

## Computer Specifications

### Main Unit

CPU	386SL microprocessor; 20 or 25 MHz and 5 or 6.25 MHz dock speed, selectable through Setup or software comand
System memory	2MB or 4MB, expandable to 14MB or 20MB; the first 640KB is conventional memory and 128KB is used for shadow RAM, the rest CM be used as extended or EMS memory; selectable through Setup
BIOS ROM	128KB on a single flash ROM (includes system BIOS and VGA BIOS)
Math coprocessor	Socket for optional 20 or 25 MHz, 387SX numeric coprocessor
Clock/calendar	Real-time clock, calendar, and CMOS RAM for configuration; backed up by 3.6 volt lithium battery
Controllers	
Diskette drive	Built-in controller for up to two diskette drives (internal 3 1/2-inch and external 5 1/4-inch); supports 1.44MB, 720KB, 1.2MB, and 360KB formats
Hard disk	Slot for 2 1/2-inch hard disk drive cartridge with embedded controller
Parallel/external diskette drive	25-pin, D-sub, female connector with standard & bit parallel or external diskette drive support, selectable through Setup
serial	RS-232-C, programmable, asynchronous, 9-pin, D-sub male connector
LCD and CRT	Built-in controller supporting standard VGA color or monochrome; external 15-pin, female connector for connecting an external monitor
Mouse, external numeric keypad, or keyboard	9-M mini-DIN connector for optional mouse, external numeric keypad, or external keyboard
Speaker	Built-in ISA compatible speaker controller; internal
Modem	Internal slot for optional modem
Keyboard	84 (International) or 82 (US) keys with four levels of user-definable functions

### Mass Storage

Diskette drives	Support for up to two drives: one internal, 3 1/2-inch 1.44MB diskette drive and one optional, external 5 1/4-inch (1.2MB) diskette drive
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# NB-SL Notebook Computers

**Hard disk drives** Support for up to two drives: one in the NB-SL and one in the Expansion Unit

Removable 40MB, 60MB, or 80MB hard disk drive cartridge designed for low power consumption in the NB-SL; embedded controller; power-saving feature

## LCD Display

**Monochrome:** 640 x 480, .3 mm, high contrast 2-film; paper-white, backlit by one CCFT (cooled cathode fluorescent tube); continuous brightness and contrast controls; power-saving feature

**Color:** 640 x 480, .3 mm, high contrast, active-matrix, MIM (metal-insulator-metal)

## Power Supply

**AC adapter** 9V, 3.0A/12V, 1.7A AC adapter with international voltage input, 50/60 Hz

**Battery packs** Two interchangeable, rechargeable, internal NiCd battery packs; 6-cell, 7.2 volt

**CAUTION:** Use only the AC adapter and batteries designed for use with the NB-SL (AC adapter model number AD0930WA, and battery model numbers BC7217WA and BH7222WA).

## Physical Dimensions

**Height** Monochrome: 51 mm (2 in);  
Color: 61 mm (2.4 in)

**Width** 297 mm (11.69 in)

**Depth** 235 mm (9.25 in)

**Weight (with hard disk and two battery packs)** Monochrome: 3.3 kg (7.2 lbs)  
Color: 3.6 kg (7.9 lbs)

## Environmental Requirements

**Temperature** Operating: 5° to 35° C (41° to 95° F)  
Non-operating: -20° to 60° C (-4° to 140° F)

**Humidity** Operating: 20% to 80% (non-condensing)  
Non-operating: 8% to 90% (non-condensing)

**Altitude** Operating: -60 to 3,000 m (-198 to 9,900 feet)  
Non-operating: -60° to 12,000 m (-198 to 39,600 feet)

**CAUTION:** When traveling by airplane, be sure to take your computer into the passenger compartment as carry-on luggage to prevent it from being stored in an unpressurized storage compartment.

