

1

[]

 가 (PLC)

[]

lean) , 가 (PLC), (boo
 가 가 .

[]

 가 . 가 . ,가
 , 가 가 . , 가

 , 가 (PLC)

 가 . , .

 PLC , PLC 가 가

 PLC ; ;
 가 .

 , 가, PLC PLC

 . , PLC PLC 5 - 10 300 - 500
 . . 가 가

160

가 ,

40 가

가 가

PLC 가 가

가

가 가 가

가 가

(RAM)

(fetch)

가

[]

1

가

2

3

[]

가

(ladder)

(PDS)

(BP)

16

가

가

BP

BP

가

. BP가

(format)

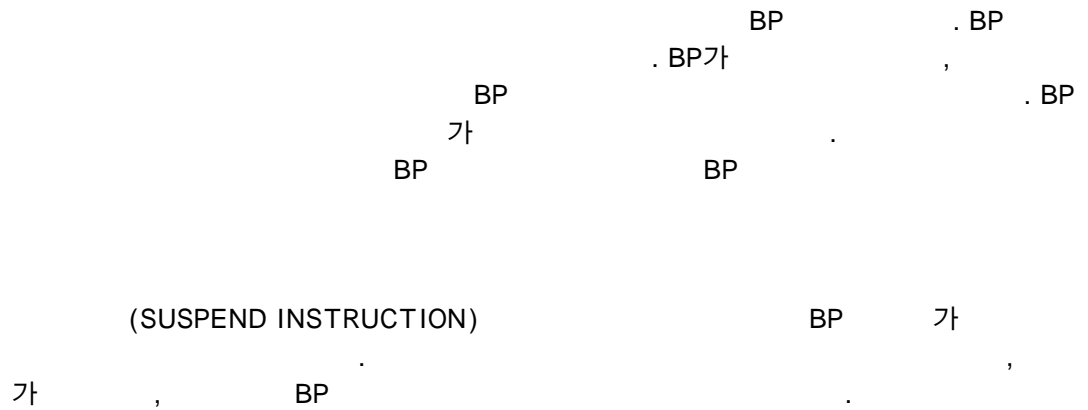
68020

PLC

BP ((prefetch unit) (execution unit))
 , (base register) (displacement)

PDS

(OPERATION WITH THE HOST PROCESSOR)



2 , 4 : (done), (hold), (active) (hold
 for interrupt) , BPPC ,
 (assert)
 BPPC (, halt) (, BUS error = berr)

가 (encounter)

1. SUSP()
2. SUSP
3. (illegal)
- 4.

SUSP , BP SUSP

BP가 , . BP
 . PDS , (idle clock)
 16 .
 , (SUSP) , BP (DONE) . BPPC SUSP
 .
 BPPC , BP (BP fault address register)
 , SUSP / B
 PPC BP (offending instruction)
 BP (negate) 가 .
 , BP , (long)
 DMA 가 BP
 BP 가 BPPC가 , BP
 가 PC 가 BP
 BPPC 가 , BPPC BP
 . 가 BP BP
 BP 가 BP가
 , BP
 1 2 . 1 (PDS) /
 . 2 , 가
 1 , mcr/jmp
 가 . (instruction queue) . 2
 . 1 2
 가 .

(DETAILED OPERATIONAL DESCRIPTION)

1 , 가 (PLC) PLC
 가 68020 (BP) . BP (μP)가 . μP
 PLC . PLC
 PLC BP

uit) , BP (ASIC : application specific integrated circ
ord , 가 8mWord . 64K (discretes) , 1mW (f
orce) 16Kb . 16Kb (word force) 1
(one - shot history bits) .

가 , (context) / , 가 .
. 가 ,
3 , (BP) ,
. BP 3 : , 가 , 3
, BP 가 (" pdecode") .

(PREFETCH UNIT)

BP 가 . 3 instlat, udecode, ldecode, basereg, j
mp, mcr .

1 . 2 . " ins
tlat" (. 68020
). instlat (long word) . instlat
2 . uuword/ulword lword . " udeco
de" " ldecode" " instlat" .

. " basereg"
. " jmp" " mcr" JMP MCR
8 가 0 0 (all zero signal) .

