

Memory	4MB RAM standard on a SIMM; expandable to 32MB using 1MB, 4MB, 8MB, and 16MB SIMMs; SIMMs must be tin-plated, 72-pin, 36-bit, fast-page mode type with 70ns or faster access speed
ROM	128KB system BIOS, video BIOS, and SETUP code located in EPROM on main system board
Video RAM	512KB DRAM on main system board; expandable to 1MB using 70ns or 80ns, 256KB x 4 bit, 20-pin, DIP DRAM chips
Shadow RAM	Supports shadowing of system and video BIOS ROM into RAM
Cache	8KB of internal cache (built into the microprocessor); supports 32KB or 128KB of external cache using 28-pin, 8 x 8, 20ns DIP chips or 28-pin, 32 x 8, 20ns DIP chips
Clock/calendar	Real-time clock, calendar, and CMOS RAM contained in 82C206 controller on main system board with NiCad battery backup
Controllers	
Video	Trident TVGA 8900C VGA controller on main system board; provides resolutions up to 1024 x 768 in 16 colors (up to 1024 x 768 in 256 colors with 1MB of video memory)
Diskette	Controller on main system board supports up to two diskette drives, maximum
Hard disk	Interface on main system board supports up to two IDE hard disk drives, maximum, with built-in controllers on the hard disk drive itself

Computer Specifications

CPU and Memory

32-bit CPU	Intel 80486SX/25 microprocessor; upgradable to 486SX/33, 486DX/33, 486DX2/50, or 486DX2/66
System speed	Fast and slow speeds available; fast speed is 25 MHz or the speed of your upgraded microprocessor, slow speed is 8 MHz; speed selection through SETUP program and keyboard commands To select slow speed, press the Ctrl, Alt, and - keys simultaneously. To select fast speed, press the Ctrl, Alt, and + keys simultaneously. (Use the - or + key on the numeric keypad.)

Interfaces

Monitor	VGA interface built into main system board for analog or multifrequency VGA monitor; 15-pin, D-shell connector
Parallel	One standard 8-bit parallel, unidirectional interface built into main system board; 25-pin, D-shell connector
serial	Two RS-232C, programmable, asynchronous interfaces built into main system board; 9-pin, D-shell connectors
Game	One game port interface built into main system board; 15-pin, D-shell connector
Keyboard	PS/2 compatible keyboard interface built into main system board; num lock setting selectable through SETUP; 6-pin, mini DIN connector

- Option slots Three 16-bit (or 8-bit) full-length and two 8-bit half-length I/O expansion slots, ISA compatible, 8.33 MHz bus speed
- Speaker Internal
- Mass Storage** Three drives maximum (two externally-accessible mounts and one internal mount), configurable using the following:
 - External mounts Up to two externally-accessible, horizontal mounts; one horizontal bay can accommodate a half-height **5¼-inch** form factor hard disk, diskette, tape, CD-ROM, or other drive; the other horizontal bay can accommodate one thud-height **3½-inch** form factor hard disk, diskette, tape, or other device
 - Internal mount One internal third- or half-height horizontal mount; bay can accommodate one **3½-inch** form factor hard disk or other drive
- Diskette drives 5.25-inch, 1.2MB (high-density)
3.5-inch, 1.44MB (high-density)
5.25-inch, 360KB (double-density)
3.5-inch, 720KB (double-density)
- Hard disk drives **3½-inch** form factor hard disk drive(s), third- or half-height size
- Other devices Half-height tape drive, CD-ROM drive, or other storage device; **5¼-inch** form factor or **3½-inch** form factor with **5¼-inch** mounting frames attached

Keyboard Detachable, two-position height; 101 or 102 sculpted keys; country-dependent main typewriter keyboard; numeric/cursor control keypad; four-key cursor control keypad; 12 function keys

SETUP Program Stored in ROM; accessible by pressing Ctrl, Alt, and S during boot or at the DOS prompt

Physical Characteristics

- Width 15.6 inches (396 mm)
- Depth 14.5 inches (368 mm)
- Height 4.1 inches (104 mm)
- Weight 15 lb (6.8 kg) without drives or keyboard

Power Supply

- Type 65 Watt, fan cooled
- Input ranges 90 to 260 VAC
- Maximum outputs +5 VDC at 7.5 Amps, +12 VDC at 2.0 Amps, -12 VDC at 0.3 Amps
- Frequency 47 to 63 Hz
- Cables **One to main** system board; four to mass storage devices

