FIG. 1

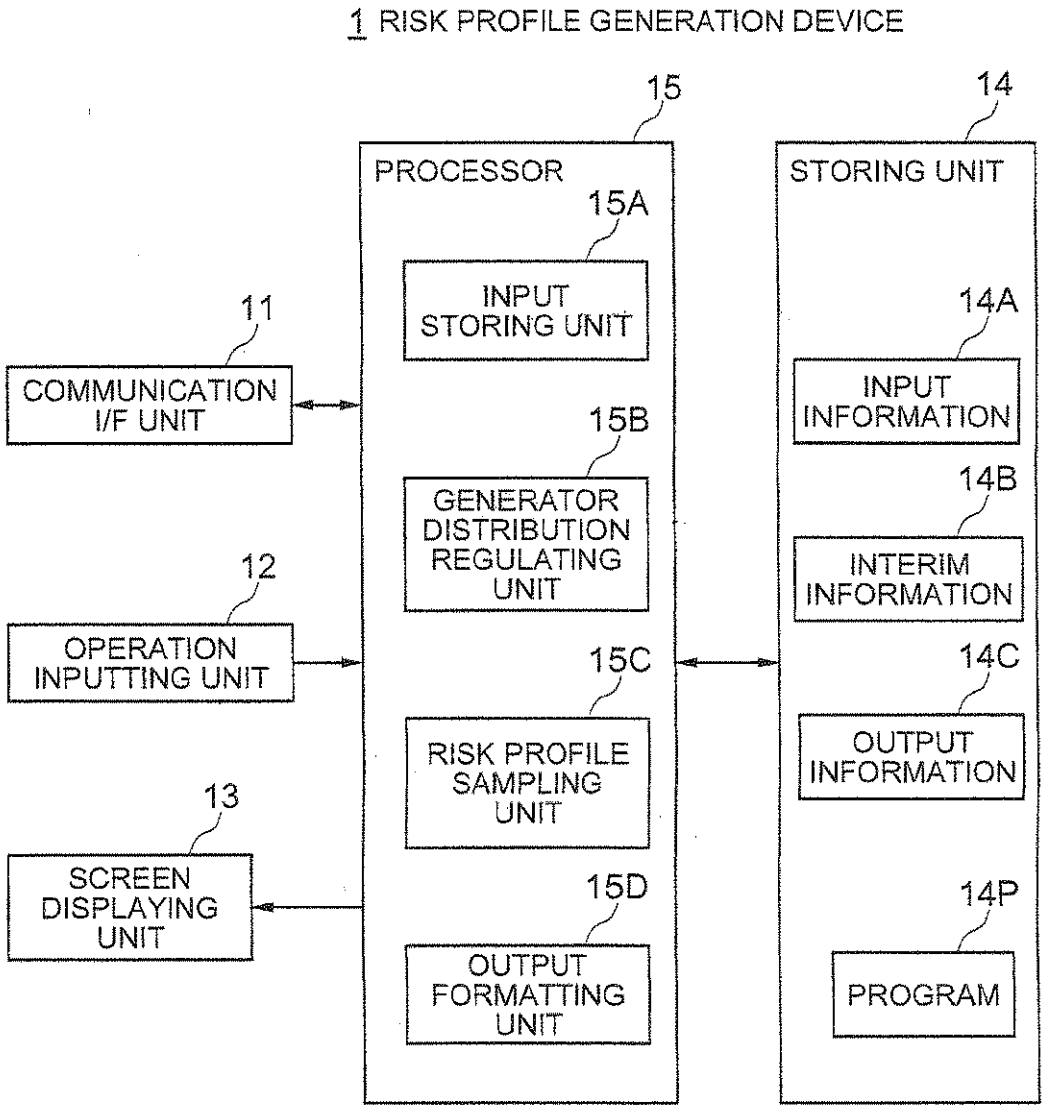

1 RISK PROFILE GENERATION DEVICE
15
PROCESSOR
15A
INPUT STORING UNIT
15B
GENERATOR DISTRIBUTION REGULATING UNIT
15C
RISK PROFILE SAMPLING UNIT
15D
OUTPUT FORMATTING UNIT
14
STORING UNIT
14A
INPUT INFORMATION
14B
INTERIM INFORMATION
14C
OUTPUT INFORMATION
14P
PROGRAM
11
COMMUNICATION I/F UNIT
12
OPERATION INPUTTING UNIT
13
SCREEN DISPLAYING UNIT

FIG. 2

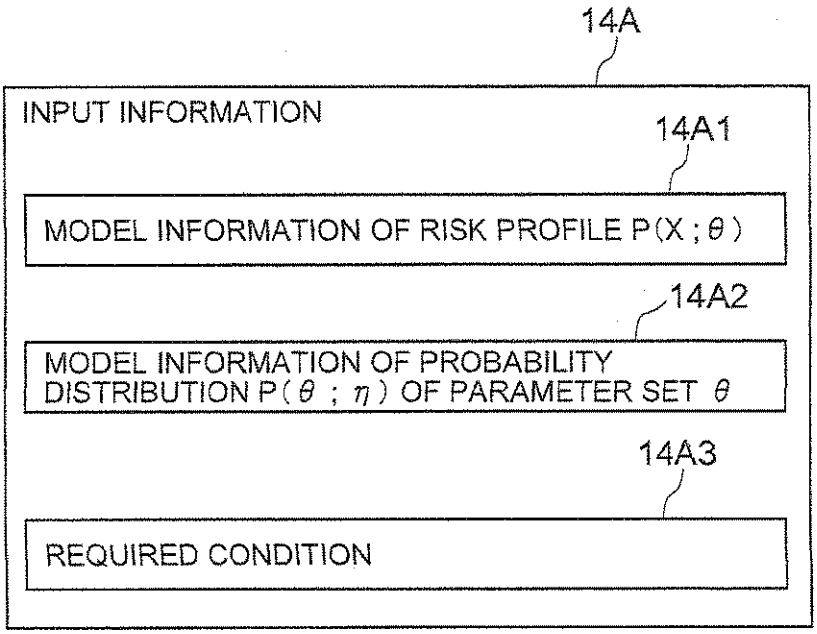

14A
INPUT INFORMATION
14A1
MODEL INFORMATION OF RISK PROFILE P(X ; θ)
14A2
MODEL INFORMATION OF PROBABILITY DISTRIBUTION P(θ ; η) OF PARAMETER SET θ
14A3
REQUIRED CONDITION

