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### 1. Recording Form

(1-A) Recording form of program or reserved program

With no pass word

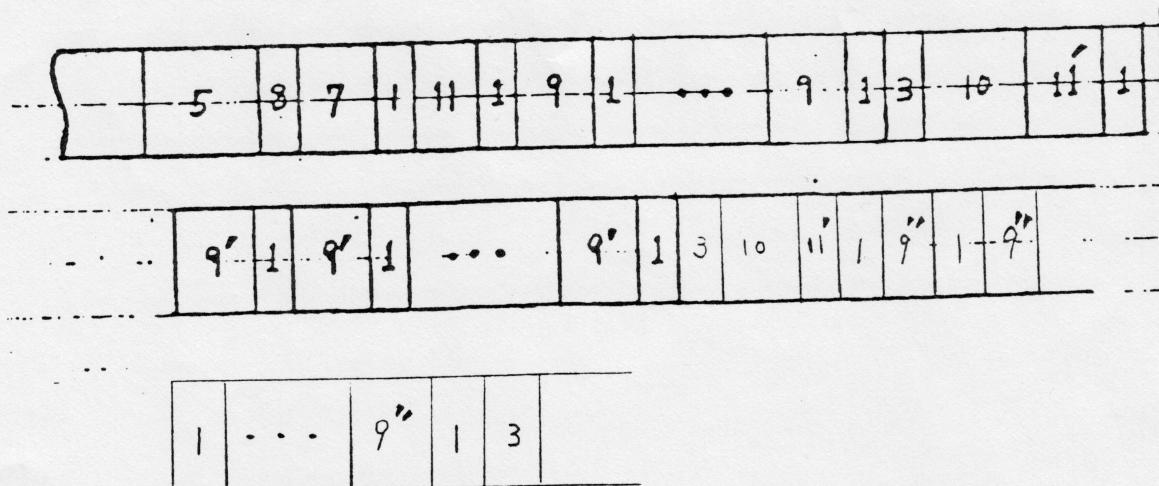
5	6	7	1	2	1	2	1	...	2	3'	3''	1
---	---	---	---	---	---	---	---	-----	---	----	-----	---

"3" is not included in check sum

With pass word

5	6'	7	1	4	1	2	1	2	1	...	2	3'	3''	1
---	----	---	---	---	---	---	---	---	---	-----	---	----	-----	---

### (1-B) Recording form of data memory



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1 = Check Sum Code

2 = Program (120 byte) or reserve program (80 byte)

3 = Last code F Ø H

3'  
3"} = last code FF H

4 = Pass Word

5 = Output is '1' in about 8 seconds

6 = This code (70H) indicates program or reserved program without password

6'= This code (71H) indicates program or reserved program with password

7 = File Name (8 byte)

8 = This code (74H) indicates data memory

9 = One data memory (8 byte) defined as A~Z or A(n)

9'= Data of variable array (8 byte)

9"= Variable data (8 byte)

10 = Output is '1' in about 2 seconds

11 = Fixed variables label (5 byte)

11'= Variable array label (5 byte)

11"= Variable data label (5 byte)

