**PC Server Enterprise
Expansion Enclosure (Type 3518)**

**Hardware Maintenance
Manual Supplement**

January 1996

**Use this supplement with the
PS/2 Hardware Maintenance Manual
and PC Servers Hardware
Maintenance Manual Supplement**

IBM

First Edition (January 1996)

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About This Supplement

This supplement contains the following service information for the PC Server Enterprise Expansion Enclosure (Type 3518).

Diagnostic information
Error codes and messages
Parts Listing
Symptom-to-FRU Index Supplement

This supplement should be used with the advanced diagnostic tests and the information in the IBM *Personal System/2 Hardware Maintenance Manual* (part number 83G8990, form number S52G-9971) and the IBM PC Servers Hardware Maintenance Manual Supplement (part number 30H2501, form number S30H-2501) to troubleshoot problems effectively.

Important

This manual is intended for trained servicers who are familiar with IBM PC Server products.

Before servicing an IBM product, be sure to review "Safety Information" in your manual.

Related Publications

The following publications are available for IBM products. For more information, contact IBM or your IBM Authorized Dealer.

For Information About	See Publication
PS/2 Computers	IBM Personal System/2 Hardware Maintenance Manual (S52G-9971)
PS/ValuePoint Computers	IBM PS/ValuePoint Hardware Maintenance Service and Reference (S61G-1423)
Laptop, Notebook, and Portable Computers	IBM Mobile Systems Hardware Maintenance Manual Volume 1 (S82G-1501)
ThinkPad computers	IBM Mobile Systems Hardware Maintenance Manual Volume 2 (S82G-1502)
ThinkPad computers	IBM Mobile Systems Hardware Maintenance Manual Volume 3 (S82G-1503)
Monitors (Displays)	IBM Display Hardware Maintenance Manual (SA38-0053) IBM Monitor Hardware Maintenance Manual (S71G-4197)
Disk Array technology overview and using the IBM RAID Configuration Program	Configuring Your Disk Array booklet (S82G-1506)
Installation Planning for Personal System/2 computers	Personal System/2 Installation Planning and Beyond (S41G-2927)

Contents

PC Server Enterprise Expansion Enclosure (Type 3518)

Systems Supported

There are two requirements for system units to support the PC Server Enterprise Expansion Enclosure (Type 3518). The requirements are:

1. Code to support up to 4 or more SCSI adapters
2. Already support 68 pin SCSI-2 adapters

The systems currently supported are:

Model 85
Model 95
Server 320
Server 500
Server 520
Server 720
Any future servers that meet the above requirements.

Features (Type 3518)

Expansion Bays

20 drive bays, 18 of which are hot-swap bays

Options Supported

Up to 18 slim-high or 9 half-high hot-swap hard disk drives
(1 GB, 2 GB, and 4 GB)
Tape autoloader
4/10 GB 3.5 Inch DAT tape drive
CD-ROM drive

Security Features

Bolt-down capability
DASD Door lock
Security cover (optional)

Information Panel

Two 16-character lines
LCD display of diagnostic and status information

Integrated Functions

LED usability support

Power Supply

470-watt with automatic range voltage selection
(115-230 V ac)
Built-in overload and surge protection
Power supply upgrade expansion option
– 220-watt automatic range voltage selection
– Built-in overload and surge protection
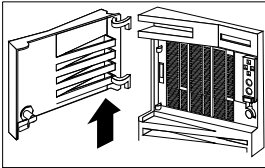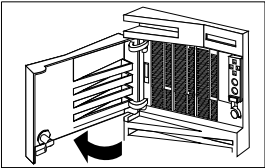
Diagnostics and Test Information (Type 3518)

The following is a list of problems and references for diagnosing the Type 3518 Expansion Enclosure.

