

, MIDI Musical Instrument Digital Interface

, SMF Standard MIDI File

「MIDI」 「SMF」

가

, SMF

가

가

가

MIDI

1

, MIDI

가

가

2

MIDI 2

MIDI

가 SMF

가

META

가

, MIDI

가

SMF

MIDI,

가

, 가

MIDI

MIDI

가

MIDI

MIDI

2

2

, 1

2

, 2

1

가

, 2

가

가

가

MIDI

가

MIDI

, 가

CD MD

URL

URL , URL

가

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SMF
MIDI
MIDI
,
META
,

28
30

CM

가
가

1 1 (1a, 1b) 가
, (1a) (1b)

(2) CPU (3) (4)
. CPU(2) 가

(1a) (3) (1a, 1b) (3a)

(4) (6) MIDI (3)가 (6) (11) (12) (13) (14) ROM(11)
(12) MIDI (11) ROM(11a) RAM 가

a) (14) (15) MIDI (11) (12) (16) (13)
) (14) (14) (15) 가 (16a)
가) (15a)가 (16) (15) (18) (16)

(19) (17) 가

(20) (18) SMF 가 SMF

(3) (1a, 1b)

MIDI 가 META 가 3 (a) (c) 3 (a) 가 MIDI (b)

가 Sys.Ex MIDI 3 (b) (c)

1 2 3 (b)

MIDI 가 3 4 (c)

4 3 MIDI 3

4 SMF SMF

META 가 5 5 (a) 2 (b) META

(c) 5 (b) (e) META (b) 가

FFh 가 META 30h, 31h, ... META

len META type id

event

len

META (a) (b) (a) 10h (b) 11h가 6

Sys.Ex 가 FFh, len, type id 5 (a) 2 (c) Sys.Ex

Sys.Ex 가 7 (a) 7 (b) (e)

SMF 8 Sys.Ex 가 5

M MIDI 가 3 A

5 (b) T 5 (c)

8 가 Sys.Ex M, A, T, P 8

(3) (3a) T (6) 가

가 t 가 T T 가 t T 가

(CPU 가

(6) 1 (3a) CPU(2) (4) 가 MIDI ROM MIDI (11)

DI (11) ROM(11a) M(3) MIDI MI

(11) CPU(2) MIDI (11) MIDI

, CPU(2)

(11) , MIDI (11) ROM(11a) CPU(2) , MIDI

(11) , MIDI (11) , MIDI (11)

MIDI , MIDI (5) Sys.Ex (7) 1 (4)

가 META (3a) 가 A (12) (12)

(13) 가 P (13)

(14) (14)

(12)가 (4) B CPU(2)

(13) B C 가 C (14) D 가

, CPU(2) C MIDI (14)

D MIDI (11) (12 14)

M MIDI (T) MIDI(M) (A) 8 A, T, P가 (3) MIDI (P) MIDI(M) (P)

(11 14) 가 (11 14) (4)

MIDI (11) (12) (15)

(15a) (13) (17) (14) (19)

(15a) (14) (18) (16) (20) 가

(4)가 6 (b) META

1 MIDI,

MIDI

가

9 1 , CPU(2)

가 가

「S」 (3)가 (1a) (S101),

(3a) (S102). (4) (3a) 가

(S103). (S104), (S104 NO), S103 가

(S104 YES), (S104 YES), MIDI (11) , MIDI (11) 가

(S105), MIDI (S105 YES), MIDI (11)

(S111).

(19) 가 (S106),

가 MIDI M (S106 YES), (S106 YES), (12) 가 (12) 가 (19)

A S112).

(19)

가 (S107 YES), T (S113). A가 (S106 NO), (13) T 가 (S107), (13) 가 (S107), (13) 가 (S107 NO), (14) 가 가 (20) 가 (S108), (14) 가 (S108 YES), (S114). 가 (S108 NO), (20) 가 가 (S109). (S110 NO), S101 (b) META 가 (S110 YES), (11) (12) 가 (12) (13) 1 (14) MIDI 가 (12) (12) MIDI (11) (12) (12) (3)가 (1a) SMF 가 (1a) (1a) 10 1 CPU(2) CM() S121 S124 9 S101 104 (S125 YES), MIDI 가 CM 가 (S125 YES), MIDI (11) (S125 NO), 가 (S126 YES), (12) (S126). (S133). (19) 가 (S127), (20) 가 (S127 YES), (13) 가 (S127), (13) 가 (S128 YES), (20) 가 (S127 NO), (14) 가 가 (S128), (14) 가 (S129 YES), (20) 가 (S135). 가 (S128 NO), (14) 가 가 (S129), (20) (S136). (S129 NO), S130 S130 S131 9 S109 S110 가 SMF 가 가 3 CM 5 7 11 () (b) (a) R t1, t2, t3 () R () R 1 R t1, t2, t3 3 3 1 R 11 12 t1 R 9 S112, S113 S114 가 10 S133, S134, S135 S136 가 (S141 NO), (S142) R (S143), R (S141 YES), CPU N (S144). N N-1 (S145). N 0 (S146), 0 (S146 NO) 9 S110 10 S131 N

0 (S146 YES), R (S147).
13 . MIDI
X , (a) MIDI , 가 ,
, 2 (MIDI) . X
, 13 (b) X , X1, X2, X3 ID
MIDI X MIDI X
14 (a) X, Y가 X, Y ID가
14 (b) MIDI X1, X2, Y1, Y2, ... X, Y
가 (3) 가 15 16 가
MIDI 14 (b) 가
15 가 X, Y X1
X2 가 X2 X3 가 Y1
16 Y2 가 Y2 Y3 가
(3)가 14 (b) X1 (S151), X1 (S152).
X2 (S153), X2가 X1 (S156),
(S154), X2 (S155). MIDI (S159),
Y1 (S157), Y1 (S158). X3 (S160), X3 Y
X3 (S161). Y2 (S162), Y2가 Y
1 (S163), Y2 (S164). 가 X4
X6
X X1, X2, ...X6
15 X X 가 X
X1, X2, ...X6 Y
17 Y
17 5 (b) 7 (b) SMF ()
가 SMF
17 T T 0 L
T L 5 (b) 7 (b) SMF T
T 가 가
17
18 W1 W4가 가 (S171),
S171 가 (S172). (S172 YES), (S172 NO),
(S173). 17 W1
(fade in) 가 (S174), 가 (S175).
(S175 YES), (S176), S174 가 가
(S175 NO), (S177),
(S177 NO), (S176), S174 가
(S177 YES), 17
W2 (fade out) 가 , S178 S176 (S178). 가

가 (S179), (S179 NO) S171 가
 17 W3, W4 가
 (S179 YES), SMF
 MIDI
 SMF (1a) (1b)
 19 (1a) (1b) (1a, 1b) 가
 (2) CPU (3) (4)
 CPU(2) 가 (3) (1a, 1b)
 (1a) (3a) (4) 2 8
 (5) (7 10) (3)가
 (6) MIDI (11)
 (12) MIDI (13) (11) 1 ROM(11a)
 (14) (14) (11) (12) (16) (13)
 (15) MIDI (14) (14) (15) 1 (17)
 (15a) (16) 1 (16a) (16)
 (15) (18) (16) (17) (18) (16) (17)
 (19) (17) 가 (20)
 (18) (21) (22)
 or) (5), (6), (15, 16), (17, 18) (21) DSP(Digital Signal Process
 . DSP . LSI 19 (4) (6)
 19 1 (7 10) (5)가 (21)가
 (22) 가
 20 19 (3)가 (1a)
 (1b) (S181). (3a) , CPU(2)
 (21) (3)가 (S182). S182 (7 10) (S183).
 4) S183 (11 14) (11 14) (S184). S184 (16) (S1
 (7 10) 가 가 (15) (19) (20) (S186).
 (11 14) , MIDI (17, 18) (19) (20) 0 4
 85). 21 S182 가 (, t
 가 (, t
 3 T2 2 , 4 , T3 3 T1 T4 , T1 2 1
 , T2 2 , T3 가 T4 가 4 .
 1 T2가 2가 , 2가 T3
 3 . t1 , t2 , t2-t1
 1 1 15ms , 1
 (21: 19) . Q t0
 , t2 , (0)

