

## BCD

```

BCD          SBCD1          SBCD2          BCD          5

STACK  SEGMENT PARA  STACK  'STACK'
        DB  200 DUP(?)
STACK  ENDS
DATA   SEGMENT
SBCD1  DB  5, 6, 9, 2;2965
SBCD2  DB  2, 3, 7, 8;8732
SSUM   DB  5    DUP(0);      2965+8732=11697
CONT   DB  4
DATA   ENDS
CODE   SEGMENT
        ASSUME  CS:CODE, DS:DATA, SS:STACK, ES:DATA
SBCDAD: MOV AX, DATA
        MOV DS, AX
        MOV ES, AX
        CLC
        CLD;DF=0  LODSB  LODSB SI  1
        MOV SI, OFFSET SBCD1
        MOV DI, OFFSET SBCD2
        MOV BX, OFFSET SSUM
        MOV CL, CONT
        MOV CH, 0
        MOV AX, 0;AX
SBCDAD1:LODSB; [SI]  AL  SI++ DF=0
        ADC AL, [DI]
        AAA;  BCD
        INC DI
        MOV BYTE PTR[BX], AL
        INC BX
        LOOP SBCDAD1
        MOV BYTE PTR[BX], AL;  SSUM
        MOV AH, 4CH
        INT 21H

```

```
CODE    ENDS
        END SBCDAD
```

## DEBUG

- : \_u 0 29

```
-u0 29
0778:0000 B87707      MOV     AX,0777
0778:0003 8ED8        MOV     DS,AX
0778:0005 8EC0        MOV     ES,AX
0778:0007 F8          CLC
0778:0008 FC          CLD
0778:0009 BE0000      MOV     SI,0000
0778:000C BF0400      MOV     DI,0004
0778:000F BB0800      MOV     BX,0008
0778:0012 BA0E0D00    MOV     CL,[000D]
0778:0016 B500        MOV     CH,00
0778:0018 B80000      MOV     AX,0000
0778:001B AC          LODSB
0778:001C 1205        ADC     AL,[DI]
0778:001E 37          AAA
0778:001F 47          INC     DI
0778:0020 8807        MOV     [BX],AL
0778:0022 43          INC     BX
0778:0023 E2F6        LOOP    001B
0778:0025 8807        MOV     [BX],AL
0778:0027 B44C        MOV     AH,4C
0778:0029 CD21        INT     21
_
```

Figure 1:

0777, SSUM 0008

- : \_g=0 27 MOV AH,4C
- : \_d 0777:0

```

-----
-g=0 27

AX=0201 BX=000C CX=0000 DX=0000 SP=00C8 BP=0000 SI=0004 DI=0000
DS=0777 ES=0777 SS=076A CS=0778 IP=0027 NU UP EI PL NZ NA PE CY
0778:0027 B44C      MOV     AH,4C

```

Figure 2:

```

-d 0777:0
0777:0000 05 06 09 02 02 03 07 08-07 09 06 01 01 04 00 00 .....
0777:0010 B8 77 07 8E D8 8E C0 F8-FC BE 00 00 BF 04 00 BB .w.....
0777:0020 08 00 8A 0E 0D 00 B5 00-B8 00 00 AC 12 05 37 47 .....7G
0777:0030 88 07 43 E2 F6 88 07 B4-4C CD 21 C0 50 8D 86 7D ..C.....L!.P..}
0777:0040 FF 50 E8 89 69 83 C4 04-0B C0 75 8C B8 FF FF 50 .P..i.....u...P
0777:0050 B8 05 00 50 8D 86 7C FF-50 E8 94 12 83 C4 06 8B ...P..!P.....
0777:0060 5E 04 D1 E3 D1 E3 A1 3A-21 8B 16 3C 21 89 87 BE ^.....:!.<?...
0777:0070 22 89 97 C0 22 5E 8B E5-5D C3 55 8B EC 81 EC 86 "..."^..l.U.....

