Zilog Z80 CPU Specifications

by Sean Young (syoung@cs.vu.nl)

Last update: September 21, 1997

Opcode Prefixes

There are four different opcode prefixes: CB, DD, ED and FD. If an opcode begins the DD prefix, the IX register is used in stead of the HL register and likewise the FD prefix results in use of the IY register in stead of the HL register. If HL refers to memory address, (e.g. LD A, (HL)), an offset d is added to the opcode (e.g. LD A, (IX + d)). If the instruction uses the H or L register, the high order byte or the low order byte of the IX or IY register is used. There are two exceptions to this rule, though: the EXX and EX DE, HL instructions. These instructions cannot be changed with a DD or FD prefix. If the instruction does not use the HL, H or L register, the instruction is executed as without the DD or FD prefix (except for the DDCB and FDCB opcode prefixes). Multiple DDs or FDs after each other operate like NOPs. If a instruction is preceded by an ED, a new set of instructions is used (see Opcode list). If the opcode is not listed, it will operate as two NOPs. Similarly the CB, FDCB and the DDCB select a new instruction set, though every possible instruction has a function and is listed.

The IM 0/1 and RETI/N instructions

The opcode list shows these two strange instructions. They are unofficial, and because both possibilities operate exactly the same way on a MSX, I can not determine which one they are. It is not important on a MSX though, but if anyone knows which one they are, please let me know.

Registers

The Z80 has the following (accessible) registers:
I, R, A, F, BC, DE, HL, IX, IY, SP, PC, AF', BC', DE' and HL'.

The R register is for memory refresh. It is increased by 1 after every instruction, whereby the CB, DD, DDCB, ED, FD and FDCB prefixes are viewed as separate instructions. Bit 7 is never modified, but it can be changed with LD A,R.

The F register is the flag register. It has the following structure:

Bit 7: The S flag: if the result of the operation is negative, this flag is high. This is a copy of the MSB of the result of the operation.
Bit 6: The Z flag: if the result is zero, this flag is high.
Bit 5: This bit has no official name. Throughout this document it is referred to as 'b5'. It is a copy of bit 5 of the result of the operation.
Bit 4: The H flag. This is the carry from bit 3 to bit 4 of the operation. Used with DAA instruction.
Bit 3: This bit has no official name. Throughout this document it is referred to as 'b3'. It is a copy of bit 3 of the result of the operation.
Bit 2: The P/V flag. It contains the overflow (high if two's complements result does not fit in register) or the parity (parity of number of high bits in result of operation). See description of instructions for which one.
Bit 1: The N flag. It is high if the last operation was an subtraction, otherwise it was an addition. Used with DAA instruction.
Bit 0: The C flag. If the result of the operation does not fit in the register, this bit is high.

Sometimes the flags have other meanings. See descriptions of instructions for details.

Interrupts

There are two types of interrupts: mask-able and non mask-able, and the are two flip-flops associated with interrupts: IFF_1 and IFF_2. DI resets both and EI sets both. If IFF_1 is set then mask-able interrupts are accepted. When an non mask-able interrupt occurs, the IFF_1 is reset, so disabling mask-able interrupts. When the CPU returns from a non mask-able interrupt (with RETN) the IFF_2 is copied into IFF_1 (and thus restored). Only IFF_2 can be read (with LD A, I and LD A, R IFF_2 is copied into the P/V flag).

> MSX Specific: non mask-able interrupts never occur in a MSX, so the two interrupt flip-flops are always identical. Viewing the CPU as though it has one Interrupt flip-flop is not incorrect.

Interrupt Modes

Interrupt modes can be set with the IM x instructions. They only affect mask-able interrupts. When a mask-able interrupt occurs, the interrupting device must supply a value.

Interrupt Mode 0:

The value the interrupting device supplies is interpreted as an 8 bit opcode which is executed (usually RST p instructions).

Interrupt Mode 1:

A call is made to address 38h. The value the interrupting device supplies is ignored.

Interrupt Mode 2:

A call is made to an address read from address (register I × 256 + value from interrupting device).

> MSX Specific: The MSX has one interrupting device (the VDP), which always provides value FFh (instruction RST 38h), so the MSX operates the same in Interrupt Mode 0 as in 1. In IM 2 a call is made to an address read from address (register I × 256 + FFh).

Instructions Descriptions

8 bit Load Group

Mnemonic	Symbolic Operation	S	Z	F5	H	F3	P/V	N	C	Opcode 76 543 210	Hex	No. of Bytes	No. of M Cycles	No. of T States	Comments
LD r, r'	r ← r'	•	•	•	•	•	•	•	•	01 r r'		1	1	4	r, r' Reg.
LD p, p'*	p ← p'	•	•	•	•	•	•	•	•	11 011 101 01 p p'	DD	2	2	8	000 B 001 C
LD q, q'*	q ← q'	•	•	•	•	•	•	•	•	11 111 101 01 q q'	FD	2	2	8	010 D 011 E
LD r, n	r ← n	•	•	•	•	•	•	•	•	00 r 110 ← n →		2	2	7	100 H 101 L
LD p, n*	p ← n	•	•	•	•	•	•	•	•	11 011 101 00 p 110 ← n →	DD	3	3	11	111 A p, p' Reg.
LD q, n*	q ← n	•	•	•	•	•	•	•	•	11 111 101 00 q 110 ← n →	FD	3	3	11	000 B 001 C 010 D
LD r, (HL)	r ← (HL)	•	•	•	•	•	•	•	•	01 r 110		1	2	7	011 E
LD r, (IX + d)	r ← (IX + d)	•	•	•	•	•	•	•	•	11 011 101 01 r 110 ← d →	DD	3	5	19	100 IX_H 101 IX_L 111 A
LD r, (IY + d)	r ← (IY + d)	•	•	•	•	•	•	•	•	11 111 101 01 r 110 ← d →	FD	3	5	19	q, q' Reg. 000 B
LD (HL), r	(HL) ← r	•	•	•	•	•	•	•	•	01 110 r		1	2	7	001 C
LD (IX + d), r	(IX + d) ← r	•	•	•	•	•	•	•	•	11 011 101 01 110 r ← d →	DD	3	5	19	010 D 011 E 100 IY_H
LD (IY + d), r	(IY + d) ← r	•	•	•	•	•	•	•	•	11 111 101 01 110 r ← d →	FD	3	5	19	101 IY_L 111 A
LD (HL), n	(HL) ← n	•	•	•	•	•	•	•	•	00 110 110 ← n →	36	2	3	10	
LD (IX + d), n	(IX + d) ← n	•	•	•	•	•	•	•	•	11 011 101 00 110 110 ← d → ← n →	DD 36	4	5	19	
LD (IY + d), n	(IY + d) ← n	•	•	•	•	•	•	•	•	11 111 101 00 110 110 ← d → ← n →	FD 36	4	5	19	
LD A, (BC)	A ← (BC)	•	•	•	•	•	•	•	•	00 001 010	0A	1	2	7	
LD A, (DE)	A ← (DE)	•	•	•	•	•	•	•	•	00 011 010	1A	1	2	7	
LD A, (nn)	A ← (nn)	•	•	•	•	•	•	•	•	00 111 010 ← n → ← n →	3A	3	4	13	
LD (BC), A	(BC) ← A	•	•	•	•	•	•	•	•	00 000 010	02	1	2	7	
LD (DE), A	(DE) ← A	•	•	•	•	•	•	•	•	00 010 010	12	1	2	7	
LD (nn), A	(nn) ← A	•	•	•	•	•	•	•	•	00 110 010 ← n → ← n →	32	3	4	13	
LD A, I	A ← I	β	β	β	0	β	IFF_2	0	•	11 101 101 01 010 111	ED 57	2	2	9	
LD A, R	A ← R	β	β	β	0	β	IFF_2	0	•	11 101 101 01 011 111	ED 5F	2	2	9	R is read after it is increased.
LD I, A	I ← A	•	•	•	•	•	•	•	•	11 101 101 01 000 111	ED 47	2	2	9	
LD R, A	R ← A	•	•	•	•	•	•	•	•	11 101 101 01 001 111	ED 4F	2	2	9	R is written after it is increased.

Notes: r, r' means any of the registers A, B, C, D, E, H, L.
p, p' means any of the registers A, B, C, D, E, IX_H, IX_L.
q, q' means any of the registers A, B, C, D, E, IY_H, IY_L.
dd_L, dd_H refer to high order and low order eight bits of the register respectively.
* means unofficial instruction.

Flag Notation: • = flag is not affected, 0 = flag is reset, 1 = flag is set,
β = flag is set according to the result of the operation, IFF_2 = the interrupt flip-flop 2 is copied.

16 bit Load Group

Mnemonic	Symbolic Operation	Flags S	Z	F5	H	F3	P/V	N	C	Opcode 76 543 210	Hex	No. of Bytes	No. of M Cycles	No. of T States	Comments
LD dd, nn	dd ← nn	•	•	•	•	•	•	•	•	00 dd0 001 ← n → ← n →		3	3	10	dd Pair 00 BC 01 DE 02 HL 03 SP
LD IX, nn	IX ← nn	•	•	•	•	•	•	•	•	11 011 101 00 110 001 ← n → ← n →	DD 21	4	4	14	
LD IY, nn	IY ← nn	•	•	•	•	•	•	•	•	11 111 101 00 110 001 ← n → ← n →	FD 21	4	4	14	
LD HL, (nn)	L ← (nn) H ← (nn+1)	•	•	•	•	•	•	•	•	00 101 010 ← n → ← n →	2A	3	5	16	
LD dd, (nn)	dd_L ← (nn) dd_H ← (nn+1)	•	•	•	•	•	•	•	•	11 101 101 01 dd1 011 ← n → ← n →	ED	4	6	20	
LD IX, (nn)	IX_L ← (nn) IX_H ← (nn+1)	•	•	•	•	•	•	•	•	11 011 101 00 101 010 ← n → ← n →	DD 2A	4	6	20	
LD IY, (nn)	IY_L ← (nn) IY_H ← (nn+1)	•	•	•	•	•	•	•	•	11 111 101 00 101 010 ← n → ← n →	FD 2A	4	6	20	
LD (nn), HL	(nn) ← L (nn+1) ← H	•	•	•	•	•	•	•	•	00 100 010 ← n → ← n →	22	3	5	16	
LD (nn), dd	(nn) ← dd_L (nn+1) ← dd_H	•	•	•	•	•	•	•	•	11 101 101 01 dd0 011 ← n → ← n →	DD	4	6	20	
LD (nn), IX	(nn) ← IX_L (nn+1) ← IX_H	•	•	•	•	•	•	•	•	11 011 101 00 100 010 ← n → ← n →	DD 22	4	6	20	
LD (nn), IY	(nn) ← IY_L (nn+1) ← IY_H	•	•	•	•	•	•	•	•	11 111 101 00 100 010 ← n → ← n →	FD 22	4	6	20	
LD SP, HL	SP ← HL	•	•	•	•	•	•	•	•	11 111 001	F9	1	1	6	
LD SP, IX	SP ← IX	•	•	•	•	•	•	•	•	11 011 101 11 111 001	DD F9	2	2	10	
LD SP, IY	SP ← IY	•	•	•	•	•	•	•	•	11 111 101 11 111 001	FD F9	2	2	10	
PUSH qq	SP ← SP - 1 (SP) ← qq_H SP ← SP - 1 (SP) ← qq_L	•	•	•	•	•	•	•	•	11 qq0 101		1	3	11	qq Pair 00 BC 01 DE 10 HL 11 AF
PUSH IX	SP ← SP - 1 (SP) ← IX_H SP ← SP - 1 (SP) ← IX_L	•	•	•	•	•	•	•	•	11 011 101 11 100 101	DD E5	2	4	15	
PUSH IY	SP ← SP - 1 (SP) ← IY_H SP ← SP - 1 (SP) ← IY_L	•	•	•	•	•	•	•	•	11 111 101 11 100 101	FD E5	2	4	15	
POP qq	(SP) ← qq_L SP ← SP + 1 (SP) ← qq_H SP ← SP + 1	•	•	•	•	•	•	•	•	11 qq0 001		1	3	10	
POP IX	(SP) ← IX_L SP ← SP + 1 (SP) ← IX_H SP ← SP + 1	•	•	•	•	•	•	•	•	11 011 101 11 100 001	DD E1	2	4	14	

POP IY	$(SP) \leftarrow IY_L$ $SP \leftarrow SP + 1$ $(SP) \leftarrow IY_H$ $SP \leftarrow SP + 1$	• • • • • • • •	11 111 101 11 100 001	FD E1	2	4	14		

Notes: dd is any of the register pair BC, DE, HL, SP.
qq is any of the register pair BC, DE, HL, AF.

