SERVICE MANUAL

Automated Blood Coagulation Analyzer

CA-500

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SECTION 1 SPECIFICATIONS

To Cover

SECTION 1 SPECIFICATIONS

1.1 OUTLINE

The Sysmex CA-500 Automated Blood Coagulation Analyzer obtains clotting times by detecting changes in scattered light intensity reflected from a diluted sample with buffer reagent which are illuminated by red light of LED.
Incubated plasma taken from the centrifuged sample blood is rapidly mixed with warmed reagent and coagulation is performed and analyzed. Its result can be automatically displayed and printed. In accordance with the way of coagulation the chromogenics substrate method and the method of immunoassay are optionally available on this unit .

1.2 NAME AND MODEL

Name: AUTOMATED BLOOD COAGULATION ANALYZER
Model: CA-510, CA-520, CA-530, CA-540, CA-550, CA-560

1.3 CONFIGURATION AND DIMENSIONS

1.3.1 Configuration and Expandability of the System

(1) Configuration
1) Main Unit (including Sampler Unit, Pneumatic Unit and Built-in Printer)
2) Chromogenic Unit and Bar Code Reader can be connected according to the following combinations as the factory option.

	Reagent Cooler Unit	Chromogenic Unit	Immunoassay	Bar Code Reader
CA-510	–	–	–	Option
CA-520	–	–	–	O
CA-530	O	O	–	Option
CA-540	O	O	–	O
CA-550	O	O	O*	Option
CA-560	O	O	O*	O

* 575 nm is used for Immunoassy.

(2) Factory Option
1) ID Bar Code Reader (optional supply is available for CA-510 and CA-530)
Sample ID numbers can be automatically read by Built-in Type Bar Code Reader (built in the sampler unit), which can scan the samples in one rack and the STAT sample. (CA-520, CA-540)
2) Chromogenic Unit
The chromogenic analysis is available on Chromogenic Unit built in Main Unit. (CA-530, CA-540)
3) Immunoassay Unit
The immunoassay is available on Immunoassay Unit built in Main Unit. (CA-550, CA-560)
4) Reagent Cooler Unit
Cooling reagent (for four parameters) is available on Reagent Cooler Unit built in Main Unit. (CA-530, CA-540)

(3) Interface with Other Instruments
1) RS-232C
2) PC-DPS(C), CA-DPS, SIS, or Host Computer can be connected.

1.3.2 Power Source

(1) Rated voltage
AC 100 V/117 V ± 10%
AC 230 V ± 15%

(2) Type of Current
Direct Current

(3) Frequency
50 or 60 Hz

(4) Maximum power consumption

Unit	CA-510	CA-520	CA-530	CA-540	CA-550	CA-560
Main Unit	310 VA or less	320 VA or less	380 VA or less	400 VA or less	380 VA or less	400 VA or less

(5) Class and Type of Electrical Protection
Class-I electrical apparatus, Type-B electrical apparatus

1.3.3 Dimensions and Weight

(1) Dimensions (excluding projections)
540 mm (width) X 487 mm (height) X 470 mm (depth) ± 3% respectively

(2) Weight

Unit	CA-510	CA-520	CA-530	CA-540	CA-550	CA-560
Main Unit	43 kg	44 kg	44 kg	45 kg	44 kg	45 kg

1.3.4 Each Unit Function and Operation

(1) Main Unit Power Switch
Turns the power ON/OFF
(2) Display Unit
Displays the analysis registrations, analysis results, stored information and operation contents on the LCD.
(3) Control Unit
Using LCD and Touch Panel, controls the operation in dialog.
(4) XYZ Drive Mechanism
Dispenses sample and reagent. Transfers the reaction tubes.
(5) Mechanical Stop Switch
Stops the operation temporary.
(6) Detector Block
Determines the coagulation time by measuring changes in the intensity of light scattered by increasing turbidity.
(7) Chromogenic Unit
Detects the changes in the light absorbance by the transmitted light.
(8) Immunoassay Unit
Detects the changes in the light absorbance by the transmitted light.
(9) Temperature Control Unit
Controls temperatures for Detector Block, Reagent Heater Section and Cooling Section.
(10) System Control Unit
Controls Main Unit system.
(11) Drive Circuit Unit
Controls each motor ‘s driving.
(12) Pneumatic Unit
(13) Sampler Unit
Enables the continuous automatic operations by the sampler. One sampler rack can contain 10 sample tubes.

1.3.5 Principles of Measurement

1.3.5.1 Biological Activation Method

(1) Coagulation Reaction Detection Method (Scattered Light Measuring Method):
Red light (660 nm) is irradiated onto the mixture of plasma and reagent and the change of the scattered light is detected, corresponding to the turbidity change when the fibrinogen is converted to fibrin.

(2) Coagulation End-Point Detection Method (Percent Detection Method):
Let the scattered light intensity at the time when the coagulation reagent is added to be 0% and that when the coagulation reaction is completed to 100. The coagulation time is obtained from the time to reach the presumed percent of the coagulation curve.

1.3.5.2 Chromogenic Substrate Method

(1) Calorimetric Method
Rate Method

1.4 PERFORMANCE, INTENDED USE AND EFFECTIVENESS

1.4.1 Intended Use

This unit measures the coagulation of the plasma or serum component of anti-coagulant (sodium citrate) added human blood.

1.4.2 Performance

(1) Measurement Parameters and Display Parameters (Default Unit is shown in [ ]).

1)	Prothrombin Time (PT)	[second]
	Calculated Parameters:	
	(a) Prothrombin Activation Percent	[%]
	(b) Prothrombin Ratio	[–]
	(c) International Normalized Ratio (INR)	[INR]
	(d) Derived Fbg (for export specification only)	[mg/dL]
2)	Activated Partial Thromboplastin Time (APTT)	[second]
	Calculated Parameters:	
	(a) APTT Ratio	[–]
	(b) Activation Percent (for European and UK specifications only)	[%]
3)	Fibrinogen (Fbg)	[second]
	Calculated Parameters:	
	(a) Fibrinogen Concentration	[mg/dL]
4)	Thrombo Test (Plasma Method)	[second]
	Calculated Parameters:	
	(a) Activation Percent	[%]
	(b) INR (for European and UK specification only)	[–]

5)	Normotest (NT)	[second]
	Calculated Parameters:	
	(a) Activation Percent	[%]
	(b) INR (for European and UK specification only)	[–]
6)	Thrombin Time (for export specifications only)	[second]
7)	Factor (II, V, VII, VIII, IX, X, XI, XII)	[second]
	Calculated Parameters:	
	(a) Activation Percent	[%]
8)	Protein C Coagulum (PCc)	[second]
	Calculated Parameters:	
	(a) Activation Percent	[%]
(9)	Batroxithonbin (BXT)	[second]
(10)	LA1, LA2	[second]

[Options]

(11)	Anti-thrombin III (AT-III)	[%]
(12)	α2 Anti-plasmin (APL)	[%]
(13)	Anti-plasminogen (Plg)	[%]
(14)	Protein C (PC)	[%]
(15)	Heparin (Hep)	[%]
	International Unit	[IU/mL]
(16)	FDP (SFDP)	[μg/mL]
(17)	Plasma FDP (PFDP)	[μg/mL]
(18)	D-Dimer (DPI/DD)	[g/mL] [μg/mL]

(2) Measurement Ranges

1) Fbg

Measuring is possible from 25 mg/dL to 1000 mg/dL of the fibrinogen concentration. (In case of 450 mg/dL or above, measurement is performed with automatic re-dilution in high Fbg concentration mode, and in case of 50 mg/dL or less, in low Fbg concentration mode. In CA-550 and CA-560, measurement for 900 mg/dL or above is performed in high Fbg concentration mode, and for 100 mg/dL or less, in low Fbg concentration mode.)

2) D-Dimer (CA-550 and CA-560 only)

With applicable reagents, measuring is possible from 50 to 9999 μ/gL. However, the concentration of 2000 μ/gL or above is measureed in 8-hold dilution mode (+D-Dimer).

3) Serum FDP(CA-550 and CA-560 only)

With applicable reagents, measuring is possible from 2.5 to 320 μg/mL . However, the concentration of 40 μg/mL or above is measureed in 8-hold dilution mode (+PFC).

4) Plasma FDP (CA-550 and CA-560 only)

With applicable reagents, measuring is possible from 2.5 to 480 μg/mL. However, in the concentration of 60 μg/mL or above, measurement is performed in 8-hold dilution mode (+PFC).

(3) Measurement Time

1) Maximum Measurement Time in Standard Mode

PT	100 seconds (120 seconds in CA-550 and CA-560)
Fbg	100 seconds
Others	190 seconds
ATIII	30 seconds

2) Maximum Measurement Time in Automatic Extended Mode

All Parameters	600 seconds

(4) Accuracy

When control plasma N is measured consecutively 10 times, measurement error of the average time (second) should lie within the following ranges. (The ambient temperature must be 25 ± 10°C.)

PT	± 8% or less
APTT	± 8% or less

(5) Reproducibility

Coefficient of variation, when control plasma N is measured consecutively 10 times, should lie within the following ranges with 95 % confidence if specified reagents are used. The ranges should be observed when measuring was performed on 10 to 30 μg/mL of diluent sample with SFDP and PFDP, and on 500 to 1000 μg/mL of diluent sample with D-Dimer.

PT, APTT	[second]	CV within 2%
TTO, NT	[second]	CV within 4%
Fbg	[second]	CV within 4%
Factor (II, V, VII, VIII, IX, X, XI, XII)		
	[second]	CV within 5%
TT	[second]	CV within 10%
BXT	[second]	CV within 4%
LA1/LA2	[second]	CV within 4%
PCc	[second]	CV within 5%
AT-III	[%]	CV within 5%
APL	[%]	CV within 5%
Plg	[%]	CV within 5%
BCPC	[%]	CV within 5%
Hep	[IU/mL]	CV within 5%
SFDP	[μg/mL]	CV within 10%
PFDP	[μg/mL]	CV within 10%
D-Dimmer	[μg/L] [μg/mL]	CV within 10%

(6) Stability

1) Temperature Stability
Variation of measurement (Activation % for AT III) at 15°C (C_{15}) or 35°C (C_{35}) from that at 25°C (C_{25}) lies within the following ranges, when this formula is used.

$$\left| \frac{\text{C15 (or C35) - C25}}{\text{C25}} \right| \times 100$$

PT, APTT (second)	± 8% or less
Fbg, TTO, HpT (second)	± 10% or less
AT III (%)	± 10% or less
D-Dimmer (μg/L)	± 10% or less

2) Stability within-a-day
Variation of measurement (Activation % for AT III) at the time of 2, 4 and 8 hours from that at 30 minutes after the power is turned on (initial value) lies within the following ranges. The ambient temperature at the time of measurement should be within the specified range. Temperature variation must be within 5°C.

$$\left| \frac{\text{(Measurement after 2, 4 or 8 hours) - (Measurement at 30 minutes)}}{\text{(Measurement at 30 minutes)}} \right| \times 100$$

PT, APTT (second)	± 8% or less
Fbg, TTO, HpT (second)	± 10% or less
AT III (%)	± 10% or less
D-Dimmer (μg/L)	± 10% or less

3) Long-term Stability (daily variation)
Variations in measurement values (Activation % for AT III) during the continuous 10 days lie within the following ranges. The ambient temperature at the time of measurement should be within the specified range. Temperature variation must be within 5°C.

$$\left| \frac{\text{(Measurement after second day) - (Mean Measurement)}}{\text{(Mean Measurement)}} \right| \times 100$$

PT, APTT (second)	± 8% or less
Fbg, TTO, HpT (second)	± 10% or less
AT III (%)	± 10% or less
D-Dimmer (μg/L)	± 10% or less

4) Stability against Power Source Variation
Variation of measurement (Activation % for AT III) lies within the following ranges when the rated voltage changes at ±10%.

$$\left| \frac{\text{(Measurement at +10% or -10%) - (Measurement at rated voltage)}}{\text{(Measurement at rated voltage)}} \right| \times 100$$

PT, APTT (second)	± 8% or less
Fbg, TTO, HpT (second)	± 10% or less
AT III (%)	± 10% or less
D-Dimmer (μg/L)	± 10% or less

(7) Analysis Mode and Sample Throughput

1) Analysis Mode
5 parameters are selected out of 7 parameters (14 parameters in CA-550 and CA-560) to perform random analysis.

2) Sample Throughput

Maximum Throughput:	approx. 54 tests/hour (when PT single parameter is measured)
Mean Throughput (PT, APTT, Fbg):	approx. 40 tests/hour (when three parameters are measured at the same time)

Mean throughput in this case means the mean throughput at the point of which an hour has passed from a Start-key entry.

(8) Time Resolution

1) Coagulation
Time resolution is as follows depending on the elapsed time from the start of measurement.

0.1 second	2 through 120 seconds
0.2 second	120 through 240 seconds
1.0 second	240 through 600 seconds

2) Chromogenics Substrate Method and Immunoassay Method
The unit can continue performing sampling every second up to 600 seconds at maximum.

(9) Compensation functions

1) Setting of Coagulation Detection End Point
The coagulation detection point can be set every 1% within the range of 2 to 80%, enabling the data calibration.

2) External compensation Function
The measured data is corrected with the linear equation.

(10) Required Volume of Plasma and Reagent

The required sample amount for each parameter and the required volume of reagent for the measurement of one sample are shown below. (Unit in µL)

Parameter	Sample/Reagent	Quantity
(1) PT	Citrated Plasma	50
	Pt	100
(2) APTT	Citrated Plasma	50
	Aptt	50
	CaC12	50
(3) Fbg	Citrated Plasma	5
	Owren's Veronal buffer	95
	Fbg	50
(4) TTO	Citrated Plasma	20
	Owren's Veronal buffer	30
	CA-Series Comlex Factor TTO	125
(5) HpT	Citrated Plasma	10
	Owren's Veronal buffer	40
	CA-Series Complex Factor HPT	125
(6) TT	Citrated Plasma	100
	Owren's Veronal buffer	50
(7) II, V, YII, X	Citrated Plasma	5
	Owren's Veronal buffer	45
	Factor Deficient Plasma	50
	PT	100

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Parameter	Sample/Reagent	Quantity
(8) VII, IX, XI, XII	Citrated Plasma	5 or 10
	Owren's Veronal buffer	45 or40
	Factor Deficient Plasma	50
	APTT	50
	Calcium Chroride	50
(9) PC.c	Citrated Plasma	5
	Protein C Deficient Plasma	35
	Protein C Activator	40
	APTT	40
	Calcium Chloride	40
(10) BXT	Citrated Plasma	50
	Batroxobin	100
(11) La1	Citrated Plasma	100
	LA1	100
La2	Citrated Plasma	100
	LA2	100
(12) AT3	Citrated Plasma	10
	Owren's Veronal buffer	83
	Thrombin Reagent	125
	Substrate Reagent	33
(13) APL	Citrated Plasma	16
	Owren's Veronal buffer	83
	Plasmin	125
	Plasmin Substrate	33
(14) Plg	Citrated Plasma	16
	Owren's Veronal buffer	112
	Streptkinase Reagent	125
	Plasmin Substrate	25
(15) BCPC	Citrated Plasma	20
	Protein C Activator	125
	Substrate Reagent	30
(16) Hep	Citrated Plasma	20
	ATIII Reagent	20
	Factor Xa Reagent	125
	Heparin Substrate	40
(17) DDPI AdDD	Citrated Plasma	50
	Accelerator	25
	Latex	150
(18) DD	D-D Dimer Standard	16
	Elpia Ace D-D Dimer Stabilizer	116
	Elpia Ace D-D Dimer Latex	33
	Elpia Ace D-D Dimer Diluent	112
(19) SFDP	Standard Set For Elpia FDP	10
	Elpia FDP Stabilizer	122
	Elpia FDP Latex	22
	Owren's Veronal buffer	97
(20) PFDP (in 800 nm analysis)	P-Fdp Standard	16
	Latex Test BL-2 P-FDP Diluent	66
	Latex Test BL-2 P-FDP Latex	94
	P-FDP Diluent	80
(21) PFDP (in 575 nm analysis)	P-FDP Standard	16
	Latex Test BL-2 P-FDP Diluent	66
	Latex Test BL-2 P-FDP Latex	94
	P-FDP Diluent	112

Additionally, approximately 6 mL of distilled water and approximately 212 µL (at the maximum) of rinsing solution (CA CLEAN I) are required for rinsing per test.

1.4.3 Functions

(1) Sample Tube Transportation Function
Sample tube is transported from the sample tube rack to the sample incubation unit by the Slide Catcher Method.

(2) Reaction Tube Feeding Function

1)	Reaction Tube Feeding Method:	Fed manually to Reaction Tube Rack
2)	Number of Reaction Tube:	2 racks containing 30 tubes each (maximum 60 reaction tubes)
3)	Kinds of Reaction Tube:	Tube SU-40 for CA-1000
4)	Detecting Reaction Tube:	Detected by Reaction Tube Detective Sensor

(3) Sample Plasma and Reagent Dispensing Function
One dispensing pipette with the heating function moves up and down, traverses, and dispenses the sample and the reagent.

1)	Temperature Control Accuracy:	37.0 ± 1.0°C (with ambient temperature of 15 ~ 30°C)
2)	Waiting Time for Setting Temp.:	within 30 minutes
3)	Volumetric Method:	Sample and reagent are aspirated, dispensed and rinsed by the syringe.
4)	Volumetric Syringe:	1
5)	Pipette:	1

(4) Liquid Surface Detection Function

The pipette has the liquid surface detection function, so that it senses the meniscus automatically and then stops at a certain depth of the sample or the reagent.

(5) Sampler Function

1) Sample Storing Method: Sysmex Rack

2) Maximum Sample Storage: 1 rack (10 samples)

3) Usable Collection Tubes:
The following types with inside diameter of 8 mm or more.
(i) 15 (OD) X 75 ~ 100 mm length
(ii) 12 (OD) X 75 ~ 100 mm length
(iii) 10 (OD) X 65 mm length (The optional spacer is required.)
(iv) Sample cup of 2 mL or 4 mL

4) Sample Cooling Function: None

5) Sample ID Reading Function: Sample ID No. can be read by the Bar Code Reader.

(6) STAT Sample Measurement Function

1) The specified sample in the STAT Sample Rack can be analyzed, interrupting the usual analysis. Within 10 minutes from the interruption by the STAT sample analysis, the analysis result can be output (when the single parameter is analyzed).

2) Number of STAT sample
One sample only.

(7) Measurement Interrupt/Restart Function (CA-550 and CA-560 only)
The analyzer has the function to allow setting additional samples to the rack in process after starting a measurement and measuring them. The registration of the additional samples can be made on the left side from the left-end tube position for the samples already set in rack and registered for measurement.

(8) Reagent Storage Function

1) Reagent Storage Method: Stored in the reagent rack

2) Reagent holder capacity: Maximum 10 kinds of reagent bottles can be set in the reagent rack. Buffer and rinsing solution can also be set.

3) Usable container: Dade Bering's old DADE for 5 mL, a sample cup, can be set, and also GW5, a new type of reagent bottles only for CA-550/CA-560, can be set.
(The outer diameter of the reagent bottle should be less than 22.5 mm, and also, if the inner diameter is too small, use the bottle adapter.)

4) Reagent Cooling Function: Four reagents can be cooled. (CA-530, CA-540)

5) Temperature Control Accuracy: within 15 ± 2°C (Room temperature: 15°C - 30°C)

6) Waiting time for setting temp.: within 30 minutes

7) Reagent Mixing Function: None

Type of reagent	Number of accommodation	Cooling function	Container which can be accommodated
PT	1	Yes	DADE 5 mL Reagent Bottle (with outer diameter of 22.3 mm)
APTT	2	No	
Fbg	1	Yes	
TTO	1	No	
NT	1	No	
TT	1	Yes	
AT-III	2	Yes (only one)	
Buffer	1	No	
CA CLEAN I	1	No	

(9) Detection Function

1) Principle of Measurement
[Coagulation Method]: Scattered Light Measuring Method (wave length 660 nm)
[Chromogenic Method]: Calorimetric method (wave length 405 nm)
[Immunoassay]: Colorimetric method (wave length 575 nm)

2) Number of Detectors
[Coagulation Method]: 4 detection wells (High and Low sensitivity automatic switching)
[Chromogenic Method]: 1 detection well
[Immunoassay]: 1 detection well

3) No. of Incubation wells: 6 wells

4) Temperature Control Accuracy: within 37.0 ± 0.5°C (ambient temperature: 15°C-30°C)
within 37.0 ± 1.0°C for Incubation Well

5) Waiting time for setting temp.: within 30 minutes

(10) Pipette Rinsing Function

1) External Container: Rinse Bottle and Waste Bottle

2) Rinse Cup: Probe Rinse Cup (Outside) and Probe Rinse Cup (Inside)

3) Rinsing Function: Pipette is rinsed by controlling the syringe and the solenoid valve, with applying the pressure on the Rinse Bottle.

4) Waste Draining: The waste is aspirated by controlling the solenoid valve, with applying vacuum on the waste bottle.

(11) XYZ Driving Function
Pipette and sample catcher mechanism on the head unit (Z axis) is driven by the XY-axis mechanism to dispense sample and reagent and transfer and discard the reaction tubes.

1) XY-axis Mechanism: Linear Slider driven by stepper motor
2) Z-axis Mechanism: Pipette and sample tube catcher are driven by one motor.

(12) Mixing Function
After dispensing the reagent, the reaction tube is vibrated and mixed by the miniature motor.

(13) Sample Data Storage Function

1) Contents of Data
   (i) Measurement data
   (ii) Setting values
   (iii) Quality control data
   (iv) Date (year, month, day, hour, minute)

2) Memory Capacity
   (i) Data of 300 samples (maximum 1500 tests = 300 samples X 5 parameters). The analysis print data is not stored once the power is OFF. As for the reaction curve, the latest 600 tests are stored.
   (ii) Quality control data: 12 kinds X 7 parameters X 180 plots (CA-510 to CA-540)
   6 kinds X 14 parameters X 180 plots. To the Quality Control file, the parameters of dilution magnification such as -Fbg, +Fbg, +DD, +DDPl, +SFD, and +PFD are also included. (CA-550 and CA-560 only)

(14) Display and Input Function

1) Display Type
Graphic panel display + touch panel using a 3.2 X 4 inch liquid crystal display (white and black back light)

2) Displayed Data
   (i) Date
   (ii) Measurement condition, Analysis status, Results
   (iii) Stored sample: Stored sample list: Date, Time, Sample ID number, Parameter name, Measured data, Reaction curves (CA-550 and CA-560 allow zooming in to view), Rack number. (CA-550 and CA-560 only).
   (iv) Quality control (QC data, QC chart)
   (Only CA-550 and CA-560 can carry markings on screen display about the data beyond the upper and lower limits of quality control. In addition, the CA-550 and CA-560 analyzers stores the data of slight coagulation errors.)
   (v) Standard curve (SC data, SC chart)
   (vi) Operation messages
   (vii) Error messages
   (viii) Maintenance information and various setting values
   (ix) Temperatures at incubation well, heater pipette, reagent cooler unit

3) Input Method
Change, select, and set functions on each screen by LCD touch panel method.

(15) Printing Function

1) Printing Method
Graphic print by a built-in thermal printer

2) Printed Data
(i) Stored sample data (the same as the measured data)
(ii) Quality control (QC data, QC chart)
(iii) Measured data (Date, Time, Sample ID number, Parameter name, Measured data, Reaction curve, Analysis print data, Rack number (CA-550 and CA-560 only))
(iv) Standard curve (SC data, SC chart)
(v) Confirmation messages, Error messages
(vi) Maintenance information and various setting values (CA-550 and CA-560 can print at each parameter.)

(16) Quality Control Function

1) L-J control or X control is possible using control material.
2) Applicable parameters: PT, APTT, Fbg, TTO, NT, TT, AT III
14 parameters (CA-550 and CA-560 only)
-Fbg, +Fbg, +DD, +DDPI, +SFD, and +PFD are also treated as parameters and QC analysis can be performed on each parameter. (CA-550 and CA-560 only)
3) Number of stored files: 12 files for each parameter
67 files (CA-550 and CA-560 only)
4) Number of data points: 180 for each parameter

(17) Select Function

1) Measurement Mode
(i) Random access measurement mode
5 parameters are selected out of 7 parameters (14 parameters in CA-550 and CA-560) and the five parameters are measured at random.
(ii) Programmable measurement mode
All parameters are measured with changing the measurement order.
(iii) Replication mode
The same sample is measured twice (or more) and the mean value is determined to be the measurement result. However, the throughput is less than half number of that of ordinary measurement.

2) Settings
(i) Sample ID number
(ii) Date/Time
(iii) Setting function for APTT heating time
2, 3, 4 or 5 (minutes) of heating time can be set. (Standard setting is 3 minutes and the throughput changes if other time is set.)

3) Output
Automatic transfer or Manual transfer can be set.
Raw data output is available in Service mode. (CA-550 and CA-560 only)

4) Stored data processing
Displaying and printing the stored data is possible.

5) Service Function
For the Customer: Displaying of standard curve data and setting of abnormal values (range)
For the Servicing Personnel: Service mode, System tests, Memory Initialization, and adjustment/setting (of X-Y axis position)

(18) Standard Curve Setting Function
Standard curve of seven parameters (14 parameters in CA-550 and CA-560) can be set at six points or less within the measurable range. Setting Standard Curve is performed by the Auto dilution or Manual Entry. (Manual dilution analysis is available only in CA-550 and CA-560.) Two kinds of standard curves can be set to one parameter (only in CA-550 and CA-560). Settings should be given to each parameter individually.

(19) Analytical Algorithm corresponding to V-Lin-Integral (CA-550 and CA-560 only)
As a new analysis method, analytical algorithm equivalent to V-Lin-Integral is provided.

(20) APTT Initial Reaction Check Algorithm (CA-550 and CA-560 only)
An algorithm to check APTT's initial reactions is newly provided.

(21) Detector Block Self-Checking Function (CA-550 and CA-560 only)
Besides the already-provided functions to adjust the detector block, a function is newly provided that the analyzer self-monitors the state of the detector block and carry out auto calibration.

(22) Error Alert Function

1) Unit Error monitoring function
   (i) Temperature of heater section
   (ii) Shortage of reagent
   (iii) Presence or absence of sample rack
   (iv) Shortage of rinse solution
   (v) Overflow from the waste bottle
   (vi) Operation of mechanical parts
   (vii) Operation of printer
   (viii) Shortage of printer paper
   (ix) Serial output
   (x) Other self-diagnosis by service mode

2) Sample Abnormality monitoring function
   (i) Upper and lower limit judgment (PT, APTT, Fbg, TTO, NT, TT, AT-III)
   Display when the measured data exceeds the preset range.

(23) External Input/Output Function
The I/O terminal in accordance with RS-232C is provided as bit serial voltage I/O.

(24) Protection Function

1) Over-heat protection thermal fuse (Pipette Unit and Detector Block)
2) Mechanical stop switch
3) Light Shield cover open/close switch
4) Sampler position sensor

(25) Display Languages
Capable of displaying six languages such as Japanese, English, French, Italian, German, and Spanish. Screen displays and messages should be consistent with those of existing models.

1.5 ACOUSTIC NOISE LEVEL

Noise level should be within the following values. (The measuring position is 1 meter from the front of the product.

(1) Stand-by status: 58 dB or less
(2) Measuring operation status: 60 dB or less

Temporary noises (less than 65 dB continued within 5 seconds) are produced on occasions, such as home positioning of X-Y table or syringe drive mechanism are not included.

1.6 ENVIRONMENTAL CONDITIONS

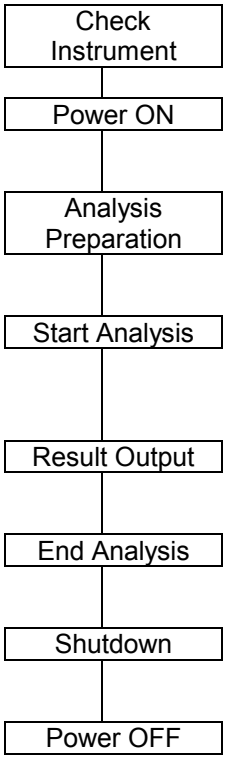
1.6.1 Operating Environment

(1) Ambient temperature: 15 ~ 35°C
(2) Relative humidity: 30 ~ 85% (non-condensing)
(3) Atmospheric pressure: 70 ~ 106 kPa
(4) Place to be installed: avoid direct sunlight, dust, vibration and acid vapors

1.6.2 Reagents to be used

Parameter	Reagent
PT	Thromborel S
	Dade Innovin
	Dade Thromboplastin C plus
APTT	Pathromtin SL
	Dade Actia Activated Cephanloplastin Reagent
	Dade Actia FS Activated FTT Reagent
	Dade Actia FSL Activated FTT Reagent
	Calcium Chroloride Solution (0.025 mol/l)
Fbg	Dade Thrombin Reagent
TT	Thrombin Clotting Time Reagent
II	Clotting Factor-II Deficient Plasma
V	Clotting Factor-V Deficient Plasma
YII	Clotting Factor-VII Deficient Plasma
X	Clotting Factor-X Deficient Plasma
VIII	Clotting Factor-VIII Deficient Plasma
IX	Clotting Factor-IX Deficient Plasma
XI	Clotting Factor-XI Deficient Plasma
XII	Clotting Factor-XII Deficient Plasma
LA1/LA2	LA1 Screening Reagent/LA2 Confirmation Reagent
PC.c	Protein C reagent
BXT	Batroxobin reagent
AT3	Berichrom Antithrombin Ⅲ (A)
APL	Berichrom α2-Antiplasmin
Plg	Berichrom Plasminogen
BCPC	Berichrom Protein C
Hep	Berichrom Heparin
PFDP	Latex Test BL-2 P-FDP
	P-FDP Diluents
DDPI/AdDD	D-Dimer PLUS/Advanced D-Dimer
	Control Plasma N(Human)
	Control Plasma P(Human)
	DadeCi-Trol Coagulation Control,Level 1
	DadeCi-Trol Coagulation Control,Level 2
	DadeCi-Trol Coagulation Control,Level 3
	Standard Human Plasma
	P-FDP Standard
	D-Dimer PLUS Standard Plasma
	PT Calibration Plasma Kit
	CA CLEAN Ⅰ
	CA CLEAN Ⅱ

1.7 HOW TO OPERATE



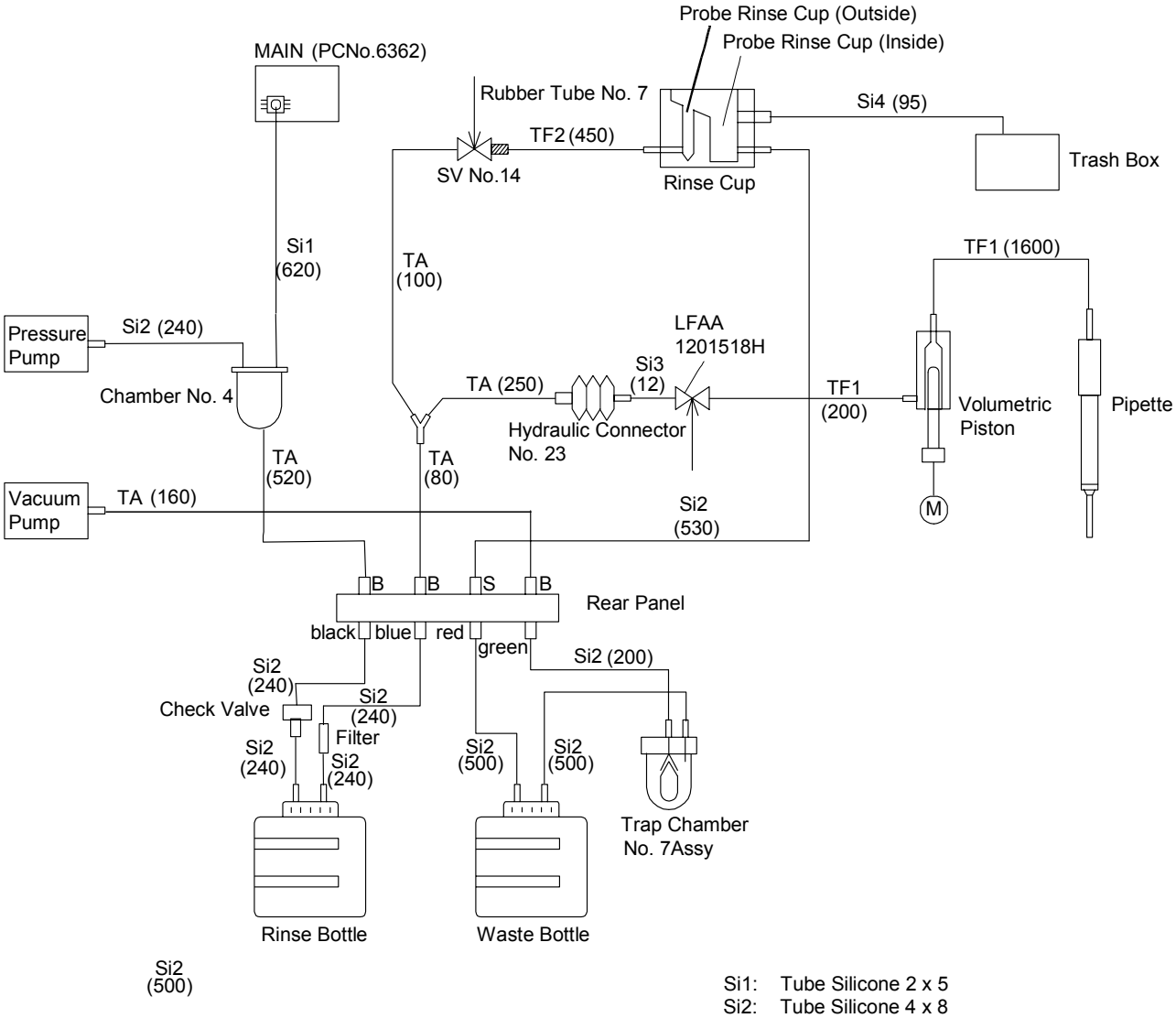
- Check the rinse solution (distilled water) to make sure that the analyzer is ready for operation.
- Turn the instrument power ON 30 minutes before the analysis.
- Dissolve reagents 30 minutes before the analysis.
  Set the reagents to the reagent holder.
  Execute the quality control to check the instrument condition.
- Set the sample to the sampler.
  Enter sample orders to be analyzed.
  Press the [Start] key to start analysis.
- The analysis results will be displayed on LCD and printed out on printer paper.
- Remove the reagents and the sample.
- Execute the daily maintenance for the next analysis.
- Rinse the pipette and turn the instrument power OFF.

SECTION 2 HYDRAULIC/MECHANICAL SYSTEMS

To Cover

SECTION 2 HYDRAULIC/MECHANICAL SYSTEMS

2.1 TUBING DIAGRAM



Si1: Tube Silicone 2 x 5
Si2: Tube Silicone 4 x 8
Si3: Tube Silicone 1/32 x 3/32 inches
Si4: Tube Silicone 6 x 10
TF1: Tube Teflon 1.2 x 2.0
TF2: Tube Teflon 1.5 x 2.5
TA: Tube Toalone 3 x 6
B: Connecting Tube No. 50
C: Connecting Tube No. 3
S: Nipple No. 123

2.2 HYDRAULIC SYSTEM OPERATION

2.2.1 Structure

The hydraulic system consists of the volumetric syringe for volumetric dispensing of samples or reagent, the filling line using the pressure pump and solenoid valve, and the drain line using the vacuum pump.

2.2.2 Operation

(1) Outline of Hydraulic System Operation

This system's filling and draining are operated by pressure created by the pressure pump and vacuum pump in the system. Therefore the pressure is applied to the rinse bottle and the vacuum is applied to the waste bottle.

(a) Filling line
A constant pressure is applied to the rinse bottle. The valve connected to the line opens to feed rinse solution.

(b) Drain Line
The drain line is released to the atmosphere at the rinse cup. The vacuum pump operates only when the vacuum to aspirate the waste into the waste bottle. The vacuum is not monitored. Instead, instrument checks if the liquid level becomes abnormal when the sample probe is moved to the Probe Rinse Cup (inside) (if liquid is not drained properly, the drain error occurs).

(2) Analysis Starting Operation

(a) Rinsing at Analysis Start
The sample probe moves to the Probe Rinse Cup (outside) to detect the syringe home position. The probe moves into the Probe Rinse Cup (inside) to remove remaining liquid on the probe tip. The probe moves to rinse solution position to aspirate CACLEAN I. Aspirated rinse solution is kept in the probe for a certain time to rinse the probe inside. (This can be changed in Service Program.)
The sample probe moves to the Probe Rinse Cup (inside), and the rinsing solution flows by opening SV on Rinse Cup. At this time, the syringe piston moves to drain the rinse solution.
The probe moves into the Probe Rinse Cup (outside), and both the Probe Rinse Cup valve and the valve on probe open to rinse the probe.

(b) Reagent Aspirating and Dispensing
When aspirating sample or reagent, the probe moves to a sample to aspirate, lowers into the test tube, detects the liquid surface, then the volumetric syringe descends and aspirates the sample. At this time, the solenoid valve does not operate (keep closed).
When draining, the probe moves to the reaction tube in the Reaction Tube Rack to dispense, the volumetric syringe ascends and dispenses the sample. After that, the probe moves to home position, and moves to the Probe Rinse Cup (inside).

(c) Probe Rinsing after Sample Aspiration
The probe moves to the Probe Rinse Cup (inside). The Probe Rinse Cup (inside) valve opens to empty rinse solution from the probe.
Then the probe moves to the Probe Rinse Cup (outside) to remove a drop from the probe tip.

(d) Reagent Aspiration and Dispensing
The probe, which stops for cleaning after sample aspiration, moves to the reagent rack to aspirate, descends into the reagent vial, detects the liquid surface, and then the volumetric syringe descends to aspirate the reagent.
At this time, the solenoid valves does not function (closed).
When dispensing, the probe moves to the heated reaction tube, catches that reaction tube, then moves to the dispensing position, and dispenses the heated reagent into the reaction tube.
After dispensing, the mixing motor mixes the sample and reagent in the tube, and sets it in the detecting well.

(e) Rinsing after Reagent Dispensing and Mixing
After reagent dispensing and mixing, the probe moves to the Probe Rinse Cup (inside). The Probe Rinse Cup (inside) valve opens to flow rinse solution out of the probe.
Next, the probe moves to the Probe Rinse Cup (outside), the probe tip touches the liquid, and then a drop adhering on its tip is removed. The probe then moves to rinse solution and aspirates CACLEAN I. After aspiration, it moves to the Probe Rinse Cup (inside), and the probe valve opens to feed out rinse solution. At this time, the syringe piston moves to dispense the rinse solution.
The probe moves to the Probe Rinse Cup (outside), and both the Probe Rinse Cup valve and the valve on probe open to rinse the probe.

(f) Probe Rinsing
The Rinse Probe key causes the probe to move to Probe Rinse Cup (outside) and detect the syringe home position. Then the probe moves into the Probe Rinse Cup (inside), and any liquid remaining on the probe tip is removed. After that, the probe moves to rinse solution and aspirates CACLEAN I.
After aspiration, the probe aspirates rinse solution 2 minutes to clean the its inside.
Now the probe moves to the Probe Rinse Cup (inside) and causes the probe valve to open and feed out rinse solution. At this time, the syringe piston moves to dispense the rinse solution.
Next, the probe moves to the Probe Rinse Cup (outside), and both the Probe Rinse Cup (outside) valve and the valve on probe open to rinse the probe.
After rinsing, the probe returns to the home position.

2.3 PRESSURE CIRCUIT

2.3.1 Structure

The pressure circuit of this system consists of two circuits: the pressure circuit designed for filling solution by the pressure pump and the vacuum circuit designed for liquid draining by the vacuum pump.
The pressure system comprises the pressure pump, circuit for its control, pump driving circuit, a bottle for filling, and a valve for filling line circuit.
The vacuum circuit system comprises the vacuum pump, pump driving circuit, and drain line circuit with a waste bottle.
For the hydraulic circuit that uses pressure to flow rinse solution.

2.3.2 Operation

(1) Outline of Pump Operation
The filling and draining by this system are performed by the pressure and vacuum. Therefore the pressure is applied to the rinse bottles connected to the outside of the system.

(a) Pressure System
The pressure system generates pressure by the pressure pump, and utilizes the pressure sensor to monitor and control the generated pressure to maintain a predetermined amount of rinse solution. The rinse solution in the rinse bottle is kept under a certain pressure by the pressure controlling, and it is supplied by opening the valve connected to the system.

(b) Vacuum System
The vacuum circuit is released to the atmosphere at the rinse cup. The vacuum pump operates only at the time of draining to aspirate the waste into its bottle. The vacuum circuit is not monitored. Instead, checking is made on whether or not the liquid level becomes abnormal when the sample probe moves into the Probe Rinse Cup (inside) (if waste is not drained properly, the drain error occurs).

(2) Specifications/Functions

(a) Pressure Pump
Pump type:
Drive power supply: AC 100 V, 50/60 Hz
Pressure generation: Over 300 g/cm^2

(b) Vacuum Pump
Pump type:
Drive power supply: AC 100 V, 50/60 Hz
Vacuum generation: Over -100 g/cm^2

2.4 DETECTOR BLOCK

2.4.1 Outline

The CA-500 detector block is provided with 4 scattered light detecting ports, 1 transmitted light detecting port, and 6 incubation wells.
The detector block is kept at 37°C by the heater and the semiconductor temperature sensor.

2.4.2 Specifications/Functions

(1) Analysis System

Scattered Light Detection

Detector Unit:	4 ports
Light Source:	LED H-2000L (peak wavelength 660 nm)
Photo Diode:	S1133 silicon diode
Filter:	R-60 (band-pass: over 600 nm)

Transmitted Light Detection

Detector Unit:	1 port
Light Source:	LED NLPB-500
Photo Diode:	S1133 silicon diode
Filter:	405 nm band-pass filter

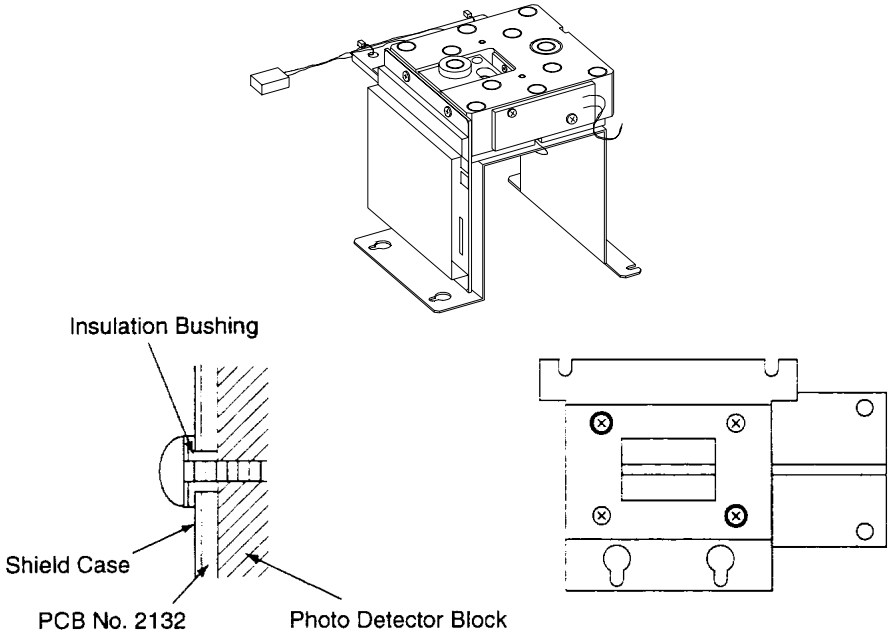
Transmitted Light Detection (Immunoassy)

Detector Unit:	1 port
Light Source:	LED TLGE159P
Photo Diode:	S1133 silicon diode
Filter:	575 nm band-pass filter

(2) Other

Incubation well:	6 wells
Heater:	28 W film heater
Overheat protection:	76°C thermal fuse

2.4.3 Assembly Diagram



2.5 REAGENT COOLING UNIT

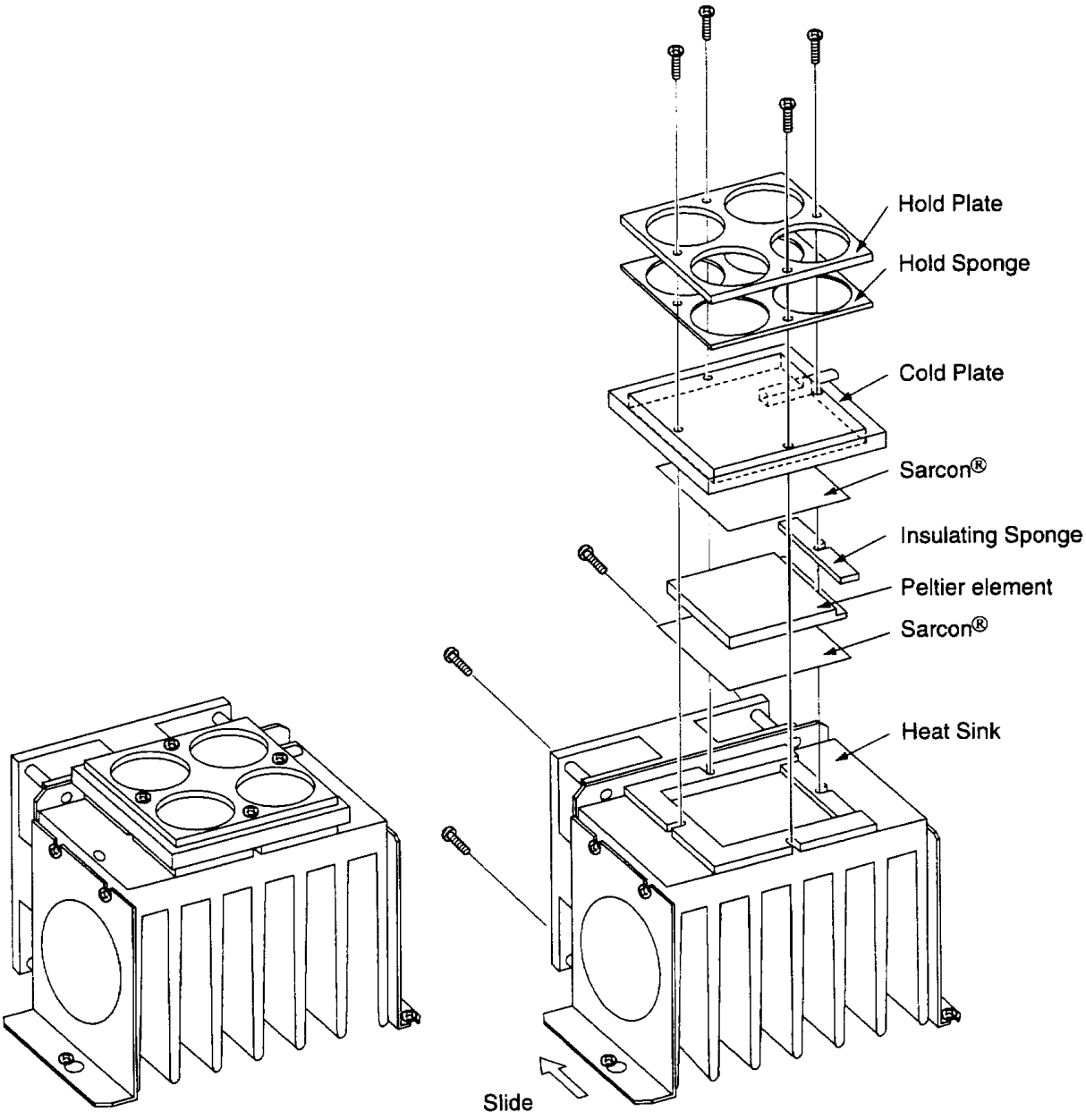
2.5.1 Outline

To cold-store reagents, electronic cooling element (Peltier element) cools the 4-hole reagent set.

2.5.2 Specifications/Functions

Cooling source:	Peltier element (1 piece, DC 12 V applied)
Cooling:	1 unit of DC fan and fin-type radiator
Temperature detection:	Semiconductor temperature sensor - 1 unit

2.5.3 Assembly Diagram



2.6 VOLUMETRIC UNIT

2.6.1 Outline

The volumetric unit is used to measure a predetermined volume of sample, reagent, buffer, and rinse.

2.6.2 Specifications/Functions

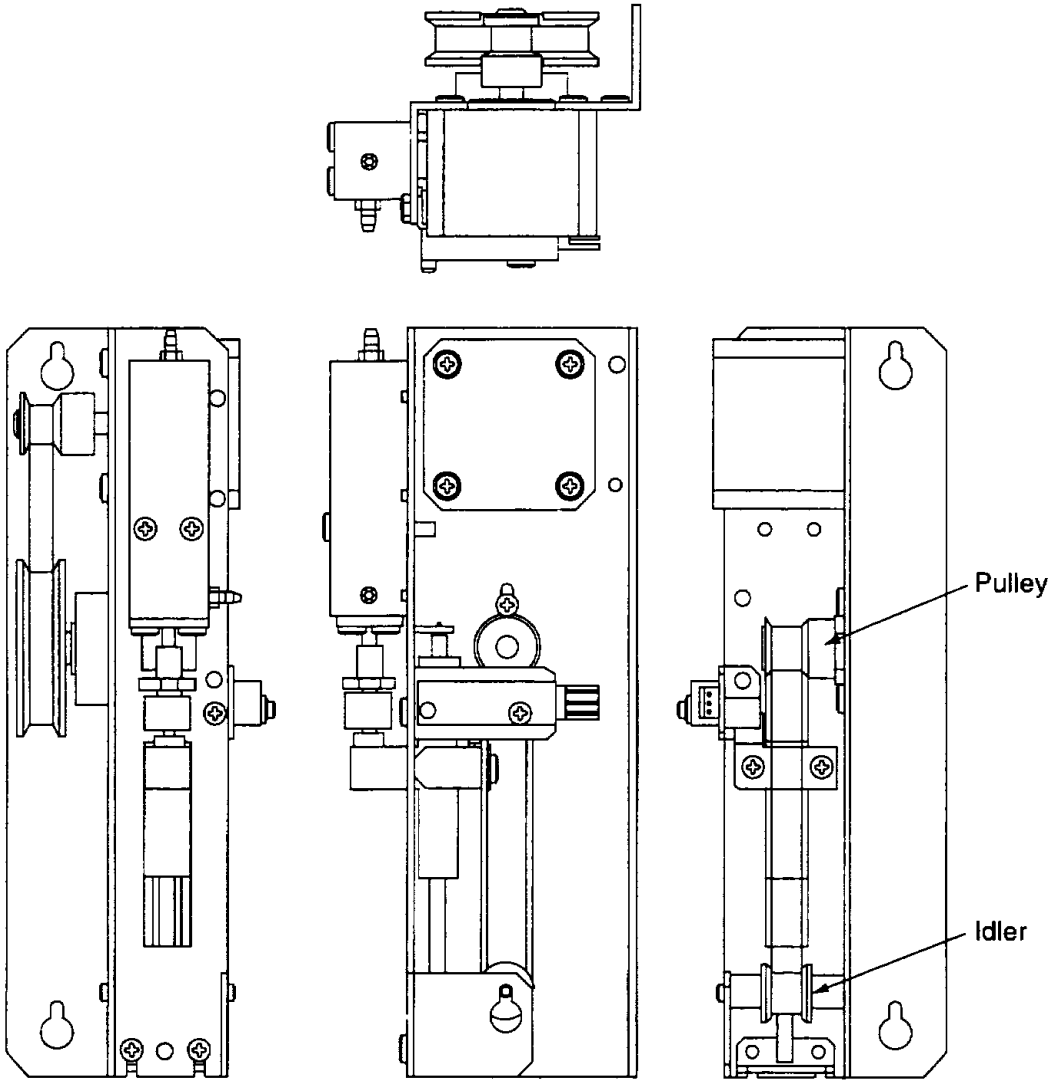
(1) Drive System

Drive source:	Unipolar-type stepping motor (1-2 phase excitation, constant current drive)
Power transmission:	Timing belt type
Resolving power:	Approx. 0.02 mm/step
Drive speed:	Approx. 1300 pps (at high speed in trapezoidal control)
Sensor:	For drive unit home position (transmission type) - 1 unit

(2) Syringe System

Piston diameter:	3 mm
Vertical stroke:	Approx. 21 mm
Syringe volume:	Approx. 151 μL/21 mm
Life:	300,000 cycles

2.6.3 Assembly Diagram



2.7 X-Y DRIVE UNIT (X-AXIS MOTOR ASSEMBLY/DRIVE-AXIS ARM ASSEMBLY)

2.7.1 Outline

This unit moves the sample probe, which aspirates and dispense plasma and reagent, to the Sample Rack, Reagent Rack, and Reaction Tube Rack; and drives, in X-Y direction, the catcher which moves reaction tubes from the reaction tube rack to the heater section, detector block, and further to dispense/discard hole.

2.7.2 Specifications/Functions

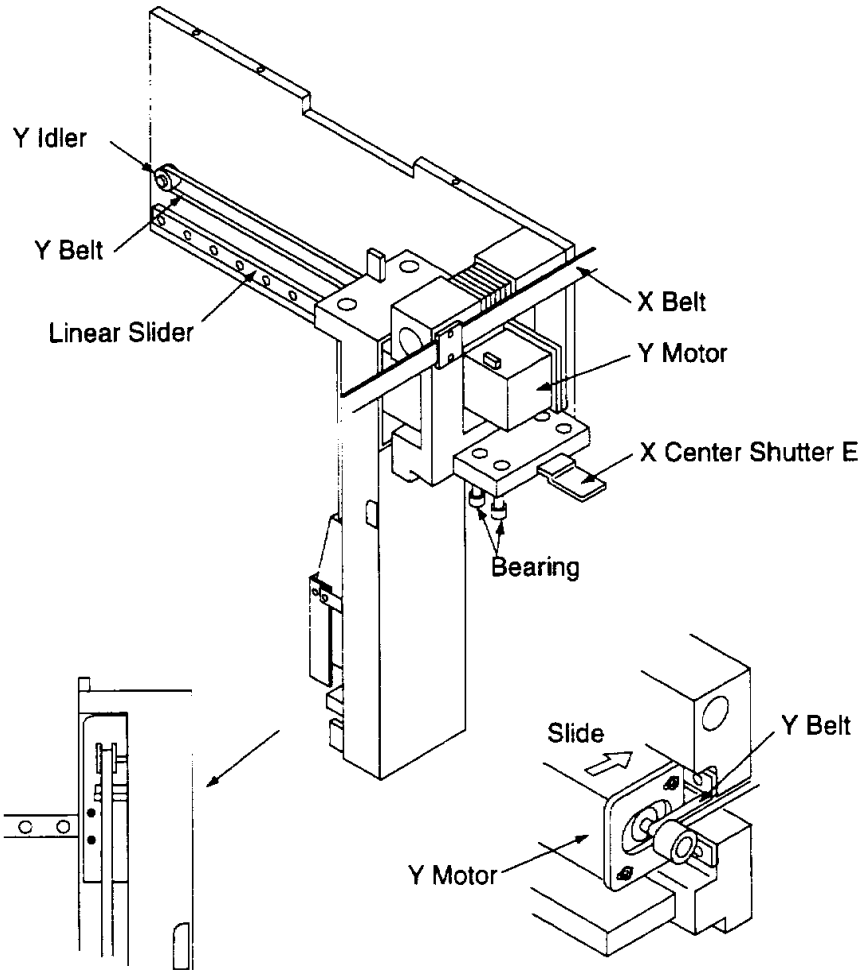
(1) X-Direction System

Drive Source:	Unipolar type stepping motor (1-2 phase excitation, constant current drive)
Drive transmission:	Timing belt type
Resolving power:	Approx. 0.08 mm/step
Drive speed:	Approx. 4500 pps (at high speed in trapezoidal control)
Sensor:	For drive unit home position (transmission type) - 1 unit

(2) Y-Direction System

Drive Source:	Unipolar type stepping motor (1-2 phase excitation, constant current drive)
Drive transmission:	Timing belt type
Resolving power:	Approx. 0.08 mm/step
Drive speed:	Approx. 4000 pps (at high speed in trapezoidal control)
Sensor:	For drive unit home position (transmission type) - 1 unit

2.7.3 Assembly Diagram



2.8 Z-AXIS DRIVE UNIT (Z-AXIS BASE ASSEMBLY)

2.8.1 Outline

To use the sample probe for aspiration or draining and to move reaction tubes, this unit grips the catcher and drives it in Z direction. The Z-axis base assembly incorporates a mechanism for mixing plasma and reagent in reaction tubes.

2.8.2 Specifications/Functions

(1) Z-Direction System

Drive Source:	Unipolar type stepping motor (1-2 phase excitation, constant current drive)
Drive transmission:	Timing belt type
Resolving power:	Approx. 0.08 mm/step
Drive speed:	Approx. 3100 pps (at high speed in trapezoidal control)
Sensor:	For drive unit home position (transmission type) - 1 unit

(2) Stirring Function

Power source:	DC motor (Driving voltage: 1.05 V)

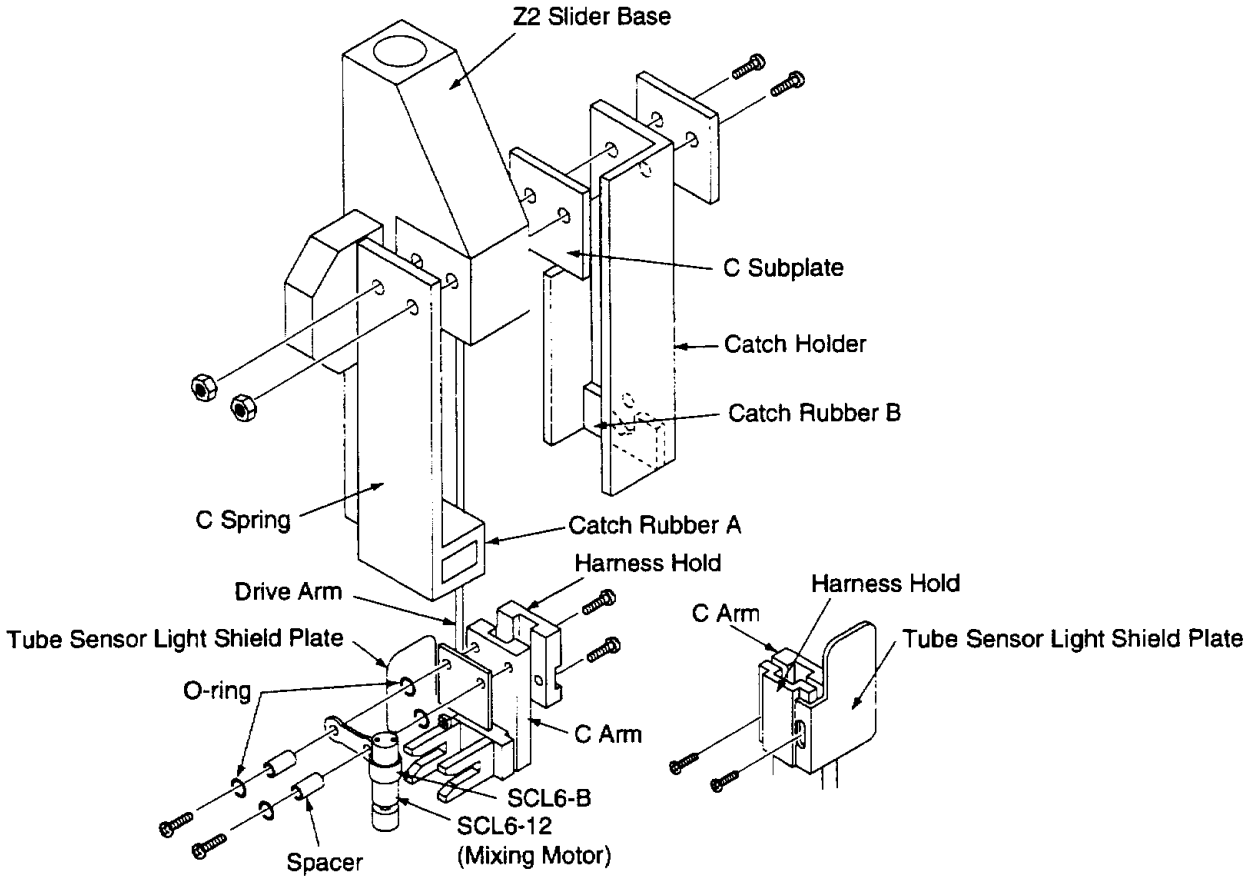
(3) Reaction tube Presence Detection

Sensor:	Detects presence of reaction tubes (modulation-reflection type) - 1 unit

(4) Sample Probe

Shape·Material:	ID 0.50 mm/OD 0.85 mm, SUS316
Heater:	
Sensor:	Glass chip thermistor
Overheat protection:	Thermal fuse 76°C

2.8.3 Assembly Diagram



2.9 BAR CODE READER UNIT (ID COMPLETED PARTS)

2.9.1 Outline

This unit drives the bar code reader, which reads ID labels affixed on the sampler set on the sample table.

2.9.2 Specifications/Functions

(1) Drive System

Drive Source:	Unipolar-type stepping motor (2-phase excitation, constant current drive)
Drive Transmission:	Timing belt type
Resolving Power:	Approx. mm/step
Drive Speed:	Approx. pps (at high speed in constant control)
Sensor:	For drive unit home position (transmission type) - 1 unit

(2) ID Specifications

Light Source/Receptor Element:	LED/CCD image sensor
Read Width:	80 mm
Scan Cycles:	500 scans/500 decodes per second
Interface:	Conforms to RS-232C
Power Source:	DC 5 V, 300 mA
Corresponding Code:	CODE39, NW-7, Industrial 2 of 5, CODE 128, etc.

2.10 PUMP UNIT (PRESSURE PUMP/VACUUM PUMP COMPLETED PARTS)

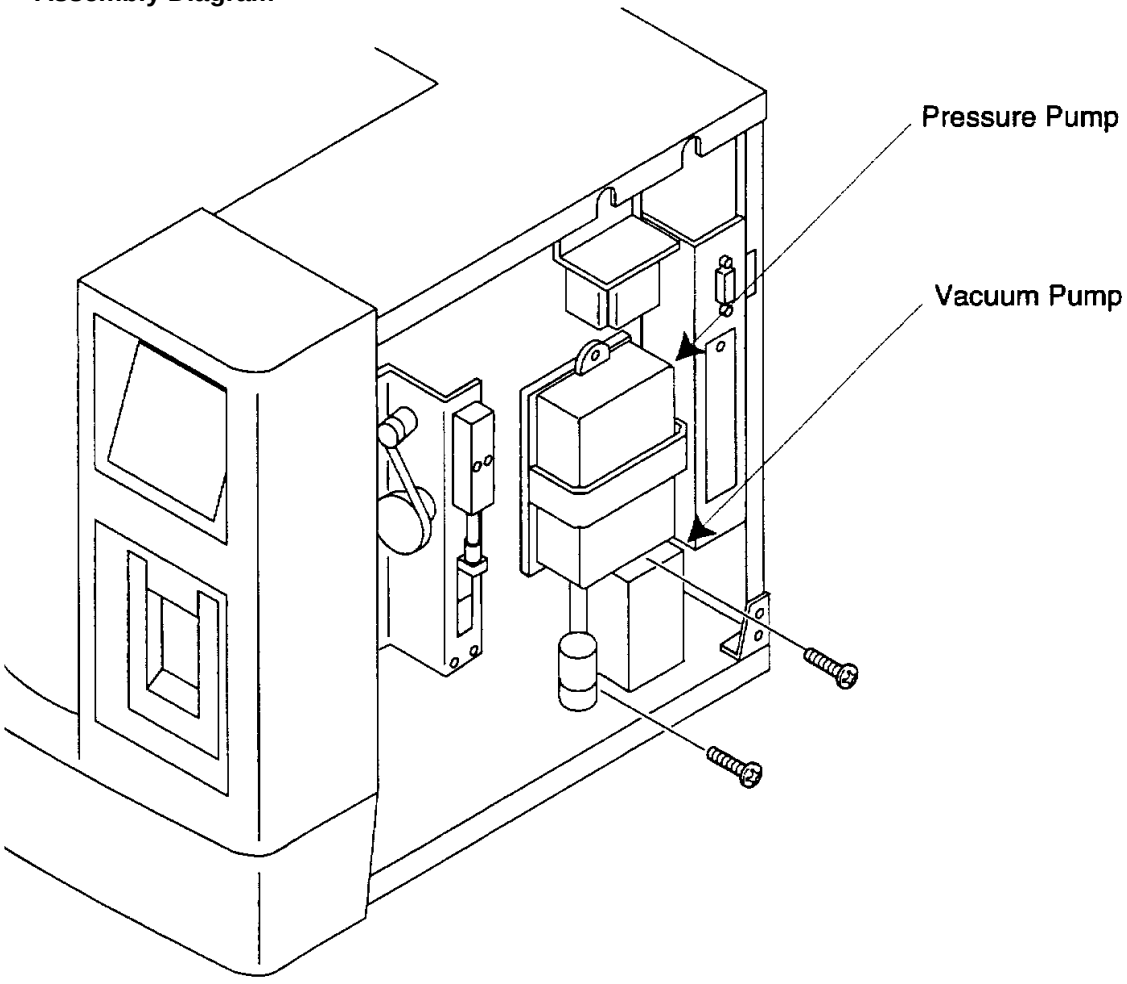
2.10.1 Outline

The pump unit comprises the pressure pump that applies positive pressure into the bottle to feed rinse solution from the rinse bottle into the system and the vacuum pump that applies vacuum into the bottle to feed out waste from the system into waste bottle.

2.10.2 Specifications/Functions

(1) Pressure Pump
Structure:
Pressure: 250 mmHg as adjusted *19*
(2) Vacuum Pump
Structure:
Vacuum: Approx. 180 mmHg as not adjusted *19*

2.10.3 Assembly Diagram



SECTION 3 ELECTRONICS

To Cover

SECTION 3 ELECTRONICS

3.1 PCB Locations

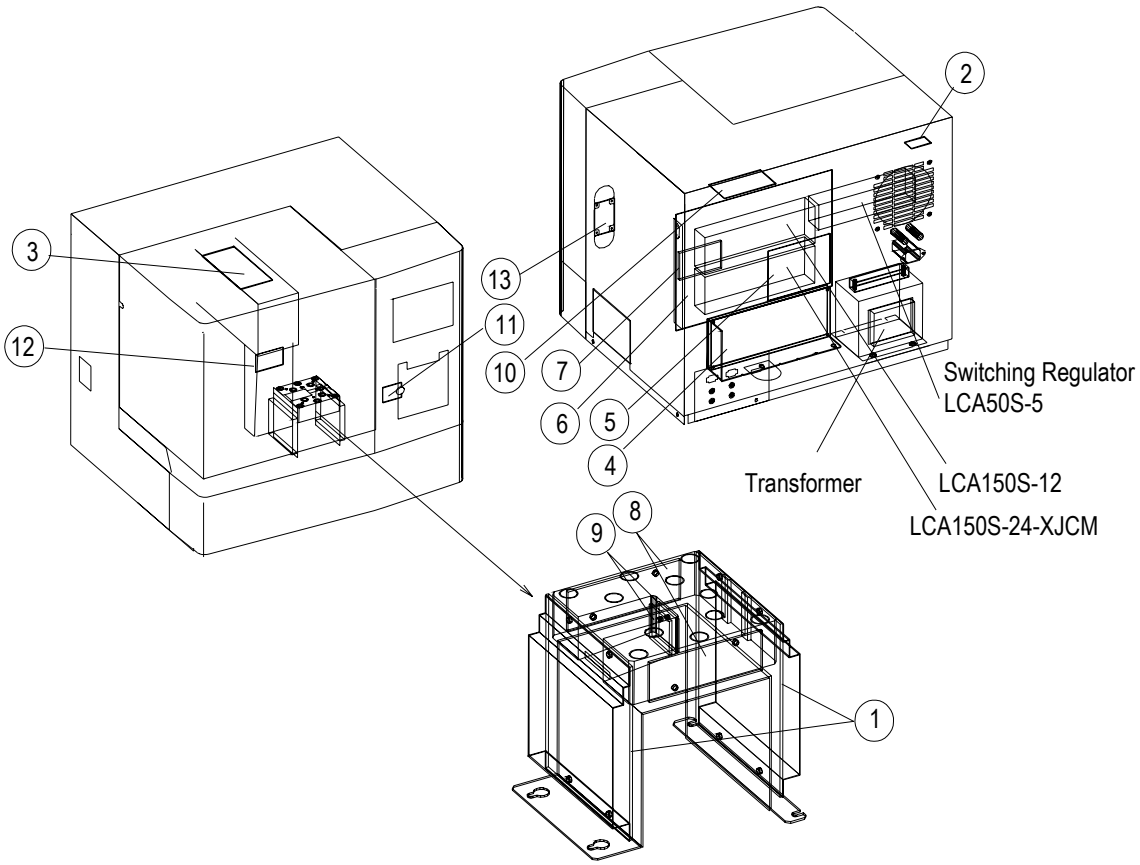


Figure 3-1: PCB Location

Symbol	Description	Name	Functions
1	PCB No. 2132 PCB No. 2156*	PD PD2	Photo Diode LED, Pre-Amplifier
2	PCB No. 2133	THERMO	Thermister (for Room Temperature)
3	PCB No. 2134 PCB No. 2157*	Y-Z RELAY Y-Z RELAY2	Liquid Surface Sensor, Probe Crash, Y-Axis Home Position Sensor
4	PCB No. 4086	PS	Power Supply, Motor Drive
5	PCB No. 6350 PCB No. 6375*	PRCN-1 PRCN-3	Printer Control Board
6	PCB No. 6362 PCB No. 6373*	MAIN MAIN-2	CPU, I/O, Motor Control, Temperature Control, A/D
7	PCB No. 7015	MEMORY	Program Memory
8	PCB N0. 9258	LED2	LED (for analyzing scattered light)
9	PCB No. 9259	LED1	LED (for analyzing transmitted light)
10	PCB No. 9260	X RELAY	X-Axis Relay
11	PCB No. 9263	VR	LCD Contrast Volume
12	PCB No. 9264	Z RELAY	Z-Axis Relay, Z-Axis Home Position Sensor
13	PCB No. 9265 PCB No. 9303*	PR RELAY PR RELAY2	Operation Panel, Syringe Motor, SV Relay

NOTE: PCB No. indicated with (*) is added with CA-550/560 which is upper compatible.

