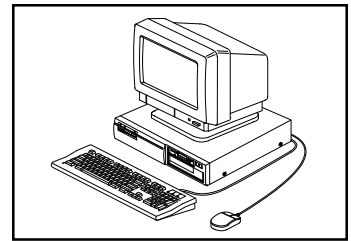


DECpc LPv/LPv+ Service Guide

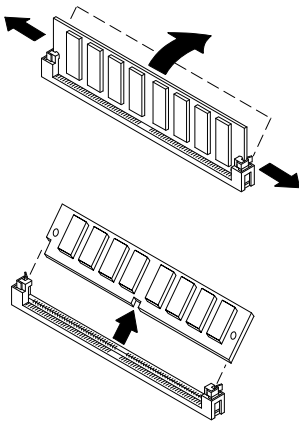
FRU Removals 4 of 5

ER-740WW-SV.A01



SIMM Removal

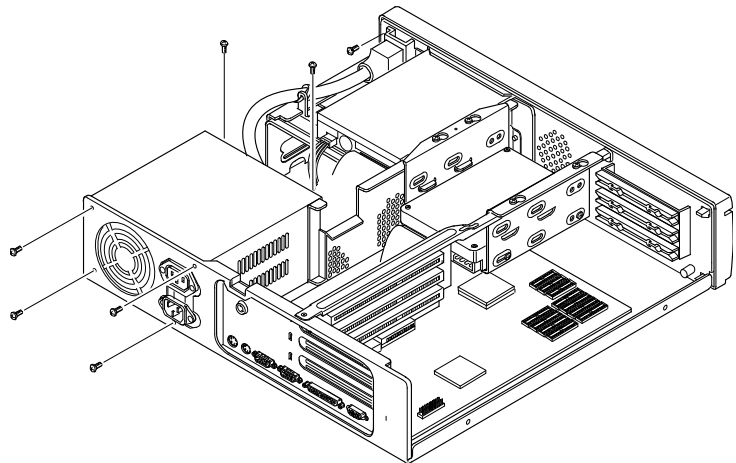
- 1 Press retaining clips out
- 2 Push SIMM down and pull out



DEC00153

Removing the Power Supply

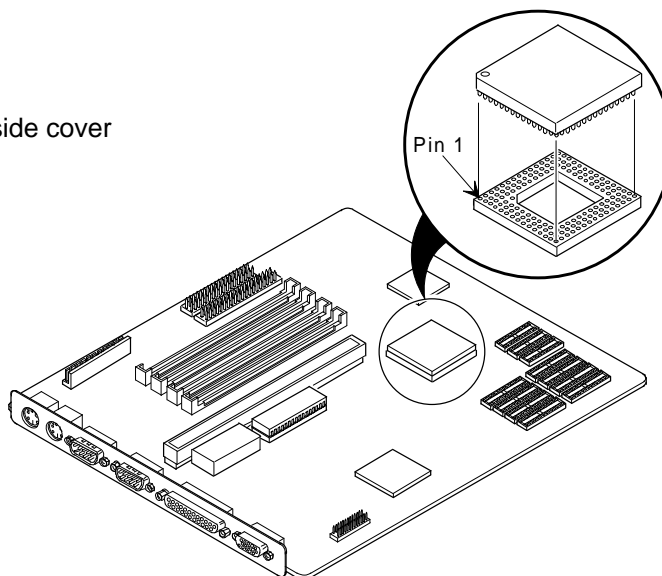
- 1 Disconnect power cord
- 2 Remove screw securing power on/off cable from chassis
- 3 Remove two screws securing power supply to chassis
- 4 Remove four screws securing power supply to rear panel
- 5 Remove power supply from computer



DEC00152

Removing the CPU

- 1 Disconnect power cord
- 2 Unlock and remove outside cover
- 3 Remove CPU
- 4 Install CPU
- 5 Set appropriate jumpers

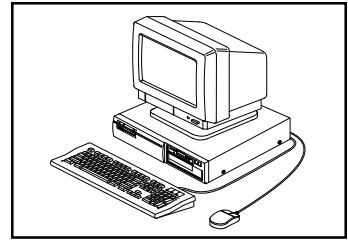


DEC00144-4

DECpc LPv/LPv+ Service Guide

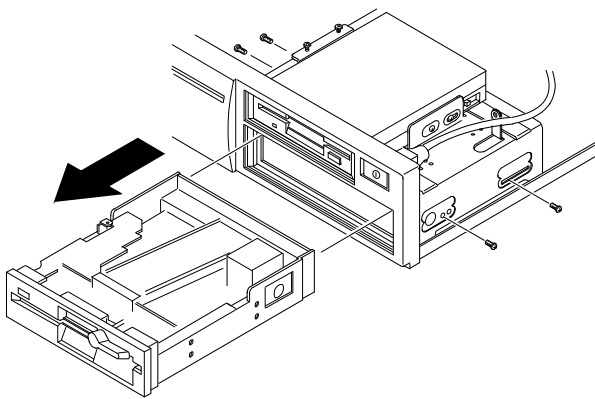
FRU Removals 3 of 5

ER-740WW-SV.A01



Removing the 5¼-Inch FDD

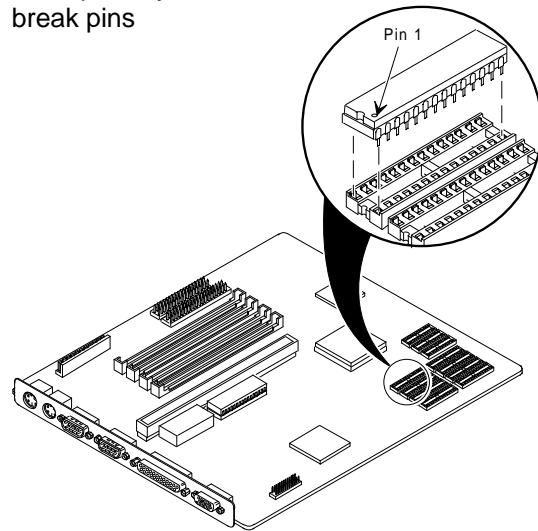
- 1 Remove two retaining screws from each side of bottom bay
- 2 Remove FDD from bay



