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(12) **Reissued Patent**

Watanabe et al.

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(45) **Date of Reissued Patent: Mar. 6, 2012**

(54) **METHOD AND SYSTEM OF REMOTE MONITORING OF IMAGE FORMING APPARATUS**

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(73) Assignee: **Ricoh Company, Limited**, Tokyo (JP)

(21) Appl. No.: **11/730,581**

(22) Filed: **Apr. 2, 2007**

Related U.S. Patent Documents

Reissue of:

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Appl. No.: **09/986,349**
Filed: **Nov. 8, 2001**

U.S. Applications:

(63) Continuation of application No. 11/171,652, filed on Jul. 1, 2005.

(60) Provisional application No. 60/330,813, filed on Oct. 31, 2001.

(51) **Int. Cl.**
G03G 15/00 (2006.01)
B41B 15/00 (2006.01)

(52) **U.S. Cl.** **399/8**; 399/9; 399/11

(58) **Field of Classification Search** 399/8–13; 358/1.14, 1.15; 702/56, 188
See application file for complete search history.

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2005/0248792	A1	11/2005	Wright	

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U.S. Appl. No. 09/986,349, filed Nov. 8, pending.

U.S. Appl. No. 09/986,384, filed Nov. 8, pending.

U.S. Appl. No. 09/408,443, Tetsuro Motoyama, et al., Method and System for Remote Diagnostic, Control and Information Collection Based on Various Communication Modes for Sending Messages to a Resource Manager, Sep. 29, 1999.

* cited by examiner

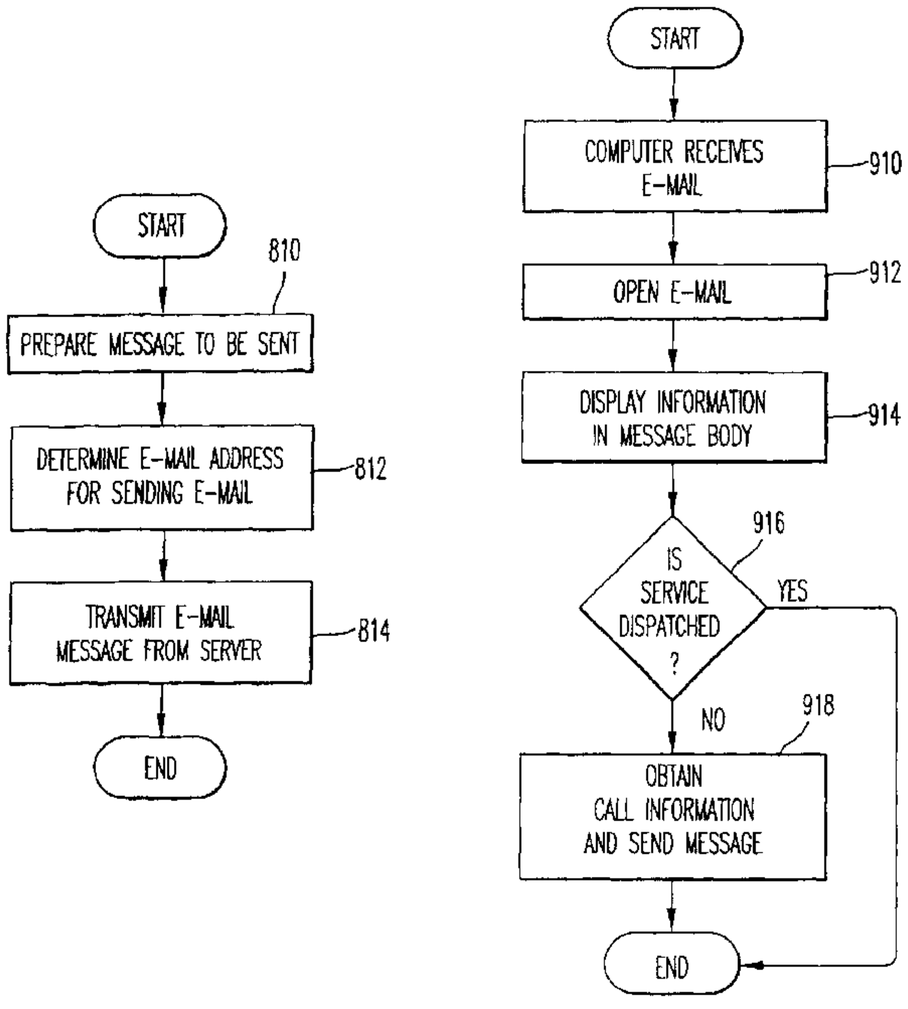
Primary Examiner — Hoang Ngo

(74) *Attorney, Agent, or Firm* — Oblon, Spivak, McClelland, Maier & Neustadt, L.L.P.

(57) **ABSTRACT**

A method and system for monitoring and controlling machines, such as printers, copiers, facsimile machine and other image forming machines. A server is used for transmitting and communicating information among machines and computers. The server acquires, after machine installation, reference values and during operation, current condition information. The server evaluates this information with the reference values such that a response to the machine may be executed remotely. The server also may update the reference values which change during operation.

9 Claims, 44 Drawing Sheets



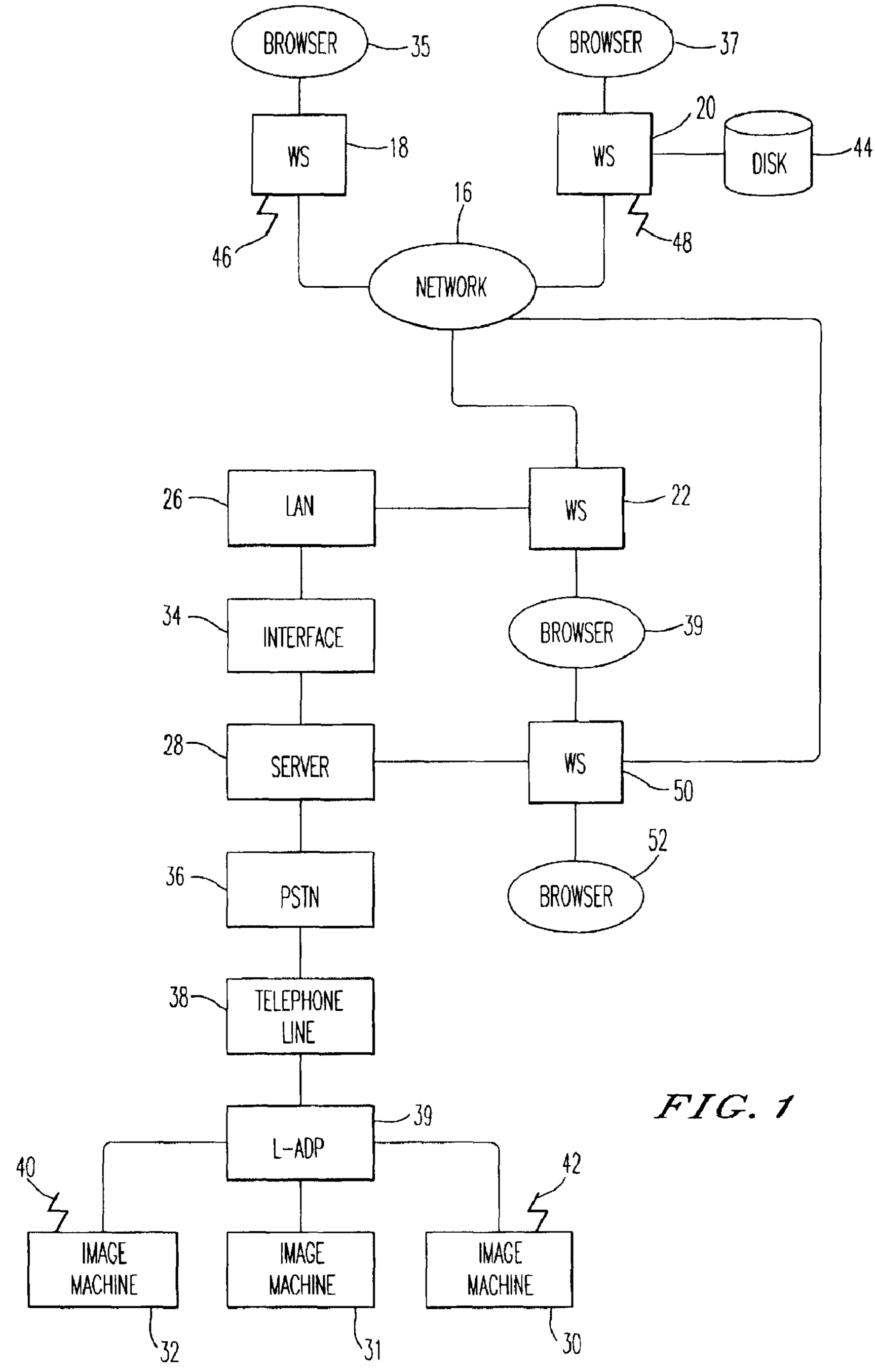

BROWSER
35
BROWSER
37
WS
18
WS
20
DISK
44
16
46
48
NETWORK
LAN
26
WS
22
INTERFACE
34
BROWSER
39
SERVER
28
WS
50
PSTN
36
52
BROWSER
TELEPHONE LINE
38
L-ADP
39
40
42
IMAGE MACHINE
IMAGE MACHINE
IMAGE MACHINE
32
31
30

FIG. 1

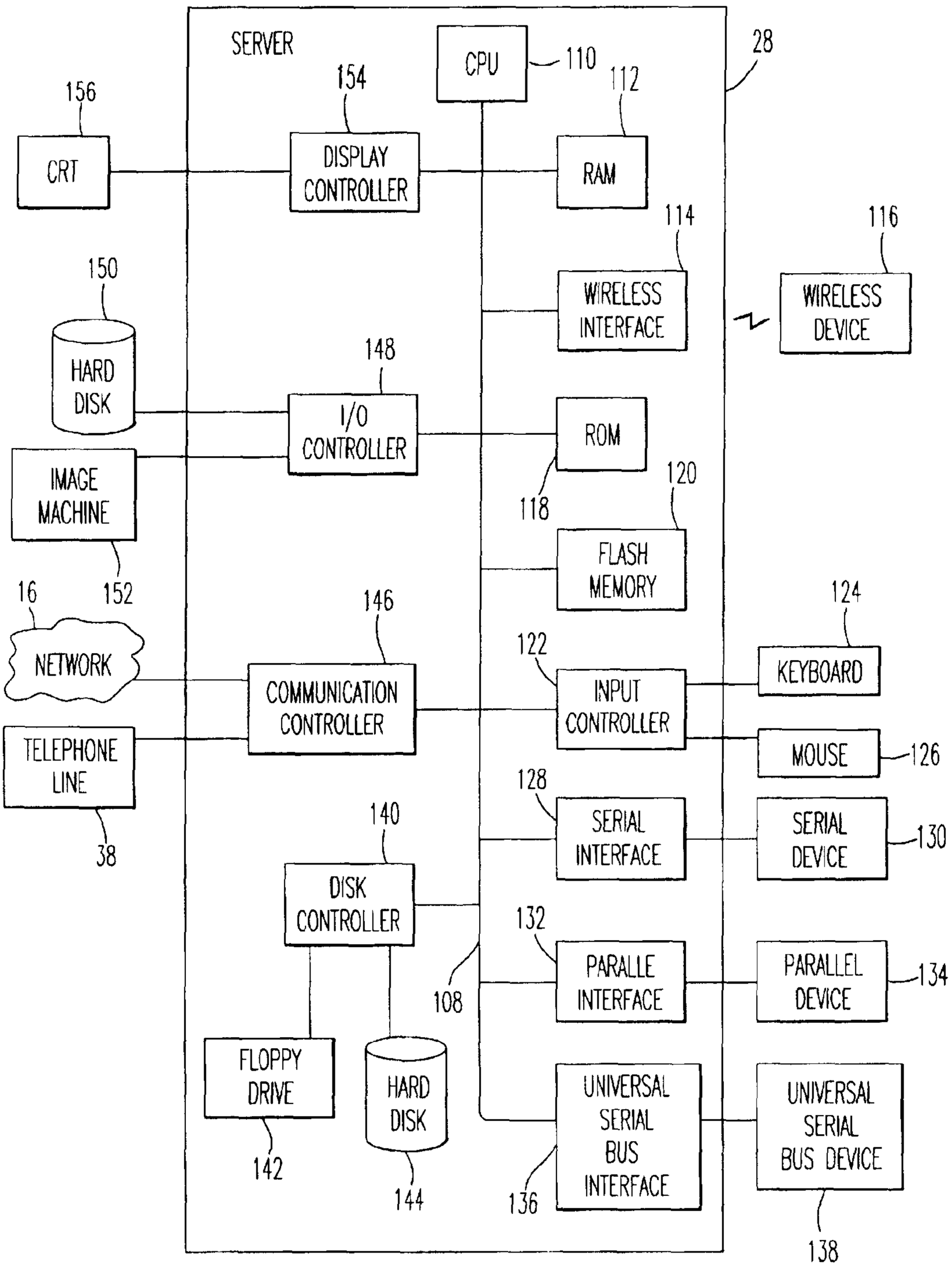

SERVER
28
CPU
110
154
112
156
CRT
DISPLAY CONTROLLER
RAM
114
116
150
WIRELESS INTERFACE
WIRELESS DEVICE
148
HARD DISK
I/O CONTROLLER
ROM
IMAGE MACHINE
118
120
FLASH MEMORY
16
152
146
124
NETWORK
COMMUNICATION CONTROLLER
122
INPUT CONTROLLER
KEYBOARD
TELEPHONE LINE
MOUSE
126
38
128
140
SERIAL INTERFACE
SERIAL DEVICE
130
DISK CONTROLLER
132
108
PARALLE INTERFACE
PARALLEL DEVICE
134
FLOPPY DRIVE
HARD DISK
UNIVERSAL SERIAL BUS INTERFACE
UNIVERSAL SERIAL BUS DEVICE
142
144
136
138

FIG. 2

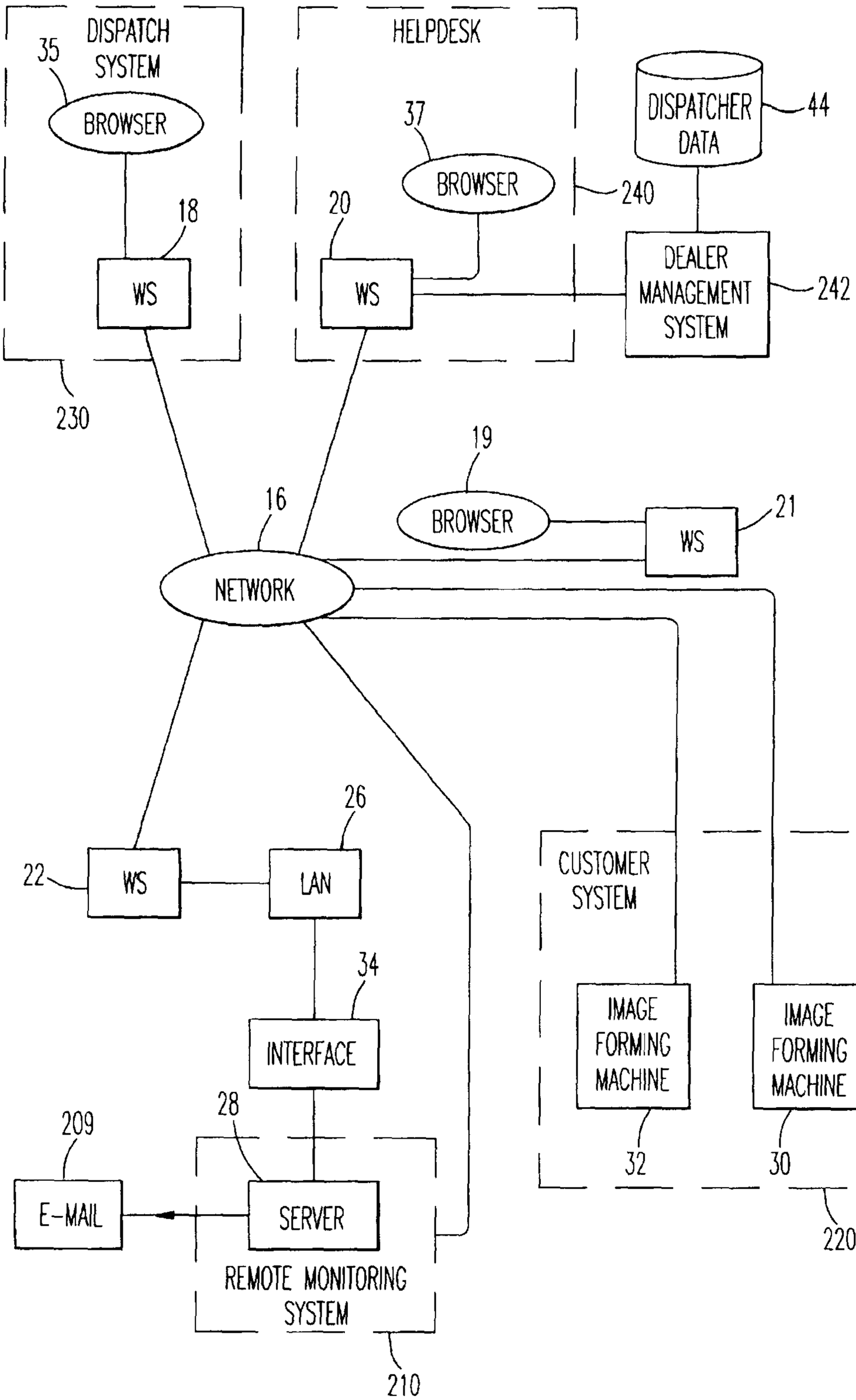

DISPATCH SYSTEM
35
BROWSER
18
WS
230
HELPDESK
37
BROWSER
240
20
WS
DISPATCHER DATA
44
DEALER MANAGEMENT SYSTEM
242
19
BROWSER
WS
21
16
NETWORK
26
22
WS
LAN
34
INTERFACE
28
209
E-MAIL
SERVER
REMOTE MONITORING SYSTEM
210
CUSTOMER SYSTEM
IMAGE FORMING MACHINE
32
IMAGE FORMING MACHINE
30
220

FIG. 3

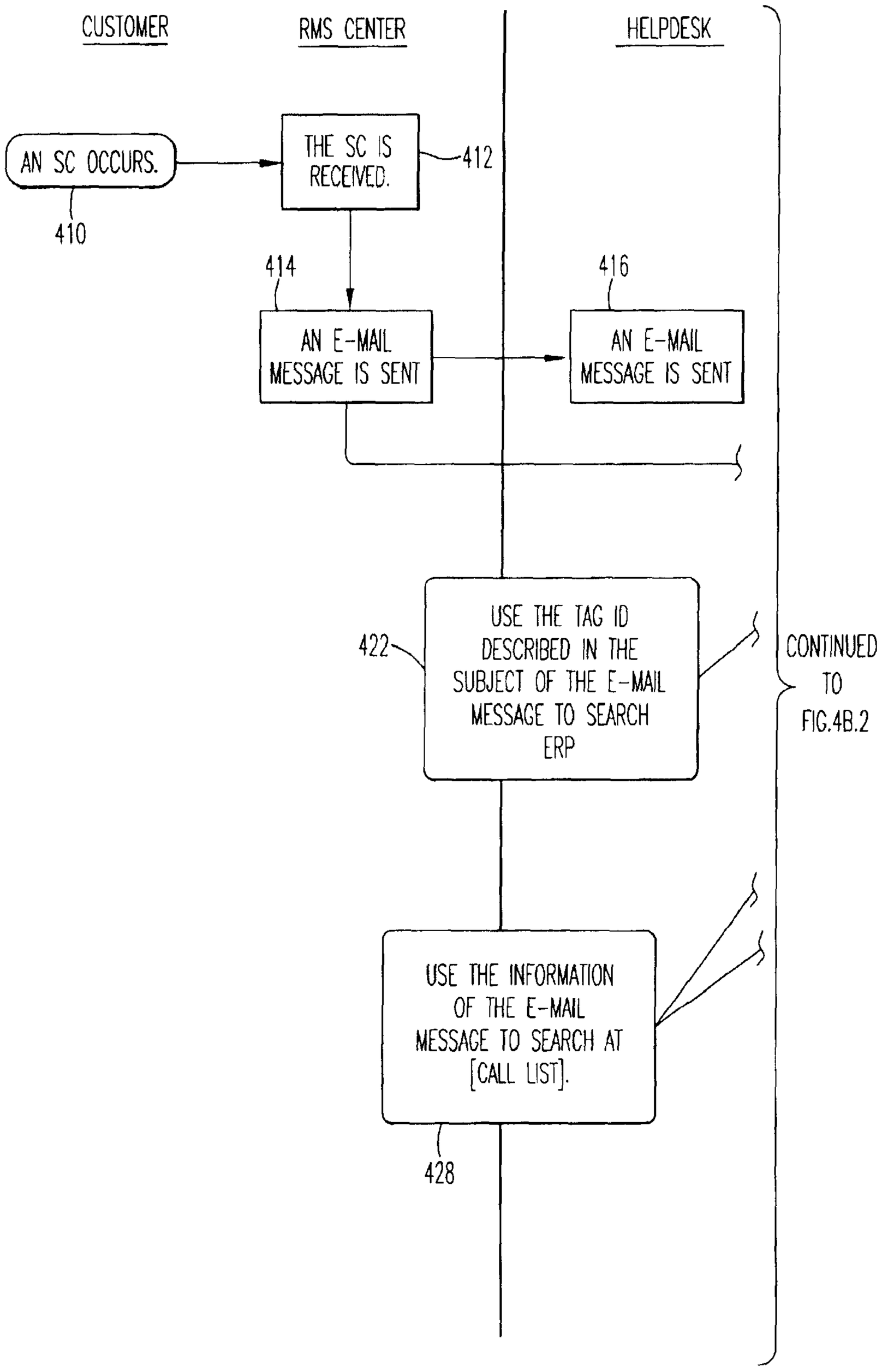

CUSTOMER
RMS CENTER
HELPDESK
AN SC OCCURS.
410
THE SC IS RECEIVED.
412
414
AN E-MAIL MESSAGE IS SENT
416
AN E-MAIL MESSAGE IS SENT
422
USE THE TAG ID DESCRIBED IN THE SUBJECT OF THE E-MAIL MESSAGE TO SEARCH ERP
USE THE INFORMATION OF THE E-MAIL MESSAGE TO SEARCH AT [CALL LIST].
428
CONTINUED TO FIG.4B.2

