

Lab report #9

Saad Ahmad

(20P-0051)

Subroutines with parameters:

The concept of subroutine with parameter is a little bit different with the high-level language's functions. In parameter subroutine the parameter is actually stored in stack as we have the limited registers, as in stack there is the concept of first in and last out so with the help of stack, we can store our parameters on it and can easily access it by base pointer. And when we end our subroutine we will add a number with the ret keyword which will clean the stack once our code is executed.

Code:

```
report8.asm  report9.asm X
coal > report9.asm
1  [org 0x0100]
2
3  jmp main
4
5  data: dw 10 , 5
6  result: dw 0
7
8  ftn:
9      push bp
10     mov bp , sp
11
12     mov ax , [bp + 6]
13     mov bx , [bp + 4]
14
15     add ax , bx
16     mov [result] , ax
17
18     pop bp
19     ret 4
20
21  main:
22     mov ax , [data]
23     mov bx , [data + 2]
24
25     push ax
26     push bx
27
28     call ftn
29
30     mov ax , 0x4c00
31     int 0x21
32
```

Output:

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -														
AX 0000	SI 0000	CS 19F5	IP 0100	Stack +0 0000	Flags 7202									
BX 0000	DI 0000	DS 19F5		+2 20CD										
CX 002C	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF									
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0 0									
CMD >						1	0	1	2	3	4	5	6	7
						DS:0000	CD	20	FF	9F	00	EA	F0	FE
						DS:0008	AD	DE	1B	05	C5	06	00	00
						DS:0010	18	01	10	01	18	01	92	01
						DS:0018	01	01	01	00	02	FF	FF	FF
						DS:0020	FF	FF	FF	FF	FF	FF	FF	FF
						DS:0028	FF	FF	FF	FF	EB	19	C0	11
						DS:0030	A2	01	14	00	18	00	F5	19
						DS:0038	FF	FF	FF	FF	00	00	00	00
						DS:0040	05	00	00	00	00	00	00	00
						DS:0048	00	00	00	00	00	00	00	00
0100 E91800 JMP 011B														
0103 0A00 OR AL,[BX*SI]														
0105 050000 ADD AX,0000														
0108 005589 ADD [DI-771,DL														
010B E58B IN AX,[8B]														
010D 46 INC SI														
010E 06 PUSH ES														
010F 8B5E04 MOV BX,[BP+04]														
2						0	1	2	3	4	5	6	7	8
						DS:0000	CD	20	FF	9F	00	EA	F0	FE
						DS:0010	18	01	10	01	18	01	92	01
						DS:0020	FF	FF	FF	FF	FF	FF	FF	FF
						DS:0030	A2	01	14	00	18	00	F5	19
						DS:0040	05	00	00	00	00	00	00	00
1 Step						2 ProcStep	3 Retrieve	4 Help ON	5 BRK Menu	6	7 up	8 dn	9 le	10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -														
AX 0000	SI 0000	CS 19F5	IP 011B	Stack +0 0000	Flags 7200									
BX 0000	DI 0000	DS 19F5		+2 20CD										
CX 002C	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF									
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0 0									
CMD >						1	0	1	2	3	4	5	6	7
						DS:0000	CD	20	FF	9F	00	EA	F0	FE
						DS:0008	AD	DE	1B	05	C5	06	00	00
						DS:0010	18	01	10	01	18	01	92	01
						DS:0018	01	01	01	00	02	FF	FF	FF
						DS:0020	FF	FF	FF	FF	FF	FF	FF	FF
						DS:0028	FF	FF	FF	FF	EB	19	C0	11
						DS:0030	A2	01	14	00	18	00	F5	19
						DS:0038	FF	FF	FF	FF	00	00	00	00
						DS:0040	05	00	00	00	00	00	00	00
						DS:0048	00	00	00	00	00	00	00	00
0100 E91800 JMP 011B														
011B A10301 MOV AX,[0103]														
011E 8B1E0501 MOV BX,[0105]														
0122 50 PUSH AX														
0123 53 PUSH BX														
0124 E8E2FF CALL 0109														
0127 B8004C MOV AX,4C00														
012A CD21 INT 21														
012C 0000 ADD [BX*SI],AL														
2						0	1	2	3	4	5	6	7	8
						DS:0000	CD	20	FF	9F	00	EA	F0	FE
						DS:0010	18	01	10	01	18	01	92	01
						DS:0020	FF	FF	FF	FF	FF	FF	FF	FF
						DS:0030	A2	01	14	00	18	00	F5	19
						DS:0040	05	00	00	00	00	00	00	00
1 Step						2 ProcStep	3 Retrieve	4 Help ON	5 BRK Menu	6	7 up	8 dn	9 le	10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -

AX 000A	SI 0000	CS 19F5	IP 011E	Stack +0 0000	Flags 7200
BX 0000	DI 0000	DS 19F5		+2 20CD	
CX 002C	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0 0