(INSTRUCTION QUEUE)

" (, fifo)" .
4 (4 deep fifo) . 2 .
(empty) (full) .

(EXECUTION UNIT)

" exec" " " 1 .

BP (HOST PROCESSOR TO BP INTERFACE)

" pdecode" 68020

가 .

(DATA AND REGISTER DESCRIPTIONS)

(DATA ORGANIZATION)

16 1 (entities) . 16 68020 1

(IMAGE REGISTER)

65536 (for
ce bit) . 1 (one shot history) 65536 . 1

(PUSH DOWN STACK, PDS)

1 (destination) (source) . (MS
B)가 (top) 16 , . 1
5 .

MCR JMP (MCR AND JMP REGISTER)

MCR JMP 4 가 8
JMP MCR .

(PROGRAM COUNTER)

2 (BPPC)
(NBPPC) . BPPC . BPPC 가
NBPPC . NBPPC , NBPPC
(displacement) . PC

(BASE REGISTER)

0 - 2가 . 16

(INSTRUCTION DESCRIPTIONS)

AND/AND_N

AND ("ands") , (c
omplemented) . AND_N (c
) (signed displacement) 11 (

STEPEN . STEPEN 가 0 , 0 .

OR/OR_N

OR , OR (" ors") ,
 . OR_N
 STEPEN 11 STEPEN 가 0 , 0

OUT/OUT_N

OUT . OUT_N
 JMP 가 OUT OUT_N MCR, JMP FORCE ()
 (nop) , OUT OUT
 0 JMP 가 OUT OUT_N
 JMP MCR 11

STR/STR_N

STR (bottom) . STR
 _N
 11 STEPEN 가 0 , 0

SUSP

SUSP 가 . SUSP
 BP 1 SUSP_T BP 가 0 SUSP_F
 BP . SUSP_T SUSP_F가 BP , SUSP
 8 BP가 , BPPC
 SUSP . BPPC SUSP

OS

OS 1 (ladder logic one shot function) . 0 1
 1 가 0
 1 0 , 1

LDA/LDAL

LDA/LDAL	16	8	(operand)	256	. LDAL	16	LDA
SKIPS/SKIPL							
SKIPS_T/SKIPL_T	8	1	BP가	SKIPL	20	SKIPL	0
CLRL							
CLRL	1		JMP 가	(nop)	JMP	MCR	MCR 가
SETL							
SETL	1		JMP 가	(nop)	JMP	MCR	MCR 가
AND STR							
AND_STR	2		(0)가	" and"	1	(pop)	
OR_STR							
OR_STR	2		(0)가	" or"	1		
SET_MCR/CLR_MCR							
SET_MCR CLR_MCR			MCR		. 0 - 7	가	8 MCR
가 . SET_MCR			MCR	CLR_MCR	MCR		
SET_JMP/CLR_JMP							
SET_JMP CLR_JMP			JMP		. 0 - 7	가	8 JMP
가 . SET_JMP			JMP	CLR_JMP	JMP		
SET_STE/CLR_STE							

SET_STE CLR_STE STE . SET_STE STE C
 LR_STE STE . STE 가 , .

RESLV/RESLV_N

RESLV and . RESLV_N
 d" . 16 " an
 (LSB) 가 , (MSB) 가 " and"

LDPDS

LDPDS 16 PDS STEPEN 가 , 0
 . NOP 1 (nop) .

LABEL

LABEL 20 가 2 (nop) .

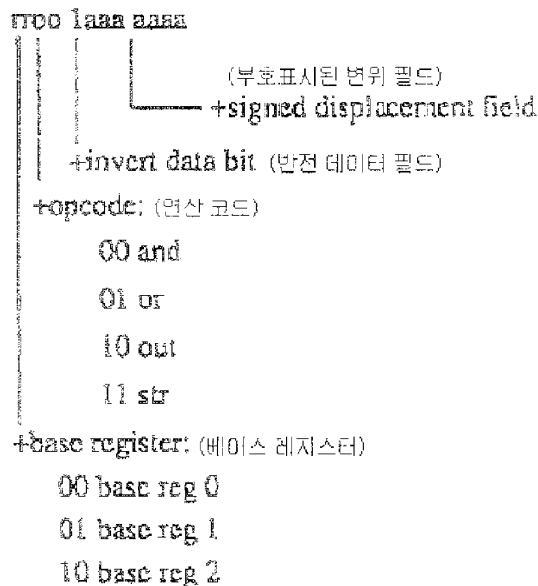
(BASIC INSTRUCTION FORMATS)

(opcode) 8 2 : (single) .
 aligned) , FF 가 , 가 (word
 (longword aligned) .