FIG. 4A. 1

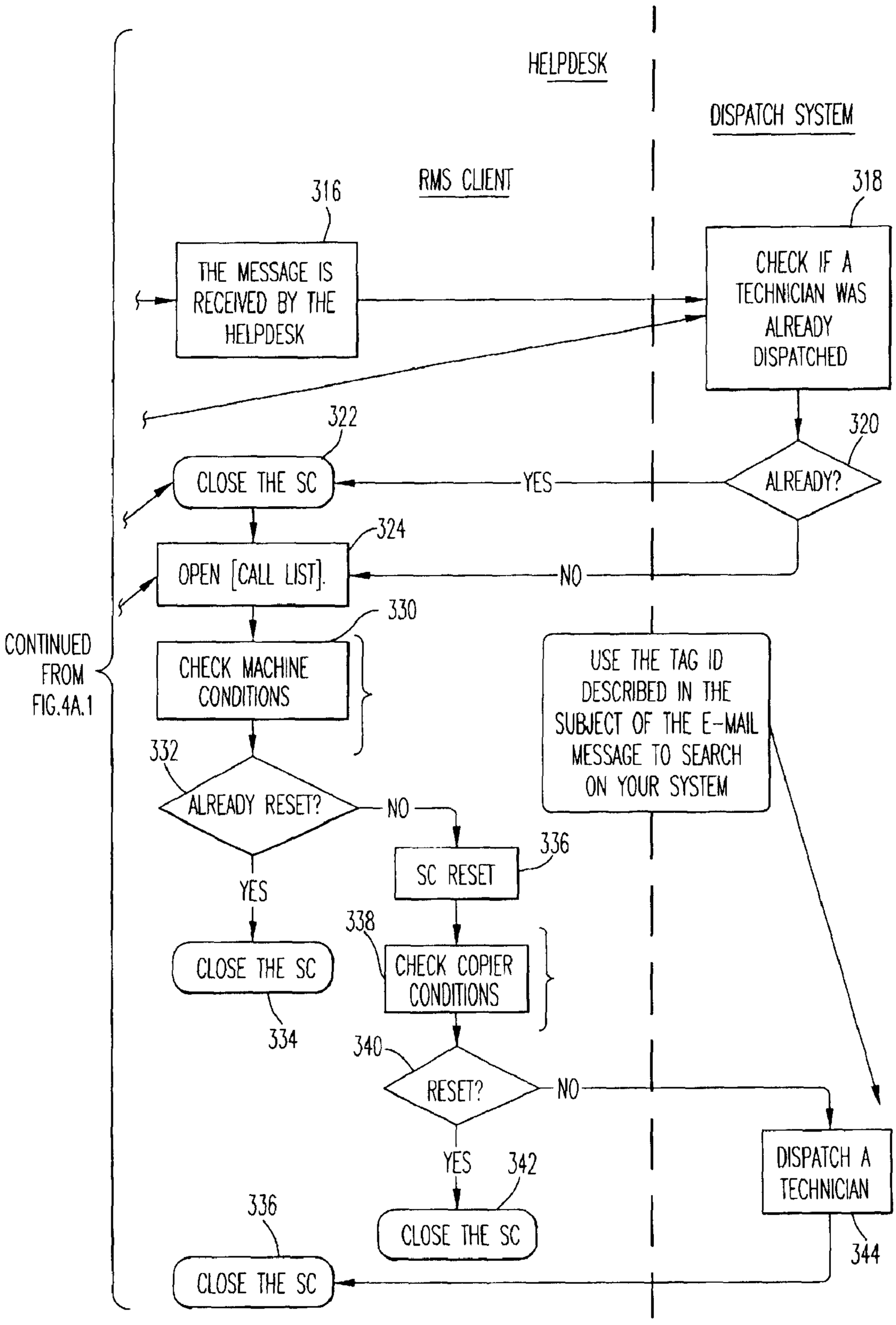

HELPDESK
DISPATCH SYSTEM
RMS CLIENT
316
318
THE MESSAGE IS RECEIVED BY THE HELPDESK
CHECK IF A TECHNICIAN WAS ALREADY DISPATCHED
322
320
CLOSE THE SC
YES
ALREADY?
324
OPEN [CALL LIST].
NO
CONTINUED FROM FIG.4A.1
330
CHECK MACHINE CONDITIONS
USE THE TAG ID DESCRIBED IN THE SUBJECT OF THE E-MAIL MESSAGE TO SEARCH ON YOUR SYSTEM
332
ALREADY RESET?
NO
336
SC RESET
YES
338
CLOSE THE SC
CHECK COPIER CONDITIONS
334
340
RESET?
NO
YES
342
DISPATCH A TECHNICIAN
336
CLOSE THE SC
344
CLOSE THE SC

FIG. 4A.2

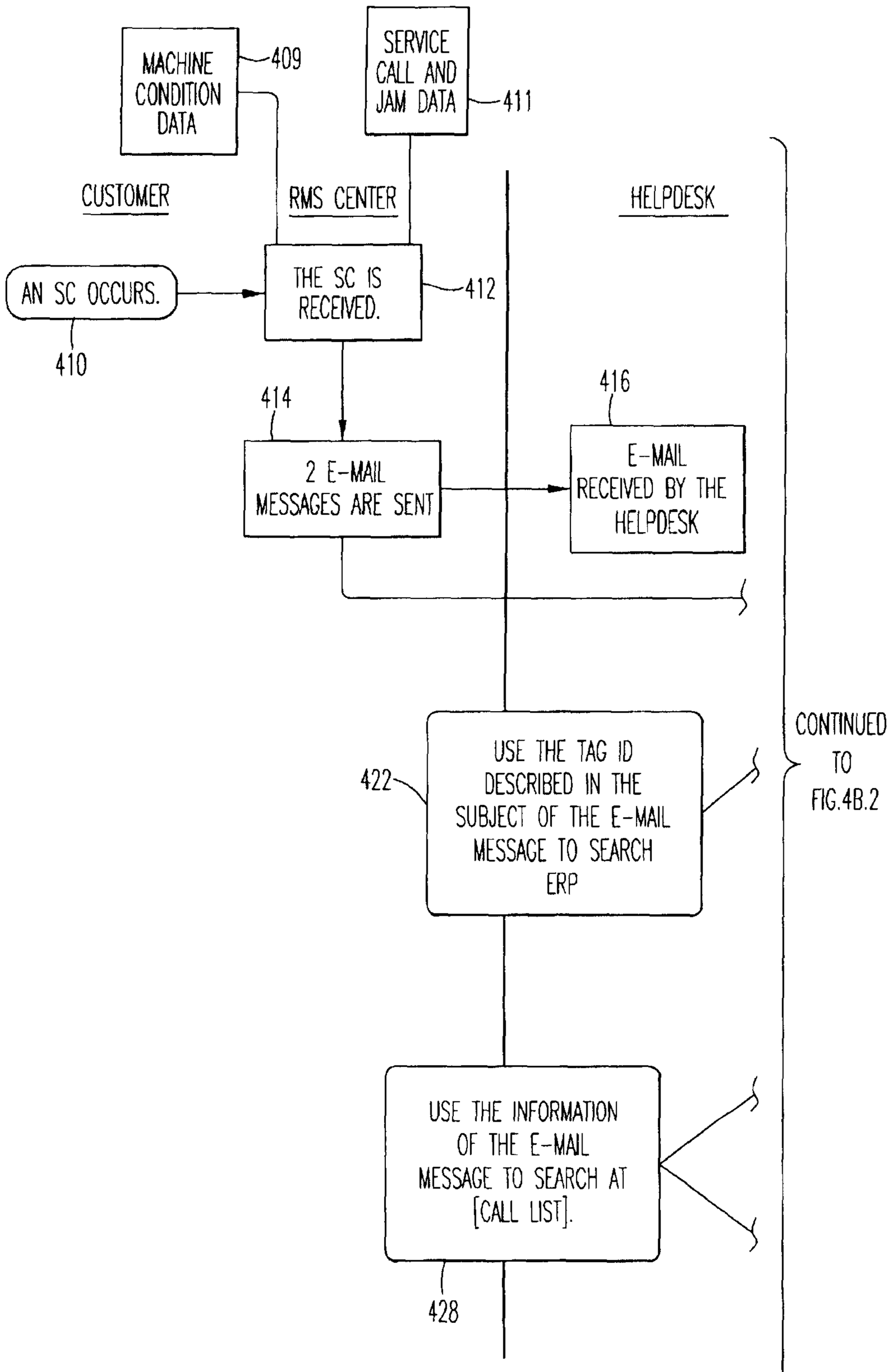

MACHINE CONDITION DATA
409
SERVICE CALL AND JAM DATA
411
CUSTOMER
RMS CENTER
HELPDESK
AN SC OCCURS.
410
THE SC IS RECEIVED.
412
414
2 E-MAIL MESSAGES ARE SENT
416
E-MAIL RECEIVED BY THE HELPDESK
422
USE THE TAG ID DESCRIBED IN THE SUBJECT OF THE E-MAIL MESSAGE TO SEARCH ERP
USE THE INFORMATION OF THE E-MAIL MESSAGE TO SEARCH AT [CALL LIST].
428
CONTINUED TO FIG.4B.2

FIG. 4B. 1

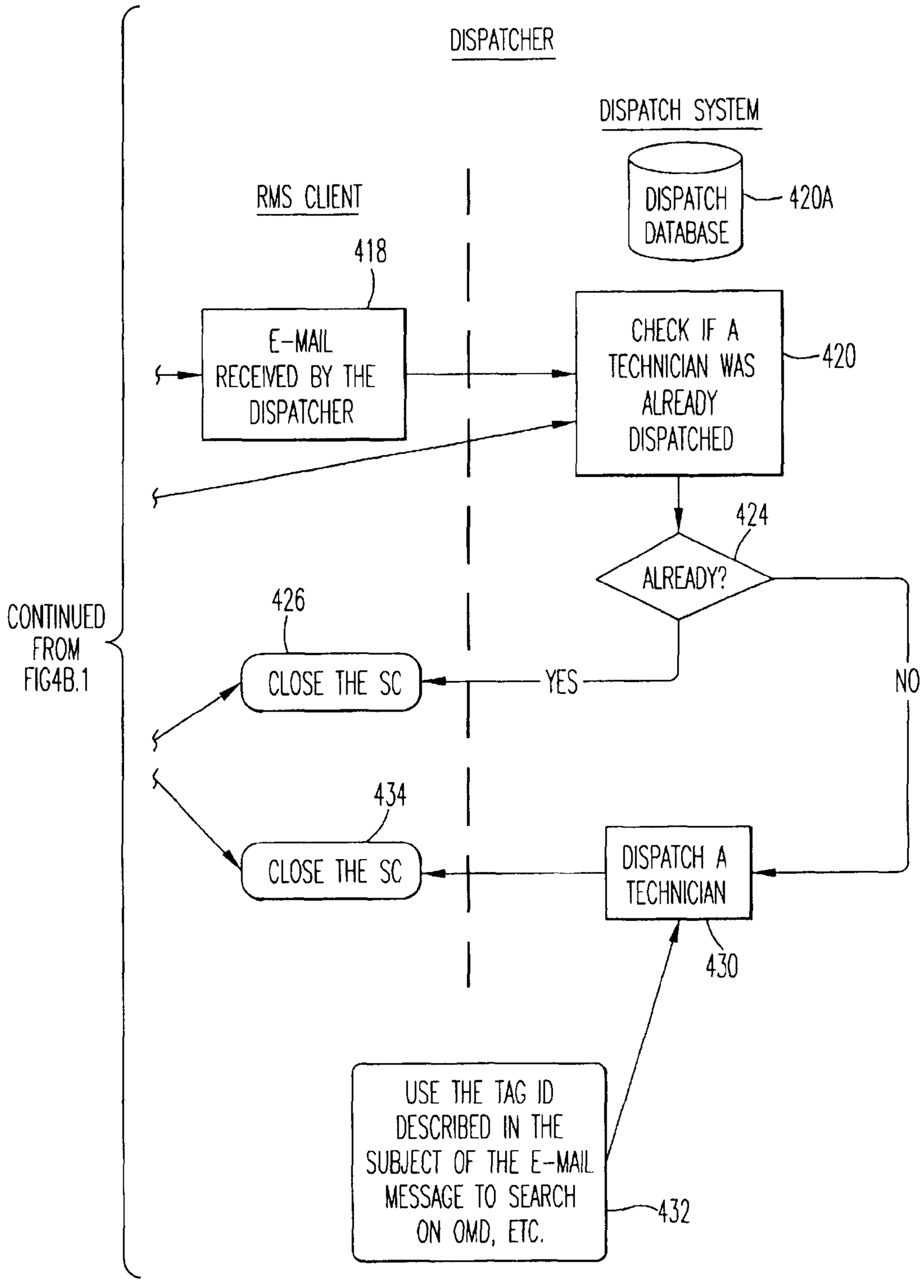

DISPATCHER
DISPATCH SYSTEM
RMS CLIENT
DISPATCH DATABASE
420A
418
E-MAIL RECEIVED BY THE DISPATCHER
CHECK IF A TECHNICIAN WAS ALREADY DISPATCHED
420
424
ALREADY?
CONTINUED FROM FIG4B.1
426
CLOSE THE SC
YES
NO
434
CLOSE THE SC
DISPATCH A TECHNICIAN
430
USE THE TAG ID DESCRIBED IN THE SUBJECT OF THE E-MAIL MESSAGE TO SEARCH ON OMD, ETC.
432

FIG. 4B.2

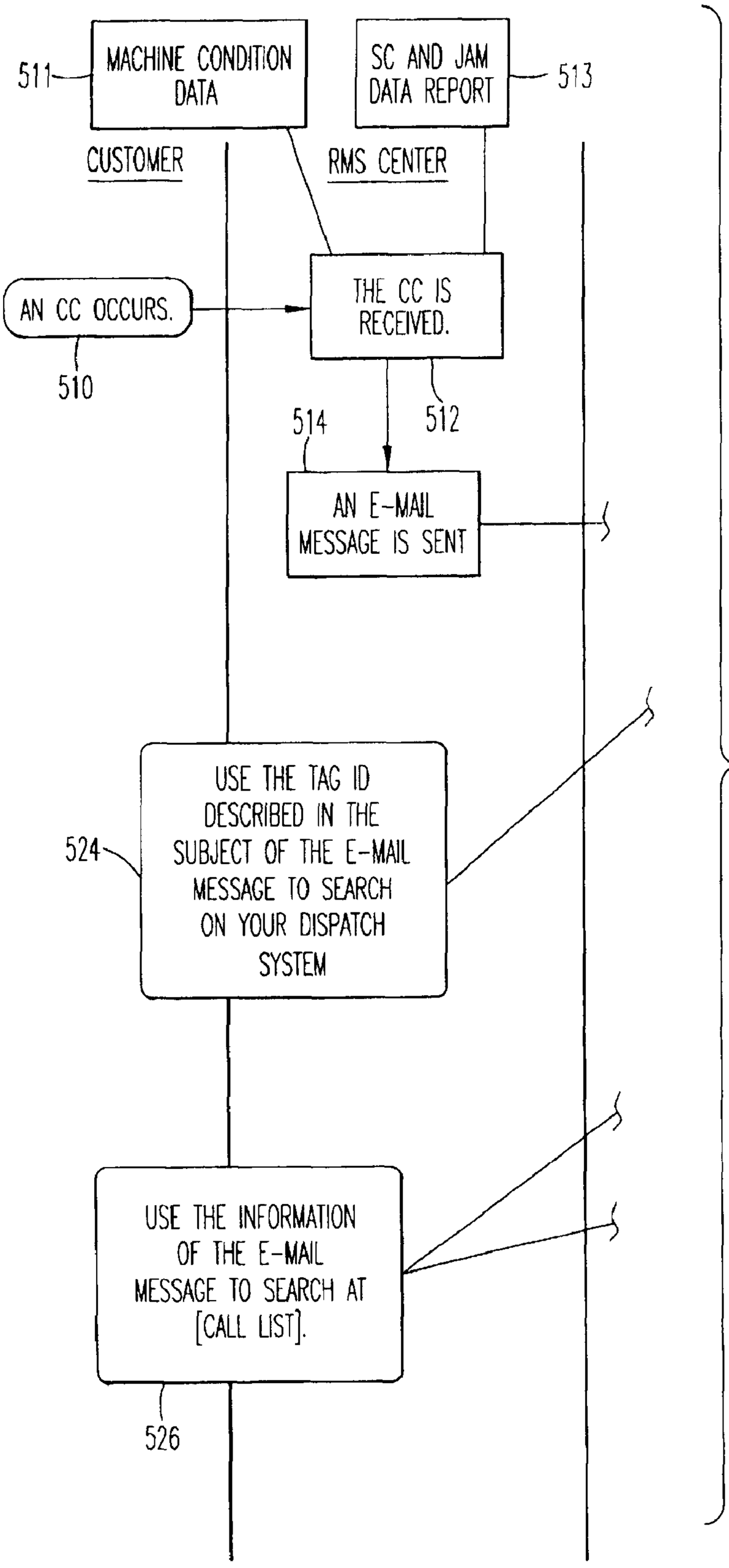

511
MACHINE CONDITION DATA
SC AND JAM DATA REPORT
513
CUSTOMER
RMS CENTER
AN CC OCCURS.
THE CC IS RECEIVED.
510
514
512
AN E-MAIL MESSAGE IS SENT
524
USE THE TAG ID DESCRIBED IN THE SUBJECT OF THE E-MAIL MESSAGE TO SEARCH ON YOUR DISPATCH SYSTEM
USE THE INFORMATION OF THE E-MAIL MESSAGE TO SEARCH AT [CALL LIST].
526
CONTINUED TO FIG.4C.2

FIG. 4C. 1

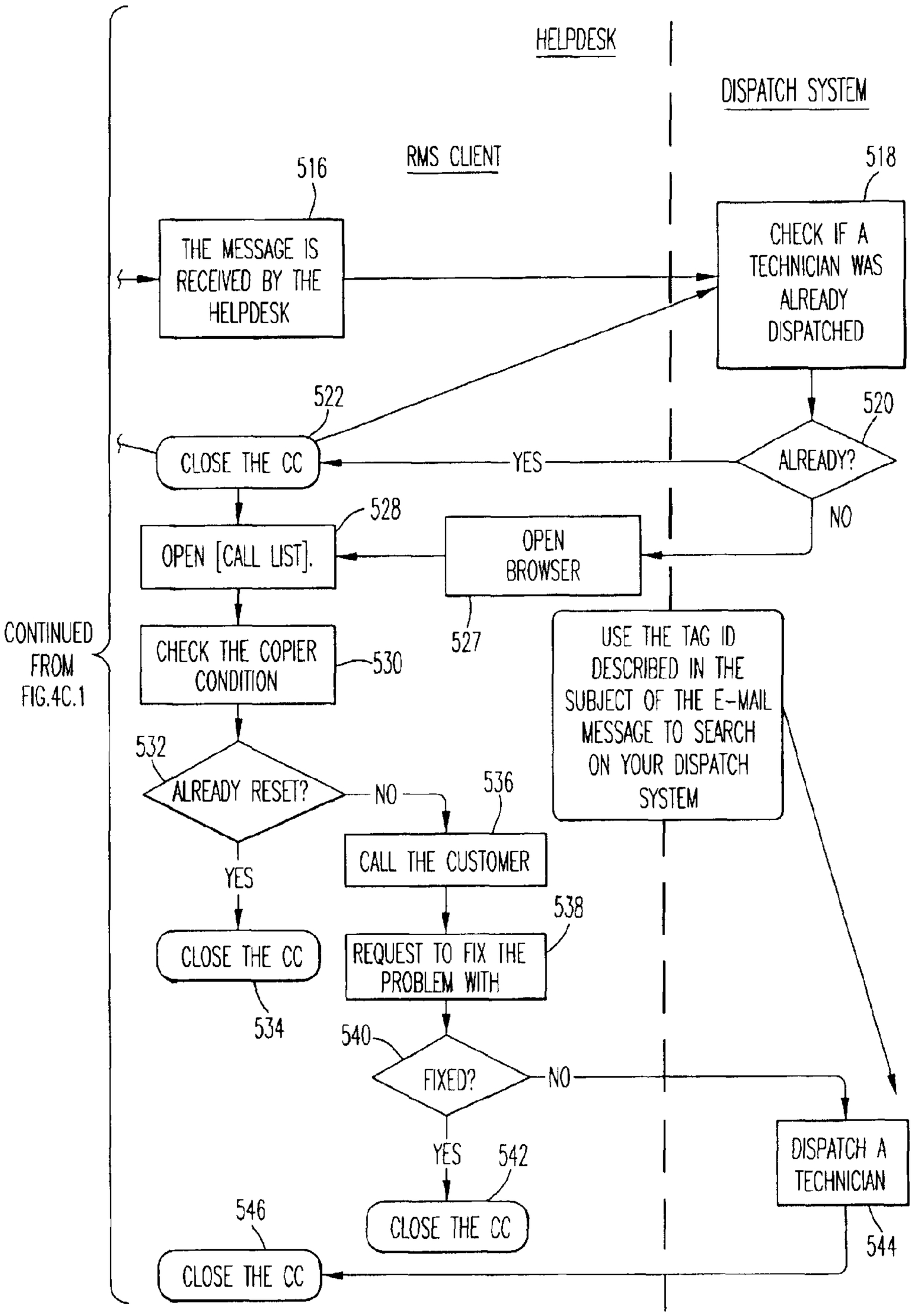

HELPDESK
DISPATCH SYSTEM
RMS CLIENT
516
518
THE MESSAGE IS RECEIVED BY THE HELPDESK
CHECK IF A TECHNICIAN WAS ALREADY DISPATCHED
522
520
CLOSE THE CC
YES
ALREADY?
NO
528
OPEN [CALL LIST].
OPEN BROWSER
527
CONTINUED FROM FIG.4C.1
CHECK THE COPIER CONDITION
530
USE THE TAG ID DESCRIBED IN THE SUBJECT OF THE E-MAIL MESSAGE TO SEARCH ON YOUR DISPATCH SYSTEM
532
ALREADY RESET?
NO
536
YES
CALL THE CUSTOMER
CLOSE THE CC
538
REQUEST TO FIX THE PROBLEM WITH
534
540
FIXED?
NO
YES
542
DISPATCH A TECHNICIAN
546
CLOSE THE CC
CLOSE THE CC
544