Option Slot Power Limits

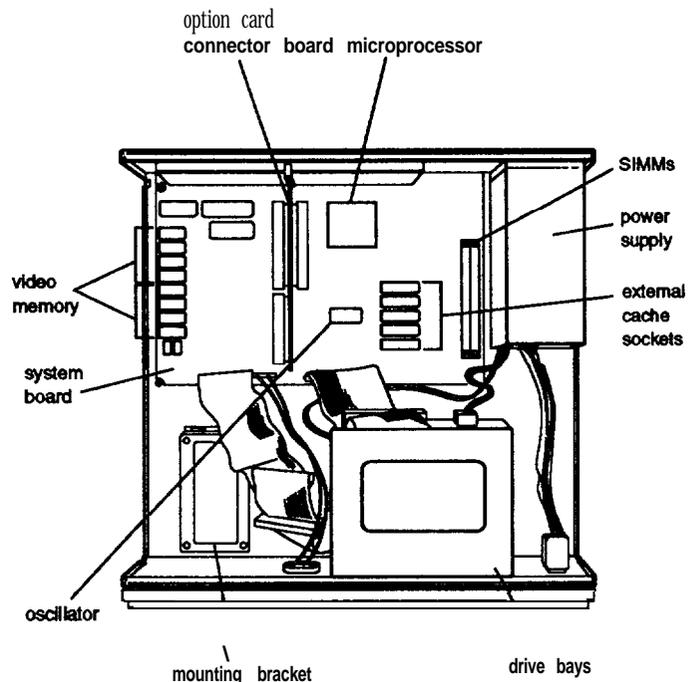
Maximum current	+5 Volts	+12 Volts	-12 volts
For all slots	4.6 Amps	1.8 Amps	0.3 Amps

This system does not support older option cards that tray require -5 volts.

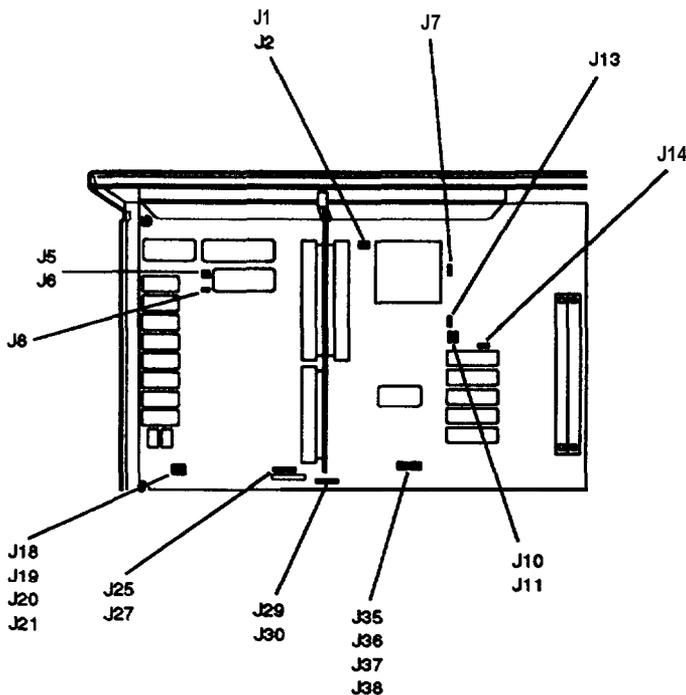
Environmental Requirements

Condition	Operating range	Non-operating range	Storage range
Temperature	41° to 90° F (5° to 32° C)	-4° to 140° F (-20° to 60° C)	-4° to 140° F (-20° to 60° C)
Humidity (non-condensing)	20% to 90%	10% to 90%	10% to 90%
Altitude	-330 to 9,900 ft (-100 to 3,000 m)	-330 to 39,600 ft (-100 to 12,000 m)	-330 to 39,600 ft (-100 to 12,000 m)

