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METHOD FOR STORING AND GENERATING
CHINESE CHARACTERS

This invention relates to a method for _____
generating characters, and more particularly to a type of
method by which various kinds of character _____
description data are stored in a memory system of a
5 character generating apparatus through different data
tables and identification values which are treated and
processed for producing characters in any resolutions
with different sizes and patterns for various
applications.

10 Conventional character generators used in a personal
computer usually adopt a dot matrix pattern. It is
understood by those skilled in the computer field that
the conventional dot-matrix character generators suffer
several problems and disadvantages as follows:

15 1) The memory used for storing the character dot
matrix is determined by the order of the matrix with an
equation number of byte = $\frac{n^2}{8}$ wherein "n" is the order
of the dot matrix. When $n = 16$, each character will use
32 bytes in a memory, and when $n = 24$, each character
20 will occupy 72 bytes in the memory. It is known that in
consideration of a memory capacity, characters adopting
16 x 16 or 24 x 24 dot matrix pattern are almost the
extremity that can be practiced. Therefore, the size of
each character and the memory space are all confined in
25 the dot matrix pattern, and no optional processing

operation can be performed.

2) In a dot matrix pattern of the conventional character generators, it is not economic to enlarge the generated character by increasing the order of the dot matrix because, in doing this, the memory space has to be greatly expanded for meeting the required enlargement. In other aspect, if a 16 x 16 or a 24 x 24 dot matrix character is enlarged, the resulting character will not have a smooth contour and will appear to be more like a sawtooth figure, lacking aesthetic quality.

3) In the conventional dot matrix pattern, it is usually not possible to change the character into an asymmetric pattern such as a 16 x 24 dot matrix pattern. Even if it is achieved by special technology, the time required for generating a single character would be very long and also memory capacity required for each character would be very large.

4) When using conventional dot matrix as stated above to process characters and graphical patterns simultaneously, and especially in processing high resolution graphical patterns at the same time as relatively low resolution characters, extra hardware and software must be introduced into the system for enabling the matching between the characters and the graphs. This not only increases the complexity and inconvenience but also to slows down the speed of the process for generating the resulting characters and graphs either

directly on a CRT or through a printer.

5) Since information processing has been so extensively developed, there is a necessity to store different kinds of information in different characters for processing in the same system. Unfortunately, different characters such as Arabic, Chinese, English, Korean, Japanese, etc., often present difficulty for being treated by the same processing system. For example, Chinese calligraphy is a traditional culture which has been practiced and practiced by Chinese people over many centuries. In preparing and processing data for Chinese characters, it is very common to use different kinds of Chinese calligraphy such as "text-hand", "running-hand", "cursive-hand", "seal-type" (a kind of Chinese calligraphy specifically used for carving seals and chops), "Sung-type" (a kind of printing type used in books and newspapers), etc. Unfortunately, however, Chinese characters stored and processed in a computer system are usually confined within a fixed limit and no variation in character pattern can be achieved.

It is accordingly a primary object of this invention to provide a method for character_____ generation in high resolution so as to create variable characters which can vary in size, thickness, etc., without distorting the basic form of the characters.

It is another object of this invention to provide a method for generating characters in high_____

resolution through which characters in different calligraphy such as "text-hand", "running hand", "seal-type", "Sung-type", etc., and also in different models such as slim strokes and boldfaced strokes, can be produced accordingly.

It is a still further object of this invention to provide a method for generating characters in high resolution by which the generated characters having a nature of dot matrix will be stored or displayed through a high resolution output device while the generated characters having a nature of vector can be directly output through a high resolution plotting device.

It is a still further object of this invention to provide a method for generating characters in high resolution in which each stored character occupies a definite memory space without incurring any expansion therein no matter how the pattern, size or model of the character is to be changed during character generating operation.

