

## Gameboy CPU (LR35902) instruction set

	x0	x1	x2	x3	x4	x5	x6	x7	x8	x9	xA	xB	xC	xD	xE	xF
0x	NOP 1 4 - - - -	LD BC,d16 3 12 - - - -	LD (BC),A 1 8 - - - -	INC BC 1 8 - - - -	INC B 1 4 Z 0 H -	DEC B 1 4 Z 1 H -	LD B,d8 2 8 - - - -	RLCA 1 4 0 0 0 C	LD (a16),SP 3 20 - - - -	ADD HL,BC 1 8 - 0 H C	LD A,(BC) 1 8 - - - -	DEC BC 1 8 - - - -	INC C 1 4 Z 0 H -	DEC C 1 4 Z 1 H -	LD C,d8 2 8 - - - -	RRCA 1 4 0 0 0 C
1x	STOP 0 2 4 - - - -	LD DE,d16 3 12 - - - -	LD (DE),A 1 8 - - - -	INC DE 1 8 - - - -	INC D 1 4 Z 0 H -	DEC D 1 4 Z 1 H -	LD D,d8 2 8 - - - -	RLA 1 4 0 0 0 C	JR r8 2 12 - - - -	ADD HL,DE 1 8 - 0 H C	LD A,(DE) 1 8 - - - -	DEC DE 1 8 - - - -	INC E 1 4 Z 0 H -	DEC E 1 4 Z 1 H -	LD E,d8 2 8 - - - -	RRA 1 4 0 0 0 C
2x	JR NZ,r8 2 12/8 - - - -	LD HL,d16 3 12 - - - -	LD (HL+),A 1 8 - - - -	INC HL 1 8 - - - -	INC H 1 4 Z 0 H -	DEC H 1 4 Z 1 H -	LD H,d8 2 8 - - - -	DAA 1 4 Z - 0 C	JR Z,r8 2 12/8 - - - -	ADD HL,HL 1 8 - 0 H C	LD A,(HL+) 1 8 - - - -	DEC HL 1 8 - - - -	INC L 1 4 Z 0 H -	DEC L 1 4 Z 1 H -	LD L,d8 2 8 - - - -	CPL 1 4 - 1 1 -
3x	JR NC,r8 2 12/8 - - - -	LD SP,d16 3 12 - - - -	LD (HL-),A 1 8 - - - -	INC SP 1 8 - - - -	INC (HL) 1 12 Z 0 H -	DEC (HL) 1 12 Z 1 H -	LD (HL),d8 2 12 - - - -	SCF 1 4 - 0 0 1	JR C,r8 2 12/8 - - - -	ADD HL,SP 1 8 - 0 H C	LD A,(HL-) 1 8 - - - -	DEC SP 1 8 - - - -	INC A 1 4 Z 0 H -	DEC A 1 4 Z 1 H -	LD A,d8 2 8 - - - -	CCF 1 4 - 0 0 C
4x	LD B,B 1 4 - - - -	LD B,C 1 4 - - - -	LD B,D 1 4 - - - -	LD B,E 1 4 - - - -	LD B,H 1 4 - - - -	LD B,L 1 4 - - - -	LD B,(HL) 1 8 - - - -	LD B,A 1 4 - - - -	LD C,B 1 4 - - - -	LD C,C 1 4 - - - -	LD C,D 1 4 - - - -	LD C,E 1 4 - - - -	LD C,H 1 4 - - - -	LD C,L 1 4 - - - -	LD C,(HL) 1 8 - - - -	LD C,A 1 4 - - - -
5x	LD D,B 1 4 - - - -	LD D,C 1 4 - - - -	LD D,D 1 4 - - - -	LD D,E 1 4 - - - -	LD D,H 1 4 - - - -	LD D,L 1 4 - - - -	LD D,(HL) 1 8 - - - -	LD D,A 1 4 - - - -	LD E,B 1 4 - - - -	LD E,C 1 4 - - - -	LD E,D 1 4 - - - -	LD E,E 1 4 - - - -	LD E,H 1 4 - - - -	LD E,L 1 4 - - - -	LD E,(HL) 1 8 - - - -	LD E,A 1 4 - - - -
6x	LD H,B 1 4 - - - -	LD H,C 1 4 - - - -	LD H,D 1 4 - - - -	LD H,E 1 4 - - - -	LD H,H 1 4 - - - -	LD H,L 1 4 - - - -	LD H,(HL) 1 8 - - - -	LD H,A 1 4 - - - -	LD L,B 1 4 - - - -	LD L,C 1 4 - - - -	LD L,D 1 4 - - - -	LD L,E 1 4 - - - -	LD L,H 1 4 - - - -	LD L,L 1 4 - - - -	LD L,(HL) 1 8 - - - -	LD L,A 1 4 - - - -
7x	LD (HL),B 1 8 - - - -	LD (HL),C 1 8 - - - -	LD (HL),D 1 8 - - - -	LD (HL),E 1 8 - - - -	LD (HL),H 1 8 - - - -	LD (HL),L 1 8 - - - -	HALT 1 4 - - - -	LD (HL),A 1 8 - - - -	LD A,B 1 4 - - - -	LD A,C 1 4 - - - -	LD A,D 1 4 - - - -	LD A,E 1 4 - - - -	LD A,H 1 4 - - - -	LD A,L 1 4 - - - -	LD A,(HL) 1 8 - - - -	LD A,A 1 4 - - - -