Major Subassemblies



Jumper Settings



Jumper settings

Jumper number	Jumper setting	Function
J18	1-2* 2-3	Enables COM1 serial port Disables COM1 serial port
J19	1-2* 2-3	Assigns COM1 serial port as COM1 Assigns COM1 serial port as COM3**
J30	1-2* 2-3	Enables COM2 serial port Disables COM2 serial port
J29	1-2* 2-3	Assigns COM2 serial port as COM2 Assigns COM2 serial port as COM4**
J21	1-2* 2-3	Enables parallel port Disables parallel port
J20	1-2* 2-3	Assigns parallel port as LPT1 Assigns parallel port as LPT2**
J5	1-2* 2-3	Enables game port Disables game port
J27	1-2* 2-3	Enables diskette drive controller Disables diskette drive controller
J25	1-2* 2-3	Enables IDE hard disk drive controller Disables IDE hard disk drive controller
J6†	1-2* 2-3	Accesses VGA memory addresses Accesses monochrome memory addresses
J8	ON* OFF	Identifies an interlaced monitor Identifies a non-interlaced monitor

- * Factory setting
DOS automatically reassigns parallel and serial ports. Check your DOS manual for more information.
- † If you change this jumper setting to position 2-3, make sure you select MONO for the Video Card option in SETUP.

Drive assignment jumper settings

Drive assignment	J-35	J36	J37	J38
Upper drive is A	1-2	1-2	1-2	1-2
Lower drive is A	2-3*	2-3*	2-3*	2-3*

* Factory setting

External cache jumper settings'

Cache size	J7	J10	J11	J13	J14
32 KB	on	1-2	1-2	1-2	1-2
128 KB	On	2-3	2-3	2-3	2-3

* If you have no external cache installed, the position of these Jumpers does not matter.

Processor type jumper settings

Processor type	J2
486SX/25 or 486SX/33	Off
486DX/33	1-2
486DX2/50 or 486DX2/66	1-2 and 3-4

Caution

Do not remove jumper J42. If J42 is off, your system cannot write to RAM.

SIMM Installation

Your computer comes with 4MB of memory on a SIMM. You can increase the memory up to 32MB by installing 1MB, 4MB, 8MB, and 16MB SIMMs in the computer's two SIMM sockets. The following table shows the possible SIMM configurations; do not install memory in any other configuration.

SIMM configuration

Bank 0 (U46)	Bank 1 (U45)	Total memory
4MB		4MB*
1MB	4MB	5MB
4MB	4MB	8MB
8MB	4MB	12MB
8MB	8MB	16MB
16MB	16MB	32MB

* Standard memory configuration

Before you install SIMMs, check the following guidelines to ensure that they will work properly:

- Use only tin-plated, 36-bit, 72-pin, fast-page mode SIMMs that operate at an access speed of 70ns (nanoseconds) or faster. Be sure all the SIMMs operate at the same speed.
- Use the correct SIMM configuration to add the amount of memory you want. See the table above.

Video Memory

The EL 486UC comes with 512KB of video memory. You can increase the video memory to 1MB by installing four video DRAM, 20-pin, 70ns or 80ns, 256KB x 4-bit, DIP chips.

For the memory to work properly, you must install chips in the following configuration (each bank contains two video memory sockets).

Video memory chip configuration

Bank 0 (U18 and U39)	Bank 1 (U24 and U43)	Bank 2 (U25 and U47)	Bank 3 (U31 and U53)	Total memory
Soldered	Filled			512KB *
Soldered	Filled	Filled	Filled	1024KB

* Standard video memory

External Cache

You can add either 32KB or 128KB of external cache to the EL 486UC by installing SRAM chips. For 32KB, use five 28-pin, 8 x 8, 20ns DIP chips. For 128KB, use five 32 x 8, 20ns DIP chips. After adding external cache, be sure to change jumpers J7, J10, J11, J13, and J14 to match the amount of cache installed.

Microprocessor Upgrades

The computer's 80486SX/25 microprocessor can be upgraded to a 486SX/33, 486DX/33, 486DX2/50, or 486DX2/66. You can either purchase an upgrade kit from Epson or buy the components separately, as listed in the following table.

Microprocessor upgrade components

Part	Manufacturer	Manufacturer's part number
486SX/33 processor	Intel	A80486SX-33 SX680B
486DX/33 processor	Intel	A80486DX-33 SX419
486DX2/50 processor	Intel	A80486DX2/50 SX626
486DX2/66 processor	Intel	A80486DX2/66 SX750
33 MHz oscillator	Ecliptek	EC1100
Heat sink and clip	EG&G	669-52AB
Two-position jumper	Foxcom	SJ05207

Use the following table to identify the general steps you need to perform to upgrade your microprocessor. The pages listed in the final column tell you where to find instructions in the User's Guide for performing those steps.

