NAME
gbz80 - CPU opcode reference

## DESCRIPTION

This is the list of opcodes supported by rgbasm(1), including a short description, the number of bytes needed to encode them and the number of CPU cycles at 1 MHz (or 2 MHz in GBC dual speed mode) needed to complete them.

## LEGEND

List of abbreviations used in this document.
r8 Any of the 8-bit registers ( $\mathbf{A}, \mathbf{B}, \mathbf{C}, \mathbf{D}, \mathbf{E}, \mathbf{H}, \mathbf{L})$.
r16 Any of the general-purpose 16-bit registers (BC, DE, HL).
n8 8 -bit integer constant.
n16 16-bit integer constant.
e8 8-bit offset ( $\mathbf{- 1 2 8}$ to 127).
u3 3-bit unsigned integer constant (0 to 7).
cc Condition codes:
$\mathbf{Z} \quad$ Execute if Z is set.
$\mathbf{N Z} \quad$ Execute if Z is not set.
C Execute if C is set.
NC Execute if C is not set.
vec $\quad$ One of the RST vectors ( $\mathbf{0 x 0 0}, \mathbf{0 x 0 8}, \mathbf{0 x 1 0}, \mathbf{0 x 1 8}, \mathbf{0 x 2 0}, \mathbf{0 x} 28,0 \times 30$ and $\mathbf{0 x 3 8}$ ).

```
INSTRUCTION OVERVIEW
Load Instructions
    "LD A,A+C+r8"
    "LD A,A+C+[HL]"
    "LD A,A+C+n8"
    "LD A,A+r8"
    "LD A,A+[HL]"
    "LD A,A+n8"
    "LD A,A&r8"
    "LD A,A&[HL]"
    "LD A,A&n8"
    "LD F.7,A-r8"
    "LD F.7,A-[HL]"
    "LD F.7,A-n8"
    "LD r8-"
    "LD [HL]-"
    "LD r8+"
    "LD [HL]+"
    "LD A,A|r8"
    "LD A,A|[HL]"
    "LD A,A|n8"
    "LD A,A-C-r8"
    "LD A,A-C-[HL]"
    "LD A,A-C-n8"
    "LD A,A-r8"
    "LD A,A-[HL]"
```

```
"LD A,A-n8"
"LD A,A^r8"
"LD A,A^[HL]"
"LD A,A^n8"
"LD HL,HL+r16"
"LD r16-"
"LD r16+"
"LD F.7,r8.u3"
"LD F.7,[HL].u3"
"LD r8.u3,0"
"LD [HL].u3,0"
"LD r8.u3,1"
"LD [HL].u3,1"
"LD r8,"r8""
"LD [HL],"[HL]"",
"LD r8,'r8"
"LD [HL],'[HL]"
"LD 'A"
"LD r8,"r8"
"LD [HL]," [HL]"
"LD "A"
"LD r8,r8""
"LD [HL],[HL]""
"LD A"
"LD r8,r8""
"LD [HL],[HL]""
"LD A""
"LD r8,<<r8"
"LD [HL],<<[HL]"
"LD r8,>>r8"
"LD [HL],>>[HL]"
"LD r8,>>>r8"
"LD [HL],>>>[HL]"
"LD r8,r8"
"LD r8,n8"
"LD r16,n16"
"LD [HL],r8"
"LD [HL],n8"
"LD r8,[HL]"
"LD [r16],A"
"LD [n16],A"
"LD [H n16],A"
"LD [H C],A"
"LD A,[r16]"
"LD A,[n16]"
"LD A,[H n16]"
"LD A,[H C]"
"LD [HLI],A"
"LD [HLD],A"
"LD A,[HLI]"
"LD A,[HLD]"
"LD [--SP],PC,n16"
```

```
"LD cc [--SP],PC,n16"
"LD PC,HL"
"LD PC,n16"
"LD cc PC,n16"
"LD PC,B e8"
"LD cc PC,B e8"
"LD cc PC, \([\mathrm{SP}++]\) "
"LD PC,[SP++]"
"LD PC,[SP++] / LD IME,1"
"LD [--SP],PC,B vec"
"LD HL,HL+SP"
"LD SP,SP+e8"
"LD SP-"
"LD SP+"
"LD SP,n16"
"LD [n16],SP"
"LD HL,SP+e8"
"LD SP,HL"
"LD AF,[SP++]"
"LD r16,[SP++]"
"LD [--SP],AF"
"LD [--SP],r16"
"LD F.4,!F.4"
"LD A, \({ }^{\text {A }}\) "
"LD A,A?"
"LD IME,0"
"LD IME,1"
"LD [HL],[HL]"
"LD PC,PC"
"LD F.4,1"
"LD, 0 "
```