These and other objects are achieved by providing a method for storing Chinese character description information for use in a character generating apparatus, said method comprising the steps of:

- (1) constructing a stroke table for Chinese characters having a character type identification code designated thereto, and each stroke of the characters for each character type identification code being defined by coordinates of stroke height, width, and curvature points

for providing stroke description information therewith and having a stroke code associated with each stroke, said character type identification code, said stroke codes and said coordinates being systematically stored in a stroke table memory of said character generating apparatus through a software program;

(2) constructing a character radical table for Chinese characters having a character type identification code designated thereto and a plurality of radicals defined therewith, each radical being assigned a radical code and stroke codes defining the strokes making up each radical in the radical table; said character type identification code and said radical and said stroke codes being systematically stored in a radical table memory of said character generating apparatus through a software program;

(3) preparing character pattern description information for Chinese characters, each character including a character code, a character radical code based on said character radical table, and stroke codes based on said stroke table; said character code, character radical code, and stroke codes being systematically stored in a character pattern description memory of said character generating apparatus through a software program; and

(4) constructing identification values for variation parameters which control the width of strokes stored in

said stroke table and the size of radicals stored in said radical table of Chinese characters for input into said character generating apparatus to produce required characters; so that characters in different patterns can be produced in high resolution.

Other advantages and characteristics of this invention will become clear from the following detailed description of a preferred embodiment when read in conjunction with the accompanying drawings, in which:

Figure 1 is a block diagram illustrating the method for high resolution character generation according to this invention, and apparatus for performing the method;

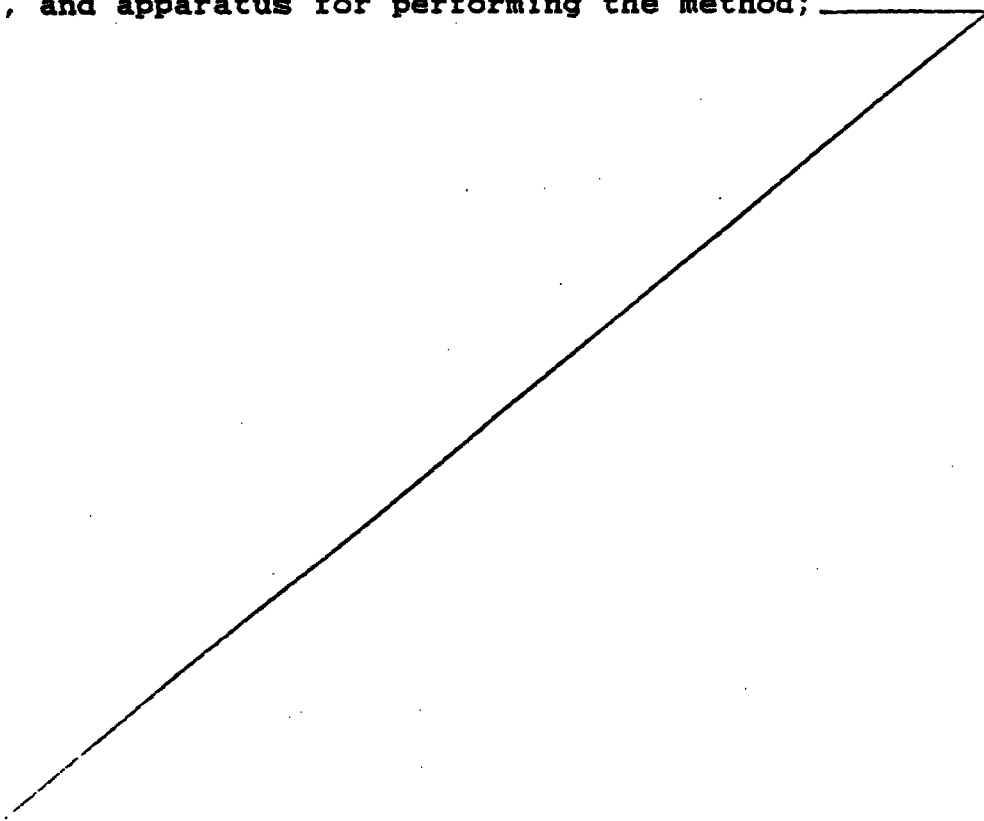


Figure 2 is an illustrative block diagram indicating a preferred embodiment of a character generating apparatus for executing the method of this invention;