## Product Configuration

Model	CPU speed	LCD type	Standard memory	Cache speed
NB-SL/20	20 MHz	FTN-Mono	2MB	35 ns
NB-SL/25	25 MHz	FTN-Mono	4MB	25 ns
NB-SL/25C	25 MHz?	MIM-Color	4MB	25 ns

## Differences Between NB-SL/20 and NB-SL/25 (Monochrome)

Product Name	NB-SL/20	NB-SL/25
CPU Chip	Intel 80386 SL-20	Intel 80386 SL-25
CPU clock speed (High speed mode)	20 MHz	25 MHz
CPU board name	1592CM	1791 CM
<b>Memory</b>		
Standard on board memory	2MB	4MB
Max RAM on board	14MB	20MB*
Board unit no.	200682100	200673800
CPU chip	Intel KU80386SLBA-20SX523 (20 MHz)	Intel KU80386SLBA-25SX524 (25 MHz)
Cache memory	Toshiba TC55326J35 (35 ns) or NEC uPD43258ALA-25	Toshiba TC55326J25 (25 ns) or NEC uPD43258ALS-25
DRAM location	U10, U12, U14, U16	U10, U12, U14, U16, U11, U13, U15, U17
Oscillator	DOC-49S2 (40 MHz)	DOC-49S2 (50 MHz)

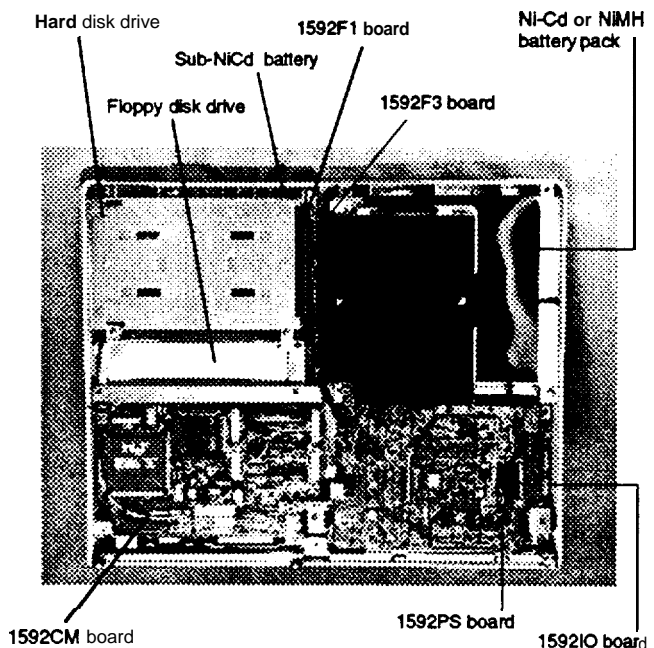
\*: Memory configuration on SL/25

## Options

Check with your dealer for availability of the following options:

- 2MB, 4MB, or 8MB expansion memory modules
- 40MB, 60MB, or 80MB removable hard disk drive cartridges
- External numeric keypad
- External keyboards
- NiCd battery pack
- Additional AC adapter
- Internal modem
- 387SX math coprocessor
- Desktop Expansion Unit carrying case

## Main System Board



## Reserved Memory

Function	Capacity	Address range
System BIOS and power management	96 KB	E8000h-FFFFh
Reserved for system use	32 KB	E0000h-E7FFFh
Shadowed video BIOS	32 KB	C0000h-C7FFFh
Video RAM	128 KB	A0000h-BFFFFh

Memory between the addresses shown above is reserved for system use. Other memory between 384KB and 1MB is available to the user if enabled through setup.