8x	ADD A,B 1 4 Z 0 H C	ADD A,C 1 4 Z 0 H C	ADD A,D 1 4 Z 0 H C	ADD A,E 1 4 Z 0 H C	ADD A,H 1 4 Z 0 H C	ADD A,L 1 4 Z 0 H C	ADD A,(HL) 1 8 Z 0 H C	ADD A,A 1 4 Z 0 H C	ADC A,B 1 4 Z 0 H C	ADC A,C 1 4 Z 0 H C	ADC A,D 1 4 Z 0 H C	ADC A,E 1 4 Z 0 H C	ADC A,H 1 4 Z 0 H C	ADC A,L 1 4 Z 0 H C	ADC A,(HL) 1 8 Z 0 H C	ADC A,A 1 4 Z 0 H C
9x	SUB B 1 4 Z 1 H C	SUB C 1 4 Z 1 H C	SUB D 1 4 Z 1 H C	SUB E 1 4 Z 1 H C	SUB H 1 4 Z 1 H C	SUB L 1 4 Z 1 H C	SUB (HL) 1 8 Z 1 H C	SUB A 1 4 Z 1 H C	SBC A,B 1 4 Z 1 H C	SBC A,C 1 4 Z 1 H C	SBC A,D 1 4 Z 1 H C	SBC A,E 1 4 Z 1 H C	SBC A,H 1 4 Z 1 H C	SBC A,L 1 4 Z 1 H C	SBC A,(HL) 1 8 Z 1 H C	SBC A,A 1 4 Z 1 H C
Ax	AND B 1 4 Z 0 1 0	AND C 1 4 Z 0 1 0	AND D 1 4 Z 0 1 0	AND E 1 4 Z 0 1 0	AND H 1 4 Z 0 1 0	AND L 1 4 Z 0 1 0	AND (HL) 1 8 Z 0 1 0	AND A 1 4 Z 0 1 0	XOR B 1 4 Z 0 0 0	XOR C 1 4 Z 0 0 0	XOR D 1 4 Z 0 0 0	XOR E 1 4 Z 0 0 0	XOR H 1 4 Z 0 0 0	XOR L 1 4 Z 0 0 0	XOR (HL) 1 8 Z 0 0 0	XOR A 1 4 Z 0 0 0
Bx	OR B 1 4 Z 0 0 0	OR C 1 4 Z 0 0 0	OR D 1 4 Z 0 0 0	OR E 1 4 Z 0 0 0	OR H 1 4 Z 0 0 0	OR L 1 4 Z 0 0 0	OR (HL) 1 8 Z 0 0 0	OR A 1 4 Z 0 0 0	CP B 1 4 Z 1 H C	CP C 1 4 Z 1 H C	CP D 1 4 Z 1 H C	CP E 1 4 Z 1 H C	CP H 1 4 Z 1 H C	CP L 1 4 Z 1 H C	CP (HL) 1 8 Z 1 H C	CP A 1 4 Z 1 H C
Cx	RET NZ 1 20/8 - - - -	POP BC 1 12 - - - -	JP NZ,a16 3 16/12 - - - -	JP a16 3 16 - - - -	CALL NZ,a16 3 24/12 - - - -	PUSH BC 1 16 - - - -	ADD A,d8 2 8 Z 0 H C	RST 00H 1 16 - - - -	RET Z 1 20/8 - - - -	RET 1 16 - - - -	JP Z,a16 3 16/12 - - - -	PREFIX CB 1 4 - - - -	CALL Z,a16 3 24/12 - - - -	CALL a16 3 24 - - - -	ADC A,d8 2 8 Z 0 H C	RST 08H 1 16 - - - -
Dx	RET NC 1 20/8 - - - -	POP DE 1 12 - - - -	JP NC,a16 3 16/12 - - - -		CALL NC,a16 3 24/12 - - - -	PUSH DE 1 16 - - - -	SUB d8 2 8 Z 1 H C	RST 10H 1 16 - - - -	RET C 1 20/8 - - - -	RETI 1 16 - - - -	JP C,a16 3 16/12 - - - -		CALL C,a16 3 24/12 - - - -		SBC A,d8 2 8 Z 1 H C	RST 18H 1 16 - - - -
Ex	LDH (a8),A 2 12 - - - -	POP HL 1 12 - - - -	LD (C),A 2 8 - - - -			PUSH HL 1 16 - - - -	AND d8 2 8 Z 0 1 0	RST 20H 1 16 - - - -	ADD SP,r8 2 16 0 0 H C	JP (HL) 1 4 - - - -	LD (a16),A 3 16 - - - -				XOR d8 2 8 Z 0 0 0	RST 28H 1 16 - - - -
Fx	LDH A,(a8) 2 12 - - - -	POP AF 1 12 Z N H C	LD A,(C) 2 8 - - - -	DI 1 4 - - - -		PUSH AF 1 16 - - - -	OR d8 2 8 Z 0 0 0	RST 30H 1 16 - - - -	LD HL,SP+r8 2 12 0 0 H C	LD SP,HL 1 8 - - - -	LD A,(a16) 3 16 - - - -	EI 1 4 - - - -			CP d8 2 8 Z 1 H C	RST 38H 1 16 - - - -