Figure 2A is a partial circuit diagram of the preferred embodiment of the character generating apparatus shown in Fig. 2;

Figure 2B is a another partial circuit diagram of the preferred embodiment of the character generating apparatus shown in Fig. 2;

Figures 3-1 to 3-20 are representations showing one set of stroke tables in "Sung-type " with a character type code "0"

Figure 4 is a representation of a specific symbol table ;

Figures 4-1 to 4-10 are representations showing one set of radical tables also in "Sung-type" with a character type "0" ;

Figure 5 is a drawing showing representations of a Chinese character "通" with the character address, radical codes and stroke codes;

Figure 6 is a drawing showing representations of a Chinese characer "通" in different dimensions;

Figures 6-1 to 6-9 are representations showing an example of various language letters produced in various dimensions;

Figure 7-1 is a drawing showing a representation of Chinese characters "神" and "通" in the type of

cursive-hand; and

Figure 7-2 is a drawing showing a representation of an English letter "G" and a Japanese character " 〇 ".

5 Referring to Figs. 1, there is shown a preferred embodiment of a method and apparatus for high resolution character generation according to this invention, which method comprises the steps of constructing and storing a stroke table as represented by the block 101,
10 constructing and storing a radical table as represented by the block 102, preparing and storing a character pattern description table as represented by the block 103, inputting character codes as represented by block 105 and character identification values as represented by
15 block 104 into a character generating apparatus 10 for processing, so that resulting characters 106 are produced accordingly.

Referring to Figs. 2, 2A and 2B, there is shown a preferred embodiment of the character generating apparatus,
20 which apparatus comprises a _____
character generating apparatus 10 mainly composed of a first central processing unit CPU-1 and a second central processing unit CPU-2, together with their functionally associated units, as shown in Figs. 2A and 2B. The CPU-1
25 and its associated units includes input means 15, 105 functionally coupled to the CPU-1 for inputting character internal code through input means 105 and character type

code and identification value through input means 15, as shown in Fig. 2; an address bus 31 and a data bus 35 connected to the CPU-1 through a port decoder 130 and an input data latch 140, and an output device composed of a high resolution plotter 25 and a high resolution display unit 28 respectively coupled with CPU-1 and CPU-2 for producing resulting characters and specific symbols 33, 34 in dot matrix through filler 27 and display unit 28 as well as resulting characters and specific symbols 26, 32 in vector value through plotter 25. In addition, port decoder 130 is used to decode address bus of CPU-1 into control signals L1, L2, L3, for controlling data transfer between CPU-1 and CPU-2.

The CPU-2 and its associated units, as shown in Figs 2A and 2B, include: a stroke generator 16, an ROM-1 defined as an internal code table memory 11 for storing an "internal code table" of Chinese characters or other language letters such as English and Japanese, Korean, etc. (wherein the "internal code table" is a known art which is normally adopted by computer manufacturers for storing the Chinese characters and other language letters in an internal memory system, and detailed description is hereby omitted), a character pattern description memory 12; an ROM-2 divided into a stroke table memory 17 for storing stroke description information of Chinese characters, a radical table memory 21 for storing radical codes and stroke codes

