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A) Data transfer

size.				
1.	MOV r_1, r_2	1 M/C	OF	4T
1	MOV r, M	2 M/C	OF + mR	7T
1	MOV M, r	2 M/C	OF + mW	7T
2	MVI r, data (8 bit)	2 M/C	OF + mR	7T
3	LXI rp, data (16 bit)	3 M/C	OF + mR + mR	10 T
3	LDA addr (16 bit)	4 M/C	OF + mR + mR + mR	13T
3	STA addr	4 M/C	OF + mR + mR + mW	13T
3	LHLD addr	5m/C	OF + mR + mR + mR + mR	16T
3	SHLD addr	5m/C	OF + mR + mR + mR + mR	16T
1	LDAX rp	2m/c	OF + mR	7T
1	STAX rp	2 m/c	OF + mW	7T
1	XCHG (HL pair ⟷ DE)	1 m/c	OF	4T

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B) Arithmetic Group.

size					
1	ADD	r	1 M/C	OF	4T
1	ADD	M	2 M/C	OF + mR	7T
1	ADC	r	1 M/C	OF	4T
1	ADC	M	2 M/C	OF + mR	7T
2	ADI	data	2 m/c	OF + mR	7T
2	ACI	data	2 M/C	OF + mR	7T
1	DAD	rp	3 M/C	OF + Bus idle + Bus idle	10T
1	SUB	r	1 M/C	OF	4T
1	SUB	M	2 M/C	OF + mR	7T
1	SBB	r	1 M/C	OF	4T
1	SBB	M	2 M/C	OF + mR	7T
2	SUI	data	2 M/C	OF + mR	7T
2	SBI	data	2 M/C	OF + mR	7T
1	INR	r	1 M/C	OF	4T
1	INR	M	3 M/C	OF + mR + mR	10T

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1	DCR	r	1M/C	OF	4T
1	DCR	M	3M/C	OF+mR+mR	10T
1	INX	rp	1 M/C	OF	6T
1	DCX	rp	1 M/C	OF	6T
1	DAA		1 M/C	OF	4T

c) Logical Group.

1	ANA	r	1 M/C	OF	4T
1	ANA	M	2 M/C	OF + mR	7T
2	ANI	data	2 M/C	OF+mR	7T
1	ORA	r	1 M/C	OF	4T
1	ORA	M	2 M/C	OF+mR	7T
2	ORI	data	2 M/C	OF+mR	7T
1	XRA	r	1 M/C	OF	4T
1	XRA	M	2 M/C	OF + mR	7T
2	XRI	data	2 M/C	OF+mR	7T

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size					
1	CMA	1 M/C	OF	4T	
1	CMC	1 M/C	OF	4T	
1	STC	1 M/C	OF	4T	
1	CMP r	1 M/C	OF	4T	
1	CMP M	2 M/C	OF+mR	7T	
2	CPI data	2 M/C	OF+mR	7T	
1	RLC	1 M/C	OF	4T	
1	RRC	1 M/C	OF	4T	
1	RAL	1 M/C	OF	4T	
1	RAR	1 M/C	OF	4T	

D) Branch Control Group.

→ Unconditional Jump

size					
3	JMP addr	3 M/C	OF+mR+mR	10T	

→ Conditional Jump.

size					
3	JZ addr	if Z=1	3 M/C	OF+mR+mR	10T
		if Z=0	2 M/C	OF+mR	7T

(unnecessary but have to wait)

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size					
3	JNZ addr	if Z = 0	3 M/C	OF+mR+mR	10T
		if Z = 1	2 M/C	OF+mR	7T
3.	JC addr	if CS = 1	3 M/C	OF+mR+mR	10T
		if CS = 0	2 M/C	OF+mR	7T
3	JNC addr	if CS = 0	3 M/C	OF+mR+mR	10T
		if CS = 1	2 M/C	OF+mR	7T
3	JP addr	if S = 0	3 M/C	OF+mR+mR	10T
		if S = 1	2 M/C	OF+mR	7T
3	JM addr	if S = 1	3 M/C	OF+mR+mR	10T
		if S = 0	2 M/C	OF+mR	7T
3	JPE addr	if P = 1	3 M/C	OF+mR+mR	10T
		if P = 0	2 M/C	OF+mR	7T
3	JPO addr	if P = 0	3 M/C	OF+mR+mR	10T
		if P = 1	2 M/C	OF+mR	7T

