

4

, ,

, VOP) VOP VOP((shot)
 , VOP , VOP 가 가
 , , 가 가
 , , (,)가 가
 . 가 가
 1 가 가
 , . , GOV 가 가 가 GOV
 가 , 가 가 가 가
 , , 가
 , , VOP
 , , 가 가 ,
 , , 가 VOP
 , VOP ,
 , ,
 , ,
 , ,

가 가

,가

가

가

가

가

가가

2

1

1

1

가

1

2

1

1

1

1

1

1

1

1

2

1

1

1

가

1

2
가

1

1

2

1

1

1

1

가

1

1

1 2
가

VOP

VOP

가

1	MPEG-4		
2	VOP		
3		1	VOP
4		1	VOP
5			VOP
6		1	VOP
7		2	VOP
8		2	VOP
9			
10		2	VOP
11		3	VOP
12		3	VOP
13		3	
14		4	VOP
15		4	VOP
16		5	VOP
17		5	VOP
18		5	VOP
19		6	VOP
20		6	VOP
21		7	VOP
22		7	VOP
23		8	VOP
24		8	VOP
25		8	
26		8	VOP
27		8	VOP
28		9	VOP
29		10	VOP
30		11	VOP
31		12	VOP

(1)

1 ISO/IEC JTC11 SC29/WG11/N1796 MPEG-4

가 VOP

MPEG-4 /

MPEG-4

MPEG-4

[Video Object(V0)]

1 , V0

[Video Object Layer(VOL)] , VOL

[Group of Video Object Plane(GOP)] , GOV

가 [Video Object Plane(VOP)] , VO

, VOL

VOP , VOP VOL (=) . GO
가
VOP 2 , 2 VOP(VOP1 , VOP2)
VOP VOP 8 (1/2
) , VOP 1, VOP 0 2
VOP VOP가 1 , VOP VOP가 . ,
, MPEG-4 1 MPEG-4
VOP ISO/IEC JTC1/SC29/WG11/N1796 VOP VOP
3 1 VOP , 110 VOP , 111 , 12
6 , 113 , 115 , 118 , 122 , 124 , 12
, 128 , 129 가 .
VOP (110) VOP (7)
(111) (113) (128) . VOP , VOL, GOV VOP (7)
VOP , VOP (7)
가 15 / (110) . 30 / , VOP (7)
1 , VOP (110) VOP VOP
6 VOP (110) , 1 VOP VOP 16 x 16 16 x 1
(111) (112) (126) (112) (109) (109)
(113) (115) (118) . (113) (109) (122)
(123a) , (114) .
(109)
(115) (122) (114)가 (123b) (116)
(109) (115)
(128) 가 (129) .
(128) (116) (117) (117)
(118) (117) MPEG-4 (109)
(119) (120) (119) (12)
6) , (120) 가 (129) 가 .
가 (129) (116) (120) 가 (121) ,
(122) (124) 가 , 가 (125)
(126) 가 (125) (112) (114)
) 4 3 VOP (119) , VOP , 1 VO , 2 VOL
, 3 GOV , 4 GOV , 5 VOP VO , 6 GOV , 7
VOP , VOL VO (1) VO
VOL (2) VOL GOV
VOL (2) VOL GOV
GOV (3) VOL GOV (2) , GOV (6)가 GOV
GOV GOV (6) GOV
GOV VOP (4) (5) , GOV (6)가 GOV

GOV (4) VOP , VOP (5)

1 VOP , 4 VOP VOP . VOP
 30 / 「00」 「01」 , VOP VOP VOP가 , VOP
 , VOP 가 , VOP 「11」 , VOP (7) VOP
 가 VOP (5) , VOP (8) VOP VOP
 VOP (10) (modulo_time_base) (9) VOP (VOP-time-in
 crement) (13) , 5 , VOP가
 , 가 , VOP (14) , 5 . , MP
 EG-4 VOP 1000 1 (12) VOP (7) . . (13) VOP
 VOP (5) (14) , . . (13) (9) , VOP
 (14) VOP (10) (14) VOP (7) 가
 . . (13) VOP (9) VOP (14) VOP (7) (8)
 . (13) VOP (10) VOP (10) . VO
 P (12) VOP (14) (11) VOP , (10)
 (11) . (11) VOP (126) . ,
 VOP , VOP 1 GOV VOP VOP 가 , ,
 , 6 , VOL VOP 가 VOP 가 , ,
 , . (13) VOP (14)가 . VOP (2) .
 , 1 ,
 (2) .
 2 1 VOP 가 가 . 2 VOP
 가 VOP 가 , 1 VOP
 VOP 가가 1 1 VOP 가
 , VOP 가 1 VOP
 30 / , 15 / , VOP , 1000 , 1001 V
 OP , 1026 VOP . 2 VOP 1 VOP
 (124) (1000)
 8 , 1002 VOL , 1003 VOP (1000)
 VO (1) VO , VOL VOL
 (1002) . VOL (1002) , VOP VOP
 GOV (3) , VOP
 3 VOP (1026) , VOP (1026) 2 / 「000」 , VOP
 5 / 「001」 , VOP 25 / , VOP 「010」 , VOP 30 / , VOP
 , VOP VOP (, VOP 10 /) 「100」 VOP 「011」
 . , VOP VOP 가
 . , VOP VOP가
 , 「101」 VOP 4 . , VOL VOP가

VOP 「0」 . 9 VOP VOL 가 「1」 ,가
GOV (3) VOL VOL (1002) (1002) , GOV (6)가 GOV
GOV GOV VOP (6) GOV GOV (6)가 GOV
GOV (4) GOV GOV (4) , VOP
4 (1003) . 10 VOP GOV (1003) . 10 VOP , 100
VOP (1026) , (1004) VOP (1001)가 가 VOP
가 가 , . VOP (1001)가 가 VOP
(10) (9) , VOP VOP VOP
VOP (8) VOP (9) , VOP (9)
VOP (10) VOP (10)
VOP (10) VOP (11) VOP (11) VOP
(10) (126) , 2 , VOL VOP VOP (1001)가 가 VOP
, VOP VOP VOP VOP 가 VOP 가 VOP
, VOP ,가 , , 가 VOP
가 2 가 , ,
(3) 3 1 VOP
, MPEG-4 (, VOP) ,
3 (VOP) VOP
ISO/IEC JTC1/SC29/WG11/N1796 , VOP VOP 1 ,
3 VOP 가 3 VOP VOP 1 ,
11 3 VOP VOP 1
2 , , 151 , 152 가 , 153 , 154 VOP
, 155 , 156 , 157 , 158 , 159
, 160 , 161 , 162 , 164 , 165
, VOP (150) (151) ,
(153) 가 (151) (152)
(154) (154) (157) (158)
(155) (154) (156)
(159) (164) (165) (153) (158)
) (160) MPEG-4 (161) (162)
(160) (162) VOP (164)
12 , 52 VO 3 , 53 VOL (151) , 54 GOV , 58 VOP , 51
, 55 VOP VO
3 (151) GOV (54) GOV VO

P VOP (58) . VOP (58)

(51) VOP (150)

가 VO (52) , 가 VOL (54) , VOL

(53) , GOV (55) , VOP (55) 가

VOP VOP (153)

VO (52) VO (53) , VOL (54)

(51) . VOL (53) (51) . GOV (54)

, GOV VOP (58) . VOP (55)

, GOV VOP (153) (51)

VOP , GOV VOP VOP

(a), 201 VOP (b), 202 13 (c), 203a , 200 VOP

03c (a)(200) VOP , 203b VOP (b)(201) VOP , 2

VOP (c)(202) VOP , 204 (a), 205

(b), 206 (c), 207 VOP (a), 208 VOP (b), 209 VOP (c), 210

, 211 (162) , VOP (GOV, VOL) 가

P VOP (a)(204) (a)(200) (c)(202) VOP (203a 203c) , VO

(c)(206) (210) VOP (210) VOP (a)(207) (c)(209) ,

VOP (211) , (211) 1 30 (가 ,

)

VOP (a)(204) 1 5 (, VOP (a)(207)가 5 /).

VOP (b)(205) 1 10 (, VOP (b)(208)가 10 /).

VOP (c)(206) 1 15 (, VOP (c)(209)가 15 /).

, (211) VOP (a)(204) (c)(206) 10

, 5 VOP (b)(205) , (a)(204) 15 , VOP

(c)(206) , , VOP 가 ,

, GOV VOP VOP 가 ,

, VOP VOL VOP , VOL ,

, VOL 가 , 1

, 3 1 VOP 가 .

3

, 3

(4) 4 3 VOP 4 VOP 가

4 가 VOP 2 VOP (151) ,

14 4 VOP , 59 VOP , GOV VOP (

54) VOP VOP (58) VOP (61) VOP VOP (62) .

