

教育用コンピュータの開発

渋井 二三男

[Outline]

For the people who use microcomputer-Model of the first fine in order to learn about microcomputer, understanding of how to use interface, programming by the way of assembly language, HAND ASSEMBLE execution of program is defficult work and it can make someone lose interest in the learning.

This micro computer, in solvind such problems, will execute the programme in the system first in the opposite order, it is a suggestion of micro computer systems which tries to make the result a joy and success so that learners interest will increase.

[Key Word]

Education of Information processing, development of programme, will, educational equipment, Education of technician.

1. Preface

Training-Model for learning micro computer is already announced. Most of the such training-Model are simple monitor programme and parallel interface equipment, cassette-tape is used for user programme and memory data as an option.

Again from the program viewpoint, as a program which is open to its user (subroutine), memory test routine, numeral routine, Key input routine are the rare kinds.

However, for the beginner students of micro computer it is possible to execute only after learning the way of using parallel interface, the way of making programme (assembler) and HAND ASSEMBLE And execution result can be confirmed by register or memory but, compared to the effort you made for programming, the impact of result can not be seen well enough.

From such a background, at this training-Model.

- ① It can used without making a programme for learning.
- ② Increasing the input and output, confirm the movement with ear and eye by using music-play, imitation sound and display of execution result, (gives an impact).

Taking these two points into consideration, micro computer education system is made. At

- ① a fewtraining programme was built in and, even if you drn't know assembler language,

a person who has experience whit basic language can programme (assembler programme), at ② 8 bit data switch, 8 bit LED, dot matrix display, output of melody etc, hardware is organised normally

To the most important problem of beginners who can learn enjoyable ;

- can be used soon.
- movement can be confirmed with ear and eye.
- how can music be played.

By thinking to make the learners more interested in these, I'll introduce yor to the outline.

2. The make-up of a training Model.

The configuration of this Microcomputer system srow Figure 1.

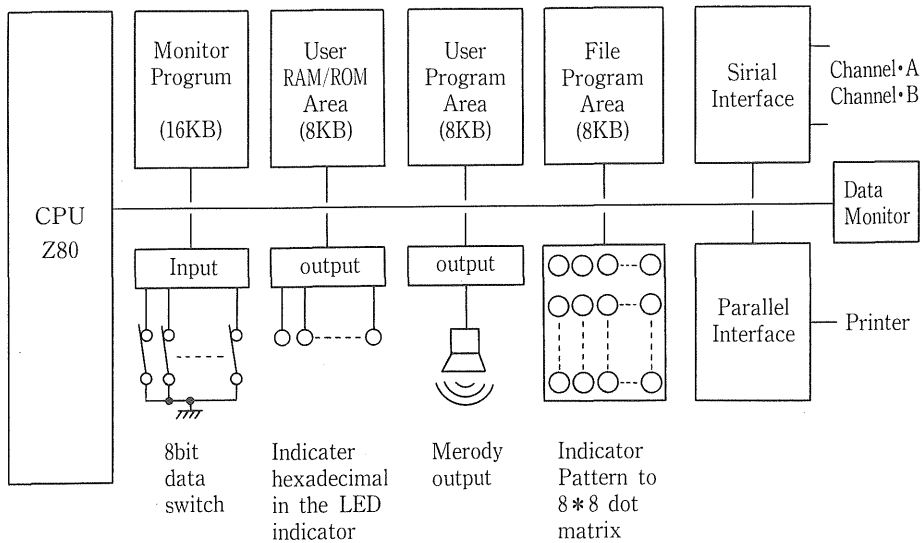


Figure 1. Diagram of Hardware Configuration for Microcomputer

It show Diagram 1. Traing Model.

As it can be understood from this diagram.

- ① 8 bit data switch
- ② 8 bit LED display
- ③ 8*8 bit matrix display
- ④ Output of melody (music, imitation sound etc, is possible).
- ⑤ parallel interface (possibility of connection with printer).
- ⑥ Serial interface (Model personal computer etc. connection is possible).
- ⑦ data monitor (different input and output data can be selected).