3.2 Block Diagram and Power Source

3.2.1 Electric Block Diagram

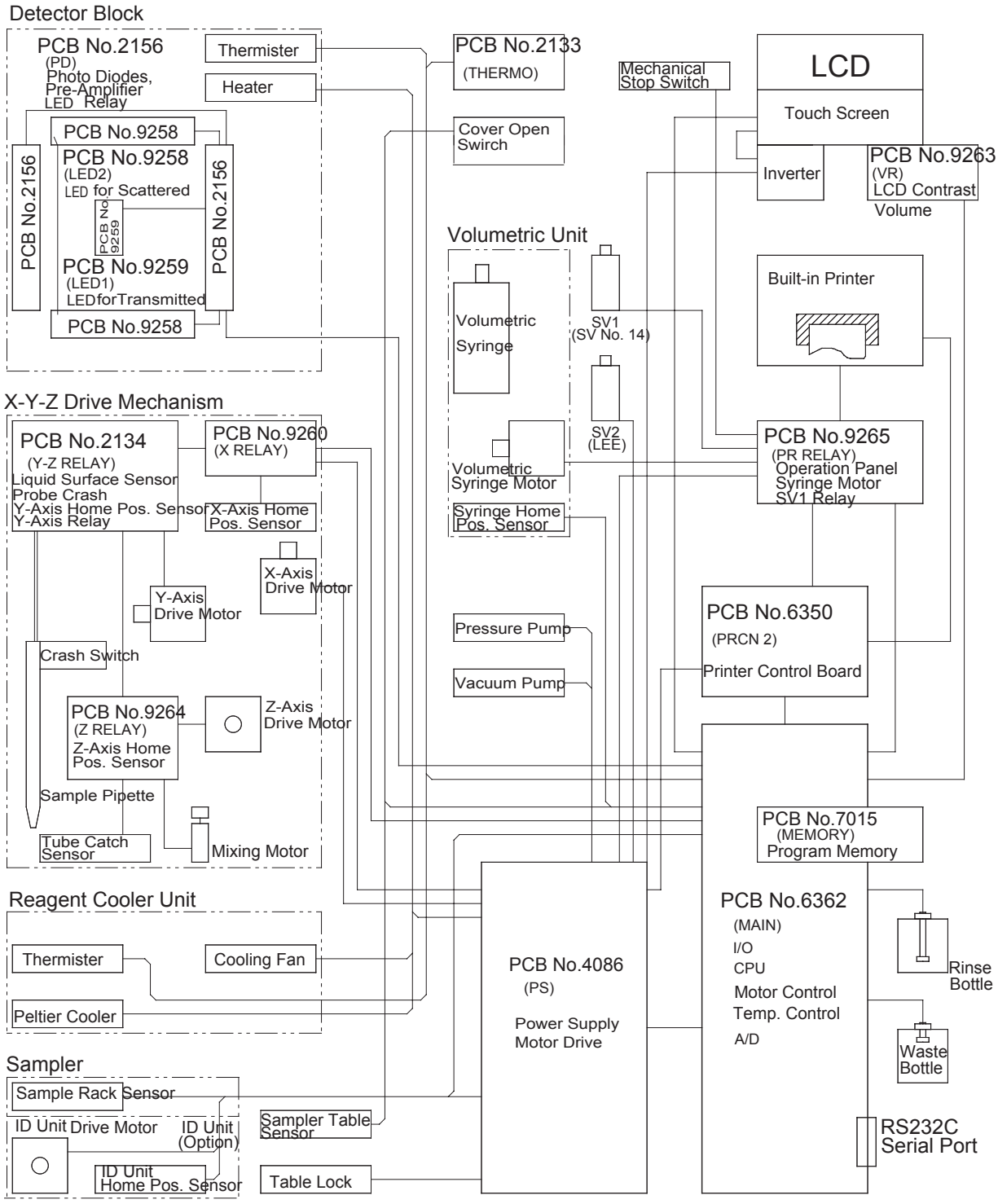


Figure 3-2a: CA-500 Electric Block Diagram 1

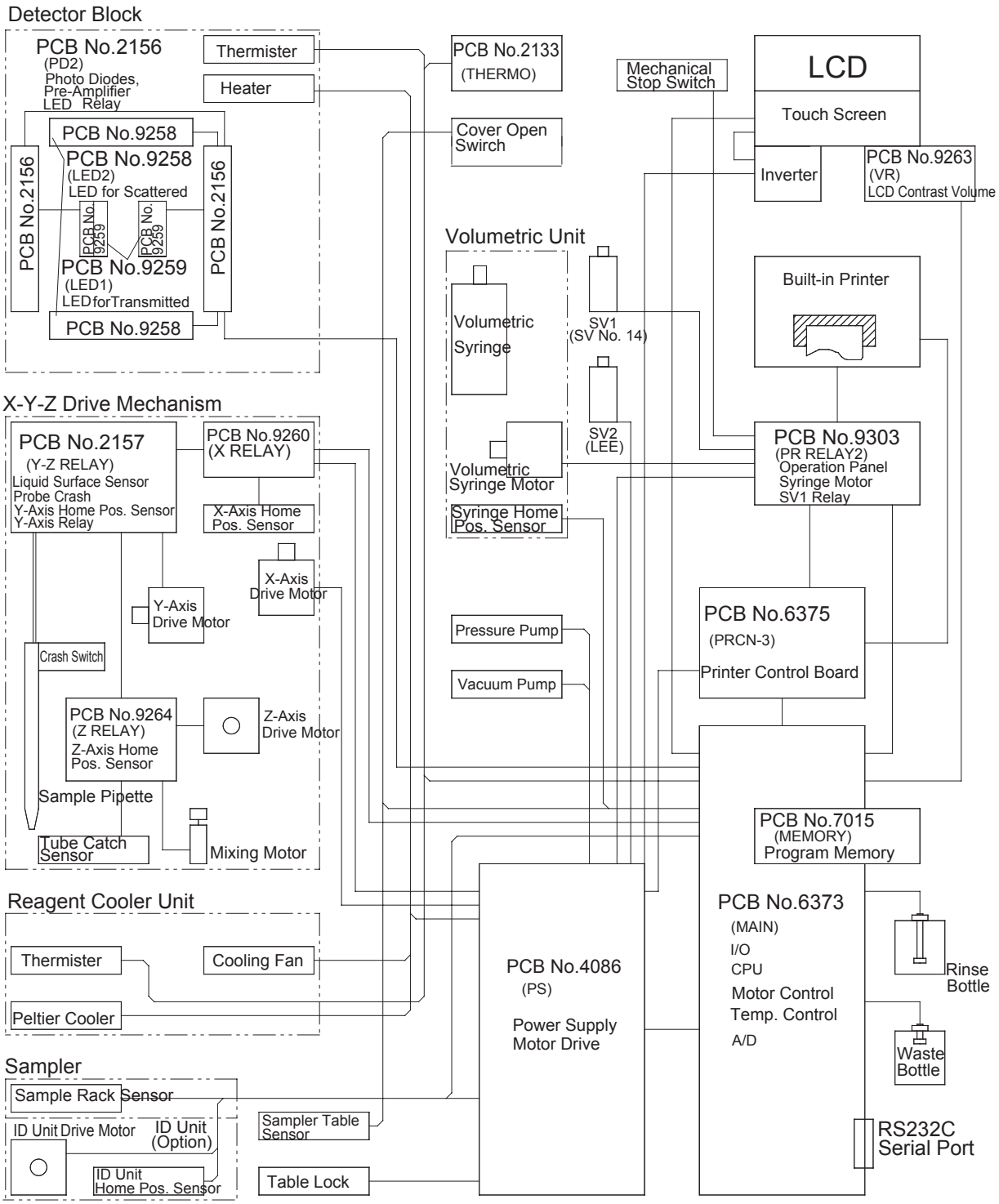


Figure 3-2b: CA-500 Electric Block Diagram 2

3.2.2 Power Supply System

CA-500 Power Supply System is composed of the Power Transformer, Switching Regulators and PCB No. 4086 as shown in the following figure. (Respective voltages indicated with balloon numbers are explained in the descriptions.)

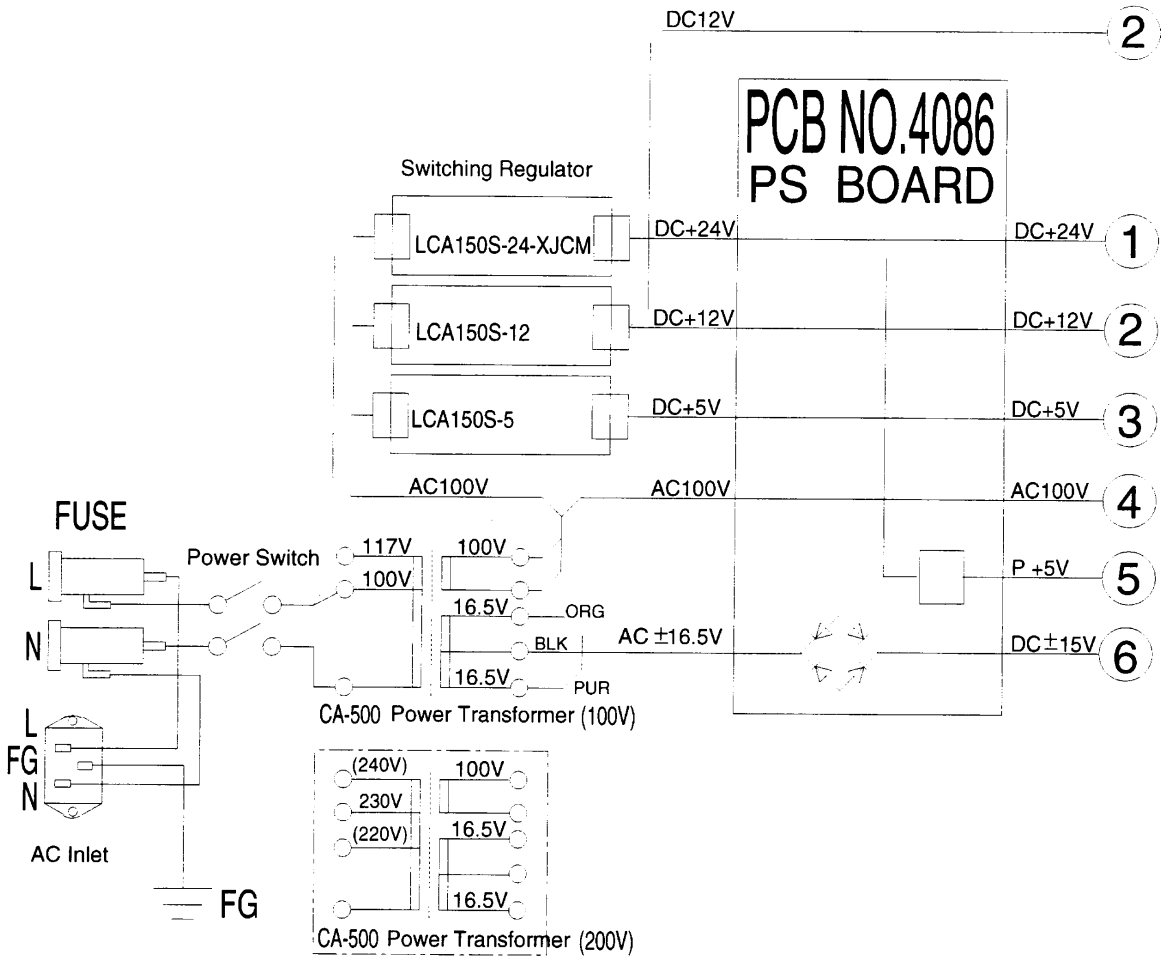


Figure 3-3: CA-500 Power Supply System Block Diagram

[Descriptions]

Switching Regulator LCA150S-24-XJCM

¨ DC +24 V: Via PCB No. 4086, used for X, Y, Z and Syringe Motor excitation, power source for Built-In Printer, for inverter power source for LCD, and for power source for Probe Heater.

Switching Regulator LCA150S-12

≠ DC +12 V: Via PCB No. 4086, used for Detector Block heater, Reagent Cooler Unit Peltier cooler, Reagent Cooler Unit cooling fan, Solenoid Valve drive, and ID Motor drive. Also used for Main Unit cooling fan with direct connection.

Switching Regulator LCA50S-5

¬ DC +5 V: Via PCB No. 4086, used for Digital Circuit for each PC board. Also used as the analog power source (PCB No. 6362 or PCB No. 6373) for temperature control circuit.

CA-500 Transformer

√ AC100 V: Used for driving Pressure Pump and Vacuum Pump. Also connected for taking in each switching regulator power. Transformers with 100 V or 200 V are installed on delivery.

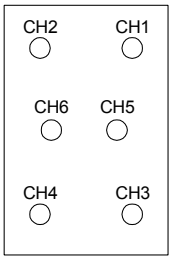
Power Supply Board PCB No. 4086

∞ P + 5 V: For Built-in Printer power source
≈ DC ± 15 V: For Analog Circuit power source (via PCB No. 6362, 2132, 2134, 9260)

3.3 PCB No. 2132 (PD; Photo Diode, Pre-Amplifier, LED Relay)
PCB No. 2156 (PD2; Photo Diode, Pre-Amplifier, LED Relay)

3.3.1 Function

These PC Boards amplify the detector signal in channels CH1~CH6 and drives LEDs for these channels. There are four kinds of boards (for CH2, 4, 6, for CH1, 3, 5, for CH1, 3, and for CH2, 4). Actually, this board is used with composing two kinds of the board. (Refer to the table below.)
This circuit detects the scattered light on the channels CH1~CH4, the transmitted light on the channel CH5 on Detector Block (ATIII) and the transmitted light on the channel CH6 on Detector Block (Immunoassy), amplifies by the current/voltage converter, and output to PCB No. 6362 (MAIN) or PCB No. 6373 (MAIN-2).



<Detector Block>

CH to be Used	PCB No.	Model	Part No.
2,4,6	PCB No. 2156 (Immuno)	CA-550/560	662-0285-7
2,4	PCB No. 2132 (Standard) PCB No. 2156 (Standard Coag/Chrom)	CA-510/520/530/540	662-0217-3 662-0281-2
1,3	PCB No. 2132 (2 Circuits) PCB No. 2156 (2 Circuits Coag)	CA-510/521	662-0218-7 662-0282-6
1,3,5	PCB No. 2132 (3 Circuits) PCB No. 2156 (3 Circuits Chrom/Immuno)	CA-530/540/550/560	662-0219-1 662-0283-0

3.3.2 Block Diagram

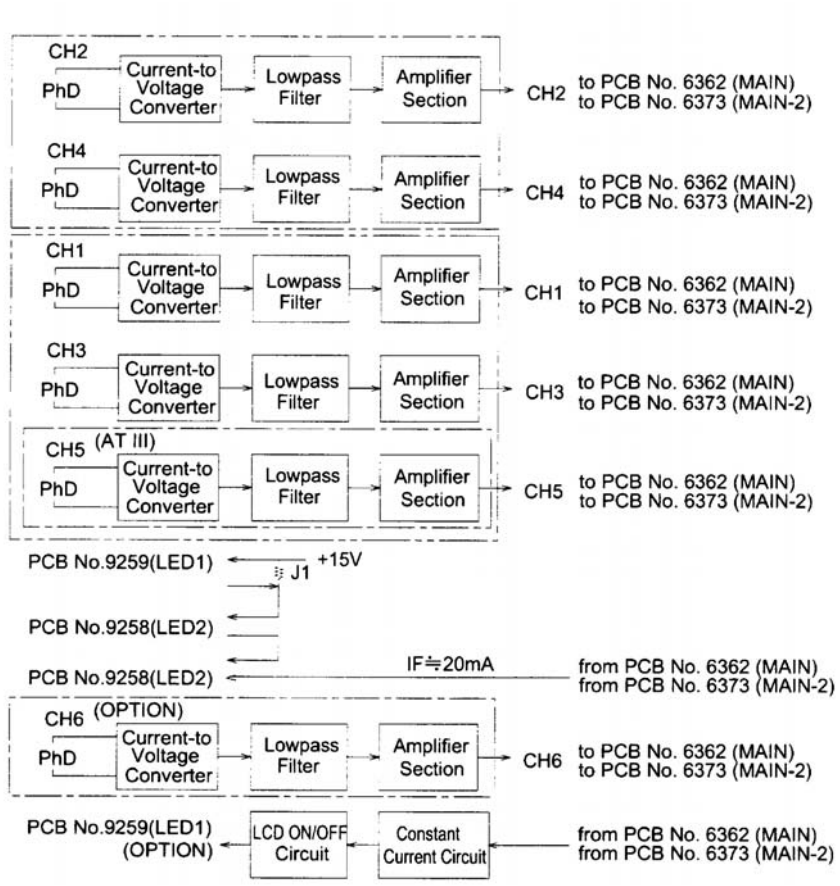


Figure 3-4: PCB No. 2132 and 2156 Block Diagram

3.3.3 Circuit Explanation

(1) Pre Amplifier Circuit

1) Current/Voltage Converter (U1, 2, 4)
The photo-diode receives scattered light and generates small electric current. This circuit converts this current into a voltage.

2) Low-pass Filter (R6 + C5, R15 + C12, R25 + C20)
Low-pass filter reduce the noise.

3) Amplifier (U3)
The channels CH1~CH4 are the direct current amplifier with a gain of 11 times.
The channel CH5 and CH6 are the direct current amplifier with a gain of 1 time.

4) Constant Current Circuit for CH6 (U3C, U5, Q1, PC1)
The shunt regulator (U5) releases reference voltage and releases the constant current circuit by comparing the voltage released from U3 to R32. PC1 controls isolated LED electricity ON/OFF signal from MAIN (PCB No. 6362) or MAIN-2 (PCB No. 6373) and Q1 turns on constant current by ON/OFF. R23~R26 bleeds only to turn LED for CH6.

3.3.4 Setting and Adjustment

Setting and adjustments are not necessary.

3.3.5 LED and Test Point

There is no LED and Test Points.

3.3.6 Assembly Drawing

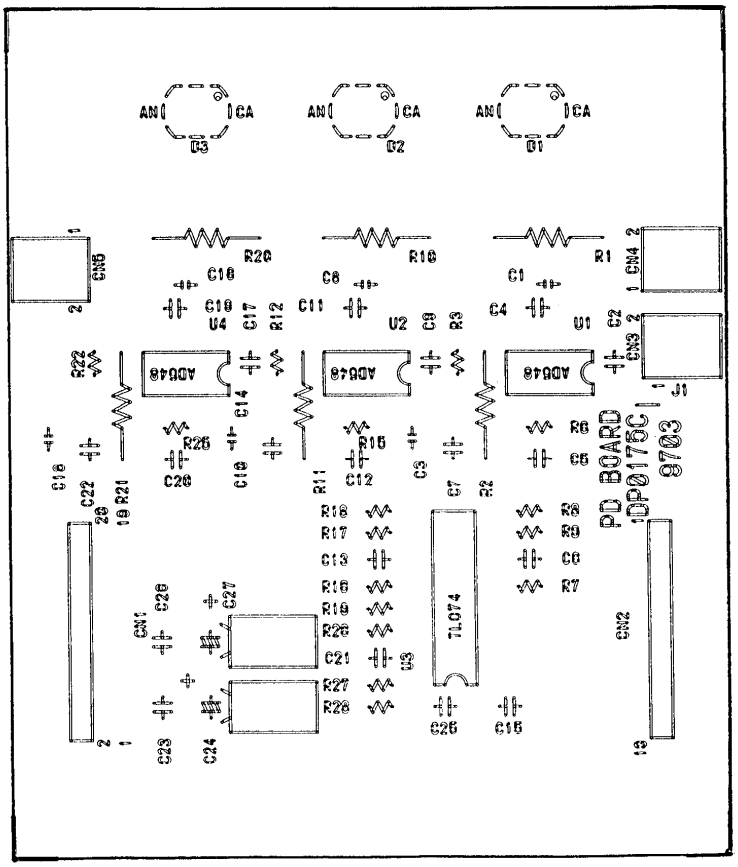


Figure 3-5: PCB No. 2132 Assembly Drawing

3.4 PCB No. 2133 (THERMO; Thermister)

3.4.1 Function

This board is used to mount the thermister.
Centigrade temperature sensor IC (LM35DZ) is used for the thermister.

3.4.2 Setting and Adjustment

Setting and adjustments are not necessary.

3.4.3 LED and Test Point

There are no LEDs or test point.

3.5 PCB No. 2134 (Y-Z RELAY; Liquid Surface Sensor, Probe Crash, Y-Axis Home Position Sensor, Z-Axis Relay) PCB No. 2157 (Y-Z RELAY2; Liquid Surface Sensor, Probe Crash, Y-Axis Home Position Sensor, Z-Axis Relay)

3.5.1 Function

This is the detection circuit of the liquid surface sensor which uses the capacitance change method in which liquid surface is detected by capacitance change when the probe touches the liquid surface. This circuit also has the Probe Crash Detection, Y-Axis Home Position Sensor, and relay to the Z-Axis signal.

(1) Liquid Surface Detection Circuit
Liquid surface of sample, reagent, buffer or rinse water is detected and a detection signal is issued. Detection signal is also issued when the probe is removed from the liquid surface.
(2) Probe Crash Detection Circuit
Probe crash is detected and a probe crash signal is issued.
(3) Probe Arm Y-Axis Home Position Sensor
(4) Probe Arm Y-Axis Motor Signal Line Relay
(5) Relay to PCB No. 9264 (Z RELAY)

3.5.2 Block Diagram

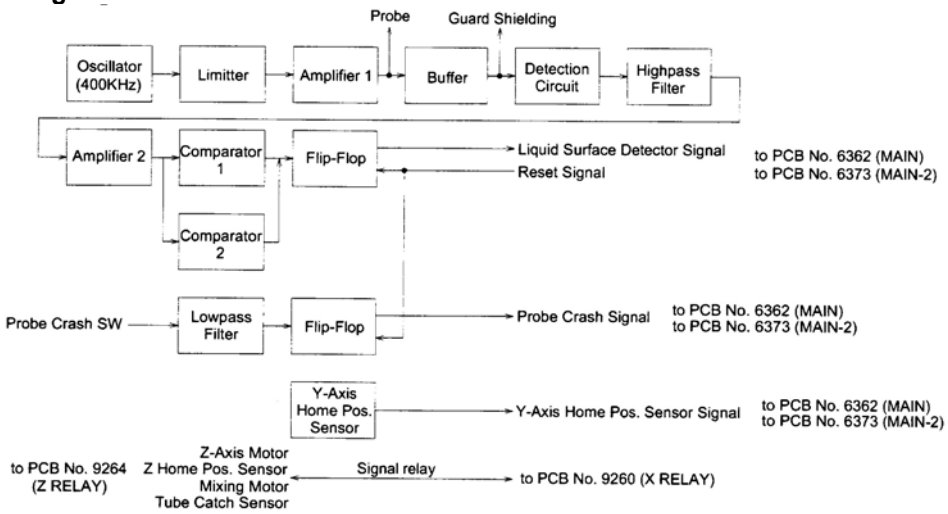


Figure 3-6: PCB No. 2134 and 2157 Block Diagram

3.5.3 Circuit Explanation

(1) Liquid Surface Detection Circuit

1) Oscillator (X1, Q1, etc.)
Colpitts Oscillator Circuit using ceramic oscillator (X1), oscillates a wave form of 400 kHz.
2) Limitter (D1)
Diode (D1) clips the 400 kHz wave form to 1.2 Vp-p.
3) Amplifier 1 (U1)
Non-inverting amplifier amplifies the 400 kHz wave form and adds the 400 kHz signal to the probe.
4) Buffer (Q2, 3, 4)
This circuit receives signal of probe capacitance change. It also imposes the guard-shield at the same potential with the probe (low impedance).
5) Detection Circuit (D5, C11, R15)
400 kHz wave form is peak-detected.
6) Highpass Filter (Q6, R18, C13)
The wave form after de-modulation is differentiated, and only the differential part is extracted.
7) Amplifier 2 (U2)
Differentiated wave form is amplified.
8) Comparator Circuit 1 and 2 (U3)
Liquid surface signals of touching and detaching the surface are compared with the reference voltage (approximately, + 2.6 V, – 2.6 V).
9) Flip-flop (U4-8, 9, 10, 11, 12, 13)
Liquid surface detection signal is latched by flip-flop.

(2) Probe Crash Detection Circuit
Probe crash is monitored by a micro-switch in the probe holder (normally ON). The micro-switch turns OFF when probe is pushed back and the probe crash signal is generated. The probe crash signal is latched by flip-flop.

3.5.4 Settings and Adjustment

Setting and adjustments are not necessary.

3.5.6 Assembly Drawing

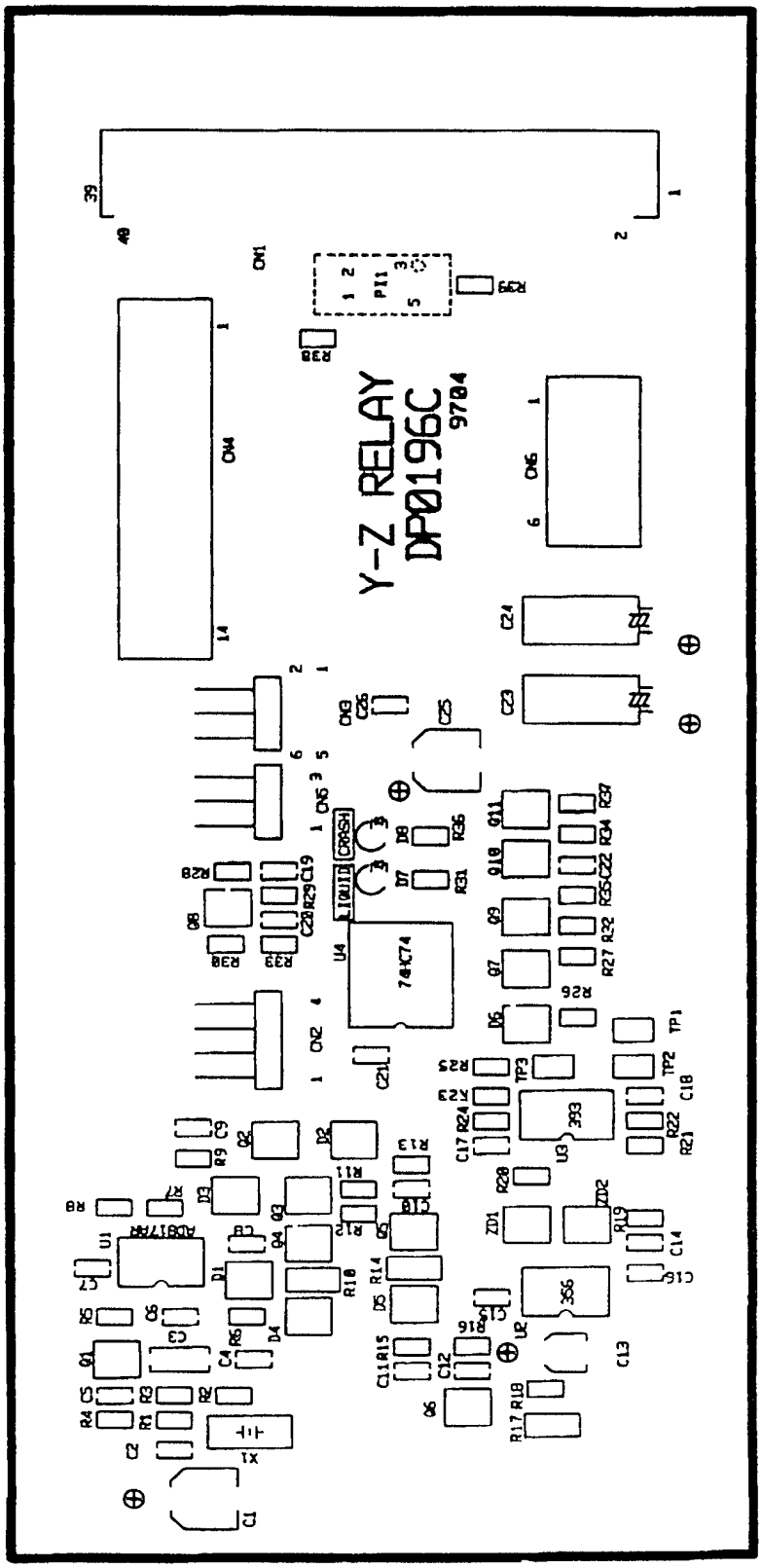


Figure 3-7: PCB No. 2134 Assembly Drawing

3.6 PCB No. 4086 (PS; Power Source, Motor Driver)

3.6.1 Function

This PC Board takes in the Transformer power output (AC100 V, AC16.5 V) and the Switching Regulator power output (+5 V, +12 V, +24 V) and delivers such power to each PC board directly or via the voltage regulator or each driver. PCB No. 6362 (Main) or PCB No. 6373 (Main-2) controls each driver.

Voltage Regulator

• Power Source for Analog Circuit	± 15 V (voltage regulator)	1 A
• + 5 V Power Source for Printer	+ 5 V (voltage regulator)	1 A
• Power Source for Stirrer Motor	Variable	1.5 A

Drivers

• Stepper Motor Driver for X-Axis	STK6713B
• Stepper Motor Driver for Y, Z, Syringe	STK6712B
• ID Unit Motor	TA8415, TD62308
• Solenoid Valve	TD62308
• Probe Heater, Detector Block Heater, Peltier Cooler	Power MOSFET
• Sampler Table Lock, Mixing Motor	Transistor with resistor
• Vacuum, Pressure Pump (AC Photo coupler)	TLP3503

3.6.2 Block Diagram

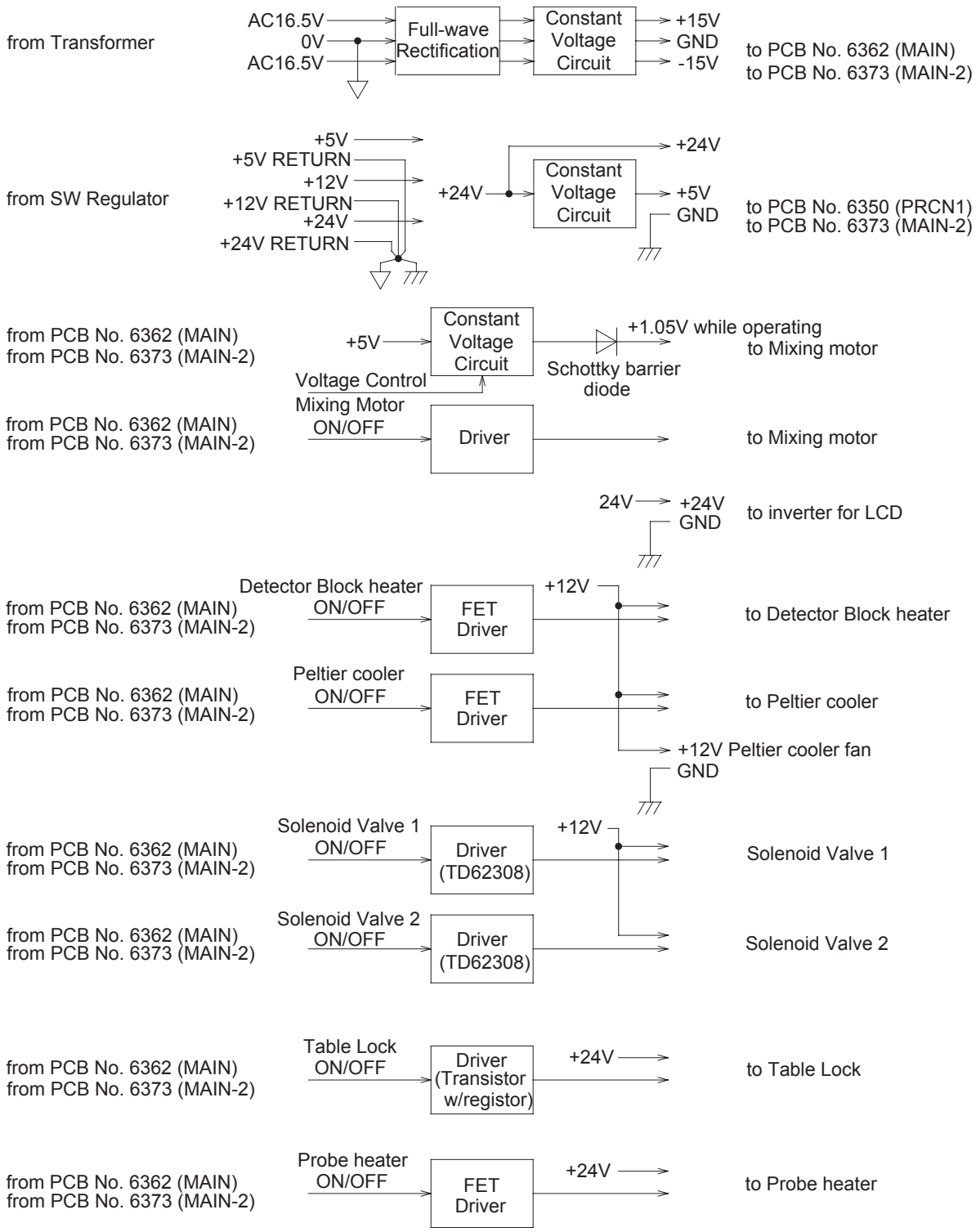


Figure 3-8-a: PCB No. 4086 Block Diagram (to be continued)

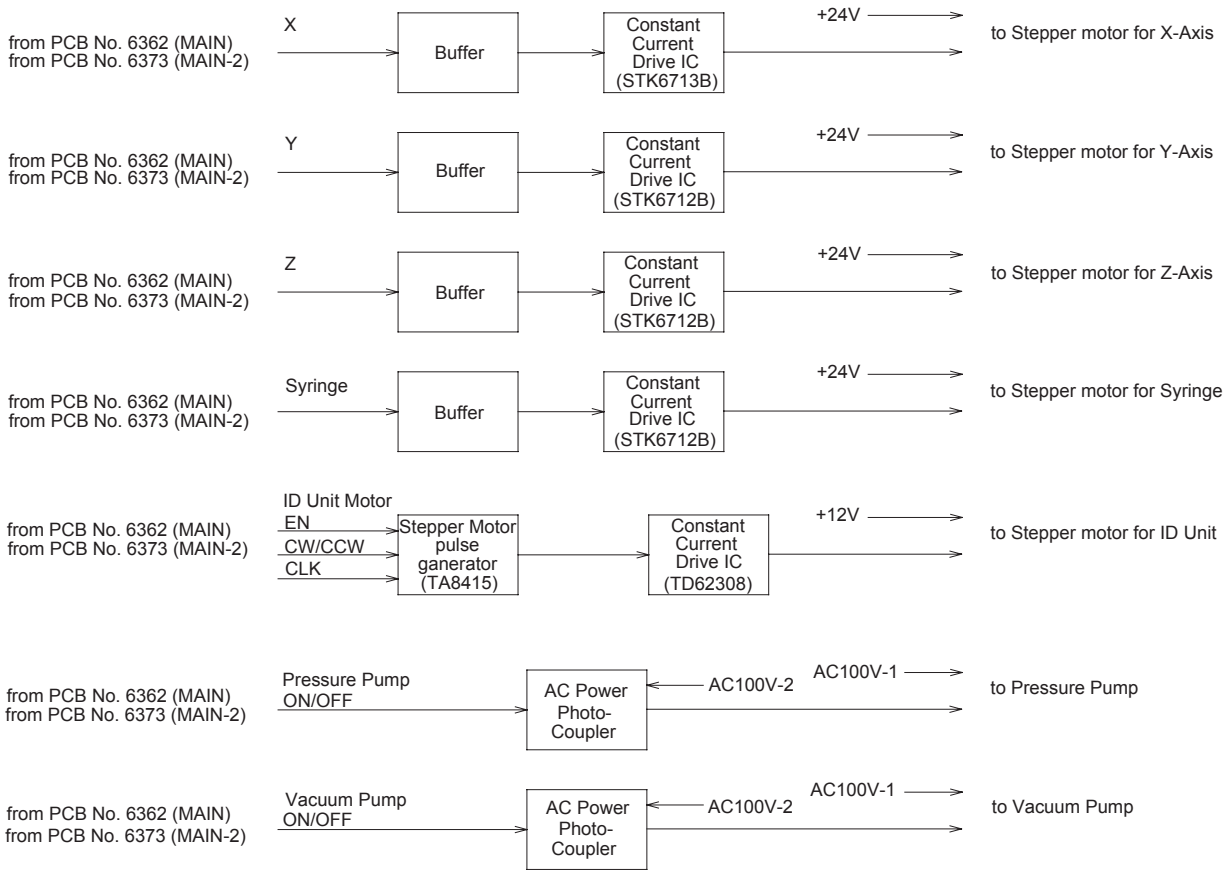


Figure 3-8-b: PCB No. 4086 Block Diagram (Continued)

3.6.3 Circuit Explanation

(1) Stepper Motor Control Circuit for X-Y-Z Drive mechanism and Syringe
This stepper motor operates by the two-phase constant current drive.

(2) Motor Drive Circuit for ID Unit
TD62308 drives the stepper motor by the four-phase pulse generated at TA8415 from the CLK signal generated on PCB No. 6362 (MAIN) or PCB No. 6373 (Main-2). This stepper motor is operated by the two-phase voltage drive.

(3) Vacuum, Pressure Pump Driver Circuit
This circuit turns the vacuum and pressure pumps ON/OFF at TLP3503 by the control signal from PCB No. 6362 (MAIN) or PCB No. 6373 (Main-2). The vacuum and pressure pumps are operated at AC 100 V.

3.6.4 Setting and Adjustment

Setting and adjustments are not necessary. Refer to Section 4 to verify each voltage.

3.6.5 LED and Test Point

(1) LED
No LED is used.

(2) Test Point
TP1: GND

3.6.6 Assembly Drawing

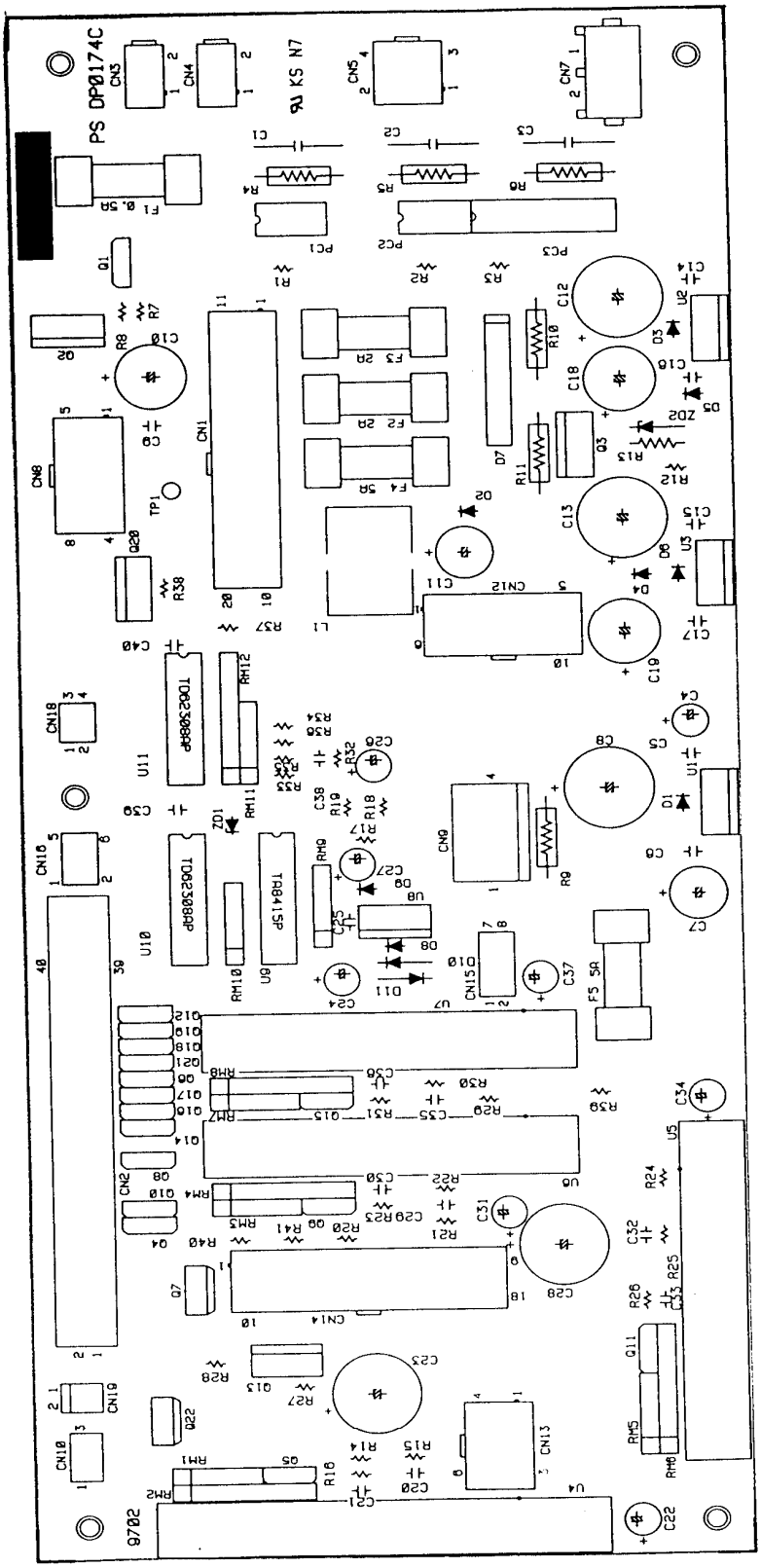


Figure 3-9: PCB No. 4086 Assembly Drawing

3.7 PCB No. 6350 (PRCN-1; Printer Control Board)
PCB No. 6375 (PRCN-3; Printer Control Board)

3.7.1 Specification

The operation of the printer and PCB No. 6350 or PCB No. 6375 are as follows.

1) When the initializing is performed with the paper loading after the power is turned ON, the printer is ready to operate, turning the READY signal to “L” and waiting for the input data.

2) Data transmitted from the host computer is handshaken by STROBE and READY signals and stored in the buffer memory in one byte steps. When a full line data (*) is reached, LF(0AH) or ESC(1BH) code is entered, all data stored in the buffer is printed out. If there is no data before LF code, only line feed takes place.
(*): When one dot line data is entered, in case of a bit image.

3) Printing is performed in synchronism with the code wheel signal.

4) If the printer head is lifted up with the Head-up lever during operation or when paper empty condition is encountered, the power to the printer head is shut off and the motor stops. resulting in the BUSY status. This status is maintained until the above condition is cleared. When cleared, the status changes to READY.

5) When the buffer contains no print data, the FEED signal is effective. “L” level of the FEED signal shows BUSY status, providing the paper feed by one line (9 dot lines).

6) If the motor is locked by paper jamming or other reason, the printer will activate the ERROR signal and makes an emergency stop.

3.7.2 Block Diagram

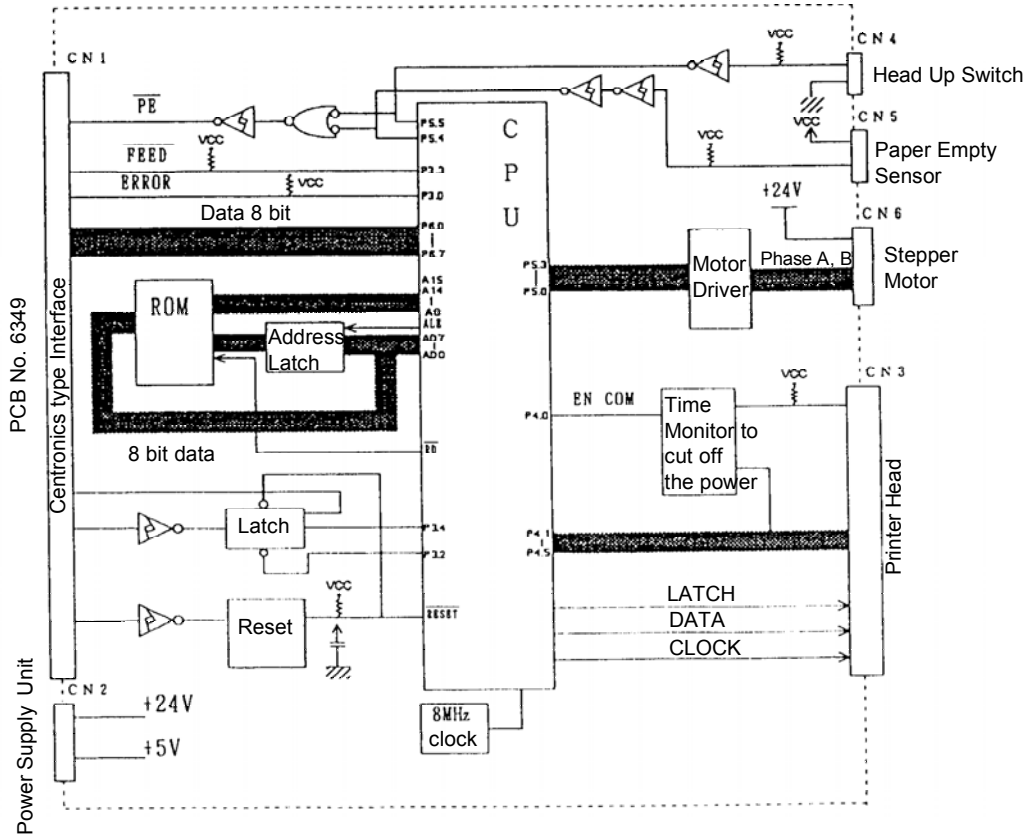


Figure 3-10: PCB No. 6350 and 6375Block Diagram

3.7.3 Setting and Adjustment

Setting and adjustments are not necessary.

3.7.4 LED and Test Point

There are no LEDs or test point.

3.8 PCB No. 6362 (MAIN; CPU, I/O, Motor Control, Temperature Control, A/D) PCB No. 6373 (MAIN-2; CPU, I/O, Motor Control, Temperature Control, A/D)

New CPU board is mounted in following instruments. 19

CA-510	S/N: A1300 and thereafter
CA-520	S/N: A1018 and thereafter
CA-530	S/N: A1805 and thereafter
CA-540	S/N: A3405 and thereafter
CA-550	S/N: A1001 and thereafter
CA-560	S/N: A1001 and thereafter

3.8.1 Function

This PCB's functions are CPU, I/O, Motor Control, Temperature Control, and A/D, etc.

(1) CPU
(2) Clock Generator Circuit
(3) Interrupt Controller Circuit
(4) Voltage Drop Monitor Circuit
(5) RESET, Backed-up Switching Circuit
(6) EEPROM, WORK RAM, B. B. RAM
(7) Real Time Clock
(8) PRCN1 Interface
(9) LCD Interface
(10) Serial Interface
(11) Touch Screen Interface
(12) ID Unit Interface
(13) MEMORY CARD Interface
(14) Sensor Entry
(15) DIP SW Entry
(16) Detector Block Interface
(17) Temperature Control Circuit
(18) Pressure Control Circuit
(19) Stepper Motor Control
(20) Vacuum Pump Drive
(21) SV Control, Sampler Table Lock Control
(22) Buzzer Control
(23) Mixing Motor Control
(24) Bus Interface

3.8.2 Block Diagram

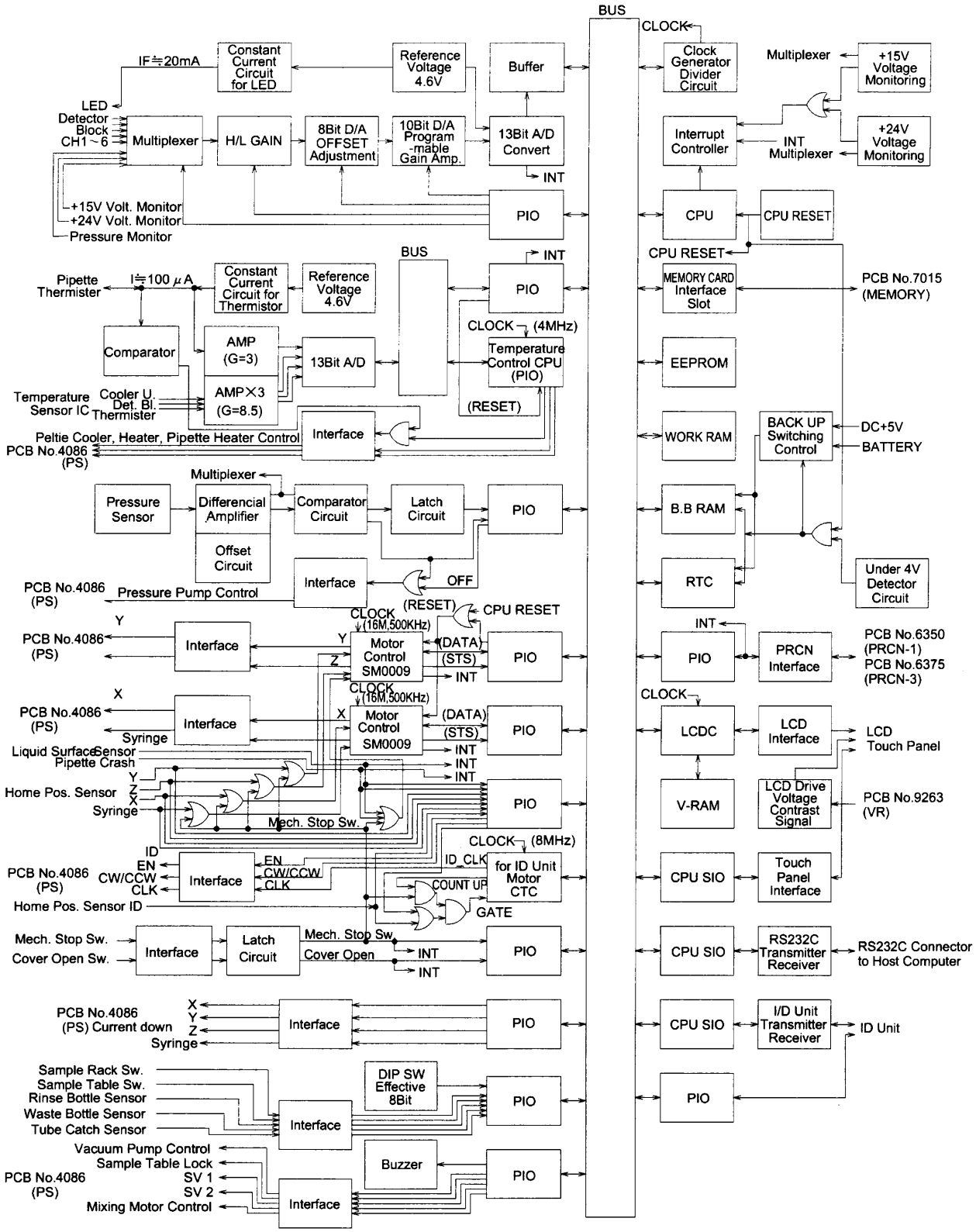


Figure 3-11: PCB No. 6362 and 6373 Block Diagram

3.8.3 Circuit Explanation

(1) CPU (U201)
The TMP68301AF-16 (TOSHIBA) is used as the Central Processing Unit (CPU) with the clock frequency of 16 MHz. This CPU includes the 68HC000 as a core, SIO, PIO, CTC, Interrupt Controller, Address Decoder, CGC, etc.

(2) Clock Frequency Generator Circuit (X201, U212, 213, 320)
The following clock frequencies are generated, divided from the 32 MHz oscillator.
- 16 MHz (CPU Clock)
- 16 MHz (Clock for Motor Controller)
- 8 MHz (for LCD Controller and Standard CLK for driving ID Unit Motor)
- 4 MHz (CPU Clock for controlling temperature)
- 2 MHz (for LCD Controller)
- 500 KHz (Clock for Motor Controller)

4.91 MHz is used for each CLK of two A/D Converters respectively.

(3) Interrupt Controller (U201, 202, 209)
This function is performed by using the interrupting function built in the CPU and the interrupt controller. The interrupt controller is used, extended from INT2 of the CPU. When the CPU receives 'INT', it proceeds in accordance with the prescribed priority of the program.

(4) Voltage Drop Monitor Circuit (U507, 508)
When the Power Source of 24 V decreases to approximately 20.7 V and the PS of 15 V to 13.8 V respectively, this circuit can detect the voltage decrease by interrupt signal and latch.

(5) RESET, Backed-up Switching Circuit (U210, U804)
This circuit monitors the digital 5 V source, and if it becomes less than approximately 4.75 V, RESET signal is generated and the protection for writing of the backed-up RAM and real time clock is performed at the same time. Also the DC + 5 V is switched by the battery power source. This circuit generates "L" when the voltage becomes less than 4 V to avoid unstable RESET signal.

(6) EEPROM, WORK RAM, B. B. RAM (EEPROM: U905 WORK RAM: U901 ~ 904 B. B. RAM:U801, 802)
EEPROM is 8KB, WORK RAM is 512 KB with SRAM, and B. B. RAM (Battery Backed-up RAM) is 256 KB with SRAM.

(7) Real Time Clock (U803)
This is battery backed-up as the calendar clock.

(8) PRCN1 Interface (U301, 312, 313)
This circuit performs the interface with the control board (PCB No. 6350 PRCN1) for Built-In Printer. It uses a port (U301) and buffers (U312, 313).

(9) LCD Interface (U701, 702, 704)
This circuit performs the LCD display by using the LCDC (LCD Controller (U701)). It writes the display dot image on the 256Kbit VRAM (U705) by the LCDC, and displays on the LCD via the buffer (U702) based on the image data. 8 MHz frequency is supplied as the internal clock and 2 MHz is supplied for LCD display timing.
The negative voltage of the LCD drive is created from + 5 V by the DC-DC Converter (U704).
For the contrast signal, the voltage divided from the above negative voltage by the external volume PCB No. 9263 (VR) is supplied to LCD.

(10) Serial Interface (U201, 601, 602)
The RS232C Serial communication is performed with the external Host Computer with using one of three channels of the serial interface for asynchronous communication built in CPU (U201).
Buffers (U601, 602) having the DC-DC Converter within it are used as the level converter.

(11) Touch Screen Interface (U201, U703-4, 5, 6, 8, 9, 10)
With using one of three channels of serial interface built in the CPU (U201) for asynchronous communication, interface with the LCD touch screen by TTL level serial communication is performed.

(12) ID Unit Interface (U201, 603)
With using one of three channels of serial interface built in the CPU (U201) for asynchronous communication, the serial communication with the ID Unit Interface is performed. Output signal for the ID reading timing and the ID reading OK/NG input signal are interfaced at the CPU port. The buffer (U603) having the DC-DC converter within it is used as a level converter.

(13) MEMORY CARD Interface (CN102)
The CPU (U201) uses the specified MEMORY CARD storing the program in the 68 pin card slot (CN102).
This 68 pin card slot is directly connected to the internal bus.
Inserting the other card than specified (PC card, etc.) cannot assure the operation.

(14) Sensor Entry (U314, 316, 327)
The X, Y, Z axis sensor signal, the volumetric syringe sensor signal, and the ID Unit sensor signal are input as the home position sensors at the motor drive position.
The Liquid Surface Sensor signal latched from the Y-Z RELAY Unit and the Probe Crash signal are input.
As the other sensor signal entries, the Mechanical Stop Switch, the Cover Open Switch, the Sample Rack Switch, the Sample Table Switch, the Rinse Bottle Sensor, the Waste Bottle Sensor, and the Tube Catch Sensor are activated.

(15) DIP SW Entry (SW202, U207)
Among the 9 bits of the Dip Switch, the 1 ~ 8 bits can be used as port entries.

(16) Detector Block Interface (U515, 506, 514, 502, 513, 505, 501)

This circuit sends the various commands such as the switching command for the signals from Detector Block (scattered light 1CH ~ 4CH, transmitted light 5CH, transmitted light for Immunoassy 6CH), the H/L Gain Amplifier command, Offset voltage control command, Gain voltage control command, and the A-D converting command. Also, the interface circuit drives the LED which is the light source of Detector Block with the constant current. Switching of each channel signal is performed every 20 ms by the multiplexer (U515) control command and then the procedure for the selected signal is performed.

By the H/L Gain Amplifier (U506-1, 2, 3 pin, U-514), switching between high sensitivity and low sensitivity in the [Detector Block Adjustment] on the Service mode is performed.

The signal of the Offset voltage control circuit (U502, U505-8, 9, 10) composed by 8 Bit D/A converter and OP Amplifier is added on the above signal.

In addition, the Gain voltage control is performed at the programmable gain amplifier (U513, U505-5, 6, 7) composed by 10 Bit D/A converter and the OP amplifier.

Both the Offset control value and the Gain control value are adjusted by the [Detector Block Adjustment] on the Service mode and stored in the EEPROM.

LED ON/OFF is executed by controlling 20 mA constant current circuit of U506 for 1CH ~ 5CH, and the photo-coupler (PC1) of PCB No. 2157 on Detector Block for 6CH.

These adjusted values are converted to the digital signals by the 13 Bit A/D converter (U501).

Additionally, as the signals other than the signals of Detector Block, +5 V, +24 V voltage level signals and the pressure sensor signal are entered, which enables the voltage monitoring and the pressure indication.

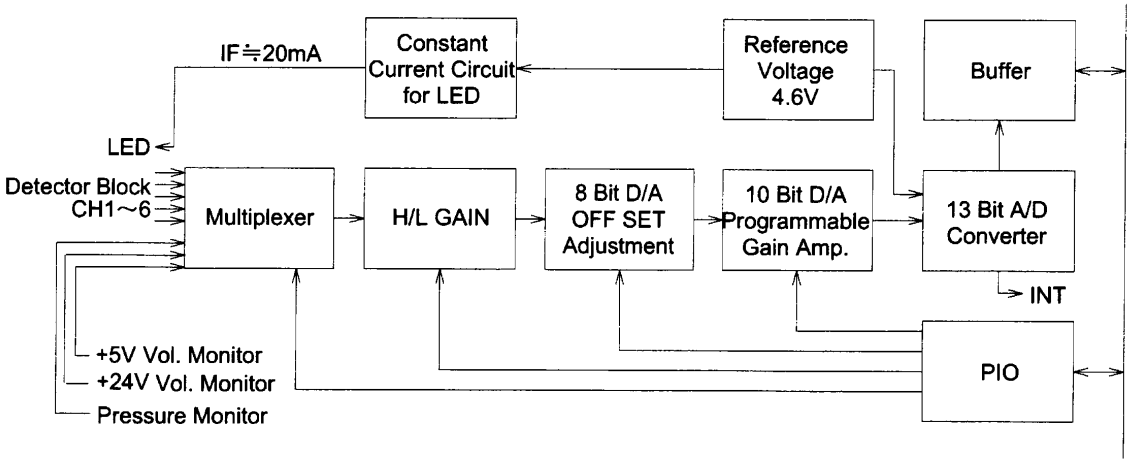


Figure 3-12: Detector Block Interface

(17) Temperature Control Circuit (U401 ~ 412)

This circuit amplifies the four temperature sensor signals (for Reagent Cooler Unit, Detector Block, Thermister, and Probe (Nozzle)), converts them to the digital signals by the 13 Bit A/D converter (U412), analyzes them at the Temperature control CPU (U401), and outputs the control signals for Detector Block heater, Probe heater, and Peltier cooler from each port.

Also, the temperature control CPU sends each sensor temperature data and the sensor controlled value by the interface (U402, 403, 404) with the Main CPU (U201).

As the sensors for Cooler Unit, Detector Block and Thermister, the centigrade temperature sensor IC (LM35DZ) is used and the sensor signal is amplified by 8.5 times at the amplifier unit.

In the case the sensor signal is cut off, each sensor signal line is pulled up or pulled down to avoid over heating or over cooling.

As the temperature sensor for the Probe, a thermister is used. Approximately 100 µA constant current is flowed in the thermister and the voltage is amplified by three times at the amplifier unit.

In the case the thermister is disconnected, or to avoid the thermal runaway when overheating due to the abnormal control, the voltage is compared by the comparator (U408) and the Probe control signal is forced to turn OFF when abnormal voltage occurred.

Each control signal for Detector Block heater, Probe heater and Peltier cooler, can be checked by the LED status (D401, D402 and D403).

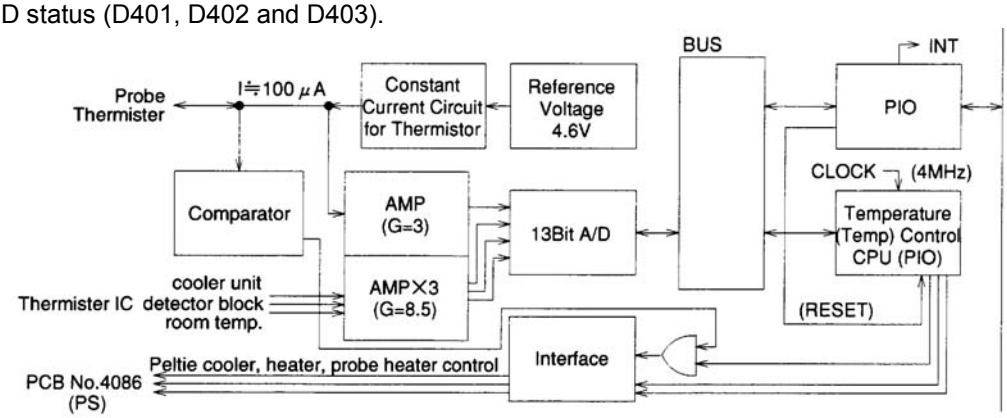


Figure 3-13: Temperature Control Circuit

(18) Pressure Control Circuit (U518, 517, 516, 519, 520, 521)

This circuit controls the pressure to supply water to each unit from Rinse Bottle. This circuit is composed by the pressure sensor, the differential amplifier, the Offset circuit and the Comparator circuit, and the pressure pump is controlled by these signals.

The pressure is supplied from the pressure pump to the pressure sensor (U518) mounted on the board, and the sensor signals are output in accordance with the supplied pressure. The Gain controlled value and the Offset controlled value are added on this signal by the differential amplifier and the signal is input in the comparator circuit(U516) to compare the voltage with the specified one.

In the case the pressure decreases in this circuit, the signal activating the pressure pump is output.

The other comparator circuit and the latch circuit (U519, 520, 521) are used for detecting the pressure error.

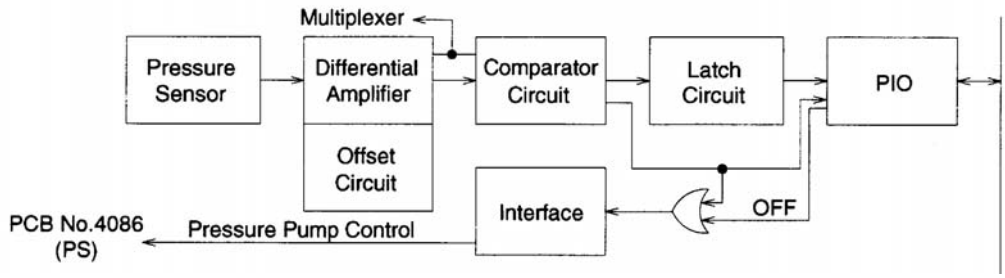


Figure 3-14: Pressure Control Circuit

(19) Stepper Motor Control (U310, 311, 302, 305, 303)

With using two stepper motor control IC (SM0009: U310, 311), this circuit controls each stepper motor of the X, Y, Z, volumetric syringe.

The motor home position sensor signal and the mechanical switch latch signal are taken as a OR circuit, therefore, as soon as the mechanical switch is turned ON, the operation immediately stops. Also, the Z-Axis sensor is taken as a OR circuit with the liquid surface detector sensor and the probe crash sensor, therefore, in the case the probe is moving downward by these signals, the operation immediately stops. The current down signal controlling the current of the driver when the motor stops is output from P10 (U302, 305).

The ID Unit stepper motor is controlled by the CTC (U303) and the peripheral gates.

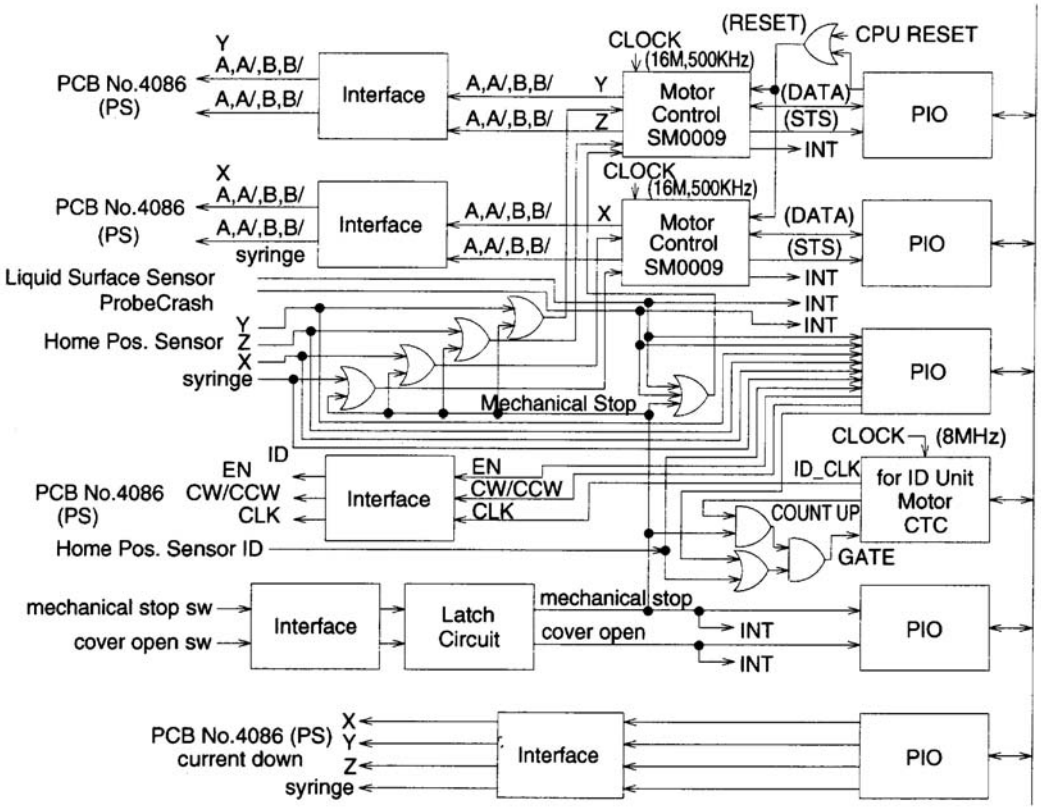


Figure 3-15: Stepper Motor Control Circuit

(20) Vacuum Pump Control

This circuit controls the vacuum pump for aspirating waste.

(21) SV Control, Sampler Table Lock Control

This circuit controls two solenoid valves and the actuator for the sampler table locking.

(22) Buzzer

This circuit controls the buzzer ON/OFF by the output port.

(23) Mixing Motor Control

This circuit controls the stirrer motor ON/OFF by the output port.

The mixing motor driving power voltage is adjusted at VR101. The regulated voltage on the PCB No. 4086 is controlled by this VR101.

(24) Bus Interface

This circuit is composed by the Address Bus, the Data Bus, the Address Decoder (U203, 203, 205, 206, etc.), and the RD/WR signal generating circuit (U208).

3.8.4 Setting and Adjustment

Refer to Section 4 for the adjustment.

3.8.5 LED and Test Point

Refer to Section 4 for the adjustment.

3.8.6 Assembly Drawing

Refer to Section 4 for the adjustment.

3.9 PCB No. 7015 (MEMORY; Program Memory)

3.9.1 Function

This PCB is the CA-500 program memory card storing the CPU program of PCB No. 6362 ((MAIN). When this PCB is inserted into the 68 pin card slot (CN102) on PCB No. 6362 or PCB No. 6373, the operation becomes available.
On this memory card, the flash memory is directly connected to the connector of the card.
This is not a PC card, therefore, do not insert it to the card slot on the instrument other than CA-500.

3.9.2 Setting and Adjustment

Setting and adjustments are not necessary.

3.9.3 LED and Test Point

There are no LEDs or test point.

3.10 PCB No. 9258 (LED2; LED for scattered light)

3.10.1 Function

This PC Board is the board for mounting the LED for analyzing the scattered light in the Detector Block. Two LEDs are mounted and two boards are used for four channels. These LEDs are driven in the constant current driving circuit (20 mA) on PCB No. 6362 (MAIN) or PCB No. 6373 (MAIN-2) together with the LED for the transmitted light.

3.10.2 Setting and Adjustment

Setting and adjustments are not necessary.

3.10.3 LED and Test Point

There are no LEDs or test point.

3.11 PCB No. 9259 (LED1; LED for transmitted light)

3.11.1 Function

This PC Board is the board for mounting the LED for the transmitted light in the Detector Block. This LED is driven in the constant current driving circuit (20 mA) on PCB No. 6362 (MAIN) or PCB No. 6373 (MAIN-2) together with the LED for the scattered light.

3.11.2 Setting and Adjustment

Setting and adjustments are not necessary.

3.11.3 LED and Test Point

There are no LEDs or test point.

3.12 PCB No. 9260 (X RELAY; X-Axis Relay)

3.12.1 Function

This PCB is used for the signal relay and the X-Axis Home Position Sensor signal relay to PCB No. 2134 (Y-Z RELAY) via FFC (Flexible Flat Cable).

3.12.2 Block Diagram

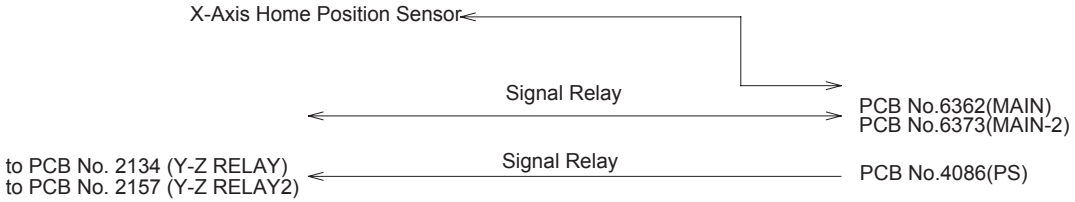


Figure 3-16: PCB No. 9260 Block Diagram

3.12.3 Settings and Adjustment

Setting and adjustments are not necessary.

3.12.4 LED and Test Point

There are no LEDs or test point.

3.12.5 Assembly Drawing

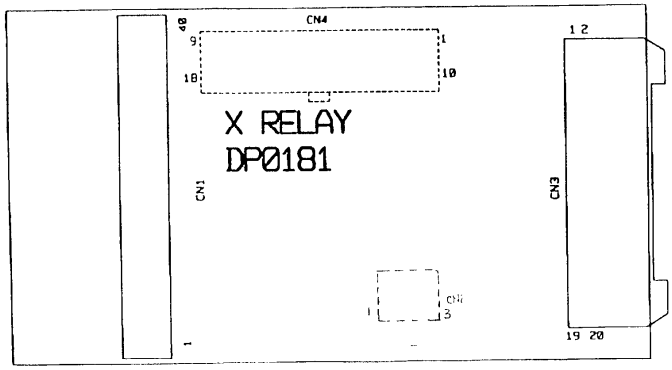


Figure 3-17: PCB No. 9260 Assembly Drawing

3.13 PCB No. 9263 (VR; LCD Contrast Volume)

3.13.1 Function

This PCB is the board to mount the volume for the LCD Contrast.

3.13.2 Setting and Adjustment

Setting and adjustments are not necessary.

3.13.3 LED and Test Point

There are no LEDs or test point.

3.14 PCB No. 9264 (Z RELAY; Z-Axis Relay, Z-Axis Home Position Sensor)

3.14.1 Function

This PCB is used for the Mixing Motor signal relay, Tube Catch Sensor signal relay, Z-Axis Home Position Sensor signal relay and Z-Axis Motor relay.

3.14.2 Block Diagram

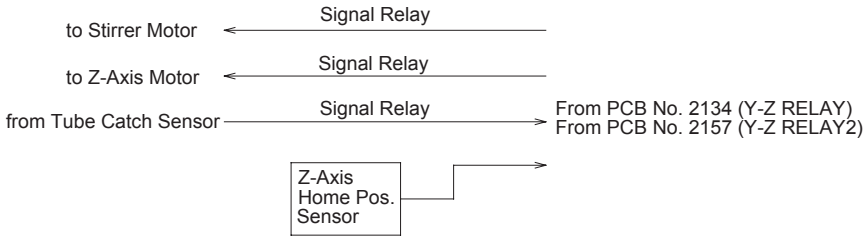


Figure 3-18: PCB No. 9264 Block Diagram

3.14.3 Setting and Adjustment

Setting and adjustments are not necessary.

3.14.4 LED and Test Point

There are no LEDs or test point.

3.14.5 Assembly Drawing

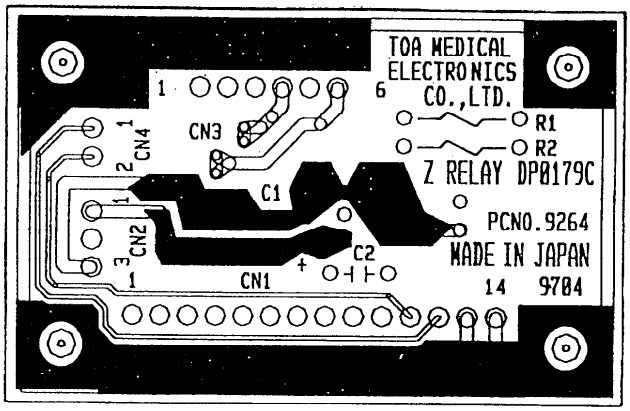


Figure 3-19: PCB No. 9264 Assembly Drawing

3.15 PCB No. 9265 (PR RELAY; Operation Panel, Syringe Motor, SV 1 Relay) PCB No. 9303 (PR RELAY2; Operation Panel, Syringe Motor, SV 1 Relay)

3.15.1 Function

This PCB is used for relaying the signal of the operation panel relay (Inverter for LCD, Mechanical Stop Switch, three kinds of Printer control line), the syringe motor and solenoid valve 1.

3.15.2 Block Diagram

Figure 3-20: PCB No. 9265 and 9303 Block Diagram

3.15.3 Setting and Adjustment

Setting and adjustments are not necessary.

3.15.4 LED and Test Point

There are no LEDs or test point.