Problem	Reference
Error Codes/Error Messages	"Symptom-to-FRU Index (Type 3518)" on page 25
Hot Swap Drives	"Hot Swap Tray (FRU No. 06H8631, 07H0774)" on page 10
Hot Swap Tray LED indications	"Hot Swap Tray (FRU No. 06H8631, 07H0774)" on page 10
Power Supply Voltages	See "Power Supplies (Type 3518)" on page 20

Locations (Type 3518)

DASD Door

Expansion Bays
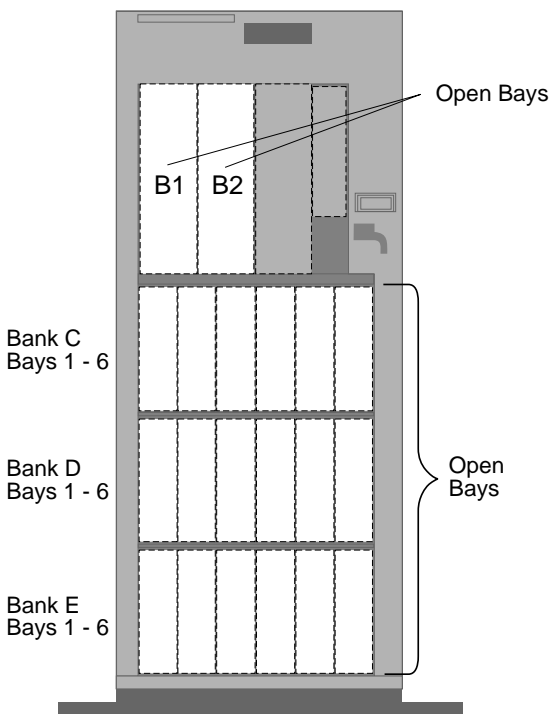
Bays/Banks	Supported Devices
Bays B1 and B2	CD-ROM drives, internal SCSI hard disk drives, or tape drives
Banks C, D, and E	Up to 18 SCA, hot-swap, 3.5-inch hard disk drives

Front Cover

Front Panel Controls

Enter Button
Power On/Off Button
Power Enable Switch
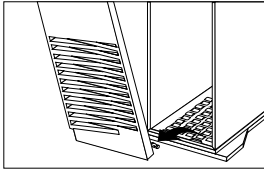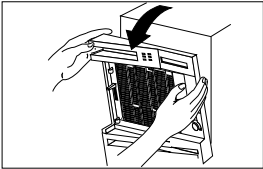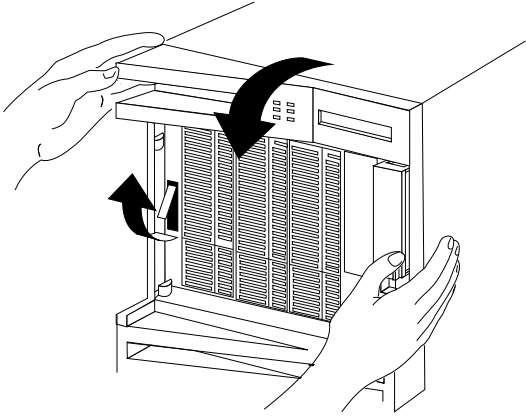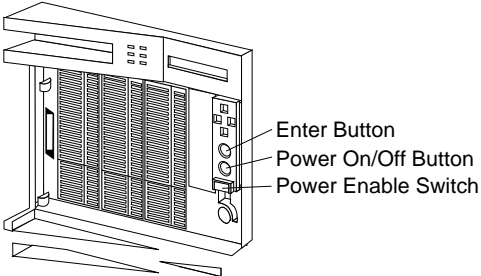
Identification Numbers

Serial Number
Machine Type/Model
Handle

Key Tag
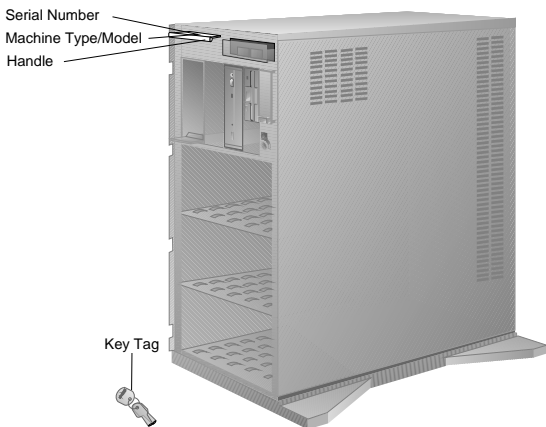
Input/Output Connectors

- **Note**

The following illustration shows the rear view of the
Type 3518 Expansion Enclosure.

