SECTION 6 ERROR MESSAGE and TROUBLESHOOTING

Alphabetical List of Error Message

SECTION 6 ERROR MESSAGE and TROUBLESHOOTING

6.1. INTRODUCTION

6.1.1 [HELP] Key Function

When a trouble has occurred, the warning alarm sounds and an error message is displayed on the screen. By pressing [HELP] key on the panel keyboard, you can stop the alarm and change over to the HELP screen that shows what action to tack against the error.
Supplementary explanation for that function is given here.
If any judgment is required when the automatic recovery is to be performed, an action message is displayed to wait for the entry.
In the event multiple errors occur at the same time, press [HELP] key. The errors that have occurred are listed in the order from higher priority.

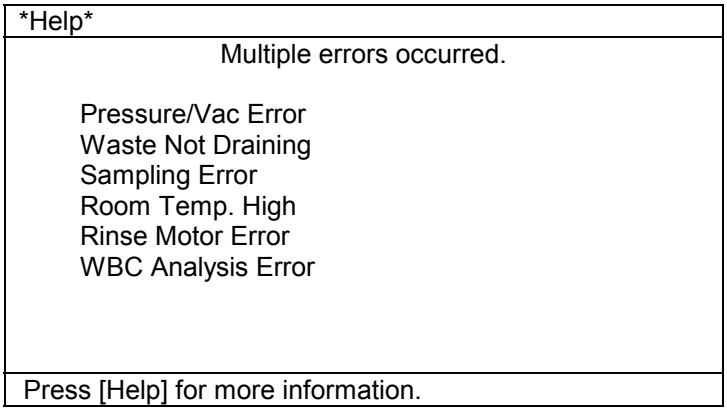


Figure 6-1-1: HELP Screen (Error List)

Press [HELP] key again. The screen changes to the HELP screen for the error listed at top.

NOTE:
- Pressing [C] key when any error occurs performs only the alarm reset.
- When any error occurs, the error message is displayed on the screen, and pressing [HELP] key performs the automatic recovery or the action message display.

As for 1., 2. and 3. of the high priority order list described in the Table 6-1-1, HELP screen is displayed without pressing [HELP] key. If there are multiple errors when exit from HELP screen, the error list is displayed.

Table 6-1-1: Error Priority (Analysis)

Priority	Error Description	KX-21's Action
1	RAM Error	Operation disabled
	ROM Error	
	Setup Data Error	
2	0.5 kg/cm^2 Pressure Error at count (for KX-21) 0.05 Mpa Pressure Error at count (for KX-21N)	Sequence suspended
3	WBC Analysis Error	Confirmation message
	RBC Analysis Error	
4	QC Error	
5 3	Error on IP [Abnormal IP]	Output function disabled partially
	IP paper empty [Abnormal IP]	
	GP printout error [Abnormal GP]	
	GP paper empty [Abnormal GP]	
	Host Output Error [Host Comm. Error]	
	DP printout error [Abnormal DP]	
6	0.5 kg/cm^2 Pressure Error (for KX-21)	Analysis disabled
	0.05 MPa Pressure Error (for KX-21N)	
	250 mmHg Vacuum Error (for KX-21)	
	0.0333 MPa Vacuum Error (for KX-21N)	
	Rinse Motor Function Error	Menu operation available
	Waste Not Draining	
	Replenish Diluent	
	Replenish Lyse	
7	HGB Error	becomes READY, however, bad effect on the next sample
	WBC CCSD Noise Error	
	RBC CCSD Noise Error	
	PLT CCSD Noise Error	
8	WBC Aperture Clog	becomes READY no bad effect on the next sample
	RBC Aperture Clog	
	Temperature High	
	Temperature Low	
	WBC Sampling Error	
	RBC Sampling Error	
	PLT Sampling Error	
	Background Error	

NOTE:
- Errors are divided into eight groups with the priority of 1 ~ 8 (high to low).
- The errors in each group are lined up from the one with the highest priority.

Table 6-1-2: Error Priority (Others)

1	Clean SRV	Maintenance message (only at start-up)
2	Clean Waste Chamber	
3	Clean Transducer	
–	Calibration Error	(only at calibration)

6.1.2 Action Message Screen

On the [Action Message] display screen, error code is displayed at the right end of the second line from the bottom of the screen.
On the [Action Message] display screen waiting for the key entry, pressing [select] key to stop the error recovery process and return to the ordinary screen (with the error status remained).

6.1.3 Error Code Function

Purpose: For service person to obtain the instrument status correctly over the phone.

Table 6-1-3: Error Codes

No.	Error	Error Description	Error Code	XXXXX	ZZZZZ
11	Pressure *6*				
	111	0.5 kg/cm^2 Pressure Error (KX-21)	111050.XXXXX.ZZZZZ	Pressure Value	Sequence No.
	111	0.05 MPa Pressure Error (KX-21N)	111050.XXXXX.ZZZZZ	Pressure Value	Sequence No.
	112	250 mmHg Vacuum Error (KX-21)	112250.XXXXX.ZZZZZ	Vacuum Value	Sequence No.
	112	0.0333 MPa Vacuum Error (KX-21N)	112333.XXXXX.ZZZZZ	Vacuum Value	Sequence No.
	119	0.5 kg/cm^2 Pressure Error at count (KX-21)	119050.XXXXX.ZZZZZ	Pressure Value	Sequence No.
	119	0.05 Mpa Pressure Error at count (KX-21N)	119050.XXXXX.ZZZZZ	Pressure Value	Sequence No.
12	Chamber				
	129	Waste Not Draining	129000.0.0	0	0
	121	Replenish Diluent	121000.0.0	0	0
	124	Replenish Lyse	124900.0.0	0	0
34	Printers				
	345	No Printer Paper (KX-21) IP paper empty (KX-21N) *3*	345020.0.0	0	0
	345	Printer Error (KX-21) Error on IP (KX-21N) *3*	345010.0.0	0	0
13	Motor				
	131	Rinse Motor Function Error	131500.0.0	0	0
21	Temperature				
	212	Room Temp. High	212510.XXXXX.0	Temperature	0
	212	Room Temp. Low	212520.XXXXX.0	Temperature	0
22	Analysis				
	221	WBC Aperture Clog	221040.XXXXX.0	Count time or Clog	0
	221	RBC Aperture Clog	221090.XXXXX.0	Count time or Clog	0
	229	Background Error	229100.XXXXX.ZZZZZ	Background Value	Parameter (2)
	223	WBC Sampling Error	223010.0.0	0	0
	223	RBC Sampling Error	223020.0.0	0	0
	223	PLT Sampling Error	223030.0.0	0	0
	222	WBC CCSD Noise Error	222010.0.0	0	0
	222	RBC CCSD Noise Error	222020.0.0	0	0
	222	PLT CCSD Noise Error	222030.0.0	0	0
	225	HGB Error	225010.XXXXX.ZZZZZ	HGB Background Value	HGB Sample Value
	226	WBC Analysis Error	226050.0.0	0	0
	226	RBC Analysis Error	226060.XXXXX.0	Conductivity	0
32	Memory				
	321	RAM Error	321050.0.0	0	0
	321	ROM Error	321010.0.0	0	0
	321	Setup Data Error	321060.XXXXX.0	Block Area	0
	323	Print Error	323010.0.0	0	0

(To be continued)

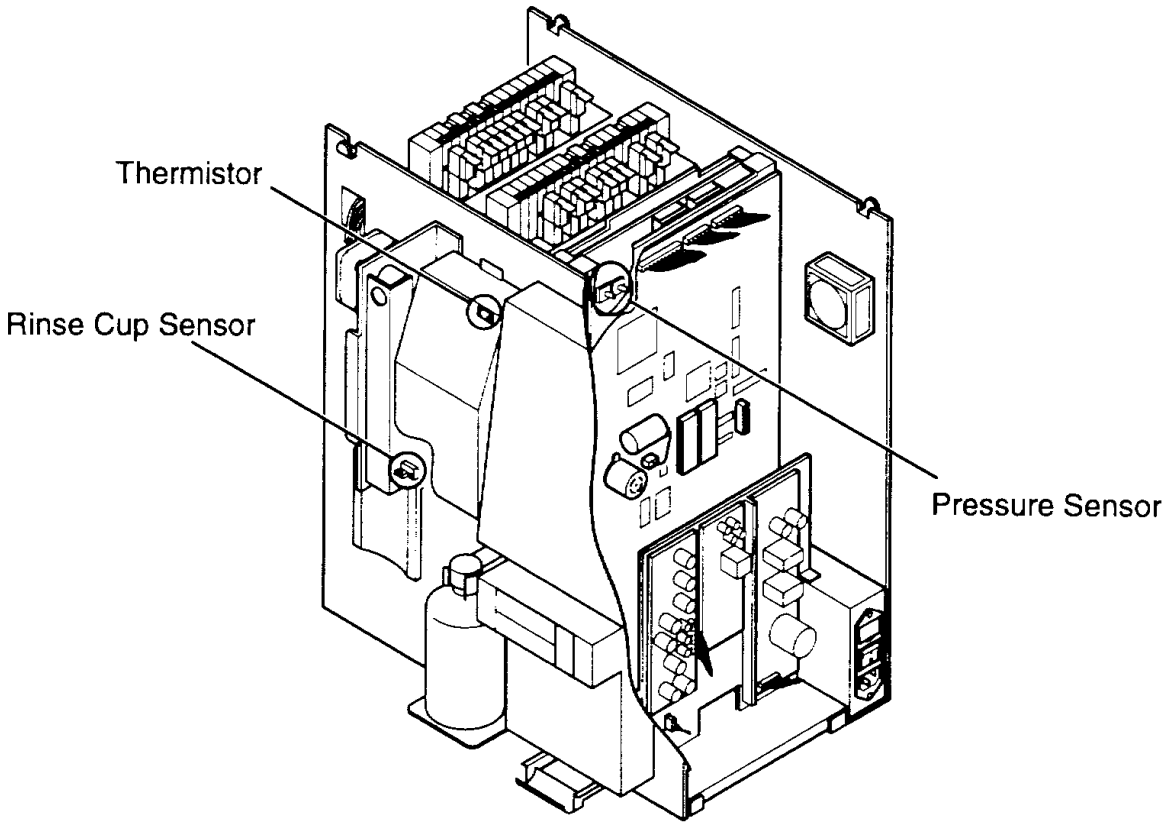
Table 6-1-3: Error Codes (Continued)

No.	Error	Error Message	Error Code	XXXXX	ZZZZZ
33	Host Output [3]				
	331	HOST Comm. Error (Offline)	331020.0.0	0	0
	331	HOST Comm. Error (Time Out)	331030.0.0	0	0
	331	HOST Comm. Error (NAK Retry)	331060.0.0	0	0
41	QC				
	411	L-J Control Error	411010.0.0	0	0
	412	$\overline{X}$ Control Error	412010.0.0	0	0
	418	Calibration Error	418010.0.0	0	0
44	External Printers [3]				
	448	GP printout error	448010.0.0	0	0
	448	GP paper empty	448020.0.0	0	0
	445	DP printout error	445010.0.0	0	0

[6] AAAAAA.XXXXX.ZZZZZ
- A: Error Code (Phenomenon)
- X: Value 1
- Z: Value 2

* X and Z have different meanings depending on the error code.

6.2 SENSOR LOCATION



6.3. ERROR MESSAGE

6.3.1 Pressure

6.3.1.1 Pressure/Vac Error [0.5 kg/cm^2 Pressure Error] (for KX-21) *6*
6.3.1.1 Pressure/Vac Error [0.05 MPa Pressure Error] (for KX-21N) *6*

Description : (for KX-21) 0.5 kg/cm^2 pressure is outside the operating range.
(for KX-21N) 0.05 MPa pressure is outside the operating range.

Function : The system secures the drain operation from the waste chamber and diaphragm pumps (DP) and the mixing operation in the transducer chambers and Hgb flow cell.

Check method : (for KX-21) A/D converter converts the voltage of the 0.5 kg/cm^2 pressure sensor, which is connected to the kg/cm^2 regulator.
(for KX-21N) A/D converter converts the voltage of the 0.05 MPa pressure sensor, which is connected to the 0.05 MPa regulator.
The instrument system checks if the pressure is within the following range.

In the Ready mode : System monitors pressure at a constant timing (every 200 ms).
(for KX-21) Allowable range: From 0.4 to 0.6 (kg/cm^2)
(for KX-21N) Allowable range: From 0.039 to 0.059 (MPa)
System assumes to be an error when pressure deviates from the allowable range for more than 1.2 seconds continuously.

During analysis : <u>Whole Blood (WB) Mode</u>
At 3.0 sec. after start of sequence 1 (WBC DP dispense - HGB background convert sample dispense)
At start of sequence 3 (RBC DP dispense - 1st dilution)
At 3.0 sec. after start of sequence 4 (Lyse Reagent DP/WBC DP dispense)
At start of sequence 5 (RBC DP dispense - 2nd dilution)
<u>Pre-Diluted (PD) Mode</u>
At 3.0 sec. after start of sequence 1 (WBC DP dispense - HGB background convert sample dispense)
At start of sequence 3 (RBC DP dispense - WB mode rinse)
At start of sequence 5 (RBC DP dispense - Lyse Reagent DP/WBC DP dispense)
(for KX-21) Allowable range: From 0.3 to 0.6 (kg/cm^2)
(for KX-21N) Allowable range: From 0.029 to 0.059 (MPa)
System assumes to be an error when pressure deviates from the allowable range at the specified timing.

KX-21's action : (1) During analysis, the alarm sounds and the error message appears in the LCD after the sequence for aspirated sample has completed and the data is output (all data becomes "*"). If pressure returns to the normal range after pressing [HELP] key, the pressure is assumed as recovered and the system enters the ready mode.

(2) In the Ready mode, the alarm sounds and the error message appears in the LCD.
If pressure returns to the normal range after pressing [HELP] key, the pressure error is assumed as recovered and the system enters the ready mode.

6.3.1.2 Pressure/Vac Error [250 mmHg Vacuum Error] (for KX-21) *6*
6.3.1.2 Pressure/Vac Error [0.0333 MPa Vacuum Error] (for KX-21N) *6*

Description : (for KX-21) 250 mmHg vacuum is outside the operating range.
(for KX-21N) 0.0333 MPa vacuum is outside the operating range.

Function : The system ensures the sample drainage from the transducer chamber and the manometer operation.

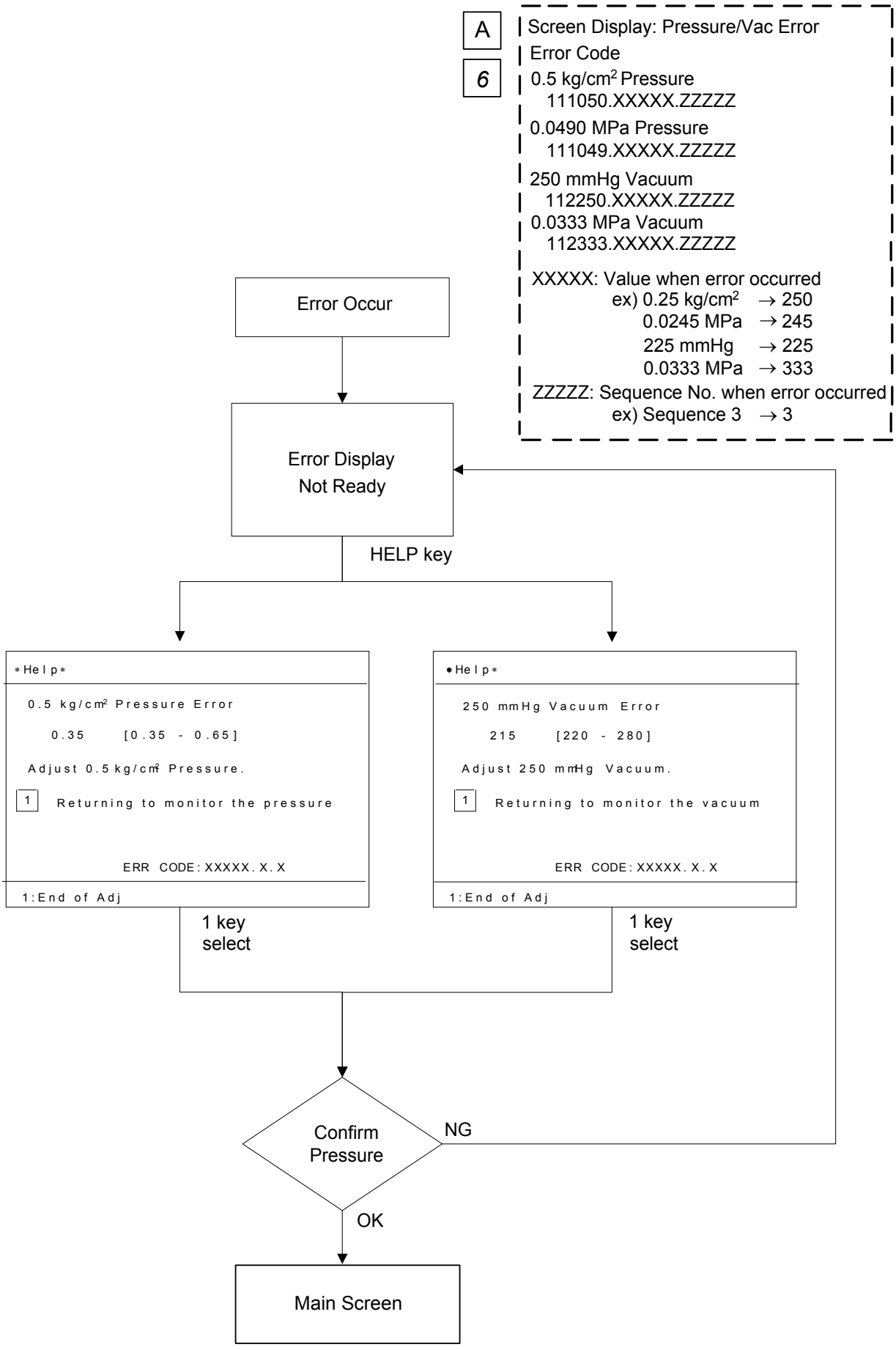
Check method : (for KX-21) A/D converter converts voltage of the 250 mmHg vacuum sensor.
(for KX-21N) A/D converter converts voltage of the 0.0333 MPa vacuum sensor.
The system checks if the vacuum reading is within the allowable range.