FIG. 3

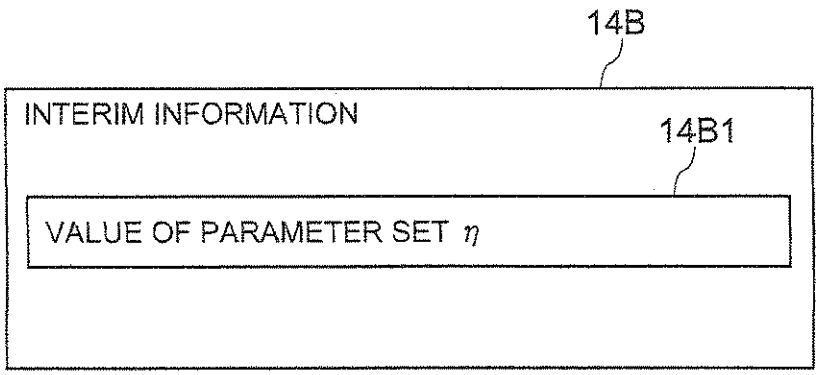


FIG. 4

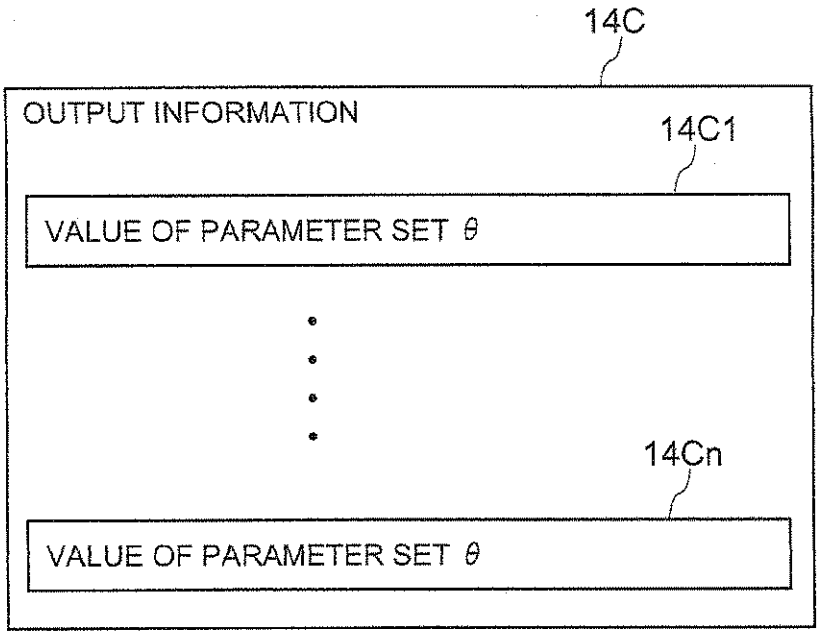

14C
OUTPUT INFORMATION
14C1
VALUE OF PARAMETER SET θ
14Cn
VALUE OF PARAMETER SET θ

FIG. 5

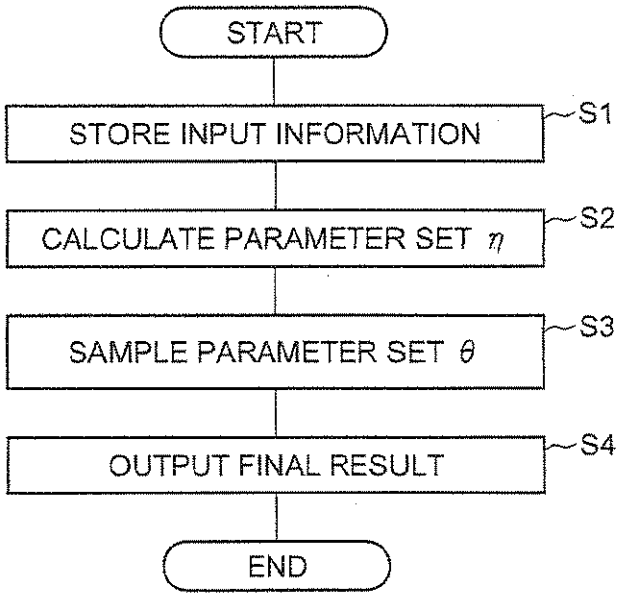

START
STORE INPUT INFORMATION
S1
CALCULATE PARAMETER SET η
S2
SAMPLE PARAMETER SET θ
S3
OUTPUT FINAL RESULT
S4
END

FIG. 6

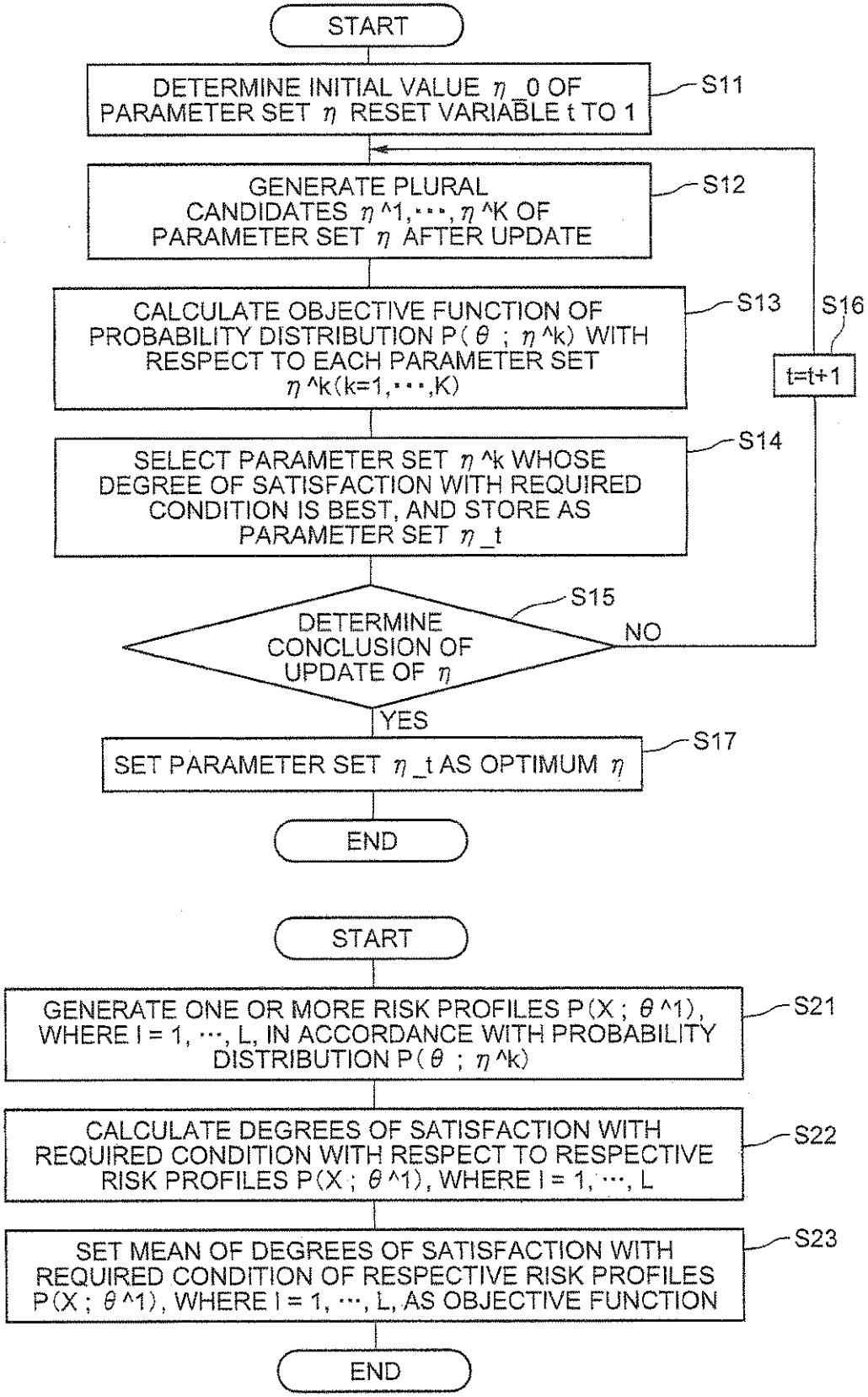

START
DETERMINE INITIAL VALUE η_0 OF PARAMETER SET η RESET VARIABLE t TO 1
S11
GENERATE PLURAL CANDIDATES η^1,・・・,η^K OF PARAMETER SET η AFTER UPDATE
S12
CALCULATE OBJECTIVE FUNCTION OF PROBABILITY DISTRIBUTION P(θ ; η^k) WITH RESPECT TO EACH PARAMETER SET η^k(k=1,・・・,K)
S13
S16
t=t+1
SELECT PARAMETER SET η^k WHOSE DEGREE OF SATISFACTION WITH REQUIRED CONDITION IS BEST, AND STORE AS PARAMETER SET η_t
S14
DETERMINE CONCLUSION OF UPDATE OF η
S15
NO
YES
SET PARAMETER SET η_t AS OPTIMUM η
S17
END
START
GENERATE ONE OR MORE RISK PROFILES P(X ; θ^1), WHERE I = 1, ・・・, L, IN ACCORDANCE WITH PROBABILITY DISTRIBUTION P(θ ; η^k)
S21
CALCULATE DEGREES OF SATISFACTION WITH REQUIRED CONDITION WITH RESPECT TO RESPECTIVE RISK PROFILES P(X ; θ^1), WHERE I = 1, ・・・, L
S22
SET MEAN OF DEGREES OF SATISFACTION WITH REQUIRED CONDITION OF RESPECTIVE RISK PROFILES P(X ; θ^1), WHERE I = 1, ・・・, L, AS OBJECTIVE FUNCTION
S23
END

FIG. 7

14A1 MODEL INFORMATION OF RISK PROFILE P(X ; θ)

(1) RANDOM VARIABLES x_1, x_2, ⋯ REPRESENTING LOSS EVENTS ARE INDEPENDENT OF EACH OTHER