→ Unconditional CALL

size				
3	CALL addr	5 M/C	OF+mR+mR+mW+mW	18T

6 + 3(4)

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→ conditional CALL

write stack location

Size						
3	CC addr	if CS = 1	5m/c	OF + mR + mR + mW + mW	18 T
		if CS = 0	2[illegible]m/c	OF + mR [illegible]	9T
				6T → unnece. but has to be done	
3	CNC addr	if CS = 0	5m/c	OF + mR + mR + mW + mW	18T
		if CS = 1	2[illegible]m/c	OF + mR	9T
3	CZ addr	if Z = 1	5m/c	OF + mR + mR + mW + mW	18T
		if Z = 0	2[illegible]m/c	OF + mR	9T
3	CNZ addr	if Z = 0	5m/c	OF + mR + mR + mW + mW	18T
		if Z = 1	2[illegible]m/c	OF + mR	9T
3	CP addr	if S = 0	5m/c	OF + mR + mR + mW + mW	18 T
		if S = 1	2[illegible]m/c	OF + mR	9 T
3	CM addr	if S = 1	5m/c	OF + mR + mR + mW + mW	18T
		if S = 0	2m/c	OF + mR	9T
3	CPE addr	if P = 1	5m/c	OF + mR + mR + mW + mW	18T
		if P = 0	2m/c	OF + mR	9T
3	CPO addr	if P = 0	5m/c	OF + mR + mR + mW + mW	18T
		if P = 1	2m/c	OF + mR	9T

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→ Unconditional Return.

size					
1	RET		3 M/C	0F + mR + mR	10T

→ Conditional Return

size				read stack location	
1	RC	if CS = 1	3 m/c	0F + mR + mR	12T
		if CS = 0	1 m/c	0F	6T
1	RNC	if CS = 0	3 m/c	0F + mR + mR	12T
		if CS = 1	1 m/c	0F	6T
1	RZ	if Z = 1	3 m/c	0F + mR + mR	12T
		if Z = 0	1 m/c	0F	6T
1	RNZ	if Z = 0	3 m/c	0F + mR + mR	12T
		if Z = 1	1 m/c	0F	6T
1	RP	if S = 0	3 m/c	0F + mR + mR	12T
		if S = 1	1 m/c	0F	6T
1	RM	if S = 1	3 m/c	0F + mR + mR	12T
		if S = 0	1 m/c	0F	6T
1	RPE	if P = 1	3 m/c	0F + mR + mR	12T
		if P = 0	1 m/c	0F	6T
1	RPO	if P = 0	3 m/c	0F + mR + mR	12T
		if P = 1	1 m/c	0F	6T

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→ Restart.

1	RST n	3 M/C	OF + mW + mW (PC data → stack)	12T

instruction		loc^n	loc^n in decimal
RST	0	0000	0
RST	1	0008	8
RST	2	0010	16
RST	3	0018	24
RST	4	0020	32
RST	5	0028	40
RST	6	0030	48
RST	7	0038	56

E). PCHL

size

1	PCHL	1 M/C	OF	6T

F) Stack, I/O, Machine control

size

2	IN port - address	3 M/C	OF + mR + I/O R	10T
2	OUT port-address	3 M/C	OF + mR + I/O W	10T
1.	PUSH rp	3 M/C	OF + mW + mW	12 T
1	PUSH PSW	3M/C	OF + mW + mW	12 T

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1	POP rp	3 M/C	OF+mR+mR	10 T
1	POP PSW	3 m/c	OF+mR+mR	10T
1	HLT	1 M/C	OF + Bus idle	5T
1	XTHL			
1	SPHL	1 M/C	OF	6T
1	EI	1 M/C	OF	4T
1	SIM	1 M/C	OF	4T
1	RIM	1 M/C	OF	4T
1	NOP	1 M/C	OF	4T