



1 ADD : add rc, ra, rb

S0 PC → MemA, INC
 D_{read} → IR

S1 INC → PC

IR₅₋₃ → RA₁

IR₈₋₆ → RA₂

S2 IR₁₁₋₉ → RA₃

RD₁ → ALuA

RD₂ → ALuB

ALu → T₃

S3 T₃ → D_{in}

2 ADC : adc rc, ra, rb

S0 PC → MemA, INC
 D_{read} → IR

S1 INC → PC

IR₅₋₃ → RA₁

IR₈₋₆ → RA₂

S2 IR₁₁₋₉ → RA₃

RD₁ → ALuA

RD₂ → ALuB

ALu → T₃

S4 if (C == 1) then
 T₃ → D_{in}

3 ADZ : adz rc, ra, rb

S0 PC → MemA, INC
 D_{read} → IR

S1 INC → PC

IR₅₋₃ → RA₁

IR₈₋₆ → RA₂

S2 IR₁₁₋₉ → RA₃

RD₁ → ALuA

RD₂ → ALuB

ALu → T₃

S5 if (Z == 1) then
 T₃ → D_{in}

4 ADL : add rc, ra, rb

S0 PC → MemA, INC
 D_{read} → IR

S1 INC → PC

IR₅₋₃ → RA₁

IR₈₋₆ → RA₂

S6 IR₁₁₋₉ → RA₃

RD₁ → ALuA

RD₂ → Shift → ALuB

ALuC → T₃

S3 T₃ → D_{in}

5. ADI : ndi rc,ra,imm5

S0 PC → Mem A, INC
 Dread → IR

S1 INC → PC

IR8-6 → RA1

S7 IR11-9 → RA3

IR5-0 → SE6 → ALUB

RD1 → ALUA

ALUC → T3

S3 T3 → Din

6 NDV : ndv rc,ra,rb

S0 PC → Mem A, INC
 Dread → IR

S1 INC → PC

IR5-3 → RA1

S56 IR8-6 → RA2

IR11-9 → RA3

RD1 → ALUA

AD2 → ALUB

ALUC → T3

S3 T3 → Din

7. NDC : ndc rc,ra,rb

S0 PC → Mem A, INC
 Dread → IR

S1 INC → PC

IR5-3 → RA1

IR8-6 → RA2

SE6 IR11-9 → RA3

RD1 → ALUA

RD2 → ALUB

ALUC → T3

S4 IF (C == 1) then

T3 → Din

8. NDZ ndz rc,ra,rb

S0 PC → Mem A, INC
 Dread → IR

S1 INC → PC

IR5-3 → RA1

S56 IR8-6 → RA2

IR11-9 → RA3

RD1 → ALUA

RD2 → ALUB

ALUC → T3

S5 IF (Z == 1) then

T3 → Din

9. LHI : lhi ra, Imm

S0 PC → MemA, INC
Dread → IR

S1 INC → PC

S8 IR11-9 → RA3

S9 IR8-0 → Shift → Din

10. LW : lw ra, rb, Imm

S0 PC → MemA, INC
Dread → IR

S1 INC → PC

IR8-6 → RA1

IR11-9 → RA3

S10 IR5-0 → ALUB

RD1 → ALUA

ALUC → T3

S11 T3 → MemA
Dread → Din

11. SW : sw ra, rb, Imm

S0 PC → MemA, INC
Dread → IR

S1 INC → PC

IR9-9 → RA2

IR8-6 → RA1

S12 IR5-0 → ALUB

RD1 → ALUA

ALUC → T3

S13 T3 → MemA

S14 RD2 → MDin

12. BEQ

IR₈₋₆ → R-A₂S15 IR₁₁₋₉ → R-A₁RD₁ → ALU ARD₂ → ALU B

if (z == 1) then

||| → R-A₁IR₅₋₀ → SE → ALU BS16 R-D₁ → ALU AALU C → T₃||| → R-A₃S3 T₃ → Din

14. JLR: jalr, ra, rb

S0 PC → Mem A, INC

Dread → IR

S1 INC → PC

IR₈₋₆ → R-A₁S19 IR₁₁₋₉ → R-A₃R-D₁ → ALU AIR₅₋₀ → SE₆ → ALU BALU C → T₃S3 T₃ → DinIR₈₋₆ → R-A₁IR₅₋₀ → SE₆ → ALU BS20 ||| → R-A₃R-D₁ → ALU AALU C → T₃S3 T₃ → Din