(2) FREQUENCY DISTRIBUTION OF EVENT CONTENT k FOLLOWS POISSON DISTRIBUTION WITH PARAMETER λk AS MEAN

(3) SCALE DISTRIBUTION OF EVENT CONTENT k FOLLOWS LOG NORMAL DISTRIBUTION WITH PARAMETERS μk and σk AS LOG MEAN AND LOG STANDARD DEVIATION

(4) k=1,・・・, 10

14A2 MODEL INFORMATION OF PROBABILITY DISTRIBUTION P(θ ; η) OF PARAMETER SET θ

(1) PROBABILITY DISTRIBUTION P(θ ; η) IS INDEPENDENT FOR EACH k

(2) DISTRIBUTION OF (λk, μk, σk) IS MULTIDIMENSIONAL NORMAL DISTRIBUTION

(3) MEAN VECTOR OF MULTIDIMENSIONAL NORMAL DISTRIBUTION IS (2,e1,e2)

(4) COVARIANCE MATRIX OF MULTIDIMENSIONAL NORMAL DISTRIBUTION IS

$$\begin{vmatrix} 0 & 0 & 0 \\ 0 & e3 & e4 \\ 0 & e4 & e5 \end{vmatrix}$$

14A3 REQUIRED CONDITION

(1) SCALE DISTRIBUTION IS EXPONENTIAL DISTRIBUTION OF MEAN PARAMETER 10

FIG. 8

14A1 MODEL INFORMATION OF RISK PROFILE P(X ; θ)

(1) RANDOM VARIABLES x_1, x_2, ··· REPRESENTING LOSS EVENTS ARE INDEPENDENT OF EACH OTHER

(2) FREQUENCY DISTRIBUTION OF EVENT CONTENT k FOLLOWS POISSON DISTRIBUTION WITH PARAMETER λk AS MEAN

(3) SCALE DISTRIBUTION OF EVENT CONTENT k FOLLOWS LOG NORMAL DISTRIBUTION WITH PARAMETERS μk and σk AS LOG MEAN AND LOG STANDARD DEVIATION

14A2 MODEL INFORMATION OF PROBABILITY DISTRIBUTION P(θ ; η) of PARAMETER SET θ

(1) PROBABILITY DISTRIBUTION P(θ ; η) IS INDEPENDENT FOR EACH k

(2) DISTRIBUTION OF (λk, μk, σk) IS MULTIDIMENSIONAL NORMAL DISTRIBUTION

(3) MEAN VECTOR OF MULTIDIMENSIONAL NORMAL DISTRIBUTION IS (e6,e1,e2)