## Shadow RAM

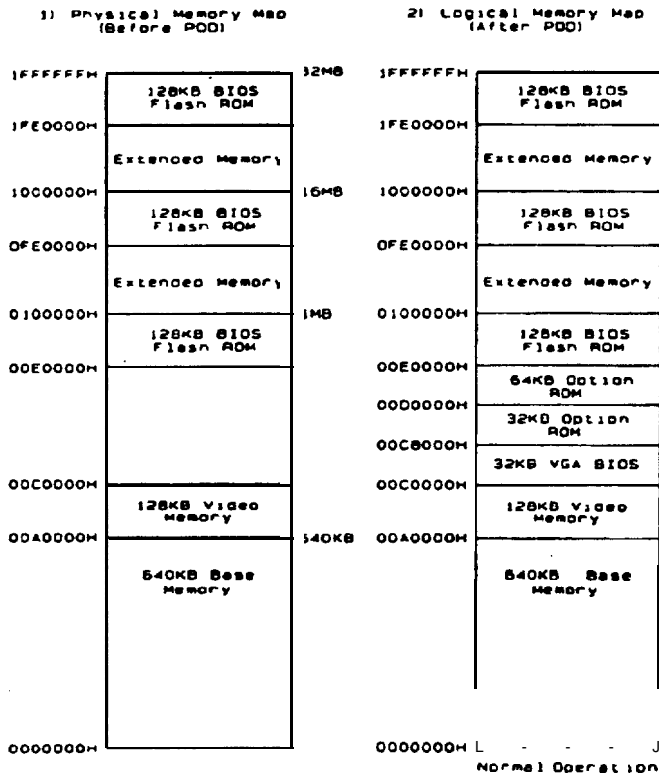
System BIOS (128KB) is copied to shadow RAM by POD when the system boots. System BIOS in flash memory is addresses from E000:0 to FFFF:F. The 8KB of memory in the address range FE00:0-FFFF:F is assigned as a boot block for flash memory and is not updated when the flash memory is overwritten

### Shadow RAM Addressing

Type of Code	Actual Address	Destination Address
VGA *	E000:0 - E7FF:F	C000:0 - C7FF:F
Others	E800:0 - FFFF:F	E800:0 - FFFF:F

- Only the VGA BIOS addresses need to be converted.

## Memory Map Before/After POD



## Memory Module Expansion

The following tables show the possible memory configurations for the NB-SL.

### 20 MHz system

Base memory	Slot 1 (CN3/4)	Slot 2 (CN5/6)	Total memory
2 MB	X	X	2MB
2 MB	2MB X	X 2 MB	4MB
2 MB	2 MB 4 MB X	2 MB X 4 MB	6 MB
2 MB	2 MB 4 MB	4 MB 2 MB	8 MB
2 MB	8 MB' X	X 8 MB	10 MB
2 MB	2 MB 8 MB'	8 MB* 2 MB	12 MB
2 MB	4 MB	8 MB	14 MB*

\*8MB modules may not be available.

- \* For 14MB of total memory, do not install an 8MB module in slot 1 and a 4MB module in slot 2.

### 2.5 MHz system

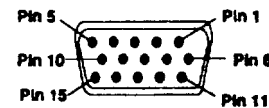
Base memory	Slot 1 (CHIN)	Slot 2 (CN5/6)	Total memory
4 MB	X	X	4 MB
4 MB	2 MB X	X 2 MB	6 MB
4 MB	2 MB X	2MB 4 MB	8 MB''
4 MB	8 MB* X	X 8 MB'	12 MB
4 MB	2 MB 8 MB*	8 MB' 2 MB	14 MB
4 MB	8 MB'	8 MB'	20 MB

• 8MB may not be available

- \* For 8MB of total memory, do not install a 4MB module in slot 1 and nothing in slot 2.