Flag Notation: • = flag is not affected, 0 = flag is reset, 1 = flag is set, β = flag is set according to the result of the operation.

Exchange, Block Transfer and Search Groups

Mnemonic	Symbolic Operation	S	Z	F5	H	F3	P/V	N	C	Opcode 76 543 210	Hex	No.of Bytes	No.of M Cycles	No.of T States	Comments
EX DE, HL	DE ↔ HL	•	•	•	•	•	•	•	•	11 101 011	EB	1	1	4	
EX AF, AF'	AF ↔ AF'	•	•	•	•	•	•	•	•	00 001 000	08	1	1	4	
EXX	BC ↔ BC' DE ↔ DE' HL ↔ HL'	•	•	•	•	•	•	•	•	11 011 001	D9	1	1	4	
EX (SP), HL	(SP+1) ↔ H (SP) ↔ L	•	•	•	•	•	•	•	•	11 100 011	E3	1	5	19	
EX (SP), IX	(SP+1) ↔ IX_H (SP) ↔ IX_L	•	•	•	•	•	•	•	•	11 011 101 11 100 011	DD E3	2	6	23	
EX (SP), IY	(SP+1) ↔ IY_H (SP) ↔ IY_L	•	•	•	•	•	•	•	•	11 111 101 11 100 011	FD E3	2	6	23	
LDI	(DE) ← (HL) DE ← DE + 1 HL ← HL + 1 BC ← BC - 1	•	•	β[1]	0	β[2]	β[3]	0	•	11 101 101 10 100 000	ED A0	2	4	16	
LDIR	(DE) ← (HL) DE ← DE + 1 HL ← HL + 1 BC ← BC - 1 repeat until: BC = 0	•	•	β[1]	0	β[2]	0	0	•	11 101 101 10 110 000	ED B0	2 2	5 4	21 16	if BC ≠ 0 if BC = 0
LDD	(DE) ← (HL) DE ← DE - 1 HL ← HL - 1 BC ← BC - 1	•	•	β[1]	0	β[2]	β[3]	0	•	11 101 101 10 101 000	ED A8	2	4	16	
LDDR	(DE) ← (HL) DE ← DE - 1 HL ← HL - 1 BC ← BC - 1 repeat until: BC = 0	•	•	β[1]	0	β[2]	0	0	•	11 101 101 10 111 000	ED B8	2 2	5 4	21 16	if BC ≠ 0 if BC = 0
CPI	A - (HL) HL ← HL + 1 BC ← BC -1	β[4]	β[4]	β[5]	β[4]	β[6]	β[3]	1	•	11 101 101 10 100 001	ED A1	2	4	16	
CPIR	A - (HL) HL ← HL + 1 BC ← BC -1 Repeat until: A = (HL) or BC = 0	β[4]	β[4]	β[5]	β[4]	β[6]	β[3]	1	•	11 101 101 10 110 001	ED B1	2 2	5 4	21 16	if BC ≠ 0 and A ≠ (HL). if BC = 0 or A = (HL)
CPD	A - (HL) HL ← HL - 1 BC ← BC -1	β[4]	β[4]	β[5]	β[4]	β[6]	β[3]	1	•	11 101 101 10 101 001	ED A9	2	4	16	
CPDR	A - (HL) HL ← HL - 1 BC ← BC -1 Repeat until: A = (HL) or BC = 0	β[4]	β[4]	β[5]	β[4]	β[6]	β[3]	1	•	11 101 101 10 111 001	ED B9	2 2	5 4	21 16	if BC ≠ 0 and A ≠ (HL). if BC = 0 or A = (HL)

Notes:
[1] F5 is a copy of bit 1 of A + last transferred byte, thus $(A + (HL))_1$
[2] F3 is a copy of bit 3 of A + last transferred byte, thus $(A + (HL))_3$
[3] P/V flag is 0 if the result of BC - 1 = 0, otherwise P/V = 1.
[4] These flags are set as in CP (HL)
[5] F5 is copy of bit 1 of A - last compared address - H, thus $(A - (HL) - H)_1$. H is as in F after the comparison.
[6] F3 is copy of bit 3 of A - last compared address - H, thus $(A - (HL) - H)_3$. H is as in F after the comparison.

Flag Notation: • = flag is not affected, 0 = flag is reset, 1 = flag is set, β = flag is set according to the result of the operation.

8 bit Arithmetic and Logical Group

Mnemonic	Symbolic Operation	S	Z	F5	H	F3	P/V	N	C	Opcode 76 543 210	Hex	No.of Bytes	No.of M Cycles	No.of T States	Comments
ADD A, r	A ← A + r	β	β	β	β	β	V	0	β	10 000 r		1	1	4	r Reg. p Reg.
ADD A, p*	A ← A + p	β	β	β	β	β	V	0	β	11 011 101 10 000 p	DD	2	2	8	000 B 000 B 001 C 001 C
ADD A, q*	A ← A + q	β	β	β	β	β	V	0	β	11 111 101 10 000 q	FD	2	2	8	010 D 010 D 011 E 011 E
ADD A, n	A ← A + n	β	β	β	β	β	V	0	β	11 000 110 ← n →		2	2	8	100 H 100 IX_H 101 L 101 IX_H
ADD A, (HL)	A ← A + (HL)	β	β	β	β	β	V	0	β	10 000 110		1	2	7	111 A 111 A
ADD A, (IX + d)	A ← A + (IX + d)	β	β	β	β	β	V	0	β	11 011 101 10 000 110 ← d →	DD	3	5	19	
ADD A, (IY + d)	A ← A + (IY + d)	β	β	β	β	β	V	0	β	11 111 101 10 000 110 ← d →	FD	3	5	19	
ADC A, s	A ← A + s + CY	β	β	β	β	β	V	0	β	001					s is any of r, n, (HL), (IX+d), (IY+d), p, q as shown for the ADD instruction. The underlined bits replace the underlined bits in the ADD set.
SUB A, s	A ← A - s	β	β	β	β	β	V	1	β	010					
SBC A, s	A ← A - s - CY	β	β	β	β	β	V	1	β	011					
AND s	A ← A AND s	β	β	β	1	β	P	0	0	100					
OR s	A ← A OR s	β	β	β	0	β	P	0	0	110					
XOR s	A ← A XOR s	β	β	β	0	β	P	0	0	101					
CP s	A - s	β	β	β[1]	β	β[1]	V	1	β	111					
INC r	r ← r + 1	β	β	β	β	β	V	0	•	00 r 100		1	1	4	
INC p*	p ← p + 1	β	β	β	β	β	V	0	•	11 011 101 00 p 100	DD	2	2	8	q Reg. 000 B
INC q*	q ← q + 1	β	β	β	β	β	V	0	•	11 111 101 00 q 100	FD	2	2	8	001 C 010 D
INC (HL)	(HL) ← (HL) + 1	β	β	β	β	β	V	0	•	00 110 100		1	3	11	011 E
INC (IX + d)	(IX + d) ← (IX + d) + 1	β	β	β	β	β	V	0	•	11 011 101 00 110 100 ← d →	DD	3	6	23	100 IY_H 101 IY_L 111 A
INC (IY + d)	(IY + d) ← (IY + d) + 1	β	β	β	β	β	V	0	•	11 111 101 00 110 100 ← d →	FD	3	6	23	
DEC m	m ← m - 1	β	β	β	β	β	V	1	•	101					m is any of r, p, q, (HL), (IX+d), (IY+d), as shown for the INC instruction. DEC same format and states as INC. Replace 100 with 101 in opcode.

Notes:
[1] F5 and F3 are copied from the operand (s), not from the result of (A - s).
The V symbol in the P/V flag column indicates that the P/V flags contains the overflow of the operation. Similarly the P symbol indicates parity.
r means any of the registers A, B, C, D, E, H, L.
p means any of the registers A, B, C, D, E, IX_H, IX_L.
q means any of the registers A, B, C, D, E, IY_H, IY_L.
dd_L, dd_H refer to high order and low order eight bits of the register respectively.
CY means the carry flip-flop.
* means unofficial instruction.

Flag Notation: • = flag is not affected, 0 = flag is reset, 1 = flag is set, β = flag is set according to the result of the operation.

16 bit Arithmetic Group

Mnemonic	Symbolic Operation	Flags S	Z	F5	H	F3	P/V	N	C	Opcode 76 543 210	Hex	No.of Bytes	No.of M Cycles	No.of T States	Comments
ADD HL, ss	HL ← HL + ss	•	•	β^2	β^2	β^2	•	0	β^1	00 ss1 001		1	3	11	ss Reg.
ADC HL, ss	HL ← HL + ss + CY	β^1	β^1	β^2	β^2	β^2	V[1]	0	β^1	11 101 101 01 ss1 010	ED	2	4	15	00 BC 01 DE
SBC HL, ss	HL ← HL - ss - CY	β^1	β^1	β^2	β^2	β^2	V[1]	1	β^1	11 101 101 01 ss0 010	ED	2	4	15	10 HL 11 SP
ADD IX, pp	IX ← IX + pp	•	•	β^2	β^2	β^2	•	0	β^1	11 011 101 00 pp1 001	DD	2	4	15	pp Reg.
ADD IY, rr	IY ← IY + rr	•	•	β^2	β^2	β^2	•	0	β^1	11 111 101 00 rr1 001	FD	2	4	15	00 BC 01 DE
INC ss	ss ← ss + 1	•	•	•	•	•	•	•	•	00 ss0 011		1	1	6	10 IX
INC IX	IX ← IX + 1	•	•	•	•	•	•	•	•	11 011 101 00 100 011	DD 23	2	2	10	11 SP
INC IY	IY ← IY + 1	•	•	•	•	•	•	•	•	11 111 101 00 100 011	FD 23	2	2	10	rr Reg. 00 BC
DEC ss	ss ← ss - 1	•	•	•	•	•	•	•	•	00 ss1 011		1	1	6	01 DE
DEC IX	IX ← IX - 1	•	•	•	•	•	•	•	•	11 011 101 00 101 011	DD 2B	2	2	10	10 IY 11 SP
DEC IY	IY ← IY - 1	•	•	•	•	•	•	•	•	11 111 101 00 101 011	FD 2B	2	2	10	

Notes:
The V symbol in the P/V flag column indicates that the P/V flags contains the overflow of the operation.
ss means any of the registers BC, DE, HL, SP.
pp means any of the registers BC, DE, IX, SP.
rr means any of the registers BC, DE, IY, SP.
16 bit additions are performed by first adding the two low order eight bits, and then the two high order eight bits.
[1] Indicates the flag is affected by the 16 bit result of the operation.
[2] Indicates the flag is affected by the 8 bit addition of the high order eight bits.
CY means the carry flip-flop.