(4) COVARIANCE MATRIX OF MULTIDIMENSIONAL NORMAL DISTRIBUTION IS

$$\begin{vmatrix} e7 & e8 & e9 \\ e8 & e3 & e4 \\ e9 & e4 & e5 \end{vmatrix}$$

14A3 REQUIRED CONDITION

(1) SCALE DISTRIBUTION IS EXPONENTIAL DISTRIBUTION OF MEAN PARAMETER 10

14A4 INDISPENSABLE CONDITION

(1) RANGE OF EVENT CONTENT IS {EVENT CONTENT 1, ···, EVENT CONTENT 10}

(2) MEAN OF NUMBERS OF EVENTS HAVING EVENT CONTENT k IS 2

FIG. 9

θ = (1, 3, 200 MILLION, 30 MILLION, 1 MILLION, 0.5 MILLION)

VaR=300 MILLION

EVENT CONTENT	MEAN OF FREQUENCY DISTRIBUTION	MEAN + STANDARD DEVIATION × 2 OF FREQUENCY DISTRIBUTION
TOKAI EARTHQUAKE	1	260 MILLION
BANK TRANSFER SCAM	3	2 MILLION

RESULT OF SAMPLING OF P(X ; θ)

X = (TOKAI EARTHQUAKE, 215 MILLION), (BANK TRANSFER SCAM, 1.25 MILLION) (BANK TRANSFER SCAM, 0.98 MILLION)
X = (BANK TRANSFER SCAM, 1.15 MILLION), (BANK TRANSFER SCAM, 0.88 MILLION) (BANK TRANSFER SCAM, 2.25 MILLION), (BANK TRANSFER SCAM, 0.93 MILLION)
X = (BANK TRANSFER SCAM, 0.88 MILLION), (BANK TRANSFER SCAM, 2.25 MILLION) (BANK TRANSFER SCAM, 0.93 MILLION), (TOKAI EARTHQUAKE, 190 MILLION)
X = (BANK TRANSFER SCAM, 0.88 MILLION), (BANK TRANSFER SCAM, 0.98 MILLION)
X = (TOKAI EARTHQUAKE, 190 MILLION), (TOKAI EARTHQUAKE, 215 MILLION) (BANK TRANSFER SCAM, 1.25 MILLION)

FIG. 10

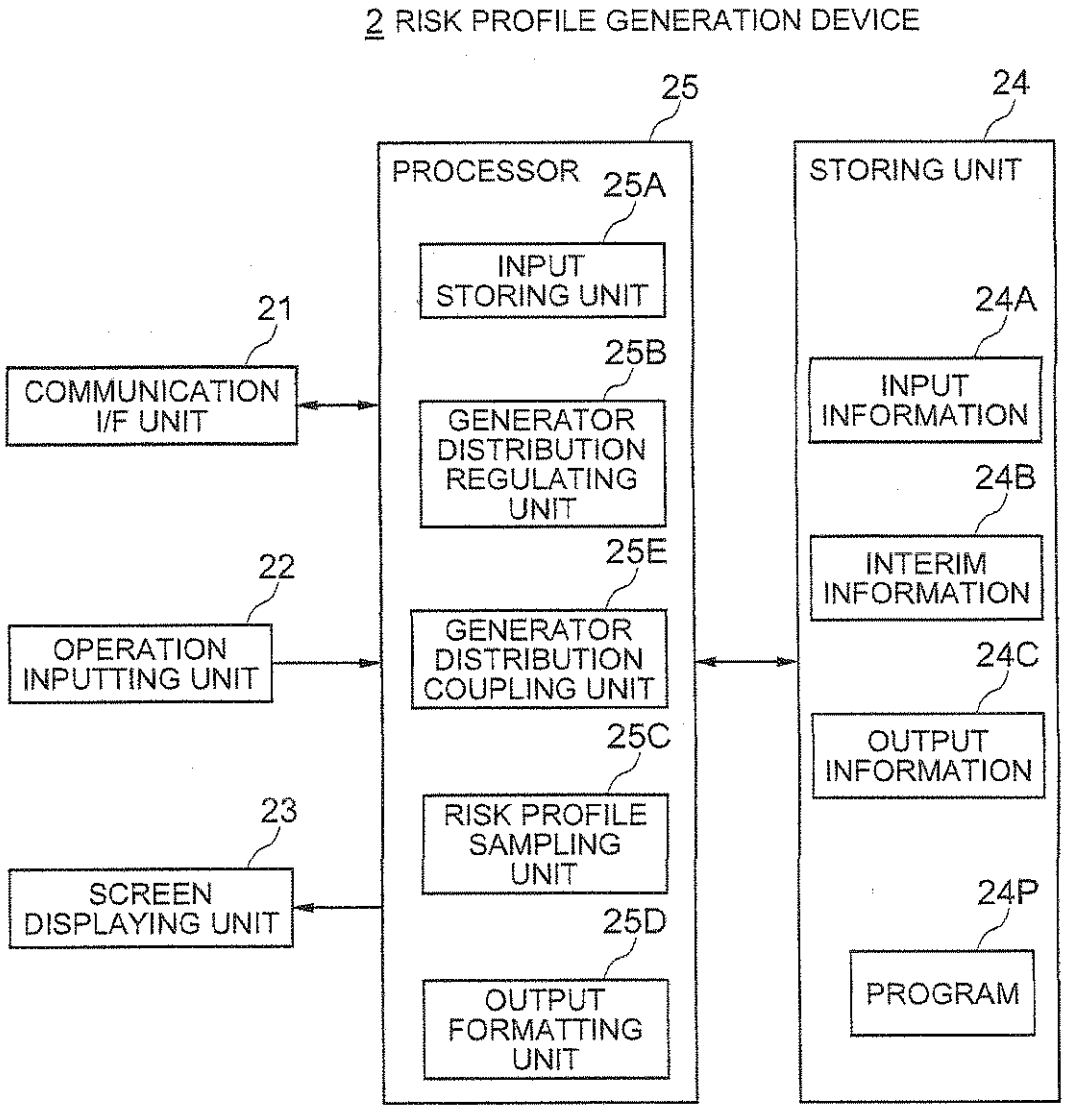

2 RISK PROFILE GENERATION DEVICE
25
PROCESSOR
25A
INPUT STORING UNIT
25B
GENERATOR DISTRIBUTION REGULATING UNIT
25E
GENERATOR DISTRIBUTION COUPLING UNIT
25C
RISK PROFILE SAMPLING UNIT
25D
OUTPUT FORMATTING UNIT
24
STORING UNIT
24A
INPUT INFORMATION
24B
INTERIM INFORMATION
24C
OUTPUT INFORMATION
24P
PROGRAM
21
COMMUNICATION I/F UNIT
22
OPERATION INPUTTING UNIT
23
SCREEN DISPLAYING UNIT