## Prefix CB

	x0	x1	x2	x3	x4	x5	x6	x7	x8	x9	xA	xB	xC	xD	xE	xF
0x	RLC B 2 8 Z 0 0 C	RLC C 2 8 Z 0 0 C	RLC D 2 8 Z 0 0 C	RLC E 2 8 Z 0 0 C	RLC H 2 8 Z 0 0 C	RLC L 2 8 Z 0 0 C	RLC (HL) 2 16 Z 0 0 C	RLC A 2 8 Z 0 0 C	RRC B 2 8 Z 0 0 C	RRC C 2 8 Z 0 0 C	RRC D 2 8 Z 0 0 C	RRC E 2 8 Z 0 0 C	RRC H 2 8 Z 0 0 C	RRC L 2 8 Z 0 0 C	RRC (HL) 2 16 Z 0 0 C	RRC A 2 8 Z 0 0 C
1x	RL B 2 8 Z 0 0 C	RL C 2 8 Z 0 0 C	RL D 2 8 Z 0 0 C	RL E 2 8 Z 0 0 C	RL H 2 8 Z 0 0 C	RL L 2 8 Z 0 0 C	RL (HL) 2 16 Z 0 0 C	RL A 2 8 Z 0 0 C	RR B 2 8 Z 0 0 C	RR C 2 8 Z 0 0 C	RR D 2 8 Z 0 0 C	RR E 2 8 Z 0 0 C	RR H 2 8 Z 0 0 C	RR L 2 8 Z 0 0 C	RR (HL) 2 16 Z 0 0 C	RR A 2 8 Z 0 0 C
2x	SLA B 2 8 Z 0 0 C	SLA C 2 8 Z 0 0 C	SLA D 2 8 Z 0 0 C	SLA E 2 8 Z 0 0 C	SLA H 2 8 Z 0 0 C	SLA L 2 8 Z 0 0 C	SLA (HL) 2 16 Z 0 0 C	SLA A 2 8 Z 0 0 C	SRA B 2 8 Z 0 0 0	SRA C 2 8 Z 0 0 0	SRA D 2 8 Z 0 0 0	SRA E 2 8 Z 0 0 0	SRA H 2 8 Z 0 0 0	SRA L 2 8 Z 0 0 0	SRA (HL) 2 16 Z 0 0 0	SRA A 2 8 Z 0 0 0
3x	SWAP B 2 8 Z 0 0 0	SWAP C 2 8 Z 0 0 0	SWAP D 2 8 Z 0 0 0	SWAP E 2 8 Z 0 0 0	SWAP H 2 8 Z 0 0 0	SWAP L 2 8 Z 0 0 0	SWAP (HL) 2 16 Z 0 0 0	SWAP A 2 8 Z 0 0 0	SRL B 2 8 Z 0 0 C	SRL C 2 8 Z 0 0 C	SRL D 2 8 Z 0 0 C	SRL E 2 8 Z 0 0 C	SRL H 2 8 Z 0 0 C	SRL L 2 8 Z 0 0 C	SRL (HL) 2 16 Z 0 0 C	SRL A 2 8 Z 0 0 C
4x	BIT 0,B 2 8 Z 0 1 -	BIT 0,C 2 8 Z 0 1 -	BIT 0,D 2 8 Z 0 1 -	BIT 0,E 2 8 Z 0 1 -	BIT 0,H 2 8 Z 0 1 -	BIT 0,L 2 8 Z 0 1 -	BIT 0,(HL) 2 16 Z 0 1 -	BIT 0,A 2 8 Z 0 1 -	BIT 1,B 2 8 Z 0 1 -	BIT 1,C 2 8 Z 0 1 -	BIT 1,D 2 8 Z 0 1 -	BIT 1,E 2 8 Z 0 1 -	BIT 1,H 2 8 Z 0 1 -	BIT 1,L 2 8 Z 0 1 -	BIT 1,(HL) 2 16 Z 0 1 -	BIT 1,A 2 8 Z 0 1 -
5x	BIT 2,B	BIT 2,C	BIT 2,D	BIT 2,E	BIT 2,H	BIT 2,L	BIT 2,(HL)	BIT 2,A	BIT 3,B	BIT 3,C	BIT 3,D	BIT 3,E	BIT 3,H	BIT 3,L	BIT 3,(HL)	BIT 3,A

