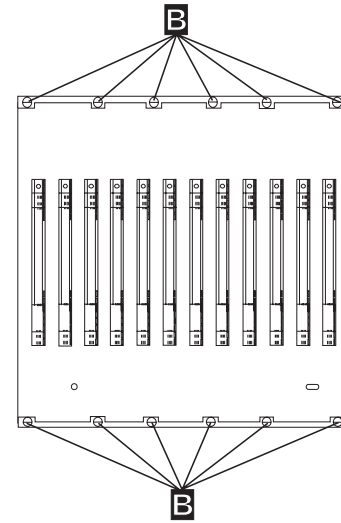
5

- Remove all modules:

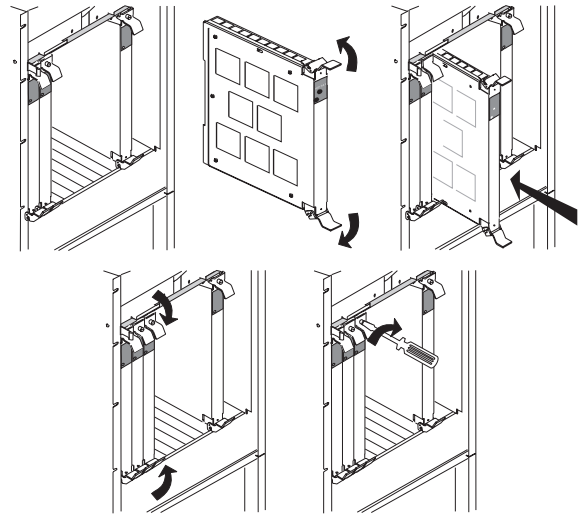
- For a DCDx module, unscrew the knobs and pull them out of the machine.
- For each other module, loosen the screws on the latches.
- Unlock the latches as shown, then remove the module from its location.



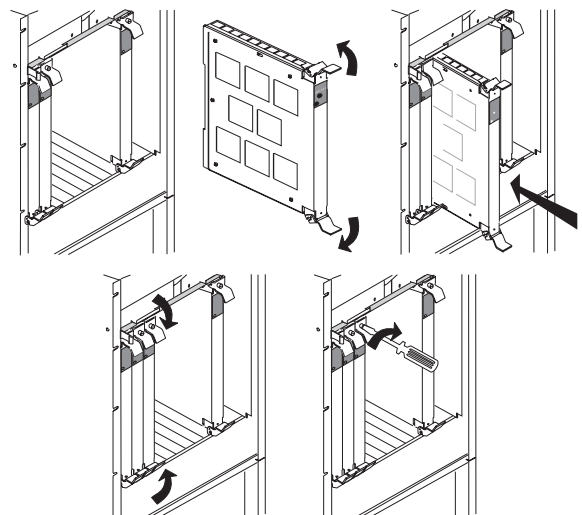
- 6
- At the front of the machine, unscrew the 12 screws **B** and remove the board.
 - Exchange the board.
 - Insert the new board in the machine and secure it using the 12 screws previously removed **B**.



- 7
- At the front of the machine, reinstall and lock in, all modules at their original position.
 - Position the latches, then slide the module into its location.
 - Secure the module by locking the latches, then tighten the screws on the latches.



- 8
- At the rear of the machine, reinstall and lock in all modules at their original position.
 - Position the latches, then slide the module into its location.
 - Secure the module by locking the latches, then tighten the screws on the latches.

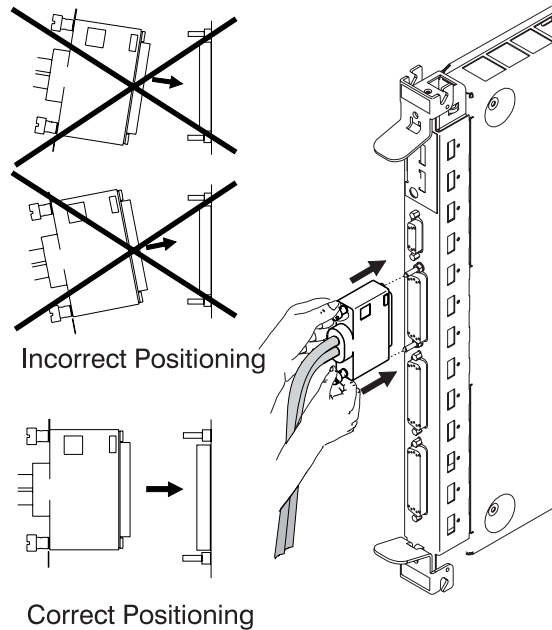


- 9
- Reinstall all cables previously removed (using your note for location).

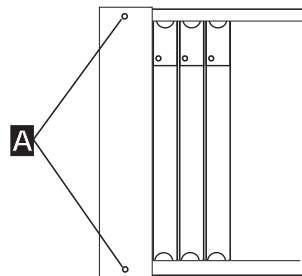
Important

Cable connectors can be damaged when installing cables on **switch** or **switch redrive** module. Maintain the cables firmly while installing the cables from the connectors to avoid any effort which can damage the connectors.

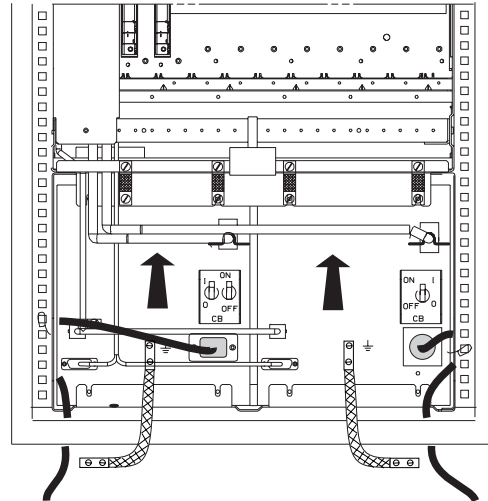
- Carefully connect the cables.
- Tighten the connector screws (tighten them progressively and alternatively on top and bottom).



- 10
- Install and secure the cover using the screws **A**.



- 11
- Switch the main CBs ON on both ACDC and DC48 power supplies.
 - On the control panel switch the **ON/STANDBY** switch to the ON position.
 - Check that during the Power ON Self Test (POST), the green **APC** LED blinks, then comes permanently ON at the end of the POST.
 - Check that:
 - The **ALARM** LED is OFF
 - The **FAN BOX 1** and **2** LEDs are OFF.
 - The **POWER SUPPLY 1** and **2** LEDs are ON (if you have two power supplies installed).
 - If there is a problem, check the board installation, then the module installation. If the problem persists call the Network Support Center. Otherwise continue with the next bullet.
 - Go to “Ending the Exchange Procedure” on page 6-70.



MAP: Prerequisite to Exchange a Clock

Before exchanging a **Clock** module you **MUST** perform the following Steps.

001

Locate the Clock module that you have to exchange, using Figure 6-10 and note carefully its slot position.

If you have:

Only **one** clock module installed you are in **simplex** clock mode.

Two clock modules installed you are in **duplex** clock mode.

						Control Panel					
Fan Box 2						Fan Box 1					
								CLK RD 1 or 2		CLK RD 1 or 2	
1	2	3	4	5	6	7	8	9	10	11	12
Power Input 2						Power Input 1					

Figure 6-10. 2220Front View

In the following table select your clock mode.

Clock Mode	Action
Simplex	Go to Step 002.
Duplex	Go to Step 003 on page 6-36

002

- You are exchanging a **Clock** module and there is NO other **Clock** module in the 2220-500
 1. You should be logged ON to the Nways Switch administration station. If not, go to “How to Start on the Local 2220” on page 3-1, and return here.
 2. If the **Clock** icon is displayed on your screen go to Step . Otherwise continue with Step **2a** on **page 6-35** .

(Step **002** continues)

002 (continued)

- a. In the **Nways Switch Services** window, double click on the **Nways Switch Resource Control (Local)** icon (using the left or bottom mouse button).
- b. In the **Nways Switch Resource Control** window, click on **View, Expanded Tree View** option.
3. Locate the **Clock** icon, then double click on it (using the left or bottom mouse button).
4. The **CMIP Status** window is displayed.

Is **Providing Services** status highlighted?

- Yes** Continue with the Step **5** .
No Continue with the Step **10** .

5. Click on **Close**
6. On the simplex machine the voice or continuous bit rate (CBR) traffic will be degraded. Prior continuing this procedure contact the network operator and inform him (her) of your action and wait for his (her) agreement.
7. If an external clock device is connected, set the external clock device to the appropriate status (device dependent).
8. On the **Clock** icon, click on the left or bottom mouse button then on the right or top mouse button. A popup menu is displayed.
9. Click on the **Deactivate** option, and wait for "deactivation complete" message, then continue with Step **10** . If the "deactivation complete" message does not appear continue with Step **10**
10. Go to "Exchange a Clock" on page 6-38, to replace the **Clock** module, then return here to continue the procedure with Step **11** .
11. Wait until the **Clock** icon comes green (up to seven minutes).
12. Double click on the **Clock** icon (using the left or bottom mouse button).
13. The **CMIP Status** window is displayed.

Is **Providing Services** status highlighted?

- Yes** Continue with the Step **14**.
No You have a problem. Call the Network Support Center to inform them and follow their instruction. The Appendix B, "Maintenance Aids" on page B-1 can help you to describe your symptom to the Network Support Center.

14. If an external clock device is connected, set the external clock device to the appropriate status (device-dependent).
15. Inform the network operator, ask him to check on Netview that the synchronization is complete (synchronization can take up to 15 minutes and possibly some time for software upgrade).
16. Go to "Ending the Exchange Procedure" on page 6-70.

.

003

- You are exchanging ONE **Clock** module and there are TWO **Clock** modules installed on the 2220-500.
 1. You should be logged ON to the Nways Switch administration station. if not go to “How to Start on the Local 2220” on page 3-1. Then return here.
 2. If clock icons are displayed on your screen go to Step 3 . Otherwise continue with Step 2a .
 - a. In the **Nways Switch Services** window, double click on the **Nways Switch Resource Control (Local)** icon using the left or bottom mouse button.
 - b. In the **Nways Switch Resource Control** window, click on **View, Expanded Tree View** option.
 3. Check the status of the **Clock** module that you are **NOT** exchanging.
 - a. Locate the **Clock** icon, then double click on it.
 - b. The **CMIP Status** window is displayed.

Is **Providing Services** status highlighted?

Yes	Continue with the Step 8 .
No	Continue with the Step 4 .
 4. On the **Clock** icon, click on the left or bottom mouse button, then on the right or top mouse button. A popup menu is displayed.
 5. Click on the **Switchover** option.
 6. A warning message is displayed informing you that you may disturb part of your traffic. Click on **Yes**.
 7. Wait for the "Action force Switchover is complete" message, click on **OK**, then continue with Step 8 . If the message does not appear in less than one minute, there is another problem with the **Clock**. call the Network Support Center to inform them, and follow their instructions.
 8. Locate the icon of the **Clock** that you want to exchange. On the **Clock** icon, click on the left or bottom mouse button then on the right or top mouse button. A popup menu is displayed.
 9. Click on the **Deactivate** option, and wait for "deactivation complete" message, then continue with Step 10 . If the "deactivation complete" message does not appear in less than one minute, continue with Step 10
 10. If an external clock device is connected, set the external clock device to the appropriate status (device dependent).
 11. Go to “Exchange a Clock” on page 6-38, to replace the **Clock** module, then return here to continue the procedure with Step 12 .
 12. Wait until the **Clock** icon comes green (up to seven minutes).
 13. Return to the Nways Switch administration station and check that **Clock** that you have exchanged is now **Active** and **Hot Standby**.
 - a. Locate the **Clock** icon that you have changed, then double click on it using the left or bottom mouse button.
 - b. The **CMIP Status** window is displayed.

Are **Active** and **Hot Standby** status highlighted?

Yes	Continue with the Step 15 on page 6-37 .
No	Continue with the Step 14 on page 6-37 .

(Step 003 continues)

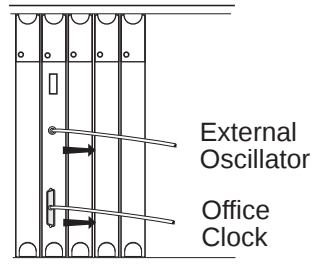
003 (continued)

14. You have a problem. Call the Network Support Center to inform them, and follow their instruction.
 15. If an external clock device is connected, set the external clock device to the appropriate status (device dependent).
 16. Check on the front of the **Clock** module that you have exchanged the status of the display. The display should be in , , or  state in less than 15 minutes. Refer to Appendix B, "Maintenance Aids" on page B-1 for all other configuration.
 17. Go to "Ending the Exchange Procedure" on page 6-70.
-

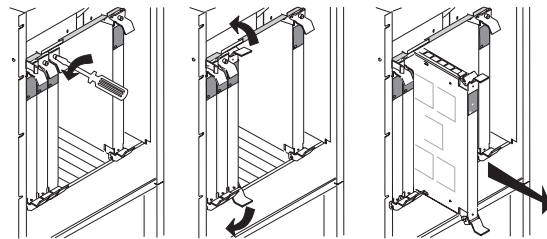
Exchange a Clock

You **MUST** have performed the “MAP: Prerequisite to Exchange a Clock” on page 6-34 before continuing through the following Steps.

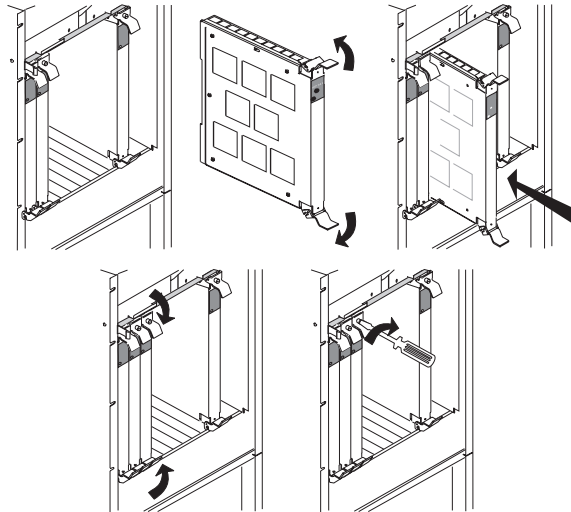
- 1
- If present, disconnect the office clock and the external oscillator cables from the Clock module.



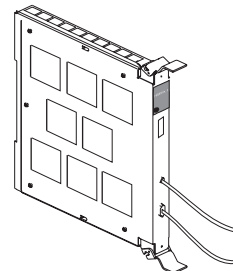
- 2
- Loosen the screws on the latches.
 - Unlock the latches as shown, then remove the module from its location.



- 3
- Insert the new clock module in the machine.
 - Position the latches, then slide the module into its location.
 - Secure the module by locking the latches, then tighten the screws on the latches.

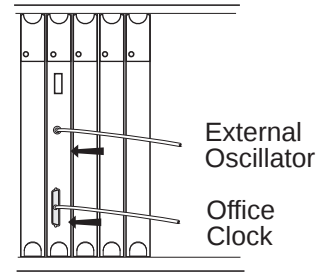


- 4
- If present, plug the office clock and the external oscillator cables into the new clock module.



- 5
- Check that the green LED of the clock module comes ON. If not, check the clock module installation. If the problem persists call the Network Support Center. Otherwise continue with the next bullet.
 - Return to the point in the prerequisite procedure where you came from.

Note: The Appendix B, "Maintenance Aids" on page B-1 can help you to describe your symptom to the Network Support Center in case of problem.



MAP: Prerequisites for Exchanging a Clock Redrive

Before exchanging a **clock redrive** module you **MUST** perform the following Steps.

001

1. Locate the clock redrive module that you have to exchange, using Figure 6-11
2. If you have:
 - Only **one** clock redrive module installed you are in **simplex** clock mode.
 - **Two** clock redrive modules installed you are in **duplex** clock mode.

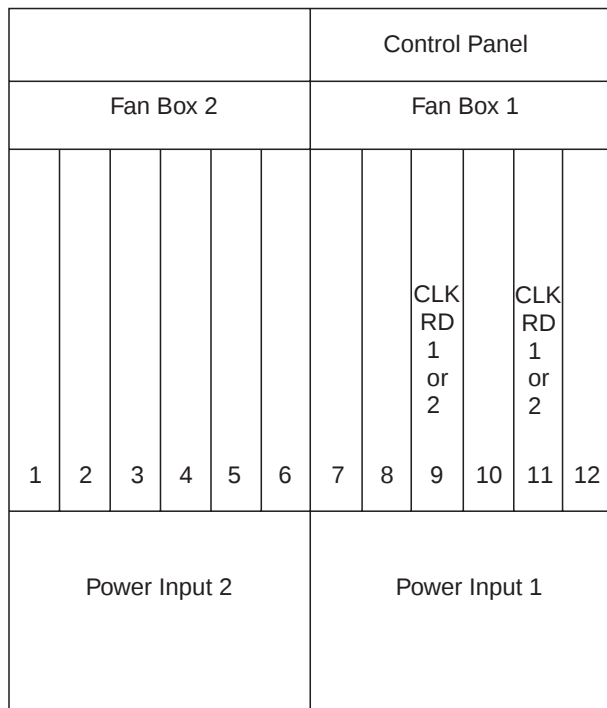


Figure 6-11. 2220 Front View

3. In the following table, select your clock mode.

Clock Mode	Action
Simplex	Go to Step 002 on page 6-41.
Duplex	Go to Step 003 on page 6-43.

- You are exchanging a **Clock redrive** and there is NO other **Clock redrive** module in the 2220-501.
 1. You should be logged ON to the Nways Switch administration station. if not go to “How to Start on the Local 2220” on page 3-1. Then return here.
 2. If clock icons are displayed on your screen go to Step 3 . Otherwise continue with Step 2a .
 - a. In the **Nways Switch Services** window, double click on the **Nways Switch Resource Control (Local)** icon using the left or bottom mouse button.
 - b. In the **Nways Switch Resource Control** window, click on **View, Expanded Tree View** option.
 3. Check the status of **Clock** associated with the **Clock redrive** that you intend to exchange.
 - a. Locate the **Clock** icon, then double click on it using the left or bottom mouse button.
 - b. The **CMIP Status** window is displayed.

Is **Providing Services** status highlighted?

Yes Continue with the Step 4 .

No You have another problem with the **Clock**. Call the Network Support Center to inform them, and follow their instruction.
 4. On the **Clock** icon, click on the left or bottom mouse button then on the right or top mouse button. A popup menu is displayed.
 5. Click on the **Deactivate** option, and wait for "deactivation complete" message, then continue with the Step 6 . If the "deactivation complete" message does not appears in less than one minute, continue with the Step 6 .
 6. Go to “Exchange a Clock Redrive” on page 6-45, to replace the **Clock redrive** module, then return here to continue the procedure with Step 7 .
 7. Return to the Nways Switch administration station and on the **Clock** icon, click on the left or bottom mouse button then on the right or top mouse button. A popup menu is displayed.
 8. Click on the **Activate** option, and wait for "activation complete" message, then continue with the next Step.
 9. Check that **Clock** is now **Active** and **Providing Services**.
 - a. Locate the **Clock** icon, then double click on it.
 - b. The **CMIP Status** window is displayed.

Is **Providing Services** status highlighted?

Yes Continue with the Step 10 .

No You have a problem. Call the Network Support Center to inform them, and follow their instruction.
 10. Check that **Clock redrive** is now **Active** and **Providing Services**.
 - a. Locate the **Clock redrive** icon, then double click on it.
 - b. The **CMIP Status** window is displayed.

Is **Providing Services** status highlighted?

Yes Continue with the Step 11 on page 6-42 .

No You have a problem. Call the Network Support Center to inform them, and follow their instruction.

(Step 002 continues)

MAP (continued)

002 (continued)

11. Inform the network operator, ask him to check on Netview that the synchronization is complete (synchronization can take up to 15 minutes).
 12. Go to "Ending the Exchange Procedure" on page 6-70.
-

- You are exchanging a **Clock redrive** module and there are TWO **Clock redrive** modules installed on the 2220-501.
 1. You should be logged ON to the Nways Switch administration station. if not go to “How to Start on the Local 2220” on page 3-1. Then return here.
 2. If clock icons are displayed on your screen go to Step 3 . Otherwise continue with Step 2a .
 - a. In the **Nways Switch Services** window, double click on the **Nways Switch Resource Control (Local)** icon using the left or bottom mouse button.
 - b. In the **Nways Switch Resource Control** window, click on **View, Expanded Tree View** option.
 3. Check the status of **Clock** associated with the **Clock redrive** that you are **NOT** exchanging.
 - a. Locate the **Clock** icon, then double click on it (using the left or bottom mouse button).
 - b. The **CMIP Status** window is displayed.

Is **Providing Services** status highlighted?

Yes Continue with the Step 4 .

No You have another problem with the **Clock**. Call the Network Support Center to inform them, and follow their instruction.
 4. Locate the icon of the **Clock** associated with the **Clock redrive** that you want exchange. On the **Clock** icon, click on the left or bottom mouse button, then on the right or top mouse button. A popup menu is displayed.
 5. Click on the **Deactivate** option, and wait for the "deactivation complete" message, then continue with the Step 6 . If the "deactivation complete" message does not appear in less than one minute, continue with the Step 6 .
 6. Go to “Exchange a Clock Redrive” on page 6-45, to replace the **Clock redrive** module, then return here to continue the procedure with Step 7.
 7. Return to the Nways Switch administration station and on the **Clock** icon, associated with the **Clock redrive** that you have exchanged, click on the left or bottom mouse button then on the right or top mouse button. A popup menu is displayed.
 8. Click on the **Activate** option, and wait for "activation complete" message, then continue with the next Step.
 9. Check that the **Clock** associated with the **Clock redrive** that you have exchanged, is now **Active** and **Hot Standby**.
 - a. Locate the **Clock** icon, then double click on it using the left or bottom mouse button.
 - b. The **CMIP Status** window is displayed.

Are **Active** and **Hot Standby** status highlighted?

Yes Continue with the Step 11 on page 6-44 .

No You have a problem. Call the Network Support Center to inform them, and follow their instruction.
 10. Check that the **Clock redrive** that you have exchanged, is now **Active** and **Hot Standby**.
 - a. Locate the **Clock redrive** icon, then double click on it using the left or bottom mouse button.
 - b. The **CMIP Status** window is displayed.

Are **Active** and **Hot Standby** status highlighted?

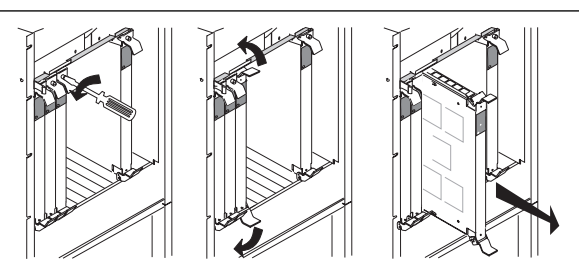
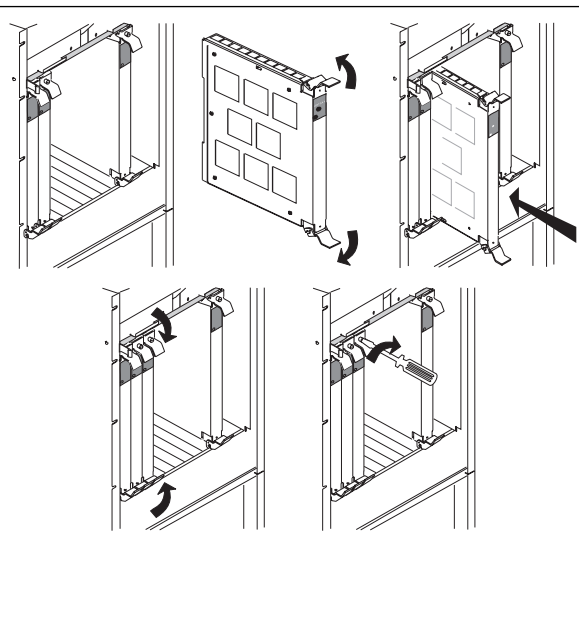
MAP (continued)

Yes	Continue with the Step 11 on page 6-44 .
No	You have a problem. Call the Network Support Center to inform them, and follow their instruction.

11. Go to "Ending the Exchange Procedure" on page 6-70.

Exchange a Clock Redrive

You **MUST** have performed the “MAP: Prerequisites for Exchanging a Clock Redrive” on page 6-40 before continuing through the following Steps.

1	• Loosen the screws on the latches. • Unlock the latches as shown, then remove the module from its location.	
2	• Exchange the clock redrive module. • Insert the new clock redrive module in the machine. – Position the latches, then slide the module into its location. – Secure the module by locking the latches, then tighten the screws on the latches. • Check that the green LED of the clock redrive module comes ON. If not, check the clock redrive module installation. If the problem persists call the Network Support Center. Otherwise continue with the next bullet. • Return to the point in the prerequisite procedure where you came from.	