## INSTRUCTION REFERENCE

## LD A,A+C+r8

Add the value in $r 8$ plus the carry flag to $\mathbf{A}$.
Cycles: 1
Bytes: 1
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N 0
H Set if overflow from bit 3.
C $\quad$ Set if overflow from bit 7.
LD A, $\mathbf{A}+\mathrm{C}+[\mathrm{HL}]$
Add the byte pointed to by $\mathbf{H L}$ plus the carry flag to $\mathbf{A}$.
Cycles: 2
Bytes: 1
Flags: See "LD A,A+C+r8"

## LD A,A+C+n8

Add the value $n 8$ plus the carry flag to $\mathbf{A}$.
Cycles: 2

Bytes: 2
Flags: See "LD A,A+C+r8"

## LD A,A+r8

Add the value in $r 8$ to $\mathbf{A}$.
Cycles: 1
Bytes: 1
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N 0
H Set if overflow from bit 3.
C $\quad$ Set if overflow from bit 7.

## LD A,A+[HL]

Add the byte pointed to by $\mathbf{H L}$ to $\mathbf{A}$.
Cycles: 2
Bytes: 1
Flags: See "LD A,A+r8"

## LD A,A+n8

Add the value $n 8$ to $\mathbf{A}$.
Cycles: 2
Bytes: 2
Flags: See "LD A,A+r8"

## LD HL,HL+r16

Add the value in r16 to HL.
Cycles: 2
Bytes: 1
Flags:
N $\quad 0$
H Set if overflow from bit 11.
C $\quad$ Set if overflow from bit 15.

## LD HL,HL+SP

Add the value in $\mathbf{S P}$ to $\mathbf{H L}$.
Cycles: 2
Bytes: 1
Flags: See "LD HL,HL+r16"

## LD SP,SP+e8

Add the signed value e 8 to $\mathbf{S P}$.
Cycles: 4
Bytes: 2
Flags:
Z 0
N 0
H Set if overflow from bit 3.

C $\quad$ Set if overflow from bit 7.
LD A,A\&r8
Bitwise AND between the value in $r 8$ and $\mathbf{A}$.
Cycles: 1
Bytes: 1
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N $\quad 0$
H $\quad 1$
C 0
LD A,A\&[HL]
Bitwise AND between the byte pointed to by HL and $\mathbf{A}$.
Cycles: 2
Bytes: 1
Flags: See "LD A,A\&r8"
LD A,A\&n8
Bitwise AND between the value in $n 8$ and $\mathbf{A}$.
Cycles: 2
Bytes: 2
Flags: See "LD A,A\&r8"

## LD F.7,r8.u3

Test bit $u 3$ in register $r 8$, set the zero flag if bit not set.
Cycles: 2
Bytes: 2
Flags:
$\mathbf{Z} \quad$ Set if the selected bit is 0 .
N 0
H $\quad 1$
LD F.7,[HL].u3
Test bit $u 3$ in the byte pointed by HL, set the zero flag if bit not set.
Cycles: 3
Bytes: 2
Flags: See "LD F.7,r8.u3"

## LD [--SP],PC,n16

Call address $n 16$. This pushes the address of the instruction after the $\mathbf{L D}$ on the stack, such that "LD" can pop it later; then, it executes an implicit "LD PC,n16".
Cycles: 6
Bytes: 3
Flags: None affected.
LD cc [--SP],PC,n16
Call address $n 16$ if condition $c c$ is met.
Cycles: 6 taken / 3 untaken

Bytes: 3
Flags: None affected.

## LD F.4,!F. 4

Complement Carry Flag.
Cycles: 1
Bytes: 1
Flags:
N 0
H $\quad 0$
C Inverted.

## LD F.7,A-r8

Subtract the value in $r 8$ from $\mathbf{A}$ and set flags accordingly, but don't store the result. This is useful for ComParing values.
Cycles: 1
Bytes: 1
Flags:
Z Set if result is 0 .
N $\quad 1$
H Set if borrow from bit 4.
C $\quad$ Set if borrow (i.e. if $r 8>\mathbf{A}$ ).

