

```
File Edit Search View Options Help
C:\MASM\BUBBLES0.ASM

.model small
display macro msg
    lea dx,msg
    mov ah,09h
    int 21h
endm
.data
list db 02h,01h,34h,0F4h,09h,05h
number equ $-list
msg1 db 0dh, 0ah,"1>>sort in ascending order$"
msg2 db 0dh, 0ah,"2>>sort in descending order$"
msg3 db 0dh, 0ah,"3>>exit$"
msg4 db 0dh, 0ah,"enter your choice::~$"
msg5 db 0dh, 0ah,"invalid choice entered$"
.code
start : mov ax,@data
        mov ds,ax
        lea si,list
        mov ch,number-1    ;cl stores the nummber of elements in a list
        display msg1       ;display the menu
        display msg2
        display msg3
Commands for manipulating files
```

```
File Edit Search View Options Help
C:\MASM\BUBBLES0.ASM

        display msg3
        display msg4
        mov ah,01h
        int 21h
        sub al,30h
        cmp al,01h        ;input=1?sort in ascending order
        je ascsort
        cmp al,02h        ;input=2?sort in descending order
        je dessort
        cmp al,03h        ;input=3?exit
        je final
        display msg5
        jmp final

ascsort: mov si,offset list
        mov cl,00h        ;j value
        mov bh,ch
        sub bh,b1          ;n-1-i

npass:  cmp cl,bh
        jnc next
        mov al,[si]
Commands for manipulating files
```

```
File Edit Search View Options Help
C:\MASM\BUBBLES0.ASM

    mov al,[si]
    mov bp,01h
    cmp al,ds:[bp][si]
    jc _nope
    xchg al,[si+1]
    xchg [si],al

_nope: inc cl
      inc si
      jmp npass

next:  inc bl
      cmp bl,ch
      jc again1
      jmp final

dessort: mov bl,00h

again1: mov si,offset list
      mov cl,00h      ;j value
      mov bh,ch
      sub bh,bl      ;n-1-i

Commands for manipulating files
```

```
File Edit Search View Options Help
C:\MASM\BUBBLES0.ASM

npass1: cmp cl,bh
      jnc next
      mov al,[si]
      mov bp,01h
      cmp al,ds:[bp][si]
      jnc _nope1
      xchg al,[si+1]
      xchg [si],al

_nope1: inc cl
      inc si
      jmp npass1

next1:  inc bl
      cmp bl,ch
      jc again1

final:  mov ah,4ch
      int 21h

end start
```

```

Z:\>c:

C:\>cd masm

C:\MASM>edit bubblesort.asm

C:\MASM>masm bubblesort;;
Microsoft (R) Macro Assembler Version 5.00
Copyright (C) Microsoft Corp 1981-1985, 1987. All rights reserved.

51446 + 465098 Bytes symbol space free

0 Warning Errors
0 Severe Errors

C:\MASM>bubblesort

1>>sort in ascending order
2>>sort in descending order
3>>exit
enter your choice::1
C:\MASM>

C:\MASM>cv bubblesort

```

File	Edit	View	Search	Run	Watch	Options	Calls	Help
local								reg
source1 CS:IP (ACTIVE)								
052A:0000	B83405	MOV	AX,0534					AX = 0000
052A:0003	8ED8	MOV	DS,AX					BX = 0000
052A:0005	8D360000	LEA	SI,Word Ptr [0000]					CX = 0000
052A:0009	B505	MOV	CH,05					DX = 0000
052A:000B	8D160600	LEA	DX,Word Ptr [0006]					SP = 0000
052A:000F	B409	MOV	AH,09					BP = 0000
052A:0011	CD21	INT	21					SI = 0000
052A:0013	8D162300	LEA	DX,Word Ptr [0023]					DI = 0000
052A:0017	B409	MOV	AH,09					DS = 051A
052A:0019	CD21	INT	21					ES = 051A
052A:001B	8D164100	LEA	DX,Word Ptr [0041]					SS = 0529
052A:001F	B409	MOV	AH,09					CS = 052A
052A:0021	CD21	INT	21					IP = 0000
052A:0023	8D164B00	LEA	DX,Word Ptr [004B]					FL = 0200
052A:0027	B409	MOV	AH,09					
052A:0029	CD21	INT	21					
command								
051A:0000	CD 20 FF 9F 00 EA FF FF-AD DE 6C 02 CD 03 32 03	. . .						
051A:0010	CD 03 4B 0A CD 03 FF 04-01 01 01 00 02 03 FF FF	..K..						
>								
								NU UP EI PL NZ NA PO NC