, VOP (55) (56), (57) (60)

VOP (59) GOV (54) VOP (58) (62)

) VOP (55) (61) (60) (60) VOP (62) VOP (58) (62)

5 / GOV (55) VOP (58) 30 / , VOP (62) VOP 1 (5)

5) 1VOP (60) VOP가 (60) , VOP 가 (62) VOP (60a)

(60b) (60a) VOP (59) VOP (56) VOP (51) 가

(62) 가 VOP 가 (62)가 3 VOP 1 VOP 가 0 가

VOP 가 (60b) (60a) (60a) 3 3 가 1 2

VOP VOP GOV VOP 가 VOP VOL 15

, 2 4 VOL (300) VOP , 1

, VOL 4 , VOP 가

, 4

5 5 3 4 VOP 가 VOP 5

VOP VOP 가 VOP 가 VOP 가 (151)

5 VOP (1005) 16 3 VOP (1006) (153) GOV 가 VOL (10

17 VOL VOP (1007) GOV (1008) VOP (1009) (1009) 가 , 1006 , 1010

VOP VOP 1 VOP 가 가 VOP 가

가 VO (1006) , VO 가 GOV (52) , GOV 가 VOL (10

07) , VOL 가 VOP VOP (1008) (153) , VOP

(1008) VO (52) VO ,

(51)

, VOL (1006) VOL VOP (58) VOP (10

10) (210) VOP (1008) , VOP (1010) VOP (1008) , VOP (58)

GOV (1007) (51) , GOV (1011) VOP (100)

8) 18 VOP (1008) . 1012 VOP (1) , (1012a),

(1012b) . 1013 , 1014 VOP , 1015

VOP (2), 1016 VOP (1016) VOP (1010)

(1)(1012) , VOP (1010)가 가 VOP (1013)

6 VOP 6 VOP
가 가
VOP
19 6 VOL (1006) VOP (1008) 6 VOP 5
VOL (1017) VOL (51) VOP (1010) VOP (101
8) VOP 가 VOP) VOP (58) VOP (1018) ,
3 VOP 가 「100」가 VOP (VOP 3 VOP 「000」, 「001」, 「01
0」, 「011」가 VOP) VOP (58) VOP (1018) (210)
20 VOP (1018) . 1025 VOP , 1019 VOP
(3) , (1019a), (1019b), (1019c) . 1020 , 10
21 VOP , 1022 VOP , 1023 . . , 1024 VOP
VOP (1025) VOP (1010) VOP (58)
VOP (1010)가 VOP (58)
010)가 가 VOP (3)(1019) , VOP (58)
12) (1010)가 VOP (58) VOP (1)(1012) 5 VOP (1)(10
, VOP (1010)가 VOP (58)
VOP (3)(1019) (1019a) (51) VOP 가
VOP (1018) (1019b) (1019b) 가 1 VOP, 2
VOP (1019c) (1023) (1023) (1020) , 가 2 VOP 가 1 V
OP (1021) (1024) VOP (1024) VOP (1020) , 가 2 VOP 가 1 VO
VOP P (1021) VOP (57) , (57) (51) VOP
(1020) . . VOP VOP 가 VOP
(1021) 2 VOP . . VOP
(1020) 1 VOP . . VOP 1 VOP VOP V
OP 6 VOP , VOP (1022) VOP VOP
1 VOP 가 「10」, 1 VOP VOP 가 「000000」(
, 1 VOP 1.0), 2 VOP 가 「10」, 2 VOP
VOP 가 「100000」(, 2 VOP VOP 1.5)
(3 0.5 가 0.5 1 VOP가 , VOP 2 /
, VOP (58) , VOP (1010)
VOP (1022) VOP , VOP (210) ((1019c)
(1009)가 VOP (1009)가 2 VOP 1 , ((1)
(1019c) (1019b) VOP (1022) V
OP VOP 가 VOP VOP가 가

(1009)가 , 가
VOP , VOP VOP (10
09) 가 , 가 VOP VOP VOP (58) VOP VOP
(1009) VOP VOP (1009)
VOP
VOP (= VOP)
(1009) 가 , (1009) 가 VO
P (2)
(1019c) (1009) VOP 2 / , VOP (1022)
VOP 2 4 / VOP VOP 1 VOP 가 가
(1019b) 2 가 0 가 (1019c) VO
P 가 VOP (1019b) 2 가 1
1, 2 VOP 가
(1013) , (1013) , VOP (1014) VOP (57)
51) (1014) (57) (51) VOP (57)
, VOP 6 , VOL VOP VOP 1 VOP 2 VOP가 가
, VOP VOP 가 , VOP , VOP VOP VOP 가
VOP VOP 가 , VOP 가 , VOP VOP 가
, VOP 가 VOP 가 VOP가
가 VOP 6 가 가
(7)
7 VOL , 1 VOL VOP VOP 7 가 VOP 가
, IEC standard publication 461 for "time and control codes for video tape recorders"
(MPEG-2 , MPEG-4 VOP
) 가 ,
7 VOP 1 가 VOP (124)
21 7 VOP , 4
1 . VO (1) VO 가 VOL
(2) VOL (2) GOV (3) VOL
GOV (18) (3) VOL GOV (2) (3) , GOV
GOV GOV (6) (6)가 GOV
4) GOV (3) GOV (4) (5) , GOV (6)가 GOV
(5) GOV (3) GOV (4) GOV , GOV VOP ()

VOP (5) VOP (126)(3) , , , , (126) 7 , MPEG-4 VOL 가 , 7 , VOP 가 가 가 , 7 VOL 가 22 VOP (301) VOP 가 , VOP (18) , VOP 가 , VOP 7 , VOP 7 , (8) 8 VOL VOP 8 VOP (302) , 8 23 VOP 2 VOP (302) VOL (302) , 303 VOL , 가 , (302) , 303 VOL , 24 (51) VOP (150) , 가 VOL (54) , VOL 가 VO (303) , VO 가 GOV (52) , GOV , VOP (55) , VOP (55) , VOP (55) , (153) , VO (52) (51) . VOL (303) (51) , VOL VOL (64) . GOV (54) (51) . VOP (55) (51) , VOP (153) , VOL VOP 25 VOP (a), 401 VOP (b), 402 VOP, (c), 403a VOP VOP (a)(400) VOP , 403b VOP (b)(401) VOP , 403c VOP (c)(402) VOP , 404 (b)(409) (a), 405 (b), 406 (c), 407 (a), 408 (156) (c), 410 , 411 , VOP (GOV, VOL) 가 (a)(400) (c)(402) VOP (403a 403c) , (a)(404) (c)(406) , VOP (410) (a)(407) (c)(409) 9) (410) VOP (411) (a)(407) (c)(409) 가 , (a)(404) VOP 01:00:00 , 01:00:00 ():():() (b)(405) VOP 01:00:10 (c)(406) VOP 01:01:00 , (410) (411) 가 01:00:00 , (a)(404) (411) , (b)(405) (411) (c)(406) (411) 1 , (c)(406) (411)

, VOL VOP 가 . ,

, 26 VOL VOP , VOP

, 27 VOL 가 , VOP VOL VOP

VOP VOP VOP , 1

, 8 VOP 가 .

, 8 1 VOP

(9) (1) VOP

9 MPEG-4 (2) VOP

1 MPEG-4 (20) VOP가

가 , 5 "111110"가 "1" "0"

V GOV 가 , GOV 가 MPEG-4 GOV

9 VOP (124)

28 9 (124) . 500 VOP

, 19 , 20 , 21 , 22

, 501 VO 가 VOL

(2) GOV VOL (1) VO 가 VOL

GOV (3) VOL GOV (2) GOV (6)가 GOV

GOV (3) GOV VOP (4) GOV (5) , GOV (6)가 GOV

GOV (3) GOV GOV (4) GOV (5) VOP (4) (5)

VOP (500) VOP (8) VOP VOP (500)

, (19) . (20) (501) . (20) 가

, (21) (22) 가 ,

가 (22) 가 가 2 가 ,

, (19) (20)가 "1111111110" , 2 , (21) "

10" VOP (500) . (22) (501) VOP "10" (8)

VOP VOP (10) (21) (10) (22) (8)

VOP (10) (501) VOP (11)

11 MPEG-4 VOP VOP

11 VOP (124)

30 11 (124) .503 VOP ,23

,26 VOP (503) VOP (8) VOP

VOP (503) (23) (25) VOP

가 VOP (503) VOP (24) VOP

(23) VOP "1"

(26) (25)

VOP "11110"(10 :30), VOP

"111110"(10 :62) "100000"(10 :32)

"100000" "1" 1 2

, "1" 가 1 "10"

, "10" 2

VOP 5 VOP

6 1 2

VOP (503) (25)

(26) VOP (10) (25)

VOP (503) VOP (10) (25)

(1)

11 MPEG-4 , MPEG-4

, MPEG-4 가 가

11 1 1 1 1 1 1

(12) 12 11 (25)

VOP VOP VOP

12 VOP (151)

31 12 (151) .504 VOP ,

71 12 ,72 (151) ,73 VOP .504 VOP ,7

4 VOP (504) ,75 (71) (51)

(72) (75) (75)

VOP (72) (73) (75)

) , 2 (504) (72) VOP (75)

(74) "1" VOP "1" VOP

(74)

"10",
 "11110" 가 2
 VOP
 "10"
 "11110"
 VOP
 "1" 1
 "1" 1
 가 , "11110"
 VOP
 VOP
 "1" VOP 8
 VOP VOP
 가
 (504) (74)
 VOP VOP 가
 (504) VOP (73) (71)
 VOP VOP
 (57)
 12
 , MPEG-4
 가 가
 12
 1 1
 2 1
 1 1 가 1 2 1
 (13)
 1 12 , 1
 가 1 12
 1 12
 가 , 1
 1 12
 (14)
 1 13 , 2 , 1
 가 1 2 , 1
 1 13
 가 , 1 13
 1 2 , 1 1
 가 2 , 1 , 2
 1 13
 ()

(15)

1 14

가

1 14

가

1 14

1

가

1 14

()

가

[1]

VOP 비율	VOP 비율 정보
30매/초	01
15매/초	10
정지 화상	00
가변	11

[2]

차분 비트열에 포함되는 "1" 비트의 수	차분 모듈로 · 타임 · 베이스
0	0
1	1 0
2	1 1 0
⋮	⋮
n	1 1 1 0

“1”이 n비트 계속

[3]

VOP 비율	VOP 비율 정보
2매/초	000
5매/초	001
25매/초	010
30매/초	011
상기 (2매/초, 5매/초, 25매/초, 30매/초) 이외의 고정 VOP 비율	100

[4]

VOP 비율	VOP 비율 정보
2매/초	000
5매/초	001
25매/초	010
30매/초	011
상기 (2매/초, 5매/초, 25매/초, 30매/초) 이외의 고정 VOP 비율	100
정지 화상	101

(57)

1.