CMD >

011B A10301

MOV AX,[0103]

011E 8B1E0501

MOV BX,[0105]

0122 50

PUSH AX

0123 53

PUSH BX

0124 E8E2FF

CALL 0109

0127 B8004C

MOV AX,4C00

012A CD21

INT 21

012C 0000

ADD [BX+SI],AL

012E 0000

ADD [BX+SI],AL

DS:0000	CD 20 FF 9F 00 EA F0 FE	AD DE 1B 05 C5 06 00 00	
DS:0010	18 01 10 01 18 01 92 01	01 01 01 00 02 FF FF FF	
DS:0020	FF FF FF FF FF FF FF FF	FF FF FF FF EB 19 C0 11	
DS:0030	A2 01 14 00 18 00 F5 19	FF FF FF FF 00 00 00 00	
DS:0040	05 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	

1 Step

2 ProcStep

3 Retrieve

4 Help ON

5 BRK Menu

6

7 up

8 dn

9 le 10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -

AX 000A	SI 0000	CS 19F5	IP 0122	Stack +0 0000	Flags 7200
BX 0005	DI 0000	DS 19F5		+2 20CD	
CX 002C	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0 0

CMD >

011E 8B1E0501

MOV BX,[0105]

0122 50

PUSH AX

0123 53

PUSH BX

0124 E8E2FF

CALL 0109

0127 B8004C

MOV AX,4C00

012A CD21

INT 21

012C 0000

ADD [BX+SI],AL

012E 0000

ADD [BX+SI],AL

0130 0000

ADD [BX+SI],AL

DS:0000	CD 20 FF 9F 00 EA F0 FE	AD DE 1B 05 C5 06 00 00	
DS:0010	18 01 10 01 18 01 92 01	01 01 01 00 02 FF FF FF	
DS:0020	FF FF FF FF FF FF FF FF	FF FF FF FF EB 19 C0 11	
DS:0030	A2 01 14 00 18 00 F5 19	FF FF FF FF 00 00 00 00	
DS:0040	05 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	

1 Step

2 ProcStep

3 Retrieve

4 Help ON

5 BRK Menu

6

7 up

8 dn

9 le 10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000A	SI 0000	CS 19F5	IP 0124	Stack +0 0005	Flags 7200
BX 0005	DI 0000	DS 19F5		+2 000A	
CX 002C	BP 0000	ES 19F5	HS 19F5	+4 0000	OF DF IF SF ZF AF PF CF
DX 0000	SP FFFA	SS 19F5	FS 19F5	+6 20CD	0 0 1 0 0 0 0 0

CMD >

0123 53	PUSH	BX	DS:0000	CD 20 FF 9F 00 EA F0 FF
0124 EBE2FF	CALL	0109	DS:0008	AD DE 1B 05 C5 06 00 00
0127 B8004C	MOV	AX,4C00	DS:0010	18 01 10 01 18 01 92 01
012A CD21	INT	21	DS:0018	01 01 01 00 02 FF FF FF
012C 0000	ADD	[BX+SI],AL	DS:0020	FF FF FF FF FF FF FF FF
012E 0000	ADD	[BX+SI],AL	DS:0028	FF FF FF FF EB 19 C0 11
0130 0000	ADD	[BX+SI],AL	DS:0030	A2 01 14 00 18 00 F5 19
0132 0000	ADD	[BX+SI],AL	DS:0038	FF FF FF FF 00 00 00 00
0134 0000	ADD	[BX+SI],AL	DS:0040	05 00 00 00 00 00 00 00
			DS:0048	00 00 00 00 00 00 00 00

2	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
DS:0000	CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00	= f.0= i|.+....
DS:0010	18	01	10	01	18	01	92	01	01	01	01	00	02	FF	FF	FF	.....f.
DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11	.....d..
DS:0030	A2	01	14	00	18	00	F5	19	FF	FF	FF	FF	00	00	00	00	6.....J.
DS:0040	05	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

1 Step
2 ProcStep
3 Retrieve
4 Help ON
5 BRK Menu
6
7 up
8 dn
9 le
10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000A	SI 0000	CS 19F5	IP 0109	Stack +0 0127	Flags 7200
BX 0005	DI 0000	DS 19F5		+2 0005	
CX 002C	BP 0000	ES 19F5	HS 19F5	+4 000A	OF DF IF SF ZF AF PF CF
DX 0000	SP FFF8	SS 19F5	FS 19F5	+6 0000	0 0 1 0 0 0 0 0