(1-C) Recording form of machine language

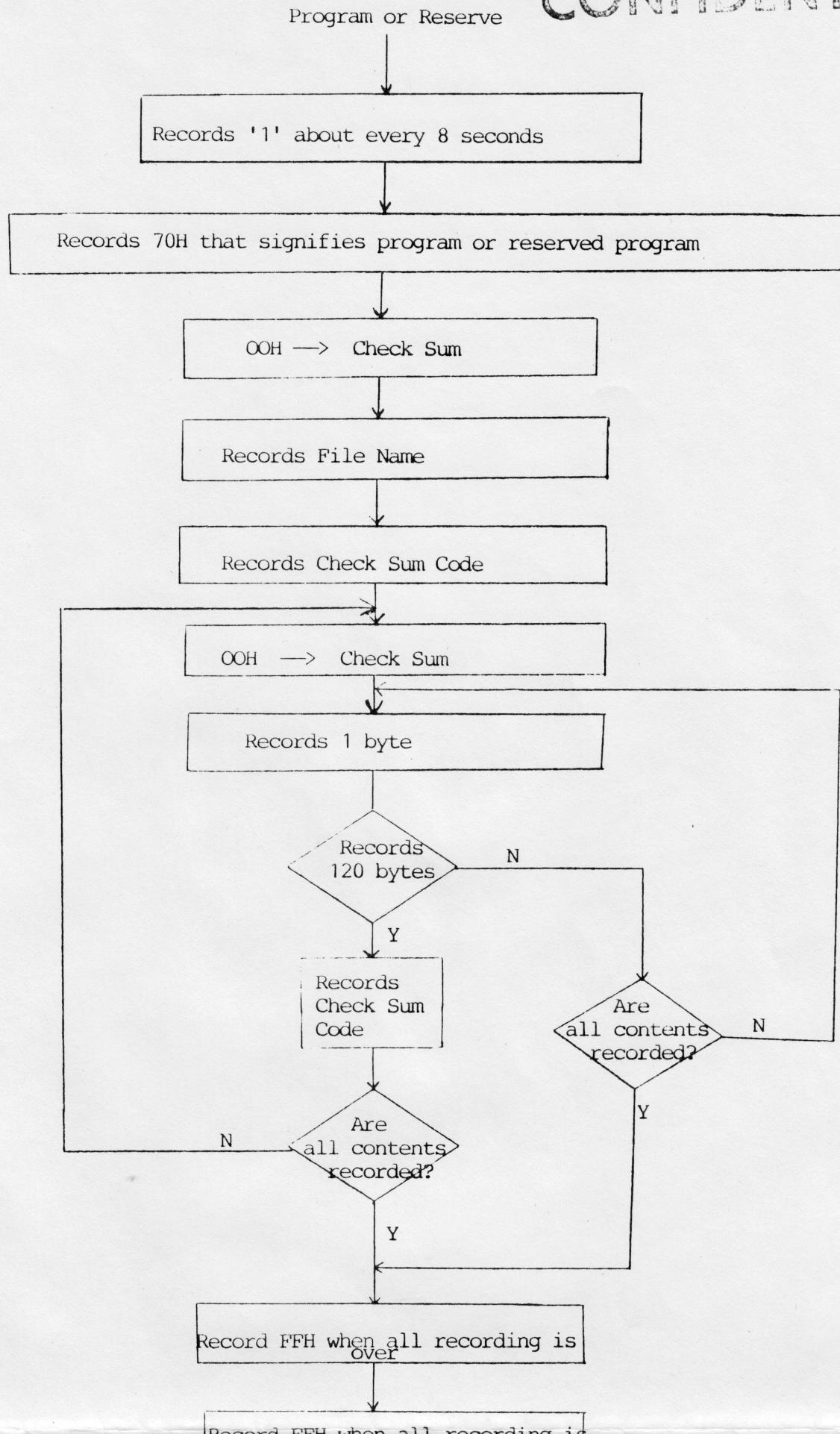
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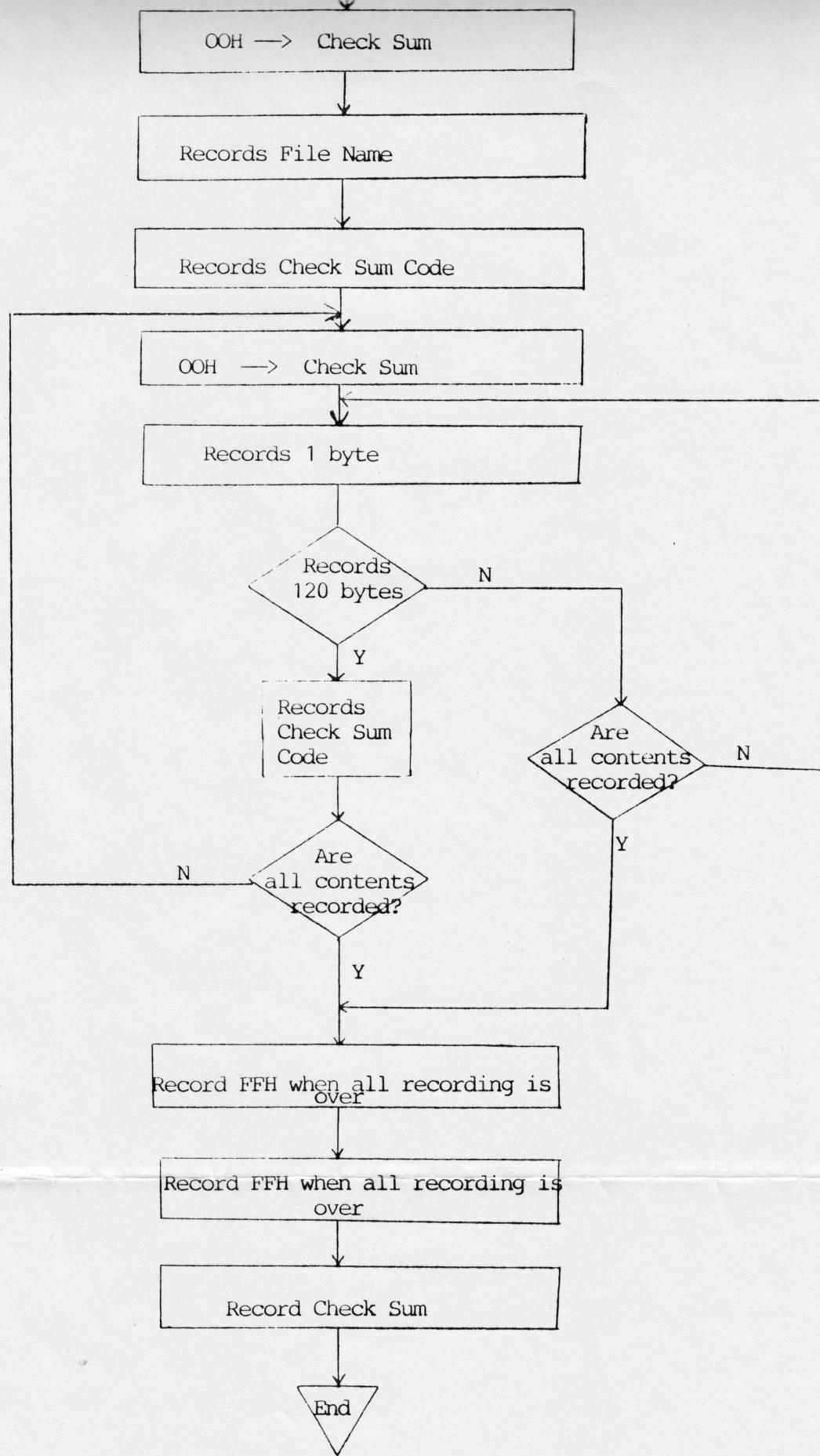
	5	12	7	1	13	1	2	1	2	1	...	2	1	3	3'	1				