constructing each radical, and a specific symbol table
memory 31 for storing various specific symbol codes for
cursive Chinese characters and other language letters,
identification values and variation parameters of Chinese
5 characters and other language letters as shown in Fig. 2;
a curve generator (CG) 23 connected to stroke generator
16 for converting the stroke coordinate variation values
22 of all stroke contour coordinates received from stroke
generator 16 into stroke contour coordinates (or stroke
10 contour vector values) 24 of character strokes and
contours; a filler 27 coupled with curve generator 23 for
blackening the contours coordinates received from curve
generator 23 and transferring the blackened
information therefrom; an RAM-1 connected to filler 27
15 and CPU-2 for temporarily storing information received
from both the filler 27 and the curve generator 23 for
the processed character radicals and strokes; a clock
generator 120 coupled to the CPU-2 for providing the CPU-
2, CG 23 and filler 27 with required clock signals; an
20 output data latch 5 coupled with the CPU-2 and the CG 23
for temporarily storing the set character parameters
transferred from the CPU-2 and determine the operation
status of the CG 23; an input/output port decoder 4
connected to the CPU-2 for decoding the address
25 information transferred from the CPU-2 into various I/O
control signals (R1-37, R2-38, R3-63, W1, W2, W3-40, W4-
42, W5-67); a second output data latch 6 connected

between the CPU-1 and CPU-2 for temporarily storing various handshaking signals from the CPU-2 to CPU-1; a multiplexer control 110 connected to the CPU-2 for generating control signals MUXA-56 and MUXB-55 therefrom
5 based upon the input signals from CPU-2; and a multiplexer 9 coupled with the filler 27, the RAM-1 and the multiplexer control 110 for determining which one of the three units--the CPU-1, CPU-2 and the filler 27 can retrieve the information from the RAM-1.

10 Referring to Figs. 2, 3-1 to 3-20, 4, 4-1 to 4-10, 5, 6, 6-1 to 6-9, and 7-1 to 7-2, the method for high resolution character generation comprises the steps of:

1) constructing a stroke table for Chinese
15 characters, as respectively shown in Figs. 3-1 to 3-20. There are many kinds of Chinese calligraphy such as text-hand, running-hand, seal-type (used for carving seals and chops), Sung-type (a kind of printing type as used in newspapers and books), etc., in standard written forms
20 and slim strokes, thick and bulky strokes, cursive strokes, etc., in non-standard written style. However, no matter how the Chinese characters change in their written forms and style, each Chinese character is basically formed by several strokes. One set of the
25 strokes is shown in Figs. 3-1 to 3-20 wherein all the basic strokes belong to Sung-type characters, and are designated with a character type identification code "0"

as shown on the upper left corner in Fig. 3-1. All Sung-type characters are classified into seventy nine basic strokes which are systematically arranged in the stroke table with each one of them being assigned with a stroke code from 0 to 78 as respectively shown in the left stroke columns of Figs. 3-1 to 3-20. Moreover, in order to define the exact stroke form, each stroke is further defined by several control points with width control points A, A' to control the width of each stroke, and profile control points B, B' to control and define the length and position of each stroke in one character. The character type identification code "0", the stroke codes (0-78), together with the coordinates derived from the strokes control points A, A'; B, B'; and other marks (not shown), are systematically stored in the stroke table memory 17 through a software program (not attached herewith).

Shown in Figs. 3-1 to 3-20 are the strokes of the Sung-type characters. It shall be appreciated that there can be another set of strokes for text-hand characters, seal-type characters, etc., and the coordinates of the strokes for different type of Chinese characters are all stored in the stroke memory 17. In Figs. 3-1 to 3-5, the nature of strokes from stroke codes "0" to "18" is explained in the "Description" column and an example of the corresponding Chinese character formed with the specified strokes is shown in the "Example"

column. For example, the stroke designated with a stroke code "0" is an upright stroke with complete top and bottom, which is written as a central stroke such as that formed in a Chinese character "中". The stroke code "6" for another example, is a hook stroke with a complete top in forming a central portion of a Chinese character such as "小".

2). Preparing a specific symbol table as shown in Fig. 4 for cursive-type Chinese characters and other language letters such as Arabian, English, French, German, Japanese, Korean, Russian, Spanish, etc., as well as some special symbols such as "┐", "★", etc. Since there is no basic stroke defined for the cursive-type characters and other language letters and special symbols, it is preferable to use specific symbols for character generating operations. The specific symbol table is also prepared in the same way as that made for the stroke table described in 1) above. Each specific symbol, as shown in Fig. 4, is assigned with a symbol code, and each symbol is defined by a plurality of key points, and then, the symbol code and the coordinates of all the specific symbols are systematically stored in the specific symbol memory 31, as shown in Fig. 2, through a software program (not attached herewith).