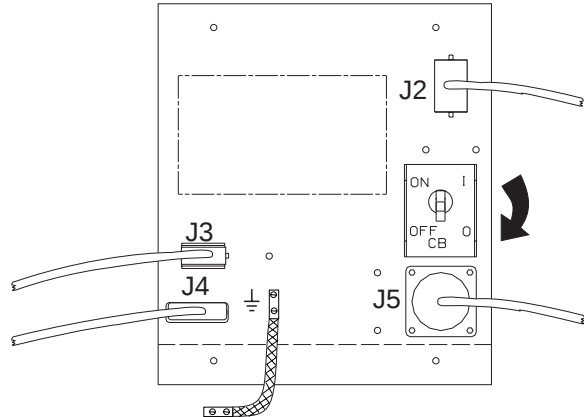
Exchange a DC48 Power Input

Important

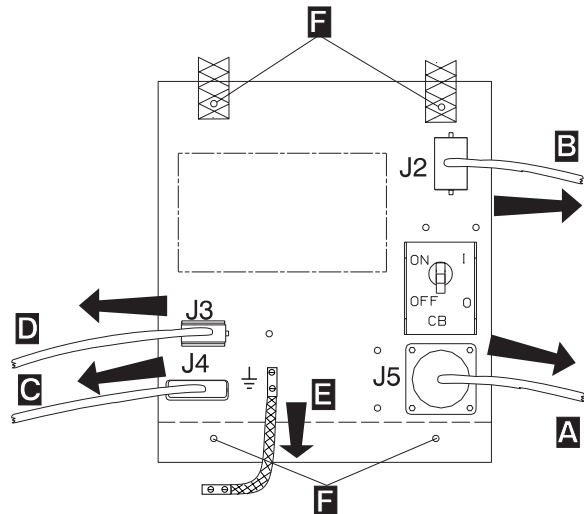
The DC48 exchange procedure is documented with the illustrations DC48 type B, but the procedure is identical for DC48 types A and B.

The differences between DC48 type A and B are shown in "Identify the DC48 Power Type" on page 6-15.

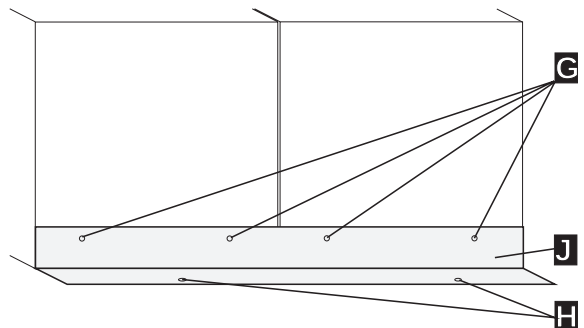
- 1
 - Locate the DC48 that you have to exchange using "2220 Front View" on page 6-12.
 - At the front of the machine, on the DC48 that you want to exchange, switch the main CB OFF.



- 2
 - At the rear of the machine, remove the cables in the following order:
 1. DC cable from DC plug **A**
 2. DC cable from the J2 connector **B**
 3. Signal cable from the J4 connector **C**
 4. Control panel cable from the J3 connector **D**
 - Disconnect the earth strap from the DC48 **E**.
 - Remove the two screws that secure the DC48 **F**.



- 3
 - At the front of the machine, remove the screws **G** that secure the DC48 to the bracket.
 - Remove the screws **H** that secure the bracket and remove the bracket **J**.
 - Pull out the DC48.

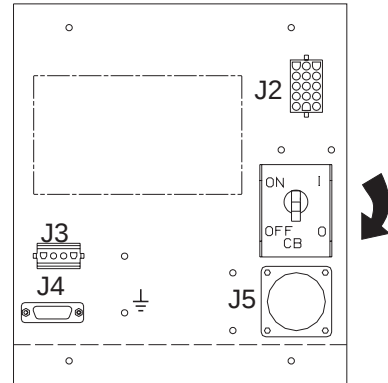


4

Note

Be sure that the new DC48 that you want to install has its CB in the OFF position.

- Exchange the DC48.
- At the front of the machine, insert the new DC48.
- Reinstall the bracket and secure it with the two screws previously removed **H**.
- Secure the DC48 to the bracket with the four screws previously removed **G**.

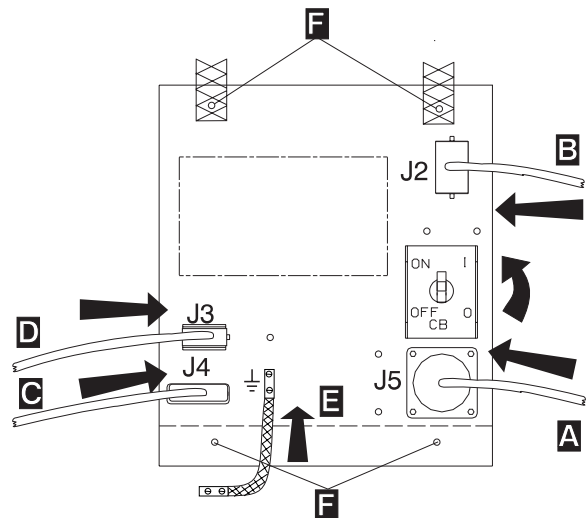


5

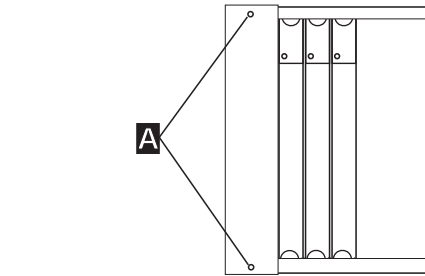
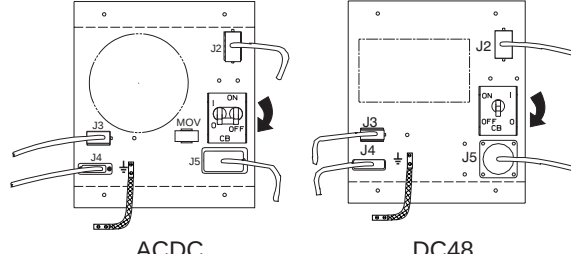
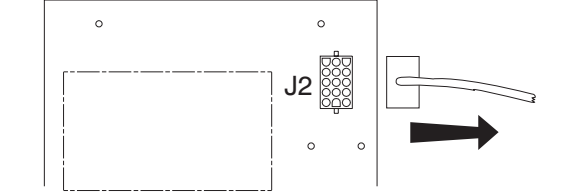
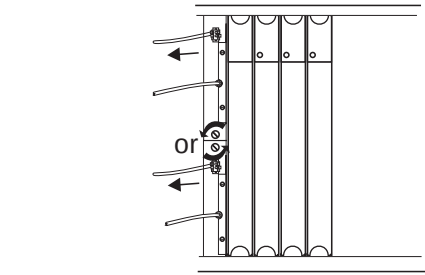
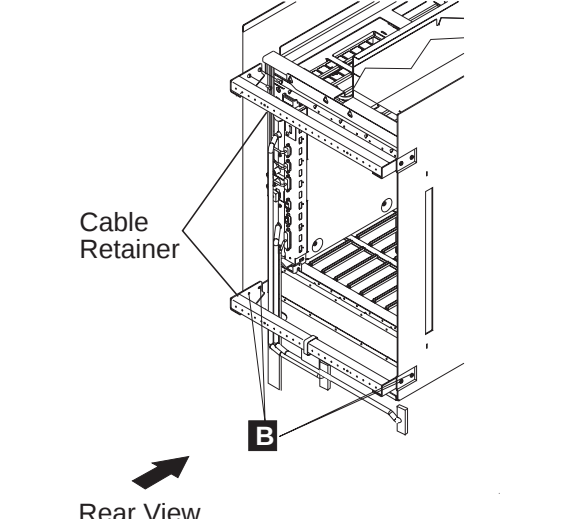
- If you are replacing a DC48 power type A with a DC48 power type B, replace the DCDx provided (refer to “Exchange a DCD1 or DCD2” on page 6-48), then continue with the next step.
- Otherwise continue with the next step.

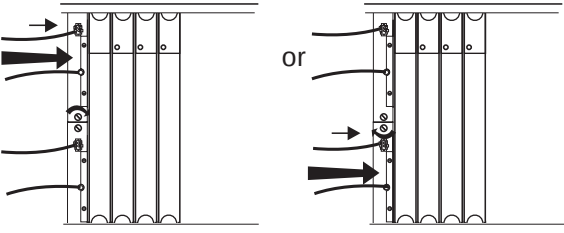
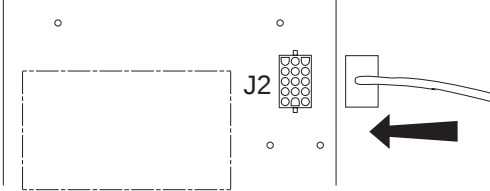
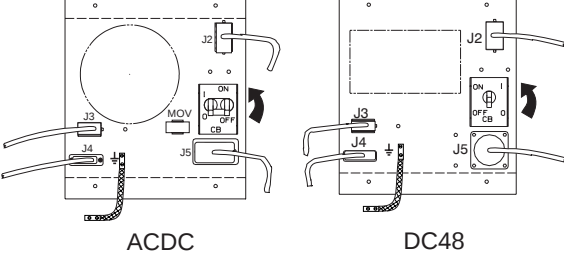
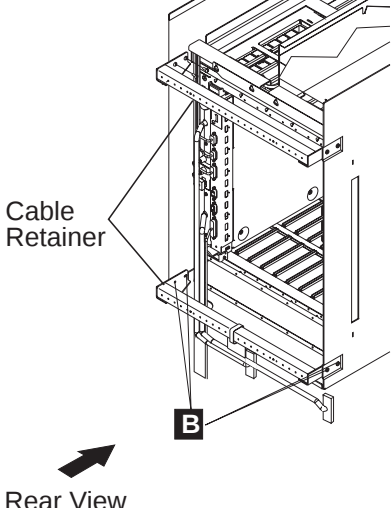
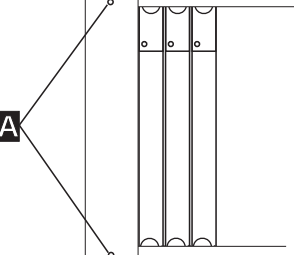
6

- At the rear of the machine, secure the DC48 and connect the earth straps using the four screws previously removed **F**.
- Connect the earth strap to the DC48 **E**.
- Connect the cables previously removed, in the following order:
 1. Control panel cable to the J3 connector **D**
 2. Signal cable to the J4 connector **C**
 3. DC cable to the J2 connector **B**
 4. DC cable to the DC plug **A**
- Switch the main CB ON.
- Check that:
 - The green LED on the DC48 front cover is ON
 - The corresponding green **POWER SUPPLY 1** or **2** LED on the control panel is ON.
- If not check the DC48 installation. If the problem persists call the Network Support Center. Otherwise, continue with the next step.
- Go to “Ending the Exchange Procedure” on page 6-70



Exchange a DCD1 or DCD2

1	- At the rear of the machine, loosen the two screws A that secure the cover, and remove the cover. - Locate the DCDx that you have to exchange, using “2220 Rear View” on page 6-13.	
2	Locate the associated ACDC or DC48 power supply attached to the defective DCDx. Switch the main CB OFF on the associated ACDC or DC48 power supply.	 ACDC DC48
3	Remove the DCDx cable from the associated power supply (Connector J2)	
4	- Remove the cable from the top of the DCDx module that you want exchange. - Unscrew the knob and pull out the DCDx module.	
5	Unscrew the screws B to remove the lower cable retainer in order to be able to take out the DCDx cable.	 Rear View

6	• Exchange the DCDx • Insert the new DCDx and secure it by tightening the knob. • Plug the cable previously removed on the top of the DCDx module.	
7	• Plug the DCDx cable into the associated power supply (J2 connector).	
8	• Switch the main CB ON on the associated ACDC or DC48 power supply.	
9	• Secure the DCDx cable using the lower cable retainer previously removed. • Tighten the screws B to secure the lower cable retainer.	
10	• Reinstall the cover and secure it using the screws previously removed A. • If you changed the DCDx because you also changed an ACDC power type A to type B, or a DC48 power type A to type B, return to the power exchange procedure where you came from. • Otherwise, continue with the next bullet. • Go to “Ending the Exchange Procedure” on page 6-70	

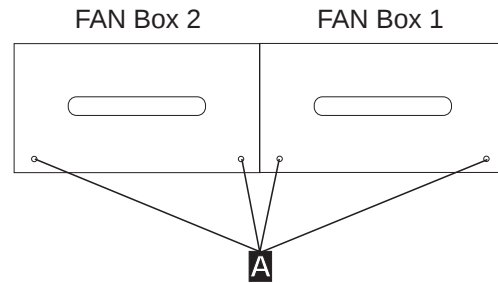
Exchange a Fan Box

Warning

Fan exchange is under timing control. Do not exchange a fan box in less than 30 seconds and no more than two minutes

Do not forget that the fan box contains two fans. If the fan monitor detects a multiple fan error, the 2220 is automatically powered OFF after two minutes.

- 1
 - Locate the fan box using “2220 Front View” on page 6-12.
 - Loosen the two nuts **A** that secure the fan box and remove the fan box.
 - Exchange the fan box.
 - Insert the new fan box into the machine and slide it firmly in until it clicks.
 - Tighten the nuts previously removed.
 - Check that the associated yellow LED is OFF on the control panel.
 - Go to “Ending the Exchange Procedure” on page 6-70

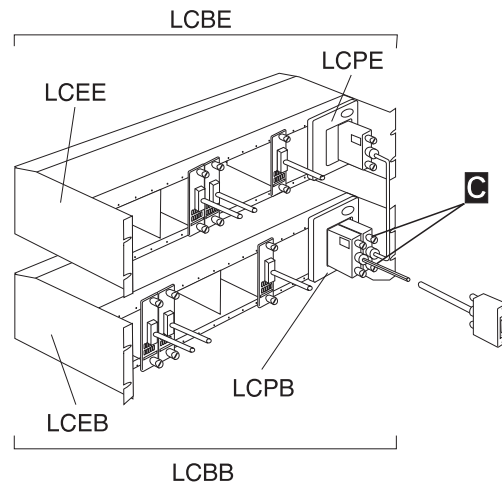


Exchange an LCEE

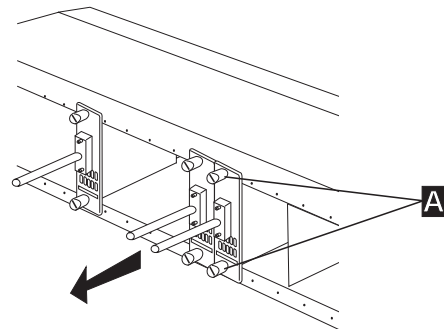
Important

Before continuing deactivate the LCBE. The LCEE and LCPE are hot pluggable when there is no ARCs installed in the LCEE. Follow carefully the procedure.

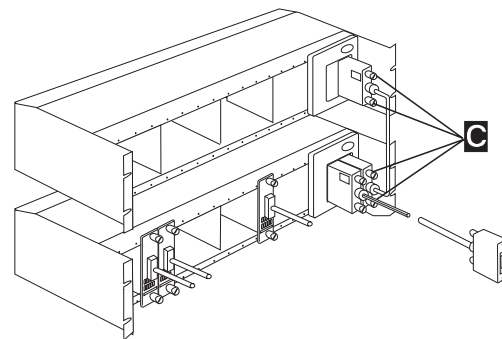
- 1
 - Locate the line connection box expansion (LCBE).



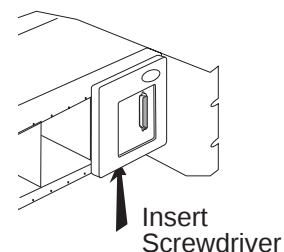
- 2
 - Loosen the screws **A** that secure the ARCs to the LCEE.
 - Remove the ARCs and **note their position in the LCEE**.



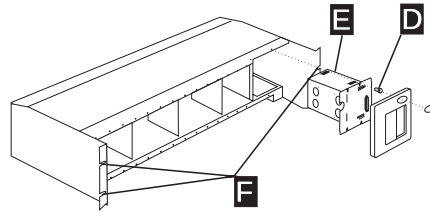
- 3
 - Loosen the screws that secure the cable between the LCBE and the line connection box base (LCBB) **C**.
 - Unplug the cable at the LCPE.



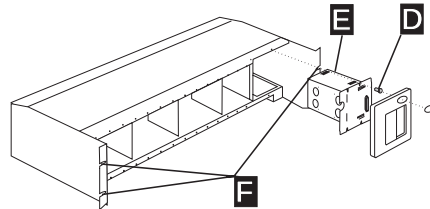
- 4
 - Insert a screwdriver under the panel of the LCPE to remove it.



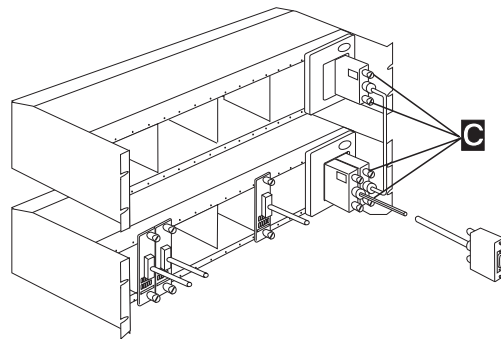
- 5
- Loosen the four screws **D** that secure the line connection power expansion (LCPE) **E** to the line connection enclosure expansion (LCEE).
 - Remove the LCPE from the LCEE.
 - Loosen the four screws that secure the LCEE **F**.
 - Remove the LCEE.



- 6
- Install the new LCEE using the screws previously removed **F**.
 - Install the LCPE previously removed **E**.
 - Secure it using the four screws **D**.
 - Install the cover.

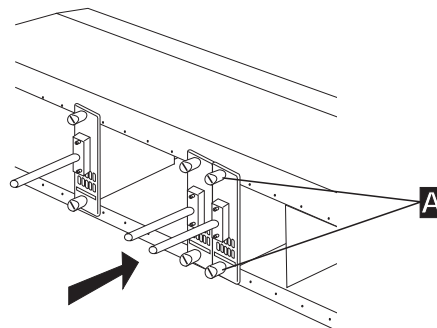


- 7
- Plug the cable to the line connection expansion base and secure it **C**.



- 8
- Reinstall all ARCs in their previous positions and secure them **A**.
 - Go to "Ending the Exchange Procedure" on page 6-70.

Note: If this procedure is not followed, some ARCs may not be correctly IMLed. In such case, the unrecognized ARCs must be unplugged and re-plugged to get started.

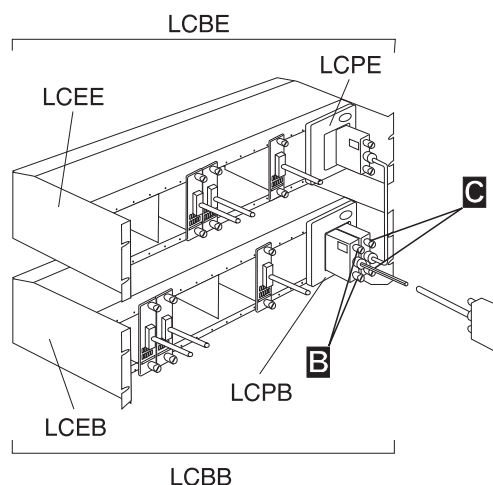


Exchange an LCEB

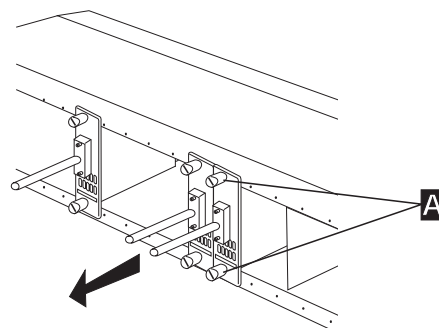
Note

The LCEB and LCPB are hot pluggable when there is no ARCs installed in LCEB and LCEE. Five seconds of delay are required between an unplug and a plug of the cable coming from the LIC511. Follow carefully the procedure.

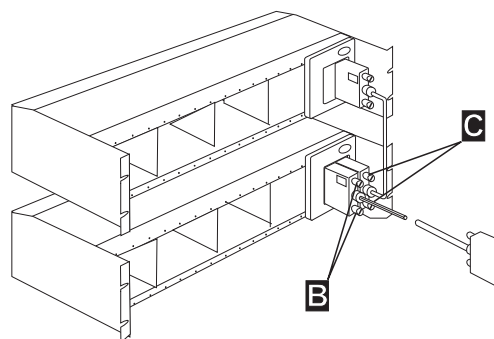
- 1
 - Locate the line connection box base (LCBB).



- 2
 - Loosen the screws **A** that secure the ARCs in LCEB and LCEE (if present).
 - Remove the ARCs and **note their positions in LCEB and LCEE**.



- 3
 - If there is a line connection box expansion:
 - Loosen the screws that secure the cable coming from the line connection box expansion **C**.
 - Unplug the cable at LCPB.
 - Loosen the screws that secure the cable coming from the LIC511. **B**.
 - Unplug the cable at LCPB.

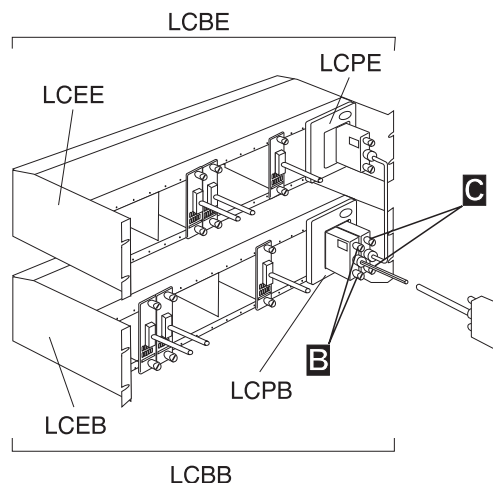


Exchange an LCPB

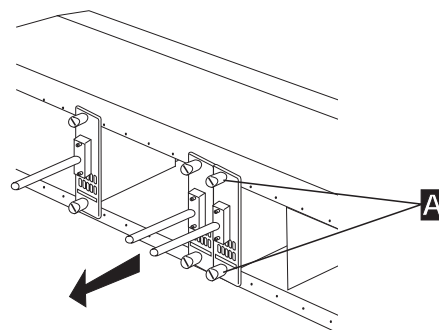
Important

Before continuing, deactivate the LCBE. The LCPB is hot pluggable when there is no ARCs installed in LCEB and LCEE. Five seconds of delay are required between an unplug and a plug of the cable coming from the LIC511. Follow carefully the procedure.

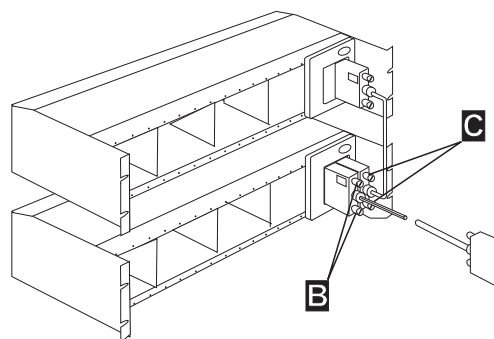
- 1
 - Locate the line connection box base (LCBB).



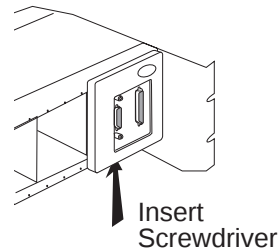
- 2
 - Loosen the screws **A** that secure the ARCs in LCEB and LCEE (if present).
 - Remove the ARCs and **note their positions in LCEB and LCEE**.



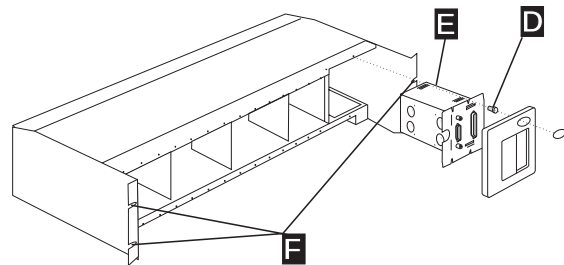
- 3
 - If there is a line connection box expansion (LCBE):
 - Loosen the screws that secure the cable coming from the line connection box expansion **C**.
 - Unplug the cable at LCPB.
 - Loosen the screws that secure the cable coming from the LIC511 **B**.
 - Unplug the cable at LCPB.



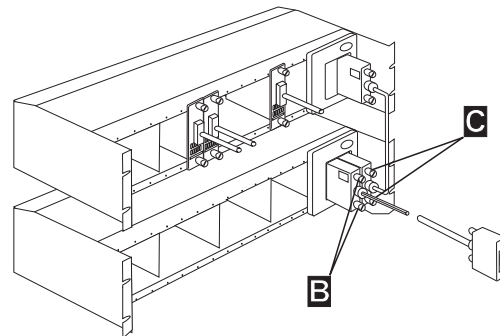
- 4
- Insert a screwdriver under the panel of the LCPB to remove it.



- 5
- Loosen the four screws **D** that secure the LCPB **E** to the line connection enclosure base (LCEB).
 - Remove the LCPB from the LCEB.
 - Insert the new LCPB **E** into the LCEB.
 - Secure it using the four screws previously removed **D**.
 - Install the new cover provided with the LCPB.
 - Stick the new IBM logo on the new cover.