13. JAL: jalr ra, Imm

PC → Mem A, INC

Dread → IR

||| → R-A₁IR₁₁₋₉ → R-A₃S17 R-D₁ → ALU

+1 → ALB

ALU C → T₃S3 T₃ → Din||| → R-A₁IR₅₋₀ → SE₆ → ALU BS18 R-D₁ → ALU AALU C → T₃||| → R-A₃S3 T₃ → Din

15. JRI: jri ra, Imm

S0 PC → Mem A, INC

Dread → IR

IR₁₁₋₉ → R-A₁RD₁ → ALUS21 IR₈₋₆ → SE₆ → ALU BALU C → T₃||| → R-A₃S3 T₃ → Din

16

LM : Low reg. Imm

IF SM : Sm, reg. Imm

S0 PC \rightarrow MemA, INC
 Dread \rightarrow IR

S0 PC \rightarrow MemA, INC
 Dread \rightarrow IR

S1 INC \rightarrow PC

S1 INC \rightarrow PC

IR₁₁₋₉ \rightarrow R-A₁

IR₁₁₋₉ \rightarrow R-A₁

R-D₁ \rightarrow ALU A

S39 RD₁ \rightarrow SP

S22 T0 \rightarrow ALU B

000 \rightarrow R-A₂

ALU C \rightarrow T₃

S40 SP \rightarrow MemA, INC

T₃ \rightarrow MemA

S23 000 \rightarrow R-A₃

S41 INC \rightarrow SP

if (R₀ == 1) then

if (R₀ == 1) then

S24 Dout \rightarrow Din

R-D₂ \rightarrow M-Din

S25 001 \rightarrow R-A₃

S42 001 \rightarrow R-A₂

if (R₁ == 1) then

SP \rightarrow MemA, INC

S26 Dout \rightarrow Din

INC \rightarrow SP

S27 010 \rightarrow R-A₃

S43 if (R₁ == 1) then

if (R₂ == 1) then

R-D₂ \rightarrow M-Din

S28 Dout \rightarrow Din

S44 010 \rightarrow R-A₂

S29 011 \rightarrow R-A₃

SP \rightarrow MemA, INC

if (R₃ == 1) then

S30 Dout \rightarrow Din

S45 INC \rightarrow SP

if (R₂ == 1) then

S31 100 \rightarrow R-A₃

R-D₂ \rightarrow M-Din

if (R₄ == 1) then

S32 Dout \rightarrow Din

S33 101 \rightarrow R-A3
 if (R5==1) then

S34 Dout \rightarrow Din

S35 110 \rightarrow R-A3
 if (R6==1) then

S36 Dout \rightarrow Din

S37 111 \rightarrow R-A3
 if (R7==1) then

S38 Dout \rightarrow Din

S46 011 \rightarrow R-A2
 SP \rightarrow MemA, INC

INC \rightarrow SP
 S47 if (R3==1) then
 R-D2 \rightarrow MDin

S48 100 \rightarrow R-A2
 SP \rightarrow MemA, INC

INC \rightarrow SP
 49 if (R4==1) then
 R-D2 \rightarrow MDin

S50 101 \rightarrow R-A2
 SP \rightarrow MemA, INC

S51 INC \rightarrow SP
 if (R5==1) then
 R-D2 \rightarrow MDin

S52 110 \rightarrow R-A2
 SP \rightarrow MemA, INC

INC \rightarrow SP
 S53 if (R6==1) then
 A-D2 \rightarrow MDin

S54 111 \rightarrow R-A2
 SP \rightarrow MemA, INC

S55 INC \rightarrow SP
 if (R7==1) then
 A-D2 \rightarrow MDin