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|------|---|---|-------|---|---|
| (71) | , | , | . | 1 | |
| (72) | , | , | 5656, | . | 6 |
| | , | , | 5656, | . | 6 |
| | , | , | 5656, | . | 6 |

(74)

:(
 (54),

(M_1, M_2, M_3, M_4)
 (S_1, S_2, S_3, S_4)
 $(P_0) \quad S_1 \quad S_j \quad (P_c) \quad j=1, 2, 3$
 $P_0 \quad . \quad . \quad (P_c) \quad (P_c)$

가
가

(gyroscopic)

가
가

1

(M_1, M_2, M_3, M_4)
가 (P_0) 가 (P_0) 가

(M_i) (S_i) ($i=1, 2, 3, 4$) ;

$S_1 S_j (P_0)$ ($j=2, 3, 4$) ; - (phase-shift)

P_c 가 P_0 , (A), (P_c) ;

(P_c) (P_c) ;

2

가

(M_1, M_2, M_3, M_4) ;

가 , , , 가 (P_0) 가 (P_0)
가 , , , (M_i) (M_i) (S_i) ;
; ; ;

(S_1, S_2, S_3, S_4) 가
 $j=2, 3, 4$ - ,
 P_c 가 P_0 , (A), (P_c) ; ; ;

(P_c) (P_c) ;

3

4

가

•
,

$(S_i) \quad (i=1, 2, 3, 4)$ 가 (M_1, M_2, M_3, M_4) 가 (P_0) ;

$$S_1 \quad S_j \quad (j=2, 3, 4) \quad - \quad (P_C), \quad P_C \nmid P_0, \quad (A), \\ c) \quad (P_C), \quad , \quad (P_0)$$

1
1

2
2

1 (10) 1 (12) (14) (40) X, Y, Z
 가 3 . Z , (50) (14) X Y , X-Y
 Z X-Y (14) (14) (14) (14) 가 3
 (14) X-Y (14) (10) (20), M₁, M₂, M₃, M₄
 . 1 (12), (30)
 , (12) (12) (14)

| | | | | | | |
|---------------------|---------------------------|-------------------------|----------------------------|-------------------------|---------------------|------------------------------|
| (20) | | (12) | | (14) | | (40) |
| . | . | . | . | . | . | . |
| (28) | (20) | (26) 가 | (22) (P _{0,REF}) | (,) | (20) | (22) |
| (P ₀) . | (P _{0,REF}) . | (P _{0,REF}) . | 가 . | (P _{0,REF}) . | (P ₀) . | 가 . |
| (P ₀) . | 1 . | (P _{0,REF}) . | X, Y, Z . | (P _{0,REF}) . | (P ₀) . | , |
| (40) | (50) | (P _c) . | (P _c) . | (P _c) . | (P _c) . | (P _c) . |
| . | . | . | . | . | . | . |
| (14) | , | , | , | , | , | , |
| . | . | . | . | . | . | . |
| 가 . | , (P _c) . | (P _c) . | (40) 가 . | (40) | (40) | (14) |
| . | 1 . | . | (P _{c,REF}) . | (P _{c,REF}) . | (P _c) . | (P _{c,REF}) . |
| X, Y, Z . | , (P _{c,REF}) . | . | (P _{c,REF}) . | (P _{0,REF}) . | { , } | (40) (P _{c,REF}) . |
| (22) 가 . | . | . | . | (P _{0,REF}) . | . | . |

$$\begin{aligned}
& \text{3, } P_4) \quad (M_1, M_2, M_3, M_4), \quad X, Y, Z \quad (P_1, P_2, P_3, P_4) \quad \text{가} \quad , \quad (P_1, P_2, P \\
& (12) \quad (M_1, M_2, M_3, M_4) \quad . \quad (M_1, M_2, M_3, M_4) \quad 1 \\
& \text{가} \quad (12) \quad , \quad , \quad . \quad (M_1, M_2, M_3, M_4) \quad (M_1, M_2, M_3, M_4) \\
& , \quad . \quad (30) \quad (30) \quad (30) \quad (30) \quad (32) \quad () \quad (40) \quad (, \quad) \\
& , \quad (12) \quad (12) \quad , \quad , \quad . \quad (30) \quad (40) \quad (30) \quad , \quad (40) \quad 1 \quad (30) \\
& , \quad . \quad (22) \quad (28) \quad (28) \quad (28) \quad (28) \quad (M_1, M_2, M_3, M_4) \\
& (4) \quad (S_i) \quad (i=1, 2, 3, 4) \quad (P_0) \quad (P_0) \quad (M_i) \quad (28) \\
& (2, S_3, S_4) \quad (P_1, P_2, P_3, P_4) \quad , \quad (P_0) \quad (22) \quad (M_1, M_2, M_3, M_4) \\
& (P_1, P_2, P_3, P_4) \quad - \quad . \quad (S_1, S_2, S_3, S_4) \quad (S_1, S_2, S_3, S_4) \\
& (20) \text{가} \quad (S_1, S_2, S_3, S_4) \quad (P_0) \quad (P_0) \quad (30) \quad (44) \\
& (P_C) \quad (P_C) \quad (P_0) \quad (P_0) \quad (30) \quad , \quad (S_1, S_2, S_3, S_4) \quad (30)
\end{aligned}$$