Again, as a programme.

- ① Monitor is made of YARUYARU monitor, it to me calculator, and simple routine.
- ② User RAM/ROM
- ③ User programme (programme area for user)
- ④ File (can memorize user programme as much as up to is files).

3. Explanation of Function

In order to give an impact on the execution result of the programme, different type of Input device and, in order to simplify the first operation, different kinds of programs are built-in, I will explain about these functions.

3.1 Hardware Function

[1] 8 bit data Switch

Numeric data, control data etc. can used freely. On the training programme, for learning binary numeral, decimal numeral, hexadecimal numeral etc. together with 8 bit LED, dataset is used.

On the easy routine, by using the command which is called SWREAD etc. this switch data can be input.

[2] 8 bit LED (Light Emitting Diode) indicator

The indication of calculation result etc. can be used freely.

On the easy routine, you can indicate hexadecimal numeral decimal numeral on this 8 bit LED indicator by using the command which is called HEXDSP, DECDSP etc.

[3] 8*8 bit matrix indicator

With $8*8=64$ bit matrix indicator, character indication, the indication of character order, the quality indication of process result etc. can be used freely. Moreover, about 20 kinds of user character pattern can be entered in (registered).

On the easy routine, by using the command which is called ASCDSP, SRGDSP, MOUDSP

etc., one character, the order of characters (periodical Indication, scroll indication)etc. can be indicated on this matrix indicator.

[4] melody output

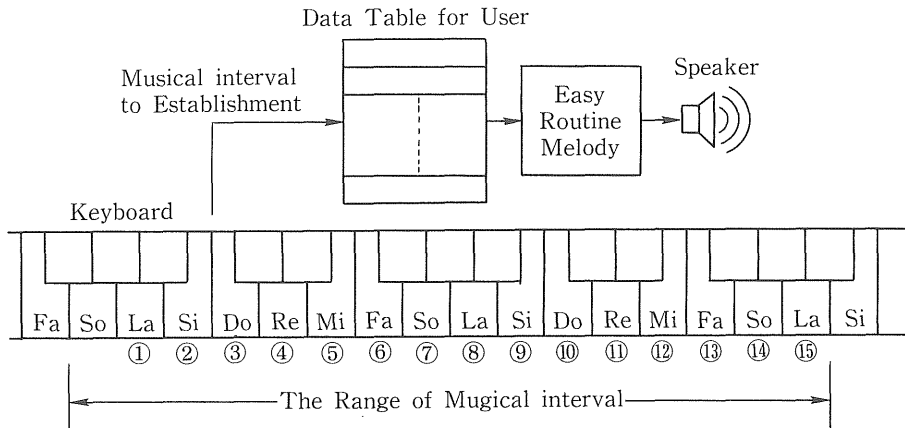


Figure 2. Methods of Melody

An imitation sound, melody output and music can be played. Performing music can be possible by establishing (a musical) internal (number) in the data table as in the diagram 2. Moreover, full (detailed) control, limitation sound, envelope control etc. can be possible.

On the easy routine, by using the command which is called MERODY, ENVLOP, NOISE, Musical play, envelope control and imitation sound output are possible with this melody output. Therefore, as one sub-routine, the same as the command statement of BASIC language, is organizing a command, even without the knowledge of assembler language, by matching this command, programme (high-level language) can be prepared.

The following are the major commands (subroutine).

- ① PIOINIT (Initialization of P10)
- ② SIOINIT (Initialization of S10)
- ③ SWREAD (Read valve of Data swtach)
- ④ DECDSP (Indication of decimal numeral on the LED Indicator)
- ⑤ HEXDSP (Indication of decimal numeral on the LED Indicator)
- ⑥ DOTDSP (Indication of pattern in the dot Indiator)
- ⑦ PRINT (Print ASC II data of A-register)
- ⑧ INIT (Initializatio all Hardware)
- ⑨ SIOAIW (A characters Input from SIO)

⑩ SENDA (Transmitting order of characters to SIO)

In diagram 3, I indicate the programme in which these commands are used.