SCSI Connector
Knockouts

SCSI Connector

Power Connector
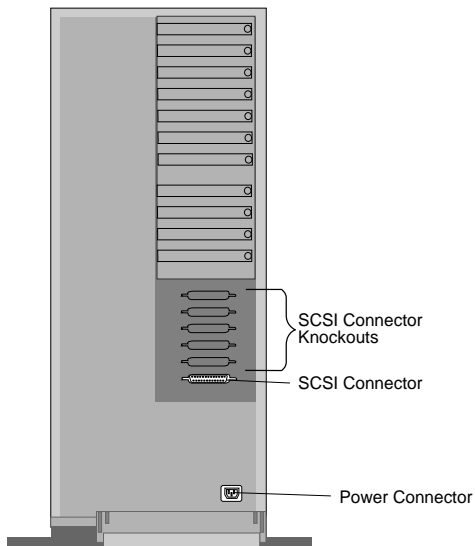
Hot Swap Backplane (FRU No. 06H8629)
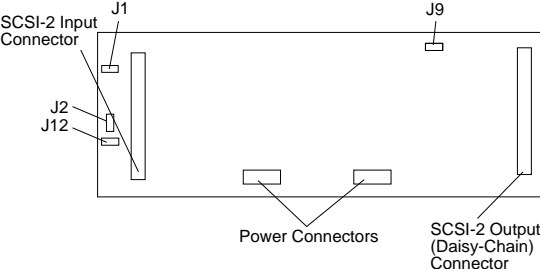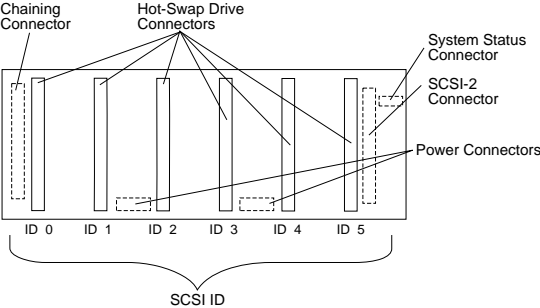
J12 Backplane SCSI ID Jumper Settings:

The Backplane SCSI ID Address Jumper, a pin block with four pairs of pins (J12), is located on the rear of the backplanes in banks C, D, and E. When two backplanes are daisy-chained in the enclosure, the first backplane address jumper (for example, Bank C) must be set to LO, defining the SCSI IDs as 0 through 5. The second backplane (in this example, bank D), must be set to either Reverse, defining the SCSI IDs as 5 through 0, or HI, defining the SCSI IDs as 8 through D. The default, no jumper installed, is to set the addresses to LO.

If the SCSI adapter supports more than eight SCSI devices per SCSI channel, the second backplane can be set either HI or Reverse. However, if the SCSI adapter supports eight or less SCSI devices per channel, the second backplane must be set to Reverse.

The following jumper settings are for SCSI ID jumper J12.

Jumper Position	Description
J12 2 4 6 8 / 1 3 5 7 LO	Sets SCSI IDs to low, starting from 0 (bay 1) to 5 (bay 6)
J12 2 4 6 8 / 1 3 5 7 LO	Sets SCSI IDs to reverse, starting from 5 (bay 1) to 0 (bay 6)
J12 2 4 6 8 / 1 3 5 7 HI	Sets SCSI IDs to high (SCSI IDs 8 to D)

Hot Swap Tray (FRU No. 06H8631, 07H0774)

> **Notes**
>
> 1. The following trays are shown with drives installed.
> 2. Each hot-swap drive installed must have a Hot Swap Drive Tray attached.
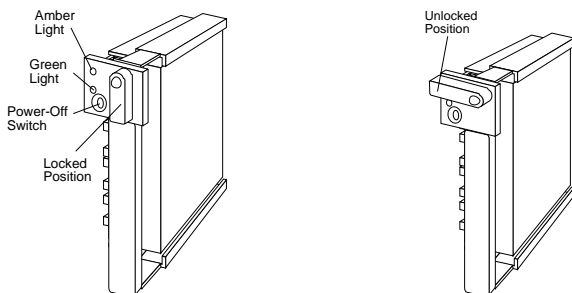
The Hot Swap Drive Tray for the expansion enclosure has a small switch that stops the movement of the disk drive. The tray also provides two LEDs (one green and one amber) to indicate the current state of the drive and tray. The following table summarizes the LED states on the hot-swap tray and their meanings.

Green	Amber	Description
On	Off	The Drive tray is powered on; the hard disk drive is inactive; and the drive should *not* be removed.
Blinking	Off	The hard disk drive is inactive. The hot-swap drive can be removed safely.
On	On or Blinking	The hard disk drive is in use, and should *not* be removed.
Off	Off	The drive is defective, or no power is being supplied to the drive. The hot-swap drive can be removed safely.