FIG. 4C. 2

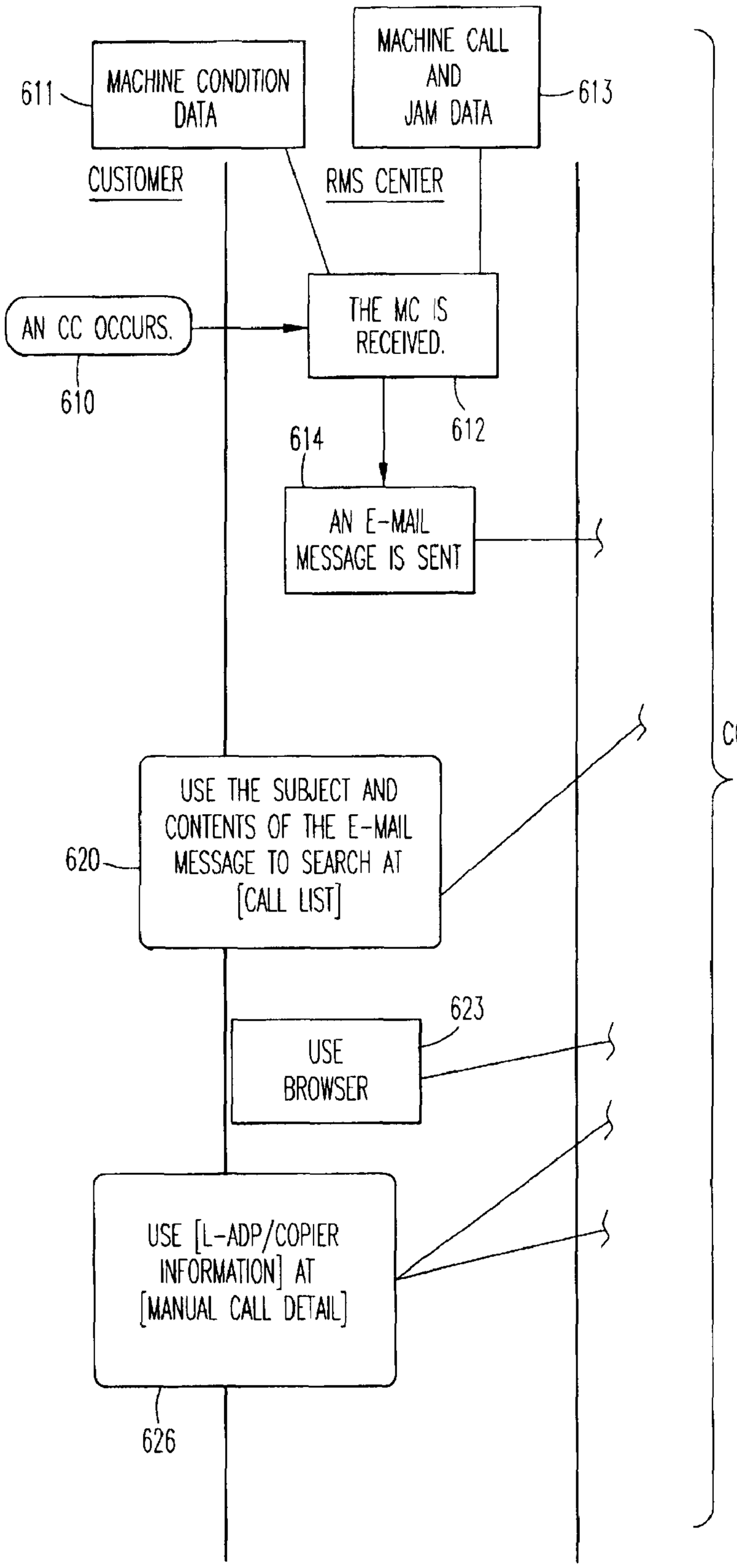

MACHINE CONDITION DATA
611
MACHINE CALL AND JAM DATA
613
CUSTOMER
RMS CENTER
AN CC OCCURS.
610
THE MC IS RECEIVED.
612
614
AN E-MAIL MESSAGE IS SENT
USE THE SUBJECT AND CONTENTS OF THE E-MAIL MESSAGE TO SEARCH AT [CALL LIST]
620
623
USE BROWSER
USE [L-ADP/COPIER INFORMATION] AT [MANUAL CALL DETAIL]
626
CONTINUED TO FIG.4D.2

FIG. 4D. 1

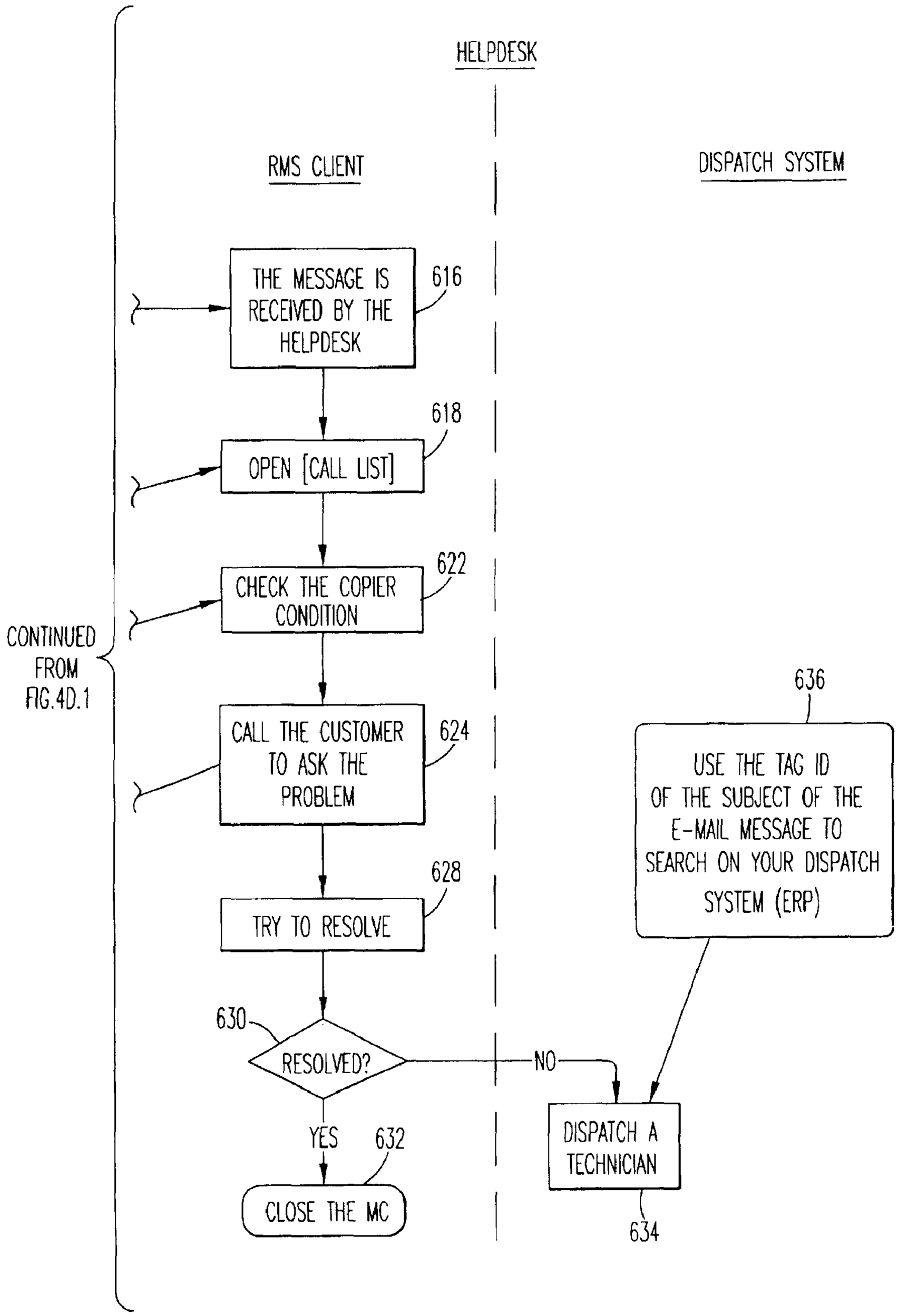

HELPDESK
RMS CLIENT
DISPATCH SYSTEM
CONTINUED FROM FIG.4D.1
THE MESSAGE IS RECEIVED BY THE HELPDESK
616
OPEN [CALL LIST]
618
CHECK THE COPIER CONDITION
622
CALL THE CUSTOMER TO ASK THE PROBLEM
624
TRY TO RESOLVE
628
RESOLVED?
630
YES
632
CLOSE THE MC
NO
DISPATCH A TECHNICIAN
634
USE THE TAG ID OF THE SUBJECT OF THE E-MAIL MESSAGE TO SEARCH ON YOUR DISPATCH SYSTEM (ERP)
636

FIG. 4D.2

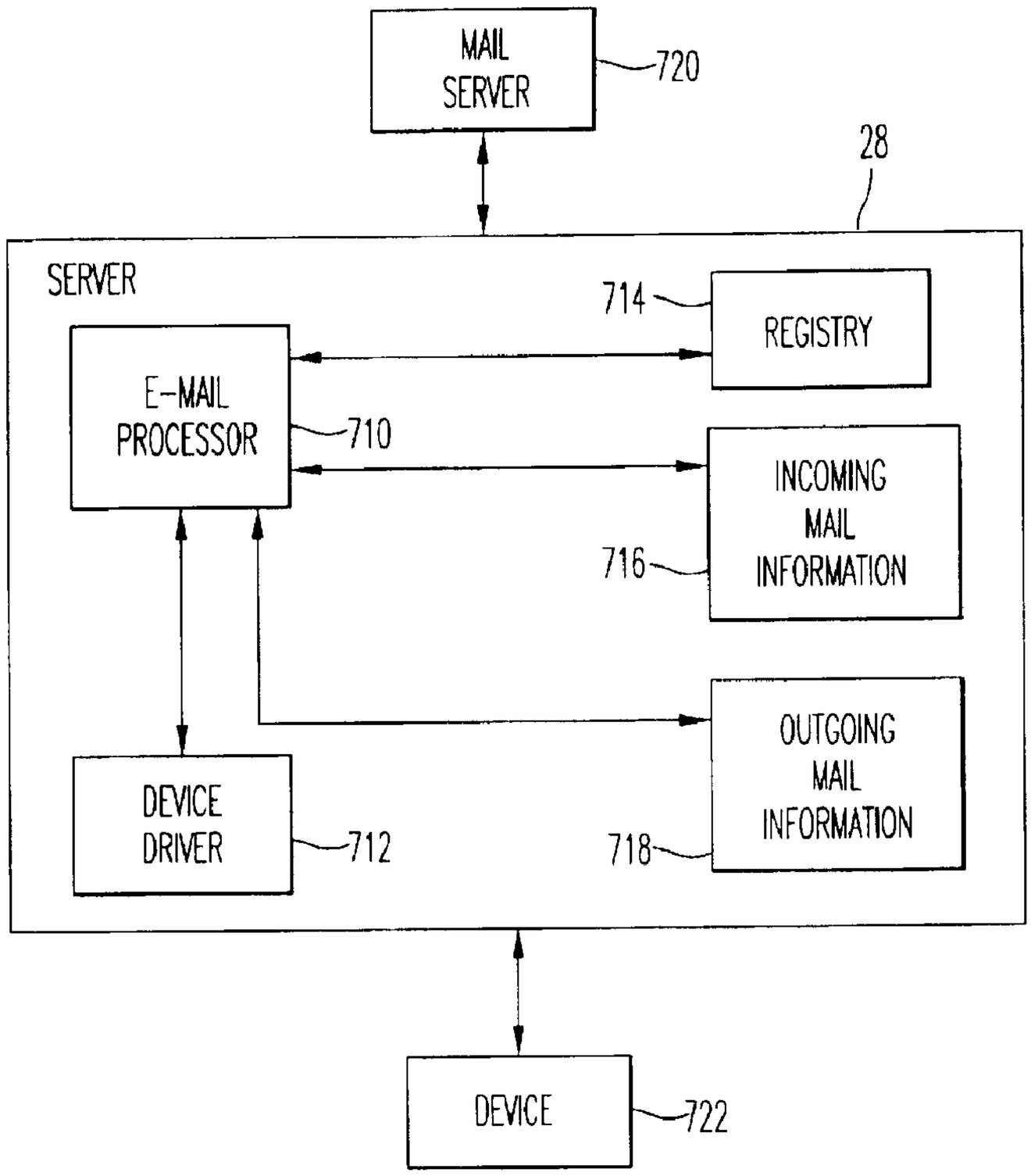

MAIL SERVER
720
28
SERVER
714
REGISTRY
E-MAIL PROCESSOR
710
INCOMING MAIL INFORMATION
716
OUTGOING MAIL INFORMATION
DEVICE DRIVER
712
718
DEVICE
722

FIG. 5A

712
DEVICE DRIVER
REMOTE CONTROL & DIAGNOSTIC MODULE
726
DEVICE FUNCTION SUPPORT MODULE
727
DEVICE DATA
728

FIG. 5B

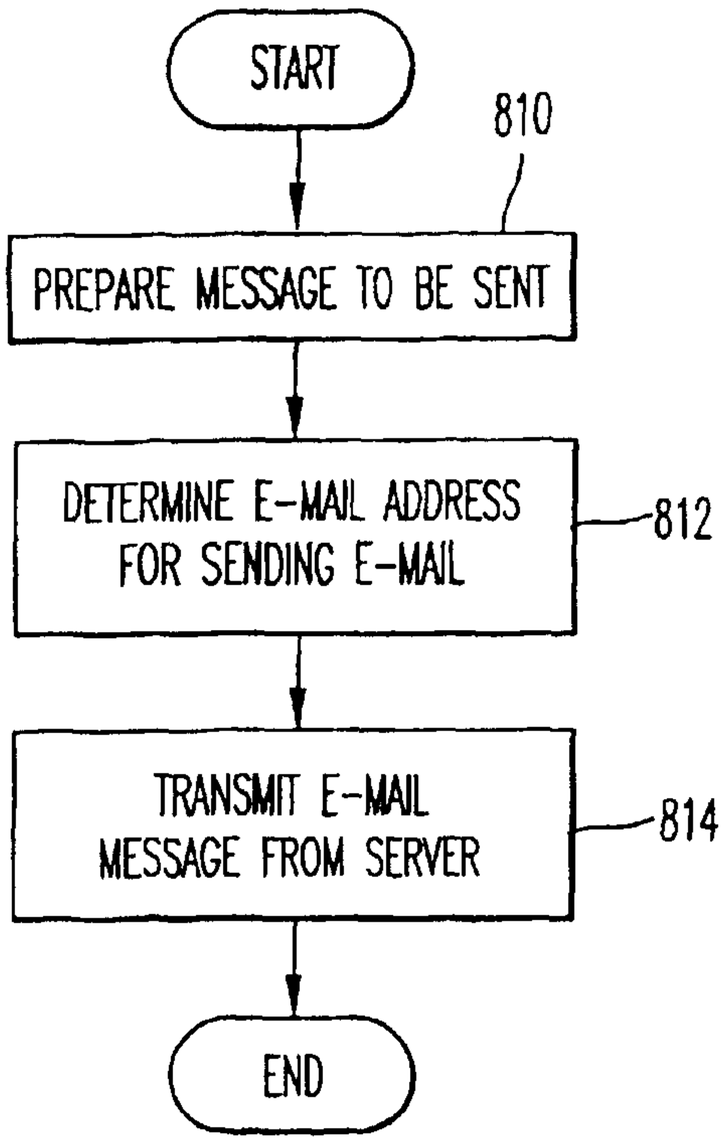

START
810
PREPARE MESSAGE TO BE SENT
DETERMINE E-MAIL ADDRESS FOR SENDING E-MAIL
812
TRANSMIT E-MAIL MESSAGE FROM SERVER
814
END

FIG. 6

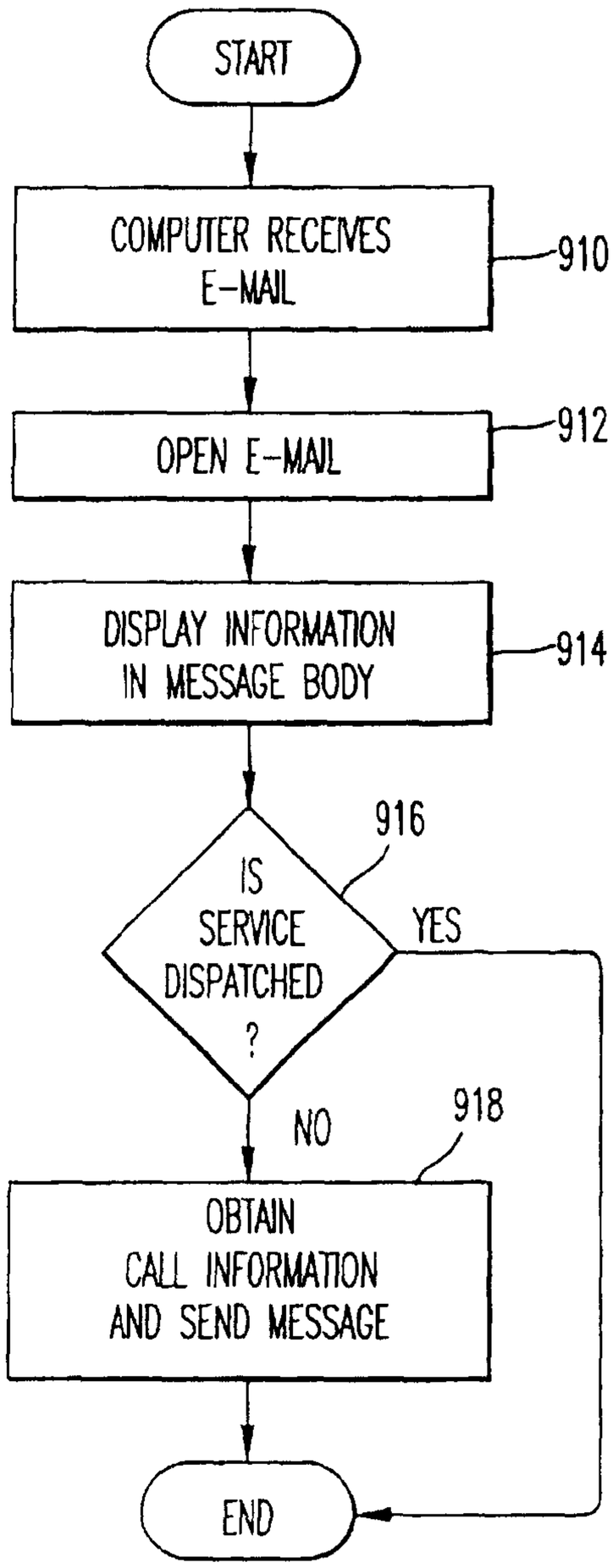

START
COMPUTER RECEIVES E-MAIL
910
OPEN E-MAIL
912
DISPLAY INFORMATION IN MESSAGE BODY
914
916
IS SERVICE DISPATCHED ?
YES
NO
918
OBTAIN CALL INFORMATION AND SEND MESSAGE
END

FIG. 7

950

ADDRESS:
HELPDESK@METR8.COM

1. SUBJECT:
2. MACHINE CALL (MC); RECEIVED TAG ID#YYYY
3. CONTENT:
4. CUSTOMER NAME
5. CUSTOMER ADDRESS
6. CUSTOMER PHONE NUMBER
7. MODEL NAME
8. COPIER S/N
9. TAG ID#
10. SC CODE NUMBER
11. RECEIVE DATE AND TIME

FIG. 8A

960

rms@rms

TO: GREGORY WRIGHT@RICOH-USA.COM
CC: MACHINE CALL
03/01/01 07:28 PM SUBJECT: RECEIVED, TAG ID#NSC 850

FIG. 8B

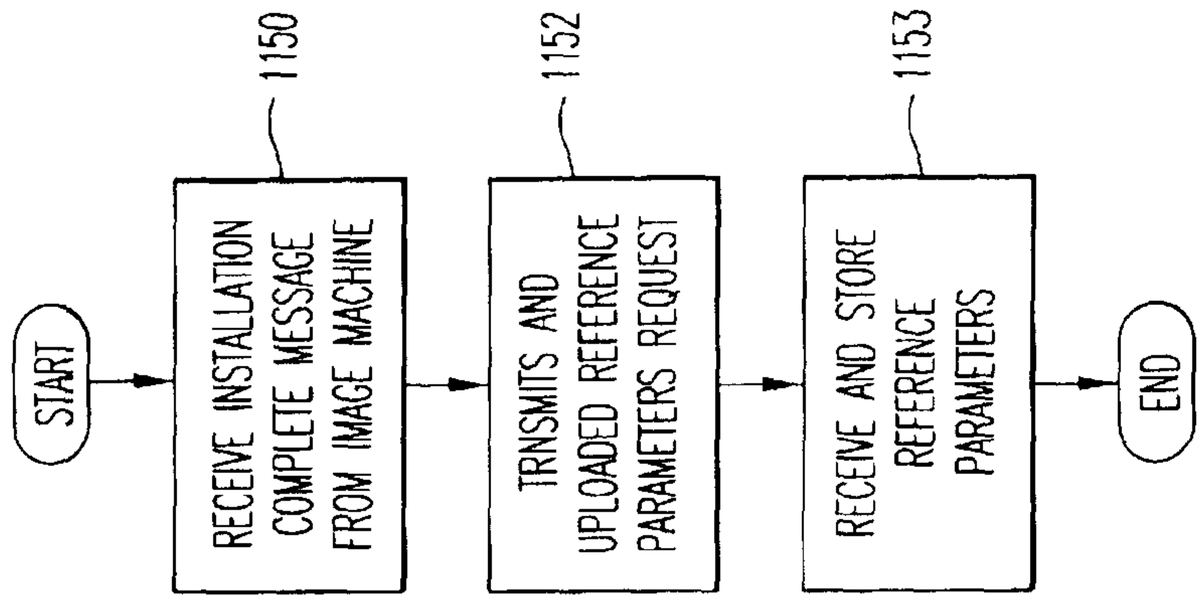

START
RECEIVE INSTALLATION COMPLETE MESSAGE FROM IMAGE MACHINE
1150
TRNSMITS AND UPLOADED REFERENCE PARAMETERS REQUEST
1152
RECEIVE AND STORE REFERENCE PARAMETERS
1153
END