## Connector Pin Assignments

### VGA Video Connector



### VGA connector pin assignments

Pin no.	Signal name	I/O	Description
1	RED	I	Red Video
2	GREEN	I	Green Video
3	BLUE	I	Blue Video
4	N.C.	-	No Connection
5	GND	-	Ground
6	REDRTN	I	Red Return
7	GREENRTN	I	Green Return
8	BLUERTN	I	Blue Return
9	N.C.	-	No Connection
10	GND	-	Ground
11	N.C.	-	No Connection
12	N.C.	-	No Connection

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## VGA connector pin assignments (continued)

Pin no.	Signal name	I/O	Description
13	HSYNC	I	Horizontal Sync
14	VSYNC	I	Vertical Sync
15	NC.	-	No Connection

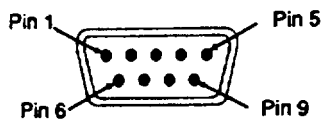
## Parallel/External FDD Connector



## Parallel port (CN3) connector pin assignments

Pin no.	Signal name	I/O	Description
1	STROBE-	O	Strobe for Printer
2	PD0	O(I)	Data Bit 0 for Printer (Index from FDD)
3	PD1	O(I)	Data Bit 1 for Printer (Track 0 from FDD)
4	PD2	O(I)	Data Bit 2 for Printer (Write Protect from FDD)
5	PD3	O(I)	Data Bit 3 for Printer (Read Data from FDD)
6	PD4	O(I)	Data Bit 4 for Printer (Disk Change from FDD)
7	PD5	O(I)	Data Bit 5 for Printer
8	PD6	O(I)	Data Bit 6 for Printer
9	PD7	O(I)	Data Bit 7 for Printer
10	ACK-	I(O)	Acknowledge from Printer (Drive Selection for FDD)
11	BUSY-	I(O)	Busy from Printer (Motor Enable for FDD)
12	PE	I(O)	Paper Empty from Printer (Write Data for FDD)
13	SLCT	I(O)	Select from Printer (Write Enable for FDD)
14	AUTOFEED-	I(O)	Auto Feed from Printer (High Density Selection for FDD)
15	ERROR-	I(O)	Error from Printer (Side Selection for FDD)
16	INIT-	I(O)	Initialization from Printer (Direction for FDD)
17	SLCTIN-	I(O)	Select In from Printer (Step for FDD)
1a25	GND	-	Ground

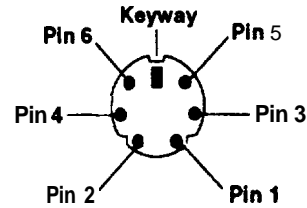
## Serial Port Connector (CN4)



## Serial port (CN4) connector pin assignments

Pin no.	Signal name	I/O	Description
1	COMADCD	I	Data Carrier Detect
2	COMARXD	I	Serial Data Receive
3	COMATXD	O	Serial Data Transmission
4	COMADTR	O	Data Terminal Ready
5	GND	-	Ground
6	COMADSR	I	Data Set Ready
7	COMARTS	O	Request to Send
8	COMACTS	I	Clear to Send
9	COMARI	I	Ring Indicator

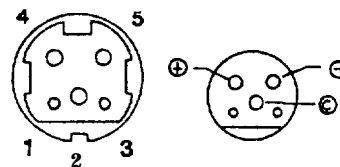
## Mouse/Numeric Keypad/External Keyboard Connector



## Mouse (CN5) connector pin assignments

Pin no.	Signal name	I/O	Mouse	Numeric keypad	External keyboard
1	OMSDATA	I/O	Mouse Data	Keypad Data	Keyboard Data
2	N.C.	-	No Connection	No Connection	No Connection
3	GND	-	Ground	Ground	Ground
4	MSVCC	-	DC+5V (fused)	DC+5V (fused)	DC+5V (fused)
5	OMSCLK	I/O	Mouse Clock	Keypad Clock	Keyboard Clock
6	N.C.	-	No Connection	No Connection	No Connection

## AC Adapter Connector



## AC adapter (CN6) connector pin assignments

Pin no.	Signal name	I/O	Description
1	AD	I	Power from AC Adapter
2	CHARGE	O	Charge
3	GND	-	Ground
4	CLON	-	No Connection
5	CHGSEL	I	Change Select
6	GND	-	Ground