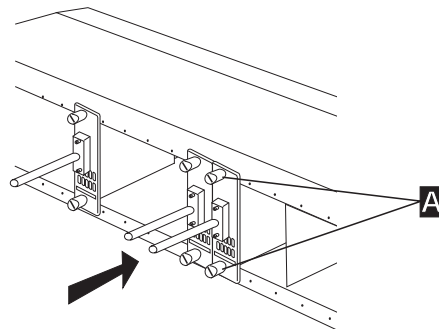


- 6
- Plug in the cable coming from the LIC and secure it **B**.
 - If present, plug in the cable coming from the line connection box expansion and secure it **C**.



- 7
- Reinstall all ARCs in their previous position, and secure them using the screws **A**.
 - Go to "Ending the Exchange Procedure" on page 6-70.

Note: If this procedure is not followed, some ARCs may not be correctly IMLed. In such case, the unrecognized ARCs must be unplugged and re-plugged to get started.



Exchange an LCPE

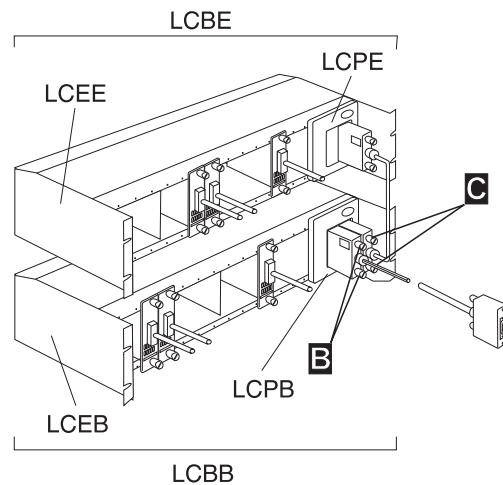
Note

The LCPE is hot pluggable when there is no ARCs installed in the LCEE. Follow carefully the procedure.

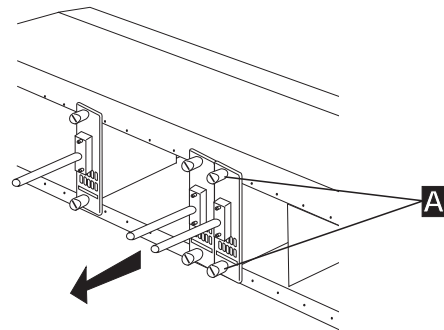
Note

The LCPE is shipped with a new cable. You **must** exchange them both at the same time.

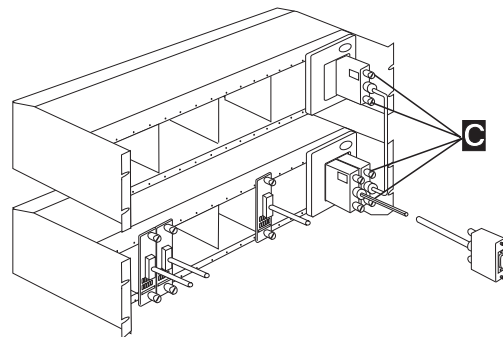
- 1 • Locate the line connection box expansion (LCBE).



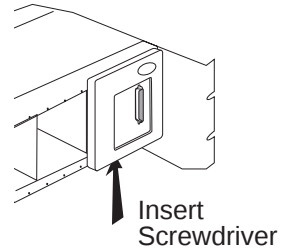
- 2 • Loosen the screws **A** that secure the ARCs to the LCEE.
• Remove the ARCs and **note their position in the LCEE**.



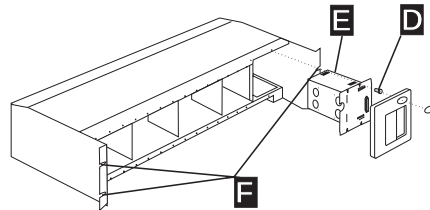
- 3 • Loosen the screws that secure the cable coming from the line connection power expansion (LCPE) to the line connection power base (LCPB) **C**.
• Remove the cable



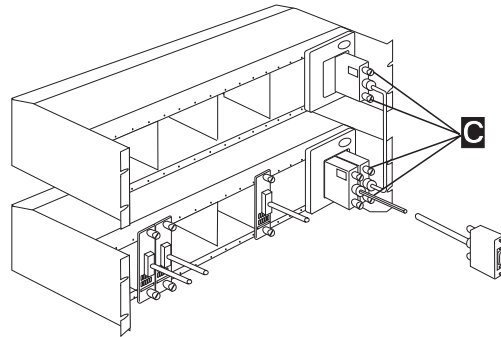
- 4
- Insert a screwdriver under the panel of the LCPE to remove it.



- 5
- Loosen the four screws **D** that secure the LCPE **E** to the line connection enclosure expansion (LCEE).
 - Remove the LCPE from the LCEE.
 - Insert the new LCPE **E** into the LCEE.
 - Secure it using the four screws previously removed **D**.
 - Install the new cover provided with the LCPE.
 - Stick the new IBM logo on the new cover.

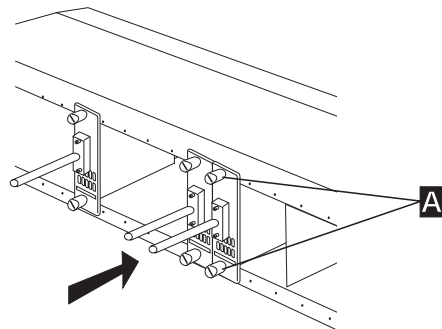


- 6
- Install the new cable between the LCPE and LCPB and secure it using the screws **C**.



- 7
- Reinstall all ARCs in their previous position, and secure them using the screws **A**.
 - Go to “Ending the Exchange Procedure” on page 6-70.

Note: If this procedure is not followed, some ARCs may not be correctly IMLed. In such case, the unrecognized ARCs must be unplugged and re-plugged to get started.



Exchange a LIC

Important

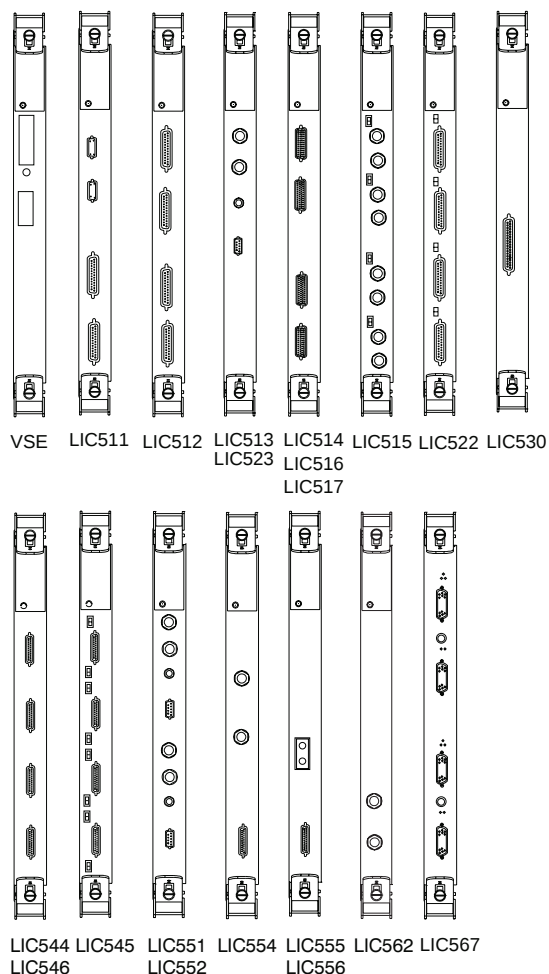
You **MUST** deactivate (force a hardware reset) the corresponding adapter before exchanging a LIC (see “Nways Switch Administration Station Windows Overview” on page 3-5). If deactivation is not possible continue with the following procedure.

Should a LIC be removed inadvertently, the corresponding adapter must be deactivated then reactivated.

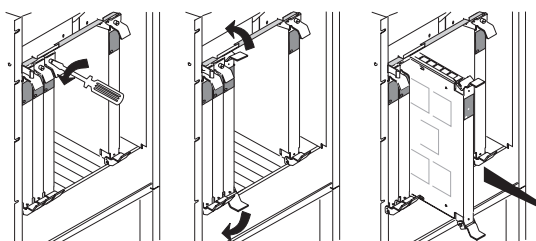
- 1
 - Locate the LIC module using “2220 Rear View” on page 6-13.
 - Using the label on the front of the LIC, check that the LIC installed on the machine and the LIC that you want to exchange are the same type.
 - Loosen the screws (if present) that secure the cable(s).
 - Remove the cable(s).

Caution

When using optical fibre do not stare into beam.



- 2
 - Loosen the screws on the latches.
 - Unlock the latches as shown, then remove the module from its location.



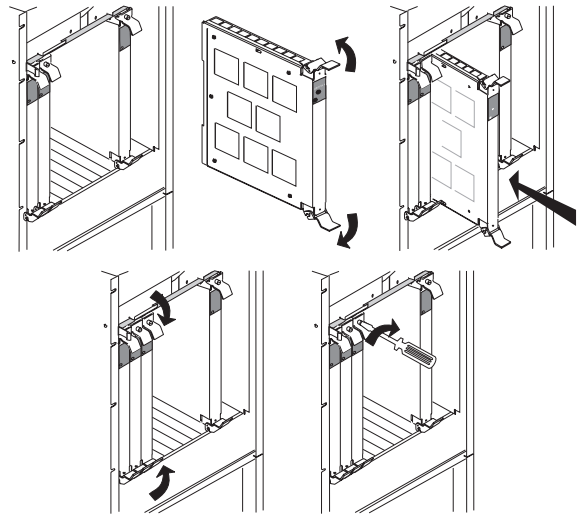
3

- If you exchange a LIC515 or LIC523 check the jumpers position inside the module and install the same configuration on the new module. See the *2220 Nways BroadBand Switch Models 300, 500, and 501 Physical Lines Interface Specifications, External Cable References, GA33-0379*.
- If you exchanged a LIC515 do not forget to set the front switches to the same position as on the removed LIC515.
- Exchange the LIC module.
- Insert the new LIC module into the machine.
 - Position the latches, then slide the module into its location.
 - Secure the module by locking the latches, then tighten the screws on the latches.
- Check that the green LED of the LIC blinks. If not, check the LIC installation. If the problem persists call the Network Support Center. Otherwise, continue with the next bullet.
- Replace the removed cable(s), then tighten the screws (if present).

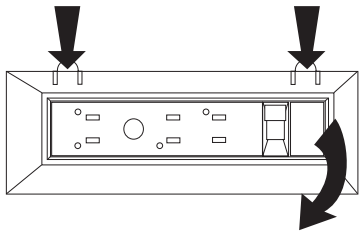
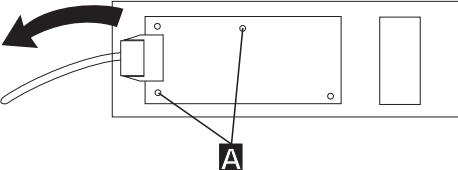
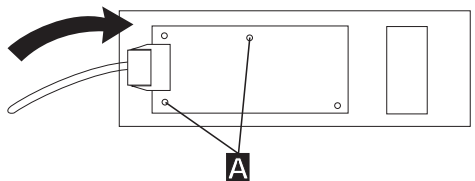
Note

LIC554, LIC555, and LIC556 are shipped with plastic caps which must be removed before installing cables.

- Reactive the corresponding adapter.
- Check that the green LED of the LIC comes ON. If not, call the Network Support Center. Otherwise, continue with the next bullet.
- Go to “Ending the Exchange Procedure” on page 6-70.



Exchange a Control Panel

1	• Locate the control panel. • On the top of the control panel cover press on the two latches and pull out the control panel cover. Warning A 48 V is present on the rear of the power ON/STANDBY switch.	
2	• On the control panel card, unplug the cable. • Unscrew the two screws A that secure the control panel card and remove the card.	
3	1. • Exchange the control panel card. • Install and secure the control panel card using the screws previously removed. • On the control panel card, plug in the cable previously removed. • Check that: . – The green POWER SUPPLY 1 and 2 LEDs are ON. (if you have two power supplies installed). – The green APC LED is ON. – The other yellow LEDs are OFF. • If there is a problem, check the control panel card installation. If the problem persists call the Network Support Center. Otherwise continue with the next bullet. • Go to “Ending the Exchange Procedure” on page 6-70.	1. 

MAP: Prerequisite to Exchange a Switch or Switch Redrive

Before exchanging a **Switch** or **Switch redrive** module you **MUST** perform the following Steps.

001

1. Locate the switch or the switch redrive module that you have to exchange, using Figure 6-12 and note carefully its slot position.

Fan Box 1						Fan Box 2					
			SW or SWR (1)								
		SW or SWR (2)									
	10	9	8	7	6	5	4	3	2	1	
Power Input 1						Power Input 2					

Figure 6-12. 2220 Rear View

2. Check the status of the **green** and **yellow** LEDs on the module that you want to exchange.
3. Use the following table to select your action.

LEDs Status	Action
The both LEDs are ON	• If you have only one switch or one Switch redrive module installed, contact the network operator and inform him (her) of your action and wait for his (her) agreement, then go to "Exchange a Switch or Switch Redrive" on page 6-64. • If you have two switch modules installed, go to Step 002 on page 6-63 to switch back the operation on the other switch.
The yellow LED is OFF	Go to "Exchange a Switch or Switch Redrive" on page 6-64.

- You have two **switch** or **Switch redrive** modules installed on your machine and the module that you want to exchange is **active** and **Providing Services**
 1. You should be logged ON to the Nways Switch administration station. If not, go to “How to Start on the Local 2220” on page 3-1, and return here.
 2. If the **Switch** icon or the **Switch redrive** icon is displayed on your screen go to Step 3 . Otherwise continue with Step 2a .
 - a. In the **Nways Switch Services** window, double click on the **Nways Switch Resource Control (Local)** icon (using the left or bottom mouse button).
 - b. In the **Nways Switch Resource Control** window, click on **View, Expanded Tree View** option.
 3. If you want exchange a **Switch**, locate its icon. If you want exchange a **Switch redrive** locate the associated **Switch**, then double click on it (using the left or bottom mouse button).
 4. The **CMIP Status** window is displayed.

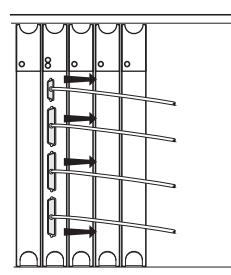
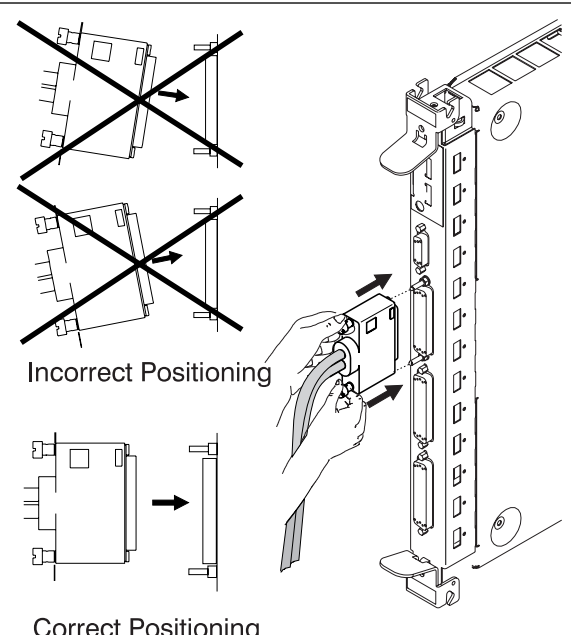
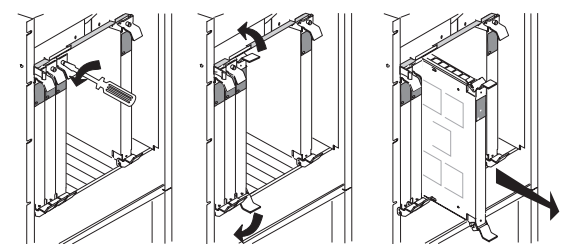
Is **Providing Services** status highlighted?

Yes Click on **Close** Continue with the Step 5 .

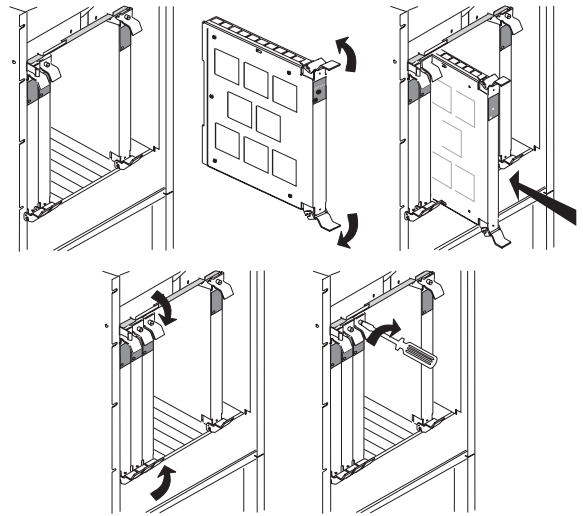
No Click on **Close** Continue with the Step 7 .
 5. Always on the same **Switch** icon, click on the left or bottom mouse button, then on the right or top mouse button. A popup menu is displayed.
 6. Click on the **Switchover** option, and wait for action message saying you that the switchover is complete. Click on the **OK** button, then continue with Step 7 . If the message does not appear in less than one minute, continue with Step 7
 7. Always on the same **Switch** icon, click on the left or bottom mouse button, then on the right or top mouse button. A popup menu is displayed.
 8. Click on the **Set Switchover Options**. On the displayed window, set the **Inhibit** option then click on the **OK** button, then continue with Step 9 .
 9. Go to “Exchange a Switch or Switch Redrive” on page 6-64, to replace the **Switch** or the **Switch redrive** module.
-

Exchange a Switch or Switch Redrive

You **MUST** have performed “MAP: Prerequisite to Exchange a Switch or Switch Redrive” on page 6-62 before continuing through the following Steps.

1	• Locate the switch or switch redrive module using Figure 6-12 on page 6-62 • If you have a rack expansion (2220 Model 501 connected): – Continue with Step 2. – Otherwise go to Step 3.	
2	• Removing cables Important Cable connectors can be damaged when removing cables on switch or switch redrive module. Maintain the cables firmly while removing the cables from the connectors to avoid any effort which can damage the connectors. – Loosen the screws that secure the cables progressively and alternatively on top and bottom. – Remove the cables.	 Incorrect Positioning Correct Positioning
3	• Loosen the screws on the latches. • Unlock the latches as shown, then remove the module from its location.	

- 4
- Exchange the module.
 - Insert the new module into the machine.
 - Position the latches, then slide the module into its location.
 - Secure the module by locking the latches, then tighten the screws on the latches.

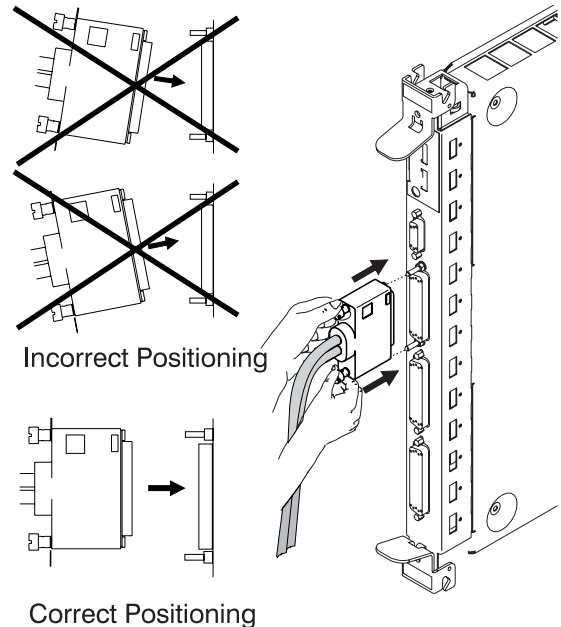


- 5
- Check that the module LED is green after completion of the Power ON Self Test (POST). If not, check the module plugging and if the problem persists call the Network Support Center. Otherwise continue with the next bullet.
 - If you have removed any cables:

Important

Cable connectors can be damaged when installing cables on **switch** or **switch redrive** module. Maintain the cables firmly while installing the cables from the connectors to avoid any effort which can damage the connectors.

- Carefully connect the cables.
 - Tighten the connector screws (tighten them progressively and alternatively on top and bottom).
- If you have two **Switch** or **Switch redrive** modules installed on your machine go to “After Exchanging a Switch or Switch Redrive” on page 6-66. Otherwise go to “Ending the Exchange Procedure” on page 6-70.



After Exchanging a Switch or Switch Redrive

You have two **switch** or **Switch redrive** modules installed on your machine and before exchanging the suspected the module you have set the **Set Switchover Options** to **Inhibit**.

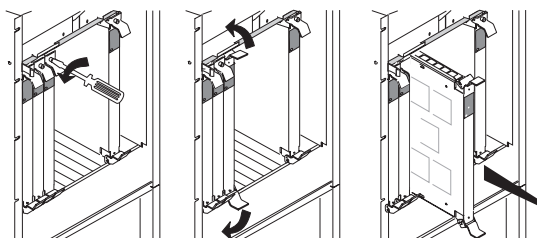
1. On the Nways Switch administration station, locate the icon of the **Switch** module that have you exchanged, or the associated **Switch** icon of the **Switch redrive** module that you have exchanged.
2. On the **Switch** icon, click on the left or bottom mouse button, then on the right or top mouse button. A popup menu is displayed.
3. Click on the **Set Switchover Options**. On the displayed window, set the **Authorize** option then click on the **OK** button.
4. Go to "Ending the Exchange Procedure" on page 6-70.

Exchange a TPA

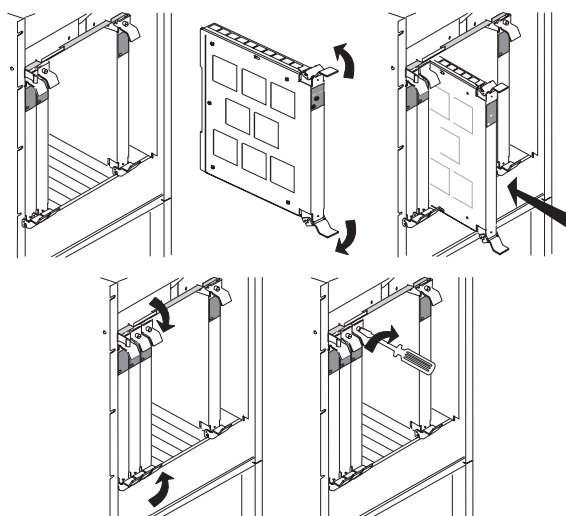
Important

You MUST deactivate (force a hardware reset) the TPA before exchanging (see “Nways Switch Administration Station Windows Overview” on page 3-5). If deactivation is not possible continue with the following procedure.

- 1
 - Locate the TPA module using “2220 Front View” on page 6-12.
 - Using the label on the front of the TPA, check that the TPA installed on the machine and the TPA that you want to exchange are the same type.
 - Loosen the screws on the latches.
 - Unlock the latches as shown, then remove the module from its location.



- 2
 - Exchange the TPA module.
 - Insert the new TPA module into the machine.
 - Position the latches, then slide the module into its location.
 - Secure the module by locking the latches, then tighten the screws on the latches.
 - Check that the green TPA LED blinks during Power On Self Test (POST) then comes ON at POST completion. If not, check the TPA plugging and if the problem persists call the Network Support Center. Otherwise go to “Ending the Exchange Procedure” on page 6-70.

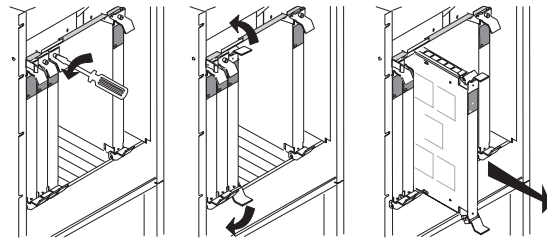


Exchange a Voice Server Adapter

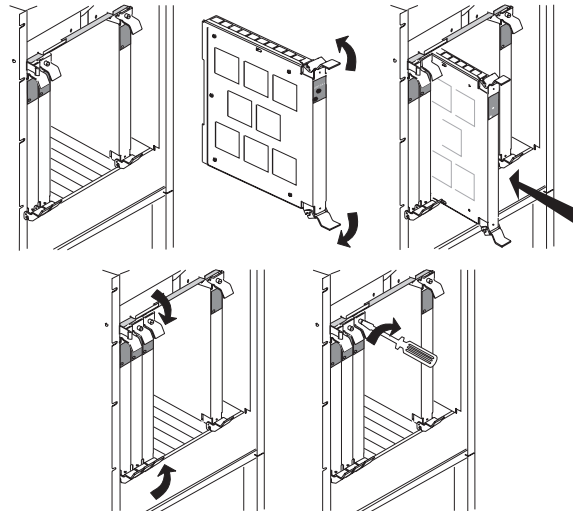
Important

You MUST deactivate (force a hardware reset) the VSA before exchanging (see “Nways Switch Administration Station Windows Overview” on page 3-5). If deactivation is not possible continue with the following procedure.