```

```

0777:0000 SSUM      0008, 9 13      11697

```

```

                ADD1 ADD2      ,      SUM      ,

STACK  SEGMENT PARA STACK 'STACK'
        DB 100 DUP(?)

STACK  ENDS
DATA   SEGMENT
ADD1   DB 0FEH, 86H, 7CH, 23H, 0A7H, 26H
ADD2   DB 0B3H, 73H, 11H, 9FH, 46H, 3EH
SUM     DB 6 DUP(0); :26A7237C86FEH+3E469F1173B3H=64EDC28DFAB1H
CONT    DB 3
DATA   ENDS
CODE   SEGMENT
        ASSUME CS:CODE, SS:STACK, DS:DATA, ES:DATA
MADDB: MOV AX, DATA
        MOV DS, AX
        MOV ES, AX
        MOV SI, OFFSET ADD1
        MOV DI, OFFSET ADD2
        MOV BX, OFFSET SUM
        MOV CL, BYTE PTR CONT
        MOV CH, 0
        CLC
MADDB1: MOV AX, [SI]
        ADC AX, [DI]
        INC SI
        INC SI
        INC DI

```

```

INC DI
MOV [BX], AX
INC BX
INC BX
LOOP MADDB1
MOV AH, 4CH
INT 21H
CODE ENDS
END MADDB

```

## DEBUG

- ```

      |_u 27
0773:0000 B87107      MOV     AX,0771
0773:0003 8ED8        MOV     DS,AX
0773:0005 8EC0        MOV     ES,AX
0773:0007 BE0000      MOV     SI,0000
0773:000A BF0600      MOV     DI,0006
0773:000D BB0C00      MOV     BX,000C
0773:0010 8A0E1200    MOV     CL,[0012]
0773:0014 B500        MOV     CH,00
0773:0016 F8          CLC
0773:0017 8B04        MOV     AX,[SI]
0773:0019 1305        ADC     AX,[DI]
0773:001B 46          INC     SI
0773:001C 46          INC     SI
0773:001D 47          INC     DI
0773:001E 47          INC     DI
0773:001F 8907        MOV     [BX],AX
0773:0021 43          INC     BX
0773:0022 43          INC     BX
0773:0023 E2F2        LOOP    0017
0773:0025 B44C        MOV     AH,4C
0773:0027 CD21        INT     21

```
- ```

      :_u 0 27 |_▲
                0771, SUM      000C

```

```

      |_g=0 25
AX=64ED BX=0012 CX=0000 DX=0000 SP=0064 BP=0000 SI=0006 DI=000C
DS=0771 ES=0771 SS=076A CS=0773 IP=0025  NU UP EI PL NZ NA PE NC
0773:0025 B44C        MOV     AH,4C

```
- ```

      :_d 0771:0 |_
0771:0000 FE 86 7C 23 A7 26 B3 73-11 9F 46 3E B1 FA 8D C2  ..!#. &.s..F>...
0771:0010 ED 64 03 00 00 00 00 00-00 00 00 00 00 00 00  .d.....
0771:0020 B8 71 07 8E D8 8E C0 BE-00 00 BF 06 00 BB 0C 00  .q.....
0771:0030 8A 0E 12 00 B5 00 F8 8B-04 13 05 46 46 47 47 89  .....FFGG.
0771:0040 07 43 43 E2 F2 B4 4C CD-21 86 FA FE 2A E4 40 50  .CC...L.?.*..@P
0771:0050 8D 86 FA FE 50 8D 86 7C-FF 50 E8 C5 72 83 C4 06  ....P..!.P..r...
0771:0060 8B 9E 7A FF D1 E3 D1 E3-8B 87 CC 17 8B 97 CE 17  ..z.....
0771:0070 89 46 FC 89 56 FE 05 0C-00 52 50 E8 42 48 83 C4  .F..V....RP.BH..