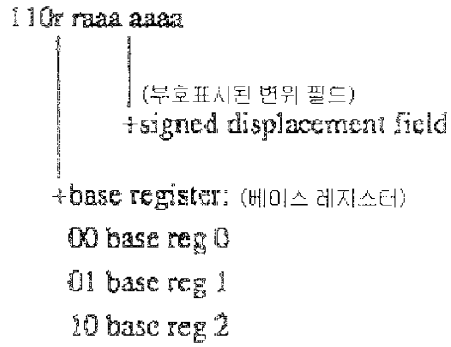
(SINGLE WORD INSTRUCTION FORMATS)

(BIT SIGNED DISPLACEMENT)

11 9 가 . \$0000~\$D7FF . 5
 가 11 . 2
 2가 가 . 1 . MSB 가 0

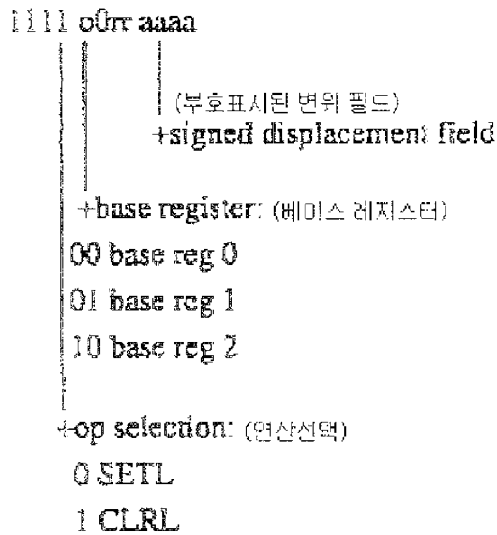


2 MSB가 , 2 가 , 1 가



(BIT SIGNED DISPLACEMENT)