3.15.5 Assembly Drawing

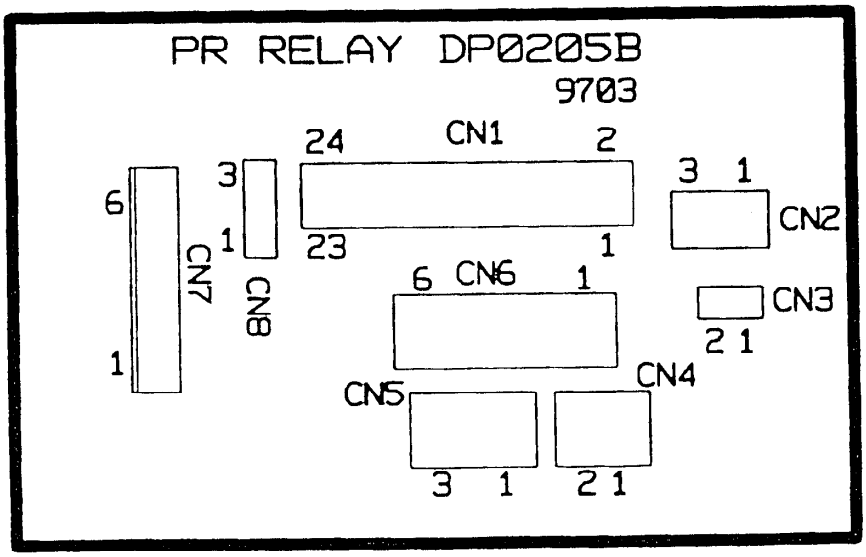


Figure 3-21: PCB No. 9265 Assembly Drawing

SECTION 4 ADJUSTMENT

To Cover

SECTION 4 ADJUSTMENT

4.1 PRESSURE ADJUSTMENT

4.1.1 Adjustment of Pressure Detector Circuit

(1) Verify that the ambient temperature where the unit is located is within the range of 15°C - 35°C. (The optimum recommended temperature range is 20°C - 30°C.)
(2) Prepare the Pressure Gauge (which can measure the pressure of 0.3 kg/cm^2) in the pressure line (black) on the rear panel.

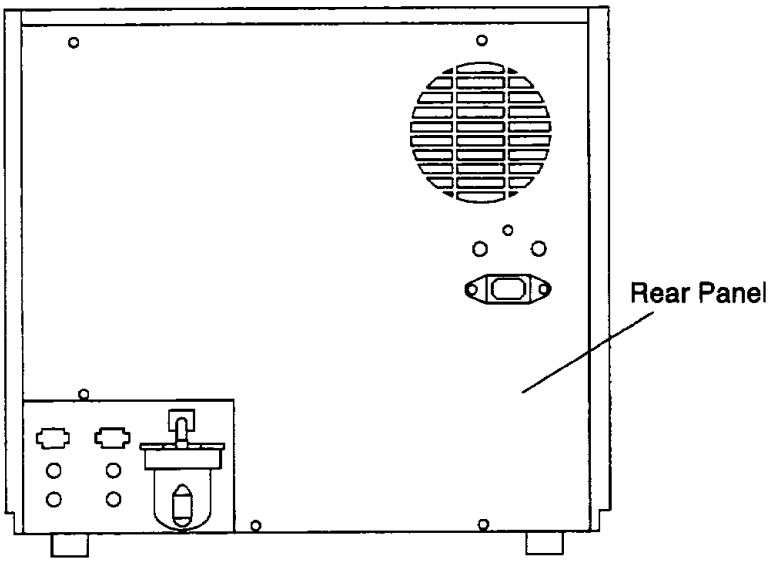


Figure 4-1-1: Rear View

(3) Adjustment procedure:

1) Turn the power OFF. Remove the rear panel and the dummy cover under the HOST connector.

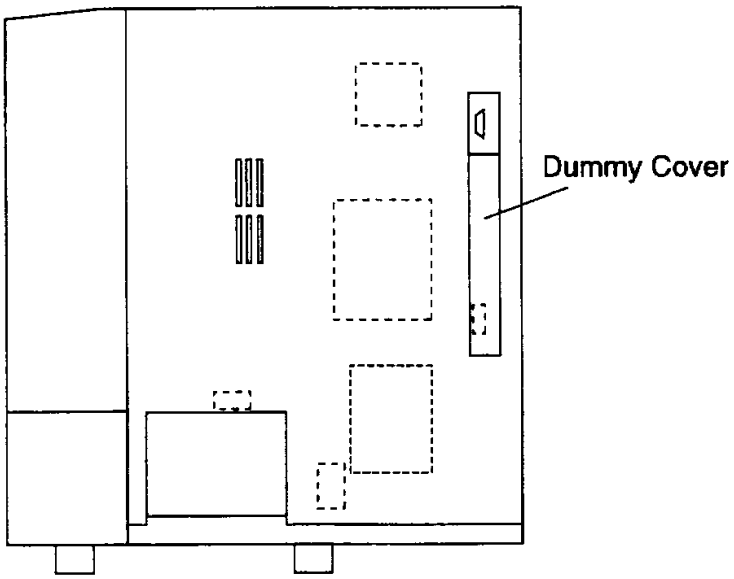


Figure 4-1-2: Dummy Cover (Left Side View)

2) Connect Jumper Pin J501 of PCB No. 6362 or PCB No. 6373 to C-2.

3) Loosen and remove the rinse bottle cap carefully because the cap will be lifted up by the pressure inside the rinse bottle.

4) Disconnect the black marked silicone tube connected to the rear panel at the rinse bottle.

5) Connect the pressure gauge to the silicone tube.

6) Turn the power ON.

7) Adjust the VR502 (OFFSET) so that the pressure becomes 225 ± 3 g/cm^2. (The pressure will be increased when VR is turned to CW direction. Disconnect the pressure gauge from the tube once when adjusting the pressure decreasing.)

8) Remove Jumper Pin J501. (Do not lose the jumper pin because it is placed on the PC board.)

9) Adjust the VR501 (GAIN) so that the pressure becomes 275 ± 3 g/cm^2. (The pressure will be increased when VR is turned to CW direction. Disconnect the pressure gauge from the tube once when adjusting the pressure decreasing.)

10) Verify Steps 1) to 5) again. As the VR502 (OFFSET) and the VR501 (GAIN) are related each other, adjust them repeatedly until the set values are obtained by repeating Steps 1) to 5).

11) Reconnect Jumper Pin J501 to C-1.

12) Disconnect the tube to decrease pressure, and reconnect it.

13) Verify that pressure is 250 ± 3 g/cm^2.
* If pressure is not 250 ± 3 g/cm^2, check and adjust again by repeating Steps 1) to 5).

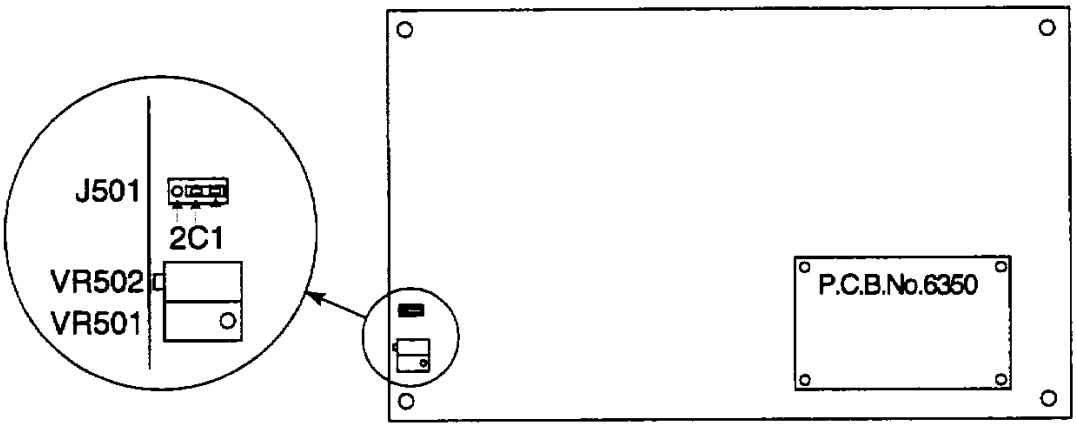


Figure 4-1-3: PCB No. 6362 Jumper, VR Location

4.1.2 Adjustment of Pressure Indication

(1) Verify that the ambient temperature where the unit is located is within the range of 15°C ~ 35°C. (The optimum recommended temperature range is 20°C ~ 30°C.)
(2) Connect the Pressure Gauge (with resolution of more than 28 g/cm^2, which can measure the pressure of 300 g/cm^2) to the pressure line (black) on the rear panel.
(3) Adjustment procedure:

1) Start Service Mode.
2) Select [Special Operate] → [Service] → [Adjust] → [Adjust. of Pump].

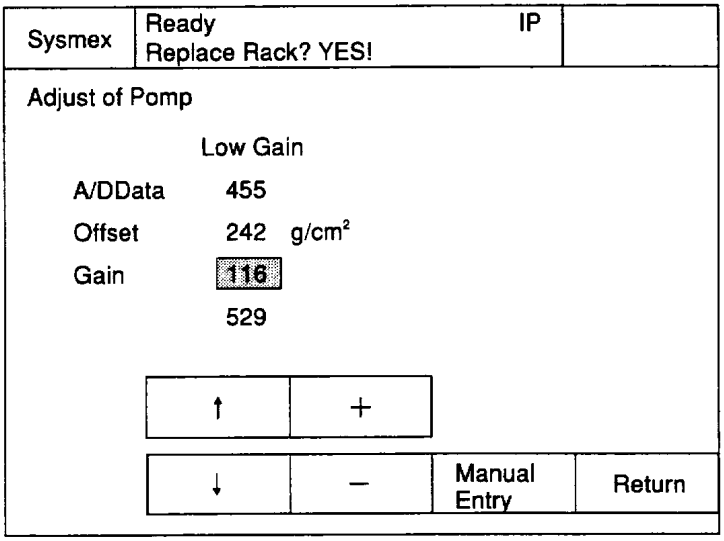


Figure 4-1-4: Adjust Pump Screen

3) Disconnect the tube at the pressure side (the black marking line on the rear panel) to release the pressure sensor (so that the pressure sensor shows the atmospheric pressure).
4) Offset the cursor by using [↑] and [↓] keys.
5) Adjust the offset value by using [+] and [-] keys so that the pressure gauge shows 1 g/cm^2. (When the offset value is lowered, A/D value also becomes lower.) (Actually, there is a fluctuation of 0 ~ 4 for the value, therefore, adjust it so that it shows the value, which approaches 0 most.)
6) Re-connect the pressure gauge to the pressure line on the rear panel.
7) Move the cursor to the gain by using "↑" and "↓" keys.
8) Adjust the gain value by using [+] and [-] keys so that the pressure gauge value (adjusted 250 g/cm^2 by the procedure described in *4.1.1 Adjustment of Pressure Detector Circuit)* agrees with the displayed pressure value on CA-500. The difference between the pressure gauge value and CA-500 displayed value should be adjusted within 3 g/cm^2.
9) Verify Steps 3) to 8) again, and if the value is within the specified range. Press the [Return] key.
10) Confirmation screen will be displayed by pressing "Return" key.

REFERENCE:	Pressure is adjusted at the factory in principle, therefore, it is not necessary to adjust in the field. Setting values are stored in EEPROM on the PCB No. 6362 or PCB No. 6373. In case of erasing the EEPROM, these printed values are attached on the memory card socket.

Select the appropriate key.
FIX: The new setting value is fixed.
Cancel: The new setting value is deleted and Adjust of Pump program will be quitted.
Continue: The adjustment can be continued.

4.2 DETECTOR BLOCK SENSITIVITY ADJUSTMENT

4.2.1 Required Tools for Adjustment

(1) CA-Series Standard Scattering Stick Set
(2) Reaction Tube
(3) Micro Pipette
(4) Ebonite Stick for adjusting offset value

4.2.2 Overview of Adjustment Screen (Description)

(Adjustment procedure starts *from 4.2.3 Adjustment of Detector Well for Analyzing the Scattered Light*)

(1) Verify that the ambient temperature where the unit is located is within the range of 15°C - 35°C. (The optimum recommended temperature range is 20°C - 30°C.)
(2) Start Service Mode.
(3) Select [Special Operate] → [Service] → [Adjust] → [Detector Gain].
(4) The Detector Gain screen will be displayed.

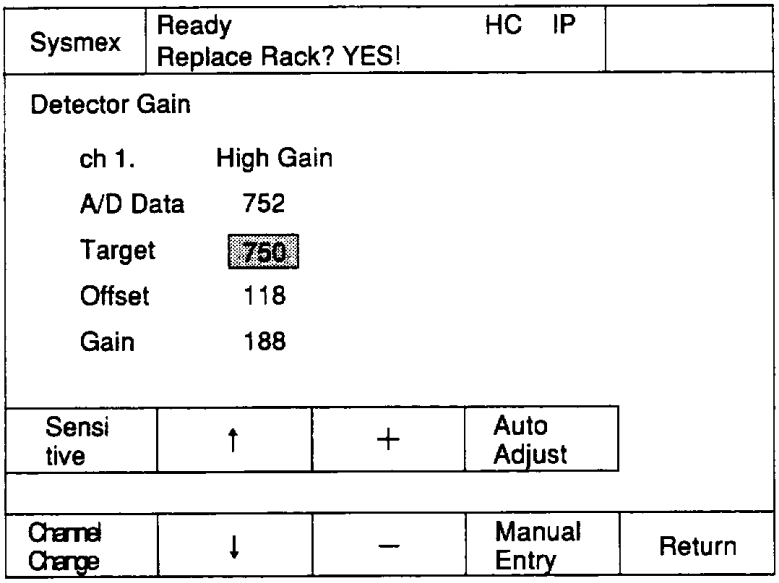


Figure 4-2-1: Detector Gain Screen

1) To change or adjust a value (Target, Offset, Gain), select the value by using [↑] and [↓] keys. The selected value is displayed in the reverse video, and inputting by pressing [+] and [–] keys or inputting numerals in the [Manual Entry] screen is available.
2) Select a channel among CH1 (Detector Well 1) → CH2 (Detector Well 2) → CH3 (Detector Well 3) → CH4 (Detector Well 4) → CH5 (Detector Well 5) → CH6 (Detector Well 6) in the order by pressing [Channel Change] key.
3) Press [Sensitive] key to alternate the sensitivity of the selected channel in the order of High Gain → Low Gain → PT Gain.

4) Start the automatic adjustment for the offset/gain value by pressing [Auto Adjust] key.

(5) Press [Manual Entry] key to display the screen that the manual entry by numeric keys is available.

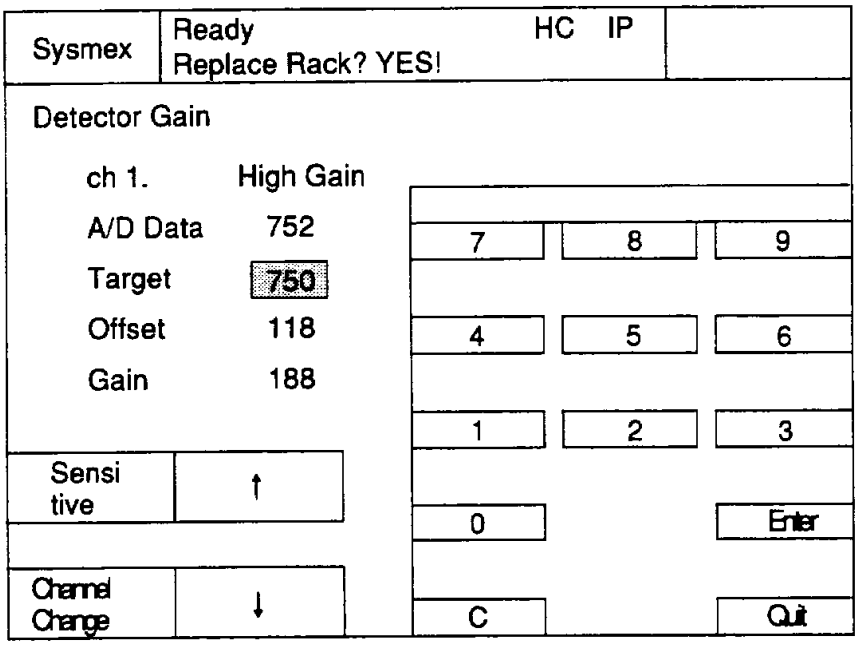


Figure 4-2-2: Manual Entry Screen

1) Pressing the numeric keys [0] to [9] can set the desirable value directly.
2) Pressing [C] key can clear the set value.
3) Press [Enter] key to settle the set value. The set value cannot be settled if [Quit] key is pressed without pressing [Enter] key.
4) Press [Quit] to return the previous screen.

CAUTION:
1) This adjustment should be done more than 30 minutes after the power-ON the instrument.
2) Use the scattering stick after being heated for more than 10 minutes in the detector well or the incubation well.
3) Close the light shield cover to avoid the influence by the external light during adjustment.
4) When Detector Adjustment Error occurs, the channel No. with the error is added to the error message. 13

Note: 13
1) Transmitted Light calibration will be performed automatically before the first measurement after switching on the instrument or after 24 hour continuous operation. It will be performed when a chromogenic or immunologic parameter is selectable in the actual group setting.
2) Instruments with new main board (PCB NO.6373) are able to switch off LEDs during standby operation automatically in order to prolong the life time of the LEDs.

4.2.3 Adjustment of Detector Well for analyzing the scattered light

(1) Offset adjustment

1) Insert the ebonite stick for adjusting the offset value in the detector well to be adjusted.

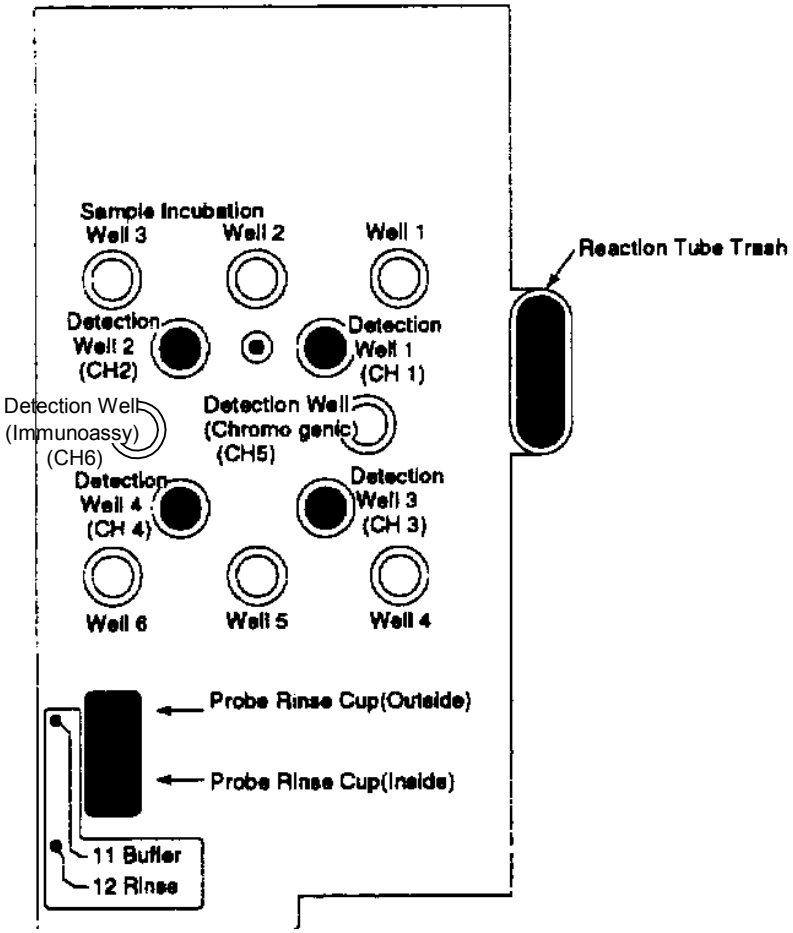


Figure 4-2-3: Detector Well Positions

2) Close the light shield cover.
3) Select channel 1 by using [Channel Change] key, select Low Gain by using [Sensitive] key, and select [Offset] position by pressing [↑] or [↓] key.
4) Press [Auto Adjust] key to start the automatic offset adjustment, and when the adjustment is completed, the alarm sounds.
5) Change Gain to PT Gain and enter Offset value manually in executing Step 3). (Press [+] and [–] keys or [Manual Entry] key to adjust manually.)
6) Execute Steps 1) to 5) for channels 2 to 4.

(2) High Sensitivity Adjustment (Gain Adjustment)

1) Insert the heated high sensitivity scattering stick (labeled usually as “750”) into the detector well to be adjusted (CH1 to 4).
2) Close the light shield cover.
3) Select channel 1 by using [Channel Change] key, select High Gain by using [Sensitive] key, and select [Gain] position by pressing [↑] or [↓] key.
4) Press [Auto Adjust] key to start the automatic gain adjustment, and when the adjustment is completed, the alarm sounds.
5) Execute Steps 1) to 5) for channels 2 to 4.

(3) Low Sensitivity Adjustment (Gain Adjustment)

1) Insert the heated low sensitivity scattering stick (labeled usually as “430”) into the detector well to be adjusted (CH1 to 4).

2) Close the light shield cover.

3) Select channel 1 by using [Channel Change] key, select Low Gain by using [Sensitive] key, and select [Gain] position by pressing [↑] or [↓] key.

4) Press [Auto Adjust] key to start the automatic gain adjustment, and when the adjustment is completed, the alarm sounds.

5) Change the sensitivity to PT Gain, and verity that both Offset and Gain values for PT Sensitivity are automatically set when changing Offset and Gain values for Low Sensitivity.
To set PT sensitivity individually, execute the same procedure as (1) Offset Adjustment and (3) Low Sensitivity Adjustment or enter values manually using numeric keys.

6) Execute Steps 1) to 5) for channels 2 to 4.

NOTE: The gain adjustment and the offset adjustment have an influence on each other, therefore, reconfirm that the set value after each adjustment is within the specified range of values. Refer *to 5.9.2 Detector Block Adjustment Value* for default value.

4.2.4 Adjustment of Detector Well for analyzing the transmitted light (Chromogenic and Immunoassy)

(1) Offset adjustment

1) Insert the ebonite stick for adjusting the offset value in the channel 5 of the detector well.

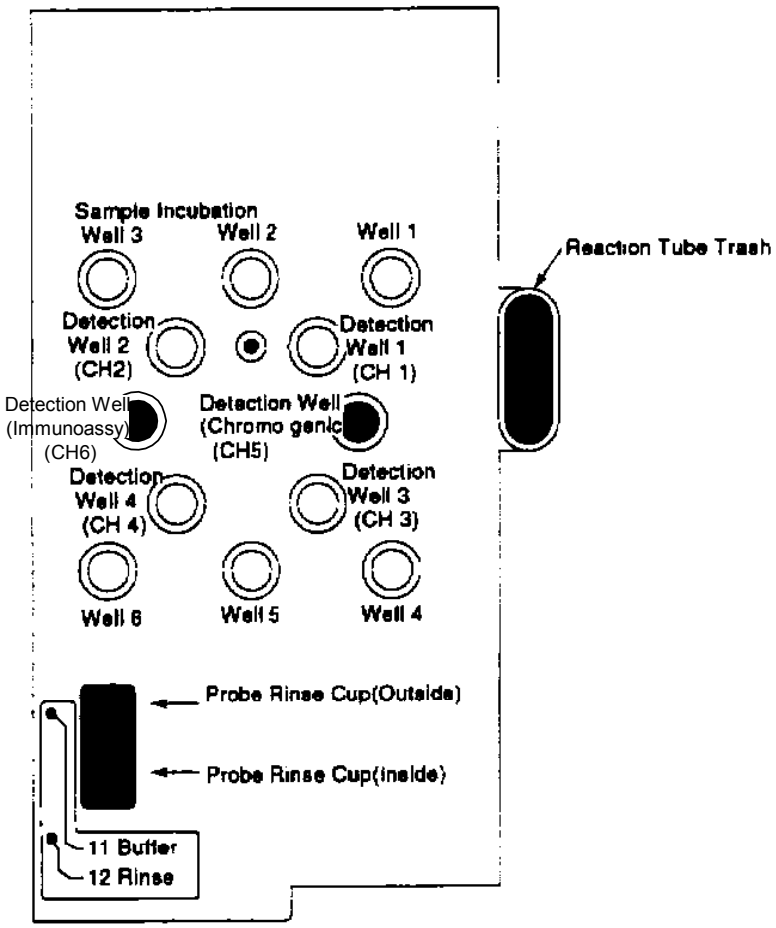


Figure 4-2-4: Detector Well Positions (Chrom, Immunoassy)

2) Close the light shield cover.
3) Select [CH5] by using [Channel Change] key and select [Offset] position by pressing [↑] or [↓] key. (Low Gain is fixed and cannot be changed.)
4) Press [Auto Adjust] key to start the automatic offset adjustment, and when the adjustment is completed, the alarm sounds.
5) Execute Steps 1) to 4) for channel 6.

(2) Gain adjustment (Dynamic Range adjustment)

1) Dispense 200 µL of distilled water or buffer (OV-30) into a reaction tube in advance, set it into the transmitted light detector well (channel 5), and heat it up for approximately 10 minutes.
2) Close the light shield cover.
3) Select [CH5] by using [Channel Change] key and select [Gain] position by pressing [↑] or [↓] key. (Low Gain is fixed and cannot be changed.)
4) Press [Auto Adjust] key to start the gain adjustment, and when the adjustment is completed, the alarm sounds.
5) Open the light shield cover, rotate the reaction tube set in the channel 5 detector well and verify that the indicated A/D value does not exceed 4,000. At this time, avoid the external light as much as possible. If the A/D value exceeds 4,000, set the reaction tube at the position where the indicated A/D value is the biggest and press [Auto Adjust] key again to start the adjustment.
6) Execute Steps 1) to 5) for channel 6.

4.2.5 Exit Adjustment

(1) When the adjustment is completed, press [Return] key.

(2) FIX, Cancel the set value, and continue the adjustment:

1) When the adjusted value is settled and the adjustment is completed, press [FIX].
Store the new setting value in the memory and output the value on the built-in printer, and then return to the sub-menu.

1997/05/09

DETECT		OFFSET	GAIN
1	HIGH	118	188
	LOW	134	250
	PT	134	249
2	HIGH	111	168
	LOW	133	244
	PT	133	242
3	HIGH	108	123
	LOW	130	162
	PT	130	164
4	HIGH	118	176
	LOW	134	243
	PT	134	243
5		127	690
6		127	690

Figure 4-2-5: Output Example

2) When the adjusted value is discarded and the adjustment is completed, press [Cancel] key. In this case, the setting value data is not changed and returned to the sub-menu.

3) When the adjustment is continued, press [Continue] key.
In this case, the screen returns to the previous set screen, so you can continue the adjustment.

4.2.6 Target Value List for Adjustment

Detector Well Specified Values 19

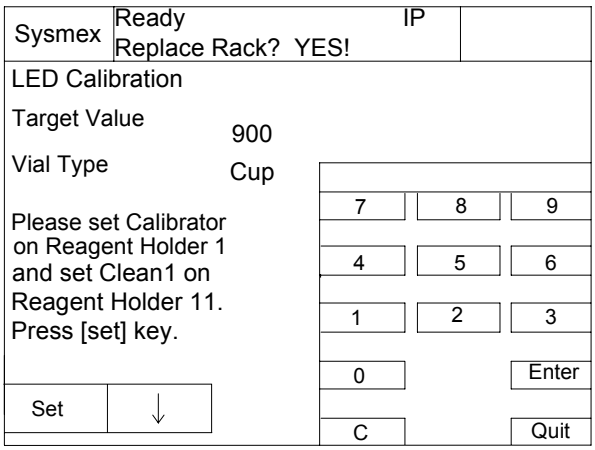
(A/D Display Value for Offset and Gain)

Detector Well		CH1 ~ 4			CH5	CH6
	Tools	HIGH	LOW	PT	LOW	LOW
OFFSET	Ebonite Stick	< 30			1 - 20	1 - 20
GAIN	480* Scattering Stick	–	480 ± 15	480 ± 15	–	–
	910* Scattering Stick	910 ± 20	–	–	–	–
	Distilled Water	–	–	–	3800 - 4000	3800 - 4000

*Varies lot by lot.

4.2.7 LED Auto Calibration 13

(1) Press [Special Operate]-[Calibration] keys. The LED Calibration screen will appear.

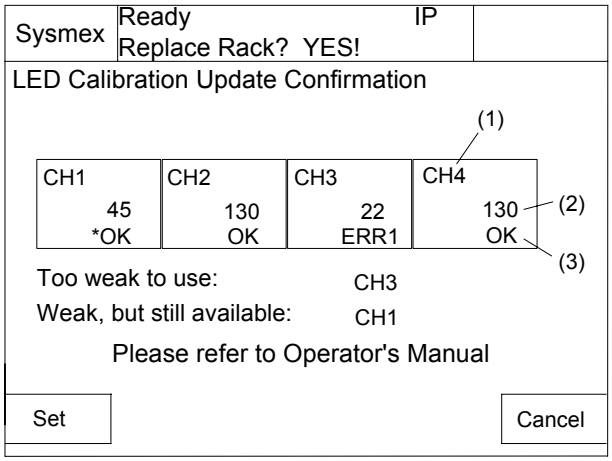


(2) Enter a target value.
Enter an indicated value (100 - 999) which is given in the calibrators table of assigned values for calibration using the numeric keys, and press [Enter] key.

(3) Select a container of the calibrator for calibration.
Move the cursor to “Vial Type” using [↑] and [↓] keys, and press [Next] key to select the container.

(4) Set the calibrator for calibration to the reagent holder 1 and set CA CLEAN I to the reagent holder 11.

(5) Press [Set]-[OK] keys to start LED calibration.
When the operation is completed, the LED Calibration Update Confirmation screen will appear.



Displayed contents
(1) Channel No.
(2) LED status
(3) OK: Available
*OK: Available. However, replacement is required within a few months.
ERRxx: Not available

(6) When updating a new adjustment value, press [FIX] key.
When the status of all channels is OK
The new adjustment value is saved, and returns to the LED Calibration screen.
When there is a channel with a calibration error
The confirmation screen will appear.
Press [Cancel] key to return to the LED Calibration Update Confirmation screen.
Press [OK] key to save the new adjustment value, and return to Calibration screen.

(7) Take out the calibrator for the calibration, and set the former reagent.

4.3 Mechanical System Adjustment

4.3.1 Required Tools for Adjustment

(1) Sample Cup (small)
(2) Reaction Tube
(3) Collection Tube (15 mm diameter)
(4) Dade 1 mL Reagent Bottle
(5) Push Vial Bottle
(6) Water (distilled water)
(7) Dispensing Pipette (50 and 60 µL)
(8) CA-5H Z-axis Position Adjustment Tool PM (031-0171-4) *13*

4.3.2 How to Enter the Mechanical System Position Adjustment Mode

(1) Start the service mode by pressing “ID No. Entry”, “C”, “9”, “-”, “0”, “Enter”, and “Quit”.

(2) The screen changes from “Main Menu” to “Mecha Position” by pressing keys of [Special Operate] → [Service] → [Adjust] → [Mecha Position].

Select the unit to be adjusted on this screen and perform the position adjustment.

4.3.3 The Mechanical System Position Adjustment Screen

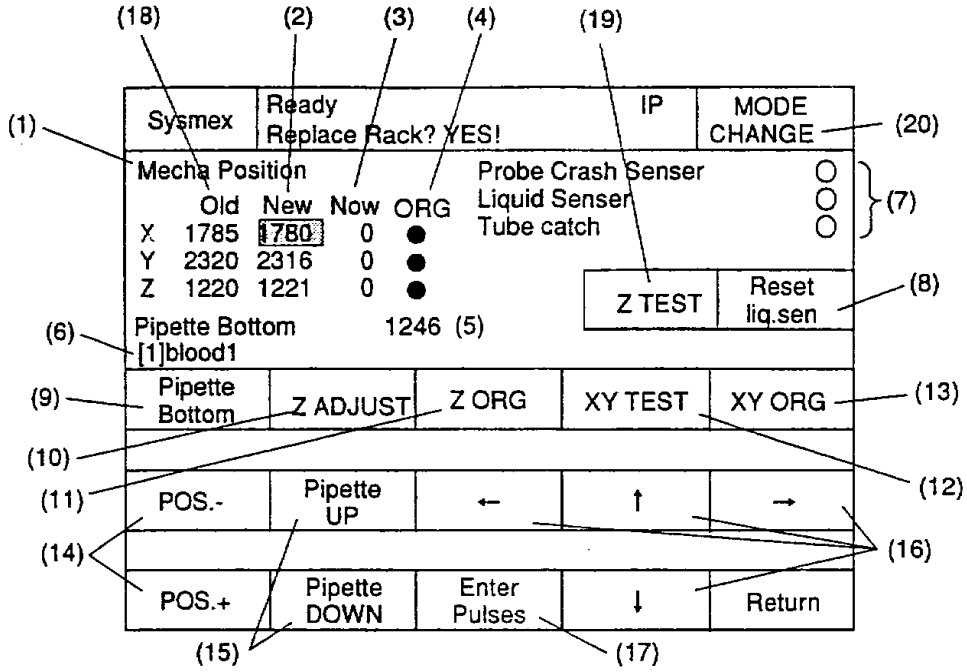


Figure 4-3-1: Mecha Position Screen

(1) Indicating the title of displayed screen.
(2) Display setting values, which indicate number of pulses of moved probe.
The probe moves to these setting values by pressing “XY TEST” and “Z ADJUST” keys.
(3) Display pulses of the probe position.
Moves to these setting values by pressing “XY TEST” and “Z ADJUST” keys.
(4) Display status of the sensor at the home position on each XYZ drive axis:
Black Circle → Detected (Activated), White Circle → Not Detected (Not Activated)
(5) Display pipette lower limit.
Usually, it is automatically set 25 pulses added to Z position adjustment value.
(6) Display selected setting position.
(Normal: Fine Adjustment Mode/Reverse: Basic Position Adjustment Mode.)
(7) Display status of each sensor on the probe:
Black Circle → Detected (Activated), White Circle → Not Detected (Not Activated)

> **REFERENCE:** The reaction tube, held by the catcher, is detected by the reflection sensor at the detection position. When Z is at the home position, the black circle will be displayed because usually the sensor is in front of the catcher.

(8) [Reset Liq. Sen]Key: Reset the detecting status of the liquid surface sensor.
(9) [Pipette Bottom], [Tube Free], [Tube Catch] Keys: Change depending to the setting position.
• Pipette Adjustment: [Pipette Bottom]
• Catcher Adjustment: [Tube Free] ← → [Tube Catch]
(10) [Z ADJUST] Key: Move the pipette or the catcher according to the setting pulses.
(11) [Z ORG] Key: Return the pipette or the catcher to Z home position.
(12) [XY TEST] Key: Move XY drive according to the setting pulses.
When the probe is not at the home position, it will move to the setting value after returning to the home position.

(13) [XY ORG] Key: Return XY drive to the home position.
When this key is pressed, Y axis then X axis returns to the home position after Z axis returns to the home position.
(14) [Pos. -], [Pos. +] Key: Switch setting position from [1] to [29].
(15) Either [Pipette] or [Catcher] Key: Move the pipette or the catcher. Moves 1 pulse by 1 press.
• Pipette Adjustment: [Pipette UP], [Pipette DOWN]
• Catcher Adjustment: [Catcher UP], [Catcher DOWN]
(16) [Arrow] Keys: Move 1 pulse by 1 press. (0,085 mm/pulse)
• [←]: Move X axis to the left (away from the home position)
• [→]: Move X axis to the right (toward the home position)
• [↑]: Moves Y axis toward the home position.
• [↓]: Moves Y axis away from the home position.
(17) [Enter Pulses] Key: Press to enter pulses manually using the numeric keys.
(18) Display number of pulses stored in EEPROM to be updated by fixing the set value.
(19) [Z TEST] key: Press to move to the Z position currently set. This is not for changing the set value, but for check only.
(20) [MODE CHANGE] key: Press to change modes.
Fine Adjustment (Individual position) Mode: Set each position for 29 points.
Basic Position Adjustment Mode: Set the basic position for each block.
By this setting, the accompanying position within the block can be set automatically.

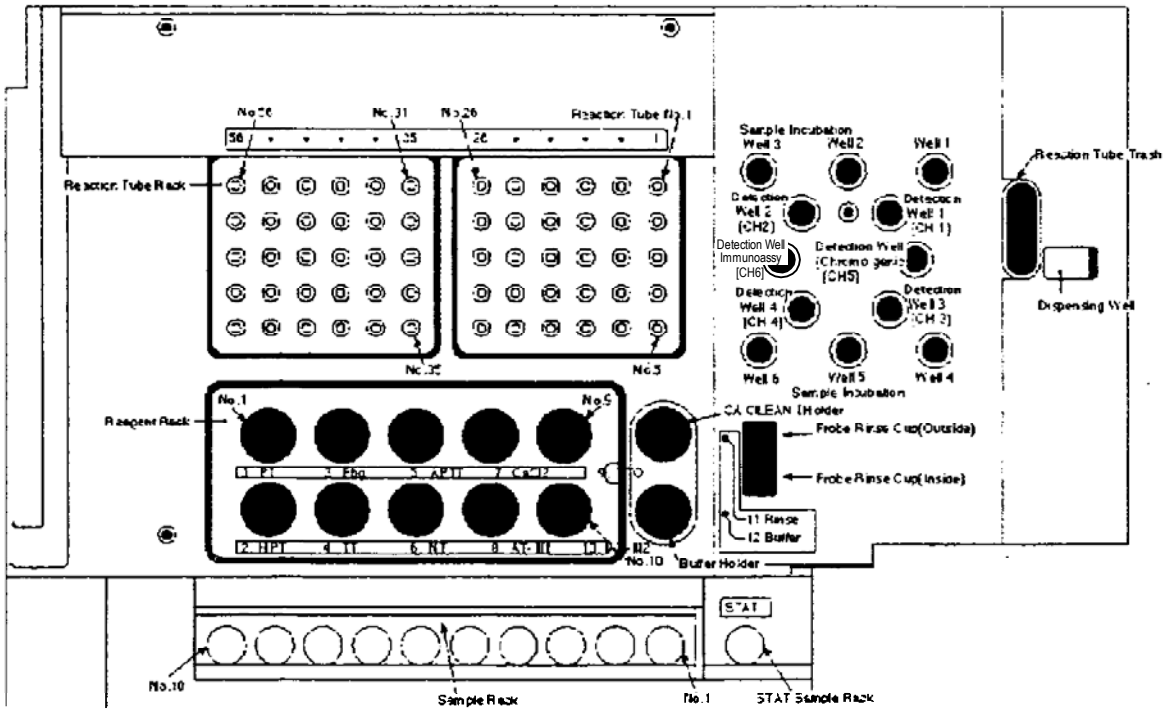


Figure 4-3-2: Table Positions

4.3.4 Position Adjustment Procedure of Pipette ("[1]blood 1", "[2]blood 10", and "[3]blood_stat")

(1) XYZ Adjustment

CAUTION: 1) When setting the sample rack, be sure that the plate is inserted to the groove of the rack correctly. It may cause the pipette to be bent.

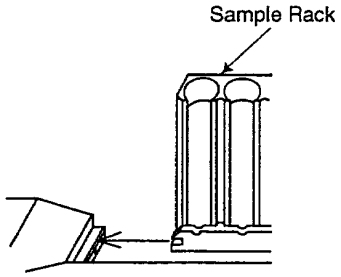


Figure 4-3-3: Setting Sample Rack

2) When setting the 15-diameter tube into the sample rack, set the tube straight into the sample rack.

1) Pour 50 µL of distilled water into the 4 mL sample cup or 50 µL of distilled water into the 15 mm diameter test tube and set it into the sample rack No.1. (Set a cup or a tube for the customer's use.)

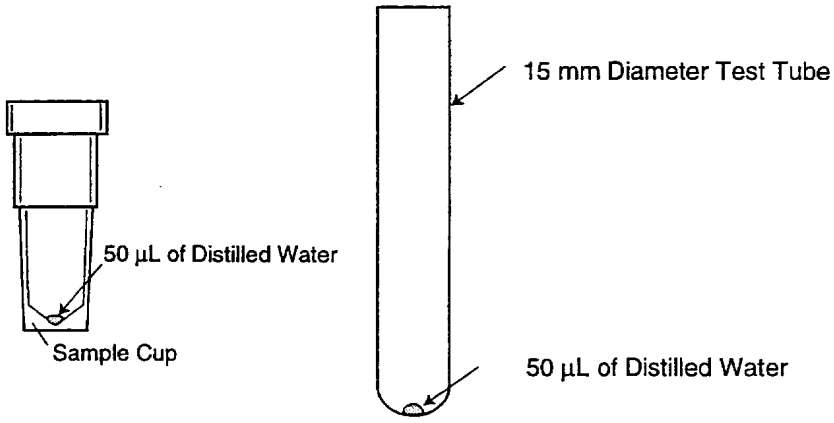


Figure 4-3-4: Sample Cup and Test Tube with Distilled Water

CAUTION: If the customer uses test tube, do not set the sample cup. The sample probe descends insufficiently when the z axis is adjusted by a sample cup.

2) Verify that the "[1] blood 1" is shown on the left center of the screen. If not, change to "[1] blood 1" by using [Pos. -] and [Pos. +] keys.

3) Move the pipette to the setting position by using [XY TEST] key.

4) Use [↑], [↓], [←], and [→] keys to adjust the pipette tip to become the center of the sample cup.

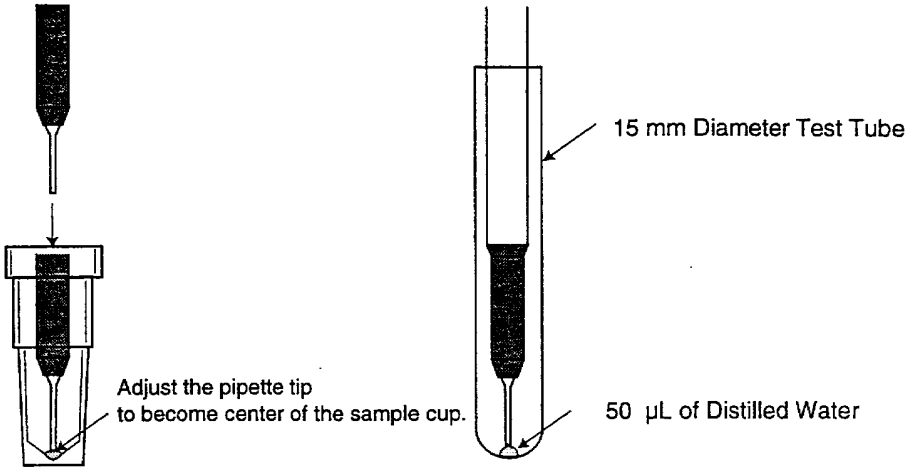


Figure 4-3-5: Pipette Tip Position

5) Press [Z TEST] key to descent the pipette. The pipette detects the 50 µL of distilled water and stops.

CAUTION: Probe descend until probe detect liquid surface or pipette bottom pulse value. When the probe stops before detecting liquid surface, perform *Section 4.3.4, (3) Pipette Lower Limit Adjustment*.

6) Use [↑], [↓], [←], and [→] keys to adjust the pipette tip to become the center of the sample cup.

7) Press [Z ADJUST] key again to ascend and descend the pipette. Verify that the pipette is placed at the center of the sample cup. (Z pulses will be stored as the setting value in the memory when "Mecha Position" adjustment is completed.)

8) Press [XY ORG] key to return the pipette (head) to the home position.

9) Move sample cup to the sample rack No. 10.

10) Press [Pos. +] key to select the setting position "[2]blood 10".

11) Execute Steps 3) to 8).

12) Move the sample cup to the blood_stat position.

13) Press [Pos. +] key to select the setting position "[3]blood_stat".

14) Execute Steps 3) to 8).

15) The confirmation screen will be displayed by pressing [Quit] key.

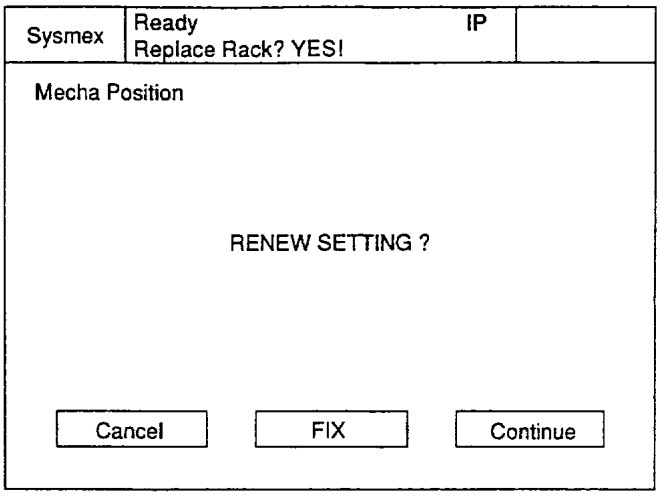


Figure 4-3-6: Confirmation Screen

16) When pressing [FIX] key, new position adjustment data will be printout and return to adjustment selection screen.

(3) Pipette Lower Limit Adjustment

When [FIX] key is pressed to complete adjustment, 25 pulses are added to Z pulse setting value and the value is automatically set as the pipette lower limit.
Large value should be set as the pipette lower limit when executing Z adjustment so that the probe can seek a liquid surface at the lowest point. Be sure to set water inside the tube when setting large value manually as Z pulse. If not, it may cause the pipette to crash at the bottom of the tube or the motor to be mis-adjusted by the pulse beyond the limit.

1) Press [Pipette Bottom] key to display Manual Entry Screen. The pipette lower limit will be reverse displayed and manual change is available.

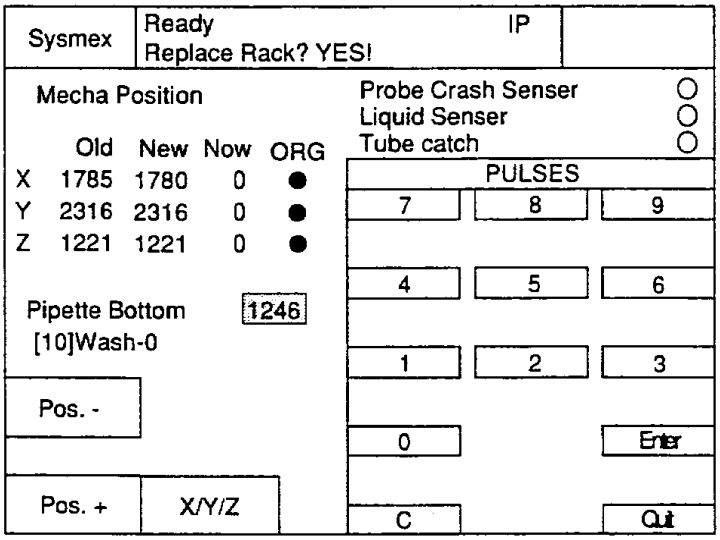


Figure 4-3-7: Pipette Lower Limit Adjustment Screen

2) Use numeric keys to input the value.
When “Z Adjustment” is disable by the insufficient pulse, input “1275” for temporary.
The pipette lower limit value “1250” is set by pressing [1], [2], [5], [0], [Enter], [Quit] and returns to the Mecha. Position Adjustment screen. Be sure to press [Enter] key to set the value.
3) When pressing [FIX] key, 25 pulses are added to Z pulse setting value and the value is automatically set as the pipette lower limit.

4.3.5 Position Adjustment Procedure of Pipette (“[4]reag 1”) (“[5]reag 9”) (“[6]reag 10”)

Continuous Z position adjustment is possible on software version 00-14 or later. **Refer to 4.3.6-2** 11

(1) XYZ Adjustment

1) Set the sample cup holder to the reagent rack No. 1. Place 60 µL of distilled water into the 4 mL sample cup.

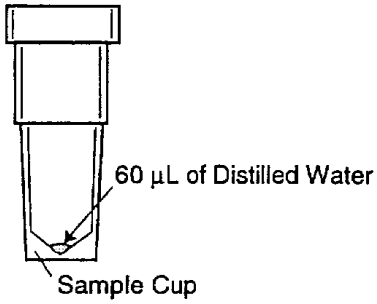


Figure 4-3-8: Sample Cup with 60 µL Distilled Water

2) Verify that the “[4]reag 1” is shown on the left center of the screen. If not, change to “[4]reag 1” by using [Pos. -] and [Pos. +] keys.
3) Move the pipette to the setting position by using [XY TEST] key.
4) Use [↑], [↓], [←], and [→] keys to adjust the pipette tip to become the center of the sample cup.

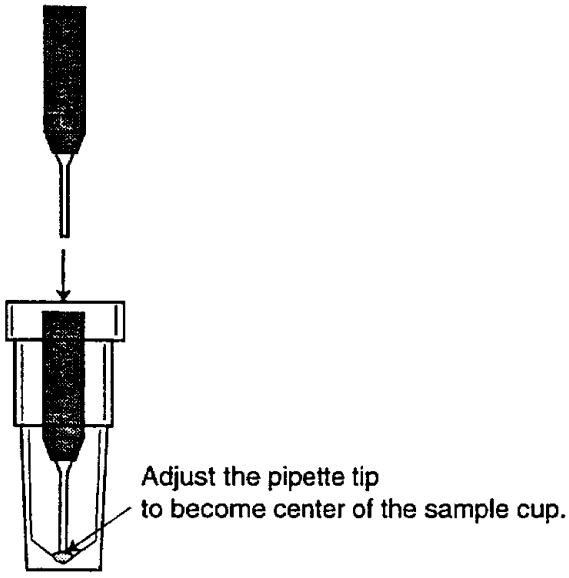


Figure 4-3-9: Pipette Tip Position

5) Press [Z TEST] key to descent the pipette. The pipette detects the 60 µL of distilled water and stops.
6) Use [↑], [↓], [←], and [→] keys to adjust the pipette tip to become the center of the sample cup.
7) Press [Z ADJUST] key to ascend and descend the pipette. Verify the pipette is placed at the center of the sample cup.
8) Press [XY ORG] key to return the pipette (head) to the home position.
9) Adjust “[5]reag 9” and “[6]reag 10” in the same way.

CAUTION: 1) Descent the pipette lower limit to the lowest for Z axis adjustment value. Adjust after executing *Section 4.3.4: Position Adjustment Procedure of Pipette, (3) Pipette Lower Limit Adjustment* when it stops before detecting liquid surface. Set “650” pulse for the pipette lower limit of the reagent rack.

4.3.6 Position Adjustment Procedure of Pipette (“[7]reag_rinse”) (“[8] buffer”)

Continuous Z position adjustment is possible on software version 00-14 or later. **Refer to 4.3.6-2** 11

(1) XY Adjustment

1) Set the sample cup holder to the CA CLEAN I Holder. Place 60 µL of distilled water into the 4 mL sample cup.

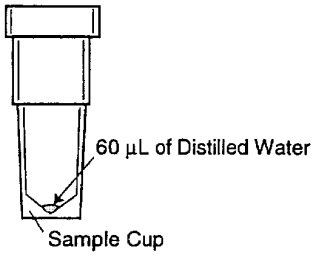


Figure 4-3-10: Sample Cup with 60 µL Distilled Water

2) Verify that the “[7]reag_rinse” is shown on the left center of the screen. . If not, change to “[7]reag_rinse” by using [Pos. -] and [Pos. +] keys.
3) Move the pipette to the setting position by using [XY TEST] key.
4) Use [↑], [↓], [←], and [→] keys to adjust the pipette tip to become the center of the sample cup.

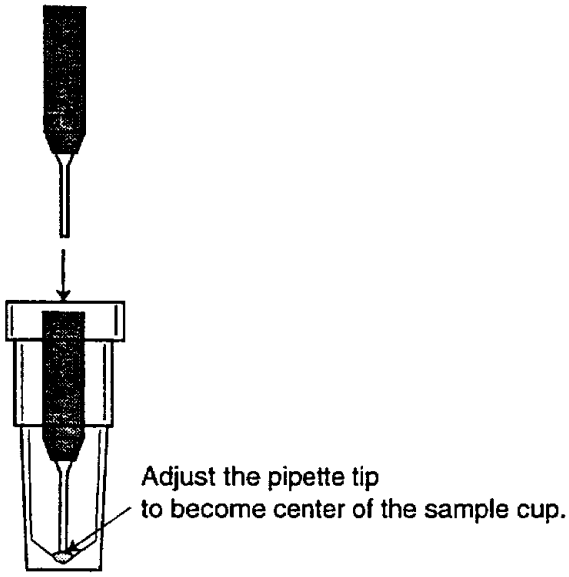


Figure 4-3-11: Pipette Tip Position

5) Press [Z TEST] key to descent the pipette. The pipette detects the 60 µL of distilled water and stops.
6) Use [↑], [↓], [←], and [→] keys to adjust the pipette tip to become the center of the sample cup.
7) Press [Z TEST] key again to ascend and descend the pipette. Verify that the pipette is placed at the center of the sample cup.
8) Press [XY ORG] key to return the pipette (head) to the home position.
9) Adjust “[8]buffer” in the same way

(2) Z Adjustment

1) Set the sample cup holder to the CA CLEAN I Holder. Place 60 µL of distilled water into the 4 mL sample cup.

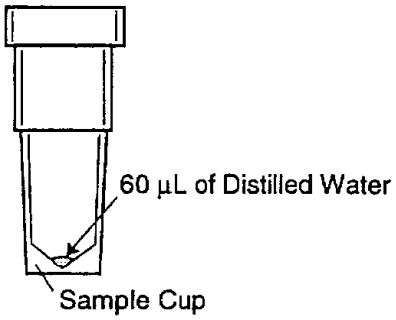


Figure 4-3-12: Sample Cup with 60 µL Distilled Water

2) Move the pipette to the adjustment position by using [XY TEST] key.

3) Press [Z ADJUST] key to descent the pipette.

4) The pipette detects the 60 µL of distilled water and stops. Z pulses will be stored as the setting value in the memory when “Mecha Position” adjustment is completed.

CAUTION:	Descent the pipette lower limit to the lowest for Z axis adjustment value. Adjust after executing *Section 4.3.4: Position Adjustment Procedure of Pipette, (3) Pipette Lower Limit Adjustment* when it stops before detecting liquid surface. Set “650” pulse for the pipette lower limit of the reagent rack.

5) Adjust “[8]buffer” in the same way.

4.3.7 Continuous Z Position Adjustment Procedure of Pipette (Ver.00-14 or later) 9

(1) XY Adjustment (“[4]reag 1”) (“[5]reag 9”) (“[6]reag 10”) (“[7]reag_rinse”) (“[8] buffer”)

1) Set the sample cup to the reagent rack No.1.

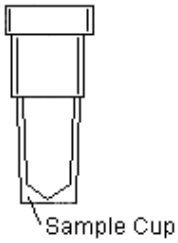


Figure 4-3-13: Sample Cup

2) Verify that the “[4]reag 1” is shown on the left center of the screen. If not, change to “[4]reag 1” by using [Pos. -] and [Pos. +] keys.
3) Move the pipette to the setting position by using [XY TEST] key.
4) Use [↑], [↓], [←], and [→] keys to adjust the pipette tip to become the center of the sample cup.
5) Adjust “[5] reag 9”, “[6] reag 10”, “[7] reag_rinse” and “[8] buffer” in the same way.

(2) Z Continuous Adjustment 13

1) Select “Reag1” by pressing [Pos+], [Pos-].
2) Press [Enter Pulses] and increase Z pulse by 50 steps using the numeric key.
3) Save parameters by pressing [Return]-[Fix].
4) Enter “Mecha Position” screen again.
5) Set Z-axis Position Adjustment Tools (031-0171-4) for Reag1 through Reag10, Rinse and Buffer (12 places).
6) Select “Reag 1” by pressing [Pos +], [Pos -] and press [Z adjust].
7) Check the check-boxes of [Z adjuster], [Continuous].

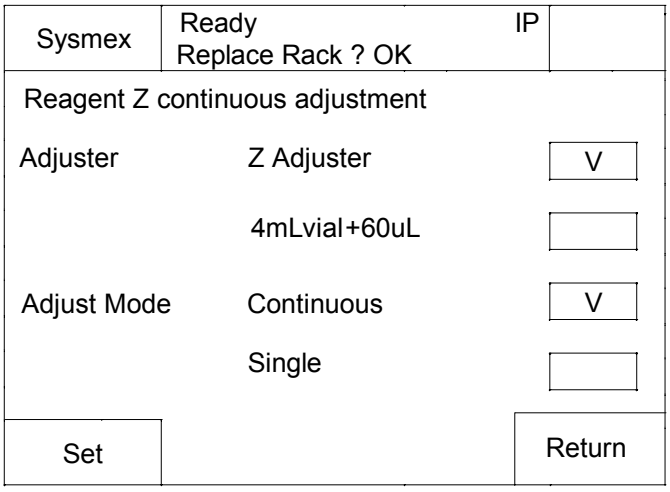


Figure 4-3-14: Reagent Z continuous adjustment

8) Press [Set] to carry out Auto Z-axis Position Adjustment.
9) Press [Return]→[Fix] to save parameters.

When there is no available Z-axis Position Adjustment Tools, carry out the adjustment as below.
1) Dispense 60uL of distilled water into the 4mL sample cups and set the sample cups for Reag1 through Reag10, Rinse, Buffer (12 places).
2) Press [Z adjust] and check the check-boxes of [4mL vial + 60µL], [Continuous].
3) Press [Set] to carry out Auto Z-axis Position Adjustment.
4) Press [Return]→[Fix] to save parameters.

When ‘Single’ is selected, Z position adjustment at each of R1 to R10 can be performed individually.

4.3.7 Position Adjustment Procedure of Pipette ("[10]wash_o)

(1) XY Adjustment

1) Select [Special Operate] → [Rinse & Prepare] from the Main Menu and supply rinse reagent into the probe rinse cup (outside).

2) Verify that the "[10]wash_o" is shown on the left center of the screen. . If not, change to "[10]wash_o" by using [Pos. -] and [Pos. +] keys.

3) Move the pipette to the setting position by using [XY TEST] key.

4) Use [↑], [↓], [←], and [→] keys to adjust the pipette tip to become the center of the rinse cup.

5) Press [Z TEST] key to descent the pipette. The pipette detects the distilled water and stops.

6) Use [↑], [↓], [←], and [→] keys to adjust the pipette tip to become the center of the probe rinse cup (outside).

7) Press [Z TEST] key again to ascend and descend the pipette. Verify that the pipette is placed at the center of the sample cup.

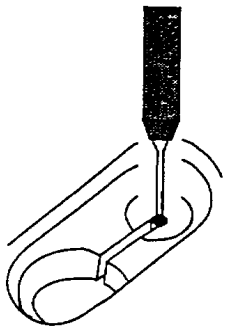


Figure 4-3-13: Probe Rinse Cup (Outside)

8) Press [XY ORG] key to return the pipette (head) to the home position.

(2) Z Adjustment

1) Select [Special Operate] → [Rinse & Prepare] from the Main Menu and supply rinse reagent into the probe rinse cup (outside).

2) Move the pipette to the adjustment position by using [XY TEST] key.

3) Press [Z ADJUST] key to descent the pipette.

4) The pipette detects the liquid surface of the probe rinse cup and stops. The following screen will appear by pressing [Enter Pulses] key. Press [X/Y/Z] key twice to move cursor to "Z". Enter 25 added pulses to present Z pulses and press [Enter] and then [Quit] key. The value will be stored in the memory when "Mecha Position" adjustment is completed.

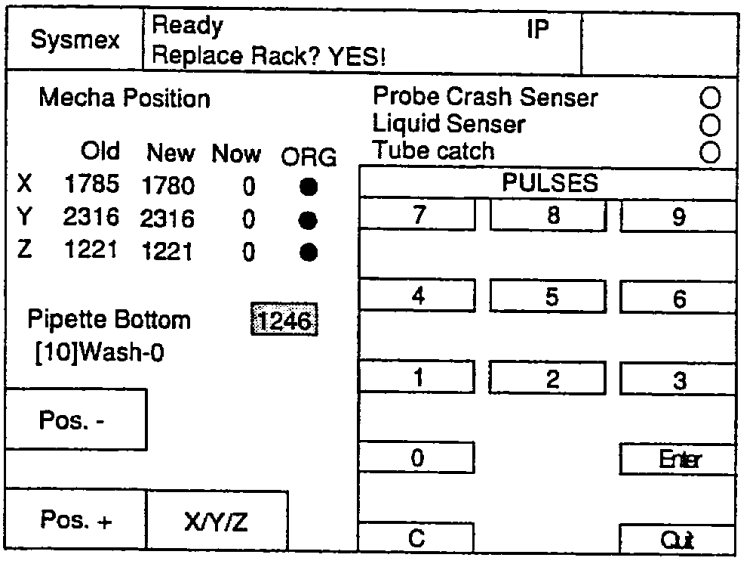


Figure 4-3-14: Enter Pulses Screen

"[9]wash_i" Adjustment

CAUTION: "[9]wash_i" Adjustment:
In Basic Position Adjustment mode, the value of the probe rinse cup (inside) is calculated automatically from the setting value of the probe rinse cup (outside). It will be stored in the memory when "Mecha Position" adjustment is completed.

In Fine Adjustment mode, set the value of the probe rinse cup (inside) by selecting [Enter Pulses] key.

Probe Rinse Cup (Inside) Value

	[9]wash-i setting value
X value	Same as Probe Rinse Cup (Outside)Value
Y value	Probe Rinse Cup (Outside)Value + 200
Z value	Same as Probe Rinse Cup (Outside)Value

4.3.8 Position Adjustment Procedure of Pipette ("[11]p_tube 1)

Adjustment Parameter:	Pipette Position XYZ
Summary:	Use the sample tube with 50 µL of distilled water inside for the position adjustment of the reaction tube rack. Adjust 3 positions for each two separated reaction tube rack.
Standard:	
XY direction:	The center of each sample tube set into the adjustment position of the reaction tube rack.
Z direction:	The lowest point of the pipette descended to the sample tube, with 50 µL of the distilled water inside, of each adjustment position of the reaction tube rack.

(1) XY Adjustment

1) Place 50 µL of distilled water into the reaction tube and set it into the tube No. 1 of the reaction tube rack.

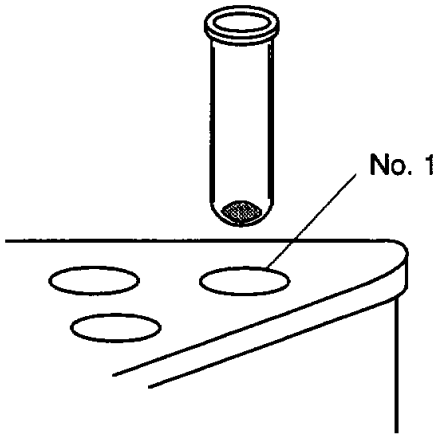


Figure 4-3-15: Reaction Tube with 50 µL Distilled Water

2) Verify that the "[11]p_tube 1" is shown on the left center of the screen. If not, change to "[11]p_tube 1" by using [Pos. -] and [Pos. +] keys.

3) Move the pipette to the setting position by using [XY TEST] key.

4) Use [↑], [↓], [←], and [→] keys to adjust the pipette tip to become the center of the reaction tube.

Figure 4-3-16: Pipette Tip inside Reaction Tube

CAUTION: 1) Do not execute Z operation when XY adjustment is insufficient.
2) Be sure that the pipette tip is at the center of the reaction tube.
If not, it may cause the pipette to touch the reaction tube when descended.

5) Press [Z TEST] key to descent the pipette. The pipette detects the 50 µL of distilled water and stops.
6) Use [↑], [↓], [←], and [→] keys to adjust the pipette tip to become the center of the reaction tube.
7) Press [Z ADJUST] key again to ascend and descend the pipette. Verify that the pipette is placed at the center of the sample cup. The pipette detects the 50 µL of distilled water inside the reaction tube and stops. Z pulses will be stored as the setting value in the memory when "Mecha Position" adjustment is completed.
8) Press [XY ORG] key to return the pipette (head) to the home position.
9) Setting Position: [11]p_tube 1, [12]p_tube 5, [13]p_tube 26,
[14]p_tube 31, [15]p_tube 35, [16]p_tube 56
Adjust above 6 positions in the same way.

NOTE: Refer to *5.10.1 Position Adjustment* for the default values. ***Jump to Section 5.10.1*** →

4.3.9 Position Adjustment Procedure of Catcher ("[17]c_tube 1)

Adjustment Parameter: Catcher Position XYZ pulses of Reaction Tube Rack
Summary: Adjust the catcher position of the reaction tube rack by setting the reaction tube to the catcher.
Adjust 3 positions for each two separated reaction tube rack.
Standard Position:
X direction: 5 pulses to the left of the line where the left surface of the reaction tube, when descended, agrees the interior surface of the reaction tube rack.
Y direction: The center of the catcher agrees the center of the reaction tube when the reaction tube is descended.
Z direction: 5 pulses above the line where the bottom of the reaction tube agrees to the bottom of the reaction tube rack.
The lower edge of the reaction tube brim should be aligned with the upper surface of the lower catcher part.

(1) XYZ Adjustment

1) Place the reaction tube to the catcher.
2) Verify that the "[17]c_tube 1" is shown on the left center of the screen. . If not, change to "[17]c_tube 1" by using [Pos. -] and [Pos. +] keys.
3) Move the catcher to the setting position by using [XY TEST] key.
4) Use [↑], [↓], [←], and [→] keys to adjust the reaction tube placed to the catcher to become the center of the reaction tube rack hole.
5) Press [Z TEST] key to descent the catcher.
6) Press [Tube Free] and [Tube Catch] keys to release and catch the reaction tube.
(a) Y direction: Use [↑] and [↓] keys to adjust the center of the reaction tube agrees the center of the catcher.

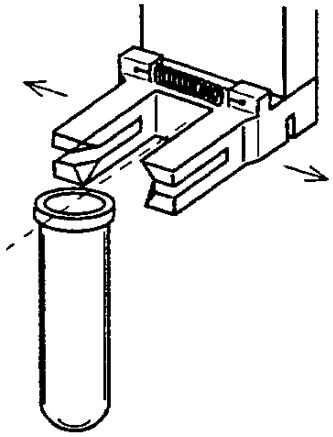


Figure 4-3-17: Y Direction Adjustment

(b) X direction: Use [←], and [→] keys to adjust the horizontal position of catcher. The catcher once ascends and then descends by pressing [Z ADJUST] key. Adjust the reaction tube position in X direction to touch the left part of the inner wall of the reaction tube rack by repeating this operation.

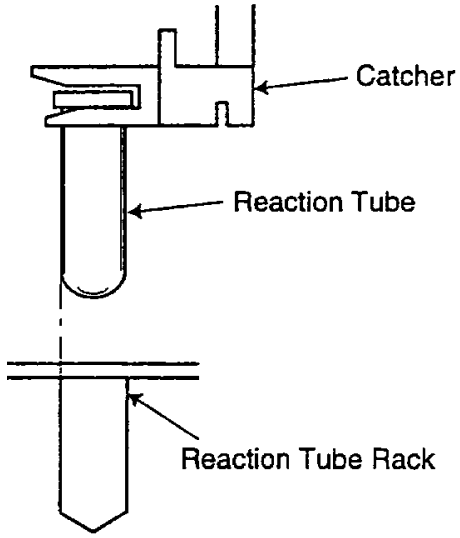


Figure 4-3-18: X Direction Adjustment

(c) Z direction: Use [Catcher DOWN] key to confirm the position where the reaction tube hit the bottom of the reaction tube rack. (Touch around the reaction tube rack hole to confirm the vibration of the hit, or touch the reaction tube to verify that there is no more play.) Press [Catcher UP] key for 5 times.
Press [Z Adjust] key for 2 or 3 times to confirm that the reaction tube does not hit the bottom of the reaction tube rack.
The Z position can be also adjusted by using [Tube Catch] key and [Tube Free] key and aligning the lower edge of the reaction tube brim with the upper surface of the lower catcher part.

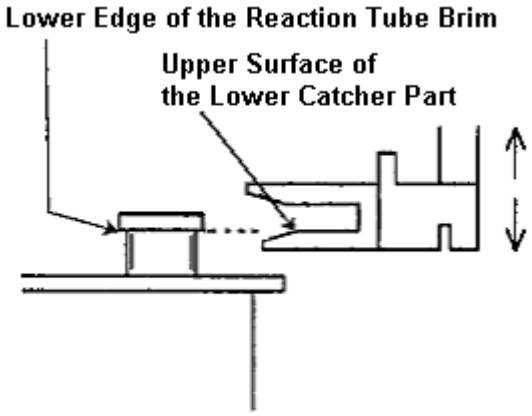


Figure 4-3-19: Z Direction Adjustment

7) Press [Tube Free] and [Tube Catch] keys to verify that the reaction tube to be caught and released smoothly.
8) When the adjustment is completed, catch the reaction tube and return the catcher to the Z home position by using [Z ORG] key. Move X axis 5 pulses towards to the left by pressing [←] key (for 5 times). This is the X adjustment value.
9) When completed, press [XY ORG] key to return the catcher to the home position.
10) Setting Position: [18]c_tube 5, [19]c_tube 26, [20]c_tube 31,
[21]c_tube 35, [22]c_tube 56
Adjust above 5 positions in the same way.

4.3.10 Position Adjustment Procedure of Catcher ("[23]warm 1)

Adjustment Parameter: Catcher Position XYZ pulses of Detector Block
Summary: Adjust the catcher XY and Z positions of the detector block by setting the reaction tube to the catcher.
Standard Position:
X direction: 5 pulses to the left of the line where the left surface of the reaction tube, when descended, agrees the interior surface of the sample incubation well.
Y direction: The center of the catcher agrees the center of the reaction tube when the reaction tube is descended.
Z direction: 5 pulses above the line where the bottom of the reaction tube agrees to the bottom of the incubation well.
The lower edge of the reaction tube brim should be aligned with the upper surface of the lower catcher part.

(1) XYZ Adjustment

1) Place the reaction tube to the catcher.
2) Verify that the "[23]warm 1" is shown on the left center of the screen. . If not, change to "[23]warm 1" by using [Pos. -] and [Pos. +] keys.
3) Move the catcher to the setting position by using [XY TEST] key.
4) Use [↑], [↓], [←], and [→] keys to adjust the reaction tube placed to the catcher to become the center of the sample incubation well.
5) Press [Z TEST] key to descent the catcher.
6) Press [Tube Free] and [Tube Catch] keys to release and catch the reaction tube.
   (a) Y direction: Use [↑] and [↓] keys to adjust the center of the reaction tube agrees the center of the catcher.

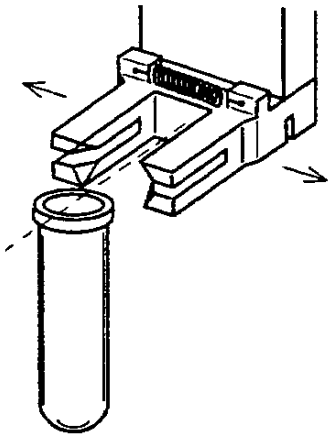


Figure 4-3-20: Y Direction Adjustment

(b) X direction: Use [←], and [→] keys to adjust the horizontal position of catcher. The catcher once ascends and then descends by pressing [Z ADJUST] key. Adjust the reaction tube position in X direction to touch the left part of the inner wall of the incubation well by repeating this operation.

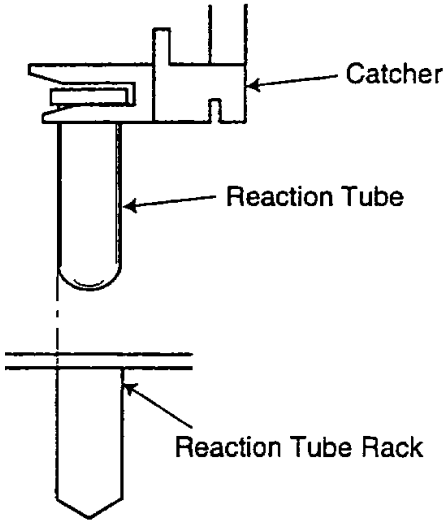


Figure 4-3-21: X Direction Adjustment

(c) Z direction: Use [Catcher DOWN] key to confirm the position where the reaction tube hit the bottom of the incubation well. (Touch around the incubation well to confirm the vibration of the hit, or touch the reaction tube to verify that there is no more play.)
Press [Catcher UP] key for 5 times.
Press [Z Adjust] key for 2 or 3 times to confirm that the reaction tube does not hit the bottom of the incubation well.
The Z position can be also adjusted by using [Tube Catch] key and [Tube Free] key and aligning the lower edge of the reaction tube brim with the upper surface of the lower catcher part.

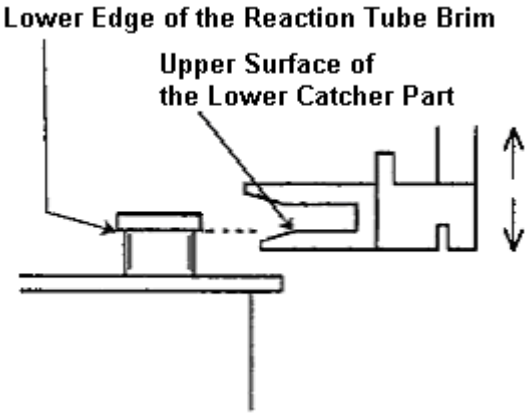


Figure 4-3-22: Z Direction Adjustment

7) Press [Tube Free] and [Tube Catch] keys to verify that the reaction tube to be caught and released smoothly.
8) When the adjustment is completed, catch the reaction tube and return the catcher to the Z home position by using [Z ORG] key. Move X axis 5 pulses towards to the left by pressing [←] key (for 5 times). This is the X adjustment value.
9) When completed, press [XY ORG] key to return the catcher to the home position.
10) Setting Position: [24]warm 3, [25]warm 4, [26]comp,
Adjust above 3 positions in the same way.