12 = Code 76H indicates machine language

13 = Start address and data length of recorded data of machine language

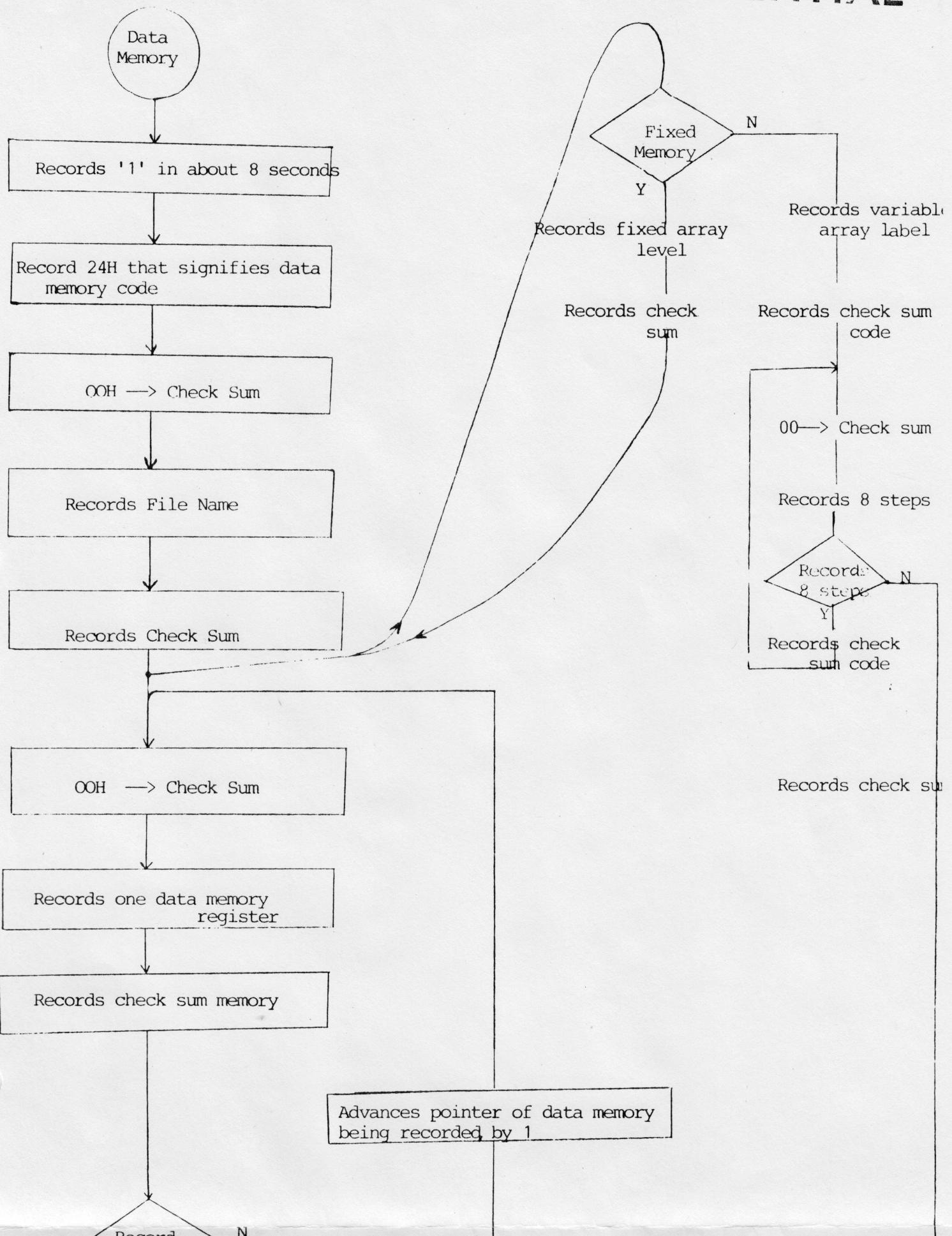
## FLOW CHART OF PROGRAM OR RESERVED PROGRAM FORM