```

BUFFER 5 8

```

STACK  SEGMENT PARA      STACK   'STACK'
        DB 200 DUP(?)
STACK  ENDS
DATA    SEGMENT
BUFFER  DB 0A5H, 43H, 11H, 0C6H, 71H;    C6H A5H 71H 43H 11H
CONT    DB 4
DATA    ENDS
CODE    SEGMENT
        ASSUME CS:CODE, DS:DATA, SS:STACK, ES:DATA
SORT:   MOV AX, DATA;
        MOV DS, AX
        MOV ES, AX
        LEA DI, BUFFER
        MOV BL, CONT
        MOV AX, 0
        MOV DX, 0
NEXT0:  MOV SI, DI
        MOV CL, BL
NEXT2:  MOV AL, [SI]
        INC SI
        CMP AL, [SI]
        JNC NEXT3; AL>[SI]          [SI] [SI-1]
        MOV DX, [SI]
        MOV [SI-1], DL
        MOV [SI], AL
NEXT3:  DEC CL
        JNZ NEXT2;
        DEC BL
        JNZ NEXT0;
        MOV AH, 4CH
        INT 21H
CODE    ENDS
        END SORT

```

## DEBUG

- ```

-u 0 31
0778:0000 B87707      MOV     AX,0777
0778:0003 8ED8        MOV     DS,AX
0778:0005 8EC0        MOV     ES,AX
0778:0007 8D3E0000      LEA     DI,[0000]
0778:000B 8A1E0500      MOV     BL,[0005]
0778:000F B80000        MOV     AX,0000
0778:0012 BA0000        MOV     DX,0000
0778:0015 8BF7        MOV     SI,DI
0778:0017 8ACB        MOV     CL,BL
0778:0019 8A04        MOV     AL,[SI]
0778:001B 46          INC     SI
0778:001C 3A04        CMP     AL,[SI]
0778:001E 7307        JNB     0027
0778:0020 8B14        MOV     DX,[SI]
0778:0022 8B54FF      MOV     [SI-01],DL
0778:0025 8B04        MOV     [SI],AL
0778:0027 FEC9        DEC     CL
0778:0029 75EE        JNZ     0019
0778:002B FECB        DEC     BL
0778:002D 75E6        JNZ     0015
0778:002F B44C        MOV     AH,4C
0778:0031 CD21        INT     21

```
- ```

: _u 0 31
0777, BUFFER      0000

```
- ```

-g=0 2F
AX=00C6 BX=0000 CX=0100 DX=71C6 SP=00C8 BP=0000 SI=0001 DI=0000
DS=0777 ES=0777 SS=076A CS=0778 IP=002F NU UP EI PL ZR NA PE NC
0778:002F B44C      MOV     AH,4C

```
- ```

: _g=0 2F MOV AH, 4C

```
- ```

-d 0777:0
0777:0000 C6 A5 71 43 11 04 00 00-00 00 00 00 00 00 00 00 ..qC.....
0777:0010 B8 77 07 8E D8 8E C0 8D-3E 00 00 8A 1E 05 00 B8 .w.....>.....
0777:0020 00 00 BA 00 00 8B F7 8A-CB 8A 04 46 3A 04 73 07 .....F:s.
0777:0030 8B 14 88 54 FF 88 04 FE-C9 75 EE FE CB 75 E6 B4 ...T...u...u...
0777:0040 4C CD 21 89 69 83 C4 04-0B C0 75 8C B8 FF FF 50 L.t.i...u...P
0777:0050 B8 05 00 50 8D 86 7C FF-50 E8 94 12 83 C4 06 8B ...P...i.P.....
0777:0060 5E 04 D1 E3 D1 E3 A1 3A-21 8B 16 3C 21 89 87 BE ^.....t...<?...
0777:0070 22 89 97 C0 22 5E 8B E5-5D C3 55 8B EC 81 EC 86 "...^...l.U....