4.3.11 Position Adjustment Procedure of Catcher ("[27]shake)

Adjustment Parameter: XYZ pulses of Reagent Dispensing Position
Summary: Use the JIG tube for adjustment to adjust reagent dispensing position.
The JIG tube is the reaction tube that the 3 mm width x 15 mm length copper tape is attached inside. (The copper tape should be attached straight from the top of the flange.)

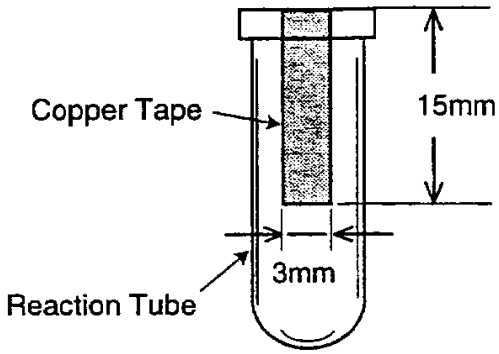


Figure 4-3-23: JIG Tube

(1) XY Adjustment

1) Place the JIG tube to the catcher.
2) Change the setting position to "[27]shake" by using [Pos. -] and [Pos. +] keys.
3) Input Z pulse "-40" by selecting "Enter Pulses".
4) Press [XY TEST] key to move XY of the pipette to the dispensing position. Press [Pipette 70 Step] key to ascend the catcher for 70 pulses.
5) Use [←], and [→] keys to move the pipette position to touch the interior surface of the reaction tube. When the pipette tip touches to the copper tape inside the tube, the liquid sensor display on the screen changes from the white circle to the black circle. This X pulse is the setting value.
6) Press [Pipette Return] key to descend the catcher for 70 pulses. (Z pulse will be back to "-40").

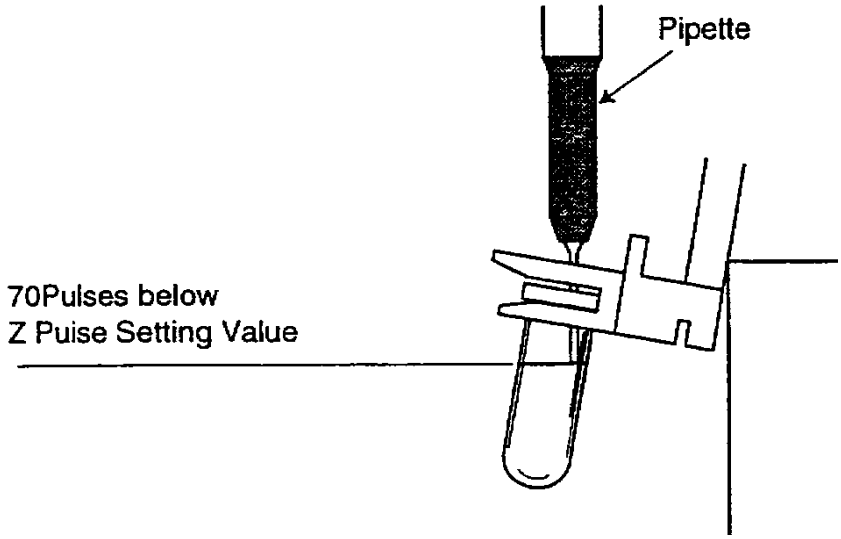


Figure 4-3-24: Catcher Adjustment

7) Press [XY ORG] key to return the pipette to the home position.

CAUTION: DO NOT press [Z ORG], [Z TEST] or [Z ADJUST] key. That will cause pipette crash.

4.3.12 Position Adjustment Procedure of Catcher ("[28]dust)

Adjustment Parameter: Catcher Position XYZ pulses of Reaction Tube Trash
Summary: Adjust the catcher XY and Z positions of the reaction tube trash by setting the reaction tube to the catcher.
Standard Position:
Y direction: A center of the waste position mark on the panel agrees a center of the reaction tube.
Z direction: Z pulse position is at 13 pulses (approx. 1 mm) above the panel.
X direction: When Z pulse is as above, the reaction tube caught by the catcher is at the panel side of the reaction tube trash. (Almost touches the trash.)

(1) XY Adjustment

1) Place the reaction tube to the catcher.
2) Verify that the "[28]dust" is shown on the left center of the screen. If not, change to "[28]dust" by using [Pos. -] and [Pos. +] keys.
3) Move the catcher to the setting position by using [XY TEST] key.
4) Use [↑], [↓], [←], and [→] keys to adjust Y direction to a center of the waste position mark and the reaction tube. Adjust X direction at the panel side of the reaction tube trash.

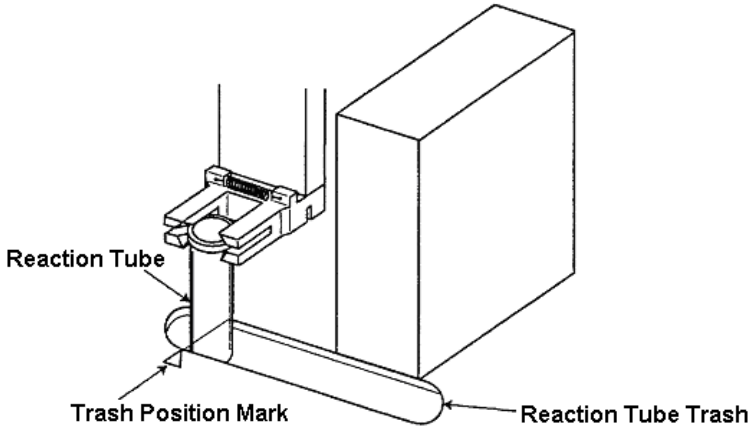


Figure 4-3-25: XY Direction Adjustment

5) Press [Z ADJUST] key to descent the catcher.
6) Use [↑], [↓], [←], [→], [Catcher UP], and [Catcher DOWN] keys to adjust the catcher position so that Z pulse to become 13 pulses (approx. 1 mm) above the reaction tube trash panel. Adjust Y direction to the center of the waste position mark and the reaction tube. Adjust the reaction tube position in X direction to touch the panel side of the reaction tube trash.

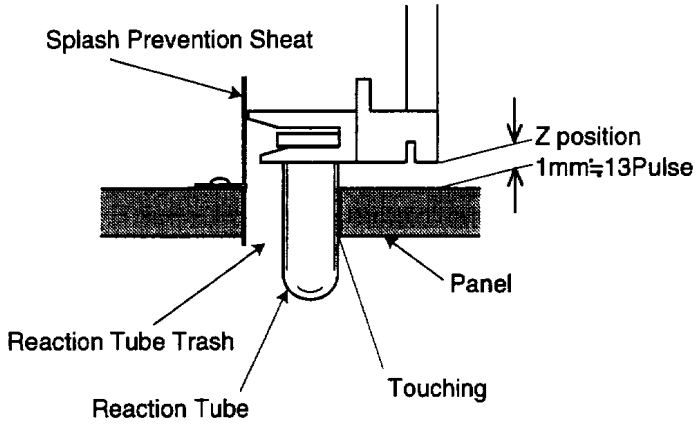


Figure 4-3-26: Z Direction Adjustment

7) Press [Z TEST] key to return to the home position and descent the catcher. Verify that the reaction tube to enter smoothly into the reaction tube trash.
8) Press [Z TEST] key to descent the catcher.
9) Use [Tube Free] and [Tube Catch] keys to verify that the reaction tube to enter smoothly into the reaction tube trash.
10) When the adjustment is completed, press [XY ORG] key to return pipette (head) to the home position.

4.3.13 Position Adjustment Procedure of Catcher ("[29]immunoassy)

Adjustment Parameter: Catcher Position XYZ pulses of Detector Block
Summary: Adjust the catcher XY and Z positions of the detector block by setting the reaction tube to the catcher.
Standard Position:
X direction: 5 pulses to the left of the line where the left surface of the reaction tube, when descended, agrees the interior surface of the immunoassay well.
Y direction: The center of the catcher agrees the center of the reaction tube when the reaction tube is descended.
Z direction: 2 pulses above the line where the bottom of the reaction tube agrees to the bottom of the immunoassay well.
The upper edge of the reaction tube brim should be aligned with the lower surface of the upper catcher part.

(1) XYZ Adjustment, X Correction

1) Place the reaction tube to the catcher.
2) Verify that the "[29]immunoassy" is shown on the left center of the screen. . If not, change to "[29]immunoassy" by using [Pos. -] and [Pos. +] keys.
3) Move the catcher to the setting position by using [XY TEST] key.
4) Use [↑], [↓], [←], and [→] keys to adjust the reaction tube placed to the catcher to become the center of the immunoassy well.
5) Press [Z TEST] key to descent the catcher.
6) Press [Tube Free] and [Tube Catch] keys to release and catch the reaction tube.
   (a) Y direction: Use [↑] and [↓] keys to adjust the center of the reaction tube agrees the center of the catcher.

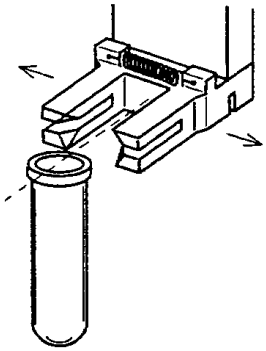


Figure 4-3-26: Y Direction Adjustment

   (b) X direction: Use [←], and [→] keys to adjust the horizontal position of catcher. The catcher once ascends and then descends by pressing [Z ADJUST] key. Adjust the reaction tube position in X direction to touch the left part of the inner wall of the immunoassay well by repeating this operation.

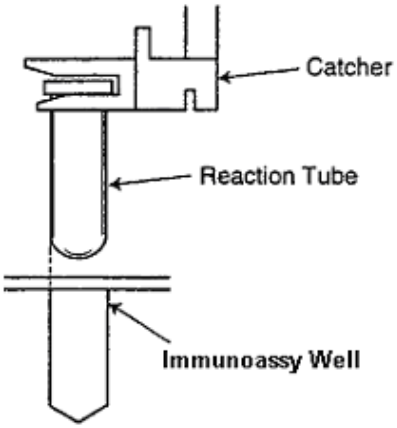


Figure 4-3-27: X Direction Adjustment

(c) Z direction: Use [Catcher DOWN] key to confirm the position where the reaction tube hit the bottom of the immunoassay well. (Touch around the immunoassay well to confirm the vibration of the hit, or touch the reaction tube to verify that there is no more play.) Press [Catcher UP] key for 2 times.
The Z position can be also adjusted by using [Tube Catch] key and [Tube Free] key and aligning the upper edge of the reaction tube brim with the lower surface of the upper catcher part.

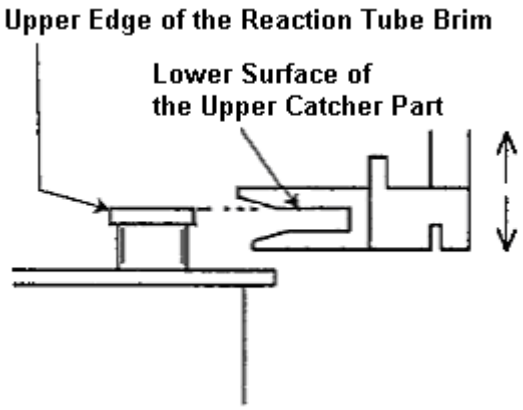


Figure 4-3-19: Z Direction Adjustment

7) Press [Tube Free] and [Tube Catch] keys to verify that the reaction tube to be caught and released smoothly.
8) When the adjustment is completed, catch the reaction tube and return the catcher to the Z home position by using [Z ORG] key. Move X axis 5 pulses towards to the left by pressing [←] key (for 5 times). This is the X adjustment value.
9) When completed, press [XY ORG] key to return the catcher to the home position.

4.3.14 Output Setting Values

(1) Press [Return] or [Quit] key on the right bottom of the screen to display the confirmation screen as follows:

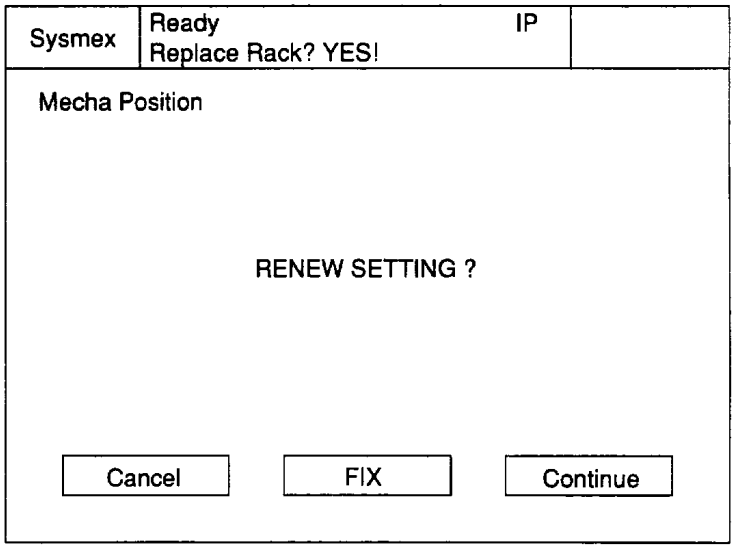


Figure 4-3-27: Confirmation Screen

(2) Press [FIX] key to update the setting value and then output.

4.4 TEMPERATURE ADJUSTMENT

4.4.1 Temperature Control Summary

The temperature control CPU gets each unit's temperature by A/D converted signal as a temperature from the sensor.
Due to the voltage comes out from the temperature sensor is various, the Main CPU sends the Offset value to the temperature control CPU for each sensor to get the temperature within the range.

4.4.2 Temperature Verification at Each Unit 4

The unit temperatures displayed on the Temp. Control screen are the temperatures at each thermister.
For the temperature adjustment, the actual temperature at each unit must be checked as follows.

4.4.2.1 Cooling section (Reagent Cooler)

After 30 minutes since turning power ON of CA-500, perform the following procedures.
1) Pour 4 mL of distilled water into DADE 1 mL bottle, and put it into position No.4 of reagent rack.
2) Measure temperature of the water, and confirm that temperature is within 15.0 +/-2°C.

4.4.2.2 Detector Block

After 30 minutes since turning power ON of CA-500, perform the following procedures.
1) Pour 150 µL of distilled water into two reaction tubes, and put it into detection well CH5 and incubation well #6.
2) Measure temperature of the water, and confirm that temperature is within the following range.
   Detection Well CH5: 37.0 +/- 0.5°C
   Incubation Well #6: 37.0 +/- 1.0°C
   (Measure the temperature after temperature of the water becomes stable.)

4.4.2.3 Reagent Nozzle 19

Perform the temperature adjustment for reagent nozzle after the temperature adjustments of the detector block and reagent block are passed successfully.
1) Enter the service mode and select [Special Operate] → [Service] → [Adjust] → [Temp. Control].
2) Press "Nozzle" area and input the D/A value attached on the heated probe to "S:xxx" area.
3) To verify the Temperature refer to Section 5.5.4 Reagent Temp. for the procedures

Jump to Section 5.5.4

4.4.2.4 Room Temperature

1) Enter the service mode and select [Special Operate] → [Service] → [Adjust] → [Temp. Control].
2) Verify that the room temperature by thermometer is within the displayed temperature +/- 3°C.
3) Press [Return] key to finish the confirmation.

4.4.3 Temperature Adjustment Procedures 4

To adjust the temperature at each temperature-controlled unit, follow the steps below.

(1) Measure the actual temperature of the unit by referring to Section 4.4.2.
(2) Enter the service mode.
(3) Select [Special Operate] → [Service] → [Adjust] → [Temp. Control].

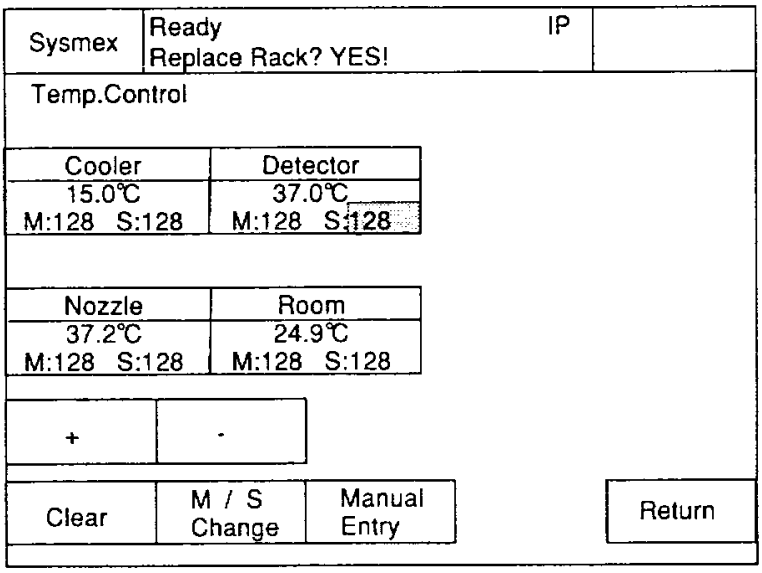


Figure 4-4-1: Temp. Control Screen

(4) Touch the desired sensor area to adjust the temperature.
"M:XXX" is Main value and "S:XXX" is Sub value. The cursor must be at "S:XXX" position.

> **IMPORTANT:** Do not change the "M:XXX" value. This is the preset value during shipping inspection for the temperature control circuit on the PCB No. 6362. It is not necessary to adjust it in the market field.
> Since the value is stored in EEPROM on PCB No. 6362, there may be the case where it is erased. Then input the M:XXX value by referring to the label attached on the memory card socket.

(5) Change the provided Sub value "S:XXX", so that the displayed temperature should be the same as the measured temperature. Use the numeric keys, which appears by pressing [Manual Entry] key or [+] [-] keys.
When pressing [+]/[-] key, the displayed temperature will increase/decrease. When numeric keys are used, the displayed temperature will change after pressing [Enter].

> **REFERENCE:** The Sub value is fixed by the shipping test and attached to the PM parts for the maintenance purpose. Its adjustment after shipment is not basically required.

(6) The unit temperature is automatically changed, by changing the Sub value, to be controlled at the target temperature of each unit.
(7) Press [Enter] key and then [Quit] key to complete number input.
(8) Press [Clear] key returns the cursor positioned value before it is changed, which is stored in EEPROM.
(9) It will be stored in the memory by pressing [FIX] key when exiting the Temp. Control screen.

4.5 ELECTRICAL ADJUSTMENT

4.5.1 PCB No. 6362: MAIN (CPU, I/O, Motor Control, Temperature Control, A/D)
PCB No. 6373: MAIN-2 (CPU, I/O, Motor Control, Temperature Control, A/D)

4.5.1.1 Setting and Adjustments

(1) Switch Setting

1. SW202

Table 4-5-1: Dip Switch Setting on PCB No. 6362

Bit	Setting	Function		
	Language Setting			
1	**Bit 1**	**Bit 2**	**Bit 3**	
2	OFF	OFF	OFF	Japanese
3	ON	OFF	OFF	English
	OFF	ON	OFF	Germany
	ON	ON	OFF	French
	OFF	OFF	ON	Italian
	ON	OFF	ON	Spanish
	OFF	ON	ON	English (for U. K.)
	ON	ON	ON	Not used
4		Chromogenic Unit		
	ON	Chromogenic Unit is used.		
	OFF	Chromogenic Unit is not used.		
5		Cooler Unit Assembly		
	ON	Cooler Unit is not used.		
	OFF	Cooler Unit is used.		
6		B. B. RAM Clear Setting		
	ON	B. B. RAM Clear at power ON		
	OFF	Normal Setting		
7		Not used		
	ON	----------		
	OFF	Normal Setting		
8		EEPROM Clear Setting		
	ON	EEPROM Clear		
	OFF	Normal Setting		
9		Not used		
	ON	----------		
	OFF	Normal Setting		

2. J501
Used for the Gain adjustment for the pressure sensor of the pressure pump.
Used usually with inserting the jumper pin between 1 and C.

(2) Pressure Adjustment
VR502 is to adjust OFFSET. VR501 is to adjust GAIN, however, it is adjusted and fixed at shipment. Refer to Section 4.1 for the procedures.

(3) Mixing Motor Driving Power Adjustment
VR101 is provided for the adjustment of mixing motor driving power, however, it is adjusted and fixed at shipment. The below is for reference only.

1) Connect the voltmeter between TP101 and the frame (GND).
2) Adjust VR101 so that the voltage when rotating the mixing motor becomes 1.05 ± 0.02 V.
3) Fix VR101 with paint lock.

4.5.1.2 LED and Test Point

(1) LED

Unit	Letters on PCB	LED	Color	Status
Reagent Cooler Unit	COL.	D403	Green	Lit while power of the thermo-module is ON
Probe Unit	NOZ.	D402	Green	Lit while the heater is ON
Detector Block	DET.	D401	Green	Lit while the heater is ON

(2) Test Point

TP101	Mixing Motor Voltage Adjustment
TP201	Verify CPU Clock
TP202	GND
TP401	Verify A/D Converter Reference Voltage for Temperature Control
TP402	Analog GND
TP501	Verify A/D Converter Reference Voltage for Detector Signal
TP502	Analog GND
TP503	Verify Pressure Sensor Analog Output

4.5.1.3 Assembly Drawing

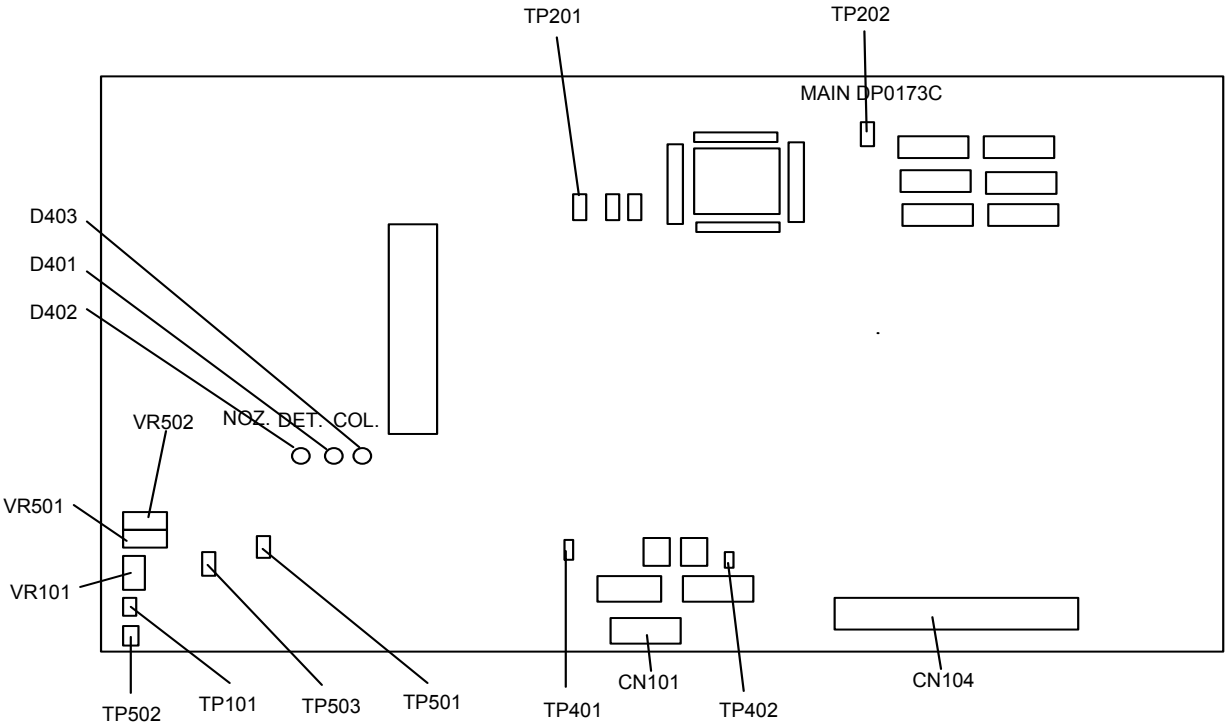


Figure 4-5-1: PCB No. 6362 Assembly Drawing

4.5.2 PCB No. 4086: PS (Power Source, Motor Driver)

4.5.2.1 CA-500 Power Supply System Check

Check the voltages for each switching regulator and PS Board (PCB No. 4086), following the procedure below.

(1) Make sure that the Main Unit Power of CA-500 is turned OFF.

(2) Disconnect the following connectors to be free from any load:
CN101, CN104 on MAIN BOARD (PCB No. 6362)
CN2 on PRCN1 (PCB No. 6350)

(3) Turn the CA-500 Main Unit power OFF.

(4) Make sure that the voltage on each switching regulator and PS Board (PCB No. 4086) shows the output voltage in Table below. (There is no adjusting point.)

(5) Turn the power switch of the CA-500 Main Unit OFF and connect CN101, CN104 on Main Board (PCB No. 6362) with CN2 on PCN1 (PCB No. 6350).

PS BOARD (PCB No. 4086) Connector (The other side is connected to TP1 (GND))		Output Voltage
CN14	pin 9	+24 V ± 1 V
CN8	pin 5	+12 V ± 0.5 V
CN12	pin 3	+5 V ± 0.2 V
CN9	pin 3	+5 V ± 0.2 V
CN12	pin 1	+15 V ± 0.6 V
CN12	pin 2	–15 V ± 0.6 V

4.5.2.2 LED and Test Point

(1) LED

Sensor	Letters on PCB	LED	Color	Status
Liquid Surface Sensor	LIQUID	D7	Red	Lit when the liquid surface is detected
Probe Crash	CRASH	D8	Green	Lit when the probe crashes

These LEDs turn OFF by the RESET signal (P-RES).

(2) Test Point

TP1	GND
TP2	Analog Signal of Liquid Surface Detection for checking
TP3	Comparator Output Signal of Liquid Surface Detection for checking

SECTION 5 SERVICE PROGRAM

To Cover

SECTION 5 SERVICE PROGRAM

5.1 SERVICE MODE

5.1.1 Starting and quitting the Service Mode

To start the service mode.
(1) Press [ID No. Entry] key on the “Ready” screen, then the ID No. entry screen will be displayed.
(2) Press "C", "9", "-", "0", [Enter] and [Quit] keys.

To quit the service mode.
(1) Press [ID No. Entry] key on the “Ready” screen, then the ID No. entry screen will be displayed.
(2) Press "C", "0", [Enter] and [Quit] keys.

NOTE:	“Light Shield Open “ error is skipped during entering Service Mode. When entered Service mode, [Special Calibration] key is added in Analysis settings screen. However do not change parameters in Special Calibration screen. (New main board (PCB NO.6373) only) 13

5.1.2 Menu Structure

Special Operate	
Service	
Service Setting	
Adjust	Mecha Position
	Detector Gain
	Temp. Control
	Adjust. Of Pump
	Trans. Light Calib
	Adjust Data Print
Initial	Init. Stored Data
	Init. QC Data
	Init. Settings-1
	Init. Entire Memory
	Init. Settings-2
	Verify Control Tbl
Test Menu	Drain Liquid
	Dispense Volume
Flag Threshold	Full Power
	Reagent Temp.
Test Mode	Tube Transfer Test
	Catcher Test
Reag. Vial Settings	
Print Service Set.	Service Setting
	Flag Threshold
	Test Mode
	Reag. Vial Settings

5.2 SERVICE SETTING

Use to set the default parameter when initializing.
From the Main menu, press [Special Operate] → [Service] → [Service Setting] keys.

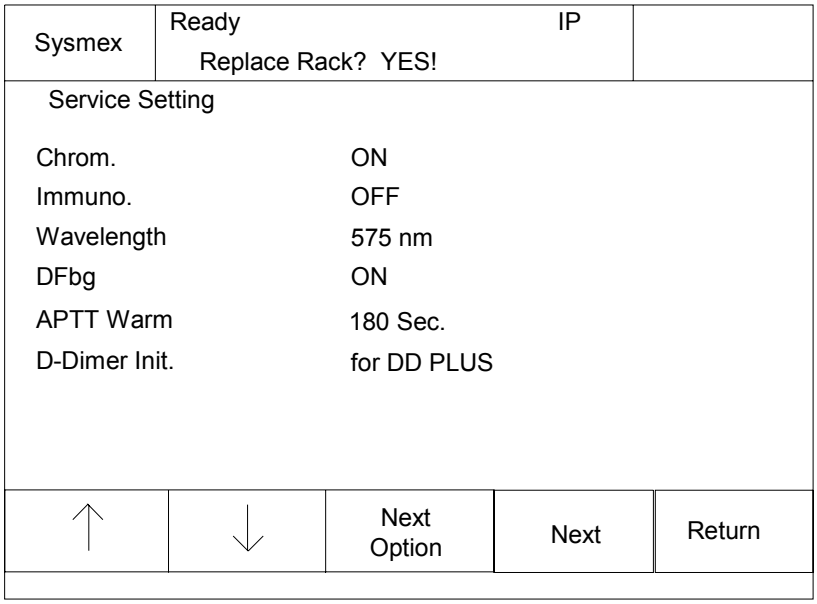


Figure 5-2-1: Service Setting Screen

[↑] or [↓]
Press to select the item to be set. Selected item is indicated in reversed.

(1) Chrom., Immuno., TTO thru PFDP
Select to set the selected parameter's analysis protocol automatically when performing initializing.

ON: To set.
OFF: Not to set.

(2) DFbg (Derived Fbg)
Set the 4th calculation parameters of PT standard curve as:

ON: Valid
OFF: Invalid

(3) APTT Warm
When selecting this item, the numeric keys will appear.
The APTT incubation time can be set using numeric keys in 30 sec increments.
If the APTT incubation time is set, the default setting of APTT incubation time is automatically set when performing initializing.

Numeric keys: To input value
Enter: To set the input value*. (*The input vale is verified.)

[Next Option]
Pressing this key alternates "ON" or "OFF".

[Return]
Use this key to quit the settings, and then the following keys will appear.
[Cancel]: Cancels the renewed setting and returns to the Service Menu screen.
[FIX]: Changes to the renewed setting and returns to the Service Menu screen. (Setting data will be stored in the memory.)
[Continue]: Returns to the Service Setting screen and allows continuous operation.

[Next Page]

Use this key to display the following parameters:

Parameter	Description	Key to be Used	Selection
Chrom.	Select whether to use Chromogenic Unit. (1)	Next Option	ON/OFF
Immuno.	Select whether to use Immuno. Unit. (1)	Next Option	ON/OFF
Wavelength	Select the wavelength of the aperture for Immuno. Unit.	Next Optioin	575 nm or 800nm
DFbg	(2)	Next Option	ON/OFF
APTT Warm	(3)	Numeric Keys	120 thru 300
D-Dimer Init.	Select the parameter for D-Dimer.	Next Option	DD PLUS, Adv.DD or LPIA DD
TTO	(1)	Next Option	ON/OFF
NT	(1)	Next Option	ON/OFF
TT	(1)	Next Option	ON/OFF
PCc	(1)	Next Option	ON/OFF
BXT	(1)	Next Option	ON/OFF
LA1	(1)	Next Option	ON/OFF
LA2	(1)	Next Option	ON/OFF
APL	(1)	Next Option	ON/OFF
Plg	(1)	Next Option	ON/OFF
Hep	(1)	Next Option	ON/OFF
SFDP	(1)	Next Option	ON/OFF
PFDP	(1)	Next Option	ON/OFF
Maintenance Rinse	Select whether to use Maintenance Rinse menu.	Next Option	ON/OFF
Terralin	Select number of times to fill up Terralin when executing Maintenance Rinse.	Numeric Keys	1 thru 10
Water	Select number of times to rinse when executing Maintenance Rinse.	Numeric Keys	1 thru 10
+Fbg / -Fbg *16*	Select whether to use +Fbg and -Fbg.	Next Option	ON/OFF

* (1), (2) and (3) indicated in the “Desctiption” of the table above correspond to (1), (2) and (3) indicated at the beginning of this section. For parameters which are set to OFF for (1) are as below:

- No test protocols will be displayed in the test setting screen.
- No reagents will be displayed in the reagent name setting screen.
- The settings will not be initialized by using “Init. Settings-1” and “Init. Entire Memory” on the “Initial” menu.

5.3 ADJUST

Use to adjust the hardware positions, sensitivities, etc.
Refer to Section 4 Adjustment for the adjustment procedures of each item.

From the Main menu, press [Special Operate] → [Service] → [Adjust] keys.

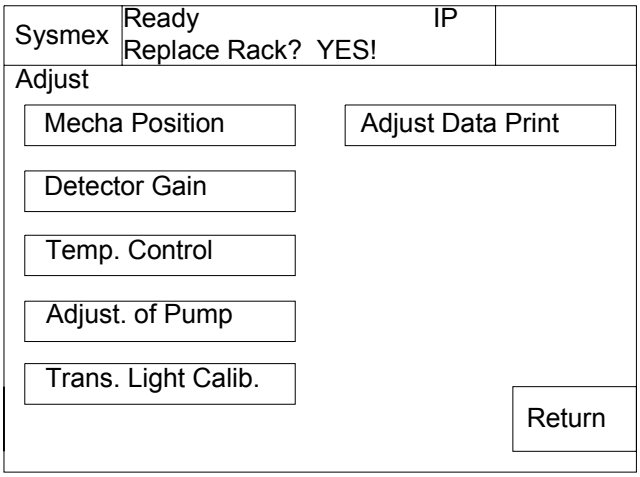


Figure 5-3-1: Adjust Menu Screen

5.3.1 Printing Adjustment Data

From Adjust menu, press [Adjust Data Print] key.
The adjustment setting values are printed to the built-in printer.

06/17/1999		11:22
Position		PULSE
blood1	X	1839
	Y	2265
	Z	1246
blood10	X	4061
	Y	2265
	Z	1246
blood_stat	X	1485
	Y	2265
	Z	1246
warm3	X	1469
	Y	80
	Z	-356
warm4	X	605
	Y	944
	Z	-356
comp	X	722
	Y	512
	Z	-369
shake	X	137
	Y	512
	Z	-29
dust	X	154
	Y	203
	Z	-376

06/17/1999		11:22
DETECT		
	OFFSET	GAIN
1 HIGH	128	128
LOW	139	128
PT	139	128
2 HIGH	114	159
LOW	134	232
PT	134	235

06/17/1999	11:22
TEMP	
COOLER	128
Main	128
Sub	128
DETECT	128
Main	128
Sub	128
PIPETTE	128
Main	128
Sub	128
ROOM	128
Main	128
Sub	128

Figure 5-3-2: Example of Setting Data Print Out

5.4 INITIALIZE

Use to initialize the settings, stored data file, etc. and to check the memory.

(1) From the Main menu, press [Special Operate] → [Service] → [Initial] keys.

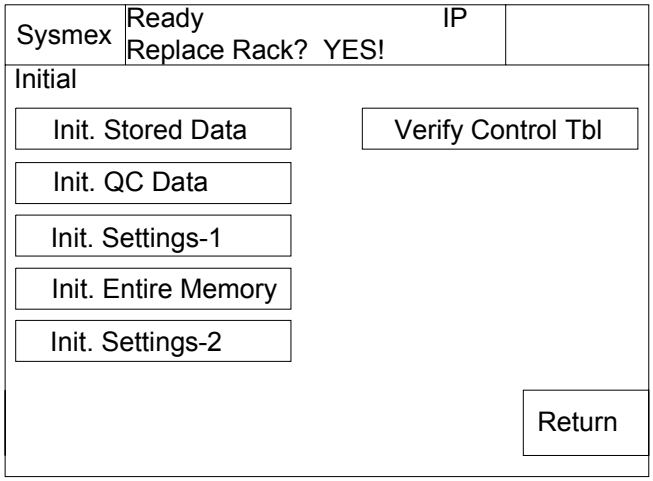


Figure 5-4-1: Initial Menu Screen

(2) Press a desired menu key, then the confirmation screen will appear.

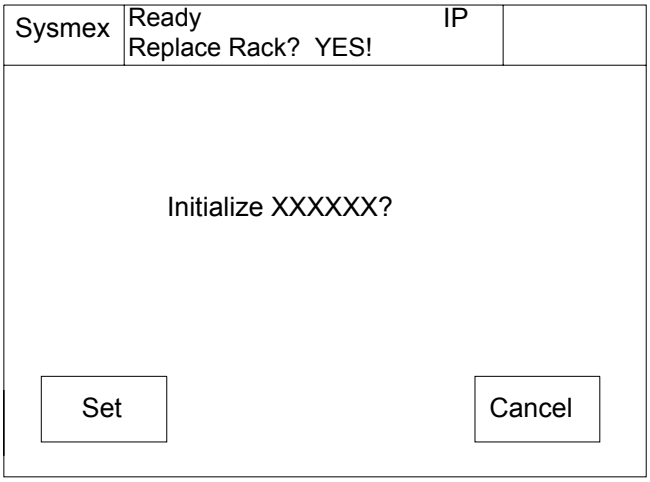


Figure 5-4-2: Initializing Confirmation Screen

(3) Press the appropriate key.
[Set]: To start initializing.
[Cancel]: To cancel initializing.

5.4.1 Initializing Stored Data

Initialize all stored data (300 samples) and all coagulation curve data (600 tests).
(1) Press [Int. Stored Data] key, then the confirmation screen will appear.
(2) Press the appropriate key.
[Set]: To start stored data initializing. When completing, the “Initial” screen will appear.
[Cancel]: To cancel stored data initializing, and return to the “Initial” screen.

5.4.2 Initializing QC Data

Initialize all QC data (7 items), 12 files.

(1) Press [Int. QC Data] key, then the confirmation screen will appear.

(2) Press the appropriate key.

[Set]: To start QC data initializing. When completing, the “Initial” screen will return.

[Cancel]: To cancel QC data initializing, and return to the “Initial” screen.

5.4.3 Initializing User Settings

(1) Press [Int. Settings-1] key, then the confirmation screen with “Initialize Standard Curve Settings?” message will appear.

When selecting this key, following customer setting items will be initialized in order.

Setting value
- Auto Val/Out
- Mark Limits
- Replic. Limits
- Report Limits
- Set Test Name
- Set Reagent Name
- Test Protocol
- Set Replication
- Test Group
- Reagents Holder
- Alarm Settings
- Conversion
- Host Computer
- Barcode Scanner
- Date Formt
- Password

Standard Curve

(2) Select the appropriate key.

[Set]: To start user-setting initializing. When completing, the “Initial” screen will return.

[Cancel]: To cancel user setting initializing, and return to the “Initial” screen.

5.4.4 Initializing Entire Memory

(1) Select “Int. Entire Memory” key, then the confirmation screen with “Initialize Entire Memory?” message will appear.

When selecting this key, the following items will be initialized in order.

- User settings (Items listed in 5.4.3.)
- Stored data
- Error Log
- Total cycles, Syringe cycles
- Group selection number
- Rinse Wait time
- Reagent volume
- Catcher test cycle counts
- Catcher test error times

(2) Select the appropriate key.

[Set]: To start entire memory initializing. When completing, the “Initial” screen will return.

[Cancel]: To cancel entire memory initializing, and return to the “Initial” screen.

NOTE: By setting the DIP SW 202 - Bit 6 on PCB No. 6362 to ON position, the BBRAM settings are cleared automatically at power ON.

5.4.5 Initializing Service Settings

(1) Press [Int. Settings-2] key, then the confirmation screen with “Initialize Entire Memory?” message will appear. When selecting this key, following service setting items will be initialized in order.
- Service Settings
- Analysis Parameters
- Confirmation Mode
- Reagent Vial Settings
- Gain Correction Coefficient

(2) Select the appropriate key.
- [Set]: To start service setting initializing. When completing, the “Initial” screen will return.
- [Cancel]: To cancel service setting initializing, and return to the “Initial” screen.

5.4.6 Data Check

(1) Select “Verify Control Tbl” key, then the confirmation screen with “Initialize Entire Memory?” message will appear.

(2) Select the appropriate key.
- [Set]: To perform memory check in order of following screen. The check result will be indicated “OK” or “NG”. The number on the screen “8333” indicates the checksum value of Flash Memory.
- [Cancel]: To cancel memory check, and return to the “Initial” screen.

(3) When [Set] is pressed, memory check will be performed in the following order.
- Flash Memory
- Motor position adjustment value
  (Detector Block adjustment, Temperature control, Pressure adjustment)
- Manufacturer settings (Service settings, Analysis Parameters, Reagent Bottle)
- Customer settings
- Standard Curve
- Each sample data in stored data
- Each file data in QC data

Important: Note that any NG file is automatically initialized.

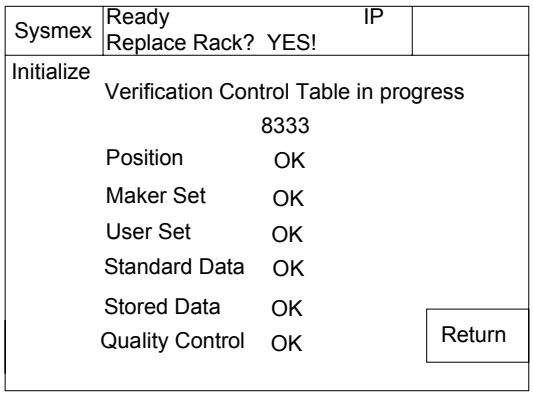


Figure 5-4-3: Data Check Screen

5.4.7 Contents stored in BBRAM

(1) Stored data
(2) QC data
(3) Flag for error message “Turned Off During Operation”.
- Syringe operation cycle counts
- Test counts

(4) Group selection number
- Rinse Wait time (Clean Sample Probe)
- Catcher transfer test cycle counts
- Catcher transfer test error cycle counts
- Storing dummy range

5.4.8 Contents stored in EEPROM

(1) Standard Curve data
    Units for calculation parameters
(2) User settings
    Auto Val/Out
    Mark Limits
    Replic. Limits
    Report Limits
    Set Test Name
    Set Reagent Name
    Test Protocol
    Set Replication
    Test Group
    Reagent Holder
    Alarm Settings
    Conversation
    Host Computer
    Barcode Scanner
    Date Format
    Password
(3) Manufacturer settings
    Service settings
    Analysis Parameters
    Confirmation Mode
    Reagent Vial settings
(4) Others
    Detector block sensitivity adjustment value
    Temperature control value
    Touch panel position adjustment calibration value (fixed)
    XYZ Axes position adjustment value
    Barcode DC motor position adjustment value (fixed)
    Pressure adjustment
    Main unit temperature Conversion value
    Sensor temperature Conversion value
(5) Others
    Barcode scanner types
    Ensuring the dummy range

5.4.9 Items needing backup when initializing

The following items are required the backup (printing out) when replacing PCB No.6362.
(1) EEPROM
    All data excluding fixed data.
(2) BBRAM
    Group selection number
    Rinsing time

5.5 TEST MENU

(1) From the Main menu, press [Special Operate] → [Service] → [Test Menu] keys.

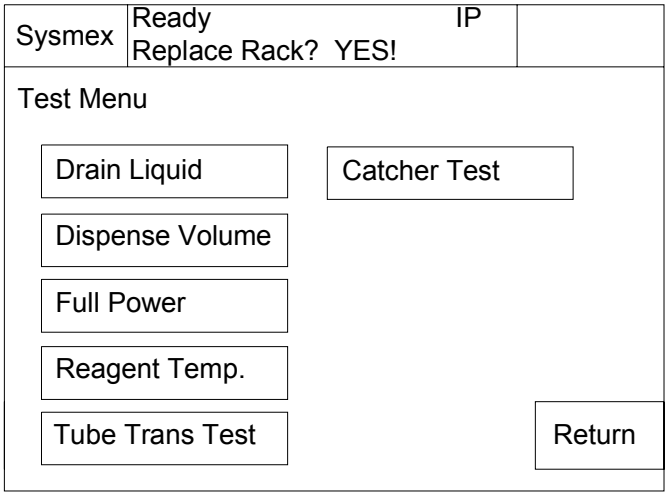


Figure 5-5-1: Test Menu Screen

(2) Press a desired key to start test.

(3) Press [Return] key to return to the service menu screen.

5.5.1 Drain Liquid

For shipment, draining the liquid from the instrument, use two operations.

(1) Press [Special Operate] → [Service] → [Test Menu] → [Drain Liquid] keys to start, then the following screen will be displayed.

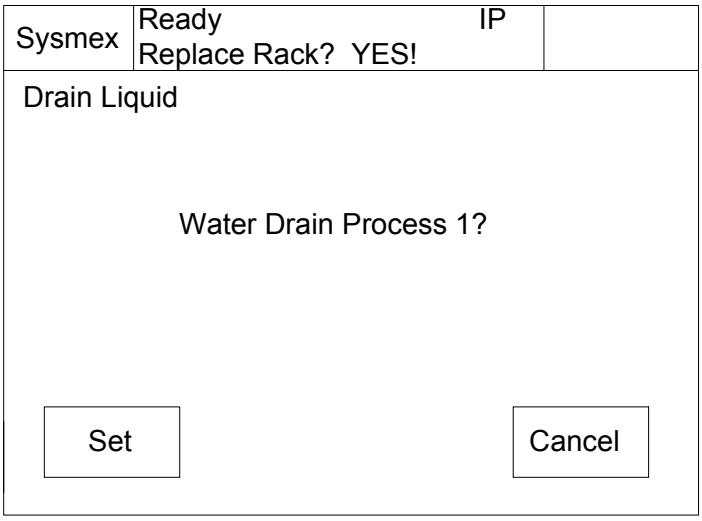


Figure 5-5-2: Drain Liquid Confirmation Screen

Water Drain Process 1

This process discards the liquid in the Rinsing bottle, then select the appropriate key.

CAUTION: Be careful when opening the rinsing bottle as it is pressurized.

(2) Select the appropriate key.
[Set]: Drains water in the pipette or tubes into the waste bottle through rinsing cup. (approx. 1 minute)
When completing, the confirmation screen of Water Drain Process 2 will be displayed.
[Cancel]: Returns to the Service Menu screen without performing the water drain sequence.

Water Drain Process 2

(3) The confirmation message “Water Drain Process 2?” will appear. Place a tissue or cloth on the rinsing cup to prevent water splashing.

(4) Select the appropriate key.
[Set]: Absorbs water in the rinsing cup or tubes. (Approx. 10 seconds)
When completing, the Test Menu screen will return. Discard the absorbed tissue or cloth.
[Cancel]: Returns to the Test Menu screen without performing the water drain sequence 2.

5.5.2 Dispense Volume

Verify Syringe dispensed volume.

(1) Press [Special Operate] → [Service] → [Test Menu] → [Dispense Volume] keys to start, then the following screen will be displayed.

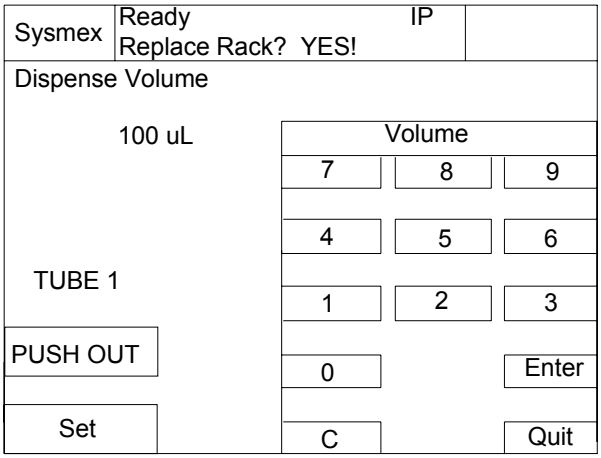


Figure 5-6-3: Drain Liquid Confirmation Screen

(2) To verify dispensed volume.
1) In advance, measure the prepared test sample by the electric balance.
2) Put the sample cup or tube containing distilled water on Sample 1 position.
3) The position to dispense can be selected. Select either “TUBE 1” or “BLOOD 2” using [PUSH OUT] key. Pressing [PUSH OUT] alternates “TUBE 1” and “BLOOD 2”.
4) When selecting “TUBE 1”, put a new reaction tube in #1 position of Reaction Tube Rack.
When selecting “BLOOD 2”, put the sample cup or sample tube containing distilled water in #2 position of sample rack.
5) Input the dispensed volume using numeric keys between 1 and 250 µL.
6) Set the input volume by pressing [Enter] key.
7) Press [Set] key to perform the dispensing operation.
After dispensing, measure the test sample by the electric balance.
8) If dispensed volume is OK, press [Quit] key. Then the screen will return to the Test Menu display.

5.5.3 Full Power

Verify the maximum power consumption.

(1) Press [Special Operate] → [Service] → [Test Menu] → [Full Power] keys to start, then the following screen will be displayed.

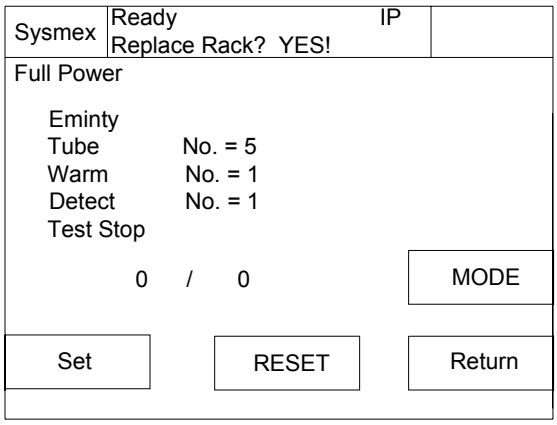


Figure 5-5-4: Full Power Screen

(2) In this test program, pipette shifting, syringe operation and valve opening are performed at once. Before performing this operation, drain water operation as described in Section 5.6.1 because there is a possibility the pipette discharges water to the incubation detector block.

NOTES:
- Avoid performing this test operation for a long time.
- Set reaction tubes to the "1", "5", "21", "25", "31", "35", "56" and "60" positions. DO NOT set tubes to the other positions.

[MODE] key: Use to alternate the mode, "Full Power" or "Eminty".
[RESET] key: Use to clear the operation counts.
[Set] key: Press to perform the test.
[Return] key: Press to quit the test operation, and to return to the Test Menu screen.

(3) To cancel power consumption test operation
Press [Return] key to stop the operation, then the power consumption test setting screen will appear. (This program does not stop automatically. You must press [Return] key when you stop this program.)

5.5.4 Reagent Temp. 19

Verify the reagent pipette incubation operation.

(1) Press [Special Operate] → [Service] → [Test Menu] → [Reagent Temp.] keys to start, then the following screen will be displayed.

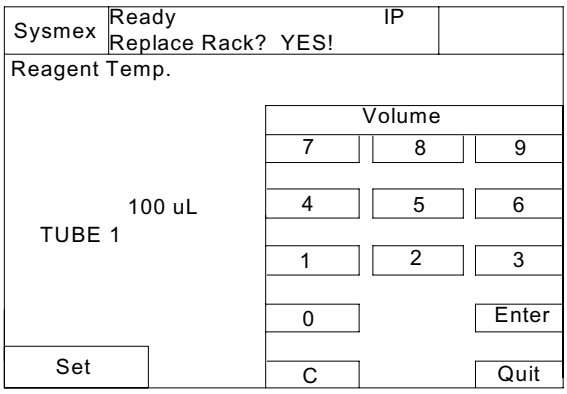


Figure 5-5-5: Reagent Temp. Screen

(2) To verify Reagent Incubation operation

1) Pour 50 µL of distilled water into a reaction tube. Set a thermometer into the water. Then put it into the incubation well #6. Verify that the distilled water temperature in the reaction tube is 37±1°C.
2) Put the sample cup containing distilled water in reagent holder #1.
3) Set the dispensing volume using numeric keys at 100 µL (default value).
4) Press [Enter] key to set, eventually, the input volume to 100ul.
5) Remove the thermometer from reaction tube and press [Set] key to perform the heating operation.
6) After the reagent nozzle is dispensing 100 µL of water in incubation well #6 from reagent holder #1, the reaction tube is moved to detection well. Confirm that the temperature of water at detection well is within 37±1°C. It is recommended that the temperature of water at detection well is adjusted within 37±0.3°C
7) If the temperature value is not within the range, return to the Temperature adjustment procedure section 4.4.3 input the new S-value as follows:
   When the measured value is higher than the range 37±0.3°C use "+" key to add 5 to the current Nozzle S-value.
   When the measured value is smaller than the range 37±0.3°C, use "-" key to subtract 5 to from the current Nozzle S-value.
   After the S-value change, perform steps 1) – 6) again.
8) Press [Quit] key to finish the test. Then the screen will return to the Test Menu display.

5.5.5 Tube Transfer Test

Verify the reaction tube transfer operation.

(1) Press [Special Operate] → [Service] → [Test Menu] → [Tube Trans Test] keys to start, then the following screen will be displayed.

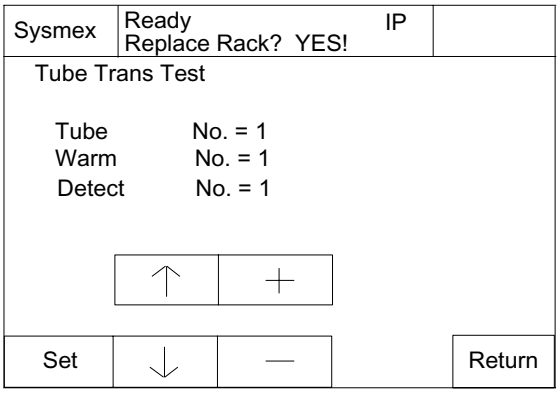


Figure 5-5-6: Tube Transfer Test Screen

(2) To verify Tube Transfer operation

1) Transfer the tube of the specified tube rack in the following order.
incubation well → reagent dispense → detector well → discard
2) DO NOT leave reaction tubes on the Reaction Tube Rack to prevent malfunction.

[↑], [↓] keys: Use to move cursor.
[+] key: Use to increase value on which cursor is positioned.
[-] key: Use to decrease value on which cursor is positioned.
[Set] key: Press to perform the tube transfer test.
[Return] key: Press to quit the test and to return to Test Menu display.

(3) To cancel tube transfer test operation
Press [Cancel] key to stop the operation, then the tube transfer test setting screen will appear.

5.5.6 Catcher Test

Verify the catcher operation.

(1) Press [Special Operate] → [Service] → [Test Menu] → [Catcher Test] keys to start, then the following screen will be displayed.

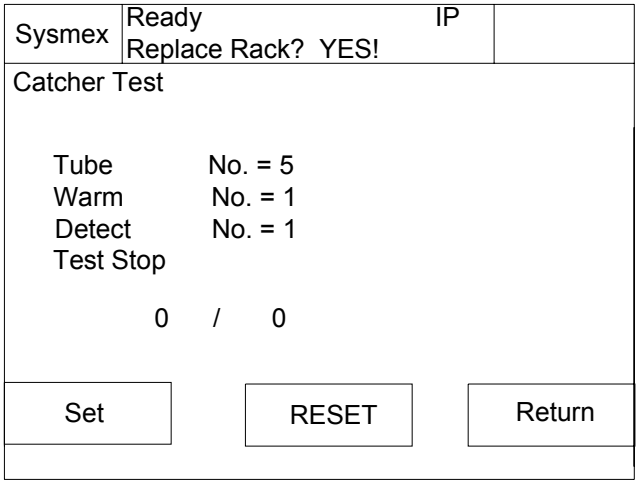


Figure 5-5-7: Catcher Test Screen

(2) To verify catcher operation

Set reaction tubes in the “1”, “5”, “21”, “25”, “31”, “35”, “56” and “60” position of the Reaction Tube Rack. DO NOT place tubes in the other positions.

[RESET] key: Use to clear the test cycle counts.
[Set] key: Press to perform the catcher test.
[Return] key: Press to quit the test and to return to Test Menu display.

(3) To cancel catcher test operation
Press [Cancel] key to stop the operation, then the catcher test setting screen will appear.

5.6 FLAG THRESHOLD

CAUTION: The change of flag threshold settings directly affects the analysis results and error detection method. DO NOT change these settings without any assistance of authorized person.

(1) Press [Special Operate] → [Service] → [Flag Threshold] keys to start, then the following screen will be displayed.

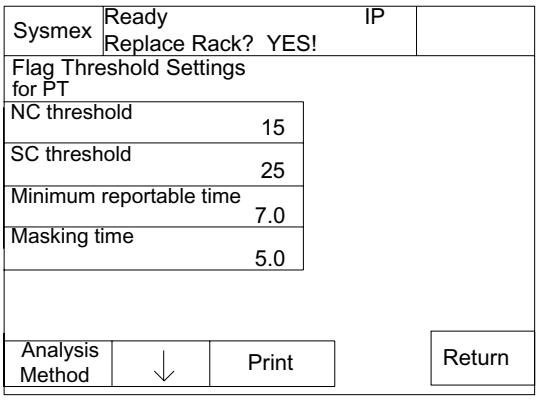


Figure 5-6-1: Flag Threshold Setting Screen

[Analysis Method] Key

Use to select the test item to change the settings.

[↓] Key

Use to move cursor to the desired item.

<Bioactivity Method>

NC threshold:	Delta-H level to detect No Coagulation error
SC threshold:	Delta-H level to detect Slight Coagulation Curve error
Minimum reportable time:	The minimum reporting time for reporting
Making time:	Analysis is not done for the raw data after adding reagent during the time period.
JumpUp:	One of the Standard Curve error (JumpUp) judgment areas
Reagent Correlation a:	Coefficient of delta-OD compensation
Reagent Correlation b:	Offset of delta-OD compensation The delta-OD after compensation = a x (Detected delta-OD) + b
SLOW REACTION Algorithm:	Use of SLOW REACTION Algorithm.
Width:	Width of check for SLOW REACTION Algorithm.
Max Time:	Threshold of error for SLOW REACTION Algorithm.
START ANGLE Algorithm:	Use of START ANGLE Algorithm.
1st Time Point:	Start of the check range for START ANGLE Algorithm.
2nd Time Point:	End of the check range for START ANGLE Algorithm.
Limit1:	Error threshold 1 for START ANGLE Algorithm.
Limit2:	Error threshold 2 for START ANGLE Algorithm.
DRIFT CHECK Algorithm:	Use of DRIFT CHECK Algorithm.
1st Check Point:	The center 1 of the check range for DRIFT CHECK Algorithm.
2nd Check Point:	The center 2 of the check range for DRIFT CHECK Algorithm.
Width:	Check range for DRIFT CHECK Algorithm.
Limit Ratio:	Threshold of error for DRIFT CHECK Algorithm.
EARLY% CHECK Algorithm:	Use of EARLY% CHECK Algorithm.
Check Point:	Check Point for EARLY% CHECK Algorithm.
Limit:	Threshold of error for EARLY% CHECK Algorithm.
Drifting Baseline Algorithm:	Use of Drifting Baseline Algorithm.
delta:	Threshold for Drifting Baseline Algorithm.
regwin:	Width of baseline interval for Drifting Baseline Algorithm.
swin:	Width of evaluation interval for Drifting Baseline Algorithm.
maxbase:	Maximum slant of linearization function for Drifting Baseline Algorithm.
derect:	The slant of reaction curve for Drifting Baseline Algorithm.
Mixing Time for Sample:	The mixing time for sample.
Mixing Time for Reagent:	The mixing time for reagent.
Calibration a:	The slant of calibration.
Calibration b:	The segment of calibration.
High Accurate Dilute ratio	The parameter for dilute ratio of standard curve analysis. ON: accuracy equal to the CA-1500 OFF: conventional accuracy 11

<Chromogenic Method>

Low Light Error Limit:	A/D limit to detect low transmitted light intensity.
High Light Error Limit:	A/D limit to detect high transmitted light intensity.
Reagent Correlation a:	Coefficient of delta-OD compensation.
Reagent Correlation b:	Offset of delta-OD compensation The delta-OD after compensation = a x (Detected delta-OD) + b
VlinIntegral Algorithm:	Use of VlinIntegral Algorithm
Polynomial Dimension:	Dimension of polynomial approximate expression
Start Time:	The start time for analysis.
End Time:	The end time for analysis.
Integral Area(auc):	The judgement value of polynomial approximate expression result
Minimum Search Window:	Width to search variable analysis starting time
Variable Start Time:	Use of variable analysis starting time
Search Width for Preevaluation:	The modulus for variable analysis starting time calculation
Upper max Evaluation Offset:	The modulus for variable analysis starting time calculation
Upper Preevaluation Rate:	The modulus for variable analysis starting time calculation
Lower Preevaluation Rate:	The modulus for variable analysis starting time calculation
Min. Regression Time:	The modulus for linearity range
Mixing Time for Sample:	The mixing time for sample
Mixing Time for Reagent:	The mixing time for reagent
Calibration a:	The slant of calibration
Calibration b:	The segment of calibration
High Accurate Dilute ratio	The parameter for dilute ratio of standard curve analysis. ON: accuracy equal to the CA-1500 OFF: conventional accuracy 11

<Immunoassy Method>

Low Light Error Limit:	A/D limit to detect low transmitted light intensity.
High Light Error Limit:	A/D limit to detect high transmitted light intensity.
Reagent Correlation a:	Coefficient of delta-OD compensation.
Reagent Correlation b:	Offset of delta-OD compensation The delta-OD after compensation = a x (Detected delta-OD) + b
Start Time a1:	The start time for Prozone check a1.
Stop Time a1:	The end time for Prozone check a1.
Start Time a2:	The start time for Prozone check a2.
Stop Time a2:	The end time for Prozone check a2.
Cut Off:	A parameter for Prozone check a1.
Rate:	A parameter for Prozone check.
Offset:	A parameter for Prozone check.
VlinIntegral Algorithm:	Use of VlinIntegral Algorithm
Polynomial Dimension:	Dimension of polynomial approximate expression
Start Time:	The start time for analysis.
End Time:	The end time for analysis.
Integral Area(auc):	The judgement value of polynomial approximate expression result
Minimum Search Window:	Width to search variable analysis starting time
Variable Start Time:	Use of variable analysis starting time
Search Width for Preevaluation:	The modulus for variable analysis starting time calculation
Upper max Evaluation Offset:	The modulus for variable analysis starting time calculation
Upper Preevaluation Rate:	The modulus for variable analysis starting time calculation
Lower Preevaluation Rate:	The modulus for variable analysis starting time calculation
Min. Regression Time:	The modulus for linearity range
Mixing Time for Sample:	The mixing time for sample
Mixing Time for Reagent:	The mixing time for reagent
Calibration a:	The slant of calibration
Calibration b:	The segment of calibration
High Accurate Dilute ratio	The parameter for dilute ratio of standard curve analysis. ON: accuracy equal to the CA-1500 OFF: conventional accuracy 11

[Print] Key

Use to output the settings for all tests to the built-in printer.

Numeric Keys

When the cursor is moved to each setting value, numeric keys appear as below to input the value.

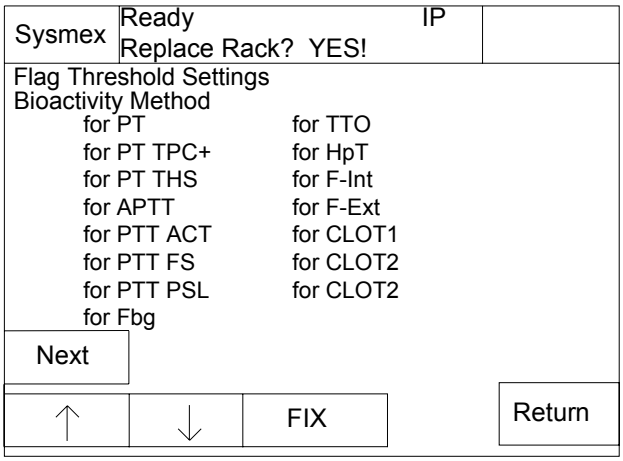


Figure 5-6-2: Detection Method Selection Screen

[Next] Key
Use to switch detection methods of Bioactivity Method, Chromogenic Method and Immunoassy Method.

[↑] [↓] Key
Use to move cursor to the desired item.

[FIX] Key
Use to set the selected method and returns to Flag Threshold Setting screen.

[Return] Key
Use to quit selecting method and returns to Flag Threshold Setting screen.

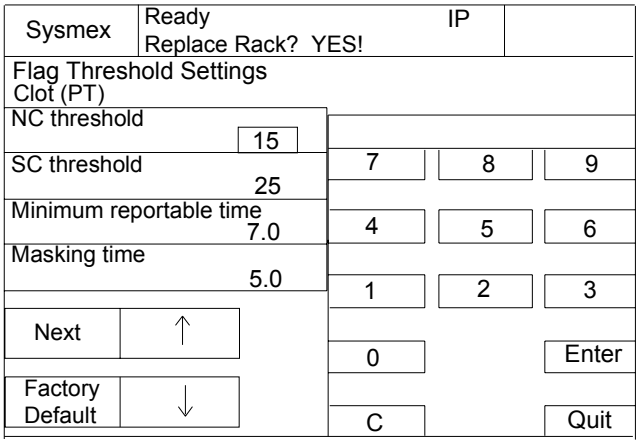


Figure 5-6-3: Numeric Keys

[Next] Key
Use to display next four parameters.

[Factory Default] Key
Use to initialize selected detection method.

[↑] [↓] Key
Use to move cursor to the desired parameter.

[Return] or [Quit] Key
Press this key to quit the flag threshold settings. Then the setting renew confirmation display will appear. Select the appropriate key.
[Cancel]: Cancels the renewed setting and returns to the Service Menu screen.
[FIX]: Changes to the renewed setting and returns to the Service Menu screen.
[Continue]: Returns to the Service Setting screen and allows continuous operation.

5.7 TEST MODE

(1) Press [Special Operate] → [Service] → [Test Mode] keys to start, then the following screen will be displayed.

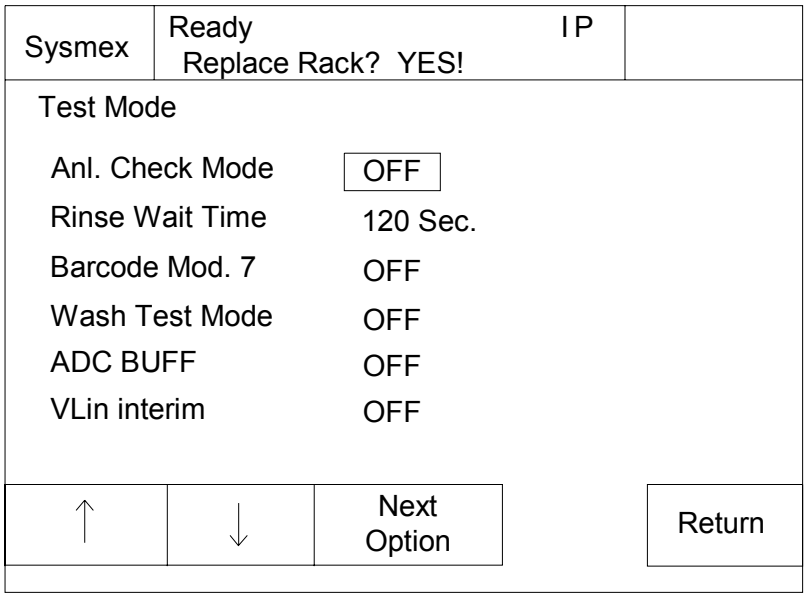


Figure 5-8-1: Test Mode Screen

[↑] and [↓] Keys
Use to move cursor. The selected item is displayed in reversed.

[Next Option] Key
Press this key to set the analysis check mode, barcode mode 7, and rinse reagent volume check selection, [ON] or [OFF].

Numeric Keys
When the cursor is moved to “Rinse Wait Time”, numeric keys appear for the setting. Refer to Section 5.9.2 below.

[Return] Key
Press this key to quit the Test Mode. Then the renew setting confirmation display will appear.
Press the appropriate key.
[Cancel]: Cancels the renewed setting and returns to the Service Menu screen.
[FIX]: Changes to the renewed setting and returns to the Service Menu screen.
[Continue]: Returns to the Test Mode screen and allows continuous operation.

5.7.1 Analysis Check Mode

This setting is used to switch the minimum reportable time.

ON: All data will be displayed and output.
OFF: No data will be displayed and output on following condition.
PT: Below 7 sec.
APTT: Below 15 sec.

5.7.2 Rinse Wait Time

Set the time period to leave the rinse solution within pipette during manual pipette rinsing.
Time between 1 and 600 seconds can be set.

5.7.3 Barcode Mod. 7

This setting is used for the use of bar code check digit “Modulus 7”.

ON: Used
OFF: Not used

5.7.4 Wash Test Mode

This setting is used to enter the rinse solution amount check mode.

ON: Enter the wash test mode (for production and servicing use only).
In the Wash Test Mode, the sample probe does not come down into the rinsing cup during reagent dispense sequence.
OFF: Customer mode.

5.7.5 ADC BUFF (For Factory Use Only)

This setting is used for the factory use only.

ON: Used
OFF: Not used

5.7.6 Vlin interim (For Factory Use Only)

This setting is used for the factory use only.

ON: Used
OFF: Not used

5.8 REAGENT VIAL SETTING

(1) Press [Special Operate] → [Service] → [Reag.Vial Settings] keys to start, then the following screen will be displayed.

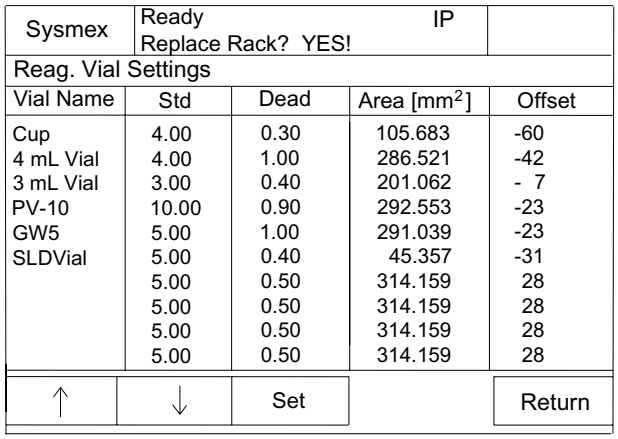


Figure 5-7-1: Reagent Vial Setting Screen 11

[↑] [↓] Key
Use to move cursor to the desired reagent vial.

[Set] Key
Use to set the selected reagent vial and returns to Reagent Vial Setting screen.

[Return] Key
Press this key to quit the reagent vial settings. Then the setting renew confirmation display will appear. Select the appropriate key.
[Cancel]: Cancels the renewed setting and returns to the Service Menu screen.
[FIX]: Changes to the renewed setting and returns to the Service Menu screen.
[Continue]: Returns to the Service Setting screen and allows continuous operation.

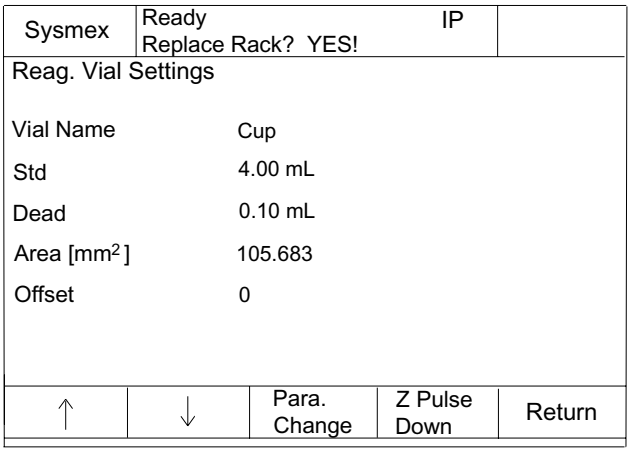


Figure 5-7-2: Reagent Vial Setting Screen

[↑] [↓] Key
Use to move cursor to the desired item.

[Para. Change] Key
Use to change the selected item by displaying [Next Option] key or numeric keys.

[Z Pulse Down] Key
Use to move to the descend pulse adjustment screen.

[Return] or Key
Returns to Reagent Vial setting screen.

The changeable parameters are as follows:

Parameter	Description	Key to be Used	Changeable Range
Vial Name	Name of Reagent Vial	Full Keyboard	9 characters maximum (Alphabets and Numbers)
Std	Normal Volume (mL)	Numeric Keys	0.01 thru 99.99 (by 0.01 mL)
Dead	Dead Volume (mL)	Numeric Keys	0.00 thru 99.99 (by 0.01 mL)
Area [mm^2]	Section Area of Vial (mm^2)	Numeric Keys	0.000 thru 999.999 (by 0.001 mm^2)
Offset	Number of Offset Pulse from Adjustment Position to Dead Volume	Numeric Keys	-999 thru 999 (by 1 pulse)

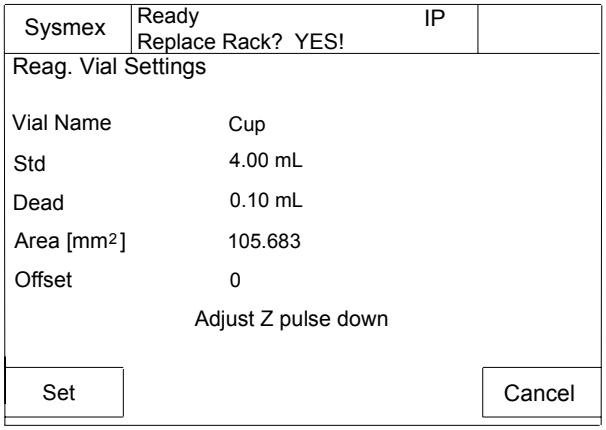


Figure 5-7-3: Z Pulse Down Adjustment Screen

[Set] Key

Use to execute Descend Pulse Adjustment screen.

