

가
 " (movement authrity)" (LMA) (가
 가 가 가 가
)
 가 가
 r chunks)" 4 (granula

가 가 4
 (following)" 가 " 가 (followed)" "

LMA
 가
 GB 1 458 659 " (track marker)"

GB 1 603 526

1

1

2

2

2 ,

1

1

1 ,

2

2 ,

5

13

5

6

7

가

8

9

(track - side)

10

가

11

12

13

가

" "

5

가

MBP가 (" MBP")가 (interlocking) MBP
 (train - borns system, Train Carried System TCS) TCS ,
 (automatic train protection uni
 t; ATP) , ATP (automatic train operation unit; ATO)

ATP , ATO , ATP
 ATP (bidirectional radio communication
 s system) (가) MBP
 가 LMA가 LMA ATP . M
 BP . LMA MBP ,

6 MBP(13) TCS 가 (10,11,12) (14) (15)
 (16) MBP (6)
 MBP MBP , MBP
 (17), (18) (19) , MBP
 (20) . MBP (21), (22) (23) ,
 (holding) (24) (setting), (locking) 가
 ATP

MBP ATP가 MBP
 " (reserve)" , 가
 LMA . LMA 가 가

- a)
- b) (un - reserved)
- e) ()
- d)

LMA가 ATP가 (가 0) LMA
 ATP

(26) 가 (brake build up time) , (27) ATP 가 (a
 lgorithm) (velocity - related brake fade) 7 (a
 (25) 가 , (26) , (27)

(27)

$$= (1+kl)(aV+aV^2+cV^4)$$

a, b c , kl (a perunit safety factor)

LMA . ATP MBP LMA , MBP

MBP MBP " (registered)" MBP MBP
 . MBP ATP (train radio system; " TT Co
 mms") . ATP , MBP , ATP LMA
 () () 가 LMA ATP LMA
 (tachogenerator)) (,
 (beacon) (Absolute Position Reference; APR)
 (.) . ATP M
 AP . MBP ATP (A B
 P가 ATP가 , AT
 rity) (fault tolerance) (extra integ

ATP manual; ATO (manned automatic; ATO), (protected
 /), (restricted manual;
) (standby;) . ATP

ATP 2/4 3 (two/three - out - of - four) 가
 (lane) 가 ATP가 . ATP " (half lane)"

ATP (remote - end) ATP (safety - critical discrete outputs) (voting arrangement) .

8 , ATP(29,30) (28)가 . ATP ATO(31) (32,33 34,35) " " (36,37) 3 2 (two - out - of - three voting unit) (38,39) 가 .

40 - 44) / , I/O I/O ((32) (tra ck code reading module) .

ATP (45,46 47,48) (49,50 51,52) 가 . ATP /

ATP (16 1) . ATP (permanent speed restriction; PSR) . ATP PSR 가 (leading edge) . PSR (30 1) 가 .

가 (trains' handling characteristics) (가)

	열차속도 분류 1	열차속도 분류 2	열차속도 분류 3	열차속도 분류 4
철로속도분류 1	10 kph	10 kph	10 kph	10 kph
철로속도분류 2	40 kph	50 kph	73 kph	105 kph
철로속도분류 3	65 kph	72 kph	112 kph	135 kph
철로속도분류 4	80 kph	100 kph	150 kph	150 kph

2 가 3 가
72 kph .

MBP (temporary speed restriction; TSR) , ATP TSR . ATP TSR (temporary speed restriction; TSR) MBP가 TSR . AT P 가 가 1% 가 .

가 PSR TSR . ATP TSR ()

a) 가 TSR ,

b) ATP가

e) TSR

ATP가

ATP

a) 가

가

ATP

b) 가

e) 가

가 ATP

(가)

(trip)

ATP

가

가 ATP

d) 가

가 ATP

(

가 "

"

).

