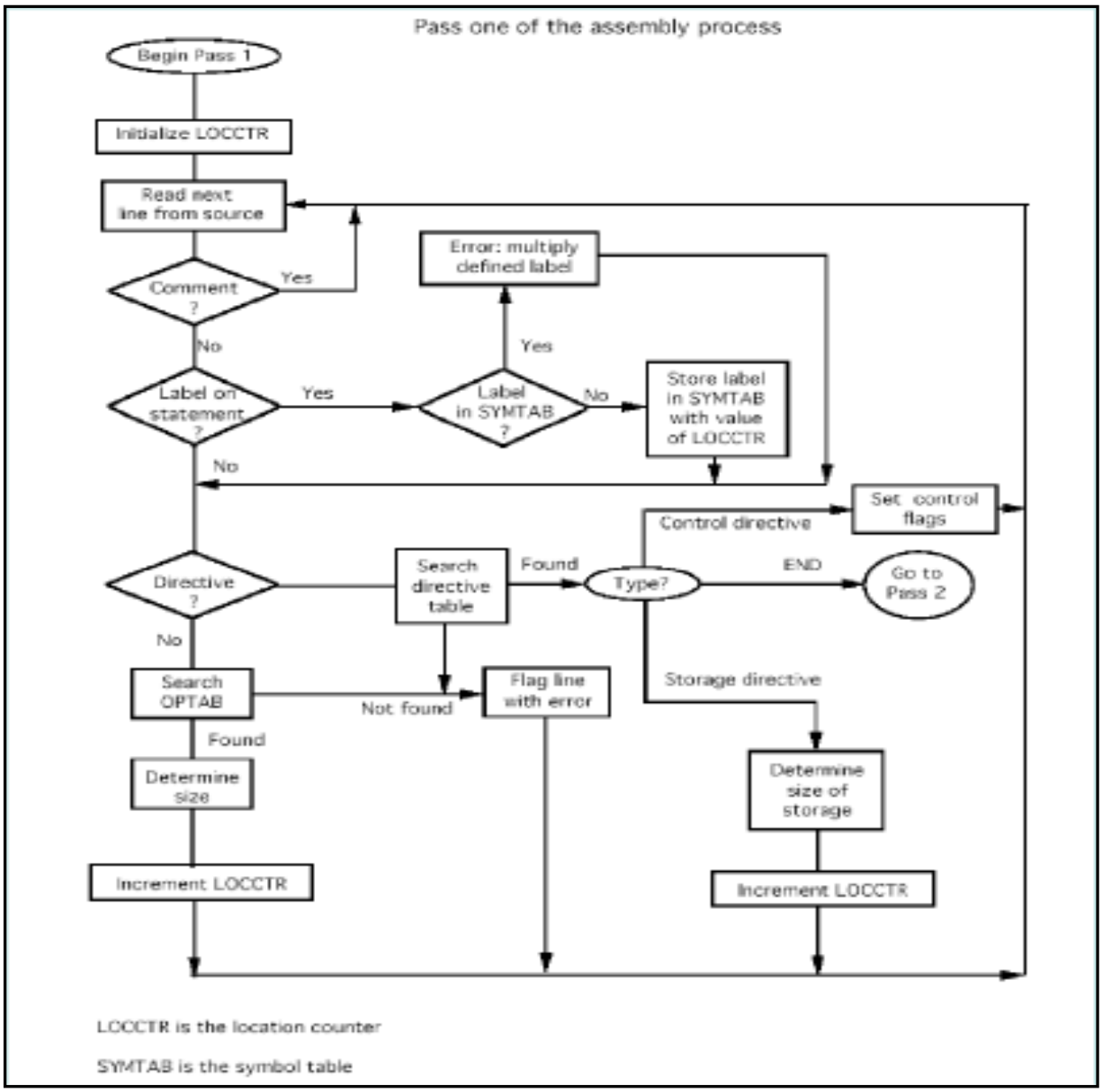
Algorithm for the Assembly Process

Pass One – Build the Symbol Table



Pass One – Build the Symbol Table

1) Initialize the LOCCTR with the value zero.

2) Read the next line from the source program.

Is it a comment? Yes, ignore
Read next line.

