

Assembler directives



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Assemble Directives

- Instructions to the Assembler regarding the program being executed.
- Control the generation of machine codes and organization of the program; but no machine codes are generated for assembler directives.
- Also called 'pseudo instructions'
- Used to :
 - › specify the start and end of a program
 - › attach value to variables
 - › allocate storage locations to input/ output data
 - › define start and end of segments, procedures, macros etc..

Assemble Directives

DB

- Define Byte

DW

- Define a byte type (8-bit) variable

SEGMENT
ENDS

- Reserves specific amount of memory locations to each variable

ASSUME

- Range : $00_H - FF_H$ for unsigned value; $00_H - 7F_H$ for positive value and $80_H - FF_H$ for negative value

ORG
END
EVEN
EQU

- General form : **variable DB value/ values**

PROC
FAR
NEAR
ENDP

Example:

```
LIST DB 7FH, 42H, 35H
```

SHORT

Three consecutive memory locations are reserved for the variable LIST and each data specified in the instruction are stored as initial value in the reserved memory location

MACRO
ENDM

Assemble Directives

DB

- Define Word

DW

- Define a word type (16-bit) variable

SEGMENT
ENDS

- Reserves two consecutive memory locations to each variable

ASSUME

- Range : $0000_H - FFFF_H$ for unsigned value; $0000_H - 7FFF_H$ for positive value and $8000_H - FFFF_H$ for negative value

ORG
END
EVEN
EQU

- General form : **variable DW value/ values**

PROC
FAR
NEAR
ENDP

Example:

```
ALIST DW 6512H, 0F251H, 0CDE2H
```

Six consecutive memory locations are reserved for the variable ALIST and each 16-bit data specified in the instruction is stored in two consecutive memory location.

MACRO
ENDM

Assemble Directives

DB

DW

SEGMENT
ENDS

ASSUME

ORG

END

EVEN

EQU

PROC

FAR

NEAR

ENDP

SHORT

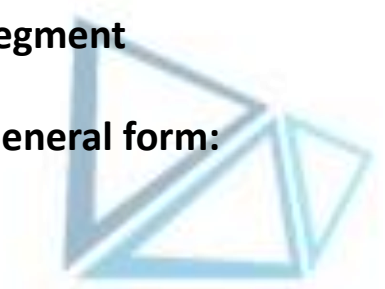
MACRO

ENDM

■ **SEGMENT** : Used to indicate the beginning of a code/ data/ stack segment

■ **ENDS** : Used to indicate the end of a code/ data/ stack segment

■ **General form:**



Segnam SEGMENT



Program code
or
Data Defining Statements

Segnam ENDS

User defined name of the segment

Assemble Directives

DB

DW

SEGMENT

ENDS

ASSUME

ORG

END

EVEN

EQU

PROC

FAR

NEAR

ENDP

SHORT

MACRO

ENDM

- Informs the assembler the name of the program/ data segment that should be used for a specific segment.

- General form:

ASSUME segreg : segnam, .. , segreg : segnam

Segment Register

User defined name of the segment

Example:

```
ASSUME CS: ACODE, DS:ADATA
```

Tells the compiler that the instructions of the program are stored in the segment ACODE and data are stored in the segment ADATA

Assemble Directives

DB

DW

SEGMENT

ENDS

ASSUME

ORG

END

EVEN

EQU

PROC

FAR

NEAR

ENDP

SHORT

MACRO

ENDM

- **ORG** (Origin) is used to assign the starting address (Effective address) for a program/ data segment
- **END** is used to terminate a program; statements after END will be ignored
- **EVEN** : Informs the assembler to store program/ data segment starting from an even address
- **EQU** (Equate) is used to attach a value to a variable

Examples:

ORG 1000H	Informs the assembler that the statements following ORG 1000H should be stored in memory starting with effective address 1000 _H
LOOP EQU 10FEH	Value of variable LOOP is 10FE _H
<pre> _SDATA SEGMENT ORG 1200H A DB 4CH EVEN B DW 1052H _SDATA ENDS </pre>	In this data segment, effective address of memory location assigned to A will be 1200 _H and that of B will be 1202 _H and 1203 _H .

Assemble Directives

DB

DW

SEGMENT

ENDS

ASSUME

ORG

END

EVEN

EQU

PROC

ENDP

FAR

NEAR

SHORT

MACRO

ENDM

■ **PROC** Indicates the beginning of a procedure

■ **ENDP** End of procedure

■ **FAR** Intersegment call

■ **NEAR** Intra-segment call

■ **General form**



procname PROC[NEAR/ FAR]



Program statements of the procedure

Last statement of the procedure

RET

procname ENDP

User defined name of the procedure

Assemble Directives

DB

DW

SEGMENT
ENDS

ASSUME

ORG
END

EVEN

EQU

PROC
ENDP
FAR
NEAR

SHORT

MACRO
ENDM

Examples:

ADD64 PROC NEAR

...

...

...

RET

ADD64 ENDP

The subroutine/ procedure named ADD64 is declared as NEAR and so the assembler will code the CALL and RET instructions involved in this procedure as near call and return

CONVERT PROC FAR

...

...

...

RET

CONVERT ENDP

The subroutine/ procedure named CONVERT is declared as FAR and so the assembler will code the CALL and RET instructions involved in this procedure as far call and return

Assemble Directives

DB

■ Reserves one memory location for 8-bit signed displacement in jump instructions

DW

SEGMENT
ENDS

Example:

ASSUME

JMP SHORT AHEAD

The directive will reserve one memory location for 8-bit displacement named AHEAD

ORG

END

EVEN

EQU

PROC

ENDP

FAR

NEAR

SHORT

MACRO

ENDM



Assemble Directives

DB

DW

SEGMENT
ENDS

ASSUME

ORG
END
EVEN
EQU

PROC
ENDP
FAR
NEAR

SHORT

MACRO
ENDM

■ **MACRO** Indicate the beginning of a macro

■ **ENDM** End of a macro

■ **General form:**

macroname **MACRO**[Arg1, Arg2 ...]

...
...



Program statements
in the macro

...

macroname **ENDM**

User defined name of the macro