```
- ```

: _d 0777:0
0777:0000 0777:0004 , C6H A5H 71H 43H 11H

```

## ASCII

```

        ASCII      BINNUM      ASCBCD

STACK   SEGMENT PARA STACK 'STACK'
        DB 100 DUP(?)

STACK   ENDS

DATA    SEGMENT

BINNUM  DW 4FFFH;20479D

ASCD CD DB 5 DUP(0)

DATA    ENDS

CODE    SEGMENT

        ASSUME CS:CODE, SS:STACK, DS:DATA, ES:DATA

```

```

B2A:  MOV AX, DATA
      MOV DS, AX
      MOV ES, AX
      MOV CX, 5;4FFFH=20479D    5
      XOR DX, DX; DX
      MOV BX, 10
      MOV AX, BINNUM
      MOV DI, OFFSET ASCDCD
B2A1: DIV BX;AX/BX  AX, DX  AX      AX/10  AX
      ADD DL, 30H;DL+48 ASCII    '0' = 48D = 30H
      MOV [DI], DL
      INC DI
      AND AX, AX;CF
      CMP CX, 5
      JC  STOP; AX 0
      MOV DL, 0
      LOOP B2A1
STOP:  MOV AH, 4CH
      INT 21H
CODE  ENDS
      END B2A

```

## DEBUG

```

      -u 0 27
0772:0000 B87107      MOV     AX,0771
0772:0003 8ED8      MOV     DS,AX
0772:0005 8EC0      MOV     ES,AX
0772:0007 B90500      MOV     CX,0005
0772:000A 33D2      XOR     DX,DX
0772:000C BB0A00      MOV     BX,000A
0772:000F A10000      MOV     AX,[0000]
0772:0012 BF0200      MOV     DI,0002
0772:0015 F7F3      DIV     BX
0772:0017 80C230      ADD     DL,30
0772:001A 8815      MOV     [DI],DL
0772:001C 47      INC     DI
0772:001D 23C0      AND     AX,AX
0772:001F 7404      JZ      0025
0772:0021 B200      MOV     DL,00
0772:0023 E2DB      LOOP    0000
0772:0025 B44C      MOV     AH,4C
0772:0027 CD21      INT     21
•   :_u 0 27 -
      0771, ASCBCD      0002

      -g=0 25
AX=0000 BX=000A CX=0001 DX=0032 SP=0064 BP=0000 SI=0000 DI=0007
DS=0771 ES=0771 SS=076A CS=0772 IP=0025  NU UP EI PL ZR NA PE NC
•   :_g=0 25 MOV AH, 4C  0772:0025 B44C      MOV     AH,4C

```

```

      -d 0771:0
0771:0000 FF 4F 39 37 34 30 32 00-00 00 00 00 00 00 00 00 .097402.....
0771:0010 B8 71 07 8E D8 8E C0 B9-05 00 33 D2 BB 0A 00 A1 .q.....3.....
0771:0020 00 00 BF 02 00 F7 F3 80-C2 30 88 15 47 23 C0 74 .....0..6#.t
0771:0030 04 B2 00 E2 F0 B4 4C CD-21 86 7A FF A1 70 08 39 .....L.!.z..p.9
0771:0040 86 7A FF 72 03 E9 8D 00-8A 86 FA FE 2A E4 40 50 .z.r.....*.eP
0771:0050 8D 86 FA FE 50 8D 86 7C-FF 50 E8 C5 72 83 C4 06 ....P..i.P..r...
0771:0060 8B 9E 7A FF D1 E3 D1 E3-8B 87 CC 17 8B 97 CE 17 ..z.....
0771:0070 89 46 FC 89 56 FE 05 0C-00 52 50 E8 42 48 83 C4 .F..U....RP.BH..
•   : _d 0771:0-
      97402 4FFFH=20749

```

## ASCII 16

```

4 ASCII      ASCII  ASCSTF      BIN

STACK  SEGMENT PARA STACK 'STACK'
      DB 100 DUP(?)
STACK  ENDS
DATA    SEGMENT
ASCSTG  DB  '5', 'A', '6', '1';16A5
BIN     DB  2 DUP(0)
DATA    ENDS
CODE    SEGMENT
      ASSUME CS:CODE, SS:STACK, DS:DATA, ES:DATA
A2H:    MOV AX, DATA
      MOV DS, AX
      MOV ES, AX
      MOV CL, 4;
      MOV CH, CL
      MOV SI, OFFSET  ASCSTG
      CLD;DF=0
      XOR AX, AX;AX=0
      XOR DX, DX;DX=0
A2H1:   LODSB;      ASCSTG;
      AND AL, 7FH;AL 01111111B ASCII   128
      CMP AL, '0';AL '0' ASCII
      JL  ERROR;
      CMP AL, '9';AL '9' ASCII      AL  A-F  ASCII
      JG  A2H2
      SUB AL, 30H; num = ascii-30H
      JMP SHORT  A2H3
A2H2:   CMP AL, 'A'
      JL  ERROR
      CMP AL, 'F'
      JG  ERROR
      SUB AL, 37H; AH = ascii - 37H = 10D
A2H3:   OR  DL, AL;AL 4      0 AL 4 DL      DX
      ROR DX, CL;DX 4,