[Cancel] Key

Cancels the Z Pulse Down Adjustment and returns to the Reagent Vial Settings screen.

<Z Pulse Down Adjustment>

(1) Fill the dead volume of the reagent in the reagent vial and place at the reagent holder No. 9.
(2) Press [Set] key to execute Z Pulse Down Adjustment.
(3) The probe moves to the reagent holder No. 9 and detect a liquid surface for 5 times.
(4) The difference between the average of the descend pulse and the value of the reagent holder No. 9 position adjustment will be calculated as the pulse correction value.

5.9 OUTPUT OF SERVICE SETTINGS

(1) Press [Special Operate] → [Service] → [Print Service Set.] keys, then the following screen will be displayed.

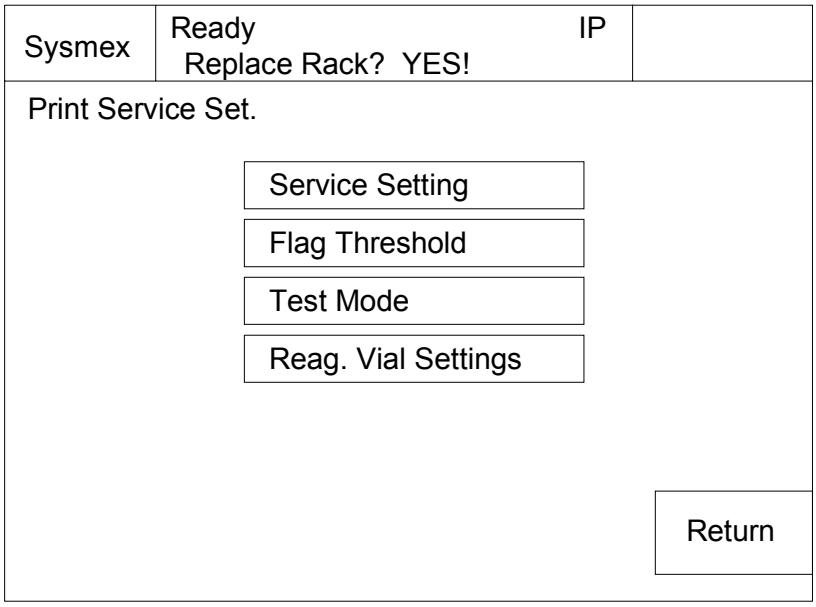


Figure 5-9-1: Print Service Setting Screen

[Service Setting] Key
Use to output the service setting values.

[Flag Threshold] Key
Use to output the flag threshold values for every tests.

[Test Mode] Key
Use to output the test mode values.

[Reag. Vial Settings] Key
Use to output the reagent vial setting values.

[Return] or [Quit] Key
Quits to output service settings and returns to Service Menu screen.

5.10 LED CALIBRATION SETTING

When entering the Service Mode, the setting of Calibration is added in customer setting menu.

(1) Enter the service mode. (See Section 5.1.1)

(2) From the main menu, press [Special Menu] → [Special Operate] → [LED Calibration] keys, then the LED Calibration Menu screen will be displayed.

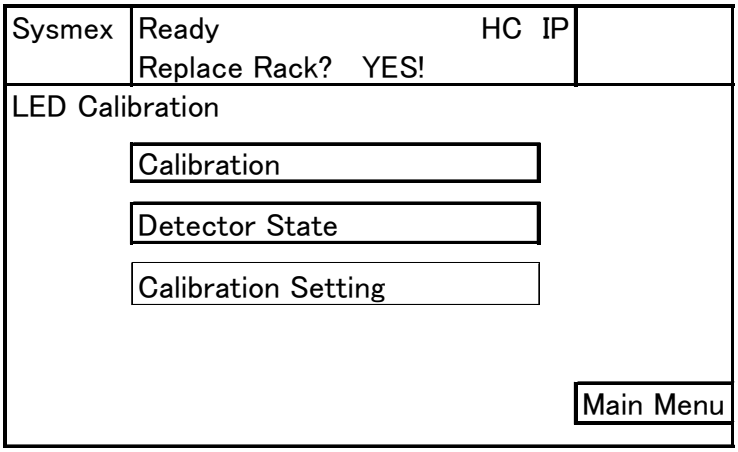


Figure 5-10-1: LED Calibration Menu Screen

(3) Press [Calibration Setting] key, then the LED Calibration Setting screen will be displayed.

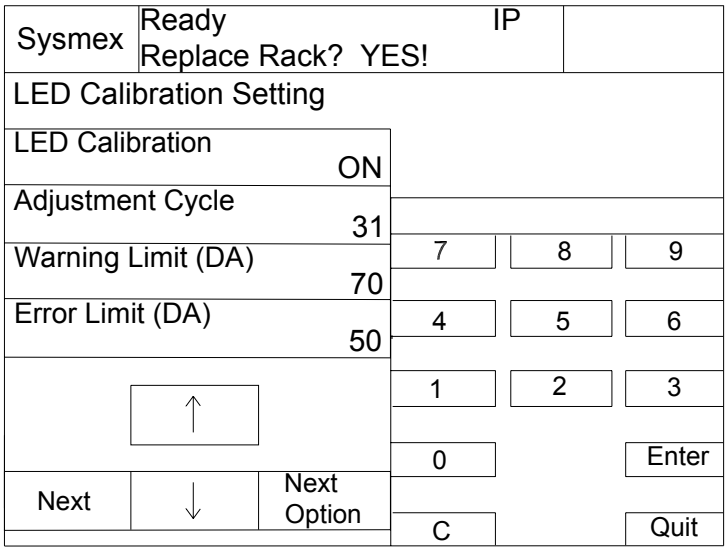


Figure 5-10-2: LED Calibration Setting Screen

[↑] and [↓] Keys
Use to move cursor. The selected item is displayed in reversed.

[Next] Key

Use this key to display the following parameters:

Parameter	Description	Key to be Used	Selection (Default)
LED Calibration	Select whether to use LED Calibration. [LED Calibration] key will be displayed on Special Operation Menu screen when the setting is ON.	Next Option	ON/OFF (ON)
Adjustment Cycle	The message to urge adjustment will be displayed when the cycle count exceeds the preset period.	Numeric Keys	1 thru 999 (31)
Warning Limit (DA)	A value to warn LED is necessary to be replaced in the near future.	Numeric Keys	1 thru 1023 (50)
Error Limit (DA)	A value to notify LED is necessary to be replaced.	Numeric Keys	1 thru 1023 (30)
CV Limit	A limit to check the fluctuation.	Numeric Keys	0.0 thru 100.0 (5.0)
Reaction tube number	A number of reaction tube to be used for the adjustment.	Numeric Keys	1 thru 5 (5)
Total volume (/tube)	A total amount of the reagent volume to be aspirated from the reagent vial.	Numeric Keys	100 thru 300 (250)
Dispensing volume (/tube)	A number of the volume to be dispensed to the reaction tube.	Numeric Keys	100 thru 300 (200)
Aspiration speed	A speed of the calibrator aspiration.	Numeric Keys	300 thru 1300 (650)
Dispensing speed	A speed of the calibrator dispensing.	Numeric Keys	300 thru 1300 (650)
CV check tube number	The minimum value of data to calculate CV. CV will be calculated when the preset number or more data exists.	Numeric Keys	3 thru 5 (3)
Mean check tube number	A number of data when adopting mean value. The mean value becomes as the adjustment value when the number of data is within preset value. If not, the mean value, without a maximum and minimum data, becomes as the adjustment value.	Numeric Keys	2 thru 5 (2)

[Quit] Key

Press this key to quit the LED Calibration settings, then the setting renew confirmation display will appear. Select the appropriate key.

[Cancel]: Cancels the renewed setting and returns to the LED Calibration screen.
[FIX]: Changes to the renewed setting and returns to the LED Calibration screen.
[Continue]: Returns to the LED Calibration screen and allows continuous operation.

5.10.1 Adjustment Value Calculation Method

The adjustment value for each reagent is calculated as below:

(1) Decide whether the data should be calculated.
The error (Err2) will be displayed and the operation will be stopped if any data fulfills as follows:
1) AD Value $\geq$ 1023
2) AD Value $\leq$ 0
3) DA Value $\geq$ 1023
4) DA Value $\leq$ 0
5) Indicated Value + delta $\leq$ AD Value
6) Indicated Value – delta $\geq$ AD Value
delta = (1023 / DA Value) / 2

2) Check CV.
When there are 3 or more data of the setting value, CV will be calculated to decide whether the data is within the allowable range. If the data exceeds the allowable range, the error (Err2) will be displayed and the operation will be stopped.

3) Calculate Adjustment Value.
When there are 3 or more data of the setting value, the mean value, without a maximum and minimum data, will be calculated and becomes as the adjustment value. If there are 2 or less data, the mean value of all becomes as the adjustment value.

5.11 FACTORY SETTING VALUE TABLE

5.11.1 Position Adjustment

(1) Pipette

Sampler	Position	X	Y	Z
	Sample 1	1839	2265	1246
	Sample 10	4061	2265	1246
	STAT Sample	1485	2265	1246
Reagent Rack	**Position**	**X**	**Y**	**Z**
	Reagent 1	3726	1339	641
	Reagent 9	2244	1339	641
	Reagent 10	2244	1709	641
	Rinse (CA CLEAN 1)	1781	1339	641
	Buffer	1781	1709	641
Rinsing cup	**Position**	**X**	**Y**	**Z**
	Inside	1300	1537	679
	Outside	1300	1339	679
Tube Rack Position	**Position**	**X**	**Y**	**Z**
	Tube 1	1818	80	658
	Tube 5	1818	820	658
	Tube 26	2682	80	658
	Tube 31	3028	80	658
	Tube 35	3028	820	658
	Tube 56	3892	80	658

(2) Catcher

Tube Rack Position	Position	X	Y	Z
	Tube 1	1974	80	-356
	Tube 5	1974	820	-356
	Tube 26	2838	80	-356
	Tube31	3184	80	-356
	Tube35	3184	820	-356
	Tube 56	4048	80	-356
Detector Block	**Position**	**X**	**Y**	**Z**
	Incubation Well 1	605	80	-356
	Incubation Well 3	1469	80	-356
	Incubation Well 4	605	944	-356
	Chrom. Well	722	512	-369
	Immuno Well	1347	510	-369
Others	**Position**	**X**	**Y**	**Z**
	Reagent Dispense	137	512	-29
	Discard Well	154	203	-376

(3) Barcode (Fixed)

	Position	X
	Tube 1	339
	Tube 10	2308
	STAT	21

5.11.2 Detector Block Adjustment Value

Activation Method (Detector well 1 - 4)			
	Offset	Gain	Target Value
High Sensitivity Low Sensitivity	128 139	128 128	- -
Chromogenic Method (Detector well 5)			
	Offset	Gain	Gain
	128	128	4000
Immunoassy Method (Detector well 6)			
	Offset	Gain	Gain
	128	128	4000

5.11.3 Temperature Adjustment Value

Unit	Main Value	Sub Value
Cooler Unit	128	128
Detector Block	128	128
Pipette Section	128	128
Room Temperature	128	128

NOTE: These are the displayed values when initialized.
For the Sub values, refer to the values on the labels attached on each temperature control PCB in each unit. For the Main values, refer to the values labeled on the CPU board. 4
Refer to Section 4.4 Temperature Adjustment.

5.11.4 Transmitted Light LED Adjustment Value

Transmitted Light LED Calibration	ON
Adjustment Limit (AD)	3800
Change Limit CH5 (DA)	103
Change Limit CH6 (DA)	60

5.11.5 Pressure Adjustment Value

Offset	Gain
128	512

NOTE: These are the displayed values when initialized.
In case of initializing the EEPROM, refer to the values labeled on the CPU board.
Refer to Section 4.1 Pressure Adjustment.

5.11.6 Service Setting Value

	CA-510/520	CA-530/540	CA-550/560
Chromogenic	OFF	ON	ON
Immunoassy	OFF	OFF	ON
Wavelength	(800)	(800)	800
DFbg	OFF	OFF	OFF
APTT Incubation Time	120	120	120
D-Dimer Default Value	(DD)	(DD)	DD
TTO	ON	ON	ON
HpT	ON	ON	ON
TT	OFF	OFF	OFF
PCc	OFF	OFF	OFF
BXT	OFF	OFF	OFF
LA1	OFF	OFF	OFF
LA2	OFF	OFF	OFF
APL	OFF	ON	ON
Plg	OFF	ON	ON
Hep	OFF	OFF	OFF
SFDP	OFF	OFF	ON
PFDP	OFF	OFF	ON
Maintenance Rinse	OFF	OFF	OFF
Fill Up Terralin	1	1	1
Water	5	5	5

5.11.7 Test Mode Value

Anl. Check Mode	OFF
Rinse Wate Time	120 sec
Barcode Mod. 7	OFF
Wash Test Mode	OFF
ADC BUFF	OFF
Vlin interim	OFF

5.11.8 Reagent Vial Setting Value 11

Vial Name	Std (mL)	Dead (mL)	Area (mm2)	Offset
Cup	4.0	0.1	105.683	0
4mL Vial	4.0	0.6	286.521	18
3mL Vial	3.0	0.6	201.062	48
PV-10	10.0	0.9	292.553	28
GW5	5.0	0.6	291.039	48
SLD Vial	5.0	0.5	314.159	-4

Ver.00-14 and later

Vial Name	Std (mL)	Dead (mL)	Area (mm2)	Offset
Cup	4.0	0.3	105.683	-60
4mL Vial	4.0	1.0	286.521	-42
3mL Vial	3.0	0.4	201.062	-7
PV-10	10.0	0.9	292.553	-23
GW5	5.0	1.0	291.039	-23
SLD Vial	5.0	0.4	45.357	-31

5.11.9 LED Calibration Value

LED Calibration	ON	Total Volume (/tube)	250
Adjustment Cycle	31	Dispensing Volume (/tube)	200
Warning Limit (DA)	50	Aspiration Speed	650
Error Limit (DA)	30	Dispensing speed	650
CV Limit	5.0	CV Check	3
Reaction tube number	5		2

5.11.10 Analysis Protocol

(1) PT

Sample Aspiration	50 µL
First Reagent	180 sec
Reagent volume 1 PT	100 µL
Rinse 11	100 µL
Detection	Activity-PT
Coag. detection point	50%
Sensitivity	Low Sensitivity
Max. detection time	100 sec

(2) APTT

Sample Aspiration	50 µL
First Reagent	60 sec
Reagent volume 5 APTT	50 µL
Rinse 11	50 µL
Second Reagent	240 sec *
Reagent volume 7 CaCl2	50 µL
Rinse 11	50 µL
Detection	Activity-APTT
Coag. detection point	50%
Sensitivity	Low Sensitivity
Max. detection time	190 sec

*__NOTE:__ This depends on the APTT Incubation time setting (Service Setting).
Japanese market: 180 sec

(3) Fbg

Sample Aspiration	10 µL
Dilution volume 12 Buffer	90 µL
First Reagent	180 sec
Reagent volume 3 Fbg	50 µL
Rinse 11	50 µL
Detection	Activity-Fbg
Coag. detection point	50%
Sensitivity	High Sensitivity
Max. detection time	100 sec

(4) TT

Sample Aspiration	100 µL
First Reagent	120 sec
Reagent volume 9 TT	50 µL
Rinse 11	50 µL
Detection	Activity-others
Coag. detection point	50%
Sensitivity	Low Sensitivity
Max. detection time	190 sec

(5) TTO

Sample Aspiration	20 µL
Dilution volume 12 Buffer	30 µL
First Reagent	180 sec
Reagent volume 8 TTO	125 µL
Rinse 11	125 µL
Detection	Activity-TTO
Coag. detection point	50%
Sensitivity	High Sensitivity
Max. detection time	190 sec

(6) NT

Sample Aspiration	20 µL
Dilution volume 12 Buffer	40 µL
First Reagent	180 sec
Reagent volume 10 NT	125 µL
Rinse 11	125 µL
Detection	Activity-NT
Coag. detection point	50%
Sensitivity	High Sensitivity
Max. detection time	190 sec

(7) AT-III

Sample Aspiration	10 µL
Dilution volume 12 Buffer	120 µL
Sample Aspiration	10 µL
Dilution volume 12 Buffer	10 µL
First Reagent	30 sec
Reagent volume 4 AT3.T	100 µL
Rinse 11	100 µL
Second Reagent	90 sec
Reagent volume 6 AT3.S	100 µL
Rinse 11	100 µL
Detection	Chromogenic
Coag. start point	11 sec
Coag. end point	40 sec
Sensitivity	Low Sensitivity

NOTE: There is a case that (4) TT - (7) AT-III are not set. It depends on the Service Settings.

5.11.11 Customer Setting Value

(1) Number of analysis on one sample

PT	1
APTT	1
Fbg	1
TT	1
TTO	1
NT	1
AT-III	1

(2) Reagent volume monitor
Inactivate.

(3) Test name

1	PT
2	APTT
3	Fbg
4	TT
5	TTO
6	NT
7	AT-III

(4) Reagent name

1	PT
2	TT
3	Fbg
4	AT3.T
5	APTT
6	AT3.S
7	$CaCl_2$
8	TTO
9	Rinse2
10	NT
11	Rinse
12	Buffer

(5) Reagent Holder

1	PT	Cup
2	TT	Cup
3	Fbg	Cup
4	AT3.T	Cup
5	APTT	Cup
6	AT3.S	Cup
7	Cacl2	Cup
8	TTO	Cup
9	Rinse2	Cup
10	NT	Cup
11	Rinse	ReagVial
12	Buffer	ReagVial

(6) Auto validation/output

Setting	Description	IP (built-in printer)	HC (host computer)
Within Limit	Normal sample	Yes	No
Out of Limit	Abnormal sample	Yes	No
Error Flag	Error Sample	Yes	No
QC Sample	QC sample	Yes	No

Format	Printout without Graphics

(7) Mark Limits

	Parameter	-	+
PT	sec	0.0	0.0
APTT	sec	0.0	0.0
Fbg	mg/dL	0.0	0.0
TT	sec	0.0	0.0
TTO	%	0.0	0.0
NT	%	0.0	0.0
AT-III	%	0.0	0.0

(8) Fbg Limits

	Upper Limit	Lower Limit	Unit
Fbg	50.0	475.0	mg/dL

(9) Replication Limits

PT	0%
APTT	0%
Fbg	0%
TT	0%
TTO	0%
NT	0%
AT-III	0%

(10) Report Limit

	<	>	Unit
PT	7.0	130.0	sec
APTT	15.0	320.0	sec
Fbg	25.0	950.0	mg/dL
TT	4.0	110.0	sec
TTO	0.0	0.0	%
NT	0.0	0.0	%
AT-III	8.0	125.0	%

(11) Calibration

	a	b
PT	1.0	0.0
APTT	1.0	0.0
Fbg	1.0	0.0
Fbg	1.0	0.0
TT	1.0	0.0
TTO	1.0	0.0
NT	1.0	0.0
AT-III	1.0	0.0

(12) Host Computer

Status	Not connected
Baud Rate (BPS)	2400
Character Length	7 bit
Stop Bit	1 bit
Parity Bit	Even
Class	Class A
Interval [sec]	2
Inquiry	Auto
Format	CA1000
ACK Text	ACK/NAK

NOTE: When CA-1000 format is selected, a sample ID number up to 13 digits is used. When CA-500 format is selected, a sample ID number up to 15 digits is used. Note that when the sample ID number consists of 15 characters and CA-1000 format is used, the upper 2 digits are automatically deleted.

(13) Barcode Scanner

Status	Not connected
Check Digit	None
Kind 1	ITF
Kind 2	NW-7
Kind 3	CODE 39
Kind 4	JAN -8

(14) Date Format

yymmdd	Japanese domestic
mmddyy	Overseas

5.11.12 Standard Curve Settings

(1) PT

	Calculation Parameters	Unit	Digit	Calculation Method
1 Invalid	PT%	%	XXX.X	Log-Log point plotted graph
2 Invalid	PT-R	-	XX.XX	-
3 Valid	PT-INR	INR	XX.XX	-
4 Invalid	dFbg	mg/dL	XXX.X	Liner graph

Auto Dilution Analysis
100, 80, 60, 40, -, - % analysis times: twice

(2) APTT

	Calculation Parameters	Unit	Digit	Calculation Method
1 Invalid		%	XXX.X	Log-Log point plotted graph
2 Invalid		-	XX.XX	
3 Invalid		-	XX.XX	
4 Invalid				

(3) Fbg

	Calculation Parameters	Unit	Digit	Calculation Method
1 Valid	Fbg C.	C. mg/dL	XXX.X	Log-Log point plotted graph
2 Invalid		-	XX.XX	
3 Invalid		-	XX.XX	
4 Invalid				

Auto Dilution Analysis
200, 150, 100, 50, 33.3, - % analysis times: twice

(4) TT

	Calculation Parameters	Unit	Digit	Calculation Method
1 Invalid		%	XXX.X	Log-Log point plotted graph
2 Invalid		-	XX.XX	
3 Invalid		-	XX.XX	
4 Invalid				

(5) TTO

	Calculation Parameters	Unit	Digit	Calculation Method
1 Valid	TTO%	%	XXX.X	Log-Log point plotted graph
2 Invalid		-	XX.XX	
3 Invalid		-	XX.XX	
4 Invalid				

Auto Dilution Analysis
150, 100, 50, 25, 12.5, 0 % analysis times: 3 times

(6) NT

	Calculation Parameters	Unit	Digit	Calculation Method
1 Valid	NT%	%	XXX.X	Log-Log point plotted graph
2 Invalid		-	XX.XX	
3 Invalid		-	XX.XX	
4 Invalid				

Auto Dilution Analysis
150, 100, 50, 25, 12.5, 0 % analysis times: 3 times

(7) AT-III

	Calculation Parameters	Unit	Digit	Calculation Method
1 Valid	AT III%	%	XXX.X	Liner graph
2 Invalid		-	XX.XX	
3 Invalid		-	XX.XX	
4 Invalid				

Auto Dilution Analysis
150, 100, 50, 25, 12.5, 0 % analysis times: 3 times

5.11.13 Quality Control • Setting Value

(a) All parameters

Analysis Time	Once
Analysis Stop Cond. Upper Limit	0.0
Upper Limit	0.0
Target	0.0
Lower Limit	0.0
Analysis Stop Cond. Lower Limit	0.0
Expire Date	2000/00/00

(b) Judging parameters

PT	sec
APTT	sec
Fbg	mg/dL
TT	sec
TTO	%
NT	%
AT-III	%

5.11.14 Analysis Parameter Default Setting Value 11

(1) Bioactivity 11

Method	PT	PT TPC+	PT-THS	APTT	PTT ACT	PTT FS	PTT PSL	Fbg	TTO	HpT	TT	F-Int	F-Ext	PCc	BXT	LA1	LA2	CLOT1	CLOT2	CLOT3
NC	15	15	15	15	15	15	15	10	10	10	10	10	10	10	10	10	10	10	10	10
SC	25	25	25	30	30	30	30	20	40	40	20	20	20	20	20	20	20	20	20	20
MinimumReportableTIme	7	7	7	15	15	15	15	3	15	15	0	0	0	0	0	0	0	0	0	0
Mask Time	5	5	5	8	8	8	8	2.5	7	7	4	4	4	4	4	4	4	4	4	4
JumpUp	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Reagent Correlation a	0.98	0.81	0.98	0.97	1.06	0.8	0.97	1	1	1	1	1	1	1	1	1	1	1	1	1
Reagent Correlation b	-0.54	1.93	-0.54	0.52	-3.37	2.03	0.52	0	0	0	0	0	0	0	0	0	0	0	0	0
SLOW REACTION Algorithm	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Width	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Masx Time	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
START ANGLE Algorithm	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1st Time Point	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
2nd Time Point	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
Limit1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Limit2	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
DRIFT CHECK Algorithm	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1st Check Time	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
2nd Check Time	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
width	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Limit Ratio	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
EARLY% CHECK Algorithm	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Check Point	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Limit	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Drifting Baseline Algorithm	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
delta	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
regwin	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
swin	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
maxbase	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
derect	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mixing Time for Sample	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Mixing Time for Reagent	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Calibration a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Calibration b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
High Accurate dilute ratio	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

(2) Chromogenic 11

Method	BCAT3	BCPC	BCHep	BCAPL	BCPlg	CHROM1	CHROM2	CHROM3
Low Light Error Limit	200	200	200	200	200	200	200	200
High Light Error Limit	4000	4000	4000	4000	4000	4000	4000	4000
Reagent Correlation a	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Reagent Correlation b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VLinIntegral Algorithm	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Polynomial Dimension	3	3	3	3	3	3	3	3
Start Time	0	0	0	0	0	0	0	0
End Time	0	0	0	0	0	0	0	0
Integral Area(AUC)	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Minimum Search Window	0	0	0	0	0	0	0	0
Variable Time of Evaluation	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SearchWidthforPreevaluation	0	0	0	0	0	0	0	0
Upper max. Evaluation Offset	0	0	0	0	0	0	0	0
Upper Preevaluation Rate	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Lower Preevaluation Rate	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Min. Regression Time	0	0	0	0	0	0	0	0
Mixing Time for Sample	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Mixing Time for Reagent	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Calibration a	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Calibration b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
High Accurate Dilute Ratio	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

(3) Immunoassy 11

Method	DD PLUS	Adv.DD	LPIA DD	S-FDP	P-FDP	IMMUNO1	IMMUNO2	IMMUNO3
Low Light Error Limit	200	200	200	200	200	200	200	200
High Light Error Limit	4000	4000	4000	4000	4000	4000	4000	4000
Reagent Correlation a	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Reagent Correlation b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Time a1	5	5	20	20	10	20	20	20
Stop Time a1	15	15	50	50	40	50	50	50
Start Time a2	70	70	80	80	70	80	80	80
Stop Time a2	150	150	260	260	150	260	260	260
Cut Off	0.020	0.020	0.010	0.010	0.020	0.001	0.001	0.001
Rate	3.600	3.600	1.900	0.700	1.050	1.000	1.000	1.000
Offset	0.085	0.085	0.010	0.018	0.012	9.999	9.999	9.999
VLinIntegral Algorithm	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Polynomial Dimension	3	3	3	3	3	3	3	3
Start Time	3	3	0	0	0	0	0	0
End Time	180	180	0	0	0	0	0	0
Integral Area(AUC)	0.012000	0.012000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Minimum Search Window	20	20	0	0	0	0	0	0
Variable Time of Evaluation	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
SearchWidthforPreevaluation	50	50	0	0	0	0	0	0
Upper max. Evaluation Offset	60	60	0	0	0	0	0	0
Upper Preevaluation Rate	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Lower Preevaluation Rate	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Min. Regression Time	15	15	0	0	0	0	0	0
Mixing Time for Sample	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Mixing Time for Reagent	0.5	0.5	0.8	0.5	0.5	0.5	0.5	0.5
Calibration a	1	1	1	1	1	1	1	1
Calibration b	0	0	0	0	0	0	0	0
High Accurate Dilute Ratio	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

5.12 SETTINGS OF CA-500 WITH 800NM DETECTOR 17

When settings of CA-500 with 800nm detector are initialized, the settings of CA-500 with 575nm detector are applied. Therefore following settings must be changed to recover it.

(1) Service setting

1) Press [Special Menu]-[Special Operate]-[Service]-[Service Setting].
   Change parameters in Service Setting screen as follows.

Wavelength	800nm
D-Dimer Init.	for LPIA DD
PFDP	OFF

2) Press [Return]-[Fix] to save parameters.
3) Press [Service]-[Initial]-[Init. Entire Memory] to enable the setting.

(2) Gain calibration

1) Press [Special Menu]-[Special Operate]-[Service]-[Adjust]-[Detector Gain].
2) Press [Channel Change] and select Channel 6.
3) Press [GAIN CALI] and move the cursor to High Gain of 800nm and change the value 0.40.
4) Press [Enter]-[Quit]-[Fix] to save parameters.

(3) Reagent Holder setting

1) Press [Special Menu]-[Settings]-[Analysis Settings]-[Reagent Holder].
   The Reagent Holder Setting screen will appear.
2) Press [Change Group] key, and select Group 3.
3) Move the cursor to Reagname/pos.1, and press [Select Reagent].
   The screen for selecting a reagent will appear.
   Move the cursor to AT3Reag, and press [Select].
4) Move the cursor to Reagname/pos.2, and press [Select Reagent].
   The screen for selecting a reagent will appear.
   Move the cursor to TestThr, and press [Select].
5) Move the cursor to Reagname/pos.5, and press [Select Reagent].
   The screen for selecting a reagent will appear.
   Move the cursor to DD.B, and press [Select].
6) Move the cursor to Reagname/pos.7, and press [Select Reagent].
   The screen for selecting a reagent will appear.
   Move the cursor to DD.L, and press [Select].
7) Press [Return]-[Fix] to save parameters.

SECTION 6 ERROR MESSAGE

To Cover

<Error Messages in Alphabetical Order>

SECTION 6 ERROR MESSAGE

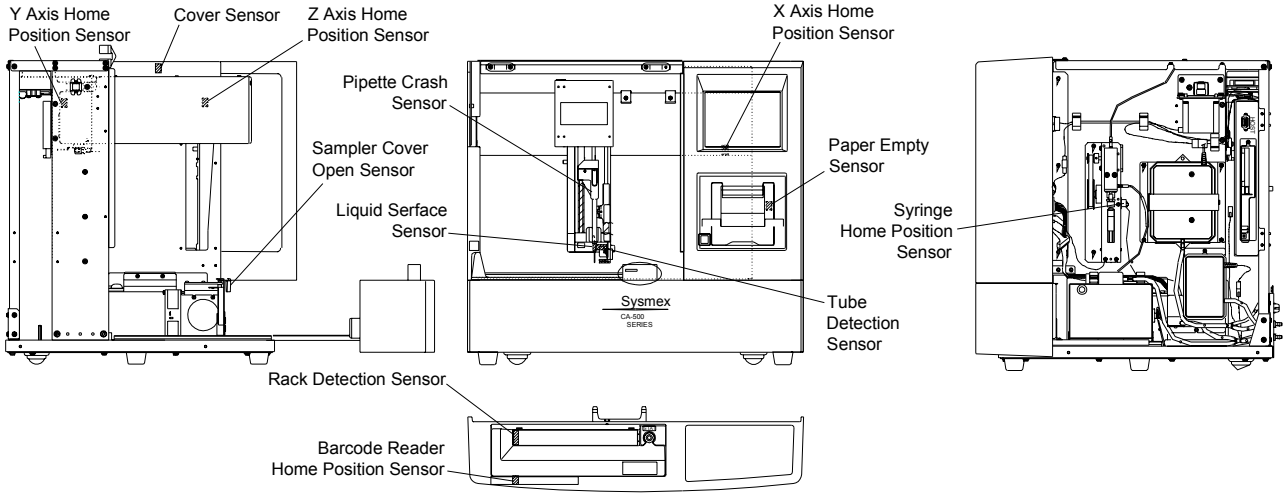


Figure 6-1: Sensor Positions

6.1 PRESSURE ERRORS

6.1.1 Pressure Pump Error

Monitor Timing: At time of each analysis start and/on rinse start, just before opening SV
Monitor Method: Monitoring 225 g/cm^2 ± 10% by the comparator
CA-500's Action: Emergency stop

(1) Probable Cause
1. The rinse bottle is not connected.
2. The cap of rinse bottle is removed.
3. SV failure
4. Pressure pump failure
5. Perforations (pinhole) in the hydraulic line.
6. Pressure sensor failure
7. Sensor circuit failure
8. Drive circuit failure

(2) Confirmation by the Operator
1. Properly connect the tube.
2. Securely tighten the bottle cap.

(3) Confirmation by the Service Engineer
1. When SV is faulty, rinse solution keeps flowing out from sample probe or rinse cup. Replace faulty SV.
2. When the hydraulic line has no failure, the pressure pump or related electronic circuit has a trouble. If replacement of the pressure pump allows the pressure adjustment, the pressure pump is failed; if not, the electronic circuit is failed.
3. The pressure pump turn ON or OFF at the pressure 250 g/cm^2. If the pump does not start operating even when the cap of rinse bottle is removed, the pump or its drive circuit is failed. Measure voltage at the connector of pump by the DVM. If AC 100 V ± 15% is displayed, the pump is failed; if not, the drive circuit is failed.

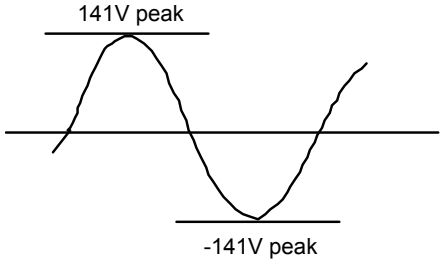


Figure 6-1-1: Normal Oscilloscope Wave

6.1.2 Vacuum Pump Error

Monitor Timing: At time of rinse sequence is started and the sample probe has moved to the rinse cup
Monitor Method: The liquid sensor checks the error when rinse liquid has collected in the rinse cup.
CA-500's Action: Emergency stop

(1) Probable Cause
1. The waste bottle is not connected.
2. The cap of waste bottle is removed.
3. SV failure
4. Vacuum pump failure.
5. Perforations (pinhole) in the hydraulic line.
6. Drive circuit failure.

(2) Confirmation by the Operator
1. Properly connect the tube.
2. Securely tighten the bottle cap.

(3) Confirmation by the Service Engineer
1. The vacuum pump operates only in rinse sequence. When the pump is operating and waste is not flowed, tubing or SV might be failed.
2. When the pump does not operate, the pump or its drive circuit is failed. Measure voltage at the connector of pump. If AC 100 V ± 15% is displayed when the pump is operating, the pump is failed; if not, the drive circuit is failed.
3. Vacuum pump only operates when rinse cup liquid draining. Check the voltage in this timing.

6.2 TEMPERATURE ERRORS

6.2.1 Temperature Error (High)/Incubator, Temperature Error (Low)/Incubator

Monitor Timing: When READY: 1-minute interval
When analyzing: At time of reagent dispensing

Monitor Method: A/D converter reads the thermistor data embedded in the sample probe as follows:
Room temperature less than 30°C: Temperature error when exceeds the range 36.0 - 38.0°C.
Room temperature above 30°C: Temperature error when exceeds the range 36.0 - 40.0°C.

CA-500's Action: When the error occurs before the analysis, the analysis does not start. During analysis, operation is continued with "Temperature Error" added to stored data.

(1) Probable Cause
1. Room temperature became outside the range between 15 - 35°C.
2. Thermistor failure
3. Heater failure
4. Failure of PCB No. 2134
5. Failure of X-axis wiring cord
6. Failure of PCB No. 9260
7. Failure of PCB No. 6362
8. Failure of PCB No. 4086

(2) Confirmation by the Operator
1. Confirm room temperature by checking temperature displayed on the main unit.

(3) Confirmation by the Service Engineer
1. Check the main unit fan is operating or not. if not, inside temperature rises, causing it impossible to keep the detector at 37°C.

Suspect Part	Test Points	Expected Value
Thermistor	CN3 pin 3 and pin 6 on PCB No. 2134	3 KΩ to 4 KΩ
Heater	CN3 pin 1 and pin 2 on PCB No. 2134	10 KΩ to 20 KΩ
PCB No. 2134	CN3 pin 12 and pin 15 on PCB No. 2134	3 KΩ to 4 KΩ
PCB No. 2134	CN1 pin 8 and pin 9 on PCB No. 9260	10 KΩ to 20 KΩ
X-axis Wiring Cord	CN1 pin 12 and pin 15 on PCB No. 9260	3 KΩ to 4 KΩ
X-axis Wiring Cord	CN1 pin 8 and pin 9 on PCB No. 9260	10 KΩ to 20 KΩ
PCB No. 9260	CN3 pin 8 and pin 9 on PCB No. 9260	3 KΩ to 4 KΩ
PCB No. 9260	CN4 pin 15 and pin 16 on PCB No. 9260	10 KΩ to 20 KΩ
PCB No. 6362	CN105 pin 8 and pin 9 on PCB No. 6362	3 KΩ to 4 KΩ
PCB No. 4086	CN14 pin 15 and pin 16 on PCB No. 4086	10 KΩ to 20 KΩ

6.2.2 Temperature Error (High)/Detector, Temperature Error (Low)/Detector

Monitor Timing: When READY: 1-minute interval
During analysis: At time of detection start

Monitor Method: A/D converter reads the thermal sensor data embedded in the sample probe as follows:
Room temperature less than 30°C: Temperature error when exceeds the range 36.0 - 38.0°C.
Room temperature above 30°C: Temperature error when exceeds the range 36.0 - 40.0°C.

(1) Probable Cause
1. Room temperature became outside the range between 15 - 35°C.
2. Check whether any obstacle is in front of the ventilation fan, or the ventilator is too close to the wall.
3. Failure of temperature sensor
4. Heater failure
5. Failure of PCB No. 6362
6. Failure of PCB No. 4086
7. Failure of main unit fan

(2) Confirmation by the Operator
1. Confirm room temperature by checking temperature displayed on the main unit.
2. Provide sufficient space around the ventilator.

(3) Confirmation by Service Engineer
1. Check the main unit fan is operating or not. If not, inside temperature rises, causing it impossible to keep the detector at 37°C.

Suspect Part	Test Points	Expected Value
Temperature sensor	Temperature sensor connector pin 1 (green) and pin 3 (black) (GND)	+5 V
	Temperature sensor connector pin 2 (white) and pin 3 (black) (GND)	0.35 V to 0.39 V
	CN115 (PCB No. 6362) pin 4 and pin 6 (GND)	+5 V
	CN115 (PCB No. 6362) pin 5 and pin 6 (GND)	0.35 V to 0.39 V
Heater	Heater connector pin 1 and pin 2	below 3 Ω or over 7 Ω
	CN8 (PCB No. 4086) pin 1 and pin 5	below 3 Ω or over 7 Ω

NOTE: Use high input impedance device. Usually normal Digital Volt Meter input impedance is higher than 1 Mega Ω and Oscilloscope is higher than 10 Mega Ω.

6.2.3 Temperature Error (High)/Cooler, Temperature Error (Low)/Cooler

Monitor Timing: When READY: 1-minute interval
During analysis: No monitoring

Monitor Method: A/D converter reads the thermal sensor data embedded in the cooler unit as follows:
Room temperature less than 30°C: Temperature error when exceeds the range 12.0 - 18.0°C.
Room temperature above 30°C: Temperature error when exceeds the range 12.0 - 20.0°C.

(1) Probable Cause
1. Room temperature became outside the range between 15 - 35°C.
2. Check whether any obstacle is in front of the ventilation ventilator or the ventilator is too close to the wall.
3. Failure of temperature sensor
4. Failure of Peltier cooler assembly
5. Failure of wiring cord (Pertier)
6. Failure of wiring cord (Temperature sensor)
7. Failure of PCB No. 6362
8. Failure of PCB No. 4086
9. Failure of main unit fan
10. Failure of cooler unit fan

(2) Confirmation by the Operator
1. Confirm room temperature by checking temperature displayed on the main unit.
2. Provide sufficient space around the ventilator.

(3) Confirmation by Service Engineer
1. Check the main unit fan is operating. If not, inside temperature rises, causing it impossible to keep the detector at 15°C.
2. If the cooling fan is failed, the temperature cannot be kept at 15°C.

Suspect Part	Test Points	Expected Value
Temperature sensor	Temperature sensor connector pin 1 (green) and pin 3 (black) (GND)	+5 V
	Temperature sensor connector pin 2 (white) and pin 3 (black) (GND)	0.10 V to 0.20 V
	CN115 (PCB No. 6362) pin 1 and pin 3 (GND)	+5 V
	CN115 (PCB No. 6362) pin 2 and pin 3 (GND)	approx. 0.15 V (cooler temp. (C°) x 0.01 V ± 0.02 V)
Pertier	Pertier connector pin 1 and pin 2	12 V ±10%

3. When the voltage between pin 4 and 5 of CN8 (PCB No. 4086) shows 12 V, the harness of Peltier heater unit is failed. Otherwise, the PCB No. 4086 is failed.

6.2.4 Temperature Error (High)/Room, Temperature Error (Low)/Room

Monitor Timing: When READY: 1-minute interval
During analysis: No monitoring
Monitor Method: A/D converter reads the thermal sensor data installed at the upper fan motor as follows:
Temperature error when exceeds the range 10.0 - 40.0°C.

(1) Probable Cause
1. Room temperature became outside the range between 15 - 35°C.
2. Check whether any obstacle is in front of the ventilation ventilator or the ventilator is too close to the wall.
4. Failure of PCB No. 6362
5. Failure of main unit fan

(2) Confirmation by the Operator
1. Confirm room temperature by checking temperature displayed on the main unit.
2. Provide sufficient space around the ventilator.

(3) Confirmation by Service Engineer
1. Check the main unit fan is operating. If not, inside temperature rises.

Suspect Part	Test Points	Expected Value
Temperature sensor	Temperature sensor connector pin 1 (green) and pin 3 (black) (GND)	+5 V
	Temperature sensor connector pin 2 (white) and pin 3 (black) (GND)	approx. 0.25 V (room temperature x 0.01 V ± 0.02 V)
	CN115 (PCB No. 6362) pin 7 and pin 9 (GND)	+5 V
	CN115 (PCB No. 6362) pin 8 and pin 9 (GND)	approx. 0.25 V (room temperature x 0.01 V ± 0.02 V)

6.2.5 Temp. Sensor Error/(Position)

Monitor Timing: Everytime
Monitor Method: Error is monitored by I/F (ACK/BUSY) signal time out with temperature control CPU on PCB No. 6362 or PCB No. 6373 and Main CPU.
CA-500's Action: Warning

(1) Probable Cause
1. Failure of PCB No. 6362

(2) Confirmation by the Operator
1. Confirm temperature by checking temperature displayed on the main unit.

(3) Confirmation by Service Engineer
1. Confirm temperature by checking temperature displayed on the main unit.
2. When the temperature is not displayed or 99.9 °C is displayed, the PCB No. 6362 is failed.

6.3 CHAMBER ERRORS

6.3.1 Waste Bottle is full

Monitor Timing: At time of analysis start, before sample dispensing
Monitor Method: The float switch in the waste bottle monitors the waste.
CA-500's Action: Interruption

(1) Probable Cause
1. The waste bottle is full.
2. The float switch connector is disconnected.
3. Failure of float switch

(2) Confirmation by the Operation
1. Empty the waste bottle.
2. Securely connect the float switch connector.

(3) Confirmation by Service Engineer
1. If an error can be solved by the short-circuiting 2 pins connector on the rear panel for float switch, the float switch is failed.

6.3.2 Replenish Rinse Reagent

Monitor Timing: At time of analysis start, before sample dispensing
Monitor Method: The float switch in the rinse bottle monitors the liquid level.
CA-500's Action: Interruption

(1) Probable Cause
1. The rinse liquid is insufficient in the rinse bottle.
2. The connector of the float switch is disconnected.
3. Failure of float switch
5. Failure of PCB No. 6362

(2) Confirmation by the Operator
1. Replenish rinse solution.
2. Securely connect the float switch connector.

(3) Confirmation by Service Engineer
1. If an error can be solved by the short-circuiting 2-pin connector on the rear panel, the float switch is failed.

6.4 MOTOR ERRORS

6.4.1 X Axis Home Position Error

Monitor Timing: At time of home X axis position sensing
Monitor Method: The photo interrupter shades the light of X-axis drive mechanism.
CA-500's Action: Emergency stop

(1) Probable Cause
1. Drive mechanism operation is obstructed.
2. Loosened pulley of motor
3. Failure of home position sensor
4. Defective light shield
5. Flaw on shaft
6. Failure of bushing
7. Failure of PCB No. 9260
8. Failure of PCB No. 6362
9. Failure of X axis motor assembly
10. Failure of PCB No. 4086

(2) Confirmation by the Operator
1. Remove the obstruction in X-axis drive mechanism.
2. Turn off the power supply, then turn it on again.

(3) Confirmation by Service Engineer
1. Retighten the screw of the pulley of motor.
2. If home position cannot be detected even when the drive mechanism is operated:
   a) Check whether the light shield is defective or not.

Suspect Part	Test Points	Expected Value
Position sensor	CN2 (PCB No. 9260) pin 1 and pin 2 (GND)	+5 V ± 0.25 V
	CN2 (PCB No. 9260) pin 2 (GND) and pin 3	5 V → 0 V when the sensor is shielded
	CN105 (PCB No. 6362) pin 13 and pin 15 (GND)	+5 V ± 0.25 V
	CN105 (PCB No. 6362) pin 15 and pin 5 (GND)	5 V → 0 V when the sensor is shielded

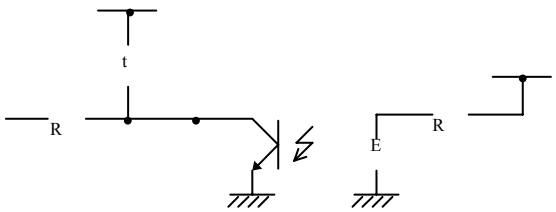


Figure 6-2: Sensor Signal Output

3. When the motor does not operate:
   a) Any of motor, wiring cord (float cable), or PCB No. 4086 is faulty. Replace and confirm.
   b) Turn the pulley by hand. If it does not move, the motor or drive mechanism is faulty.

4. Failure of the drive mechanism
   a) Check for flaws on the shaft.
   b) If the shaft is free from flaws, the problem is in the bushing.

6.4.2 Y Axis Home Position Error

Monitor Timing: At time of Y axis home position sensing
Monitor Method: The photo interrupter shades the light of Y-axis drive mechanism.
CA-500's Action: Emergency stop

(1) Probable Cause
1. Drive mechanism operation is obstructed.
2. Loosened pulley of motor
3. Failure of PCB No. 2134
4. Defective light shield
5. Flaw on shaft
6. Failure of slider
7. Failure of PCB No. 9260
8. Failure of X axis wiring cord
9. Failure of PCB No. 6362
10. Failure of Y axis motor assembly
11. Failure of PCB No. 4086

(2) Confirmation by the Operator
1. Remove the obstruction in Y-axis drive mechanism.
2. Turn off the power supply, then turn it on again.

(3) Confirmation by Service Engineer
1. Retighten the screw of the pulley of motor.
2. If home position cannot be detected even when the drive mechanism is operated:
   a) Check whether the light shield is defective or not.

Suspect Part	Test Points	Expected Value
Position sensor	CN1 (PCB No. 2134) pin 19 and pin 20 (GND)	5 V → 0 V when the sensor is shielded
	CN1 (PCB No. 9260) pin 19 and pin 20 (GND)	5 V → 0 V when the sensor is shielded
	CN105 (PCB No. 6362) pin 6 and pin 14 (GND)	5 V → 0 V when the sensor is shielded

3. When the motor does not operate:
   a) Any of motor, PCB No. 2134, X-axis wiring cord (18 wire cable), or PCB No. 4086 is faulty. Replace and confirm.
   b) Turn the pulley by hand. If it does not move, the motor or drive mechanism is faulty.

4. Failure of the drive mechanism
   a) Check for flaws on the shaft.
   b) If the shaft is free from flaws, the problem is in the bushing.

6.4.3 Z Axis Home Position Error

Monitor Timing: At time of home position sensing during operation
Monitor Method: The photo interrupter shades the light of Z axis drive mechanism.
CA-500's Action: Emergency stop

(1) Probable Cause
1 Drive mechanism operation is obstructed.
2. Loosened pulley of motor
3. Failure of PCB No. 9264
4. Failure of PCB No. 2134
5. Defective light shield
6. Flaws on shaft
7. Failure on bushing
8. Failure of PCB No. 9260
9. Failure of X axis wiring cord
10. Failure of PCB No. 6362
11. Failure of Z axis motor assembly
12. Failure of PCB No. 4086

(2) Confirmation by the Operator
1. Remove the obstruction in Z-axis drive mechanism.
2. Turn off the power supply and turn it on again.

(3) Confirmation by Service Engineer
1. Retighten the screw of the pulley of motor.
2. If home position cannot be detected even when the drive mechanism is operated:
   a) Check whether the light shield is defective or not.

Suspect Part	Test Points	Expected Value
Position sensor	CN1 (PCB No. 9264) pin 9 (GND) and pin 7	5 V → 0 V when the sensor is shielded
	CN4 (PCB No. 2134) pin 9 (GND) and pin 7	5 V → 0 V when the sensor is shielded
	CN1 (PCB No. 2134) pin 17 and pin 18 (GND)	5 V → 0 V when the sensor is shielded
	CN1 (PCB No. 9260) pin 17 and pin 18 (GND)	5 V → 0 V when the sensor is shielded
	CN105 (PCB No. 6332) pin 7 and pin 14 (GND)	5 V → 0 V when the sensor is shielded

3. When the motor does not operate,
   a) Any of motor, PCB No. 9264, PCB No. 2134, X-axis wiring cord, and PCB No. 4086 is faulty.
   b) Turn the pulley by hand. If it does not move, the motor or drive mechanism is faulty.
4. Failure of drive mechanism
   a) Check for flaws on the shaft.
   b) If the shaft is free from flaws, the problem is in the bushing.

6.4.4 Z Axis Down Error

Monitor Timing: When reaction tube is caught and released
Monitor Method: Monitoring the tube detection condition.
CA-500's Action: Emergency stop

(1) Probable Cause
1. Drive mechanism operation is obstructed.
2. Loosened pulley of motor
3. Failure of PCB No. 9264
4. Failure of PCB No. 2134
5. Defective light shield
6. Flaws on shaft
7. Failure on bushing
8. Failure of PCB No. 9260
9. Failure of wiring cord (flat cable)
10. Failure of PCB No. 6362
11. Failure of Z axis motor assembly
12. Failure of PCB No. 4086
13. The light shield attached to the catcher is mis-positioned or defective.

(2) Confirmation by the Operator
1. Remove the reaction tube.
2. Remove the obstruction in Z-axis drive mechanism.
3. Turn off the power supply and turn it on again.

(3) Confirmation by Service Engineer
1. Retighten the screw of the pulley of motor.
2. If home position cannot be detected even when the drive mechanism is operated:
   a) Check whether the light shield is defective or not.

Suspect Part	Test Points	Expected Value
Position sensor	CN1 (PCB No. 9264) pin 9 (GND) and pin 7	5 V → 0 V when the sensor is shielded
	CN4 (PCB No. 2134) pin 9 (GND) and pin 7	5 V → 0 V when the sensor is shielded
	CN1 (PCB No. 2134) pin 17 and pin 18 (GND)	5 V → 0 V when the sensor is shielded
	CN1 (PCB No. 9260) pin 17 and pin 18 (GND)	5 V → 0 V when the sensor is shielded
	CN105 (PCB No. 6332) pin 7 and pin 14 (GND)	5 V → 0 V when the sensor is shielded

3. When the motor does not operate,
   a) Any of motor, PCB No. 9264, PCB No. 2134, X-axis wiring cord, and PCB No. 4086 is faulty. Replace and confirm.
4. Failure of drive mechanism
   a) Check for flaws on the shaft.
   b) If the shaft is free from flaws, the problem is in the bushing.

6.4.5 Tube Catch Error (Position)

Monitor Timing: Just after the reaction tube catching operation
Monitor Method: Tube detection sensor monitors the Tube catch error.
CA-500's Action: Interruption

(1) Probable Cause
1. A tube cannot be caught.
2. Tube catch operation is obstructed.
3. Tube catcher tried to catch a reaction tube not in the order.
4. The catcher is too dirty to function.
5. Mis-positioned catcher
6. Defective catcher
7. Tube detection sensor is dirty.
8. Failure of tube detection sensor
9. Failure of PCB No. 9264
10. Failure of PCB No. 2134
11. Failure of PCB No. 9260
12. Failure of X axis wiring cord
13. Failure of PCB No. 6362

(2) Confirmation by the Operator
1. Remove anything that is obstructing the catching.
2. Clean any contamination using alcohol or the like.

(3) Confirmation by Service Engineer
1. When Tube Catch Error has occurred,
   a) Correct any mis-positioning that has happened.
   b) Replace the catcher.
2. When an error occurs though a tube is caught:

Suspect Part	Test Points	Expected Value
Tube Detection Sensor	CN2 (PCB No. 9264) pin 3 (GND) and pin 2	5 V → 0 V when a tube is detected
	CN1 (PCB No. 9264) pin 13 (GND) and pin 8	5 V → 0 V when a tube is detected
	CN4 (PCB No. 2134) pin 13 (GND) and pin 8	5 V → 0 V when a tube is detected
	CN1 (PCB No. 2134) pin 16 (GND) and pin 4	5 V → 0 V when a tube is detected
	CN1 (PCB No. 9260) pin 16 (GND) and pin 4	5 V → 0 V when a tube is detected
	CN105 (PCB No. 6362) pin 13 (GND) and pin 1	5 V → 0 V when a tube is detected

6.4.6 Tube Release Error (Position)

Monitor Timing: Just after the reaction tube releasing operation
Monitor Method: Monitoring tube detection sensor condition
CA-500's Action: Interruption

(1) Probable Cause
1. A tube cannot be released.
2. Tube detection sensor is obstructed.
3. The waste box of tube is full.
4. The catcher is too dirty to function.
5. Mis-position of catcher
6. Defective catcher
7. Failure of tube detection sensor
8. Failure of PCB No. 9264
9. Failure of PCB No. 2134
10. Failure of PCB No. 9260
11. Failure of X axis wiring cord
12. Failure of PCB No. 6362

(2) Confirmation by the Operator
1. Empty the waste box if it is full of the reaction tube.
2. Remove anything that is obstructing the release operation.
3. Wash away any contamination on catcher by using alcohol.

(3) Confirmation by Service Engineer
1. When Tube Release Error has occurred:
   a) Correct any mis-positioning of the catcher if that has happened.
   b) Replace the catcher.
2. When an error occurs although a tube is released:
   a) The sensor functions up to 30 mm apart from tubes. Keep away any objects that reflect light to cause release error.

Suspect Part	Test Points	Expected Value
Tube Detection Sensor	CN2 (PCB No. 9264) pin 3 (GND) and pin 2	5 V → 0 V when a tube is detected
	CN1 (PCB No. 9264) pin 13 (GND) and pin 8	5 V → 0 V when a tube is detected
	CN4 (PCB No. 2134) pin 13 (GND) and pin 8	5 V → 0 V when a tube is detected
	CN1 (PCB No. 2134) pin 16 (GND) and pin 4	5 V → 0 V when a tube is detected
	CN1 (PCB No. 9260) pin 16 (GND) and pin 4	5 V → 0 V when a tube is detected
	CN105 (PCB No. 6362) pin 13 (GND) and pin 1	5 V → 0 V when a tube is detected

6.5 DISPENSING ERRORS

6.5.1 No Sample (Rack Position)

Monitor Timing: At sample aspiration
Monitor Method: Detects liquid level by the capacitance liquid level detection sensor.
CA-500's Action: The sample is not analyzed.

(1) Probable Cause
1. Specimens are not placed.
2. Plasma volume is insufficient.
3. Failure of sample probe
4. Failure of PCB No. 2134
5. Failure of Y-Z relay harness
6. Failure of PCB No. 9260
7. Failure of X axis wiring cord
8. Failure of wiring cord (flat cable)
9. Failure of PCB No. 6362

(2) Confirmation by the operator.
1. Place the specimen.
2. Check whether the sample location (rack number) matches its registration or not.

(3) Confirmation by Service Engineer.
1. Monitor the liquid sensor function in the Service mode. If it does not function, the followings are conceivable. Since the liquid level detection is latched each time, reset it on the screen to check.

Suspect Part	Test Points	Expected Value
Liquid Sensor	CN2 (PCB No. 2134) pin 1 is touched with tweezers or the like	Indicator on LCD changes from white circle to black circle
	CN1 (PCB No. 2134) pin 16 (GND) and pin 5	5 V when probe touches liquid surface
	CN1 (PCB No. 9260) pin 16 (GND) and pin 5	5 V when probe touches liquid surface
	CN105 (PCB No. 6362) pin 13 (GND) and pin 2	5 V when probe touches liquid surface

6.5.2 Sampling Error (Position)

Monitor Timing: When the probe has been apart from liquid surface after sample or reagent aspiration
Monitor Method: The capacitance liquid level detection sensor monitors the probe has not been apart from the sample or reagent.
CA-500's Action: In the case of a sample, the instrument stops. In the case of a position of reagent, the concerned analysis will not be done. The related analysis parameter of reagent will not be done thereafter. In the case of rinse reagent, however, emergency stop is made.

(1) Probable Cause
1. Plasma volume is insufficient.
2. Power supply is not frame-grounded in a noisy and static-charged environment.
3. Failure of PCB No. 2134

(2) Confirmation by the operator
1. Check whether a sample location (rack number) matches its registration or not.
2. Secure the frame grounding of the power supply.

(3) Confirmation by service Engineer.
1. Failure of PCB No. 2134
2. Always secure frame grounding in a noisy environment.

6.5.3 Insufficient Reagent (Holder No.)

Monitor Timing: At reagent aspiration
Monitor Method: The capacitance liquid level detection sensor monitors the insufficient reagent aspiration.
CA-500's Action: In the case of a sample, the instrument stops. In the case of a reagent, the concerned analysis will not be done. The related analysis parameter of reagent will not be done thereafter. In the case of rinse reagent, however, emergency stop is made.

(1) Probable Cause
1. Reagent is not placed.
2. Reagent volume is insufficient.
3. Failure of sample probe
4. Failure of PCB No. 2134
5. Failure of Y-Z relay harness
6. Failure of PCB No. 9260
7. Failure of X axis wiring cord
8. Failure of wiring cord (flat cable)
9. Failure of PCB No. 6362

(2) Confirmation by the operator.
1. Place a reagent.
2. Check whether the reagent location (holder No.) matches its registration or not.

(3) Confirmation by Service Engineer.
1. Monitor the liquid sensor function in the Service mode. If it does not function, the followings are conceivable. Since the liquid level detection is latched each time, reset it on the screen to check.

Suspect Part	Test Points	Expected Value
Liquid Sensor	CN2 (PCB No. 2134) pin 1 is touched with tweezers or the like	Indicator on LCD changes from white circle to black circle
	CN1 (PCB No. 2134) pin 16 (GND) and pin 5	5 V when probe touches liquid surface
	CN1 (PCB No. 9260) pin 16 (GND) and pin 5	5 V when probe touches liquid surface
	CN105 (PCB No. 6362) pin 13 (GND) and pin 2	5 V when probe touches liquid surface

6.5.4 No Reaction Tube

Monitor Timing: Just after the catching operation at reaction tube rack
Monitor Method: Tube detection sensor monitors a reaction tube.
CA-500's Action: Interruption

(1) Probable Cause
1. A reaction tube cannot be caught.
2. Tube catch operation is obstructed.
3. The catcher tried to catch a reaction tube from the middle of tube rack, but it failed.
4. No tube
5. The number of tube rack exceeds 60 during analysis.
6. The catcher is too dirty to function.
7. Mis-positioned tube
8. Failure of catcher
9. Dirty of tube detection sensor
10. Failure of tube detection sensor
11. Failure of PCB No. 9264
12. Failure of PCB No. 2134
13. Failure of Y-Z relay harness
14. Failure of PCB No. 9260
15. Failure of X axis wiring cord
16. Failure of wiring cord (flat cable)
17. Failure of PCB No. 6362

(2) Confirmation by the operator
1. Remove reaction tubes that are standing in the way.
2. Remove anything that is obstructing the catching operation.
3. Clean any contamination by alcohol or the like.
4. Place the tubes in order.
5. Place the tubes properly in the quantity required for testing.

* If sample discharged in the tube rack or on the reagent stage, clean them.

(3) Confirmation by Service Engineer
1. When catching error has occurred,
   a) Correct any mis-positioning.
   b) Replace the catcher.
2. When an error occurs though a tube is caught:
   a) If the tube detection sensor is dirt, wipe it clean by alcohol.

Suspect Part	Test Points	Expected Value
Tube Detection Sensor	CN2 (PCB No. 9264) pin 3 (GND) and pin 2	5 V → 0 V when a tube is detected
	CN1 (PCB No. 9264) pin 13 (GND) and pin 8	5 V → 0 V when a tube is detected
	CN4 (PCB No. 2134) pin 13 (GND) and pin 8	5 V → 0 V when a tube is detected
	CN1 (PCB No. 2134) pin 16 (GND) and pin 4	5 V → 0 V when a tube is detected
	CN1 (PCB No. 9260) pin 16 (GND) and pin 4	5 V → 0 V when a tube is detected
	CN105 (PCB No. 6362) pin 13 (GND) and pin 1	5 V → 0 V when a tube is detected

6.5.5 Probe Crash

Monitor Timing: When the probe descends
Monitor Method: Micro switch incorporated in the probe holder monitors Probe crash.
CA-500's Action: Emergency stop

(1) Probable Cause
1. Reagent is absent or insufficient in reaction tube or sampler cup in reagent rack, or in sampler cup. Plasma sample is absent or insufficient in reaction tube, or sampler cup in reagent rack, or in sampler cup.
2. Probe is obstructed to descend.
3. Mis-positioned probe
4. Failure of probe
5. Failure of PCB No. 9264
6. Failure of PCB No. 2134
7. Failure of Y-Z relay harness
8. Failure of PCB No. 9260
9. Failure of X axis wiring cord
10. Failure of wiring cord (flat cable)
11. Failure of PCB No. 6362

(2) Confirmation by the operator
1. Place reagent and sample in required amounts.
2. Remove anything that is obstructing the operation.

(3) Confirmation by Service Engineer
1. When probe crash has actually occurred,
   a) Correct mis-positioning if it is the case.
   b) Confirm probe position for reagent, sample, and reaction tube.
2. When Probe Crash appears even no crash has occurred, or for an unstable situation, confirm the following:
   a) Slide the probe up and down in the probe holder. If this improves the situation, the probe holder assembly might have a trouble.

Suspect Part	Test Points	Expected Value
Probe Crash Sensor	CN5 (PCB No. 2134) pin 1 (GND) and pin 2	5 V → 0 V when probe crash occurs
	CN1 (PCB No. 2134) pin 16 (GND) and pin 7	5 V → 0 V when probe crash occurs
	CN1 (PCB No. 9260) pin 16 (GND) and pin 7	5 V → 0 V when probe crash occurs
	CN105 (PCB No. 6362) pin 13 (GND) and pin 4	5 V → 0 V when probe crash occurs

* PCB No. 2134 latches Crash signal each time. So, confirm the above by pressing the liquid level sensor reset switch in the service mode.

6.5.6 Syringe Error

Monitor Timing: When sensing home position during operation
Monitor Method: Photo interrupter is shaded by the light shield to drive mechanism.
CA-500's Action: Emergency stop

(1) Probable Cause
1. The motion of drive mechanism is obstructed.
2. Loosened pulley of motor.
3. Failure of home position detection sensor
4. Defective light shield
5. Flaws on shaft
6. Failure of bushing
7. Failure of PCB No. 9265
8. Failure of wiring cord (wiring cord from CN19 on PCB No. 4086)
9. Failure of PCB No. 6362
10. Failure of syringe motor
11. Failure of wiring cord (printer relay flat cable)
12. Failure of PCB No. 4086

(2) Confirmation by the operator
None

(3) Confirmation by Service Engineer
1. Retighten the pulley of motor if it is loosened.
2. When home position cannot be sensed even if the drive mechanism is functioned:
   a) Check the light shield plate is broken or not.
   b) If 5 V is not appeared the pin 2 and pin 1 of CN112 for PCB No. 6362, or if the signal on the pin 2 and pin 3 changes from 5 V to 0 V when the sensor is shielded, the PCB No. 6362 is faulty. If 5 V ± 0.25 V is appeared on the pin 2 and pin 1 and the signal on the pin 2 and pin 3 does not change, the wiring cord (wiring cord from CN19 on PCB No. 4086) or the sensor is faulty.
3. When the motor does not run:
   a) Any of motor, PCB No. 9265, wiring cord (printer relay flat cable), and PCB No. 4086 is faulty. Replace and confirm.
   b) Turn the pulley by hand. If it does not move, the motor or drive mechanism is faulty.
4. Failure of the drive mechanism
   a) Check for flaws on the shaft.
   b) If the axis is free from flaws, check the bushing is all right or not.
   c) Check the piston No. 28 is broken or not.

6.5.7 Check Syringe Unit

Monitor Timing: When starting analysis
Monitor Method: Compares the syringe cycles recorded on BBRAM and active operation cycle by the software.
CA-500's Action: Warning at each analysis.

(1) Probable Cause
1. The syringe cycles exceeded 300,000.
2. Failure of PCB No. 6362

(2) Confirmation by the operator
None

(3) Confirmation by Service Engineer
1. If the warning is displayed in the normal status, replace the syringe.
2. In other case, the PCB No. 6362 might be faulty.

6.6 SAMPLER ERRORS

6.6.1 Replace Sample Rack

Monitor Timing: Monitor every 50 msec during interruption
Monitor Method: The micro switch in the sample rack table
CA-500's Action: Warning at each analysis.

(1) Probable Cause
1. The sampler rack is removed.
2. The sampler rack is not properly mounted.
3. Failure of sampler rack sensor assembly
4. Failure of wiring cord (wiring cord with spiral)
5. Failure of PCB No. 6362

(2) Confirmation by the operator
1. Place the sampler rack properly.

(3) Confirmation by Service Engineer
1. Check the dirt on sample rack table and/or it is free of foreign matters.
2. Short-circuit the pin 20 and pin 18 of relay connector. If it can be monitored on the switch sensor screen, the sample rack drawer might be faulty. Check the harness and sample rack sensor.
3. If the above step 2 does not solve the trouble, short-circuit the pin 14 and pin 12 of CN111 on PCB No. 6362. If this solves the trouble, the wiring cord (wiring cord with spiral) is faulty. If not, the PCB No. 6362 is faulty.

6.6.2 Set Sample Rack

Monitor Timing: When starting analysis
Monitor Method: The micro switch in the sample rack table.
CA-500's Action: Warning is displayed and no analysis is performed.

(1) Probable Cause
1. The sample rack is removed.
2. The sample rack is not properly mounted.
3. Failure of sample rack sensor assembly
4. Failure of wiring cord (wiring cord with spiral)
5. Failure of PCB No. 6362

(2) Confirmation by the operator
1. Place the sample rack properly.

(3) Confirmation by Service Engineer
1. Check the dirt on sample rack table and/or it is free of foreign matters.
2. Short-circuit the pin 20 and pin 18 of relay connector. If it can be monitored on the switch sensor screen, the sample rack drawer might be faulty. Check the harness and sample rack sensor.
3. If the above step 2 does not solve the trouble, short-circuit the pin 14 and pin 12 of CN111 on PCB No. 6362. If this solves the trouble, the wiring cord (wiring cord with spiral) is faulty. If not, the PCB No. 6362 is faulty.

6.6.3 Replace Sample Rack Drawer

Monitor Timing: When starting analysis
Monitor Method: Photo interrupter incorporated is shaded by the light shield attached to the sample rack drawer.
CA-500's Action: Warning is displayed and no analysis is performed.

(1) Probable Cause
1. The sample rack drawer is removed.
2. The sample rack drawer is not properly mounted.
3. Defective light shield of sample rack drawer.
4. Failure of photo interrupter sensor
5. Failure of solenoid valve assembly
6. Failure of PCB No. 6362

(2) Confirmation by the operator
1. Place the sample rack drawer properly.
2. Remove any foreign matters.

(3) Confirmation By Service Engineer
1. Check the dirt on table rock mechanism and/or it is free from foreign matters.
2. Check whether the light shield is damaged or not on the sample rack drawer rear side.
3. If the signal on the pin 2 and pin 3 of the relay connector for solenoid assembly does not change even photo interrupter is shaded by the light shield, the solenoid valve assembly or sensor is faulty.
4. If the above step 3 does not solve the trouble, short-circuit the pin 5 and pin 6 of CN112 on PCB No. 6362. If this solves the trouble, the wiring cord (wiring cord from CN19 on PCB No. 4086) is faulty. If not, the PCB No. 6362 is faulty.

6.6.4 Barcode Scanner Driver Error

Monitor Timing: When sensing barcode home position
Monitor Method: Photo interrupter is shaded by the light shield to drive mechanism.
CA-500's Action: Warning is displayed and no analysis is performed.

(1) Probable Cause
1. Barcode drive mechanism is obstructed.
2. Loosened pulley of motor
3. Failure of BCR motor assembly
4. Defective light shield
5. Failure of sensor
6. Flaws on shaft
7. Failure of bushing
8. Failure of wiring cord (wiring cord with spiral)
9. Failure of PCB No. 6362
10. Failure of PCB No. 4086

(2) Confirmation by the operator
1. Remove any foreign matters of the barcode drive mechanism.

(3) Confirmation by Service Engineer
1. Remove any foreign matters on the barcode drive mechanism.
2. If the motor runs while barcode does not move, retighten the pulley.
3. Check whether the light shield for the home position sensor is damaged or not.
4. Short-circuit the pin 19 and pin 17 of the relay connector on the rail. If this allows monitoring the detection of home position, the sensor inside the sample rack drawer or wiring cord (for ID reader) is faulty.
5. Short-circuit the pin 13 and pin 11 of CN111 on PCB No. 6362. If this allows monitoring, the wiring cord (wiring cord with spiral) is faulty; otherwise, PCB No. 6362 is faulty.
6. Check whether the drive mechanism shaft is free from flaws.
7. Check whether the slide of shaft bushing is smooth or not.
8. If the motor does not operate or unstable even when the shaft is free from problems, any of ID motor assembly, wiring cord (for ID reader), wiring cord (wiring cord with spiral), or PCB No. 4086 is faulty.

6.6.5 Barcode Scanner Error

Monitor Timing: When turning on power supply and changing the preset
Monitor Method: CPU communicate with Bar Code Scanner
CA-500's Action: Warning

(1) Probable Cause
1. Failure of barcode scanner
2. Failure of wiring cord (for ID reader)
3. Failure of wiring cord (wiring cord with spiral)
4. Failure of PCB No. 6362

(2) Confirmation by the operator
None

(3) Confirmation by Service Engineer
Replace and confirm. Otherwise, confirm connections and identify failed locations by a voltmeter.

6.6.6 Change Sample Rack

Monitor Timing: Monitor every 50 msec during interruption
Monitor Method: 1. The micro switch in the sample rack table.
2. Photo interrupter incorporated is shaded by the light shield attached to the sample rack drawer.
CA-500's Action: Warning at each analysis.

(1) Probable Cause
1. The sampler rack is not replaced.
2. Failure of sampler rack sensor assembly
3. Failure of wiring cord (wiring cord with spiral)
4. The sample rack drawer is not opened or closed.
5. Defective light shield of sample rack drawer.
6. Failure of sensor
7. Failure of solenoid valve assembly
8. Failure of PCB No. 6362

(2) Confirmation by the operator
1. Place the sampler rack properly.
2. Place the sampler rack drawer properly.

(3) Confirmation by Service Engineer
1. Check the dirt on sample rack table and/or it is free of foreign matters.
2. Short-circuit the pin 20 and pin 18 of relay connector. If it can be monitored on the switch sensor screen, the sample rack drawer might be faulty. Check the harness and sample rack sensor.
3. If the above step 2 does not solve the trouble, short-circuit the pin 14 and pin 12 of CN111 on PCB No. 6362. If this solves the trouble, the wiring cord (wiring cord with spiral) is faulty. If not, the PCB No. 6362 is faulty.
4. Check whether the light shield is damaged or not on the sample rack drawer rear side.
5. If the signal on the pin 2 and pin 3 of the relay connector for solenoid assembly does not change even photo interrupter is shaded by the light shield, the solenoid valve assembly or sensor is faulty.
6. If the above step 5 does not solve the trouble, short-circuit the pin 5 and pin 6 of CN112 on PCB No. 6362. If this solves the trouble, the wiring cord (wiring cord from CN19 on PCB No. 4086) is faulty. If not, the PCB No. 6362 is faulty.

6.6.7 Replace STAT Sample

Monitor Timing: Monitor every 50 msec during interruption
(Instrument monitors when next STAT sample is analyzed whether previous STAT sample is removed.)
Monitor Method: Photo interrupter incorporated is shaded by the light shield attached to the sample rack drawer.
CA-500's Action: Warning at each STAT sample analysis.

(1) Probable Cause
1. The STAT sample is not replaced.
2. The light shield cover was opened when replacing.
3. Defective light shield of sample rack drawer.
4. The sample rack drawer is not opened or closed.
5. Failure of solenoid valve assembly
6. Failure of PCB No. 6362

(2) Confirmation by the operator
1. Place the sampler rack drawer properly.
2. Remove the foreign matters.

