Programming in Assembler – Laboratory

Exercise No.5
Procedures, macros

During the Exercise No.5 students are to analyze the program using the CodeView Debugger. Next step is to modify the macros in the program changing them into procedures. On the last step the program should be modified to conditional version.
Program is attached to the documentation in `lab5.asm` file.

Explanation of DOS functions used in the program:
62h – Get PSP address - Gets the segment address of the PSP for the current process.
Returns in BX: segment address of PSP for current process.

29h – Parse Filename. CP/M based function that fills the FCB block with file name.
ES:DI holds the address of filled FCB block;
DS:SI holds address of the file name string;
AL=01 for ignoring separate characters.

4Ah – Resize memory block - Adjusts the size of a previously allocated block of memory.
BX = new size of memory block in paragraphs;
ES = segment address of previously allocated memory block.
Returns in carry flag; clear if successful; set otherwise
Returns in AX:
  -   07 if memory control blocks damaged;
  -   08 if insufficient memory to allocate as requested;
  -   09 if incorrect memory segment specified;
Returns in BX: maximum number of paragraphs available (if an increase was requested).

4Bh – Load and execute program (EXEC) - Loads a program file into memory and optional executed the program. This function can also be used to load a program overlay.
AL =
  -   00 to load and execute program;
  -   03 to load overlay;
DS:DX = address of ASCIIZ pathname for an executable program file;
ES:BX = address of parameter block.
Returns in carry flag: clear if successful; set otherwise;
Returns in AX:
  -   01 if invalid function (AL not 00 or 03);
  -   02 if file not found;
  -   03 if path not found;
  -   05 if access denied;
  -   08 if insufficient memory;
  -   0Ah if bad environment;
  -   0Bh if bad format (for AL=00 only).
Note: With MS-DOS 2.x all registers except CS and IP can be destroyed; with 3.x registers are preserved.

During the laboratory students are to:
1. Create the project to the `lab5.asm` file with options for debugging and generating listing file.
2. Assemble the project to the `*.exe` file and run the program in debugger using step-by-step mode.
3. Analyze the program with attention to macros' expantion.
4. Modify the program replacing the macros with procedures.
5. Modify the program to conditional version that:
    o Assemble to the version with macros when `USEMACRO =1`
    o Assemble to the version with procedures when `USEMACRO =0`
6. Analyze and compare the execution time of two program versions.
7. Analyze and compare the memory space of two program versions.
8. Comment the program.

The report should consist of:
    - Title page.
    - Explanation of program function.
    - Modified program listing file.
    - Expantions of two chosen macros.
    - Comparison of memory usage and execution time of two versions.
    - Conclusions.