VOP

2.

1

3.

1

가 가

4.

1

5.

4

6.

VOP

7.

6

6 8. , 가 가 (가) ,

8 9. , 가 ,가

6 10. , 가 , 가 가 가

6 11. 7 , ,

12.

13.

14.

2 1 , 1 , 1 , 1 가 , , 1

15.

2 1 , 1 , 1 , 1 1 , 1 1

16.

2 1 , 1 ,

가 1 1 1 2

17.

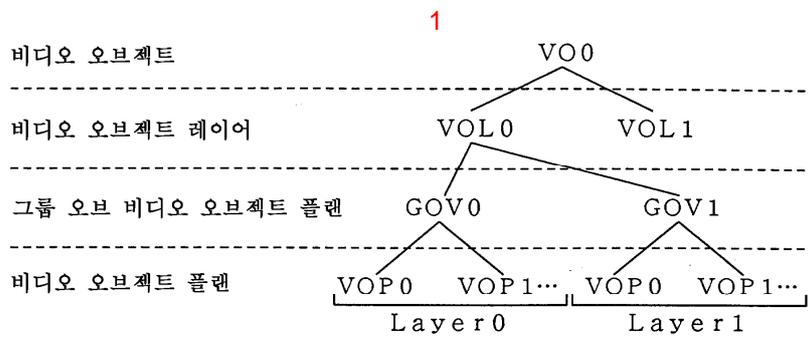
1 1 1 1 1 1 1 1 1 2

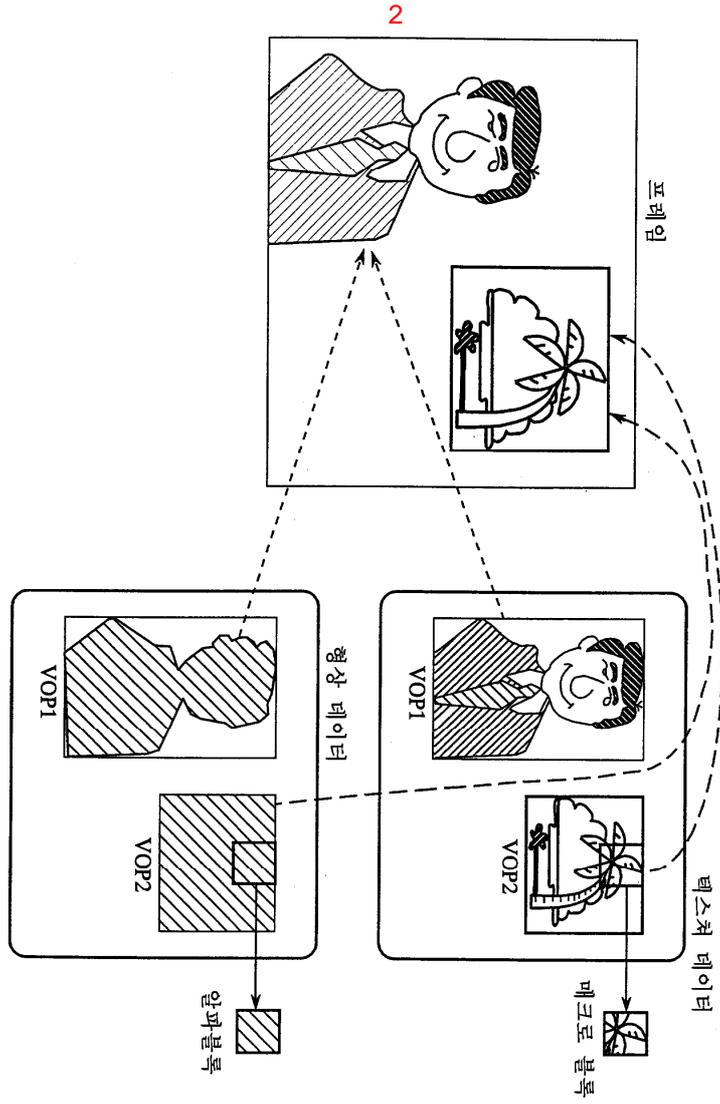
18.

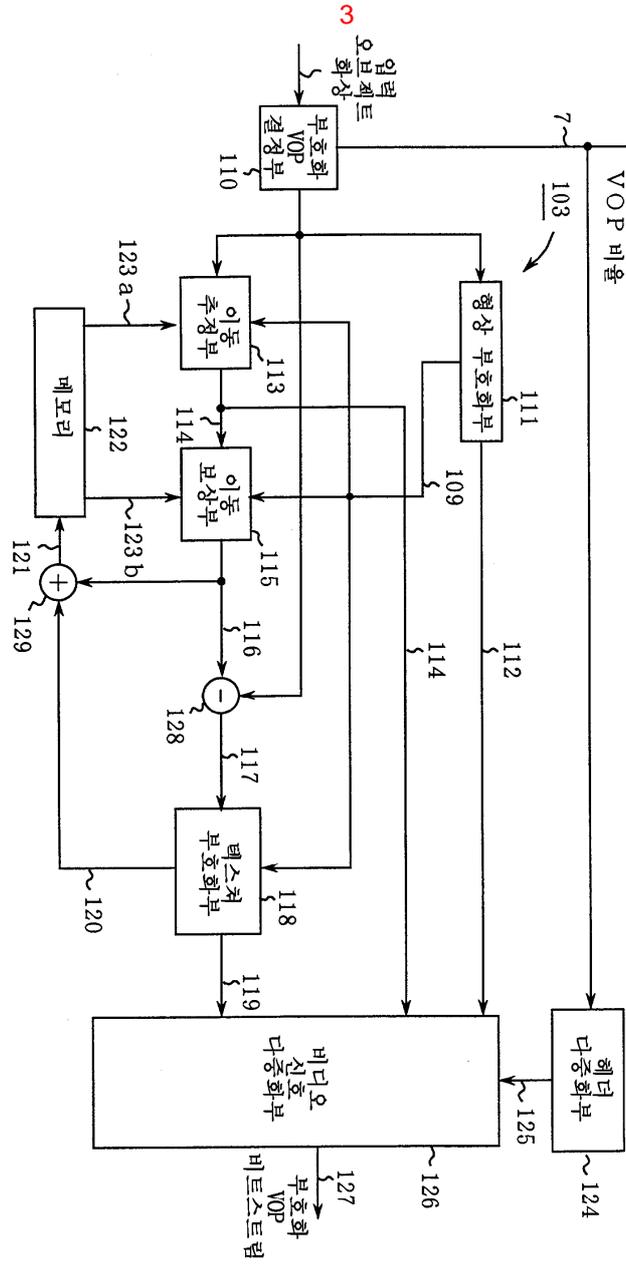
VOP

19.