Front Panel LED Status Indicators

Power OK Indicator

Power Enable Indicator

All Subsystems
Good Indicator

Processor Complex
Error Indicator

Information Panel
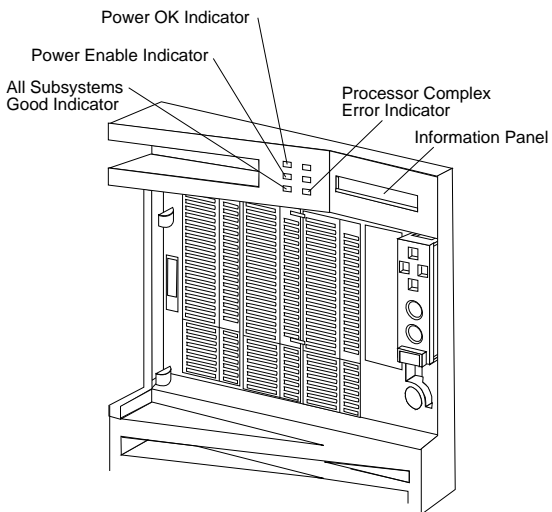
Side Cover
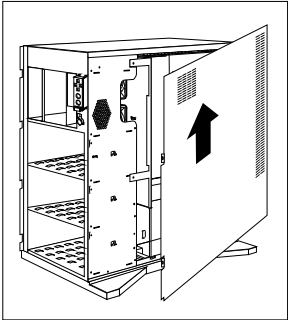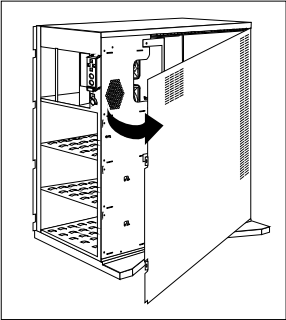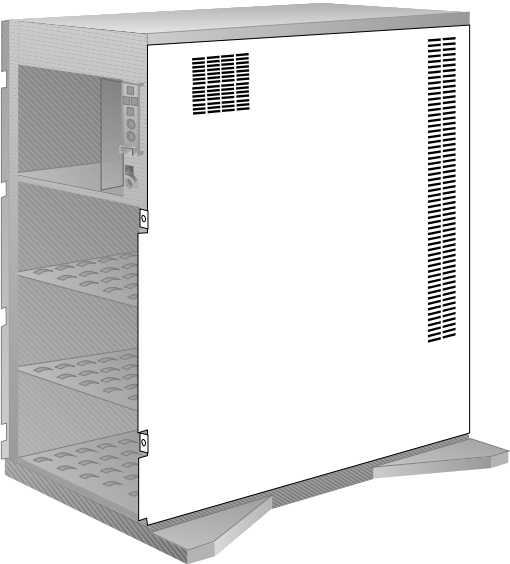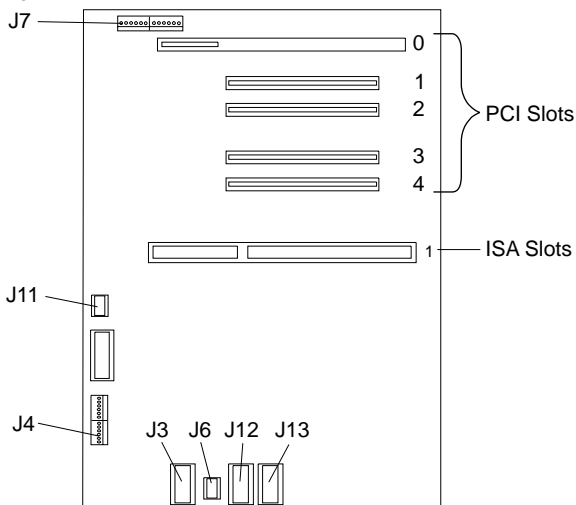
System Board

System Board Connections

Connector	Description	Connect To
J3	Power Supply Connector	P1
J6	Power Supply Connector	P3
J7	Operator Panel Connector	Operator Panel
J12	Power Supply Connector	P2
J13	Power Supply Connector	P2A

Note

The following slots/connectors on the system board are not currently supported.