- 1
 - Locate the voice server adapter (VSA) module using “2220 Front View” on page 6-12.
 - Using the label on the front of the VSA, check that the VSA installed on the machine and the VSA that you want to exchange are the same type.
 - Loosen the screws on the latches.
 - Unlock the latches as shown, then remove the module from its location.



- 2
 - Exchange the VSA module.
 - Insert the new VSA module into the machine.
 - Position the latches, then slide the module into its location.
 - Secure the module by locking the latches, then tighten the screws on the latches.
 - Check that the VSA LED is green after completion of the Power ON Self Test (POST). If not, check the VSA plugging and if the problem persists call the Network Support Center, Otherwise go to “Ending the Exchange Procedure” on page 6-70.



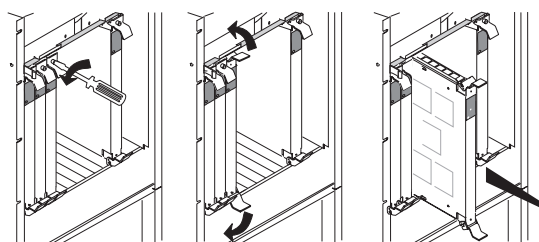
Exchange a Voice Server Extension

Important

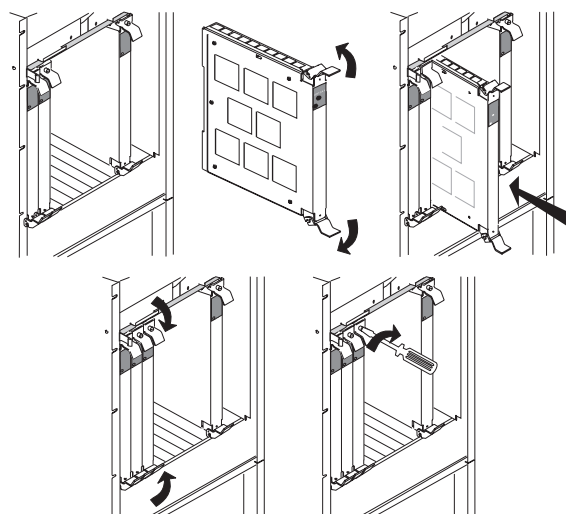
You MUST deactivate (force a hardware reset) the corresponding VSA before exchanging (see “Nways Switch Administration Station Windows Overview” on page 3-5). If deactivation is not possible continue with the following procedure.

Should a voice server extension (VSE) removed inadvertently, the corresponding VSA must be deactivated then reactivated.

- 1
 - Locate the voice server extension (VSE) module using “2220 Rear View” on page 6-13.
 - Using the label on the front of the VSE, check that the VSE installed on the machine and the VSE that you want to exchange are the same type.
 - Loosen the screws on the latches.
 - Unlock the latches as shown, then remove the module from its location.



- 2
 - Exchange the VSE module.
 - Position the latches, then slide the module into its location.
 - Secure the module by locking the latches, then tighten the screws on the latches.
 - Check that the green LED of the VSE module blinks. If not, check the VSE module installation and if the problem persists call the Network Support Center.
 - Reactive the corresponding VSA.
 - Check that the green LED of the VSE module comes ON. If not, call the Network Support Center. Otherwise go to “Ending the Exchange Procedure” on page 6-70.



Ending the Exchange Procedure

1. If you have another FRU to exchange return to Table 6-1 on page 6-4. Otherwise continue with the next step.
2. After you have exchanged all faulty FRUs, continue with “Leaving Procedure.”

Leaving Procedure

1. After you have terminated your investigation, call the Network Support Center to inform them and follow their instructions, if not already done.
2. Before leaving do not forget to Switch OFF the display of the NAS. For display installed in the rack perform the following Steps.
 - a. For display type A go to Step 7.
 - b. For display type B go to Step 3.
3. Remove the front cover plate by unscrewing the two screws **A** if not already done.
4. Switch OFF the display using the power ON/OFF switch located under the front panel.

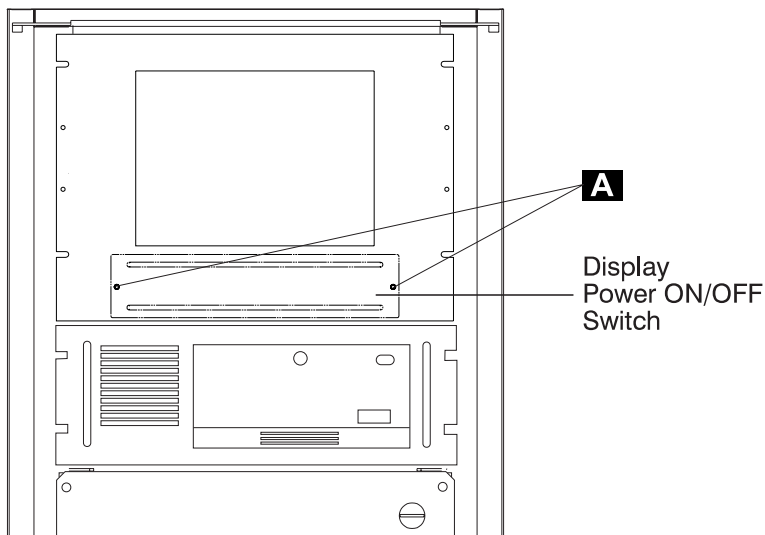


Figure 6-13. Display Power ON/OFF Switch

5. Reinstall the front cover plate and secure it using the two screws **A**.
6. Go to Step 8 on page 6-71.
7. Switch OFF the display of the NAS.

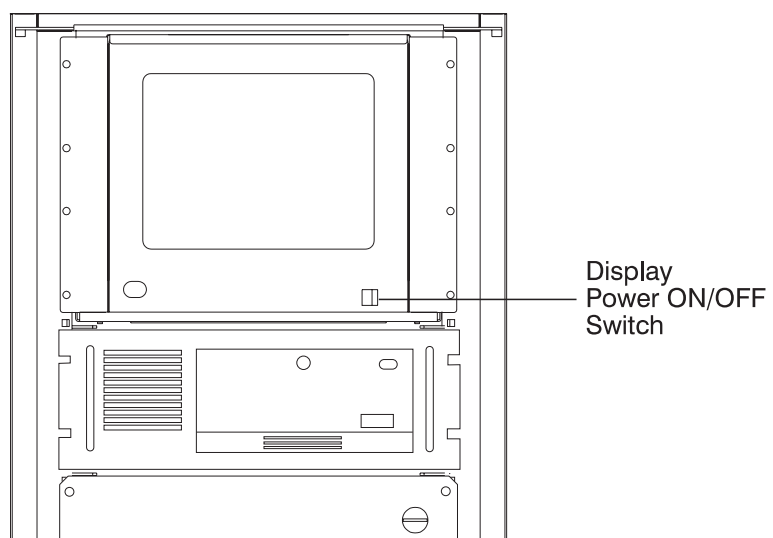


Figure 6-14. Display Power ON/OFF Switch

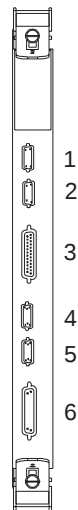
8. Re-install the external covers that you have removed, and close the doors.

Appendix A. Schematics

Important

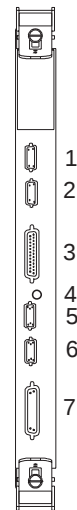
Two levels of schematics are available according to the level of your machine.

To select the appropriate schematics, check the APC type.



APC

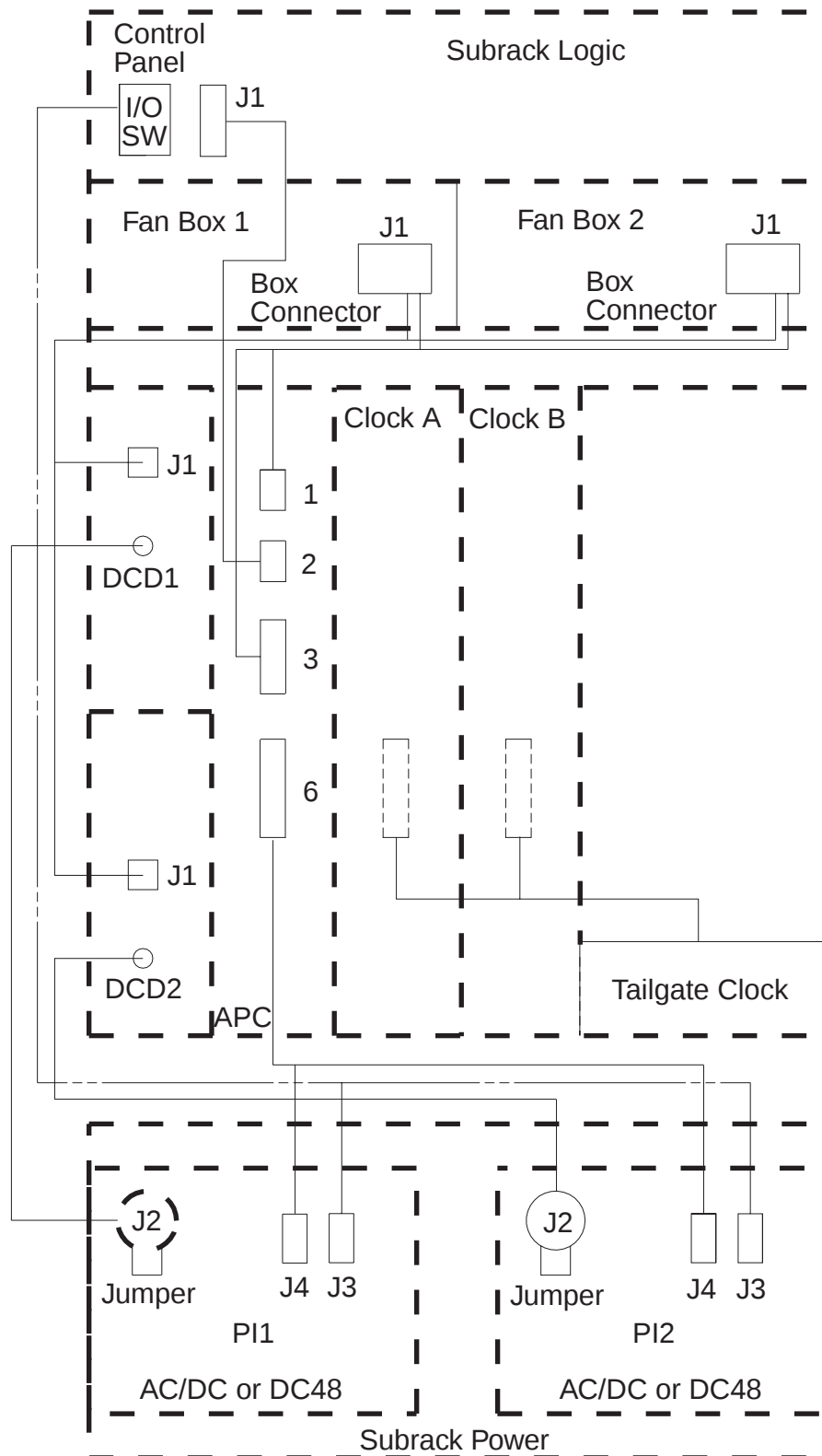
APC Type A



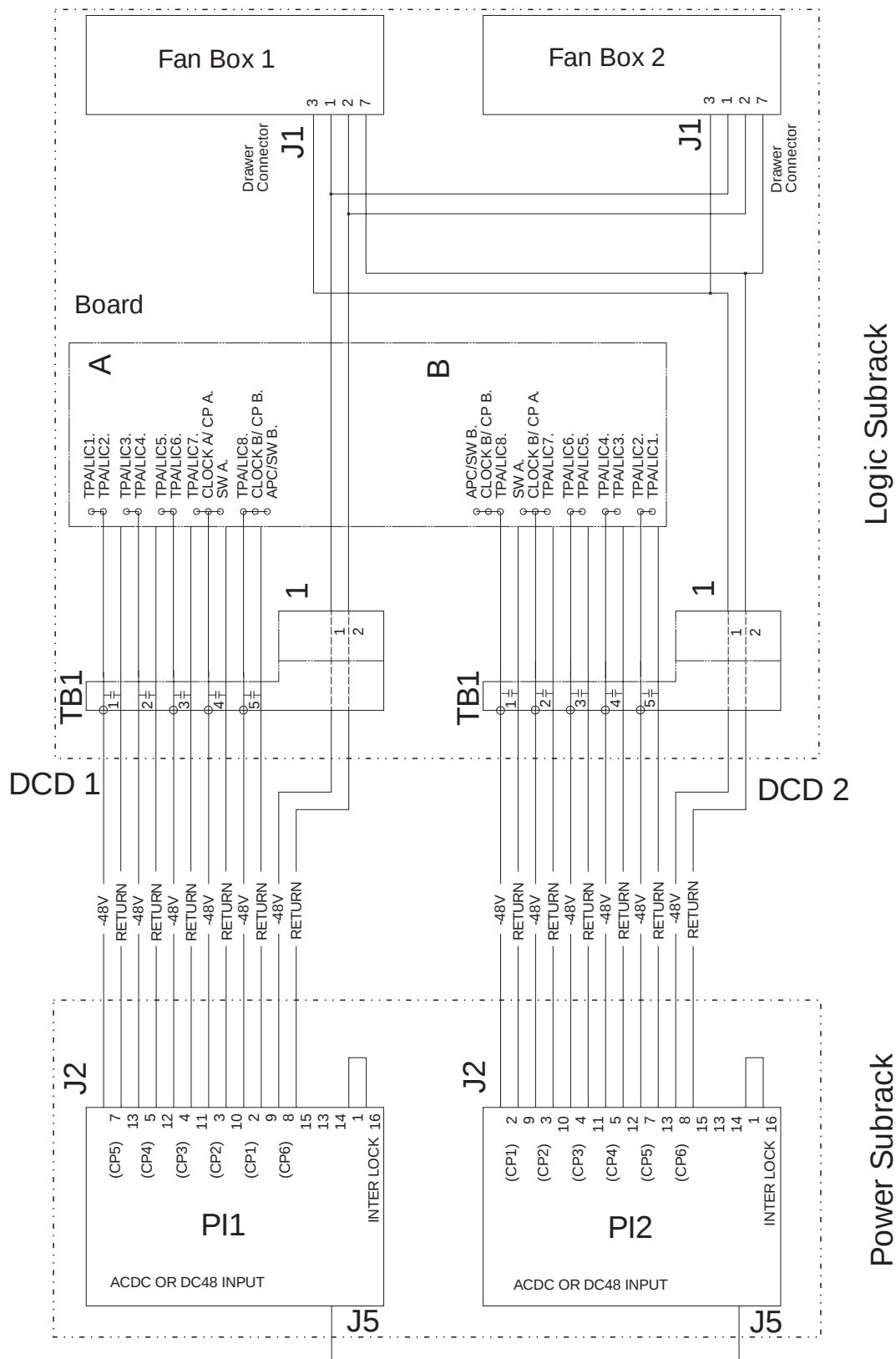
APC

APC Type B

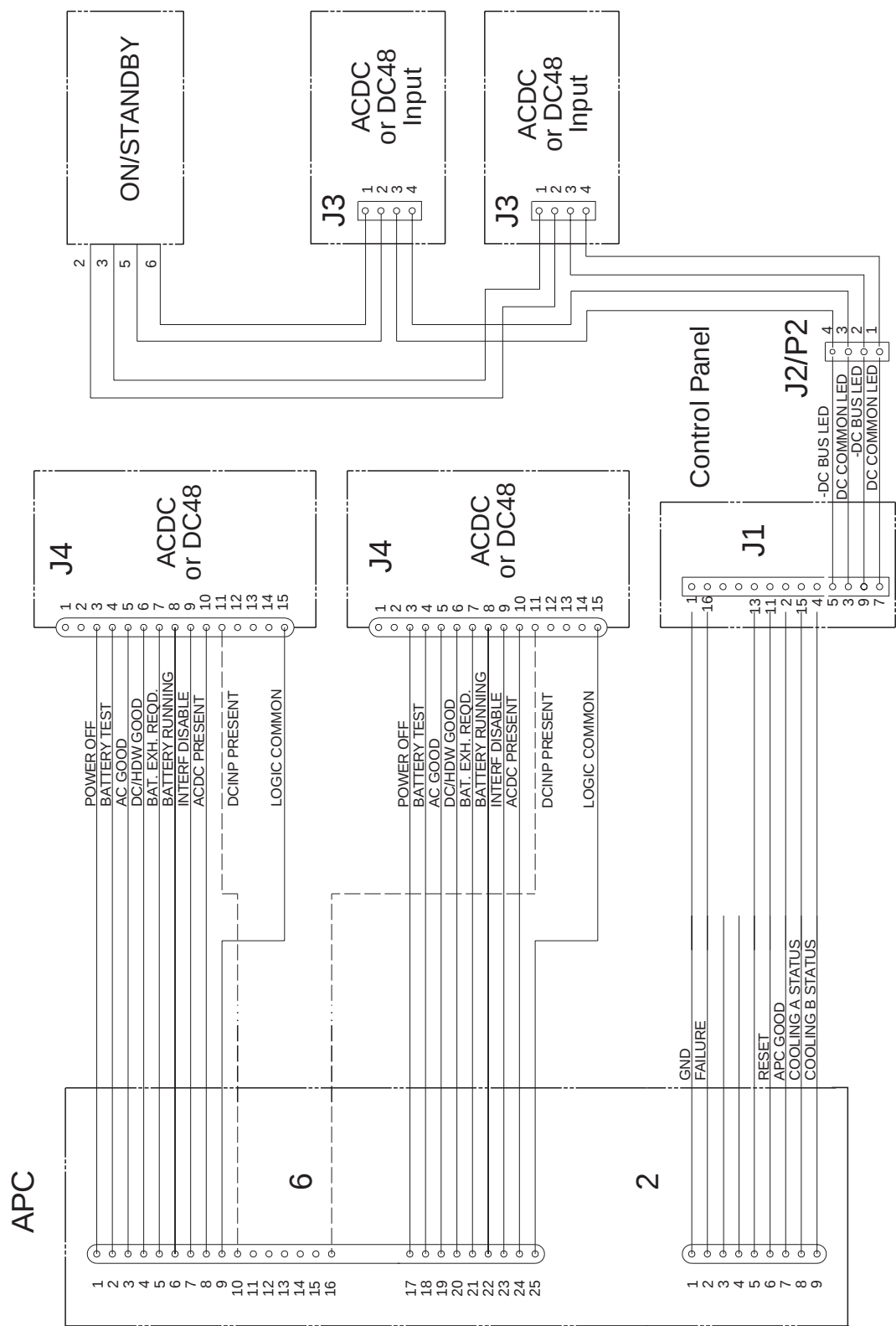
Power and Control Cables (With APC Type A)



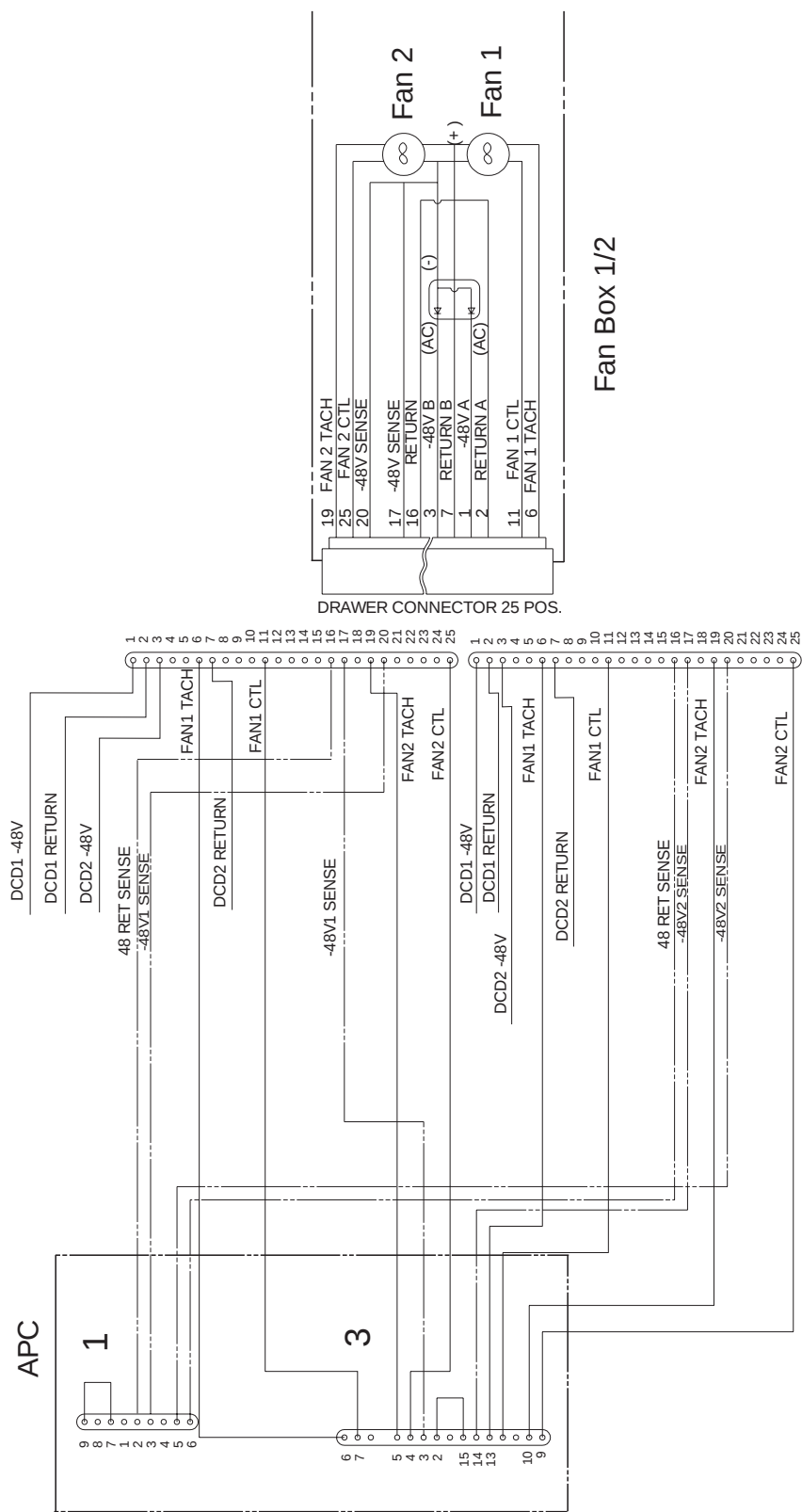
Power 48 V DC Distribution (With APC Type A)



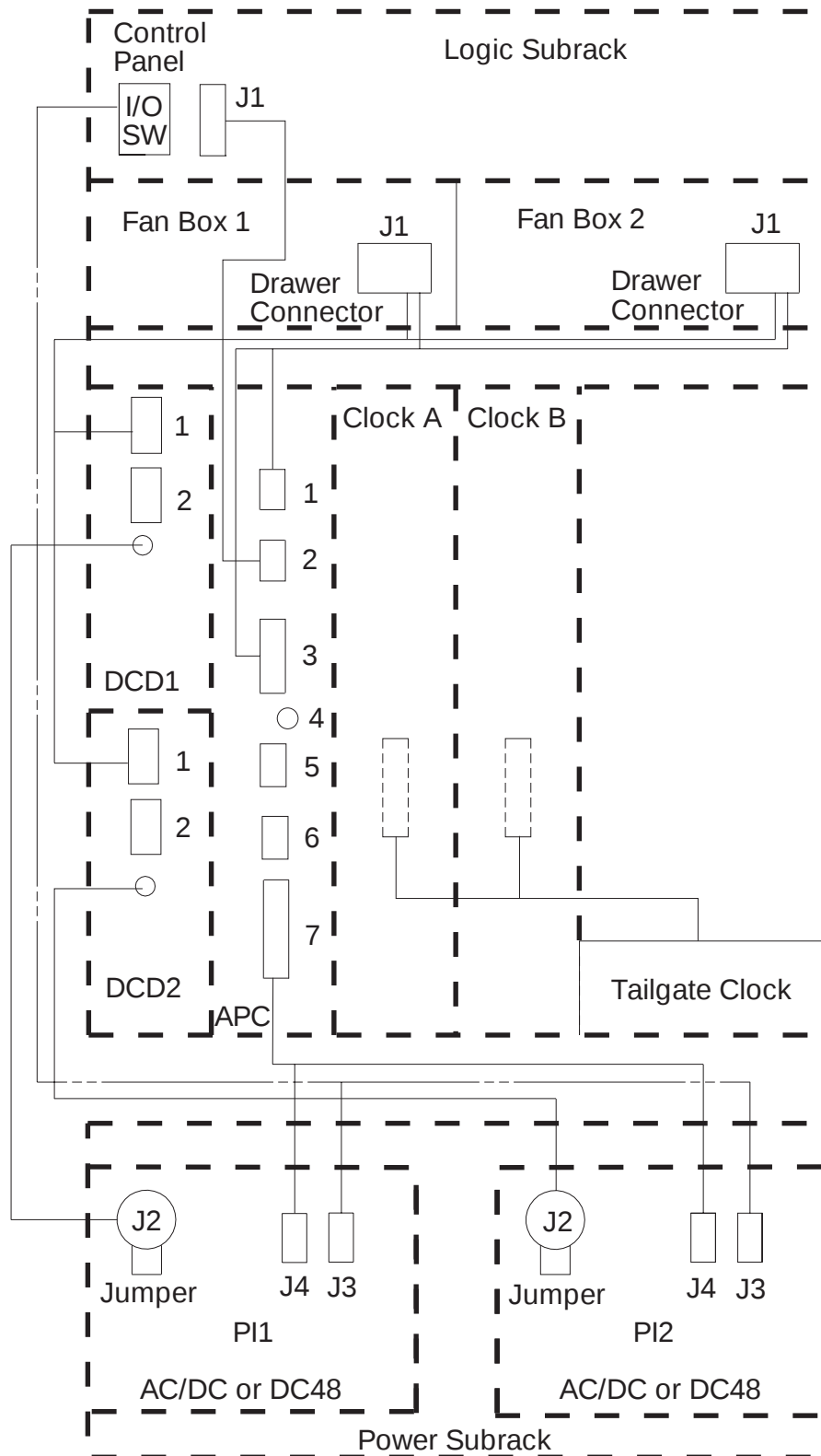
Power Control (With APC Type A)