Thus, the hardware is made of the input, output function which is thought to be interesting to learners.

3.2 Software Function

[1] Traing Programme

About 10 different kinds of training programmes are built-in to the simple routine group, and as some of them are organised to change the result by changing the data, at first it is possible to learn by using this program.

The following are the major programs.

① Learning binary, decimal, hexadecimal numerals

By using data Switch and 8 bit Led it is possible to learn each numerals. (It is possible to change one another by using the leave it to me calculator.)

② The indication of character order

The name, alphabet and characters set us by user can be indicated on the 8*8 dot matrix.

③ Printing the name

If you connect the printer, it is possible to print the alphabet and the names set up by the user.

④ Playing the music

It is prssible to play the music (see diagram 2) set us by the user and the「OUMA」, 「UM I」 built into the system.

⑤ Computer Communication

Among these Model or personal computer, programme, data etc. it is possible to forward.

[2] Programming in the image of High Level language.

With this training, about 60 different kinds of sub-routine programs (which is said to be simple routine. as it is shown, below is made of built-in basic disposition units.

- Initialization of Parallel interface
- Data Switch is used to input data.
- LED indicator indicates decimal numerals.
- To print the order of characters in the printer.

[3] Programming in assembler Language.

Programme is done and executed at [1], [2], initially programming is assembler Language, hand assembler operation etc. can be performed in the same way with other training Model.

In this way without programming from the beginning software can be used and learners can do programming by using the assembler language, step by step I was able to widen the limit of programming done by learners.

(example) Input the switch data, by doing hexadecimal indication in the LED ircl : coror together with pattern in dicater in the 8*8 dot matrixindicator.

[disposition order]

- ① Input switch data
- ② Indicate hexadecimal in the LED indicator
- ③ Indicate pattern to 8*8 dot matrix

diagram 3 programming example of High Level language

4. Summary

This training Model, besides the functions of the 3 clauses mentioned before, has the following functions.

- ① It can be down load and excute via sirial inter face developed program by another system of personal computer etc.
- ② It can be used as an input and out unit of CASL language by connecting the CASL language trainer (option).
- ③ Fil Control function usedto EE PROM.
- ④ It can be used as a calculator by just changing the switch.

(Example) Input switch data, Indicate Hexadecimal in the LED indicator,
Indicate Pattern to 8*8 dot Matrix.

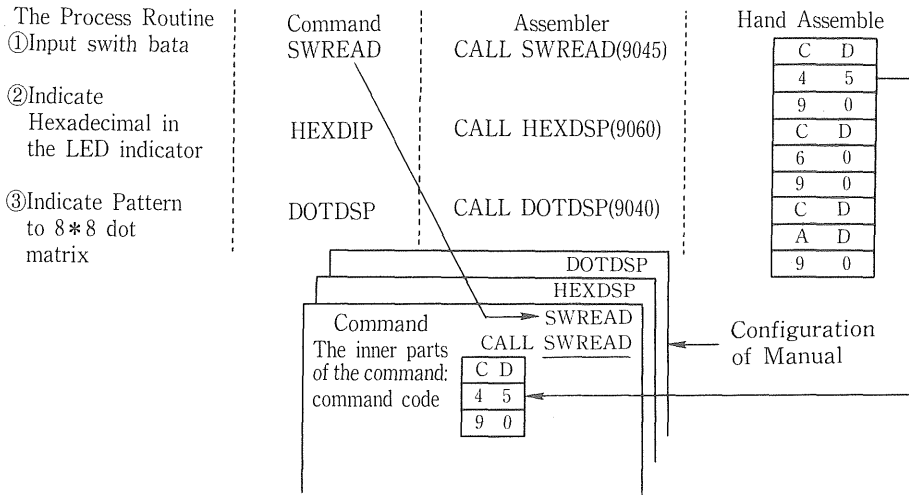


Figure 3. Example of Programming