CMD >

0124 EBE2FF	CALL	0109	DS:0000	CD 20 FF 9F 00 EA F0 FF
0109 55	PUSH	BP	DS:0008	AD DE 1B 05 C5 06 00 00
010A 89E5	MOV	BP,SP	DS:0010	18 01 10 01 18 01 92 01
010C 8B4606	MOV	AX,[BP+06]	DS:0018	01 01 01 00 02 FF FF FF
010F 8B5E04	MOV	BX,[BP+04]	DS:0020	FF FF FF FF FF FF FF FF
0112 01D8	ADD	AX,BX	DS:0028	FF FF FF FF EB 19 C0 11
0114 A30701	MOV	[0107],AX	DS:0030	A2 01 14 00 18 00 F5 19
0117 5D	POP	BP	DS:0038	FF FF FF FF 00 00 00 00
0118 C20400	RET	0004	DS:0040	05 00 00 00 00 00 00 00
			DS:0048	00 00 00 00 00 00 00 00

2	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
DS:0000	CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00	= f.0= i|.+....
DS:0010	18	01	10	01	18	01	92	01	01	01	01	00	02	FF	FF	FF	.....f.
DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11	.....d..
DS:0030	A2	01	14	00	18	00	F5	19	FF	FF	FF	FF	00	00	00	00	6.....J.
DS:0040	05	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

1 Step
2 ProcStep
3 Retrieve
4 Help ON
5 BRK Menu
6
7 up
8 dn
9 le
10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -

AX 000A	SI 0000	CS 19F5	IP 010F	Stack +0 0000	Flags 7200
BX 0005	DI 0000	DS 19F5		+2 0127	
CX 002C	BP FFF6	ES 19F5	HS 19F5	+4 0005	OF DF IF SF ZF AF PF CF
DX 0000	SP FFF6	SS 19F5	FS 19F5	+6 000A	0 0 1 0 0 0 0 0

CMD >

010C 8B4606	MOV	AX, [BP+06]	DS:0000	CD 20 FF 9F 00 EA F0 FE
010F 8B5E04	MOV	EX, [BP+04]	DS:0008	AD DE 1B 05 C5 06 00 00
0112 01D8	ADD	AX, BX	DS:0010	18 01 10 01 18 01 92 01
0114 A30701	MOV	[0107], AX	DS:0018	01 01 01 00 02 FF FF FF
0117 5D	POP	BP	DS:0020	FF FF FF FF FF FF FF FF
0118 C20400	RET	0004	DS:0028	FF FF FF FF EB 19 C0 11
011B A10301	MOV	AX, [0103]	DS:0030	A2 01 14 00 18 00 F5 19
011E 8B1E0501	MOV	EX, [0105]	DS:0038	FF FF FF FF 00 00 00 00
0122 50	PUSH	AX	DS:0040	05 00 00 00 00 00 00 00
0123 50	PUSH	AX	DS:0048	00 00 00 00 00 00 00 00

2	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
DS:0000	CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00	= f.0= i |..+...
DS:0010	18	01	10	01	18	01	92	01	01	01	01	00	02	FF	FF	FF	.....f.
DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11	.....δ. L.
DS:0030	A2	01	14	00	18	00	F5	19	FF	FF	FF	FF	00	00	00	00	6.....J.
DS:0040	05	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -

AX 000A	SI 0000	CS 19F5	IP 0112	Stack +0 0000	Flags 7200
BX 0005	DI 0000	DS 19F5		+2 0127	
CX 002C	BP FFF6	ES 19F5	HS 19F5	+4 0005	OF DF IF SF ZF AF PF CF
DX 0000	SP FFF6	SS 19F5	FS 19F5	+6 000A	0 0 1 0 0 0 0 0

CMD >

010F 8B5E04	MOV	EX, [BP+04]	DS:0000	CD 20 FF 9F 00 EA F0 FE
0112 01D8	ADD	AX, BX	DS:0008	AD DE 1B 05 C5 06 00 00
0114 A30701	MOV	[0107], AX	DS:0010	18 01 10 01 18 01 92 01
0117 5D	POP	BP	DS:0018	01 01 01 00 02 FF FF FF
0118 C20400	RET	0004	DS:0020	FF FF FF FF FF FF FF FF
011B A10301	MOV	AX, [0103]	DS:0028	FF FF FF FF EB 19 C0 11
011E 8B1E0501	MOV	EX, [0105]	DS:0030	A2 01 14 00 18 00 F5 19
0122 50	PUSH	AX	DS:0038	FF FF FF FF 00 00 00 00
0123 53	PUSH	EX	DS:0040	05 00 00 00 00 00 00 00
0124 53	PUSH	EX	DS:0048	00 00 00 00 00 00 00 00

2	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
DS:0000	CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00	= f.0= i |..+...
DS:0010	18	01	10	01	18	01	92	01	01	01	01	00	02	FF	FF	FF	.....f.
DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11	.....δ. L.
DS:0030	A2	01	14	00	18	00	F5	19	FF	FF	FF	FF	00	00	00	00	6.....J.
DS:0040	05	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000F SI 0000 CS 19F5 IP 0114 Stack +0 0000 Flags 7204