```



```

        DEC CH
        JNZ A2H1
        MOV WORD PTR BIN, DX
ERROR:  MOV AH, 4CH
        INT 21H
CODE    ENDS
        END A2H

```

## DEBUG

```

• :_u 0 34 _u-
      |_u 0 2C
      0772:0000 B87107      MOV     AX,0771
      0772:0003 8ED8      MOV     DS,AX
      0772:0005 8EC0      MOV     ES,AX
      0772:0007 B104      MOV     CL,04
      0772:0009 8AE9      MOV     CH,CL
      0772:000B BE0000     MOV     SI,0000
      0772:000E FC        CLD
      0772:000F 33C0      XOR     AX,AX
      0772:0011 33D2      XOR     DX,DX
      0772:0013 AC        LODSB
      0772:0014 247F      AND     AL,7F
      0772:0016 3C30      CMP     AL,30
      0772:0018 7C1E      JL      0038
      0772:001A 3C39      CMP     AL,39
      0772:001C 7F04      JG      0022
      0772:001E 2C30      SUB     AL,30
      0772:0020 EB0A      JMP     002C
      0772:0022 3C41      CMP     AL,41
      0772:0024 7C12      JL      0038
      0772:0026 3C46      CMP     AL,46
      0772:0028 7F0E      JG      0038
      0772:002A 2C37      SUB     AL,37
      0772:002C 0AD0      OR      DL,AL

```

```

      |_u
      0772:000E D3C0      ROR     DX,CL
      0772:0000 F3C0      RRC     CH
      0772:0002 750F      JNZ     0013
      0772:0004 09160400   MOV     [0004],DX
      0772:0000 B44C      MOV     AH,4C
      0772:000A CB21      INT     21
      0772:000C 2AE4      SUB     AH,AH

```

0771, ASCBCD 0004

```

• :_g=0 38 MOV AH, 4C
      |_g=0 38
      AX=0001 BX=0000 CX=0004 DX=16A5 SP=0064 BP=0000 SI=0004 DI=0000
      DS=0771 ES=0771 SS=076A CS=0772 IP=0038 NU UP EI PL ZR NA PE NC
      0772:0038 B44C      MOV     AH,4C

```

```

• :_d 0771:0-
      |_d 0771:0
      0771:0000 35 41 36 31 A5 16 00 00-00 00 00 00 00 00 00 00 5A61.....
      0771:0010 B8 71 07 8E D8 8E C0 B1-04 8A E9 BE 00 00 FC 33 .q.....3
      0771:0020 C0 33 D2 AC 24 7F 3C 30-7C 1E 3C 39 7F 04 2C 30 .3..$.<0i.<9...0
      0771:0030 EB 0A 3C 41 7C 12 3C 46-7F 0E 2C 37 0A D0 D3 CA ..<A!.<F...7...
      0771:0040 FE CD 75 DF 89 16 04 00-B4 4C CD 21 2A E4 40 50 ..u.....L.!*.0P
      0771:0050 8D 86 FA FE 50 8D 86 7C-FF 50 E8 C5 72 83 C4 06 ...P...i.P..r...
      0771:0060 8B 9E 7A FF D1 E3 D1 E3-8B 87 CC 17 8B 97 CE 17 ..z.....
      0771:0070 89 46 FC 89 56 FE 05 0C-00 52 50 E8 42 48 83 C4 .F..U....RP.BH..

```