

NEC

Personal Computer

# PC-8000 Series

Introducing Long-Awaited Innovations.



# Advanced NEC LSI technology and extensive computer expertise give you exciting efficiency in a highly-economic personal computer—the PC-8000 Series!

What makes the NEC PC-8000 Series innovative is the advanced expertise of one of the world's leading semiconductor manufacturers. NEC's latest LSIs assure the finest cost-performance ratio on the market today.

The PC-8001 incorporates an NEC  $\mu$ PD780C (Z-80A compatible CPU),  $\mu$ PD416C (16K Bit dynamic RAM) and  $\mu$ PD2364C (64K Bit MASK ROM). A CRT display controller  $\mu$ PD3301D

and disk controller  $\mu$ PD765C in the mini-disk unit offer versatile commands for graphic and disk control. The PC-8001 contains interfaces with a CRT display, audio cassette recorder and printer. Expansion is easy with mini-disk units and RS-232C type peripherals. A full-size keyboard is provided with 10 keys, function keys, programmable function keys and 56 graphic patterns. The N-key rollover

input system permits high-speed typing for professional use. Basic memory configuration is 24K Bytes of ROM and 32K Bytes of RAM. NEC's PC-8001 readily combines with wide-ranging peripherals to let you compose an optimum system for diverse needs.



# 7 Features That Make PC-8001 Innovative.

**1) Numerous interfaces included in the keyboard unit\* allow easy system expansion.**

Interfaces for color video, B&W video, audio cassette and printer are included in the keyboard unit. External buses for the dual mini floppy disk unit and expansion unit make it easy to expand system capabilities.

\*The keyboard unit includes a CPU, ROMs, RAMs, various interfaces and power supply.

**2) MICROSOFT™ BASIC, powerful graphic and other original commands are combined to produce a high-performance DISK BASIC (N-BASIC)\*.**

N-BASIC, based on MICROSOFT™ BASIC, can utilize many published application softwares with slight modification. As N-BASIC is in the Read-Only-Memory (ROM), turning on the power switch is enough to start this system. ROM also contains a monitor program for machine words. \*N-BASIC is the BASIC language specially developed for the NEC PC-8001.

**3) Programmable function keys are highly effective in composing or executing programs.**

Five function keys on the keyboard can be used as ten by using the shift key. This function is useful for both program composing and execution. An application program stored in the floppy disk can be loaded in the RAM area simply by pressing the proper function key. In addition, there are several effective ways possible. For example, in an inventory control program, long-named items are registered with the keys to avoid troublesome key operation.

**4) The built-in color video interface creates the vivid 8-color graphic pattern.**

Even a complex graph or pattern can be easily recognized by using the 8-color display function. When a green monitor or B&W home TV\* is used, this function produces the varied 8-step brightness on the screen.

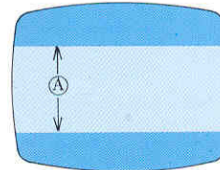
**5) The powerful screen editor reduces programing time.**

The cursor control key (←, →, ↑, ↓) that can move the cursor character by character, INS (insert) key and DEL (delete) key let you easily correct, append and delete a program. Also AUTO, DELETE and RENUM commands are introduced to simplify program editing.

(I) WIDTH command defines the characters/line and lines/screen. 36, 40, 72 and 80 characters per line are selectable. The character size has two modes, one for 36, 40 ch/line and another for 72, 80 ch/line configurations. There are 20-line and 25-line screen modes possible. The 25-line screen mode is recommended for graphic pattern display.

(II) The scroll area can be defined by CONSOLE command. You can scroll in area "A" only as diagramed. This is one of the most remarkable features of this system. There are other highly useful commands available, including CLEAR DATA, REVERSE AND SELECT.

**6) A special CRT controller LSI defines the scroll area on the screen and blinks the character. The screen is absolutely stabilized even when high-speed display operation is performed.**



ROM contains software for non-protocol terminal. Therefore, the PC-8001 can be used as a simple terminal with the optional RS-232C cable (PC-8062) to connect a modem or an acoustic coupler.

**7) The terminal capability distinguishes the PC-8001 from other personal computers.**

**Flexible expandability and wide-range peripherals support your application. An ideal machine for CP/M.**

## WHICH system

### System Configuration Examples

PC-8001 Keyboard unit  
 PC-8043 12-inch high-resolution color display  
 Cassette tape recorder  
 (Any type is applicable)

PC-8001 Keyboard unit  
 PC-8023 Dot impact printer  
 PC-8031 Dual mini-disk unit  
 PC-8043 12-inch high-resolution color display  
 PC-8033 I/O port for PC-8031 dual mini-disk unit

PC-8001 Keyboard unit  
 PC-8012 Expansion Unit  
 PC-8023 Dot impact printer  
 PC-8031 Dual mini-disk unit  
 PC-8043 12-inch high-resolution color display



Combination with a CRT display, printer and audio cassette recorder is sufficient for most applications.