DEC00082-3

Removing Cache and Tag SRAMs

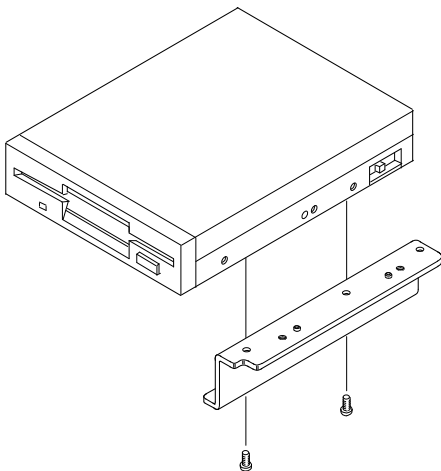
- 1 Use suitable device puller and gently remove SRAM chips from sockets
- 2 Be especially careful not to bend or break pins



DEC00144-3

Removing the Mounting Adapter from the FDD

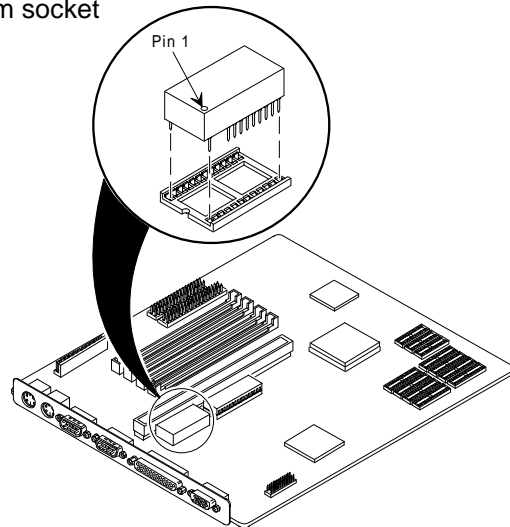
- 1 Remove two retaining screws from bottom and remove adapter



DEC00079

Removing Real-Time Clock (RTC)

- 1 Use device puller and gently remove RTC from socket

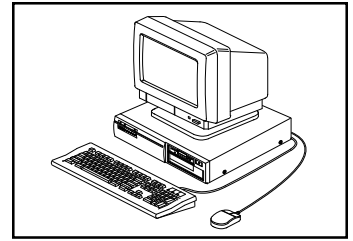


DEC00144-2

DECpc LPv/LPv+ Service Guide

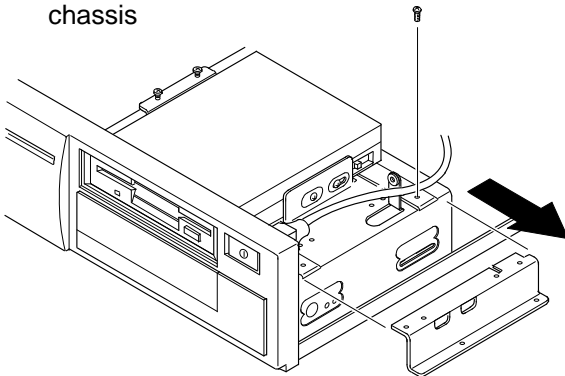
FRU Removals 2 of 5

ER-740WW-SV.A01



Removing the Mounting Adapter

- 1 Remove one retaining screw
- 2 Remove mounting adapter from chassis

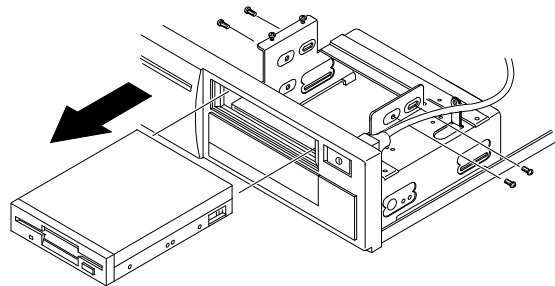


DEC00078-2

NOTE: Mounting bracket is required when installing a 3 1/2 inch device in the lower 5 1/4 inch drive bay.

Removing the 3½-Inch FDD

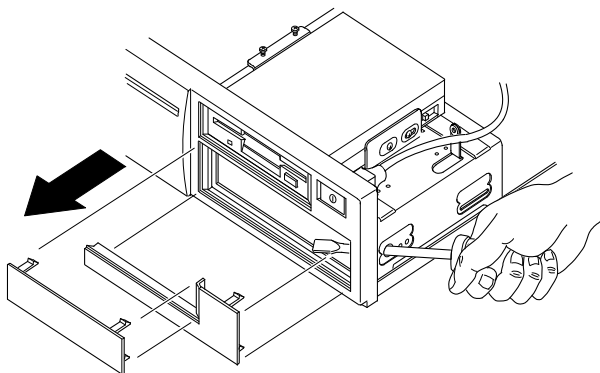
- 1 From top bay, remove two retaining screws from each side
- 2 Remove FDD from bay
- 3 From bottom bay, remove two retaining screws securing mounting adapter to chassis
- 4 Remove FDD from bay with filler panel