Slots/Connectors	Description
PCI Slot 0	64 Bit PCI connector
PCI Slots 1 to 4	32 Bit PCI connectors
ISA Slot 1	System Maintenance Adapter for Reporting Trouble (SMART) ISA Card
J11	C2 Security Connector

U-Bolt Security (Optional)
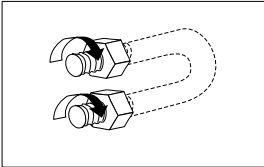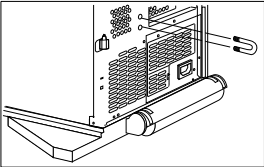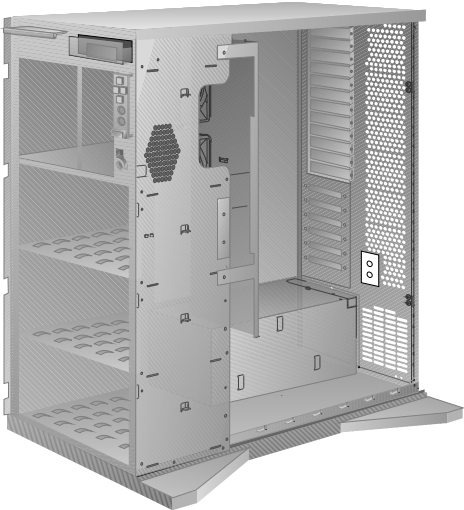
Parts Listings (Type 3518)
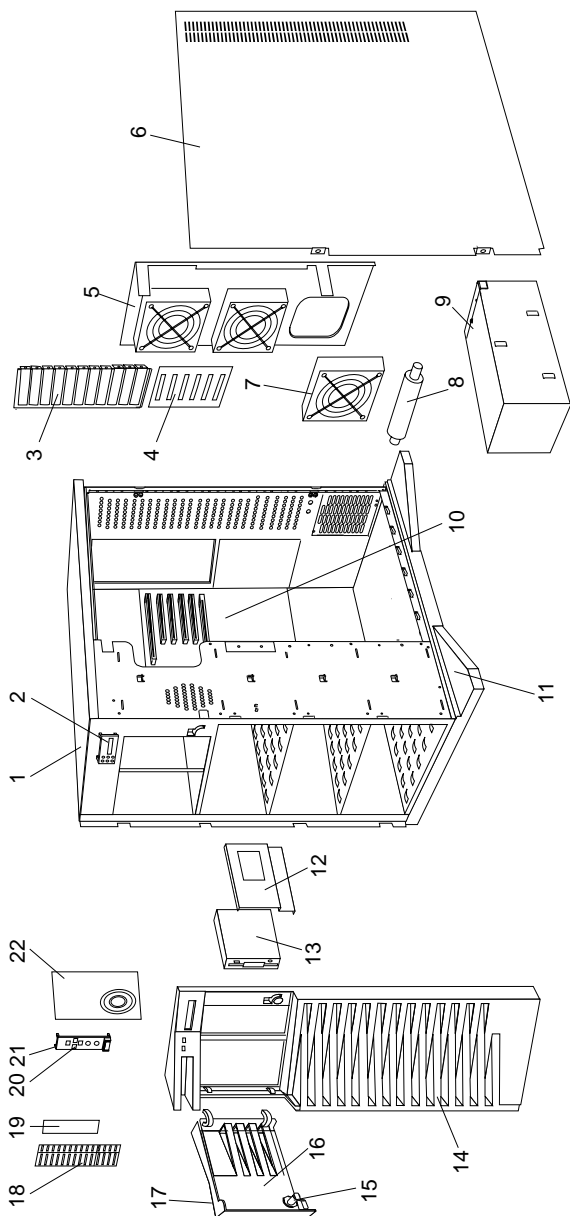
Index	System Unit (Type 3518)	
	Index System Unit (Type 3518)	
1	Base Frame (4X CD-ROM)	06H8685
2	Information Display Assembly	82G3614
	Display Panel Support	06H7961
3	I/O Panel Die Cast	06H8657
	(Additional Micro Channel Blanks)	
4	I/O Flex Plate	06H8627
5	Fan Mounting Support	82G3618
6	Right Side Door	82G3594
7	Fan Assembly	82G3616
8	Pedestal Wheel	82G3609
9	470 Watt Power Supply	06H3589
	220 Watt Power Supply Upgrade	06H3237
10	System Board (Planar)	06H8625
11	Pedestal	82G3608
12	DASD Tray - Hot Swap (Wide)	06H8631
12	DASD Tray - Hot Swap (Narrow) - Optional	07H0744
	(for Option 70G8492)	
13	Hard Disk Drive - Optional	
14	Front Bezel with Shield (4X CD-ROM)	06H9379
15	Keylock with Keys	82G3606
16	DASD Door	82G3596
17	IBM Logo (Restricted)	82G3601
18	5.25-Inch Blank Bezel (4X CD-ROM)	06H8684
19	Diskette Drive Bezel	06H8670
20	Rubber Dome Switch Pad	06H7873
21	Control Panel Bezel	82G3607
22	Control Panel Card Assembly	75H7652
	4 mm DAT Autoloader - Optional	06H7514
	Control Panel Cable Jumper	06H8663
	DASD Mounting Plate	82G3602
	Hinges with Screws	82G3600
	Hot Swap Back Plane Assembly	06H8629
	Hot Swap Cam Spring, Shaft/Knob	07H0498
	Miscellaneous Parts Kit	82G3611
	Screws (4 each)	
	Lock Pawl (1 each)	
	EMI Ground Clip (4 each)	
	System Board Mounting Clip (2 each)	
	C2 Spring (1 each)	
	Miscellaneous Parts Kit (Blackplane)	07H0745
	Jumpers (4 each)	
	Screws (4 each)	
	Standoff (4 each)	
	Power Cord (see "Power Cords" on page 18)	