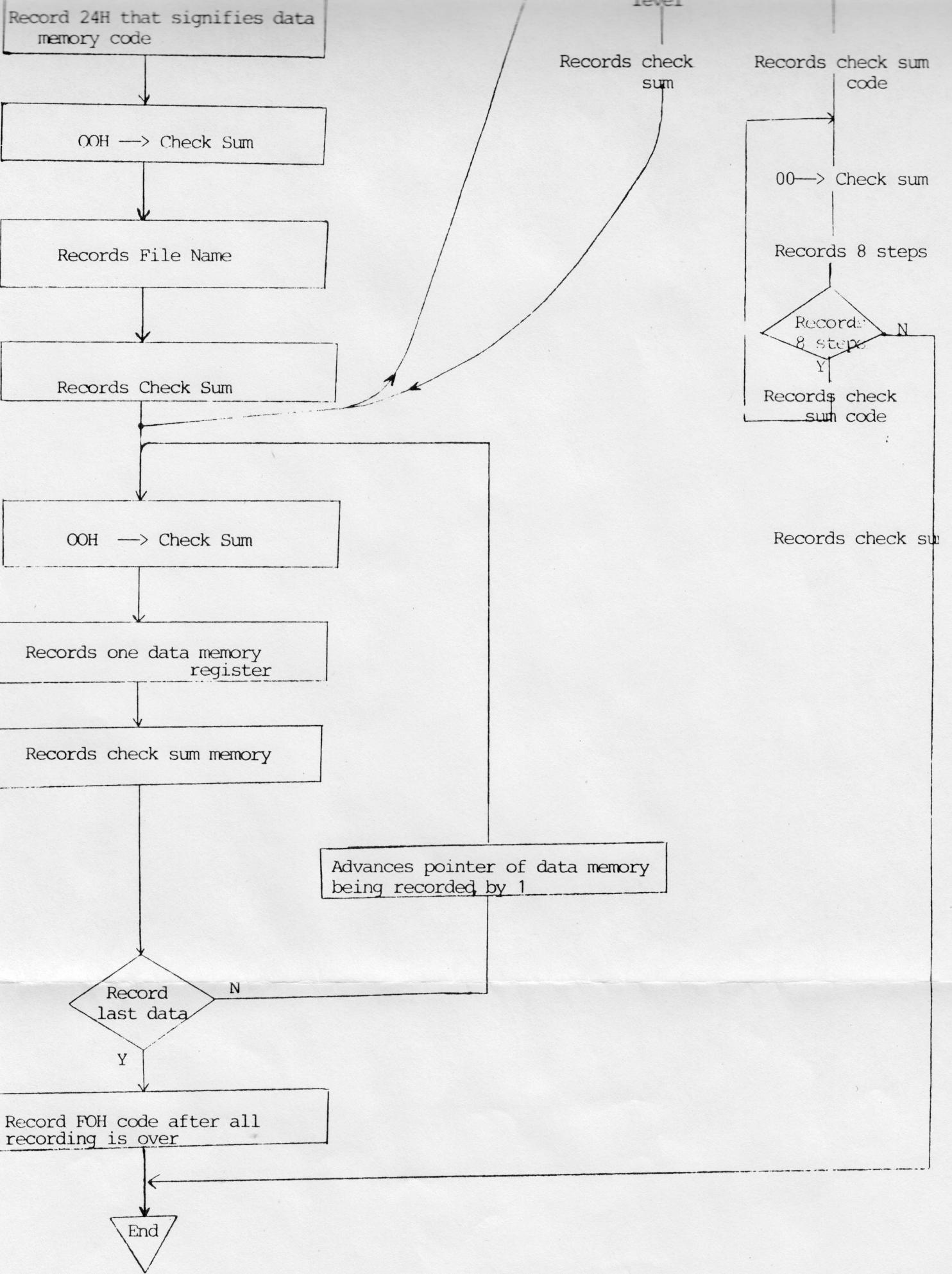
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## FLOW CHART OF RECORDING FORM OF DATA MEMORY