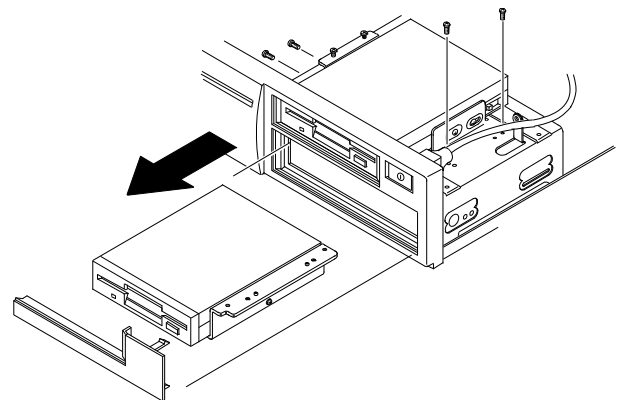
DEC00076-2

Removing Filler Panels

- 1 Place screwdriver through hole at side
- 2 Release plastic locking tabs
- 3 Remove both filler panels



DEC00080

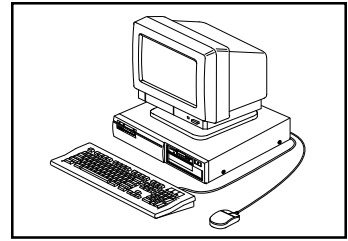


DEC00081-3

DECpc LPv/LPv+ Service Guide

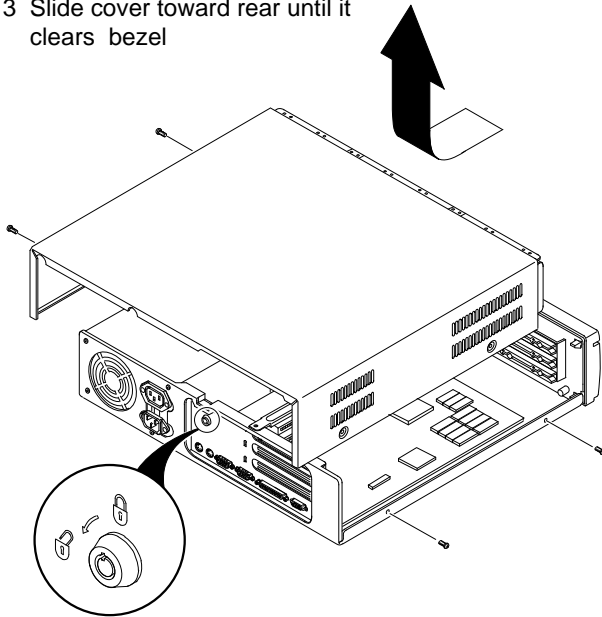
FRU Removals 1 of 5

ER-740WW-SV.A01



Unlocking and Removing the Outside Cover

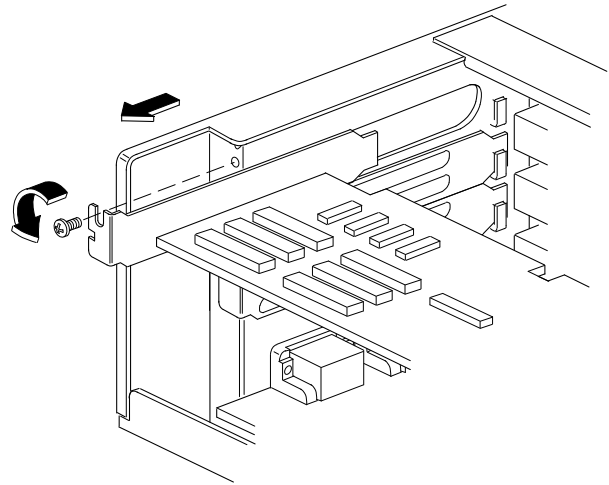
- 1 Unlock outside cover
- 2 Remove two retaining screws at each side
- 3 Slide cover toward rear until it clears bezel



DEC00118-2

Removing Expansion Boards

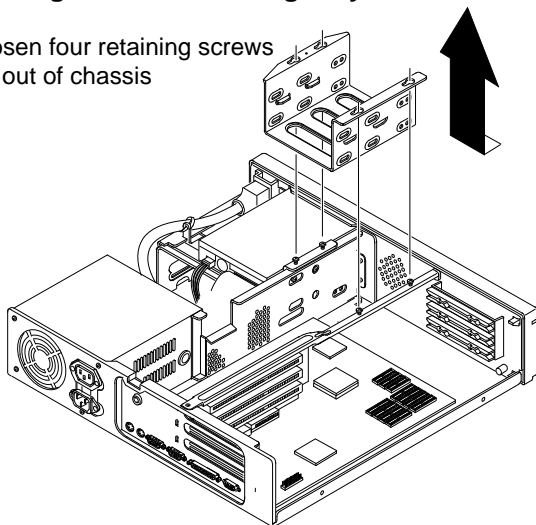
- 1 Remove screw
- 2 Gently pull board outward



DEC00092-3

Removing Internal Mounting Tray

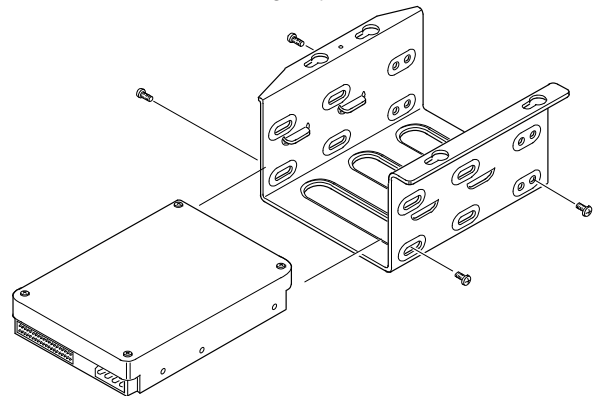
- 1 Loosen four retaining screws
- 2 Lift out of chassis



DEC00119-2

Removing IDE Hard Disk Drive from Mounting Tray

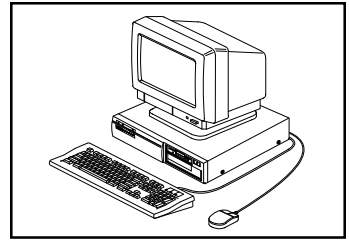
- 1 Removing four mounting screws
- 2 Pull drive from mounting tray