Cables (Type 3518)

Index   Cables (Type 3518)
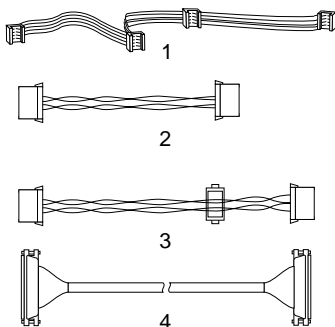
Index	Cables (Type 3518)	
1	System Status Cable 1X4 (with 4 connectors)	82G3617
2	Hard Disk Drive Power Cable 2X (with 2 connector)	06H8640
3	Hard Disk Drive Power Cable 2X Short (with 2 connectors)	06H8641
4	SCSI-Fast/Wide Cable 1X Short (with 1 connector)	06H7957
	C2 Cable with Switch	82G3612
	Fan Cable Assembly	06H7870
	Information Display Cable	06H8679
	Hot Swap Back Plane Chaining - Optional	06H8644
	DASD ID Cable - Optional (for Option No. 96G3055, 94G3057, 94G3052)	07H1696
	DASD ID Cable (for Option No. 71G9743)	06H8664
	4X Non-Hot Swap SCSI Cable - Optional	06H8647

Power Cords

Power Cords	
Arabic	14F0033
Belgium	13F9979
Bulgaria	13F9979
Czech Republic	13F9979
Denmark	13F9997
Finland	13F9979
France	13F9979
Germany	13F9979
Hungary	13F9979
Israel	14F0087
Italy	14F0069
Latvia	13F9979
Netherlands	13F9979
Norway	13F9979
Poland	13F9979
Portugal	13F9979
Serbia	13F9979
Slovakia	13F9979
South Africa	14F0015
Spain	13F9979
Switzerland	13F9979
Switzerland (French/German)	14F0051
U.S. English	62X1045
U.K./Ireland	14F0033
Yugoslavia	13F9979

Power-on Self-Test (POST

Each time the expansion enclosure is powered on, it performs a series of tests called the power-on self-test, or POST. If the tests detect a problem, an error/message appears on the information panel. If you suspect a problem or an error/message appears, refer to "Symptom-to-FRU Index (Type 3518)" on page 25.

Power-on Sequence

> **Note**
>
> The expansion enclosure can be powered on without connecting it to a server. However, the expansion enclosure must be connected to a server before the drives installed in the enclosure can be used.

To power-on the expansion enclosure, do the following.

1. Locate the keys; then unlock and open the door on the front of the expansion enclosure.
2. If the server is powered-on, power it off.
3. Lift the transparent Power Enable Switch cover on the front panel and press the Power Enable Switch; the Power OK indicator will illuminate.
4. Then, press the Power On/Off switch (located just above the Power Enable Switch). The information panel will display IBM 3518.
5. Power-on the server. The *power-on self-test (POST)* begins.
6. Check the monitor connected to the server. The screen displays the IBM logo and a number that represents the amount of available server memory. The server beeps once to indicate that it is working properly.