APR

(

가

가

)

(tag)

("

(transponder)") ,

(

train mounted reader)

8

(65)

ATP

RF (61 - 64)

가

가

,

가

ATP

R

ATP

APR

가

AP

(maximum system delay time)

ATP

(active communications window time)

APR

APR

가 APR

RF

(field)

ATP

(edge)

(offset)

ATP

, ATP

APR

, ATP가

(trigger)

APR

ATP

TT Comms

(broadcast)

(leaky feeder radio)

8

(53 - 56)

(aerials) (57 - 60) 가)

(5

3 - 56) ATP

MBP

MBP

TT

Comms

MBP가

MBP

MBP가

(frame)

TT Comms

가

가 . TT Comms
(Emergency Stop) (bit)

가 (Registration Available) . TT Comms

TT Comms 가 (communications slot)
가 (dummy message)
9 , MBP / (leaky feeder splitter/combine
r unit) (69) (base transceiver) (66,67)

MBP LMA
TSR 가 ATP가 MBP M
BP가 MBP
MBP () MBP () , MBP
(6 70) 가

가 (setting)

가 가 가
가 가 10
가 K L

(71)가 (73)가 (71) (72)
(74)가 K, (71) (72) 가
LMA

ATP가 MBP

가 11

가

가 12

MBP가 ATP " ATP MBP MBP " "
(proteted mode)" MBP

MBP 가

a) (controlled) - 가

b) (uncontrolled) - ,

MBP 가 ((valid move)) . MBP가

a) 가 , MBP

b) , 가 , 가 e)

c) , LMA 가 MBP

MBP , MBP 가

()

a) LMA가 , MBP 가

b) , MBP 가 (Reserved) 가 MBP (approach lock) () .

c) MBP가 (reserve active staus) MBP LMA가

d) MBP (가 1 가)

가 () 가 가

MBP 가

a) () MBP

b) 가

e) 가 가

MBP MBP 가 가

a) 가 LMA 가 , 가

b) 가 () 가 (protected modes not available) 가

가 , MBP 가 MBP

A가 , MBP 가 LM (, 가

) 가 MBP 가 가

()가 MBP가 LMA가 , MBP ATP

a) 가 BP LMA , LMA가 . (M .)

b) 가 가

c) 가 가 가 (가)

MBP가 (interlocking route holding)가 , 가 ,

a) 가 ((wrong side detection section failures))

b) 가

c) () 가

가 MBP MBP LMA MBP MBP MBP MBP

cy Apply) TSR' ' (Emergency Stop Request)' 가 .(LMA MBP (Emergen MBP

MBP 가 MBP 가 , MBP LMA가 ((Start Session for Train) ' .

), 가 MBP MBP
 LMA , MBP MBP
 (Take Control of Train) MBP가 가
 MBP (Unable to Take Control of Train) MBP MBP
 MBP 가 MBP MBP MBP
 MBP (Close Session for Train) MBP 가 MBP MBP MBP
 가 MBP가 (Abort Session for Train) MBP MBP
 MBP TCS가 가 MBP
 가 MBP
 (diversence message)
 MBP 가 가
 ATP가 MBP 가 ATP가 MBP
 가 , ATP가 MBP
 a) ATP가 (offset) , ATP가 (segment)
 b) ATP가 , 가 가
 가 가 가 가
 가 (MBP)
 MBP가 ATP MBP 가
 MBP (plain line uni - directional track) 가 (m
 echanical interlocking) 가 (levers) 가 (m
 (relay interlocking) (wire) 가 ,
 MBP " (parallel)" (electronic interlocking) MBP
 가 (MBP) MBP , 가
 " (processed)" (version) " 가 (p
 pseudo track section)"
 (" (unit lever)" , 가
 , " (route call)" , 가

) , MBP () 가
() . MBP (back - up)
가 가 , TCS

MBP TCS 가
) 가 () (

MBP .

TCS 가 가 , MBP
. MBP TCS

가 가 LMA
LMA가 TSR . MBP

13 . 13 TCS가 (75)가 TCS가 (76)
(77 - 81) ,
(88) MBP (82 - 86) . MBP
(80) (89)가

가 , ,

envisaged 가 ,

(57)

1.