In the Ready mode : System monitors at a constant timing (every 200 ms)
(for KX-21) Allowable range: from 230 to 270 (mmHg)
(for KX-21N) Allowable range: from 0.0307 to 0.0360 (MPa)
System assumes to be an error when vacuum deviates from the allowable range for more than 1.2 seconds continuously.

During analysis : <u>Whole Blood (WB) Mode</u>
At start of sequence 1 (0.5 seconds before draining from the mix chamber and W/R detection chamber)
At 0.4 seconds after start of sequence 2
(HGB background convert sample aspirate)
At start of sequence 4 (RBC charge)
At 0.9 seconds after start of sequence 4
(Mix chamber drain, W/R detection chamber drain)
At 1.6 seconds after start of sequence 7
(HGB sample convert sample aspirate)
At start of sequence 9
(0.5 seconds before draining from W/R detection chamber)
At 6.4 seconds after start of sequence 9
(HGB flow cell rinse solution aspirate)
At 8.6 seconds after start of sequence 9 (W/R detection chamber drain)
At 0.1 seconds after start of sequence 10
(HGB flow cell rinse solution aspirate)
<u>Pre-Diluted (PD) Mode</u>
At start of sequence 1 (0.5 seconds before draining from the mix chamber and W/R detection chamber)
At 0.4 seconds after start of sequence 2
(HGB background convert sample aspirate)
At 1.4 seconds after start of sequence 3
(Mix chamber drain, W/R detection chamber drain)
At 1.6 seconds after start of sequence 7
(HGB sample convert sample aspirate)
At start of sequence 9
(0.5 seconds before draining from W/R detection chamber)
At 8.9 seconds after start of sequence 9
(HGB flow cell rinse solution aspirate)
At 11.6 seconds after start of sequence 9 (W/R detection chamber drain)
At 0.1 seconds after start of sequence 10
(HGB flow cell rinse solution aspirate)
(for KX-21) Allowable range: From 100 to 270 (mmHg)
(for KX-21N) Allowable range: From 0.0133 to 0.0360 (MPa)
Assumed to be an error when vacuum deviates from the allowable range at the specified timing.

KX-21's action : (1) During analysis, the error message appears in the LCD after the sequence for aspirated sample has completed and the data is output (all data becomes "*"). If vacuum returns to the normal range after pressing [HELP] key, the vacuum error is assumed as recovered and the system enters the ready mode.

(2) In the Ready mode, the alarm sounds and the error message appears in the LCD. If vacuum returns to the normal range after pressing [HELP] key, the vacuum error is assumed to have recovered and the system enters the ready mode.


A
6
Screen Display: Pressure/Vac Error
Error Code
0.5 kg/cm2 Pressure
111050.XXXXX.ZZZZZ
0.0490 MPa Pressure
111049.XXXXX.ZZZZZ
250 mmHg Vacuum
112250.XXXXX.ZZZZZ
0.0333 MPa Vacuum
112333.XXXXX.ZZZZZ
XXXXX: Value when error occurred
ex) 0.25 kg/cm2 → 250
0.0245 MPa → 245
225 mmHg → 225
0.0333 MPa → 333
ZZZZZ: Sequence No. when error occurred
ex) Sequence 3 → 3
Error Occur
Error Display
Not Ready
HELP key
Help
0.5 kg/cm2 Pressure Error
0.35 [0.35 - 0.65]
Adjust 0.5 kg/cm2 Pressure.
1 Returning to monitor the pressure
ERR CODE: XXXXX.X.X
1:End of Adj
Help
250 mmHg Vacuum Error
215 [220 - 280]
Adjust 250 mmHg Vacuum.
1 Returning to monitor the vacuum
ERR CODE: XXXXX.X.X
1:End of Adj
1 key
select
1 key
select
Confirm
Pressure
NG
OK
Main Screen

A by TB 99003

6.3.1.3 Pressure/Vac Error [0.5 kg/cm^2 Pressure Error at count] (for KX-21) *6*
6.3.1.3 Pressure/Vac Error [0.05 MPa Pressure Error at count] (for KX-21N) *6*

Description : (KX-21) 0.5 kg/cm^2 pressure is lowered for more than the specified time period, and the analysis process is not assured on the following samples.
(KX-21N) 0.05 MPa pressure is lowered for more than the specified time period, and the analysis process is not assured on the following samples.

Function : The system secures the operation of the solenoid valve, master valve, DP, etc.

Check method : (for KX-21) A/D converter converts voltage of the 0.5 kg/cm^2 pressure sensor which is connected to the 0.5 kg/cm^2 regulator. *13*
(for KX-21N) A/D converter converts voltage of the 0.05 MPa pressure sensor which is connected to the 0.05 MPa regulator. *13*
The system checks if the pressure reading is within the following range.

During analysis : System monitors at a constant timing (every 200 ms).
(for KX-21) Allowable range: From 0.3 to 0.7 (kg/cm^2)
(for KX-21N) Allowable range: From 0.029 to 0.069 (Mpa)
System assumes to be an error when pressure deviates from the allowable range for more than 1.2 seconds continuously.

KX-21's action : The system immediately stops the currently running sequence and turns OFF all the solenoid valves and pneumatic unit. Subsequent operation cannot be continued and waited in power OFF condition.

6

Screen Display: Pressure/Vac Error

Error Code

119050.XXXXX.ZZZZZ

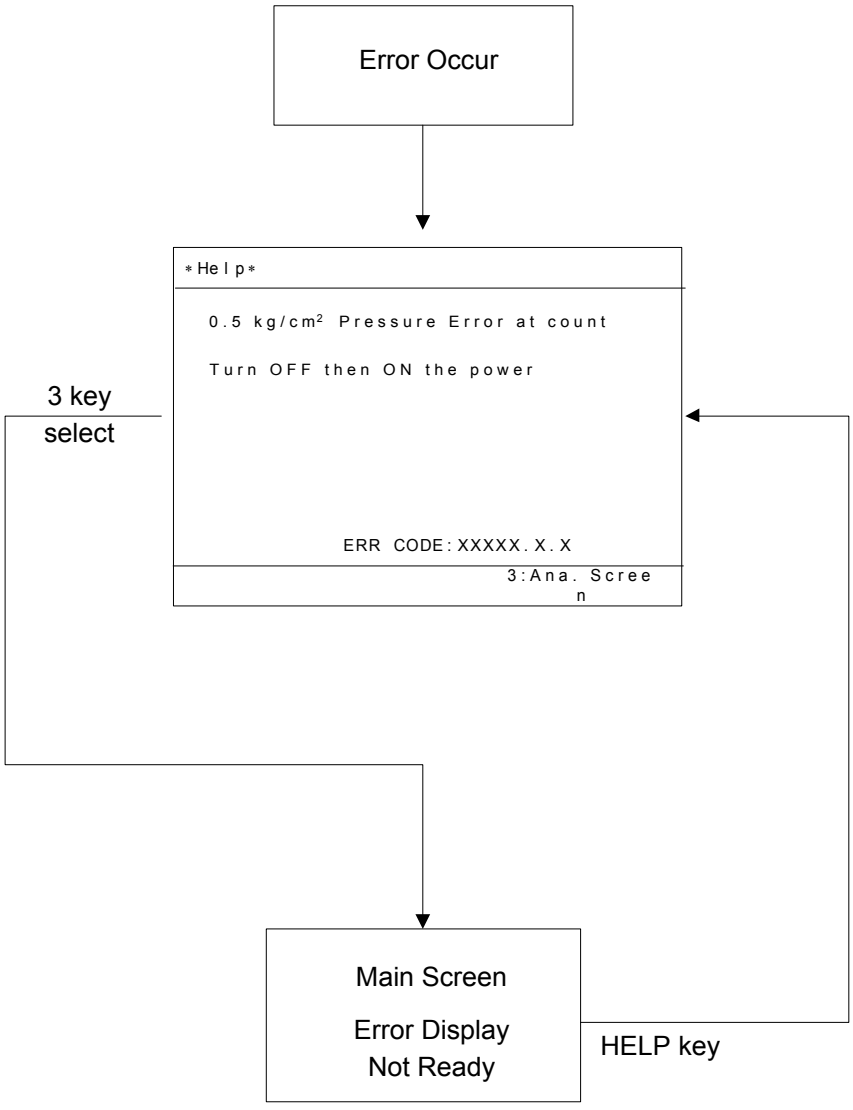
XXXXX: Value when error occurred

ex) 0.25 kg/cm^2 → 250

0.0245 MPa → 245

ZZZZZ: Secuence No. when error occurred

ex) Secuence 3 → 3



6.3.2 Chamber

6.3.2.1 Waste Not Draining

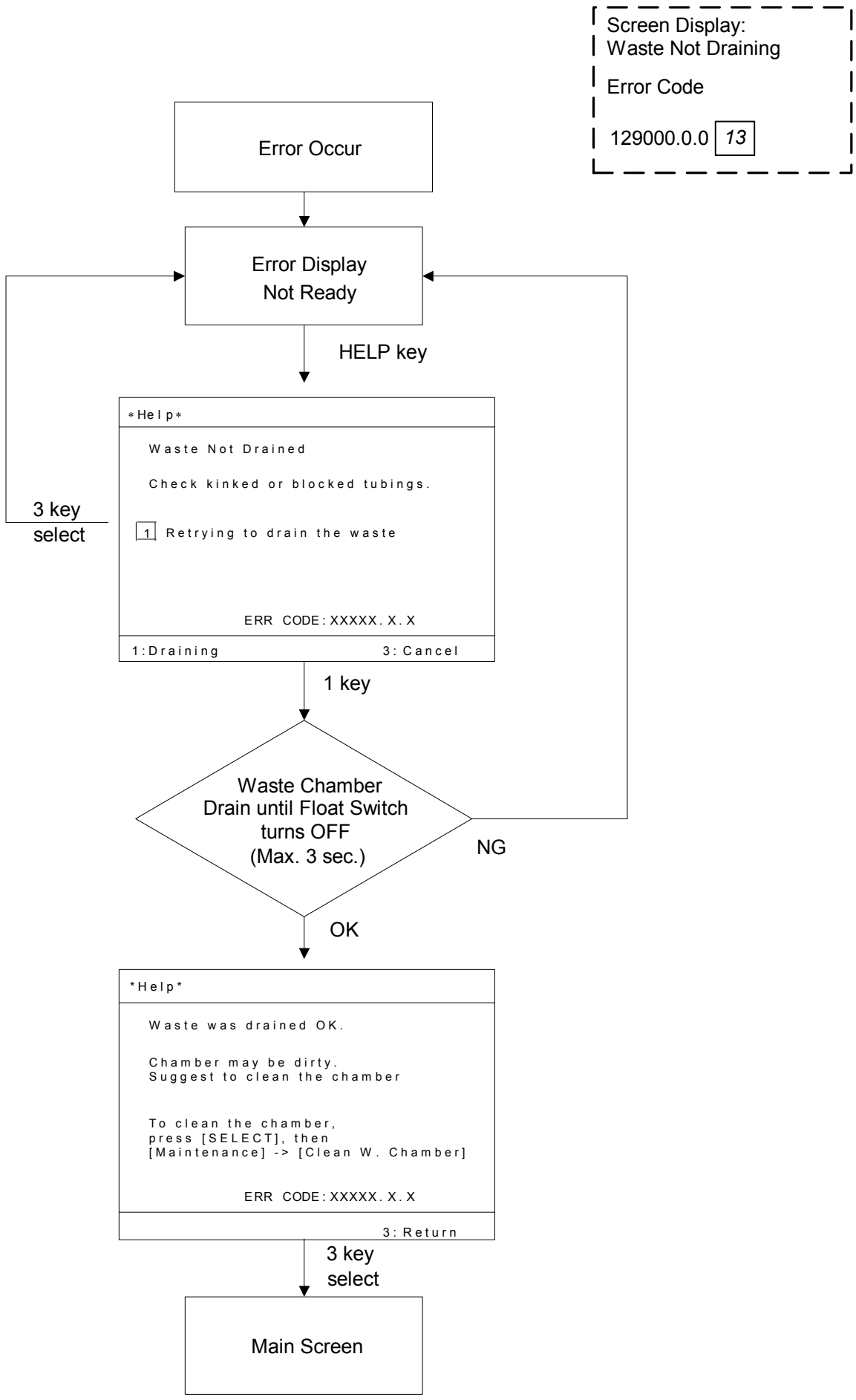
Description : The waste chamber fails to drain.

Function : The system secures drainage of waste fluid from the waste chamber and acceptance of new waste.

Check method : System checks that the float switch in the waste chamber (sensor FSW1) is ON (the float is in the lower limit).
In the Ready mode : System monitors every 100 nsec.
When the Main Unit is ON : System monitors at SV1 OFF (completion of drain).

KX-21's action : (1) During analysis, the analysis data and the error message appear in the LCD after the sample analysis has completed and the data is output (all data becomes "*").
System waits for the [HELP] key entry.
If pressure returns to the normal range after pressing [HELP] key, the pressure is assumed to have recovered and the system enters the ready mode.

(2) In the Ready mode, the alarm sounds and the error message appears in the LCD.
The system becomes ready when waste chamber draining sequence is performed without an error during starting up.


Screen Display:
Waste Not Draining
Error Code
129000.0.0 13
Error Occur
Error Display
Not Ready
HELP key
Help
Waste Not Drained
Check kinked or blocked tubings.
1 Retrying to drain the waste
ERR CODE:XXXXX.X.X
1:Draining
3:Cancel
3 key
select
1 key
Waste Chamber
Drain until Float Switch
turns OFF
(Max. 3 sec.)
NG
OK
Help
Waste was drained OK.
Chamber may be dirty.
Suggest to clean the chamber
To clean the chamber,
press [SELECT], then
[Maintenance] -> [Clean W. Chamber]
ERR CODE:XXXXX.X.X
3:Return
3 key
select
Main Screen

6.3.2.2 Replenish Diluent

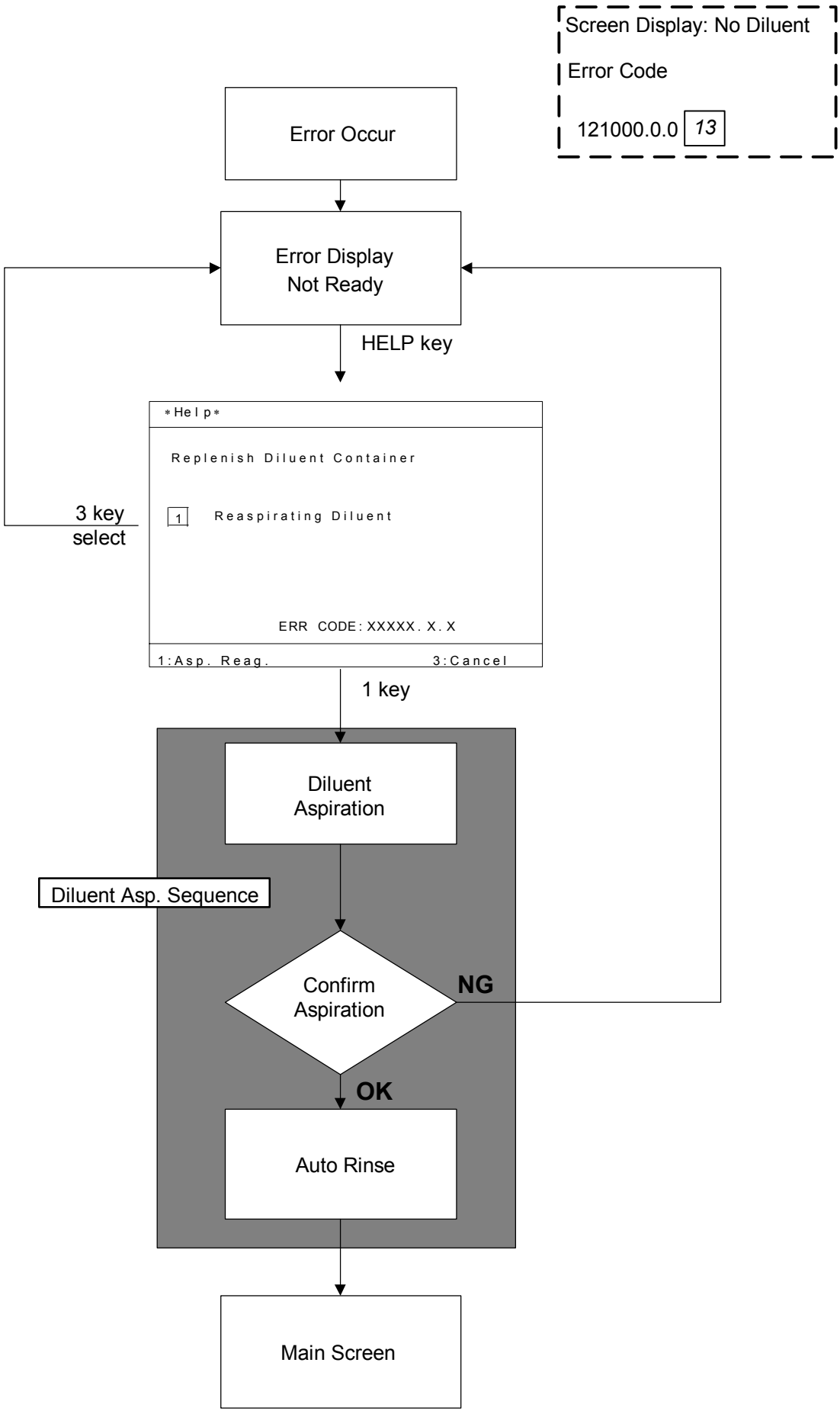
Description : Diluent (CELLPACK) cannot be aspirated into the reagent chamber in specified time, or air bubbles enters, resulting the diluent chamber float switch (sensor FSW2) OFF and ON.