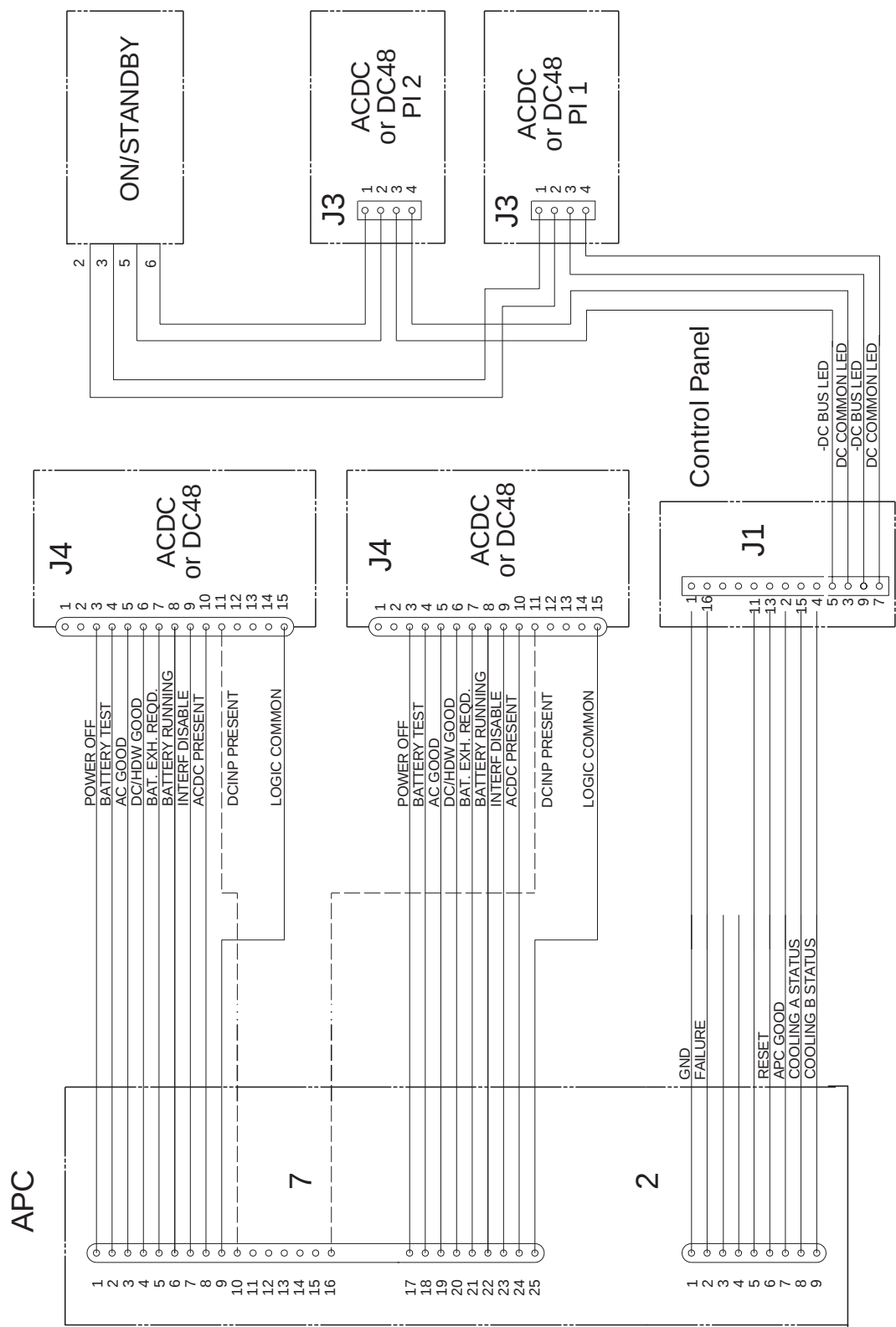
Control Panel and FAN Control (With APC Type A)



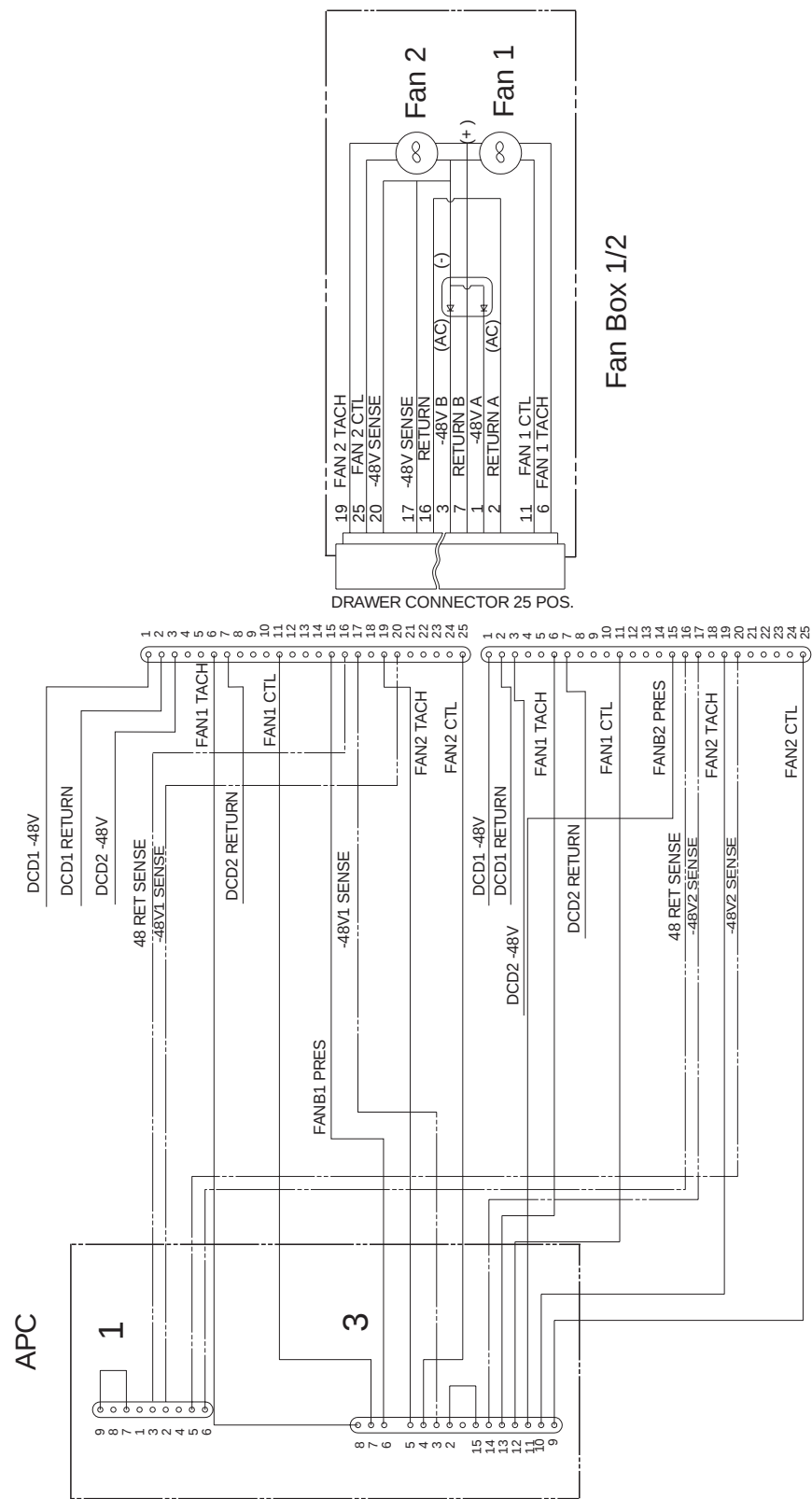
Power and Control Cables (With APC Type B)



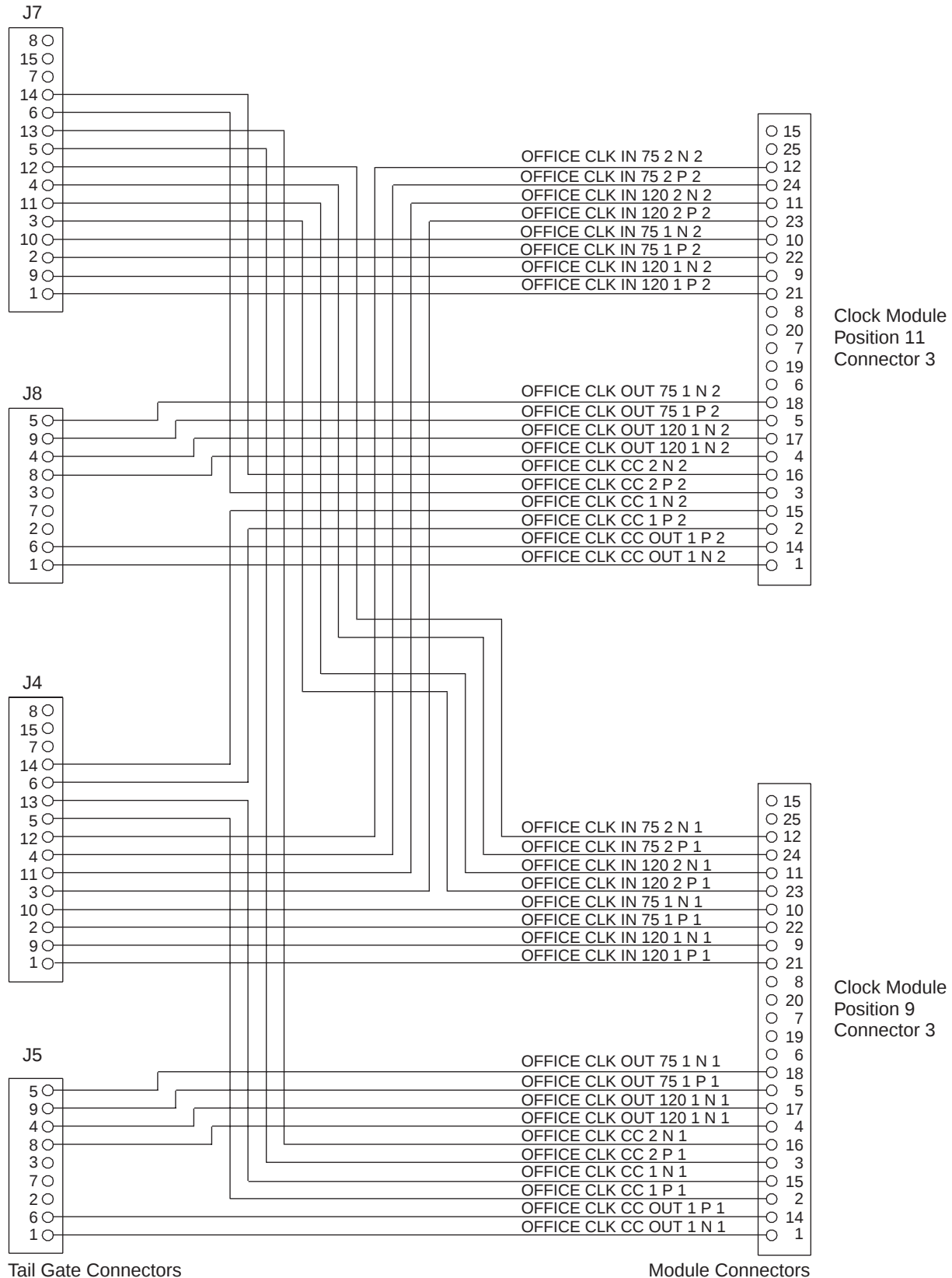
Power Control (With APC Type B)

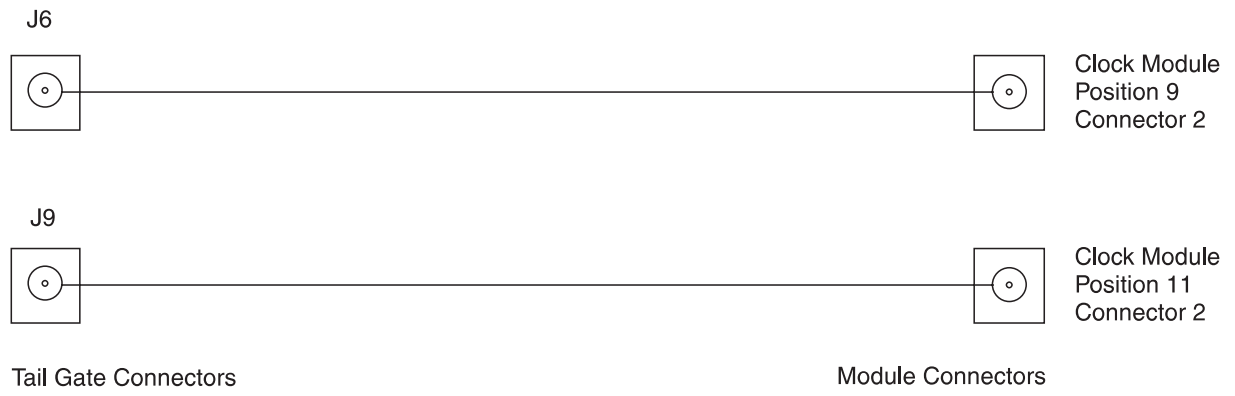


Control Panel and FAN Control (With APC Type B)



Clock Cables





Appendix B. Maintenance Aids

Clock Module LED Segment Reference

Use the following figure to identify the LED segments Lighted. Select the status column according to the **Clock** or **Clock redrive** status, then locate the LED segments lighted with letters.

Front Panel Display Reference

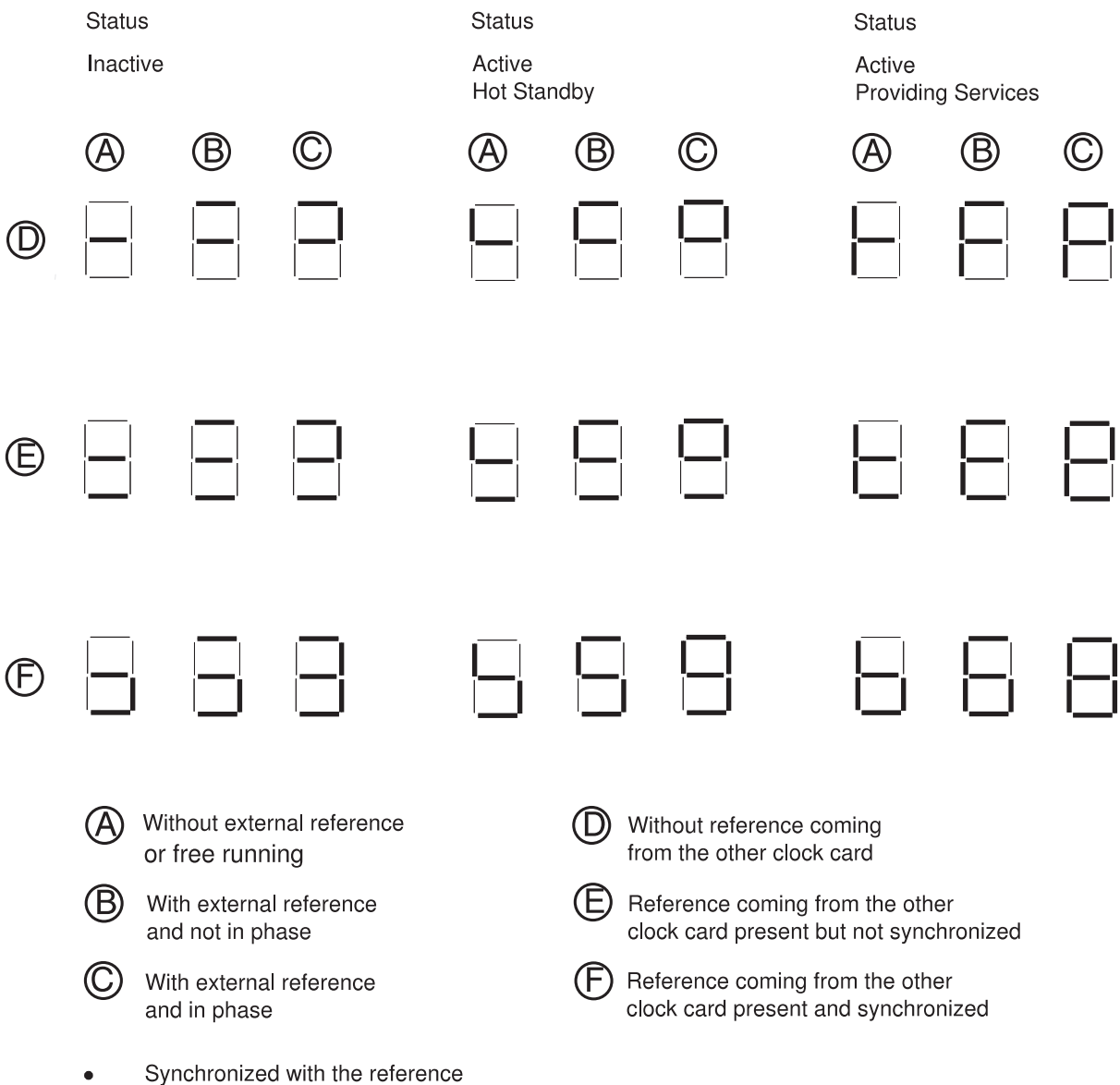


Figure B-1. Clock Module LED Segment Reference

Shipping Group Tools

The following tools are shipped with the machine:

Tool	Qty	Part Nbr.
LIC511 Wrap Plug	1	58G9425
LIC512 Wrap Plug	1	57G8096
LIC514/LIC516 Wrap Plug	1	57G8097
LIC513/LIC515/LIC523/LIC545 or LIC562 Wrap Plug	1	57G8093
LIC517 Wrap Plug	1	80G2221
LIC522 Wrap Plug	1	57G8096
LIC530 Wrap Plug	1	57G8098
LIC544/LIC546 Wrap Plug	1	57G8097
LIC554 Wrap Plug	1	80G3917
LIC555 Wrap Plug	1	80G3796
LIC556 Wrap Plug	1	81G3185
LIC567 Wrap Plug	1	57G8097

Wrap plugs for testing ARCs alone.

These wrap plugs must be installed at the rear of the ARCs.

Tool	Qty	Part Nbr.
ARC V.24 Wrap Plug	1	80G3742
ARC V.35 Wrap Plug	1	80G3743
ARC X.21 Wrap Plug	1	80G3744

Wrap plugs for testing ARCs and cables.

These wrap plugs must be installed on ARC cables.

Tool	Qty	Part Nbr.
ARC V24 DTE Wrap Plug	1	80G3745
ARC V24 DCE Wrap Plug	1	61F4522
ARC V35 DTE Wrap Plug	1	80G3746
ARC V35 DCE Wrap Plug	1	61F4526
ARC X21 DTE Wrap Plug	1	61F4530
ARC X21 DCE Wrap Plug	1	61F4529

Appendix C. 2220 Power Consumption

2220 Power Limits

The total power consumption depends on the type of power source (ac or dc) and the number of power supply. Table C-1 shows the maximum total power consumption allowed.

<i>Table C-1. Maximum total consumption allowed.</i>			
Power supply type	Quantity	Total allowed (Watt)	Battery backup support (Watt)
ac	1 or 2	1350	1350 (note)
dc (-48v)	1 or 2	1550	n/a

Note: Every ac power has a battery backup. In this mode, the power consumption is up to 675 Watts per battery during 3 to 5 minutes.

2220 Base Machine and Modules Power Consumption

Table C-2 shows the base machine and modules power consumption.

<i>Table C-2 (Page 1 of 2). Base Machine and Module Power Consumption</i>		
Types	Feature Code	Consumption (Watt)
Base machine		
2220 Model 300	N/A	150
2220 Model 500		178
2220 Model 501		175
Trunk/Port Adapter		
Low-speed Type 1 (LSA1)	5410	35
Low-speed Type 2 (LSA2)	5440	45
Low-speed Type 3 (LSA3)	5460	38
High-speed Type 1 (HSA1)	5415	42
High-speed Type 2 (HSA2)	5445	55
High-speed Type 3 (HSA3)	5446	44
ATM Type 1 (ATMA1)	5450	41
ATM Type 2 (ATMA2)	5451	41
Voice Server Adapter (VSA)	5400	44
Switch		
2220 Model 300	5350	29
2220 Model 500	5340	57
2220 Model 501 (redrive)	5341	54
Clock		
2220 Model 300	5355	20
2220 Model 500	5355	20
2220 Model 501 (redrive)	5356	10

<i>Table C-2 (Page 2 of 2). Base Machine and Module Power Consumption</i>		
Types	Feature Code	Consumption (Watt)
Voice Server Expansion		
Type 1 (VSE1)	5501	35
Type 2 (VSE2)	5502	64
Line Interface Coupler		
511	5511	9
512	5512	17
513	5513	23
514	5514	18
515/516	5515/5516	19
517	5517	18
522/525	5522/5525	20
523	5523	26
530	5530	0
544	5544	43
545	5545	41
546	5546	40
551	5551	36
552	5552	53
553	5553	40
554	5554	26
555	5555	26
556	5556	26
562	5562	20
567	5567	24
Line Connection Box with:		
10m RVX cable + 15 x V.24 ARCs	5600/5601 + 5024	9.8
100m RVX cable + 15 x V.24 ARCs	5600/5601 + 5024	10.5
10m RVX cable + 15 x V.35 ARCs	5600/5601 + 5024	20
100m RVX cable + 15 x V.35 ARCs	5600/5601 + 5024	23.5
10m RVX cable + 15 x X.21 ARCs	5600/5601 + 5035	20
100m RVX cable + 15 x X.21ARCs	5600/5601 + 5035	23.5
	5600/5601 + 5021	
	5600/5601 + 5021	

Appendix D. Parts Catalog

This chapter contains listings and illustrations of all replaceable assemblies, subassemblies, and detail parts for the 2220 and IBM Rack.

This information is used by stock and maintenance personnel to identify, requisition, and issue replacement parts.