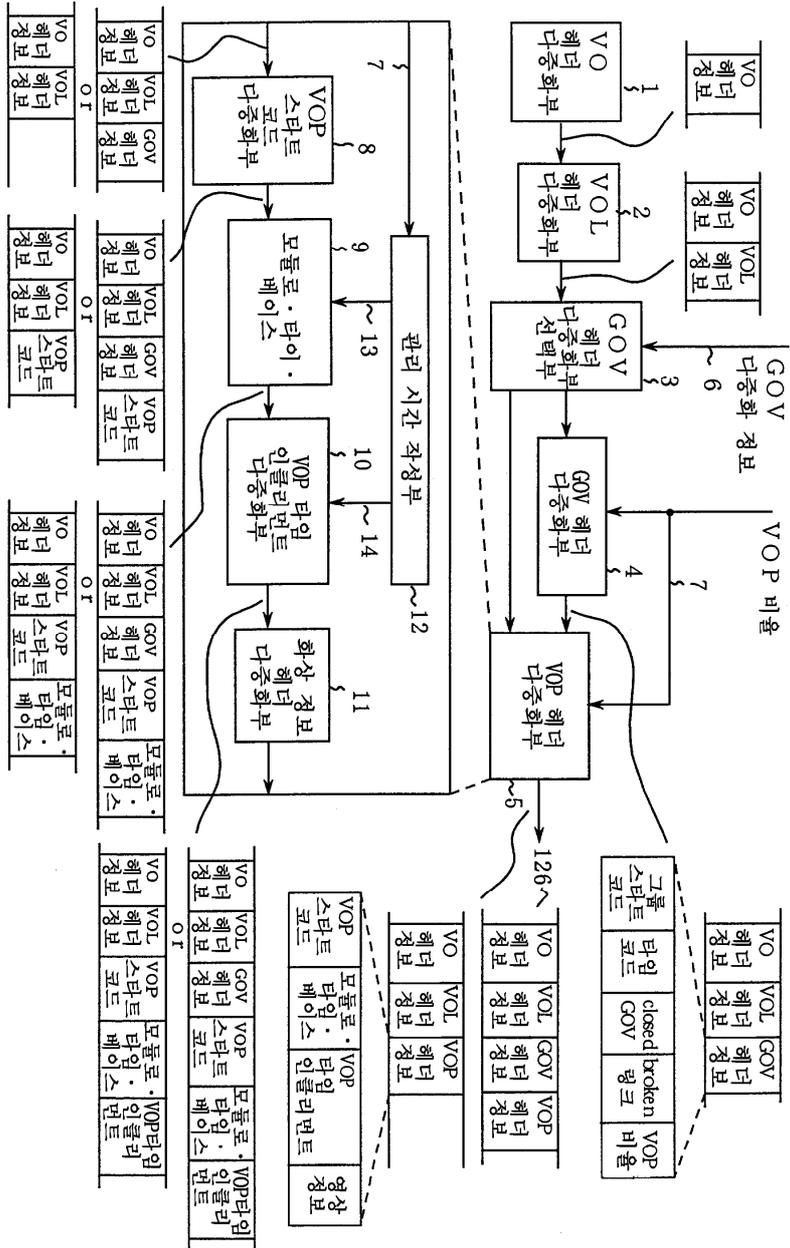
VOP



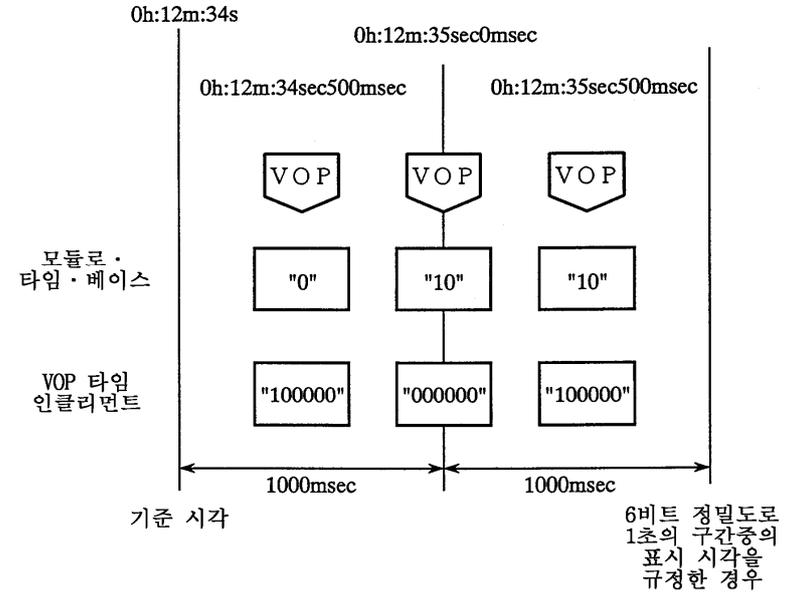




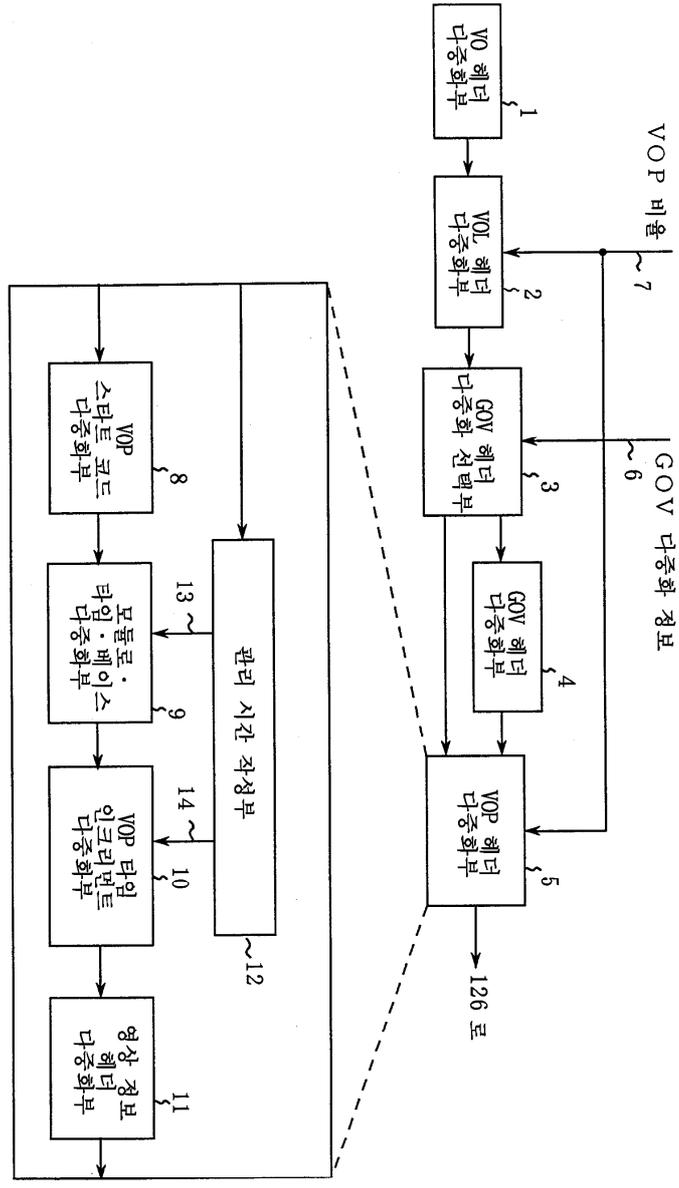
4

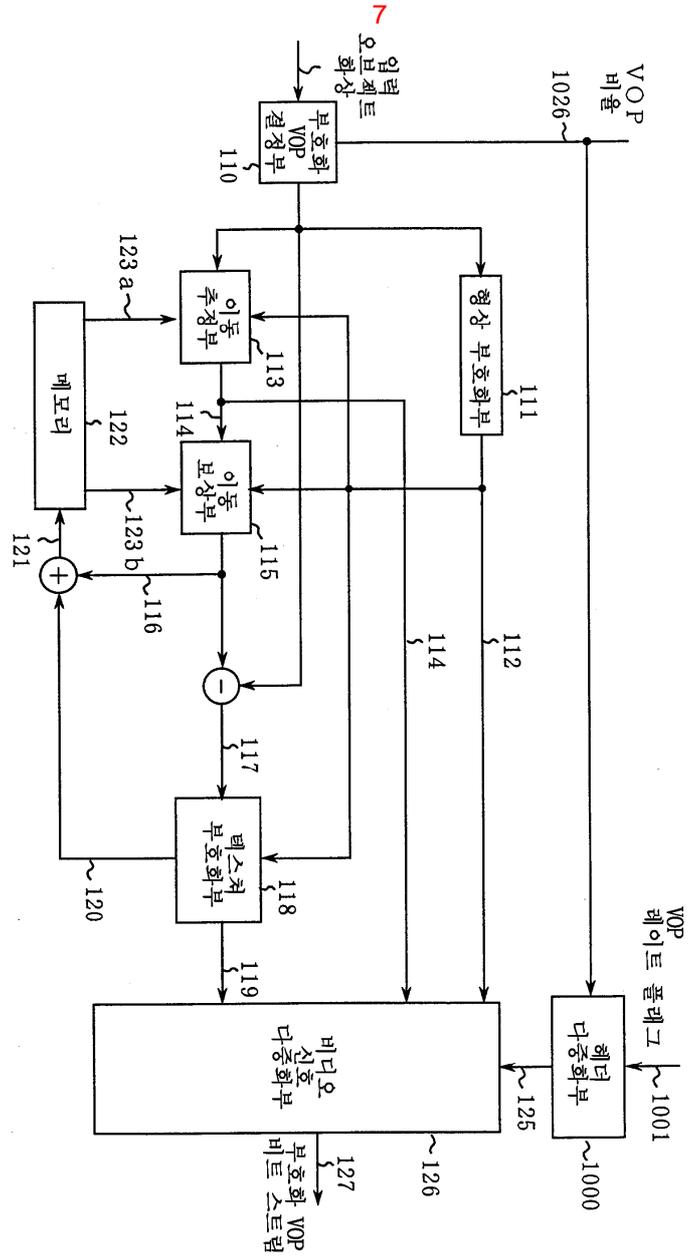


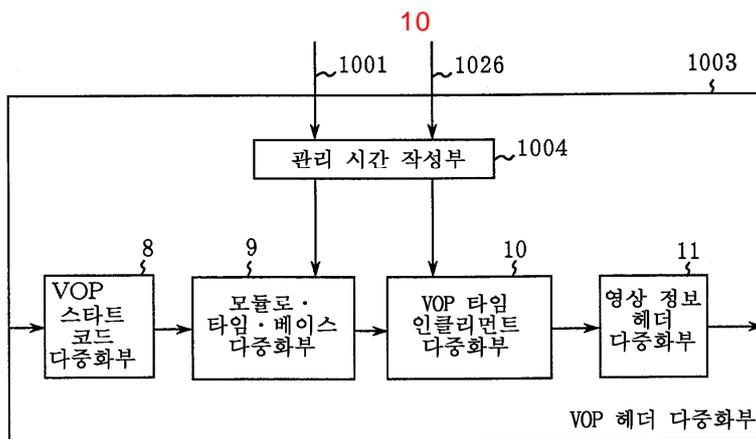
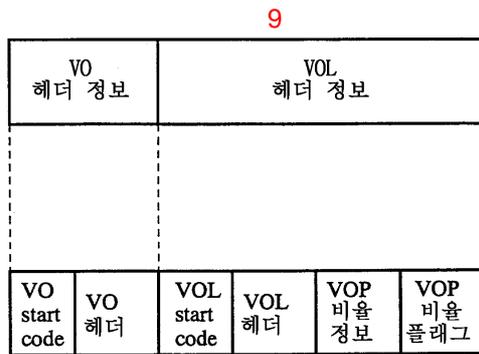
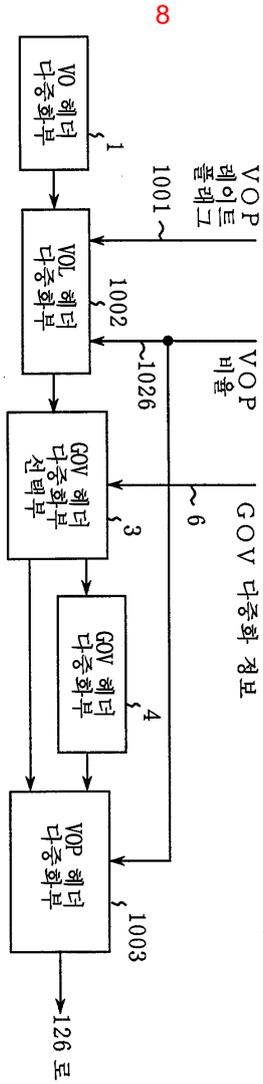
5