FIG. 11

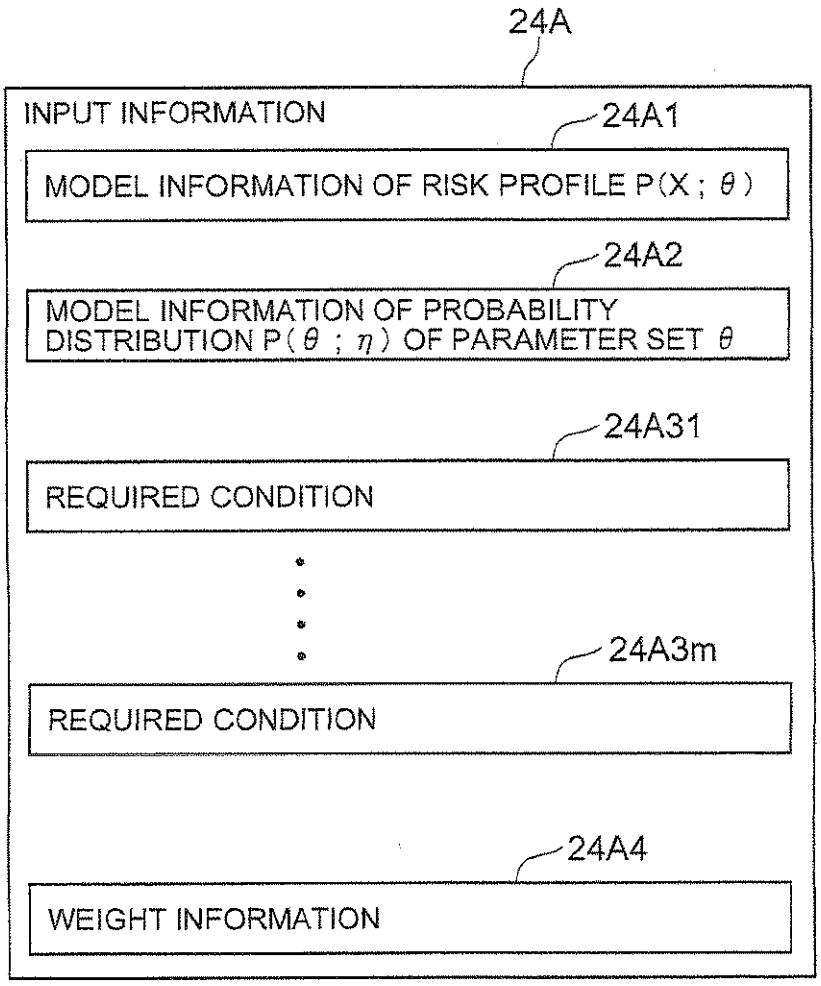

24A
INPUT INFORMATION
24A1
MODEL INFORMATION OF RISK PROFILE P(X ; θ)
24A2
MODEL INFORMATION OF PROBABILITY DISTRIBUTION P(θ ; η) OF PARAMETER SET θ
24A31
REQUIRED CONDITION
24A3m
REQUIRED CONDITION
24A4
WEIGHT INFORMATION

FIG. 12

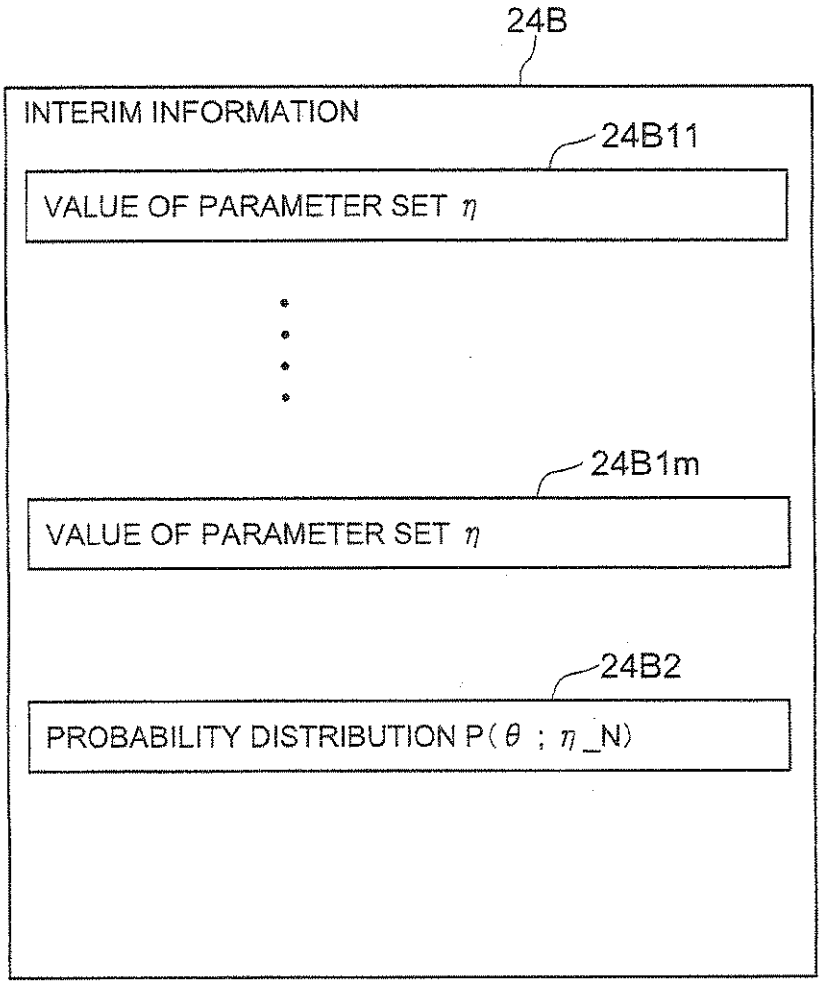

24B
INTERIM INFORMATION
24B11
VALUE OF PARAMETER SET η
24B1m
VALUE OF PARAMETER SET η
24B2
PROBABILITY DISTRIBUTION P(θ ; η_N)