22 (4) , 21 22
 가 , WAKE 가 (S191), CPU(2) Q (21) CPU(2) (S192). Q
 Q=t2-t0 , CPU (2)
 T (S193), Q T (S194). Q T
 (S194 YES), (S195, S198, S200, S202),
 (7 10) (S196, S199, S201, S203). , Q=Q- T Q
 (S197).
 21 0 가 1 1
 T1 Q> T1 S194 YES가 , 가 MIDI
 (S195). 21 , 1 MIDI (S195 YES), (7)
 (S196). 1 MIDI 가 (S195 NO), (S198).
 1 (S198 YES), (8) (S199). 1
 가 (S198 NO), (S200). 1 (S200 Y
 ES), (9) (S201). 1 가 (S200 NO)
 , (S202). 1 (S202 YES), (10)
 (S203). 1 (S202 NO),
 , 가 1 (7 10) , Q=Q- T1 (S197), S
 193 가 2 T2 Q T2 (S194). Q Q=Q
 - T1 , 21 Q- T1> T2 S194 YES가 , 가
 2 , Q=Q- T2 (S197), S193 가 3 T3 Q T
 3 YES가 , Q Q=Q- T1- T2 , 21 Q- T1- T2> T3 S194
 , Q=Q- T3 (S197), S193 가 4 T4 (21
 , Q=Q- T3 4 t2), Q T4 , t2 4 (3a) 가
 가 Q- T1- T2- T3< T4 S194 (S194). Q Q=Q- T1- T2- T3 , 21
 , SLEEP (21) 가 , WAKE 가 (S191), 4
 22 , S192 S194 S197 20 S182가 , S195, S196, S198 S203
 20 S183 (11 14) , 20 S184 . 23
 , MIDI (11) (4) , (a) MIDI (11) 가 (7)
 4) (S211). , MIDI (3,
 MIDI (11) , (S212). (15)
 23 (b) (12) (12) (4)
 1 가 (8) , 1 (S311).
 , [5 (b), 7 (b)]
 (S312). (12)
 23 (c) (13) (13) (4)
 1 가 (9) , 1 (S411).
 , [5 (c), 7 (c)]
 (S412). (13)
 23 (d) (14) (14) (4)
 1 가 (10) , 1 (S511).
 , [5 (d), 7 (d)]
 (S512). (14)
 (16) (S513).

23 (a) (d) , (a) (d)
 가 (c) , (a) MIDI , (b) ,
 (5) , (6) 가 (d) , DSP가 1 , DSP
 S213 (15) MIDI , S313 (15) (15)
 (17) , S513 (16) , S413 (16) (18) ,
 가 (20) 2 가 (17) (19) 1 가 (18)
 (20) CPU(2) () (21) (17) 1 가 (21)
 Nx 가 N (18) , N 가 (21)
 24 (18) , (a) 가
 , F1 F3 1 , (b) 15ms ,
 (4) 15ms , A , T (21) 가 . t ,
 , M MIDI 21 가 , P 가
 21 , F1 (11 14) 1 F2 (7 10)
 , 24 (a) 1 F2 가 1
 가 24 (b) , 가 1 F2 ,
 (11 14) M(MIDI), A() , P()가 M A 1[19 (15)
 24 (b) , P 2[19 (16)] , F1 , F2
 SLEEP 가 , 1 F3 가 1[19 (17)] , (18)
)) F3 F3 가 , 2 2[19 (17)] , (18)
 가 , F2 F3 A, M, T 가 , F4 (F3 24 M, A, T)
 , 19 , 가 ,
 , (4) (7 10) , (3)가 , (11 14)
 , (4) 가 (7 10) 가 , 19 ,
 , 15ms , 1 15ms
 , 1 , 1
 1 , 가 , 24 (b) F
 , A M , 가 A, M, T , 가 가 , F2 ,
 , A M , 가 , 15ms 가 가 M, A, T, P ,

(3) J, J<E, J>E, J=E

가 가 (4) MIDI 가 A, B, C가 (12)

(4) (13) (14) 가 (11 14)가 (11 14)

(4) 가 (3a) 3 A, B, C 1 19

가 37 CM() 가 (50) (51) (51)

(50) (52), (53), (54) (55), (56) (72) (73)

(52) (73) (53) (55) 가 (57)

(54) 0 9 (56) (58) (59)

(53) (61) (60) (63) (65) (72)

(62) (64) (67) 가 (69) 가 (66) 가 (71)가 ()

(68) (70) (70) (51) (71)가 ()

(71) (53) 1 19 (20) ,가 ,가 ,

가 , CM (55) 1 19 (19) MIDI ,가 (50)

가 , CM CM (song) , 1 19 (50) 가 (72) MIDI , MIDI (55) MIDI (50)

(50) () MIDI () MIDI BGM((71)

) 가 (70) 19 (22) CD(Compact Disk) 가 38 CD

MIDI (70) CD . MD(Mini Disk)

(50) 28 CM (50) 28

28 19 (50) (23)가 , 19 (7) MIDI (11) 28

(24)가
29 28 , (19) (c) CM
(20) (d) CM (3) (a)
가 , (3) (23) 가 MIDI
(24) (7) (23) (7) (23) 가 MIDI
(11) (11) (23) (19) (19) (b)
CM MIDI (15) (17) (19) (19) (c)
) CM CM MIDI , CM (d) (20)
. , 28 , MIDI (11)
가 ,
, 37 (50)
, MIDI
, 19 가 30 (25)
가 (7) MIDI (11) 30 (26)가 (19) (c)
31 30 (20) (d) 가 (3)
, (3) (a) (25) (25) (26) (7)
. MIDI (11) (26) (17) (19) (19) (b)
MIDI (() 가 (19) (c)
, (d) (20) , 30
MIDI MIDI (11) 가 가
4 , CM 가 32 3
33 MIDI, 가 CM
(Z) 34 URL (Uniform Resource Locator)
, 「XXX」 CM
32 (S601). CM (1a: 1, 19) CM
(13) (19) (20) (3) (4)
(S604). ()가 (S603), URL (S60
5), CM 「XXX」 CM (S
606). , CM 20%
35 36 가
. 가 36 가
2000 9 15 , 「from=2000/08/15 to= 2000/09/15」 2000 8 15
「YYY」 가 가
35 (S701). (3) (4) (1a)
(19) (20) (4) [22: 37
(70)] 가 (S702). (13)
, 36 가 (S703), 가 (S704).
URL () (S705), 가 (S704 YES), (S708).
706), 「YYY」 가 (S704 NO), (S708). (S
가 (20)

가 (S707).

가

STB(Set Top

Box)

(57)

1.

가

가

2.

1

MIDI(Musical Instrument Digital Interface)
2

1

, MIDI

3.

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MIDI

가

가

MIDI

가

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7.

6

가

1

MIDI

8.

7

MIDI

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1

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1

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MIDI

1

, MIDI

가

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가

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가

17.

16

(前回)

가

가

가

18.

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1 15

가

J

E
J<E

, J> E

22.

1 15

가 가

23.

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26.

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가 가 가

MIDI

27.