$$|P_1 - P_0| - |P_j - P_0| = C \Delta T_{1j}$$

$$P_{\text{cx}} = P_{\text{cx,REF}} + A_x (P_{\text{ox}} - P_{\text{ox,REF}})$$

$$P_{CY} = P_{CY,REF} + A_Y (P_{0Y} - P_{0Y,REF})$$

2c

$$P_{CZ} = P_{CZ,REF} + A_z (P_{OZ} - P_{OZ,REF}) + (Z_s (P_{CX}, P_{CY}) - P_{CZ,REF})$$

P_{CX}, P_{CY}, P_{CZ} X, Y, Z P_C . $P_{CX,REF}, P_{CY,REF}$, $P_{CZ,REF}$ $X, Y,$
 Z $P_{C,REF}$. $P_{0X,REF}, P_{0Y,REF}$, $P_{0Z,REF}$ X, Y, Z $P_{0,REF}$.
 $P_{CZ,REF}$ (14) (44) 가 . $Z_s(P_{CX}, P_{CY})$ P_{CX} P_{CY} (14) (44) X, Y Z
 (44) Z . , $Z_s(X, Y)$ X Y (14) ' . (14) Z
 $.$, $Z_s(X, Y)$ (14) ' . (14)
 $,$, $Z_s(P_{CX}, P_{CY}) = P_{CZ,REF} ($, ' ') P_{CZ} (2C) $P_{CZ} = P_{CZ,REF} + A$
 $z(P_{0Z} - P_{0Z,REF})$ (14) $Z_s(X, Y)$ 가 P_{CX} P_{CY} (2A) (2B)
 $,$ ' (14) $Z_s(X, Y)$ 가 $Z_s(P_{CX}, P_{CY}) \neq P_{CZ,REF}$ (2A), (2B), (2C) 가

P_c , (44) (44) (20) (P_0) (P_c)
 (P_c) , (A) (A) (20) (A) X, Y, Z (44)
; , (2A), (2B), A_x A_y X-Y (44) (44) - (2C) - ,
2C) , (Z_s (P_{cx} , P_{cy}) - $P_{cz,ref}$), A_x Z (44) , (2C) , A_z (14)
, Z_s ($P_{cz,ref}$) (44) , (44) , (44) , (44) ,
(14) , (A_x, A_y, A_z) (2A), (2B), (2C) P_c ,
, A_x, A_y, A_z (44)

1 , 0.5cm/inch
 (20) X (A x) 0.5cm (44)가 X . (22)(
 $(A x)$ X (22)(
 $(44)가 X$ 0.1 (20)) . 3 , 600 pixel/inch (44)가 X (A x) X 600
 $(22)($. Z (44)
 $,$ Y Z A y A z

$$A_z = 0 \quad , \quad (14) \quad , \quad A_z = 0 \quad , \quad (44)$$

$$(22) \quad (\text{, } 20\text{kHz}) \quad (28) \quad . \quad (22)\text{가} \\ \triangle T_{ij}(\text{, }) \quad \triangle T_{ij}\text{가} \quad (28) \quad . \quad (S_1)$$

S_j ($j=2, 3, 4$)

가 335.28m/sec(1100ft/sec)

(C)

$$(28) \quad |P_1 - P_0| - |P_2 - P_0|$$

30.48cm(1ft)

1

ΔT_{12}

20kHz

가 50

msec

(1)

(28)

47

49

,

2.3 msec

가

99 msec

가

,

43

, 47

20kHz

가

가

(28)

(28)

20kHz

,

 ΔT_{ij} ($i=1, 2, 3$) $j=1, 2, 3$ $i \neq j$

(28) (T)

가

$$(M_1, M_2, M_3, M_4) \\ M_3, M_4) \\ (28)$$

$$(M_1, M_2, \\ ,$$

ΔT_{ij} ($i=1, 2, 3$)

$j=1, 2, 3$

$i \neq j$)

$$(F_1, F_2, F_3, F_4)(1) S_1, S_2, S_3, S_4 \\ (S_1, S_2, S_3, S_4) \\ (28)$$

2

(10)

2

(12)

(14)

(M_1, M_2, M_3, M_4)

(10)

$(M_1, M$

$$(10) M_1, M_2, M_3, M_4 \\ M_3) \\ M_1, M_2, M_3, M_4 \\ M_1, M_2, M_3, M_4 \\ (M_1, M_2, M_3, M_4)$$

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$$(S_i)(i=1, 2, 3, 4), \quad (22) \quad \text{가} \quad (20);$$

$$30) \quad S_1, S_j \quad (j=2, 3, 4) \quad , \quad (40) \quad , \quad P_0, \quad (P_0) \quad , \quad (40), S_1, S_2, S_3, S_4 \quad , \quad (30);$$

(40) (P_c) (P_c)

2. 1 , (M_1, M_2, M_3, M_4) , M_1, M_2, M_3, M_4 가

$$3. \quad 1, \quad (M_1, M_2, M_3, M_4), M_1, M_2, M_3, M_4 \quad 가$$

$$4. \quad 1, \quad (14)$$

5. 1 , 가

6. 5 , 가 20kHz 가

$$7. \quad 5, \quad (S_i) \quad (i=1, 2, 3, 4),$$

8. (30) ,

$$(11) \quad \rightarrow \quad (12)$$

$$-S_1 S_j \left(\frac{j=2, 3, 4}{P_0}, P_c \right) \frac{, P_c \neq P_0,}{(P_0)}, \quad (A), \quad (40) \quad (14) \quad (P_c) \quad (P_c)$$

9. (20) , (20) (22) , ()
22)

$$10. \quad (14) \qquad (40) \quad ,$$

(M₋₁, M₋₂, M₋₃, M₋₄)

(22) 가

(20) $(P_0)(P_0)$ 가 (P_0)
(M_1, M_2, M_3, M_4) (M_i) (S_i) ($i=1, 2, 3, 4$) $-S_1 S_j$ ($j=2, 3, 4$) $-P_c \text{ 가 } P_0$, (A),

(14)

(40)

 (P_c) $(40) (P_c)$ (P_c)

11.

(30)