Flag Notation:
• = flag is not affected, 0 = flag is reset, 1 = flag is set, β = flag is set according to the result of the operation.

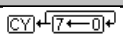
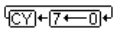
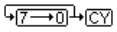
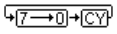
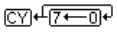
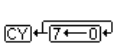
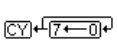
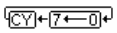
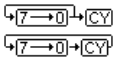
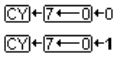
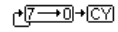
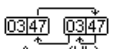
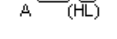
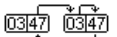
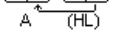
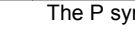
General Purpose Arithmetic and CPU Control Groups

Mnemonic	Symbolic Operation	Flags S	Z	F5	H	F3	P/V	N	C	Opcode 76 543 210	Hex	No.of Bytes	No.of M Cycles	No.of T States	Comments
DAA	Converts A into packed BCD following add or subtract with BCD operands.	β	β	β	β	β	P	•	β	00 100 111	27	1	1	4	
CPL	$A \leftarrow \overline{A}$	•	•	β^1	1	β^1	•	1	•	00 101 111	2F	1	1	4	One's complement.
NEG[4]	A ← 0 - A	β	β	β	β	β	V	1	β	11 101 101 01 000 100	ED 44	2	2	8	Two's complement.
CCF	$CY \leftarrow \overline{CY}$	•	•	β^1	β^2	β^1	•	0	β	00 111 111	3F	1	1	4	Complement carry flag.
SCF	CY ← 1	•	•	β^1	0	β^1	•	0	1	00 110 111	37	1	1	4	
NOP	No operations	•	•	•	•	•	•	•	•	00 000 000	00	1	1	4	
HALT	CPU halted	•	•	•	•	•	•	•	•	01 110 110	76	1	1	4	
DI[3]	$IFF_1 \leftarrow 0$ $IFF_2 \leftarrow 0$	•	•	•	•	•	•	•	•	11 110 011	F3	1	1	4	
EI[3]	$IFF_1 \leftarrow 1$ $IFF_2 \leftarrow 1$	•	•	•	•	•	•	•	•	11 111 011	FB	1	1	4	
IM 0[4]	Set interrupt mode 0	•	•	•	•	•	•	•	•	11 101 101 01 000 110	ED 46	2	2	8	
IM 1[4]	Set interrupt mode 1	•	•	•	•	•	•	•	•	11 101 101 01 010 110	ED 56	2	2	8	
IM 2[4]	Set interrupt mode 2	•	•	•	•	•	•	•	•	11 101 101 01 011 110	ED 5E	2	2	8	

Notes:
The V symbol in the P/V flag column indicates that the P/V flags contains the overflow of the operation. Similarly the P symbol indicates parity.
[1] F5 and F3 are a copy of bit 5 and 3 of register A
[2] H contains the previous carry state (after instruction $H \leftrightarrow \overline{C}$)
[3] No interrupts are issued directly after a DI or EI.
[4] This instruction has other unofficial opcodes, see Opcodes list.
CY means the carry flip-flop.

Flag Notation:
• = flag is not affected, 0 = flag is reset, 1 = flag is set, β = flag is set according to the result of the operation.

Rotate and Shift Group

Mnemonic	Symbolic Operation	Flags S	Z	F5	H	F3	P/V	N	C	Opcode 76 543 210	Hex	No. of Bytes	No. of M Cycles	No. of T States	Comments
RLCA		•	•	β	0	β	•	0	β	00 000 111	07	1	1	4	
RLA		•	•	β	0	β	•	0	β	00 010 111	17	1	1	4	
RRCA		•	•	β	0	β	•	0	β	00 001 111	0F	1	1	4	
RRA		•	•	β	0	β	•	0	β	00 011 111	1F	1	1	4	
RLC r		β	β	β	0	β	P	0	β	11 001 011 00 000 r	CB	2	2	8	r Reg. 000 B
RLC (HL)		β	β	β	0	β	P	0	β	11 001 011 00 000 110	CB	2	4	15	001 C 010 D
RLC (IX + d)		β	β	β	0	β	P	0	β	11 011 101 11 001 011 ← d → 00 000 110	DD CB	4	6	23	011 E 100 H 101 L 111 A
RLC (IY + d)		β	β	β	0	β	P	0	β	11 111 101 11 001 011 ← d → 00 000 110	FD CB	4	6	23	
LD r,RLC (IX + d)*	r ← (IX + d) RLC r (IX + d) ← r	β	β	β	0	β	P	0	β	11 011 101 11 001 011 ← d → 00 000 r	DD CB	4	6	23	
LD r,RLC (IY + d)*	r ← (IY + d) RLC r (IY + d) ← r	β	β	β	0	β	P	0	β	11 111 101 11 001 011 ← d → 00 000 r	FD CB	4	6	23	
RL m		β	β	β	0	β	P	0	β	010					Instruction format and states are the same as RLC. Replace 000 with new number.
RRC m		β	β	β	0	β	P	0	β	001					
RR m		β	β	β	0	β	P	0	β	011					
SLA m		β	β	β	0	β	P	0	β	100					
SLL m*		β	β	β	0	β	P	0	β	110					
SRA m		β	β	β	0	β	P	0	β	101					
SRL m		β	β	β	0	β	P	0	β	111					
RLD		β	β	β	0	β	P	0	•	11 101 101 01 101 111	ED 6F	2	5	18	
RRD		β	β	β	0	β	P	0	•	11 101 101 01 100 111	ED 67	2	5	18	

Notes: The P symbol in the P/V flag column indicates that the P/V flags contains the parity of the result.
r means any of the registers A, B, C, D, E, H, L.
* means unofficial instruction.
CY means the carry flip-flop.

Flag Notation: • = flag is not affected, 0 = flag is reset, 1 = flag is set, β = flag is set according to the result of the operation.

Bit Manipulation Group

Mnemonic	Symbolic Operation	Flags S	Z	F5	H	F3	P/V	N	C	Opcode 76 543 210	Hex	No. of Bytes	No. of M Cycles	No. of T States	Comments
BIT b, r	$Z \leftarrow \overline{r_b}$	β^1	β	β^2	1	β^3	β^4	0	•	11 001 011 01 b r	CB	2	2	8	r Reg. 000 B 001 C 010 D 011 E 100 H 101 L 111 A
BIT b, (HL)	$Z \leftarrow \overline{(HL)_b}$	β^1	β	β^2	1	β^3	β^4	0	•	11 001 011 01 b 110	CB	2	3	12	
BIT b, (IX + d)[5]	$Z \leftarrow \overline{(IX + d)_b}$	β^1	β	β^2	1	β^3	β^4	0	•	11 011 101 11 001 011 ← d → 01 b 110	DD CB	4	5	20	
BIT b, (IY + d)[5]	$Z \leftarrow \overline{(IY + d)_b}$	β^1	β	β^2	1	β^3	β^4	0	•	11 111 101 11 001 011 ← d → 01 b 110	FD CB	4	5	20	
SET b, r	$r_b \leftarrow 1$	•	•	•	•	•	•	•	•	11 001 011 11 b r	CB	2	2	8	b Bit. 000 0 001 1 010 2 011 3 100 4 101 5 110 6 111 7
SET b, (HL)	$(HL)_b \leftarrow 1$	•	•	•	•	•	•	•	•	11 001 011 11 b 110	CB	2	4	15	
SET b, (IX + d)	$(IX + d)_b \leftarrow 1$	•	•	•	•	•	•	•	•	11 011 101 11 001 011 ← d → 11 b 110	DD CB	4	6	23	
SET b, (IY + d)	$(IY + d)_b \leftarrow 1$	•	•	•	•	•	•	•	•	11 111 101 11 001 011 ← d → 11 b 110	FD CB	4	6	23	
LD r,SET b, (IX + d)*	$r \leftarrow (IX + d)$ $r_b \leftarrow 1$ $(IX + d) \leftarrow r$	•	•	•	•	•	•	•	•	11 011 101 11 001 011 ← d → 11 b r	DD CB	4	6	23	
LD r,SET b, (IY + d)*	$r \leftarrow (IY + d)$ $r_b \leftarrow 1$ $(IY + d) \leftarrow r$	•	•	•	•	•	•	•	•	11 111 101 11 001 011 ← d → 11 b r	FD CB	4	6	23	
RES b, m	$m_b \leftarrow 0$ m ≡ r, (HL), (IX+d), (IY+d)	•	•	•	•	•	•	•	•	10					To form new opcode replace 11 of SET b, s with 10. Flags and states are the same.

Notes:
The notation m_b indicates bit b (0 to 7) of location m.
BIT instructions are performed by an bitwise AND.
[1] S is set if b = 7 and Z = 0
[2] F5 is set if b = 5 and Z = 0
[3] F3 is set if b = 3 and Z = 0
[4] P/V is set like the Z flag
[5] This instruction has other unofficial opcodes
* means unofficial instruction.

Flag Notation: • = flag is not affected, 0 = flag is reset, 1 = flag is set, β = flag is set according to the result of the operation.

Input and Output Groups

Mnemonic	Symbolic Operation	S	Z	F5	H	F3	P/V	N	C	Opcode 76 543 210	Hex	No.of Bytes	No.of M Cycles	No.of T States	Comments
IN A, (n)	A ← (n)	•	•	•	•	•	•	•	•	11 011 011 ← n →	DB	2	3	11	r Reg. 000 B
IN r, (C)	r ← (C)	β	β	β	0	β	P	0	•	11 101 101 01 r 000	ED	2	3	12	001 C 010 D
IN (C)* or IN F, (C)*	Just affects flags, value is lost.	β	β	β	0	β	P	0	•	11 101 101 01 110 000	ED 70	2	3	12	011 E 100 H
INI	(HL) ← (C) HL ← HL + 1 B ← B - 1	β[1]	β[1]	β[1]	β[3]	β[1]	X	β[2]	β[3]	11 101 101 10 100 010	ED A2	2	4	16	101 L 111 A
INIR	(HL) ← (C) HL ← HL + 1 B ← B - 1 Repeat until B = 0	0	1	0	β[3]	0	X	β[2]	β[3]	11 101 101 10 110 010	ED B2	2 2	5 4	21 16	if B ≠ 0 if B = 0
IND	(HL) ← (C) HL ← HL - 1 B ← B - 1	β[1]	β[1]	β[1]	β[4]	β[1]	X	β[2]	β[4]	11 101 101 10 101 010	ED AA	2	4	16	
INDR	(HL) ← (C) HL ← HL - 1 B ← B - 1 Repeat until B = 0	0	1	0	β[4]	0	X	β[2]	β[4]	11 101 101 10 111 010	ED BA	2 2	5 4	21 16	if B ≠ 0 if B = 0
OUT (n), A	(n) ← A	•	•	•	•	•	•	•	•	11 010 011 ← n →	D3	2	3	11	
OUT (C), r	(C) ← r	•	•	•	•	•	•	•	•	11 101 101 01 r 001	ED	2	3	12	
OUT (C), 0*	(C) ← 0	•	•	•	•	•	•	•	•	11 101 101 01 110 001	ED 71	2	3	12	
OUTI	(C) ← (HL) HL ← HL + 1 B ← B - 1	β[1]	β[1]	β[1]	X	β[1]	X	X	X	11 101 101 10 100 011	ED A3	2	4	16	
OTIR	(C) ← (HL) HL ← HL + 1 B ← B - 1 Repeat until B = 0	0	1	0	X	0	X	X	X	11 101 101 10 110 011	ED B3	2 2	5 4	21 16	if B ≠ 0 if B = 0
OUTD	(C) ← (HL) HL ← HL - 1 B ← B - 1	β[1]	β[1]	β[1]	X	β[1]	X	X	X	11 101 101 10 101 011	ED AB	2	4	16	
OTDR	(C) ← (HL) HL ← HL - 1 B ← B - 1 Repeat until B = 0	0	1	0	X	0	X	X	X	11 101 101 10 111 011	ED BB	2 2	5 4	21 16	if B ≠ 0 if B = 0

Notes:
The V symbol in the P/V flag column indicates that the P/V flags contains the overflow of the operation. Similarly the P symbol indicates parity.
r means any of the registers A, B, C, D, E, H, L.
[1] flag is affected by the result of B ← B - 1 as in DEC B.
[2] N is a copy bit 7 of the last value from the input (C).
[3] this flag contains the carry of (((C + 1) AND 255) + (C))
[4] this flag contains the carry of (((C - 1) AND 255) + (C))
* means unofficial instruction.