However, if you require a mini-disk unit, you first need an FDC I/O port (PC-8033). For one mini-disk unit (2 drives), you have the Mini-Disk Unit (PC-8031). You have the Expansion Mini-Disk Unit (PC-8032), which couples with PC-8031, for two. The PC-8001 can utilize up to two Mini-

Disk Drive Units (4 drives).

For further system expansion the PC-8011 unit and the PC-8012 unit are available.

The PC-8011 unit incorporates 32K Bytes of RAM, sockets for 8K Bytes of PROM, real-time RS-232C interface, 34PIN I/O, 50PIN expansion I/O bus, IEEE-488 interface and a timer clock. The PC-8012 unit has a FDC I/O port, real-time clock, interrupt capability,

sockets for 2K Bytes of PROM and 32K Bytes of RAM. In addition to that, there are 6 other slots which allow the user to take advantage of other specialized circuits available on the market and those unique circuits developed by the end user. A powerful CP/M<sup>®</sup> available from NEC can be applied to the PC-8000 series by incorporating either a PC-8011 or PC-8012.

(CP/M is a trademark of Digital Research Inc.)

## is best for you?

The basic system consists of the PC-8001, CRT and audio cassette tape recorder. With this system you can enjoy powerful N-BASIC and vector graphic functions.

### Basic System

The PC-8023 printer is useful for drawing up the chit and keeping book. Data retrieval, through the dual mini-disk unit, cuts processing time drastically. In this system the optional PC-8033 I/O port is needed to link the dual mini-disk unit with the keyboard unit.

### Expanded System Example (1)

Expansion of RAM (32K Bytes) is possible. The dual mini-disk unit directly couples to the expansion unit without an optional I/O port. CP/M is available.

### Expanded System Example (2)

# N-BASIC displays 100% of PC-8001 hardware function.

NEC's PC-8001 has two modes; basic and terminal.

The basic mode is for use as a stand-alone personal computer, while the terminal mode is for use as a terminal of another computer or time sharing system. N-BASIC, in basic mode, displays outstanding performance in calculations and graphics. It can handle such variables as single precision, double precision, integer and calculation with an accuracy of 16 digits. N-BASIC has as many as

52 functions.

Also the vector graphic function, in terms of lines, provides efficient graphic display. There is a GET statement for loading the displayed pattern to the memory and a PUT statement for bringing the pattern to the screen from the memory. Proper use of these statements, with axes as parameters, provides easy forming of geometrical repetitive patterns.

Other attractive features include a direct access statement to the

memory and I/O, powerful PRINT USING statement to adjust the format and trace statements for debugging.

The PC-8001 can be utilized as a non-protocol terminal. Addition of the expansion unit permits real-time communication and editing of received data.

Transmission-reception control and data edition are handled with the BASIC language.



PC-8001 Specifications	
CPU	$\mu$ PD780C-1 (Z-80A compatible), 4MHz
ROM	24K Bytes (Expandable up to 32K Bytes)
RAM	32K Bytes
CRT	Choice of 80 characters $\times$ 25 or 20 lines 72 " $\times$ 25 or 20 lines 40 " $\times$ 25 or 20 lines 36 " $\times$ 25 or 20 lines
	Composition: Characters and graphic patterns (247 kinds)
	Graphic function: 160 $\times$ 100 dots
	Color: 8 colors (Black, blue, red, magenta, green, cyan, yellow and white)
	Other functions: Reverse, blink, secret
Cassette Interface	FSK system (1200, 2400Hz), 600 baud
Printer Interface	Parallel interface incorporated. (Standard centronics printer interface)
Keyboard	English upper/lower case characters, 10 keys, control keys, 5 function keys.
Serial Interface	Built-in TTL-level serial interface, 4800/2400/1200/600/300 baud. (Refer to the user's manual for actual character transfer speed in terminal mode.)
Power Supply	A Type: AC 120V $\pm$ 10%, 50/60Hz, 20W B Type: AC 220/240V $\pm$ 10%, 50/60Hz, 20W
Dimensions	440(W) $\times$ 265(D) $\times$ 80(H)mm
Weight	About 4Kg

N-BASIC Language Specifications	
Character	English upper/lower case characters, English symbols, numerals, special characters and symbols.
Number	Integer, floating-point arithmetic, octonal and hexadecimal figures.
Significant figures	16 digits max.
Line number	0 - 65529
Multi-statement	Available
Direct execution	Available
Variable names	Beginning with English letter followed by any combination/length of English letters and numerals. (Only the first two characters significant)
Array	255 dimensions. Suffix from 0 to 65535 and limited by available memory.
Graphic function	Draws lines and boxes. "GET" displayed data to array. "PUT" arrayed data on screen.
Color function	Available
Access to I/O, memory	Available (PEEK, POKE, OUT, INP)
Formatted output	Available (PRINT USING statement)
IF-THEN-ELSE structure	Available
Editing function	Screen editor
Machine word monitor	Available
Terminal mode	Possible (ASCII)
File	Possible in both sequential and random-access modes.