8 CLRL SETL 3

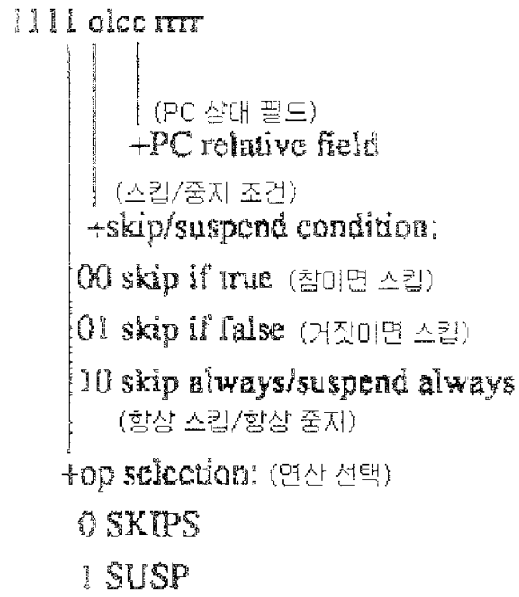


8 PC (8 BIT PC RELATIVE)

8 PC (SKIP)

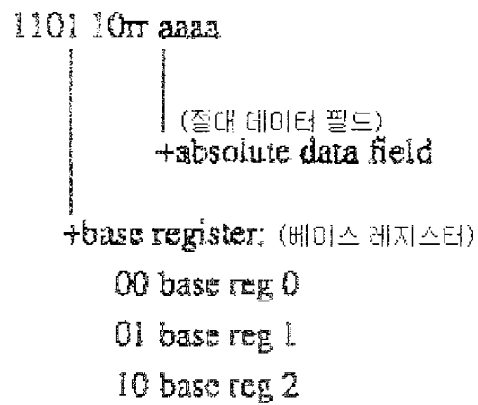
8

BP , SKIP_T / SUSP_F



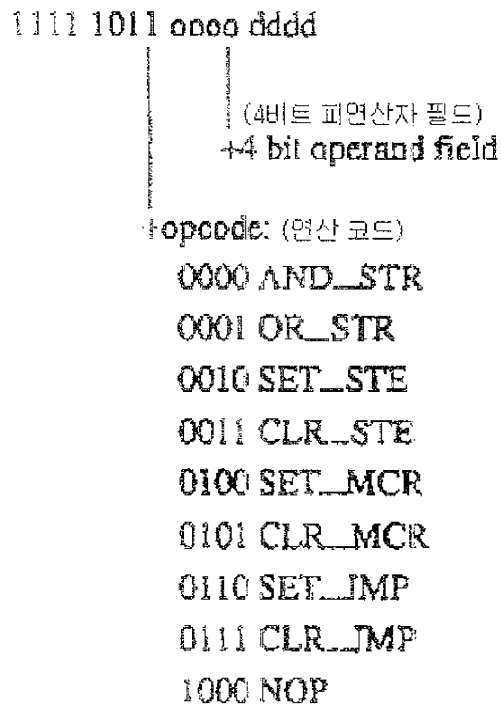
8 (8 BIT ABSOLUTE)

8 LDA 가 , LDA 8



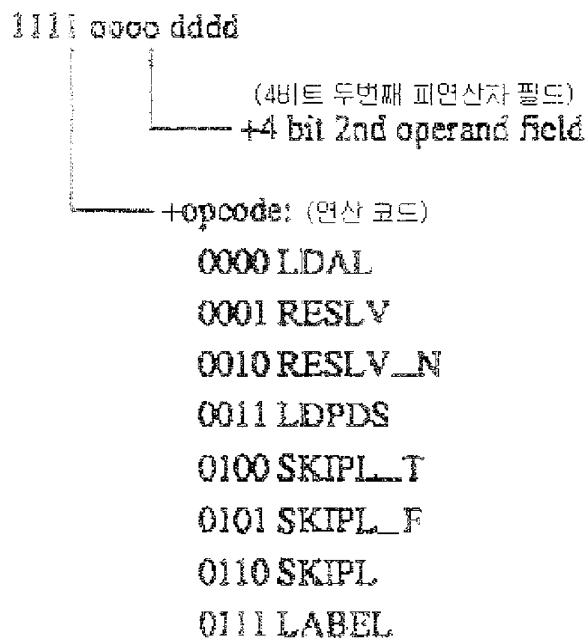
4 (4 BIT OPERAND)

, " dddd" 0 4



(DOUBLE WORD INSTRUCTION FORMATS)

4



SKIPL_T, SKIPL_F, SKIPL LABEL

4

" dddd"

20

4

4

(DETAILED MEMORY MAP DESCRIPTIONS)

(REGISTERS)

가 . (application)

. 가

(MEMORY MAP)

BP

8

1. , , jmp, mcr
2. , (packed), jmp, mcr ,
3. , , jmp, mcr ,
4. , , jmp, mcr ,
5. ,
6. ,
7. , (32)
- 8.

770000 77FFFF

BP

()

770000 PDS 16

770002 0 16

770004 1 16

770006 2 16

770008 BP 32

77000C BPPC 32

770010 BP 16

770012 MCR 8

770013 JMP 8
 770100 PDS 16
 770102 0 16
 770104 1 16
 770106 2 16
 770108 BP 32
 77010C BPPC 32
 770110 BP 16
 770112 MCR 8
 770113 JMP 8
 770200 8
 770201 8
 770202 8
 770203 (R/O) 8
 770204 PC 32
 770208 BP 32

(PROGRAM COUNTER)

BP 2 : PC PC PC(BPPC)
 C NBPPC PC(NBPPC) BPP
 2) 가 . NBPPC BPPC 4 (16 . BPP
) . , . 4 (16 2
 가 , NBPPC 가 . BPPC

BPPC (BPPC VALUE AFTER TERMINATION)

BPPC 가 . , . BPPC
 BPPC

BPPC BPPC
 PC BPPC

 PC PC
 BPPC (section)
 (int restart) PC
 가 가 BP

 BPPC BPPC BPPC BPPC
 BPPC (16 32) 16 32
 BPPC BPPC

 32 :

 BPPC+2 BPPC+4

 BPPC BPPC+2

 16 :

 BPPC+2

 BPPC

 NBPPC 가 , NBPPC

 / (SAVE/RESTORE DIFFERENCES)

 BPPC NBPPC /
 BPPC BP /
 BPPC BP BPPC NBPPC
 , / BPPC

 0 - 2(BASE REGISTER 0 - 2)

 BP 3 .
 가 (at least word wide and word aligned)

 , .