DEC00086

DECpc LPv/LPv⁺ Service Guide

System Description 1 of 1



ER-740WW-SV.A01

DECpc LPv/LPv⁺

Main Logic Board

CPU	Intel i486
Clock Speed	25 MHz SX, 33 MHz SX, 33 MHz DX, 50 MHz DX2, 66 MHz DX2
ROM BIOS	128 KB
Cache, internal	8 KB
Cache, secondary	Direct-mapped, write-back, 0 KB standard, 128 KB or 256 KB optional
Expansion Slots	3 Standard ISA, 8-bit and 16-bit

Memory

Up to 64 MB using 4 MB, 16 MB, 32-bit SIMMs

Power Supply

Rated Voltage Range	100 V ac - 120 V ac 220 V ac - 240 V ac
Maximum Range	88 V ac - 132 V ac 176 V ac - 264 V ac
Rated Input Current*	3.4 A 1.8 A
Frequency Range	50 Hz - 60 Hz
DC Voltage Output	+12 V dc, -12 V dc +5 V dc, -5 V dc

* Includes outlet current

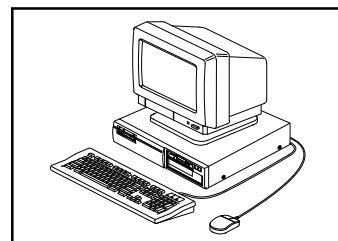
SIMM Configuration

Bank 0	Bank 1	Bank 2	Bank 3	Total
4 MB				4 MB
4 MB	4 MB			8 MB
4 MB	4 MB	4 MB		12 MB
4 MB	4 MB	4 MB	4 MB	16 MB
4 MB	16 MB			20 MB
4 MB	4 MB	16 MB		24 MB
4 MB	4 MB	16 MB	16 MB	40 MB
16 MB				16 MB
16 MB	16 MB			32 MB
16 MB	16 MB	16 MB		48 MB
16 MB	16 MB	16 MB	16 MB	64 MB

DECpc LPv/LPv⁺ Service Guide

Jumpers 2 of 3

ER-740WW-SV.A01



Main Logic Board Jumper Settings

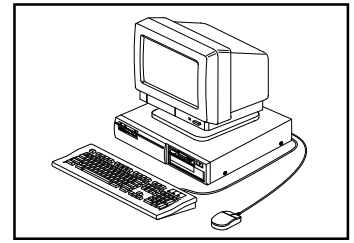
Feature	Description	Setting
Onboard VGA (IRQ9)	Disable IRQ9 Enable IRQ9	J25, open* J25, jumpered
Onboard VGA	Enable VGA Disable VGA	J23, pins 1 and 2 jumpered* J23, pins 2 and 3 jumpered
Factory test	Normal MFG test	J28, open* J28, jumpered
Video display type	Mono monitor Color monitor	J29, open* J29, jumpered
CPU clock speed	50 MHz	J18, open J19, open J20, open
	40 MHz	J18, jumpered J19, open J20, open
	33 MHz	J18, jumpered* J19, open* J20, jumpered*
	25 MHz	J18, open J19, jumpered J20, jumpered