Flag Notation:
• = flag is not affected, 0 = flag is reset, 1 = flag is set, X = flag is unknown,
β = flag is set according to the result of the operation.

Jump Group

Mnemonic	Symbolic Operation	S	Z	F5	H	F3	P/V	N	C	Opcode 76 543 210	Hex	No.of Bytes	No.of M Cycles	No.of T States	Comments
JP nn	PC ← nn	•	•	•	•	•	•	•	•	11 000 011 ← n → ← n →	C3	3	3	10	
JP cc, nn	if cc is true, PC ← nn	•	•	•	•	•	•	•	•	11 ccc 010 ← n → ← n →		3	3	10	ccc Condition 000 NZ 001 Z 010 NC 011 C 100 PO 101 PE 110 P 111 M
JR e	PC ← PC + e	•	•	•	•	•	•	•	•	00 011 000 ← e - 2 →	18	2	3	12	
JR ss, e	if ss is true PC ← PC + e	•	•	•	•	•	•	•	•	00 ss 000 ← e - 2 →		2 2	3 2	12 7	if ss is true if ss is false
JP HL	PC ← HL	•	•	•	•	•	•	•	•	11 101 001	E9	1	1	4	
JP IX	PC ← IX	•	•	•	•	•	•	•	•	11 011 101 11 101 001	DD E9	2	2	8	ss Condition 111 C 110 NC
JP IY	PC ← IY	•	•	•	•	•	•	•	•	11 111 101 11 101 001	FD E9	2	2	8	101 Z 100 NZ
DJNZ e	B ← B - 1 if B ≠ 0 PC ← PC + e	•	•	•	•	•	•	•	•	00 010 000 ← e - 2 →	10	2 2	2 3	8 13	if B = 0 if B ≠ 0

Notes: e is a signed two-complement number in the range <-126, 129>
e - 2 in the opcode provides an effective number of PC + e as PC incremented by 2 prior to the addition of e.

Flag Notation: • = flag is not affected, 0 = flag is reset, 1 = flag is set, β = flag is set according to the result of the operation.

Call and Return Group

Mnemonic	Symbolic Operation	S	Z	F5	H	F3	P/V	N	C	Opcode 76 543 210	Hex	No.of Bytes	No.of M Cycles	No.of T States	Comments
CALL nn	SP ← SP - 1 (SP) ← PC_H SP ← SP - 1 (SP) ← PC_L PC ← nn	•	•	•	•	•	•	•	•	11 001 101 ← n → ← n →	CD	3	5	17	
CALL cc, nn	if cc is true, SP ← SP - 1 (SP) ← PC_H SP ← SP - 1 (SP) ← PC_L PC ← nn	•	•	•	•	•	•	•	•	11 ccc 100 ← n → ← n →		3 3	3 5	10 17	if cc is false if cc is true
RET	PC_L ← (SP) SP ← SP + 1 PC_H ← (SP) SP ← SP + 1	•	•	•	•	•	•	•	•	11 001 001	C9	1	3	10	
RET cc	if cc is true, PC_L ← (SP) SP ← SP + 1 PC_H ← (SP) SP ← SP + 1	•	•	•	•	•	•	•	•	11 ccc 000		1 1	1 3	5 11	if cc is false if cc is true
RETI[2]	PC_L ← (SP) SP ← SP + 1 PC_H ← (SP) SP ← SP + 1	•	•	•	•	•	•	•	•	11 101 101 01 001 101	ED 4D	2	4	14	cc Condition 000 NZ 001 Z 010 NC 011 C
RETN[1,2]	PC_L ← (SP) SP ← SP + 1 PC_H ← (SP) SP ← SP + 1 IFF_1 ← IFF_2	•	•	•	•	•	•	•	•	11 101 101 01 000 101	ED 45	2	4	14	100 PO 101 PE 110 P 111 M
RST p	SP ← SP - 1 (SP) ← PC_H	•	•	•	•	•	•	•	•	11 t 111		1	3	11	t p 000 0h

	$SP \leftarrow SP - 1$ $(SP) \leftarrow PC_L$ $PC \leftarrow p$	001 8h 010 10h 011 18h 100 20h 101 28h 110 30h 111 38h

Notes: [1] This instruction has other unofficial opcodes, see Opcode list.

[2] Instruction also $IFF_1 \leftarrow IFF_2$

Flag Notation: • = flag is not affected, 0 = flag is reset, 1 = flag is set, β = flag is set according to the result of the operation.

Instructions sorted by opcode

If an EDxx instruction is not listed, it should operate as two NOPs.
If a DDxx or FDxx instruction is not listed, it should operate as without the DD or FD prefix.
An asterisk (*) after a instruction means it is unofficial.

00	NOP	45	LD B, L	8A	ADC A, D
01 n n	LD BC, nn	46	LD B, (HL)	8B	ADC A, E
02	LD (BC), A	47	LD B, A	8C	ADC A, H
03	INC BC	48	LD C, B	8D	ADC A, L
04	INC B	49	LD C, C	8E	ADC A, (HL)
05	DEC B	4A	LD C, D	8F	ADC A, A
06 n	LD B, n	4B	LD C, E	90	SUB B
07	RLCA	4C	LD C, H	91	SUB C
08	EX AF, AF'	4D	LD C, L	92	SUB D
09	ADD HL, BC	4E	LD C, (HL)	93	SUB E
0A	LD A, (BC)	4F	LD C, A	94	SUB H
0B	DEC BC	50	LD D, B	95	SUB L
0C	INC C	51	LD D, C	96	SUB (HL)
0D	DEC C	52	LD D, D	97	SUB A
0E n	LD C, n	53	LD D, E	98	SBC A, B
0F	RRCA	54	LD D, H	99	SBC A, C
10 n	DJNZ PC + n	55	LD D, L	9A	SBC A, D
11 n n	LD DE, nn	56	LD D, (HL)	9B	SBC A, E
12	LD (DE), A	57	LD D, A	9C	SBC A, H
13	INC DE	58	LD E, B	9D	SBC A, L
14	INC D	59	LD E, C	9E	SBC A, (HL)
15	DEC D	5A	LD E, D	9F	SBC A, A
16 n	LD D, n	5B	LD E, E	A0	AND B
17	RLA	5C	LD E, H	A1	AND C
18 n	JR PC + n	5D	LD E, L	A2	AND D
19	ADD HL, DE	5E	LD E, (HL)	A3	AND E
1A	LD A, (DE)	5F	LD E, A	A4	AND H
1B	DEC DE	60	LD H, B	A5	AND L
1C	INC E	61	LD H, C	A6	AND (HL)
1D	DEC E	62	LD H, D	A7	AND A
1E n	LD E, n	63	LD H, E	A8	XOR B
1F	RRA	64	LD H, H	A9	XOR C
20 n	JR NZ, PC + n	65	LD H, L	AA	XOR D
21 n n	LD HL, nn	66	LD H, (HL)	AB	XOR E
22 n n	LD (nn), HL	67	LD H, A	AC	XOR H
23	INC HL	68	LD L, B	AD	XOR L
24	INC H	69	LD L, C	AE	XOR (HL)
25	DEC H	6A	LD L, D	AF	XOR A
26 n	LD H, n	6B	LD L, E	B0	OR B
27	DAA	6C	LD L, H	B1	OR C
28 n	JR Z, PC + n	6D	LD L, L	B2	OR D
29	ADD HL, HL	6E	LD L, (HL)	B3	OR E
2A n n	LD HL, (nn)	6F	LD L, A	B4	OR H
2B	DEC HL	70	LD (HL), B	B5	OR L
2C	INC L	71	LD (HL), C	B6	OR (HL)
2D	DEC L	72	LD (HL), D	B7	OR A
2E n	LD L, n	73	LD (HL), E	B8	CP B
2F	CPL	74	LD (HL), H	B9	CP C
30 n	JR NC, PC + n	75	LD (HL), L	BA	CP D
31 n n	LD SP, nn	76	HALT	BB	CP E
32 n n	LD (nn), A	77	LD (HL), A	BC	CP H
33	INC SP	78	LD A, B	BD	CP L
34	INC (HL)	79	LD A, C	BE	CP (HL)
35	DEC (HL)	7A	LD A, D	BF	CP A
36 n	LD (HL), n	7B	LD A, E	C0	RET NZ
37	SCF	7C	LD A, H	C1	POP BC
38 n	JR C, PC + n	7D	LD A, L	C2 n n	JP NZ, nn
39	ADD HL, SP	7E	LD A, (HL)	C3 n n	JP nn
3A n n	LD A, (nn)	7F	LD A, A	C4 n n	CALL NZ, nn
3B	DEC SP	80	ADD A, B	C5	PUSH BC
3C	INC A	81	ADD A, C	C6 n	ADD A, n
3D	DEC A	82	ADD A, D	C7	RST 0h
3E n	LD A, n	83	ADD A, E	C8	RET Z
3F	CCF	84	ADD A, H	C9	RET
40	LD B, B	85	ADD A, L	CA n n	JP Z, nn
41	LD B, C	86	ADD A, (HL)	CB00	RLC B
42	LD B, D	87	ADD A, A	CB01	RLC C
43	LD B, E	88	ADC A, B	CB02	RLC D
44	LD B, H	89	ADC A, C	CB03	RLC E