 (PUSH DOWN STACK, PDS)

 PDS , 0

. PDS 가 (\$770000)
(PDS 15) 7 0 , 1
0 0 6 .

JMP MCR (JMP AND MCR REGISTER)

JMP MCR 8 , OUT, OUT_N, S
ETL CLRL DMF .

(STATUS REGISTER)

2 : 0 7 .

(BIT DESCRIPTIONS)

BP STE .

1111 11

5432 1098

XX.. /

..X. STE

...X =1 :

.... X... =1 :

.... .X.. =1 : BPPC

.... ..X. =1 :

, PDS 가 (qualify) " STE BP가
" " 가 . 1
0 , BPPC BP . 9
가
0-7 .

/ (SAVE/RESTORE DIFFERENCES)

, / BP STE 가
 / MSB 가 BP가 (DONE) (MSB
 =0) (HOLD_FOR_INTERRUPT) (MSB=1)

(WAIT REGISTER)

7654 3210

XXX.

- 1

...X

/

- 1

.... .X..

(don't care)

(no effect)

가

.... ..X.

.... ..X - 1:

devd

pds(15:8)

5 - 7

3 - 4

1 1

0 PDS

8 가 D

EVD

가 \$40

3

, 1

(WORD IMAGE BASE AND SIZE REGISTERS)

가

(WISR)

WISR

()

00 128

01 256

03 512

07 1K

0F 2K

1F 4K

2F 8K

7F 16K

FF 32K

가 65K

(HOST PROCESSOR IMAGE ACCESS)

32K x 8

BP

8

32

(DISCRETE IMAGE REGISTER)

4 , PLC

JMP/MCR

(returned),

0 (taken).

LSB

가 8

+7

0

\$700000

\$71FFFF

MCR JMP

(conditioned).

MCR

가

JMP

가

MCR

가

J

가

\$720000

\$73FFFF

MP MCR

\$740000

\$74FFFF

가

, \$71

0023

\$740023

(WORD IMAGE REGISTER)

가

BP

\$750000

\$75FFFF

(word point)