FIG. 13

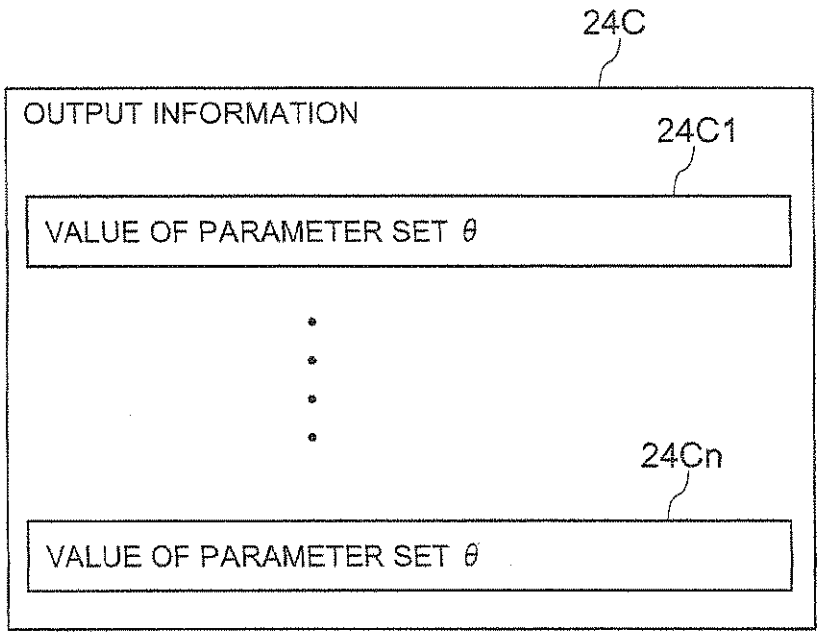

24C
OUTPUT INFORMATION
24C1
VALUE OF PARAMETER SET θ
24Cn
VALUE OF PARAMETER SET θ

FIG. 14

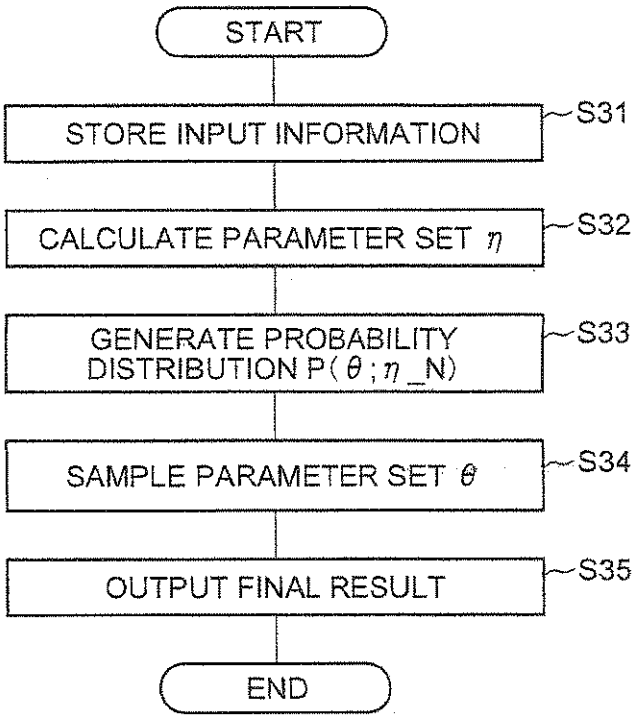

START
STORE INPUT INFORMATION
S31
CALCULATE PARAMETER SET η
S32
GENERATE PROBABILITY DISTRIBUTION P(θ;η_N)
S33
SAMPLE PARAMETER SET θ
S34
OUTPUT FINAL RESULT
S35
END

FIG. 15

24A1 MODEL INFORMATION OF RISK PROFILE P(X ; θ)

(1) RANDOM VARIABLES x_1, x_2, ··· REPRESENTING LOSS EVENTS ARE INDEPENDENT OF EACH OTHER

(2) FREQUENCY DISTRIBUTION OF EVENT CONTENT k FOLLOWS POISSON DISTRIBUTION WITH PARAMETER λk AS MEAN

(3) SCALE DISTRIBUTION OF EVENT CONTENT k FOLLOWS LOG NORMAL DISTRIBUTION WITH PARAMETERS μk AND σk AS LOG MEAN AND LOG STANDARD DEVIATION

(4) k=1,···, 10

24A2 MODEL INFORMATION OF PROBABILITY DISTRIBUTION P(θ ; η) OF PARAMETER SET θ

(1) PROBABILITY DISTRIBUTION P(θ ; η) IS INDEPENDENT FOR EACH k

(2) DISTRIBUTION OF (λk, μk, σk) IS MULTIDIMENSIONAL NORMAL DISTRIBUTION

(3) MEAN VECTOR OF MULTIDIMENSIONAL NORMAL DISTRIBUTION IS (2,e1,e2)

(4) COVARIANCE MATRIX OF MULTIDIMENSIONAL NORMAL DISTRIBUTION IS

$$\begin{vmatrix} 0 & 0 & 0 \\ 0 & e3 & e4 \\ 0 & e4 & e5 \end{vmatrix}$$

24A31 REQUIRED CONDITION

(1) SCALE DISTRIBUTION IS EXPONENTIAL DISTRIBUTION OF MEAN PARAMETER 2

24A32 REQUIRED CONDITION

(1) SCALE DISTRIBUTION IS EXPONENTIAL DISTRIBUTION OF MEAN PARAMETER 10

24A4 WEIGHT INFORMATION

(1) (w_1,w_2)=(0.0, 1.0), (0.2, 0.8), (0.4, 0.6), (0.6, 0.4), (0.8, 0.2), (1.0, 0.0)