3

URL , UR

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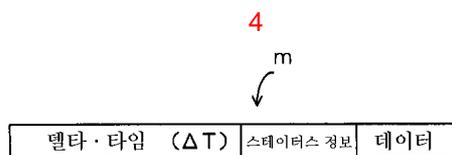
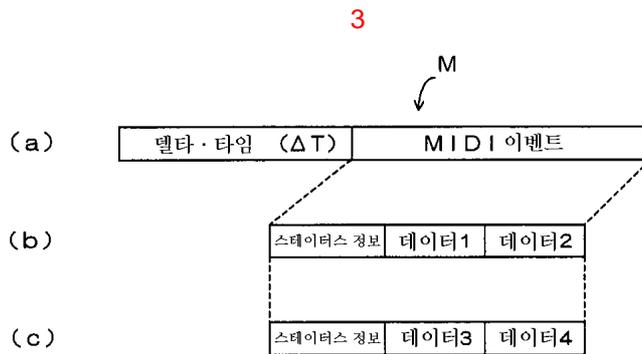
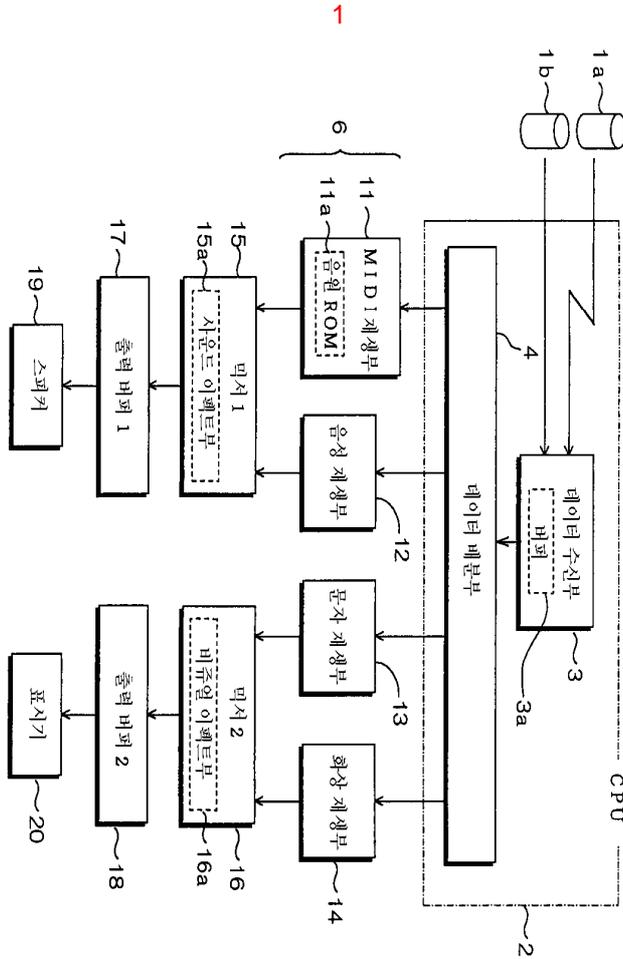
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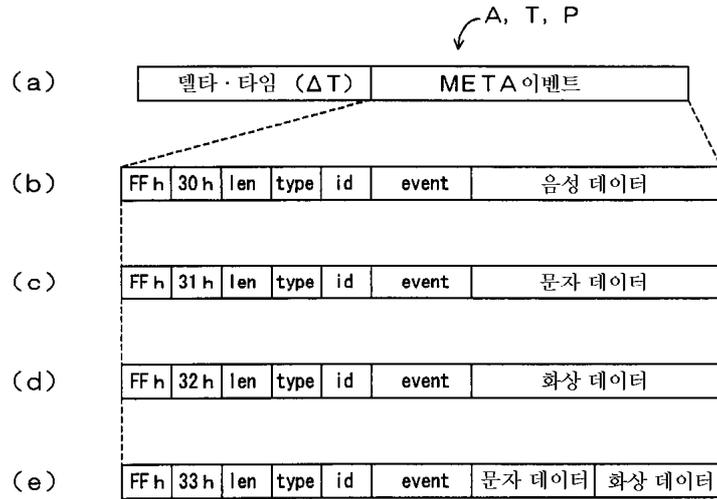
가

가

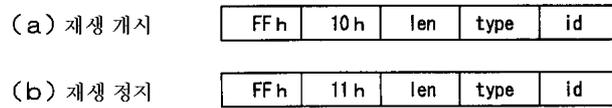
가



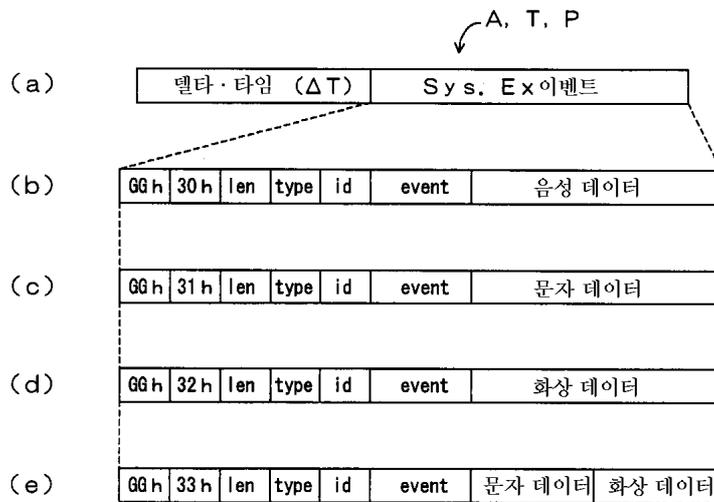
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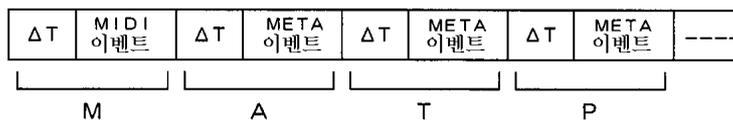
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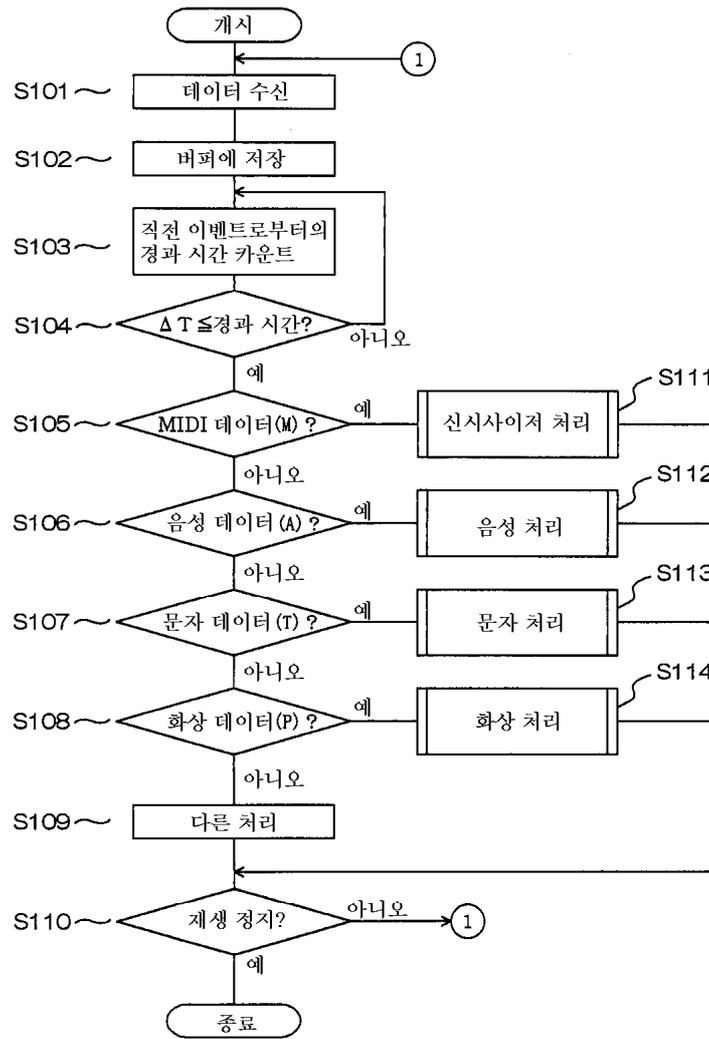