EX 0005 DI 0000 DS 19F5 +2 0127

CX 002C BP FFF6 ES 19F5 HS 19F5 +4 0005 0F DF IF SF ZF AF PF CF

DX 0000 SP FFF6 SS 19F5 FS 19F5 +6 000A 0 0 1 0 0 0 1 0

CMD >

0112 01D8 ADD AX,BX

0114 A30701 MOV [0107],AX

0117 5D POP BP

0118 C20400 RET 0004

011B A10301 MOV AX,[0103]

011E 8B1E0501 MOV BX,[0105]

0122 50 PUSH AX

0123 53 PUSH BX

0124 E8E2FF CALL 0109

0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

DS:0018 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF

DS:0028 FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

DS:0038 FF FF FF FF 00 00 00 00

DS:0040 05 00 00 00 00 00 00 00

DS:0048 00 00 00 00 00 00 00 00

2

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00

DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00

= f.Ω≡ i|.+....

.....fl.

.....δ.ℓ.

6.....J.

.....

1 Step

2ProcStep

3Retrieve

4Help ON

5BRK Menu

6

7 up

8 dn

9 le

10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000F SI 0000 CS 19F5 IP 0117 Stack +0 0000 Flags 7204

EX 0005 DI 0000 DS 19F5 +2 0127

CX 002C BP FFF6 ES 19F5 HS 19F5 +4 0005 0F DF IF SF ZF AF PF CF

DX 0000 SP FFF6 SS 19F5 FS 19F5 +6 000A 0 0 1 0 0 0 1 0

CMD >

0114 A30701 MOV [0107],AX

0117 5D POP BP

0118 C20400 RET 0004

011B A10301 MOV AX,[0103]

011E 8B1E0501 MOV BX,[0105]

0122 50 PUSH AX

0123 53 PUSH BX

0124 E8E2FF CALL 0109

0127 BB004C MOV AX,4C00

0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

DS:0018 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF

DS:0028 FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

DS:0038 FF FF FF FF 00 00 00 00

DS:0040 05 00 00 00 00 00 00 00

DS:0048 00 00 00 00 00 00 00 00

2

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00

DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00

= f.Ω≡ i|.+....

.....fl.

.....δ.ℓ.

6.....J.

.....

1 Step

2ProcStep

3Retrieve

4Help ON

5BRK Menu

6

7 up

8 dn

9 le

10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -

AX 000F SI 0000 CS 19F5 IP 0118 Stack +0 0127 Flags 7204

BX 0005 DI 0000 DS 19F5 +2 0005

CX 002C BP 0000 ES 19F5 HS 19F5 +4 000A 0F DF IF SF ZF AF PF CF

DX 0000 SP FFF8 SS 19F5 FS 19F5 +6 0000 0 0 1 0 0 0 1 0

CMD >

0117 5D POP BP

0118 C20400 RET 0004

011B A10301 MOV AX,[0103]

011E 8B1E0501 MOV BX,[0105]

0122 50 PUSH AX

0123 53 PUSH BX

0124 E8E2FF CALL 0109

0127 B8004C MOV AX,4C00

012A CD21 INT 21

1

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

DS:0018 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF

DS:0028 FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

DS:0038 FF FF FF FF 00 00 00 00

DS:0040 05 00 00 00 00 00 00 00

DS:0048 00 00 00 00 00 00 00 00

2

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω≡ i |..†...

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FFfl.

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 δ.t.

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J.

DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

1 Step

2ProcStep

3Retrieve

4Help ON

5BRK Menu 6

7 up

8 dn

9 le

10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -

AX 000F SI 0000 CS 19F5 IP 0127 Stack +0 0000 Flags 7204

BX 0005 DI 0000 DS 19F5 +2 20CD

CX 002C BP 0000 ES 19F5 HS 19F5 +4 9FFF 0F DF IF SF ZF AF PF CF

DX 0000 SP FFFE SS 19F5 FS 19F5 +6 EA00 0 0 1 0 0 0 1 0

CMD >

0118 C20400 RET 0004

0127 B8004C MOV AX,4C00

012A CD21 INT 21

012C 0000 ADD [BX+SI],AL

012E 0000 ADD [BX+SI],AL

0130 0000 ADD [BX+SI],AL

0132 0000 ADD [BX+SI],AL

0134 0000 ADD [BX+SI],AL

0136 0000 ADD [BX+SI],AL

1

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω≡ i |..†...

DS:0008 AD DE 1B 05 C5 06 00 00fl.

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FF δ.t.

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 6.....J.