How to Use This Parts Catalog

HOW TO FIND PART INFORMATION

WHEN ASSEMBLY
LOCATION IS KNOWN



PERFORM STEPS

(A) (B) (D)

WHEN ASSEMBLY
NAME IS KNOWN



PERFORM STEPS

(B) (C) (D)

WHEN PART NUMBER
IS KNOWN



PERFORM STEPS

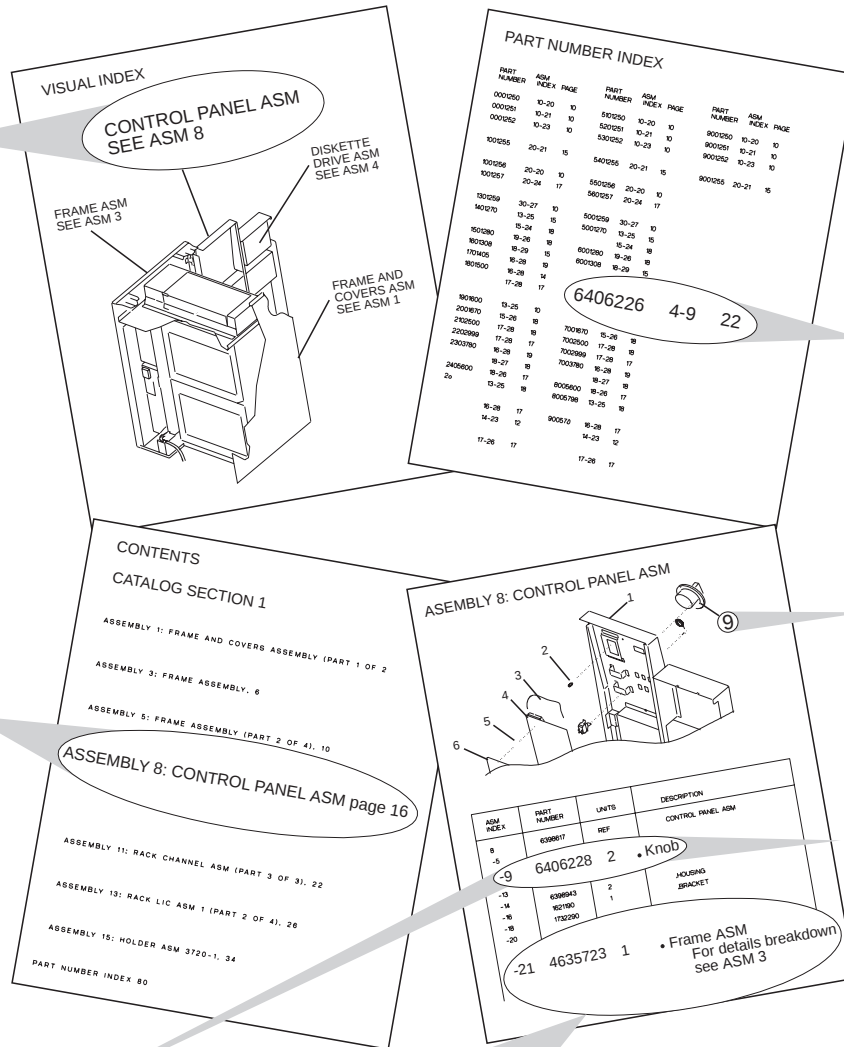
(E) (F) (G)

(A) Turn to the visual index then locate, by illustration, the assembly containing the part.

(B) Turn to the page for that assembly, then locate the part visually.

(C) Turn to the contents page, then locate, by name, the assembly containing the part.

(D) Using the part number index shown with the part, refer to the accompanying listing to obtain the part number, description, and quantity.



Part Listing Glossary

1 NONE When this notation appears in the Part Number column, it denotes a part or group of parts that have not been assigned a part number. The part number of cards and boards is not given because it is subject to frequent changes.

2 NR this notation in the Units column denotes a part not recommended for field replacement.

3 AR this notation in the Units column indicates that the quantity is as required.

4 SIMILAR ASSEMBLIES If two or more assemblies contain a majority of identical parts, they are combined in the same listing. Parts common to assemblies are illustrated and listed by one index number.

Parts specific to one or the other of the assemblies are listed separately and identified either in the description of the part, or

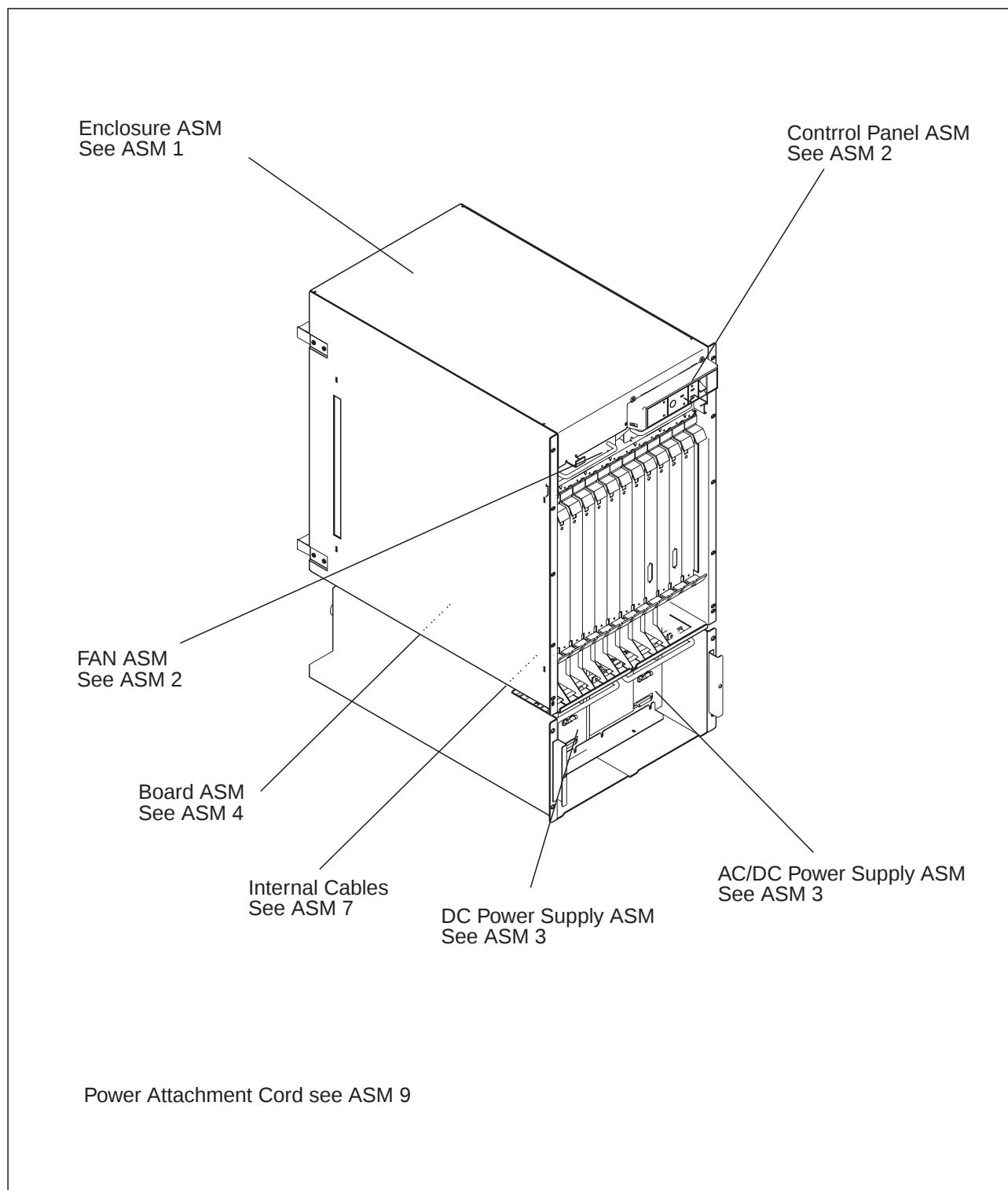
5 REF this notation in the Units column indicates that the listing of the assembly is repeated and reference should be made to its previous listing for the quantity required.

6 INDENTATION the indentation of items in the Description column of the table below shows the relationship between assemblies, subassemblies and detail parts. For example:

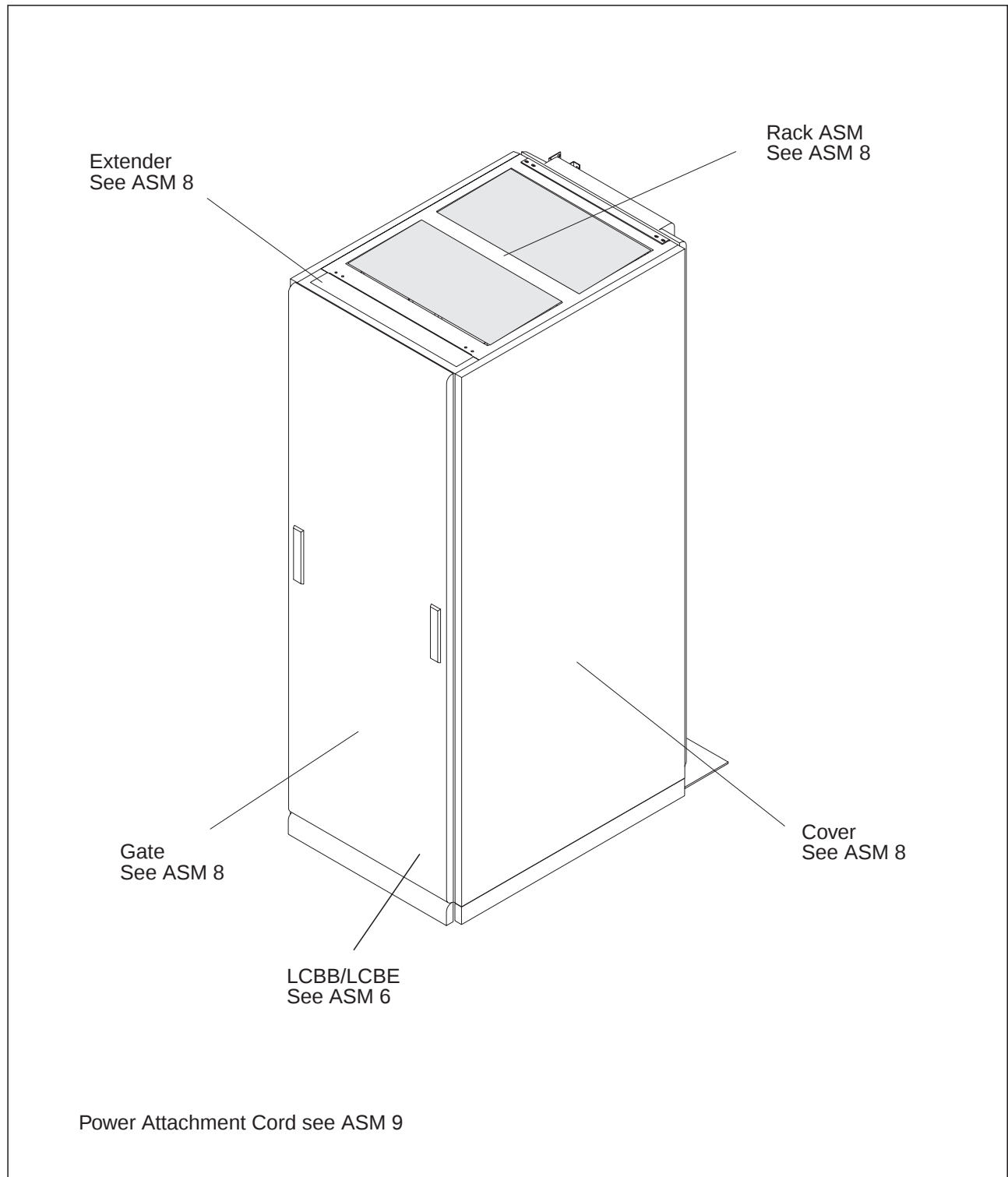
Not dot		MAIN ASSEMBLY
One dot	●	Detail parts of main ASM
One dot	●	Assembly within main ASM
Two dots	● ●	Detail part of 1 dot ASM
Two dots	● ●	Assembly within 1 dot ASM
Three dots	● ● ●	Detail parts of 2 dot ASM

Asm-Index	Part Number	Units	Description
8-	NONE	REF	Final Assembly
-1	1501460	1	● Disk Drive ASM
-2	6426882	1	● Bracket
-3	10170	4	● Screw, Slot Bind HD-6/32 X 0.250 LG
-4	NONE	1	● Power Attachment Cord
-5	6398770	8	● Modular Dummy
-6	6398942	1	● Overlay-English
-6	6427178	1	● Overlay-French
-6	6427181	1	● Overlay-Portuguese
-6	6428182	1	● Overlay-Spanish
-7	6398936	NR	● Cover
-8	1621197	AR	● Screw, Pan HD-M4 X 6 LG

Visual Index

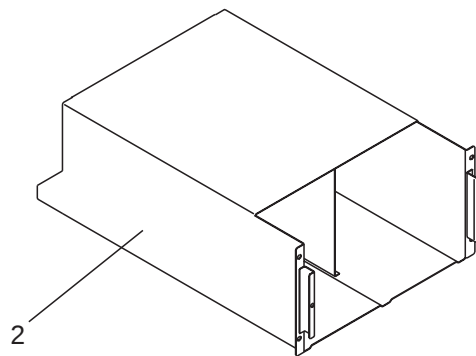
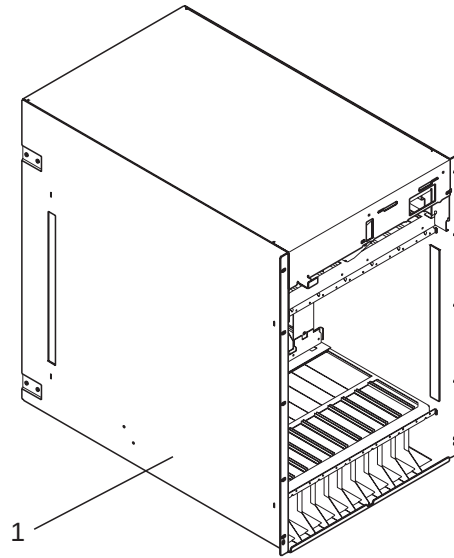


Visual Index



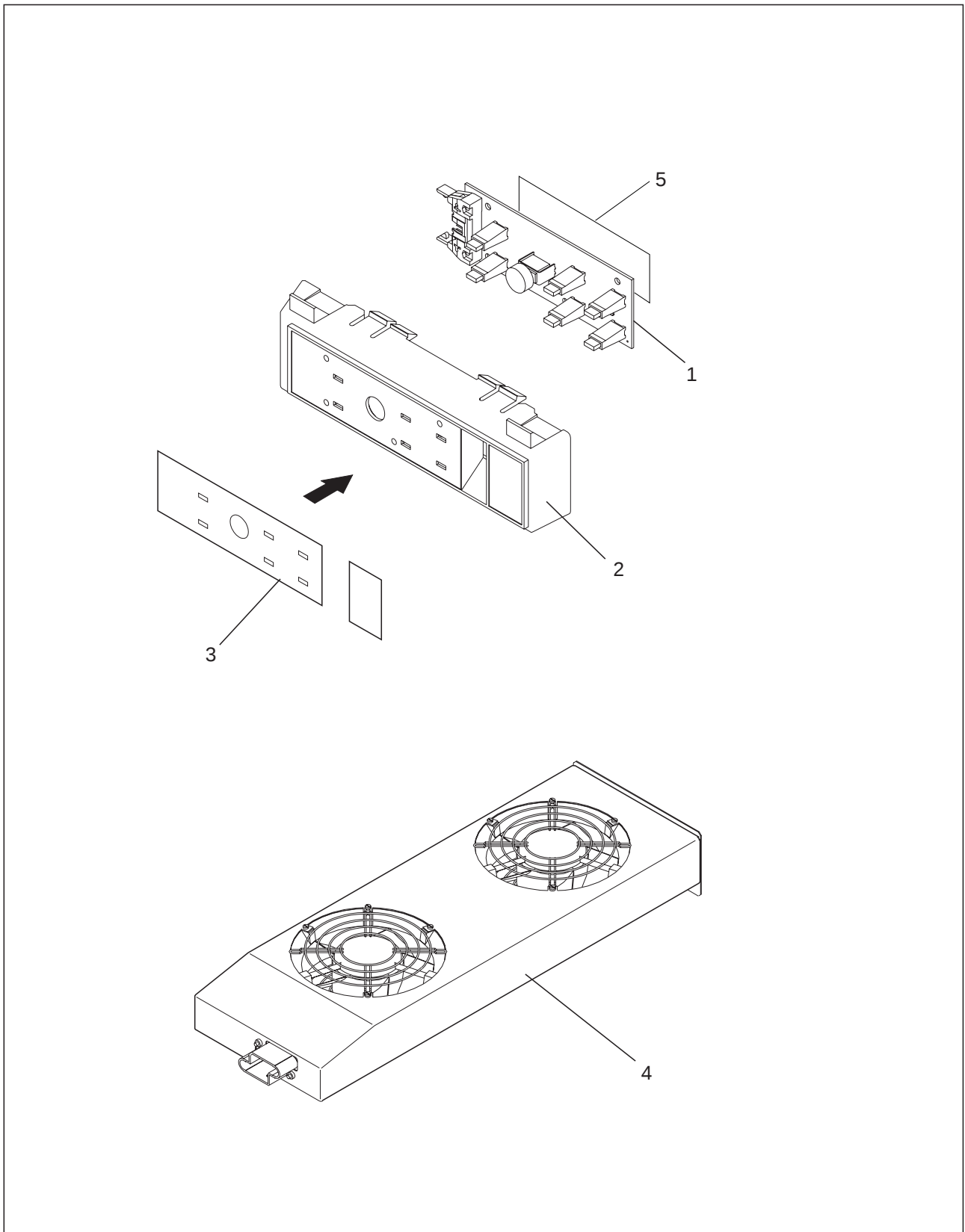
Catalog Section

Assembly 1: 2220 Enclosure Assembly, Models 300, 500, and 501



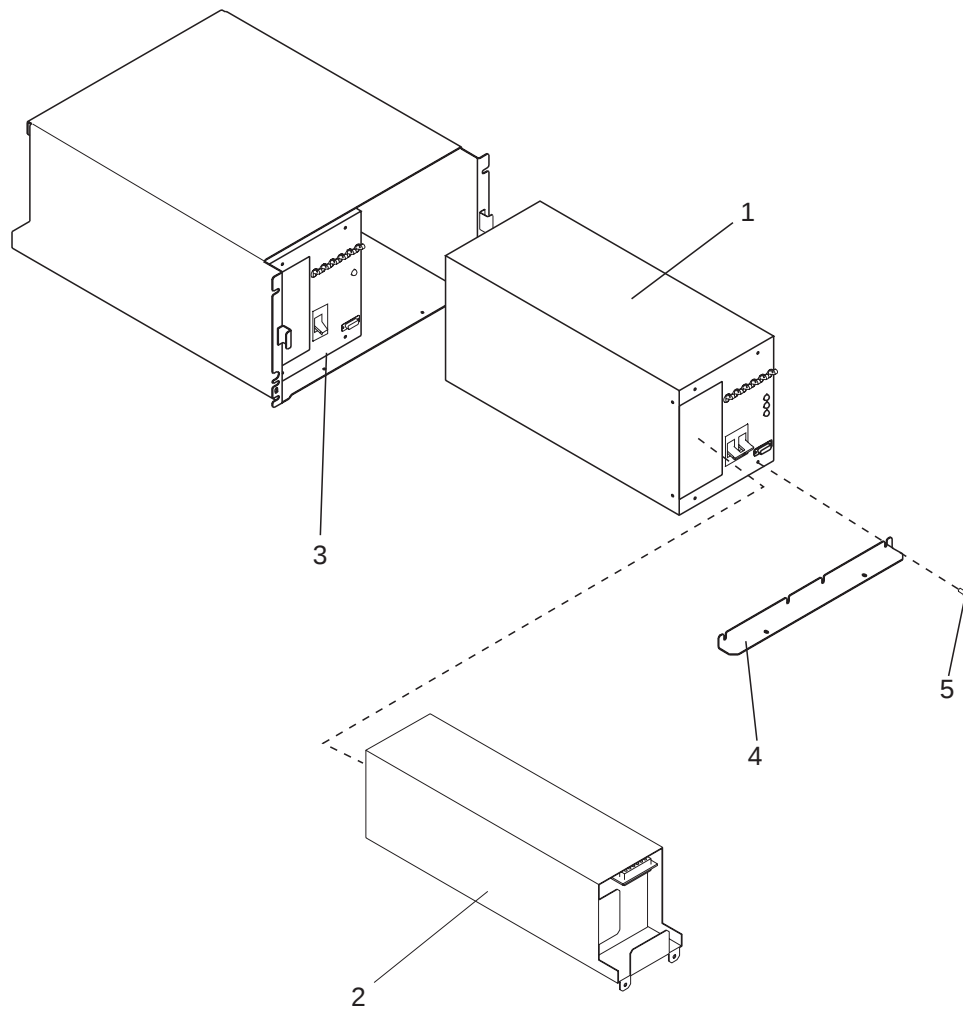
Asm- Index	Part Number	Units	Description
1-	NONE	REF	Enclosure Assembly, Models 300, 500, and 501
-1	80G3810	1	Enclosure Logic
-2	57G7755	1	Enclosure Power

Assembly 2: 2220 Control Panel and FAN Box Assembly



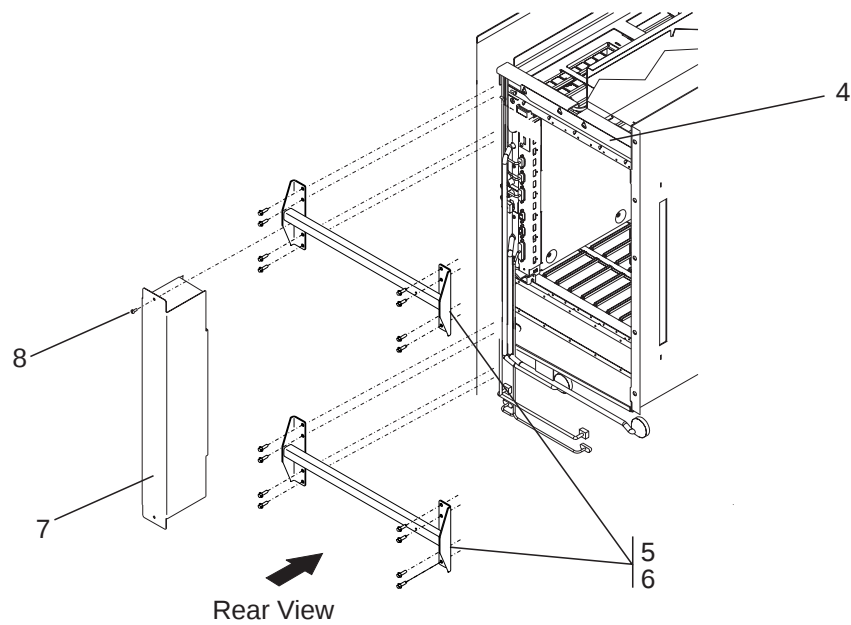
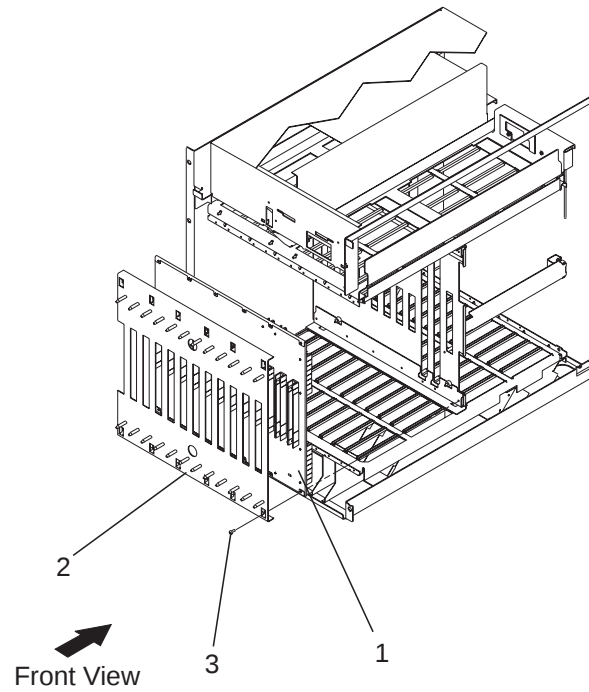
Asm- Index	Part Number	Units	Description
2-	NONE	REF	Control Panel and FAN Box Assembly
-1	NONE	1	OP Panel Card
-2	57G7771	1	Panel
-3	57G7950	1	Overlay English
-3	57G7951	1	Overlay French
-3	57G7952	1	Overlay German
-3	57G7953	1	Overlay Italian
-3	57G7954	1	Overlay Spanish
-3	57G7955	1	Overlay Japanese
-4	57G7634	2	FAN Box Assembly
-5	80G3891	1	Shield

Assembly 3: 2220 AC/DC and DC Power Supply Assembly



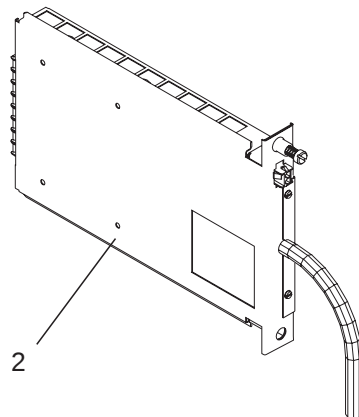
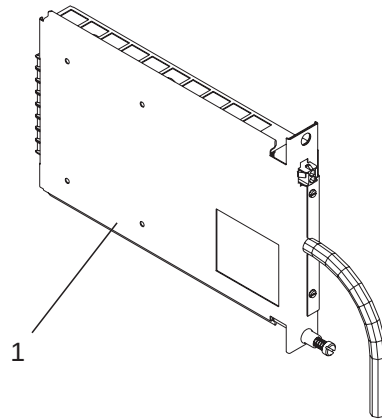
Asm- Index	Part Number	Units	Description
3-	NONE	REF	AC/DC and DC Power Supply Assembly
-1	80G3978	1	AC/DC Power Supply + Labels
-2	80G4478	1	Battery Back-up + Labels
-3	80G4441	1	DC 48V Power Supply
-3	57G7934	1	Power Cord DC 48V
-4	57G7631	1	Front Bracket
-5	4796653	6	Screw Hex Washer HD-M4 X 10