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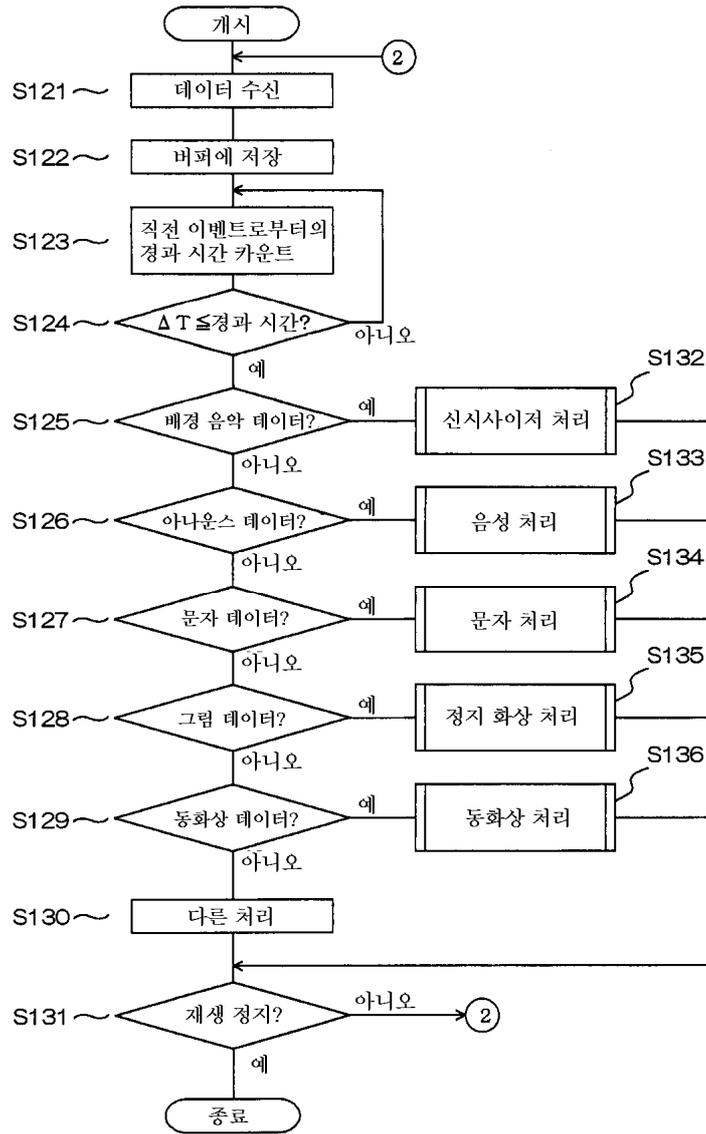


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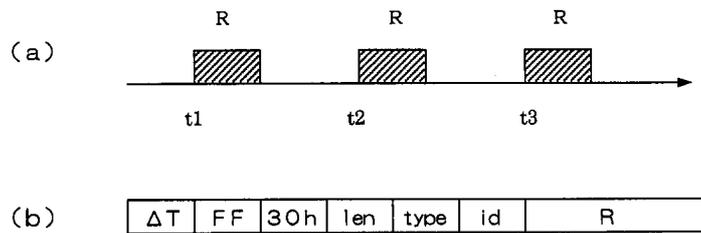




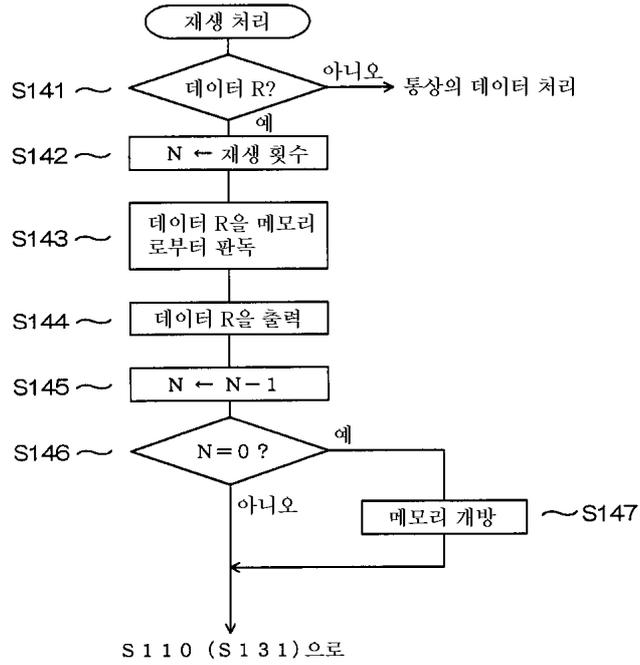
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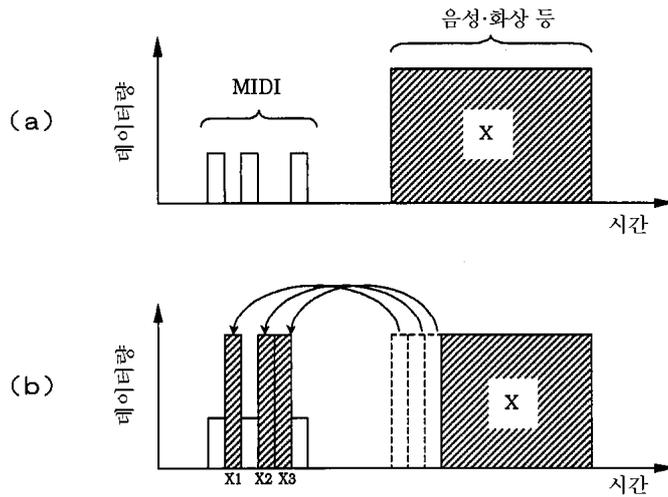
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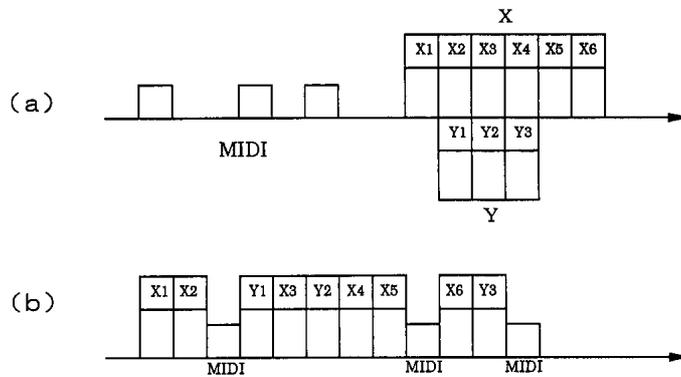
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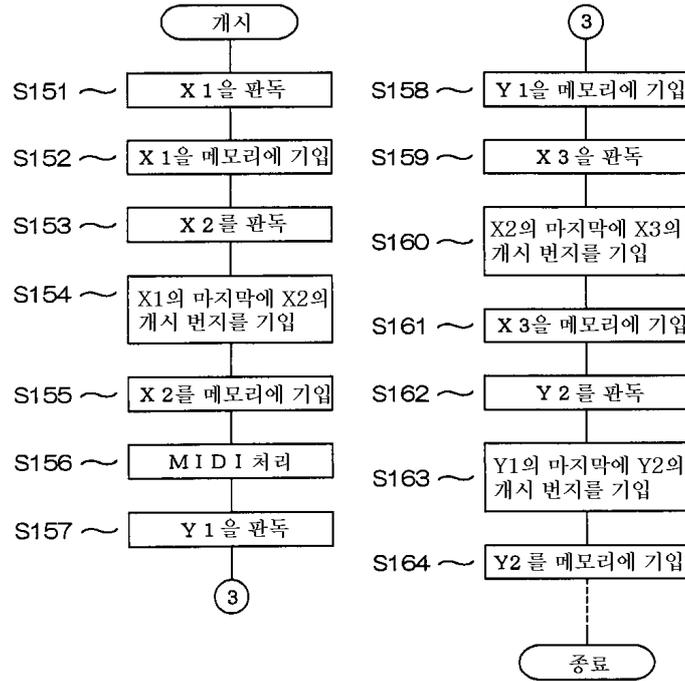
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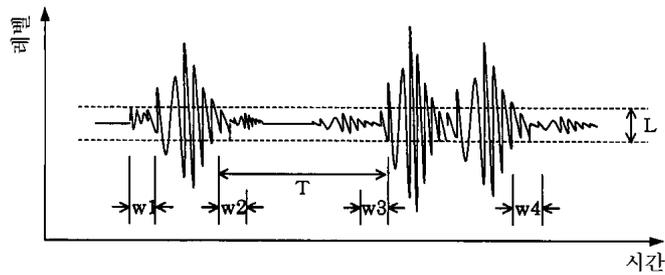
15