FIG. 10

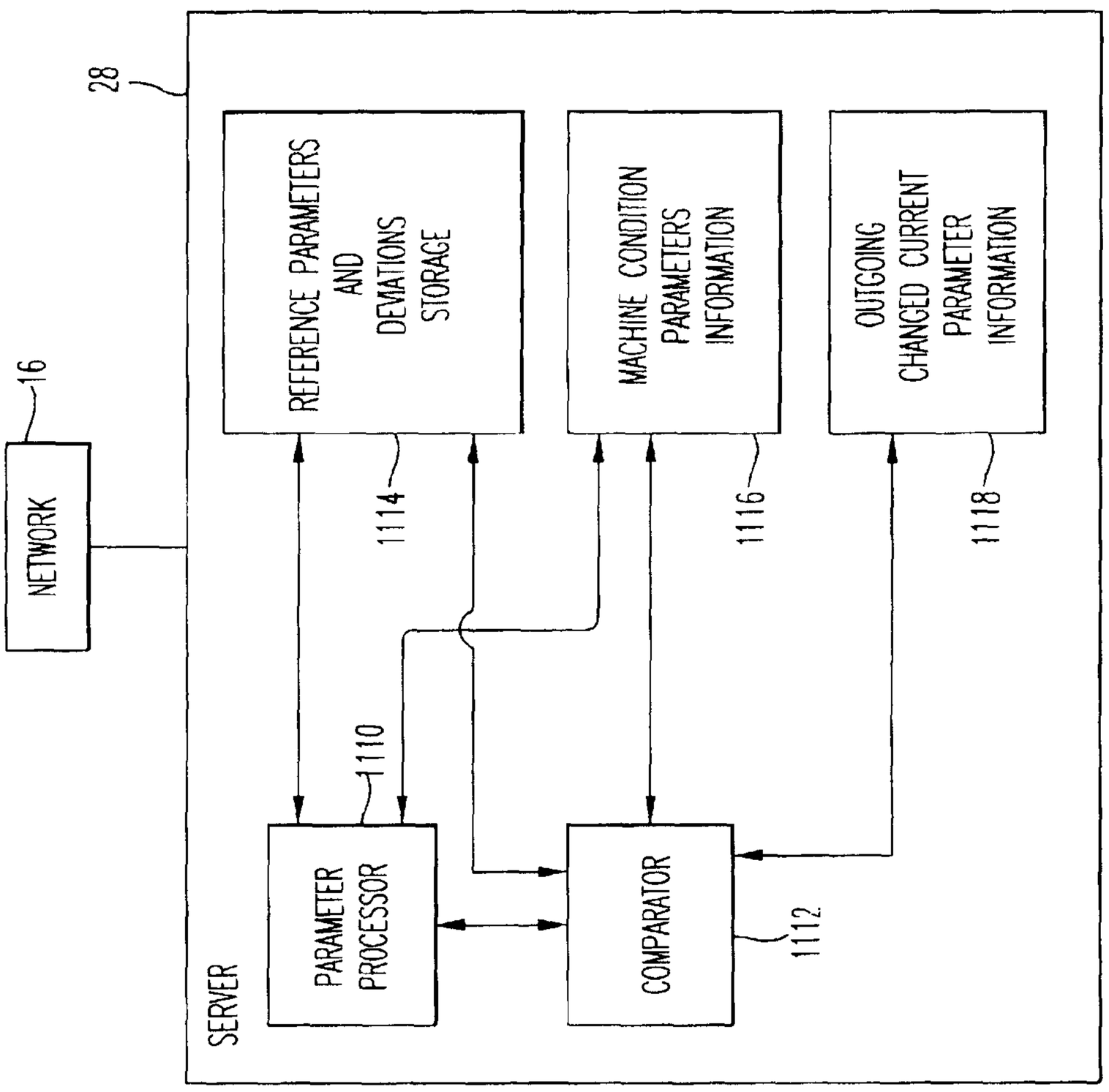

NETWORK
16
28
REFERENCE PARAMETERS AND DEVIATIONS STORAGE
1114
MACHINE CONDITION PARAMETERS INFORMATION
1116
OUTGOING CHANGED CURRENT PARAMETER INFORMATION
1118
SERVER
PARAMETER PROCESSOR
1110
COMPARATOR
1112

FIG. 9

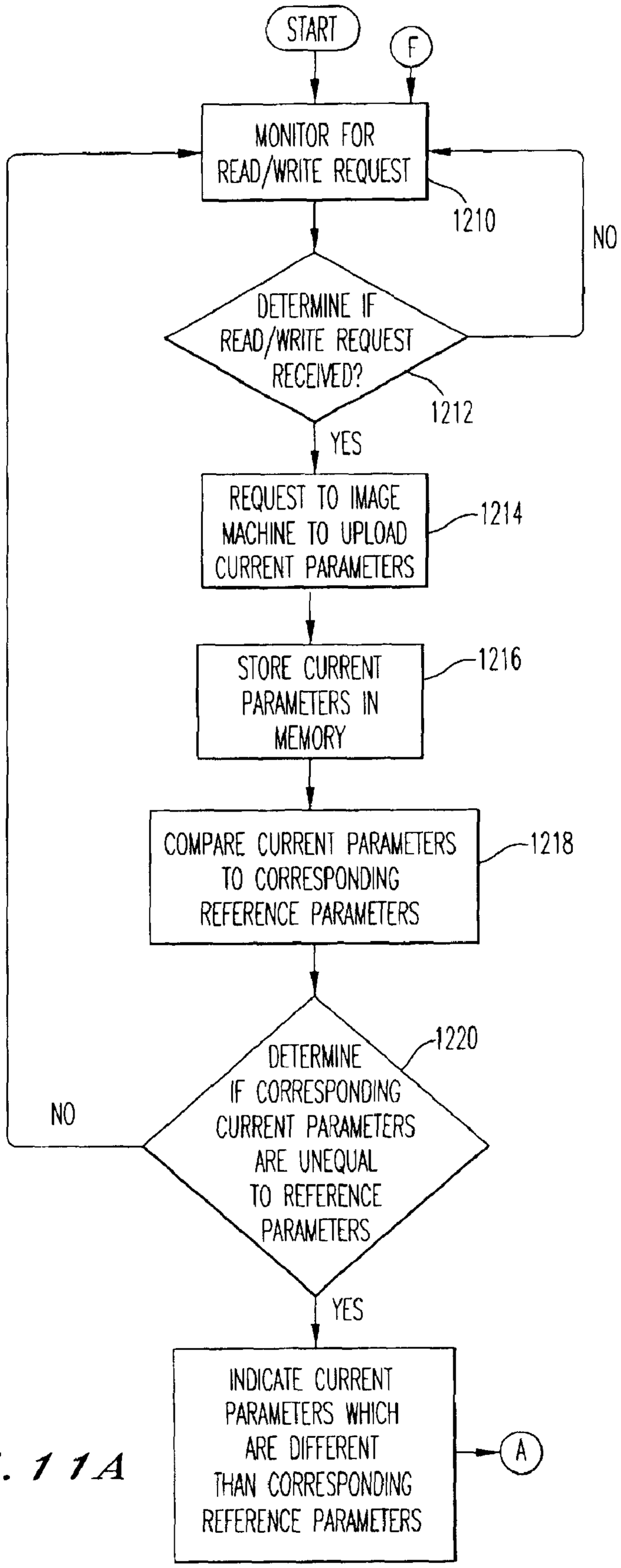

START
F
MONITOR FOR READ/WRITE REQUEST
1210
NO
DETERMINE IF READ/WRITE REQUEST RECEIVED?
1212
YES
REQUEST TO IMAGE MACHINE TO UPLOAD CURRENT PARAMETERS
1214
STORE CURRENT PARAMETERS IN MEMORY
1216
COMPARE CURRENT PARAMETERS TO CORRESPONDING REFERENCE PARAMETERS
1218
DETERMINE IF CORRESPONDING CURRENT PARAMETERS ARE UNEQUAL TO REFERENCE PARAMETERS
1220
NO
YES
INDICATE CURRENT PARAMETERS WHICH ARE DIFFERENT THAN CORRESPONDING REFERENCE PARAMETERS
A

FIG. 11A

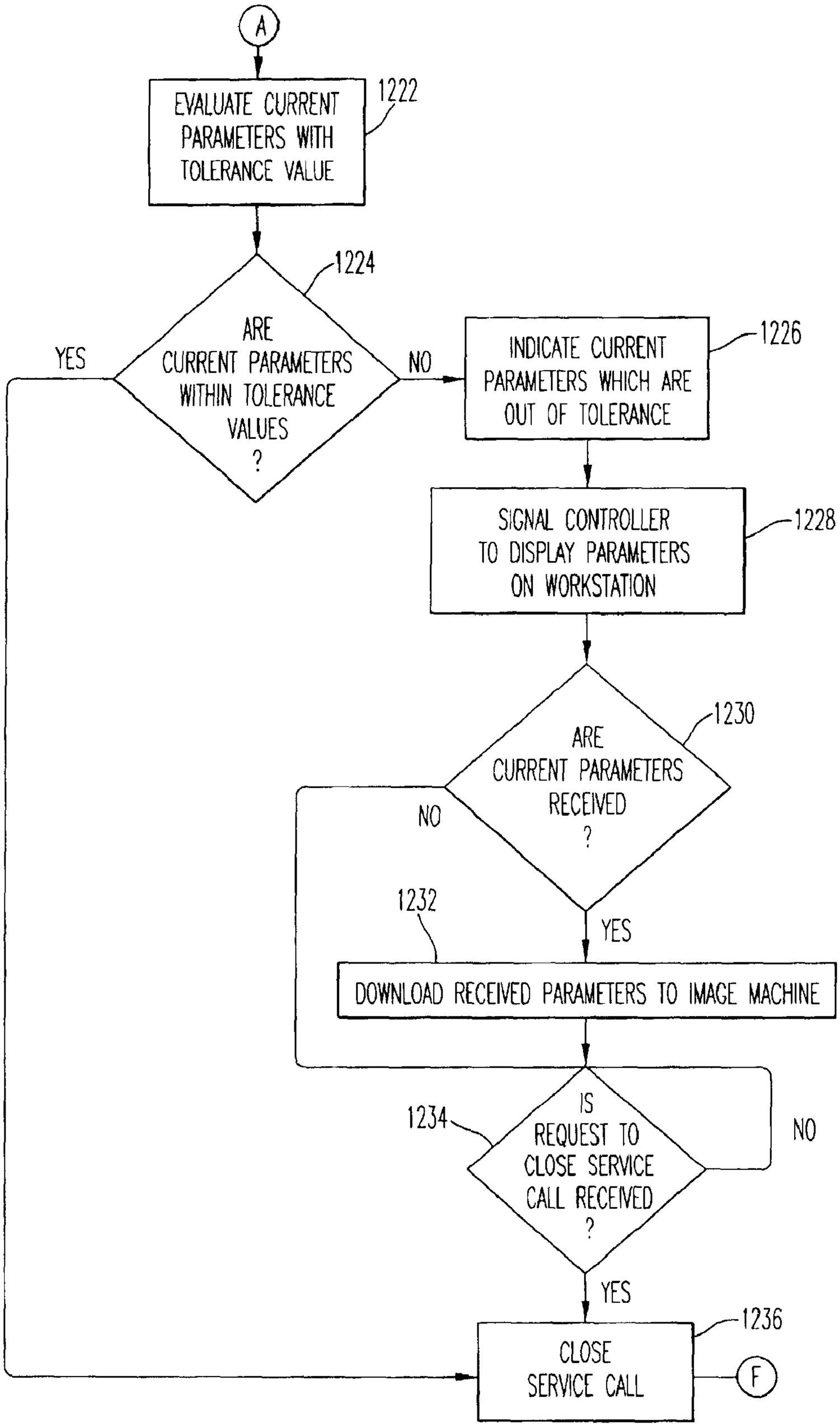
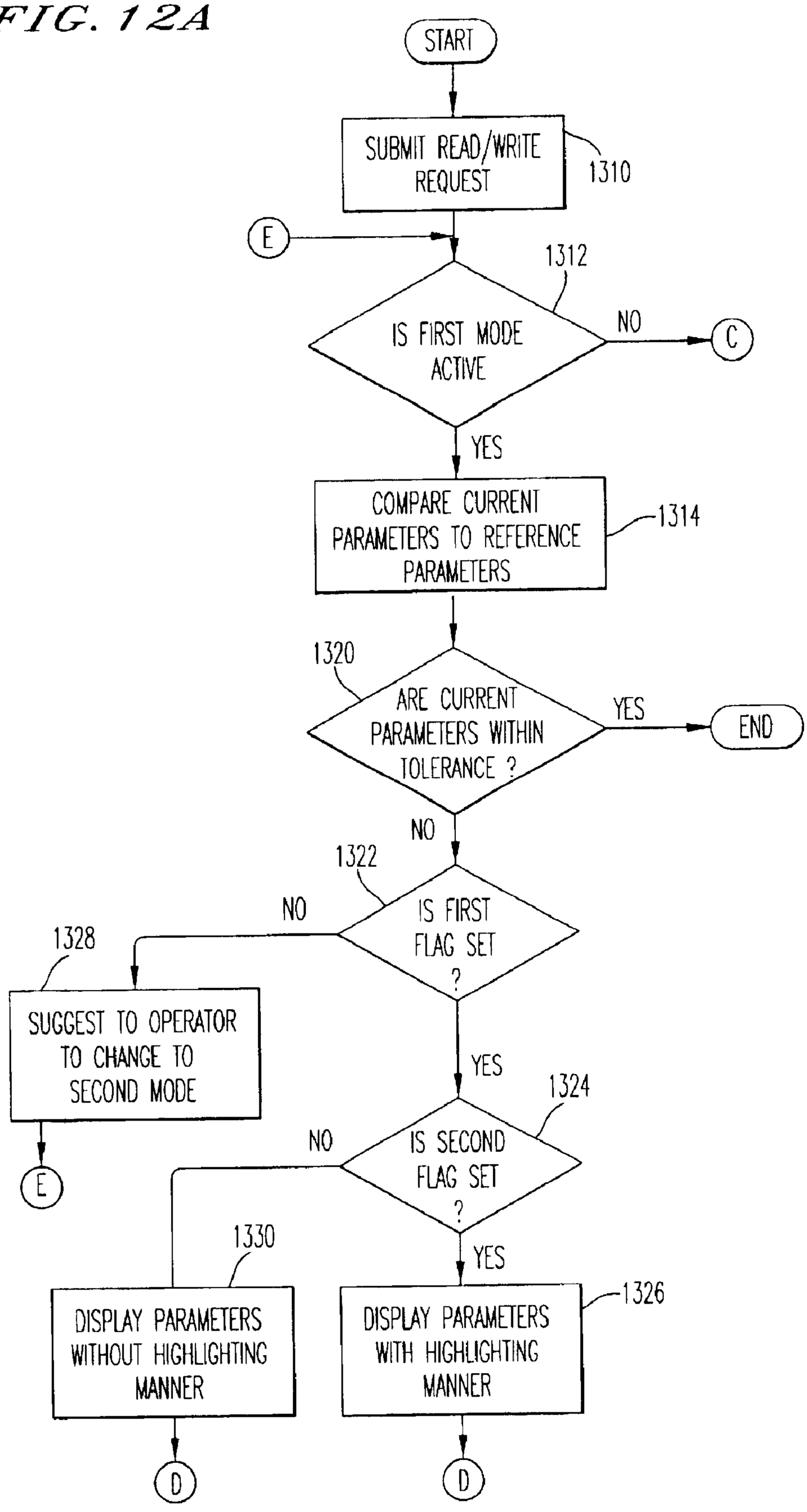

A
EVALUATE CURRENT PARAMETERS WITH TOLERANCE VALUE
1222
ARE CURRENT PARAMETERS WITHIN TOLERANCE VALUES ?
1224
YES
NO
INDICATE CURRENT PARAMETERS WHICH ARE OUT OF TOLERANCE
1226
SIGNAL CONTROLLER TO DISPLAY PARAMETERS ON WORKSTATION
1228
ARE CURRENT PARAMETERS RECEIVED ?
1230
NO
YES
1232
DOWNLOAD RECEIVED PARAMETERS TO IMAGE MACHINE
IS REQUEST TO CLOSE SERVICE CALL RECEIVED ?
1234
NO
YES
CLOSE SERVICE CALL
1236
F

FIG. 11B

FIG. 12A


START
SUBMIT READ/WRITE REQUEST
1310
E
1312
IS FIRST MODE ACTIVE
NO
C
YES
COMPARE CURRENT PARAMETERS TO REFERENCE PARAMETERS
1314
1320
ARE CURRENT PARAMETERS WITHIN TOLERANCE ?
YES
END
NO
1322
IS FIRST FLAG SET ?
NO
1328
YES
1324
SUGGEST TO OPERATOR TO CHANGE TO SECOND MODE
E
IS SECOND FLAG SET ?
NO
YES
1330
1326
DISPLAY PARAMETERS WITHOUT HIGHLIGHTING MANNER
DISPLAY PARAMETERS WITH HIGHLIGHTING MANNER
D
D