Is there a label? Yes, is it in the Symbol Table? Yes, ERROR-multiple label definition
No, add it to the Symbol Table with the value of the LOCCTR
Continue

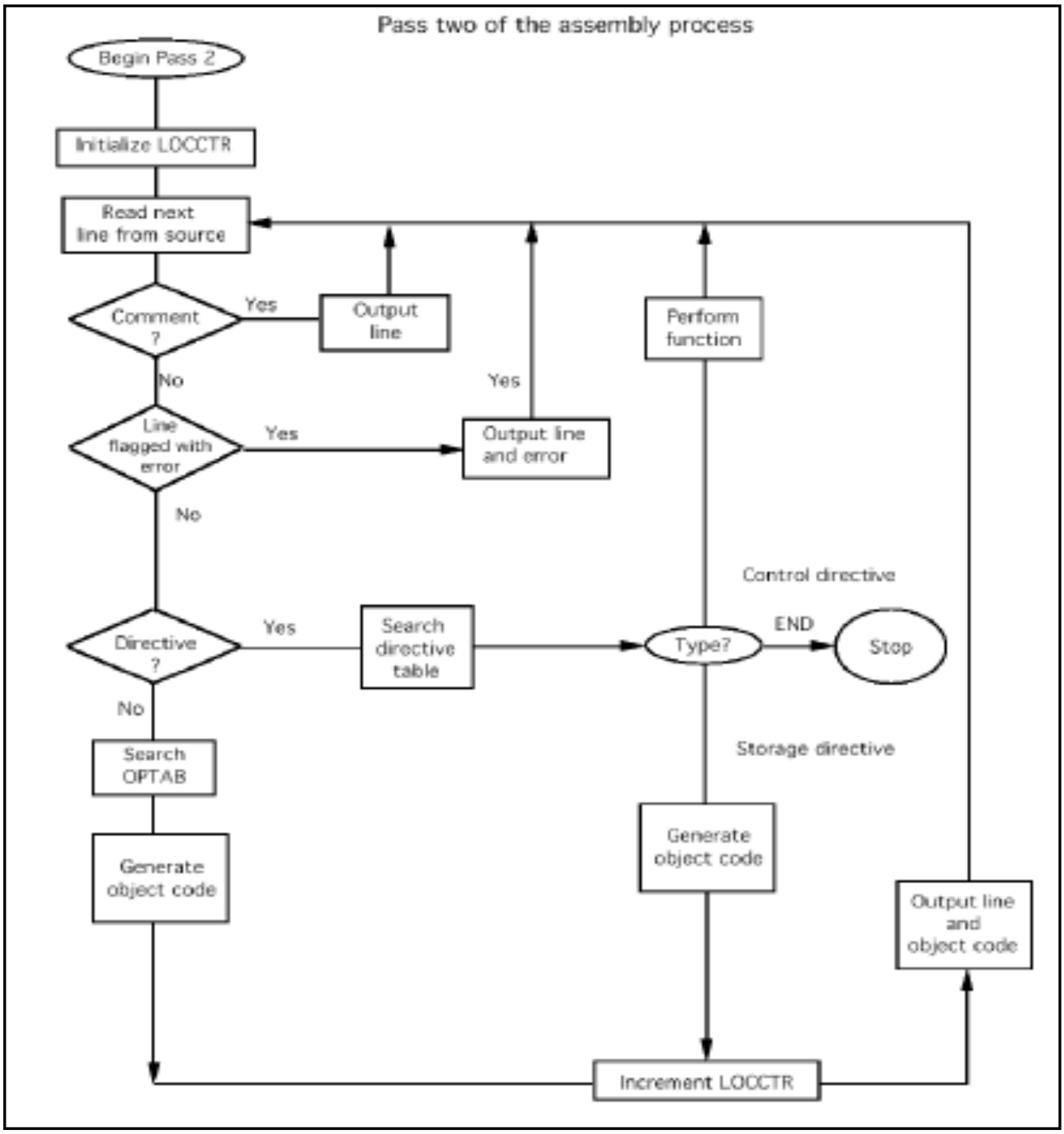
Is it a directive? Yes, Is it Valid? Yes, determine type and increment LOCCTR as appropriate
Is it valid? No, ERROR-invalid directive
Read next line

Is it a valid Instruction? No, ERROR-unrecognized instruction
Yes, increment LOCCTR as appropriate
Read next line.

3) At end of file, save the value of the LOCCTR as it is the size of the program.

At this point the Assembler has read thru the source program, found all the labels, and determined the size and location of all the labeled objects. It has also build the Symbol table with the labels and their address values.

Pass Two – Build the Object Program



Pass Two – Build the Object Program

1) Re-set the LOCCTR with the value zero.

2) Reset the file pointer to the source program, read the first line.

3) Initialize the Listing file, and the Object Program file

4) Read the next line from the source program.

Is it a Comment? Yes, Read next line.	copy it to the Listing file
Is it a line with an ERROR? Yes, Read next line.	copy it to the Listing file
Is it a Directive? Yes	perform the indicated function, create Object Program records as appropriate; increment the LOCCTR; copy the Directive to the Listing file. Read next line.
Is it an Instruction? Yes	create the Object Program record information; increment the LOCCTR; copy the Instruction to the Listing file. Read the next line.

5) At end of file, complete the Object Program file; close the Listing file.

6) Stop

Now the Assembler has read the program a second time, it has used the Symbol Table to create the machine code instructions. It has collected the machine instructions and information about the data elements into the records of the Object Program file. It has created a Listing file for the programmer.