	2 8 Z 0 1 -	2 8 Z 0 1 -	2 8 Z 0 1 -	2 8 Z 0 1 -	2 8 Z 0 1 -	2 8 Z 0 1 -	2 16 Z 0 1 -	2 8 Z 0 1 -	2 8 Z 0 1 -	2 8 Z 0 1 -	2 8 Z 0 1 -	2 8 Z 0 1 -	2 8 Z 0 1 -	2 8 Z 0 1 -	2 16 Z 0 1 -	2 8 Z 0 1 -
6x	BIT 4,B 2 8 Z 0 1 -	BIT 4,C 2 8 Z 0 1 -	BIT 4,D 2 8 Z 0 1 -	BIT 4,E 2 8 Z 0 1 -	BIT 4,H 2 8 Z 0 1 -	BIT 4,L 2 8 Z 0 1 -	BIT 4,(HL) 2 16 Z 0 1 -	BIT 4,A 2 8 Z 0 1 -	BIT 5,B 2 8 Z 0 1 -	BIT 5,C 2 8 Z 0 1 -	BIT 5,D 2 8 Z 0 1 -	BIT 5,E 2 8 Z 0 1 -	BIT 5,H 2 8 Z 0 1 -	BIT 5,L 2 8 Z 0 1 -	BIT 5,(HL) 2 16 Z 0 1 -	BIT 5,A 2 8 Z 0 1 -
7x	BIT 6,B 2 8 Z 0 1 -	BIT 6,C 2 8 Z 0 1 -	BIT 6,D 2 8 Z 0 1 -	BIT 6,E 2 8 Z 0 1 -	BIT 6,H 2 8 Z 0 1 -	BIT 6,L 2 8 Z 0 1 -	BIT 6,(HL) 2 16 Z 0 1 -	BIT 6,A 2 8 Z 0 1 -	BIT 7,B 2 8 Z 0 1 -	BIT 7,C 2 8 Z 0 1 -	BIT 7,D 2 8 Z 0 1 -	BIT 7,E 2 8 Z 0 1 -	BIT 7,H 2 8 Z 0 1 -	BIT 7,L 2 8 Z 0 1 -	BIT 7,(HL) 2 16 Z 0 1 -	BIT 7,A 2 8 Z 0 1 -
8x	RES 0,B 2 8 - - - -	RES 0,C 2 8 - - - -	RES 0,D 2 8 - - - -	RES 0,E 2 8 - - - -	RES 0,H 2 8 - - - -	RES 0,L 2 8 - - - -	RES 0,(HL) 2 16 - - - -	RES 0,A 2 8 - - - -	RES 1,B 2 8 - - - -	RES 1,C 2 8 - - - -	RES 1,D 2 8 - - - -	RES 1,E 2 8 - - - -	RES 1,H 2 8 - - - -	RES 1,L 2 8 - - - -	RES 1,(HL) 2 16 - - - -	RES 1,A 2 8 - - - -
9x	RES 2,B 2 8 - - - -	RES 2,C 2 8 - - - -	RES 2,D 2 8 - - - -	RES 2,E 2 8 - - - -	RES 2,H 2 8 - - - -	RES 2,L 2 8 - - - -	RES 2,(HL) 2 16 - - - -	RES 2,A 2 8 - - - -	RES 3,B 2 8 - - - -	RES 3,C 2 8 - - - -	RES 3,D 2 8 - - - -	RES 3,E 2 8 - - - -	RES 3,H 2 8 - - - -	RES 3,L 2 8 - - - -	RES 3,(HL) 2 16 - - - -	RES 3,A 2 8 - - - -
Ax	RES 4,B 2 8 - - - -	RES 4,C 2 8 - - - -	RES 4,D 2 8 - - - -	RES 4,E 2 8 - - - -	RES 4,H 2 8 - - - -	RES 4,L 2 8 - - - -	RES 4,(HL) 2 16 - - - -	RES 4,A 2 8 - - - -	RES 5,B 2 8 - - - -	RES 5,C 2 8 - - - -	RES 5,D 2 8 - - - -	RES 5,E 2 8 - - - -	RES 5,H 2 8 - - - -	RES 5,L 2 8 - - - -	RES 5,(HL) 2 16 - - - -	RES 5,A 2 8 - - - -