LSB

\$C00742

\$750742

\$C003A9

\$7503A8

16

LVOP

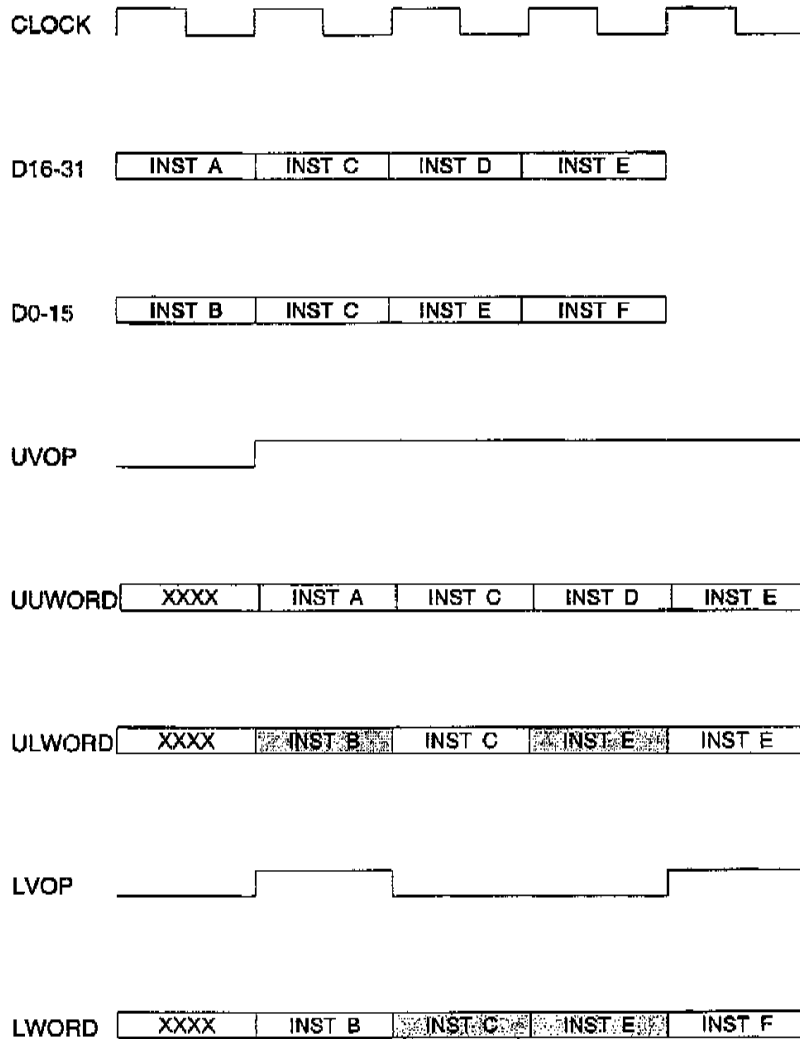
UVOP

LWORD

16 가

ULNORD 'INST B' 'INST A'가 1 , 'INST B'가 LWORD
 . LWORD 'INST C' , UNWORD ULWORD
 . ULWORD 'INST E' 'INST D'가
 LWORD 'INST E'
 (edge) , LWORD UUWORD ,
 ULWORD ,
 UUWORD ULWORD 'INST F' LWORD , 'INST E'

[]



LGNLW , UUWORD ULWORD , . CONTPEND 가 . A
 D 4MBS AND . UOPFX UUWORD 4 가 1 . U UWOR
 (buffing) 2 - 3

UOPXF 8 - 11 1 . UOPXB 8 - 11 16 'B' . UO
 PXF UOPXB UUWORD 8,9 11 (flip - flop)
 . NA220 IV140 UUWORD 10 AND
 . UOPXF , 4 (NAND) IV140

UVOP UVOPA UVOPB

(INSTRUCTION LATCH INPUTS)

(IDIN) , BP

CLKZ (falling edge)가 INSTLAT
3 . RESET

PWSRBPSR

SUSP PREFETCH BP가
 . LATCHOP PREFETCH , IDIN . PCWRT
 가
 . PCWRTDN
 가

INSTA(1) 1 , (IDIN)

IN16BIT 16 가 . BP가

(INSTRUCTION LATCH OPERATION)

, UVOP, LVOP CONTPEND . , INSTVLD CNTFLG
 . INSTVLD 가 . CNTFLG

LATCHOP가
 INSTVLD . 가 , INST(1) 0 . LATCHOP가 ,
 , UVOP . BP가 , U
 VOP LATCHOP . IDIN . LINSTPDU가
 IDIN UUWORD . IDIN LINSTPDL ULOWRD . IDIN LINSTLW
 LWORD .

CONTPEND가 :

1. UUWORD/ULWORD , (UVOP
).

2. LWORD LWORD(8:15)=FF .

CONTPEND가 , LWORD가 LVOP ,
 2 , LVOP가 .
 , UVOP가 , UVOP가 . LATCHOP가
 IDIN . CONTPEND
 . CONTPEND가 , IDIN () .

CONTPEND가 , LWORD 2 IDIN
 . IDIN LWORD . CONTPEND LATCHOP가 , LINS
 TPD가 LWORD UUWORD , IDIN ULWORD .

LWORD 2 CONTPEND가 . CNTFLG가
 2 UUWORD ULWORD 가 , LWORD가 FF CONTPEND가 .
 LVOP . , CONTPEND가 LVOP가 .

SUSP BP가 가 . INSTVLD, UVOP, CNTFLG가
 , 가 .

/ (switch) 가 .
 , PWSRBPSR . IDIN(25) BP가
 , INSTVLD가 . UVOP CNTFLG . UUWORD U
 LWORD , LWORD . 2 8
 FF LWORD FF . BP가 IDIN
 LWORD . , .

(57)

1.

1 ; ; ; ; 1 1
, , , , ;

2 , a) ; b)
2 가 .

2.

1 ,
가 .

3.

1 ,
가 .

4.

1 ,
가 .

5.

1 ,
가 .