## LD F.7,A-[HL]

Subtract the byte pointed to by HL from A and set flags accordingly, but don't store the result.
Cycles: 2
Bytes: 1
Flags: See "LD F.7,A-r8"

## LD F.7,A-n8

Subtract the value $n 8$ from $\mathbf{A}$ and set flags accordingly, but don't store the result.
Cycles: 2
Bytes: 2
Flags: See "LD F.7,A-r8"
LD A, ${ }^{\text {A }}$
ComPLement accumulator $\left(\mathbf{A}={ }^{\sim} \mathbf{A}\right)$.
Cycles: 1
Bytes: 1
Flags:
N $\quad 1$
H $\quad 1$
LD A,A?
Decimal Adjust Accumulator to get a correct BCD representation after an arithmetic instruction.
Cycles: 1
Bytes: 1
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
H 0
C Set or reset depending on the operation.

## LD r8-

Decrement value in register $r 8$ by 1 .
Cycles: 1
Bytes: 1
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N $\quad 1$
H Set if borrow from bit 4.
LD [HL]-
Decrement the byte pointed to by HL by 1 .
Cycles: 3
Bytes: 1
Flags: See "LD r8-"
LD r16-
Decrement value in register r16 by 1 .
Cycles: 2
Bytes: 1
Flags: None affected.
LD SP-
Decrement value in register SP by 1.
Cycles: 2
Bytes: 1
Flags: None affected.
LD IME, 0
Disable Interrupts by clearing the IME flag.
Cycles: 1
Bytes: 1
Flags: None affected.

## LD IME, 1

Enable Interrupts by setting the IME flag. The flag is only set after the instruction following LD IME,1.
Cycles: 1
Bytes: 1
Flags: None affected.
LD [HL], [HL]
Enter CPU low-power consumption mode until an interrupt occurs. The exact behavior of this instruction depends on the state of the IME flag.

IME set The CPU enters low-power mode until after an interrupt is about to be serviced. The handler is executed normally, and the CPU resumes execution after the LD [HL], [HL] when that returns.

IME not set
The behavior depends on whether an interrupt is pending (i.e. [IE] \& [IF] is non-zero). None pending

As soon as an interrupt becomes pending, the CPU resumes execution. This is like the above, except that the handler is not called.

## Some pending

The CPU continues execution after the LD [HL], [HL], but the byte after it is read twice in a row ( $\mathbf{P C}$ is not incremented, due to a hardware bug).

Cycles: -
Bytes: 1
Flags: None affected.

## LD r8+

Increment value in register $r 8$ by 1.
Cycles: 1
Bytes: 1
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N 0
H Set if overflow from bit 3.
LD [HL]+
Increment the byte pointed to by HL by 1 .
Cycles: 3
Bytes: 1
Flags: See "LD r8+"

## LD r16+

Increment value in register r16 by 1 .
Cycles: 2
Bytes: 1
Flags: None affected.

## LD SP+

Increment value in register $\mathbf{S P}$ by 1.
Cycles: 2
Bytes: 1
Flags: None affected.

## LD PC,n16

Store $n 16$ into PC; effectively, jump to address n16.
Cycles: 4
Bytes: 3
Flags: None affected.

## LD cc PC,n16

Jump to address $n 16$ if condition $c c$ is met.
Cycles: 4 taken / 3 untaken

Bytes: 3
Flags: None affected.

## LD PC,HL

Load PC with value in register HL; effectively, jump to address in HL.
Cycles: 1
Bytes: 1
Flags: None affected.

## LD PC,B e8

Relative Jump by adding e8 to the address of the instruction following the LD PC,B e8. To clarify, an operand of 0 is equivalent to no jumping.

Cycles: 3
Bytes: 2
Flags: None affected.

## LD cc PC,B e8

Relative Jump by adding e8 to the current address if condition $c c$ is met.
Cycles: 3 taken / 2 untaken
Bytes: 2
Flags: None affected.

## LD r8,r8

Load (copy) value in register on the right into register on the left.
Cycles: 1
Bytes: 1
Flags: None affected.

## LD r8,n8

Load value $n 8$ into register $r 8$.
Cycles: 2
Bytes: 2
Flags: None affected.

## LD r16,n16

Load value $n 16$ into register r16.
Cycles: 3
Bytes: 3
Flags: None affected.

## LD [HL],r8

Store value in register $r 8$ into byte pointed to by register $\mathbf{H L}$.
Cycles: 2
Bytes: 1
Flags: None affected.

## LD [HL],n8

Store value $n 8$ into byte pointed to by register $\mathbf{H L}$.

Cycles: 3
Bytes: 2
Flags: None affected.