(3) Confirmation by Service Engineer
1. Check the dirt on table rock mechanism and/or it is free of foreign matters.
2. Check whether the light shield is damaged or not on the sample rack drawer rear side.
3. If the signal on the pin 2 and pin 3 of the relay connector for solenoid assembly does not change even photo interrupter is shaded by the light shield, the solenoid valve assembly or sensor is faulty.
4. If the above step 3 does not solve the trouble, short-circuit the pin 5 and pin 6 of CN112 on PCB No. 6362. If this solves the trouble, the wiring cord (wiring cord from CN19 on PCB No. 4086) is faulty. If not, the PCB No. 6362 is faulty.

6.6.8 Exist same Sample No.

Monitor Timing: When barcode reading is completed
Monitor Method: Same sample No. exists in one rack.
CA-500's Action: Warning

(1) Probable Cause
1. Same sample No. exists in one rack.
2. Barcode drive mechanism is obstructed.
3. Loosened pulley of motor
4. Failure of BCR (Bar Code Reader) motor assembly
5. Defective light shield
6. Failure of sensor
7. Flaws on shaft
8. Failure of bushing
9. Failure of wiring cord (wiring cord with spiral)
10. Failure of PCB No. 6362
11. Failure of PCB No. 4086

(2) Confirmation by the operator
1. Check the barcode label.
2. Remove any foreign matters of the barcode drive mechanism.

(3) Confirmation by Service Engineer
1. Remove any foreign matters on the barcode drive mechanism.
2. If the motor runs while barcode does not move, retighten the pulley.
3. Check whether the light shield for the home position sensor is damaged or not.
4. Short-circuit the pin 19 and pin 17 of the relay connector on the rail. If this allows monitoring the detection of home position, the sensor inside the sample rack drawer or wiring cord (wiring cord for ID barcode reader) is faulty.
5. Short-circuit the pin 13 and pin 11 of CN111 on PCB No. 6362. If this allows monitoring, the wiring cord (wiring cord with spiral) is faulty; otherwise, PCB No. 6362 is faulty.
6. Check whether the drive mechanism shaft is free from flaws.
7. Check whether the slide of shaft bushing is smooth or not.
8. If the motor does not operate or unstable even when the shaft is free from problems, any of ID motor assembly, wiring cord (wiring cord for ID barcode reader), wiring cord (wiring cord with spiral), or PCB No. 4086 is faulty.

6.6.9 Load New Sample

Monitor Timing: When the analysis is re-started after interrupted to load new sample
Monitor Method: Sample rack sensor is monitored.
CA-500's Action: Warning

(1) Probable Cause
1. New rack is not loaded when the analysis is re-started after adding new order.

(2) Confirmation by the operator
1. Check sample rack.
2. Check sample table

(3) Confirmation by Service Engineer
1. Check the sample rack sensor.

6.7 ANALYSIS ERRORS

6.7.1 Analysis Error

Monitor Timing: When measuring/analyzing
Monitor Method:

Coagulation

Error code	Status	Action
ERROR0001 (Temp Error)	Temperature error occurred when sample was being analyzed.	Refer to 6.2 Temperature Errors.
ERROR0002 (Slight Coagulation)	Detected coagulation curve shows extremely small change.	Reanalyze the sample to make comprehensive judgment, taking sample, reagent, etc. into account.
ERROR0004 (Analysis Time Over)	Coagulation did not finish within preset detection time or within Auto Extension Mode detection time.	Reanalyze the sample to make comprehensive judgment, taking sample, reagent, etc. into account. Or conduct another test with prolonged detection time.
ERROR0008 (Coag. Curve Error)	1. Curve shows a drop in some area. 2. Curve shows too steep in some areas. 3. As buffer was cool, clotting time was extended by the influence of air bubbles. (Fbg)	
ERROR0016 (Turbidity Level Over)	Turbidity was too high to analyze.	Reanalyze the sample by pre-dilution.
ERROR0032 (No coagulation)	Clotting could not be detected.	Reanalyze the sample after checking samples and reagents (storage status blood collecting method, etc.) for any errors, and make comprehensive judgment.
ERROR0064 (Measurement Error)	Due to any problem before photo detection, such as insufficient sample plasma, instrument error, insufficient reagent, Mechanical Stop Switch operation, analysis could not be done.	Reanalyze the sample after preparing required amount of plasma.
ERROR0100 (Range Over)	The detection time at 50% point is exceeding the preset time, i.e. coagulation is drastic.	Reanalyze the sample after checking samples and reagents (storage status, blood collecting method, etc.) for any errors, and make comprehensive judgment.
ERROR0200 (Fbg Range Over)		

Chromogenic/Immunoassy

Error code	Status	Action
ERROR0401 (Trans Light Low)	Transmitted Light was too low.	Check the reagent, lamp, etc. and reanalyze.
ERROR0402 (Trans Light High)	Transmitted Light was too high.	Check the reagent, lamp, etc. and reanalyze.
ERROR0404 (No Linearity)	Reaction Curve had no linearity.	Reanalyze the sample.
ERROR0408 (Reaction Curve Error)	Reaction Curve changed to the opposite direction.	Check the setting, reagent and reanalyze.
ERROR0416 (Range Over)	Antigen became range over (with Immunoassy only).	Reanalyze the sample by re-dilution, etc.
ERROR0528 (No Polynomial Adjustment)	Polynomial adjustment could not be performed (when using VlinIntegral mode only).	Check the setting, reagent and reanalyze.

(1) Confirmation by Service Engineer
1. Adjustment of detector block
2. Confirmation of SV function
3. Confirmation of dispensing positions
4. Checking the tube between the syringe and probe for breakage, pin holes, contamination, or bubbles.
5. Check probes for contamination, clogging, etc.
6. Check mixing status (no bubbles)
7. Check rinse solution amount and pressure.
8. Confirm plasma dispensing position in a reaction tube.

6.7.2 Check Reagent Expiry

Monitor Timing: When starting analysis
Monitor Method: Monitor standard curve, reagent information, and current date (RTC) by the software.
CA-500's Action: Warning is displayed.

(1) Probable Cause
1. Failure to preset reagent expiry date or wrong setting.

(2) Confirmation by the operator
1. Preset the expiry date properly in standard curve and reagent information settings.

(3) Confirmation by Service Engineer
The same as above.

6.7.3 Check Control Expiry

Monitor Timing: When starting analysis of QC order
Monitor Method: Monitor QC settings by the software.
CA-500's Action: Warning is displayed.

(1) Probable Cause
1. Failure to preset expiry date of control plasma or wrong setting

(2) Confirmation by the operator
1. Preset expiry date properly at QC settings.

(3) Confirmation by Service Engineer
The same as above.

6.8 MEMORY ERRORS

6.8.1 Invalid Settings

Monitor Timing: At time of updating the settings
Monitor Method:
CA-500's Action: No updating

(1) Probable Cause
1. Input data exceeds the limit.

(2) Confirmation by the operator
1. Change settings after confirming appropriate settings and conditions.

(3) Confirmation by Service Engineer
The same as above.

6.8.2 Stored Data Error

Monitor Timing: When the power switch is turned on.
Monitor Method: Monitors CHECK SUM of stored data
CA-500's Action: Deletion of error data

(1) Probable Cause
Refer to below (3).

(2) Confirmation by the operator
1. Turn the power switch off, and on again.

(3) Confirmation by Service Engineer
1. The PCB No. 6362 or backup battery is faulty.

6.8.3 QC Data Error

Monitor Timing: When the power switch is turned on.
Monitor Method: Monitors CHECK SUM of each file of QC data
CA-500's Action: Deletion of error data

(1) Probable Cause
Refer to below (3).

(2) Confirmation by the operator
1. Turn the power switch off, and on again.

(3) Confirmation by Service Engineer
1. The PCB No. 6362 or backup battery is faulty.

6.9 EXTERNAL DEVICE ERRORS

6.9.1 No Paper

Monitor Timing: At time of printing
Monitor Method: Monitoring PE signal from Printer
CA-500's Action: Warning and no printing

(1) Probable Cause
1. No printer paper
2. Failure of Printer
3. Failure of PCB No. 9265
4. Failure of wiring cord (for printer relaying)
5. Failure of PCB No. 6350
6. Failure of wiring cord (for printer signal)

(2) Confirmation by the operator
1. Place printer paper correctly.

(3) Confirmation by Service Engineer

Suspect Part	Test Points	Expected Value
Printer	CN5 (PCB No. 9265) pin 3 and pin 1	1.2 V ± 0.2 V
	CN5 (PCB No. 9265) pin 3 and pin 2	5 V → 0 V when paper is set
PCB No. 9265	CN1 (PCB No. 9265) pin 14 and pin 12	5 V → 0 V when paper is set
Wiring Cord (for printer relaying)	CN5 (PCB No. 6350) pin 3 and pin 1	1.2 V ± 0.2 V
	CN5 (PCB No. 6350) pin 3 and pin 2	5 V → 0 V when probe crash occurs
PCB No. 6350	CN1 (PCB No. 6350) pin 15 and pin 1	5 V → 0 V when probe crash occurs
PCB No. 6362	CN106 (PCB No. 6362) pin 15 and pin 1	5 V → 0 V when probe crash occurs

6.9.2 Printer Error

Monitor Timing: At time of printing
Monitor Method: Monitoring head up signal of Printer
CA-500's Action: Warning and no printing

(1) Probable Cause
1. The head up lever is not set down.
2. Failure of Printer
3. Failure of PCB No. 9265
4. Failure of wiring cord (for printer relaying)
5. Failure of PCB No. 6350

(2) Confirmation by the operator
1. Place printer paper correctly.

(3) Confirmation by Service Engineer

Suspect Part	Test Points	Expected Value
Printer	CN3 (PCB No. 9265) pin 2 and pin 1	5 V → 0 V when pulling the lock lever down
PCB No. 9265	CN1 (PCB No. 9265) pin 3 and pin 4	5 V → 0 V when pulling the lock lever down
Wiring Cord (for printer relaying)	CN4 (PCB No. 6350) pin 1 and pin 2	5 V → 0 V when pulling the lock lever down

6.9.3 HC Off Line

Monitor Timing: When communicating with host computer
Monitor Method: Monitoring RS-232C DSR control signal
CA-500's Action: Warning

(1) Probable Cause
1. The connector cable is disconnected.
2. The host computer is not turned on.
3. The host computer is not ready to receive data.
4. Failure of PCB No. 6362

(2) Confirmation by the operator
1. Check the connection with host computer.
2. Turn on the host computer.
3. Check the host computer data transmission.

(3) Confirmation by Service Engineer
1. Replace the PCB No. 6362.

6.9.4 HC Communication Error
6.9.5 HC CTS Time Out

Monitor Timing: During data transmission
Monitor Method: Monitors RS-232C protocol and time out
CA-500's Action: Warning

(1) Probable Cause
1. Failure of connection cable
2. Failure of host computer
3. Failure of PCB No. 6362

(2) Confirmation by the operator
1. Check the connection with host computer.
2. Check the host computer.

(3) Confirmation by Service Engineer
1. Replace the PCB No. 6362.

6.9.6 HC ACK Code Error
6.9.7 HC Transmission Count Error
6.9.8 HC Reception Count Error

Monitor Timing: During data transmission
Monitor Method: Monitors RS-232C protocol and time out
CA-500's Action: Warning

(1) Probable Cause
1. Failure of connection cable
2. Failure of host computer
3. Failure of PCB No. 6362

(2) Confirmation by The operator
1. Check the connection with host computer.
2. Check the host computer.

(3) Confirmation by Service Engineer
1. Replace the PCB No. 6362.

6.9.9 HC ACK Time Out
6.9.10 HC STX Time Out
6.9.11 HC ETX Time Out

Monitor Timing: During data transmission
Monitor Method: Monitors RS-232C protocol and time out
CA-500's Action: Warning

(1) Probable Cause
1. Failure of connection cable
2. Failure of host computer
3. Failure of PCB No. 6362

(2) Confirmation by the operator
1. Check the connection with host computer
2. Check the host computer.

(3) Confirmation by Service Engineer
1. Replace the PCB No. 6362.

6.9.12 Instruction Not Found in HC

Monitor Timing: During data transmission
Monitor Method: Monitoring RS-232C protocol and time out
CA-500's Action: Warning

(1) Probable Cause
1. No registration of Work List.

(2) Confirmation by the operator
1. Register the Work List in the host computer correctly.

(3) Confirmation by Service Engineer
The same as above (2).

6.9.13 Serial Illegal Error

Monitor Timing: During data transmission
Monitor Method: Monitoring RS-232C protocol and time out
CA-500's Action: Warning

(1) Probable Cause
1. Receive Data failure caused by noise, etc.
2. Problem is occurred on the program of the host computer.

(2) Confirmation by the operator
1. Register the Work List in the host computer correctly.

(3) Confirmation by Service Engineer
The same as above (2).

6.10 QUALITY CONTROL AND STANDARD CURVE ERRORS

6.10.1 QC Limit Error

Monitor Timing: When analyzing QC data in QC mode
Monitor Method: Monitors the Control Limit and actual QC data
CA-500's Action: Warning

(1) Probable Cause
1. QC analysis result exceeded the Upper or Lower Limit of the preset range.

(2) Confirmation by the operator
1. Check whether control plasma has been expired or not.
2. Check the storage of control plasma.

(3) Confirmation by Service Engineer
The same as above (2).

6.10.2 QC Limit Error (STOP)

Monitor Timing: When analyzing QC data in QC mode
Monitor Method:Monitors the QC Limit (Stop)
CA-500's Action: Analysis stop

(1) Probable Cause
1. QC analysis result exceeded the Upper Stop or Lower Stop Limit of the preset range.

(2) Confirmation by the operator
1. Check whether control plasma has been expired or not.
2. Check the storage of control plasma.

(3) Confirmation by Service Engineer
The same as above (2).

6.10.3 Set more than two points

Monitor Timing: When preset the standard curve
Monitor Method:Monitors the number of preset point of standard curve and actual analysis points.
CA-500's Action: Warning

(1) Probable Cause
1. The number of point of standard curve is not satisfied on actual analysis.

(2) Confirmation by the operator
1. Preset more than two points.

(3) Confirmation by Service Engineer
The same as above (2).

6.10.4 Standard Curve Error

Monitor Timing: When preset the Standard Curve
Monitor Method: Monitors the preset limit and actual data
CA-500's Action: Warning

(1) Probable Cause
1. Data of Standard Curve is out of limit.

(2) Confirmation by the operator
1. Preset the correct data of Standard Curve

(3) Confirmation by Service Engineer
The same as above (2).

6.11 OPERATION ERRORS

6.11.1 Interrupt by Mechanical Stop

Monitor Timing: During operation
Monitor Method: Monitors Mechanical Stop Switch ON or OFF
CA-500's Action: Emergency stop

(1) Probable Cause
1. The mechanical stop switch has been pressed.
2. Failure of the mechanical stop switch.
3. Failure of PCB No. 9265
4. Failure of wiring cord (for printer relaying)
5. Failure of PCB No. 6362

(2) Confirmation by the operator
1. Confirm whether the mechanical stop switch is pressed or not.

(3) Confirmation by Service Engineer

Suspect Part	Test Points	Expected Value
Mechanical Stop Switch	CN3 (PCB No. 9265) pin 1 and pin 2	5 V ± 0.25 V, when the mechanical stop switch is not ON
PCB No. 9265	CN1 (PCB No. 9265) pin 3 and pin 4	5 V ± 0.25 V, when the mechanical stop switch is ON 0 V, when the mechanical stop switch is not ON
Wiring Cord (for printer relaying)	CN107 (PCB No. 6362) pin 9 and pin 10	5 V ± 0.25 V, when the mechanical stop switch is ON 0 V, when the mechanical stop switch is not ON

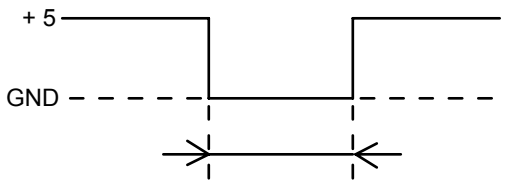


Figure 6-3: Mechanical Switch ON

6.11.2 Turned Off During Operation

Monitor Timing: At the time when the power is turned ON
Monitor Method:
CA-500's Action: Warning

(1) Probable Cause
1. AC power supply failed.
2. Fuse was burned.

(2) Confirmation by the operator
1. Check the AC power supply connection and fuse.

(3) Confirmation by Service Engineer
1. Check each unit carefully if the fuse is burned frequently.

6.11.3 Light Shield Open

Monitor Timing: At time of analysis start, during analysis, and rising mode.
Monitor Method: Photo interrupter monitors the light shield cover is open or closed by the light shield.
CA-500's Action: Emergency stop

(1) Probable Cause
1. The light shield cover is opened intentionally.
2. Foreign matters such as dirt and others on the sensor
3. Failure of the cover switch sensor
4. Failure of wiring cord (wiring cord from CN19 on PCB No. 4086)
5. Failure of PCB No. 6362

(2) Confirmation by the operator
1. Remove the foreign objects on the sensor section.

(3) Confirmation by Service Engineer

Suspect Part	Test Points	Expected Value
Switch Sensor	Relay connector pin 2 and pin 1	5 V
	Relay connector pin 2 and pin 3	0 V
PCB No. 9265	CN112 (PCB No. 6362) pin 8 and pin 9	0 V, when light shield cover is CLOSED 5 V ± 0.25 V, when light shield cover is OPEN
Wiring Cord (wiring cord from CN19 or PCB No. 4086)	CN112 (PCB No. 6362) pin 8 and pin 9	Does not change the signal when light shield is OPEN or CLOSED

6.11.4 Enter Work List

Monitor Timing: At time of analysis start
Monitor Method: Software
CA-500's Action: No analysis

(1) Probable Cause
1. The Work List is not registered.
2. Operation error

(2) Confirmation by the operator
1. Register the Work List correctly.

(3) Confirmation by Service Engineer
The same as above (2).

6.11.5 Check Reagent Volume 1

Monitor Timing: At time of analysis start
Monitor Method: Monitors preset data on EEPROM and actual accumulated amount of volume
CA-500's Action: Warning

(1) Probable Cause
1. When reagent volume monitor in valid, the theoretical calculation volume of reagent exceeds the used reagent volume.

(2) Confirmation by the operator
1. Replenish reagent and input new data of reagent volume.

(3) Confirmation by Service Engineer
The same as above (2).

6.11.6 Insufficient Reaction Tube

Monitor Timing: At time of analysis start
Monitor Method: Software
CA-500's Action: Does not analyze.

(1) Probable Cause
1. The number of test registered in Work List exceeds that of the remaining reaction tubes (a maximum of 60 tests).

(2) Confirmation by the operator
1. Reduce the number of test registered in Work List.
2. Replenish the reaction tube.

(3) Confirmation by Service Engineer
The same as above (2).

6.12 OTHERS

6.12.1 Voltage Low Limit

Monitor Timing: When analyzing, when monitoring
Monitor Method: Monitors voltage
CA-500's Action: Emergency stop

(1) Probable Cause
1. The power fail is occurred.
2. The momentary power fail is occurred.
3. Instability of the AC line voltage

(2) Confirmation by the operator
1 Confirm whether the power fail or the momentary power fail is occurred.
2. Confirm whether AC supply to the Main Unit is over the capacity of connection tool.

(3) Confirmation by Service Engineer
1. Check the AC line voltage is stable within the capacity.
2. Check the voltage between pin No. 33 and 34 of the flat cable (PS control harness) between PCB No. 4086 and PCB No. 6362 is within 1.7 V ± 10%.
3. If the voltage is within above, the PCB No. 6362 might be faulty.
4. In other case:
   1) Check the PCB No. 4086 fuse is blown.
   2) If the PCB No. 4086 is not blown, flat cable might be faulty.
   3) If the PCB No. 4086 is blown, the following might be faulty by 24 V short circuit in Y, Z drive:
      - PCB No. 4086
      - X PC board harness
      - PCB No. 9260
      - X axis motor wiring cord
      - PCB No. 2134
      - Y-Z relay harness
      - PCB No. 9264
      - Y axis motor
      - Z axis motor
      - Reagent heater pipette

6.12.2 CPU Failure (“Number”)

Number:	3	System bus error
	4	Address error
	5	Illegal instruction
	6	Divided by 0 (program bug)
	97	Interrupt controller initializing error
	256	Undefined interrupt
Monitor Timing:	Always	
Monitor Method:	Monitors signals around CPU board	
CA-500’s Action:	Alarm and system stops in locked condition (alarm cannot be reset)	
	Turn the power OFF.	

(1) Probable Cause
No. 3, 4, 5, 97, 256
1. Failure of PCB No. 6362
2. Failure of PCB No. 7015

No. 6
1. Main program failure of PCB No. 7015

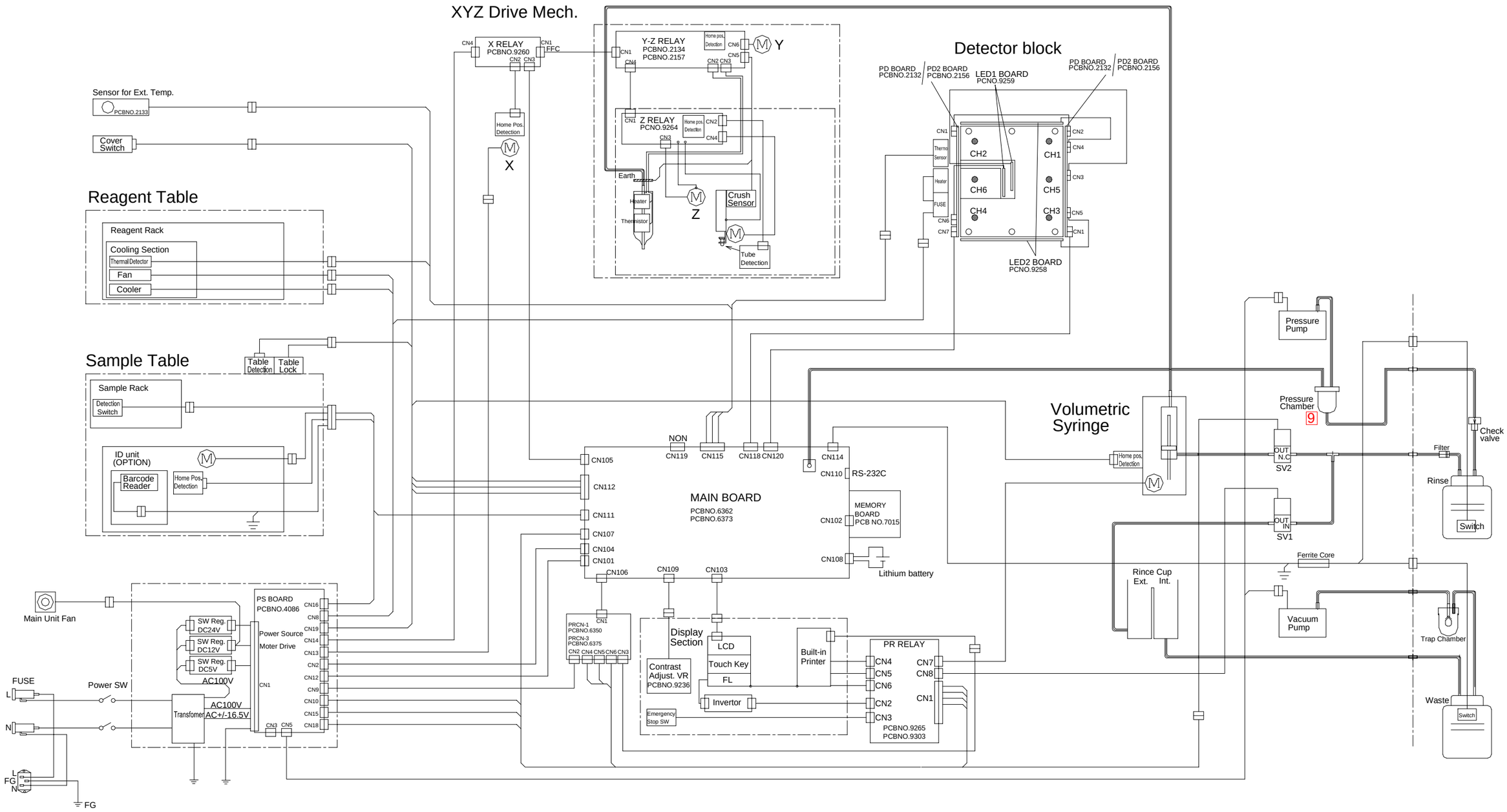
(2) Confirmation by the operator
1. Turn the power OFF/ON.
2. Contact your Sysmex service representative.

(3) Confirmation by Service Engineer
No. 3, 4, 5, 97, 256
1. Check the data check operation of the service program.
2. Check clog of PCB No. 7015 socket.
3. Failure of PCB No. 6362

No. 6
1. Main program failure

SECTION 7 SCHEMATICS

To Cover



CA-500 Wiring/Tubing Diagram 19

APPENDIX A PARTS LIST

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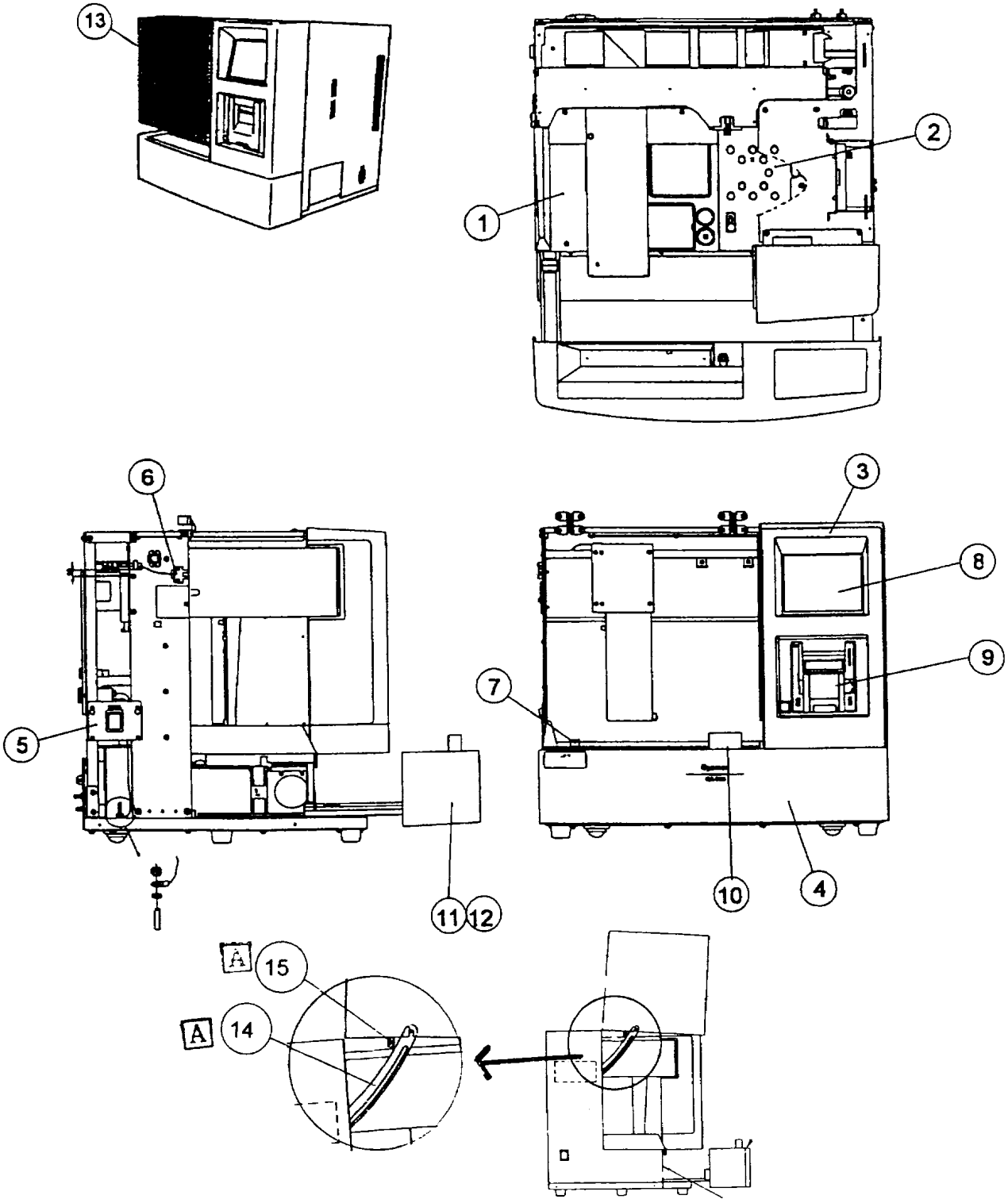
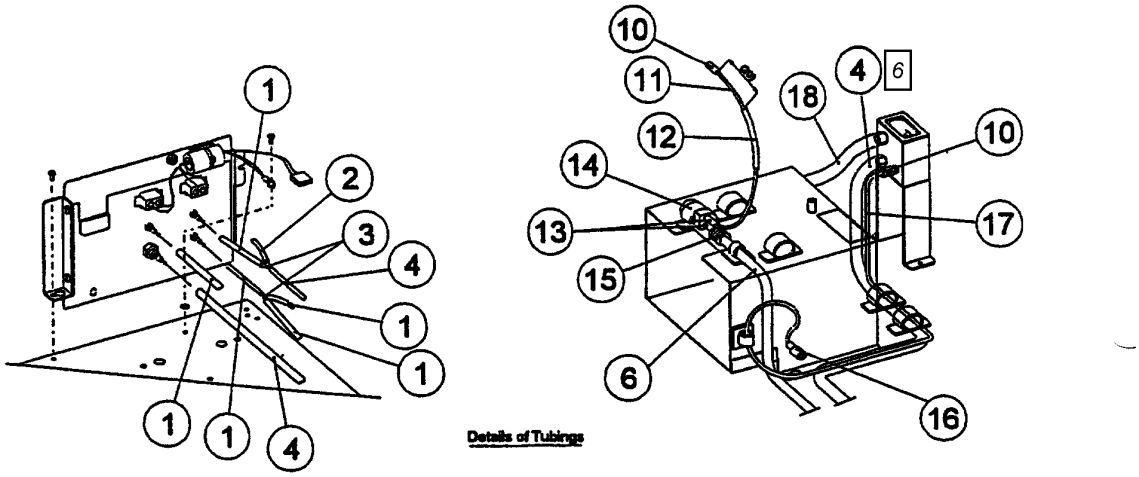
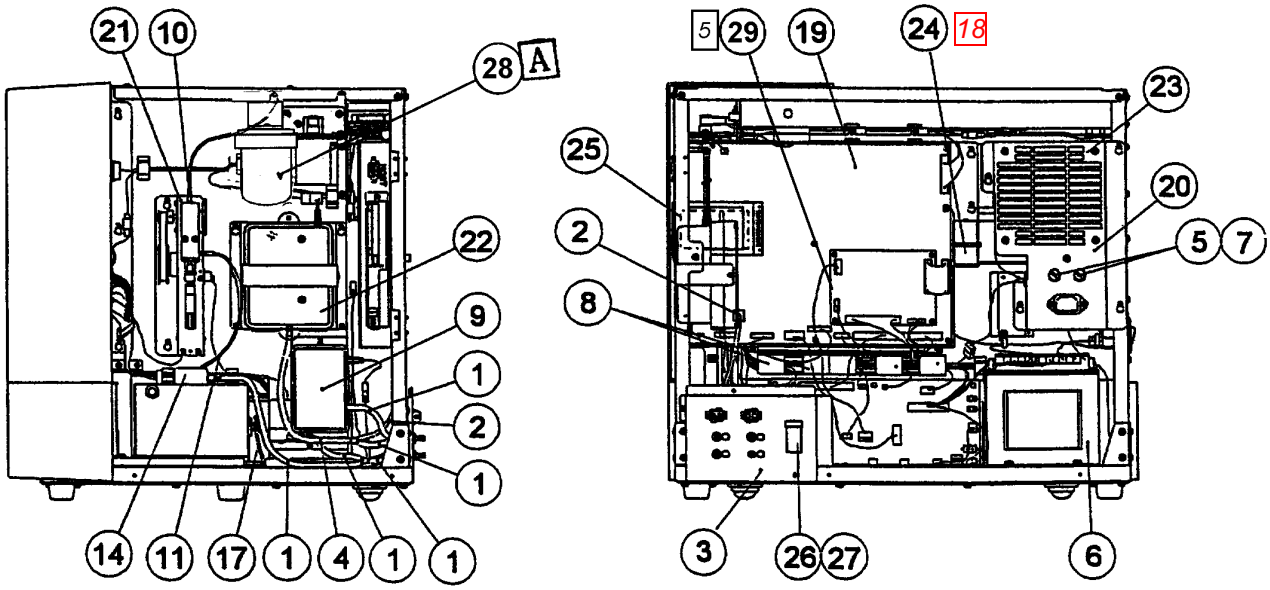


CA-500 MAIN UNIT CHASSIS ASSY (1/2)

	Code No.	Drawing No.	Description	Qty per Unit
	663-0202-5	1	REAGENT STAGE ASSY	1
8	663-0203-9	2&	SAMPLE STAGE ASSY	1
8	663-0400-9	2%	SAMPLE STAGE ASSY 2 (IMMUNO)	1
	663-0168-5	3	OPERATION PANEL ASSY	1
	663-0174-8	4#	SAMPLE TABLE ASSY (ID)	1
	663-0173-4	4*	SAMPLE TABLE ASSY (STANDARD)	1
	662-2219-8	5	POWER SWITCH ASSY CA-500	1
	228-3418-6	6	PHOTO SENSOR EE-SX670	1
	663-0179-6	7	SAMPLE RACK SENSOR ASSY	1
	228-3754-7	8	LCD LRHBJ3431A	1
	663-0205-6	9	PRINTER COVER ASSY	1
2	~~663-0175-1~~	~~10~~	~~SAMPLE TABLE BASE ASSY~~	~~1~~
2	663-0177-9	10	ID ASSY	1
	663-0176-5	11	ID MOTOR ASSY	1
	662-8181-6	12	ID WIRING CORD	1
8	663-0204-2	13&	LIGHT SHIELD COVER ASSY	1
8	663-0401-2	13%	LIGHT SHIELD COVER ASSY (IMMUNO)	1
A	324-9079-8	14	STAY DM1102	1
A	324-9075-3	15	COVER SENSOR SHUTTER-B DM1374	1
	363-2558-6	OPTION	HOLDER NO. 89	1
	363-2559-0	OPTION	HOLDER NO. 90 (TTO)	1
	913-1091-3	OPTION	STANDARD SCATTERING STICK SET	1
7	365-9200-4	OPTION	SPACER FOR RUBBER SHOE	1

CA-500 Main unit Chassis Assy (2/2)





CA-500 Main unit Chassis Assy (2/2)

	Code No.	Drawing No.	Description	Qty per Unit
	442-5475-1	1	TUBE TOALONE 3MMID X 6MMOD	10
	442-5315-1	2	TUBE SILICONE 2MMIDX5MMOD(CLR)	10
	442-1403-8	3	CONNECTING TUBE NO. 3	10
	442-5290-6	4	TUBE SILICONE 4MMID X 8MMOD	20
5	~~266-5045-0~~	~~5$¥~~	~~FUSE 125V6A UL-TSC-6A-N1~~	~~1~~
5	266-5106-0	5$¥	FUSE 250V6.3A ST4-6.3A-N1(N.A.	1
	266-5293-0	5#	FUSE 250V3.15A NO.19195(EUROP)	10
	662-2209-1	6$¥	TRANSFORMER POWER ASSY (100V)	1
	662-2208-7	6#	TRANSFORMER POWER ASSY (200V)	1
	266-3536-6	7$¥	FUSE HOLDER CAP 031-1666(N.AME	10
	266-3533-5	7#	FUSE HOLDER CAP 031-1663(EUROP	10
	322-9150-1	8	WIRING CORD COVER	1
	663-0197-3	9	VACUUM PUMP ASSY	1
	442-5292-3	10	TUBE SILICONE 1.5MMID X 6MMOD	5
6	~~442-5452-5~~	~~11~~	~~TUBE TEFLON 1.5MMID X 2.5MMOD~~	~~10~~
6	442-5416-1	11	TUBE TEFLON 1.2MMID X 2.0MMOD	10
	442-5280-9	12	TUBE SILICONE 2MMID X 3MMOD	10
	442-5279-4	13	TUBE SILICONE 1/32"X3/32"F7391	1
	663-0198-7	14	SOLENOID VALVE ASSY (VOLUMET.)	1
	442-3433-7	15	HYDRAULIC CONNECTOR NO.23	10
	442-3307-4	16	RUBBER TUBE NO. 7	5
	442-5452-5	17	TUBE TEFLON 1.5MMID X 2.5MMOD	10
	442-5295-4	18	TUBE SILICONE 6MMID X10MMOD	10
	662-0221-9	19	PCB NO.6362	1
8	662-0287-4	19	PCB NO.6373	1
	663-0195-6	20	AC INLET ASSY	1
	663-0164-1	21	VOLUMETRIC PISTON ASSY	1
	663-0191-1	22	PRESSURE PUMP ASSY	1
	663-0196-0	23	MAIN UNIT FAN ASSY	1
18	~~289-9170-6~~	~~24~~	~~BATTERY LITHIUM CR23500SE-CJ2~~	~~1~~
18	289-9169-1	24	BATTERY LITHIUM CR17450SE-2-CJ2	1
	662-0225-3	25	PCB NO.7015	1
8	662-0278-1	25	PCB NO.7015 (2)(FLASH MEMORY)	1
	443-0823-8	26	CHAMBER NO. 4	1
	365-1333-3	27	SUPPORT NO.247	1
A	---	28	CA-500 PRESSURE CHAMBER ASSY	-
5	~~662-0168-8~~	~~29~~	~~PCB NO. 6350 WITH ROM~~	~~1~~
5	662-0276-3	29	PCB NO. 6350 WITH ROM (FOR CA)	1
8	662-0288-8	29	PCB NO. 6375 ASSY	1

: PCB used with CA-550/560 (upper compatible), and will be replaced with the old PCB (written above) when the stock is depleted.

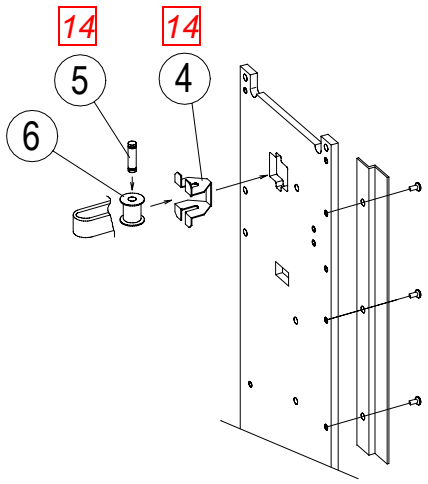
: Flash Memory added with CA-550/560 (upper compatible) from program Ver. 00-13.

$: FOR 117 VAC
#: FOR 220 VAC
¥: FOR 100 VAC

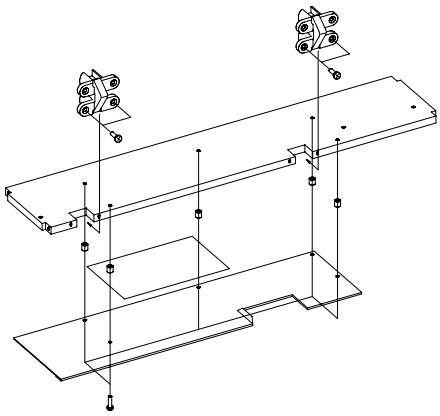
New CPU board (PCB NO.6373)is mounted in following instruments. 19

CA-510	S/N: A1300 and thereafter
CA-520	S/N: A1018 and thereafter
CA-530	S/N: A1805 and thereafter
CA-540	S/N: A3405 and thereafter
CA-550	S/N: A1001 and thereafter
CA-560	S/N: A1001 and thereafter

CA-500 Chassis Assy (1/2)



Details of Part B



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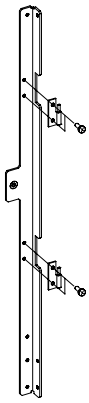

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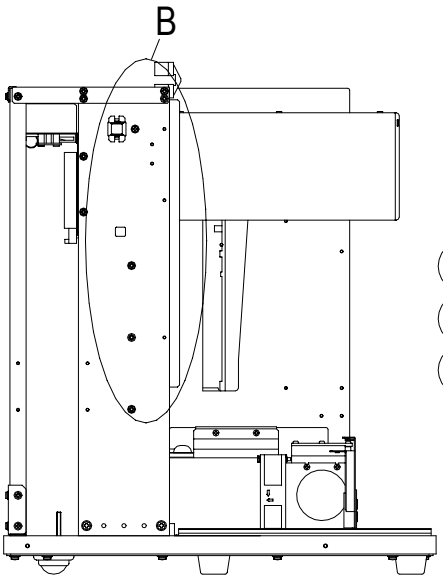
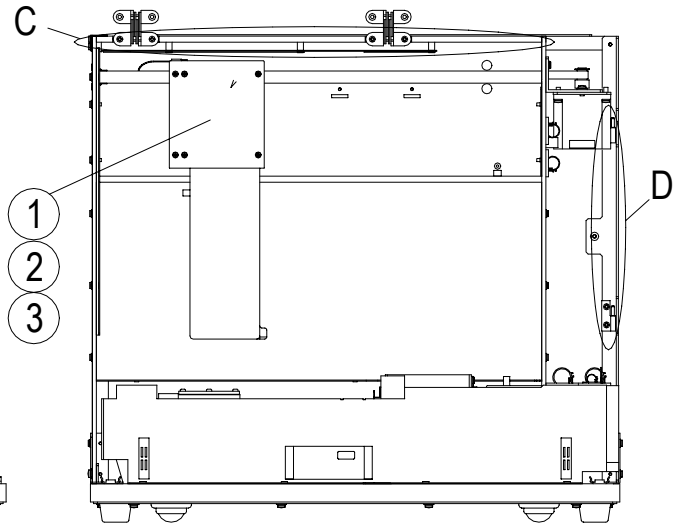




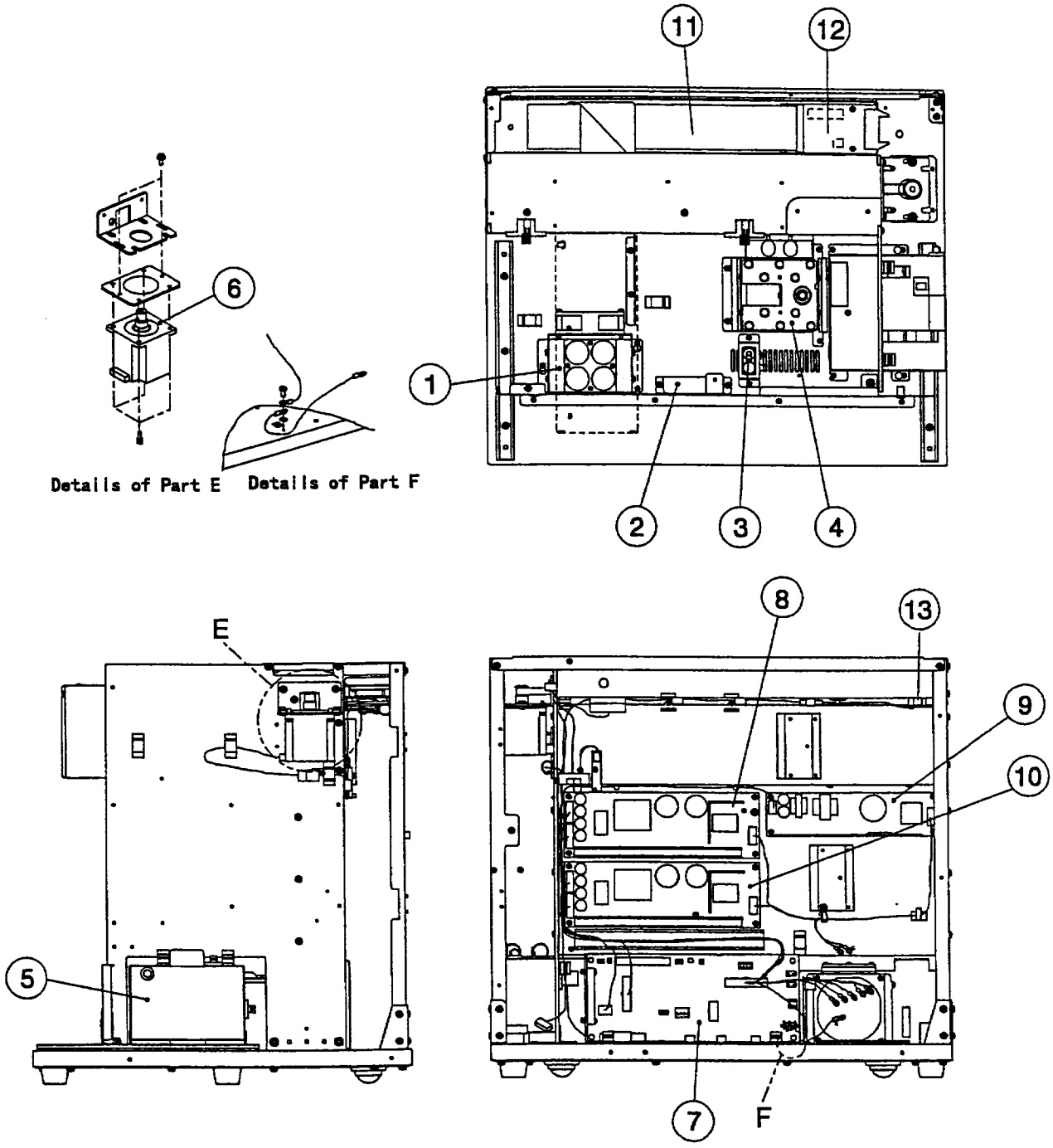
CA-500 Main unit Chassis Assy (2/2)

	Code No.	Drawing No.	Description	Qty per Unit
	663-0180-1	1	DRIVE ARM ASSY	1
	662-0223-6	2*#	PCB NO.2134	1
8	662-0286-1	2*#&	PCB NO.2157	1
	663-0181-4	3	X AXIS SLIDER ASSY	1
14	663-0374-9	4	BASE DM1197B	1
A 14	663-0371-8	5	SHAFT-B DM1090B	1
A B	663-0370-4	6	PULLEY 1329A	1
B	663-0392-6	6	PULLEY DM1329	1
2	344-3529-8	7	HINGE R-45 N GREASE TOA	1

: PCB used with CA-550/560 (upper compatible), and will be replaced with the old PCB (written above) when the stock is depleted.

2 TB200049
8 TB200203
14 ECR303C033

CA-500 Chassis Assy (2/2)

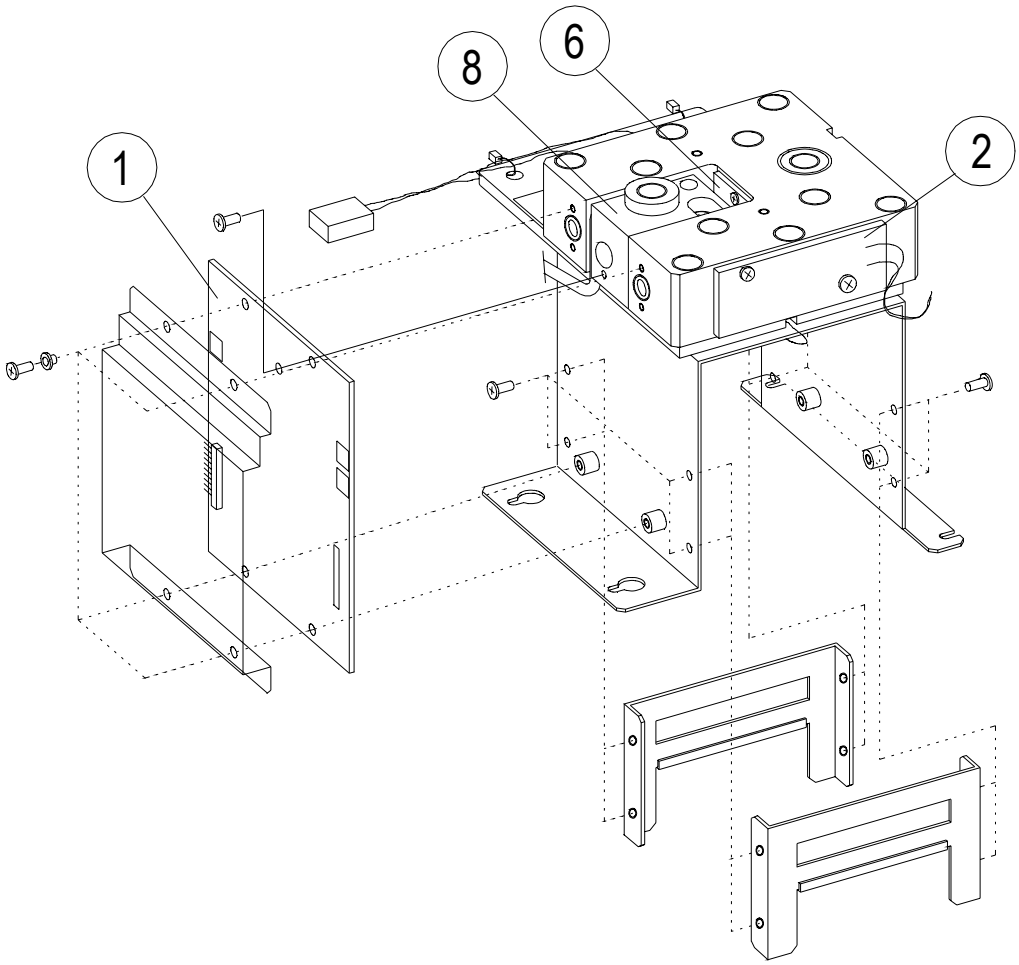


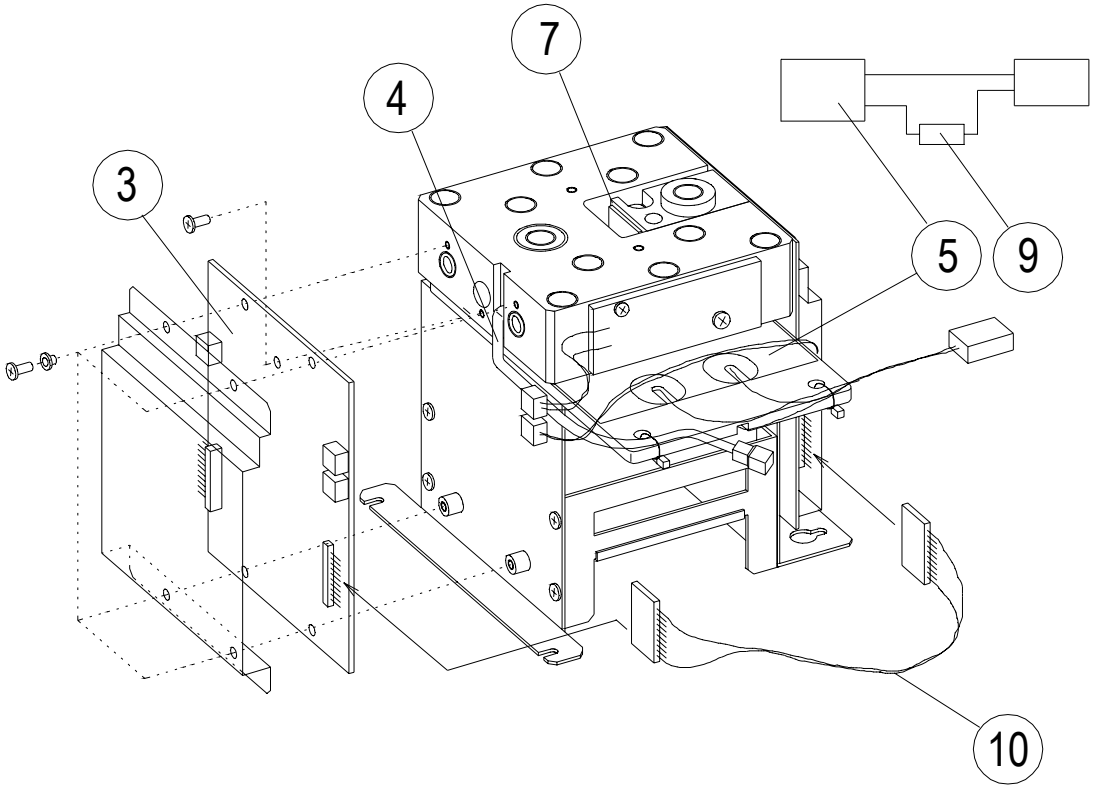
CA-500 Chassis Assy (2/2)

	Code No.	Drawing No.	Description	Qty per Unit
	663-0161-0	1	COOLING SECTION ASSY	1
	663-0217-1	2	TABLE LOCK MECHANISM ASSY	1
	663-0199-1	3	RINSING CUP ASSY	1
	663-0158-8	4#	DETECTOR BLOCK (AT3)	1
	663-0159-1	4*	DETECTOR BLOCK (STANDARD)	1
8	663-0399-1	4&	DETECTOR BLOCK (D-DIMER)	1
17	663-0415-4	4&&	DETECTOR BLOCK (D-DIMER 800NM)	1
	322-9151-5	5	TRASH COVER CA-500	1
	663-0201-1	6	X AXIS MOTOR ASSY	1
	662-0220-5	7	PCB NO.4086	1
	289-9377-2	8	SW REGULATOR LCA150S-12	1
	289-9376-9	9	SW REGULATOR LCA50S-5	1
A	~~289-9378-6~~	~~10~~	~~SW REGULATOR LCA150S-24-XJCM~~	~~1~~
A	289-9379-0	10	SW REGULATOR LCA150S-24-H	1
	662-8182-0	11	X AXIS WIRING CORD	1
	662-0224-0	12	PCB NO.9260	1
	662-2207-3	13	THERMAL SENSOR ASSY	1

#: CA-530, CA-540
*: CA-510, CA-520
&: CA-550, CA-560
&&: CA-550, CA-560 (800nm detector block)

CA-500 Detector Block





CA-500 Detector Block 8

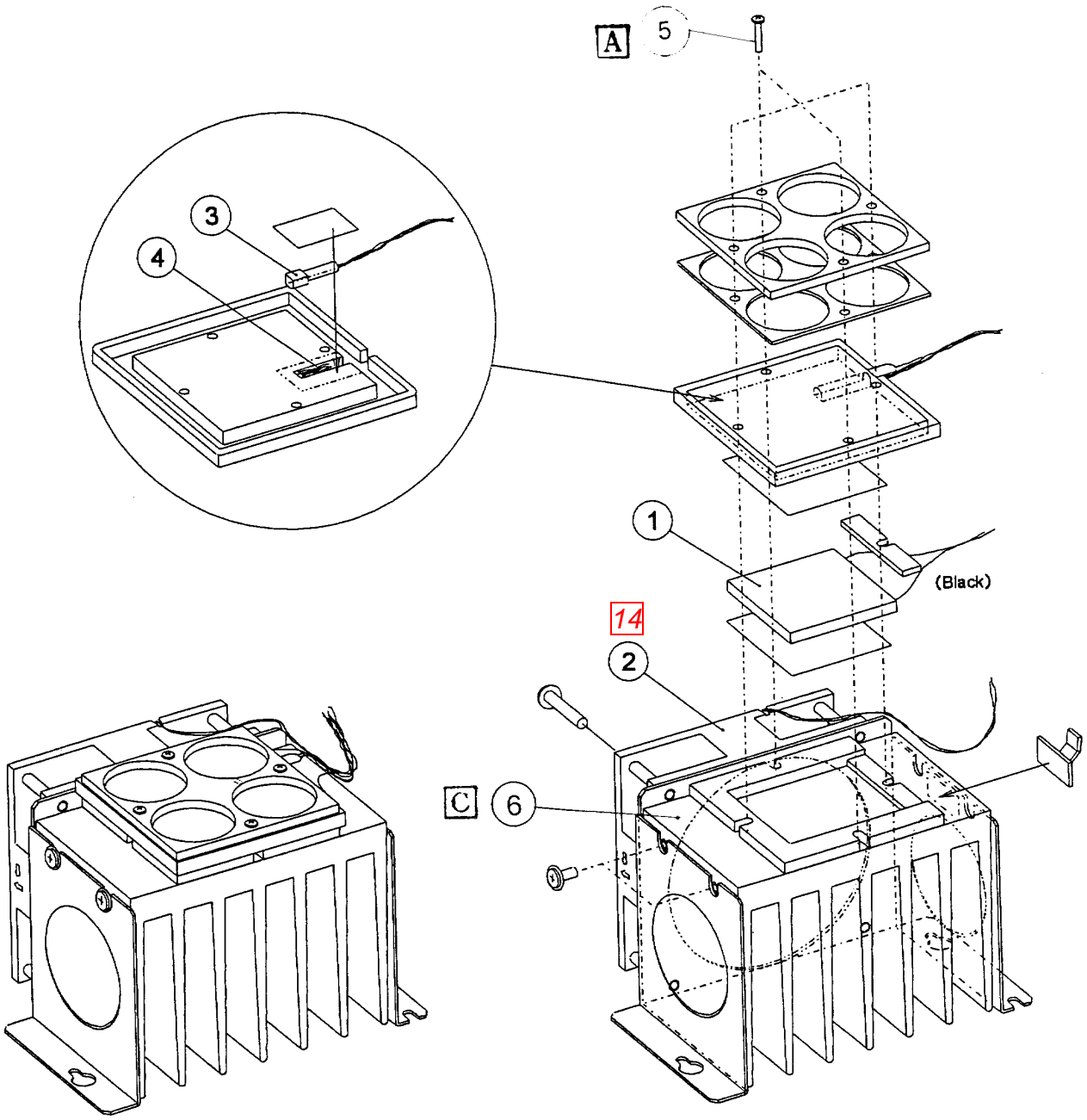
	Code No.	Drawing No.	Description	Qty per Unit
	663-0159-1	1-5*	DETECTOR BLOCK (STANDARD)	1
	663-0158-8	1-6#	DETECTOR BLOCK (AT3)	1
	663-0399-1	1-8&	DETECTOR BLOCK (D-DIMER)	1
17	663-0415-4	1-8$	DETECTOR BLOCK (D-DIMER 800NM)	1
	662-0217-3	1*#	PCB NO.2132 (STANDARD)	1
	662-0281-2	1*#	PCB NO.2156 (STANDARD CLOT/AT3)	1
	662-0285-7	1&	PCB NO.2156 (5 CIRCUITS DD 575NM)	1
17	662-0284-3	1$	PCB NO.2156 (4 CIRCUITS DD 800NM)	1
	662-2205-6	2	COAGULATION LED ASSY	1
	662-0218-7	3*	PCB NO.2132 (2 CIRCUITS)	1
	662-0282-6	3*	PCB NO.2156 (2 CIRCUITS CLOT)	1
	662-0219-1	3#	PCB NO.2132 (3 CIRCUITS)	1
17	662-0283-0	3#&$	PCB NO.2156 (3 CIRCUITS AT3/DD)	1
	662-2203-9	4	DETECTOR THERMAL ASSY	1
	663-0160-6	5	HEATER ASSY	1
17	662-2204-2	6#&$	CHROMOGENIC LED ASSY	1
	662-0280-9	7&	D-DIMER LED ASSY (575NM)	1
17	662-0279-4	7$	D-DIMER LED ASSY (800NM)	1
17	663-0404-3	8&$	CH6	10
	266-5395-2	9	FUSE THERMAL 125V5A TYPE210	10
	662-8214-1	10	WIRING CORD PD DW0458	1

* : CA-510, CA-520
\# : CA-530, CA-540
& : CA-550, CA-560
$: CA-550, CA-560 (800nm detector block)

: PCB used with CA-550/560 (upper compatible), and will be replaced with the old PCB (written above) when the stock is depleted.

	ECR, TB No	Serial No.
8	200203	CA-550 A1001-, CA-560 A1001-
17	303G037	Not applicable

CA-500 Cooling Section Assy



CA-500 Cooling Section Assy

	Code No.	Drawing No.	Description	Qty per Unit
	663-0161-0	1-	COOLING SECTION ASSY	1
B	663-0162-3	1	COOLER ASSY (THERMAL MODULE)	1
14	663-0163-7	2	COOLING FAN ASSY	1
	662-2206-0	3	COOLER THERMAL ASSY (SERNSOR IC)	1
	426-3152-0	4	SILICONE GREASE THERMAL 800-8	1
A	348-5936-2	5	SCREW ROUND M3X15 PC(+)	100
C	663-0372-1	6	HEAT SINK DM1113	1

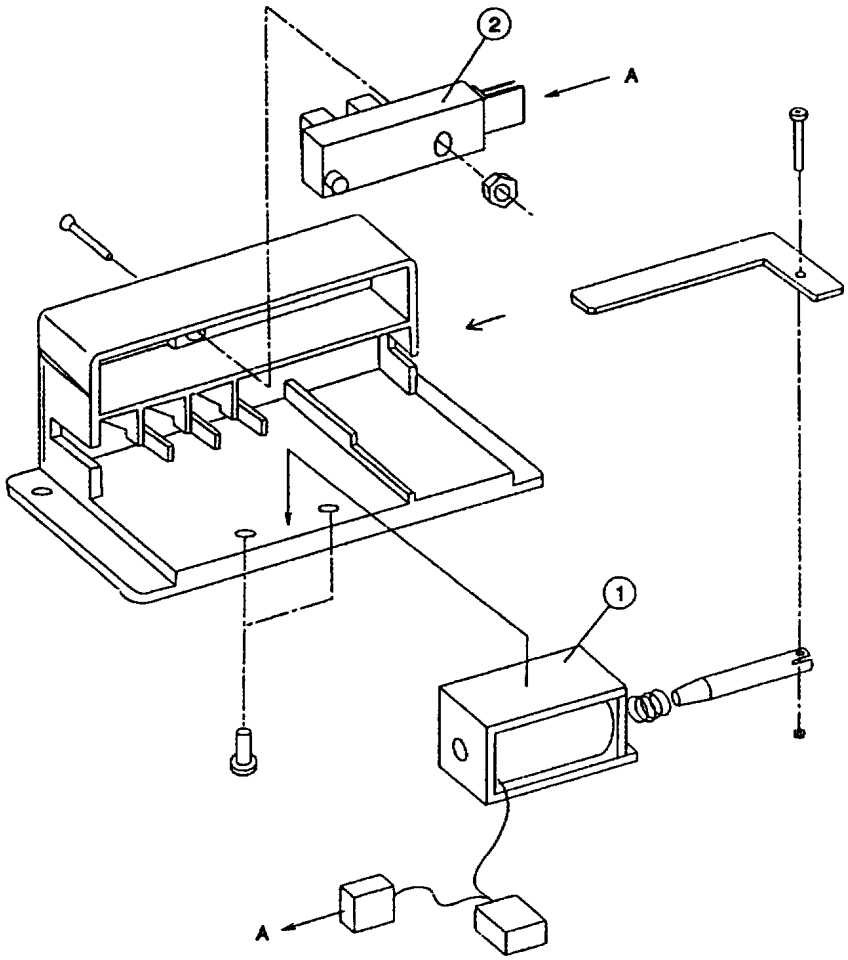
A 399E018 - -

B 399J015 CA-510 A1030-, CA-520 A1003-, CA-530 A1393-, CA-540 A2277-

C 399K012 - - -

14 ECR303C033

Table Lock Mech. Assy



X AXIS SLIDER ASSY

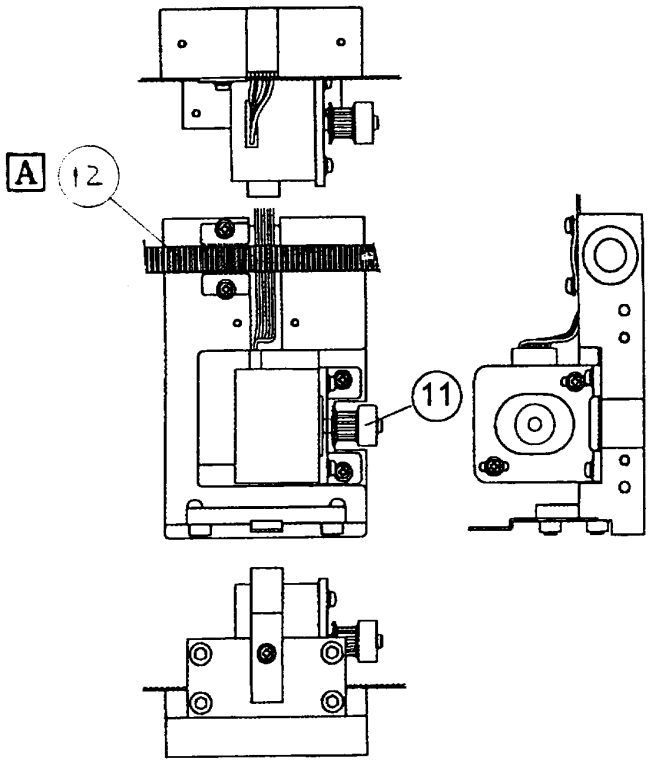
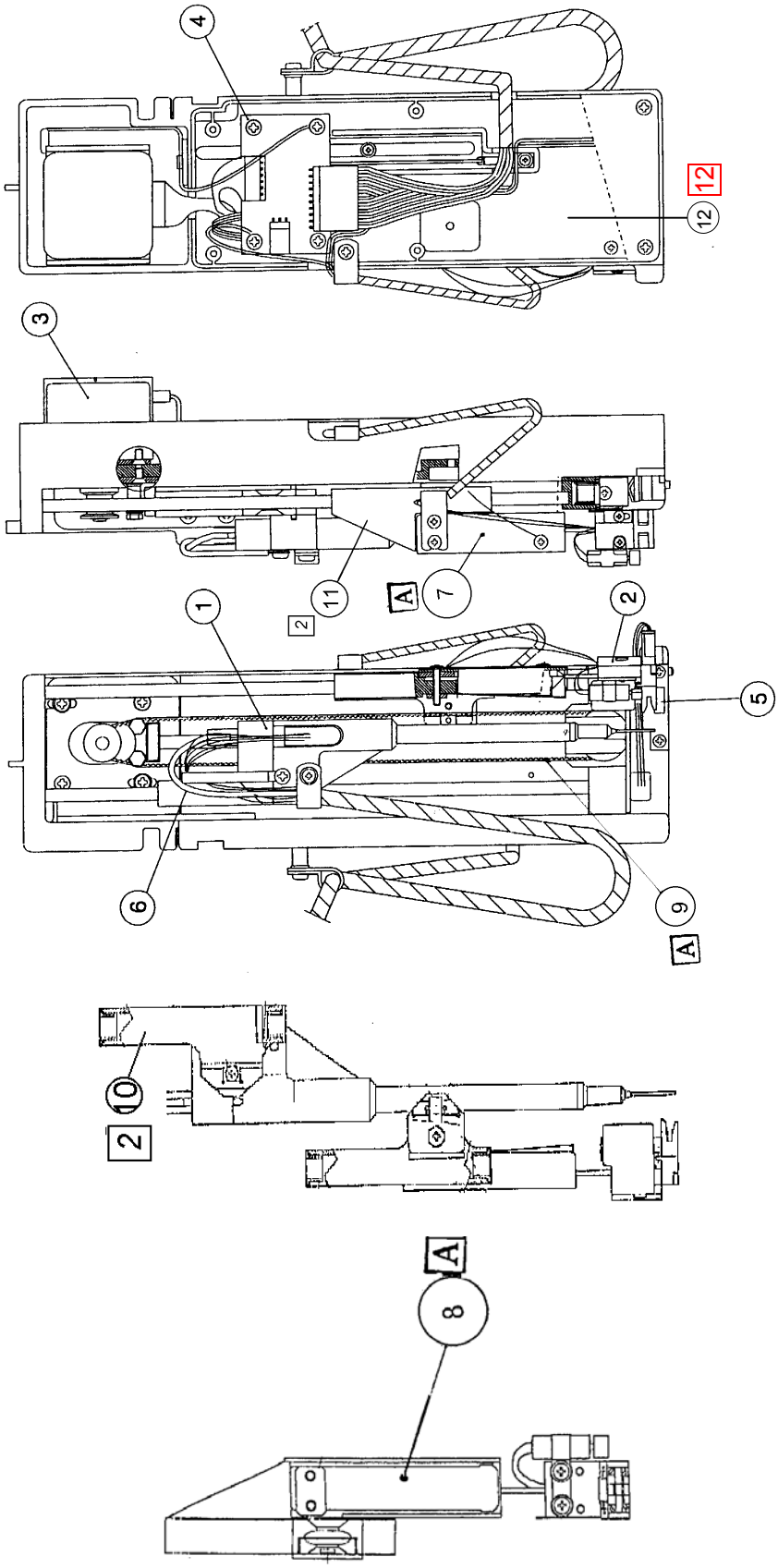


TABLE LOCK MECHANISM ASSY & X AXIS SLIDER ASSY

	Code No.	Drawing No.	Description	Qty per Unit
	663-0217-1	1-	TABLE LOCK MECHANISM ASSY	1
	663-0200-8	1	SOLENOID ASSY	1
	228-3753-3	2	PHOTO-INTERRUPTER LG-217D-3	1
	663-0181-4	11-	X AXIS SLIDER ASSY	1
	663-0185-9	11	Y AXIS MOTOR ASSY	1
A	342-1816-4	12	TIMING BELT B488MXL9.5	1

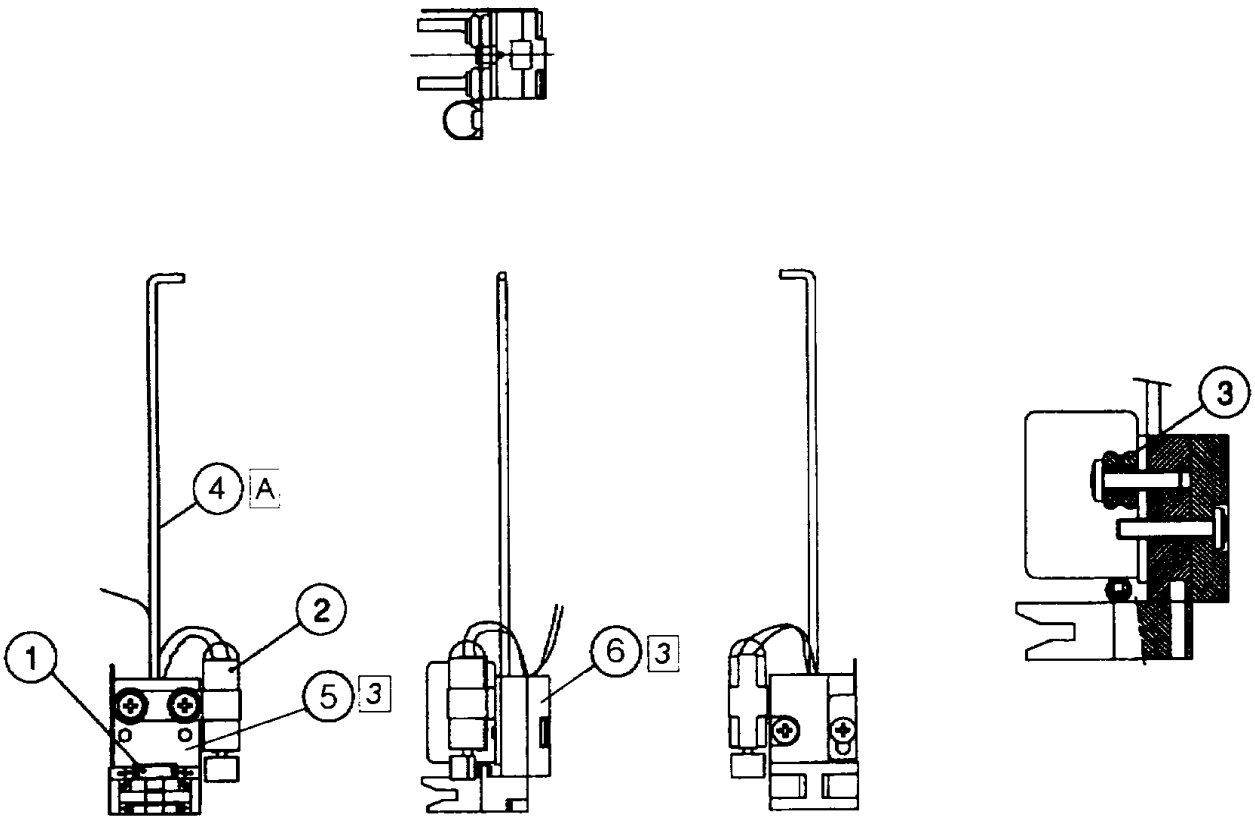
CA-500 Z Axis Base Assy



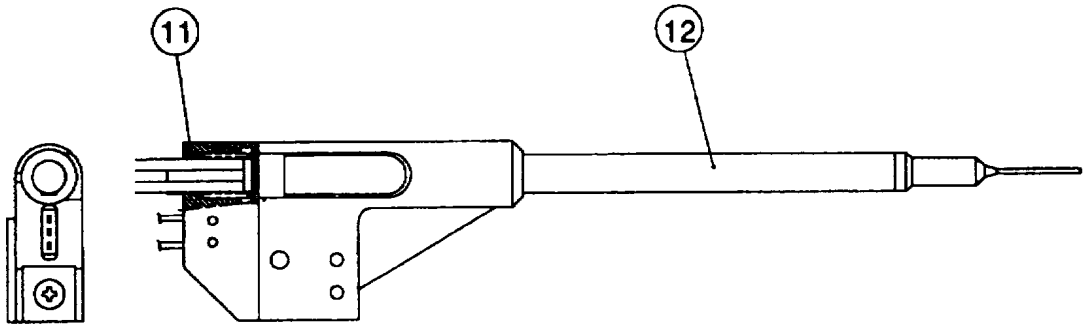
CA-500 Z Axis Base Assy

	Code No.	Drawing No.	Description	Qty per Unit
	663-0182-8	1-	Z AXIS BASE ASSY	1
	663-0183-1	1	PIPETTE HOLDER ASSY	1
	663-0188-0	2	CATCHER ASSY	1
	663-0186-2	3	Z AXIS MOTOR ASSY	1
	662-0222-2	4	PCB NO.9264	1
	228-4050-8	5	PHOTO-IC SENSOR PS-R11L	1
	663-0189-3	6	TUBING ASSY (PIPETTE)	1
A	324-9078-4	7	CATCH BOX DM1357	1
A	324-9076-7	8	CATCH HOLD PLATE DM1358	1
A	342-1815-1	9	TIMING BELT B216MXL4.8	1
2	663-0393-0	10	Z1 SLIDER-C ASSY DU1469	1
2	663-0394-3	11	Z2 SLIDER-C ASSY DU1468	1
12	322-9152-9	12	ZSB REAR COVER	1