CB04	RLC H	CB57	BIT 2, A	CBAA	RES 5, D
CB05	RLC L	CB58	BIT 3, B	CBAB	RES 5, E
CB06	RLC (HL)	CB59	BIT 3, C	CBAC	RES 5, H
CB07	RLC A	CB5A	BIT 3, D	CBAD	RES 5, L
CB08	RRC B	CB5B	BIT 3, E	CBAE	RES 5, (HL)
CB09	RRC C	CB5C	BIT 3, H	CBAF	RES 5, A
CB0A	RRC D	CB5D	BIT 3, L	CBB0	RES 6, B
CB0B	RRC E	CB5E	BIT 3, (HL)	CBB1	RES 6, C
CB0C	RRC H	CB5F	BIT 3, A	CBB2	RES 6, D
CB0D	RRC L	CB60	BIT 4, B	CBB3	RES 6, E
CB0E	RRC (HL)	CB61	BIT 4, C	CBB4	RES 6, H
CB0F	RRC A	CB62	BIT 4, D	CBB5	RES 6, L
CB10	RL B	CB63	BIT 4, E	CBB6	RES 6, (HL)
CB11	RL C	CB64	BIT 4, H	CBB7	RES 6, A
CB12	RL D	CB65	BIT 4, L	CBB8	RES 7, B
CB13	RL E	CB66	BIT 4, (HL)	CBB9	RES 7, C
CB14	RL H	CB67	BIT 4, A	CBBA	RES 7, D
CB15	RL L	CB68	BIT 5, B	CBBB	RES 7, E
CB16	RL (HL)	CB69	BIT 5, C	CBBC	RES 7, H
CB17	RL A	CB6A	BIT 5, D	CBBD	RES 7, L
CB18	RR B	CB6B	BIT 5, E	CBBE	RES 7, (HL)
CB19	RR C	CB6C	BIT 5, H	CBBF	RES 7, A
CB1A	RR D	CB6D	BIT 5, L	CBC0	SET 0, B
CB1B	RR E	CB6E	BIT 5, (HL)	CBC1	SET 0, C
CB1C	RR H	CB6F	BIT 5, A	CBC2	SET 0, D
CB1D	RR L	CB70	BIT 6, B	CBC3	SET 0, E
CB1E	RR (HL)	CB71	BIT 6, C	CBC4	SET 0, H
CB1F	RR A	CB72	BIT 6, D	CBC5	SET 0, L
CB20	SLA B	CB73	BIT 6, E	CBC6	SET 0, (HL)
CB21	SLA C	CB74	BIT 6, H	CBC7	SET 0, A
CB22	SLA D	CB75	BIT 6, L	CBC8	SET 1, B
CB23	SLA E	CB76	BIT 6, (HL)	CBC9	SET 1, C
CB24	SLA H	CB77	BIT 6, A	CBCA	SET 1, D
CB25	SLA L	CB78	BIT 7, B	CBCB	SET 1, E
CB26	SLA (HL)	CB79	BIT 7, C	CBCC	SET 1, H
CB27	SLA A	CB7A	BIT 7, D	CBCD	SET 1, L
CB28	SRA B	CB7B	BIT 7, E	CBCE	SET 1, (HL)
CB29	SRA C	CB7C	BIT 7, H	CBCF	SET 1, A
CB2A	SRA D	CB7D	BIT 7, L	CBD0	SET 2, B
CB2B	SRA E	CB7E	BIT 7, (HL)	CBD1	SET 2, C
CB2C	SRA H	CB7F	BIT 7, A	CBD2	SET 2, D
CB2D	SRA L	CB80	RES 0, B	CBD3	SET 2, E
CB2E	SRA (HL)	CB81	RES 0, C	CBD4	SET 2, H
CB2F	SRA A	CB82	RES 0, D	CBD5	SET 2, L
CB30	SLL B*	CB83	RES 0, E	CBD6	SET 2, (HL)
CB31	SLL C*	CB84	RES 0, H	CBD7	SET 2, A
CB32	SLL D*	CB85	RES 0, L	CBD8	SET 3, B
CB33	SLL E*	CB86	RES 0, (HL)	CBD9	SET 3, C
CB34	SLL H*	CB87	RES 0, A	CBDA	SET 3, D
CB35	SLL L*	CB88	RES 1, B	CBDB	SET 3, E
CB36	SLL (HL)*	CB89	RES 1, C	CBDC	SET 3, H
CB37	SLL A*	CB8A	RES 1, D	CBDD	SET 3, L
CB38	SRL B	CB8B	RES 1, E	CBDE	SET 3, (HL)
CB39	SRL C	CB8C	RES 1, H	CBDF	SET 3, A
CB3A	SRL D	CB8D	RES 1, L	CBE0	SET 4, B
CB3B	SRL E	CB8E	RES 1, (HL)	CBE1	SET 4, C
CB3C	SRL H	CB8F	RES 1, A	CBE2	SET 4, D
CB3D	SRL L	CB90	RES 2, B	CBE3	SET 4, E
CB3E	SRL (HL)	CB91	RES 2, C	CBE4	SET 4, H
CB3F	SRL A	CB92	RES 2, D	CBE5	SET 4, L
CB40	BIT 0, B	CB93	RES 2, E	CBE6	SET 4, (HL)
CB41	BIT 0, C	CB94	RES 2, H	CBE7	SET 4, A
CB42	BIT 0, D	CB95	RES 2, L	CBE8	SET 5, B
CB43	BIT 0, E	CB96	RES 2, (HL)	CBE9	SET 5, C
CB44	BIT 0, H	CB97	RES 2, A	CBEA	SET 5, D
CB45	BIT 0, L	CB98	RES 3, B	CBEB	SET 5, E
CB46	BIT 0, (HL)	CB99	RES 3, C	CBEC	SET 5, H
CB47	BIT 0, A	CB9A	RES 3, D	CBED	SET 5, L
CB48	BIT 1, B	CB9B	RES 3, E	CBEE	SET 5, (HL)
CB49	BIT 1, C	CB9C	RES 3, H	CBEF	SET 5, A
CB4A	BIT 1, D	CB9D	RES 3, L	CBF0	SET 6, B
CB4B	BIT 1, E	CB9E	RES 3, (HL)	CBF1	SET 6, C
CB4C	BIT 1, H	CB9F	RES 3, A	CBF2	SET 6, D
CB4D	BIT 1, L	CBA0	RES 4, B	CBF3	SET 6, E
CB4E	BIT 1, (HL)	CBA1	RES 4, C	CBF4	SET 6, H
CB4F	BIT 1, A	CBA2	RES 4, D	CBF5	SET 6, L
CB50	BIT 2, B	CBA3	RES 4, E	CBF6	SET 6, (HL)
CB51	BIT 2, C	CBA4	RES 4, H	CBF7	SET 6, A
CB52	BIT 2, D	CBA5	RES 4, L	CBF8	SET 7, B
CB53	BIT 2, E	CBA6	RES 4, (HL)	CBF9	SET 7, C
CB54	BIT 2, H	CBA7	RES 4, A	CBFA	SET 7, D
CB55	BIT 2, L	CBA8	RES 5, B	CBFB	SET 7, E
CB56	BIT 2, (HL)	CBA9	RES 5, C	CBFC	SET 7, H