Function : The system secures reagent volume required for analysis. Or detects that the air bubbles enters the diluent chamber.

Check method : (1) Monitoring conditions:
1) System assumes to be an error when longer than 7 seconds.
2) System assumes the entering of the air bubbles when the float switch (Sensor FSW2) turns ON (lower) between 0.2 seconds and 0.4 seconds after the float switch turns OFF (upper).
3) System assumes to be an error when the replenishing time is longer than 15.0 seconds.
4) System assumes to be an error when the replenishing time is longer than 14.5 seconds.
5) System assumes to be an error when the replenishing time is longer than 30.0 seconds.

(2) During sample analysis, the above 1) and 2) monitoring are performed.
(3) During the initialization, or in the reagent replenish sequence, the above 3) monitoring is performed.
(4) During Factory Rinsing, or Shipping sequence, the above 4) and 5) monitoring are performed.
(5) During Setting sequence, the above 1) and 5) monitoring are performed.
(6) On the other sequences, the above 1) monitoring is performed.
(7) In the Ready mode, monitoring is not performed.

KX-21's action : Turns the solenoid valve for diluent aspiration ON until the float switch turns OFF. When the error is resolved, the system enters the ready mode.


Screen Display: No Diluent
Error Code
121000.0.0 13
Error Occur
Error Display
Not Ready
HELP key
Help
Replenish Diluent Container
1 Reaspirating Diluent
ERR CODE: XXXXX. X. X
1:Asp. Reag.
3:Cancel
3 key
select
1 key
Diluent
Aspiration
Diluent Asp. Sequence
Confirm
Aspiration
NG
OK
Auto Rinse
Main Screen

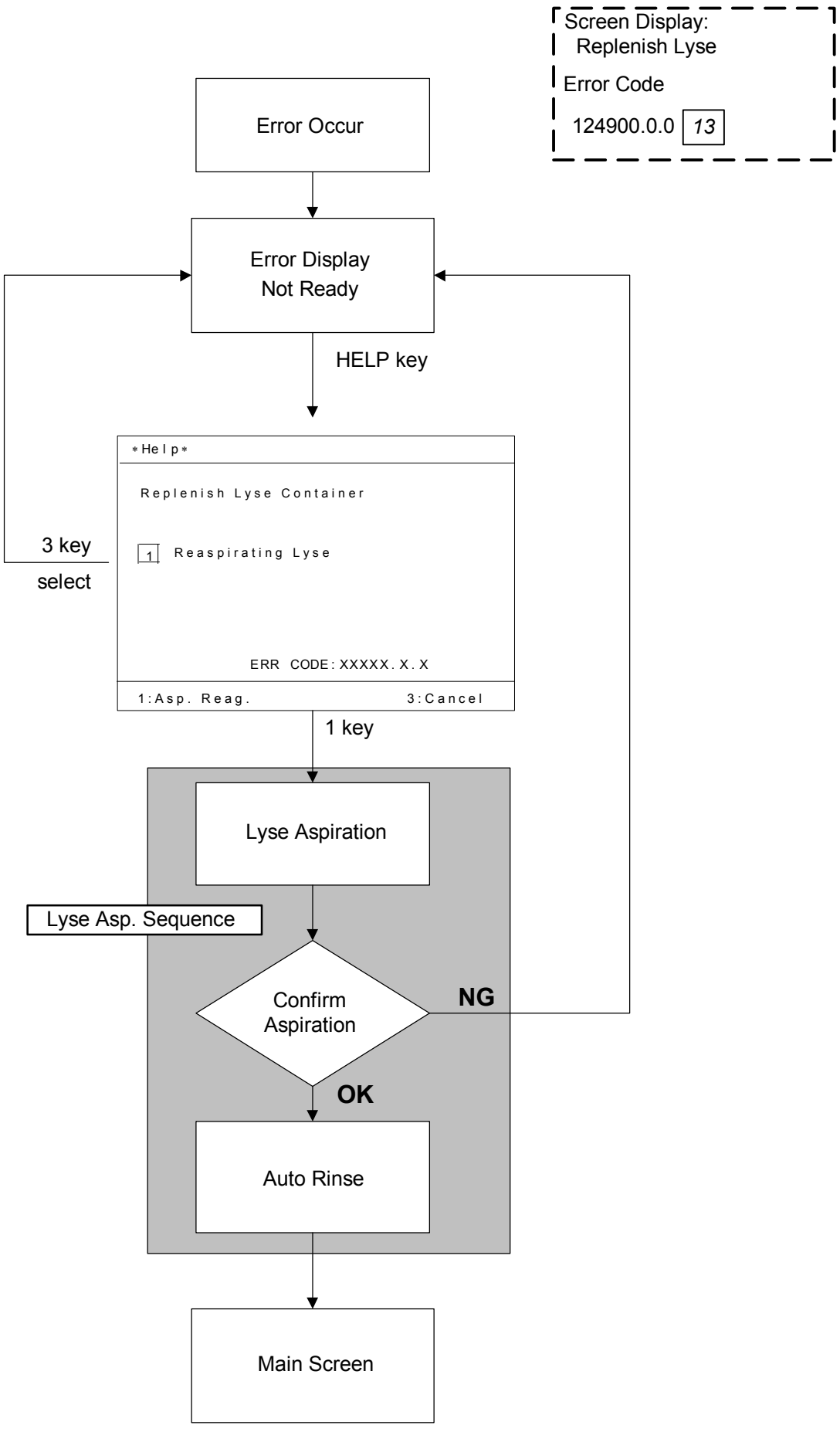
6.3.2.3 Replenish Lyse

Description : The available cycles reaches the specified count after the float switch for monitoring the lyse reagent turns ON.

Function : The system secures lyse reagent volume remained for analysis.

Check method : System checks that the cycle is less than 95 for the 500 mL bottle after the float switch for monitoring the lyse reagent (FSW7) turns ON (for one second consecutively).

KX-21's action : The alarm sounds and the error message appears in the LCD. The system enters the ready mode after [HELP] key is pressed.
3 After pressing [1] key on Help screen, lyse reagent aspiration sequence will run and auto rinse with background check will follow. Then, system enters Ready when no abnormality is found.


Screen Display:
Replenish Lyse
Error Code
124900.0.0 13
Error Occur
Error Display
Not Ready
HELP key
Help
Replenish Lyse Container
1 Reaspirating Lyse
ERR CODE:XXXXX.X.X
1:Asp. Reag.
3:Cancel
3 key
select
1 key
Lyse Aspiration
Lyse Asp. Sequence
Confirm
Aspiration
NG
OK
Auto Rinse
Main Screen

6.3.3 Printers

6.3.3.1 No Printer Paper [Built-in Printer (IP)] (KX-21)
IP paper empty [Abnormal IP] (KX-21N) 3

Description : Paper has run out in the built-in printer.

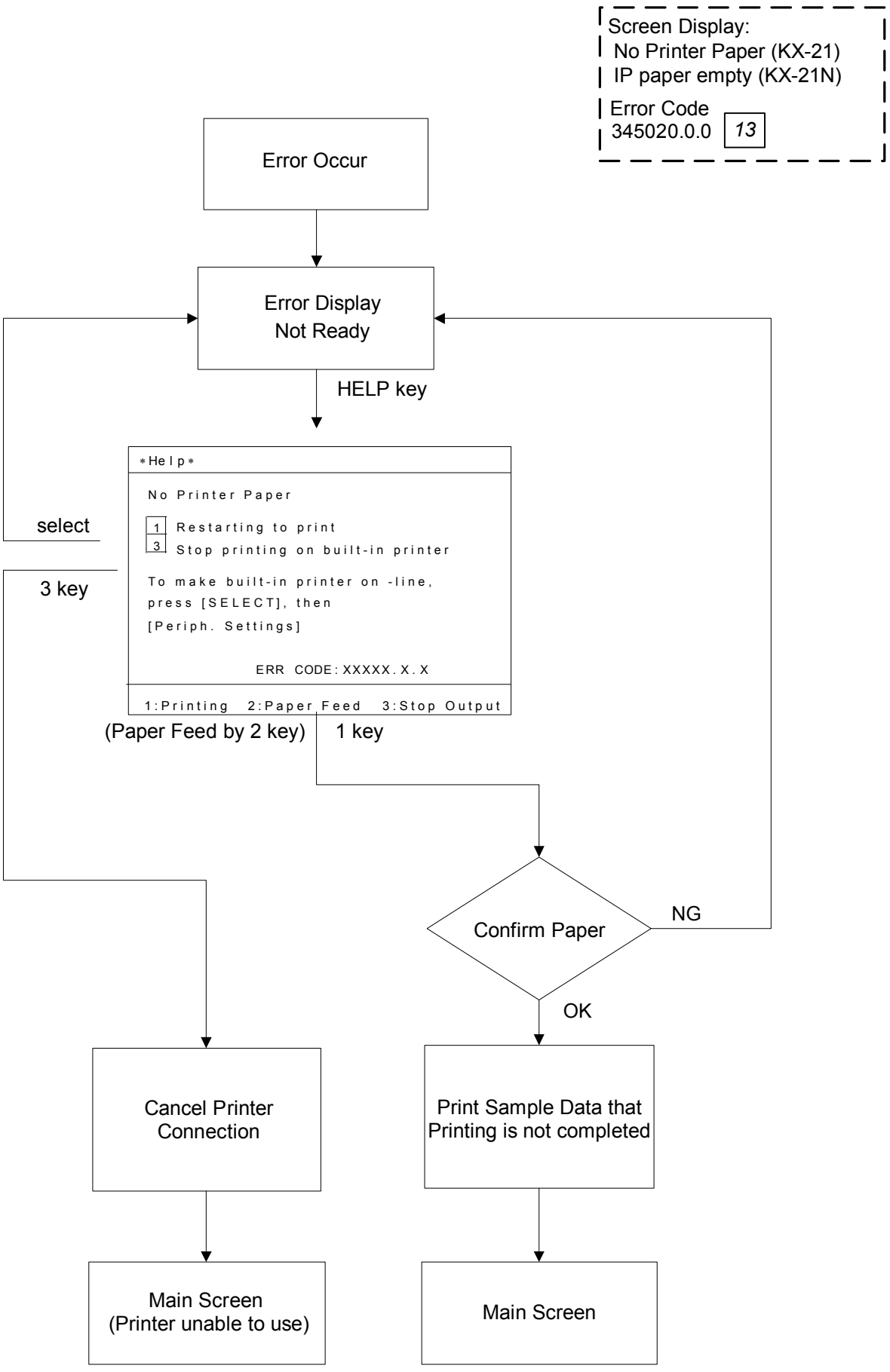
Function : The system secures printing of measurement results.

Check method : System checks the bit of no-paper sensor in the built-in printer throughout the printing process.

KX-21's action : (1) System displays the error message on the LCD when no paper error is detected.

(2) System waits for the [HELP] key entry after the sequence for the aspirated sample has completed. If the error recovers after the [HELP] key is pressed, built-in printer prints the data which has been suspended. After the data is normally printed, system exits from the error.

NOTE: When [3] key is pressed on the HELP screen, error monitoring for the built-in printer is canceled. The print out on the built-in printer is not possible, but the sample analysis is possible.


Screen Display:
No Printer Paper (KX-21)
IP paper empty (KX-21N)
Error Code
345020.0.0
13
Error Occur
Error Display
Not Ready
HELP key
Help
No Printer Paper
1 Restarting to print
3 Stop printing on built-in printer
To make built-in printer on -line,
press [SELECT], then
[Periph. Settings]
ERR CODE:XXXXX.X.X
1:Printing 2:Paper Feed 3:Stop Output
select
3 key
(Paper Feed by 2 key)
1 key
Confirm Paper
NG
OK
Cancel Printer
Connection
Print Sample Data that
Printing is not completed
Main Screen
(Printer unable to use)
Main Screen

6.3.3.2 Printer Error [Built-in Printer (IP)] (KX-21)
Error on IP [Abnormal IP] (KX-21N) 3

Description : This message is issued when a hardware error occurs on the built-in printer, a cable connected to the built-in printer is disconnected, or the paper holder lever releases.

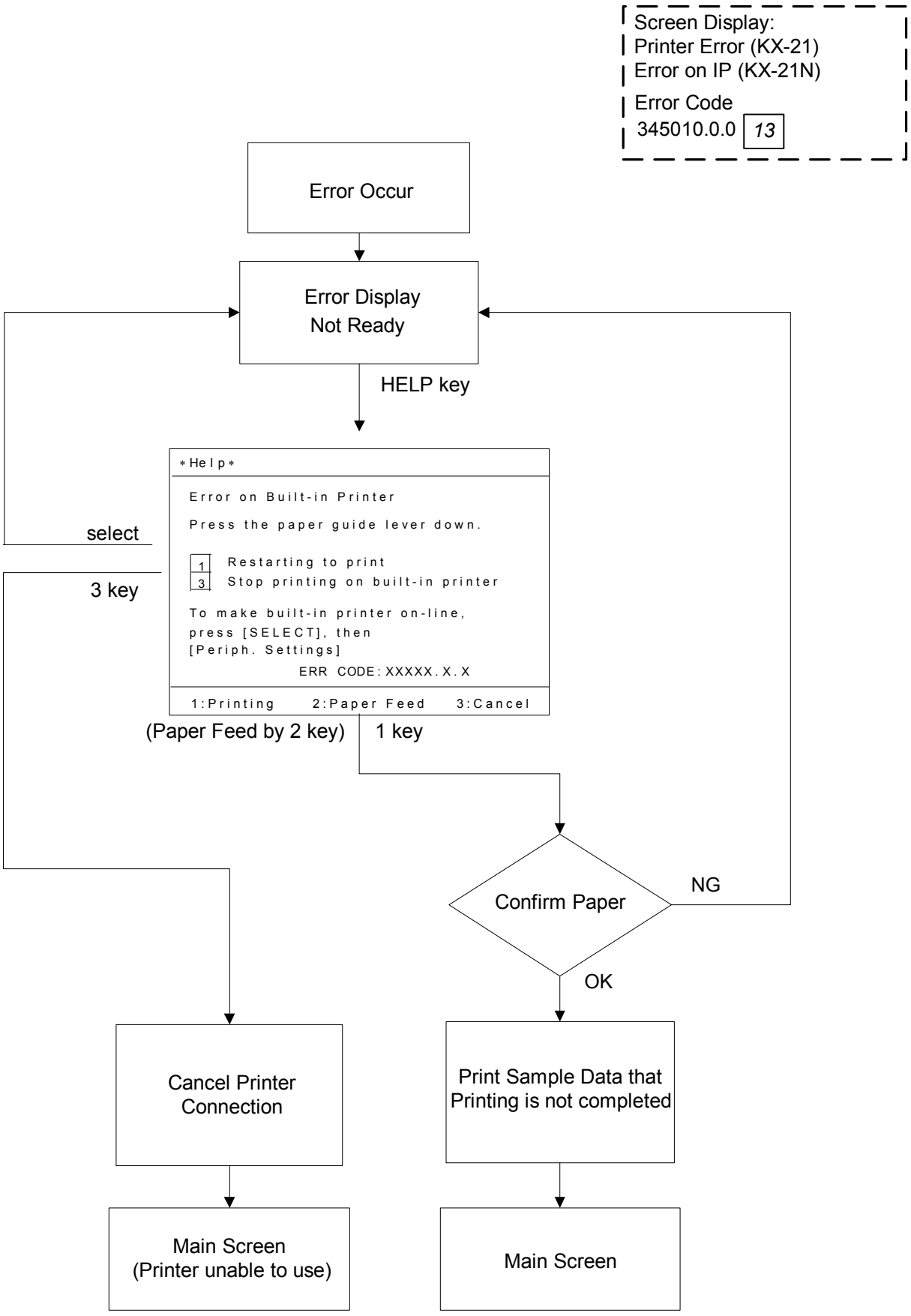
Function : The system secures printing of measurement results and/or error messages.

Check method : System checks the error-bit of the built-in printer throughout the printing process.

KX-21's action : (1) System displays the error message on the LCD when a printer error is detected.

(2) System waits for the [HELP] key entry after the sequence for the aspirated sample has completed. If the error recovers after the [HELP] key is pressed, built-in printer prints the data which has been paused. After the data is normally printed, system exits from the error.

NOTE: When [3] key is pressed on the HELP screen, error monitoring for the built-in printer is canceled. The print out on the built-in printer is not possible, but the sample analysis is possible.


Screen Display:
Printer Error (KX-21)
Error on IP (KX-21N)
Error Code
345010.0.0 13
Error Occur
Error Display
Not Ready
HELP key
Help
Error on Built-in Printer
Press the paper guide lever down.
1 Restarting to print
3 Stop printing on built-in printer
To make built-in printer on-line,
press [SELECT], then
[Periph. Settings]
ERR CODE:XXXXX.X.X
1:Printing 2:Paper Feed 3:Cancel
select
3 key
(Paper Feed by 2 key)
1 key
Confirm Paper
NG
OK
Cancel Printer
Connection
Print Sample Data that
Printing is not completed
Main Screen
(Printer unable to use)
Main Screen

6.3.3.3 GP printout error (Abnormal GP) (KX-21N only) 3

Description : Graphic printer is disconnected, is not powered, or the connecting cable is defective or not properly connected.

Function : The system secures printing of measurement results.

Check method : System checks the error-bit of the graphic printer throughout the printing process.