CA-500 Catcher Assy



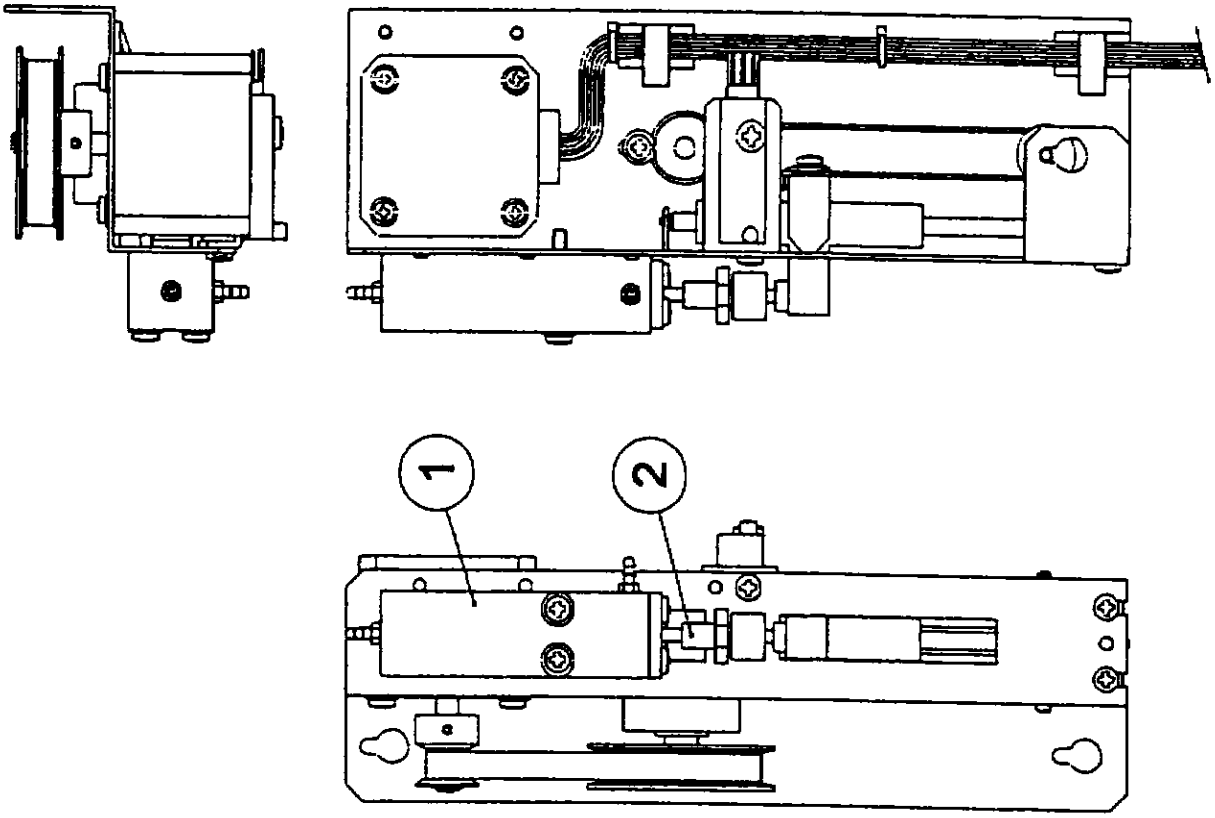
CA-500 Pipette Holder Assy



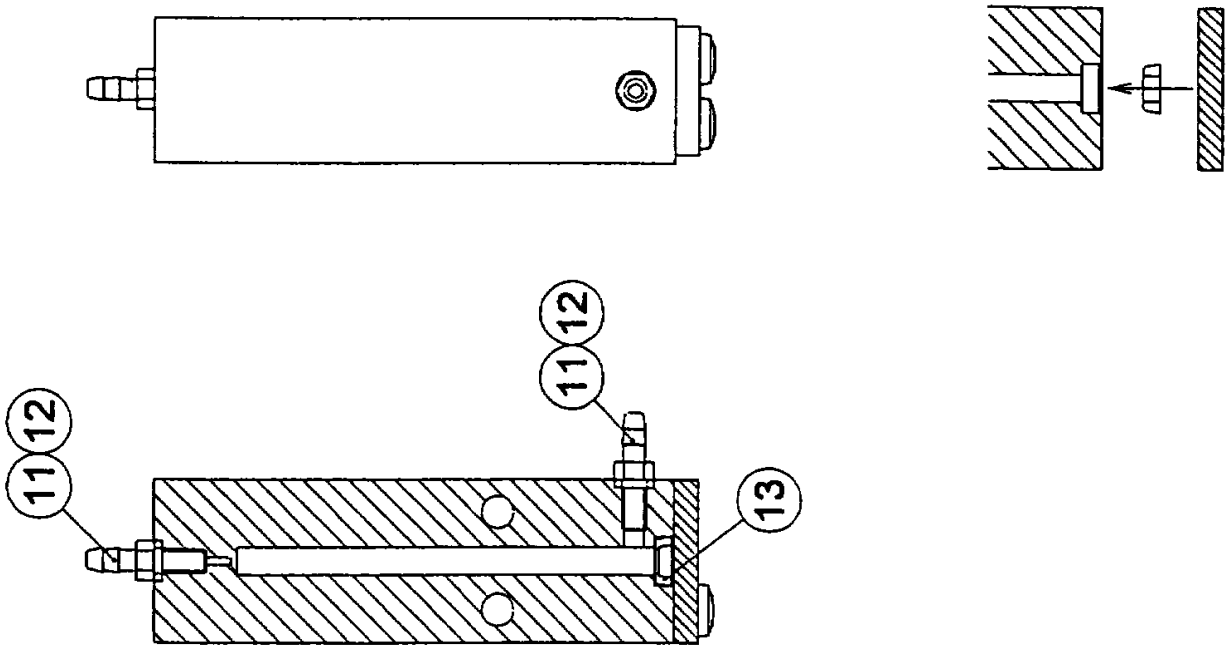
CA-500 CATCHER ASSY & PIPETTE HOLDER ASSY

	Code No.	Drawing No.	Description	Qty per Unit
	663-0188-0	1-	CATCHER ASSY	1
	345-3767-8	1	SPRING PIN KSSC 2017	1
	663-0187-6	2	MIXER MOTOR ASSY	1
	346-4213-1	3	O-RING S-3 (SLICONE)	10
A	324-9077-1	4	VIBRATION ARM DM1163	1
3	324-9082-0	5	C ARM PLATE DM1221	1
3	324-9081-6	6	WIRING CORD HOLDER DM1220	1
	663-0183-1	11-	PIPETTE HOLDER ASSY	1
	663-0184-5	11	PIPETTE CRUSH SENSOR ASSY	1
	663-0190-8	12	PIPETTE ASSY CA-500	1

CA-500 Volumetric Piston Assy



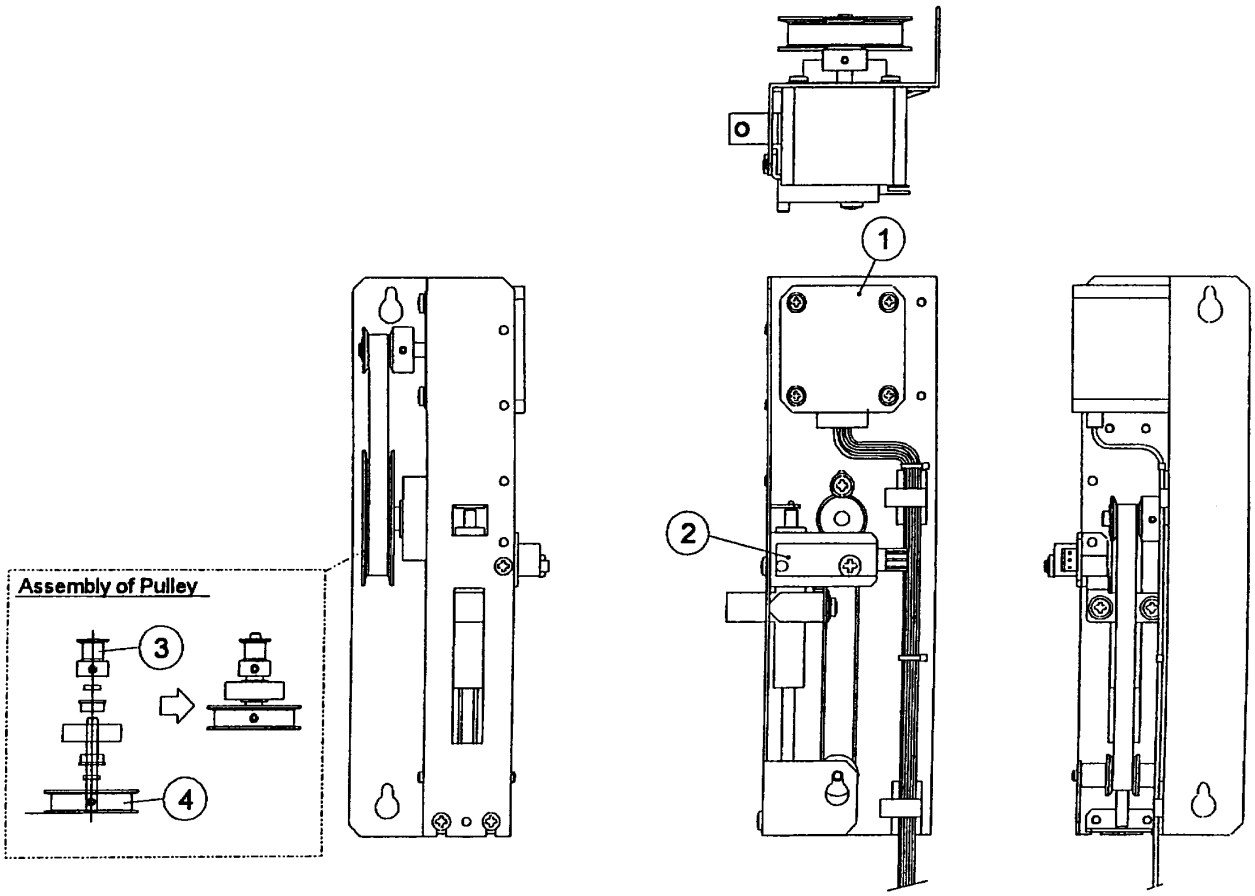
CA-500 Cylinder Assy



VALUMETRIC POSTON ASSY & CA-500 CYLINDER ASSY

Code No.	Drawing No.	Description	Qty per Unit
663-0164-1	1-	VOLUMETRIC PISTON ASSY	1
663-0166-8	1	CYLINDER ASSY	1
663-0167-1	2	PISTON ASSY	1
663-0166-8	11-	CYLINDER ASSY	1
442-3509-2	11	NIPPLE NO. 9	10
343-2466-0	12	O-RING NO.16	50
346-8215-2	13	SEAL TEFLON AR401-P3-XC	1

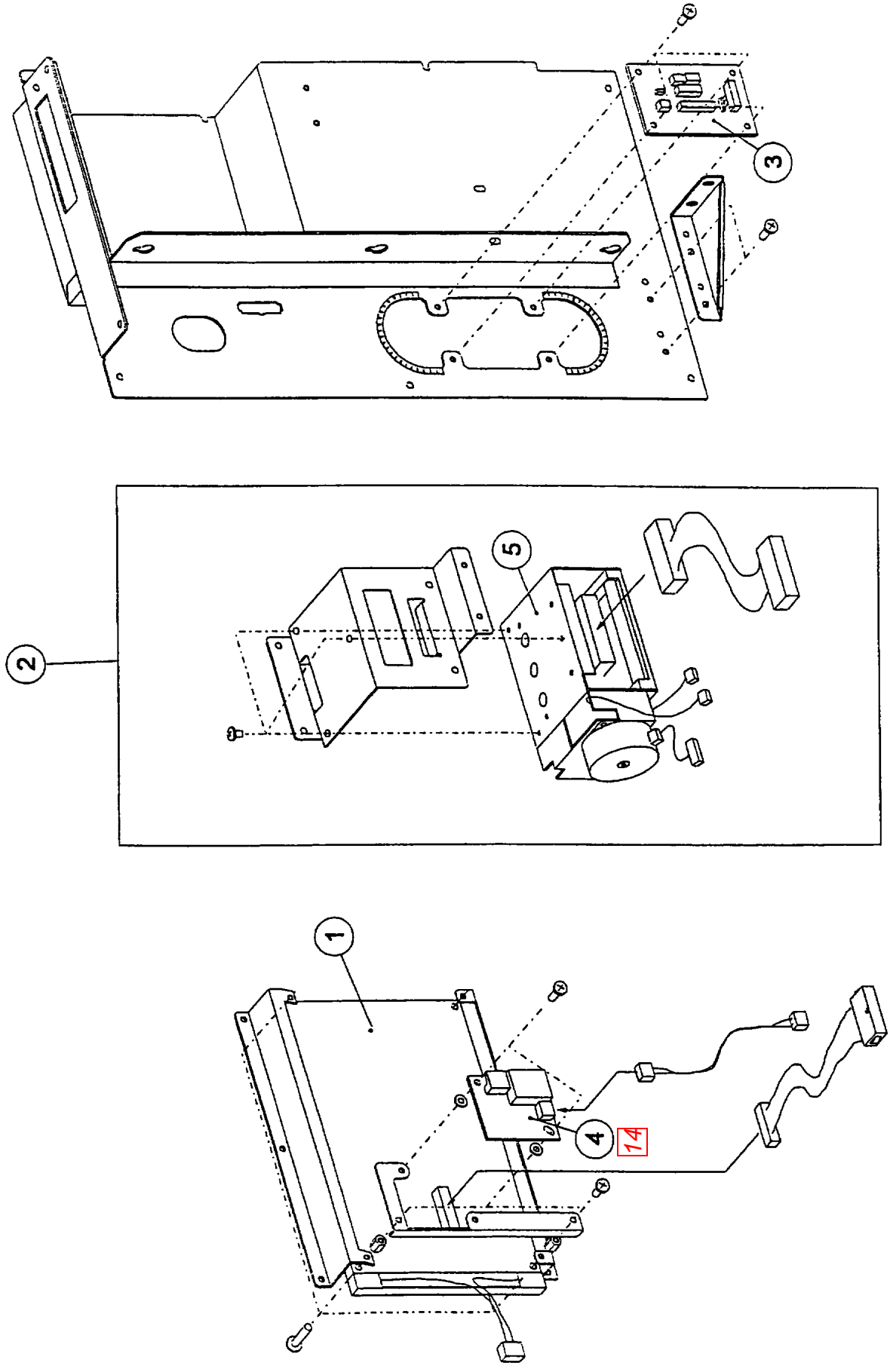
CA-500 Volumetric Mech. Assy



CA-500 Volumetric Mech. Assy

Code No.	Drawing No.	Description	Qty per Unit
663-0165-4	1	SYRINGE MOTOR ASSY	1
228-3753-3	2	PHOTO-INTERRUPTER LG-217D-3	1
342-1517-1	3	PULLEY NO.185	1
342-2776-6	4	PULLEY NO.143	1

CA-500 Operation Panel Assy (1/2)



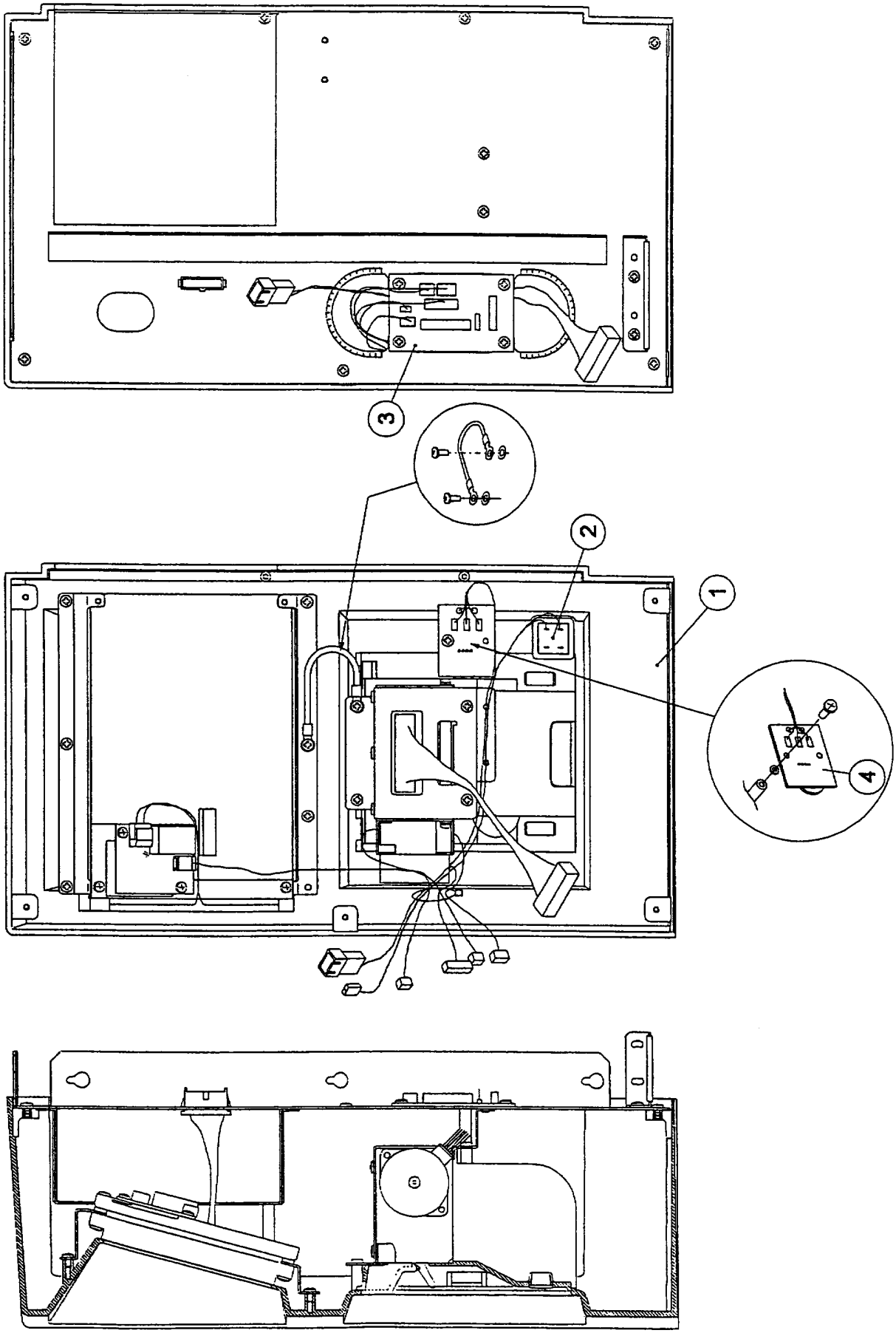
CA-500 Operation Panel Assy (1/2)

	Code No.	Drawing No.	Description	Qty per Unit
	663-0168-5	1-	OPERATION PANEL ASSY	1
	228-3754-7	1	LCD LRHBJ3431A	1
	663-0172-1	2	PRINTER ASSY	1
	662-0228-4	3	PCB NO.9265	1
8	662-0289-1	3	PCB NO.9303	1
14	~~228-9153-2~~	~~4~~	~~INVERTER CXA-K05M-C~~	~~1~~
14 20	~~228-9153-2~~	~~4~~	~~INVERTER INV-5~~	~~1~~
20	228-9301-0	4	INVERTER INV-5	1
	281-7226-1	5	PRINTER FTP-421MCL001	1

:PCB No.9303 developed for the CA-550/560 is compatible with all CA-500 series analyzers.
Therefore, PCB No.9265 will be replaced by PCB No.9303 when current stock is depleted.

8 TB200203
14 ECR303C033
20 ECR304C035

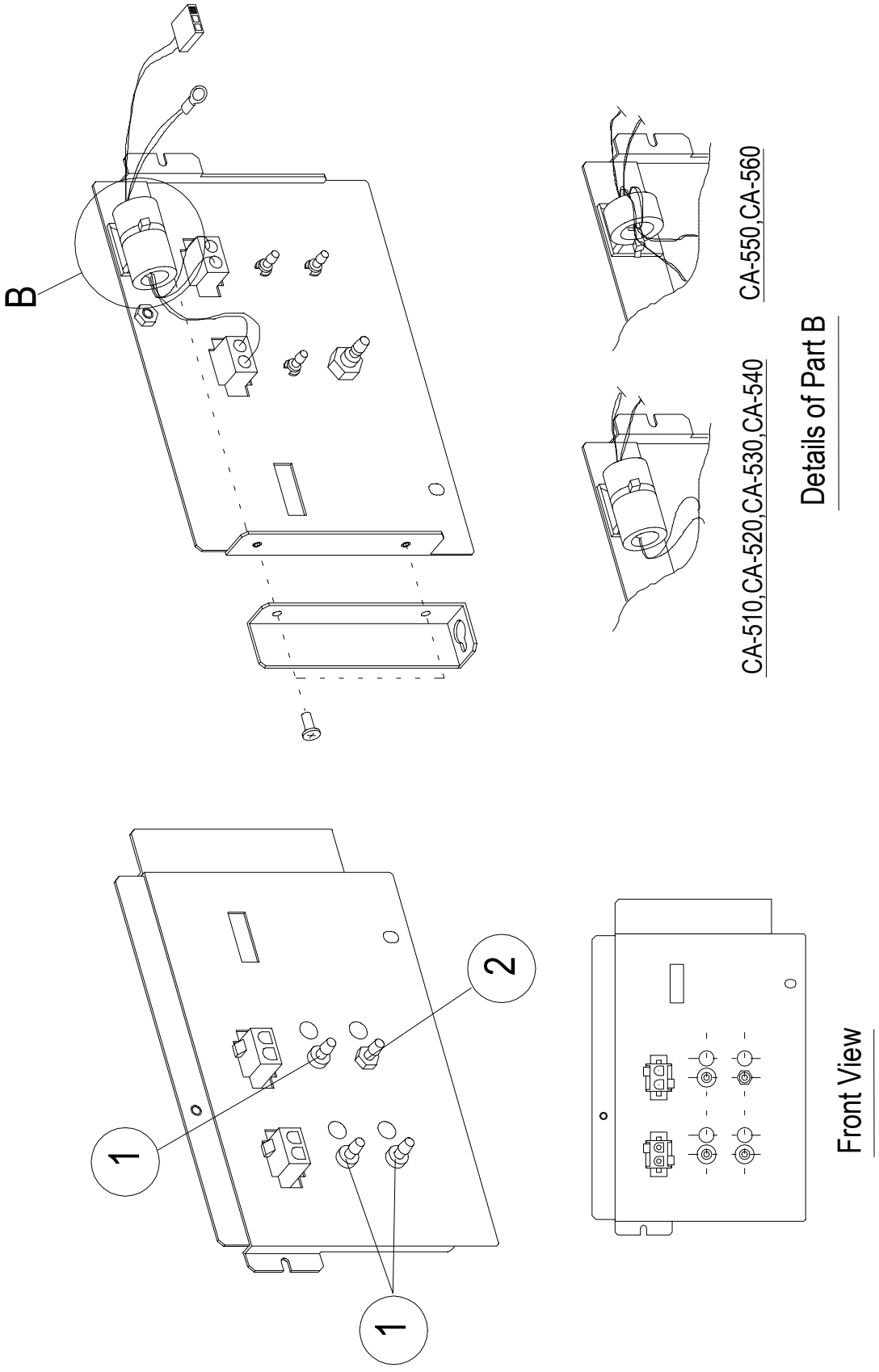
CA-500 Operation Panel Assy (2/2)



CA-500 Operation Panel Assy (2/2)

Code No.	Drawing No.	Description	Qty per Unit
663-0168-5	1-	OPERATION PANEL ASSY	1
663-0170-3	1	OPERATION PANEL BASE ASSY	1
663-0171-7	2	EMERGENCY STOP SW ASSY	1
662-0228-4	3	PCB NO.9265	1
663-0169-9	4	VR ASSY	1

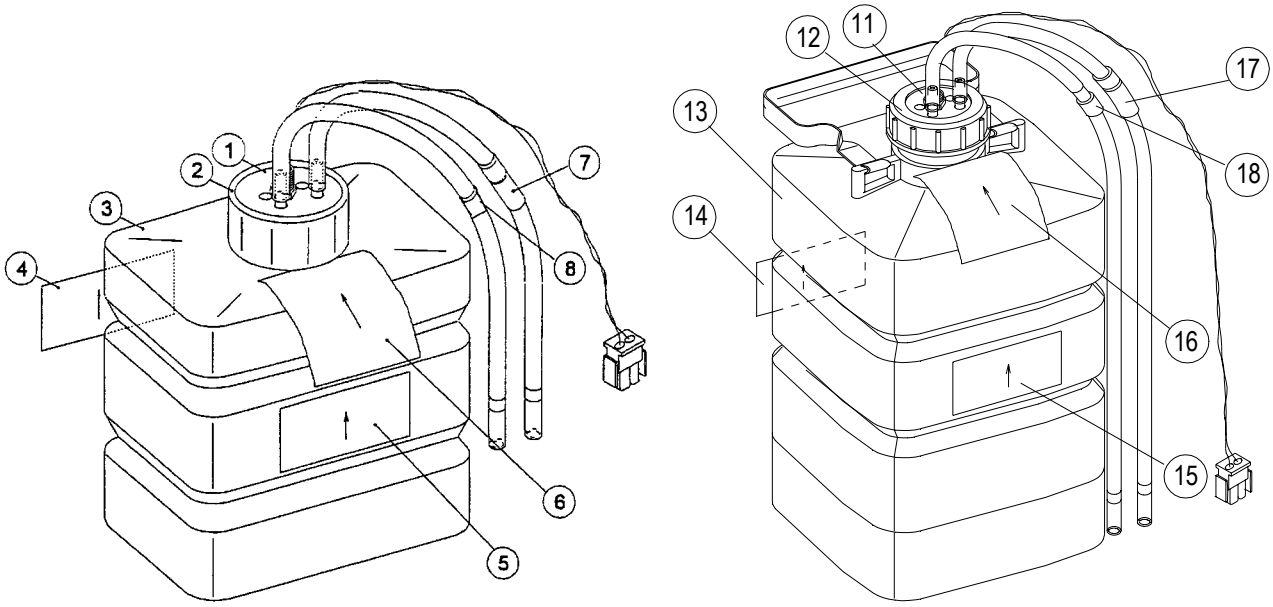
CA-500 Rear Panel for Bottles



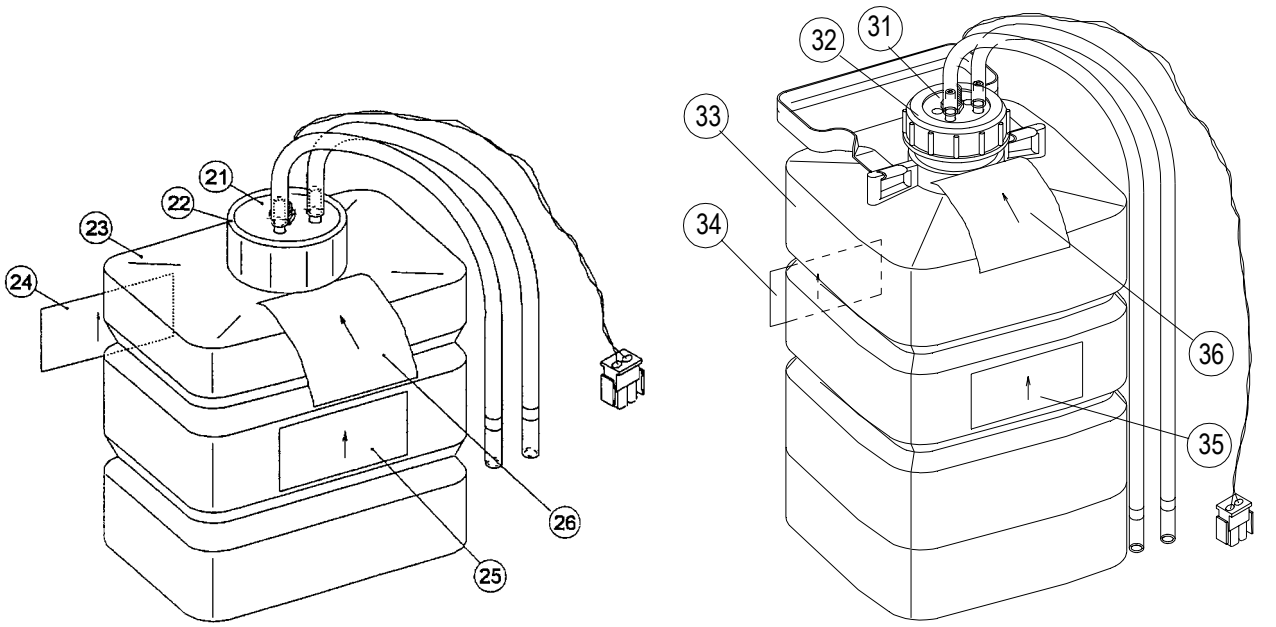
CA-500 Rear Panel for Bottles

Code No.	Drawing No.	Description	Qty per Unit
442-1450-3	1	CONNECTING TUBE NO. 50	5
442-4003-7	2	NIPPLE NO.123	1

CA-500 Rinse Bottle Assy 8



CA-500 Waste Bottle Assy 8



RINSE BOTTLE ASSY & WASTE BOTTLE ASSY

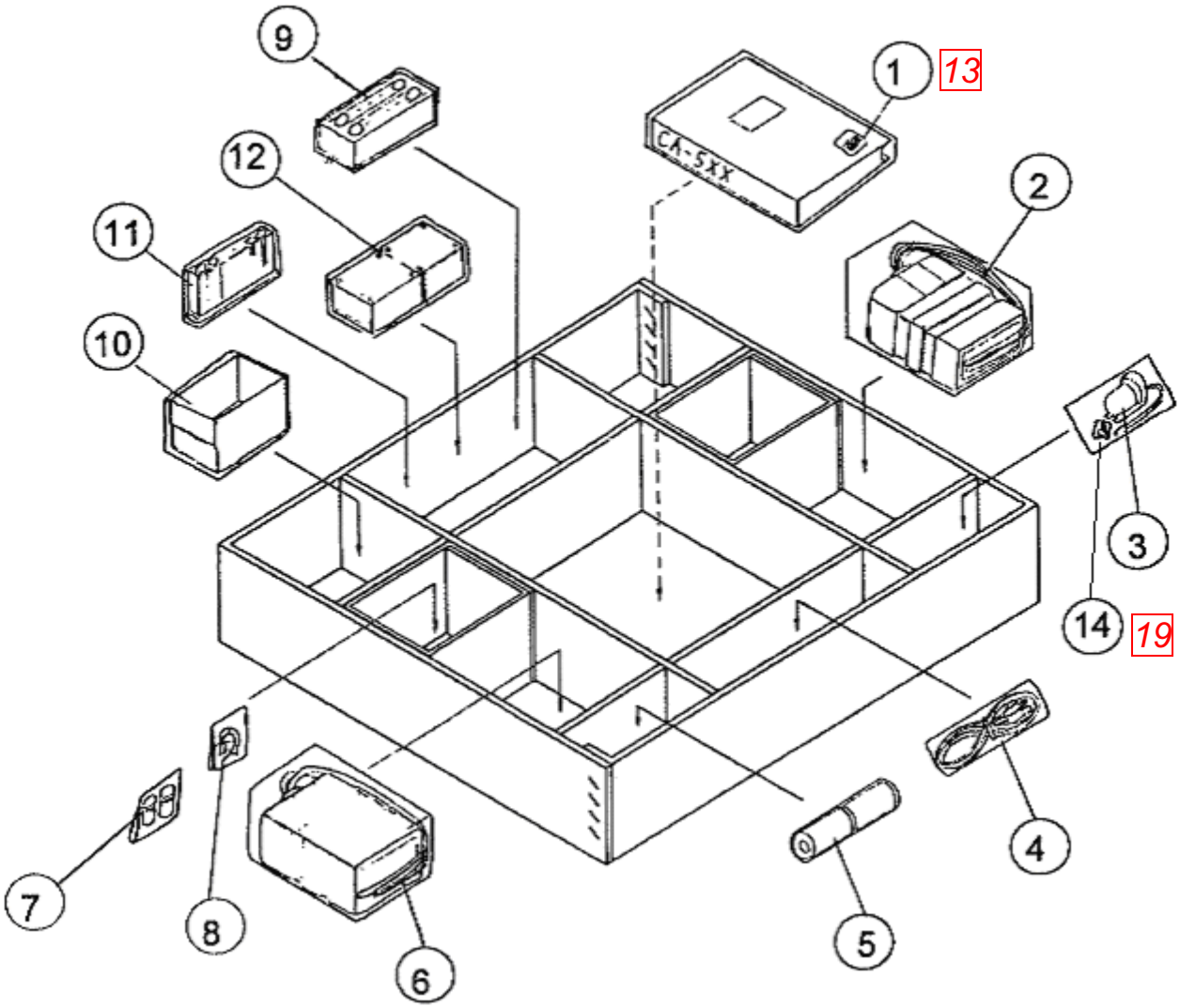
	Code No.	Drawing No.	Description	Qty per Unit
	663-0209-1	1-8*	RINSE BOTTLE ASSY CA-5H (2L)	1
8	663-0407-4	1-8#	RINSE BOTTLE ASSY CA-5H (2L/EU/UK)	1
	662-2220-2	1	RINSE BOTTLE FLOAT SWITCH ASSY (2L)	1
	424-4679-6	2	LID NO. 9	5
	424-9150-0	3	BOTTLE TANK-A (RINSE 2L/BLUE)	1
15	369-8604-6	4*	INSTRUCTION LABEL-7	1
15	369-8326-1	4#	CAUTION MARK NO.208	1
15	369-8601-5	5*	INSTRUCTION LABEL-1 (JAPANESE)	UNSALABLE
15	369-8326-1	5#	CAUTION MARK NO.208	1
	369-8016-8	6*	CAUTION MARK NO. 16	1
	664-0167-9	7	FILTER ASSY FOR RINSE BOTTLE	1
	443-2804-4	8	NON-RETURN VALVE MFP-6-V	1
8	663-0402-6	11-18*	RINSE BOTTLE ASSY CA-5H (5L)	1
8	663-0405-7	11-18#	RINSE BOTTLE ASSY CA-5H (5L/EU/UK)	1
8	662-2409-1	11	RINSE BOTTLE FLOAT SWITCH ASSY (5L)	1
8	424-4679-6	12	LID NO. 9	5
15	663-0410-6	13-15*	BOTTLE TANK (RINSE 5L/BLUE)	1
15	663-0411-0	13-15#	BOTTLE TANK (RINSE 5L/BLUE/EU/UK)	1
15	369-8604-6	14*	INSTRUCTION LABEL-7	1
15	369-8326-1	14#	CAUTION MARK NO.208	1
15	369-8601-5	15*	INSTRUCTION LABEL-1 (JAPANESE)	UNSALABLE
15	369-8326-1	15#	CAUTION MARK NO.208	1
8	369-8016-8	16*	CAUTION MARK NO. 16	1
8	664-0167-9	17	FILTER ASSY FOR RINSE BOTTLE	1
8	443-2804-4	18	NON-RETURN VALVE MFP-6-V	1
	663-0210-5	21-26*	WASTE BOTTLE ASSY CA-5H (2L)	1
10	663-0408-8	21-26#	WASTE BOTTLE ASSY CA-5H (2L/EU/UK)	1
	662-2221-6	21	WASTE BOTTLE FLOAT SWITCH ASSY (2L)	1
	424-4679-6	22	LID NO. 9	5
	424-9151-3	23	BOTTLE TANK-A (WASTE 2L/RED)	1
15	369-8602-9	24*	INSTRUCTION LABEL-2	1
15	369-8603-2	25*	INSTRUCTION LABEL-3 (JAPANESE)	UNSALABLE
	369-8016-8	26*	CAUTION MARK NO. 16	1
8	663-0403-0	31-36*	WASTE BOTTLE ASSY CA-5H (5L)	1
10	663-0406-1	31-36#	WASTE BOTTLE ASSY CA-5H (5L/EU/UK)	1
8	662-2410-6	31	WASTE BOTTLE FLOAT SWITCH ASSY (5L)	1
8	424-4679-6	32	LID NO. 9	5
15	663-0412-3	33-35*	BOTTLE TANK (WASTE 5L/RED)	1
15	663-0413-7	33-35#	BOTTLE TANK (WASTE 5L/RED/EU/UK)	1
15	369-8602-9	34*	INSTRUCTION LABEL-2	1
15	369-8603-2	35*	INSTRUCTION LABEL-3 (JAPANESE)	UNSALABLE
8	369-8016-8	36*	CAUTION MARK NO. 16	1

* : For 117V

: For 220/240V

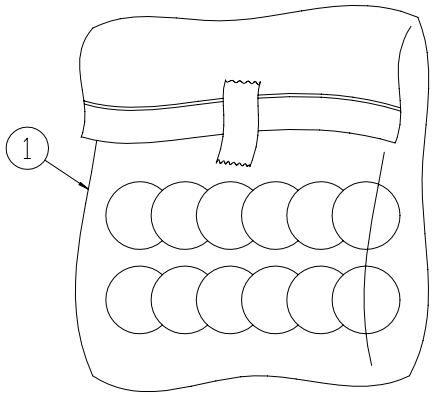
8 TB200203
10 ECR301K074
15 ECR303F001

CA-500 Accessories



CA-5H Z-Axis Position Adjustment Tool PM 13

(Note) This tool is not included with CA-500 Accessories.



13 ECR303C012

19 TB200408

CA-500 ACCESSORIES

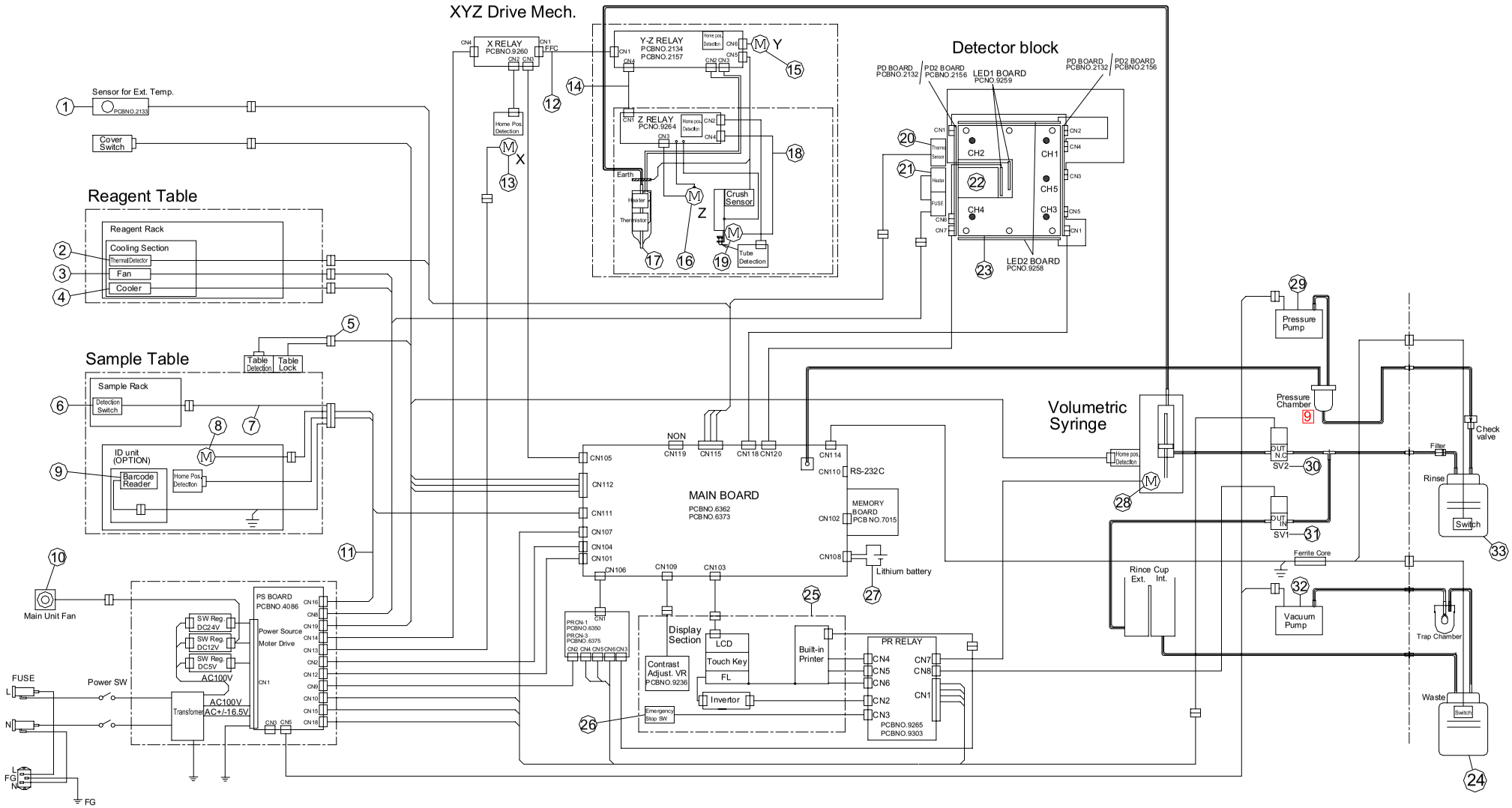
	Code No.	Drawing No.	Description	Qty per Unit
13	~~461-2047-7~~	~~1~~	~~OPERATOR'S MANUAL CA-500~~	~~1~~
13	461-2655-0	1	OPERATORS MANUAL CA-500 (2)	1
	663-0209-1	2*	RINSE BOTTLE ASSY CA-5H (2L)	1
	663-0402-6	2#	RINSE BOTTLE ASSY CA-5H (5L)	1
	663-0407-4	2*	RINSE BOTTLE ASSY CA-5H (2L/EU/UK)	1
	663-0405-7	2#	RINSE BOTTLE ASSY CA-5H (5L/EU/UK)	1
	663-0211-9	3	TRAP CHAMBER COMPLETE	1
	264-0801-7	4	ADAPTOR ID-23/G	1
	921-0351-8	5	PAPER THERMAL F1-2 (5/BOX)	1
	663-0210-5	6*	WASTE BOTTLE ASSY CA-5H (2L)	1
	663-0403-0	6#	WASTE BOTTLE ASSY CA-5H (5L)	1
10	663-0408-8	6*	WASTE BOTTLE ASSY CA-5H (2L/EU/UK)	1
10	663-0406-1	6#	WASTE BOTTLE ASSY CA-5H (5L/EU/UK)	1
	541-1352-1	7	PUSH VIAL PV-10	10
	663-0213-6	8	SAMPLE TUBE SPACER 13 PHI	1
	663-0206-0	9	REAGENT RACK ASSY	1
	663-0207-3	10	REACTION TUBE TRASH BOX	1
	833-3895-6	11	SAMPLE RACK NO. 3 W/HOLDER #55	1
13	~~365-2231-4~~	~~13~~	~~VIAL SPACER NO.1~~	~~1~~
19	344-5471-7	14	FIXING SCREW TL-233	1
	663-0212-2	OPTION	SAMPLE TUBE SPACER 10MM DIAMET	1

: Included in supply parts of CA-550/560.
* : Included in supply parts of CA-510, 520, 530 and 540.

CA-500 Z-Axis Position Adjustment Tool PM 13

Code No.	Drawing No.	Description	Qty per Unit
031-0171-4	1	CA-5H Z-AXIS POSITION ADJUSTMENT TOOL PM	1

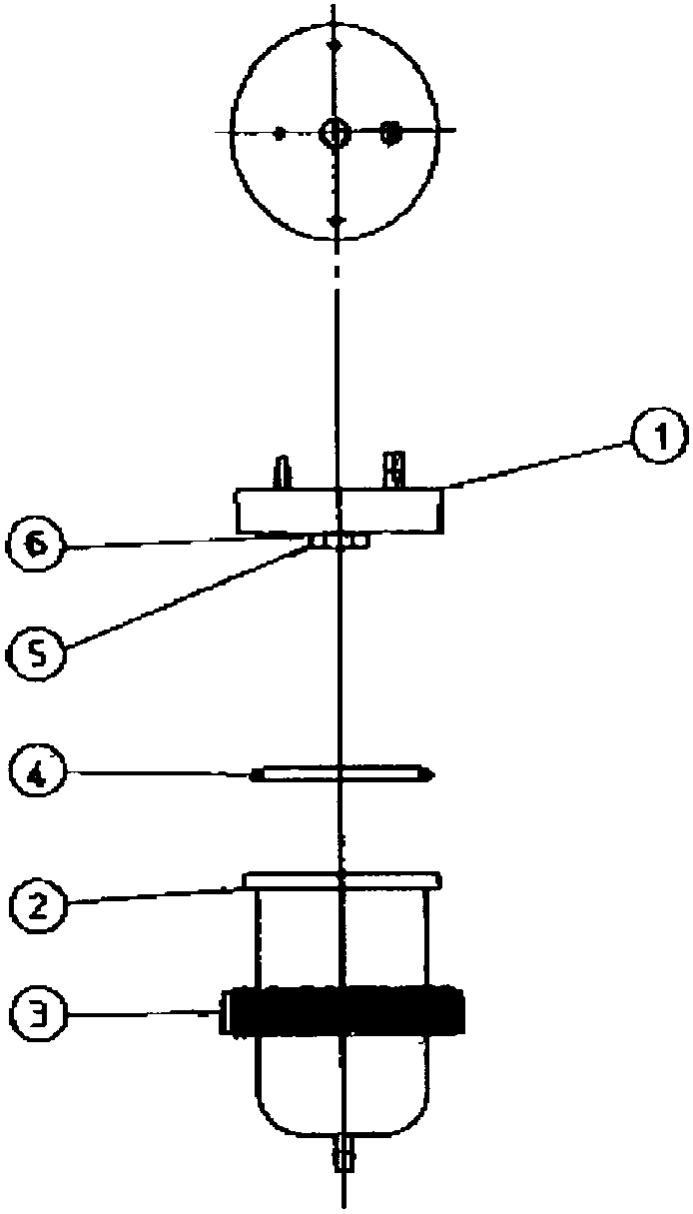
10 ECR301K074
13 ECR303C012
19 TB200408


XYZ Drive Mech.
X RELAY
PCBNO.9260
Y-Z RELAY
PCBNO.2134
PCBNO.2157
Z RELAY
PCNO.9264
Home Pos. Detection
Crush Sensor
Tube Detection
Earth
Heater
Thermistor
Detector block
PD BOARD
PCBNO.2132
PD2 BOARD
PCBNO.2156
LED1 BOARD
PCNO.9259
LED2 BOARD
PCNO.9258
CH1
CH2
CH3
CH4
CH5
Thermo Sensor
Heater
FUSE
Sensor for Ext. Temp.
PCBNO.2133
Cover Switch
Reagent Table
Reagent Rack
Cooling Section
Thermal Detector
Fan
Cooler
Sample Table
Table Detection
Table Lock
Sample Rack
Detection Switch
ID unit (OPTION)
Barcode Reader
Home Pos. Detection
Main Unit Fan
PS BOARD
PCBNO.4086
SW Reg. DC24V
SW Reg. DC12V
SW Reg. DC5V
Power Source
Moter Drive
AC100V
Transformer
AC+/-16.5V
FUSE
Power SW
L
N
FG
MAIN BOARD
PCBNO.6362
PCBNO.6373
NON
CN105
CN112
CN111
CN107
CN104
CN101
CN106
CN109
CN103
CN119
CN115
CN118
CN120
CN114
CN110
RS-232C
CN102
MEMORY BOARD
PCB NO.7015
CN108
Lithium battery
PRCN-1
PCBNO.6350
PRCN-3
PCBNO.6375
Display Section
LCD
Touch Key
FL
Invertor
Contrast Adjust. VR
PCBNO.9236
Emergency Stop SW
Built-in Printer
PR RELAY
PCBNO.9265
PCBNO.9303
Volumetric Syringe
Home pos. Detection
Rince Cup
Ext.
Int.
Pressure Pump
Pressure Chamber
9
Check valve
Filter
Rinse
Switch
OUT
N.C
SV2
SV1
IN
Ferrite Core
Vacuum Pump
Trap Chamber
Waste
Switch

CA-500 TUBING DIAGRAM

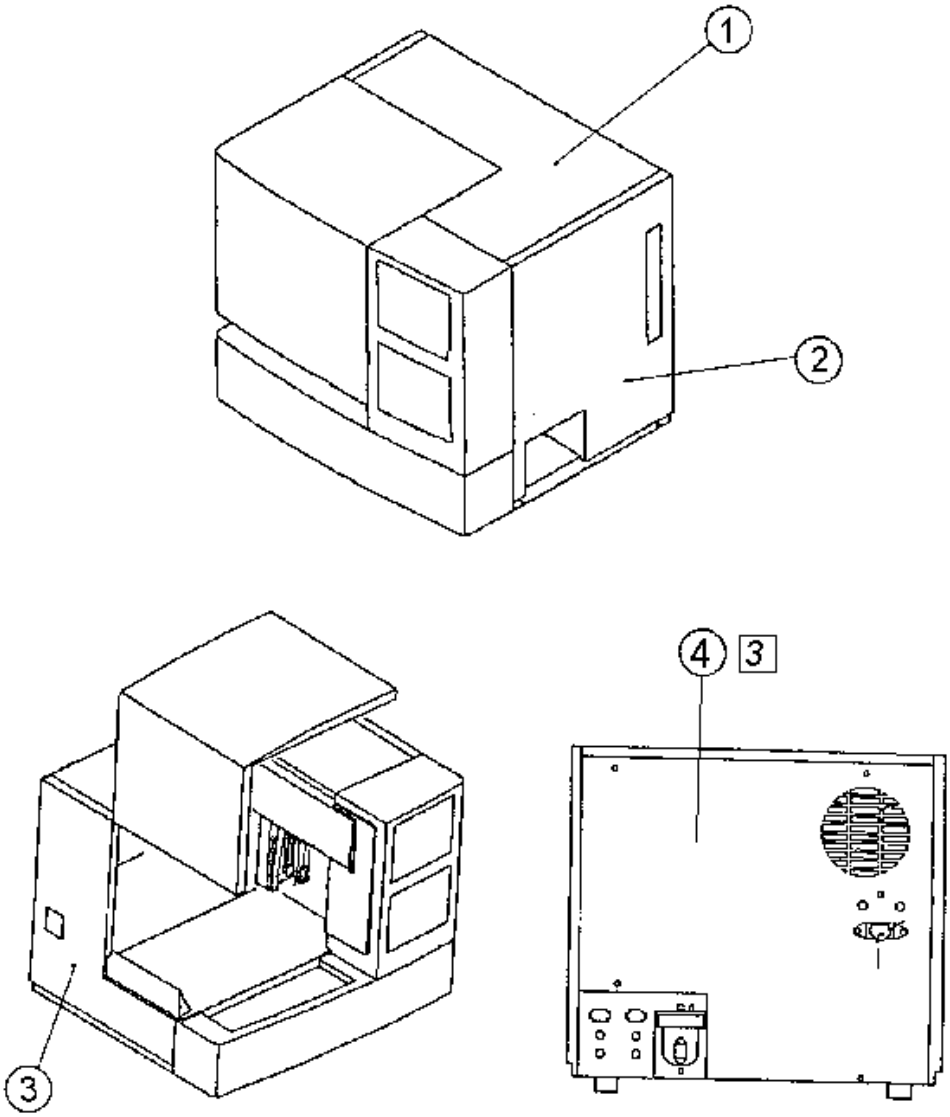
Code No.	Drawing No.	Description	Qty per Unit
662-2207-3	1	THERMAL SENSOR ASSY	1
662-2206-0	2	COOLER THERMAL ASSY	1
663-0163-7	3	COOLING FAN ASSY	1
663-0162-3	4	COOLER ASSY	1
663-0200-8	5	SOLENOID ASSY	1
663-0179-6	6	SAMPLE RACK SENSOR ASSY	1
662-8181-6	7	ID WIRING CORD	1
663-0176-5	8	ID MOTOR ASSY	1
663-0177-9	9	ID ASSY	1
663-0196-0	10	MAIN UNIT FAN ASSY	1
265-1243-1	11	WIRING CORD NO.2703	1
662-8182-0	12	X AXIS WIRING CORD	1
663-0201-1	13	X AXIS MOTOR ASSY	1
265-1242-8	14	WIRING CORD NO.2702	1
663-0185-9	15	Y AXIS MOTOR ASSY	1
663-0186-2	16	Z AXIS MOTOR ASSY	1
663-0190-8	17	PIPETTE ASSY CA-500	1
265-1241-4	18	WIRING CORD NO.2701	1
663-0187-6	19	MIXER MOTOR ASSY	1
662-2203-9	20	DETECTOR THERMAL ASSY	1
663-0160-6	21	HEATER ASSY	1
662-2204-2	22	CHROMOGENIC LED ASSY	1
662-2205-6	23	COAGULATION LED ASSY	1
663-0210-5	24	WASTE BOTTLE ASSY	1
663-0169-9	25	VR ASSY	1
663-0171-7	26	EMERGENCY STOP SW ASSY	1
289-9170-6	27	BATTERY LITHIUM CR23500SE-CJ2	1
663-0165-4	28	SYRINGE MOTOR ASSY	1
663-0191-1	29	PRESSURE PUMP ASSY	1
663-0198-7	30	SOLENOID VALVE ASSY (VOLUMET.)	1
941-0131-3	31	SOLENOID VALVE NO.14D (PM)	1
663-0197-3	32	VACUUM PUMP ASSY	1
663-0209-1	33	RINSE BOTTLE ASSY CA-500	1
662-8222-1	34	WIRING CORD PD SIGNAL DW0590	1

CA-500 Pressure Chamber Assy



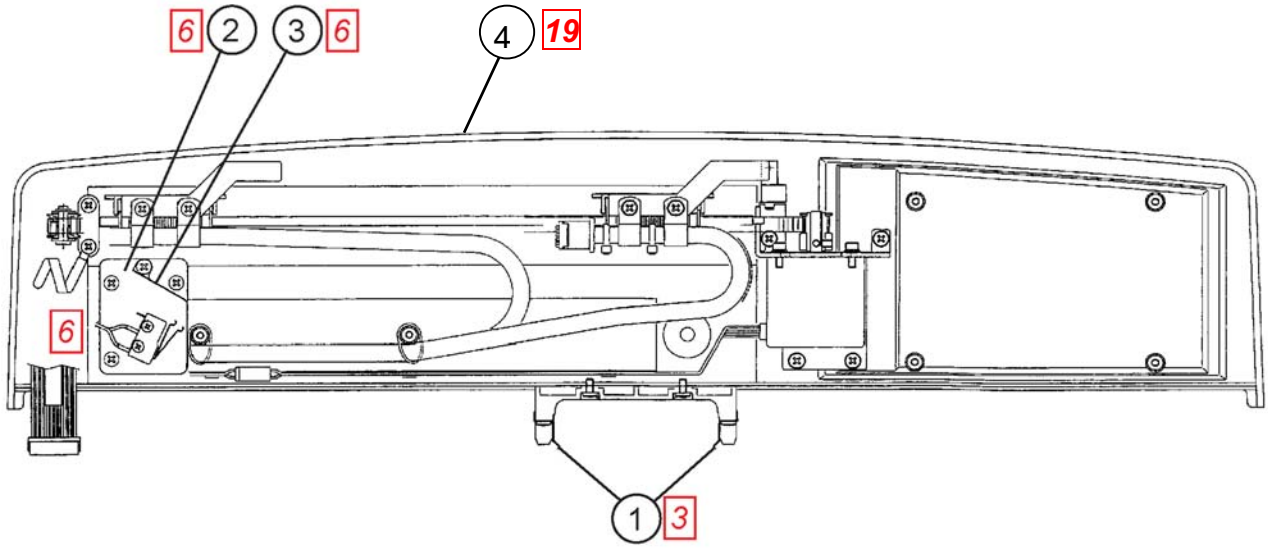
Code No.	Drawing No.	Description	Qty per Unit
365-1333-3	1	SUPPORT NO.247	1
443-0823-8B	2	CHAMBER NO.4	1
363-5015-0	3	FIXING MATERIAL NO.15	1
346-3939-1	4	O-RING P-39	1
- - -	5	BOLT M8X10	1
346-3909-0	6	O-RING P-8 (NITRIL)	1

CA-500 Panels



	Code No.	Drawing No.	Description	Qty per Unit
	663-0373-5	1	TOP PANEL DM0930	1
	663-0375-2	2	PANEL (R) DM0932	1
	363-5015-0	3	PANEL (L) DM0931	1
3	324-9080-2	4	REAR PANEL DM0933 CA5H	1

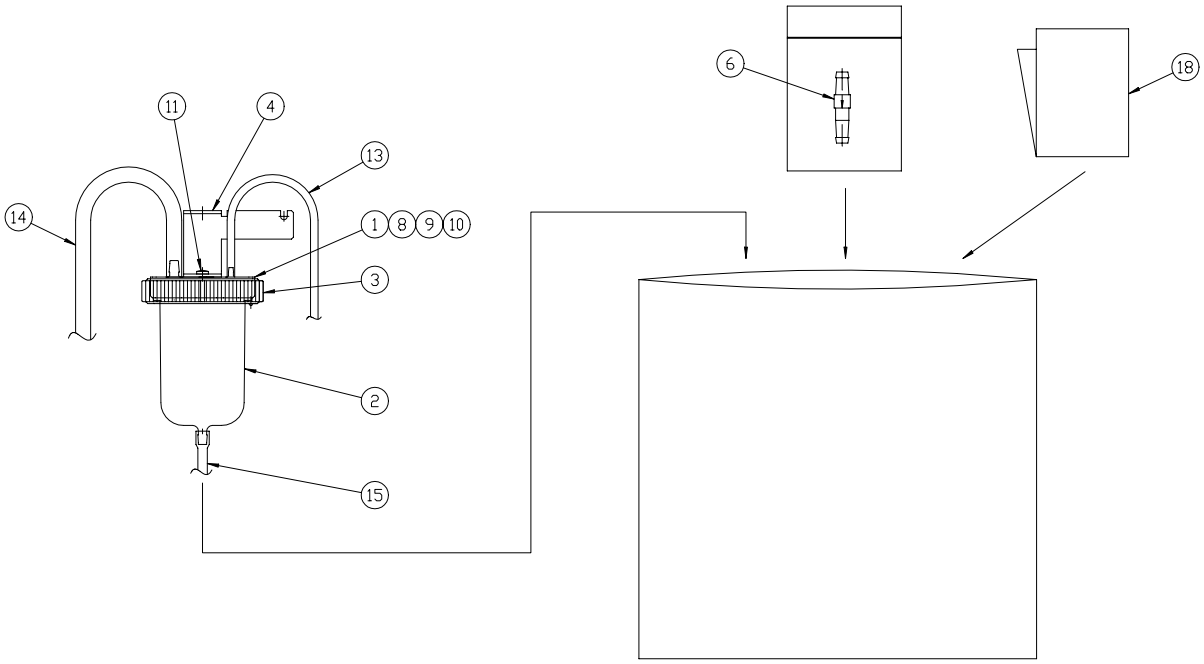
CA-500 Sampler



	Code No.	Drawing No.	Description	Qty per Unit
3	324-9083-3	1	LOCK SPRING DM1298	1
6	324-9084-7	2	SS BASE PLATE DM1361	1
6	324-9085-1	3	SS ACTIARM DM1362	1
19	663-0175-1	4	SAMPLE TABLE BASE ASSY	1

CA-500 Pressure Chamber Kit (OPTION) 9

-



Code No.	Drawing No.	Description	Qty per Unit
021-0011-0	1-	PRESSURE CHAMBER KIT CA-5H	1
365-1333-3	1	SUPPORT NO.247	1
443-0823-8	2	CHAMBER NO. 4	1
363-5015-0	3	FIXING MATERIAL NO. 15	1
363-1597-8	4	STAY NO.11	1
443-2804-4	6	NON-RETURN VALVE MFP-6-V	1
346-3939-1	8	O-RING P-39	10
346-3909-0	9	O-RING P- 8 (NITRIL)	10
348-5082-5	10	SCREW HEX-SOCKET BOLT M8X14(SU	50
348-3812-1	11	SCREW BINDING M3X6 (SUS)	100
442-5305-4	13	TUBE SILICONE 2 X 4MM SR-1554	1
442-5290-6	14	TUBE SILICONE 4MMID X 8MMOD	20
442-5475-1	15	TUBE TOALONE 3MMID X 6MMOD	10
461-9128-7	18	TRAP CHAMBER PROCEDURE	1

In the following CA instruments, the Pressure Chamber Kit has already installed.
CA-510 S/N A1023 and thereafter
CA-530 S/N A1368 and thereafter
CA-540 S/N A2016 and thereafter

PART NO.	No.	PART DESCRIPTION	UNIT Q'TY
<CLASS A>			
663-0188-0	A-1	CATCHER ASSY	1
663-0162-3	A-2	COOLER ASSY	1
662-0221-9	A-3	PCB NO.6362	1
8 662-0287-4	A-3	PCB NO.6373	1
663-0184-5	A-4	PIPETTE CRUSH SENSOR ASSY	1
913-1091-3	A-5	STANDARD SCATTERING STICK SET	1
<CLASS B>			
424-9150-0	B-1	BOTTLE TANK-A (RINSE/BLUE)	1
424-9151-3	B-2	BOTTLE TANK-A (WASTE/RED)	1
424-4679-6	B-3	LID NO. 9	5
663-0190-8	B-4	PIPETTE ASSY	1
346-8215-2	B-5	SEAL TEFLON AR401-P3-XC	1
663-0198-7	B-6	SOLENOID VALVE ASSY (VOLUMET.)	1
<CLASS C>			
663-0197-3	C-1	VACUUM PUMP ASSY	1
663-0191-1	C-2	PRESSURE PUMP ASSY	1
289-9377-2	C-3	SW REGULATOR LCA150S-12	1
289-9378-6	C-4	SW REGULATOR LCA150S-24-XJCM	1
289-9376-9	C-5	SW REGULATOR LCA50S-5	1

: PCB used with CA-550/560 (upper compatible), and will be replaced with the old PCB (written above) when the stock is depleted.