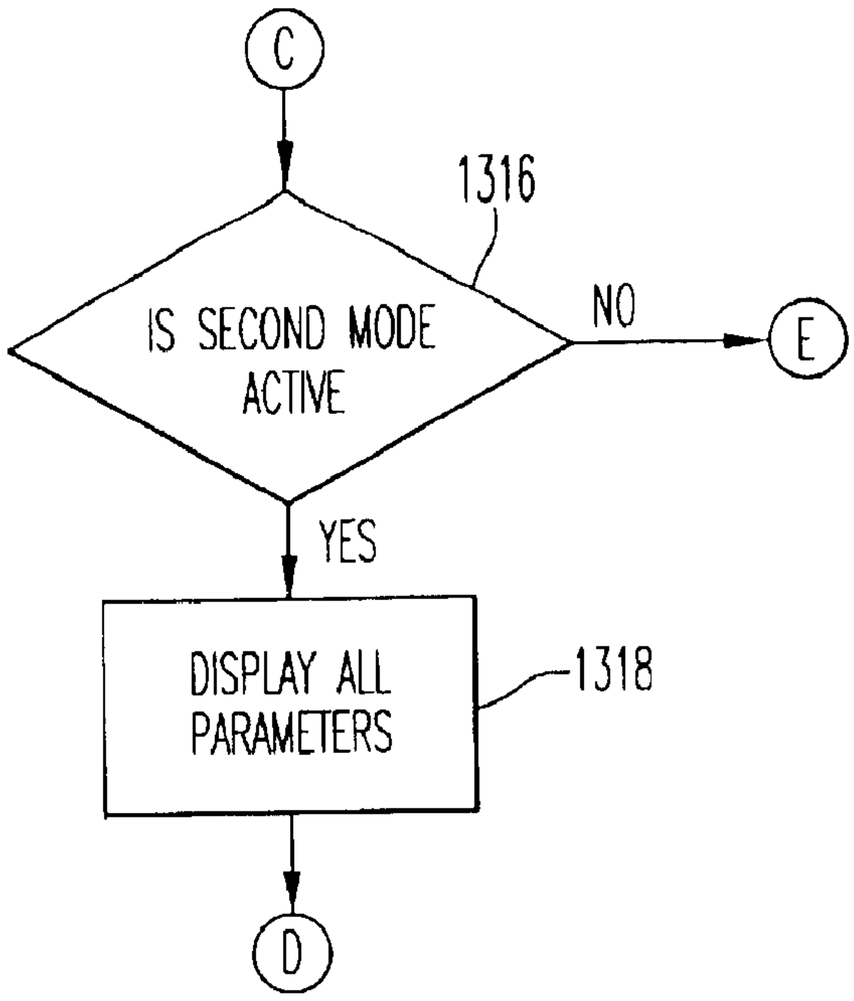


FIG. 12B

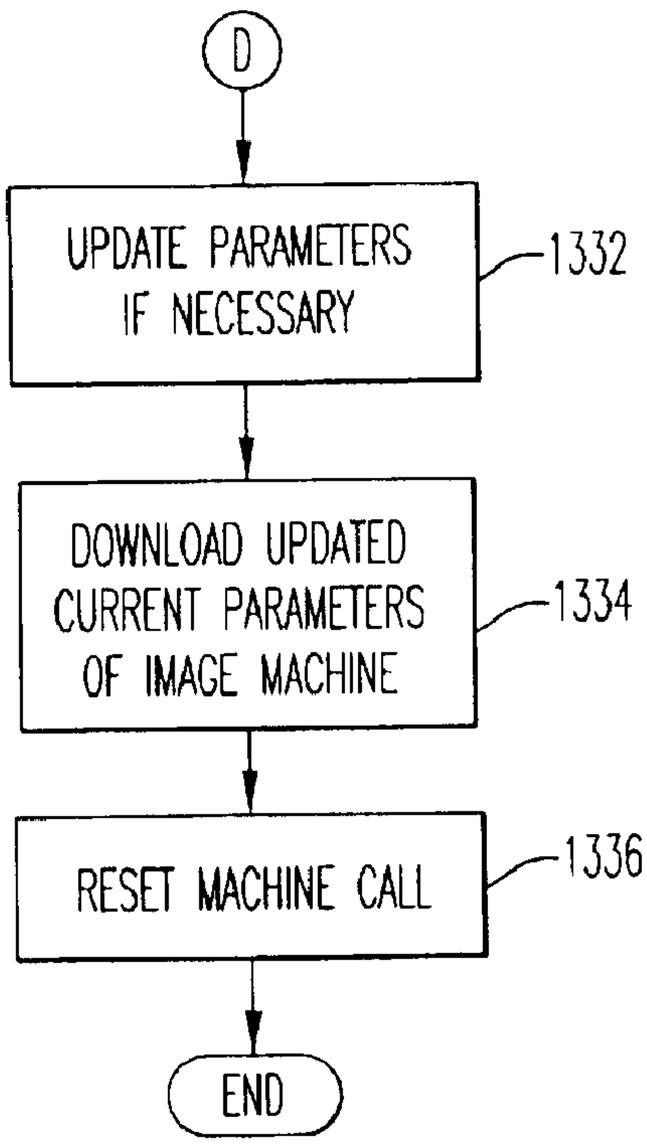


FIG. 12C

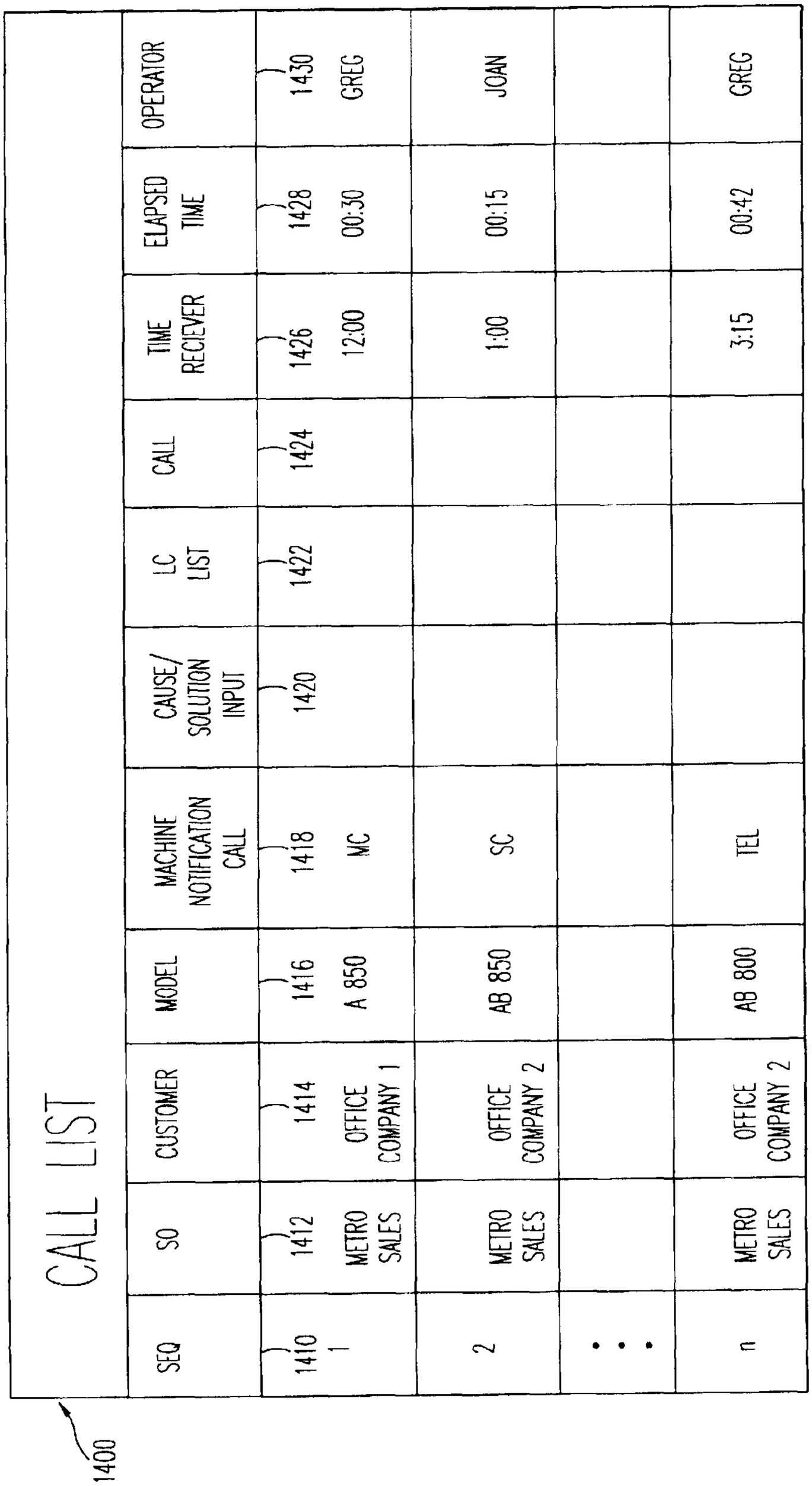

CALL LIST
1400
SEQ
SO
CUSTOMER
LC LIST
CALL
CAUSE/ SOLUTION INPUT
MACHINE NOTIFICATION CALL
MODEL
TIME RECIEVER
ELAPSED TIME
OPERATOR
1410
1
1412
METRO SALES
1414
OFFICE COMPANY 1
1422
1424
1420
1418
MC
1416
A 850
1426
12:00
1428
00:30
1430
GREG
2
METRO SALES
OFFICE COMPANY 2
AB 850
SC
1:00
JOAN
n
METRO SALES
OFFICE COMPANY 2
AB 800
TEL
3:15
GREG
00:42

FIG. 13

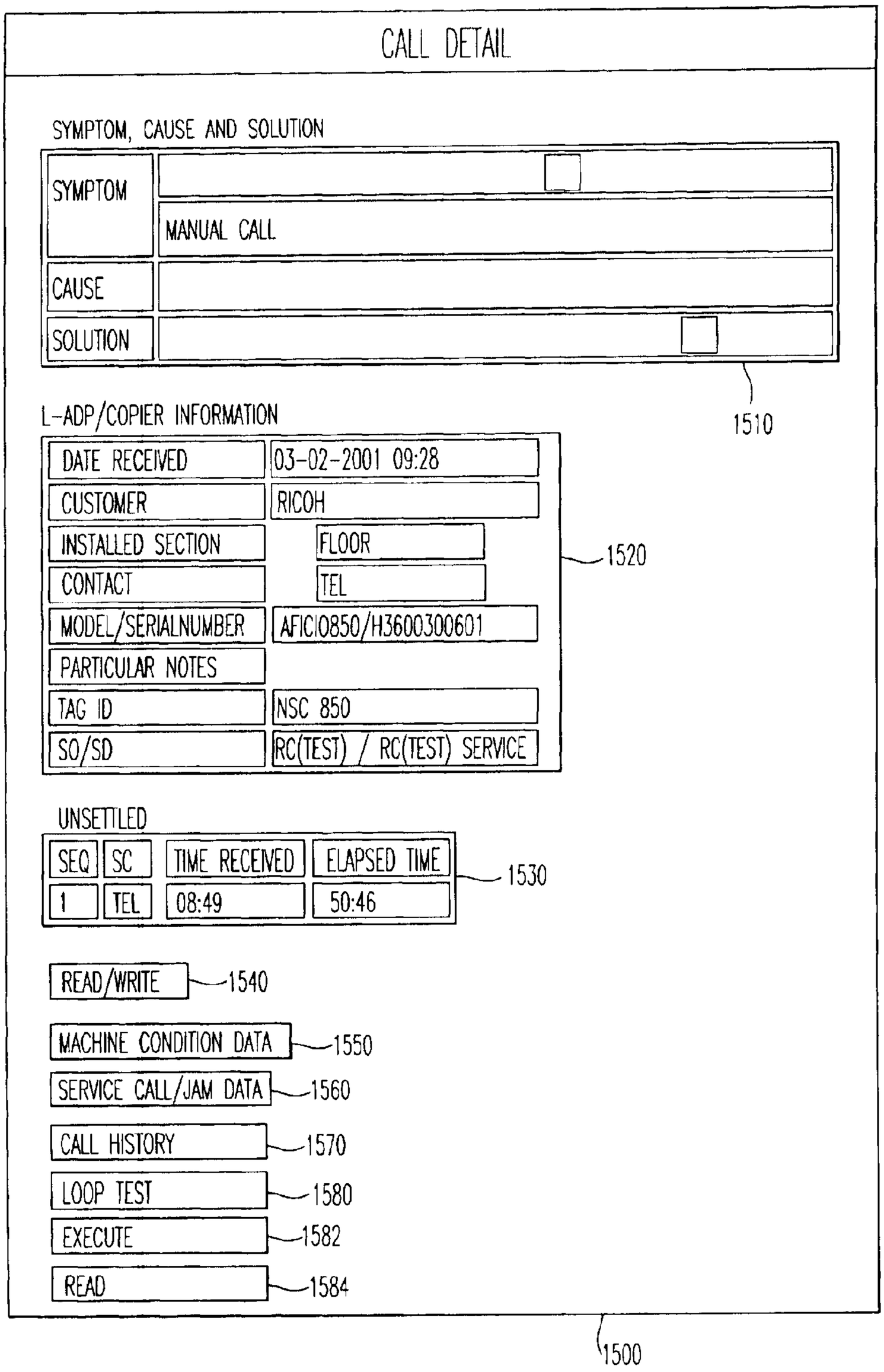

CALL DETAIL
SYMPTOM, CAUSE AND SOLUTION
SYMPTOM
MANUAL CALL
CAUSE
SOLUTION
1510
L-ADP/COPIER INFORMATION
DATE RECEIVED
03-02-2001 09:28
CUSTOMER
RICOH
INSTALLED SECTION
FLOOR
CONTACT
TEL
MODEL/SERIALNUMBER
AFICIO850/H3600300601
PARTICULAR NOTES
TAG ID
NSC 850
SO/SD
RC(TEST) / RC(TEST) SERVICE
1520
UNSETTLED
SEQ
SC
TIME RECEIVED
ELAPSED TIME
1
TEL
08:49
50:46
1530
READ/WRITE
1540
MACHINE CONDITION DATA
1550
SERVICE CALL/JAM DATA
1560
CALL HISTORY
1570
LOOP TEST
1580
EXECUTE
1582
READ
1584
1500

FIG. 14A

SERVICE CALL AND JAM DATA

L-ADP/COPIER INFORMATION

DATE RECEIVED	03-02-2001 09:28
CUSTOMER	RICOH
INSTALLED SECTION	FLOOR
CONTACT	TEL
MODEL/SERIALNUMBER	AFICIO850/H3600300601
PARTICULAR NOTES	
TAG ID	NSC 850
SO/SD	RC(TEST) / RC(TEST) SERVICE

1564

1562

1566

SC AND JAM DATA

NO.	ITEM	RESULT
1	MACHINE CONDITION	2
2	SC DETAILS	sp_wcom.c LINE:1288 VAL : -13
3	TOTAL PAPER JAMS	0057
4	TOTAL P.JAMS BY TRAY 1	0002
5	TOTAL P.JAMS BY TRAY 2	0004
6	TOTAL P.JAMS BY LCT(TRAY 3)	0001
7	TOTAL P.JAMS BY LCT EXIT	0002
8	TOTAL P.JAMS BY REGISTRATION	0006
9	TOTAL P.JAMS BY EXIT	0005
10	TOTAL ORIGINAL JAMS	0079
11	TOTAL P.JAMS BY DUP.ENTRANCE	0005
12	TOTAL P.JAMS BY DUP.TRANS.3	0001
13	TOTAL P.JAMS BY INVERTER	0006
14	TOTAL P.JAMS BY FIN. ENTRANCE	0005

FIG. 14B

16	TOTAL P.JAMS BY FIN. SHIFT T	0006
17	TOTAL P.JAMS BY FIN. STAPLE 1	0005
18	TOTAL P.JAMS BY FIN. STAPLE 2	0007
19	TOTAL P.JAMS BY FIN. STAPLE 3	0001
20	TOTAL ORIG'L JAMS:ADF FEED	0070
21	TOTAL ORIG'L JAMS:ADF EXIT	0009
22	TOTAL P.JAMS BY LT(S)	0048
23	TOTAL P.JAMS BY OTHER SIZE	0002
24	TOTAL P.JAMS BY DLT	0002
25	TOTAL P.JAMS BY LG	0001
26	TOTAL P.JAMS BY LT(L)	0004
27	P.JAMS HISTORY: LATEST 0	232632616
28	P.JAMS HISTORY: LATEST 1	232630278
29	P.JAMS HISTORY: LATEST 2	282630277

FIG. 14C

READ/WRITE IMAGE MACHINE DATA

L-ADP/COPIER INFORMATION

DATE RECEIVED	03-02-2001 09:28		
CUSTOMER	RICOH		
INSTALLED SECTION		FLOOR	
CONTACT		TEL	
MODEL/SERIAL NUMBER	AFICIO850/H3600300601		
PARTICULAR NOTES			
TAG ID	NSC 850		
SO/SD	RC(TEST) / RC(TEST) SERVICE		

1610

1620A

READ/WRITE ITEMS

NO.	ITEM	STANDARD	TOLERANCE	REFERENCE PARAMETERS	CURRENT PARAMETERS	NEW
1	◉ L.EDGE REGIST. ADJ.PT:1001-1	+00	-90 – +90	0.1	0.5	☐
2	○ L.EDGE REGIST. ADJ.DT:1001-2	+00	-90 – +90	0	0	☐
3	○ S-TO-S REGIST. ADJ.T1:1002-1	-15	-90 – +90	-3.9	-3.9	☐
4	○ S-TO-S REGIST. ADJ.T2:1002-2	-15	-90 – +90	-2.7	-5	☐
5	○ S-TO-S REGIST. ADJ.T3:1002-3	-15	-90 – +90	-3		☐
6	○ S-TO-S REGIST. ADJ.T4:1002-4	-25	-90 – +90	-2		☐

1600

FIG. 15A

1620B

7	°S-TO-S REGIST. ADJ.T5:1002-5	-25	-90 ~ +90	-2		
8	°S-TO-S REGIST. ADJ.T6:1002-6	-25	-90 ~ +90	-1.5		
9	°S-TO-S REGIST. ADJ.DT:1002-7	-30	-90 ~ +90	-3.7		
10	°FUSING TEIMP. ADJ.STNDBY:1105-1	173	168 ~ 178	173	179	
11	°FUSING TEIMP. ADJ.	015	000 ~ 020	015	-5	
12	°FUSING TEIMP. ADJ.A4/LT :1105-4	010	000 ~ 020	+10	15	
13	°WEB M. CONT'I DISP/ADJ.:1902-1	0	000 ~ 102	102		
14	°C.CORONA BAIS ADJ. IA:2001-1	1000	0600 ~ 1300	1000		
15	°C.CORONA BAIS ADJ. ID:2001-2	800	0600 ~ 1300	0800		
16	°ERASE MGN ADJ. L-EDGE :2101-1	25	00 ~ 90	0.25		
17	°ERASE MGN ADJ. T-EDGE :2101-2	25	00 ~ 90	0.23		
18	°ERASE MGN ADJ.LEFT :2101-3	20	00 ~ 90	0.2		
19	°ERASE MGN ADJ.RIGHT :2101-4	20	00 ~ 90	0.27		

FIG. 15B

1620C

20	°DEVELOPMENT BIAS ADJ.:2201-1	530	200 – 700	620	
21	°TONER SUPPLY MODE SET:2208-1	0	0 – 1	0	
22	°TONER SUPPLY RATE SET:2209-1	0800/1k	0100 – 2000	0800	
23	°VREF MANUAL SETTING :2220	250	160 – 350	203	
24	°T.CURRENT ADJ.1STSIDE:2301-1	120/140	010 – 200	140	
25	°T.CURRENT ADJ.THICK :2301-2	120/140	010 – 200	120	
26	°T.CURRENT ADJ.OHP :2301-3	140/140	010 – 200	140	
27	°T.CURRENT ADJ.TRANSP.:2301-4	120/140	010 – 200	140	
28	°T.CURRENT ADJ.2NDSIDE:2301-5	120/140	010 – 200	120	
29	°T.CURRENT ADJ.BET.P :2301-6	20	010 – 200	020	
30	°CLEANING INTERVAL SET:2506-1	1	0 – 1	1	
31	°CLEANING INTERVAL ADJ:2506-2	030	001 – 100	030	
32	°VCOUNT MANUAL SETTING:2906	097	040 – 240	0.96	

FIG. 15C

1620D

33	○ID SENSOR INITIAL SET:3001-1	62	000 – 255	061	
34	○SCAN.SUB SCAN MAG.ADJ.:4008	+0	-9 – +9	0	
35	○SCAN.L-EDGE REGIST.ADJ:4010	+00	-90 – +90	-0.7	
36	○SCAN.S-TO-S REGIST.ADJ:4011	+00	-60 – +60	-0.6	
37	○SBU SET:4902-25(FACTORY USE)	117	000 – 255	143	
38	○PAPER TRAY PRIORITY SET(UT)	1	1 – 6	1	
39	○A.P.S. PRIORITY SETTING(UT)	0	0 – 1	0	
40	○A.I.D. PRIORITY SETTING(UT)	0	0 – 1	0	
41	○PANEL TONE ON/OFF SET(UT)	2	0 – 3	2	
42	○PRESET R/E RETIO KEY1 (UT)	025	025 – 400	025	
43	○PRESET R/E RETIO KEY2 (UT)	050	025 – 400	050	
44	○PRESET R/E RETIO KEY3 (UT)	065	025 – 400	065	
45	○PRESET R/E RETIO KEY4 (UT)	073	025 – 400	073	

FIG. 15D

1620E

46	○ PRESET R/E RETIO KEY5 (UT)	078	025 – 400	078	
47	○ PRESET R/E RETIO KEY6 (UT)	085	025 – 400	085	
48	○ PRESET R/E RETIO KEY7 (UT)	093	025 – 400	093	
49	○ PRESET R/E RETIO KEY8 (UT)	121	025 – 400	121	
50	○ PRESET R/E RETIO KEY9 (UT)	129	025 – 400	129	
51	○ PRESET R/E RETIO KEY10 (UT)	155	025 – 400	155	
52	○ PRESET R/E RETIO KEY11 (UT)	200	025 – 400	200	
53	○ PRESET R/E RETIO KEY12 (UT)	400	025 – 400	400	
54	○ COPY COUNT UP/DOWN SET(UT)	0	0 – 1	0	
55	○ TRAY 1:PAPER TYPE SET (UT)	0	0 – 2	0	
56	○ TRAY 2:PAPER TYPE SET (UT)	0	0 – 4	0	
57	○ TRAY 3:PAPER TYPE SET (UT)	0	0 – 4	0	
58	○ TRAY 4:PAPER TYPE SET (UT)	0	0 – 7	0	

FIG. 15E

1620F

59	○TRAY 5:PAPER TYPE SET (UT)	0	0 – 7	0	
60	○TRAY 6:PAPER TYPE SET (UT)	0	0 – 4	0	
61	○MAX. COPY QUANTITY SET (UT)	9999	0001 – 9999	9999	
62	○TRAY 1:PAPER SIZE SET (UT)	005	000 – 255	038	
63	○TRAY 2:PAPER SIZE SET (UT)	005	000 – 255	166	
64	○TRAY 3:PAPER SIZE SET (UT)	005	000 – 255	160	
65	○TRAY 6:PAPER SIZE SET (UT)	005	000 – 255	038	
66	○SYSTEM RESET TIMER SET(UT)	060	000 – 999	060	
67	○COPY RESET TIMER SET(UT)	060	000 – 999	060	
68	○PANEL OFF TIMER SETTING(UT)	060	000 – 999	999	
69	○AUTO TRAY SWITCHING SET(UT)	0	0 – 2	0	
70	○A3/DLT DOUBLE COUNT SET:5104	0	0 – 1	0	
71	○BORDER ERASE WIDTH SET(UT)	03	01 – 20	04	

FIG. 15F

1620G

72	○ COMBINE ORIG.SHADOW ERASE	0	0 – 1	0	
73	○ CENTER ERASE WIDTH SET(UT)	03	01 – 20	04	
74	○ 1-2DUP.AUTO MARGIN ADJ.SET	0	0 – 1	1	
75	○ DISABLE COPYING:SP5118	0	0 – 1	0	
76	○ DATE/TIME SET(Y;M;D;H;M;W)		******* – *******	2001022711332	
77	○ SETWEEKLYTIMER:SUN:ON (H;M)	9999	0000 – 9999	9999	
78	○ SETWEEKLYTIMER:SUN:OFF (H;M)	9999	0000 – 9999	9999	
79	○ SETWEEKLYTIMER:MON:ON (H;M)	9999	0000 – 9999	9999	
80	○ SETWEEKLYTIMER:MON:OFF (H;M)	9999	0000 – 9999	9999	
81	○ SETWEEKLYTIMER:TUE:ON (H;M)	9999	0000 – 9999	9999	
82	○ SETWEEKLYTIMER:TUE:OFF (H;M)	9999	0000 – 9999	9999	
83	○ SETWEEKLYTIMER:WED:ON (H;M)	9999	0000 – 9999	9999	
84	○ SETWEEKLYTIMER:WED:OFF (H;M)	9999	0000 – 9999	9999	

FIG. 15G

1620H

85	○ SETWEEKLYTIMER:THU:ON (H;M)	9999	0000 – 9999	9999	
86	○ SETWEEKLYTIMER:THU:OFF (H;M)	9999	0000 – 9999	9999	
87	○ SETWEEKLYTIMER:FRI:ON (H;M)	9999	0000 – 9999	9999	
88	○ SETWEEKLYTIMER:FRI:OFF (H;M)	9999	0000 – 9999	9999	
89	○ SETWEEKLYTIMER:FRI:ON (H;M)	9999	0000 – 9999	9999	
90	○ SETWEEKLYTIMER:FRI:OFF (H;M)	9999	0000 – 9999	9999	
91	○ KEY OP. CODE SETTING(UT)		******* – *******		
92	○ AUTO OFF ON/OFF SET(SP)	0	0 – 1	0	
93	○ AUTO OFF TIMER SETTING (UT)	90	001 – 240	240	
94	○ C:USER CODE ON/OFF SET(UT)	0	0 – 1	0	
95	○ C:KEY COUNTER ON/OFF SET(UT)	0	0 – 1	0	
96	○ NOT USED	0	0 – 1	0	
97	○ P:USER CODE ON/OFF SET(UT)	0	0 – 1	0	