Bx	RES 6,B 2 8 - - - -	RES 6,C 2 8 - - - -	RES 6,D 2 8 - - - -	RES 6,E 2 8 - - - -	RES 6,H 2 8 - - - -	RES 6,L 2 8 - - - -	RES 6,(HL) 2 16 - - - -	RES 6,A 2 8 - - - -	RES 7,B 2 8 - - - -	RES 7,C 2 8 - - - -	RES 7,D 2 8 - - - -	RES 7,E 2 8 - - - -	RES 7,H 2 8 - - - -	RES 7,L 2 8 - - - -	RES 7,(HL) 2 16 - - - -	RES 7,A 2 8 - - - -
Cx	SET 0,B 2 8 - - - -	SET 0,C 2 8 - - - -	SET 0,D 2 8 - - - -	SET 0,E 2 8 - - - -	SET 0,H 2 8 - - - -	SET 0,L 2 8 - - - -	SET 0,(HL) 2 16 - - - -	SET 0,A 2 8 - - - -	SET 1,B 2 8 - - - -	SET 1,C 2 8 - - - -	SET 1,D 2 8 - - - -	SET 1,E 2 8 - - - -	SET 1,H 2 8 - - - -	SET 1,L 2 8 - - - -	SET 1,(HL) 2 16 - - - -	SET 1,A 2 8 - - - -
Dx	SET 2,B 2 8 - - - -	SET 2,C 2 8 - - - -	SET 2,D 2 8 - - - -	SET 2,E 2 8 - - - -	SET 2,H 2 8 - - - -	SET 2,L 2 8 - - - -	SET 2,(HL) 2 16 - - - -	SET 2,A 2 8 - - - -	SET 3,B 2 8 - - - -	SET 3,C 2 8 - - - -	SET 3,D 2 8 - - - -	SET 3,E 2 8 - - - -	SET 3,H 2 8 - - - -	SET 3,L 2 8 - - - -	SET 3,(HL) 2 16 - - - -	SET 3,A 2 8 - - - -
Ex	SET 4,B 2 8 - - - -	SET 4,C 2 8 - - - -	SET 4,D 2 8 - - - -	SET 4,E 2 8 - - - -	SET 4,H 2 8 - - - -	SET 4,L 2 8 - - - -	SET 4,(HL) 2 16 - - - -	SET 4,A 2 8 - - - -	SET 5,B 2 8 - - - -	SET 5,C 2 8 - - - -	SET 5,D 2 8 - - - -	SET 5,E 2 8 - - - -	SET 5,H 2 8 - - - -	SET 5,L 2 8 - - - -	SET 5,(HL) 2 16 - - - -	SET 5,A 2 8 - - - -
Fx	SET 6,B 2 8 - - - -	SET 6,C 2 8 - - - -	SET 6,D 2 8 - - - -	SET 6,E 2 8 - - - -	SET 6,H 2 8 - - - -	SET 6,L 2 8 - - - -	SET 6,(HL) 2 16 - - - -	SET 6,A 2 8 - - - -	SET 7,B 2 8 - - - -	SET 7,C 2 8 - - - -	SET 7,D 2 8 - - - -	SET 7,E 2 8 - - - -	SET 7,H 2 8 - - - -	SET 7,L 2 8 - - - -	SET 7,(HL) 2 16 - - - -	SET 7,A 2 8 - - - -