PC-8000 Series Peripherals		
Model	Description	Features
PC-8011A PC-8011B	Expansion Unit	32K RAM, 8K PROM area. RS-232C interface $\times$ 2ch (Interrupt driven). IEEE-488 interface. Parallel ports. I/O Bus.
PC-8012A PC-8012B	Expansion Unit	32K RAM, 2K PROM area. Main Bus for system expansion.
PC-8023A-C PC-8023B-C	Dot Impact Printer	Character formation 7 $\times$ 9 or 8 $\times$ 8 dot matrix. Printing speed 100 characters/second bidirectional. Dot image graphic printing available. Printing sizes maximum 136 characters/line. Paper width 10 inches max. Ribbon cassette.
PC-8031A PC-8031B	Dual Mini-Disk Unit	CPU-incorporated intelligent dual mini-disk unit. Equipped with two drive units (143K Byte single-sided, double-density).
PC-8032A PC-8032B	Expansion Dual Mini-Disk Unit	Combinedly used with PC-8031. PC-8001 can utilize up to 4 drives PC-8031 and PC-8032.
PC-8033A PC-8033B	I/O port for PC-8031	I/O port to connect PC-8001 with PC-8031. (Not required when you have PC-8011 or PC-8012 in the system)
PC-8041A PC-8041B	12-inch Green Display	80 characters/line display for professional use. Video signal input system.
PC-8043A PC-8043B	12-inch High-Resolution Color Display	High-Resolution display of up to 80 characters/line. Separate R.G.B. signal (TTL level) input system.
PC-8062A	RS-232C Cable	Converts input/output signals of PC-8001 to RS-232C level for connection with a modem or an acoustic coupler.
PC-8091A	Cable for Color Display	Connection cable for PC-8001 and PC-8043.
PC-8092A	Cable for Green Display	Connection cable for PC-8001 and PC-8041.
PC-8093A	Cable for CMT	Connection cable for PC-8001 and audio cassette tape recorder.
PC-8094A	Cable for printer	Connection cable for PC-8001 and printer.
PC-8095A	RS-232C Cable for PC-8011	Connection cable for PC-8011 and a variety of devices—a modem, a printer, a CRT terminal, and so on.
PC-8096A	IEEE-488 Cable for PC-8011	Connection cable for PC-8011 and any device which using IEEE-488 bus.
PC-8097A	GP-IB (IEEE-488) Interface Set for PC-8011	ROM (include the software for bus control) + PC-8096A

Notes; A Type: Power Supply 120V 50/60Hz  
B Type: Power Supply 220/240V 50/60Hz

# N-BASIC Language

Command	Description
AUTO	Automatically numbers program statements
CLOAD	Loads a program from cassette tape into memory
CONT	Continues execution after BREAK
CSAVE	Saves the program currently in memory on cassette tape
DELETE	Deletes a line or lines from a program
FILES	Displays a list of all non-invisible files on a disk
FORMAT	Formatting a diskette
KEYLIST	Displays a list of defined function keys
LFILES	Outputs to the printer
LIST	Displays a line or lines of a program
LLIST	Lists the program currently at the printer
LOAD	Retrieves a file from disk
MERGE	Combines file program with current program
MON	Returns to operating system
MOUNT	Reads file table from disk
NAME	Changes file name
NEW	Deletes current program, clears variables
RENUM	Changes program line number
REMOVE	Writes file table to disk
RUN	Executes program
SAVE	Stores program or file on disk
SET	Determines the attributes of the currently mounted disk drive
TERM	Escapes from BASIC-mode and enters into TERMINAL-mode

Statement	Description
CLEAR	Sets aside memory for strings
DATA	Identifies values that can be assigned with a READ statement
DEF	Defines a user written function
DEFDBL	Defines variable names starting with the given letter as double-precision floating-point
DEFINT	Defines variable names starting with the given letter as integer
DEFSNG	Defines variable names starting with the given letter as single-precision floating-point
DEFSTR	Defines variable names starting with the given letter as string variable names
DIM	Allocates space for array variables
END	Concludes program
ERASE	Eliminates arrays from a program
FIELD	Allocates space in random file buffer
FOR-NEXT-STEP	Creates looped subroutine
GOSUB	Transfers execution to subroutine
GOTO	Transfers execution to line number
IF-THEN-ELSE	When the expression specified is true, the statement executes; if false, a second statement executes
LET	Assigns value to variables
LSET	Left-justifies text in random file buffer
ON-GOSUB	Transfers execution to Xth subroutine for expression X

