4.1 Overview:

Those days, electronic circuits consist of numerous CMOS and TTL chips. Chip 89C2051 as an ideal replacement for a lot of CMOS/TTL chips. No one was able to design his own chips !

Initially a complete tool for DOS was written, then MCS started to sell BASCOM-LT, a BASIC compiler for Windows 3.1 .It was the first Windows application that offered a complete and affordable solution, editor, compiler, simulator and programmer .

BASCOM-LT is a 8051, using an LCD display was simple, just a configuration line to define the used pins and voila, a working application in minutes. When a different LCD display is needed, simply the CONFIG line.is changed. When a different processor is needed, only the name of the definition file is changed, no need for a lot of .h files .

4.2 Bascom characters:

Characters from the BASCOM character set are put together to form labels, keywords, variables and operators.

This is description of the format of BASCOM program lines:

- The specific characters in the character set and the special meanings of some characters.
- The format of a line in a BASCOM program.
- Line labels.
- Program line length.

4.3 Expressions and Operators:

How expressions combine, modify, compare, or get information by using the operators available in BASCOM following kind of operators:

- Arithmetic operators, used to perform calculations.
- Relational operators, used to compare numeric or string values.
- Logical operators, used to test conditions or manipulate individual bits.
- Functional operators, used to supplement simple operators.

4.4 Programming and Compiling:

The program used was BASCOM language. Any program in this language will save in a life with extension name –bas. After writing and saving the program, it must be compiled by press compiler icon. The compiling is completing in two steps:

- Convert (bas) extension file to assembly code.
- The compiler automatically convert the assembly code to executable HEX file can be downloaded to the microcontroller.

4.5 Structures:

The program is beginning with various based instructions. Because of the huge number of instructions in BASCOM**.**

4.6 Definition of Protues:

Protues is a virtual system modeling (VSM) that combines a circuit simulation, animated components and microprocessor models to co-simulate the complete microcontroller basic designs, this is the prefect tool for engineers to test their microcontroller designs before constructing a physical prototype in a real time.

This program allows users to interact with the design using on screen indicators and/or LED and LCD displays , Protues in VSM comes with extensive debugging features including break points , single steping and variable display for neat design period to hardware prototyping .

In summary protues is the program to use when you want to simulate the interaction between software running on microcontroller and any analog or digital electronic device connected to it.

Advantages of protues :

- ❖ Real time simulation
- ❖ Time and money saving

There are some important steps that take when you want to design a circuit in protues simulation software.

4.7 Flow Chart:

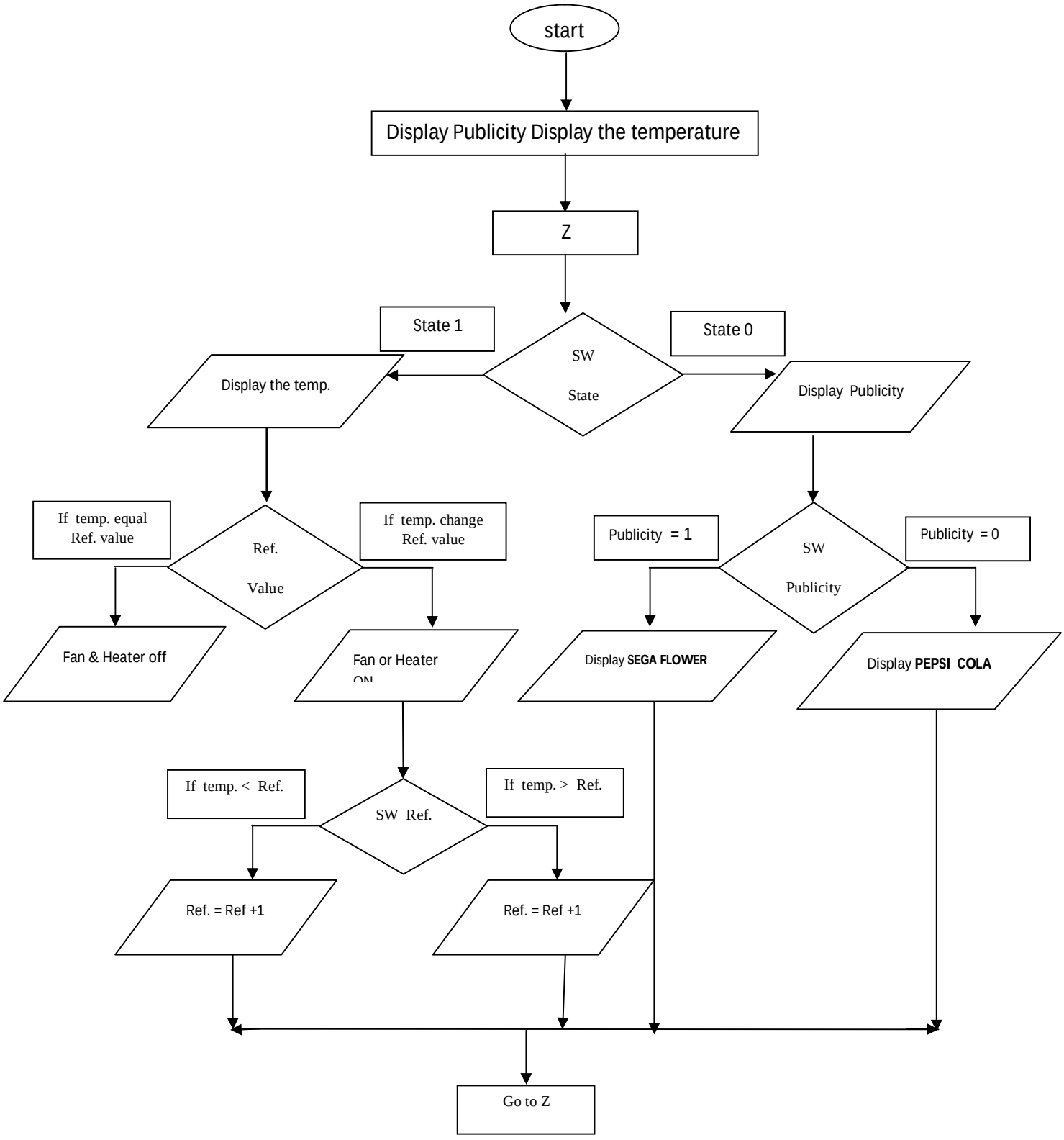

Figure (4.1) Flow Chart Diagram