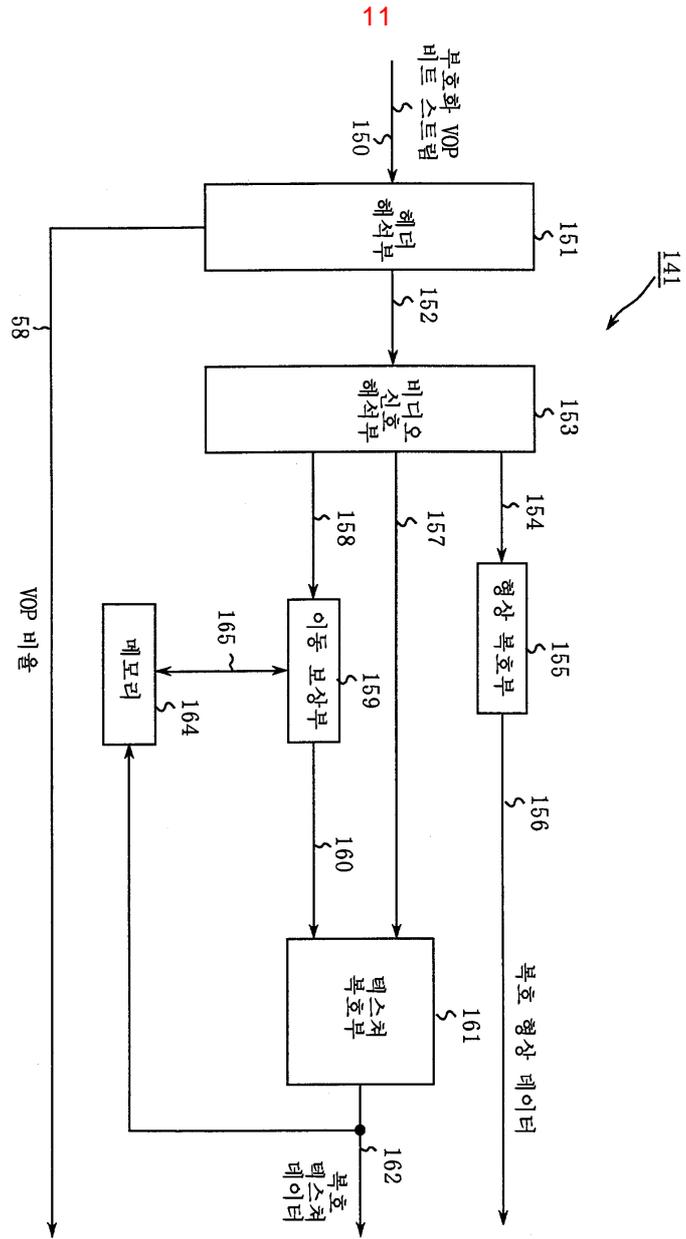


6

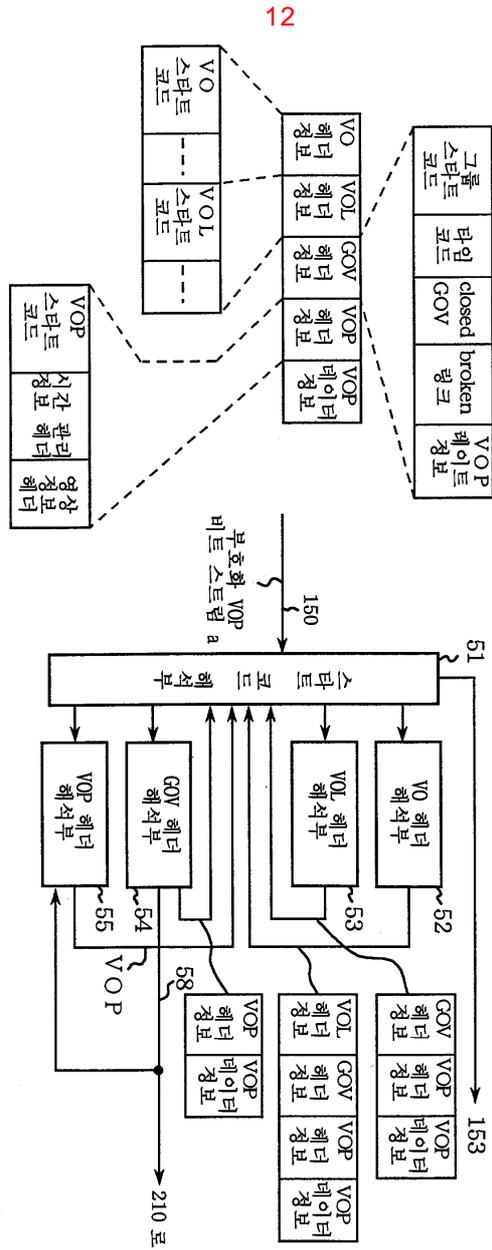


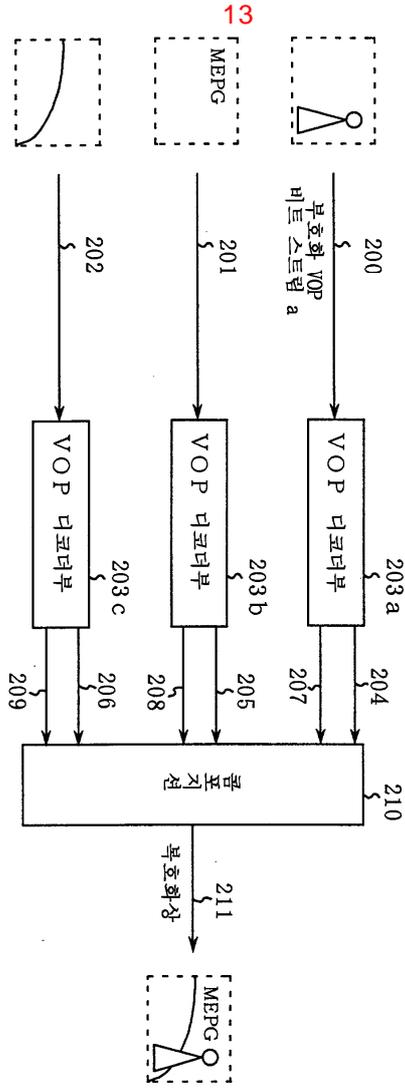




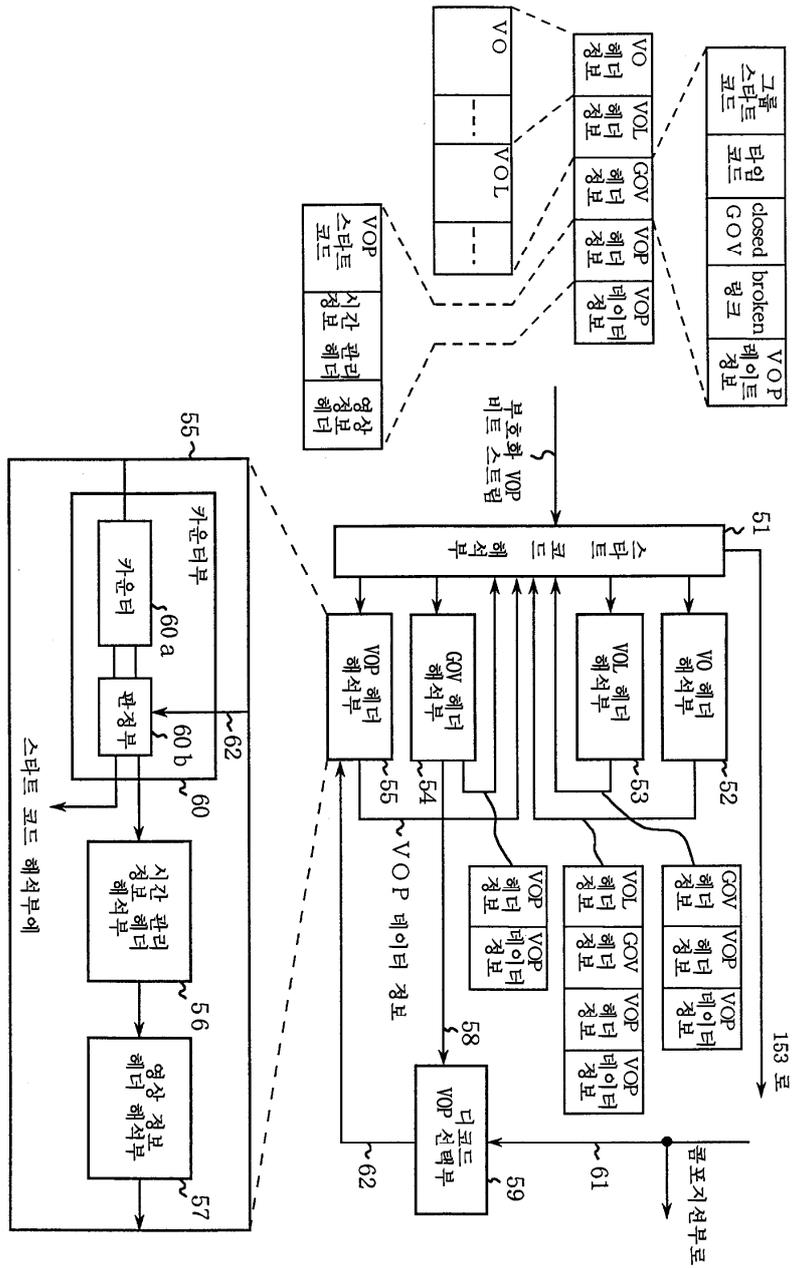


11

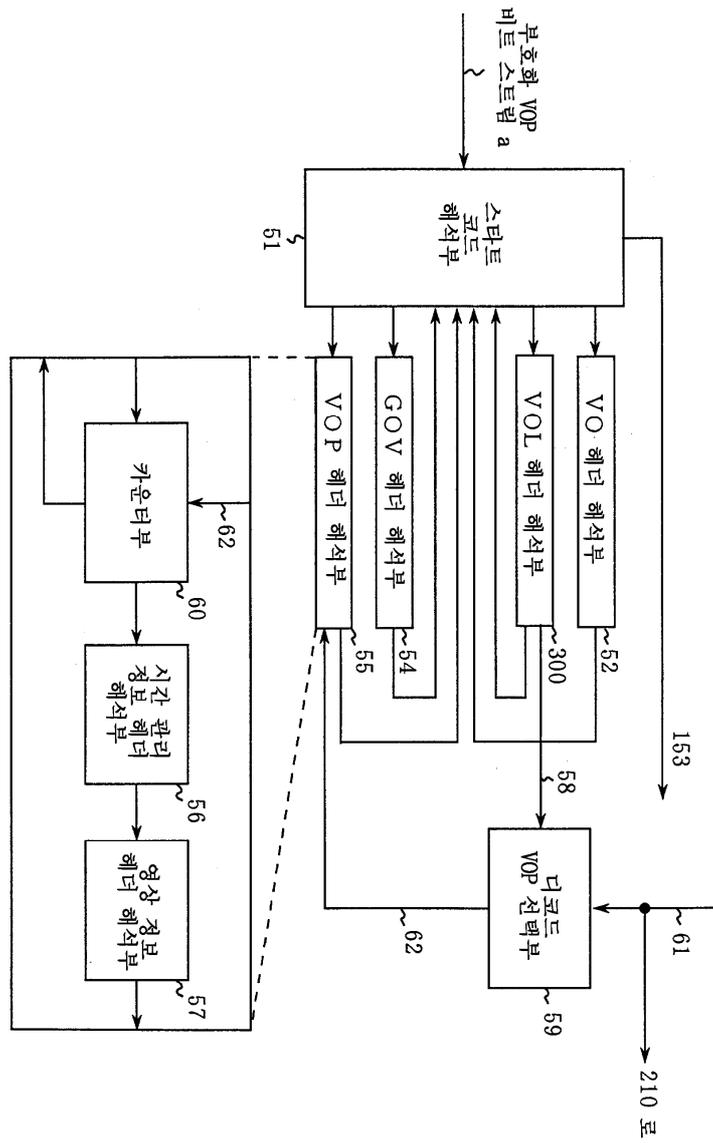