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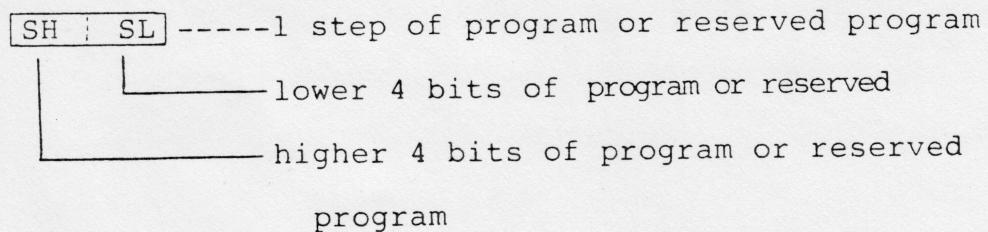
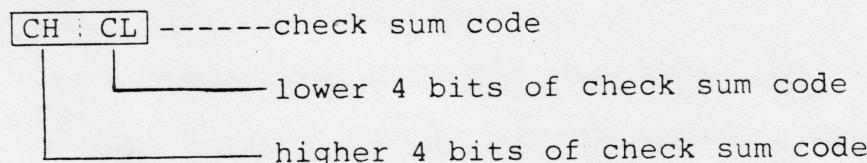
1-1 Check Sum

The initialization (OOH) of the check sum code should be conducted before recording the following: file name, data memory and "120 steps of program or reserve program".

While recording 120 steps of program or reserved program, the initialization is not conducted.

The calculation of the check sum should be conducted for recording the following:

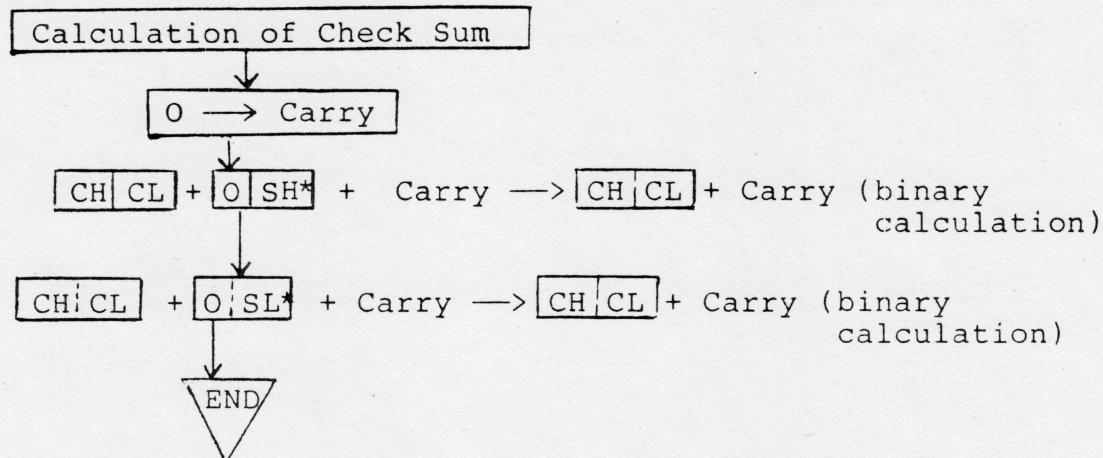
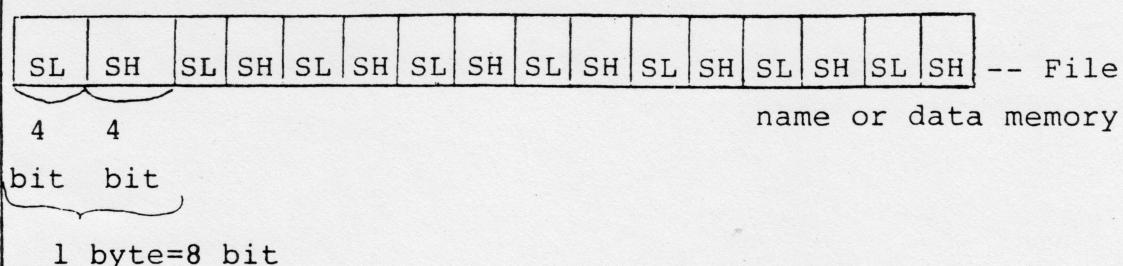
File name, each step for the program or reserved program and also when 1 byte of data memory register is recorded. The calculation is as follows:



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-7-

Check Sum  
(contd.)



NOTE:  $SH^*$  = {  
    SH: for 1 step of program or reserve program  
    SL: for file name or 1 byte data memory

$SL^*$  = {  
    SL: for 1 step of program or reserve program  
    SH: for file name or 1 byte data memory

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1-2

Configuration  
of File Name

File name must be configured in 8 steps, e.g.  
"PROGRAM", "DATA"

"PROGRAM"

Code

M	A	R	G	O	R	P	F5H
D'41'42574F'42'S0'55'F							

"DATA"

Code

00H	00H	00H	A	T	A	D	F5H
0'00000144514445'F							

When length of file name cannot be filled in 7 steps,  
then replace the missing step by OOH. The beginning  
of the file name starts with F5H code and is constructed  
in 8 byte. When there is no input in the file name,  
the beginning of the file name starts with F5H and  
the rest is all OOH.

1-3

Configuration  
of Data  
Memory (Fixed  
Variable)

Configuration of data memory is 8 byte.

String Variables: This method is basically the  
same as the file name.

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1-3

Configuration  
of Data  
Memory (Fixed  
Variable)  
(cont.)

e.x. "BOOK"

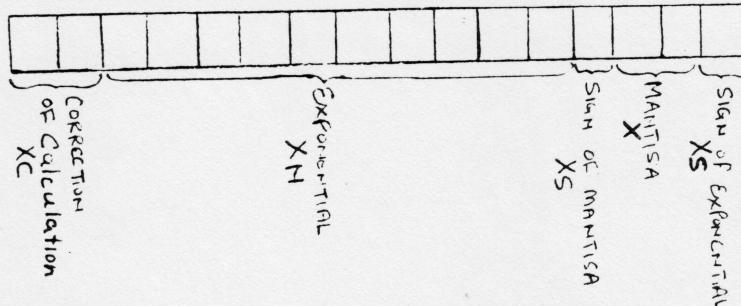
"BOOK"

Code

00H	00H	00H	K	0	0	8	F5H
0	0	0	0	0	B	4	F

Numeric

Variable:



e.g.  $\pi = 3.141592654$

0	0	4	5	6	2	9	5	1	4	1	3	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

$-123 \times 10^{10} -- 1.23 \times 10^{12}$

0	0	0	0	0	0	0	0	3	2	1	8	2	1	0	
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	--

$0.0789 = 7.89 \times 10^{-2}$

0	0	0	0	0	0	0	1	0	9	8	7	0	8	9	9
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

\*

The significant figure of the number is 10 digits (digits of  $X_n$ ). As explained above, 1 numeric variable consists of  $X_c$ ,  $X_n$ ,  $X_s$ ,  $X$  and  $X_s$ . The sign of the value is stored in  $X_s$ .