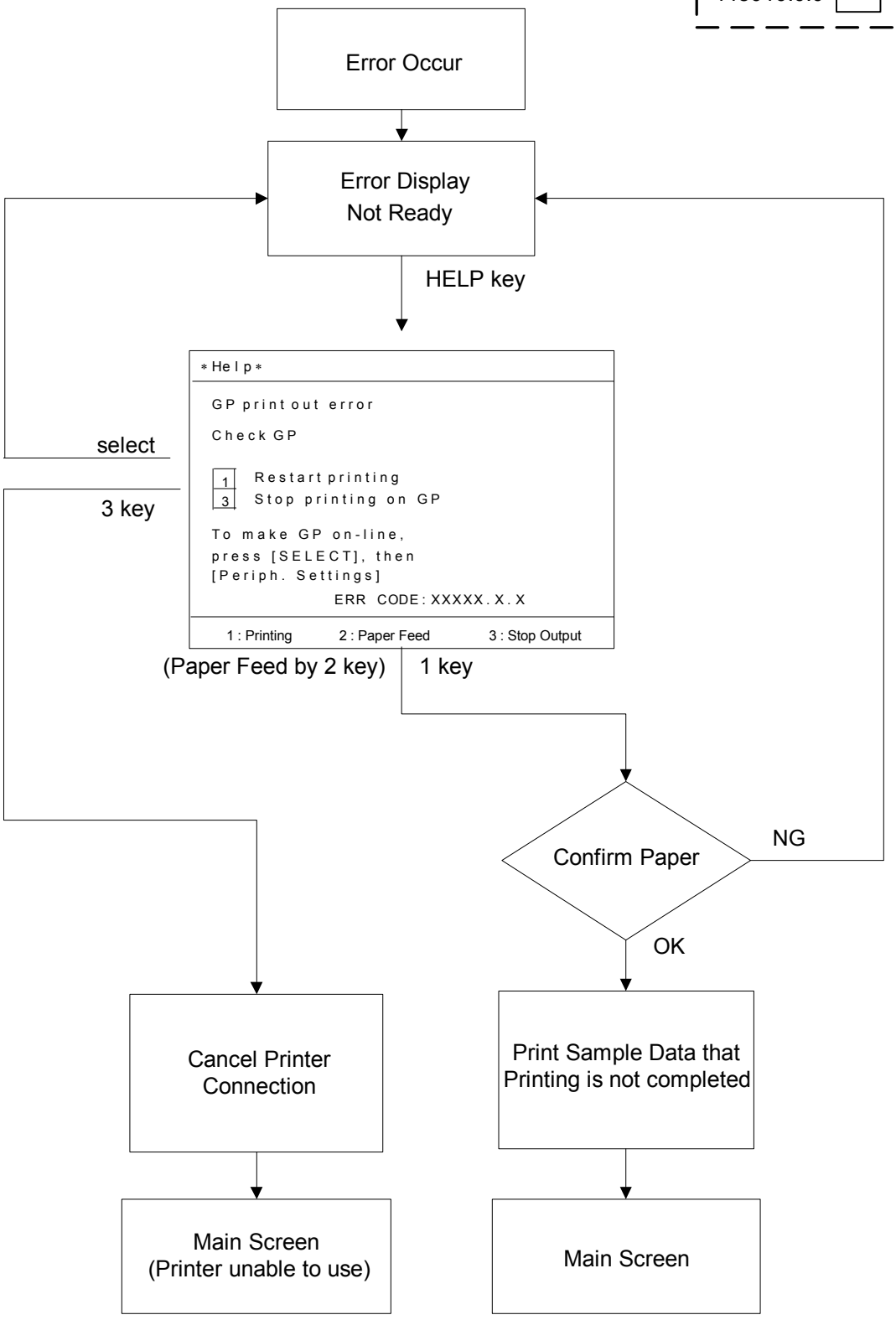
KX-21's action : (1) System starts sounding alarm and displays the error message on the LCD when a printer error is detected.

(2) System waits for the [HELP] key entry after the sequence for the aspirated sample has completed. If the error recovers after the [HELP] key is pressed, graphic printer prints the data which has been paused. After the data is normally printed, system exits from the error.

NOTE: When [3] key is pressed on the HELP screen, error monitoring for the graphic printer is canceled. The GP/LP print out is not possible, but the sample analysis is possible.

Screen Display:
Abnormal GP (KX-21N)

Error Code
448010.0.0 13



6.3.3.4 GP Paper Empty (Abnormal GP) (KX-21N only) 3

Description : Graphic printer is out of paper.

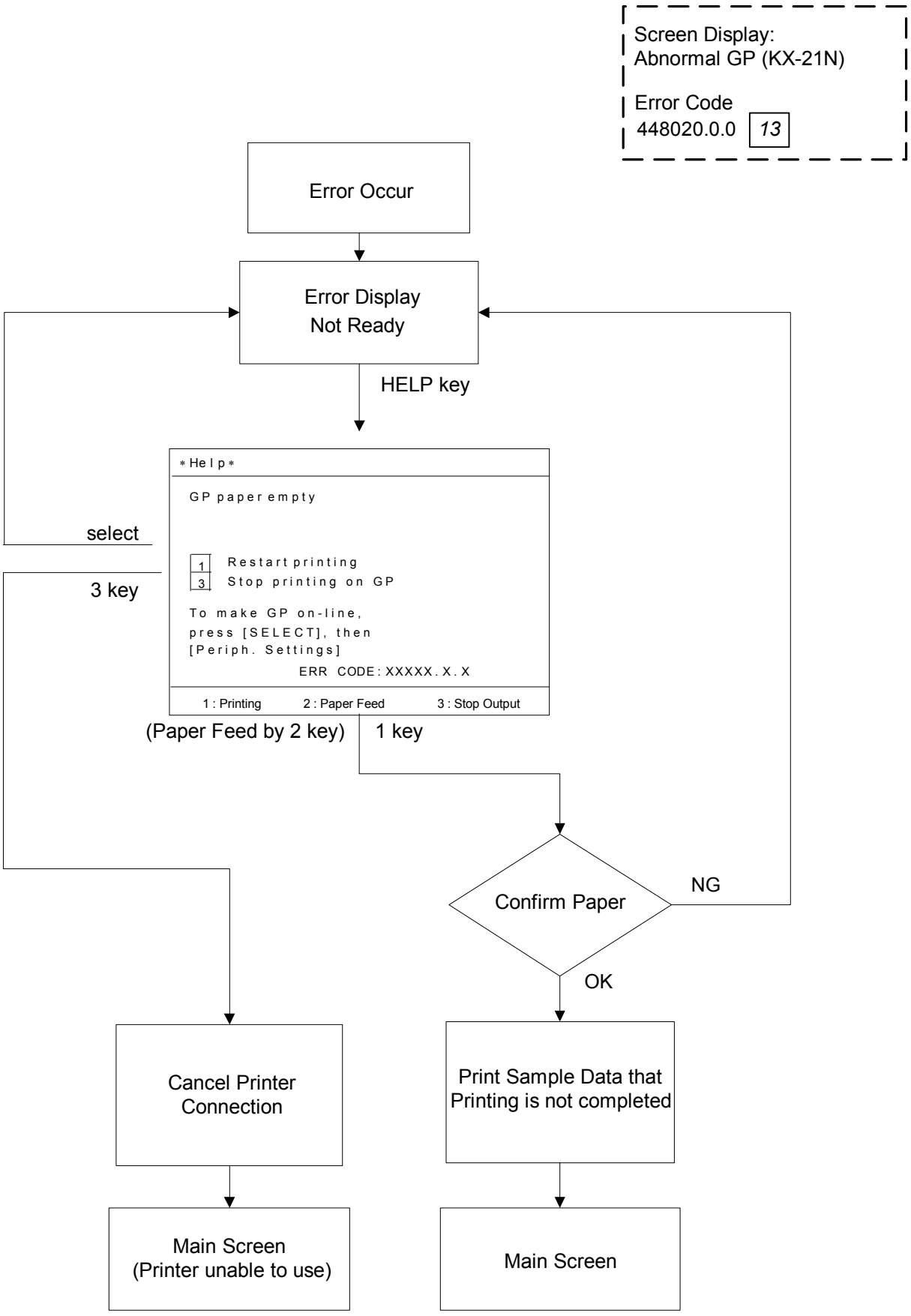
Function : The system secures printing of measurement results.

Check method : System checks the paper-empty bit of the graphic printer throughout the printing process.

KX-21's action : (1) System starts sounding alarm and displays the error message on the LCD when a printer error is detected.

(2) System waits for the [HELP] key entry after the sequence for the aspirated sample has completed. If the error recovers after the [HELP] key is pressed, graphic printer prints the data which has been paused. After the data is normally printed, system exits from the error.

NOTE: When [3] key is pressed on the HELP screen, error monitoring for the graphic printer is canceled. The GP/LP print out is not possible, but the sample analysis is possible.


Screen Display:
Abnormal GP (KX-21N)
Error Code
448020.0.0 13
Error Occur
Error Display
Not Ready
HELP key
Help
GP paper empty
select
1 Restart printing
3 Stop printing on GP
3 key
To make GP on-line,
press [SELECT], then
[Periph. Settings]
ERR CODE: XXXXX.X.X
1 : Printing
2 : Paper Feed
3 : Stop Output
(Paper Feed by 2 key)
1 key
Confirm Paper
NG
OK
Cancel Printer
Connection
Print Sample Data that
Printing is not completed
Main Screen
(Printer unable to use)
Main Screen

6.3.3.5 DP printout error (Abnormal DP) (KX-21N only) 3

Description : Data printer is disconnected, is not powered, or the connecting cable is defective or not properly connected.

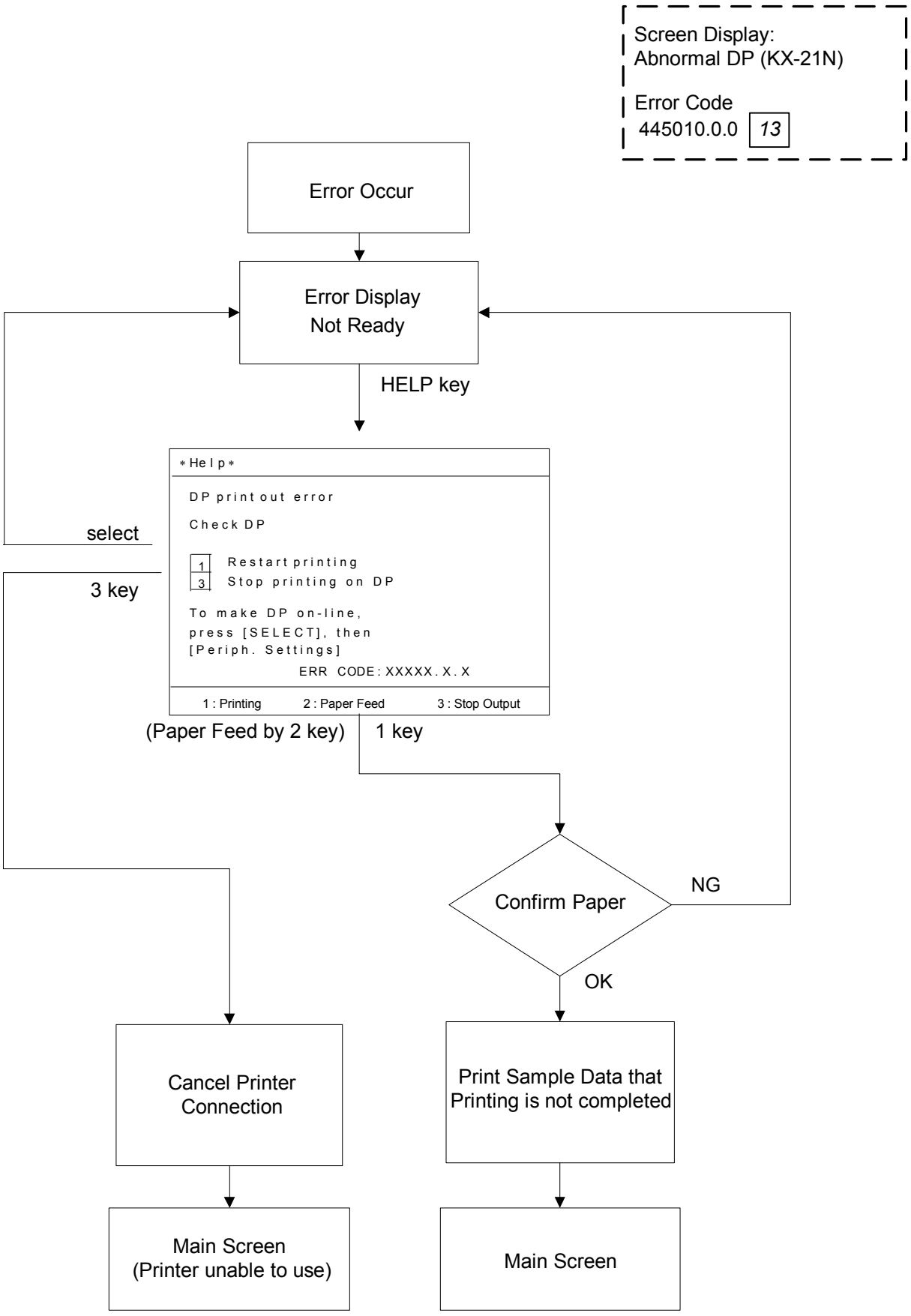
Function : The system secures printing of measurement results.

Check method : System checks the error-bit of the data printer throughout the printing process.

KX-21's action : (1) System starts sounding alarm and displays the error message on the LCD when a printer error is detected.

(2) System waits for the [HELP] key entry after the sequence for the aspirated sample has completed. If the error recovers after the [HELP] key is pressed, data printer prints the data which has been paused. After the data is normally printed, system exits from the error.

NOTE: When [3] key is pressed on the HELP screen, error monitoring for the data printer is canceled. The DP print out is not possible, but the sample analysis is possible.


Screen Display:
Abnormal DP (KX-21N)
Error Code
445010.0.0 13
Error Occur
Error Display
Not Ready
HELP key
Help
DP print out error
Check DP
1 Restart printing
3 Stop printing on DP
To make DP on-line,
press [SELECT], then
[Periph. Settings]
ERR CODE: XXXXX.X.X
1 : Printing
2 : Paper Feed
3 : Stop Output
select
3 key
(Paper Feed by 2 key)
1 key
Confirm Paper
NG
OK
Cancel Printer
Connection
Print Sample Data that
Printing is not completed
Main Screen
(Printer unable to use)
Main Screen

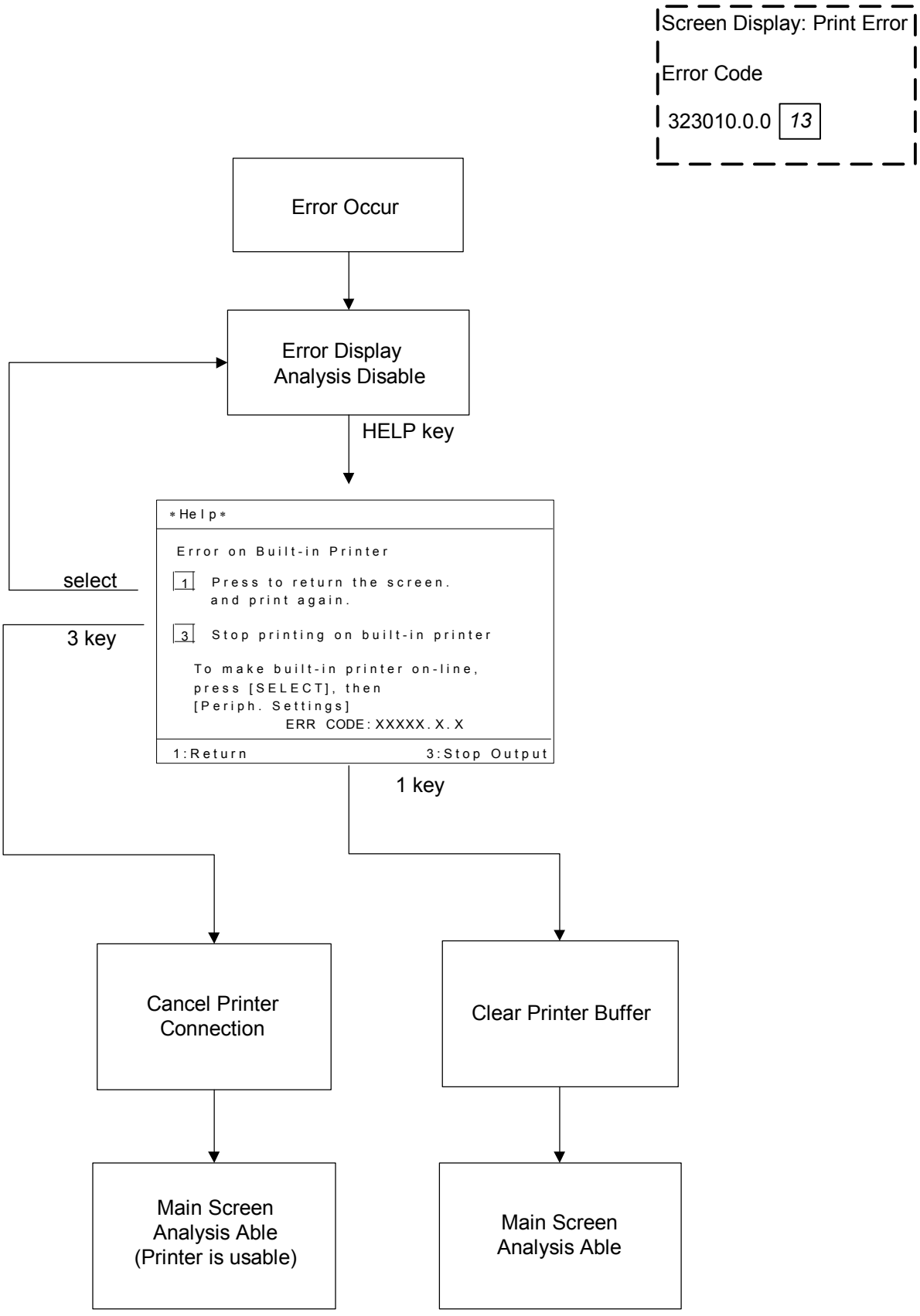
6.3.3.6 Print Error (KX-21 only) 3

Description : The main CPU detects an error in the data output program and data cannot be printed on the Data Printer.

Function : System ensures that data is printed correctly on the Data Printer.

Check method : System checks whether the work memory can be reserved for printing the data.

KX-21's action : Subsequent operations are disabled. The error is reset by turning OFF the power switch.