ON-GOTO	Transfers execution to Xth line number for expression X
READ	Assigns values from DATA statements to program variables
REM	Non-printing comments in program text
RESTORE	Resets pointer for reading DATA statements
RETURN	Transfers control back to statement following last GOSUB
RSET	Right-justifies text in random file buffer
STOP	Halts program execution
SWAP	Exchanges value of two variables of similar type

I/O Statement	Description
CLOSE	Closes one or more files
DSKO\$	Writes the string on the specified sector
GET	Retrieves data from disk file
INPUT	Prompts for terminal input in program
INPUT #	Reads data from sequential file
INPUT #1	Reads data from cassette tape
KILL	Deletes a file from disk
LINE INPUT	Enters entire line from sequential disk file
LINE INPUT #	Reads an entire line from a sequential disk data file to a string variable
LPRINT	Prints data at the printer
LPRINT USING	Prints data at the printer according to given format
OPEN	Creates sequential or random disk files
OUT	Writes values to I/O ports
POKE	Writes byte to memory location
PRINT	Displays text on terminal
PRINT USING	Displays text according to given format
PRINT #	Stores data in sequential disk file
PRINT #1	Stores data in cassette tape
PUT	Stores data in random disk file
WAIT	Halts execution until true compare

Screen Statement	Description
COLOR	Assigns color (or attribute in B/W Mode) of displayed character or graphics
CONSOLE	Assigns mode of display
GET @	Stores graphics into an array from screen
LINE	Draws a line (or rectangular) between two points
LOCATE	Allocates cursor to assigned position
PRESET	Erases a dot point at assigned position on screen
PSET	Draws a dot point at assigned position on screen
PUT @	Puts graphics array onto the screen
WIDTH	Changes width of display line

Other Statement	Description
BEEP	Beeps a sound
ERROR	Simulates errors with given error number
KEY	Assigns a character string for user-programable function key

MOTOR	Controls a relay-switch function for cassette tape drive
ON-ERROR	Traps errors by branching to error resolving routines
TROFF	Turns off trace facility
TRON	Turns on trace facility
RESUME	Restarts execution after errors

Function	Returns
ABS	Absolute value
ATN	Arctangent, in radians
CDBL	Double-precision floating-point value
CINT	Integer value
COS	Cosine, in radians
CSNG	Single-precision floating-point value
EXP	e to the (X)th power
FIX	Integer value of (X)
INT	Integer value of (X)
LOG	Natural log of (X)
RND	Single-precision random number between 1 and 0
SGN	Sign of (X)
SIN	Sine, in radians
SQR	Square root of (X)
TAN	Tangent, in radians

String Function	Returns
ASC	ASCII code of the first character of the specified string
CHR\$	Character corresponding to the specified ASCII code
CVD	8-byte string equal to double-precision floating-point variable
CVI	2-byte string equal to integer variable
CVS	4-byte string equal to single-precision floating-point variable
HEX\$	String equal to hex value of (X%)
INKEY\$	Character code of depressed key
INPUT\$	Points to (X) characters in file (Y)
INSTR	Position of (X\$) within (Y\$)
LEFT\$	Leftmost (X) characters of (Y\$)
LEN	Character length of (X\$)
MID\$	J characters, starting at I, of string (X\$)
MKD\$	Double-precision floating-point value equal to 8-byte string
MKI\$	Integer value equal to 2-byte string
MKS\$	Single-precision floating-point value equal to 4-byte string
OCT\$	Octal equivalent of decimal number
RIGHT\$	Rightmost (X) characters of (Y\$)
SPACE\$	String of (X) spaces
STR\$	String equal to (X)
STRING\$	Character X, Y% times; the first character of X\$, Y% times
VAL	Numerical value of (X\$)

Disk Function	Returns
DSKI\$	Returns the contents of a sector to a string variable name
EOF	-1 if end-of-file; 0 if not (for file X)
FPOS	Physical sector number of assigned file
LOC	Current record number in random file X. Sectors read or written since last OPEN in sequential file X.
LOF	Number of records in random file X. Number of data sector in sequential file X.

**NEC** Nippon Elec

NEC Building  
Minato-ku, Tokyo  
Tel: 03-454-1111  
Telex: NECTC  
Cable: MICRO

**Tricomp**

CAB Holland  
Administratie/verkoop zakelijke systemen  
Peulenstraat 85 - Postbus 202 - 3370 AE Hardinxveld-Giessendam  
Telefoon: 01846-6638

Ingenieursbureau Koopmans  
Werkplaats/verkoop hobby- en technische systemen  
Sluisweg 2h - Postbus 176 - 3370 AD Hardinxveld-Giessendam  
Telefoon: 01846-6833

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