FIG. 15H

1620I

98	○P:KEY COUNTER ON/OFF SET(UT)	0	0 – 1	0	
99	○NOT USED	0	0 – 1	0	
100	○PM ALARM INTERVAL SET:5501	0	000 – 999	000	
101	○JAM ALARM LEVEL SET:5504-1	3	0 – 3	3	
102	○SC ALARM LEVEL SET:5505	30	000 – 255	030	
103	○NOT USED (CONSUMABLE ALARM)	0	******* – *******	0	
104	○NOT USED (CONSUMABLE ALARM)	0	******* – *******	0	
105	○NOT USED (CONSUMABLE ALARM)	0	******* – *******	0	
106	○NOT USED (CONSUMABLE ALARM)	01000	00250 – 10000	01000	
107	○NOT USED (CONSUMABLE ALARM)	01000	00250 – 10000	01000	
108	○NOT USED (CONSUMABLE ALARM)	01000	00250 – 10000	01000	
109	○NOT USED (CONSUMABLE ALARM)	01000	00250 – 10000	01000	
110	○NOT USED (CONSUMABLE ALARM)	01000	00250 – 10000	01000	

FIG. 15I

1620J

111	○NOT USED (CONSUMABLE ALARM)	01000	00250 – 10000	01000	
112	○NOT USED (CONSUMABLE ALARM)	01000	00250 – 10000	01000	
113	○NOT USED (CONSUMABLE ALARM)	01000	00250 – 10000	01000	
114	○NOT USED (CONSUMABLE ALARM)	01000	00250 – 10000	01000	
115	○NOT USED (CONSUMABLE ALARM)	01000	00250 – 10000	01000	
116	○CC201/202 ON/OFF SETTING	1	******* – *******	1	
117	○PM CLL INTERVAL:COPY:5513-1	0300	0001 – 9999	0300	
118	○PM CALL INTERVAL:ADF:5513-2	0300	0001 – 9999	0300	
119	○PM CALL SETTING:COPY:5514-1	1	******* – *******	1	
120	○PM CALL SETTING:ADF:5514-2	0	******* – *******	0	
121	○S/N FOR DISPLAY SETTING:5811		******* – *******	H3600300601	
122	○ID2 CODE:5811-3		******* – *******	H3600300601	

FIG. 15J

1620K

123	○ SERVICE PHONE NUMBER:5812-1		****** – ******	00-0000-0000	
124	○ NOT USED (CONSUMABLE ALARM)	0	****** – ******	0	
125	○ NOT USED (CONSUMABLE ALARM)	0	****** – ******	0	
126	○ NOT USED (CONSUMABLE ALARM)	0	****** – ******	0	
127	○ NOT USED (CONSUMABLE ALARM)	0	****** – ******	0	
128	○ NOT USED (CONSUMABLE ALARM)	0	****** – ******	0	
129	○ NOT USED (CONSUMABLE ALARM)	0	****** – ******	0	
130	○ SADF AUTO RESET TIMER(UT)	10	03 – 99	10	
131	○ STAPLE POSITION ADJ.:SP6105	+00	-35 – +35	0	
132	○ TOTAL COUNTER		0000000 – 9999999	0231033	
133	○ NOT USED (GPC COUNTER)		0000000 – 9999999	0035303	

FIG. 15K

MACHINE CONDITION DATA

L-ADP/COPIER INFORMATION

DATE RECEIVED	03-02-2001 09:28	
CUSTOMER	RICOH	
INSTALLED SECTION	FLOOR	1720
CONTACT	TEL	
MODEL/SERIALNUMBER	AFICIO850/H3600300601	
PARTICULAR NOTES		
TAG ID	NSC 850	
SO/SD	RC(TEST) / RC(TEST) SERVICE	

STATE INFO. 1730

NO.	ITEM	RESULT
1	PAPER END:P.LCT(TRAY3)	1
2	MACHINE CONDITION	2
3	SC DETAILS	sp_wcom.c LINE:1288 VAL :-13
4	PAPER SIZE: TRAY 1	26
5	PAPER SIZE: TRAY 2	A4
6	PAPER SIZE: TRAY 3	A0
7	PAPER SIZE: LCT(TRAY 1)	26
8	PAPER SIZE: LCT(TRAY 2)	26
9	PAPER SIZE: LCT(TRAY 3)	26
10	CONFIGUARATION:ADF	2
11	CONFIGURATION:FINISHER	1
12	CONFIGURATION:PRINTER KIT	1
13	CONFIGURATION:SCANNER KIT	1
14	CONFIGURATION:LCT	1

FIG. 16A

JAM HISTORY

NO.	ITEM	RESULT
1	TOTAL PAPER JAMS	0057
2	TOTAL P.JAMS BY TRAY 1	0002
3	TOTAL P.JAMS BY TRAY 2	0004
4	TOTAL P.JAMS BY LCT(TRAY 3)	0001
5	TOTAL P.JAMS BY LCT EXIT	0002
6	TOTAL P.JAMS BY REGISTRATION	0006
7	TOTAL P.JAMS BY EXIT	0005
8	TOTAL ORIGINAL JAMS	0079
9	TOTAL P.JAMS BY DUP.ENTRANCE	0005
10	TOTAL P.JAMS BY DUP.TRANS.3	0001
11	TOTAL P.JAMS BY INVERTER	0006
12	TOTAL P.JAMS BY FIN.ENTRANCE	0005
13	TOTAL P.JAMS BY FIN.EXIT	0001
14	TOTAL P.JAMS BY FIN.SHIFT T	0006
15	TOTAL P.JAMS BY FIN.STAPLE 1	0005
16	TOTAL P.JAMS BY FIN.STAPLE 2	0007
17	TOTAL P.JAMS BY FIN.STAPLE 3	0001
18	TOTAL ORIG'L JAMS:ADF FEED	0070
19	TOTAL ORIG'L JAMS:ADF EXIT	0009
20	TOTAL P.JAMS BY LT(S)	0048
21	TOTAL P.JAMS BY OTHER SIZE	0002
22	TOTAL P.JAMS BY DLT	0002
23	TOTAL P.JAMS BY LG	0001
24	TOTAL P.JAMS BY LT(L)	0004
25	P.JAMS HISTORY:LATEST 0	232632616
26	P.JAMS HISTORY:LATEST 1	232630278
27	P.JAMS HISTORY:LATEST 2	282630277
28	P.JAMS HISTORY:LATEST 3	692629913
29	P.JAMS HISTORY:LATEST 4	162629488

1740A

FIG. 16B

30	P.JAMS HISTORY:LATEST 5	282629120
31	P.JAMS HISTORY:LATEST 6	692626033
32	P.JAMS HISTORY:LATEST 7	352625442
33	P.JAMS HISTORY:LATEST 8	290018214
34	P.JAMS HISTORY:LATEST 9	292618213
35	ORIG'I JAMS HISTORY: LATEST 0	032636226
36	ORIG'I JAMS HISTORY: LATEST 1	032632102
37	ORIG'I JAMS HISTORY: LATEST 2	032631464
38	ORIG'I JAMS HISTORY: LATEST 3	032626880
39	ORIG'I JAMS HISTORY: LATEST 4	040525489
40	ORIG'I JAMS HISTORY: LATEST 5	030018781
41	ORIG'I JAMS HISTORY: LATEST 6	032618694
42	ORIG'I JAMS HISTORY: LATEST 7	032618667
43	ORIG'I JAMS HISTORY: LATEST 8	032616667
44	ORIG'I JAMS HISTORY: LATEST 9	032605030

1740B

COUNTERS

NO.	ITEM	RESULT
1	NO.OF SCANS	0038125
2	TOTAL COPY COUNTER	00236302
3	TOTAL PRINT COUNTER	00105878
4	NOT USED (GPC)	00035303
5	NOT USED (GPC)	00035358
6	TOTAL COPIES BY SIZE:LT(S)	0128095
7	TOTAL COPIES BY SIZE:OTHERS	0000002
8	TOTAL COPIES BY TRAY 1	0104700
9	TOTAL COPIES BY TRAY 2	0001302
10	TOTAL COPIES BY TRAY 3	0002667
11	TOTAL COPIES BY TRAY 4	0003009
12	TOTAL COPIES BY TRAY 5	0027878
13	TOTAL COPIES BY TRAY 6	0060825

17450A

FIG. 16C

14	TOTAL COPIES BY SIZE:A3	0000013
15	TOTAL COPIES BY SIZE:DLT	0001484
16	TOTAL COPIES BY SIZE:LG	0000700
17	TOTAL COPIES BY SIZE:LT(L)	0000043
18	TOTAL ADF COUNTER	0033657
19	STAPLE COUNTER	010689
20	PM COUNTER:COPY (SP7-617-01)	0237921
21	PM COUNTER:ADF (SP7-617-02)	0030127
22	PM ALARM COUNTER (SP7-803)	0237
23	:50%~99%	0002950
24	:FULL SIZE	0126539
25	:101%~200%	0000409
26	:201%~400%	0000008
27	:DIRECT MAG.	0000004
28	:SIZE MAG.	0000427
29	:FIXED MAG.	0003367
30	T. COPIES BY TEXT MODE	0130010
31	T. COPIES BY TEXT/PHOTO MODE	0000002
32	T. COPIES BY PHOTO MODE	0000080
33	T. COPIES BY GENERATION MODE	0000044
34	T. COPIES BY PALE MODE	0000201
35	T. COPIES BY PUNCH	0002947
36	T. COPIES BY SORT	0101360
37	T. COPIES BY STAPLE	0073731
38	T. COPIES BY SERIES	0000200
39	T/C BY MULTIPLE COPY :1 TO 1	0006293
40	:1 TO 2~5	0000923
41	:1 TO 6~10	0000757
42	:1 TO 11~20	0000130
43	:1 TO 21~50	0000080
44	:1 TO 51~100	0000026

1750B

FIG. 16D

45	:1 TO 101~300	0000011
46	:1 TO 300~	0000006
47	T.COPIES BY DUPLEX COPY	0037858
48	T.COPIES BY ADF	0000043
49	T.COPIES BY 2-SIDE ORIGINAL	0020899
50	T.COPIES BY INTERRUPT	0000360
51	T.COPIES BY COMBINE-1SIDE	0000069
52	T.COPIES BY COMBINE-2SIDE	0000070
53	T.COPIES BY BOOKLET MODE	0000004
54	T.COPIES BY MAGAZINE MODE	0000010
55	T.COPIES BY PAGE NUMBERING	0000030

1750C

OPERATION TIME

NO.	ITEM	RESULT
1	OPERATION TIME(MIN.)	0078
2	PM PARTS LEVEL:DEVELOPER	6
3	(PM):OIL SUPPLY/CLEANING WEB	7
4	(PM):WEB CLEANING ROLLER	3
5	(PM):PRESSURE ROLLER	3
6	(PM):PR CLEANING ROLLER	3
7	(PM):HR STRIPPER	3
8	(PM):DEV. FILTER	7
9	(PM):TONER FILTER(CENTER)	5
10	(PM):TONER FILTER (FRONT)	5
11	(PM):1ST FEED ROLLER	3
12	(PM):1ST PICK-UP ROLLER	3
13	(PM): 1ST SEP. ROLLER	3
14	(PM):TRANSFER BELT	5
15	(PM):TRSF BELT C. BLADE	5
16	(PM):DUST FILTER	7
17	(PM):CLEANING BLADE	7
18	(PM): CLEANING BRUSH	7

1760A

FIG. 16E

19	(PM):GRID PLATE	6
20	(PM):CHARGE CORONA WIRE	6
21	(PM):WIRE CLEANER	6
22	(PM):CUSHION C. CORONA WIRE	6
23	(PM):PICK-OFF PAWLS	6
24	(PM):ADF TRANSPORT BELT	3
25	(PM):ADFSEPARATION ROLLER	3
26	(PM):ADF FEED BELT	3
27	(PM):ADF PICK-UP ROLLER	3
28	(PM):LCT 3RD FEED ROLLER	2
29	(PM):LCT 3RD PICK-UP ROLLER	2
30	(PM):.LCT 3RD SEP. ROLLER	2
31	(PM):RESERVED AREA 1	Z
32	(PM):RESERVED AREA 2	Z
33	(PM):RESERVED AREA 3	Z

SC HISTORY

NO.	ITEM	RESULT
1	TOTAL SC COUNTER	0021
2	NO. OF SC310	01
3	NO. OF SC312	01
4	NO. OF SC321	01
5	NO. OF SC352	01
6	NO. OF SC630	07
7	NO. OF SC640	03
8	NO. OF SC643	02
9	NO. OF SC738	02
10	NO. OF SC990	03

1770

FIG. 16F

SENSOR OUTPUT, ROM VER. ETC

NO.	ITEM	RESULT
1	NO. OF REGISTERED PROGRAM	00
2	FUSING TEMPERATURE(C)	174
3	TD SENSOR OUTPUT:VT	2.09
4	ID SENSOR OUTPUT:VSG	4.05
5	ID SENSOR OUTPUT:VSP	0.41
6	APS SENSOR OUTPUT DISPLAY	00000000
7	HDD1 BAD SECTER:TOTAL	00
8	HDD1 BAD SECTER:COPY	00
9	HDD1 BAD SECTER:PRINTER	00
10	HDD1 BAD SECTER:COPY SERVER	00
11	HDD2 BAD SECTER:TOTAL	00
12	HDD2 BAD SECTER:COPY	00
13	HDD2 BAD SECTER:PRINTER	00
14	HDD2 BAD SECTER:COPY SERVER	00
15	ROM VERSION:SICU	A2945604P
16	ROM VERSION:BCU	A2945264P
17	ROM VERSION:CONCORDE(PI)	A2325372C
18	ROM VERSION:HDC	A2945144
19	ROM VERSION:SCANNER	A2945057C
20	ROM VERSION:ADF	B3015562D
21	ROM VERSION:FINISHER	B3025103G
22	NOT USED(ROM VERSION:RMC)	B3275141
23	ROM VERSION:PRINTER	

1780A

COPY COUNTER BY USER CODE

NO.	ITEM	RESULT

1790

NOT USED

NO.	ITEM	RESULT

1792

ALARM INFO.

NO.	ITEM	RESULT

1794

SC INFO.

NO.	ITEM	RESULT

1796

READ/WRITE CHANGE INFO.

NO.	ITEM	RESULT

1798

FIG. 16G

1800

CUSTOMER INFORMATION

CUSTOMER	
DIVISION/DEPARTMENT/SECTION	
COPIER ADMINISTRATION	
ADDRESS	
CITY/STATE/ZIP/COUNTRY	

1810

L-ADP INFORMATION

S/N PREFIX AND SERIAL NUMBER		A755 [ ]
L-ADP PHONE NUMBER		
DAILING INFO	DIAL TYPE	○ TONE ○ PULSE(20PPS) ○ PULSE(10PPS)
	REDIALING	REGISTER: [9,18007426449] REDIAL INTERVAL TIME: [60] REDIAL FREQUENCY: [2]

1820

FIG. 17A

COPIER 0 INFORMATION

S/N PREFIX AND SERIAL NUMBER	DEVICE CODE: 0
INSTALLED SECTION	FLOOR:
TAG ID	
CONTACT	TEL:
SO/SD	SO: SD:
M/R DATE	
PARTICULAR NOTES	
M/R INFORMATION	
INSTALLATION DATE	

1830

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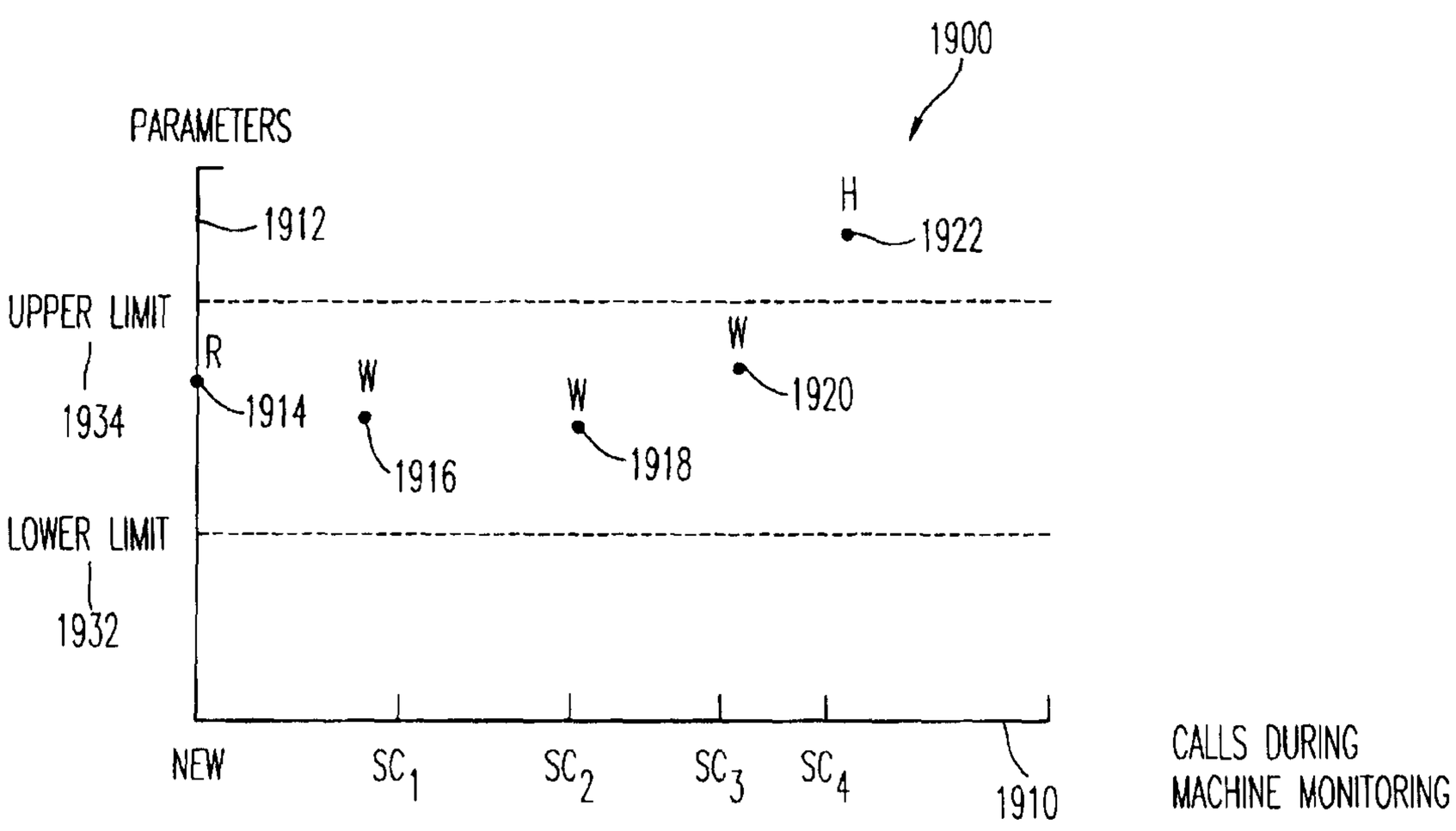
COPIER N INFORMATION

S/N PREFIX AND SERIAL NUMBER	DEVICE CODE: 1
INSTALLED SECTION	FLOOR:
TAG ID	
CONTACT	TEL:
SO/SD	SO: SD:
M/R DATE	

FIG. 17B



R = REFERENCE VALUE (AFTER TEST COPYING FOR INSTALLING COPIER)
W = DISPLAY ON SCREEN WITHOUT HIGHLIGHT
H = DISPLAY ON SCREEN WITH HIGHLIGHT IN FIRST MODE

FIG. 18

METHOD AND SYSTEM OF REMOTE MONITORING OF IMAGE FORMING APPARATUS

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

CROSS-REFERENCE TO RELATED APPLICATION

[The present application is related to U.S. Provisional Patent Application No. 60/330,813 filed Oct. 31, 2001, entitled "Method and System of Remote Monitoring of Image Forming Apparatus."]

The present reissue application is a continuation application of U.S. application Ser. No. 11/171,652 filed on Jul. 1, 2005, which is a reissue application of U.S. application Ser. No. 09/986,349 (now U.S. Pat. No. 6,587,647), filed on Nov. 8, 2001, which claims priority to U.S. Application No. 60/330, 813, filed Oct. 31, 2001.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention generally relates to a method and apparatus for remotely monitoring an image forming apparatus or other apparatus. More particularly, the invention relates to evaluating machine conditions and transmitting information based on the conditions.

2. Discussion of the Background

Image forming machines such as copiers, facsimile machines, and printers experience operational problems. When operational problems arise, a dealer will typically provide repair products and services to the customer. Maintenance and repairs are managed and provided by the dealer who purchases the machine from manufacturers and who then sells the machine to the customer. Unfortunately, in such a marketplace, it is difficult for manufacturers to obtain information about machine conditions during the machine's operational lifetime. The inventors of the present invention recognized that it would be advantageous to have an image forming machine monitoring system and method which remotely monitor the image forming machines.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the invention to provide a method and system for remote monitoring and/or controlling of machines, such as but not limited to, image forming machines.