Screen Display: Print Error
Error Code
323010.0.0 13
Error Occur
Error Display
Analysis Disable
HELP key
Help
Error on Built-in Printer
1 Press to return the screen.
and print again.
3 Stop printing on built-in printer
To make built-in printer on-line,
press [SELECT], then
[Periph. Settings]
ERR CODE: XXXXX.X.X
1:Return
3:Stop Output
select
3 key
1 key
Cancel Printer
Connection
Clear Printer Buffer
Main Screen
Analysis Able
(Printer is usable)
Main Screen
Analysis Able

6.3.4 Motor

6.3.4.1 Rinse Motor Error [Rinse Motor Function Error]

Description : The rinse cup operation is abnormal. The rinse cup is at the lower position when the power turns ON.

Function : System prevents blood and rinsing solution from splashing when cleaning the whole blood aspiration pipette. System also eliminates carryover from the previous sample. In addition, system secures that the manual pipette does not get bent.

Check method :

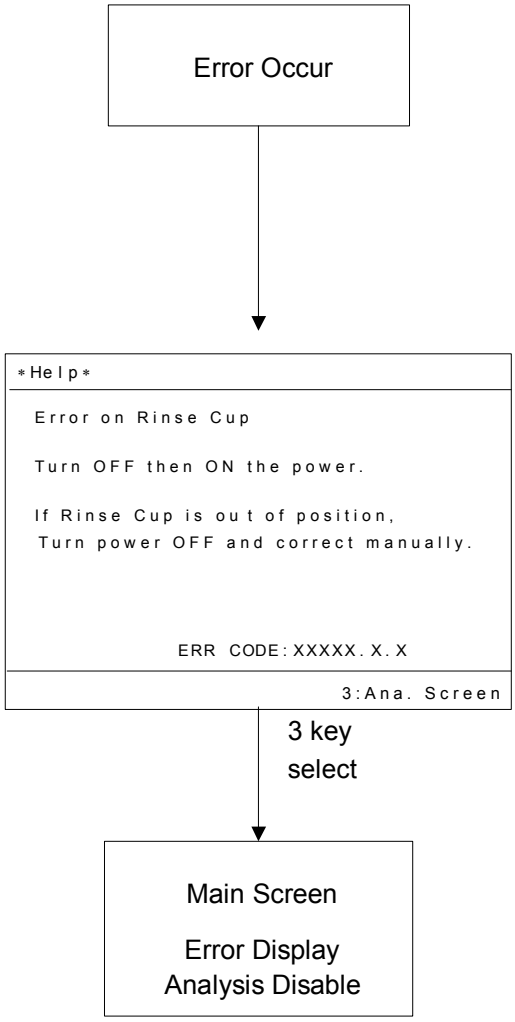
When the power is turned ON	: System confirms that the rinse cup is not at the lower position when the power turns ON.
When starting up	: System monitors whether the rinse cup reaches the lower limit at the timing described in the timing chart is checked, by confirming that the photo-interrupter at the lower limit is ON. During the rinse cup operation test, an error is also issued if the motor is still active 1.6 seconds after the rinse cup starts ascending.
During analysis	: System confirms that the rinse cup reaches the lower limit at 9 seconds after starting up.

KX-21's action : System waits for the [HELP] key entry after the sequence for the aspirated sample has completed. System enters the ready mode when pipette rinsing operation is performed without an error during starting up. The system disables following operation and waits for powering OFF. Some part of stored data can be performed by pressing the [HELP] key.

Screen Display: Rinse Motor Error

Error Code

131500.0.0 *13*



6.3.5 Temperature

6.3.5.1 Room Temp. High
6.3.5.2 Room Temp. Low

Description : Room temperature is out of the preset limit.

Function : System secures the HCT temperature compensation and PLT S/N (Signal to noise ratio), and avoids blood clotting on the cold agglutinin disease samples. System also secures hemolyzing in WBC samples.

Check method : System monitors A/D converted value of the thermistor installed in the WBC and RBC transducer chambers, and checks the temperature is within the following range.

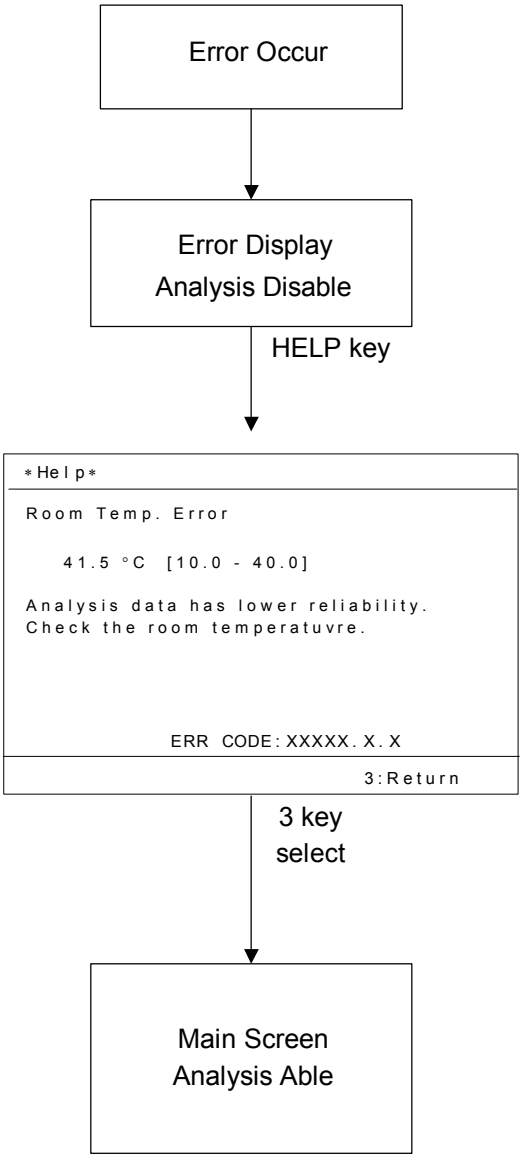
During analysis : For 0.5 seconds before starting the counting. The mean value of the three counted values excluding the maximum and the minimum from the five counted values after turning the Start switch ON should be: From 10.0°C to 40.0°C

KX-21's action : After the sequence for aspirated sample has completed, built-in printer prints the data (the related data is printed normally). System displays the error message then enters the ready mode.

Screen Display: Room Temp. High
Room Temp. Low

Error Code
Room Temp. High
212510. XXXXX. 0 *13*
Room Temp. Low
212520. XXXXX. 0 *13*

XXXXX : Temp. when error occurred
ex) 41.5 °C → 415



6.3.6 Analysis

6.3.6.1 Background Error

Description : Background value of any parameter exceeds the preset limit, and count results will be falsely increased.

Function : System ensures that the background value for all parameters is lower than the preset limit so as not to influence the analysis data.

Check method : System checks that the background value is lower than the following limits. A background error occurs if any parameter of the background value exceeds the preset limit either in the Auto Rinse procedure or in the background check at power ON.

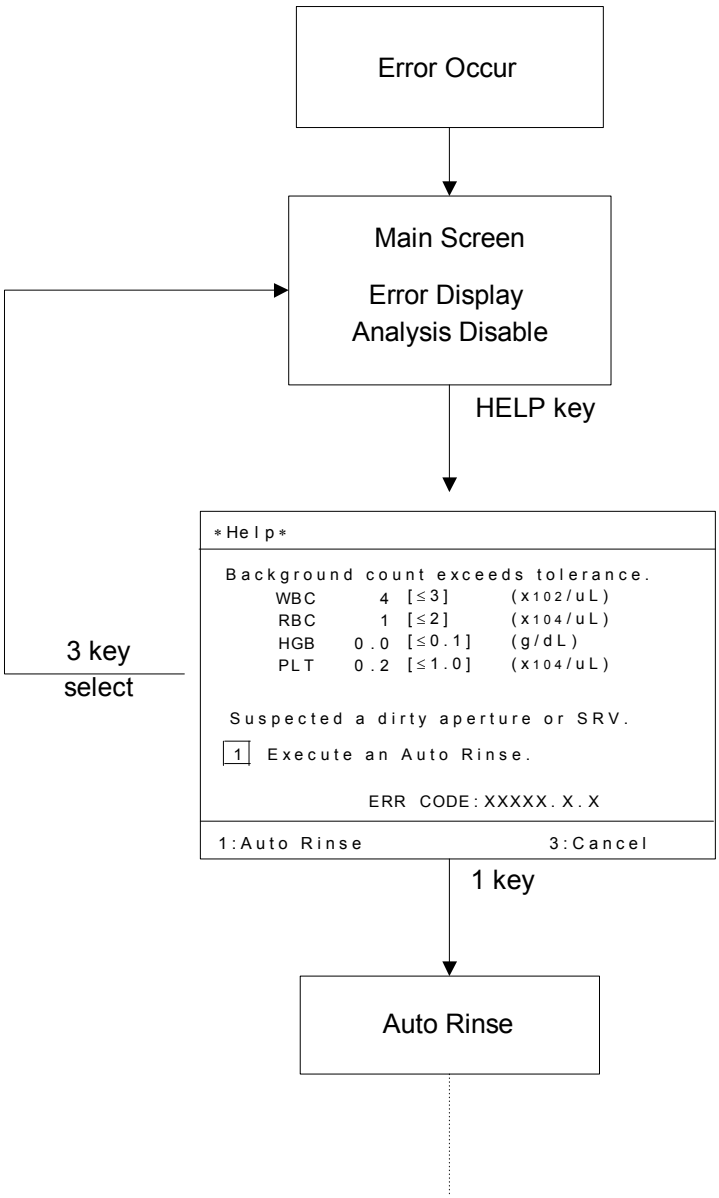
WBC	:	0.3	[$x10^3/\mu L$]
RBC	:	0.02	[$x10^6/\mu L$]
HGB	:	0.1	[g/dL]
PLT	:	10	[$x10^3/\mu L$]

KX-21's action : System displays the error message on LCD then enters the ready mode.

Screen Display: Background Error

Error Code

229010.0.0 13



6.3.6.2 Sampling Error [RBC Sampling Error]

Description : During RBC counting, system detects the abnormal uniformity of the counted cell pulses that is beyond the preset limit.

Function : System monitors uniform cell pulses of RBC sample to monitor clog in the RBC transducer aperture.

Check method : System calculates sampling values every 0.5 seconds during RBC counting. When the maximum value, minimum value, and sum of sampling values satisfy the following equations, system judges that a noise is generated.

$$\frac{\text{(Maximum value - Minimum value - 1250)}}{\text{Sum of sampling values}} \times 100 > 2.0\ [\%]$$

The sampling data range from 3 to 19 (1.0 s - 1.5 s) applies the above formula.

KX-21's action : (1) After the sequence for aspirated sample has completed, built-in printer prints the data (the related data is printed as "*"). System displays the error message then enters the ready mode. The error is cleared.

(2) The count starting level for the sampling value is 25 fL.

6.3.6.3 Sampling Error [PLT Sampling Error]

Description : During PLT counting, system detects the abnormal uniformity of the counted cell pulses that is beyond the preset limit.

Function : System monitors uniform cell pulses of PLT sample to monitor clog in the RBC transducer aperture.

Check method : System calculates sampling values every 0.5 seconds during PLT counting. When the maximum value, minimum value, and sum of sampling values satisfy the following equations, system judges that a noise is generated.

$$\frac{\text{(Maximum value - Minimum value - 100)}}{\text{Sum of sampling values}} \times 100 > 2.0\ [\%]$$

The sampling data range from 3 to 17 (1.0s - 8.5s) applies the above formula. (Sampling data 17: number of the sampling data between 8.0 s and 8.5 s.)

KX-21's action : (1) After the sequence for aspirated sample has completed, built-in printer prints the data (the related data is printed as "*"). System displays the error message then enters the ready mode. The error is cleared.

(2) The count starting level for the sampling value is 2 fL. (However, as for the upper limit, it has been already set by the analog board hardware. Therefore, the data contains much RBC data actually.)

6.3.6.4 Sampling Error [WBC Sampling Error]

Description : During WBC counting, system detects the abnormal uniformity of the counted cell pulses that is beyond the preset limit.

Function : System monitors uniform cell pulses of WBC sample to monitor clog in the WBC transducer aperture.

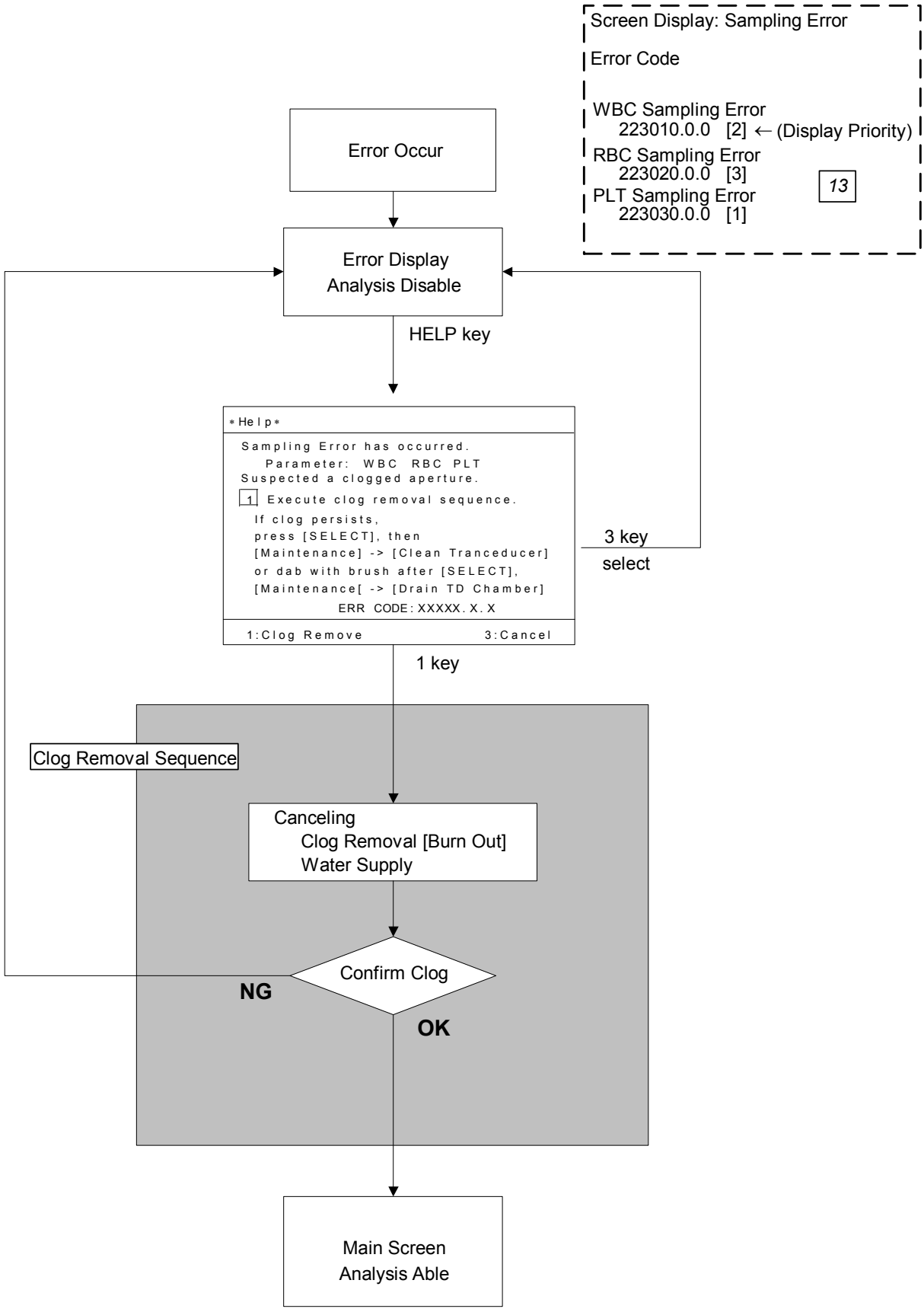
Check method : System calculates sampling values every 0.5 seconds during WBC counting. When the maximum value, minimum value, and sum of sampling values satisfy the following equations, system judges that a noise is generated.

$$\frac{\text{(Maximum value - Minimum value - 200)}}{\text{Sum of sampling values}} \times 100 > 2.0\ [\%]$$

The sampling data range from 3 to 19 (1.0s - 9.5s) applies the above formula.

KX-21's action : (1) After the sequence for aspirated sample has completed, built-in printer prints the data (the related data is printed as "*"). System displays the error message then enters the ready mode. The error is cleared.

(2) The count starting level for the sampling value is 30 fL.