X 1	X 2 의 게시 번지
X 2	X 3 의 게시 번지
Y 1	Y 2 의 게시 번지
X 3	X 4 의 게시 번지
Y 2	Y 3 의 게시 번지
X 4	X 5 의 게시 번지
⋮	⋮

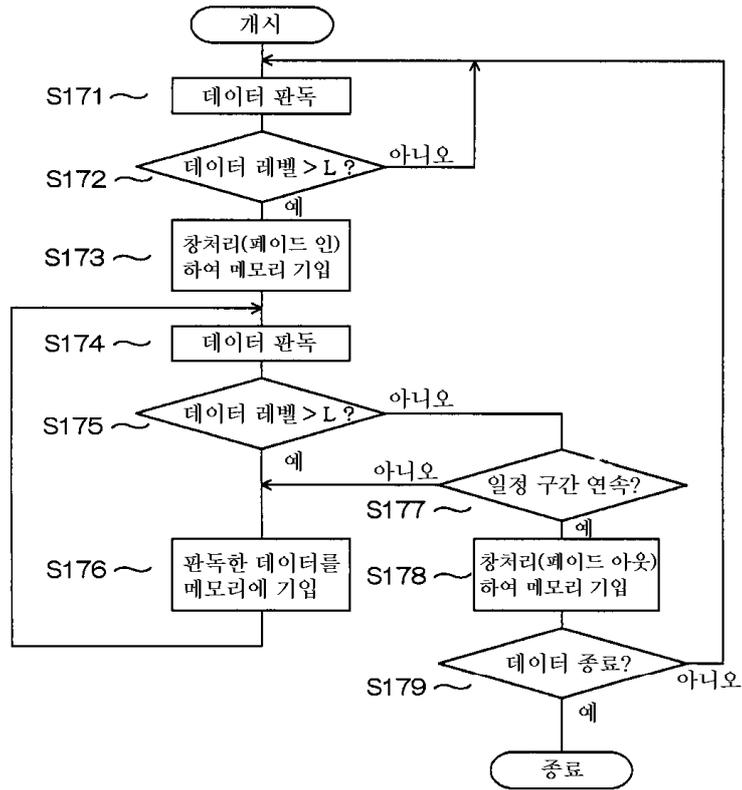
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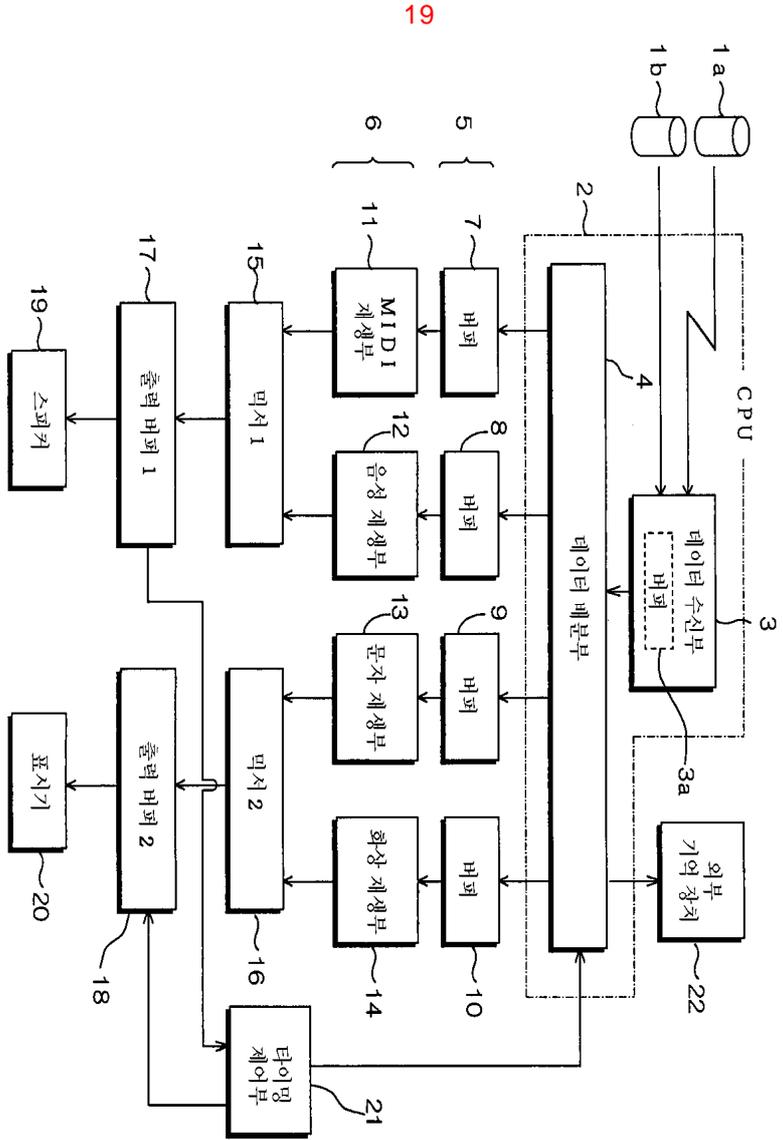


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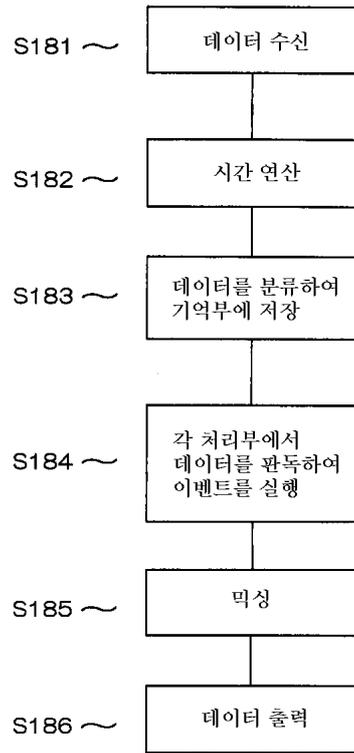


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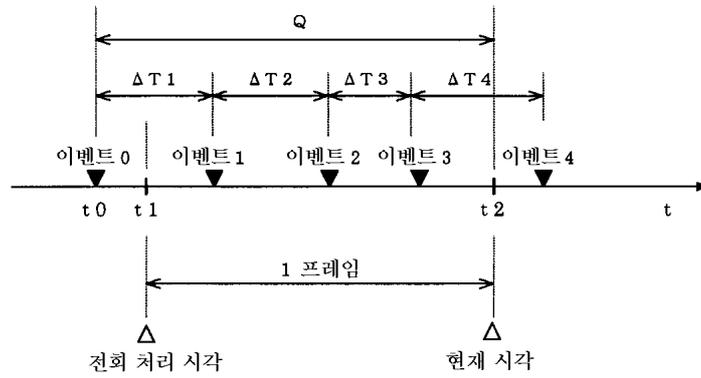