CBFD	SET 7, L	DD95	SUB IX_L*	DDCB d 42	BIT 0, (IX + d)*
CBFE	SET 7, (HL)	DD96 d	SUB (IX + d)	DDCB d 43	BIT 0, (IX + d)*
CBFF	SET 7, A	DD9C	SBC A, IX_H*	DDCB d 44	BIT 0, (IX + d)*
CC n n	CALL Z, nn	DD9D	SBC A, IX_L*	DDCB d 45	BIT 0, (IX + d)*
CD n n	CALL nn	DD9E d	SBC A, (IX + d)	DDCB d 46	BIT 0, (IX + d)
CE n	ADC A, n	DDA4	AND IX_H*	DDCB d 47	BIT 0, (IX + d)*
CF	RST 8h	DDA5	AND IX_L*	DDCB d 48	BIT 1, (IX + d)*
D0	RET NC	DDA6 d	AND (IX + d)	DDCB d 49	BIT 1, (IX + d)*
D1	POP DE	DDAC	XOR IX_H*	DDCB d 4A	BIT 1, (IX + d)*
D2 n n	JP NC, nn	DDAD	XOR IX_L*	DDCB d 4B	BIT 1, (IX + d)*
D3 n	OUT (n), A	DDAE d	XOR (IX + d)	DDCB d 4C	BIT 1, (IX + d)*
D4 n n	CALL NC, nn	DDB4	OR IX_H*	DDCB d 4D	BIT 1, (IX + d)*
D5	PUSH DE	DDB5	OR IX_L*	DDCB d 4E	BIT 1, (IX + d)
D6 n	SUB n	DDB6 d	OR (IX + d)	DDCB d 4F	BIT 1, (IX + d)*
D7	RST 10h	DDBC	CP IX_H*	DDCB d 50	BIT 2, (IX + d)*
D8	RETC	DDBD	CP IX_L*	DDCB d 51	BIT 2, (IX + d)*
D9	EXX	DDBE d	CP (IX + d)	DDCB d 52	BIT 2, (IX + d)*
DA n n	JP C, nn	DDCB d 00	LD B, RLC (IX + d)*	DDCB d 53	BIT 2, (IX + d)*
DB n	IN A, (n)	DDCB d 01	LD C, RLC (IX + d)*	DDCB d 54	BIT 2, (IX + d)*
DC n n	CALL C, nn	DDCB d 02	LD D, RLC (IX + d)*	DDCB d 55	BIT 2, (IX + d)*
DD09	ADD IX, BC	DDCB d 03	LD E, RLC (IX + d)*	DDCB d 56	BIT 2, (IX + d)
DD19	ADD IX, DE	DDCB d 04	LD H, RLC (IX + d)*	DDCB d 57	BIT 2, (IX + d)*
DD21 n n	LD IX, nn	DDCB d 05	LD L, RLC (IX + d)*	DDCB d 58	BIT 3, (IX + d)*
DD22 n n	LD (nn), IX	DDCB d 06	RLC (IX + d)	DDCB d 59	BIT 3, (IX + d)*
DD23	INC IX	DDCB d 07	LD A, RLC (IX + d)*	DDCB d 5A	BIT 3, (IX + d)*
DD24	INC IX_H*	DDCB d 08	LD B, RRC (IX + d)*	DDCB d 5B	BIT 3, (IX + d)*
DD25	DEC IX_H*	DDCB d 09	LD C, RRC (IX + d)*	DDCB d 5C	BIT 3, (IX + d)*
DD26 n	LD IX_H, n*	DDCB d 0A	LD D, RRC (IX + d)*	DDCB d 5D	BIT 3, (IX + d)*
DD29	ADD IX, IX	DDCB d 0B	LD E, RRC (IX + d)*	DDCB d 5E	BIT 3, (IX + d)
DD2A n n	LD IX, (nn)	DDCB d 0C	LD H, RRC (IX + d)*	DDCB d 5F	BIT 3, (IX + d)*
DD2B	DEC IX	DDCB d 0D	LD L, RRC (IX + d)*	DDCB d 60	BIT 4, (IX + d)*
DD2C	INC IX_L*	DDCB d 0E	RRC (IX + d)	DDCB d 61	BIT 4, (IX + d)*
DD2D	DEC IX_L*	DDCB d 0F	LD A, RRC (IX + d)*	DDCB d 62	BIT 4, (IX + d)*
DD2E n	LD IX_L, n*	DDCB d 10	LD B, RL (IX + d)*	DDCB d 63	BIT 4, (IX + d)*
DD34 d	INC (IX + d)	DDCB d 11	LD C, RL (IX + d)*	DDCB d 64	BIT 4, (IX + d)*
DD35 d	DEC (IX + d)	DDCB d 12	LD D, RL (IX + d)*	DDCB d 65	BIT 4, (IX + d)*
DD36 d n	LD (IX + d), n	DDCB d 13	LD E, RL (IX + d)*	DDCB d 66	BIT 4, (IX + d)
DD39	ADD IX, SP	DDCB d 14	LD H, RL (IX + d)*	DDCB d 67	BIT 4, (IX + d)*
DD44	LD B, IX_H*	DDCB d 15	LD L, RL (IX + d)*	DDCB d 68	BIT 5, (IX + d)*
DD45	LD B, IX_L*	DDCB d 16	RL (IX + d)	DDCB d 69	BIT 5, (IX + d)*
DD46 d	LD B, (IX + d)	DDCB d 17	LD A, RL (IX + d)*	DDCB d 6A	BIT 5, (IX + d)*
DD4C	LD C, IX_H*	DDCB d 18	LD B, RR (IX + d)*	DDCB d 6B	BIT 5, (IX + d)*
DD4D	LD C, IX_L*	DDCB d 19	LD C, RR (IX + d)*	DDCB d 6C	BIT 5, (IX + d)*
DD4E d	LD C, (IX + d)	DDCB d 1A	LD D, RR (IX + d)*	DDCB d 6D	BIT 5, (IX + d)*
DD54	LD D, IX_H*	DDCB d 1B	LD E, RR (IX + d)*	DDCB d 6E	BIT 5, (IX + d)
DD55	LD D, IX_L*	DDCB d 1C	LD H, RR (IX + d)*	DDCB d 6F	BIT 5, (IX + d)*
DD56 d	LD D, (IX + d)	DDCB d 1D	LD L, RR (IX + d)*	DDCB d 70	BIT 6, (IX + d)*
DD5C	LD E, IX_H*	DDCB d 1E	RR (IX + d)	DDCB d 71	BIT 6, (IX + d)*
DD5D	LD E, IX_L*	DDCB d 1F	LD A, RR (IX + d)*	DDCB d 72	BIT 6, (IX + d)*
DD5E d	LD E, (IX + d)	DDCB d 20	LD B, SLA (IX + d)*	DDCB d 73	BIT 6, (IX + d)*
DD60	LD IX_H, B*	DDCB d 21	LD C, SLA (IX + d)*	DDCB d 74	BIT 6, (IX + d)*
DD61	LD IX_H, C*	DDCB d 22	LD D, SLA (IX + d)*	DDCB d 75	BIT 6, (IX + d)*
DD62	LD IX_H, D*	DDCB d 23	LD E, SLA (IX + d)*	DDCB d 76	BIT 6, (IX + d)
DD63	LD IX_H, E*	DDCB d 24	LD H, SLA (IX + d)*	DDCB d 77	BIT 6, (IX + d)*
DD64	LD IX_H, IX_H*	DDCB d 25	LD L, SLA (IX + d)*	DDCB d 78	BIT 7, (IX + d)*
DD65	LD IX_H, IX_L*	DDCB d 26	SLA (IX + d)	DDCB d 79	BIT 7, (IX + d)*
DD66 d	LD H, (IX + d)	DDCB d 27	LD A, SLA (IX + d)*	DDCB d 7A	BIT 7, (IX + d)*
DD67	LD IX_H, A*	DDCB d 28	LD B, SRA (IX + d)*	DDCB d 7B	BIT 7, (IX + d)*
DD68	LD IX_L, B*	DDCB d 29	LD C, SRA (IX + d)*	DDCB d 7C	BIT 7, (IX + d)*
DD69	LD IX_L, C*	DDCB d 2A	LD D, SRA (IX + d)*	DDCB d 7D	BIT 7, (IX + d)*
DD6A	LD IX_L, D*	DDCB d 2B	LD E, SRA (IX + d)*	DDCB d 7E	BIT 7, (IX + d)
DD6B	LD IX_L, E*	DDCB d 2C	LD H, SRA (IX + d)*	DDCB d 7F	BIT 7, (IX + d)*
DD6C	LD IX_L, IX_H*	DDCB d 2D	LD L, SRA (IX + d)*	DDCB d 80	LD B, RES 0, (IX + d)*
DD6D	LD IX_L, IX_L*	DDCB d 2E	SRA (IX + d)	DDCB d 81	LD C, RES 0, (IX + d)*
DD6E d	LD L, (IX + d)	DDCB d 2F	LD A, SRA (IX + d)*	DDCB d 82	LD D, RES 0, (IX + d)*
DD6F	LD IX_L, A*	DDCB d 30	LD B, SLL (IX + d)*	DDCB d 83	LD E, RES 0, (IX + d)*
DD70 d	LD (IX + d), B	DDCB d 31	LD C, SLL (IX + d)*	DDCB d 84	LD H, RES 0, (IX + d)*
DD71 d	LD (IX + d), C	DDCB d 32	LD D, SLL (IX + d)*	DDCB d 85	LD L, RES 0, (IX + d)*
DD72 d	LD (IX + d), D	DDCB d 33	LD E, SLL (IX + d)*	DDCB d 86	RES 0, (IX + d)
DD73 d	LD (IX + d), E	DDCB d 34	LD H, SLL (IX + d)*	DDCB d 87	LD A, RES 0, (IX + d)*
DD74 d	LD (IX + d), H	DDCB d 35	LD L, SLL (IX + d)*	DDCB d 88	LD B, RES 1, (IX + d)*
DD75 d	LD (IX + d), L	DDCB d 36	SLL (IX + d)*	DDCB d 89	LD C, RES 1, (IX + d)*
DD77 d	LD (IX + d), A	DDCB d 37	LD A, SLL (IX + d)*	DDCB d 8A	LD D, RES 1, (IX + d)*
DD7C	LD A, IX_H*	DDCB d 38	LD B, SRL (IX + d)*	DDCB d 8B	LD E, RES 1, (IX + d)*
DD7D	LD A, IX_L*	DDCB d 39	LD C, SRL (IX + d)*	DDCB d 8C	LD H, RES 1, (IX + d)*
DD7E d	LD A, (IX + d)	DDCB d 3A	LD D, SRL (IX + d)*	DDCB d 8D	LD L, RES 1, (IX + d)*
DD84	ADD A, IX_H*	DDCB d 3B	LD E, SRL (IX + d)*	DDCB d 8E	RES 1, (IX + d)
DD85	ADD A, IX_L*	DDCB d 3C	LD H, SRL (IX + d)*	DDCB d 8F	LD A, RES 1, (IX + d)*
DD86 d	ADD A, (IX + d)	DDCB d 3D	LD L, SRL (IX + d)*	DDCB d 90	LD B, RES 2, (IX + d)*
DD8C	ADC A, IX_H*	DDCB d 3E	SRL (IX + d)	DDCB d 91	LD C, RES 2, (IX + d)*
DD8D	ADC A, IX_L*	DDCB d 3F	LD A, SRL (IX + d)*	DDCB d 92	LD D, RES 2, (IX + d)*
DD8E d	ADC A, (IX + d)	DDCB d 40	BIT 0, (IX + d)*	DDCB d 93	LD E, RES 2, (IX + d)*
DD94	SUB IX_H*	DDCB d 41	BIT 0, (IX + d)*	DDCB d 94	LD H, RES 2, (IX + d)*

