

## 附页（程序执行过程）

### 一、读硬盘主引导扇区程序

```
DOSBox 0.74-3-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
-A
073F:0100 MOV AX,0201
073F:0103 MOV BX,0200
073F:0106 MOV CX,0001
073F:0109 MOV DX,0080
073F:010C INT 13
073F:010E INT 20
073F:0110
-U 100
073F:0100 B80102      MOV     AX,0201
073F:0103 BB0002      MOV     BX,0200
073F:0106 B90100      MOV     CX,0001
073F:0109 BA8000      MOV     DX,0080
073F:010C CD13        INT     13
073F:010E CD20        INT     20
073F:0110 0000        ADD     [BX+SI],AL
073F:0112 0000        ADD     [BX+SI],AL
073F:0114 0000        ADD     [BX+SI],AL
073F:0116 0000        ADD     [BX+SI],AL
073F:0118 0000        ADD     [BX+SI],AL
073F:011A 0000        ADD     [BX+SI],AL
073F:011C 3400        XOR     AL,00
073F:011E 2E         CS:
073F:011F 07         POP     ES
-U 100 10F
073F:0100 B80102      MOV     AX,0201
073F:0103 BB0002      MOV     BX,0200
073F:0106 B90100      MOV     CX,0001
073F:0109 BA8000      MOV     DX,0080
073F:010C CD13        INT     13
073F:010E CD20        INT     20
-U 100 10E
073F:0100 B80102      MOV     AX,0201
073F:0103 BB0002      MOV     BX,0200
073F:0106 B90100      MOV     CX,0001
073F:0109 BA8000      MOV     DX,0080
073F:010C CD13        INT     13
073F:010E CD20        INT     20
-U 101 10E
073F:0101 0102        ADD     [BP+SI],AX
073F:0103 BB0002      MOV     BX,0200
073F:0106 B90100      MOV     CX,0001
073F:0109 BA8000      MOV     DX,0080
073F:010C CD13        INT     13
073F:010E CD20        INT     20
-U 102 10E
073F:0102 02BB0002     ADD     BH,[BP+DI+0200]
073F:0106 B90100      MOV     CX,0001
073F:0109 BA8000      MOV     DX,0080
073F:010C CD13        INT     13
073F:010E CD20        INT     20
```

## 二、单步执行完成二进制加法 11011101+01011001

```
DOSBox 0.74-3-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
073F:01D0  00 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 .....
073F:01E0  00 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 .....
073F:01F0  00 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 .....
-A 100
073F:0100  MOV AL,DD
073F:0102  MOV BL,59
073F:0104  ADD AL,BL
073F:0106
-U 100 105
073F:0100  B0DD      MOV     AL,DD
073F:0102  B359      MOV     BL,59
073F:0104  00D8      ADD     AL,BL
-R IP
IP 0100
:100
-R
AX=0000 BX=0000 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0100  NU UP EI PL NZ NA PO NC
073F:0100  B0DD      MOV     AL,DD
-T
AX=00DD BX=0000 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0102  NU UP EI PL NZ NA PO NC
073F:0102  B359      MOV     BL,59
-T
AX=00DD BX=0059 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0104  NU UP EI PL NZ NA PO NC
073F:0104  00D8      ADD     AL,BL
-T
AX=0036 BX=0059 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0106  NU UP EI PL NZ AC PE CY
073F:0106  B90100    MOV     CX,0001
```

## 三、单步执行完成计算 4-(-124)的程序

```
-A 100
073F:0100  MOV AL,4
073F:0102  MOV BL,84
073F:0104  SUB AL,BL
073F:0106
-U 100 105
073F:0100  B004      MOV     AL,04
073F:0102  B384      MOV     BL,84
073F:0104  28D8      SUB     AL,BL
-R IP
IP 0106
:100
-R
AX=0036 BX=0059 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0100  NU UP EI PL NZ AC PE CY
073F:0100  B004      MOV     AL,04
```

```

-T
AX=0004 BX=0059 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0102  NU UP EI PL NZ AC PE CY
073F:0102 B3B4          MOV     BL,B4
-T
AX=0004 BX=0084 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0104  NU UP EI PL NZ AC PE CY
073F:0104 28D8          SUB     AL,BL
-T
AX=0080 BX=0084 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0106  OU UP EI NG NZ NA PO CY
073F:0106 B90100        MOV     CX,0001

```

在十六位范围内执行

```

-A 100
073F:0100 MOV AX,4
073F:0103 MOV BX,FFB4
073F:0106 SUB AX,BX
073F:0108
-U 100 107
073F:0100 B80400        MOV     AX,0004
073F:0103 BB84FF        MOV     BX,FF84
073F:0106 29D8          SUB     AX,BX
-R IP
IP 0106
:100
-R
AX=0080 BX=0084 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0100  OU UP EI NG NZ NA PO CY
073F:0100 B80400        MOV     AX,0004
-T
AX=0004 BX=0084 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0103  OU UP EI NG NZ NA PO CY
073F:0103 BB84FF        MOV     BX,FF84
-T
AX=0004 BX=FF84 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0106  OU UP EI NG NZ NA PO CY
073F:0106 29D8          SUB     AX,BX
-T
AX=0080 BX=FF84 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0108  NU UP EI PL NZ NA PO CY
073F:0108 00BA8000      ADD     [BP+SI+0000],BH      SS:0080=00