3). Constructing a character radical table as respectively shown in Figs. 4-1 to 4-10. Although Chinese characters in written form can be defined with

strokes, many of the characters have a common sub-structure in strokes froming a radical. It is therefore preferable to provide a set of character radical table for being easily used to speed up the generation of Chinese characters. Again, in constructing the character radical table, the Sung-type characters are also adopted as a standard form, and a character type identification code "0" is assigned for it as shown on the upper left of Fig. 4-1. As shown in the character radical table, there are four kinds of radicals defined for the Sung-type characters based on the occurence of the radicals written in characters, such as left hand radicals shown in Fig. 4-1; right hand radicals shown in Figs. 4-2 to 4-9; top radicals, and bottom radicals in Fig. 4-10. In addition, there are six top radicals marked with "R" (for right), "B" (for bottom), and "T" (for top), as shown in Fig. 4-10, serving as optional radicals which can be used in different positions depending on the necessary occurence of the radicals in characters. Each kind of radicals is further defined with regard to stoke number, such as a two stroke radical, three stroke radical, etc., and each one of the defined radicals is assigned with a radical code from 0 to 763. These radical codes, together with the character type identification code "0", are systematically stored in the radical memory 21, as shown in Fig. 2, through a specific software program (not attached herewith). Since

the strokes used in each radical are predetermined, it is best to store the sequential strokes with their related coordinates into the radical memory 21.

4). Preparing a character pattern description table for Chinese characters (written in standard form). Based upon the stroke table and the radical table as described and illustrated in Figs. 3-1 to 3-20 and 4-1 to 4-10, any Chinese character can be easily arranged in a pattern description table, as shown in Fig. 5, wherein each character is assigned with an address for being used to indicate the position of the character in a memory unit, a radical set representing those portions of the character that can be isolated into radicals, and a stroke set representing those portions that cannot be defined as radicals. Each radical set has a radical code and each stroke set has a plurality of stroke codes. For example, the Chinese character "通", as shown in Fig. 5, has a character code 6639, a radical "辶" which has a radical code 18 (as shown in Fig. 4-1 of the radical table) and stroke codes 53, 47, 2, 10, 17, 17, and 4 (as respectively shown in Figs. 3-1 to 3-14 of the stroke table) wherein the radical "辶" can be further defined by strokes as shown in a', b', c' and d' with the corresponding stroke codes 45, 56, 54 and 77 respectively arranged in the stroke table. The character code, the radical codes and stroke codes representing the description of each character pattern is stored in the

character pattern description memory 12 of the character generating apparatus, as shown in Fig. 2, through a software program (not attached herewith).

5) . Contructing identification values for the variation parameters of the strokes and radicals for Chinese characters and other language letters as shown in Figs 6, 6-1 to 6-9 and 7-1 to 7-2. The stroke identification value can be from 0 to 240, the radical identification value from 255 and above without limiting upward optional expansion, and the variation parameter identification values from 241 (with the following parameters) to 254 (with the following parameters) wherein numeral 241 represents character height identification vlaue, 242 represents character type identification value, 243 represents the stroke width identification value, 244 represents a ratio of height to width identification value, 245 represents special symbols identification value, etc. Moreover, the value of a character height can be set from 16 to 1024, meaning that the dot matrix forms of a character can be generated in dimensions from 16 x 16 to 1024 x 1024; the character types can have a maximum number up to 256 wherein "0" represents Sung-type characters, "1" represents slim stroke characters, "2" represents slim boldface stroke characters, "3" represents slim round stroke characters, "4" represents bulky stroke characters, "5" represents bulky boldface stroke characters, "6" represents bulky

round stroke characters, "7" represents text-hand characters, "8" represents seal-type characters, "9" ... with "256" in total. In addition, the value (243) of the stroke width can be set as "n" and $n > 0$, representing
5 "n" times of the stroke width defined by the width coordinates; the value (244) of a ratio of height to width is again set as "n" and $n > 0$ where "n" may not be an integer; and the value (245) representing specific symbols can also be set from 0 to "n" wherein 0
10 represents letter A, 1 represents letter B ... 25 represents letter Z, 26 represents small letter "a" ... up to 245 by which any cursive Chinese characters and other language letters can be defined with this identification value system for being input into the
15 characer generating apparatus 10 in producing the required characters.