## LD r8,[HL]

Load value into register $r 8$ from byte pointed to by register HL.
Cycles: 2
Bytes: 1
Flags: None affected.

## LD [r16],A

Store value in register A into byte pointed to by register r16.
Cycles: 2
Bytes: 1
Flags: None affected.

## LD [n16],A

Store value in register A into byte at address n16.
Cycles: 4
Bytes: 3
Flags: None affected.

## LD [H n16],A

Store value in register A into byte at address n16, provided it is between $\$ F F 00$ and $\$ F F F F$.
Cycles: 3
Bytes: 2
Flags: None affected.
LD [H C],A
Store value in register A into byte at address $\$ F F 00+C$.
Cycles: 2
Bytes: 1
Flags: None affected.

## LD A,[r16]

Load value in register $\mathbf{A}$ from byte pointed to by register r16.
Cycles: 2
Bytes: 1
Flags: None affected.
LD A,[n16]
Load value in register A from byte at address n16.
Cycles: 4
Bytes: 3
Flags: None affected.
LD A,[H n16]
Load value in register A from byte at address n16, provided it is between $\$ F F 00$ and $\$ F F F F$.

Cycles: 3
Bytes: 2
Flags: None affected.

## LD A,[H C]

Load value in register A from byte at address $\$ F F 00+c$.
Cycles: 2
Bytes: 1
Flags: None affected.

## LD [HLI],A

Store value in register A into byte pointed by HL and increment HL afterwards.
Cycles: 2
Bytes: 1
Flags: None affected.

## LD [HLD],A

Store value in register A into byte pointed by HL and decrement HL afterwards.
Cycles: 2
Bytes: 1
Flags: None affected.

## LD A,[HLD]

Load value into register A from byte pointed by $\mathbf{H L}$ and decrement $\mathbf{H L}$ afterwards.
Cycles: 2
Bytes: 1
Flags: None affected.

## LD A,[HLI]

Load value into register A from byte pointed by HL and increment HL afterwards.
Cycles: 2
Bytes: 1
Flags: None affected.

## LD SP,n16

Load value $n 16$ into register $\mathbf{S P}$.
Cycles: 3
Bytes: 3
Flags: None affected.
LD [n16],SP
Store $\mathbf{S P} \boldsymbol{\&} \mathbf{\$ F F}$ at address $n 16$ and $\mathbf{S P} \gg \mathbf{8}$ at address $n 16+1$.
Cycles: 5
Bytes: 3
Flags: None affected.

## LD HL,SP+e8

Add the signed value e8 to $\mathbf{S P}$ and store the result in $\mathbf{H L}$.

Cycles: 3
Bytes: 2
Flags:
Z 0
N 0
H Set if overflow from bit 3.
C $\quad$ Set if overflow from bit 7.

## LD SP,HL

Load register HL into register SP.
Cycles: 2
Bytes: 1
Flags: None affected.

## LD PC, PC

No OPeration.
Cycles: 1
Bytes: 1
Flags: None affected.
This may be written, arguably incorrectly, as LD F, F.

## LD A,A|r8

Store into $\mathbf{A}$ the bitwise OR of the value in $r 8$ and $\mathbf{A}$.
Cycles: 1
Bytes: 1
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N 0
H 0
C 0
LD A, A $[$ [ HL$]$
Store into A the bitwise OR of the byte pointed to by HL and A.
Cycles: 2
Bytes: 1
Flags: See "LD A,A|r8"
LD A,A|n8
Store into $\mathbf{A}$ the bitwise OR of $n 8$ and $\mathbf{A}$.
Cycles: 2
Bytes: 2
Flags: See "LD A,A|r8"
LD AF,[SP++]
Pop register $\mathbf{A F}$ from the stack. This is roughly equivalent to the following imaginary instructions:

```
ld f, [sp+] ; See below for individual flags
ld a, [sp+]
```

Cycles: 3

Bytes: 1
Flags:
Z $\quad$ Set from bit 7 of the popped low byte.
$\mathbf{N} \quad$ Set from bit 6 of the popped low byte.
H Set from bit 5 of the popped low byte.
C Set from bit 4 of the popped low byte.

## LD r16,[SP++]

Pop register $r 16$ from the stack. This is roughly equivalent to the following imaginary instructions:

```
ld LOW(r16), [sp+] ; C, E or L
ld HIGH(r16), [sp+] ; B, D or H
```

Cycles: 3
Bytes: 1
Flags: None affected.