```

四、无符号数减法不借位

```

-A 100
073F:0100 MOV AL,D1
073F:0102 SUB AL,35
073F:0104
-U 100 103
073F:0100 B0D1          MOV     AL,D1
073F:0102 2C35          SUB     AL,35
-R IP
IP 0108
:100
-R
AX=0080 BX=FF84 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0100  NU UP EI PL NZ NA PO CY
073F:0100 B0D1          MOV     AL,D1

```

```

-T
AX=00D1 BX=FF84 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0102  NU UP EI PL NZ NA PO CY
073F:0102 2C35          SUB     AL,35
-T
AX=009C BX=FF84 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0104  NU UP EI NG NZ AC PE NC
073F:0104 84FF          TEST    BH,BH

```

## 五、无符号数减法不够剪，需要借位

```

DOSBox 0.74-3-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
-A 100
073F:0100 MOV AL,35
073F:0102 SUB AL,58
073F:0104
-U 100 102
073F:0100 B035          MOV     AL,35
073F:0102 2C58          SUB     AL,58
-R IP
IP 0104
:100
-R
AX=009C BX=FF84 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0100  NU UP EI NG NZ AC PE NC
073F:0100 B035          MOV     AL,35
-T
AX=0035 BX=FF84 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0102  NU UP EI NG NZ AC PE NC
073F:0102 2C58          SUB     AL,58
-T
AX=00DD BX=FF84 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0104  NU UP EI NG NZ AC PE CY
073F:0104 84FF          TEST    BH,BH

```

## 六、有符号数与无符号数的约定

```

-A 100
073F:0100 MOV AL,A6
073F:0102 MOV BL,3A
073F:0104 ADD AL,BL
073F:0106
-U 100 105
073F:0100 B0A6          MOV     AL,A6
073F:0102 B33A          MOV     BL,3A
073F:0104 00D8          ADD     AL,BL
-R IP
IP 0104
:100
-R
AX=00DD BX=FF84 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0100  NU UP EI NG NZ AC PE CY
073F:0100 B0A6          MOV     AL,A6
-T
AX=00A6 BX=FF84 CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0102  NU UP EI NG NZ AC PE CY
073F:0102 B33A          MOV     BL,3A

```

```

-T
AX=00A6 BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0104 NU UP EI NG NZ AC PE CY
073F:0104 00D8 ADD AL,BL
-T
AX=00E0 BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0106 NU UP EI NG NZ AC PO NC
073F:0106 29D8 SUB AX,BX

```

## 七、有符号数运算溢出

```

-A 100
073F:0100 MOV AL,55
073F:0102 ADD AL,78
073F:0104 MOV AL,C4
073F:0106 ADD AL,BL
073F:0108 MOV AL,23
073F:010A ADD AL,32
073F:010C MOV AL,FE
073F:010E ADD AL,FB
073F:0110
-U 100 10F
073F:0100 B055 MOV AL,55
073F:0102 0478 ADD AL,78
073F:0104 B0C4 MOV AL,C4
073F:0106 00D8 ADD AL,BL
073F:0108 B023 MOV AL,23
073F:010A 0432 ADD AL,32
073F:010C B0FE MOV AL,FE
073F:010E 04FB ADD AL,FB
-R IP
IP 0106
:100
-R
AX=00E0 BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0100 NU UP EI NG NZ AC PO NC
073F:0100 B055 MOV AL,55
-T
AX=0055 BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0102 NU UP EI NG NZ AC PO NC
073F:0102 0478 ADD AL,78
-T
AX=00CD BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0104 OV UP EI NG NZ NA PO NC
073F:0104 B0C4 MOV AL,C4
-T
AX=00C4 BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0106 OV UP EI NG NZ NA PO NC
073F:0106 00D8 ADD AL,BL
-T
AX=00FE BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0108 NU UP EI NG NZ NA PO NC
073F:0108 B023 MOV AL,23

```

```

-T
AX=0023 BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=010A  NU UP EI NG NZ NA PO NC
073F:010A 0432          ADD     AL,32
-T
AX=0055 BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=010C  NU UP EI PL NZ NA PE NC
073F:010C B0FE          MOV     AL,FE
-T
AX=00FE BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=010E  NU UP EI PL NZ NA PE NC
073F:010E 04FB          ADD     AL,FB
-T
AX=00F9 BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0110  NU UP EI NG NZ AC PE CY
073F:0110 0000          ADD     [BX+SI],AL          DS:FF3A=00

```

## 八、BCD 码运算的结果调整

```

DOSBox 0.74-3-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
-A 100
073F:0100 MOV AL,19
073F:0102 ADD AL,08
073F:0104
-U 100 102
073F:0100 B019          MOV     AL,19
073F:0102 0408          ADD     AL,08
-R IP
IP 0110
:100
-R
AX=00F9 BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0100  NU UP EI NG NZ AC PE CY
073F:0100 B019          MOV     AL,19
-T
AX=0019 BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0102  NU UP EI NG NZ AC PE CY
073F:0102 0408          ADD     AL,08
-T
AX=0021 BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0104  NU UP EI PL NZ AC PE NC
073F:0104 B0C4          MOV     AL,C4
-A 104
073F:0104 DAA
073F:0105
-T
AX=0027 BX=FF3A CX=0000 DX=0000 SP=00FD BP=0000 SI=0000 DI=0000
DS=073F ES=073F SS=073F CS=073F IP=0105  NU UP EI PL NZ AC PE NC
073F:0105 C400          LES     AX,[BX+SI]          DS:FF3A=0000

```