* Factory setting

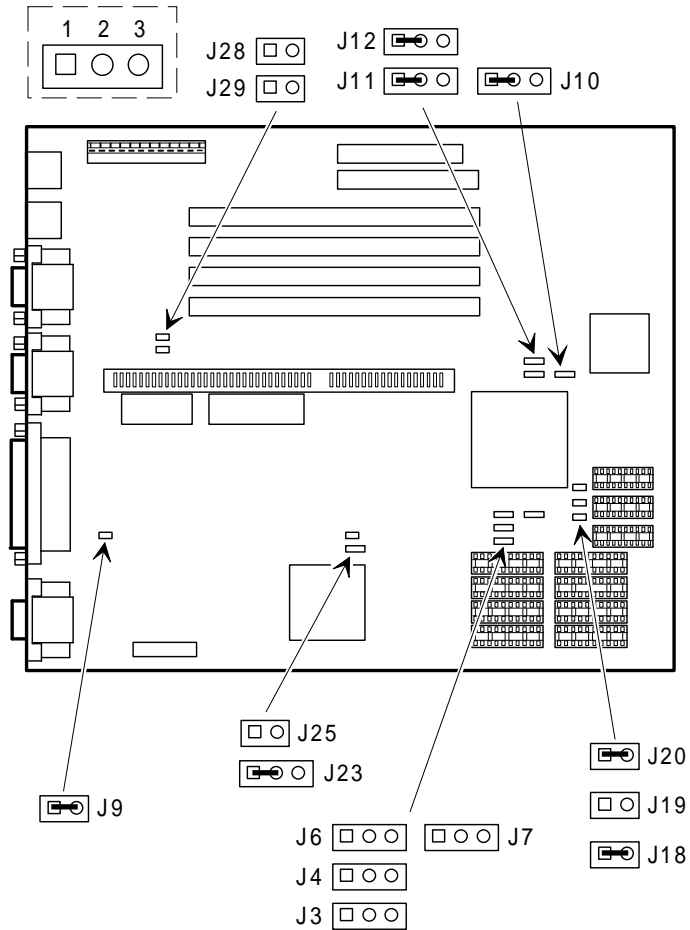
DECpc LPv/LPv+ Service Guide

Jumpers 1 of 3

ER-740WW-SV.A01

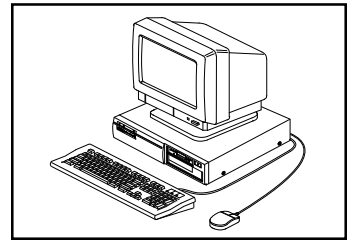


Main Logic Board Jumper Locations



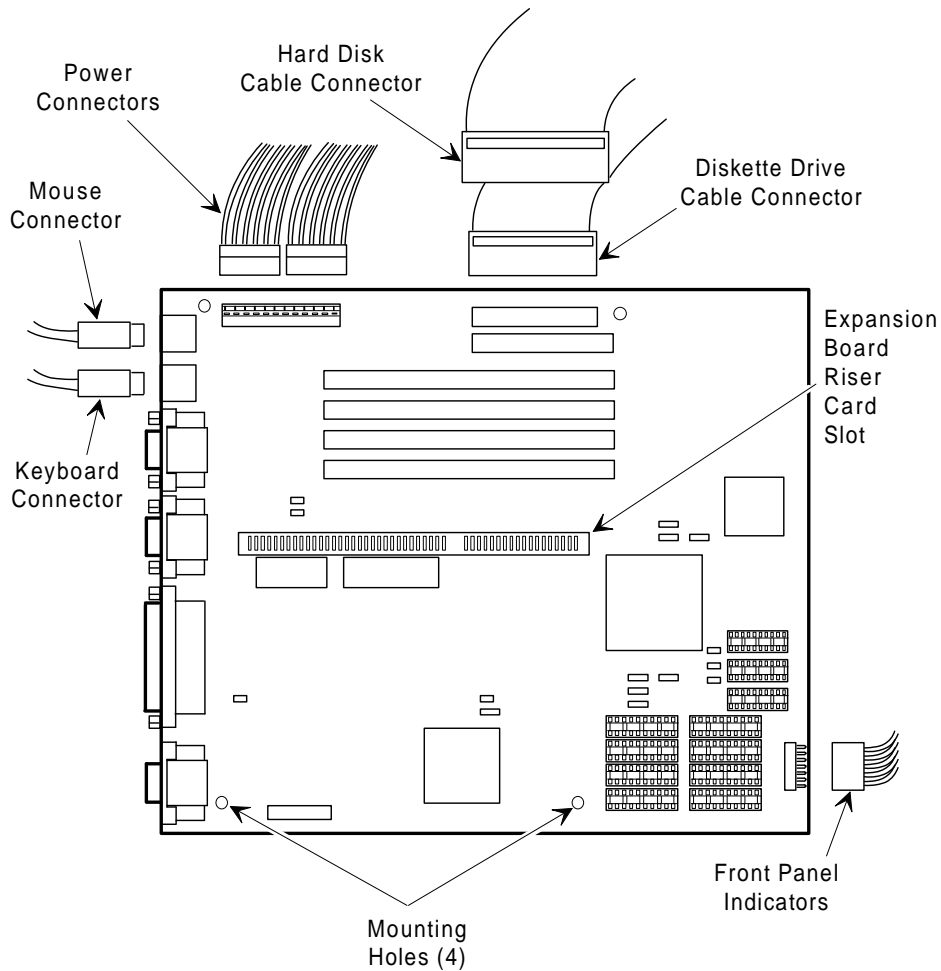
DEC00143-2

Jumpers are shown with factory settings.



Removing the Main Logic Board

- 1 Disconnect all cables
- 2 Remove expansion board riser card
- 3 Remove mounting screws and lift main logic board from computer

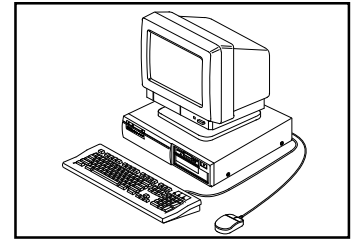


DEC00143-4

DECpc LPv/LPv+ Service Guide

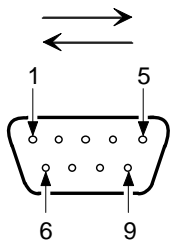
Rear Panel Connectors 3 of 3

ER-740WW-SV.A01



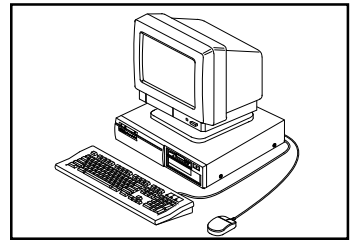
Serial Port Connector

The serial port is a 9-pin, D-shell male connector. Supported baud rates are 300, 1200, 2400, 4800, 9600, 19 200, and 38 400. An asterisk (*) after a signal name indicates an active low signal state. For example, RXD*.



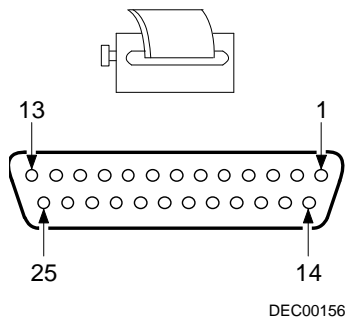
DEC00157

DB9	Signal	Function
1	DCD	Data Carrier Detect
2	RXD*	Receive Data
3	TXD	Transmit Data
4	DTR*	Data Terminal Ready
5	GND	Signal Ground
6	DSR	Data Set Ready
7	RTS*	Request To Send
8	CTS	Clear To Send
9	RING	Ring Indicator



Parallel Port Connector

The parallel port connector provides an interface for a parallel printer or other parallel device. An asterisk(*) after a signal name indicates an active low signal state. For example, STB-R*.

