

# **AmigaFlight Binary Coded Decimal Instructions**

Andrew Duffy Morris

**COLLABORATORS**

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WRITTEN BY	Andrew Duffy Morris	July 1, 2022	

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## Chapter 1

# AmigaFlight Binary Coded Decimal Instructions

## 1.1 AmigaFlight® Help: Binary Coded Decimal Instructions

Binary Coded Decimal Instructions

There are three operations on numbers in BCD, each of which operates on a byte only (two decimal digits) and incorporate the extend flag:

```

ABCD
    Add Decimal with Extend

NBCD
    Negate Decimal with Extend

SBCD
    Subtract Decimal with Extend

```

## 1.2 AmigaFlight® Help: Add Decimal with Extend

ABCD Add Decimal with Extend

Add the source operand to the destination operand using Binary Coded Decimal (BCD) arithmetic. Store the result in the destination operand.

Destn + Source + X -> Destn

Assembler Syntax

```

ABCD Dy,Dx
ABCD -(Ay),-(Ax)

```

## Data Size

-----  
 Byte

## Status Flags

-----  
 N Undefined  
 Z Clear if result non-zero else unchanged  
 V Undefined  
 C Set if carry (decimal) else clear  
 X Set same as carry

## Instruction Size and Cycles to Execute

-----  
 # p  
 Dy, Dx 2 6  
 - (Ay), - (Ax) 2 18  
  
 # = no. of program bytes  
 p = no. of instruction clock periods

### 1.3 AmigaFlight® Help: Negate Decimal with Extend

## NBCD Negate Decimal with Extend

=====

Subtract the destination operand and the source operand and the extend bit from zero, and store the result back in the destination location. This produces a tens complement if the extend bit is 0, a nines complement if it is set. This is a byte operation only.

0 - Destn - X -> Destn

## Assembler Syntax

-----  
 NBCD <ea>  
  
 <ea> - data alterable

## Addressing Modes

-----  

Mode	Source	Destination
Data Register Direct	-	*
Address Register Direct	-	-
Address Register Indirect	-	*
Postincrement Register Indirect	-	*
Predecrement Register Indirect	-	*
Register Indirect with Offset	-	*
Register Indirect with Index	-	*
Absolute Short	-	*

```

Absolute Long      - *
P.C. Relative with Offset  - -
P.C. Relative with Index  - -
Immediate          - -

```

Data Size

-----

Byte

Status Flags

-----

```

N Undefined
Z Cleared if result non-zero, else unchanged
V Undefined
C Set if borrow (decimal), else cleared
X Set same as carry bit

```

Instruction Size and Cycles to Execute

-----

```

<ea>   # p
Dn     2 6
(An)   2 12
(An)+  2 12
-(An)  2 14
d16(An) 4 16
d8(An,Ri) 4 18
Abs short 4 16
Abs long  6 20

```

# = no. of program bytes

p = no. of instruction clock periods

## 1.4 AmigaFlight® Help: Subtract Decimal with Extend

SBCD Subtract Decimal with Extend

=====

Subtract the source operand from the destination operand using binary coded decimal (BCD) arithmetic. Store the result in the destination operand.

Destn - Source - X -> Destn

Assembler Syntax

-----

```

SBCD Dy,Dx
SBCD -(Ay),-(Ax)

```

Data Size

-----

Byte

Status Flags

-----

N Undefined  
Z Clear if result  $\neq$  0 else unchanged  
V Undefined  
C Set if borrow (decimal) else clear  
X Set same as carry

Instruction Size and Cycles to Execute

-----

# p  
Dy, Dx 2 6  
-(Ay), -(Ax) 2 18

# = no. of program bytes  
p = no. of instruction clock periods