Assembly 4: 2220 Board Assembly



Asm- Index	Part Number	Units	Description
4-	NONE	REF	Board Assembly
-1	NONE	1	Board Assembly
-2	57G7629	1	Cover Plate
-3	57G7782	14	Special Screw M4
-4	5767855	1	Cover Plate
-5	80G3877	2	Cable Routing Bar
-6	43G3084	16	ScREW Hex MD-M6 X 8
-7	57G7873	1	Cover Plate
-8	4796653	2	ScREW Hex Washer MD-4 X 10

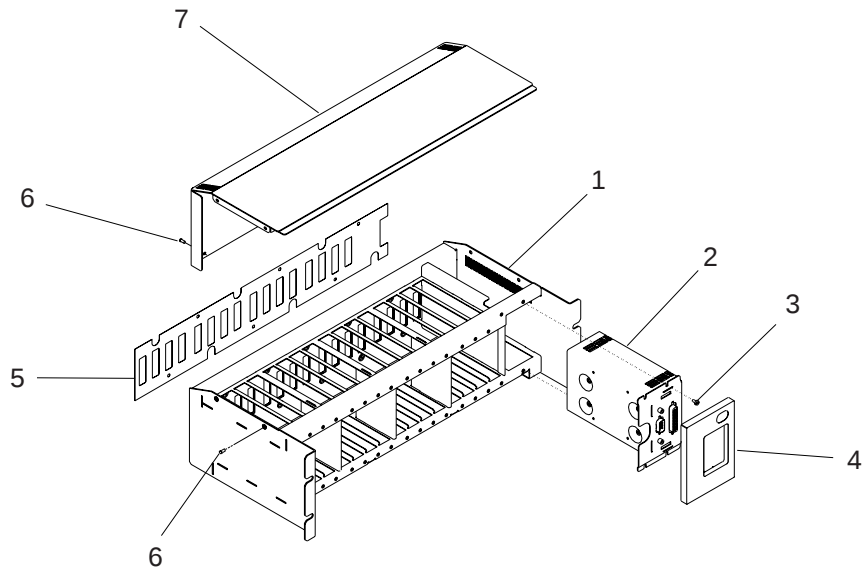
Assembly 5: 2220 Modules



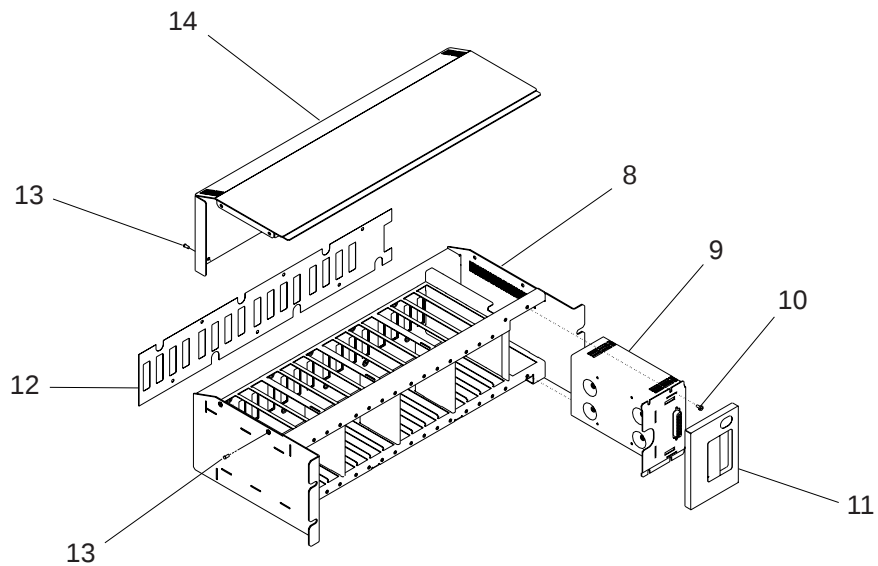
Asm- Index	Part Number	Units	Description
5-	NONE	REF	Modules
-1	80G4866	1	Power Module Upper (Position A)
-2	80G4867	1	Power Module Lower (Position B)

Assembly 6: LCBB and LCBE Assembly

LCBB

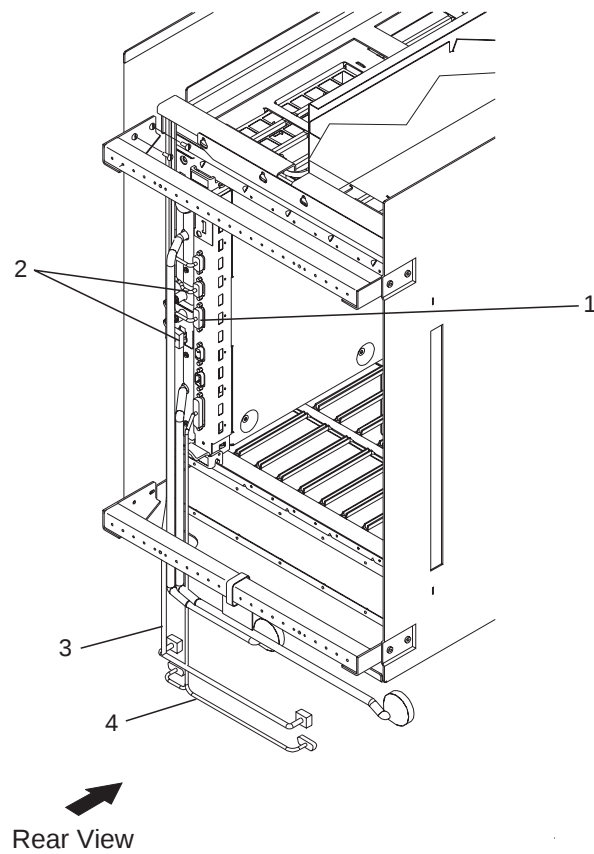


LCBE



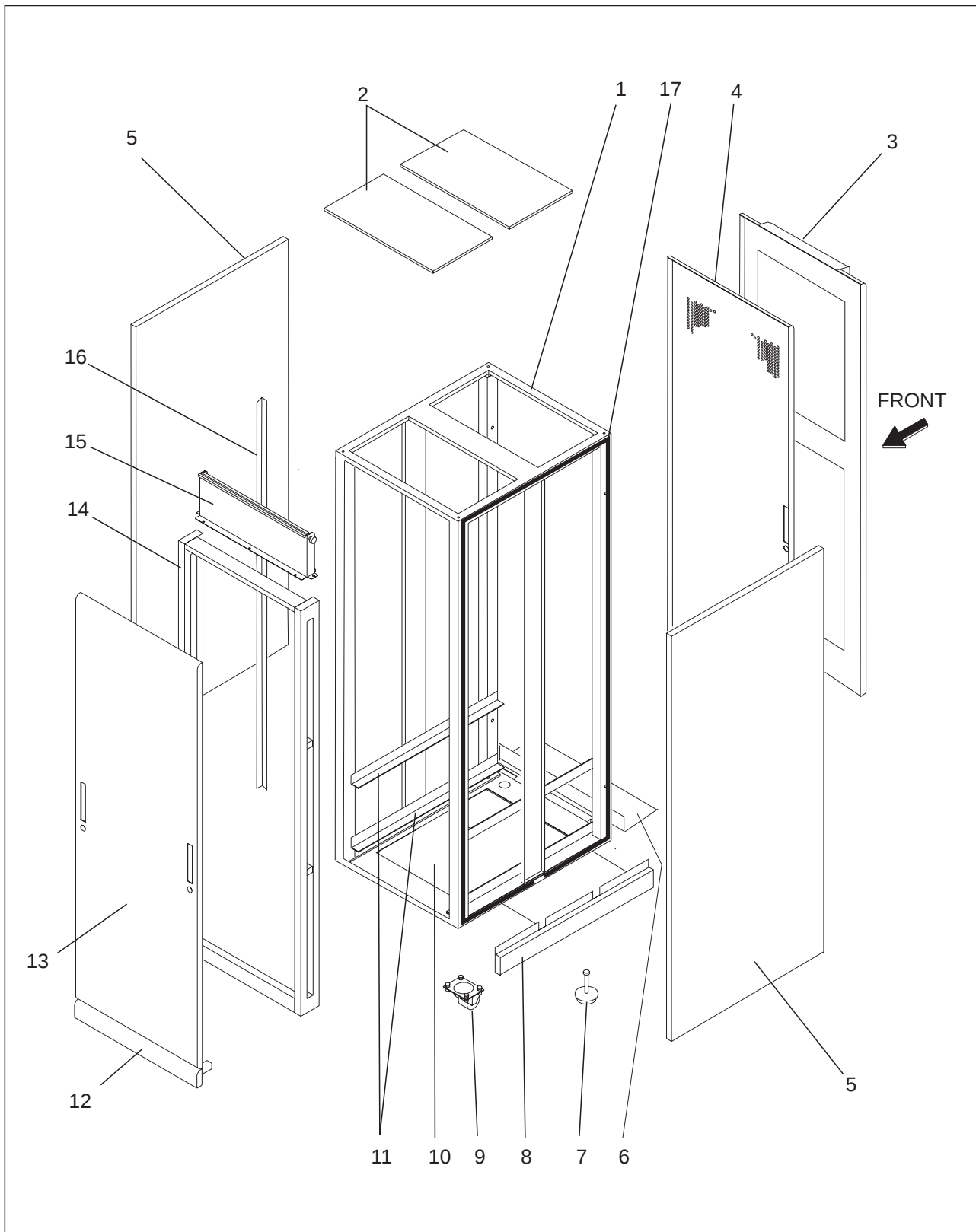
Asm- Index	Part Number	Units	Description
6-	NONE	REF	Final Assembly
-1	NONE	REF	Enclosure LCBB
-2	NONE	REF	Power SMU LCPB
-3	1621170	4	Screw, Pan HD- M3 X 6 LG
-4	63F2498	1	Panel
-5	63F2501	1	Isolation Foil
-6	65X8654	8	Rivet
-7	61F4592	1	Cover
-8	NONE	REF	Enclosure LCBE
-9	NONE	REF	Power SMU LCPE
-10	1621170	4	Screw, Pan HD- M3 X 6 LG
-11	17G5839	1	Panel
-12	63F2501	1	Isolation Foil
-13	65X8654	8	Rivet
-14	61F4592	1	Cover

Assembly 7: Internal Cables Assembly



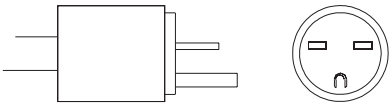
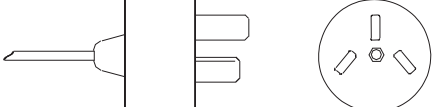
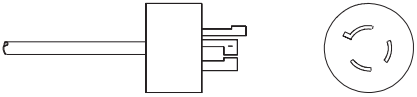
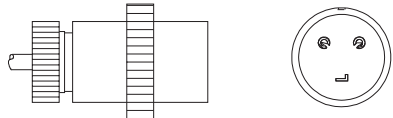
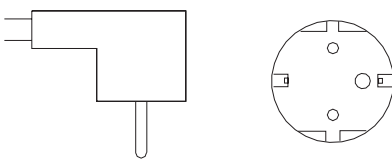
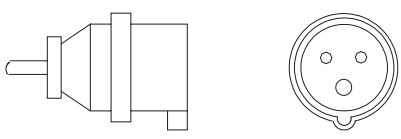
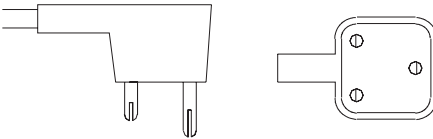
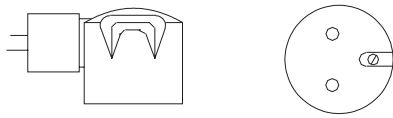
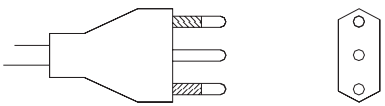
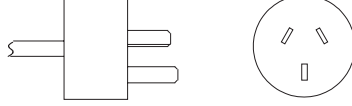
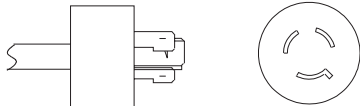
Asm- Index	Part Number	Units	Description
7-	NONE	REF	Internal Cables Assembly
-1	80G3890	1	Panel Control Cable
-2	57G7640	1	Fan Box Cable
-3	57G7767	1	OP Panel Cable
-4	57G7639	1	DC Control Cable

Assembly 8: RACK Assembly



Asm- Index	Part Number	Units	Description
8-	NONE	REF	RACK Assembly
-1	43G3041	1	Basic Frame 37U with 4 Casters/pads
-2	43G3087	1	EMC Top Grid with screws
-3	43G3074	1	EMC Filtered Door ASM with mounting elements
-4	43G3071	1	EMC Perforated Door ASM with mounting elements
-5	43G3061	1	Side Cover 840mm with EMC Gaskets
-6	43G3125	1	Stabilizer kit and screw
-7	43G3118	4	Leveller Delivered by 4
-8	43G3096	1	EMC Kickplates 840mm
-9	43G3117	4	Caster with Damper Delivered by 4
-10	43G3086	1	EMC Bottom Plate with Screws
-11	43G3111	2	Slides 30 kg Delivered by 2
-11	43G3112	2	Slides 130 kg Delivered by 2
-12	43G3094	2	EMC Kickplate with mounting elements Front and Rear EMC Kickplate are same
-13	43G3071	1	EMC Plain Door ASM with mounting elements
-14	43G3105	1	Cable Extender ASM with mounting elements
-15	43G3107	1	Upper Cable Exit Device for Extender with Screws
-16	43G3101	2	Rail 37U EIA with Screws Delivered by 2
-17	43G3127	1	Rack to Rack EMC attachment Kit
-	43G3076	AR	Pair of Filters for Filtered Door
-	43G3077	AR	EMC Gasket Kit for Door
-	43G3121	AR	Box of 50 Captive Nuts M6
-	43G3122	AR	Box of 50 Screws M6 X 16
-	43G3123	AR	Box of 2 Thumbscrews Stabilizers
-	43G3131	AR	Box of 50 Cable Clips

Assembly 9: Power Attachment Cord Assembly

5  250 V 15 A	32  250 V 16 A
10  250 V 15 A	34  250 V 15 A
18  250 V 16 A	46  250 V 16 A
22  250 V 16 A	49  250 V 16 A
25  250 V 16 A	54  250 V 15 A
29  250 V 18 A	

Asm- Index	Part Number	Units	Description
9-	NONE	REF	Power Attachment Cord Assembly
-5	14F1547	REF	Power Attachment Cord, 1.80 m
-5	14F1548	REF	Power Attachment Cord, 4.30 m
-10	14F1549	REF	Power Attachment Cord, 1.80 m
-10	14F1550	REF	Power Attachment Cord, 4.30 m
-18	14F1554	REF	Power Attachment Cord, 4.30 m
-22	14F1557	REF	Power Attachment Cord, 4.30 m
-25	14F1560	REF	Power Attachment Cord, 4.30 m
-29	14F1553	REF	Power Attachment Cord, 4.30 m
-32	14F1561	REF	Power Attachment Cord, 4.30 m
-34	86F2645	REF	Power Attachment Cord, 1.80 m
-34	86F2646	REF	Power Attachment Cord, 4.30 m
-46	14F1555	REF	Power Attachment Cord, 4.30 m
-49	14F1558	REF	Power Attachment Cord, 4.30 m
-54	14F1559	REF	Power Attachment Cord, 4.30 m

Appendix E. Part Number Index

Part Number	Asm-Index	Page	Part Number	Asm-Index	Page
NONE	1-	D-9	43G3118	8-7	D-23
	2-	D-11	43G3121	8-	D-23
	2-1	D-11	43G3122	8-	D-23
	3-	D-13	43G3123	8-	D-23
	4-	D-15	43G3125	8-6	D-23
	4-1	D-15	43G3127	8-17	D-23
	5-	D-17	43G3131	8-	D-23
	6-	D-19	4796653	3-5	D-13
	6-1	D-19		4-8	D-15
	6-2	D-19	57G7629	4-2	D-15
	6-8	D-19	57G7631	3-4	D-13
	6-9	D-19	57G7634	2-4	D-11
	7-	D-21	57G7639	7-4	D-21
	8-	D-23	57G7640	7-2	D-21
	9-	D-25	57G7755	1-2	D-9
14F1547	9-5	D-25	57G7767	7-3	D-21
14F1548	9-5	D-25	57G7771	2-2	D-11
14F1549	9-10	D-25	57G7782	4-3	D-15
14F1550	9-10	D-25	57G7873	4-7	D-15
14F1553	9-29	D-25	57G7934	3-3	D-13
14F1554	9-18	D-25	57G7950	2-3	D-11
14F1555	9-46	D-25	57G7951	2-3	D-11
14F1557	9-22	D-25	57G7952	2-3	D-11
14F1558	9-49	D-25	57G7953	2-3	D-11
14F1559	9-54	D-25	57G7954	2-3	D-11
14F1560	9-25	D-25	57G7955	2-3	D-11
14F1561	9-32	D-25	5767855	4-4	D-15
1621170	6-3	D-19	61F4592	6-7	D-19
	6-10	D-19		6-14	D-19
17G5839	6-11	D-19	63F2498	6-4	D-19
43G3041	8-1	D-23	63F2501	6-5	D-19
43G3061	8-5	D-23		6-12	D-19
43G3071	8-4	D-23	65X8654	6-6	D-19
	8-13	D-23		6-13	D-19
43G3074	8-3	D-23	80G3810	1-1	D-9
43G3076	8-	D-23	80G3877	4-5	D-15
43G3077	8-	D-23	80G3890	7-1	D-21
43G3084	4-6	D-15	80G3891	2-5	D-11
43G3086	8-10	D-23	80G3978	3-1	D-13
43G3087	8-2	D-23	80G4441	3-3	D-13
43G3094	8-12	D-23	80G4478	3-2	D-13
43G3096	8-8	D-23	80G4866	5-1	D-17
43G3101	8-16	D-23	80G4867	5-2	D-17
43G3105	8-14	D-23	86F2645	9-34	D-25
43G3107	8-15	D-23	86F2646	9-34	D-25
43G3111	8-11	D-23			
43G3112	8-11	D-23			
43G3117	8-9	D-23			

Bibliography

This section lists prerequisite and related publications.

Nways Switch Publications

- *2220 Nways BroadBand Switch At a Glance, an Overview*, GA33-0292
- *2220 Nways BroadBand Switch Planning Guide*, GA33-0293
- *2220 Nways BroadBand Switch Configuration Guide*, GA33-0474
- *2220 Nways BroadBand Switch Physical Lines Interface Specifications, External Cable References*, GA33-0379
- *2220 Nways BroadBand Switch Frame Relay Interface Specifications*, GA33-0374
- *2220 Nways BroadBand Switch HDLC Interface Specifications*, GA33-0375
- *2220 Nways BroadBand Switch CES Interface Specifications*, GA33-0376
- *2220 Nways BroadBand Switch ATM Interface Specifications*, GA33-0378
- *2220 Nways BroadBand Switch X.25 Interface Specifications*, GA33-0413
- *2220 Nways BroadBand Switch ISDN Interface Specifications*, GA33-0447
- *How to use the NAS*, online tutorial¹
- *2220 Nways BroadBand Switch Setup Guide*, SY33-2105 (P/N 59G0544)
- *2220 Nways BroadBand Switch Service Guide*, SY33-2121 (P/N 02L4247)
- *Nways Switch Administration Station Setup and Service Guide (Based on 7585)*, SY33-2122 (P/N 02L4248)
- *Nways Switch Administration Station Setup and Service Guide (Based on 6282)*, SY33-2123 (P/N 02L4249)
- *2220 Nways BroadBand Switch Models 300, 500, and 501; Safety Information*, GA33-0401 (P/N 80G4908)

Nways 2220 Switch Manager Publications

- *IBM Nways 2220 Switch Manager for AIX Installation Guide*, SH11-3088
- *IBM Nways 2220 Switch Manager for AIX: Performance Monitoring and Accounting*, GA33-0366
- *IBM Nways 2220 Switch Manager User's Guide*, online manual²

Related Publications

- *Link Problem Determination Aid*, SY33-2064
- *Power Supply and Telecommunication Connections*, GA33-0054
- *IBM 7855 Guide to Operation*, GA33-0160
- *IBM 7857 Guide to Operation*, GA13-1839
- *IBM 7858 Professional Modem Guide to Operation*, GA13-1981
- For 7585 Model 001: *7585 Industrial Computer Information: Installation, Operation, Hardware Maintenance*, S06H-2298
- For 7585 Model P02: *7585 P02 Industrial Computer PCI/ISA: Information, Installation, Operation, Hardware Maintenance*, S76H-3792
- *IBM Personal Computer 300 Series, 700 Series, IntelliStation; Hardware Maintenance Manual*, S83G-7789
- *Planning for Enterprise Systems Connection Links*, GA23-0367

World Wide Web

You can access the latest news and information about IBM network products, customer service and support, and microcode upgrades on the IBM World Wide Web server, via Internet, at the URL <http://www.ibm.com>

¹ Online documentation delivered with the 2220 Nways Switch Control Program.

² Online documentation delivered with the Nways 2220 Switch Manager product.

Glossary

The following are the abbreviations and technical terms used in the 2220 Nways Switch library.

2220. The IBM 2220 Nways BroadBand Switch (also called Nways Switch) is a fast packet switch enabling high-speed communications over a broadband network. It implements the functions of the IBM Networking BroadBand Services (NBBS) architecture.

2220-300. 2220 Nways Switch Model 300.

2220-500. 2220 Nways Switch Model 500.

2220-501. 2220 Nways Switch Model 501.

2220 NSM. 2220 Nways Switch Manager

AAL. ATM adaptation layer.

ABR. Availability bit rate. A best effort service with a minimum bit rate and a maximum cell loss value.

ac. Alternating current.

access services. Functions that are performed by a port adapter of the IBM 2220 Nways BroadBand Switch to:

- Support the attachment of external user devices through port lines
- Prepare user data packets
- Control the input traffic on port lines
- Manage line protocols.

active remote connector (ARC). A connector that supplies the electrical and physical interfaces between a line interface coupler type 511 (LIC511) in an Nways Switch subrack and data circuit-terminating equipment (DCE) or data terminal equipment (DTE). ARCs are housed in line connection boxes (LCBs).

adapter. An Nways Switch module that can be used, depending on its hardware type and the code that it runs, as:

Control point adapter
Port adapter
Trunk adapter
Voice server adapter.

A trunk or port adapter is associated with a line interface coupler (LIC). A voice server adapter can be associated with a voice server extension (VSE).

ADPCM. Adaptive differential pulse code modulation.

AIS. Alarm indicator signal.

AIX. Advanced Interactive Executive.

alarm and power control (APC). In an Nways Switch, a module that connects the NAS, reports alarms, and controls the power supplies.

Alert Manager. An application that processes the SNA alerts received from IBM 3746s operating in IP mode.

AMI. Alternate mark inversion.

ANSI. American National Standards Institute.

APC. Alarm and power control (module).

AR. Access rate.

ARC. Active remote connector.

asynchronous transfer mode (ATM). A high-speed, connection-oriented switching and multiplexing protocol that transmits different types of traffic (voice, video, and data) simultaneously.

ATM. Asynchronous transfer mode.

ATMAN. ATM adapter type n (module).

ATM adaptation layer (AAL). In ATM devices, a set of protocols that adapt non-ATM devices to an ATM network. There are several classes of ATM adaptation layers which represent the main traffic types (for example, data, voice, and video).

ATM network interface. A logical resource generated by the Nways Switch Control Program to provide access services to a physical ATM port or trunk line. An ATM network interface sets up and maintains predefined ATM virtual connections.

AT&T. American Telephone & Telegraph (Company).

B8ZS. Bipolar eight-zero substitution.

Bc. Burst committed.

Be. Burst in excess.

bearer service profile (BSP). A set of parameters that defines a type of ISDN traffic (speech, audio, data, or video). One BSP is associated with each ISDN numbering plan table.

BECN. Backward explicit congestion notification.

B-ICI. Broadband inter-carrier interface.

BMI. Byte multiplexer interface.

BNC. Bayonet Niell-Concelman.

bps. Bit per second.

bridge. A functional unit that interconnects two local area networks. A bridge works at the data link level (layer 2) of the OSI reference model.

broadband network. A network that uses a large frequency band to transport different kinds of traffic (such as coded voice, video, and data) at the same time.

BS. Bearer services.

BSC. Binary synchronous communication.

BSP. Bearer service profile.

BT. Burst tolerance.

bursty. Refers to transmission at variable bit rate where the time between data transmissions is not always the same.

CAC. Connection admission control.

CAS. Channel associated signaling.

CBR. Constant bit rate.

CCS. (1) Common channel signaling (2) Change control server (also called CC server).

CDB. Configuration database.

CDV. Cell delay variation.

CDVT. Cell delay variation tolerance.

cell loss priority (CLP). A priority bit in the ATM cell header. When set, it indicates that the cell can be discarded during traffic congestion.

centralized configuration database. A database prepared with the Nways Switch Configuration Tool Version 2 (NCT2) on a configuration station. It stores the parameters of a 2220 network.