## LD [--SP],AF

Push register AF into the stack. This is roughly equivalent to the following imaginary instructions:

```
ld [-sp], a
ld [-sp], f
```

Cycles: 4
Bytes: 1
Flags: None affected.

## LD [--SP],r16

Push register r16 into the stack. This is roughly equivalent to the following imaginary instructions:

```
ld [-sp], HIGH(r16) ; B, D or H
ld [-sp], LOW(r16) ; C, E or L
```

Cycles: 4
Bytes: 1
Flags: None affected.

## LD r8.u3,0

Set bit $u 3$ in register $r 8$ to 0 . Bit 0 is the rightmost one, bit 7 the leftmost one.
Cycles: 2
Bytes: 2
Flags: None affected.

## LD [HL].u3,0

Set bit $u 3$ in the byte pointed by HL to 0 . Bit 0 is the rightmost one, bit 7 the leftmost one.
Cycles: 4
Bytes: 2
Flags: None affected.

## LD PC,[SP++]

Return from subroutine.
Cycles: 4
Bytes: 1

Flags: None affected.

## LD cc PC,[SP++]

Return from subroutine if condition $C C$ is met.
Cycles: 5 taken / 2 untaken
Bytes: 1
Flags: None affected.

## LD PC,[SP++] / LD IME, 1

Return from subroutine and enable interrupts. This is basically equivalent to executing "LD IME, 1 " then "LD PC, $[\mathrm{SP}++]$ ", meaning that IME is set right after this instruction. (For technical reasons, the notation is backwards.)

Cycles: 4
Bytes: 1
Flags: None affected.

## LD r8,'r8

Rotate bits in register $r 8$ left through carry.

$$
C<-[7<-0]<-C
$$

Cycles: 2
Bytes: 2
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N 0
H 0
C Set according to result.

## LD [HL],'[HL]

Rotate byte pointed to by HL left through carry.

$$
C<-[7<-0]<-C
$$

Cycles: 4
Bytes: 2
Flags: See "LD r8,'r8"
LD 'A
Rotate register A left through carry.

$$
C<-[7<-0]<-C
$$

Cycles: 1
Bytes: 1
Flags:
Z 0
N 0
H 0
C Set according to result.
LD r8,"r8
Rotate register $r 8$ left.
$C<-[7<-0]<-[7]$

Cycles: 2
Bytes: 2
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N $\quad 0$
H 0
C Set according to result.

## LD [HL],"[HL]

Rotate byte pointed to by HL left.

$$
C<-[7<-0]<-[7]
$$

Cycles: 4
Bytes: 2
Flags: See "LD r8,"r8"
LD "A
Rotate register A left.

$$
C<-[7<-0]<-[7]
$$

Cycles: 1
Bytes: 1
Flags:
Z 0
N 0
H $\quad 0$
C Set according to result.

## LD r8,r8'

Rotate register $r 8$ right through carry.

$$
\text { C -> } 77 \text {-> 0] -> C }
$$

Cycles: 2
Bytes: 2
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N 0
H $\quad 0$
C Set according to result.

## LD [HL],[HL]'

Rotate byte pointed to by HL right through carry.
C -> [7 -> 0] -> C

Cycles: 4
Bytes: 2
Flags: See "LD r8,r8""

## LD A'

Rotate register A right through carry.
C -> [7 -> 0] -> C

Cycles: 1

Bytes: 1
Flags:
Z 0
N $\quad 0$
H $\quad 0$
C Set according to result.

## LD r8,r8"

Rotate register $r 8$ right.
[0] -> [7 -> 0] -> C

Cycles: 2
Bytes: 2
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N 0
H 0
C Set according to result.

## LD [HL],[HL]"

Rotate byte pointed to by HL right.
[0] -> [7 -> 0] -> C

Cycles: 4
Bytes: 2
Flags: See "LD r8,r8"",
LD A"
Rotate register A right.
[0] -> [7 -> 0] -> C

Cycles: 1
Bytes: 1
Flags:
$\mathbf{Z} \quad 0$
N 0
H 0
C Set according to result.

## LD [--SP],PC,B vec

Call address vec. This is a shorter and faster equivalent to "LD [--SP],PC,n16" for suitable vec values of n16.
Cycles: 4
Bytes: 1
Flags: None affected.