DDCB d 95	LD L, RES 2, (IX + d)*
DDCB d 96	RES 2, (IX + d)
DDCB d 97	LD A, RES 2, (IX + d)*
DDCB d 98	LD B, RES 3, (IX + d)*
DDCB d 99	LD C, RES 3, (IX + d)*
DDCB d 9A	LD D, RES 3, (IX + d)*
DDCB d 9B	LD E, RES 3, (IX + d)*
DDCB d 9C	LD H, RES 3, (IX + d)*
DDCB d 9D	LD L, RES 3, (IX + d)*
DDCB d 9E	RES 3, (IX + d)
DDCB d 9F	LD A, RES 3, (IX + d)*
DDCB d A0	LD B, RES 4, (IX + d)*
DDCB d A1	LD C, RES 4, (IX + d)*
DDCB d A2	LD D, RES 4, (IX + d)*
DDCB d A3	LD E, RES 4, (IX + d)*
DDCB d A4	LD H, RES 4, (IX + d)*
DDCB d A5	LD L, RES 4, (IX + d)*
DDCB d A6	RES 4, (IX + d)
DDCB d A7	LD A, RES 4, (IX + d)*
DDCB d A8	LD B, RES 5, (IX + d)*
DDCB d A9	LD C, RES 5, (IX + d)*
DDCB d AA	LD D, RES 5, (IX + d)*
DDCB d AB	LD E, RES 5, (IX + d)*
DDCB d AC	LD H, RES 5, (IX + d)*
DDCB d AD	LD L, RES 5, (IX + d)*
DDCB d AE	RES 5, (IX + d)
DDCB d AF	LD A, RES 5, (IX + d)*
DDCB d B0	LD B, RES 6, (IX + d)*
DDCB d B1	LD C, RES 6, (IX + d)*
DDCB d B2	LD D, RES 6, (IX + d)*
DDCB d B3	LD E, RES 6, (IX + d)*
DDCB d B4	LD H, RES 6, (IX + d)*
DDCB d B5	LD L, RES 6, (IX + d)*
DDCB d B6	RES 6, (IX + d)
DDCB d B7	LD A, RES 6, (IX + d)*
DDCB d B8	LD B, RES 7, (IX + d)*
DDCB d B9	LD C, RES 7, (IX + d)*
DDCB d BA	LD D, RES 7, (IX + d)*
DDCB d BB	LD E, RES 7, (IX + d)*
DDCB d BC	LD H, RES 7, (IX + d)*
DDCB d BD	LD L, RES 7, (IX + d)*
DDCB d BE	RES 7, (IX + d)
DDCB d BF	LD A, RES 7, (IX + d)*
DDCB d C0	LD B, SET 0, (IX + d)*
DDCB d C1	LD C, SET 0, (IX + d)*
DDCB d C2	LD D, SET 0, (IX + d)*
DDCB d C3	LD E, SET 0, (IX + d)*
DDCB d C4	LD H, SET 0, (IX + d)*
DDCB d C5	LD L, SET 0, (IX + d)*
DDCB d C6	SET 0, (IX + d)
DDCB d C7	LD A, SET 0, (IX + d)*
DDCB d C8	LD B, SET 1, (IX + d)*
DDCB d C9	LD C, SET 1, (IX + d)*
DDCB d CA	LD D, SET 1, (IX + d)*
DDCB d CB	LD E, SET 1, (IX + d)*
DDCB d CC	LD H, SET 1, (IX + d)*
DDCB d CD	LD L, SET 1, (IX + d)*
DDCB d CE	SET 1, (IX + d)
DDCB d CF	LD A, SET 1, (IX + d)*
DDCB d D0	LD B, SET 2, (IX + d)*
DDCB d D1	LD C, SET 2, (IX + d)*
DDCB d D2	LD D, SET 2, (IX + d)*
DDCB d D3	LD E, SET 2, (IX + d)*
DDCB d D4	LD H, SET 2, (IX + d)*
DDCB d D5	LD L, SET 2, (IX + d)*
DDCB d D6	SET 2, (IX + d)
DDCB d D7	LD A, SET 2, (IX + d)*
DDCB d D8	LD B, SET 3, (IX + d)*
DDCB d D9	LD C, SET 3, (IX + d)*
DDCB d DA	LD D, SET 3, (IX + d)*
DDCB d DB	LD E, SET 3, (IX + d)*
DDCB d DC	LD H, SET 3, (IX + d)*
DDCB d DD	LD L, SET 3, (IX + d)*
DDCB d DE	SET 3, (IX + d)
DDCB d DF	LD A, SET 3, (IX + d)*
DDCB d E0	LD B, SET 4, (IX + d)*
DDCB d E1	LD C, SET 4, (IX + d)*
DDCB d E2	LD D, SET 4, (IX + d)*
DDCB d E3	LD E, SET 4, (IX + d)*
DDCB d E4	LD H, SET 4, (IX + d)*
DDCB d E5	LD L, SET 4, (IX + d)*
DDCB d E6	SET 4, (IX + d)
DDCB d E7	LD A, SET 4, (IX + d)*
DDCB d E8	LD B, SET 5, (IX + d)*
DDCB d E9	LD C, SET 5, (IX + d)*
DDCB d EA	LD D, SET 5, (IX + d)*
DDCB d EB	LD E, SET 5, (IX + d)*
DDCB d EC	LD H, SET 5, (IX + d)*
DDCB d ED	LD L, SET 5, (IX + d)*
DDCB d EE	SET 5, (IX + d)
DDCB d EF	LD A, SET 5, (IX + d)*
DDCB d F0	LD B, SET 6, (IX + d)*
DDCB d F1	LD C, SET 6, (IX + d)*
DDCB d F2	LD D, SET 6, (IX + d)*
DDCB d F3	LD E, SET 6, (IX + d)*
DDCB d F4	LD H, SET 6, (IX + d)*
DDCB d F5	LD L, SET 6, (IX + d)*
DDCB d F6	SET 6, (IX + d)
DDCB d F7	LD A, SET 6, (IX + d)*
DDCB d F8	LD B, SET 7, (IX + d)*
DDCB d F9	LD C, SET 7, (IX + d)*
DDCB d FA	LD D, SET 7, (IX + d)*
DDCB d FB	LD E, SET 7, (IX + d)*
DDCB d FC	LD H, SET 7, (IX + d)*
DDCB d FD	LD L, SET 7, (IX + d)*
DDCB d FE	SET 7, (IX + d)
DDCB d FF	LD A, SET 7, (IX + d)*
DDE1	POP IX
DDE3	EX (SP), IX
DDE5	PUSH IX
DDE9	JP (IX)
DDF9	LD SP, IX
DE n	SBC A, n
DF	RST 18h
E0	RET PO
E1	POP HL
E2 n n	JP PO, nn
E3	EX (SP), HL
E4 n n	CALL PO, nn
E5	PUSH HL
E6 n	AND n
E7	RST 20h
E8	RET PE
E9	JP (HL)
EA n n	JP PE, (nn)
EB	EX DE, HL
EC n n	CALL PE, nn
ED40	IN B, (C)
ED41	OUT (C), B
ED42	SBC HL, BC
ED43 n n	LD (nn), BC
ED44	NEG
ED45	RETN
ED46	IM 0
ED47	LD I, A
ED48	IN C, (C)
ED49	OUT (C), C
ED4A	ADC HL, BC
ED4B n n	LD BC, (nn)
ED4C	NEG*
ED4D	RETI
ED4E	IM 0/1*
ED4F	LD R, A
ED50	IN D, (C)
ED51	OUT (C), D
ED52	SBC HL, DE
ED53 n n	LD (nn), DE
ED54	NEG*
ED55	RETN*
ED56	IM 1
ED57	LD A, I
ED58	IN E, (C)
ED59	OUT (C), E
ED5A	ADC HL, DE
ED5B n n	LD DE, (nn)
ED5C	NEG*
ED5D	RETN*
ED5E	IM 2
ED5F	LD A, R
ED60	IN H, (C)
ED61	OUT (C), H
ED62	SBC HL, HL
ED63 n n	LD (nn), HL
ED64	NEG*
ED65	RETN*
ED66	IM 0*
ED67	RRD
ED68	IN L, (C)
ED69	OUT (C), L
ED6A	ADC HL, HL
ED6B n n	LD HL, (nn)
ED6C	NEG*
ED6D	RETN*
ED6E	IM 0/1*
ED6F	RLD
ED70	IN (C)* / IN F, (C)*
ED71	OUT (C), 0*
ED72	SBC HL, SP
ED73 n n	LD (nn), SP
ED74	NEG*
ED75	RETN*
ED76	IM 1*
ED78	IN A, (C)
ED79	OUT (C), A
ED7A	ADC HL, SP
ED7B n n	LD SP, (nn)
ED7C	NEG*
ED7D	RETN*
ED7E	IM 2*
EDA0	LDI
EDA1	CPI
EDA2	INI
EDA3	OUTI
EDA8	LDD
EDA9	CPD
EDAA	IND
EDAB	OUTD
EDB0	LDIR
EDB1	CPIR
EDB2	INIR
EDB3	OTIR
EDB8	LDDR
EDB9	CPDR
EDBA	INDR
EDBB	OTDR
EE n	XOR n
EF	RST 28h
F0	RET P
F1	POP AF
F2 n n	JP P, nn
F3	DI
F4 n n	CALL P, nn
F5	PUSH AF
F6 n	OR n
F7	RST 30h
F8	RET M
F9	LD SP, HL
FA n n	JP M, nn
FB	EI
FC n n	CALL M, nn
FD09	ADD IY, BC
FD19	ADD IY, DE
FD21 n n	LD IY, nn
FD22 n n	LD (nn), IY
FD23	INC IY
FD24	INC IY_H*
FD25	DEC IY_H*
FD26 n	LD IY_H, n*
FD29	ADD IY, IY
FD2A n n	LD IY, (nn)
FD2B	DEC IY
FD2C	INC IY_L*
FD2D	DEC IY_L*
FD2E n	LD IY_L, n*
FD34 d	INC (IY + d)
FD35 d	DEC (IY + d)
FD36 d n	LD (IY + d), n
FD39	ADD IY, SP
FD44	LD B, IY_H*
FD45	LD B, IY_L*
FD46 d	LD B, (IY + d)
FD4C	LD C, IY_H*
FD4D	LD C, IY_L*
FD4E d	LD C, (IY + d)
FD54	LD D, IY_H*
FD55	LD D, IY_L*
FD56 d	LD D, (IY + d)
FD5C	LD E, IY_H*
FD5D	LD E, IY_L*