## System I/O Address map

Address	Assigned devices	Expansion Unit
170 - 178	Hard disk controller secondary	
1F0 - 1F8	Hard disk controller primary	Yes
200 - 207	Game I/O	
278 - 27F	Parallel printer port 2	Yes (*2)
2F8 - 2FF	Serial port 2	Yes
300 - 31F	Prototype card	
360 - 36F	Reserved	
378 - 37F	Parallel printer port 1	Yes (*2)
380 - 38F	SDLC, bisynchronous 2	
3A0 - 3AF	Bisynchronous 1	
3B0 - 3BB	VGA monitor adapter	
3BC - 3BE	Parallel printer alternate port (*1)	
3BF - 3DF	VGA monitor adapter	
3F8 - 3FF	Serial port 1	Yes

(\*1): If this port is drive, the BIOS will give priority to it.  
 (\*2): Select one by software.

**Additional I/O Map**

Address	Assigned devices
11B8	Power control register
11BD	Configuration register

**Configuration register**

Bit no.	Assigned devices	Set to "0"	Set to "1"
7	HDD (in D/S)	Disable	Enable
6	HDD	D: drive	C: drive
5	Parallel	378-37F h	278-27F h
4	Parallel	Disable	Enable
3	Parallel	Normal printer	Bi-directional printer
2	Serial	Primary=3F8-3FFh Secondary=2F8-3FFh	Primary=2F8-2FFh Secondary=3F8-3FFh
1	Secondary modem	Disable	Enable
0	Primary RS-232C	Disable	Enable

**DMA Request Level**

Level	Assigned device
DRQ 0 (CTRL1)	Not designated
DRQ 1 (CTRL1)	Not designated
DRQ 2 (CTRL1)	Floppy disk drive controller
DRQ 3 (CTRL1)	Not designated
DRQ 4 (CTRL2)	(Cascade for CTRL1)
DRQ 5 (CTRL2)	Not designated
DRQ 6 (CTRL2)	Not designated
DRQ 7 (CTRL2)	Not designated

**Power-on Diagnostics (POD) Step IDs**

Step ID	Contents	Step ID	Contents
02	Flag test	3A	Retest 64K base RAM
04	Register test	3C	CPU speed calculation
06	System hardware initialization	3E	Get switches from 8042
08	Initialize chip set registers	40	Configure CPU speed
0A	BIOS ROM checksum	42	Initialize interrupt vectors
0C	DMA page register test	44	Verify video configuration
0E	8254 timer test	46	Initialize video system
10	8254 timer initialization	48	Test unexpected interrupts
12	8237 DMA controller	4A	Start second protected mode test
14	6237 DMA initialization	4C	Verify LDT instruction
16	Initialize 8259/Reset coprocessor	4E	Verify TR instruction
18	8259 interrupt controller test	50	Verify LSL instruction
1A	Memory refresh test	52	Verify LAR instruction
1C	Base 64KB address test	54	Verify LERR instruction
1E	Base 64KB memory test	56	Unexpected exception
20	Base 64KB test (upper 16 bits)	58	Address line 20 test
22	8742 keyboard self test	5A	Keyboard ready test
24	MC146616 CMOS test	5C	Determine AT or XT keyboard
26	Start first protected mode test	5E	Start protected mode test
28	Memory sizing test	60	Base memory test
2A	Autosize memory chips	62	Base memory address test
2C	Chip interleave enable test	64	Shadow memory test
2E	First protected mode test exit	66	Extended memory test
30	Unexpected mode test exit	68	Extended address test
32	System board memory size	6A	Determine memory size
34	Relocate shadow RAM if configured	6C	Display error message