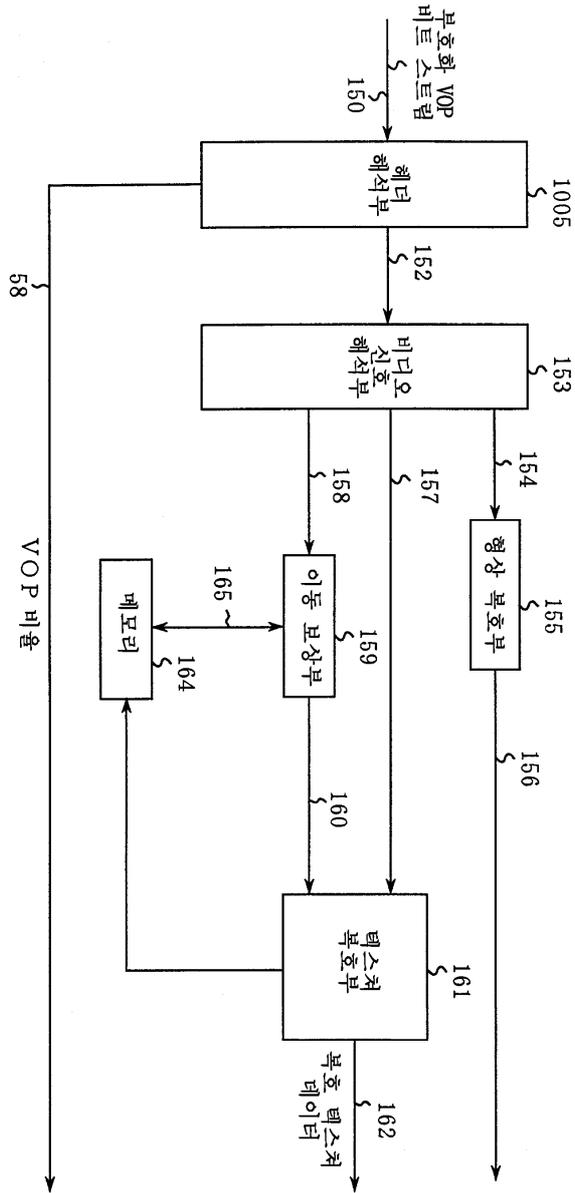
14

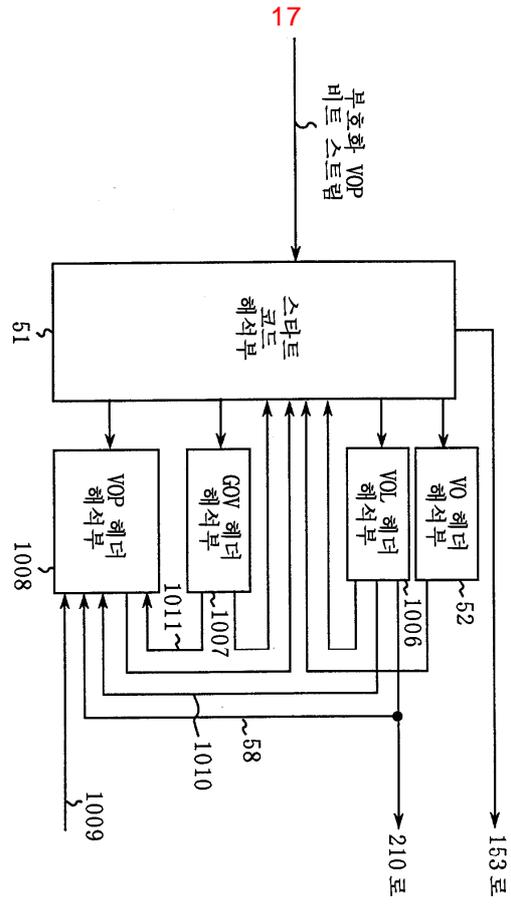


15

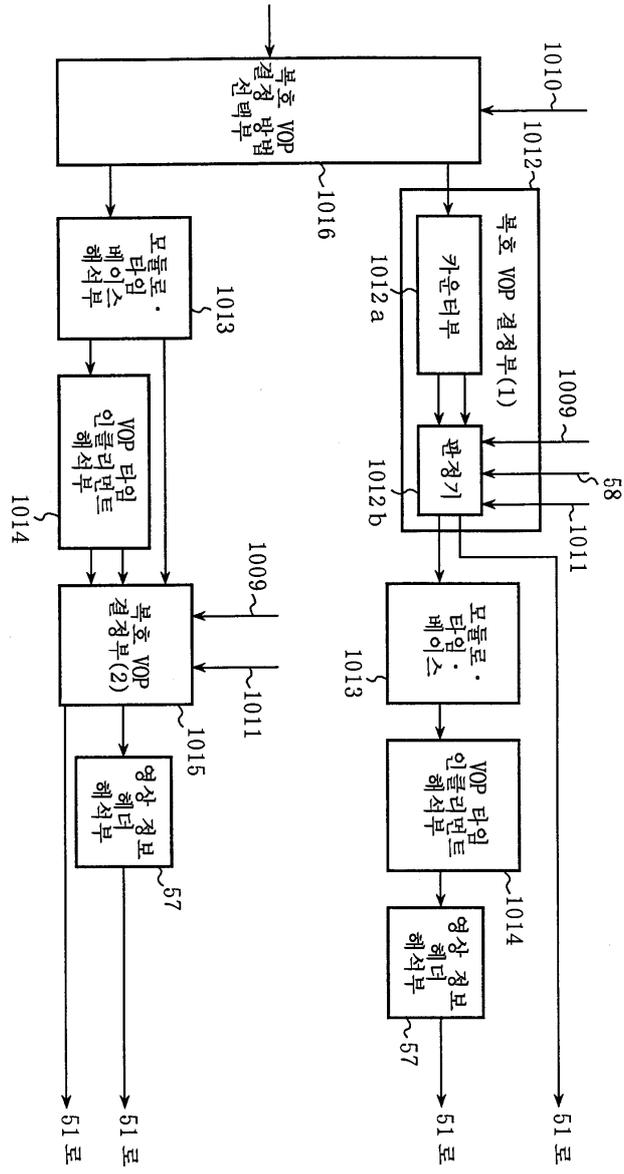


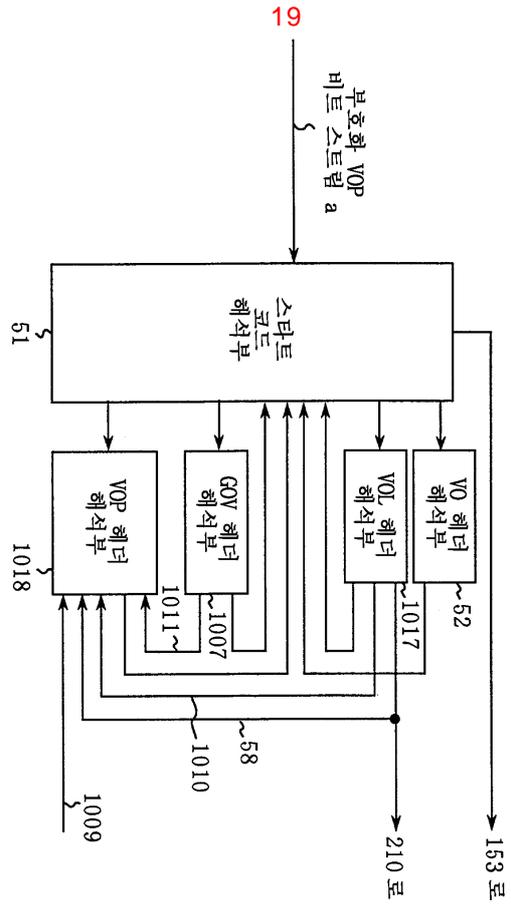
16