1 , 1 ,

가 2 , 2 ,

2 ,

2 ,
,

(line - side)

(occupancy)

가

1

가

1

2.

1 , 1

2

3.

1 , 1

4.

1 , 1
, 2

1 2

5.

1 ,

6.

1 , 1

7.

1 , 1 2

8.

1 , 1

9.

8 , 1 2

10.

9 , 1 2 2

11.

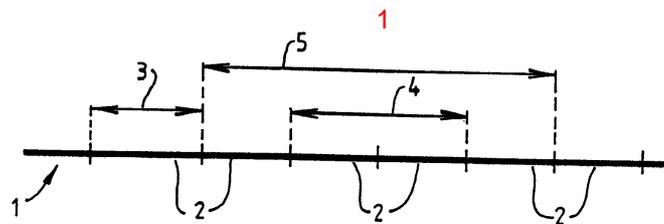
1 , (track
circuit) ,

12.

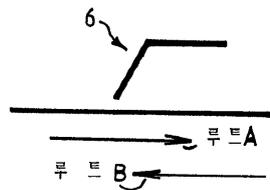
1 , 1 1

13.

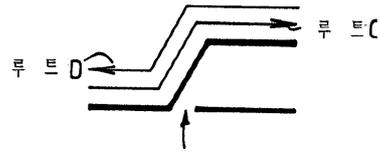
1 ,



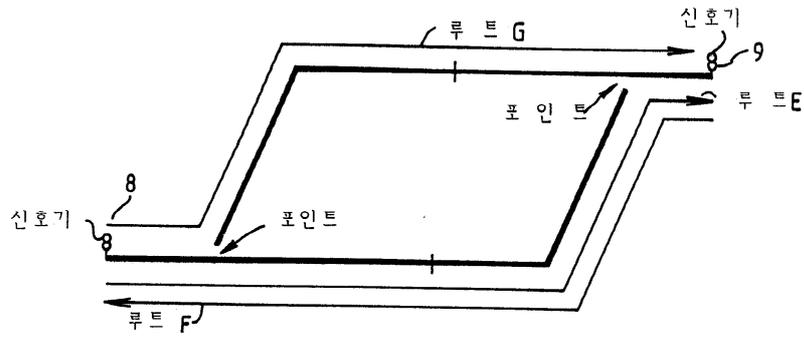
2a



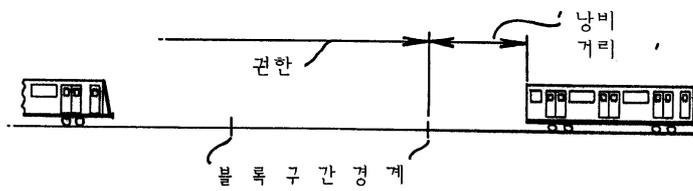
2b



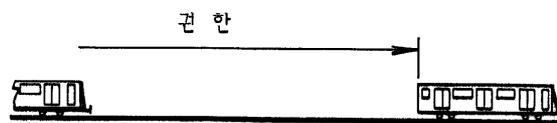
3



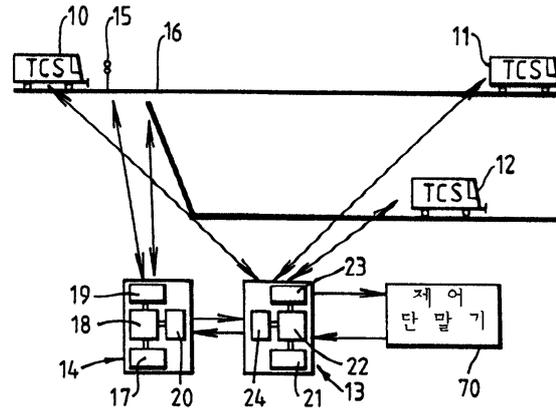
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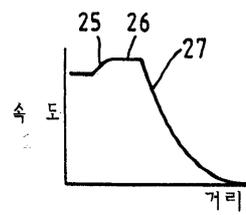
5