Misc/control instructions  
Jumps/calls  
8bit load/store/move instructions  
16bit load/store/move instructions  
8bit arithmetic/logical instructions  
16bit arithmetic/logical instructions  
8bit rotations/shifts and bit instructions

Length in bytes →

INS reg  
2 8  
Z N H C

← Instruction mnemonic  
← Duration in cycles  
← Flags affected

Duration of conditional calls and returns is different when action is taken or not. This is indicated by two numbers separated by "/". The higher number (on the left side of "/") means duration of instruction when action is taken, the lower number (on the right side of "/") means duration of instruction when action is not taken.

Instruction **STOP** has according to manuals opcode **10 00** and thus is 2 bytes long. Anyhow it seems there is no reason for it so some assemblers code it simply as one byte instruction **10**.  
Flags affected are always shown in **Z N H C** order. If flag is marked by **"0"** it means it is reset after the instruction. If it is marked by **"1"** it is set. If it is marked by **"-"** it is not changed. If it is marked by **"Z"**, **"N"**, **"H"** or **"C"** corresponding flag is affected as expected by its function.

- d8** means immediate 8 bit data
- d16** means immediate 16 bit data
- a8** means 8 bit unsigned data, which are added to \$FF00 in certain instructions (replacement for missing **IN** and **OUT** instructions)
- a16** means 16 bit address
- r8** means 8 bit signed data, which are added to program counter

**LD A,(C)** has alternative mnemonic **LD A,(\$FF00+C)**  
**LD C,(A)** has alternative mnemonic **LD (\$FF00+C),A**  
**LDH A,(a8)** has alternative mnemonic **LD A,(\$FF00+a8)**  
**LDH (a8),A** has alternative mnemonic **LD (\$FF00+a8),A**  
**LD A,(HL+)** has alternative mnemonic **LD A,(HLI)** or **LDI A,(HL)**  
**LD (HL+),A** has alternative mnemonic **LD (HLI),A** or **LDI (HL),A**  
**LD A,(HL-)** has alternative mnemonic **LD A,(HLD)** or **LDD A,(HL)**  
**LD (HL-),A** has alternative mnemonic **LD (HLD),A** or **LDD (HL),A**  
**LD HL,SP+r8** has alternative mnemonic **LDHL SP,r8**

Registers

15 ... 8	7 ... 0
A (accumulator)	F (flags)
B	C
D	E
H	L

Flag register (F) bits:

7	6	5	4	3	2	1	0
Z	N	H	C	0	0	0	0

**Z** - Zero Flag

15 . . . 0
SP (stack pointer)
PC (program counter)

- N** - Subtract Flag
- H** - Half Carry Flag
- C** - Carry Flag
- 0** - Not used, always zero