CES. Circuit emulation services.

change control server (CCS or CC server). A station that runs the IBM NetView Distribution Manager for AIX to store the Nways Switch Control Program and to manage code changes.

CIR. Committed information rate.

circuit emulation services (CES). An access service that emulates a leased line. It transports information

with a constant bit rate at the source and destination. The traffic can be PCM voice, video, fax, multimedia, or real-time synchronous data (such as BSC).

CLIP. Calling line identification presentation.

CLIR. Calling line identification restriction.

CLK. Clock (module).

CLKRD. Clock redrive (module).

clock module (CLK). A module of the 2220 Model 300 or 500 that transmits clock signals to the line interface couplers (LICs). It is optional and can have a backup.

clock redrive (CLKRD). A module of the 2220 Model 501 that drives the signals from the Model 500 clock module to the adapters of the Model 501. The clock redrive is optional and can have a backup.

clock references. In an Nways Switch, the software function that controls the transmission of clock signals to the LICs where they are used for bit synchronization.

CLP. Cell loss priority.

CMIP. Common management information protocol.

CMIS. Common management information services.

CMOT. CMIP over TCP/IP.

CNM. Communication network management.

code file. A named set of records stored as a unit in a change control server. An Nways Switch code file can include data or internal code.

COLP. Connected line identification presentation.

COLR. Connected line identification restriction.

configuration station. See Nways Switch configuration station.

control point (CP). In an Nways Switch, a logical resource that provides network control functions. It can have a backup.

CP. Control point.

CPA. Control point adapter (module).

CPE. Customer premises equipment.

CP spanning tree. In a 2220 network, a distribution tree that connects the Nways Switch control points through trunk lines.

The CP spanning tree supplies a very fast and efficient way to multicast control messages such as network topology data.

CRC. Cyclic redundancy check.

CSU. Channel access unit.

CTD. Cell transfer delay.

data circuit-terminating equipment (DCE). An equipment installed on a user premises that provides all the functions required to establish, maintain, and terminate a connection, and to do the signal conversion and coding between a data terminal equipment (DTE) and a line. A DCE can be separate piece of equipment or part of other equipment.

data terminal equipment (DTE). That part of a data station that serves as data source, data sink, or both, and provides the data communication control function depending on the type of protocol used.

dB. Decibel.

dBm. Decibel based on 1 milliwatt.

DC48. Dc power input type -48V

dc. Direct current.

DCD. Dc distribution (module).

DCE. Data circuit-terminating equipment.

DDI. Direct dialing-in.

DE. Discard eligibility.

decibel (dB). (1) One tenth of a bel. (2) A unit that expresses the ratio of two power levels on a logarithmic scale. (3) A unit for measuring relative power. The number of decibels is 10 times the logarithm (base 10) of the ratio of the measured power levels; if the measured levels are voltages (across the same or equal resistance), the number of decibels is 20 times the log of the ratio.

decibel based on 1 milliwatt (dBm). A unit of absolute power measurement that is scaled such that 0 dBm equals 1 milliwatt.

dialog box. On the screen of a station, an area with entry fields and push buttons. (Also called dialog.)

DLCI. Data link connection identifier.

DNPT. Destination numbering plan table.

DSP. Digital service processor.

DSU. Data service unit.

DTE. Data terminal equipment.

DTMF. Dual-tone modulation frequency.

DTR. Data terminal ready.

dummy module. In an Nways Switch, a cover inserted in the place of a module to ensure correct air cooling inside a logic subrack. During normal operation, the dummy modules must not be removed.

E1 standard. A European standard for TDM digital transmission service at 2.048 Mbps.

E3 standard. A European standard for TDM digital transmission service at 34.368 Mbps. An E3 line can transport up to 16 E1 circuits.

E&M. Earth & mark.

ECMA. European Computers Manufacturers Association.

EIA. Electronics Industries Association.

equivalent capacity. The minimum amount of bandwidth needed by a connection to ensure that the packet loss ratio is below a specified threshold.

ESF. Extended status flags.

ETS. European telecommunication standard.

FANB. Fan box.

FAT. File allocation table.

fax. Document received from a facsimile machine. Synonym for telecopy.

FCS. Frame check sequence.

FDDI. Fiber Distributed Data Interface.

FE1. Fractional E1.

FECN. Forward explicit congestion notification.

FEP. Front-end processor.

fiber. Synonym for optical fiber.

fiber budget. The optical power loss as result of the number of connections in the optical fiber link subtracted from the working budget. The loss as a result of connections includes connector loss and splice loss. The fiber budget is expressed in decibels.

Fiber Distributed Data Interface (FDDI). A U.S. standard for 100 Mbps token-ring LANs using optical fiber cables over distances of several kilometers.

fiber optic cable. Synonym for optical fiber.

FR. Frame relay.

FRAD. Frame-relay access device.

frame relay (FR). A connection-oriented protocol to transport data frames over a fast packet-network with guaranteed end-to-end quality of service.

FRFH. Frame-relay frame handler.

front-end processor (FEP). A processor, such as the IBM 3745, 3746 Model 900 or 950, or 3174, that relieves a main frame from communication control tasks.

FRTE. Frame-relay terminal equipment.

FRU. Field replaceable unit.

FT1. Fractional T1.

FTP. File transfer protocol.

Gbps. Gigabit per second (10 to the power of 9 bits per second).

GCRA. Generic cell rate algorithm.

GFP. Generic function protocol.

GFT. Generic function transport.

GSM. Group special mobile.

GUI. Graphical user interface.

HDB3. High-density bipolar 3.

HDLC. High-level data link control.

high-level data link control (HDLC). A data network protocol.

hot pluggable. Refers to a hardware component that can be installed or removed without disturbing the operation of any other resource that is not connected to, or dependent, on this component.

HPFS. High-performance file system.

HPRI. High priority.

HSA_n. High-speed adapter type n (module).

HSDS. High-speed digital services.

HSSI. High-speed serial interface.

hub (intelligent). A wiring concentrator, such as the IBM 8260, that supplies bridging and routing functions for LANs with different cables and protocols.

hunt group. See X.25 hunt group.

IDNX. Integrated Digital Network Exchange.

IE. Information element.

ILMI. Interim local management interface.

IMU. Inverse multiplexing unit

Integrated Digital Network Exchange (IDNX). A processor integrating voice, data, and image applications. It also manages transmission resources and connects to multiplexers and network management support systems. It permits integration of equipment from different vendors.

integrated services digital network (ISDN). A digital end-to-end public or private network that supports multiple services including, but not limited to, voice and data.

IP. Internet Protocol.

IP gateway adapter. In an Nways Switch, a port adapter that routes the IP control between the NAS and the network management station.

ISDN. Integrated services digital network.

ISDN network interface. A logical resource generated by the Nways Switch Control Program to provide access services to a physical ISDN or QSIG port line. An ISDN network interface sets up and maintains connections between calling ISDN terminal equipments and called terminal equipments attached through other Nways Switches.

ISO. International Organization for Standardization.

isochronous. Refers to transmission at a constant bit rate where there is a clock relationship between source and destination. The bit rates are the same on the destination and source.

ITU-T. International Telecommunication Union - Telecommunication (replaces CCITT).

jitter. Undesirable variations in the transmission delay of a digital signal. Also called cell delay variation (CDV).

KB. Kilobyte (storage capacity, 1024 bytes).

kbps. Kilobit per second (1000 bits per second).

LAN. Local area network.

LAPB. Link access procedure for B-channel.

LAPD. Link access procedure for D-channel.

LCB. Line connection box.

LCBB. Line connection box, base (LCEB and LCPB).

LCBE. Line connection box, expansion (LCEE and LCPE).

LCEB. Line connection enclosure, base.

LCEE. Line connection enclosure, expansion.

LCPB. Line connection power, base.

LCPE. Line connection power, expansion.

LCR. Least cost routing.

LED. Light-emitting diode.

LICn. Line interface coupler type n (module).

line. In a 2220 network, any physical medium, such as a telephone wire, microwave beam, or optical fiber, that transmits information. A line can be a trunk line or a port line.

line connection box (LCB). A metallic box that:

- Multiplexes up to 15 low-speed lines. There can be up to four LCBs per LIC type 511 for a total of 60 lines (two LCBs and 30 lines per LIC connector).
- Reduces cable lengths between Nways Switch and DCE or DTE locations.

An LCB fits in a standard 19-inch rack. Each one houses up to 15 active remote connectors (ARCs).

line interface coupler (LIC). In an Nways Switch, a module that physically attaches trunk or port lines. Each line interface coupler is associated with a trunk or port adapter, and supports specific line interfaces.

LIV. Link integrity verification.

LMI. Local management interface.

local area network (LAN). A computer network located on a user premises in a limited geographical area.

logical port. (Also called NBBS port.) A logical resource generated by the Nways Switch Control Program to provide access services to a physical port line (or channel of a TDM port line) using HDLC, FR, or CES protocol. A logical port sets up and maintains its predefined connections.

logical trunk. (Also called NBBS trunk.) A logical resource generated by the Nways Switch Control Program to provide transport services to a physical trunk line (or channel of a TDM trunk line). A logical trunk is mainly responsible for optimizing bandwidth and maintaining the CP spanning tree.

LSAn. Low-speed adapter type n (module).

MA/SR. Multi-access/sub-rate.

management access. Refers to an Nways Switch that connects a network management station or a change control server to a 2220 network through its service bus, which is a dedicated Ethernet LAN.

MB. Megabyte (storage capacity, 1 048 576 bytes).

Mbps. Megabit per second (10 to the power of 6 bits per second).

MBS. Maximum burst size.

MLT. Multiple logical trunks.

module. In an Nways Switch, a hardware unit plugged in a slot of the logic subrack. It houses, for example, an adapter, a line interface coupler, or a voice server extension. All modules are hot pluggable.

ms. Millisecond (1/1000 second).

NAS. Nways Switch administration station.

NBBS. Networking BroadBand Services (architecture).

NBBS architecture. See Networking BroadBand Services.

NBBS connection. See potential connection and virtual connection.

NBBS network. A network built with IBM 2220 Nways BroadBand Switches and conforming to the IBM Networking BroadBand Services (NBBS) architecture.

NBBS port. See logical port.

NBBS trunk. See logical trunk.

NCT2. Nways Switch Configuration Tool Version 2.

NDPS. Non-disruptive path switching.

NEM. Nways Enterprise Manager (see 2220 Nways Switch Manager).

network control. Functions that are performed by an Nways Switch control point to:

- Allocate and control the Nways Switch resources
- Provide topology and directory services

- Select routes
- Control congestion.

network management station (NMS). A station that runs IBM NetView for AIX and the 2220 Nways Switch Manager. It is used to manage network topology, accounting, performance, configuration, and error reporting.

network node interface (NNI). An interface between nodes in a communication network.

Network Support Center (NSC). A location from which IBM remotely supports 2220 networks.

Networking BroadBand Services (NBBS). An IBM architecture for high-speed networking that complements ATM standards and provides access services, transport services, and network control to user traffic.

NIC. Network Information Center.

NMS. Network management station.

NNI. Network node interface.

NPT. Numbering plan table.

NR. Non-reserved.

NRT. Non-real-time.

NRZI. Non-return-to-zero inverted recording.

NRZ-1. Non-return-to-zero change-on-ones recording.

NSAP. Network service address point.

NSC. Network Support Center.

NSM. (See 2220 Nways Switch Manager)

NVDM. NetView Distribution Manager for AIX.

NTT. Nippon Telegraph & Telephone (Corporation).

numbering plan table (NPT). A set of parameters, organized in origin NPT and destination NPT, that defines a type of called ISDN numbers. A numbering plan table is associated with each ISDN network interface.

Nways 2220 Switch Manager (2220 Switch Manager). An IBM licensed program that runs under NetView for AIX to manage the 2220 Nways Switch operation and configuration from a network management station. It replaces the Nways Enterprise Manager (NEM) which is no longer available.

Nways BroadBand Switch. Synonym for 2220 Nways BroadBand Switch.

Nways Enterprise Manager (NEM). An IBM licensed program that was used under NetView for AIX in a network management station to manage Nways Switches, routers, and bridges in a 2220 network (see 2220 Nways Switch Manager).

Nways Switch. Synonym for 2220 Nways BroadBand Switch.

Nways Switch administration station (NAS). A station attached to each 2220 to run the Control Program, and control and service the Nways Switch locally.

Nways Switch configuration station. A mandatory OS/2 or AIX station that runs a stand-alone version of the Nways Switch Configuration Tool Version 2 (NCT2) and stores the centralized configuration database of the NBBS network. An OS/2 station can be used as a remote user console.

Nways Switch Configuration Tool Version 2 (NCT2). A component of the Nways Switch Control Program that is used to configure physical and logical resources. It is also used in stand-alone version under OS/2 or AIX .

Nways Switch Control Program. The IBM licensed program that runs in the NAS and adapters of the 2220 Nways Switch. It includes a CMIP agent to work with the 2220 Switch Manager.

Nways 2220 Switch Manager for AIX. (See Nways 2220 Switch Manager)

Nways Switch Resource Control. A component of the Nways Switch Control Program. It is used from the NAS of an Nways Switch or from a remote user console to control resources and configuration files.

OAM. Operation, administration, and maintenance.

OC3. Optical carrier level 3.

ONPT. Origin numbering plan table.

operation, administration, and maintenance (OAM). A group of functions coded in specific ATM cells to handle alarms and loopback tests on ATM connections.

optical fiber. In fiber optics technology, a wave guide that propagates optical signals from light-generating transmitters to light-detecting receivers.

OSI. Open systems interconnection.

packet loss ratio. The probability that a packet will not reach its destination or not reach it in a specified

time. It is obtained by dividing the number of packets lost in transmission by the total number transmitted.

packet transfer mode (PTM). The native transfer mode of the NBBS architecture. PTM divides the traffic into packets of variable length.

PBX. Private branch exchange.

PCM. Pulse code modulation.

PCR. Peak cell rate.

PDH. Plesiochronous digital hierarchy.

permanent virtual circuit (PVC). A virtual circuit that has a logical channel permanently assigned to it at each item of data terminal equipment. It is activated by a program or by a network operator request.

plesiochronous. Refers to transmission at a nominal bit rate where the source and destination are controlled by different clocks. The bit rates are nearly the same.

PLP. Packet layer protocol.

PNP. Private numbering plan.

port. See logical port.

port adapter. In an Nways Switch, a module that provides access services to one or more port lines. Each port adapter is associated with a line interface coupler (LIC).

port line. A communication line that connects a device on user premises to an Nways Switch and serves as a port to the 2220 network. Port lines have different protocols and interfaces.

position. When configuring an Nways Switch, the position parameter indicates the line attachment number on the LIC module (1 to 8, depending on the LIC type).

potential connection. A predefined connection through a 2220 network between two HDLC, CES, or frame-relay devices.

PPP. Point-to-point protocol.

PRA. Primary Rate Access.

private branch exchange (PBX). A switching system located on a user premises that relays inside lines (extensions) and provides access to the public telephone network.

PRS. Primary reference source.

PSDN. Packet switched data network.

PSN. Public switched network.

PSTN. Public switched telephone network.

PTF. Program temporary fix.

PTM. Packet transfer mode.

PTNX. Private telecommunications network exchange.

pulse code modulation (PCM). A standard adopted for the digitalization of analog voice signals. In PCM, voice is sampled at a rate of 8 kHz and each sample is coded in an 8-bit frame.

PVC. Permanent virtual circuit.

Q signaling (QSIG). An international standard for signaling procedures in private telecommunication networks. It applies to the PBX-to-Nways Switch interface, which is called the Q reference point.

QoS. Quality of service.

QSIG. Q signaling.

quality of service (QoS). In a 2220 network, a set of parameters that guarantees the characteristics of a connection, mainly its end-to-end delay, delay variation, and packet loss tolerance.

RABM. Router and Bridge Manager.

rack. A metallic structure, with a standard 19-inch width, that houses the hardware elements of an Nways Switch, that is, logic subrack with modules, fan boxes, and power units.

When configuring an Nways Switch, the rack parameter indicates the 2220 Model (rack A is the Model 300 or 500, and rack B is the Model 501).

RDI. Remote defect indication.

real-time processing. Refers to the manipulations of data that are required, or generated, by certain process while the process is in operation. Usually, the results influence the process and, perhaps, related processes.

remote user console. A station running OS/2, TCP/IP, and Nways Switch Resource Control. It can be connected to the NAS of an Nways Switch to remotely control and service it.

resource. In an Nways Switch, a hardware element or a logical entity created by the Control Program. Adapters, modules, and line attachments are examples of physical resources. Control points, logical trunks, logical ports, and network interfaces are examples of logical resources.

resource profile. A record of the characteristics of an Nways Switch resource. It includes (for example) the

part number or module name, the change level, and the name and phone number of the person to contact when a problem occurs.

RETAIN. Remote Technical Assistance Information Network

RIP. Route Information Protocol.

router. An attaching device that connects two LAN segments of the same or different architectures. It can also be connected to a wide area network. A router works at the network level (layer 3) of the OSI reference model by determining the best paths for network traffic flows.

Router And Bridge Manager. An application that provides distributed management for routers such as the IBM 2210 or 2216, bridges such as the IBM 8229, and communication controllers such as the IBM 3746 in IP mode.

RS. Recommended specification.

RSF. Remote support facility.

RSN. Receive sequence number.

RT. Real-time.

RVX. RS/EIA-232, V.24/V.35, X.21.

s. Second.

SCR. Sustainable cell rate.

SDH. Synchronous digital hierarchy.

SDLC. Synchronous data link control.

SDT. Structured data transfer.

serial line internet protocol (SLIP). A TCP/IP protocol used on a point-to-point connection between two IP hosts over a serial line (for example, an RS/EIA-232 connection to a modem over a telephone line).

SLA. Serial link architecture.

SLIP. Serial line internet protocol.

slot. When configuring an Nways Switch, the slot parameter indicates the module location (1 to 12) in the logic subrack.

SNA. Systems Network Architecture.

SNMP. Simple Network Management Protocol.

SONET. Synchronous optical network.

spanning tree. See CP spanning tree.

SRC. System reference code.

SSN. Send sequence number.

station. A microcomputer that is connected to a host or a network and at which a user can run applications.

STM-1. Synchronous transport module type 1.

STS-3c. Synchronous transport signal type 3 concatenated.

SUB. Subaddress.

subrack. A metallic structure installed in an Nways Switch rack. A logic subrack holds modules. A power subrack holds power supply components.

SVC. Switched virtual circuit.

SW. Switch (module).

switch module (SW). A module of the 2220 Model 300 or 500 that interconnects the adapters through an ATM cell switch. It can have a backup.

switch redrive (SWRD). A module of the 2220 Model 501 that drives the signals from the switch module in the Model 500 to the adapters of the Model 501. It can have a backup.

SWRD. switch redrive (module)

switched virtual circuit (SVC). A connection set up from a calling address to a called address following a call establishment protocol. It is released when a clear request signal is received.

synchronous digital hierarchy (SDH). A international recommendation for the internal operation of carrier optical networks.

synchronous optical network (SONET). A U.S. standard for transmitting digital information over optical interfaces. It is closely related to the international recommendation for synchronous digital hierarchy (SDH).

T1 standard. A TDM digital transmission service with a basic rate of 1.544 Mbps. Also called DS-1.

T3 standard. A TDM digital transmission service with a basic rate of 44.736 Mbps. A T3 line can transport up to 28 T1 circuits. Also called DS-3.

TCPA. Trunk and control point adapter.

TCP/IP. Transmission Control Protocol/ Internet Protocol.

TDM. Time division multiplexing.

TE. Terminal equipment.

Telnet. In TCP/IP, an application protocol that allows a user at one site to access a remote system as if the display station were locally attached. Telnet uses the Transmission Control Protocol (TCP) as the underlying protocol.

time division multiplexing (TDM). The process of breaking the bandwidth on a communication line into a number of channels, possibly of different size.

TME. Tivoli Management Environment.

TMN. Telecommunication Management Network.

TPA. Trunk or port adapter.

Transmission Control Protocol/ Internet Protocol (TCP/IP). A set of communication protocols that support peer-to-peer connections over both local and wide area networks.

transport services. Functions that are performed by a trunk adapter of an Nways Switch to:

- Support the attachment of trunk lines
- Maximize bandwidth utilization
- Guarantee the quality of service of a connection
- Transfer packets between Nways Switches
- Manage logical queues and schedule transmission.

trunk. See logical trunk.

trunk adapter. In an Nways Switch, a module that provides transport services to one or more trunk lines. Each trunk adapter is associated with a line interface coupler (LIC).

trunk line. In a 2220 network, a high-speed line connecting two Nways Switches. It can be, for example, a copper cable, optical fiber, or radio wave guide and can be leased from telecommunication companies.

UBR. Unspecified bit rate. A best effort service with no quality commitment.

UNI. User network interface.

UPC. Usage parameter control.

URL. Uniform resource locator.

user network interface (UNI). A standardized interface between a user and a communication network.

UTC. Universal time, coordinated.

UUS. User-user signaling.

VBR. Variable bit rate.

VC. Virtual channel.

VCC. Virtual channel connection.

VCI. Virtual channel identifier.

VCN. Virtual circuit number.

virtual channel (VC). In ATM, a unidirectional route between two ATM devices. Virtual channels always come in pairs, one in each direction. They follow virtual paths.

virtual channel connection (VCC). In ATM, a unidirectional connection established over a virtual channel. Virtual channel connections always come in pairs, one VCC in each direction.

virtual channel identifier (VCI). In ATM, the unique numeric tag that identifies every channel. It is defined by a 16-bit field in the ATM cell header.

virtual connection. In frame relay, the return path of an FR potential connection.

virtual path (VP). In ATM, a group of virtual channels that are switched together as one unit. (Also called VC service.)

virtual path connection (VPC). In ATM, a connection established over a virtual path. Virtual path connections always come in pairs, one VPC in each direction. (Also called VP service.)

virtual path identifier (VPI). In ATM, an 8-bit field in the ATM cell header that indicates the virtual path over which the cell is to be routed.

voice server adapter (VSA). In an Nways Switch, a module that supplies additional voice functions to voice connections operating in pulse code modulation at 64 kbps. It can attach a voice server extension (VSE).

voice server extension (VSE). In an Nways Switch, a module associated with a voice server adapter (VSA) to supply voice functions to an extended number of PCM voice connections.

VP. Virtual path.

VPC. Virtual path connection.

VPD. Vital product data.

VPI. Virtual path identifier.

VPN. Virtual private network.

VSA. Voice server adapter (module).

VSEn. Voice server extension type n (module).

WAN. Wide area network.

wide area network (WAN). A network that provides communication services to a large geographic area. It can use or provide public communication facilities.

window. On the screen of a station, an area with a title bar, a menu bar, and scroll bars.

X.25 hunt group. A group of X.25 network interfaces associated with one common subscriber address. If an interface is busy, the connection searches (hunts) for

the other interfaces of the group until a free one is found.

X.25 network interface. A logical resource generated by the Nways Switch Control Program to provide access services to a physical X.25 port line. An X.25 network interface sets up and maintains connections between calling X.25 subscribers and called subscribers attached to other Nways Switches.

X.25 Recommendation. An international standard for the interface between data terminal equipments and packet-switched networks.

X.25 subscriber. An X.25 end-user connected to an X.25 network interface through a DTE. A subscriber is defined by an address and a logical name.

Index

Numerics

2220 FRU exchange 6-1
2220 models 2-2
2220 problem determination 5-1
 basic verification 5-2

A

address
 how to find a TCP/IP address 3-20

B

Broadband network 2-1

C

clock module
 LED segment reference B-1
 shipping group tools B-2
control panel functions 2-3

D

diagnostics 4-1

H

how to
 display the control program inventory and
 level 3-22
how to display 3-8, 3-11, 3-13
 Alarm Desk 3-11
 CMIP status 3-8
 configuration 3-13
 test event desk 3-18
how to find
 a TCP/IP address 3-20
how to perform
 emergency trunk unlock 3-26
how to remove
 a line or trunk cable 3-24

I

IP address
 how to find a TCP/IP address 3-20

O

Opening
 doors and covers 6-6

P

parts catalog D-1
power consumption C-1

S

service procedure 1-1

Readers' Comments — We'd Like to Hear from You

**2220 Nways BroadBand Switch
Models 300, 500, and 501
Service Guide**

Publication No. SY33-2121-00

Please send us your comments concerning this book. We will greatly appreciate them and will consider them for later releases of the present book.

If you prefer sending comments by FAX or electronically, use:

- FAX: 33 4 93 24 77 97
- IBM Internal Use: LGERCF at IBMFR
- Internet: lgercf@fr.ibm.com

In advance, thank you.

Your comments:

Name

Address

Company or Organization

Phone No.



Fold and Tape

Please do not staple

Fold and Tape

PLACE
POSTAGE
STAMP
HERE

IBM France
Centre d'Etudes et Recherches
Service 0798 - BP 79
06610 La Gaude
France

Fold and Tape

Please do not staple

Fold and Tape



Part Number: 02L4247

Printed in Denmark by IBM Danmark A/S

SY33-2121-00



02L4247