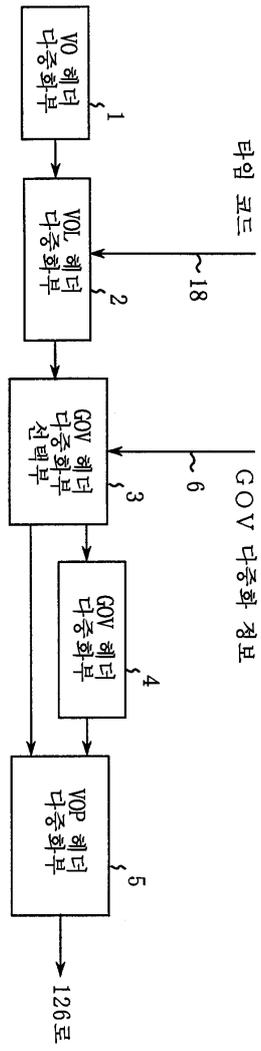


18

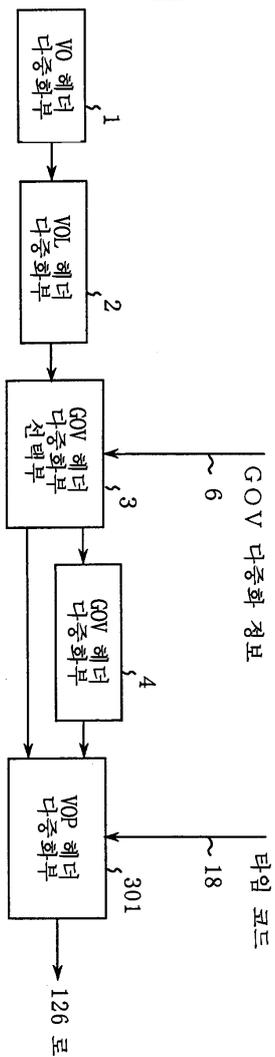


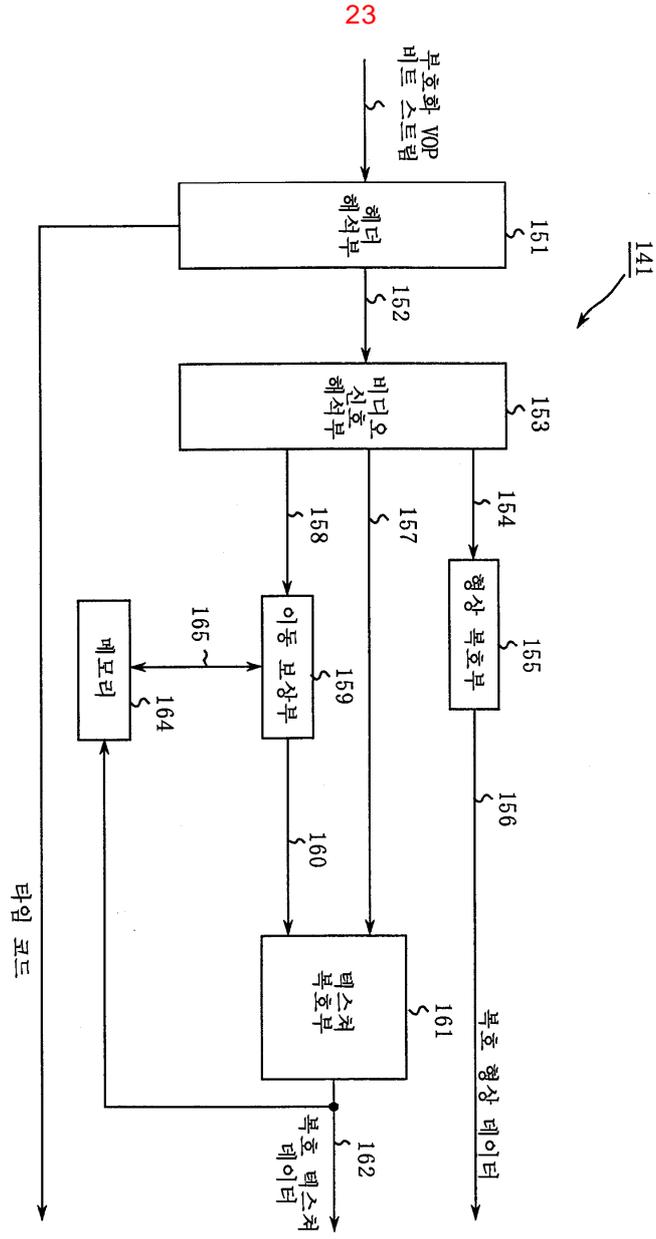


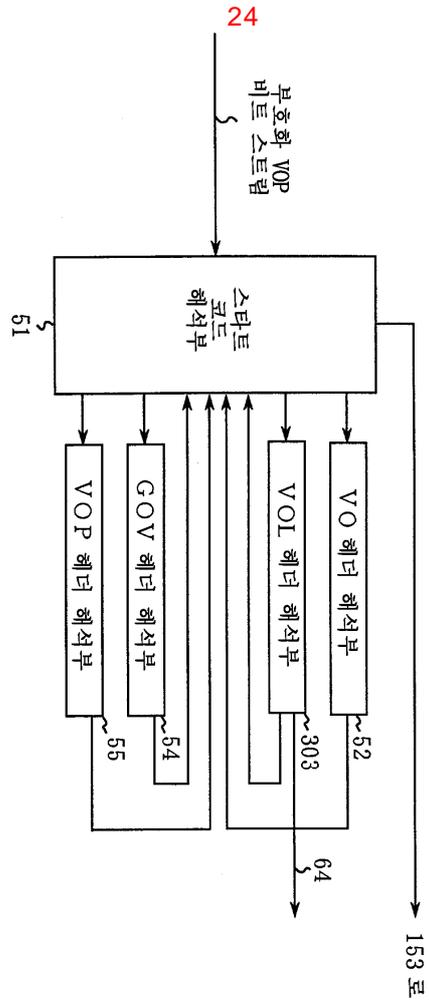
21



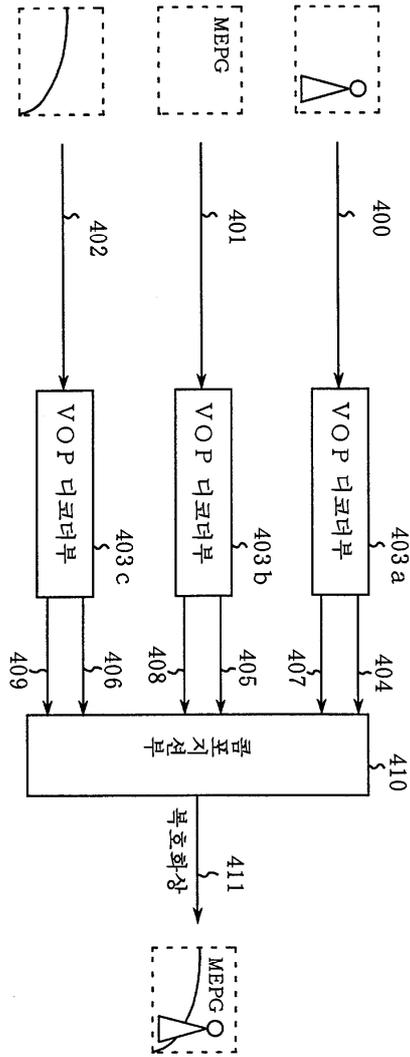