Microprocessor upgrade procedures

If you Install	You need to	See page
486SX/33	Remove the option card connector board	3-17
	Remove existing processor chip	3-26
	Install the 486SX/33 chip	3-26
	Replace the existing oscillator	3-29
486DX/33	Remove the option card connector board	3-17
	Remove existing processor chip	3-26
	Install the 486DX/33 chip	3-26
	Install a heat sink on the chip	3-28
	Replace the existing oscillator	3-29
	Change jumpers J1 and J2	3-6
486DS2/50	Remove the option card connector board	3-17
	Remove existing processor chip	3-26
	Install the 486DX2/50 chip	3-26
	Install a head sink on the chip	3-28
	Change jumpers J1 and J2	3-6
	Replace the option card connector board	3-18
486DX2/66	Remove the option card connector board	3-17
	Remove existing processor chip	3-26
	Install the 486DX2/66 chip	3-26
	Install a heat sink on the chip	3-28
	Replace the existing oscillator	3-29
	Change jumpers J1 and J2	3-6
	Replace the option card connector board	3-18

Hard Disk Drive Types

The following table lists types of hard disk drives you can use in the computer. Check this table and your hard disk manual to find the correct type number(s) for the hard disk drive(s) installed in the computer. You need to enter the type number(s) when you set the hard disk drive configuration in the SETUP program.

Hard disk drive types

Type	Cyl	Heads	Precomp	LZ	Sec	Size* (MB)
1	306	4	128	305	17	10
2	615	4	300	615	17	20
3	615	6	300	615	17	30
4	940	8	512	940	17	62
5	940	6	512	940	17	46
6	615	4	-1	615	17	20
7	462	8	256	511	17	30
8	733	5	-1	733	17	30
9	900	15	-1	901	17	112
10	820	3	-1	820	17	20
11	855	5	-1	855	17	35
12	855	7	-1	855	17	49
13	306	8	128	319	17	20
14	733	7	-1	733	17	42
16	612	4	0	663	17	20
17	977	5	300	977	17	40
18	977	7	-1	977	17	56
19	1024	7	512	1023	17	59
20	733	5	300	732	17	30
21	733	7	300	732	17	42
22	733	5	300	733	17	30
23	306	4	0	336	17	10
24	Drive table entry unused					

Hard disk drive types (continued)

Type	Cyl	Heads	Precomp	LZ	Sec	Size* (MB)
25	615	4	0	615	17	20
26	1024	4	-1	1023	17	34
27	1024	5	-1	1023	17	42
28	1024	8	-1	1023	17	68
29	512	8	256	512	17	34
30	615	2	615	615	17	10
31	989	5	0	989	17	41
32	1020	15	-1	1024	17	127
33	615	4	-1	615	26	31
34	820	6	-1	820	26	62
35	1024	9	1024	1024	17	78
36	1024	5	512	1024	17	42
37	1024	5	512	1024	26	65
38	823	10	256	824	17	68
39	615	4	128	664	17	20
40	615	8	128	664	17	40
41	917	15	-1	918	17	114
42	1023	15	-1	1024	17	127
43	823	10	512	823	17	68
44	820	6	-1	820	17	40
45	1024	5	-1	1023	17	42
46	925	9	-1	925	17	69
47	699	7	256	700	17	40
48, 49	User-defined drive type					

* Actual formatted size may be slightly different than size on drive label.

If the computer has an Epson-supplied hard disk drive, select a userdefined drive type and enter the appropriate **information** from the table below using the SETUP program.

Epson-supplied hard disk drive types

Epson drive options	Cyl	Hd	Pre	LZ	Sec	Size* (MB)
80MB ** (Conner CP30084E)	903	4	-1	902	46	81
120MB ** (Conner CP30104H)	762	8	-1	761	39	115
170MB ** (Conner CP30174E)	903	8	-1	902	46	162
170MB (Quantum ELS170AT)	1011	15	-1	1010	22	170
240MB (Quantum LPS240AT)	723	13	-1	722	51	234
250MB (Conner CP30254)	895	10	-1	894	55	240
340MB (Conner CP30344)	655	16	0	654	63	343

* Actual formatted size may be slightly different than size on drive label.

** If you have one of these hard disk drives, make sure you set the Shadow BIOS ROM option to WP-Shadow or Cacheable.

Installation/Support Tips**Installing Option Cards**

Although the EL 486UC will support most full-length option cards, option cards with an I/F connector on the back may not fit into the option slot.

Note that the EL 486UC system does not support older option cards requiring -5 VDC.