6.

1 , 1
가 .

7.

1 , 16
가 .

8.

7 , AND, AND_N, OR, OR_N, OUT, OUT_N, STR, STR_N, SUSP, OS,
LDA, LDAL 가 .

9.

7 , SKIPS, SKIPL, CLRL, SETL, AND_STR, OR_STR, SET_MCR, CLR
_MCR, SET_JMP, CLR_JMP, SET_STE, CLR_STE, RESLV, RESLV_N, LDPDS
가 .

10.

8 , AND
" "
가 .

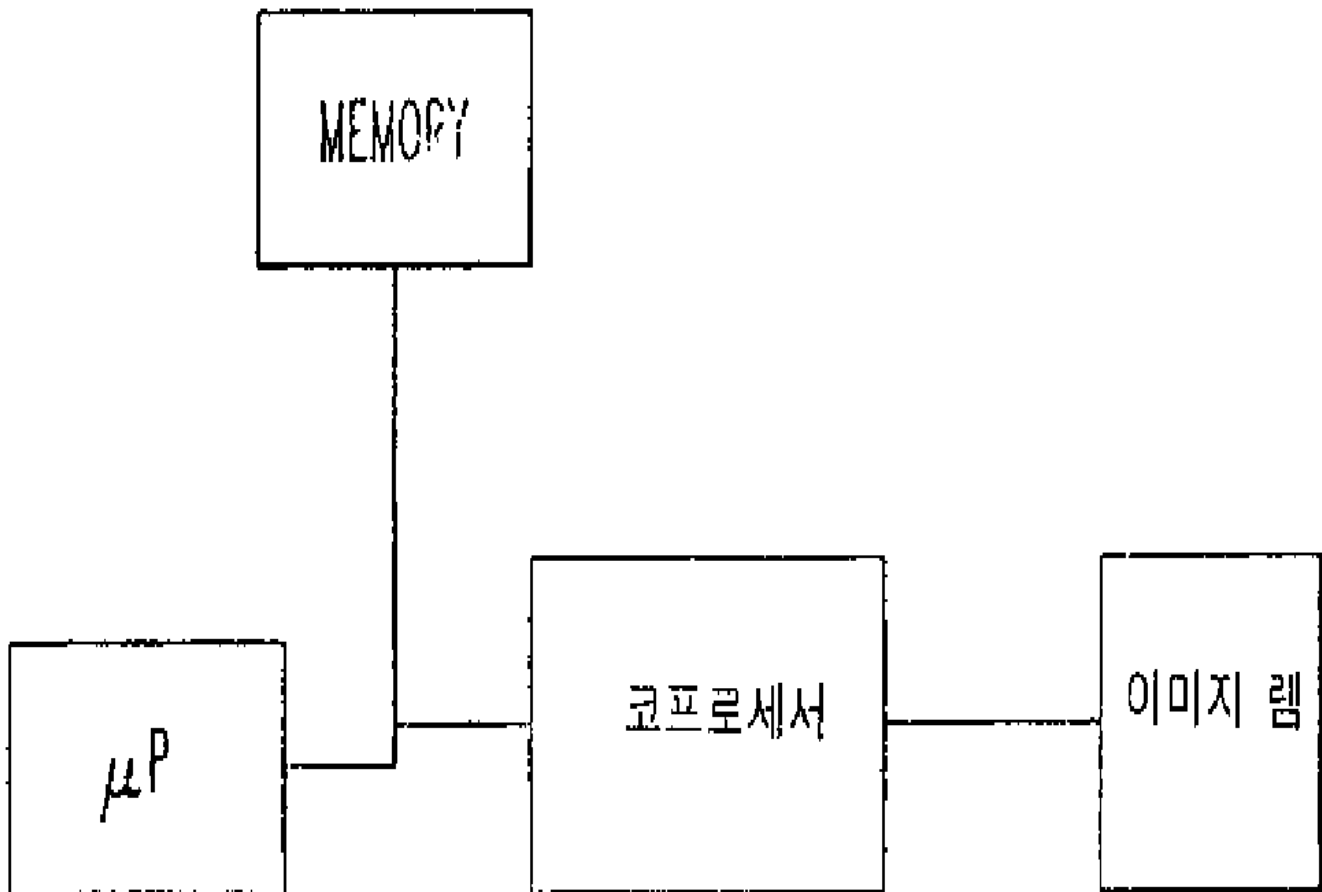
11.