<F8=Trace> <F10=Step> <F5=Go> <F6=Window> <F3=Display> <ESC=Cancel>

```
File Edit Search View Options Help
C:\MASM\ASCIIUAL.ASM

.model small
.data
msg1 db 0dh,0ah,"enter alphanumeric character $"
res db 02 dup(0)
.code
mov ax,@data
mov ds,ax
lea dx,msg1
call disp
mov ah,01h
int 21h
mov bl,al
mov cl,4
shr al,cl
cmp al,0ah
jc digit
add al,07h

digit: add al,30h
      mov res,al
      and bl,0fh
      cmp bl,0ah

Commands for manipulating files
```

```
File Edit Search View Options Help
C:\MASM\ASCIIUAL.ASM

      cmp bl,0ah
      jc digit1
      add bl,07h

digit1: add bl,30h
      mov res+1,bl
      mov ah,00h
      mov al,03h
      int 10

mov ah,02h
mov bh,00h
mov dh,0ch
mov dl,28h
int 10h

mov res+2,'$'
lea dx,res
call disp
mov ah,4ch
int 21h

Commands for manipulating files
```

```
disp proc near
mov ah,09h
int 21h
ret
disp endp
end
```

Commands for manipulating files

```
Z:\>SET BLASTER=A220 I7 D1 H5 T6
```

```
Z:\>MOUNT C C:\
```

Mounting c:\ is NOT recommended. Please mount a (sub)directory next time.
Drive C is mounted as local directory C:\

```
Z:\>C:
```

```
C:\>CD MASM
```

```
C:\MASM>EDIT ASCIIUAL.ASM
```

```
C:\MASM>MASM ASCIIUAL;; 24
```

```
C:\MASM>t (R) Macro Assembler Version 5.00
```

Copyright (C) Microsoft Corp 1981-1985, 1987. All rights reserved.

51688 + 464856 Bytes symbol space free

0 Warning Errors

0 Severe Errors

```
C:\MASM>ASCIIUAL
```

enter alphanumeric character \$

File Edit View Search Run Watch Options Calls Help			
local			
source1 CS:IP (ACTIVE)			
052A:0000	B82F05	MOV	AX,052F
052A:0003	8ED8	MOV	DS,AX
052A:0005	8D160800	LEA	DX,Word Ptr [0008]
052A:0009	E84700	CALL	0053
052A:000C	B401	MOV	AH,01
052A:000E	CD21	INT	21
052A:0010	8AD8	MOV	BL,AL
052A:0012	B104	MOV	CL,04
052A:0014	D2E8	SHR	AL,CL
052A:0016	3C0A	CMP	AL,0A
052A:0018	7202	JB	001C
052A:001A	0407	ADD	AL,07
052A:001C	0430	ADD	AL,30
052A:001E	A22800	MOV	Byte Ptr [0028],AL
052A:0021	80E30F	AND	BL,0F
052A:0024	80FB0A	CMP	BL,0A
command			
051A:0000	CD 20 FF 9F 00 EA FF FF-AD DE 6C 02 CD 03 32 03	. . .	
051A:0010	CD 03 4B 0A CD 03 FF 04-01 01 01 00 02 03 FF FF	..K..	
>			
<div> <div>AX = 0000</div> <div>BX = 0000</div> <div>CX = 0000</div> <div>DX = 0000</div> <div>SP = 0000</div> <div>BP = 0000</div> <div>SI = 0000</div> <div>DI = 0000</div> <div>DS = 051A</div> <div>ES = 051A</div> <div>SS = 0529</div> <div>CS = 052A</div> <div>IP = 0000</div> <div>FL = 0200</div> </div> <div> <div>NU UP EI PL</div> <div>NZ NA PO NC</div> </div>			
<F8=Trace> <F10=Step> <F5=Go> <F6=Window> <F3=Display> <ESC=Cancel>			