FIG. 16

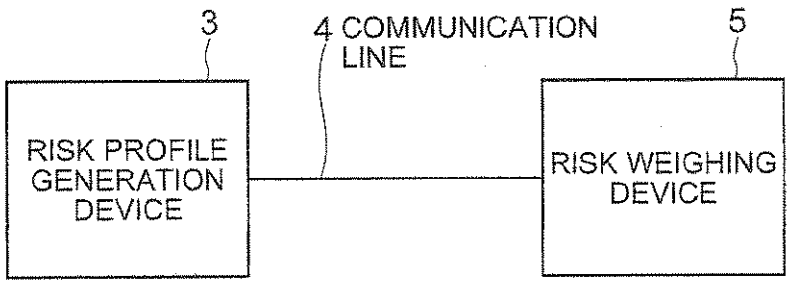

3
4 COMMUNICATION LINE
5
RISK PROFILE GENERATION DEVICE
RISK WEIGHING DEVICE

FIG. 17

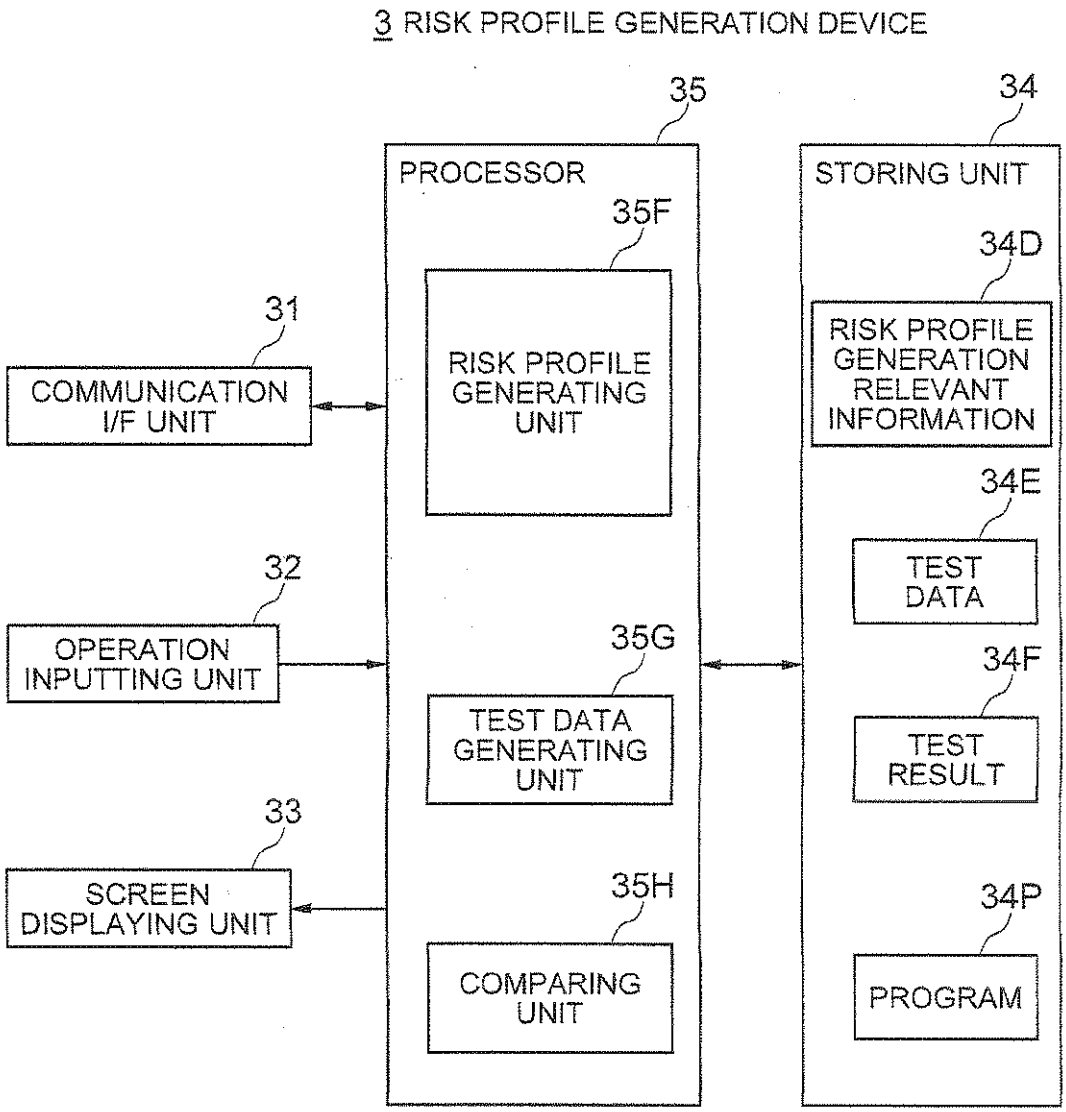

3 RISK PROFILE GENERATION DEVICE
35
PROCESSOR
35F
RISK PROFILE GENERATING UNIT
35G
TEST DATA GENERATING UNIT
35H
COMPARING UNIT
34
STORING UNIT
34D
RISK PROFILE GENERATION RELEVANT INFORMATION
34E
TEST DATA
34F
TEST RESULT
34P
PROGRAM
31
COMMUNICATION I/F UNIT
32
OPERATION INPUTTING UNIT
33
SCREEN DISPLAYING UNIT