When  $X_s$  is 0, we have a PLUS sign, when  $X_s$  is 8, we have a MINUS sign.

The sign of the mantisa part of the numeric part;  $X$ , is stored in  $X_s$ .  $X$  has 2 digits. The value is stored in the form of exponential. If the absolute value is less than 1, a value subtracted from 1,000 will be stored in  $X_s$ ,  $X$ .

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1-4

Recording  
of Program

It is necessary to have 2 steps of program memory  
for the program line number.

e.g.

line no.	1
line no.	12
line no.	123

00	01
00	0C
00	7B

After the line numbers, the number of byte from the next byte  
of the line number to "ENTER" code is recorded.

Example of program is listed below:

10	Input A, B
20	$C = \sqrt{A^2 + B^2}$
30	Print C
40	End

Content of program memory at the above example as it  
appears in the computer is shown below:

10	INPUT A, B	ENTER	20	C = $\sqrt{A^2 + B^2}$
00	0A	05	DF	41 2C 42 0B 00 14 0D 43 3B FC 38 41 2A 41 2B 42 3A

BYTE NO. FROM  
INPUT TO ENTER

BYTE NO. FROM  
C TO ENTER

1	)	ENTER	30	PRINT C	ENTER	40	END	ENTER					
42	29	0D	00	1E	03	0E	43	00	00	28	02	0F	0B

BYTE NO. FROM  
PRINT TO ENTER

BYTE NO. FROM  
END TO ENTER

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1-5

Reserved  
Program

For example, if one assigns RUN on the **Z** key,  
SIN A on the **A** key, the content of the reserved  
program memory will look like the figure below:

SHIFT Z		RUN		SHIFT A		SIN		A	
F	A	B	0	8	1	4	5	4	1

Reserved codes like SHIFT Z, SHIFT A are put in  
the memory in one byte as in the table below:

L \ U	8	F
O		
1	SHIFT A	SHIFT SPC
2	SHIFT B	
3	SHIFT C	SHIFT S
4	SHIFT D	SHIFT =
5		
6	SHIFT F	SHIFT V
7	SHIFT G	
8	SHIFT H	SHIFT X
9		
A	SHIFT J	SHIFT Z
B	SHIFT K	
C	SHIFT L	
D	SHIFT M	
E	SHIFT N	
F		

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1-6

Record of  
File Name  
and Data  
Memory

Method of recording file name and data memory  
(fixed memory) is listed in the table below:

File name "PROGRAM"

M	A	R	G	O	R	P	F5H
D	4	1	4	2	5	7	4

String variable="BOOK"

OOH	OOH	OOH	K	O	O	B	F5H
0	0	0	B	4	F	4	2

Numeric variable=

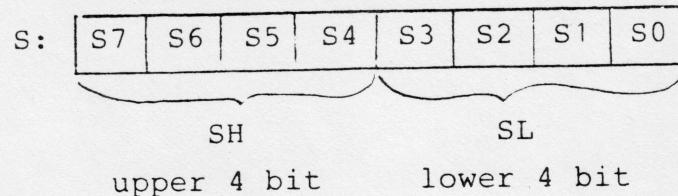
3.141592654

OO	4	5	6	2	9	5	1	4	1	3	0	0	0	0
0	0	4	5	6	2	9	5	1	4	1	3	0	0	0

1-7

Recording  
of 1 Byte

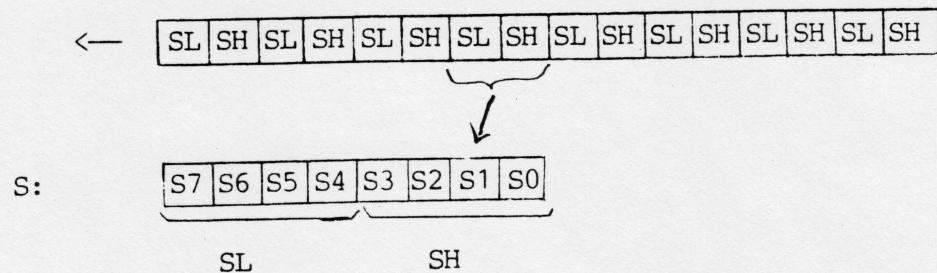
Let 70H or 71H represent program, reserve program  
or check sum code, 74H represents data memory, also  
let FOH or FFH representing end of recording be:



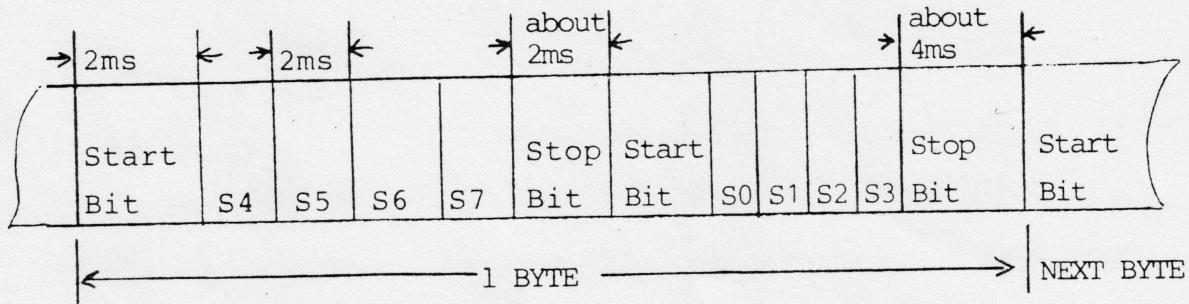
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Also, file name a 1 data memory register will be represented as follows:

### Direction of recordings



In this case, the recording pattern of S (one byte) will be as shown in the table below:



The width of the start bit and the data bit is 2m seconds.

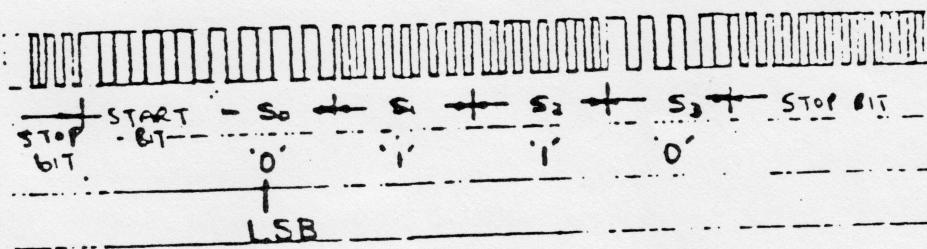
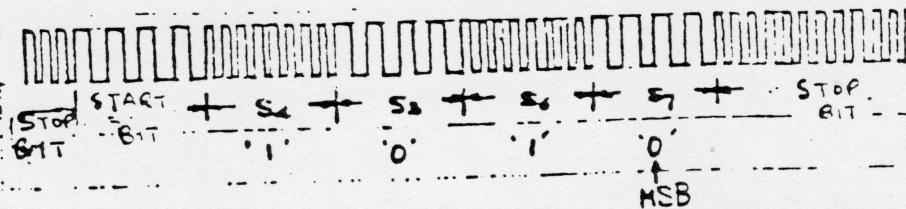
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1-8  
Recording  
Signal

Pulse rate of 2KHZ is generated 4 times within 2msec when the content of the start bit and data bit is '0'. On the other hand, a Pulse rate of 4KHZ is generated 8 times when content of data bit is '1'.

The example below is the content of S(1 byte)  
Content of S(1 byte) is (01010110)

5    6



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1-9  
Variable  
Label

(A) Fixed variable label.

Direction of recording ← [E F 0 0 0 0 0 0 0 0]

(B) Array variable label

Total Length	Total Length	DIM 1	DIM 2	Length
H	L	1	2	

Direction of recording ← [L H L H L H L H L H]

(C) Variable Label

Put Ø in the DIM #1, DIM #2 in the above item (B)

1-10  
Configuration  
of Variable  
Array

Data configuration of variable array

e.g. Book Book

[B O O K B O O K ]

Direction of recording ←

[2 4 F 4 F 4 B 4 2 4 F 4 F 4 B 4 ]

e.g.  $\pi = 3.141592654$

Direction of recording ←

[0 0 0 0 1 3 1 4 9 5 6 2 4 5 0 0 ]

The recording order of 1 byte data H.L. is same as that of fixed data memory.

But the recording order of 1 data register (8-80 byte) is different.

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1-11  
Configuration  
of Password

Configuration of Password is the same as that for file name.

Using "PASS" as an example:

"PASS" [OOH] [OOH] [OOH] [S] [S] [A] [P] [F5H]

Direction of recording ←

[0] [0] [0] [0] [0] [3] [5] [3] [5] [1] [4] [0] [5] [5] [F]