Step ID	Contents	Step ID	Contents
36	Configure EMS system	6E	Copy BIOS to shadow memory
38	Configure wait states	70	8254 clock test
3A	Retest 64K base RAM	72	MC146818 real time clock test
74	Keyboard struck key test	76	Initialize hardware interrupt vectors
78	Math coprocessor test	7A	Determine COM ports available
7C	Determine LPT ports available	7E	Initialize BIOS data area
80	Determine floppy/fixed controller	82	Floppy disk test
84	Fixed disk test	86	External ROM scan
88	System key lock test	8A	Wait for F1 key pressed
8C	Final system initialization	8E	Interrupt 19 boot loader
B0	Unexpected interrupt		

**Expansion Unit Hard Disk Drive Types**

If you need to enter the drive type in the Setup program for a hard disk drive you have installed in the Expansion Unit, refer to the table below.

*Hard disk drive types*

Type no.	Cylinders	Heads	Sectors	Precomp	Landing zone	MB	Drive name
00							No hard disk
01	306	4	17	128	305	10.2	
02	615	4	17	300	615	20.4	(1)
03	615	6	17	300	615	30.6	
04	940	8	17	512	940	62.4	
05	940	6	17	512	940	46.8	
06	615	4	17	—	615	20.4	Conner CP-3024
07	462	8	17	256	511	30.7	
08	733	5	17	—	733	30.4	
09	900	15	17	—	901	112.1	
10	820	3	17	—	820	20.4	
11	855	5	17	—	855	35.5	
12	855	7	17	—	855	49.7	
13	306	a	17	125	319	20.3	
14	733	7	17	—	733	42.6	
15							reserved
16	612	a	17	0	663	20.3	
17	977	5	17	300	977	40.5	CDC 94205-51, Conner CP-3044, CP2044, (2) Toshiba MK1122FC
18	977	7	17	—	977	56.8	
19	1024	7	17	512	1023	59.5	CP-2064
20	733	5	17	300	732	39.4	Toshiba MK-133FA
21	733	7	17	300	732	42.6	Toshiba MK-134FA
22	733	5	17	300	733	30.4	
23	306	4	17	0	336	10.2	
24	612	4	17	306	663	29.4	
25	306	4	17	—	340	10.2	
26	612	4	17	—	670	20.4	
27	608	7	17	300	732	40.6	
28	976	5	17	488	877	40.5	
29	306	4	17	0	340	10.2	
30	611	4	17	306	663	20.4	
31	732	7	17	300	N...	42.5	
32	1023	7	17	—	1023	42.5	
33-36							none
37	683	16	38	—	683	202.8	Conner CO-3204
38	548	a	38	—	547	m.3	Conner 2084

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## Hard disk drive types

Type no.	Cylinders	Heads	Sectors	Precomp	Landing zone	MB	Drive name
39	761	8	39	0fffh	760	1159	Conner CP-30104
40	960	10	17	0fffh	979	a14	Maxtor 7080A, Toshiba MK2024FC
41	1022	5	34	---	1022	84.8	CDC 94216-106 (3)
42	1022	5	36	---	1022	89.8	CDC 94216-106
43	1024	8	17	512	1023	68.0	(4)
44	828	10	34	---	828	137.5	Toshiba MK-156F
45	1024	8	17	512	1023	42.5	
46							-reserved-
47							-reserved-

(1) Miniscrbe 8425F, Seagate ST125, Toshiba MK1022FC

(2) Conner CP-3044, CP-2044 can be used as type 17 by Translate mode

(3) For Western Digital ESDI HDC or drive maker default setting

(4) Micropolis 1325, Atasi 3085, Lanetor Lan64, Maxtor XT1085, Newbury NDR1085

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## Information Reference List

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### Engineering Change Notices

None.

### Technical Information Bulletins

None.

### Product Support Bulletins

None.

### Related Documentation

TM-NBSL20T NB-SL, Service Manual Text  
TM-NBSL20C NB-SL, Cover/Spine/Divider  
PL-NBSL20 NB-SL, Parts Price List  
SPK-NBSL20 NB-SL, Self Paced Kit  
400105201 NB-SL, User's Guide