FIG. 18

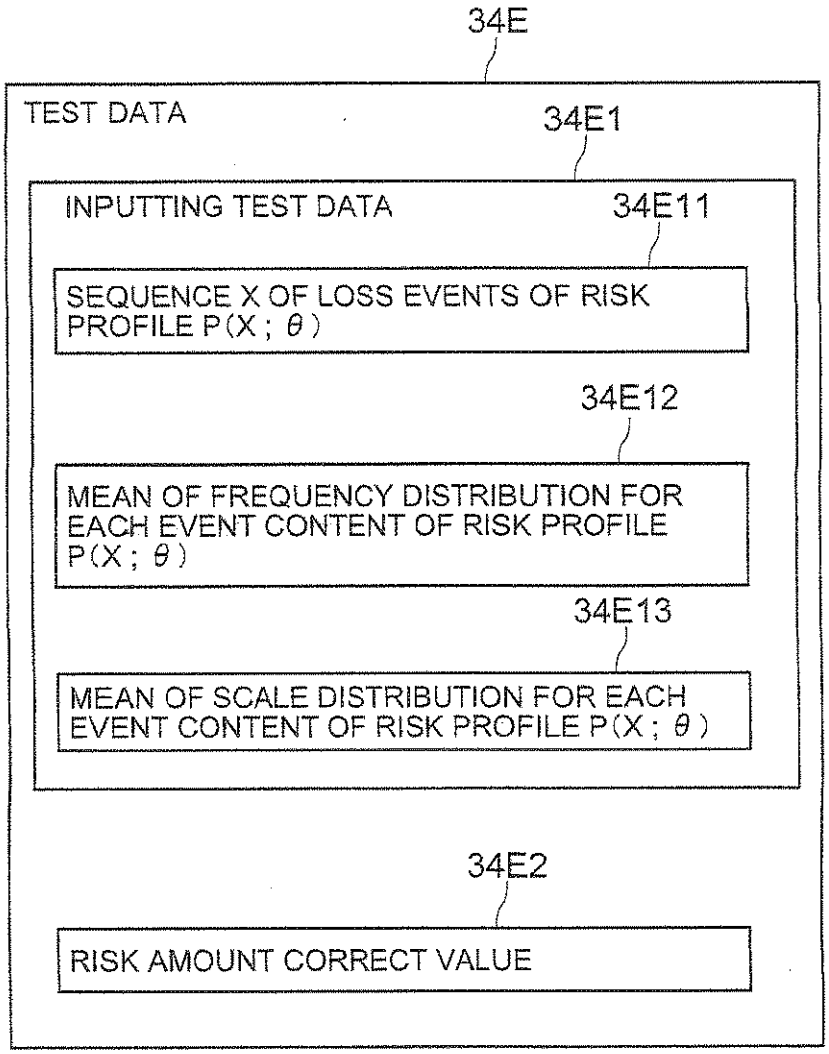

34E
TEST DATA
34E1
INPUTTING TEST DATA
34E11
SEQUENCE X OF LOSS EVENTS OF RISK PROFILE P(X ; θ)
34E12
MEAN OF FREQUENCY DISTRIBUTION FOR EACH EVENT CONTENT OF RISK PROFILE P(X ; θ)
34E13
MEAN OF SCALE DISTRIBUTION FOR EACH EVENT CONTENT OF RISK PROFILE P(X ; θ)
34E2
RISK AMOUNT CORRECT VALUE

FIG. 19

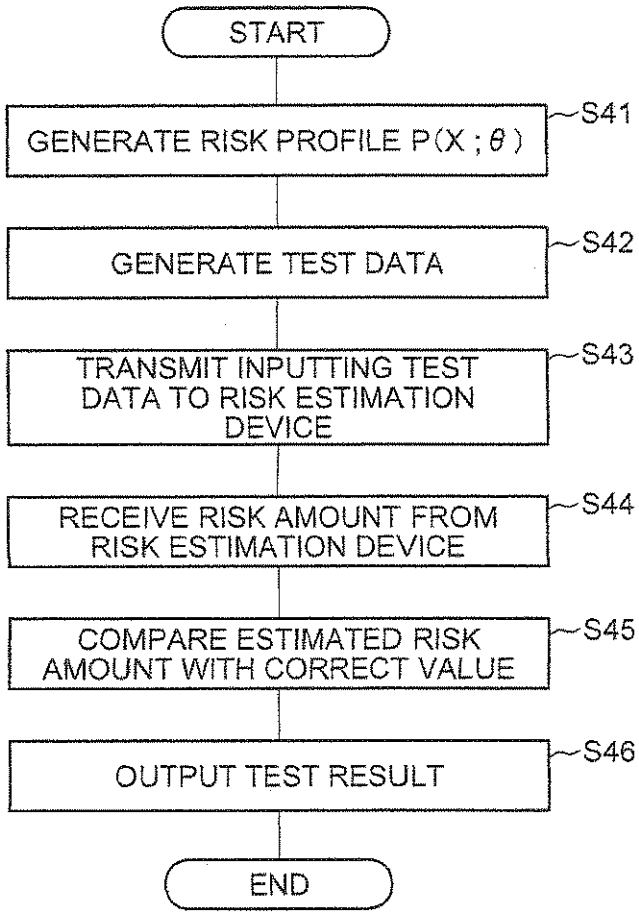
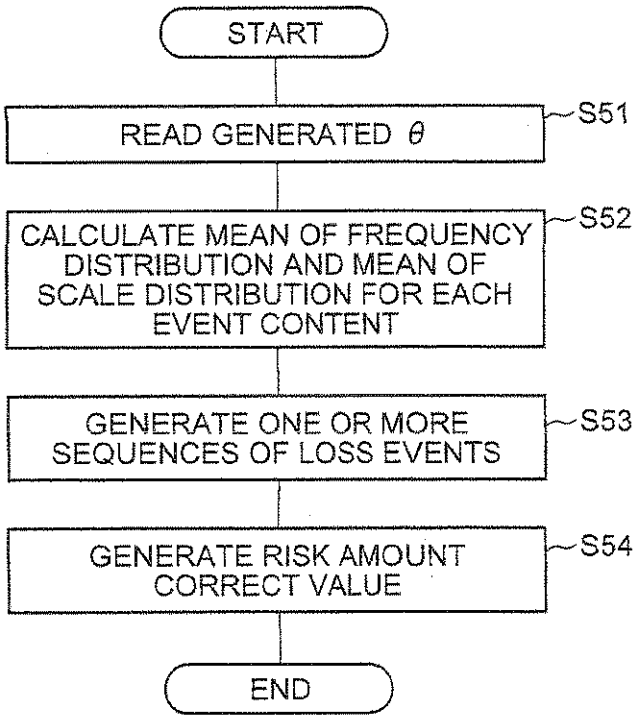

START
GENERATE RISK PROFILE P(X ; θ)
S41
GENERATE TEST DATA
S42
TRANSMIT INPUTTING TEST DATA TO RISK ESTIMATION DEVICE
S43
RECEIVE RISK AMOUNT FROM RISK ESTIMATION DEVICE
S44
COMPARE ESTIMATED RISK AMOUNT WITH CORRECT VALUE
S45
OUTPUT TEST RESULT
S46
END

FIG. 20


START
READ GENERATED θ
S51
CALCULATE MEAN OF FREQUENCY DISTRIBUTION AND MEAN OF SCALE DISTRIBUTION FOR EACH EVENT CONTENT
S52
GENERATE ONE OR MORE SEQUENCES OF LOSS EVENTS
S53
GENERATE RISK AMOUNT CORRECT VALUE
S54
END