Installing Diskette Drives

Make sure that the drive type has been correctly selected in the SETUP program.

Installing Hard Disk Drives

- It is recommended that a 16-bit, AT-type hard disk controller be used if you are installing a drive that cannot use the embedded IDE interface. If you install a non-IDE hard disk drive and controller card, you need to disable the built-in IDE hard disk drive **interface** by moving jumper J25 to position 2-3.
- When installing a hard disk drive, see the hard disk drive type tables on pages 4 and 5 and use the SETUP program to select the correct type number for the drive. You can select a type number that matches the parameters for the drive or a type number with parameters having lesser values, as long as they do not exceed the maximum capacity (ii MB) of the drive. If there is no match for the drive, you can select a userdefined drive type (48 or 49) and enter the drive's exact parameters.
- If you are going to install NetWare 286, version 2.2, do not assign a user-defined disk drive type for your disk drive. Assign the pre-defined hard disk drive type that most closely matches the drive you are installing.
- If you are installing an ESDI hard disk drive, make sure you disable the built-in IDE hard disk drive interface by moving jumper J25 to position 2-3. Also be sure to remove the hard disk drive ribbon connector from the system board.

Software Problems

- When installing a copy-protected software package, first try the installation at high speed. If this does not work properly, select low speed by pressing the Ctrl and Alt keys and the - key on the numeric keypad simultaneously. Try loading the program at low speed and then switching to high speed, if possible.
- When using a software package that uses a key disk as its copy-protection method, try loading it at high speed. If this does not work, load it at low speed.

COM Port Assignment

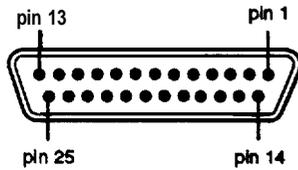
If you want to assign COM1 as COM3, you must set jumper J19 to position 2-3.

Booting Sequence

If you cannot boot the computer from the hard disk, make sure the booting sequence in SETUP is set to A, c Then boot the computer from a system diskette in drive A.

Connector Pin Assignments

Parallel Port Connector (CN3)

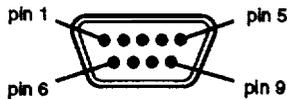


Parallel port connector pin assignments

Pin	Signal	Pin	Signal	Pin	Signal
1	Strobe	10	ACK *	19	Signal ground
2	Data 0	11	Busy	20	Signal ground
3	Data 1	12	PE	21	Signal ground
4	Data 2	13	Select	22	Signal ground
5	Data 3	14	Auto *	23	Signal ground
6	Data 4	15	Error *	24	Signal ground
7	Data 5	16	Init *	25	Signal ground
8	Data 6	17	Selectin *		
9	Data 7	18	Signal ground		

*Active low logic

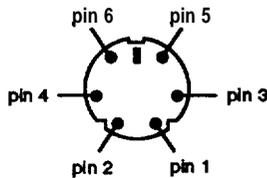
Serial Port Connectors (CN4 and CN5)



Serial port connector pin assignments

Pin	Signal	Pin	Signal
1	Data carrier detect	6	Data set ready
2	Receive data	7	Request to send
3	Transmit data	8	Clear to send
4	Data terminal ready	9	Ring indicator
5	Not used		

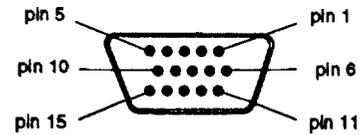
Keyboard Connector (CON1)



Keyboard connector pin assignments

Pin	Signal	Pin	Signal
1	Data	4	+5 VDC
2	Resewed	5	Clock
3	Ground	8	Reserved

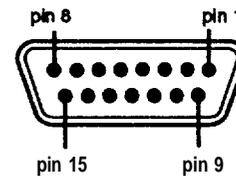
VGA Port Connector (CN2)



VGA port connector pin assignments

Pin	Signal	Pin	Signal	Pin	Signal
1	Red	6	Red ground	11	NC
2	Green	7	Green ground	12	Monitor detect
3	Blue	8	Blue ground	13	Horizontal sync
4	NC	9	NC	14	Vertical sync
5	Ground	10	GND	15	NC

Game Port Connector (CN1)



Game port connector pin assignments

Pin	Signal	Pin	Signal	Pin	Signal
1	+5 VDC	6	Position 1	11	Position 2
2	Button 4	7	Button 5	12	Signal ground
3	Position 0	8	+5 VDC	13	Position 3
4	Signal ground	9	+5 VDC	14	Button 7
5	Signal ground	10	Button 6	15	+5 VDC