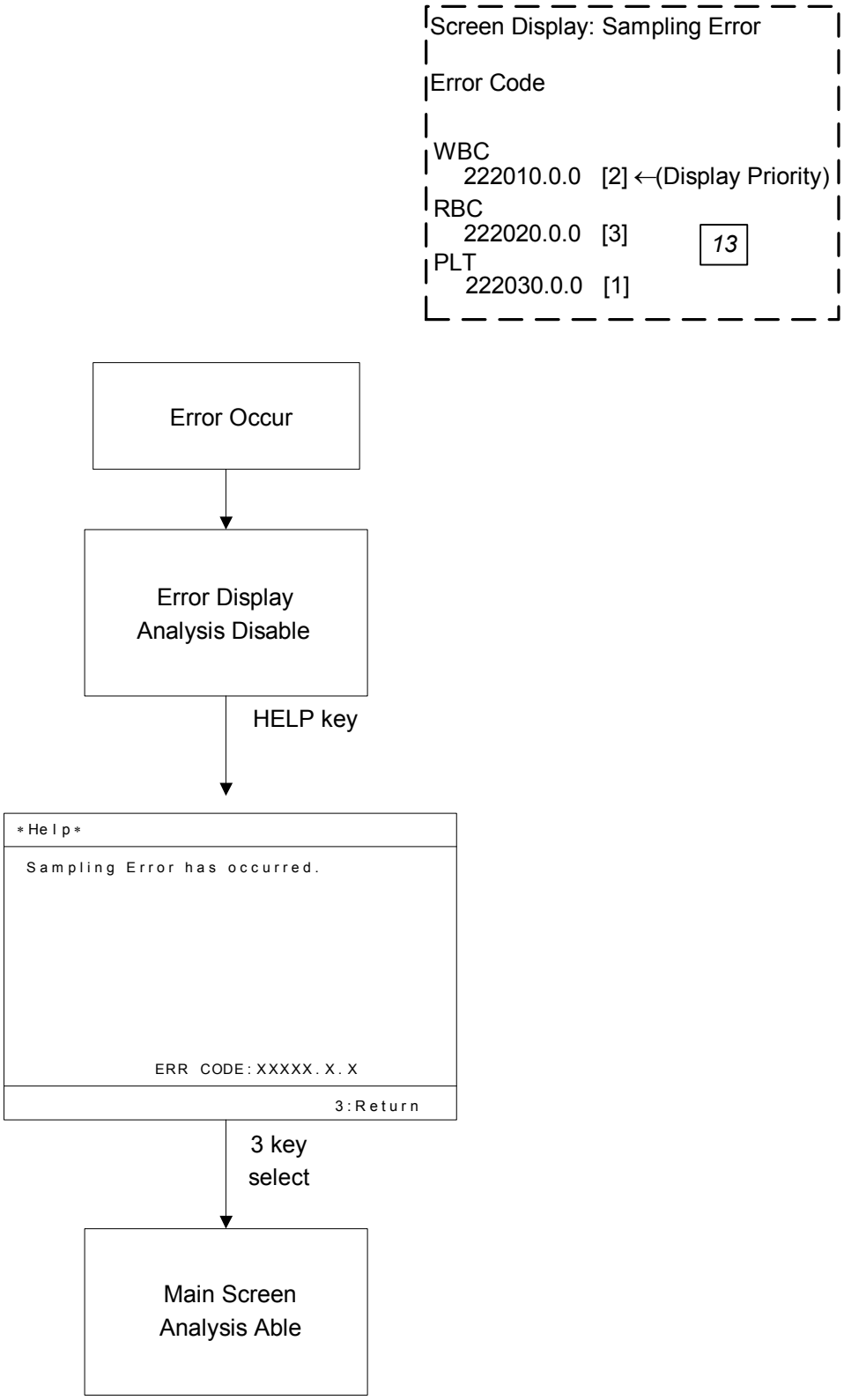
6.3.6.5 Sampling Error [RBC CCSD Noise Error]
6.3.6.6 Sampling Error [PLT CCSD Noise Error]
6.3.6.7 Sampling Error [WBC CCSD Noise Error]

Description : Overrun of A/D converter occurs. Overflow of counter occurs. No clearing the counter is performed.

Function : System secures the counting procedure.

Check method : Judged by status register's contents in gate alley after completing counting.

KX-21's action : After all the sequence for the aspirated samples are completed, built-in printer prints the data (the related data is printed as "*"). System displays the error message then enters the ready mode.


Screen Display: Sampling Error
Error Code
WBC
222010.0.0 [2] ←(Display Priority)
RBC
222020.0.0 [3]
PLT
222030.0.0 [1]
13
Error Occur
Error Display
Analysis Disable
HELP key
＊Help＊
Sampling Error has occurred.
ERR CODE:XXXXX.X.X
3:Return
3 key
select
Main Screen
Analysis Able

6.3.6.8 HGB Error

Description : A/D converted HGB BLANK value or HGB sample value exceeds the preset limit.

Function : System ensures that the HGB value is analyzed without any problem.

Check method : HGB error occurs when the A/D converted HGB BLANK value or HGB sample value satisfies either of the following conditions.
Blank < 50
Blank > 10000
(Sample - Blank) < -50
(Sample - Blank) > 3600

KX-21's action : After the sequence for aspirated sample has completed, built-in printer prints the data (the related data is printed as "*"). System displays the error message then enters the ready mode.

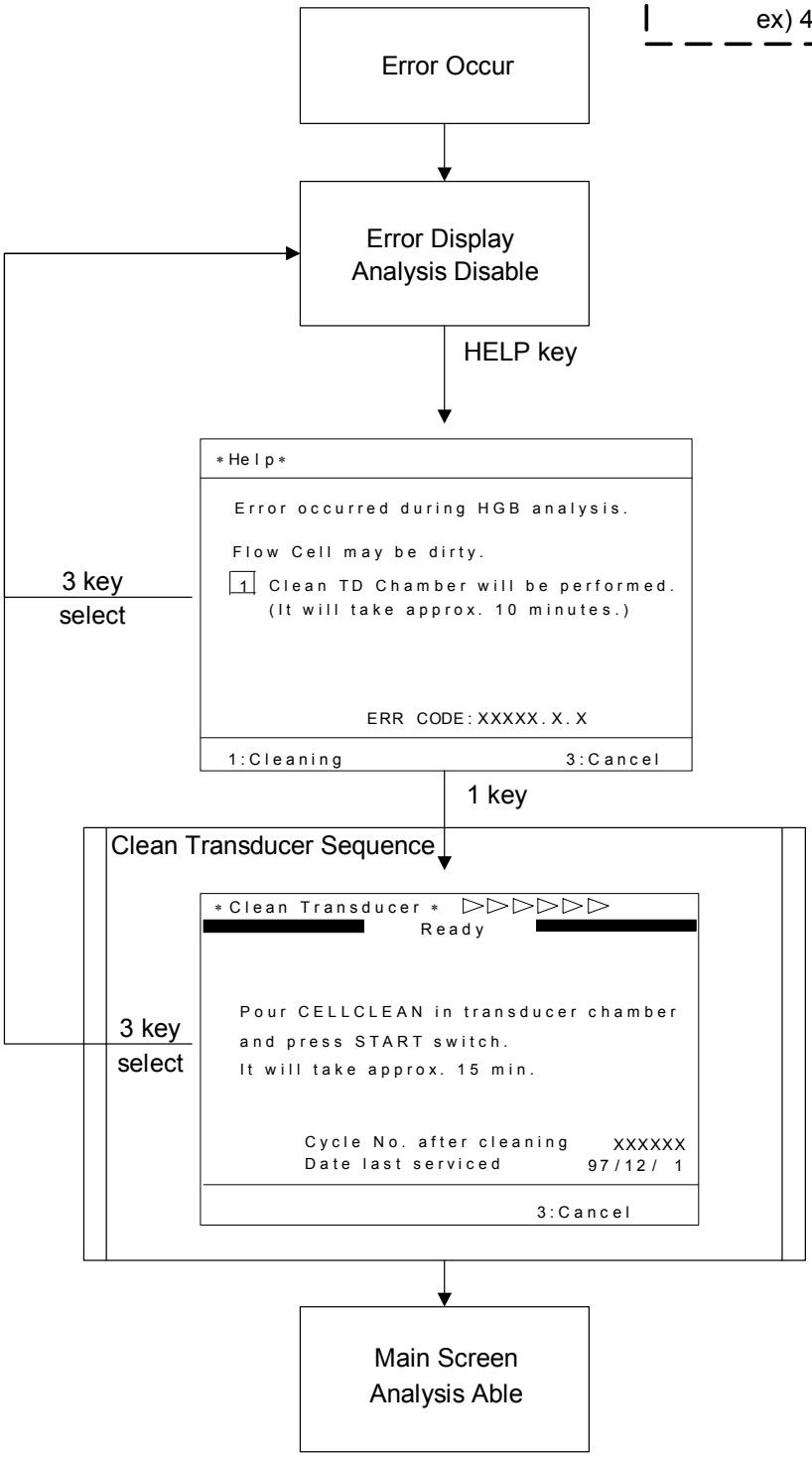
Screen Display: HGB Error

Error Code

225010.XXXXX.ZZZZZ

XXXXX : HGB Converted value (background)
ex) 50 → 50 13

ZZZZZ : HGB Converted value (sample)
ex) 4500 → 4500 13



6.3.6.9 WBC Aperture Clog

Description : The WBC transducer aperture has clogging.

Function : System secures the WBC analysis.

Check method : System monitors the A/D converted value of the clogging signal from the both electrodes at the transducer, and checks the value is within the following range. Also, verify the sampling data at the completion of the counting is within the following range.

During Auto Rinsing: For 0.5 seconds before completion of the background check on the auto rinse, system monitors clogging rate.

Clogging rate: $C \leq 120$

$$C = 3.333 \times 10 \times D \times 5.05/256 - 2.961 \times T_{TD}^2 \times 10^{-2} + 3.376 \times T_{TD} - 6.590 \times 10$$

C: Clogging Rate (integral value, round to decimal point)
D: A/D converted value of the clogging voltage
T_{TD}: Detector block temperature (**.*°C)

During analysis: S_E : Mean value of the three sampling data before the gate OFF
S_H : Mean value of the sampling data 3 - 19 (1.0 - 9.5 s)
$S_E/S_H \geq 0.5$
Sampling data n: number of the sampling data between (n-1)/2 and n/2
Sampling data 3: number of the sampling data between 1.0 s and 1.5 s.
Sampling data 19: number of the sampling data between 9.0 s and 9.5 s.

KX-21's action : After all the sequences for the aspirated samples are completed, the system enters the ready mode. All the related data are masked.

6.3.6.10 RBC Aperture Clog

Description : The RBC transducer aperture has clogging.

Function : System secures the RBC analysis.

Check method : System monitors the A/D converted value of the clogging signal from the both electrodes at the transducer, and checks the value is within the following range. Also, verify the sampling data at the completion of the counting is within the following range.

During Auto Rinsing: For 0.5 seconds before completion of the background check on the auto rinse, system monitors clogging rate.

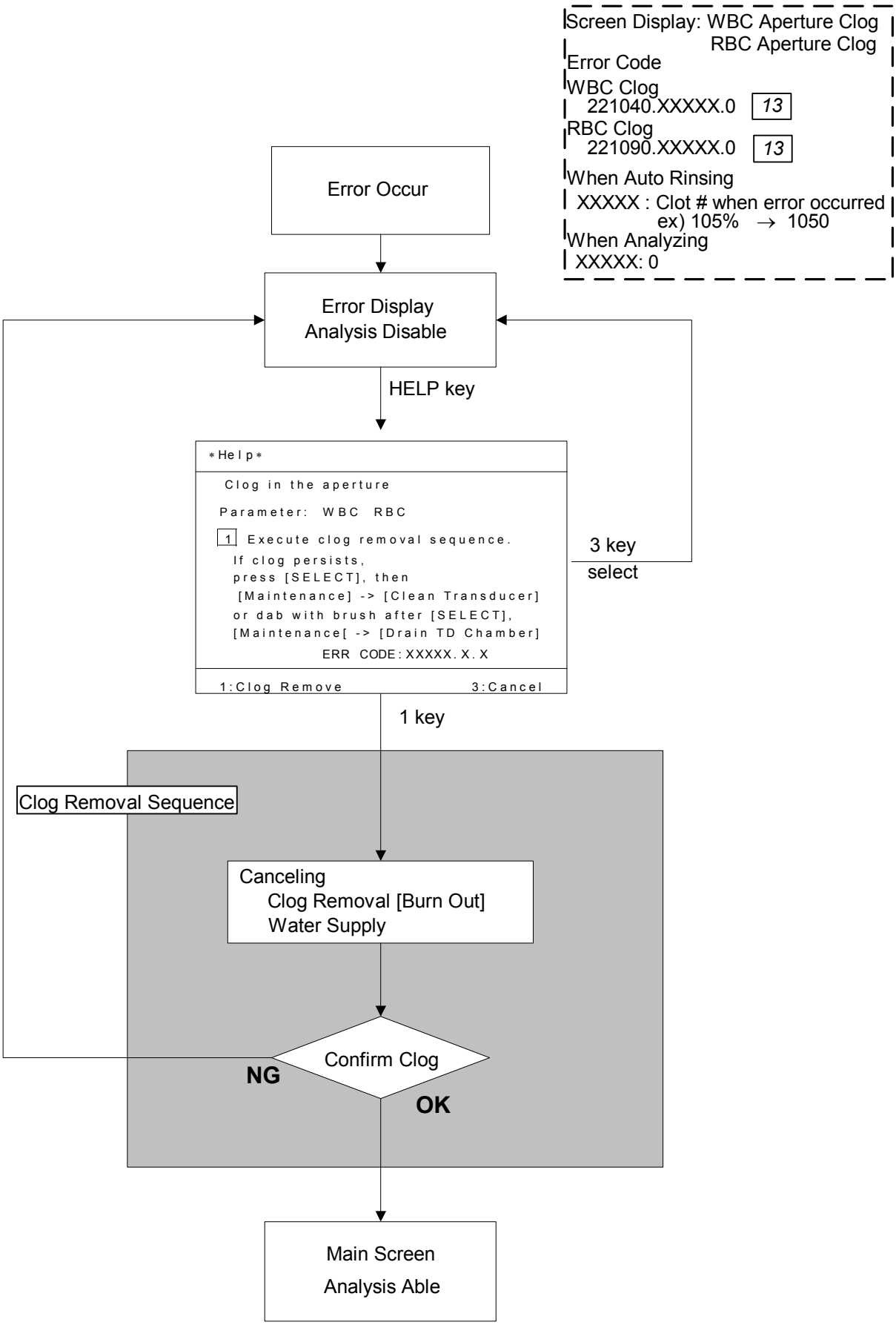
Clogging rate: $C \leq 120$

$$C = 3.333 \times 10 \times D \times 5.05/256 - 2.961 \times T_{TD}^2 \times 10^{-2} + 3.376 \times T_{TD} - 6.590 \times 10$$

C: Clogging Rate (integral value, round to decimal point)
D: A/D converted value of the clogging voltage
T_{TD}: Detector block temperature (**.*°C)

During analysis: S_E : Mean value of the three sampling data before the gate OFF
S_H : Mean value of the sampling data 3 - 19 (1.0 s - 9.5 s)
$S_E/S_H \geq 0.5$

KX-21's action : After all the sequences for the aspirated samples are completed, the system enters the ready mode. All the related data are masked.


Screen Display: WBC Aperture Clog
RBC Aperture Clog
Error Code
WBC Clog
221040.XXXXX.0 13
RBC Clog
221090.XXXXX.0 13
When Auto Rinsing
XXXXX : Clot # when error occurred
ex) 105% → 1050
When Analyzing
XXXXX: 0
Error Occur
Error Display
Analysis Disable
HELP key
Help
Clog in the aperture
Parameter: WBC RBC
1 Execute clog removal sequence.
If clog persists,
press [SELECT], then
[Maintenance] -> [Clean Transducer]
or dab with brush after [SELECT],
[Maintenance[-> [Drain TD Chamber]
ERR CODE: XXXXX.X.X
1:Clog Remove
3:Cancel
3 key
select
1 key
Clog Removal Sequence
Canceling
Clog Removal [Burn Out]
Water Supply
Confirm Clog
NG
OK
Main Screen
Analysis Able

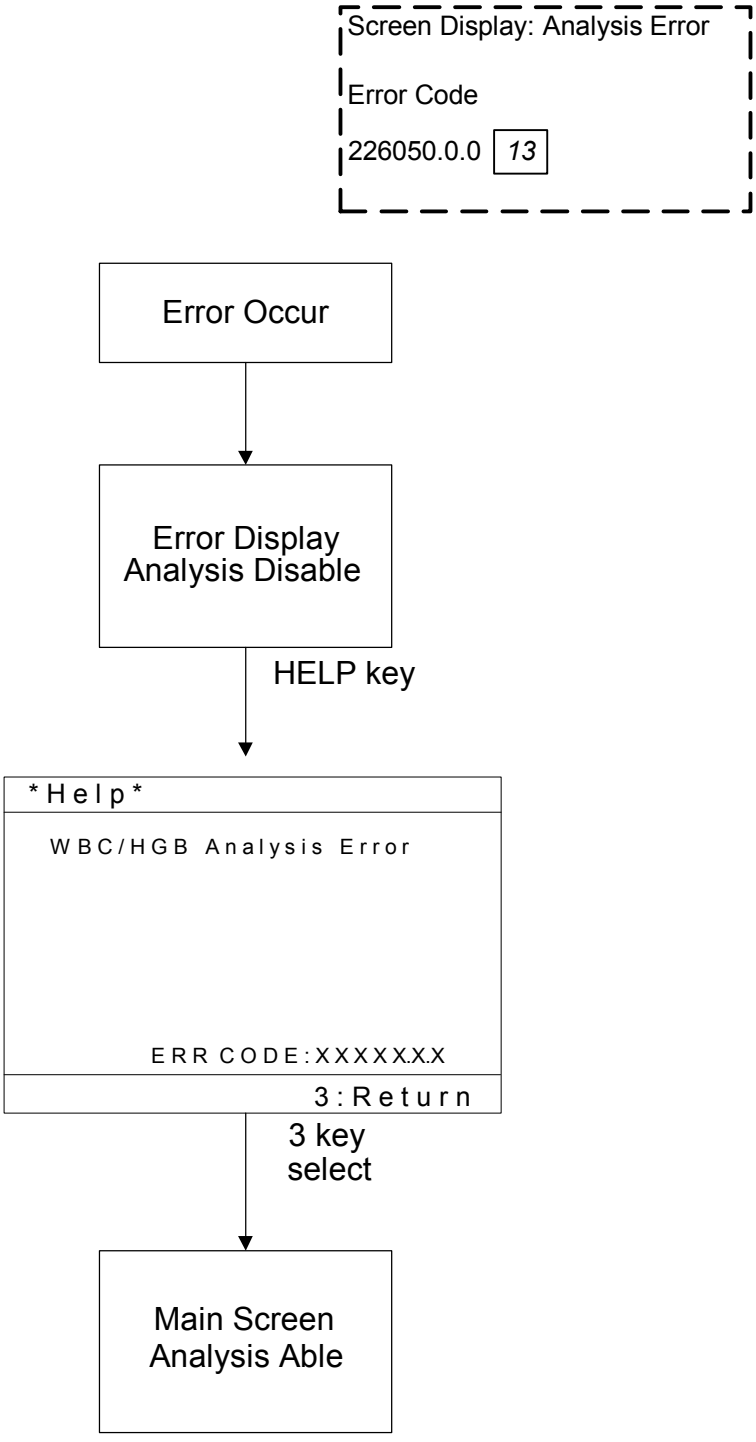
6.3.6.11 Analysis Error [WBC/HGB Error (Tri-modal Particle)]

Description : Tri-modal particle size distribution cannot be correctly divided.