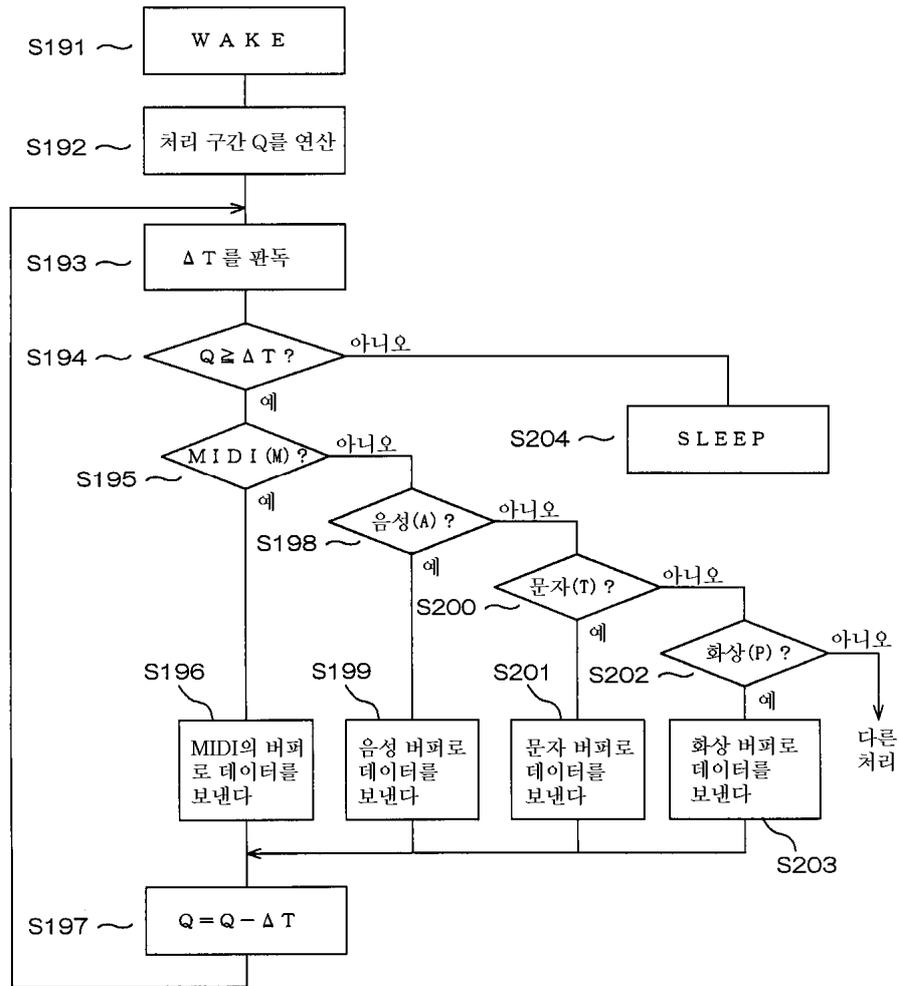


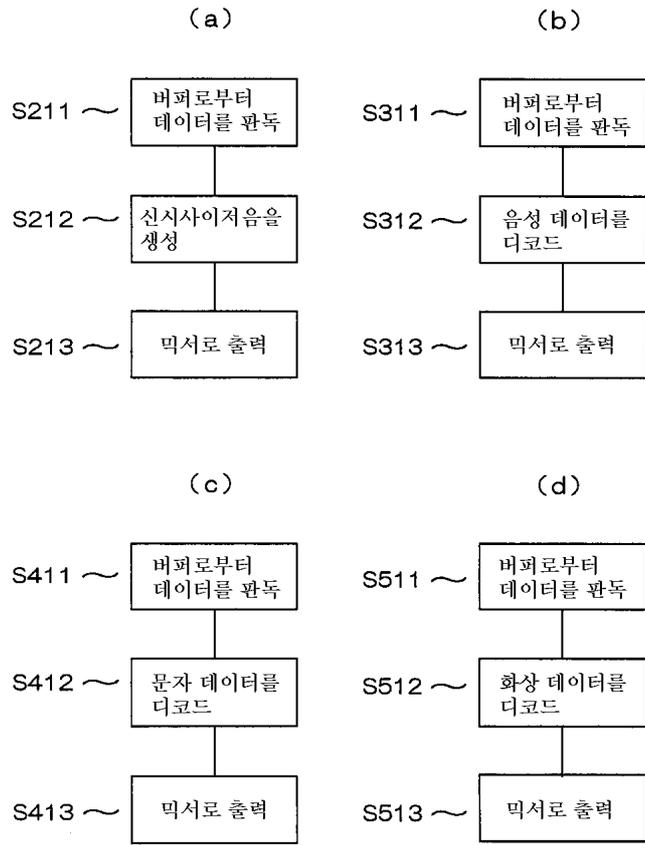
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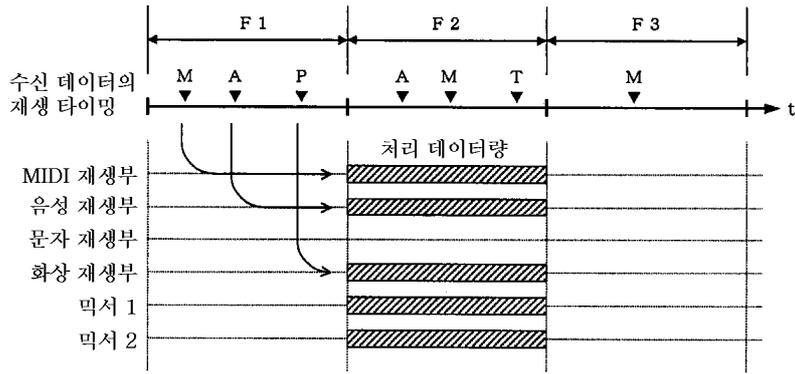




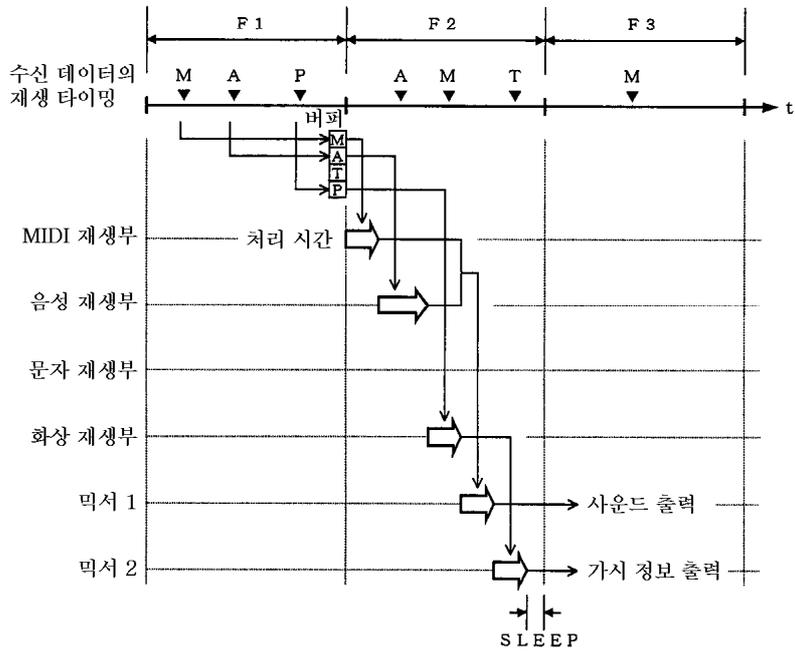


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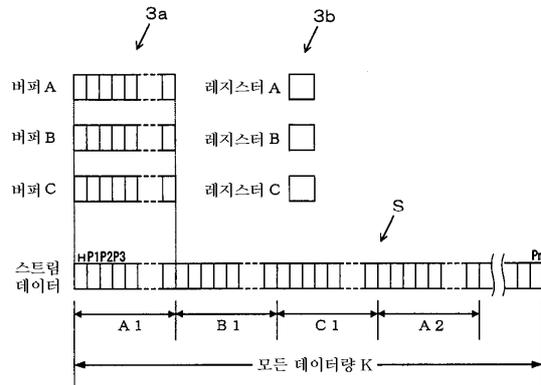
(a)



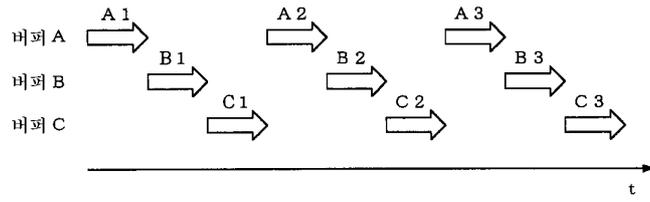
(b)