Referring to Figs. 2, 2A and 2B, the process of character generation in high resolution is as follows:

When character internal code, character type code and
20 identification value (150) is input into the character generating apparatus 10 through the input means 15 and 105 of CPU-1 (the input means can be a keyboard or other input unit such as a mouse, a digitizer, etc.), data informaion is transferred from CPU-1 to CPU-2 where by
25 using the character code as an index, CPU-2 can get the address of the input character from the internal code table memory 11 and retrieving the related character

description information stored in the character pattern description memory 12 , and then, character description information including radical code 13 and stroke code 14, together with specific symbol codes 29, variation parameters 30 and character type identification code 150 from input 15 of the CPU-1, are transferred to the stroke generating means 16 for further processing. It is to be noted that before the character internal code, character type code and identification values are transferred to CPU-2, all the above codes and values are temporarily stored in the input data latch 140, and, at the same time, signal from CPU-1 is sent to CPU-2 (via INT-72 path), indicating that character internal code, character type code and identification values 150 (hereinafter referred to as "character data information) are already stored in the input data latch 140 (it shall also be understood that before all the above character codes and values are transferred to the input data latch 140, CPU-1 will read in the one flag of the status data latch 6 via path L2-33 so as to see if the flag status of the second data latch 6 is at high level, which denotes that the second data latch 6 is available to store the data information; however, if the flag status of the status data latch 6 is at low level, it means that the last data information stored therein has not been read out by CPU-2 and no further data information can be stored. Therefore, CPU-1 must keep on detecting the flag

condition of the status data latch 6 until the flag status thereof is at a high level indicating that the status data latch 6 is available, and then the flag will be automatically set to a low level after the CPU-1
5 writes the data information into input data latch 140).

Having found that the character data information is stored in the input data latch 140, CPU-2 starts to read the character data information from the input data latch 140 via a port enable signal R2-38, and, at the same
10 time, sets the flag to a high level in the status data latch 6, indicating that the character data information is read out from the input data latch 140. After a complete character data information is fed into CPU-2, detailed processing will be made through the memory unit
15 ROM-2 defined as stroke table memory 17, radical table memory 21 and specific symbol table memory 31, so as to respectively obtain the corresponding character description information including the corresponding coordinates of length, width and curvature 18, 19, 20 of
20 the strokes from stroke table memory 17, the radical and stroke codes from radical table memory 21, and specific symbol codes, if any, from specific symbol table memory 31, and transfer them to stroke generator 16 from which stroke coordinates and variation values 22 of all strokes
25 are therefore generated and transferred into the curve generator 23 (it shall be understood that before the stroke coordinates and variation values 22 are transferred

to curve generator 23, CPU-2 must detect for sure that the input buffer of the curve generator 23 is not occupied; otherwise, CPU-2 must keep on detecting until the curve generator 23 is in depletion condition ready to receive the information 22).

After curve generator 23 received the stroke coordinates and variation values 22 of all strokes from CPU-2, it will immediately check for sure whether or not the previous information processed therein is already completed (it shall be noted that, having received the stroke coordinates and variation values 22 from CPU-2, the curve generator 23 will immediately set a flag therein for indicating that its input buffer is fully occupied so as to prevent CPU-2 from inputting another stroke coordinates and variation values 22). If the previous data information (22) is completely processed, then it can accept the next stroke coordinates and variation values, and new process for the newly received data information (22) will begin; otherwise, curve generator 23 will continue its arithmetical operation of the previous data information until it is completed. After curve generator 23 has arithmetically completed a set of stroke coordinates and variation values, a VALID - 57 = 1 will be set therein for indicating that its output buffer is ready to send out the processed stroke contour coordinates and, in the meantime, its internal processing operation will be

temporarily held until the calculated stroke contour coordinates are read out by filler 27 or CPU-2. After the stroke contour coordinates are read out, curve generator 23 will set a VALID - 57 = 0 therein and continue its
5 internal processing operation.