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00

DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

1 Step

2ProcStep

3Retrieve

4Help ON

5BRK Menu 6

7 up

8 dn

9 le

10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -

AX 000F	SI 0000	CS 19F5	IP 0127	Stack +0 0000	Flags 7204
BX 0005	DI 0000	DS 19F5		+2 20CD	
CX 002C	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 1 0

CMD >

011B C20400	RET	0004	
0127 B8004C	MOV	AX,4C00	
012A CD21	INT	21	
012C 0000	ADD	[BX+SI],AL	
012E 0000	ADD	[BX+SI],AL	
0130 0000	ADD	[BX+SI],AL	
0132 0000	ADD	[BX+SI],AL	
0134 0000	ADD	[BX+SI],AL	
0136 0000	ADD	[BX+SI],AL	

DS:0000	CD 20 FF 9F 00 EA F0 FE	AD DE 1B 05 C5 06 00 00
DS:0010	18 01 10 01 18 01 92 01	01 01 01 00 02 FF FF FF
DS:0020	FF FF FF FF FF FF FF FF	FF FF FF FF EB 19 C0 11
DS:0030	A2 01 14 00 18 00 F5 19	FF FF FF FF 00 00 00 00
DS:0040	05 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 lc 10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -

AX 4C00	SI 0000	CS 19F5	IP 012A	Stack +0 0000	Flags 7204
BX 0005	DI 0000	DS 19F5		+2 20CD	
CX 002C	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 1 0

CMD >

0127 B8004C	MOV	AX,4C00	
012A CD21	INT	21	
012C 0000	ADD	[BX+SI],AL	
012E 0000	ADD	[BX+SI],AL	
0130 0000	ADD	[BX+SI],AL	
0132 0000	ADD	[BX+SI],AL	
0134 0000	ADD	[BX+SI],AL	
0136 0000	ADD	[BX+SI],AL	
0138 0000	ADD	[BX+SI],AL	

DS:0000	CD 20 FF 9F 00 EA F0 FE	AD DE 1B 05 C5 06 00 00
DS:0010	18 01 10 01 18 01 92 01	01 01 01 00 02 FF FF FF
DS:0020	FF FF FF FF FF FF FF FF	FF FF FF FF EB 19 C0 11
DS:0030	A2 01 14 00 18 00 F5 19	FF FF FF FF 00 00 00 00
DS:0040	05 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 lc 10 ri

```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -
AX 4C00 SI 0000 CS F000 IP 14A0 Stack +0 42BD Flags 7004
BX 0005 DI 0000 DS 19F5 +2 06C5
CX 002C BP 0000 ES 19F5 HS 19F5 +4 7004 OF DF IF SF ZF AF PF CF
DX 0000 SP FFF2 SS 19F5 FS 19F5 +6 012C 0 0 0 0 0 0 1 0

CMD >

012A CD21 INT 21
14A0 FB STI
14A1 FE DB FE
14A2 3825 CMP DI, AH
14A4 00CF ADD BH, CL
14A6 CB RET Far
14A7 51 PUSH CX
14A8 B94001 MOV CX, 0140
14AB E2FE LOOP 14AB

DS:0000 CD 20 FF 9F 00 EA F0 FE
DS:0008 AD DE 1B 05 C5 06 00 00
DS:0010 18 01 10 01 18 01 92 01
DS:0018 01 01 01 00 02 FF FF FF
DS:0020 FF FF FF FF FF FF FF FF
DS:0028 FF FF FF FF EB 19 C0 11
DS:0030 A2 01 14 00 18 00 F5 19
DS:0038 FF FF FF FF 00 00 00 00
DS:0040 05 00 00 00 00 00 00 00
DS:0048 00 00 00 00 00 00 00 00

2 0 1 2 3 4 5 6 7 8 9 A B C D E F
DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.2= i|..+...
DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FF .....f. ....
DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 .....δ..
DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J. ....
DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri

```

LOCAL VARIABLES

An important role of the stack is in the creation of local variables that are only needed while the subroutine is in execution and not afterwards. They should not take permanent space like global variables. Local variables should be created when the subroutine is called and discarded afterwards. So that the spaced used by them can be reused for the local variables of another subroutine. They only have meaning inside the subroutine and no meaning outside it.

Code:

```
test.cpp  ASM ftn_loc.asm X
coal > ASM ftn_loc.asm
1  [org 0x0100]
2
3  jmp main
4
5  data: dw 10
6  result: dw 0
7
8  ftn:
9      push bp
10     mov bp , sp
11     sub sp , 2
12
13     mov ax , [bp + 4]
14     mov word[bp - 2] , 5      ; creating a local variable
15
16     mov bx , word[bp - 2]
17
18     add ax , bx
19     mov [result] , ax
20
21     mov sp , bp
22     pop bp
23     ret 2
24
25 main:
26     mov ax , [data]
27
28     push ax
29     call ftn
30
31     mov ax , 0x4c00
32     int 0x21
33
```

Output:

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -																						
AX 0000	SI 0000	CS 19F5	IP 0100	Stack +0 0000	Flags 7202																	
BX 0000	DI 0000	DS 19F5		+2 20CD																		
CX 0030	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF																	
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0 0																	
CMD >																						
0100 E92100 JMP 0124																						
0103 0A00 OR AL,[BX+SI]																						
0105 0000 ADD [BX+SI],AL																						
0107 55 PUSH BP																						
0108 89E5 MOV BP,SP																						
010A 81EC0200 SUB SP,0002																						
010E 8B4604 MOV AX,[BP+04]																						
0111 C746FE0500 MOV [BP-02],0005																						
2						0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
DS:0000						CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00	= f.Ω≡ i|.+...
DS:0010						18	01	10	01	18	01	92	01	01	01	00	02	FF	FF	FF	FFf.
DS:0020						FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11		δ.ℓ.
DS:0030						A2	01	14	00	18	00	F5	19	FF	FF	FF	FF	00	00	00	00	6.....J.
DS:0040						05	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1 Step						2ProcStep				3Retrieve				4Help ON				5BRK Menu				6
																		7 up				8 dn
																		9 le				10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD																						
AX 0000	SI 0000	CS 19F5	IP 0124	Stack +0 0000	Flags 7200																	
BX 0000	DI 0000	DS 19F5		+2 20CD																		
CX 0030	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF																	
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0 0																	
CMD >																						
0100 E92100 JMP 0124																						
0124 A10301 MOV AX,[0103]																						
0127 50 PUSH AX																						
0128 E8DCFF CALL 0107																						
012B B8004C MOV AX,4C00																						
012E CD21 INT 21																						
0130 07 POP ES																						
0131 8B5702 MOV DX,[BX+02]																						
0134 85D2 TEST DX,DX																						
2						0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
DS:0000						CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00	= f.Ω≡ i|.+...
DS:0010						18	01	10	01	18	01	92	01	01	01	00	02	FF	FF	FF	FFf.
DS:0020						FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11		δ.ℓ.
DS:0030						A2	01	14	00	18	00	F5	19	FF	FF	FF	FF	00	00	00	00	6.....J.
DS:0040						05	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1 Step						2ProcStep				3Retrieve				4Help ON				5BRK Menu				6
																		7 up				8 dn
																		9 le				10 ri

```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -
AX 000A SI 0000 CS 19F5 IP 0127 Stack +0 0000 Flags 7200
BX 0000 DI 0000 DS 19F5 +2 20CD
CX 0030 BP 0000 ES 19F5 HS 19F5 +4 9FFF OF DF IF SF ZF AF PF CF
DX 0000 SP FFFE SS 19F5 FS 19F5 +6 EA00 0 0 1 0 0 0 0 0

CMD >

0124 A10301 MOV AX,[0103]
0127 50 PUSH AX
0128 E8DCFF CALL 0107
012B B8004C MOV AX,4C00
012E CD21 INT 21
0130 07 POP ES
0131 8B5702 MOV DX,[BX+02]
0134 85D2 TEST DX,DX
0136 7504 JNZ 013C

2 0 1 2 3 4 5 6 7 8 9 A B C D E F
DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω= i.+.
DS:0010 18 01 10 01 18 01 92 01 01 01 00 02 FF FF FF .....f. ....
DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 .....δ.
DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J. ....
DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri

```

```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -
AX 000A SI 0000 CS 19F5 IP 0128 Stack +0 000A Flags 7200
BX 0000 DI 0000 DS 19F5
CX 0030 BP 0000 ES 19F5 HS 19F5 +4 20CD OF DF IF SF ZF AF PF CF
DX 0000 SP FFFC SS 19F5 FS 19F5 +6 9FFF 0 0 1 0 0 0 0 0

CMD >

0127 50 PUSH AX
0128 E8DCFF CALL 0107
012B B8094C MOV AX,4C00
012E CD21 INT 21
0130 07 POP ES
0131 8B5702 MOV DX,[BX+02]
0134 85D2 TEST DX,DX
0136 7504 JNZ 013C
0138 85C0 TEST AX,AX

2 0 1 2 3 4 5 6 7 8 9 A B C D E F
DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω= i|.+....
DS:0010 18 01 10 01 18 01 92 01 01 01 01 02 FF FF FF .....f. ....
DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF .....δ.L.
DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J. ....
DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri

```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000A SI 0000 CS 19F5 IP 0107 Stack +0 012B Flags 7200

BX 0000 DI 0000 DS 19F5

CX 0030 BP 0000 ES 19F5 HS 19F5

DX 0000 SP FFFA SS 19F5 FS 19F5

+2 000A

+4 0000 OF DF IF SF ZF AF PF CF

+6 20CD 0 0 1 0 0 0 0 0

CMD >

0128 E8DCFF CALL 0107

0107 55 PUSH BP

0108 89E5 MOV BP,SP

010A 81EC0200 SUB SP,0002

010E 8B4604 MOV AX,[BP+04]

0111 C746FE0500 MOV [BP-02],0005

0116 8B5EFE MOV BX,[BP-02]

0119 01D8 ADD AX,BX

011B A30501 MOV [0105],AX

1

0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

DS:0018 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF

DS:0028 FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

DS:0038 FF FF FF FF 00 00 00 00

DS:0040 05 00 00 00 00 00 00 00

DS:0048 00 00 00 00 00 00 00 00

2

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω≡ ↓|..†...