This and other objects are accomplished by a method and system in which machine data is transmitted from the image machine to a remote monitoring system for evaluation. The current machine data may be of any type related to the image machine, including, for example, paper jams, paper usage, energy usage, functionality of device components and usage frequency, although other types of data may be utilized. The evaluation of the current machine data includes comparing the current machine condition data to determine possible sources that are causing the operating problem. The remote monitoring system may respond to the operating problem by adjusting the image machine, sending a notification to a dealer's help desk and to a dispatcher. The image machine may be of any type of electronically controllable device that produces

images, including, for example, printers, copiers, facsimile machines, and digital cameras.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

FIG. **1** illustrates a block diagram of three networked image forming machines connected to a network of computers and databases through a telephone line and a network;

FIG. **2** illustrates a block diagram of an exemplary computer which monitors machine conditions and which communicates with the image forming machines and computers;

FIG. **3** illustrates a block diagram of a network with a remote monitoring server, dispatch system, helpdesk and customer system connected to a network;

FIGS. **4**A.1 and **4**A.2 illustrates an alternate embodiment of a data flow diagram of communication, during a service call which requires dispatching of a technician, among the customer system, remote monitoring system, helpdesk and dispatch system of FIG. **3**;

FIGS. **4**B.1 and **4**B.2 illustrates an alternate embodiment of a data flow diagram of communication, during an automatic call, among the customer system, remote monitoring system, helpdesk and dispatch system of FIG. **3**;

FIGS. **4**C.1 and **4**C.2 illustrates an alternate embodiment of a data flow diagram of communication, during a customer call, among the customer system, remote monitoring system, helpdesk and dispatch system of FIG. **3**;

FIGS. **4**D .1 and **4**D.2 illustrates an alternate embodiment of a data flow diagram of communication, during a manual call, among the customer system, remote monitoring system, helpdesk and dispatch system of FIG. **3**;

FIG. **5**A illustrates a block diagram of e-mail related modules, objects and information which are located in a server;

FIG. **5**B illustrates a block diagram of the device driver of FIG. **5**A;

FIG. **6** illustrates a data flow diagram of FIG. **5**A;

FIG. **7** illustrates a flow diagram of the help desk upon receiving an e-mail call request;

FIG. **8**A illustrates an exemplary e-mail message for a critical service call;

FIG. **8**B illustrates an alternate exemplary e-mail message;

FIG. **9** illustrates a block diagram of related modules, objects and information which are located in a server;

FIG. **10** illustrates a flow chart for obtaining reference parameters related to machine conditions;

FIG. **11**A and FIG. **11**B illustrate a flowchart of the process performed, in the server, when monitoring the image forming machine for read/write requests;

FIG. **12**A, FIG. **12**B and FIG. **12**C illustrate a flowchart of the process performed when a read/write function is activated;

FIG. **13** is an exemplary call list;

FIG. **14**A is an exemplary call detail;

FIGS. **14**B and **14**C are an exemplary service call and jam data;

FIGS. **15**A to **15**K are an exemplary read/write screen including read/write machine data;

FIGS. **16**A to **16**G are exemplary machine condition data during operation; and

FIGS. **17**A and **17**B are exemplary machine identification information for a customer; and

FIG. **18** illustrates a chart indicating calls during monitoring and associated displayed and undisplayed parameters.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, wherein like numerals designate identical or corresponding parts throughout the several views, and more particularly to FIG. **1** thereof, there is illustrated a figure showing various machines and computers forming a system for monitoring, diagnosing and controlling the operation of the machines. The present invention can be used with JP2001-136192, which corresponds to Ser. No. 09/408,443 entitled METHOD AND SYSTEM FOR REMOTE DIAGNOSTIC, CONTROL, AND INFORMATION COLLECTION BASED UPON THE CONNECTION OR CONNECTIONLESS COMMUNICATION METHOD SENDING MESSAGES TO THE RESOURCE MANAGER, which is incorporated herein by reference. In FIG. **1**, there is a first network **16**, such as the Internet connected to computer workstations (WS) **18**, **20** and **22**. The workstations may be of any type of computer including IBM Personal Computer compatible devices, Unix based computers or Apple Macintosh computers. Connected to the network **16** is a Local Area Network ("LAN"); however, it should be appreciated that any number of additional networks capable of connecting to networks, various machines or computers may be included in the system. Also connected to the network **16** is a server **28** and workstations (WS) **18**, **20** and **22**.

Server **28** is connected to the network **16** via the LAN **26**, an interface **34** and workstation **22**. Alternatively, server **28** may be connected directly to the network **16**. Server **28** is also connected to image machines **30**, **31** and **32** via a PSTN **36**, a telephone line **38** and a line-adapter/multiplexer (L-ADP) **39**. Images machines **30**, **31** and **32** may be digital copiers/printers, facsimile machines, printers postage machines, multifunction image machines, or any other type of machine or device that displays or generates images or data, whether it be done on a printer medium or an electronic display. The image machines may be used as the machines or monitored devices. Although three image machines are shown as supported by the L-ADP, it should be appreciated that any number of image machines or monitored devices may be supported by each L-ADP. For example, up to 5 copiers or more may be supported by the L-ADP.

Additionally, a facsimile server (not illustrated) may be connected to server **28** and have a telephone, Integrated Services Digital Network (ISDN), wireless or cable connection. The image machines **30**, **31** and **32** may also include connections **40** and **42**, respectively, which may be conventional telephone, ISDN and/or cable. The image machines **30**, **31** and **32** communicate with remote monitoring, diagnosis and server **28** via the direct telephone line, ISDN, wireless or cable connection. Server **28** may also be connected to a workstation **50** with a browser **52**.

In FIG. **1**, the network **16** includes a plurality of interconnected computers and routers (not shown). The manner of communicating over a network is known through Request for Comments ("RFC") documents obtained by file transfer protocol ("FTP") at NIC.DDN.MIL or at FTP.NISC.SRI.COM. Transmission Control Protocol/Internet Protocol ("TCP/IP") related communication is described for example in the book "TCP/IP Illustrated," Vol. 1, The Protocols, by Stevens, from Addison-Wesley Publishing Company, 1994, which is incorporated herein by reference.

Workstations **18**, **20**, **22** are connected to network **16** and are located remotely from each other and other machines;

however, it should be appreciated that any of the workstations may be locally located to each other or any of the machines. Workstations **18**, **20**, **22** include browsers **35**, **37**, **39** which allow obtaining and transmitting information over network **16**. Workstation **20** includes a disk **44** which may be shared using proper encryption and protocols over the network with other workstations connected to the network or in communication with workstation **20**. It should be appreciated that although only one workstation **20** is illustrated as including a disk **44**, any workstations may include a disk for storing information. The disks used to store databases are a non-volatile memory such as a hard disk or optical disk. Alternatively, the databases may be stored in any storage device, including but not limited to, solid state and/or semiconductor memory devices. Disk **44** includes dispatch data; however, any number of databases or types of information may be stored thereon. Dispatch data is information related to service technicians, such as but not limited to, whether a dispatcher or service technician has been called for a particular call or machine notification, service technician contact information, including but not limited to service technician e-mail addresses, numeric and alphanumeric pagers numbers and telephone numbers. Workstations **18**, **20** and **22** are exemplary of computers which are uses by dealers and/or service repair entities.

Workstation **50** is connected to the server **28** and allows access to the information transmitted to and/or stored at server **28**, and may be provided with at least as much information and capability as workstation **18**, **20** and **22**.

In addition to the workstations **18**, **20**, **22** being connected to network **16**, the workstations may also include connections **46**, **48** to a telephone line, ISDN, DSL, ADSL, cable or any other appropriate connection which provides a secure connection to the machine which is monitored, diagnosed and/or controlled. Connections **46**, **48** may provide automatic alternative communication among the network, telephone line, ISDN or cable, if any one connection is not operating properly.

Workstation **22** is coupled between the server **28** and the network **16**. Workstation **18** and **20** are coupled to the network. Workstation **18** is exemplary of a workstation a helpdesk utilizes. Workstation **20** is exemplary of a workstation which a dispatcher would use. Workstation **22** is exemplary of a workstation a dealer or service organization would use. The workstation **22** may transmit information related to image machines **30**, **32** to/from the network **16** and to/from server **28**. Additionally, workstation **24** includes a browser **39** so that data may be viewed and so that a read and write capability is available. The read and write capability allows a user to view information presented on the browser **39** and also to modify it as necessary. Thus, information may not only be received, but also data may be entered and transmitted to the image machines **30**, **31** and **32**, server **28** or any other workstations, machines and devices in the system.

FIG. **2** illustrates the server **28** of the present invention including a CPU **110** which may be implemented as any type of processor including commercially available microprocessors from companies such as Intel, Motorola, Hitachi and NEC, for example. The various elements of the server **28** are connected by a system bus **108**.

A working memory such as a RAM **112**, a wireless interface **114** which communicates with a wireless device **116** is included in server **28**. The communication between interface **114** and device **116** may use any wireless medium such as radio waves or light waves, for example. The radio waves may be implemented using a spread spectrum technique such as

Code Division Multiple Access ("CDMA") communication or using frequency hopping techniques, or any other transmission method.

A non-volatile memory, such as a ROM **118** and/or a flash memory **120**, for example, an EPROM or EEPROM may be used to store instruction that the CPU **110** executes, for example. An input controller **122** has connected thereto a keyboard **124** and a mouse **126**. Additionally, a serial interface **128** coupled to a serial device **130**, a parallel interface **132** coupled to a parallel device **134**, and a universal serial bus interface **136** coupled to a universal serial bus device **138** is included in server **28**.

With a continued reference to FIG. **2**, a disk controller is coupled to a floppy drive **142** and a hard disk **144**. A communication controller **146** is coupled to with network **16** and telephone **38**. An I/O (input/output) controller **148** is coupled to hard disk **150** and image machine **152**. It should be appreciated that any number of image machines may be coupled to controller **148**. A display controller **154** connected to CRT (Cathode Ray Tube) **414** is included in server **28**, although an LDC display, plasma display, or any other type of display may be utilized. Server **28** is exemplary of a computer which may be used as a remote monitoring system for a manufacturer of machines and any other type of computer, peripherals, etc. maybe used.

FIG. **3** illustrates an alternate implementation of monitoring, diagnosing and controlling the operation of machines. This implementation may use the same or different type of components, computers, and networks as previously described. FIG. **3** includes a remote monitoring system (RMS) server **210**, a customer system **220**, a dispatch system **230** and a help desk **240** coupled to network **16**. The arrangement of FIG. **3** allows one system to monitor, diagnose and control various machines at remote locations. The RMS server **210** monitors, diagnoses and controls the images machines in customer system **220** and provides access to information related to the image machines to workstation **18**, **20**, **21** and **22**. Although one customer system **220** is shown, it should be appreciated that any number of remotely located customer systems may be in communication with remote monitoring system **210**. Also, the dispatch system **230** and the help desk **240** are in communication with remote monitoring system **210** and are capable of transmitting and receiving information. The dispatch system **230** and the help desk **240** may be located remotely or locally to each other. The help desk and also the dispatcher may be a dealer of machines.

Remote monitoring system **210** includes server **28** which is connected to a network **16** via the LAN **26** and the interface **24**. Remote monitoring system **210** includes email **209** which are sent to the help desk **240** and/or dispatch system **230** and include image machine information such as a tag ID number. Customer system **220** is coupled to network **16**. Customer system **220** includes image forming machines **30**, **32**; however it should be appreciated that additional machines may be provided. The dispatch system **230** and the help desk **240** include workstations **18**, **20**, respectively. The dispatch system **230** and the help desk **240** may be located remotely as separate systems or may be combined as one system.

Workstations **18** and **20** include browsers **35** and **37**, respectively. Each browser provides display of data including, machine condition data which is real-time data related to the monitored machines or image forming machines **32**, **30**, to each user at the workstation. In the one embodiment, data may be viewed over the network **16** and does not have to be downloaded from the remote monitoring system **210**. This viewing feature is beneficial because data may be accessed easily and quickly. Help desk **240** may be associated with a dealer which sold the machine to the customer. The help desk assists in ascertaining and solving the problem related to machine notification. The dispatcher provides information related to dispatching a service technician.

A dealer management system **242** may be connected, for example, to the workstation **20** at the helpdesk **240**. The dealer management system **242** may include product and service information, such as, but not limited to, supply order status, product usage status and service dispatch status. The information may be acquired via the network **16** using a managing application for machine dealers. One exemplary asset managing application is enterprise resource planning system which is described below with reference to FIG. **4**B at step **422**. A dispatch database **44** is coupled to dealer management system. Dispatch system **230** may be connected to dealer management system **242**.

A remote workstation **21** coupled to a browser **19** may be connected to the network **16** to allow additional helpdesks, dispatchers, customers or other appropriate entities to view information and to assist in controlling the system.

During monitoring, diagnosing and controlling operation of the machines, various information is transmitted and received by the remote monitoring system **210**, the customer system **220**, the dispatch system **230** and the help desk **240**. FIGS. **4**A, **4**B, **4**C and **4**D illustrate the process of information transmitting and receiving during a machine notification or call request related to the image machine. A machine notification or call request is a transmitted signal from the image forming machine if a potential problem is realized.

FIG. **4**A illustrates a response process to a call or machine notification which is indicative of potential problems with the machine. The exemplary call is a service call with a request for a service technician dispatch and checking the machine condition. It should be appreciated that other types of call may be transmitted, for example, but not limited to, a manual call and a customer call. The service call includes, for example, fixing errors which are related to the hardware of the image machine, for example, "fusing thermistor open," "fusing temperature warming-up error," and "fusing overheat error" are indicative that the problem related to fusing and a replacement part may be required. A service repair person may be dispatched to fix the machine at the customer site. Alternatively, the machine conditions may be checked remotely to determine the problem. For example, a manufacturer may remotely modify software to improve fusing.

With a continued reference to FIGS. **4**A.1 and **4**A.2, step **310** a service call ("SC") occurs and is transmitted from the image machine to the RMS center where at step **312** the service call is received. The service call includes an identifier, such as, but not limited to a tag ID number which unique for every image machine or monitored machine which communicates with the center. At step **314**, an e-mail message is sent. The e-mail message may be determined based on a unique identifier or other appropriate image machine identifying information. At step **316**, the e-mail message is received by the help desk. The help desk includes a RMS client and a dispatch system which may be located either remotely or locally to each other. At the dispatch system, step **318** receives a request to check if a technician was already dispatched. At determination step **320**, the dispatch system determines whether the technician was already dispatched. The determination that the technician was already dispatched is based on using the tag ID number provided in the e-mail message to search on the dispatch system at block **328**. If the technician was already dispatched, then the help desk transmits a request at step **322** to close the service call.

If the technician was not already dispatched, then at step **324** the help desk opens the call list using the information of the e-mail message to search at the call list at block **326**. The call list is described below with reference to FIG. **13**. At step **330**, the help desk checks the image machine condition. At determination step **332**, the help desk determines if the copier is already reset, and therefore indicative that no problem is pending or that servicing has been initiated. If the image machine is already reset, then at step **334** the helpdesk closes the service call. If the service call is not reset, then at step **336** the service call is reset.

At step **338**, the help desk checks the image machine or copier condition. The image machine condition is checked by activating a read and write capability via a Read/Write menu which is described below with reference to FIGS. **15**A-I. The instruction to upload the current machine parameters is transmitted from the workstation to the image machine through the RMS server and the telephone line. The current machine parameters are uploaded to the RMS server. The operator at the helpdesk can monitor the uploaded parameters by using the browser which is installed in the workstation, as shown in FIG. **1**. The number of current machine parameters which represent the copier condition may be numerous, and therefore difficult for the operator to identify the copier problem. In order to resolve the difficulty in analyzing the information, the current machine condition parameters may be compared to the reference parameters at the RSM server.

During read and write activation, a parameter acquiring device in the RMS server requests to upload the parameters to the LADP, and the LADP requests to upload the current machine parameters which are related to the copier or image machine designated on the call list menu described below with reference to FIG. **13**. The uploaded current machine parameters are stored in the memory in the RMS server. A comparing device compares the current machine parameters and the reference parameters. The read/write menu may allow an operator to select current machine parameters for uploading. For example, changed parameters may be selected for uploading because only changed parameters will be updated. Parameters that are not changed do not have to be uploaded.

At determination step **340**, the help desk checks if the machine was reset. If the machine was reset, then at step **336** the help desk closes the service call. If the machine was not reset, then at step **344** the dispatch system dispatches a technician, and at step **336** closes the service call.

If the service call or any other call, such as a customer call, or manual call occurs, event notification is transmitted from the copier to the RMS server through the public phone line. By using the public phone line, the event notification is transmitted to the RMS server securely, although other transmission means, such as Internet may be used. If the Internet is used, encryption may be used, if desired. If the RMS server receives the call notification, it sends e-mail to an appropriate entity(s) that can resolve the problem related to the copier and/or to dispatch the service technician. Consequently, timely information reaches the appropriate entities because the notification is made via e-mail. Also, the current machine information and the reference parameters are updated and provided by the RMS server. The helpdesk, dispatcher or other entity can view detailed information regarding the copier condition from a workstation through the Internet or other appropriate network.

FIGS. **4**B.1 and **4**B.2 illustrate a response process to a service call with a request for a service technician dispatch and the checking of the machine condition. The service call includes but is not limited to issues related to "SC310 & 312: photoconductive drum potential sensor error", "SC321: laser writing error", "SC352: image density sensor error", "SC630: Communication error between LADP and RMS server", "SC640&643: communication error caused by electric board", "SC738: finisher shift-tray lift motor error" and "SC990: software performance error."

At step **410** a service call occurs. The service call is automatically activated by the image machine because there is a problem with the machine which is not easily fixed by the customer and which is critical because it may involve hardware repairs. The service call is transmitted from the copier to the RMS server through the public phone line. When the service call is transmitted, the machine condition data **409** and the service call and jam data **411** are also transmitted from the copier to the RMS server via the phone line. At step **412**, the service call is received by the RMS server. The RMS server checks a table in which the e-mail address of the sales dealer (SO) is determined based on the copier identification, such as the tag ID number. The tag ID number is a number which uniquely identifies a copy machine and particular information associated with the copier, such as that described with reference to FIG. **17**. At step **414**, the RMS server sends two e-mails. However, it should be appreciated that any number of e-mail may be sent to notify appropriate entities such as dealers (help desk), service repair technicians or customers. The e-mails are sent to the helpdesk and the dispatcher. The first e-mail is send to the helpdesk. However, the additional e-mail is sent to the dispatcher based on the type of service call which may require hardware adjustments or replacements, and therefore require a technician. FIGS. **5**, **6**, **7** and **8** describe the devices and process of e-mails sent to and from the RMS server.

Referring again to FIGS. **4**B.1 and **4**B.2, step **416** receives e-mail at the helpdesk. The e-mail may include the tag ID number and the type of machine notification which are capable of obtaining other data related to the machine problem Step **420** checks if a technician was already dispatched based on the dispatch database **420**a which located at the dispatch system. Block **422** indicates that dispatching of a technician is determined by using the tag ID transmitted in the e-mail message to search on an enterprise resource planning (ERP) system or other appropriate management system. An ERP assists a manufacturer or other business to manage the important parts of its business, including product planning, parts purchasing, maintaining inventories, interacting with suppliers, providing customer service, and tracking orders. ERP can also include application modules for the finance and human resources aspects of a business. An ERP system uses or is integrated with a relational database system. The OMD is an application which manages, inventor, service and products, for example, but not limited to, the copier installation, billing, supply order information, product usage information and service dispatch information. Step **424** determines if the technician has been dispatched. If the service technician has already been dispatched, step **426** closes the service call using the information of the e-mail message to search the call list. For example, the tag ID number may assist in uniquely identifying the information. If the service technician has not been dispatched, step **430** dispatches a technician. Block **432** indicates that dispatching of a technician is based on using the tag ID transmitted in the e-mail message to search on OMD. Step **434** closes the service call.

FIGS. **4**C.1 and **4**C.2 illustrate a response process to a customer call (CC) with a request for a service technician dispatch. The customer call transmits a machine notification to the customer. At step **510** a customer call occurs. The customer call includes but is not limited to "door open for a predetermined period of time" and "jam occurrence fre-

quently at the same position of the paper feed path." The customer call is activated by a potential machine problem which occurs based on certain conditions, including, but not limited to, a duration of time and quantity. At step **512**, the customer call is received by the RMS server. The customer call is transmitted from the copier to the RMS server through the public phone line. When the customer call is transmitted, machine condition data **511** and SC and Jam data report **513** are also transmitted from the copier to the RMS server via the telephone line. If the RMS server receives the customer call, the RMS server checks a table to determine e-mail addresses based on the tag ID number. Step **514** sends e-mail to the helpdesk to notify the customer call is activated.

At step **516**, the message is received by the helpdesk. Step **518** checks if service technician was already dispatched. Step **520** determines if a technician is already dispatched. If the service technician has already been dispatched, step **522** step closes the customer call and no further action will be made. If the service technician has not been already dispatched, step **527** opens a browser. Step **528** opens the call list, described below with reference to FIG. **13**, to see the copier information related to the customer call occurs. The call list may be displayed on the browser. Alternatively, a separate application may display the call list. Step **530** checks the copier condition. The checking of the copier condition is explained above with reference to FIG. **4**A, step **338**, and is applicable for step **530**.

Step **532** determines if the image machine was already set. If the machine has been already reset, step **534** closes the customer call. If the machine has not been reset, then step **536** calls the customer to inquire about the problem. Step **538** requests to fix the problem with the customer's advice. The customer may assist with fixing by answering questions, adjusting the copier hardware and software, or providing supplies such as toner or paper to the machine. The helpdesk also may change the parameters based on the response from the customer. Step **540** determines whether the problem is fixed. The helpdesk may ask the customer if the problem has been fixed: If the problem is fixed, then step **542** closes the customer call. If the problem is not fixed, then step **544** dispatches a technician. Step **546** closes the customer call.

FIGS. **4**D.1 and **4**D.2 illustrate a response process to a manual call with a request for a service technician dispatch and checking the machine condition. At step **610**, a manual call occurs. The manual call is activated when a customer enters the sequential keystrokes on an operation panel of the copier, and the manual call may be transmitted to the RSM server through the telephone line. When the manual call is transmitted, machine condition data **611** and manual call and jam data **613** are also transmitted from the copier to the RMS server via LADP. A controller of the RSM server checks the data table in which the tag ID and the service organization (SO)/service dealer (SD) are stored in order to find an appropriate dealer and/or help desk. The service organization may be associated with multiple service dealers. If the RSM server can find the appropriate helpdesk, the RSM server automatically sends e-mail to the help desk. The sample of the e-mail that is sent to the helpdesk is shown in FIG. **8**B. In the RSM server, the e-mail address of each helpdesk is stored, and if the RSM server finds the appropriate helpdesk, automatically the helpdesk e-mail is sent. The e-mail function is described with reference to FIGS. **5**, **6** and **7**.

At step **616**, the e-mail is received at the help desk. Step **618** opens the call list to see the copier information related to the manual call, using the subject and contents of the e-mail message to search the call list at block **620**. Step **622** checks the copier condition. The checking of the copier condition is described with reference to FIG. **4**A. Step **623** uses the browser to check the copier condition. The call list, described with reference to FIG. **13**, is used and the SEQ number is activated by an operator such that the call detail described with reference to FIG. **14**A, is opened. By activating the machine condition data menu, the machine condition data screen is displayed on to an operator at the helpdesk. By viewing parameters and related data on this screen, the operator at the help desk knows the LADP/Copier Information and the condition of the copier. The operator may determine the problems of the copier by analyzing the parameters. Step **624** calls the customer to ask the problem.