When filler 27 detects a high level condition of the VALID - 57 from curve generator 23, a REQ-51 signal (negative) will be sent out for reading in the stroke contour coordinates either in dot matrix or in vector
10 value into RAM-1 for being read out in by CPU-1. On the other hand, the stroke contour coordinates in dot matrix will be transferred to filler 27 for performing the blackening operation, and then, the blackened character pattern (in dot matrix) is stored in the memory unit RAM-
15 1 by the control of the multiplexer 9 for being output through the high resolution display unit 28 of the CPU-1 output device for producing resultant characters 33 and specific symbols 34. Moreover, the vector value stored in RAM-1 will be read out by CPU-1 and transferred to the
20 high plotter 25 of the CPU-1 output device for producing the resultant characters 26 and specific symbols 32 as shown in Fig. 2.

In the character generating operations as described and illustrated with reference to Figs. 2, 2A and 2B, it
25 is to be understood that there are three units which can access the RAM-1 -- 1) the CPU-2 for storing vector value; 2) the filler 27 for storing the generated dot

matrix; and 3) the CPU-1 for reading out the vector value
or dot matrix information. The determination of which
one among the three units to have the right to access
RAM-1 is made through the MUX-9 controlled by two
5 signals MUXA-55 and MUXB-56, which are further controlled
by CPU-2 by using I/O port decoder 4. Meanwhile, a
holding signal will also be sent to filler 27 through I/O
port decoder 4 and the output data latch 5 via path HOLD-
58 for keeping filler 27 latched thereat so as to prevent
10 the data information from getting lost therefrom.

In the processing of character generation as
described above, the filler 27 keeps on blackening the
stroke contour one by one until all the stroke contours
are completely blackened into the resultant dot matrix
15 (or bit map) characters. On the other hand, after the
completion of transferring the variation values 22 to
curve generator 23, CPU-2 will keep on monitoring the
arithmetical and blackening operations of both curve
generator 23 and filler 27. Once the blackening
20 operation is completed by filler 27 and CPU-2 has the
stroke contour coordinates read into RAM-1, a signal from
CPU-2 will be sent to CPU-1 through input data latch 140,
indicating that the generated characters in dot matrix or
vector value have been in RAM-1 and CPU-1 can now read
25 the generated character information from RAM-1 through
CPU data bus and address bus released by CPU-2. In the
meantime, CPU-2 will also send a latching signal to

filler 27 throughh output data latch 5 via HOLD-58 to lock out all operations of filler 27.

Referring to Figs. 3, 4, 5, 6 and 7, a Chinese character or other language letters can be obtained by
5 inputting the character description information according to the stored tables and identifcaion values. For example, as shown in Figs. 5 and 6, the Chinese character
"通³" is obtained by inputting the character description information of a characer code 6639, a
10 character radical code 18 and stroke codes 53, 47, 2, 10, 17, 17, and 4 into the character generating apparatus 10 through the input means 15, 105. The character generating apparatus 10 will quickly process the input character code, variation parameters and identification
15 values first through CPU-1 and then transferred to CPU-2 as described hereinbefore for producing the resultant character. As shown in Fig. 6, if parameters 24140 (241 is the height identification number and 40 is the height to width ratio of the character) and 2420 (242 is
20 a character type identification code and 0 represents a Sung-type character) are also input, the corresponding coordinates of height, width, and curvature of each sroke with stroke codes 53, 47, 2, 10, 17, 17, 4 from stroke table memory 17 as well as the radical code 18 and stroke
25 codes 45, 56, 54 and 77 from the radical table memory 21 will be fed into the stroke ampliyer 16, producing the resulting character like the character "通^{1 2}" shown by (1)

in Fig. 6 with a dimension of 40 x 40. By inputting different parameters of character height and height to width ratio, various patterns of a Chinese characters in different dimensions can be easily obtained as those
5 shown by (2) to (9) in Fig. 6.

