

2.6 SUBROUTINE INSTRUCTIONS

A subroutine is a group of instructions that will be used repeatedly in different locations of the program. Rather than repeat the same instructions several times, they can be grouped into a one program which is called subroutine.

When main program calls a subroutine the program execution is transferred to the subroutine. After the completion of the subroutine, the program execution returns to the main program. The microprocessor uses the stack to store the return address of the subroutine.

The 8085 has two instructions for dealing with subroutines.

- The CALL instruction is used to CALL the subroutine.
- The RET instruction is used to return to the main program at the end of the subroutine.

Subroutine process is shown in figure below.

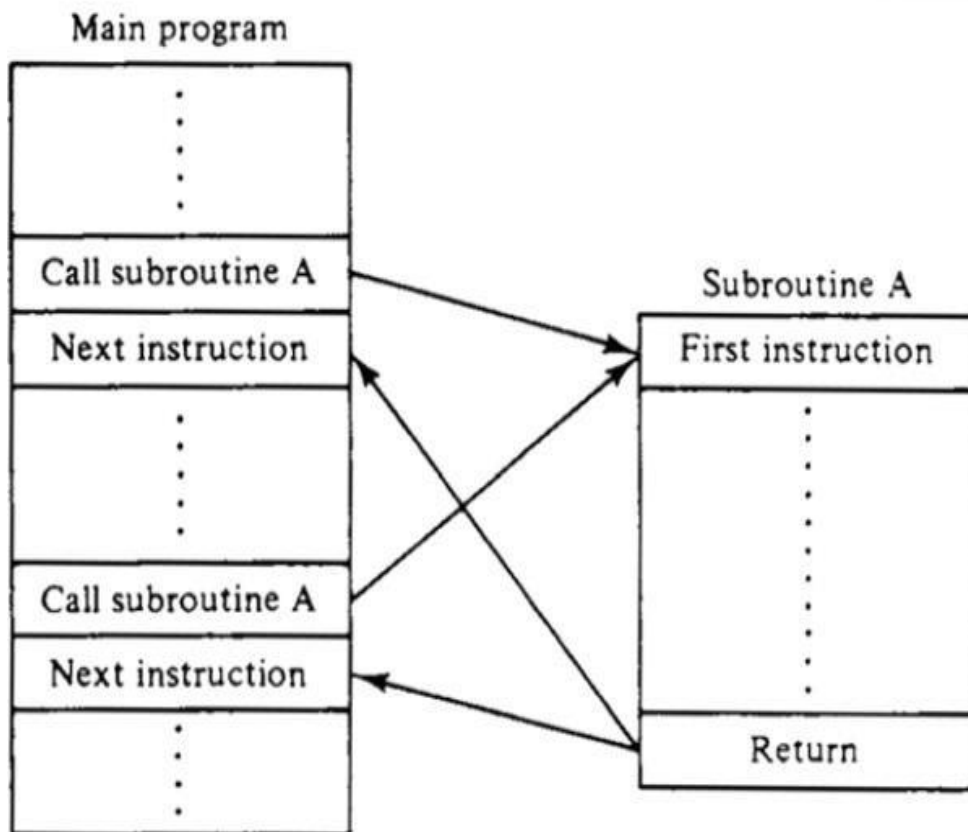


Figure 2.6.1 Subroutine process

[Source: "Microprocessor Architecture Programming and Application" by R.S. Gaonkar, page-249]

The CALL Instruction

CALL 16-bit address

The program sequence is transferred to the memory location specified by the 16-bit address given in the operand. Before the transfer, the address of the next instruction after CALL (the contents of the program counter) is pushed onto the stack.

Example: CALL 2034H or CALL XYZ

We can also call the subroutine by using conditional CALL instruction. For Example,

CC 16-bit address Call on if CY = 1

CNC16-bit address Call on no Carry CY = 0

CP16-bit address Call on positive S = 0

CM16-bit address Call on minus S = 1

CZ 16-bit address Call on zero Z = 1

CNZ16-bit address Call on no zero Z = 0

CPE16-bit address Call on parity even P = 1

CPO16-bit address Call on parity odd P = 0

RET Instruction

RET none

The program sequence is transferred from the subroutine to the calling program. The two bytes from the top of the stack are copied into the program counter, and program execution begins at the new address.

Example: RET

We can also return from the subroutine by using conditional RET instruction. For Example,

RC 16-bit address Return if CY = 1

RNC16-bit address Return if CY = 0

RP16-bit address Return if S = 0

RM16-bit address Return if S = 1

RZ 16-bit address Return if Z = 1

RNZ16-bit address Return if Z = 0

RPE16-bit address Return if P = 1

RPO16-bit address Return if P = 0