DMA Assignments

Level	Assigned device
DMA0	Spare (8-bit)
DMA1	Spare (8-bit)
DMA2	FDD controller (8-bit)
DMA3	Spare (8-bit)
DMA4	Cascade for DMA controller 1
DMA5	Spare (16-bit)
DMA6	Spare (16-bit)
DMA7	Spare (16-bit)

Hardware Interrupts

IRQ no.	Function
IRQ0	Timer output
IRQ1	Keyboard
IRQ2	Cascade from IRQ controller 2
IRQ3	Serial port 2
IRQ4	Serial port 1
IRQ5	Parallel port 2 (Available)
IRQ6	FDD controller
IRQ7	Parallel port 1
IRQ8	Real-time clock
IRQ9	Available

Hardware interrupts (continued)

IRQ10	Available
IRQ11	Available
IRQ12	Available
IRQ13	Math coprocessor
IRQ14	HOC controller
IRQ15	Available

System Memory Map

000FFFFFFh	System BIOS ROM: 64KB Duplicated from 0F0000h	32MB (Maximum system memory)
000FF0000h	Reserved for system board: 64KB Duplicated from 0E0000h	
000FE0000h	Extended memory	
00100000h	System BIOS ROM: 64KB Default Shadow RAM duplicated at FF0000h	1MB
000F0000h	Unused or I/O expansion ROM: 160KB Resewed for ROM on I/O adapters	
000C8000h	VGA BIOS ROM: 32KB Default Shadow RAM	640KB
000C0000h	VGA text (color): 32KB	
000B8000h	Unused or VGA text (monochrome): 32KB	
000B0000h	Video memory: 64KB Reserved for graphics display buffer	
000A0000h	Conventional system memory: 640KB	
00000000h		

System I/O Address Map

Hex address	Assigned device
000 - 01F	DMA controller 1, 8237A-5
020 - 03F	Interrupt controller 1, 8259A, master
022 - 023	Chip set configuration register
040 - 05F	Timer, 8254-2
060 - 06F	8042 (Keyboard)
070 - 07F (CMOS)	Real-time clock NMI (non-maskable interrupt) mask
080 - 09F	DMA page register, 74LS812
0A0 - 0BF	Interrupt controller 2, 8259A
0C0 - 0DF	DMA controller 2, 8237A-5
0F0	Clear math coprocessor busy
0F1	Reset math coprocessor
0F8 - 0FF	Math coprocessor
1F0 - 1F8	Hard disk
200 - 207	Game I/O
278 - 27F	Parallel printer port 2
2B0 - 2DF	Alternate enhanced graphics adapter
2E1	GPIB (adapter 0)
2E2 and 2E3	Data acquisition (adapter 0)
2F8 - 2FF	Serial port 2
300 - 31F	Prototype card
360 - 36F	Reserved
378 - 37F	Parallel printer port 1
380 - 38F	SDLC, bisync 2
390 - 393	Cluster
3A0 - 3AF	Bisynchronous 1
3B0 - 3BF	Monochrome display and printer adapter
3C0 - 3CF	Reserved
3D0 - 3DF	Color/graphics monitor adapter
3F0 - 3F7	FDD controller
3F8 - 3FF	Serial port 1
6E2 and 6E3	Data acquisition (adapter 1)
790 - 793	Cluster (adapter 1)
AE2 and AE3	Data acquisition (adapter 2)
B90 - B93	Cluster (adapter 2)
EE2 - EE3	Data acquisition (adapter 3)
1390 - 1393	Cluster (adapter 3)
22E1	GPIB (adapter 1)
2390 - 2393	Cluster (adapter 4)
42E1	GPIB (adapter 2)
62E1	GPIB (adapter 3)
82E1	GPIB (adapter 4)
A2E1	GPIB (adapter 5)
C2E1	GPIB (adapter 6)
E2E1	GPIB (adapter 7)

Information Reference List**Engineering Change Notices**

None.

Technical Information Bulletins

None.

product Support Bulletins

None.

Related Documentation

TM-EL486UC Epson EL 486UC Service Manual

PL-EL486UC Epson EL 486UC Parts Price List

400235000 Epson EL 486UC User's Guide

Novell Certification as Client, July 19,1993

Novell Certification Documents: W-730 (SX/25), W-729
(DX2/66), 7/13/93