It is still to be noted that when a specific symbol and cursive Chinese characters or other language letters such as those shown in Figs. 4, 6-1 to 6-9 and 7-1 to 7-2 are to be generated by the method and apparatus of this
10 invention, the process is the same as when processing an ordinary Chinese character except that specific symbol identification code 29, variation parameter 30 and specific symbol code are input through input 15. In this condition, CPU-2 will process all the related information
15 through the specific symbol table memory 31 and the stroke amplifier 16, as shown in Fig. 2, for generating the resultant cursive Chinese characters "神"² and "通"^S as shown in Figs. 7-1, other language letters shown in Figs. 6-1 to 6-9 and 7-2, and the special symbols as
20 shown in Fig. 4 in high resolution.

It can be appreciated that the character generation method and apparatus of this invention indeed provides a valuable solution for processing the Chinese characters, and other language letters and specific
25 symbols. No matter how the characters, letters and specific symbols are changed in their pattern, each character, letter and specific symbol stored in the

memory units of the character generating apparatus 10
ordinarily occupies 64 bytes. In addition, since all the
stored description information of characters, letters and
specific symbols are treated as graphs by the method and
5 apparatus of this invention, both the characters and the
graphic information can be handled quickly and
simultaneously. this invention treats all the stored
characters, letters and spicific symbols as a graph, it
is therefore very fast in handling both the characters
10 and the graphic information at the same time.

Although the method for high resolution _____
character generation of the present invention has been
described by way of preferred embodiment, it is to be
noted that changes and modifications made by those
15 skilled in the art are still possible without departing
from the scope of the Claims appended hereto.



CLAIMS:

1. A method for storing Chinese character description information for use in a character generating apparatus, said method comprising the steps of:

(1) constructing a stroke table for Chinese characters having a character type identification code designated thereto, and each stroke of the characters for each character type identification code being defined by coordinates of stroke height, width and curvature points for providing stroke description information therewith and having a stroke code associated with each stroke, said character type identification code, said stroke codes and said coordinates being systematically stored in a stroke table memory of said character generating apparatus through a software program:

(2) constructing a character radical table for Chinese characters having a character type identification code designated thereto and a plurality of radicals defined therewith, each radical being assigned a radical code and stroke codes defining the strokes making up each radical in the radical table; said character type identification code and said radical and said stroke codes being systematically stored in a radical table memory of said character generating apparatus through a software program;



(3) preparing character pattern description information for Chinese characters, each character including a character code, a character radical code based on said character radical table, and stroke codes based on said stroke table; said character code, character radical code, and stroke codes being systematically stored in a character pattern description memory of said character generating apparatus through a software program; and

(4) constructing identification values for variation parameters which control the width of strokes stored in said stroke table and the size of radicals stored in said radical table of Chinese characters for input into said character generating apparatus to produce required characters; so that characters in different patterns can be produced in high resolution.

2. A method according to Claim 1 wherein said step of constructing identification values for variation parameters of strokes and radicals of Chinese characters further comprises the step of defining a character height and width identification value, a character type identification value, a stroke width identification value, a ratio of character height to width identification value, and a symbol identification value, so that various dimensions of characters and specific symbols can be produced in high



resolution.

3. A method as claimed in Claim 1 wherein said step of constructing identification values for variation parameters of strokes and radicals of Chinese characters further comprises the step of defining character dimensions from 16 x 16 up to 1,024 x 1,024 dot matrix forms.

4. A method for storing Chinese character description information for use in a character generation apparatus substantially as described herein with reference to the accompanying drawings.