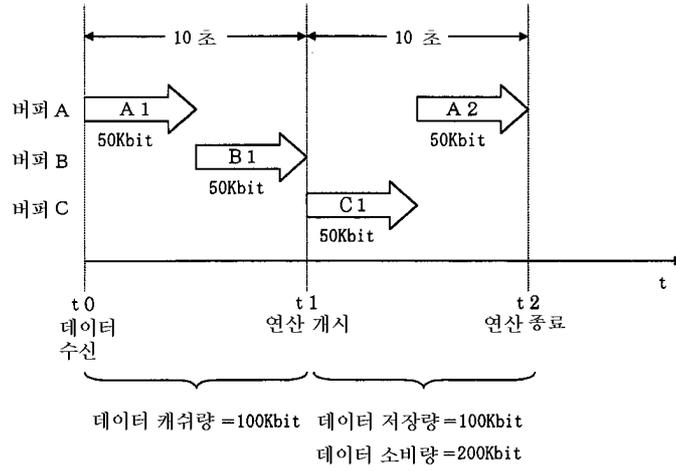
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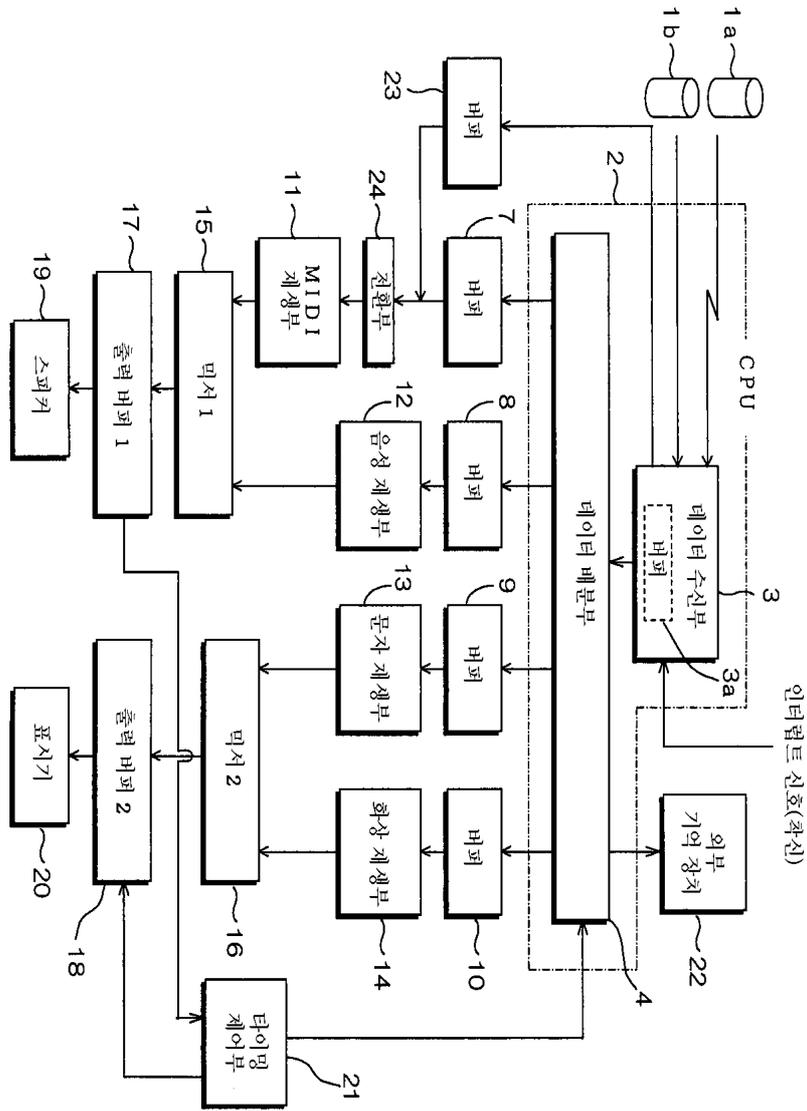
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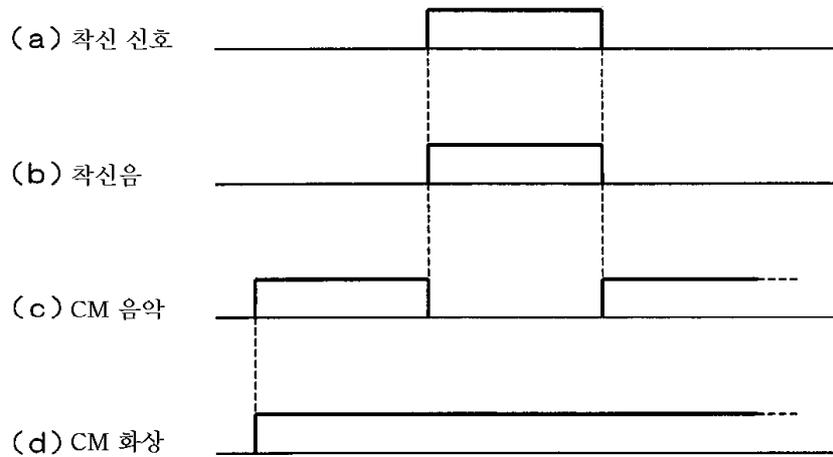
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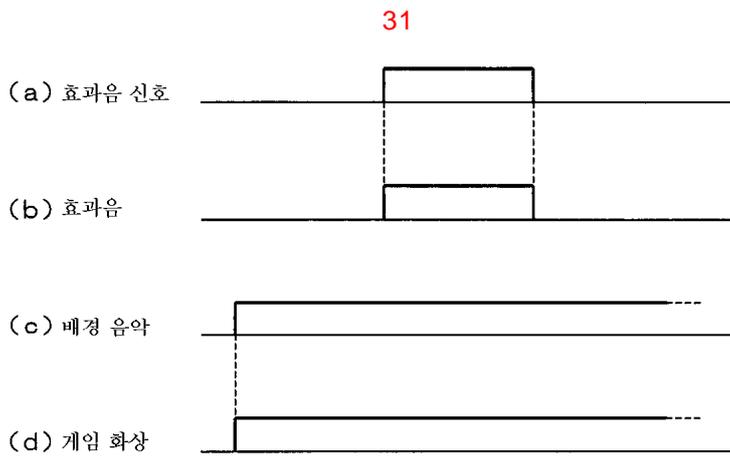
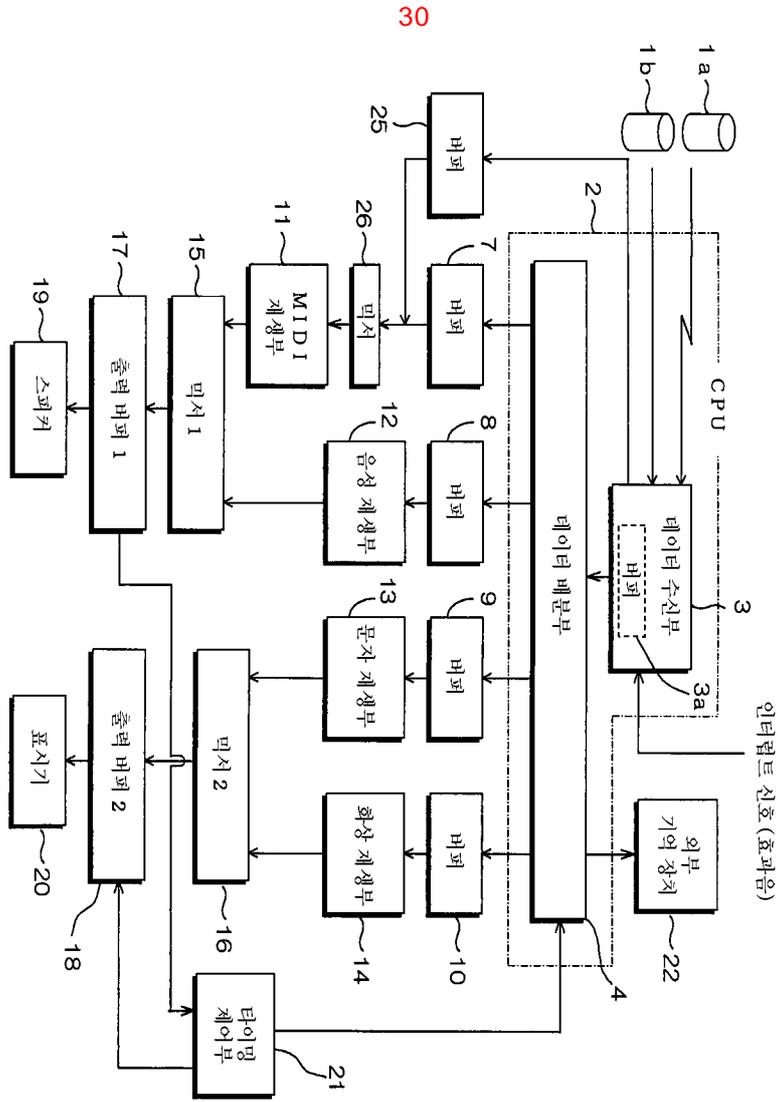