22

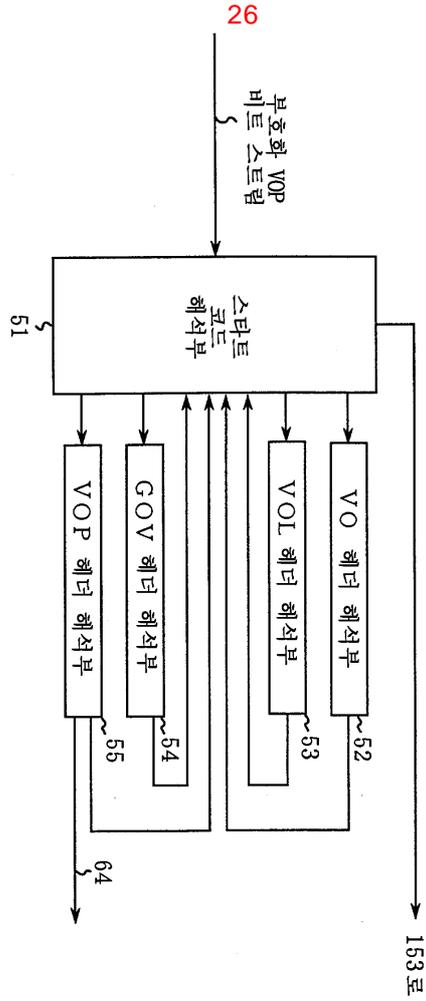


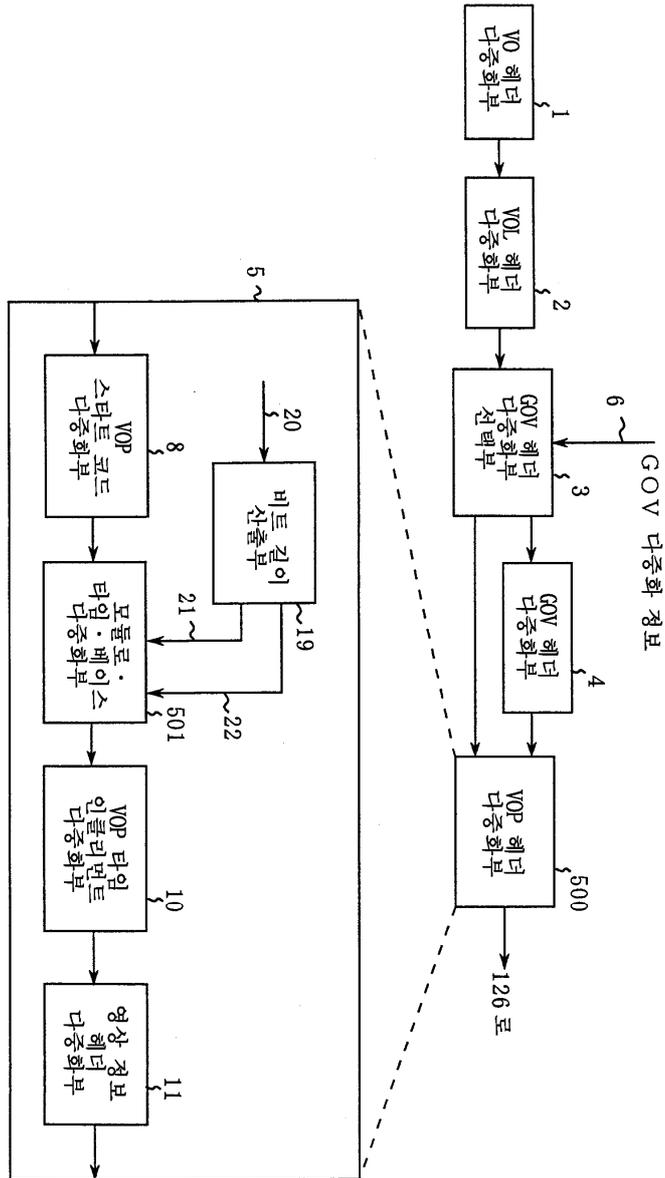




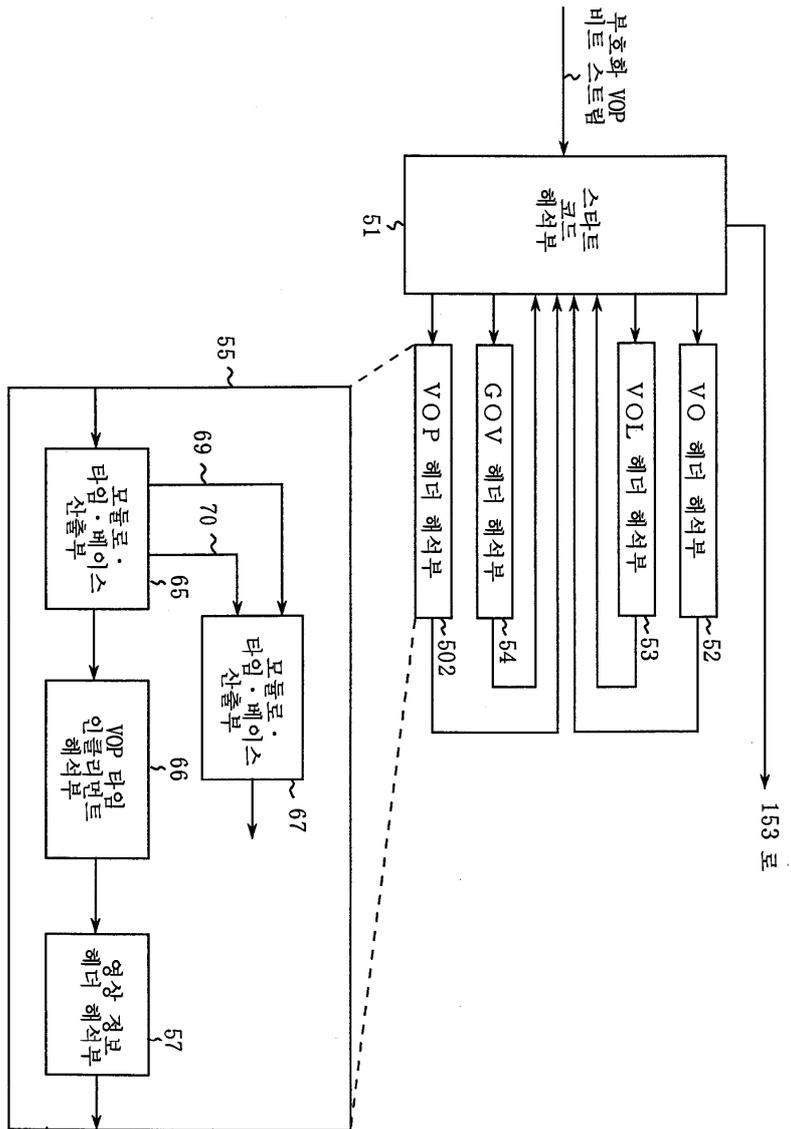
25

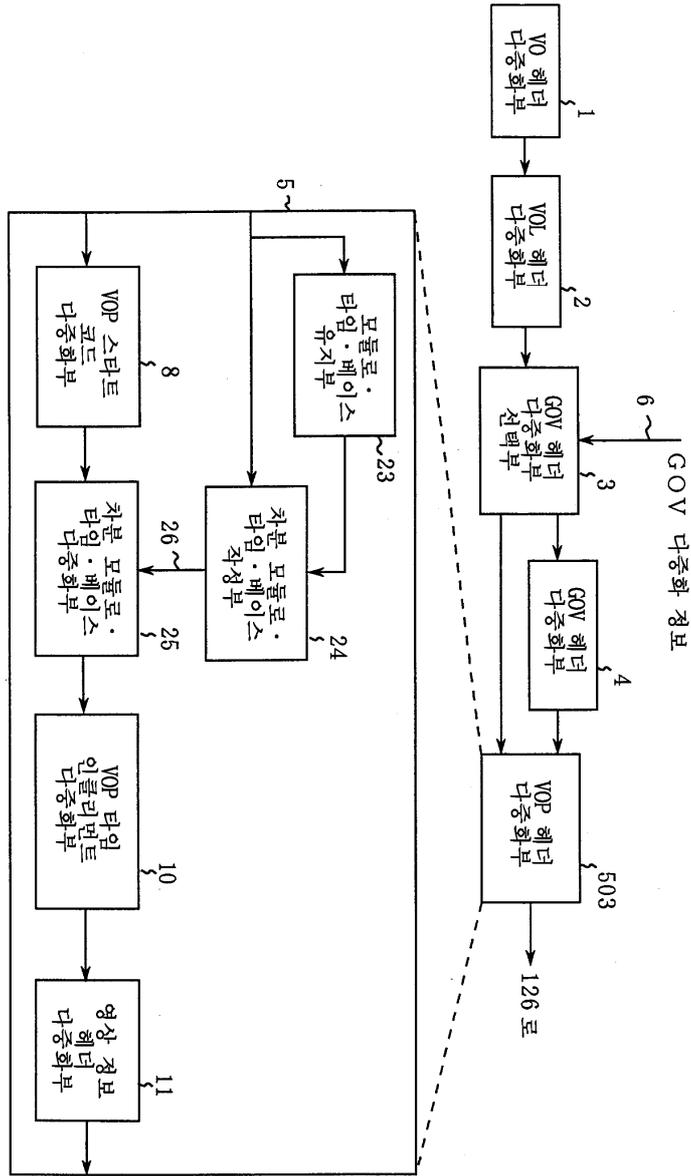






29





31