> **Notes**
>
> 1. If you hear more than one beep or no beep, check the monitor and the information panel.
> 2. If an error message appears on the information panel or the expansion enclosure stops running during testing or normal operation, see "Symptom-to-FRU Index (Type 3518)" on page 25.
> 3. If an error message appears on the monitor screen, the monitor screen is blank, or the server stops during normal operation, refer to the diagnostic information for the server.

Power Supplies (Type 3518)

> **Attention**
>
> Always unplug the power cord and wait two minutes
> before replacing the power supply to give the power
> supply capacitors time to discharge.

The expansion tower is shipped with a primary power
supply. An additional or optional power supply can be
added to the computer. Connectors are used to transfer
the primary power supply voltages and signals from the
primary power supply to the optional power supply. The
following illustrations show how the two power supplies are
connected.

> **Attention**
>
> When replacing the primary power supply cover plate,
> rotate the plate 180°. (This will leave an opening for
> the primary power supply connector cable that
> connects to the optional power supply.) Failure to do
> so will cause the power supply connector cable to be
> crimped when the plate is replaced.
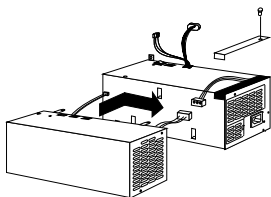
> **Note**
>
> Tabs are located on the side of each power supply to
> secure them together.

Power Supply LED and Button: The
power-good LED and button are located on the side of the
primary power supply button. The LED (when lit) indicates
that the power supply is good. If the LED fails to come on
when the computer is powered-on, do the following:

> While observing the LED on the power supply, press
> the power supply button. If the LED fails to light
> (while you are holding the button in), you may have a
> defective power supply. If the LED lights when the
> button is pressed, go to "Power Supply Shutdowns"
> on page 23.

Primary Power Supply Voltages:
If the voltages are correct and the power supply fan runs, the power supply is OK.

Connector P1

Key
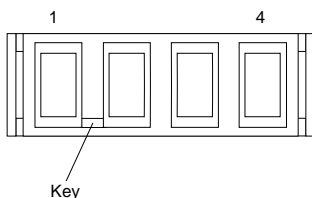
−**Lead Pin**	+**Lead Pin**	**V dc Minimum**	**V dc Maximum**
4	1	+ 4.8	+ 5.25
4	2	+ 4.8	+ 5.25

Connector P2, P2A

Key
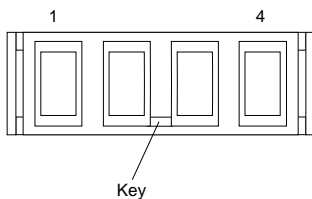
−**Lead Pin**	+**Lead Pin**	**V dc Minimum**	**V dc Maximum**
4	1	+ 3.3	+ 3.5
4	2	+ 3.3	+ 3.5

Connector P3

1   12
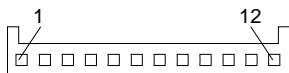
−Lead Pin	+Lead Pin	V dc Minimum	V dc Maximum
2	4	+ 11.52	+ 12.6
2	5	+ 11.52	+ 12.6
2	8	- 10.8	- 13.2
2	10	+ 4.8	+ 5.25

Connector P4, P5, P6, P7, P8, P9, P10

A   B   C   D
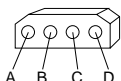
−Lead Pin	+Lead Pin	V dc Minimum	V dc Maximum
B	A	+ 4.8	+ 5.25
B	D	+ 11.52	+12.6

Optional Power Supply Drive Connector

Voltages: If the voltages are correct and the power supply fan runs, the power supply is OK.

A   B   C   D
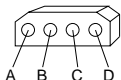
−Lead Pin	+Lead Pin	V dc Minimum	V dc Maximum
B	A	+ 4.8	+ 5.25
B	D	+ 11.52	+12.6

Power Supply Shutdowns: If the power supply shuts down, or *appears* to fail at power-on, you might have one of the following problems:

Too many devices are set to start instantly. See "Setting the Motor-Start Jumper" on page 414 in the PS/2 Hardware Maintenance Manual.