FD5E d	LD E, (IY + d)	FDCB d 20	LD B, SLA (IY + d)*	FDCB d 73	BIT 6, (IY + d)*
FD60	LD IY_H, B*	FDCB d 21	LD C, SLA (IY + d)*	FDCB d 74	BIT 6, (IY + d)*
FD61	LD IY_H, C*	FDCB d 22	LD D, SLA (IY + d)*	FDCB d 75	BIT 6, (IY + d)*
FD62	LD IY_H, D*	FDCB d 23	LD E, SLA (IY + d)*	FDCB d 76	BIT 6, (IY + d)
FD63	LD IY_H, E*	FDCB d 24	LD H, SLA (IY + d)*	FDCB d 77	BIT 6, (IY + d)*
FD64	LD IY_H, IY_H*	FDCB d 25	LD L, SLA (IY + d)*	FDCB d 78	BIT 7, (IY + d)*
FD65	LD IY_H, IY_L*	FDCB d 26	SLA (IY + d)	FDCB d 79	BIT 7, (IY + d)*
FD66 d	LD H, (IY + d)	FDCB d 27	LD A, SLA (IY + d)*	FDCB d 7A	BIT 7, (IY + d)*
FD67	LD IY_H, A*	FDCB d 28	LD B, SRA (IY + d)*	FDCB d 7B	BIT 7, (IY + d)*
FD68	LD IY_L, B*	FDCB d 29	LD C, SRA (IY + d)*	FDCB d 7C	BIT 7, (IY + d)*
FD69	LD IY_L, C*	FDCB d 2A	LD D, SRA (IY + d)*	FDCB d 7D	BIT 7, (IY + d)*
FD6A	LD IY_L, D*	FDCB d 2B	LD E, SRA (IY + d)*	FDCB d 7E	BIT 7, (IY + d)
FD6B	LD IY_L, E*	FDCB d 2C	LD H, SRA (IY + d)*	FDCB d 7F	BIT 7, (IY + d)*
FD6C	LD IY_L, IY_H*	FDCB d 2D	LD L, SRA (IY + d)*	FDCB d 80	LD B, RES 0, (IY + d)*
FD6D	LD IY_L, IY_L*	FDCB d 2E	SRA (IY + d)	FDCB d 81	LD C, RES 0, (IY + d)*
FD6E d	LD L, (IY + d)	FDCB d 2F	LD A, SRA (IY + d)*	FDCB d 82	LD D, RES 0, (IY + d)*
FD6F	LD IY_L, A*	FDCB d 30	LD B, SLL (IY + d)*	FDCB d 83	LD E, RES 0, (IY + d)*
FD70 d	LD (IY + d), B	FDCB d 31	LD C, SLL (IY + d)*	FDCB d 84	LD H, RES 0, (IY + d)*
FD71 d	LD (IY + d), C	FDCB d 32	LD D, SLL (IY + d)*	FDCB d 85	LD L, RES 0, (IY + d)*
FD72 d	LD (IY + d), D	FDCB d 33	LD E, SLL (IY + d)*	FDCB d 86	RES 0, (IY + d)
FD73 d	LD (IY + d), E	FDCB d 34	LD H, SLL (IY + d)*	FDCB d 87	LD A, RES 0, (IY + d)*
FD74 d	LD (IY + d), H	FDCB d 35	LD L, SLL (IY + d)*	FDCB d 88	LD B, RES 1, (IY + d)*
FD75 d	LD (IY + d), L	FDCB d 36	SLL (IY + d)*	FDCB d 89	LD C, RES 1, (IY + d)*
FD77 d	LD (IY + d), A	FDCB d 37	LD A, SLL (IY + d)*	FDCB d 8A	LD D, RES 1, (IY + d)*
FD7C	LD A, IY_H*	FDCB d 38	LD B, SRL (IY + d)*	FDCB d 8B	LD E, RES 1, (IY + d)*
FD7D	LD A, IY_L*	FDCB d 39	LD C, SRL (IY + d)*	FDCB d 8C	LD H, RES 1, (IY + d)*
FD7E d	LD A, (IY + d)	FDCB d 3A	LD D, SRL (IY + d)*	FDCB d 8D	LD L, RES 1, (IY + d)*
FD84	ADD A, IY_H*	FDCB d 3B	LD E, SRL (IY + d)*	FDCB d 8E	RES 1, (IY + d)
FD85	ADD A, IY_L*	FDCB d 3C	LD H, SRL (IY + d)*	FDCB d 8F	LD A, RES 1, (IY + d)*
FD86 d	ADD A, (IY + d)	FDCB d 3D	LD L, SRL (IY + d)*	FDCB d 90	LD B, RES 2, (IY + d)*
FD8C	ADC A, IY_H*	FDCB d 3E	SRL (IY + d)	FDCB d 91	LD C, RES 2, (IY + d)*
FD8D	ADC A, IY_L*	FDCB d 3F	LD A, SRL (IY + d)*	FDCB d 92	LD D, RES 2, (IY + d)*
FD8E d	ADC A, (IY + d)	FDCB d 40	BIT 0, (IY + d)*	FDCB d 93	LD E, RES 2, (IY + d)*
FD94	SUB IY_H*	FDCB d 41	BIT 0, (IY + d)*	FDCB d 94	LD H, RES 2, (IY + d)*
FD95	SUB IY_L*	FDCB d 42	BIT 0, (IY + d)*	FDCB d 95	LD L, RES 2, (IY + d)*
FD96 d	SUB (IY + d)	FDCB d 43	BIT 0, (IY + d)*	FDCB d 96	RES 2, (IY + d)
FD9C	SBC A, IY_H*	FDCB d 44	BIT 0, (IY + d)*	FDCB d 97	LD A, RES 2, (IY + d)*
FD9D	SBC A, IY_L*	FDCB d 45	BIT 0, (IY + d)*	FDCB d 98	LD B, RES 3, (IY + d)*
FD9E d	SBC A, (IY + d)	FDCB d 46	BIT 0, (IY + d)	FDCB d 99	LD C, RES 3, (IY + d)*
FDA4	AND IY_H*	FDCB d 47	BIT 0, (IY + d)*	FDCB d 9A	LD D, RES 3, (IY + d)*
FDA5	AND IY_L*	FDCB d 48	BIT 1, (IY + d)*	FDCB d 9B	LD E, RES 3, (IY + d)*
FDA6 d	AND (IY + d)	FDCB d 49	BIT 1, (IY + d)*	FDCB d 9C	LD H, RES 3, (IY + d)*
FDAC	XOR IY_H*	FDCB d 4A	BIT 1, (IY + d)*	FDCB d 9D	LD L, RES 3, (IY + d)*
FDAD	XOR IY_L*	FDCB d 4B	BIT 1, (IY + d)*	FDCB d 9E	RES 3, (IY + d)
FDAE d	XOR (IY + d)	FDCB d 4C	BIT 1, (IY + d)*	FDCB d 9F	LD A, RES 3, (IY + d)*
FDB4	OR IY_H*	FDCB d 4D	BIT 1, (IY + d)*	FDCB d A0	LD B, RES 4, (IY + d)*
FDB5	OR IY_L*	FDCB d 4E	BIT 1, (IY + d)	FDCB d A1	LD C, RES 4, (IY + d)*
FDB6 d	OR (IY + d)	FDCB d 4F	BIT 1, (IY + d)*	FDCB d A2	LD D, RES 4, (IY + d)*
FDBC	CP IY_H*	FDCB d 50	BIT 2, (IY + d)*	FDCB d A3	LD E, RES 4, (IY + d)*
FDBD	CP IY_L*	FDCB d 51	BIT 2, (IY + d)*	FDCB d A4	LD H, RES 4, (IY + d)*
FDBE d	CP (IY + d)	FDCB d 52	BIT 2, (IY + d)*	FDCB d A5	LD L, RES 4, (IY + d)*
FDCB d 00	LD B, RLC (IY + d)*	FDCB d 53	BIT 2, (IY + d)*	FDCB d A6	RES 4, (IY + d)
FDCB d 01	LD C, RLC (IY + d)*	FDCB d 54	BIT 2, (IY + d)*	FDCB d A7	LD A, RES 4, (IY + d)*
FDCB d 02	LD D, RLC (IY + d)*	FDCB d 55	BIT 2, (IY + d)*	FDCB d A8	LD B, RES 5, (IY + d)*
FDCB d 03	LD E, RLC (IY + d)*	FDCB d 56	BIT 2, (IY + d)	FDCB d A9	LD C, RES 5, (IY + d)*
FDCB d 04	LD H, RLC (IY + d)*	FDCB d 57	BIT 2, (IY + d)*	FDCB d AA	LD D, RES 5, (IY + d)*
FDCB d 05	LD L, RLC (IY + d)*	FDCB d 58	BIT 3, (IY + d)*	FDCB d AB	LD E, RES 5, (IY + d)*
FDCB d 06	RLC (IY + d)	FDCB d 59	BIT 3, (IY + d)*	FDCB d AC	LD H, RES 5, (IY + d)*
FDCB d 07	LD A, RLC (IY + d)*	FDCB d 5A	BIT 3, (IY + d)*	FDCB d AD	LD L, RES 5, (IY + d)*
FDCB d 08	LD B, RRC (IY + d)*	FDCB d 5B	BIT 3, (IY + d)*	FDCB d AE	RES 5, (IY + d)
FDCB d 09	LD C, RRC (IY + d)*	FDCB d 5C	BIT 3, (IY + d)*	FDCB d AF	LD A, RES 5, (IY + d)*
FDCB d 0A	LD D, RRC (IY + d)*	FDCB d 5D	BIT 3, (IY + d)*	FDCB d B0	LD B, RES 6, (IY + d)*
FDCB d 0B	LD E, RRC (IY + d)*	FDCB d 5E	BIT 3, (IY + d)	FDCB d B1	LD C, RES 6, (IY + d)*
FDCB d 0C	LD H, RRC (IY + d)*	FDCB d 5F	BIT 3, (IY + d)*	FDCB d B2	LD D, RES 6, (IY + d)*
FDCB d 0D	LD L, RRC (IY + d)*	FDCB d 60	BIT 4, (IY + d)*	FDCB d B3	LD E, RES 6, (IY + d)*
FDCB d 0E	RRC (IY + d)	FDCB d 61	BIT 4, (IY + d)*	FDCB d B4	LD H, RES 6, (IY + d)*
FDCB d 0F	LD A, RRC (IY + d)*	FDCB d 62	BIT 4, (IY + d)*	FDCB d B5	LD L, RES 6, (IY + d)*
FDCB d 10	LD B, RL (IY + d)*	FDCB d 63	BIT 4, (IY + d)*	FDCB d B6	RES 6, (IY + d)
FDCB d 11	LD C, RL (IY + d)*	FDCB d 64	BIT 4, (IY + d)*	FDCB d B7	LD A, RES 6, (IY + d)*
FDCB d 12	LD D, RL (IY + d)*	FDCB d 65	BIT 4, (IY + d)*	FDCB d B8	LD B, RES 7, (IY + d)*
FDCB d 13	LD E, RL (IY + d)*	FDCB d 66	BIT 4, (IY + d)	FDCB d B9	LD C, RES 7, (IY + d)*
FDCB d 14	LD H, RL (IY + d)*	FDCB d 67	BIT 4, (IY + d)*	FDCB d BA	LD D, RES 7, (IY + d)*
FDCB d 15	LD L, RL (IY + d)*	FDCB d 68	BIT 5, (IY + d)*	FDCB d BB	LD E, RES 7, (IY + d)*
FDCB d 16	RL (IY + d)	FDCB d 69	BIT 5, (IY + d)*	FDCB d BC	LD H, RES 7, (IY + d)*
FDCB d 17	LD A, RL (IY + d)*	FDCB d 6A	BIT 5, (IY + d)*	FDCB d BD	LD L, RES 7, (IY + d)*
FDCB d 18	LD B, RR (IY + d)*	FDCB d 6B	BIT 5, (IY + d)*	FDCB d BE	RES 7, (IY + d)
FDCB d 19	LD C, RR (IY + d)*	FDCB d 6C	BIT 5, (IY + d)*	FDCB d BF	LD A, RES 7, (IY + d)*
FDCB d 1A	LD D, RR (IY + d)*	FDCB d 6D	BIT 5, (IY + d)*	FDCB d C0	LD B, SET 0, (IY + d)*
FDCB d 1B	LD E, RR (IY + d)*	FDCB d 6E	BIT 5, (IY + d)	FDCB d C1	LD C, SET 0, (IY + d)*
FDCB d 1C	LD H, RR (IY + d)*	FDCB d 6F	BIT 5, (IY + d)*	FDCB d C2	LD D, SET 0, (IY + d)*
FDCB d 1D	LD L, RR (IY + d)*	FDCB d 70	BIT 6, (IY + d)*	FDCB d C3	LD E, SET 0, (IY + d)*
FDCB d 1E	RR (IY + d)	FDCB d 71	BIT 6, (IY + d)*	FDCB d C4	LD H, SET 0, (IY + d)*
FDCB d 1F	LD A, RR (IY + d)*	FDCB d 72	BIT 6, (IY + d)*	FDCB d C5	LD L, SET 0, (IY + d)*

FDCB d C6	SET 0, (IY + d)
FDCB d C7	LD A, SET 0, (IY + d)*
FDCB d C8	LD B, SET 1, (IY + d)*
FDCB d C9	LD C, SET 1, (IY + d)*
FDCB d CA	LD D, SET 1, (IY + d)*
FDCB d CB	LD E, SET 1, (IY + d)*
FDCB d CC	LD H, SET 1, (IY + d)*
FDCB d CD	LD L, SET 1, (IY + d)*
FDCB d CE	SET 1, (IY + d)
FDCB d CF	LD A, SET 1, (IY + d)*
FDCB d D0	LD B, SET 2, (IY + d)*
FDCB d D1	LD C, SET 2, (IY + d)*
FDCB d D2	LD D, SET 2, (IY + d)*
FDCB d D3	LD E, SET 2, (IY + d)*
FDCB d D4	LD H, SET 2, (IY + d)*
FDCB d D5	LD L, SET 2, (IY + d)*
FDCB d D6	SET 2, (IY + d)
FDCB d D7	LD A, SET 2, (IY + d)*
FDCB d D8	LD B, SET 3, (IY + d)*
FDCB d D9	LD C, SET 3, (IY + d)*
FDCB d DA	LD D, SET 3, (IY + d)*
FDCB d DB	LD E, SET 3, (IY + d)*
FDCB d DC	LD H, SET 3, (IY + d)*
FDCB d DD	LD L, SET 3, (IY + d)*
FDCB d DE	SET 3, (IY + d)
FDCB d DF	LD A, SET 3, (IY + d)*
FDCB d E0	LD B, SET 4, (IY + d)*
FDCB d E1	LD C, SET 4, (IY + d)*
FDCB d E2	LD D, SET 4, (IY + d)*
FDCB d E3	LD E, SET 4, (IY + d)*
FDCB d E4	LD H, SET 4, (IY + d)*
FDCB d E5	LD L, SET 4, (IY + d)*
FDCB d E6	SET 4, (IY + d)
FDCB d E7	LD A, SET 4, (IY + d)*
FDCB d E8	LD B, SET 5, (IY + d)*
FDCB d E9	LD C, SET 5, (IY + d)*
FDCB d EA	LD D, SET 5, (IY + d)*
FDCB d EB	LD E, SET 5, (IY + d)*
FDCB d EC	LD H, SET 5, (IY + d)*
FDCB d ED	LD L, SET 5, (IY + d)*
FDCB d EE	SET 5, (IY + d)
FDCB d EF	LD A, SET 5, (IY + d)*
FDCB d F0	LD B, SET 6, (IY + d)*
FDCB d F1	LD C, SET 6, (IY + d)*
FDCB d F2	LD D, SET 6, (IY + d)*
FDCB d F3	LD E, SET 6, (IY + d)*
FDCB d F4	LD H, SET 6, (IY + d)*
FDCB d F5	LD L, SET 6, (IY + d)*
FDCB d F6	SET 6, (IY + d)
FDCB d F7	LD A, SET 6, (IY + d)*
FDCB d F8	LD B, SET 7, (IY + d)*
FDCB d F9	LD C, SET 7, (IY + d)*
FDCB d FA	LD D, SET 7, (IY + d)*
FDCB d FB	LD E, SET 7, (IY + d)*
FDCB d FC	LD H, SET 7, (IY + d)*
FDCB d FD	LD L, SET 7, (IY + d)*
FDCB d FE	SET 7, (IY + d)
FDCB d FF	LD A, SET 7, (IY + d)*
FDE1	POP IY
FDE3	EX (SP), IY
FDE5	PUSH IY
FDE9	JP (IY)
FDF9	LD SP, IY
FE n	CP n
FF	RST 38h