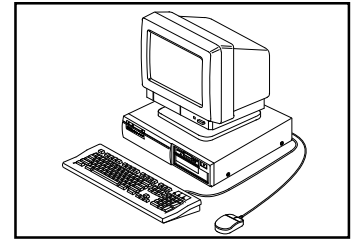


DB25 Pin	Signal	Function
1	STB-R*	Strobe
2	PRTD0	Printer data bit 0
3	PRTD1	Printer data bit 1
4	PRTD2	Printer data bit 2
5	PRTD3	Printer data bit 3
6	PRTD4	Printer data bit 4
7	PRTD5	Printer data bit 5
8	PRTD6	Printer data bit 6
9	PRTD7	Printer data bit 7
10	ACK*	Acknowledge
11	BUSY	Busy
12	PE	Paper end
13	SLCT	Select
14	AUTOFDXT*	Autofeed
15	ERR*	Error
16	INIT*	Initialize printer
17	SLCTIN*	Select
18 to 25	GND	Ground

DECpc LPv/LPv+ Service Guide

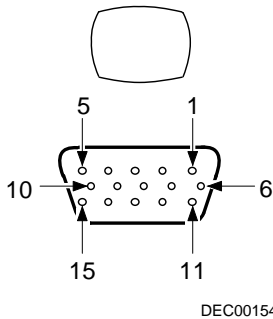
Rear Panel Connectors 1 of 3

ER-740WW-SV.A01



VGA Connector

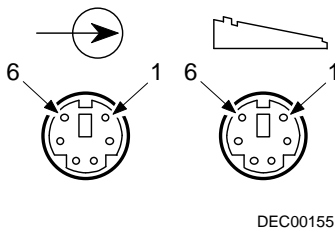
The VGA connector is an industry standard, 15-pin, D-type, male connector



Pin	Function
1	Red video
2	Green video
3	Blue video
4	MS2
5	Digital ground
6	Red return (ground)
7	Green return (ground)
8	Blue return (ground)
9	No connection
10	Digital ground
11	MS0
12	MS1
13	Horizontal sync
14	Vertical sync
15	No connection

Keyboard and Mouse Connectors

The keyboard and mouse connectors are each 6-pin, mini-DIN connectors

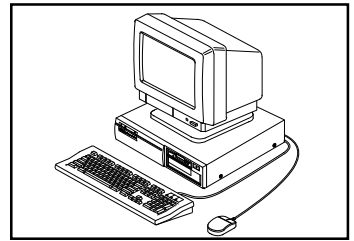


Pin	Function
1	Data
2	Reserved
3	Ground
4	+5 Vdc (fused)
5	Clock
6	No connection

DECpc LPv/LPv⁺ Service Guide

Jumpers 3 of 3

ER-740WW-SV.A01



Main Logic Board Jumper Settings (continued)

Feature	Description	Setting
Cache size select	0 KB	J3, open* J4, open* J6, open* J7, open*
	128 KB	J3, pins 1 and 2 jumpered J4, pins 1 and 2 jumpered J6, pins 1 and 2 jumpered J7, pins 1 and 2 jumpered
	256 KB	J3, pins 2 and 3 jumpered J4, pins 2 and 3 jumpered J6, pins 2 and 3 jumpered J7, pins 2 and 3 jumpered
Reset switch	Enable	J9, pins 1 and 2 jumpered*
	Disable	J9, pins 1 and 2 open
CPU type	DX	J11, pins 1 and 2 jumpered* J12, pins 1 and 2 jumpered*
	SX	J11, pins 2 and 3 jumpered J12, pins 2 and 3 jumpered
RDY signal type	VLRDY->CPURDY (VL bus ready connects to CPU bus ready)	J10, pins 1 and 2 jumpered*
	VLRDY->LRDY (VL bus ready synchronized through chipset**)	J10, pins 2 and 3 jumpered
Recovery mode	Recovery mode	J27, jumpered
	Normal	J27, open*

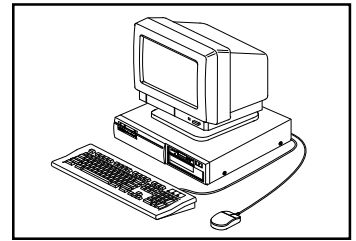
* Factory setting

** Might be required by some expansion boards
Refer to the documentation supplied with the expansion board

DECpc LPv/LPv⁺ Service Guide

Logistics and Support 1 of 1

ER-740WW-SV.A01



Part Numbers

54-22703-01	Main logic board, 486SX/25
54-22703-02	Main logic board, 486SX/33
54-22703-03	Main logic board, 486DX/33
54-22703-04	Main logic board, 486D2/50
54-22703-06	Main logic board, 486D2/66
54-22703-08	Main logic board, 486SX/25*
54-22703-09	Main logic board, 486SX/33*
54-22703-10	Main logic board, 486DX/33*
54-22703-11	Main logic board, 486D2/50*
54-22703-13	Main logic board, 486D2/66*
30-41318-02	Power supply, 145W
54-22058-01	Bus card
17-00606-02	Power cord term, 110V
17-00209-15	Power cord term, 220V
17-03460-02	Flat cable, 34-pin (diskette drive)
17-03461-01	Flat cable, 40-pin (IDE drive)
-PC7XL-AA	Keyboard, US
-PCXAL-AA	Keyboard, US
-PCXAL-NA	Keyboard, US
-PC7XS-AA	Mouse, 2-button
21-39125-01	Real-time clock
-ME524-DE	4 MB SIMM, 70ns
-ME544-DE	16 MB SIMM, 70ns
-PC75M-BA	128 KB SRAM, cache memory, 0-128K upgrade
-PC74M-BA	128 KB SRAM, cache memory, 128-256K upgrade
-RX23L-AA	3.5-inch FDD, 1.44 MB
-RX33L-AA	5.25-inch FDD, 1.2 MB
-RE23R-E	3.5-inch HDD 170 MB (IDE)
-RE24L-EA	3.5-inch HDD 245 MB (IDE)*
-RE25L-EA	3.5-inch HDD 525 MB (IDE)*
-RE24M-E	3.5-inch HDD 340 MB (IDE)
-RE25LL	3.5-inch HDD 540 MB (IDE)