File Edit Search View Options Help	
C:\MASM\PALINDRO.ASM	
<pre> .model small display macro msg lea dx,msg mov ah,09h int 21h endm .data msg1 db 0dh,0ah,"enter the string:\$" msg2 db 0dh,0ah,"reverse string: \$" msg3 db 0dh,0ah,"input string is a palindrome \$" msg4 db 0dh,0ah,"input string is not a palindrome \$" string db 80h dup(?) restring db 80h dup(?) .code start: mov ax,0data mov ds,ax display msg1 ;take the string from keyboard character by character mov si,offset string xor cl,cl </pre>	
Commands for manipulating files	

```
File Edit Search View Options Help
C:\MASM\PALINDRO.ASM

    xor cl,cl
again: mov ah,01h
      int 21h
      cmp al,0dh
      je next
      mov [si],al
      inc si
      inc cl
      jmp again
next:  mov [si],BYTE PTR '$'
      ;string input over.....
      dec si
      mov ch,cl
      ;reverse the string and store it in restrng
      mov di,offset restrng
back:  mov al,[si]
      mov [di],al
      dec si
      inc di
Commands for manipulating files
```

```
File Edit Search View Options Help
C:\MASM\PALINDRO.ASM

    inc di
    dec ch
    jnz back
    mov di, BYTE PTR '$'
    DISPLAY MSG2
    DISPLAY RESTRING
    MOV SI, OFFSET STRING
    MOV DI, OFFSET RESTRING

AG:  MOV AL, SI
     CMP AL, DI
     JNE FAIL
     INC SI
     INC DI
     DEC CX
     JZ SUCCESS
     JMP AG

FAIL: DISPLAY MSG4
      JMP FINAL

SUCCESS: DISPLAY MSG3
Commands for manipulating files
```

```
SUCCESS: DISPLAY MSG3

FINAL: MOV AH, 4CH
       INT 21H

END
Commands for manipulating files
```



```
C:\MASM>EDIT PALINDROME.ASM
```

```
C:\MASM>MASM PALINDROME.;
```

```
Microsoft (R) Macro Assembler Version 5.00
```

```
Copyright (C) Microsoft Corp 1981-1985, 1987. All rights reserved.
```

```
51640 + 464904 Bytes symbol space free
```

```
0 Warning Errors
```

```
0 Severe Errors
```

```
C:\MASM>PALINDROME
```

```
enter the string:MADAM
```

```
reverse string: MADAM
```

```
input string is a palindrome
```

```
C:\MASM>PALINDROME
```

```
enter the string:BMSCE
```

```
reverse string: ECSMB
```

```
input string is not a palindrome
```

```
C:\MASM>
```

The screenshot displays the MASM interface with a menu bar (File, Edit, View, Search, Run, Watch, Options, Calls, Help) and a toolbar. The main window is divided into three panes: a source code pane, a command pane, and a register pane.

Source Code Pane: Shows assembly code for a program named PALINDROME. The code is organized into two sections: 052A:0000 and 051A:0000. The 052A section contains instructions for reversing the string "MADAM" and checking if it is a palindrome. The 051A section contains instructions for reversing the string "BMSCE" and checking if it is a palindrome.

Command Pane: Shows the command line for the assembly process, including the command to assemble the file and the command to run the program.

Register Pane: Shows the current state of the registers. The registers are listed in two columns: AX, BX, CX, DX, SP, BP, SI, DI, DS, ES, SS, CS, IP, FL and NU, UP, EI, PL, NZ, NA, PO, NC. The values for the first column are: AX = 0000, BX = 0000, CX = 0000, DX = 0000, SP = 0000, BP = 0000, SI = 0000, DI = 0000, DS = 051A, ES = 051A, SS = 0529, CS = 052A, IP = 0000, FL = 0200. The values for the second column are: NU = 0000, UP = 0000, EI = 0000, PL = 0000, NZ = 0000, NA = 0000, PO = 0000, NC = 0000.

Command Line: Shows the command to assemble the file: `CD 20 FF 9F 00 EA FF FF-AD DE 6C 02 CD 03 32 03 . . .` and the command to run the program: `CD 03 4B 0A CD 03 FF 04-01 01 01 00 02 03 FF FF ..K..`.