Function : System monitors the counterfeit lyse reagent.

Check method : System verifies that the number of cases when the tri-modal particle size cannot be correctly counted is less than 10 consecutively. (Error occurs when 11 or more abnormal tri-modal samples are counted consecutively.)

KX-21's action : The message [Analysis Error] is displayed and the alarm sounds. The message remains displayed until the error is recovered or the power is turned OFF. There are two types of the data display method.
(1) Level 1: All the tri-modal data are displayed as "---.-".
(2) Level 2: * (low reliability mark) is attached to the obtained bi-modal data and the tri-modal data not analyzed automatically are displayed as "---.-".



6.3.6.12 Analysis Error [Detect Sensitivity Error (Electrical Conductivity)]

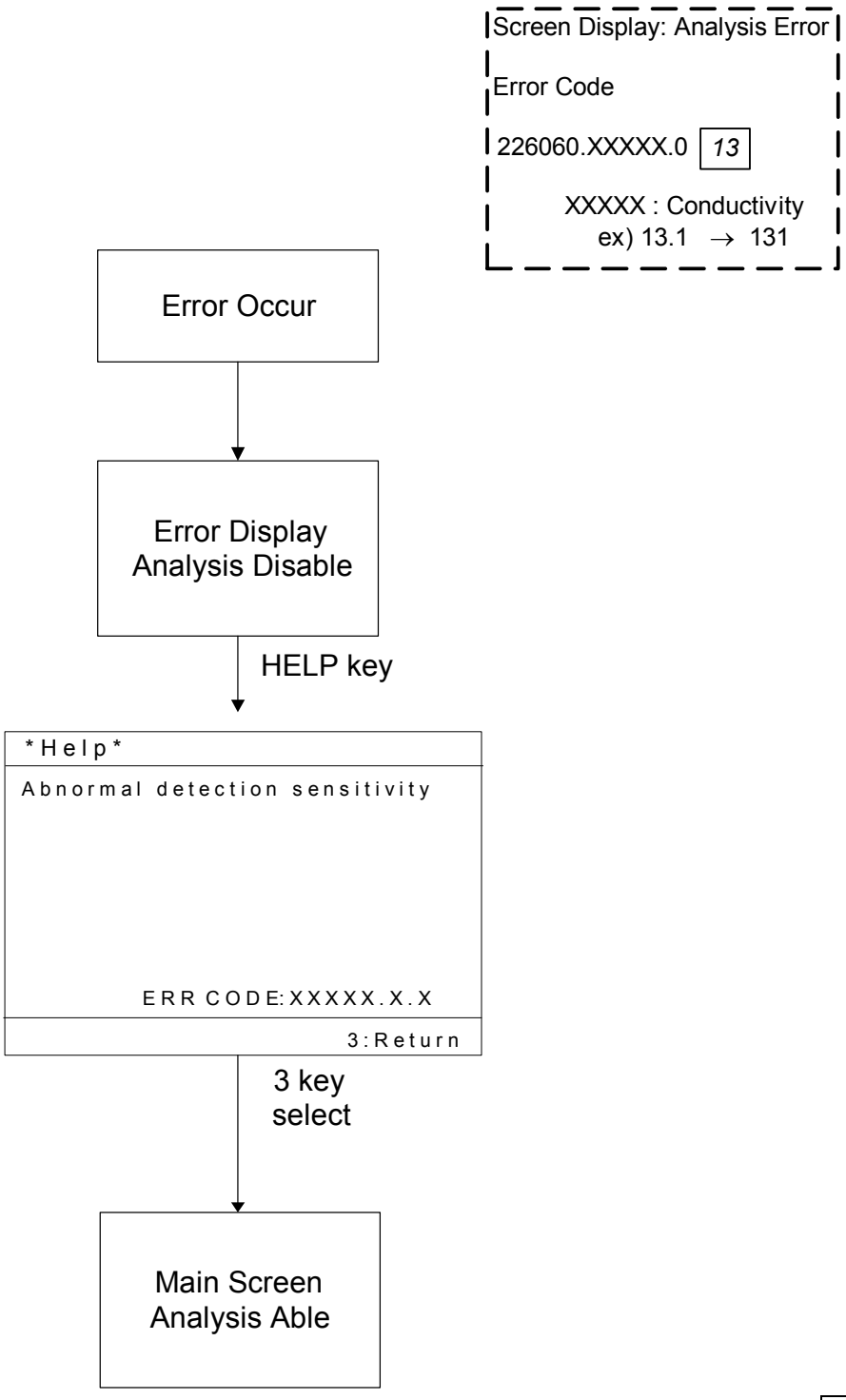
Description : Electrical conductivity gets out of the control limit.

Function : System monitors the counterfeit diluent.

Check method : System verifies that the clogging rate (C) is within the range of ($80 \leq C \leq 125$). A

KX-21's action : The message [Analysis Error] is displayed and the alarm sounds. The message remains displayed until the error is recovered or the power is turned OFF. There are two types of the data display method.
(1) Level 1: HCT and MCV data are displayed as "---.-".
(2) Level 2: * (low reliability mark) is attached to the HCT and MCV data.

A **NOTE:** During Shutdown sequence, [RBC Aperture Clog] occurs at the same time.



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6.3.7 Memory

6.3.7.1 Memory Error [RAM Error]

Description : The main CPU detects an error to access the RAM (Random Access Memory).

Function : System ensures that the main CPU accesses the RAM without any problem.

Check method : System writes test data to a certain address at power-on, and checks whether the same data is read later. System repeats the same check procedure sequentially for every RAM address.

KX-21's action : System stops the operation immediately. The error is reset by turning OFF the power switch.

6.3.7.2 Memory Error [ROM Error]

Description : The main CPU detects an error to read data from ROM (Read Only Memory).

Function : System ensures that the main CPU reads the program from the ROM correctly.

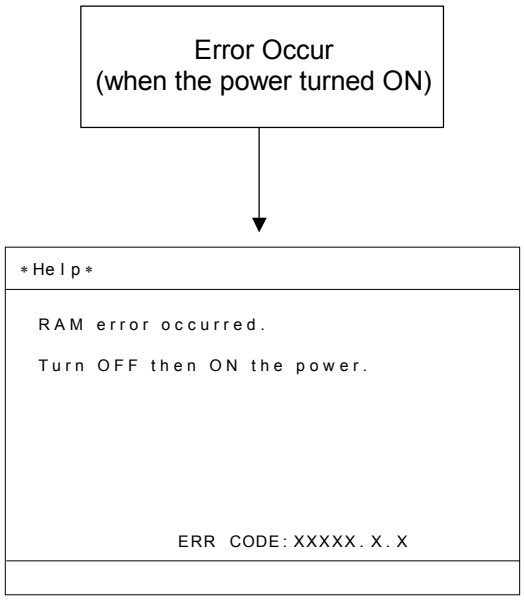
Check method : System performs a ROM checksum (reads data from the entire area, calculates the total, and finds the 8 low order bits). Then, system checks that the value matches the checksum value stored in the ROM.

KX-21's action : System stops the operation immediately. The error is reset by turning OFF the power switch.

Screen Display: Memory Error

Error Code

RAM Error
321050.0.0 *13*
ROM Error
321010.0.0 *13*



* Alarm doesn't stop

6.3.7.3 Setup Data Error

Description : The main CPU detects an error to read data from EEPROM (Electric Erasable Programmable Read Only Memory).

Function : System ensures that setting values are written and read correctly.

Check method : System performs a checksum in a data area and compares the calculated value with the checksum value stored in the EEPROM.

KX-21's action : System initializes the mismatched value of the data area to the factory default values. The data areas are separated as shown below.
- Block 1: User setting value
- Block 10: Production service setting value

Screen Display: Set Value Error

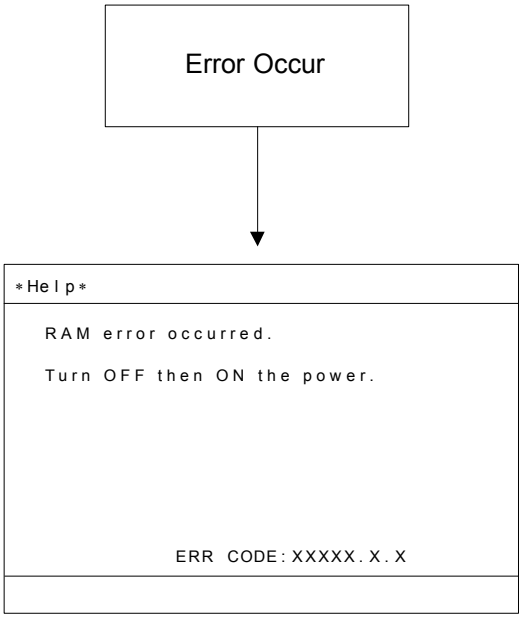
Error Code

321060.XXXXX.0 *13*

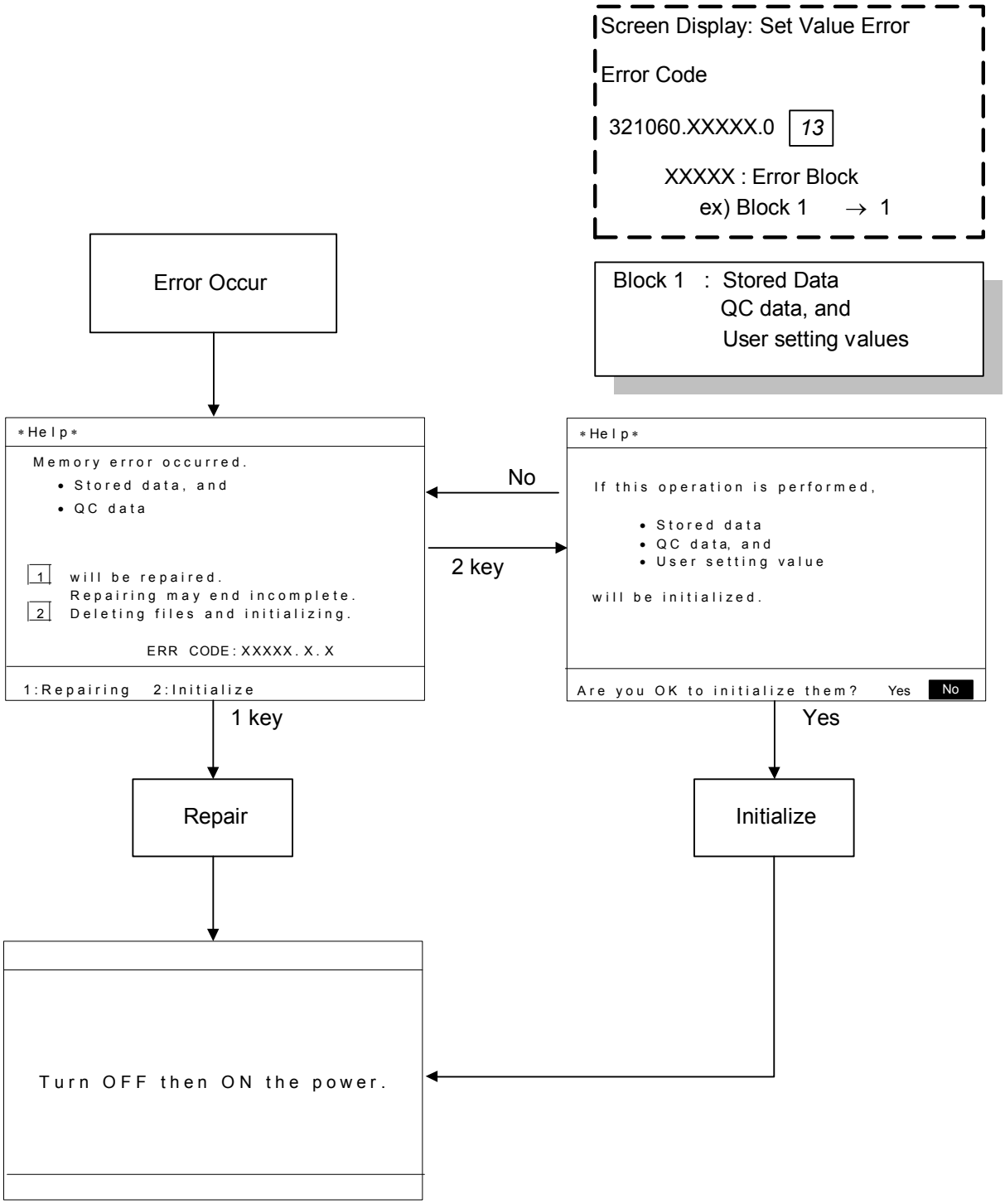
XXXXX : Error Block
ex) Block 10 → 10
Block 1 and 10 → 11

Block 1 : Stored Data
QC data, and
User setting values

Block 10 : Factory, Service
Setting values



∗ Alarm doesn't stop


Screen Display: Set Value Error
Error Code
321060.XXXXX.0 13
XXXXX : Error Block
ex) Block 1 → 1
Error Occur
Block 1 : Stored Data
QC data, and
User setting values
Help
Memory error occurred.
• Stored data, and
• QC data
1 will be repaired.
Repairing may end incomplete.
2 Deleting files and initializing.
ERR CODE: XXXXX.X.X
1:Repairing 2:Initialize
No
2 key
Help
If this operation is performed,
• Stored data
• QC data, and
• User setting value
will be initialized.
Are you OK to initialize them? Yes No
1 key
Yes
Repair
Initialize
Turn OFF then ON the power.

6.3.8 Host Output

6.3.8.1 HOST Comm. Error

Description : The communication with Host Computer is failed. The analysis result cannot be transmitted to HOST. There are three types of HOST communication error (Offline, Time Out, NAK Retry).

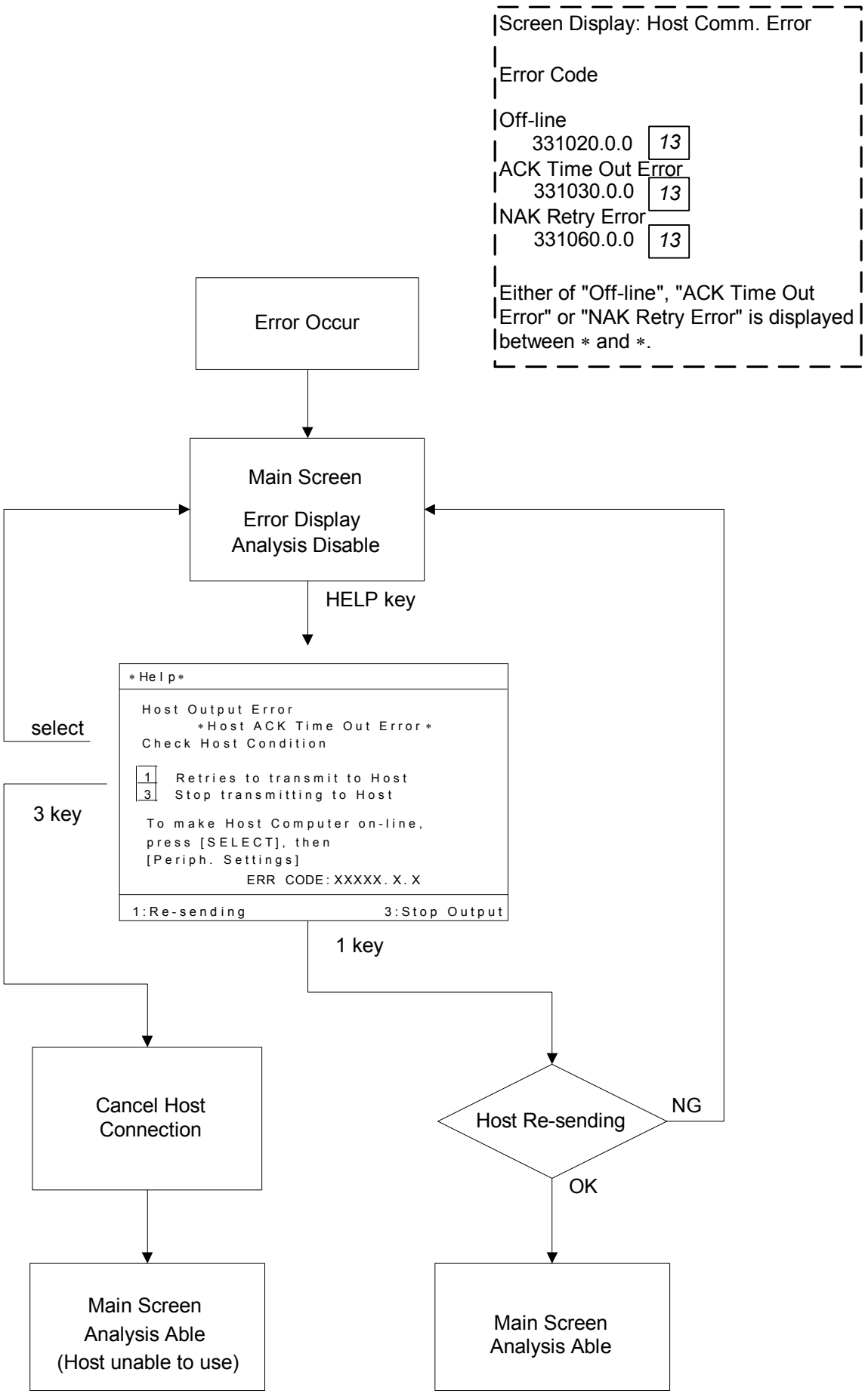
Function : System ensures that data is transferred to the host computer without any error.

Check method : System checks that the communication with Host Computer is succeeded.

KX-21's action : (1) System starts sounding alarm and displays the error message on the LCD when a communication error is detected.
(2) System waits for the [HELP] key entry, then [1] (retry) or [3] (cancel) key entry.

[1] Retry: Data is transferred again. If system received an ACK, system returns to the ready mode. If system received a NAK again, the same error is issued.
[3] Cancel: System stops transferring data. System disables the host connection setting and returns to the ready mode.

IMPORTANT: Data will not be transferred to the host computer until the host setting is changed.