* for LPv only

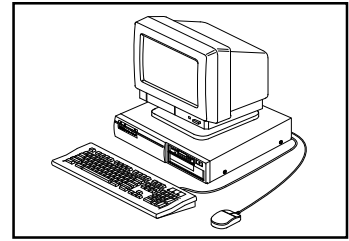
Related Documentation

<i>DECpc LPv/LPv⁺ User's Guide</i>	ER-740WW-UA.A01
<i>DECpc LPv/LPv⁺ Installation Card</i>	ER-740WW-IA.A01

DECpc LPv/LPv+ Service Guide

Troubleshooting 8 of 8

ER-740WW-SV.A01



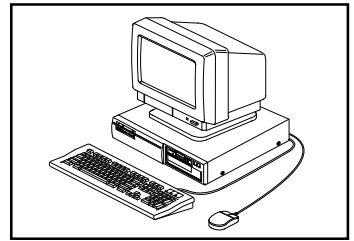
QAPLUS Error Messages (continued)

Component	Messages	Solution
Floppy drive	Floppy Drives Failed	Check connections Replace drive
Battery/Clock	Clock Stopped Invalid Date RTC Interrupt Failed	Run Setup Replace battery/clock
CMOS	CMOS Clock Test Failed	Change time from Setup menu in QAPLUS
Serial port	COM port failed Serial Chip Error Serial Compare Error Serial Timeout Error	Check COM device Check connections Replace COM device
Onboard video circuitry	Video Failed Error in Video Buffer	Replace main logic board

DECpc LPv/LPv+ Service Guide

Troubleshooting 7 of 8

ER-740WW-SV.A01



QAPLUS Advanced Diagnostics

To:

- * Receive System Information, select SysInfo menu from the main menu.
- * Locate bad chips and run mouse and keyboard tests, select Interact menu.
- * Edit CMOS select Setup menu.
- * Run tests on components, select Testing menu.

Default testing is No Pause on Errors/Single Pass/No Peripherals/No Error Logging/Test All Components.

To change default, select settings under the Testing menu *before* running tests.

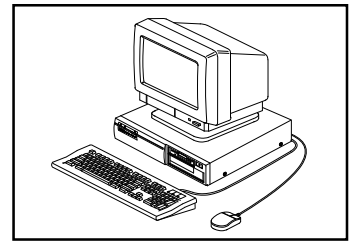
QAPLUS Error Messages

Component	Messages	Solution
CPU	Arithmetic Function Failed General Functions failed Exception Interrupt in Protected Mode Refresh Failure Logic Functions Failed	Reset CPU Replace CPU
Hard disk	Butterfly Cylinder Access Test Failed Cylinder 0 Errors Random Cylinder Access Failed Linear Cylinder Access Failed	Low-level format hard disk Replace disk
Hard drive/controller	Controller Diagnostic Test Failed Questionable Controller Card Hard drives failed	Run Setup Check connections Reset controller Replace controller Replace disk
Floppy diskette	Media Mismatch Drive Not Ready Unformatted Media Write Protected Media	Use known good diskette Check size and density of diskette Close drive door Remove write protection Format diskette

DECpc LPv/LPv⁺ Service Guide

Troubleshooting 6 of 8

ER-740WW-SV.A01

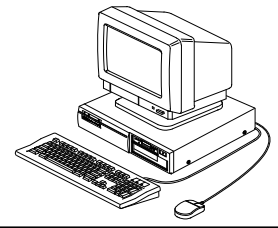


DMA Channel Assignment

Channel	Controller	Function
0	1	Refresh
1	1	Not used
2	1	Diskette controller
3	1	ECP (optional)
4	2	Cascade DMA
5	2	Not used
6	2	Not used
7	2	Not used

DECpc LPv/LPv+ Service Guide

Troubleshooting 5 of 8



ER-740WW-SV.A01

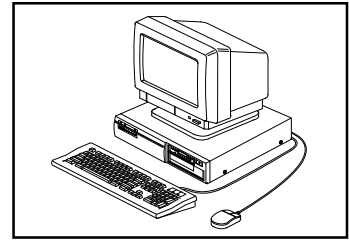
Computer Interrupt Levels

Priority	Interrupt Controller	Interrupt Number	Interrupt Source
1	1	IRQ0	Timer tick
2	1	IRQ1	Keyboard controller
	1	IRQ2	Cascade interrupt
3	2	IRQ8	Real-time clock (RTC)
4	2	IRQ9	Reserved
5	2	IRQ10	Reserved
6	2	IRQ11	Reserved
7	2	IRQ12	Mouse interrupt
8	2	IRQ13	Math co-processor
9	2	IRQ14	Hard disk drive
10	2	IRQ15	Reserved
11	1	IRQ3	COM2, COM4
12	1	IRQ4	COM1, COM3
13	1	IRQ5	Reserved
14	1	IRQ6	Diskette drive
15	1	IRQ7	LPT1, LPT2, LPT3

DECpc LPv/LPv⁺ Service Guide

Troubleshooting 4 of 8

ER-740WW-SV.A01



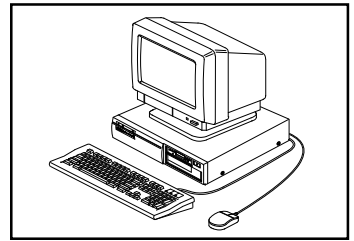
I/O Address Map (continued)

Range (hexadecimal)	Function
46E8	VGA enable register
42E8	VGA enhanced mode register
42E8	
4AE8	
82E8	
86E8	
8AE8	
8EE8	
92E8	
96E8	
9AE8	
9EE8	
A2E8	
A6E8	
AAE8	
AEE8	
B2E8	
B6E8	
BAE8	
BEE8	
E2E8	
E2EA	