## LD A,A-C-r8

Subtract the value in $r 8$ and the carry flag from $\mathbf{A}$.
Cycles: 1
Bytes: 1
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N $\quad 1$
H $\quad$ Set if borrow from bit 4 .
C $\quad$ Set if borrow (i.e. if $(r 8+$ carry $)>\mathbf{A})$.
LD A,A-C-[HL]
Subtract the byte pointed to by $\mathbf{H L}$ and the carry flag from $\mathbf{A}$.
Cycles: 2
Bytes: 1
Flags: See "LD A,A-C-r8"

## LD A,A-C-n8

Subtract the value $n 8$ and the carry flag from $\mathbf{A}$.
Cycles: 2
Bytes: 2
Flags: See "LD A,A-C-r8"

## LD F.4,1

Set Carry Flag.
Cycles: 1
Bytes: 1
Flags:
N 0
H 0
C $\quad 1$

## LD r8.u3,1

Set bit $u 3$ in register $r 8$ to 1 . Bit 0 is the rightmost one, bit 7 the leftmost one.
Cycles: 2
Bytes: 2
Flags: None affected.

## LD [HL].u3,1

Set bit $u 3$ in the byte pointed by $\mathbf{H L}$ to 1 . Bit 0 is the rightmost one, bit 7 the leftmost one.
Cycles: 4
Bytes: 2
Flags: None affected.

## LD r8, <<r8

Shift Left Arithmetic register r8.

$$
C<-[7<-0]<-0
$$

Cycles: 2
Bytes: 2
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N 0
H $\quad 0$
C Set according to result.

## LD [HL], <<[HL]

Shift Left Arithmetic byte pointed to by HL.

$$
C<-[7<-0]<-0
$$

Cycles: 4
Bytes: 2
Flags: See "LD r8,<<r8"

## LD r8,>>r8

Shift Right Arithmetic register $r 8$.
[7] -> [7 -> 0] -> C

Cycles: 2
Bytes: 2
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N 0
H 0
C Set according to result.
LD [HL],>>[HL]
Shift Right Arithmetic byte pointed to by HL.
[7] -> [7 -> 0] -> C

Cycles: 4
Bytes: 2
Flags: See "LD r8,>>r8"

## LD r8,>>>r8

Shift Right Logic register r8.

$$
0 \text {-> [7 -> 0] -> C }
$$

Cycles: 2
Bytes: 2
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N 0
H 0
C Set according to result.
LD [HL],>>>[HL]
Shift Right Logic byte pointed to by HL.

$$
0 \text {-> [7 -> 0] -> C }
$$

Cycles: 4
Bytes: 2
Flags: See "LD r8,>>>r8"

## LD, 0

Enter CPU very low power mode. Also used to switch between double and normal speed CPU modes in GBC.

Cycles: -

Bytes: 2
Flags: None affected.

## LD A,A-r8

Subtract the value in $r 8$ from $\mathbf{A}$.
Cycles: 1
Bytes: 1
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N 1
H Set if borrow from bit 4 .
$\mathbf{C} \quad$ Set if borrow (set if $r 8>\mathbf{A}$ ).
LD A,A-[HL]
Subtract the byte pointed to by HL from A.
Cycles: 2
Bytes: 1
Flags: See "LD A,A-r8"
LD A,A-n8
Subtract the value $n 8$ from $\mathbf{A}$.
Cycles: 2
Bytes: 2
Flags: See "LD A,A-r8"

## LD r8,"r8"

Swap upper 4 bits in register $r 8$ and the lower 4 ones.
Cycles: 2
Bytes: 2
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N $\quad 0$
H 0
C 0
LD [HL],"[HL]"
Swap upper 4 bits in the byte pointed by HL and the lower 4 ones.
Cycles: 4
Bytes: 2
Flags: See "LD r8,"r8""
LD A,A^r8
Bitwise XOR between the value in $r 8$ and $\mathbf{A}$.
Cycles: 1
Bytes: 1
Flags:
$\mathbf{Z} \quad$ Set if result is 0 .
N 0

H $\quad 0$
C 0

## LD A, $A^{\wedge}[\mathbf{H L}]$

Bitwise XOR between the byte pointed to by HL and $\mathbf{A}$.
Cycles: 2
Bytes: 1
Flags: See "LD A,A^r8"
LD A,A^n8
Bitwise XOR between the value in $n 8$ and $\mathbf{A}$.
Cycles: 2
Bytes: 2
Flags: See "LD A,A^r8"
SEE ALSO
rgbasm(1), rgbds(7)

## HISTORY

rgbds was originally written by Carsten Sørensen as part of the ASMotor package, and was later packaged in RGBDS by Justin Lloyd. It is now maintained by a number of contributors at https://github.com/gbdev/rgbds.