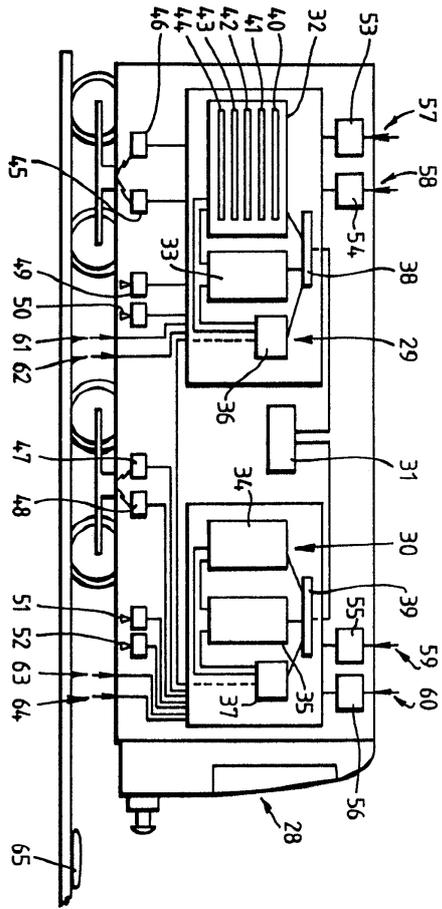
6



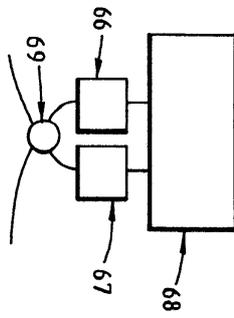
7



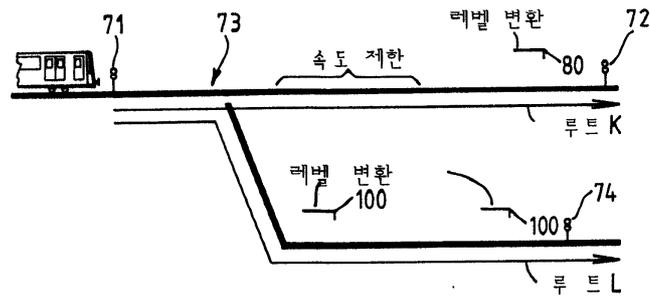
8



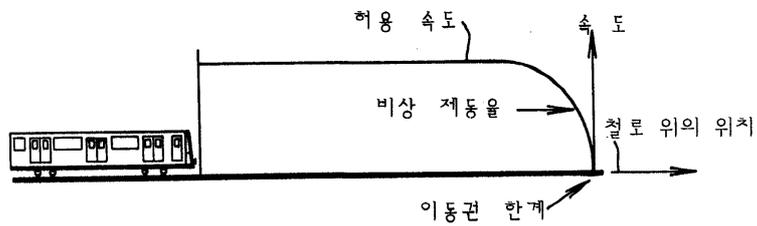
9



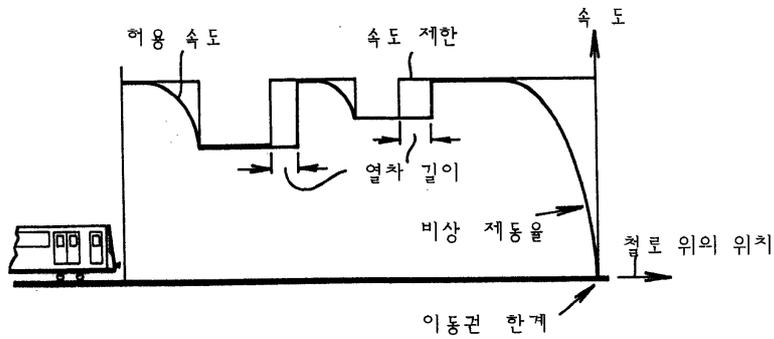
10



11



12



13