DECpc LPv/LPv+ Service Guide

Troubleshooting 3 of 8

ER-740WW-SV.A01



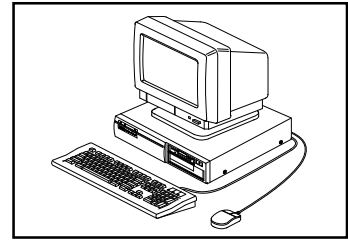
I/O Address Map

Range (hexadecimal)	Function
000 - 00F	DMA controller one
020 - 021	Interrupt controller one
022	Index register (85C461)
023	Data register (85C461)
040 - 043	Interval timer
060 - 06F	Keyboard controller
070 - 07F	Real-time clock (RTC), NMI
080 - 08F	DMA page register
0A0 - 0A1	Interrupt controller two
0C0 - 0CF	DMA controller two
0F0	Clear math co-processor busy
0F1	Reset math co-processor
0F8 - 0FF	Math co-processor
1F0 - 1F7	IDE controller
278 - 27A	LPT2
2E8 - 2EF	COM4
2F8 - 2FF	COM2
378 - 37A	LPT1
3BC - 3BE	LPT3
3E8 - 3EF	COM3
3B0 - 3DF	VGA registers
3F0 - 3F7	Diskette controller
3F6 - 3F7	IDE controller (alt status, device address)
3F8 - 3FF	COM1

DECpc LPv/LPv+ Service Guide

Troubleshooting 2 of 8

ER-740WW-SV.A01



Beep Codes

Beep Codes for Fatal Errors

Beep Code	Error Message	Port 80h
1-1-3	CMOS Write/Read test or failure	02h
1-1-4	ROM Checksum test or failure	03h
1-2-1	Interval timer test or failure	04h
1-2-2	DMA initialization or failure	05h
1-2-3	DMA page register write/read test or failure	06h
1-3-1	RAM refresh verification or failure	08h
1-3-3	1st 64 KB RAM chip or data line failure	0Ah
1-3-4	1st 64 KB RAM odd/even logic failure	0Bh
1-4-1	1st 64 KB RAM address line failure	0Ch
1-4-2	1st 64 KB RAM parity test failure	0Dh
2-1-1	Bit 0 1st 64 KB RAM failure	10h
2-1-2	Bit 1 1st 64 KB RAM failure	11h
2-1-3	Bit 2 1st 64 KB RAM failure	12h
2-1-4	Bit 3 1st 64 KB RAM failure	13h
2-2-1	Bit 4 1st 64 KB RAM failure	14h
2-2-2	Bit 5 1st 64 KB RAM failure	15h
2-2-3	Bit 6 1st 64 KB RAM failure	16h
2-2-4	Bit 7 1st 64 KB RAM failure	17h
2-3-1	Bit 8 1st 64 KB RAM failure	18h
2-3-2	Bit 9 1st 64 KB RAM failure	19h
2-3-3	Bit A 1st 64 KB RAM failure	1Ah
2-3-4	Bit B 1st 64 KB RAM failure	1Bh
2-4-1	Bit C 1st 64 KB RAM failure	1Ch
2-4-2	Bit D 1st 64 KB RAM failure	1Dh
2-4-3	Bit E 1st 64 KB RAM failure	1Eh
2-4-4	Bit F 1st 64 KB RAM failure	1Fh

Beep Code	Error Message	Port 80h
3-1-1	Slave DMA register test or failure	20h
3-1-2	Master DMA register test or failure	21h
3-1-3	Master interrupt mask register test or failure	22h
3-1-4	Slave interrupt mask register test or failure	23h
3-2-4	Keyboard/mouse controller test or failure	27h
4-2-1	Timer tick interrupt test or failure	34h
4-2-2	Shutdown test or failure	35h
4-2-3	Gate A20 failure	36h
4-2-4	Unexpected interrupt in protected mode	37h
4-3-1	RAM test or failure (above 0FFFFh)	38h
4-3-3	Interval timer 2 test or failure	3Ah
4-3-4	Time-of-day clock test or failure	3Bh
4-4-1	Serial port test or failure	3Ch
4-4-2	Parallel port test or failure	3Dh
4-4-3	Math coprocessor test or failure	3Eh

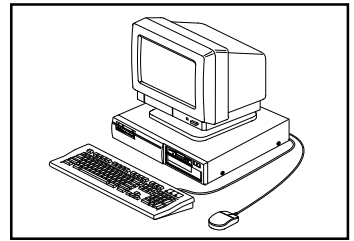
Beep Codes for Non-Fatal Errors

Beep Code	Error Message	Port 80h
3-3-4	Screen memory test or failure	2Bh
3-4-1	Screen initialization or failure	2Ch
3-4-2	Screen retrace test or failure	2Dh

DECpc LPv/LPv+ Service Guide

Troubleshooting 1 of 8

ER-740WW-SV.A01



POST Error Messages

POST Countdown Number	Message Number	Message	Solution
240 200 190	0007 0001 0009	No timer tick Shutdown Failure Timer 2 failure	Contact your Digital service representative
180	0010	Keyboard stuck key Controller Clock line Data line Keyboard failure	<ul style="list-style-type: none"> - Check connections - Check controller - Replace keyboard - Contact service rep.
170	0041	Mouse failure	<ul style="list-style-type: none"> - Check connection - Check for IRQ conflict - Replace mouse
160	—	640 KB base memory 0 KB extended memory	—
150 050	0017 0019	Time-of-day clock stopped Time-of-day not set	<ul style="list-style-type: none"> - Contact service rep - Run setup - Replace clock
100	0018	Invalid configuration	- Run setup
090	0011	Diskette drive failure	<ul style="list-style-type: none"> - Run setup - Check connections - Replace drive
080	0015	Hard disk failure HDD controller failure	<ul style="list-style-type: none"> - Run setup - Check connections - Replace drive
060	0021	nxxx0h optional ROM bad Checksum=xxxx	<ul style="list-style-type: none"> - Correct address conflict - Replace ROM chip
040	0020	Keyboard locked	Unlock keyboard
020	—	Enable NMI	
010	—	Enable cache	
000	—	Boot	