At step **622**, the copier condition is checked. The checking of the copier condition is explained above with reference to FIG. **4**A, step **338**, and is applicable for step **622**. The operator may determine the problems and/or solutions of the copier by studying the parameters. Step **624** calls the customer to inquire about assisting with resolving the problem. Calling the customer uses LADP/Copier Information at manual call detail at block **626**.

Step **628** attempts to resolve the problem. As the operator has estimated the problems of the copier, the operator may ask questions. Alternatively, the operator may attempt to solve the problem by changing the parameters based on the response from the customer. Step **630** determines if the problem is solved. If the problem is solved, then step **632** closes the manual call. If the problem is not solved, step **634** dispatches a technician using the tag ID of the subject of the e-mail message to search on the dispatch system at block **636**.

FIG. **5**A illustrates various objects such as software objects and modules contained within the server **28**. The server **28** is connected to a mail server **720** through which mail is sent and received. The mail server **720** may be located at an Internet service provider (not shown), may be located on a network, may be owned by the company owning the server **28**, or may even be located inside of the server **28 360**, for example. An e-mail processor **710** is utilized to control the transmitting and receiving of electronic mail messages. The e-mail processor may be implemented in any desired or known manner and may be based on commercially available electronic mail programs such as Microsoft's Outlook Express, or GroupWise by Novell, although any other e-mail program may be used, if desired. As a specific implementation, the e-mail system may retrieve e-mail from the server using POP**3** (Post Office Protocol) and to access the e-mail server in order to send e-mails using SMTP (Simple Mail Transfer Protocol), although any other protocol may be used, if desired. If the computer **360** utilizes an operating system such as an operating system for Unix, then the computer will usually have an IP address and a mail system built-in. Therefore, there may be no need to utilize the mail server **720** with such a system. A registry **714** contains various information of the system and may be implemented in the same or similar manner as the registry of Windows 95, Windows 98, and/or Windows NT, for example. Incoming mail information **716** maybe utilized to store incoming mail. Additionally, if desired the incoming mail information **716** may be implemented to store the POP**3** location, and store file information about the incoming e-mails. Outgoing mail information **718** contains information regarding SMTP and file information for outgoing mail. A device driver **712**, such as a printer driver, scanner driver, or other driver, for example may be used to communicate with the device **422** which may be any type of device from which information is desired or to which information or control signals are to be sent. The device driver **712** is implemented to translate commands or signals from the e-mail processor **710** to signals which are transmitted to the device **722** and vice

versa. Alternatively, the e-mail processor **710** may perform more of the processing functions and the device driver **712** may have simple programming and few responsibilities. Further, any other implementation of the software may be utilized as long as the function of proper communication and control of the device **772** using e-mail messages is performed.

A more detailed exemplary implementation of the device driver **712** of FIG. **5**A is illustrated in FIG. **5**B. The device driver **712** includes a device function support module **726** which may be implemented to perform the conventional and/or desired functions of a device driver. The device driver **712** also includes a remote control and diagnostic module **726**. If desired, the remote control and diagnostic module **726** may be implemented to perform some or all of the control and/or diagnostic functions which are described in the related patent and patent applications and are incorporated by reference above. By implementing the control and diagnostic module **726** in the device driver **712**, the cost of the device **712** may be reduced and the resources and capabilities of the device **712** may be eliminated or reduced such as by reducing the amount of memory in the device **712** such as DRAM (Dynamic Random Access Memory) or flash memory, for example. This reduced cost is possible as the hardware resources of the server **28** may be utilized in place of constructing additional hardware to go into the device **722**, if desired. Various information including log information and error information may be stored in a data base which includes device data **728** using any desired hardware and data or data base management software. Further, software within the device **722** may be reduced by increasing the functions performed by the device driver **712** including functions performed by the remote control and diagnostic module **726** and the device function support module **724**. These two software modules may be implemented in one software module, if desired. Additionally, the software which keeps track of the usage of the device may be removed from the device itself and included in the device driver **712**.

FIG. **6** illustrates a flow diagram of the process of transmitting to a customer, helpdesk, and/or dispatcher that a call or machine notification, including but not limited to, the service call, machine call or customer call, has been sent from the image machine. Step **810** prepares a corresponding email message for sending. The e-mail message may include the type of call, including either a manual call, service call, or customer call, the tag ID. Other information may also be included in the e-mail, the customer name, the customer address, the customer phone number, the model name, the copier S/N, the received date and time. Step **812** determines a corresponding e-mail address for sending. The e-mail address may be determined based on the machine event notification and the tag ID number. Step **814** transmits the corresponding e-mail from the server to the appropriate entities, for example the help desk and/or the dispatcher.

FIG. **7** illustrates a flow diagram of the process of the help desk receiving the e-mail. Step **910** receives the e-mail. Step **912** opens the e-mail. Step **914** displays information in the message body. Determination step **916** determines if service is dispatched. If service is dispatched then the process ends, for example by closing the call. If service is not dispatched, then step **918** obtains call information and sends a message.

FIG. **8**A illustrates an exemplary e-mail message **950** used by the present invention. The message contains, at each line, information for processing a call from the machine. Line I indicates the subject of the e-mail message which includes at line **2** the service call generated and the received tag ID number. Line **3** indicates the content of the e-mail message which includes additional information indicated by lines **4**-**11**. Line **4** indicates the customer name. Line **5** indicates the customer address. Line **6** indicates the customer phone number. Line **7** indicates the model name. Line **8** indicates the copier serial number. Line **9** indicates the tag ID number. Line **10** indicates the call code number. Line **11** indicates the received data and time. Additionally, e-mail may contain information which assists any of the entities in solving problems which caused the call.

FIG. **8**B illustrates an alternate e-mail message **960** in which information is limited to the e-mail address and the tag ID number in the header. This e-mail message allows a user to obtain information without opening the e-mail to view contents. More information related to a copier may be obtained based on the tag ID number. This type of e-mail may be used with manual calls, customer calls, certain service calls, or any other appropriate type of call.

FIG. **9** illustrates related modules, objects and information for evaluating machine condition data which may be implemented, for example, using the structure illustrated in FIG. **2**. The server **28** includes a parameter processor **1110**, a comparator **1112**, a first parameter and deviation storage **1114**, machine condition parameters information **1116**, and outgoing changed current parameter information **1118**. The parameter processor **1110** communicates with the first parameter and deviation storage **1114**, and the incoming second parameters information **1116**. The comparator **1112** communicates with parameter processor **1110**, the first parameter and deviation storage **1114**, the incoming second parameters information **1116**, and the outgoing changed current parameter information **1118**.

Server **28** is connected to the network **16**. The network **16** is an appropriate network, for example the Internet, that permits sending and receiving of image machine data. Alternatively, a private network such as a WAN or LAN may be utilized, or a telephone may be utilized. The reference parameters and deviations storage **1114** stores data. The data includes the reference parameters related to each image machine in the system and the deviation values which are tolerances within which machine conditions are evaluated. Individual tolerances are predetermined for the machine condition parameters. Alternatively, tolerance may be adjusted as necessary. Reference parameters are obtained when the image machine is installed and is explained below with reference to FIG **10**. The machine condition parameters information **1116** includes current condition machine data which is indicative of the real-time conditions of the monitored machine. Exemplary machine condition data is described with reference to FIG. **15**. During a request to diagnose or control the image machine, incoming second parameters information **1116** receives data which is indicative of the current conditions of the image machine. Outgoing changed parameter information **1118** includes machine condition data which is evaluated as changed from the reference parameter data and/or indicative of problems with the machine.

Comparator **1112** compares current machine condition parameters to reference parameters and deviations or tolerance ranges and standard values) which are obtained from reference parameters and deviations storage **1114**. Parameter processor **1110** retrieves correlated reference parameters and deviations based on the current machine condition parameters and provides the changed second parameters for updating.

FIG. **10** illustrates a flow diagram of initializing reference parameters of an image machine. After installation of the image machine at the customer location, at step **1150**, the server receives the installation complete message. Step **1152** transmits an upload reference parameters request. The

uploaded parameters request performs the function of querying the image machine to transmit the reference parameters. At step **1153**, the server receives and stores the reference parameters in a hard disk or other appropriate storage; thus initialization of the reference parameters is complete.

FIGS. **11**A and **11**B are flowcharts illustrating the process performed for monitoring and controlling image machines. The processes are performed in the server. Alternatively, it should be appreciated that the process may be performed at another part of the system. After initializing reference parameters for any image machine that is included in the system, step **1210** monitors for machine event notification or service or read/write requests transmitted from image machines or helpdesk. Read/write requests may be generated from the machine, the customer or the server. Step **1212** determines if a read/write request is received. If a read/write request is not received, then monitoring for read/write requests continues. If a read/write request is received, then step **1214** requests to the image machine to upload parameters indicative of the current machine conditions. Step **1216** stores current parameters in memory. Step **1218** compares current parameters to corresponding reference parameters.

Step **1220** determines if current parameters are unequal to corresponding reference parameters. If the parameters are not different, then monitoring for read/write requests continues at step **1210**. If the parameters are different, then step **1221** indicates current parameters which are unequal to corresponding reference parameters. Step **1222** evaluates the current parameters based on the tolerance values. Step **1224** determines if current parameters are within the tolerance values. If current parameters are within the tolerance values, then step **1236** closes the service call. Tolerances provide a range within which current machine condition parameters may be compared. For example, if the left edge register adjustment indicates a current machine condition value of 0.5 and the reference parameter (or present value) is 0.1 with a tolerance or setting range of −90 to +90. If current parameters are not within the tolerance values, then step **1226** indicates current parameters which are out of tolerance. Current parameters are indicated by highlighting parameters out of the tolerance range. Step **1228** signals controller to display parameters on workstation.

Step **1230** determines if current parameters are received by image machine. If current parameters are not received, then step **1234** determines if request to close service call is received. The service call is received by the RMS server. If the request is received, then step **1236** closes the service call and continues monitoring the machine for read/write requests, otherwise step **1234** is iterative. If current parameters are received, then step **1232** downloads received parameters to image machine. Step **1234** determines if a request to close manual call is received. If request is received, then step **1236** closes the service call and continues monitoring the machine for read/write requests, otherwise step **1234** is iterative.

FIGS. **12**A and **12**B are flowcharts illustrating the process performed by the customer or helpdesk. After starting, step **1310** submits a read/write request via an input device such as a mouse, keyboard or other appropriate device such as a touch screen.

Step **1312** determines if a first mode is active. The first mode and a second mode may be available at the server, and customer and help desk workstations. The first mode allows the operators to select between a first displaying mode and a second displaying mode, the first displaying mode is the mode to display parameters with unequal flags set and highlight the parameters with out of tolerance flags set. The second mode is the mode to display all current machine parameters without regard to flags.

If the first mode is not active, then step **1316** determines if the second mode is active. If the second mode is not active then step **1312** determines if the first mode is active, otherwise, step **1318** displays all the parameters. If the first mode is active, then step **1314** compares current parameters to the corresponding reference parameters.

Step **1320** determines if the current parameters are within tolerance. If current parameters are within tolerance, then read/write request ends; otherwise step **1322** determines if a first flag is set. The first flag is set and indicates that current parameters are unequal to corresponding reference parameters. If the first flag is not set, then step **1328** suggests that the operator change to second mode, then flow proceeds step **1312** to determine if the first mode is active. If the first flag is set, then step **1324** determines if the second flag is set. Second flag is set to indicate current machine parameters which are out of the tolerance range. The unequal current machine conditions are compared by using the tolerance range which may have an upper limit value and lower limit value. If the current parameter is out of the deviation, a tolerance error indicator of a second flag is set on the current parameter. If second flag is not set, then step **1330** displays current parameters without highlighting manner. If second flag is set, then step **1326** displays current parameters with highlighting manner.

In FIG. **12**C, step **1332** updates parameters based on a need to know current machine conditions for future monitoring and controlling. For example, if the fusing temperature is different than the reference fusing temperature, then it is updated because the current fusing temperature is needed to monitor and control the image machine. Step **1334** downloads updated current parameters at image machine. Step **1336** resets service call and ends read/write request.

FIG. **13** is an exemplary call list **1400**. The call list **1400** indicates data including sequential numbers indicating when the calls were transmitted (SEQ) **1410**, service organization (SO) **1412**, customer **1414**, model **1416**, machine notification call **1418**, cause/solution input **1420**, LC list **1422**, call **1424**, time received **1426**, elapsed lime **1428** and operator **1430**. The calls are each listed at each line and are displayed in a sequential sort. However, it should be appreciated that any of data may be used to organize the display of the call list.

FIG. **14**A is an exemplary call detail **1500** including symptom, cause and solution data **1510**, L-ADP/copier information data **1520**, unsealed data **1530** such as SEQ, SC, time received and elapsed time. Call detail **1500** also includes activation regions which may be clicked on or touch activated if displayed on a touch screen, and then will open more data or screens. Activation regions include, but are not limited to, read/write **1540**, machine condition data **1550**, service call/jam data **1560**, call history **1570**, loop test **1580**, execute **1582** and read **1584**.

FIGS. **14**B.1 and **14**B.2 is machine call and jam data which may be displayed by activating service call (SC)/jam data in the call detail as shown in service call (SC)/jam data **1560** of FIG. **14**A. Service call and jam data **1662** includes **1**-ADP/copier information **1564** and service call and jam data **1566**. This data indicates the information to identify which machine is having a problem and the related machine notification, for example, a service call, and related paper jam information.

FIGS. **15**A to **15**K are an exemplary read/write screen **1600** for image machine data. Screen **1600** includes L-ADP/copier information **1610** such as date received, customer, installed section, contact, model/serial number, particular notes, tag ID, and service organization (SO)/ service dealer (SD). Read

write items **1620**A to **16201** includes, number (No.), item, standard which is a factory setting which is a predetermined desired value for a particular machine, setting range or tolerance within which machine condition data is evaluated, reference parameters which may be predetermined for a particular machine after installation or adjusted during based on usage, current machine condition parameters, and new values which has a write capability such that a user can input data into the new values and activate a write command. Consequently, the values will be read into memory.

FIGS. **16**A to **16**G are exemplary machine condition data **1700** including LADP/copier information **1720**, state information **1730** and jam history **1750**A, **1750**B, counter **1750**A, **1750**B, **1750**C, operation time **1760**A, **1760**B indicating the total time the machine has been in operation, and **1770** service call (SC) history indicating the service call history. It should be appreciated that any machine notification history such as manual call history and customer call history may be included. Also included in machine condition data **1700** is sensor output, ROM, **1780**A, **1780**B, copy counter by user **1790**, not used **1792**, alarm information **1794**, SC information **1796** and read/write change information **1798**.

FIGS. **17**A and **17**B are exemplary identification information related to the machines. The identification information **1800** includes customer information **1810**, LADP information **1820**, and related copier information **1830** which includes information related to all copiers with the same customer information **1810** and LADP information **1820**. For example, all copiers as a customer site may be referenced to the same customer and LADP information. This information is stored in server **28**. Alternatively, each help desk may store this type of information.

FIG. **18** is a table including a manual call during monitoring axis **1910** and a parameter axis **1912**. Tolerance values of a lower limit **1932** and an upper limit **1934** are determined. After reference parameters R **1914** is obtained from a newly installed machine, then machine calls occur over time. Each service call (SC) generates current machine condition parameters W **1916**, W **1918**, W **1920** and H **1922**, respectively. The W **1916**, **1918**, **1920** indicates current parameters which are indicative machine conditions within the tolerance and which are not displayed in a highlighted manner. The H **1922** parameter indicates current parameters which are not within the tolerance range and are displayed highlighted.

Obviously, numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described herein.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

[1. A method of monitoring an image forming apparatus, comprising:

communicating from the image forming apparatus to a server which is remote from the image forming apparatus a condition of the image forming apparatus;

sending an email from the server to a terminal which is remote from the image forming apparatus and remote from the server;

reading the email at the terminal, using an email program; and

viewing, in response to a reading of the email, a condition of the image forming apparatus, using a browser.**]**

[2. The method of claim **1**, wherein the step of viewing comprises:

viewing the condition using a web browser which is different from the email program.**]**

[3. The method according to claim **2**, wherein the step of sending is performed in response to an abnormal condition in the image forming apparatus.**]**

[4. The method according to claim **2**, wherein the step of communicating is performed in response to an abnormal condition in the image forming apparatus.**]**

[5. A method of monitoring an image forming apparatus, comprising the steps of:

determining at the image forming apparatus a machine notification based on a condition of the image forming apparatus;

transmitting, from the image forming apparatus to a server, said machine notification;

determining, at said server, at least one electronic address which is capable of receiving an electronic message, whereby the step of determining is based on the machine notification;

sending, from said server to at least one terminal which is remote from the image forming apparatus, said electronic message based on said machine notification;

opening, at said remote computer, a browser; and

accessing, via said browser, data related to operation of said image forming apparatus, said data determined based on said electronic message.**]**

[6. The method of claim **5**, wherein said electronic message is at least one of an e-mail, a telephone call and a pager message.**]**

[7. The method of claim **5**, wherein said machine notification includes a machine identification and a type of machine notification.**]**

[8. The method of claim **5**, further including the steps of:

sending, to said image forming apparatus, a termination of said machine notification, said termination based on the evaluation of said data.**]**

[9. The method of claim **5**, wherein said machine notification is selected from the group consisting of a manual call, a service call and a customer call.**]**

[10. The method of claim **5**, wherein said machine notification is automatically initiated by said image forming apparatus.**]**

[11. The method of claim **5**, wherein said machine notification is initiated by a user at said image machine.**]**

[12. The method of claim **5**, further including the steps of:

adjusting, from the server, said data associated with operation of said image machine.**]**

[13. An image forming apparatus monitoring system, comprising:

means for communicating from the image forming apparatus to a server which is remote from the image forming apparatus a condition of the image forming apparatus;

means for sending an email from the server to a terminal which is remote from the image forming apparatus and remote from the server;

means for reading the email at the terminal, using an email program; and

means for viewing, in response to a reading of the email, a condition of the image forming apparatus, using a browser.**]**

[14. The system of claim **13**, wherein said means for viewing includes a web browser which is different from the email program.**]**

[15. The system of claim **13**, wherein said e-mail is sent based on an abnormal condition in the image forming apparatus.**]**

[16. The system of claim **15**, wherein said abnormal condition is selected from the group consisting of hardware problems, software problems, or combinations thereof.**]**

[17. The system of claim **15**, wherein said condition is communicated based on said abnormal condition in the image forming apparatus.**]**

[18. The system of claim **13**, further comprising:

a resource planning system which determines, based on said machine notification, a status of service dispatching.**]**

[19. A system for monitoring an image forming apparatus, comprising:

means for determining at the image forming apparatus a machine notification based on a condition of the image forming apparatus;

means for transmitting, from the image forming apparatus to a server, said machine notification;

means for determining, at said server, at least one electronic address which is capable of receiving an electronic message, whereby the step of determining is based on the machine notification;

means for sending, from said server to at least one terminal which is remote from the image forming apparatus, said electronic message based on said machine notification;

means for opening, at said remote computer, a browser; and

means for accessing, via said browser, data related to operation of said image forming apparatus, said data determined based on said electronic message.**]**

[20. The system of claim **19**, wherein said electronic message is at least one of an e-mail, a telephone call and a pager message.**]**

[21. The system of claim **19**, wherein said machine notification includes a machine identification and a type of machine notification.**]**

[22. The system of claim **19**, further comprising:

means for sending, to said image forming apparatus, a termination of said machine notification, said termination based on the evaluation of said data.**]**

[23. The method of claim **19**, wherein said machine notification is selected from the group consisting of a manual call, a service call and a customer call.**]**

[24. The method of claim **19**, wherein said machine notification is automatically initiated by said image forming apparatus.**]**

[25. The method of claim **19**, wherein said machine notification is initiated by a user at said image machine.**]**

[26. The method of claim **19**, further including the steps of:

adjusting, from the server, said data associated with operation of said image machine.**]**

[27. A method of communicating, comprising:

sending an email from a first device containing information related to an image forming apparatus to a second device;

reading the email at the second device, using an email program; and

viewing, in response to a reading of the email, a condition of the image forming apparatus, using a browser.**]**

[28. A system for communicating, comprising:

means for sending an email from a first device containing information related to an image forming apparatus to a second device;

means for reading the email at the second device, using an email program; and

means for viewing, in response to a reading of the email, a condition of the image forming apparatus, using a browser.**]**

29. An image-forming system for sending, to a remote device, an electronic mail message containing information related to the image-forming system, the image-forming system comprising:

means for determining a condition of the image-forming system;

means for generating the electronic mail message based on the determined condition of the image-forming system, the electronic mail message including information enabling status information indicative of at least one current monitored machine condition of the image-forming system to be accessed, from the image-forming system, and viewed at the remote device, using a browser; and

means for sending the electronic mail message to the remote device.

30. The image-forming system of claim 29, wherein the means for generating generates the electronic message, the electronic message including an identifier of the image-forming system.

31. The image-forming system of claim 29, wherein the means for generating generates the electronic message, the electronic message including information of an abnormal condition of the image-forming system.

32. The image-forming apparatus of claim 29, wherein the means for determining comprises:

means for determining at least one of a hardware problem and a software problem in the image-forming system.

33. An image-forming system for sending, to a remote device, an electronic mail message containing information related to the image-forming system, the image-forming system comprising:

a processor configured to determine a condition of the image-forming system; and

an e-mail processor configured (1) to generate the electronic mail message based on the determined condition of the image-forming system, the electronic mail message including information enabling status information indicative of at least one current monitored machine condition of the image-forming system to be accessed, from the image-forming system, and viewed at the remote device, using a browser, and (2) to send the electronic mail message to the remote device.

34. The image-forming system of claim 29, further comprising:

an image forming apparatus and a server.

35. The image-forming system of claim 34, wherein

the image forming apparatus is configured to generate a machine notification to the server, and

the server is configured to send the electronic mail message based on the machine notification to the remote device.

36. The image-forming system of claim 33, further comprising:

an image forming apparatus and a server.

37. The image-forming system of claim 36, wherein

the image forming apparatus is configured to generate a machine notification to the server, and

the server is configured to send the electronic mail message based on the machine notification to the remote device.

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