Screen Display: Host Comm. Error
Error Code
Off-line
331020.0.0 13
ACK Time Out Error
331030.0.0 13
NAK Retry Error
331060.0.0 13
Either of "Off-line", "ACK Time Out Error" or "NAK Retry Error" is displayed between ∗ and ∗.
Error Occur
Main Screen
Error Display
Analysis Disable
HELP key
∗Help∗
Host Output Error
∗Host ACK Time Out Error∗
Check Host Condition
1 Retries to transmit to Host
3 Stop transmitting to Host
To make Host Computer on-line, press [SELECT], then [Periph. Settings]
ERR CODE:XXXXX.X.X
1:Re-sending
3:Stop Output
select
3 key
1 key
Cancel Host Connection
Host Re-sending
NG
OK
Main Screen
Analysis Able
(Host unable to use)
Main Screen
Analysis Able

6.3.8.2 HOST Comm. Error 2 3

(Reserved. The related program has not been available yet.)

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6.3.9 QC

6.3.9.1 QC Error [L-J Control Error]

Description : The main CPU detects a situation that an L-J control error occurred.

Function : System ensures that the main unit is under the quality control and the data has been out of the control limits.

Check method : Statistically performs quality control using the weighted data of normal samples as the control data. If the data is not within the control limit, it is assumed to be the L-J control error.

KX-21's action : After all the sequences for the aspirated samples are completed, the system enters the ready mode. The analysis data is effective.

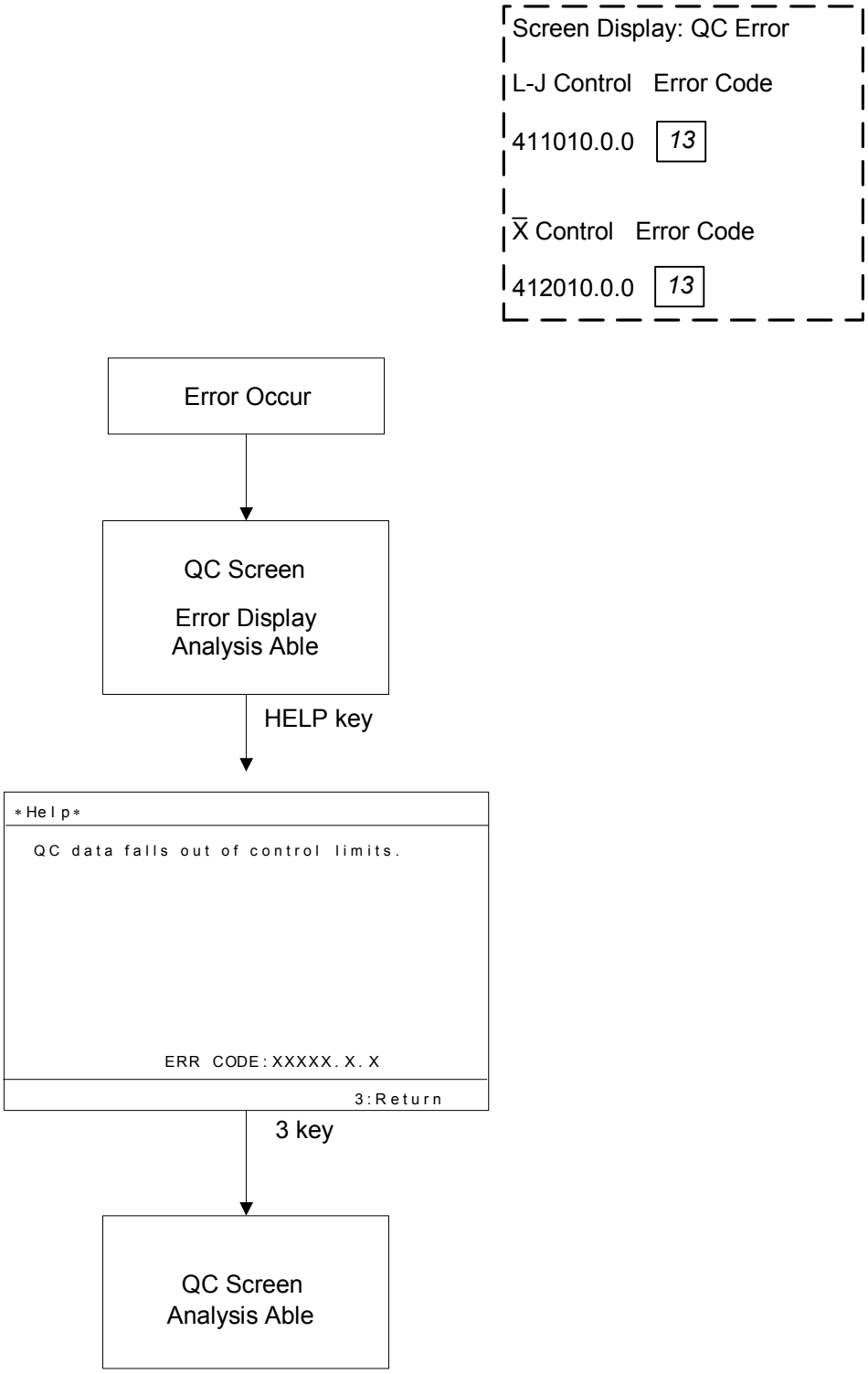
6.3.9.2 QC Error [$\overline{X}$ Control Error]

Description : The main CPU detects a situation that an $\overline{X}$ control error occurred.

Function : System ensures that the main unit is under the quality control and the data has been out of the control limits.

Check method : Statistically performs quality control using the average of control blood data of analyzed twice in a row as the control data. If the data is not within the control limit, it is assumed to be the X control error.

KX-21's action : After all the sequences for the aspirated samples are completed, the system enters the ready mode. The analysis data is effective.

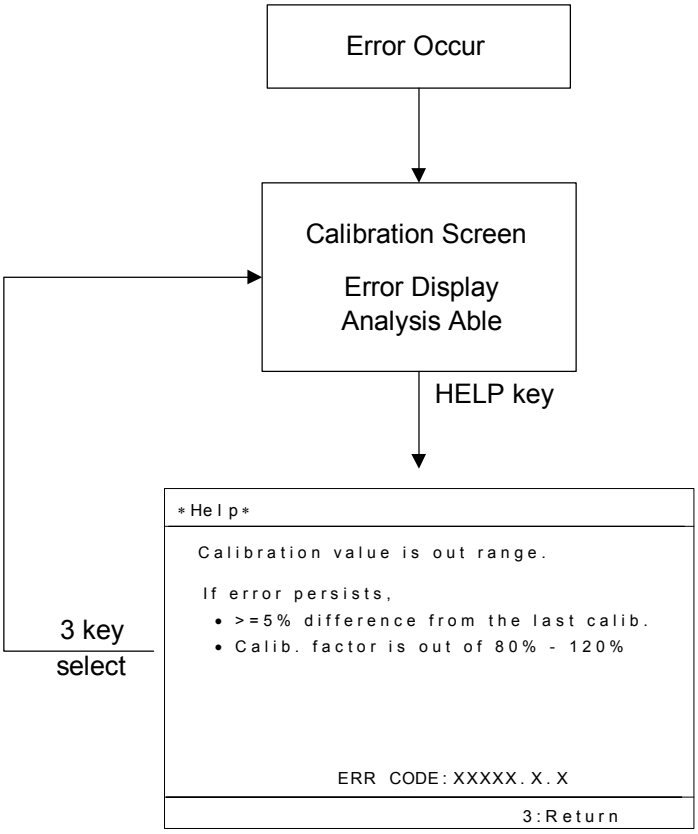

Screen Display: QC Error
L-J Control Error Code
411010.0.0 13
X̄ Control Error Code
412010.0.0 13
Error Occur
QC Screen
Error Display
Analysis Able
HELP key
Help
QC data falls out of control limits.
ERR CODE:XXXXX.X.X
3:Return
3 key
QC Screen
Analysis Able

6.3.9.3 Calibration Error

Description	:	The calibration is performed with much change in values by once.
Function	:	System ensures that the calibration cannot be performed more than specified.
Check method	:	System checks the error when the calibration change between new and old exceeds 5% or the calibration change exceeds from 80% to 120%.
KX-21's action	:	When the error occurs, the alarm sounds and the input setting value becomes ineffective.

Screen Display:
Calibration Error

Error Code
418010.0.0 13



6.3.10 Maintenance

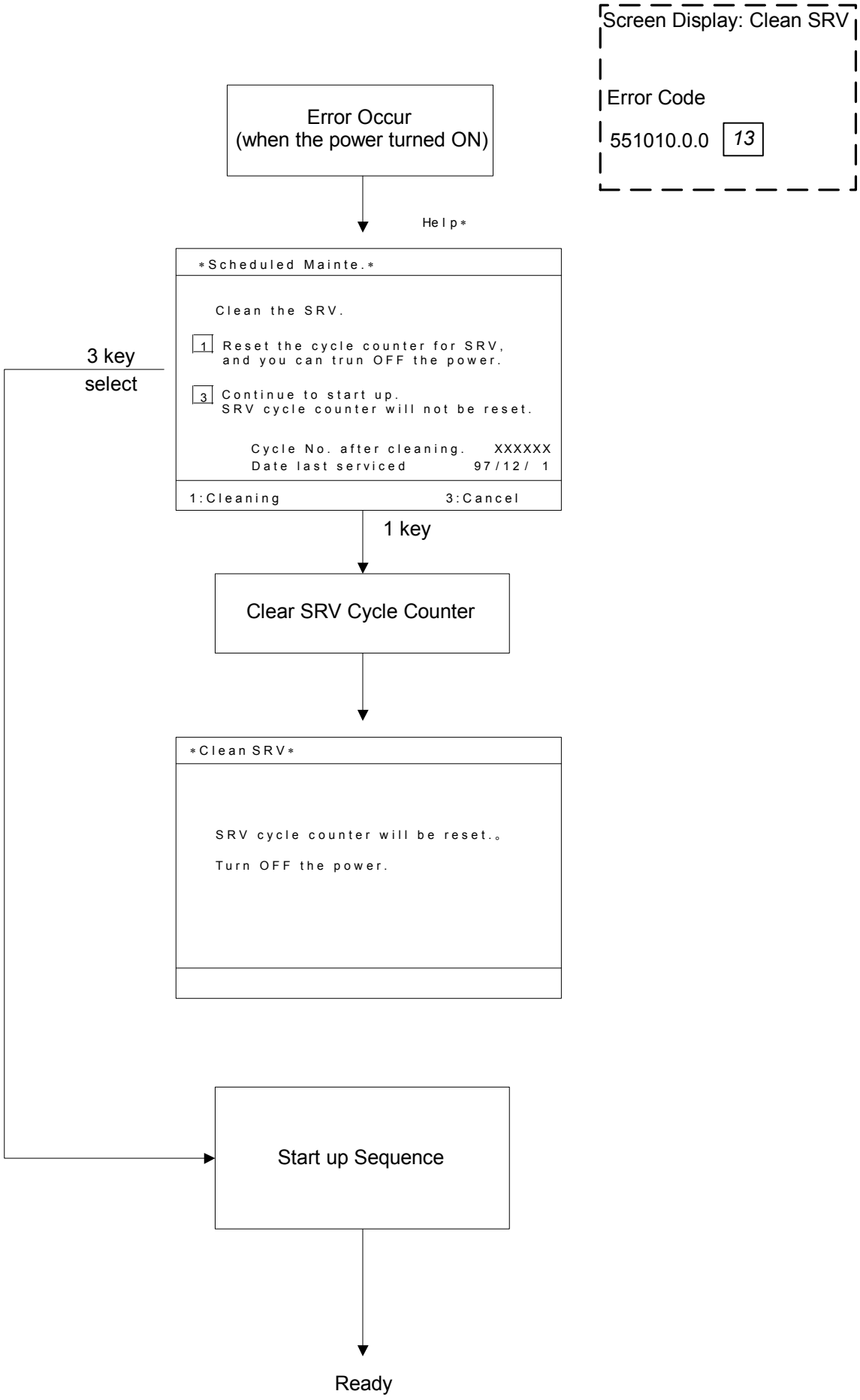
6.3.10.1 Clean SRV

Description : The main CPU detects a situation that the cycle counter reaches the preset value. It is the time to clean the SRV.

Function : System alerts the operator to clean the SRV.

Check method : System checks cycle count at power ON. When the SRV cycle count reaches 7500 or passes 3 months, this message is printed on the built-in printer. The cycle count increments by 1 for every execution of analysis sequence.

KX-21's action : System only print the message and could be operate the system as usual. The cycle count can be reset on the select menu in the maintenance mode.


Screen Display: Clean SRV
Error Code
551010.0.0 13
Error Occur
(when the power turned ON)
Help*
Scheduled Mainte.
Clean the SRV.
1 Reset the cycle counter for SRV,
and you can trun OFF the power.
3 Continue to start up.
SRV cycle counter will not be reset.
Cycle No. after cleaning. XXXXXX
Date last serviced 97/12/ 1
1:Cleaning
3:Cancel
3 key
select
1 key
Clear SRV Cycle Counter
Clean SRV
SRV cycle counter will be reset.。
Turn OFF the power.
Start up Sequence
Ready

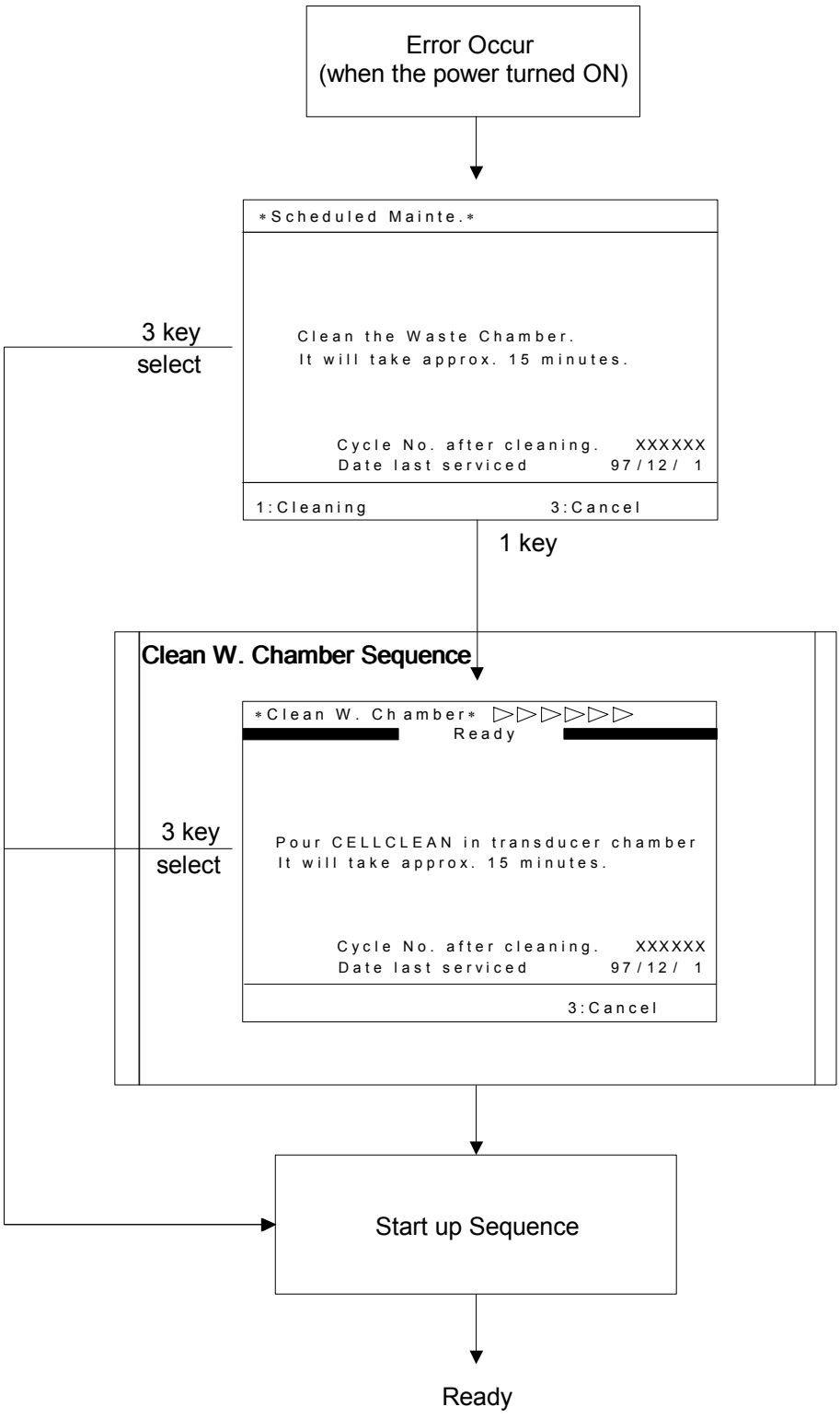
6.3.10.2 Clean W. Chamber (Clean Waste Chamber.)

Description	:	The main CPU detects a situation that the cycle counter reaches the preset value. It is the time to clean the waste chamber.
Function	:	System alerts the operator to clean the waste chamber.
Check method	:	System checks cycle count at power ON. When the waste chamber cycle count reaches 2500 or passes a month, this message is printed on the built-in printer. The cycle count increments by 1 for every execution of analysis sequence.
KX-21's action	:	System only print the message and could be operate the system as usual. The cycle count can be reset on the select menu in the maintenance mode.

Screen Display:
Clean W. Chamber

Error Code

511030.0.0 13



6.3.10.3 Clean Transducer

Description	:	The main CPU detects a situation that the cycle counter reaches the preset value. It is the time to clean the transducer.
Function	:	System alerts the operator to clean the transducer.
Check method	:	System checks cycle count at power ON. When the transducer cycle count reaches 2500 or passes a month, this message is printed on the built-in printer. The cycle count increments by 1 for every execution of analysis sequence.
KX-21's action	:	System only print the message and could be operate the system as usual. The cycle count can be reset on the select menu in the maintenance mode.

Screen Display: Clean Transducer

Error Code

511050.0.0 13