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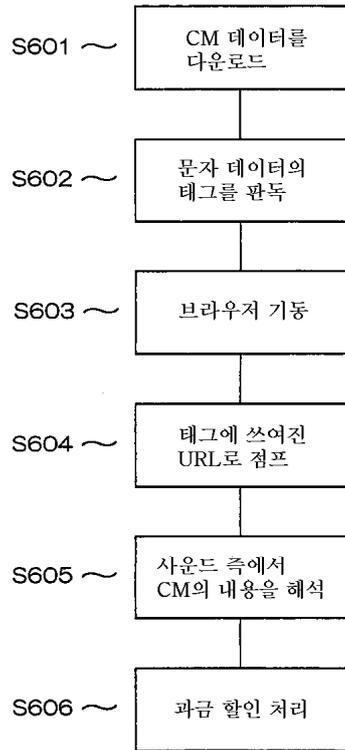


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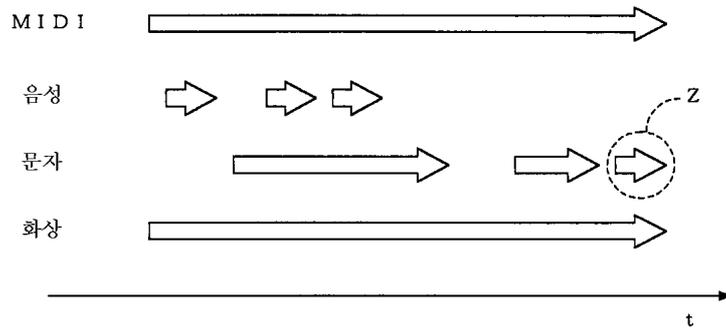




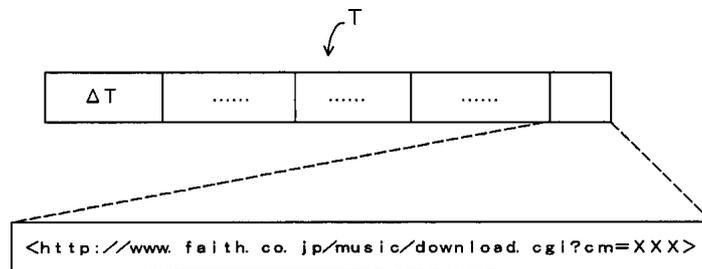
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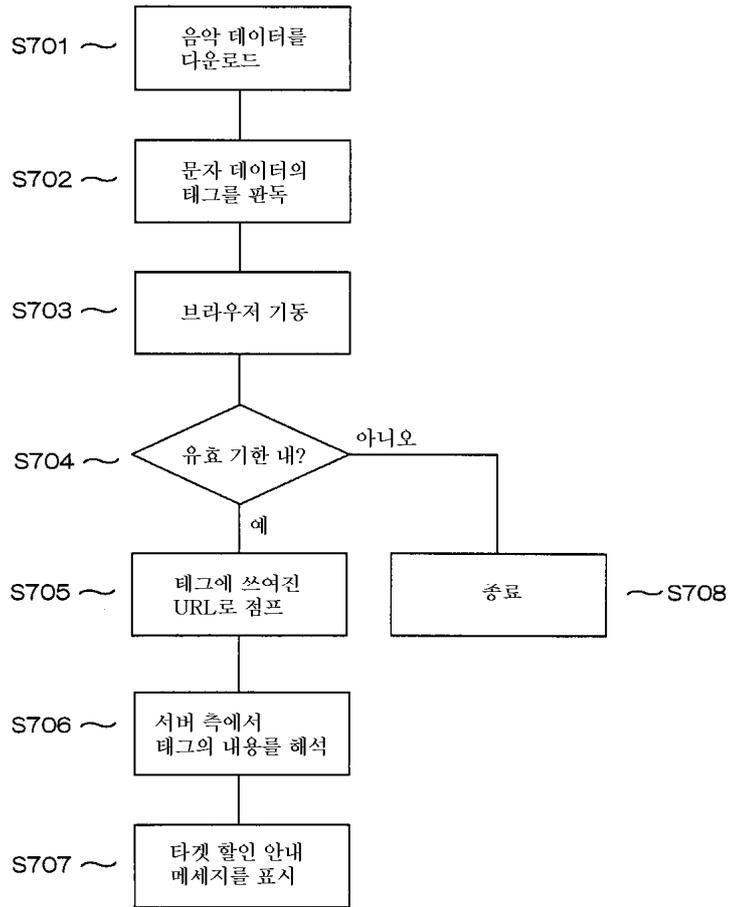
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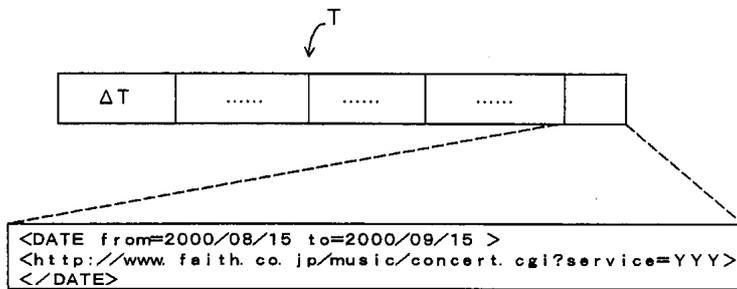
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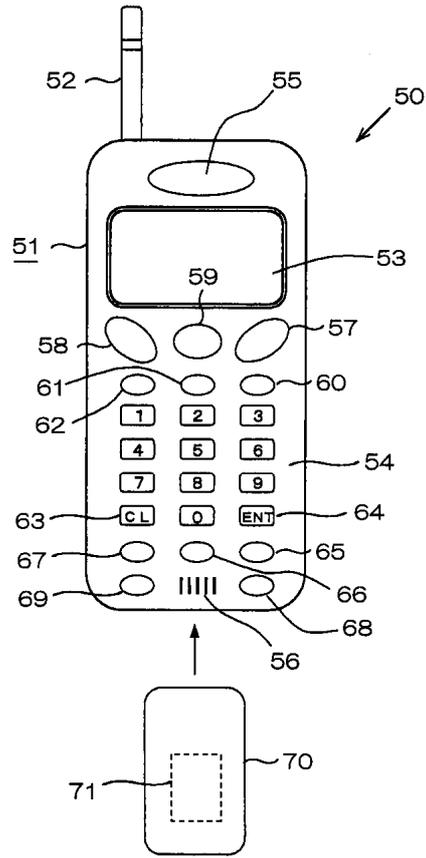
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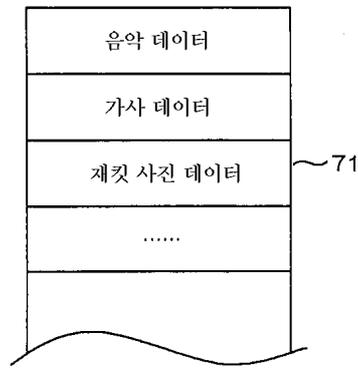
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