9 , SKIPS
가 .

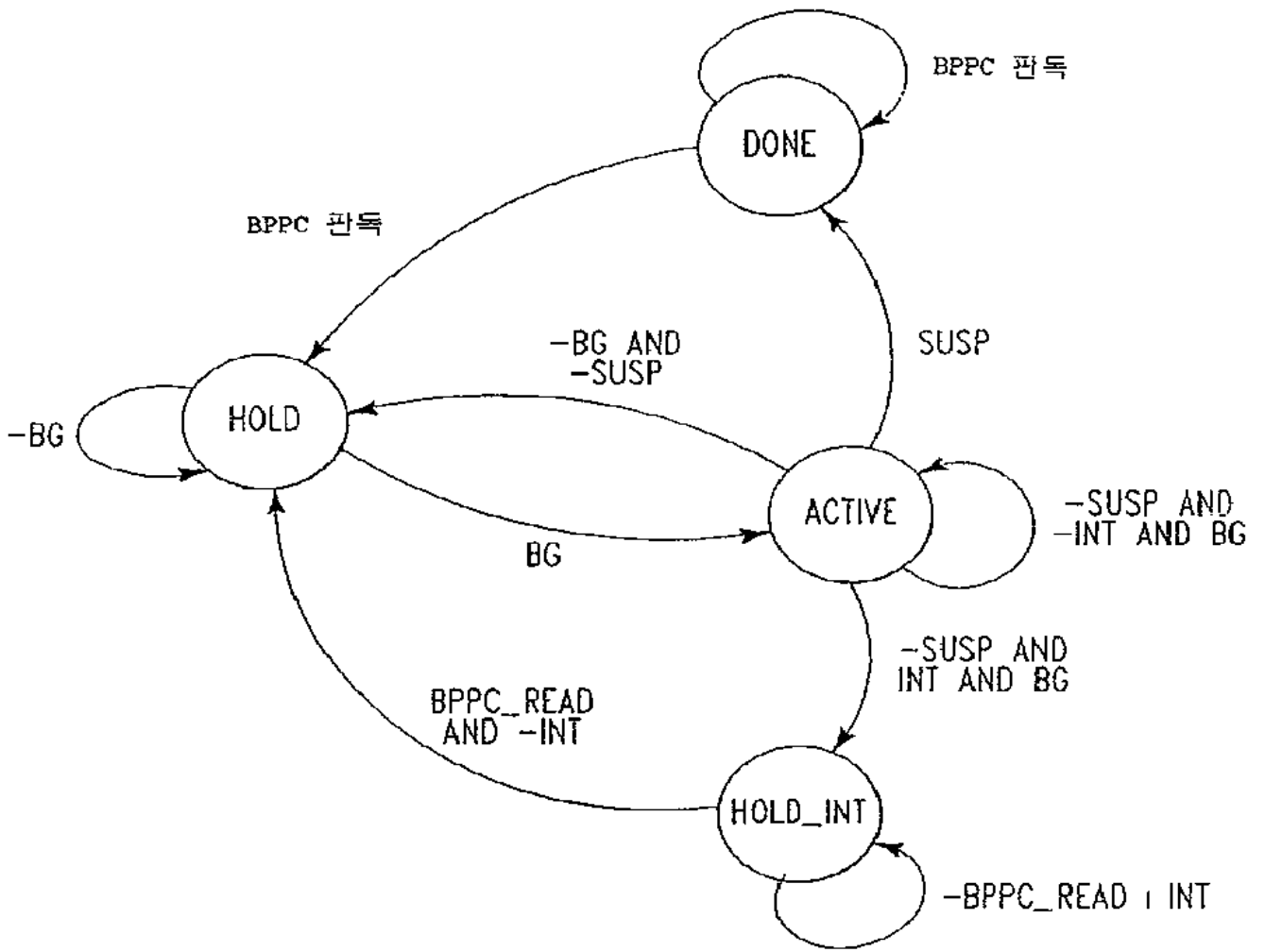
12.

8 , OR_STR " "
가 .

1



2



3