There are too many large-capacity devices installed (such as hard disk drives). The nominal operating current of the devices installed collectively exceeds the available current of the power supply. See the "Personal System/2 Installation Planning" guide (form number S41G-2927) for more information.

Also ensure that the fans operate when the machine is powered on.

--- **Note** ---

Verify that the voltage-select switch (if applicable) is set for the correct voltage.

If the voltages are correct and the Symptom-to-FRU index does not solve the problem, go to "Undetermined Problems" on page 183 in the PS/2 Hardware Maintenance Manual.

Specifications (Type 3518)

Size

With pedestal:
- – Depth: 635 mm (25 in.)
  835 mm (32.8 in.) with cable cover
- – Height: 635 mm (25 in.)
- – Width: 247 mm (9.75 in.)

Weight

Minimum configuration as shipped: 29.1 kg (64 lb)

Environment

Air temperature
- – System on: 10° to 35° C (50° to 95° F)
  Altitude: 0 to 914 mm (3000 ft.)
- – System on: 10° to 32° C (50° to 90° F)
  Altitude: 914m (3000 ft.) to 2133 m (7000 ft.)
- – System off: 10° to 43° C (50° 110° F)
  Maximum Altitude: 2133 m (7000 ft.)

Humidity
- – System on: 8% to 80%
- – System off: 8% to 80%

Maximum altitude: 2133 m (7000 ft.)

Heat Output

Approximate heat output in British Thermal Units (BTU) per
hour
- – Minimum configuration: 150 BTU (44 watts)
- – Maximum configuration: 3600 BTU (1055 watts)

Electrical Input

Sine-wave input (50 to 60 Hz is required)
Input voltage
- – Low range
  - - Minimum: 90 V ac
  - - Maximum: 137 V ac
- – High range
  - - Minimum: 180 V ac
  - - Maximum: 265 V ac
- – Input kilovolt-amperes (kVA) approximately
  - - Minimum configuration as shipped: 0.16 kVA
  - - Maximum configuration: 1.0 kVA

Total Power Available for Drives

Nominal operating current allowed:
- – +5 V dc line: 7.5 A base; 20.5 A with upgrade
- – +12 V dc line: 4.7 A base; 17.7 A with upgrade

Symptom-to-FRU Index (Type 3518)

This index supports the PC Server Enterprise Expansion Enclosure (Type 3518).

The system management subsystem consists of a main processor that acts as the controller. The controller monitors the system temperature, the power supply, the fan rotation, and the system voltages. If a non-fatal error is detected, an error code or error message is displayed on the information panel. Fatal errors are logged to the system EEPROM and displayed at the next power-on.

Use this Symptom-to-FRU Index to help you decide which FRUs to have available when servicing the expansion enclosure.

For information on:	Go to:
Power supply problems	"Power Supplies (Type 3518)" on page 20

Error Code/Symptom	FRU/Action
E700 AC Failure (Power lost while the enclosure was running. The error is displayed the next power-on.)	1. **Power Cord** 2. Power Supply
E701 Power Supply (Redundant power supply indicates a bad condition. Error is non-fatal and can be cleared by pressing the front panel Enter button.)	1. **Power Supply**
E702 5V Failure (Enclosure 5V input is low or too high. If too low, non-fatal error is written to the information panel. If to high, enclosure is shutdown and the error is displayed the next power-on.)	1. **Power Supply** 2. System Board (Planar)
703 12V Failure (Enclosure 12V input is low or too high. If too low, non-fatal error is written to the information panel. If to high, enclosure is shutdowns and the error is displayed the next power-on.)	1. **Power Supply** 2. System Board (Planar)

Error Code/Symptom	FRU/Action
E704 Fan Failure (In a non-fatal situation , a fan has failed. If multiple fans fail, the enclosure is shutdown and the enclosure will not run until the failure is corrected.)	1. **Fan** 2. System Board (Planar)
E705 Overheat (Power supply overheated and the enclosure was shutdown.)	1. **Power Supply** 2. Fan 3. System Board (Planar)
Blank information panel (If the Power OK indicator is on and the fans are running, operation will probably not be affected. However, no diagnostic errors/messages will be displayed.)	1. **Information Display Cable** 2. Information Display Assembly 3. System Board (Planar)
No power (Be sure the power cords and cables are properly plugged in, the expansion enclosure is properly enabled and powered on, and the electrical power source is active.)	1. **Power Cord** 2. Power Supply

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