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FFf.

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11δ.ℓ.

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J.

DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 lc 10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000A SI 0000 CS 19F5 IP 0108 Stack +0 0000 Flags 7200

BX 0000 DI 0000 DS 19F5

CX 0030 BP 0000 ES 19F5 HS 19F5

DX 0000 SP FFF8 SS 19F5 FS 19F5

+2 012B

+4 000A OF DF IF SF ZF AF PF CF

+6 0000 0 0 1 0 0 0 0 0

CMD >

0107 55 PUSH BP

0108 89E5 MOV BP,SP

010A 81EC0200 SUB SP,0002

010E 8B4604 MOV AX,[BP+04]

0111 C746FE0500 MOV [BP-02],0005

0116 8B5EFE MOV BX,[BP-02]

0119 01D8 ADD AX,BX

011B A30501 MOV [0105],AX

011E 89EC MOV SP,BP

1

0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

DS:0018 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF

DS:0028 FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

DS:0038 FF FF FF FF 00 00 00 00

DS:0040 05 00 00 00 00 00 00 00

DS:0048 00 00 00 00 00 00 00 00

2

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω≡ ↓|..†...

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FFf.

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11δ.ℓ.

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J.

DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 lc 10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -

AX 000A SI 0000 CS 19F5 IP 010A Stack +0 0000 Flags 7200

BX 0000 DI 0000 DS 19F5 +2 012B

CX 0030 BP FFF8 ES 19F5 HS 19F5 +4 000A OF DF IF SF ZF AF PF CF

DX 0000 SP FFF8 SS 19F5 FS 19F5 +6 0000 0 0 1 0 0 0 0 0

CMD >

0108 89E5 MOV BP,SP

010A 81EC0200 SUB SP,0002

010E 8B4604 MOV AX,[BP+04]

0111 C746FE0500 MOV [BP-02],0005

0116 8B5EFE MOV BX,[BP-02]

0119 01D8 ADD AX,BX

011B A30501 MOV [0105],AX

011E 89EC MOV SP,BP

0120 5D POP BP

1

0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

DS:0018 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF

DS:0028 FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

DS:0038 FF FF FF FF 00 00 00 00

DS:0040 05 00 00 00 00 00 00 00

DS:0048 00 00 00 00 00 00 00 00

2

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω≡ i|..†...

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FFf.

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11δ.ℓ.

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J.

DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 lc 10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -

AX 000A SI 0000 CS 19F5 IP 010E Stack +0 7300 Flags 7284

BX 0000 DI 0000 DS 19F5 +2 0000

CX 0030 BP FFF8 ES 19F5 HS 19F5 +4 012B OF DF IF SF ZF AF PF CF

DX 0000 SP FFF6 SS 19F5 FS 19F5 +6 000A 0 0 1 1 0 0 1 0

CMD >

010A 81EC0200 SUB SP,0002

010E 8B4604 MOV AX,[BP+04]

0111 C746FE0500 MOV [BP-02],0005

0116 8B5EFE MOV BX,[BP-02]

0119 01D8 ADD AX,BX

011B A30501 MOV [0105],AX

011E 89EC MOV SP,BP

0120 5D POP BP

0121 C20200 RET 0002

1

0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

DS:0018 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF

DS:0028 FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

DS:0038 FF FF FF FF 00 00 00 00

DS:0040 05 00 00 00 00 00 00 00

DS:0048 00 00 00 00 00 00 00 00

2

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω≡ i|..†...

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FFf.

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11δ.ℓ.

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J.

DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 lc 10 ri

```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -
AX 000A SI 0000 CS 19F5 IP 0111 Stack +0 7300 Flags 7284
BX 0000 DI 0000 DS 19F5
CX 0030 BP FFF8 ES 19F5 HS 19F5 +4 012B OF DF IF SF ZF AF PF CF
DX 0000 SP FFF6 SS 19F5 FS 19F5 +6 000A 0 0 1 1 0 0 1 0

CMD >
010E 8B4604 MOV AX,[BP+041]
0111 C746FE0500 MOV [BP-02],0005
0116 8B5EFE MOV BX,[BP-02]
0119 01D8 ADD AX,BX
011B A30501 MOV [0105],AX
011E 89EC MOV SP,BP
0120 5D POP BP
0121 C20200 RET 0002
0124 A10301 MOV AX,[0103]

DS:0000 CD 20 FF 9F 00 EA F0 FE
DS:0008 AD DE 1B 05 C5 06 00 00
DS:0010 18 01 10 01 18 01 92 01
DS:0018 01 01 01 00 02 FF FF FF
DS:0020 FF FF FF FF FF FF FF FF
DS:0028 FF FF FF FF EB 19 C0 11
DS:0030 A2 01 14 00 18 00 F5 19
DS:0038 FF FF FF FF 00 00 00 00
DS:0040 05 00 00 00 00 00 00 00
DS:0048 00 00 00 00 00 00 00 00

2 0 1 2 3 4 5 6 7 8 9 A B C D E F
DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω≡ i.+.+...
DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FF .....f. ....
DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 .....δ.+.
DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J. ....
DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri

```

```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -
AX 000A SI 0000 CS 19F5 IP 0116 Stack +0 0005 Flags 7284
BX 0000 DI 0000 DS 19F5 +2 0000
CX 0030 BP FFF8 ES 19F5 HS 19F5 +4 012B OF DF IF SF ZF AF PF CF
DX 0000 SP FFF6 SS 19F5 FS 19F5 +6 000A 0 0 1 1 0 0 1 0

CMD >

0111 C746FE0500 MDU [BP-02],0005
0116 8B5EFE MDU BX,[BP-02]
0119 01D8 ADD AX,BX
011B A30501 MDU [0105],AX
011E 89EC MDU SP,BP
0120 5D POP BP
0121 C20200 RET 0002
0124 A10301 MDU AX,[0103]
0127 50 PUSH AX

0 1 2 3 4 5 6 7 8 9 A B C D E F
DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω≡ i.+.t...
DS:0010 18 01 10 01 18 01 92 01 01 01 01 02 FF FF FF FF .....f. ....
DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 .....δ.t.
DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J. ....
DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri

```


DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000F SI 0000 CS 19F5 IP 011E Stack +0 0005 Flags 7204

BX 0005 DI 0000 DS 19F5 +2 0000

CX 0030 BP FFF8 ES 19F5 HS 19F5 +4 012B OF DF IF SF ZF AF PF CF

DX 0000 SP FFF6 SS 19F5 FS 19F5 +6 000A 0 0 1 0 0 0 1 0

CMD >

011B A30501 MOV [0105],AX

011E 89EC MOV SP,BP

0120 5D POP BP

0121 C20200 RET 0002

0124 A10301 MOV AX,[0103]

0127 50 PUSH AX

0128 E8DCFF CALL 0107

012B B8004C MOV AX,4C00

012E CD21 INT 21

1

0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

DS:0018 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF

DS:0028 FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

DS:0038 FF FF FF FF 00 00 00 00

DS:0040 05 00 00 00 00 00 00 00

DS:0048 00 00 00 00 00 00 00 00

2

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω= i|..+...

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FFf.

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 δ..L.

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 ó.....J.

DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00

1 Step

2 ProcStep

3 Retrieve

4 Help ON

5 BRK Menu

6

7 up

8 dn

9 le

10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000F SI 0000 CS 19F5 IP 0120 Stack +0 0000 Flags 7204

BX 0005 DI 0000 DS 19F5 +2 012B

CX 0030 BP FFF8 ES 19F5 HS 19F5 +4 000A OF DF IF SF ZF AF PF CF

DX 0000 SP FFF8 SS 19F5 FS 19F5 +6 0000 0 0 1 0 0 0 1 0

CMD >

011E 89EC MOV SP,BP

0120 5D POP BP

0121 C20200 RET 0002

0124 A10301 MOV AX,[0103]

0127 50 PUSH AX

0128 E8DCFF CALL 0107

012B B8004C MOV AX,4C00

012E CD21 INT 21

0130 07 POP ES

1

0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

DS:0018 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF

DS:0028 FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

DS:0038 FF FF FF FF 00 00 00 00

DS:0040 05 00 00 00 00 00 00 00

DS:0048 00 00 00 00 00 00 00 00

2

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω= i|..+...

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FFf.

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 δ..L.

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 ó.....J.

DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00

1 Step

2 ProcStep

3 Retrieve

4 Help ON

5 BRK Menu

6

7 up

8 dn

9 le

10 ri


```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -
AX 4C00 SI 0000 CS 19F5 IP 012E Stack +0 0000 Flags 7204
BX 0005 DI 0000 DS 19F5      +2 20CD
CX 0030 BP 0000 ES 19F5 HS 19F5    +4 9FFF OF DF IF SF ZF AF PF CF
DX 0000 SP FFFE SS 19F5 FS 19F5    +6 EA00 0 0 1 0 0 0 1 0

CMD >

012B B8004C      MOV     AX,4C00
012E CD21        INT     21
0130 07          POP     ES
0131 8B5702      MOV     DX,[BX+02]
0134 85D2        TEST    DX,DX
0136 7504        JNZ     013C
0138 85C0        TEST    AX,AX
013A 741C        JZ      0158
013C C746DC0000  MOV     [BP-24],0000

2 0 1 2 3 4 5 6 7 8 9 A B C D E F
DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω■ i.+.+...
DS:0010 18 01 10 01 18 01 92 01 01 01 00 02 06 FF FF .....ft. ....
DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 .....δ.+.
DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF FF 00 00 00 6.....J. ....
DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri

```