	PART NO.	PART DESCRIPTION	UNIT Q'TY	PAGE	NO.
A	---	CA-500 PRESSURE CHAMBER ASSY	-	A-1-5	28
	- - -	BOLT M8X10	1	A-1-36	5
	021-0011-0	PRESSURE CHAMBER KIT CA-5H	1	A-1-39	1-
	031-0171-4	CA-5H Z-AXIS POSITION ADJUSTMENT TOOL PM	1	A-1-33	1
	228-3418-6	PHOTO SENSOR EE-SX670	1	A-1-3	6
	228-3753-3	PHOTO-INTERRUPTER LG-217D-3	1	A-1-15	2
	228-3753-3	PHOTO-INTERRUPTER LG-217D-3	1	A-1-23	2
	228-3754-7	LCD LRHBJ3431A	1	A-1-3	8
	228-3754-7	LCD LRHBJ3431A	1	A-1-25	1
	228-4050-8	PHOTO-IC SENSOR PS-R11L	1	A-1-17	5
~~14~~	~~228-9153-2~~	~~INVERTER CXA-K05M-C~~	~~1~~	A-1-25	~~4~~
14	228-9153-2	INVERTER INV-5	1	A-1-25	4
	264-0801-7	ADAPTOR ID-23/G	1	A-1-33	4
	265-1241-4	WIRING CORD NO.2701	1	A-1-35	18
	265-1242-8	WIRING CORD NO.2702	1	A-1-35	14
	265-1243-1	WIRING CORD NO.2703	1	A-1-35	11
	266-3533-5	FUSE HOLDER CAP 031-1663(EUROP	10	A-1-5	7#
	266-3536-6	FUSE HOLDER CAP 031-1666(N.AME	10	A-1-5	7$¥
~~5~~	~~266-5045-0~~	~~FUSE 125V6A UL-TSC-6A-N1~~	~~1~~	A-1-5	~~5$¥~~
5	266-5106-0	FUSE 250V6.3A ST4-6.3A-N1(N.A.	1	A-1-5	5$¥
	266-5293-0	FUSE 250V3.15A NO.19195(EUROP)	10	A-1-5	5#
	266-5395-2	FUSE THERMAL 125V5A TYPE210	10	A-1-11	9
	281-7226-1	PRINTER FTP-421MCL001	1	A-1-25	5
18	289-9169-1	BATTERY LITHIUM CR17450SE-2-CJ2	1	A-1-5	24
~~18~~	~~289-9170-6~~	~~BATTERY LITHIUM CR23500SE-CJ2~~	~~1~~	A-1-5	~~24~~
	289-9170-6	BATTERY LITHIUM CR23500SE-CJ2	1	A-1-35	27
	289-9376-9	SW REGULATOR LCA50S-5	1	A-1-9	9
	289-9377-2	SW REGULATOR LCA150S-12	1	A-1-9	8
A	~~289-9378-6~~	~~SW REGULATOR LCA150S-24-XJCM~~	~~1~~	A-1-9	~~10~~
A	289-9379-0	SW REGULATOR LCA150S-24-H	1	A-1-9	10
	322-9150-1	WIRING CORD COVER	1	A-1-5	8
	322-9151-5	TRASH COVER CA-500	1	A-1-9	5
12	322-9152-9	ZSB REAR COVER	1	A-1-17	12
A	324-9075-3	COVER SENSOR SHUTTER-B DM1374	1	A-1-3	15
A	324-9076-7	CATCH HOLD PLATE DM1358	1	A-1-17	8
A	324-9077-1	VIBRATION ARM DM1163	1	A-1-19	4
A	324-9078-4	CATCH BOX DM1357	1	A-1-17	7
A	324-9079-8	STAY DM1102	1	A-1-3	14
3	324-9080-2	REAR PANEL DM0933 CA5H	1	A-1-37	4
3	324-9081-6	WIRING CORD HOLDER DM1220	1	A-1-19	6
3	324-9082-0	C ARM PLATE DM1221	1	A-1-19	5
3	324-9083-3	LOCK SPRING DM1298	1	A-1-38	1
6	324-9084-7	SS BASE PLATE DM1361	1	A-1-38	2
6	324-9085-1	SS ACTIARM DM1362	1	A-1-38	3
	342-1517-1	PULLEY NO.185	1	A-1-23	3
A	342-1815-1	TIMING BELT B216MXL4.8	1	A-1-17	9
A	342-1816-4	TIMING BELT B488MXL9.5	1	A-1-15	12
	342-2776-6	PULLEY NO.143	1	A-1-23	4
	343-2466-0	O-RING NO.16	50	A-1-21	12
2	344-3529-8	HINGE R-45 N GREASE TOA	1	A-1-7	7
19	344-5471-7	FIXING SCREW TL-233	1	A-1-33	14
	345-3767-8	SPRING PIN KSSC 2017	1	A-1-19	1
	346-3909-0	O-RING P-8 (NITRIL)	1	A-1-36	6
	346-3909-0	O-RING P- 8 (NITRIL)	10	A-1-39	9
	346-3939-1	O-RING P-39	1	A-1-36	4
	346-3939-1	O-RING P-39	10	A-1-39	8

	PART NO.	PART DESCRIPTION	UNIT Q'TY	PAGE	NO.
	346-4213-1	O-RING S-3 (SLICONE)	10	A-1-19	3
	346-8215-2	SEAL TEFLON AR401-P3-XC	1	A-1-21	13
	348-3812-1	SCREW BINDING M3X6 (SUS)	100	A-1-39	11
	348-5082-5	SCREW HEX-SOCKET BOLT M8X14(SU	50	A-1-39	10
A	348-5936-2	SCREW ROUND M3X15 PC(+)	100	A-1-13	5
	363-1597-8	STAY NO.11	1	A-1-39	4
	363-2558-6	HOLDER NO. 89	1	A-1-3	OPTION
	363-2559-0	HOLDER NO. 90 (TTO)	1	A-1-3	OPTION
	363-5015-0	FIXING MATERIAL NO.15	1	A-1-36	3
	363-5015-0	PANEL (L) DM0931	1	A-1-37	3
	363-5015-0	FIXING MATERIAL NO. 15	1	A-1-39	3
	365-1333-3	SUPPORT NO.247	1	A-1-5	27
	365-1333-3	SUPPORT NO.247	1	A-1-36	1
	365-1333-3	SUPPORT NO.247	1	A-1-39	1
13	~~365-2231-4~~	~~VIAL SPACER NO.1~~	~~1~~	A-1-33	~~13~~
7	365-9200-4	SPACER FOR RUBBER SHOE	1	A-1-3	OPTION
	369-8016-8	CAUTION MARK NO. 16	1	A-1-31	6*
8	369-8016-8	CAUTION MARK NO. 16	1	A-1-31	16*
	369-8016-8	CAUTION MARK NO. 16	1	A-1-31	26*
8	369-8016-8	CAUTION MARK NO. 16	1	A-1-31	36*
15	369-8326-1	CAUTION MARK NO.208	1	A-1-31	4#
15	369-8326-1	CAUTION MARK NO.208	1	A-1-31	5#
15	369-8326-1	CAUTION MARK NO.208	1	A-1-31	14#
15	369-8326-1	CAUTION MARK NO.208	1	A-1-31	15#
15	369-8601-5	INSTRUCTION LABEL-1 (JAPANESE)	UNSALABLE	A-1-31	5*
15	369-8601-5	INSTRUCTION LABEL-1 (JAPANESE)	UNSALABLE	A-1-31	15*
15	369-8602-9	INSTRUCTION LABEL-2	1	A-1-31	24*
15	369-8602-9	INSTRUCTION LABEL-2	1	A-1-31	34*
15	369-8603-2	INSTRUCTION LABEL-3 (JAPANESE)	UNSALABLE	A-1-31	25*
15	369-8603-2	INSTRUCTION LABEL-3 (JAPANESE)	UNSALABLE	A-1-31	35*
15	369-8604-6	INSTRUCTION LABEL-7	1	A-1-31	4*
15	369-8604-6	INSTRUCTION LABEL-7	1	A-1-31	14*
	424-4679-6	LID NO. 9	5	A-1-31	2
8	424-4679-6	LID NO. 9	5	A-1-31	12
	424-4679-6	LID NO. 9	5	A-1-31	22
8	424-4679-6	LID NO. 9	5	A-1-31	32
	424-9150-0	BOTTLE TANK-A (RINSE 2L/BLUE)	1	A-1-31	3
	424-9151-3	BOTTLE TANK-A (WASTE 2L/RED)	1	A-1-31	23
	426-3152-0	SILICONE GREASE THERMAL 800-8	1	A-1-13	4
	442-1403-8	CONNECTING TUBE NO. 3	10	A-1-5	3
	442-1450-3	CONNECTING TUBE NO. 50	5	A-1-29	1
	442-3307-4	RUBBER TUBE NO. 7	5	A-1-5	16
	442-3433-7	HYDRAULIC CONNECTOR NO.23	10	A-1-5	15
	442-3509-2	NIPPLE NO. 9	10	A-1-21	11
	442-4003-7	NIPPLE NO.123	1	A-1-29	2
	442-5279-4	TUBE SILICONE 1/32"X3/32"F7391	1	A-1-5	13
	442-5280-9	TUBE SILICONE 2MMID X 3MMOD	10	A-1-5	12
	442-5290-6	TUBE SILICONE 4MMID X 8MMOD	20	A-1-5	4
	442-5290-6	TUBE SILICONE 4MMID X 8MMOD	20	A-1-39	14
	442-5292-3	TUBE SILICONE 1.5MMID X 6MMOD	5	A-1-5	10
	442-5295-4	TUBE SILICONE 6MMID X10MMOD	10	A-1-5	18
	442-5305-4	TUBE SILICONE 2 X 4MM SR-1554	1	A-1-39	13
	442-5315-1	TUBE SILICONE 2MMIDX5MMOD(CLR)	10	A-1-5	2
6	442-5416-1	TUBE TEFLON 1.2MMID X 2.0MMOD	10	A-1-5	11
6	~~442-5452-5~~	~~TUBE TEFLON 1.5MMID X 2.5MMOD~~	~~10~~	A-1-5	~~11~~
	442-5452-5	TUBE TEFLON 1.5MMID X 2.5MMOD	10	A-1-5	17

	PART NO.	PART DESCRIPTION	UNIT Q'TY	PAGE	NO.
	442-5475-1	TUBE TOALONE 3MMID X 6MMOD	10	A-1-5	1
	442-5475-1	TUBE TOALONE 3MMID X 6MMOD	10	A-1-39	15
	443-0823-8	CHAMBER NO. 4	1	A-1-5	26
	443-0823-8	CHAMBER NO. 4	1	A-1-39	2
	443-0823-8B	CHAMBER NO.4	1	A-1-36	2
	443-2804-4	NON-RETURN VALVE MFP-6-V	1	A-1-31	8
8	443-2804-4	NON-RETURN VALVE MFP-6-V	1	A-1-31	18
	443-2804-4	NON-RETURN VALVE MFP-6-V	1	A-1-39	6
13	~~461-2047-7~~	~~OPERATOR'S MANUAL CA-500~~	~~1~~	A-1-33	~~1~~
13	461-2655-0	OPERATORS MANUAL CA-500 (2)	1	A-1-33	1
	461-9128-7	TRAP CHAMBER PROCEDURE	1	A-1-39	18
	541-1352-1	PUSH VIAL PV-10	10	A-1-33	7
5	~~662-0168-8~~	~~PCB NO. 6350 WITH ROM~~	~~1~~	A-1-5	~~29~~
	662-0217-3	PCB NO.2132 (STANDARD)	1	A-1-11	1*#
	662-0218-7	PCB NO.2132 (2 CIRCUITS)	1	A-1-11	3*
	662-0219-1	PCB NO.2132 (3 CIRCUITS)	1	A-1-11	3#
	662-0220-5	PCB NO.4086	1	A-1-9	7
	662-0221-9	PCB NO.6362	1	A-1-5	19
	662-0222-2	PCB NO.9264	1	A-1-17	4
	662-0223-6	PCB NO.2134	1	A-1-7	2*#
	662-0224-0	PCB NO.9260	1	A-1-9	12
	662-0225-3	PCB NO.7015	1	A-1-5	25
	662-0228-4	PCB NO.9265	1	A-1-25	3
	662-0228-4	PCB NO.9265	1	A-1-27	3
5	662-0276-3	PCB NO. 6350 WITH ROM (FOR CA)	1	A-1-5	29
8	662-0278-1	PCB NO.7015 (2)(FLASH MEMORY)	1	A-1-5	25
17	662-0279-4	D-DIMER LED ASSY (800NM)	1	A-1-11	7$
	662-0280-9	D-DIMER LED ASSY (575NM)	1	A-1-11	7&
	662-0281-2	PCB NO.2156 (STANDARD CLOT/AT3)	1	A-1-11	1*#
	662-0282-6	PCB NO.2156 (2 CIRCUITS CLOT)	1	A-1-11	3*
17	662-0283-0	PCB NO.2156 (3 CIRCUITS AT3/DD)	1	A-1-11	3#&$
17	662-0284-3	PCB NO.2156 (4 CIRCUITS DD 800NM)	1	A-1-11	1$
	662-0285-7	PCB NO.2156 (5 CIRCUITS DD 575NM)	1	A-1-11	1&
8	662-0286-1	PCB NO.2157	1	A-1-7	2*#&
8	662-0287-4	PCB NO.6373	1	A-1-5	19
8	662-0288-8	PCB NO. 6375 ASSY	1	A-1-5	29
8	662-0289-1	PCB NO.9303	1	A-1-25	3
	662-2203-9	DETECTOR THERMAL ASSY	1	A-1-11	4
	662-2203-9	DETECTOR THERMAL ASSY	1	A-1-35	20
17	662-2204-2	CHROMOGENIC LED ASSY	1	A-1-11	6#&$
	662-2204-2	CHROMOGENIC LED ASSY	1	A-1-35	22
	662-2205-6	COAGULATION LED ASSY	1	A-1-11	2
	662-2205-6	COAGULATION LED ASSY	1	A-1-35	23
	662-2206-0	COOLER THERMAL ASSY (SERNSOR IC)	1	A-1-13	3
	662-2206-0	COOLER THERMAL ASSY	1	A-1-35	2
	662-2207-3	THERMAL SENSOR ASSY	1	A-1-9	13
	662-2207-3	THERMAL SENSOR ASSY	1	A-1-35	1
	662-2208-7	TRANSFORMER POWER ASSY (200V)	1	A-1-5	6#
	662-2209-1	TRANSFORMER POWER ASSY (100V)	1	A-1-5	6$¥
	662-2219-8	POWER SWITCH ASSY CA-500	1	A-1-3	5
	662-2220-2	RINSE BOTTLE FLOAT SWITCH ASSY (2L)	1	A-1-31	1
	662-2221-6	WASTE BOTTLE FLOAT SWITCH ASSY (2L)	1	A-1-31	21
8	662-2409-1	RINSE BOTTLE FLOAT SWITCH ASSY (5L)	1	A-1-31	11
8	662-2410-6	WASTE BOTTLE FLOAT SWITCH ASSY (5L)	1	A-1-31	31
	662-8181-6	ID WIRING CORD	1	A-1-3	12
	662-8181-6	ID WIRING CORD	1	A-1-35	7

	PART NO.	PART DESCRIPTION	UNIT Q'TY	PAGE	NO.
	662-8182-0	X AXIS WIRING CORD	1	A-1-9	11
	662-8182-0	X AXIS WIRING CORD	1	A-1-35	12
	662-8214-1	WIRING CORD PD DW0458	1	A-1-11	10
8	662-8222-1	WIRING CORD PD SIGNAL DW0590	1	A-1-35	34
	663-0158-8	DETECTOR BLOCK (AT3)	1	A-1-9	4#
	663-0158-8	DETECTOR BLOCK (AT3)	1	A-1-11	1-6#
	663-0159-1	DETECTOR BLOCK (STANDARD)	1	A-1-9	4*
	663-0159-1	DETECTOR BLOCK (STANDARD)	1	A-1-11	1-5*
	663-0160-6	HEATER ASSY	1	A-1-11	5
	663-0160-6	HEATER ASSY	1	A-1-35	21
	663-0161-0	COOLING SECTION ASSY	1	A-1-9	1
	663-0161-0	COOLING SECTION ASSY	1	A-1-13	1-
B	663-0162-3	COOLER ASSY (THERMAL MODULE)	1	A-1-13	1
	663-0162-3	COOLER ASSY	1	A-1-35	4
14	663-0163-7	COOLING FAN ASSY	1	A-1-13	2
	663-0163-7	COOLING FAN ASSY	1	A-1-35	3
	663-0164-1	VOLUMETRIC PISTON ASSY	1	A-1-5	21
	663-0164-1	VOLUMETRIC PISTON ASSY	1	A-1-21	1-
	663-0165-4	SYRINGE MOTOR ASSY	1	A-1-23	1
	663-0165-4	SYRINGE MOTOR ASSY	1	A-1-35	28
	663-0166-8	CYLINDER ASSY	1	A-1-21	1
	663-0166-8	CYLINDER ASSY	1	A-1-21	11-
	663-0167-1	PISTON ASSY	1	A-1-21	2
	663-0168-5	OPERATION PANEL ASSY	1	A-1-3	3
	663-0168-5	OPERATION PANEL ASSY	1	A-1-25	1-
	663-0168-5	OPERATION PANEL ASSY	1	A-1-27	1-
	663-0169-9	VR ASSY	1	A-1-27	4
	663-0169-9	VR ASSY	1	A-1-35	25
	663-0170-3	OPERATION PANEL BASE ASSY	1	A-1-27	1
	663-0171-7	EMERGENCY STOP SW ASSY	1	A-1-27	2
	663-0171-7	EMERGENCY STOP SW ASSY	1	A-1-35	26
	663-0172-1	PRINTER ASSY	1	A-1-25	2
	663-0173-4	SAMPLE TABLE ASSY (STANDARD)	1	A-1-3	4*
	663-0174-8	SAMPLE TABLE ASSY (ID)	1	A-1-3	4#
2	~~663-0175-1~~	~~SAMPLE TABLE BASE ASSY~~	~~1~~	A-1-3	~~10~~
19	663-0175-1	SAMPLE TABLE BASE ASSY	1	A-1-38	4
	663-0176-5	ID MOTOR ASSY	1	A-1-3	11
	663-0176-5	ID MOTOR ASSY	1	A-1-35	8
2	663-0177-9	ID ASSY	1	A-1-3	10
	663-0177-9	ID ASSY	1	A-1-35	9
	663-0179-6	SAMPLE RACK SENSOR ASSY	1	A-1-3	7
	663-0179-6	SAMPLE RACK SENSOR ASSY	1	A-1-35	6
	663-0180-1	DRIVE ARM ASSY	1	A-1-7	1
	663-0181-4	X AXIS SLIDER ASSY	1	A-1-7	3
	663-0181-4	X AXIS SLIDER ASSY	1	A-1-15	11-
	663-0182-8	Z AXIS BASE ASSY	1	A-1-17	1-
	663-0183-1	PIPETTE HOLDER ASSY	1	A-1-17	1
	663-0183-1	PIPETTE HOLDER ASSY	1	A-1-19	11-
	663-0184-5	PIPETTE CRUSH SENSOR ASSY	1	A-1-19	11
	663-0185-9	Y AXIS MOTOR ASSY	1	A-1-15	11
	663-0185-9	Y AXIS MOTOR ASSY	1	A-1-35	15
	663-0186-2	Z AXIS MOTOR ASSY	1	A-1-17	3
	663-0186-2	Z AXIS MOTOR ASSY	1	A-1-35	16
	663-0187-6	MIXER MOTOR ASSY	1	A-1-19	2
	663-0187-6	MIXER MOTOR ASSY	1	A-1-35	19
	663-0188-0	CATCHER ASSY	1	A-1-17	2

	PART NO.	PART DESCRIPTION	UNIT Q'TY	PAGE	NO.
	663-0188-0	CATCHER ASSY	1	A-1-19	1-
	663-0189-3	TUBING ASSY (PIPETTE)	1	A-1-17	6
	663-0190-8	PIPETTE ASSY CA-500	1	A-1-19	12
	663-0190-8	PIPETTE ASSY CA-500	1	A-1-35	17
	663-0191-1	PRESSURE PUMP ASSY	1	A-1-5	22
	663-0191-1	PRESSURE PUMP ASSY	1	A-1-35	29
	663-0195-6	AC INLET ASSY	1	A-1-5	20
	663-0196-0	MAIN UNIT FAN ASSY	1	A-1-5	23
	663-0196-0	MAIN UNIT FAN ASSY	1	A-1-35	10
	663-0197-3	VACUUM PUMP ASSY	1	A-1-5	9
	663-0197-3	VACUUM PUMP ASSY	1	A-1-35	32
	663-0198-7	SOLENOID VALVE ASSY (VOLUMET.)	1	A-1-5	14
	663-0198-7	SOLENOID VALVE ASSY (VOLUMET.)	1	A-1-35	30
	663-0199-1	RINSING CUP ASSY	1	A-1-9	3
	663-0200-8	SOLENOID ASSY	1	A-1-15	1
	663-0200-8	SOLENOID ASSY	1	A-1-35	5
	663-0201-1	X AXIS MOTOR ASSY	1	A-1-9	6
	663-0201-1	X AXIS MOTOR ASSY	1	A-1-35	13
	663-0202-5	REAGENT STAGE ASSY	1	A-1-3	1
8	663-0203-9	SAMPLE STAGE ASSY	1	A-1-3	2&
8	663-0204-2	LIGHT SHIELD COVER ASSY	1	A-1-3	13&
	663-0205-6	PRINTER COVER ASSY	1	A-1-3	9
	663-0206-0	REAGENT RACK ASSY	1	A-1-33	9
	663-0207-3	REACTION TUBE TRASH BOX	1	A-1-33	10
	663-0209-1	RINSE BOTTLE ASSY CA-5H (2L)	1	A-1-31	1-8*
	663-0209-1	RINSE BOTTLE ASSY CA-5H (2L)	1	A-1-33	2*
	663-0209-1	RINSE BOTTLE ASSY CA-500	1	A-1-35	33
	663-0210-5	WASTE BOTTLE ASSY CA-5H (2L)	1	A-1-31	21-26*
	663-0210-5	WASTE BOTTLE ASSY CA-5H (2L)	1	A-1-33	6*
	663-0210-5	WASTE BOTTLE ASSY	1	A-1-35	24
	663-0211-9	TRAP CHAMBER COMPLETE	1	A-1-33	3
	663-0212-2	SAMPLE TUBE SPACER 10MM DIAMET	1	A-1-33	OPTION
	663-0213-6	SAMPLE TUBE SPACER 13 PHI	1	A-1-33	8
	663-0217-1	TABLE LOCK MECHANISM ASSY	1	A-1-9	2
	663-0217-1	TABLE LOCK MECHANISM ASSY	1	A-1-15	1-
A B	663-0370-4	PULLEY 1329A	1	A-1-7	6
A 14	663-0371-8	SHAFT-B DM1090B	1	A-1-7	5
C	663-0372-1	HEAT SINK DM1113	1	A-1-13	6
	663-0373-5	TOP PANEL DM0930	1	A-1-37	1
14	663-0374-9	BASE DM1197B	1	A-1-7	4
	663-0375-2	PANEL (R) DM0932	1	A-1-37	2
B	663-0392-6	PULLEY DM1329	1	A-1-7	6
2	663-0393-0	Z1 SLIDER-C ASSY DU1469	1	A-1-17	10
2	663-0394-3	Z2 SLIDER-C ASSY DU1468	1	A-1-17	11
8	663-0399-1	DETECTOR BLOCK (D-DIMER)	1	A-1-9	4&
	663-0399-1	DETECTOR BLOCK (D-DIMER)	1	A-1-11	1-8&
8	663-0400-9	SAMPLE STAGE ASSY 2 (IMMUNO)	1	A-1-3	2%
8	663-0401-2	LIGHT SHIELD COVER ASSY (IMMUNO)	1	A-1-3	13%
8	663-0402-6	RINSE BOTTLE ASSY CA-5H (5L)	1	A-1-31	11-18*
	663-0402-6	RINSE BOTTLE ASSY CA-5H (5L)	1	A-1-33	2#
8	663-0403-0	WASTE BOTTLE ASSY CA-5H (5L)	1	A-1-31	31-36*
	663-0403-0	WASTE BOTTLE ASSY CA-5H (5L)	1	A-1-33	6#
17	663-0404-3	CH6	10	A-1-11	8&$
8	663-0405-7	RINSE BOTTLE ASSY CA-5H (5L/EU/UK)	1	A-1-31	11-18#
	663-0405-7	RINSE BOTTLE ASSY CA-5H (5L/EU/UK)	1	A-1-33	2#
10	663-0406-1	WASTE BOTTLE ASSY CA-5H (5L/EU/UK)	1	A-1-31	31-36#

	PART NO.	PART DESCRIPTION	UNIT Q'TY	PAGE	NO.
10	663-0406-1	WASTE BOTTLE ASSY CA-5H (5L/EU/UK)	1	A-1-33	6#
8	663-0407-4	RINSE BOTTLE ASSY CA-5H (2L/EU/UK)	1	A-1-31	1-8#
	663-0407-4	RINSE BOTTLE ASSY CA-5H (2L/EU/UK)	1	A-1-33	2*
10	663-0408-8	WASTE BOTTLE ASSY CA-5H (2L/EU/UK)	1	A-1-31	21-26#
10	663-0408-8	WASTE BOTTLE ASSY CA-5H (2L/EU/UK)	1	A-1-33	6*
15	663-0410-6	BOTTLE TANK (RINSE 5L/BLUE)	1	A-1-31	13-15*
15	663-0411-0	BOTTLE TANK (RINSE 5L/BLUE/EU/UK)	1	A-1-31	13-15#
15	663-0412-3	BOTTLE TANK (WASTE 5L/RED)	1	A-1-31	33-35*
15	663-0413-7	BOTTLE TANK (WASTE 5L/RED/EU/UK)	1	A-1-31	33-35#
17	663-0415-4	DETECTOR BLOCK (D-DIMER 800NM)	1	A-1-9	4&&
17	663-0415-4	DETECTOR BLOCK (D-DIMER 800NM)	1	A-1-11	1-8$
	664-0167-9	FILTER ASSY FOR RINSE BOTTLE	1	A-1-31	7
8	664-0167-9	FILTER ASSY FOR RINSE BOTTLE	1	A-1-31	17
	833-3895-6	SAMPLE RACK NO. 3 W/HOLDER #55	1	A-1-33	11
	913-1091-3	STANDARD SCATTERING STICK SET	1	A-1-3	OPTION
	921-0351-8	PAPER THERMAL F1-2 (5/BOX)	1	A-1-33	5
	941-0131-3	SOLENOID VALVE NO.14D (PM)	1	A-1-35	31

APPENDIX: B INSTALLATION

To Cover

APPENDIX: B INSTALLATION

B.1 Check Before Installation

Based on the following check list, check the packings before installation.

B.1.1 Unpacking Check List

Table B-1: Unpacking Check List

Description		Quantity			Check
		117V	220V	240V	
461-2047-7	CA-500 Operator's Manual	1	1	1	
266-5293-0	Fuse 250V 3.15A No. 19195 (Europe)	-	2	2	
266-5106-0	Fuse 250V 6.3A ST4-6.3A-N1 (N.Amer)	2	-	-	
663-0213-6	Holder CA-500 (for 13 mm diameter tube)	1	1	1	
369-5982-2	Indication Mark No. 954 (for Reagent Rack)	1	1	1	
462-4842-7	Paper Thermal F1-2 (2/Pack)	1	1	1	
265-4719-0	Power Cord 4622-007-0092 (Europe)	-	1	-	
265-4723-5	Power Cord F1686 (U.K.)	-	-	1	
793-0012-1	Power Cord No. 4 (N.Amer)	1	-	-	
541-1352-1	Push Vial PV-10 (22 mm OD x 40 mm high)	2	2	2	
541-0541-8	Reaction Tube (CA-1000)	60	60	60	
663-0206-0	Reagent Rack CA-500	1	1	1	
663-0209-1	Rinse Bottle CA-500 Assembly	1	1	1	
663-0407-4	Rinse Bottle CA-500 Assembly (EU/UK)	1	1	1	
663-0402-6	Rinse Bottle CA-500 Assembly (5L)*	1	1	1	
663-0405-7	Rinse Bottle CA-500 Assembly (5L) (EU/UK)*	1	1	1	
833-3895-6	Sample Rack No. 3 w/Holder #55	1	1	1	
663-0208-7	Sample Tube Rack CA-500	2	2	2	
663-0211-9	Trap Chamber CA-500 Assembly	1	1	1	
663-0207-3	Tube Trash CA-500	1	1	1	
663-0210-5	Waste Bottle CA-500 Assembly	1	1	1	
663-0403-0	Waste Bottle CA-500 Assembly (5L)*	1	1	1	

*: Packed with CA-550/560

B.2 Installation Space

To make maintenance and service easy, give consideration to heat radiation by the instrument, provide at least 50 cm clearance between the wall and the instrument's side panels, rear and top panels.

Reference: maximum power consumption

Table B-2:

MODEL	CA-510	CA-520	CA-530	CA-540	CA-550	CA-560
MAIN UNIT	310VA	320VA	380VA	400VA	380VA	400VA

The power cord is 1.8 m long

Table B-3**:**

	Width (mm)	Depth (mm)	Height (mm)	Weight (kg)
Main Unit	540	470	487	Approx. 45

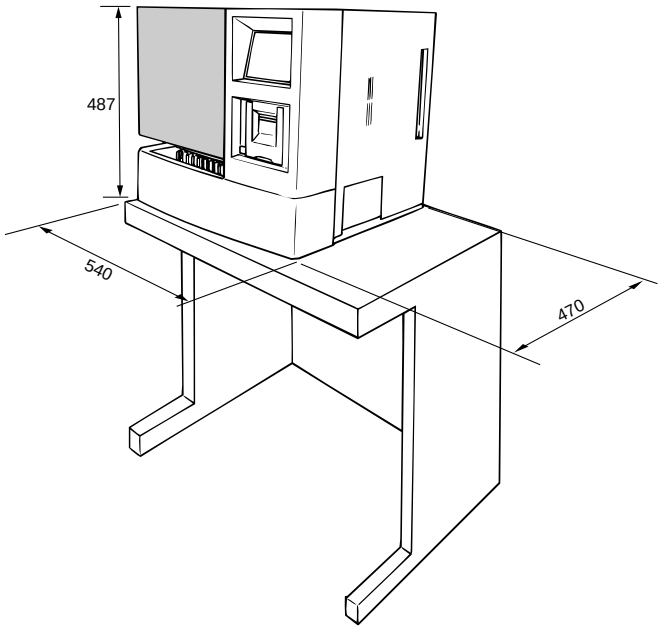


Figure B-1: Instruments Dimensions

CAUTION:
- Be sure to place the rinse bottle and waste bottle on the base which the instrument is set.
- Do not put them on the instrument, or there is a possibility the instrument may break down or fail to produce correct results.

B.3 Remove Shipping Clamps

Remove the shipping clamps used on movable components of the instrument.

(1) Open the front cover of the main unit.

(2) Remove the X-Y mechanism fixing metals.
Two fixing metals are retained with screws as shown. Loosen the screws and remove the metals.

> **CAUTION:** • Unless the fixing metals are removed, the instrument cannot operate.

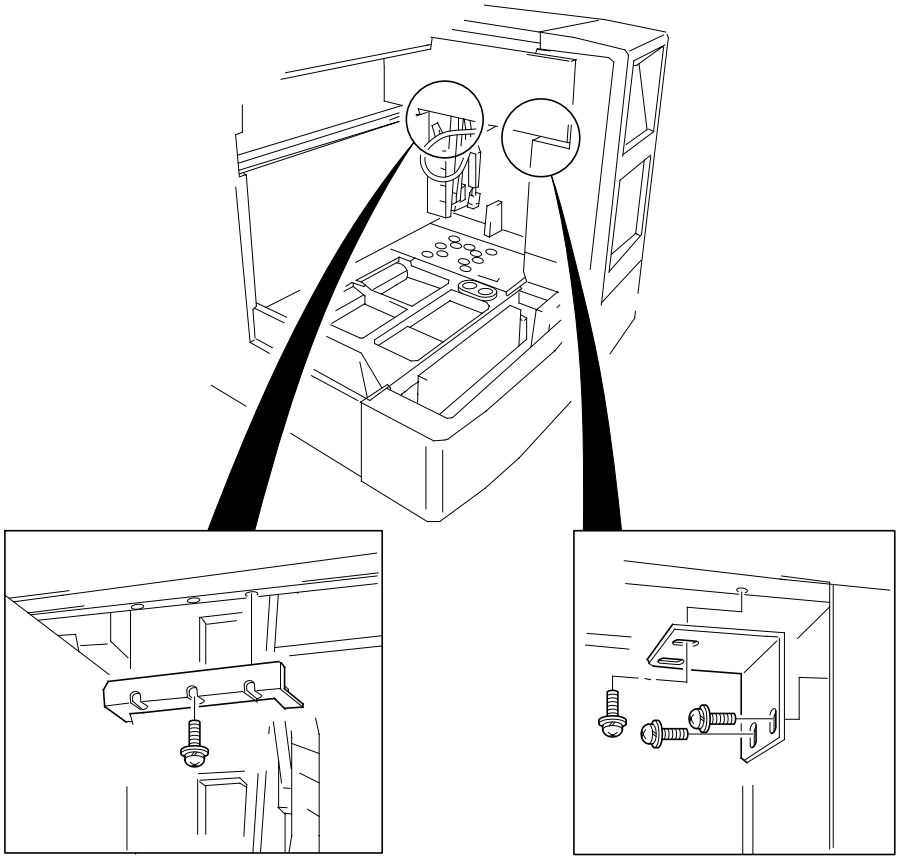


Figure B-2: Removing the Fixing Metals

(3) Move the sample probe unit by hand to a place where it is easy to operate.
Remove the sample probe retainer.

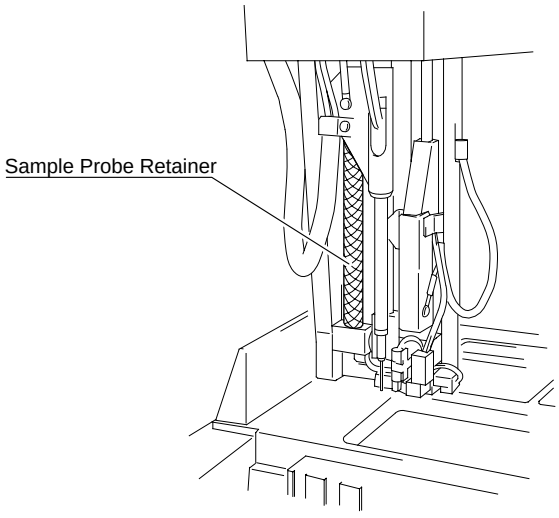


Figure B-3: Removing the Sample Probe Retainer

CAUTION: • Unless the retainer is removed, the instrument cannot operate.

(4) Raise the sample probe by hand to a place where it is easy to operate.
Remove the catcher retainer.

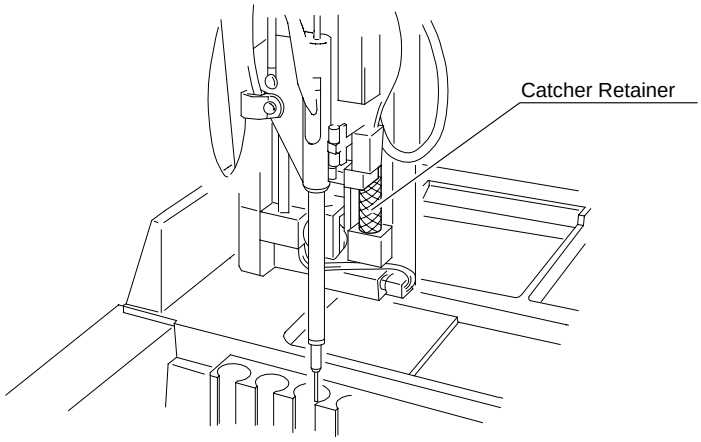


Figure B-4: Removing the Catch Retainer

CAUTION: • Unless the retainer is removed, the instrument cannot operate.

B.4 Attach Trap Chamber

(1) Attach the furnished trap chamber to the rear panel.
Connect the trap chamber tube (green) to the waste vacuum nipple (green) on the rear panel.

WARNING!
- When draining the trap chamber, always wear rubber gloves.
- After completing the operation, be sure to wash hands in anti-septic solution.
- If hands should be contaminated with blood or the like, there is a hazard of being infected by pathogenic bacteria.

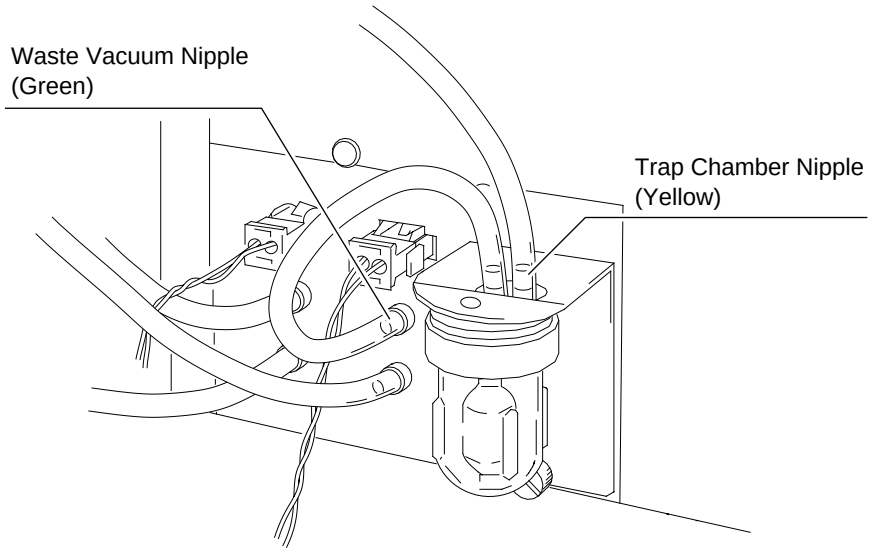


Figure B-5: Attaching the Trap Chamber

B.5 Connect Rinse Bottle and Waste Bottle

Connect the rinse bottle and the waste bottle to the nipples on the instrument rear panel.

(1) Connect Rinse Bottle.
   1) Connect the rinse bottle to the pressure supply nipple (black), and rinse aspiration nipple (blue) on the rear panel, at places where the color matches with the bottle.
   2) Connect the level-detecting float switch to the float switch connector on the rear panel.

(2) Connect Waste Bottle.
   1) Connect the waste bottle tube (red) to the waste drain nipple (red) on the rear panel. Connect the waste bottle tube (yellow) to the trap chamber nipple (yellow).
   2) Connect the level-detecting float switch to the float switch connector on the rear panel.

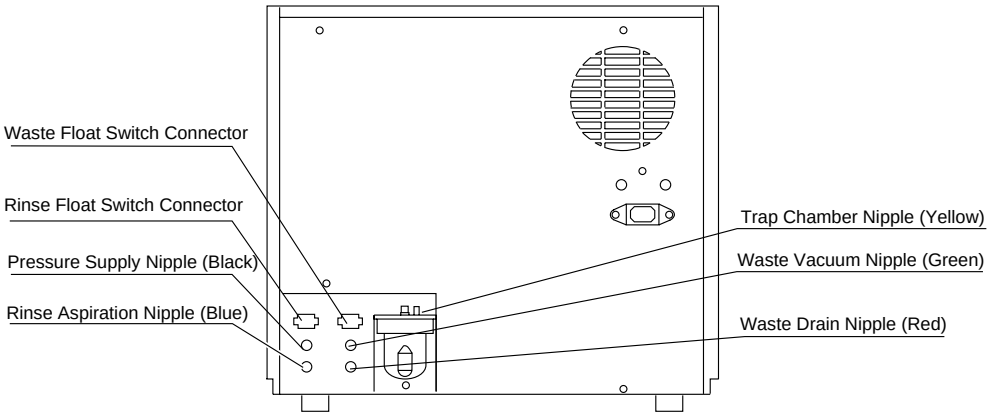
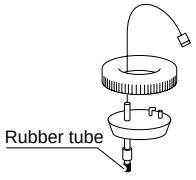


Figure B-6: Connecting the Bottles

CAUTION:
- Even at a facility equipped with the waste channel (drain system), the waste bottle should be connected.
- Also, put the rinse bottle and the waste bottle at the same level as the instrument. Be sure not to use any other tube than the furnished one; otherwise, the instrument's hydraulic system may fail to operate properly.

CAUTION:
- Remove the rubber tube that locks the float switch in the rinse bottle and waste bottle. This rubber tube served to prevent vibration in transit.



B.6 Connect Power Cord and Connection Cord

(1) Connect the furnished power cord.
1) Make sure the power switch is OFF, at "O."

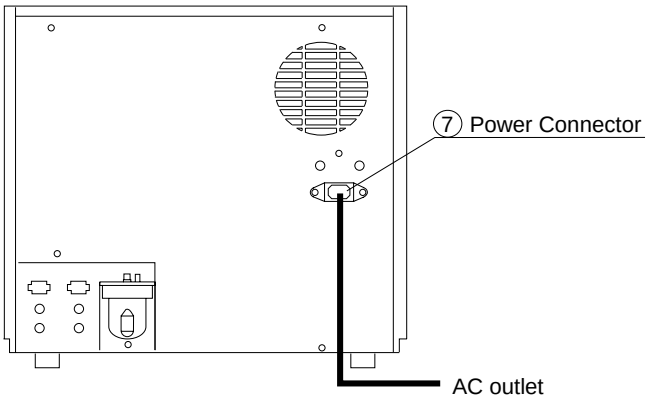


Figure B-7: Connecting the Power Cord

CAUTION: Confirm the power switch is OFF, at "O," before routing the power cord. Make sure to ground the AC outlet; otherwise, there is a hazard of electrical shock.

(2) Connect the cable to link with the host computer.
1) Make sure the power switch is OFF, at "O."
2) Connect the connection cord to HOST on the right side panel and tighten the screw to fix it.

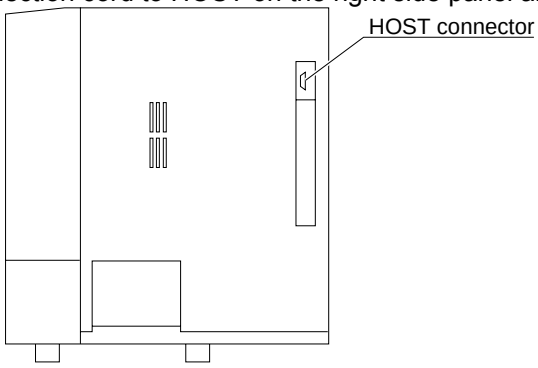


Figure B-8: Connecting to HOST Computer

CAUTION: Confirm the power switch is OFF, at "O," before routing the connection cord; otherwise, there is a hazard of electrical shock.

NOTE:
- For setting host computer interface parameters, refer to *Operator's Manual Chapter 10: Section 5.1: Host Computer.*
- The connection cord for the host computer is not included in the accessories.

B.7 Set Print Paper

(1) Remove the printer cover.
It can be removed by raising the lower edge of the printer cover.

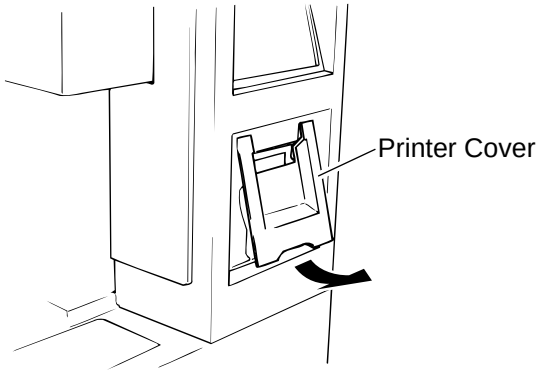


Figure B-9: Removing the Printer Cover

(2) Release the lock.
Raise the lock lever to unlock.

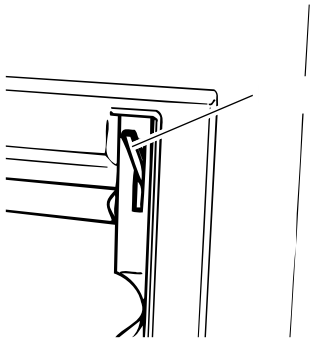


Figure B-10: Releasing the Lock

(3) Load a paper roll.
Load a new print paper roll.

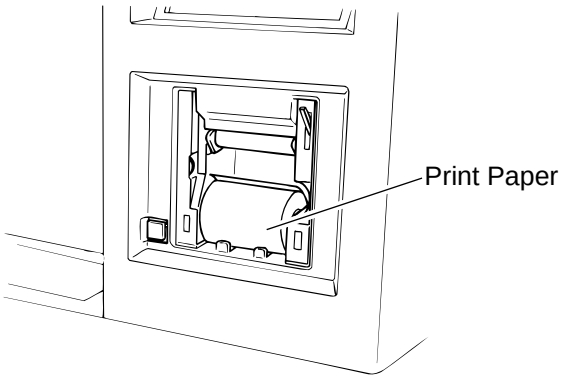


Figure B-11: Loading the Paper Roll

(4) Pass a print paper.
Pass the print paper as shown below and throw down the lock lever to lock.

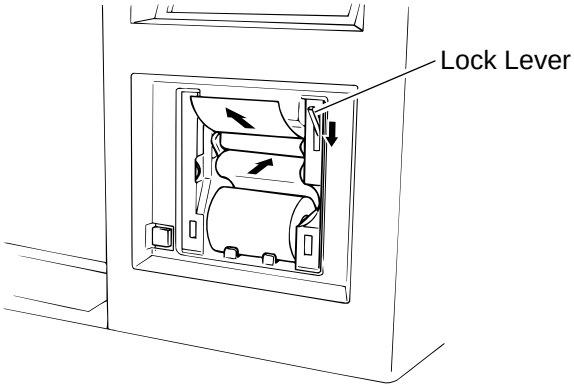


Figure B-12: Passing the Print Paper

(5) Feed a print paper.
If power is turned ON, press [Sysmex] key, then [P. FEED] on the Sysmex Menu screen.

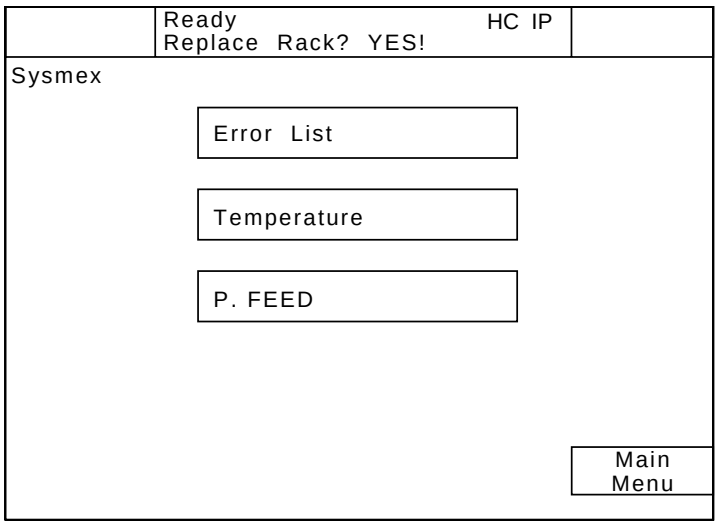


Figure B-13: Sysmex Menu Screen

(6) Attach the printer cover.

B.8 Adjust LCD Contrast

With the printer cover removed, LCD contrast can be adjusted using the contrast adjust dial located on the left of the printer.
Turn the dial up for darker shade and turn it down for lighter shade.

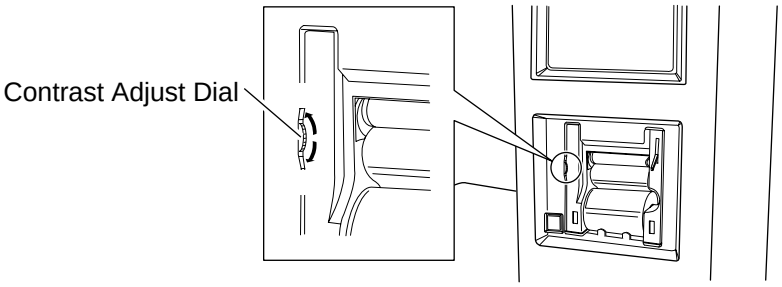


Figure B-14: Adjusting the LCD Contrast

B.9 Replenish Rinse Solution

(1) Press [Special Menu] key on the Root Menu screen.
The contents of the Root Menu will changeover.

(2) Press [Special Operate] key on the Root Menu screen.
The Special Operation Menu screen will appear.

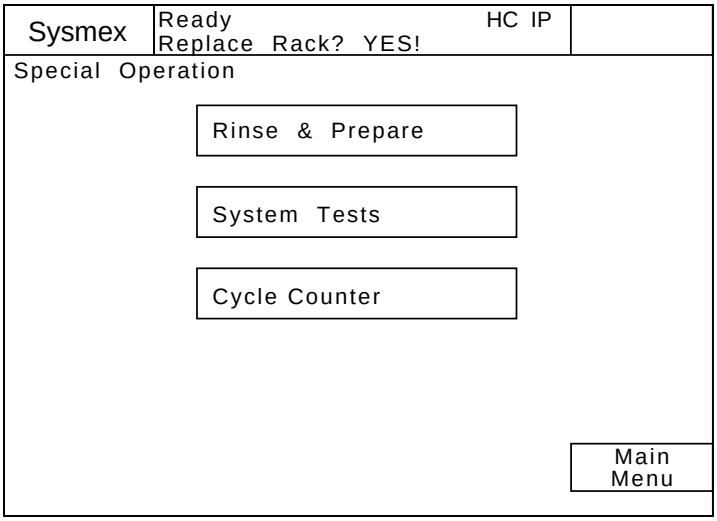


Figure B-15: Special Operation Menu Screen

(3) Press [Rinse & Prepare] key on the Special Operation Menu screen.
The Supply Liquid Confirmation screen will display the message "Water supply?"

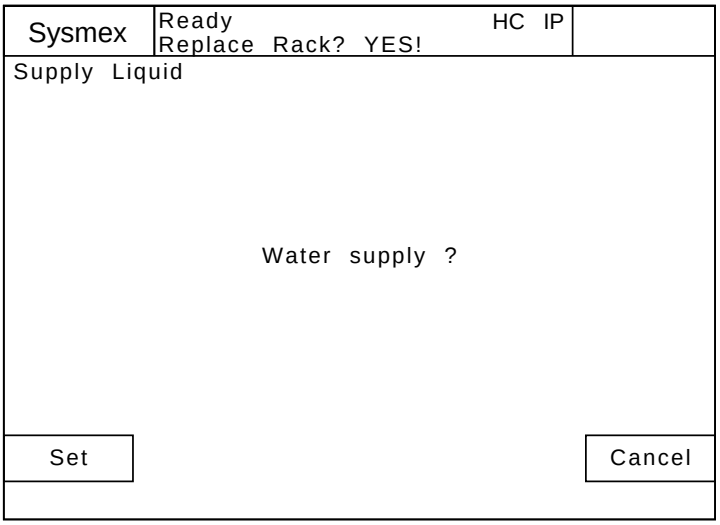


Figure B-16: Supply Liquid Confirmation Screen

(4) Press [Set] key or [Cancel] key on the Supply Liquid Confirmation screen.
[Set] key: Executes water supply.
[Cancel]: Cancels water supply and returns the screen to the Root Menu.

(5) Water supply begins.
When [Set] key is pressed, water supply will begin and the message "Water supply running" will appear. To stop water supply while it is in progress, press [Cancel] key.

NOTE:	Filling the hydraulic line with rinse solution takes 35 sec or so.

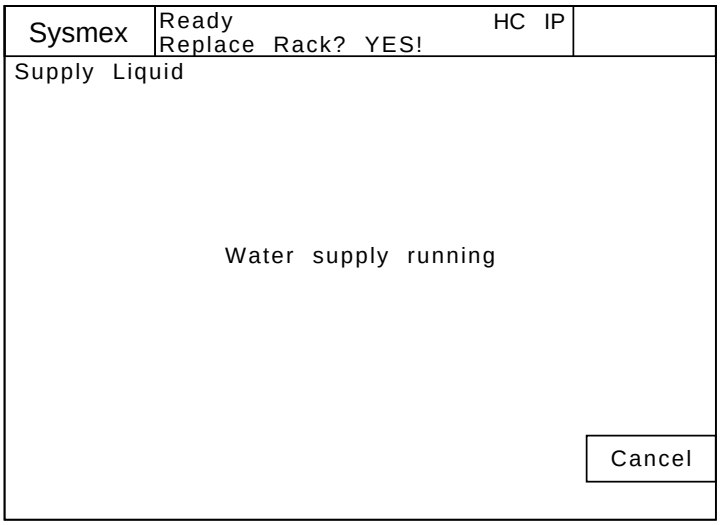


Figure B-17: "Water supply running" Message Screen

(6) Water supply is completed.
When water supply is over, the Special Operation Menu screen will return.

B.10 Set Tube Trash Drawer

Set the furnished tube trash drawer.

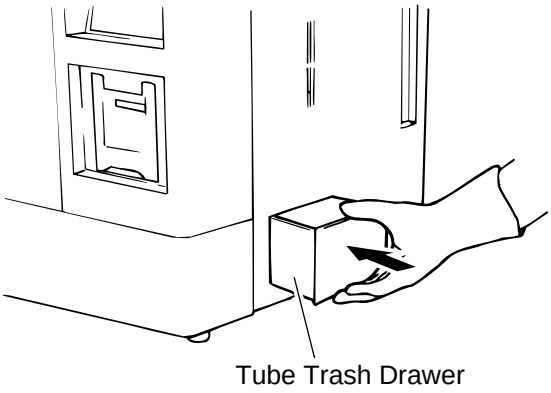


Figure B-18: Setting the Tube Trash Drawer

B.11 Set Reagent Rack and Reaction Tube Rack

Set the furnished reagent rack and reaction tube rack.

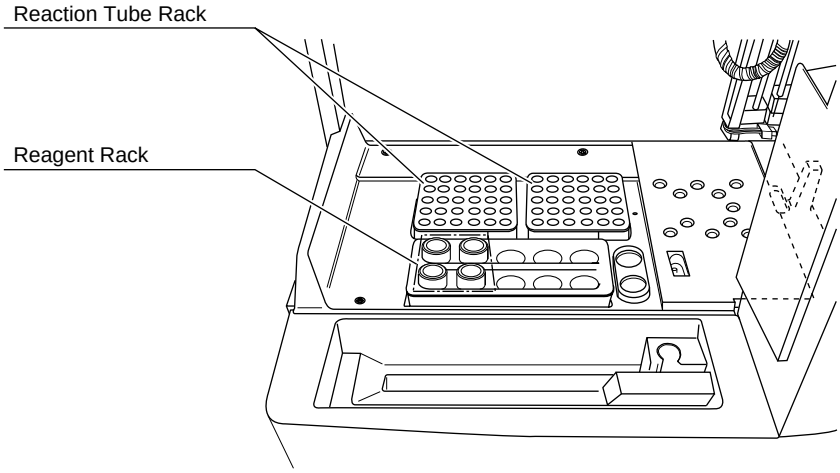


Figure B-19: Setting the Reagent Rack and Reaction Tube Rack

Affix Indication Mark No. 954 on the reagent rack.

B.12 Install Sampler with ID Bar Code Scanner (Option)

An optional Bar code Scanner is installed on the CA-510 or CA-530, as follows.

(1) Remove the left side panel of the CA-500 main unit.
Loosen the screws as shown to remove the panel.

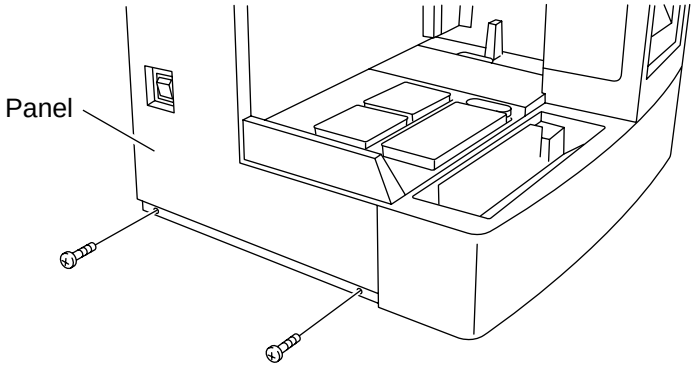


Figure B-20: Removing the Panel

(2) Remove the sampler.
1) Pull the sampler forward.
Pull it out until it stops against the stopper.
2) Remove the duct cover for the sampler slide rail by sliding it backward.

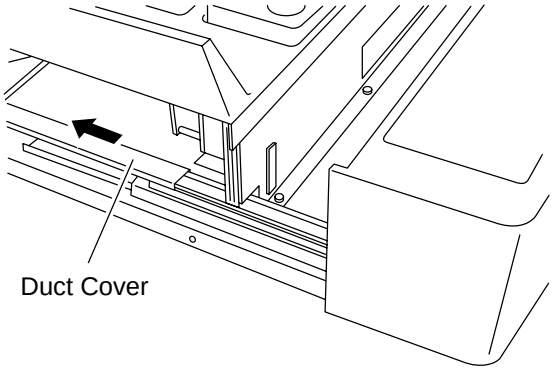


Figure B-21: Removing the Duct Cover

3) Pull out the connector from the duct, and disconnect the connector.

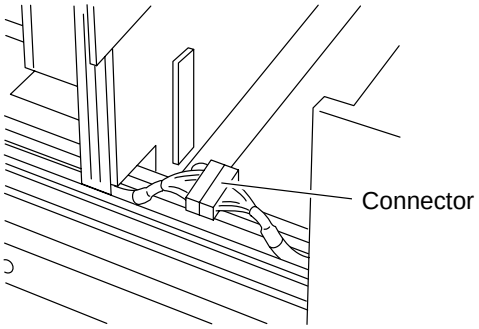


Figure B-22: Removing the Connector

4) Remove the sampler.
Release the stoppers while pushing the stopper levers by fingers, and remove the sampler.

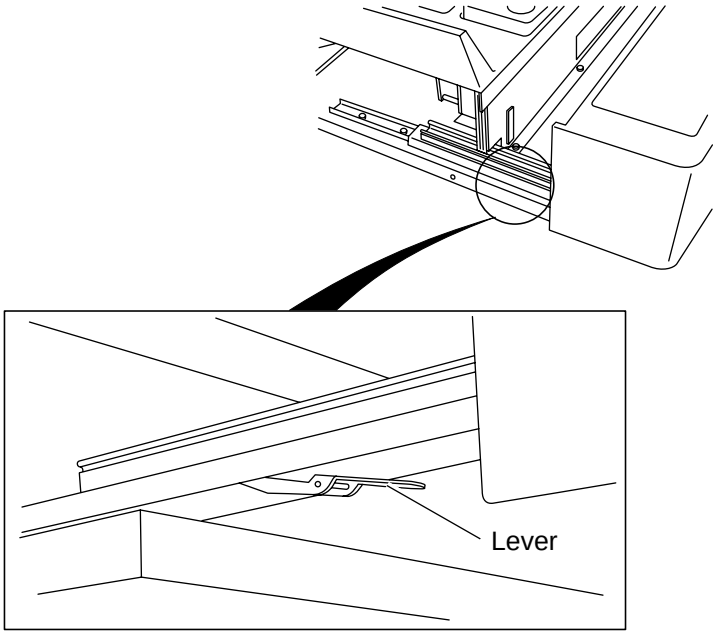


Figure B-23: Removing the Sampler

(3) Attach the slide rail to the sampler with the ID bar code scanner.

1) Remove the slide rail from the removed sampler.
Loosen the screws as shown and remove the slide rail from the sampler.
Take care not to lose the slide rail, screws, or washers that were removed, as they must be attached to the sampler with the ID bar code scanner.

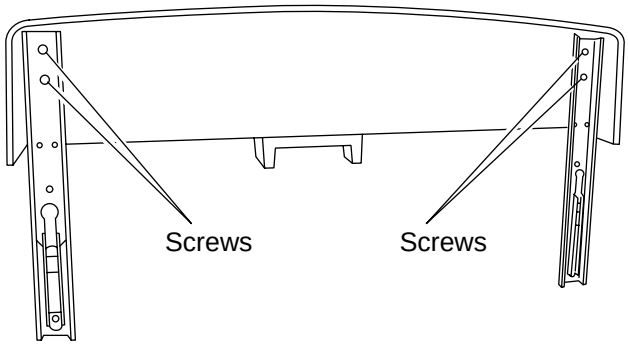


Figure B-24: Removing the Slide Rail

2) Attach the slide rail to the sampler with the ID bar code scanner.
Mount the duct-attached slide rail to the sampler onto the side where the cable protrudes. All four screws should be temporarily tightened.

3) Insert the cable from the sampler into the slide rail duct.

(4) Install the sampler with the ID bar code scanner to the CA-500 main unit.

1) While finger-pushing the stopper lever to release the stopper, push in the sampler a few centimeters on the inner rails of the CA-500 main unit.

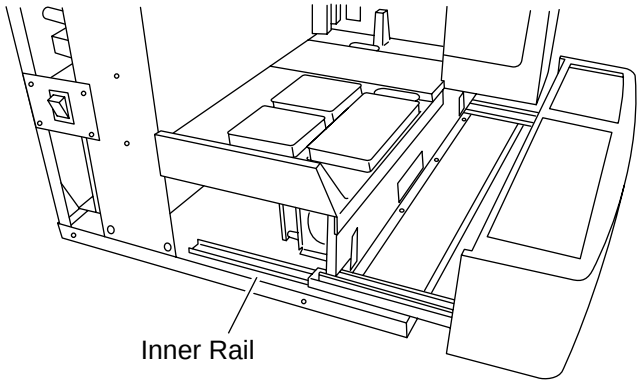


Figure B-25: Inserting the Sampler

CAUTION:	Until you are sure the sampler with ID bar code scanner will not disconnect, do not let go hands.

2) Push the sampler with ID bar code scanner in parallel.
Push it in until the lock guide arms fit in the table lock of the CA-500 main unit. As you push it, the sampler will feel heavier, but keep pushing little by little.

CAUTION:	The table lock is only 1 mm apart from the lock guide arms. In pushing, take care not to allow the lock guide arm to contact the under panel.

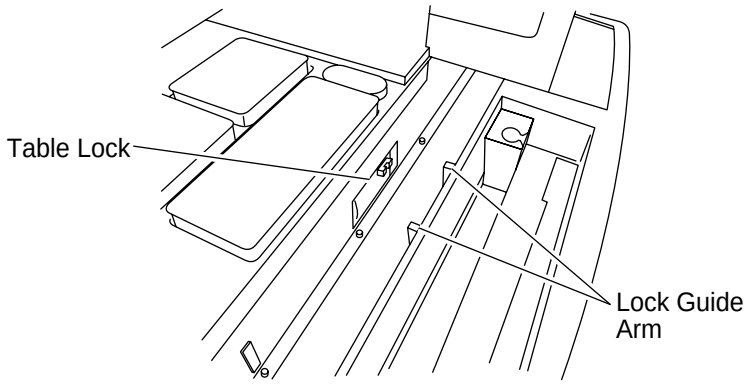


Figure B-26: Table Lock & Lock Guide Arm

3) Connect the connector and put it in the duct.

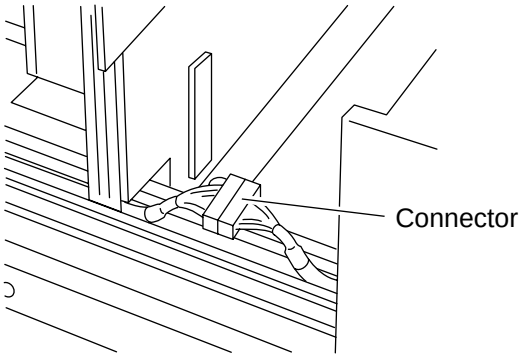


Figure B-27: Connecting the Connector

4) Attach the duct cover.
The duct cover should be attached so that it will cover the outlet for the cable of the sampler with ID bar code scanner.

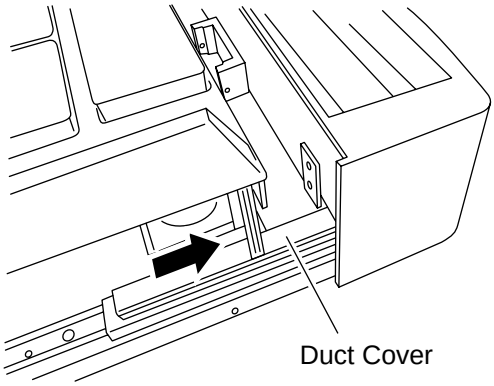


Figure B-28: Attaching the Duct Cover

5) Repeat pushing in and pulling out the sampler with ID bar code scanner several times.
6) With the sampler pulled out in parallel, fully tighten the screws that were temporarily tightened before.
7) Make sure that the sampler with ID bar code scanner will slide in and out smoothly.

(6) Attach the left side panel of the CA-500 main unit.

(7) Check the Sensor Status and Locking Function

1) Turn ON the power.
2) Change the Barcode Scanner setting to “connected” Refer to Operator’s Manual *Chapter 10 5. Devices to be connected* for more detail.
3) Select [Sensor Status] by selecting [Special Menu] Æ [Special Operate] Æ [System Tests] Æ [System Test] Æ [Sensor Status].
4) Make sure that [Sample Table] status changes from “●“ to “❍“ when Sampler position changes from in to out. (“IN” position : “●“ ,”OUT” position : “❍“)
5) Make sure that Sampler cannot be pull out when [Lock] key is pressed on Sampler’s IN position. Make sure that [Lock] key changes to [Unlock] when [Lock] key is pressed.
6) Make sure that Sample can be pulled out when [Unlock] key is pressed.

(8) Check the Reading Function

1) Select [Sensor Status] by selecting [Special Menu] -> [Special Operate] -> [System Tests] -> [System Test] -> [Barcode Scanner].
2) Make sure that bar code scanner moves to the home position when [Ret ORG] key is pressed. Make sure that [ORG Sensor] status changes from “❍“ to “●“ when the bar code scanner reaches to the home position. (There is a case that [ORG Sensor] status changes from “❍“ to “●“ and changes to “❍“ in a very short time. This is also normal function.)
3) Set 10 sample test tubes with bar code label in the sample rack.
4) Perform reading test by pressing [CONTINUE] key. (Refer to *Operator’s Manual Chapter 8 5. Barcode Scanner*.)
5) Make sure that all labels are read without an error.

(9) Adjust the Pipette Position for the Sampler

1) Perform pipette position adjustment. Refer to *Service Manual 4.3.4 Position Adjustment Procedure of Pipette (“(1)blood 1”, “(2)blood 10” and “(3)blood stat”).*

APPENDIX C DISASSEMBLY

To Cover

APPENDIX C DISASSEMBLY

C.1 Detector Unit Assembly

(1) Remove Light Shield Cover with Hinge from Top Cover. (Also remove the screws for the stop bar for Light Shield Cover.)
(2) Remove two screws fixing Left Side Cover and remove the cover by lifting upward.
(3) Remove Reagent Stage. (by removing 4 screws)
(4) Remove Detection Stage. (by removing 2 screws)

> **CAUTION:** Be careful not to hit the Detection Stage to the tip of the pipette.

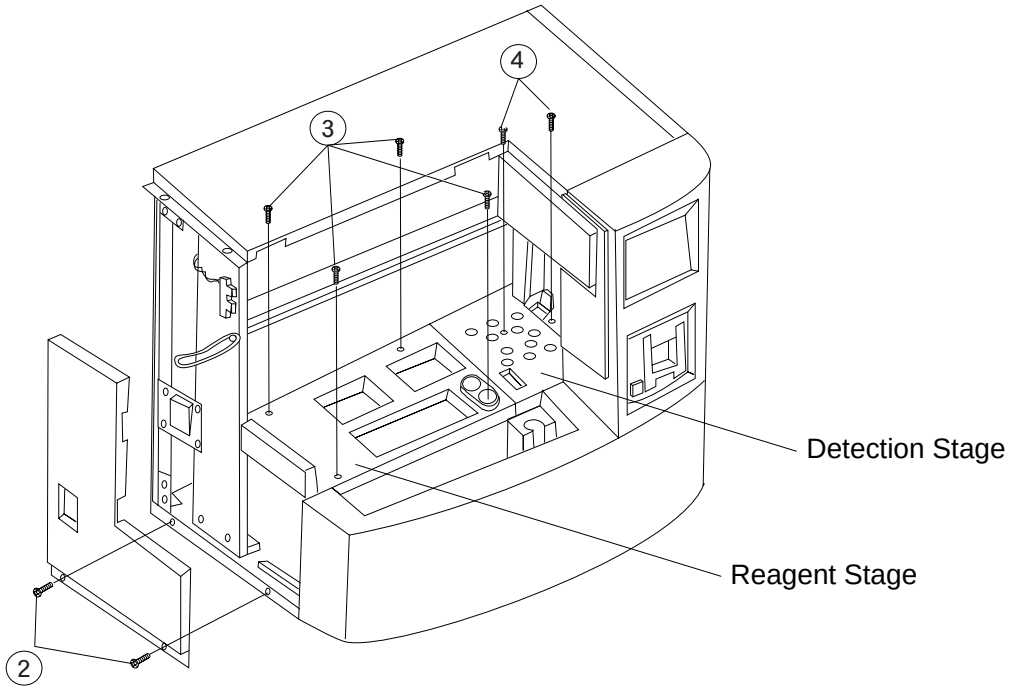


Figure C-1: Removing Reagent Stage and Detection Stage

(5) For Detector Unit Assembly, loosen Four fixing screws (item 5 in the Figure C-2), and remove it by sliding to the left side.
(6) Disconnect relay Connector and PCB Connectors.
(7) Channel 6 is fixed by two screws.
(8) PCB No. 9259 (Immuno, LED) is fixed by one screw.
(9) PCB No. 9259 (AT3, LED) is fixed by one screw.
(10) PCB No. 2132 is tightened by four screws together with Shield Case. (Including Isolation Bush.)
(11) PC Board of Photo Diode for AT-3 is fixed to Heater Block by one screw.
(12) Thermal Sensor is inserted in the Block with Sarcon®.
(13) Turn over the Block and remove the aluminum plate by removing two screws. (item 11)
(14) Remove two fixing screws (item 12) on the aluminum plate to remove the heater.

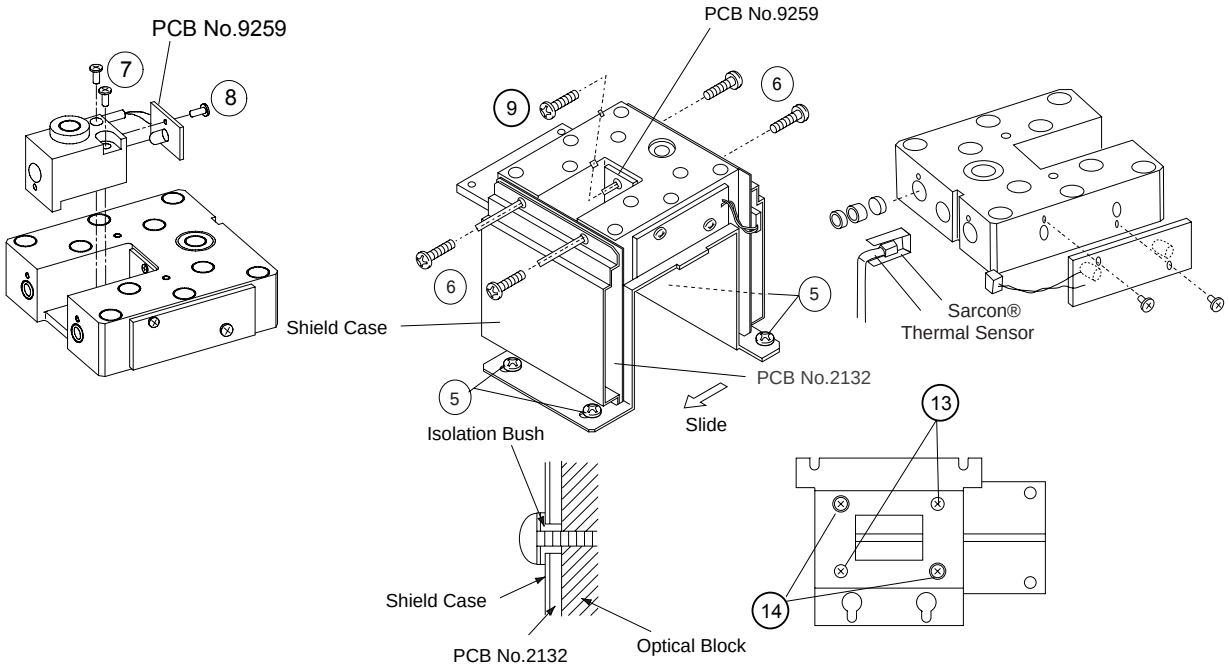


Figure C-2: Disassembling Detector Unit

C.2 Cooler Unit Assembly

(1) Remove Light Shield Cover with Hinge from Top Cover. (Also remove the screws for the stop bar for Light Shield Cover.)
(2) Remove two screws fixing Left Side Cover and remove the cover by lifting upward.
(3) Remove Reagent Stage. (by removing 4 screws)
(4) Slide and remove Cooler Unit by loosening a screw on the left side and two screws on the right. (item 4)
(5) Remove four plastic screws (item 5) on Holding Plate to remove the Pertier Element.
(6) Thermal Sensor is inserted in the Cooler Plate. (item 6)
(7) Cooler Fan is fixed by four fixing screws with spacers.

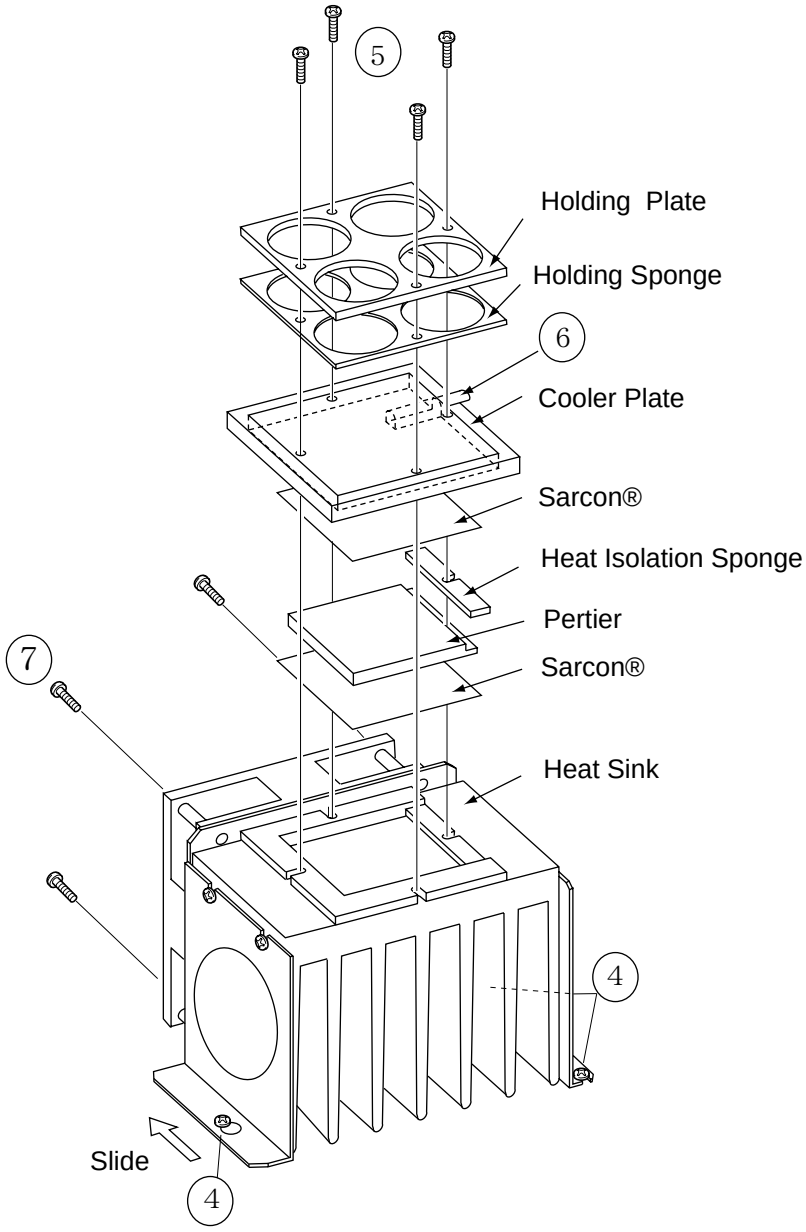


Figure C-3: Disassembling Cooler Unit

C.3 Volumetric Unit Assembly

(1) Remove Right Side Panel by removing two screws.
(2) Disconnect Photo Sensor connector and Motor connector.
(3) Move the pipette to Rinse Cup and disconnect the tubing.
(4) Remove the volumetric unit motor by loosening two screws (item 4).

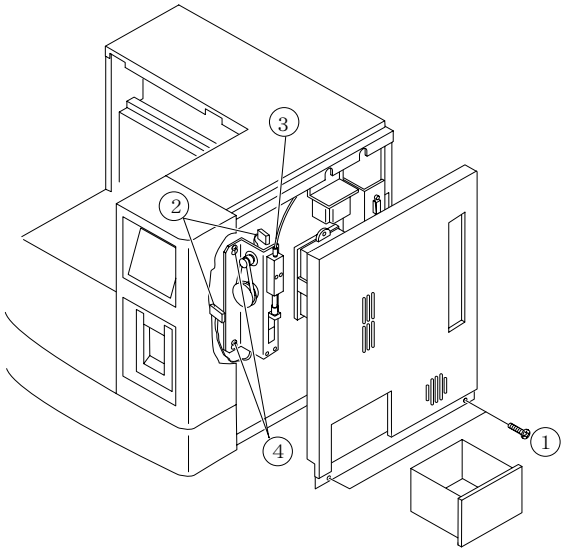


Figure C-4: Removing Volumetric Unit Motor

(5) The motor is fixed by two fixing screws (item 5). (Adjust the belt tension so that the belt is indented 4 mm when it is pushed at the center by a finger.)
(6) As for the adjustment of the tension between Idler and Pulley, adjust it at Pulley position. (Adjust the belt tension so that the belt is indented 4 mm when it is pushed at the center by a finger.)

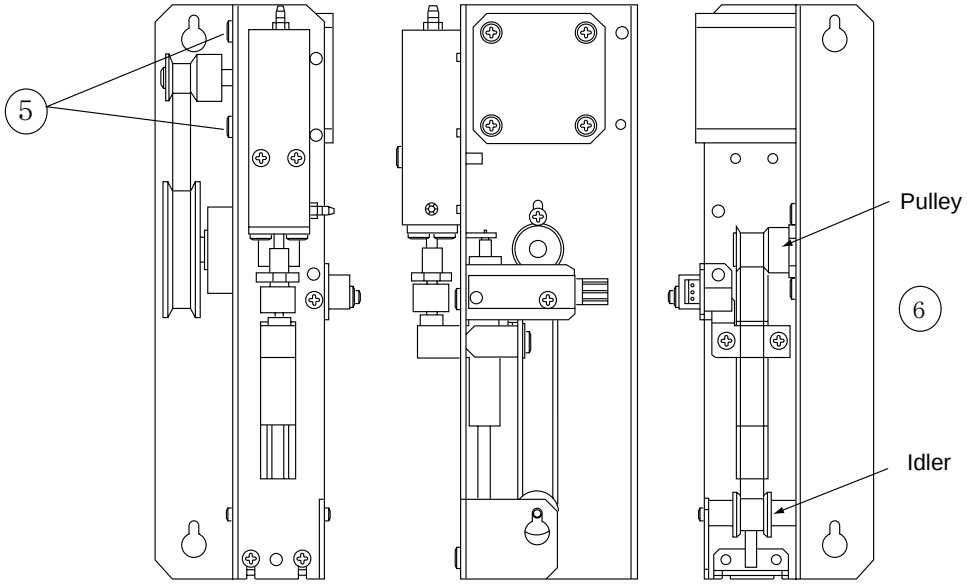


Figure C-5: Adjusting Belt Tension

C.4 Drive Arm Assembly

(1) Remove all the panels.
(2) Remove the belt by loosening the tension of X-motor by loosening two screws (item 2). (Be careful, as the left side idler comes off.)
(3) Remove four screws on the right and left sides and two screws (item 3) on the top side of the top plate (aluminum plate).

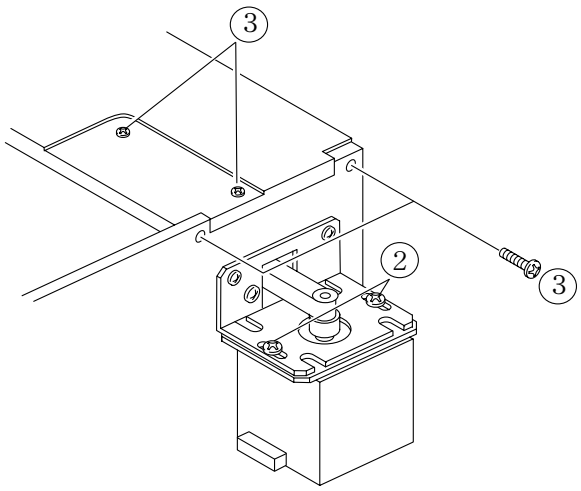


Figure C-6: Removing Drive Probe Assembly

(4) Remove two fixing metals clamping the FPC (item 4), and remove the FPC from PCB No. 9260.
(5) Remove the screw fixing the X-axis shaft and loosen the screw of the aluminum plate on the left side.

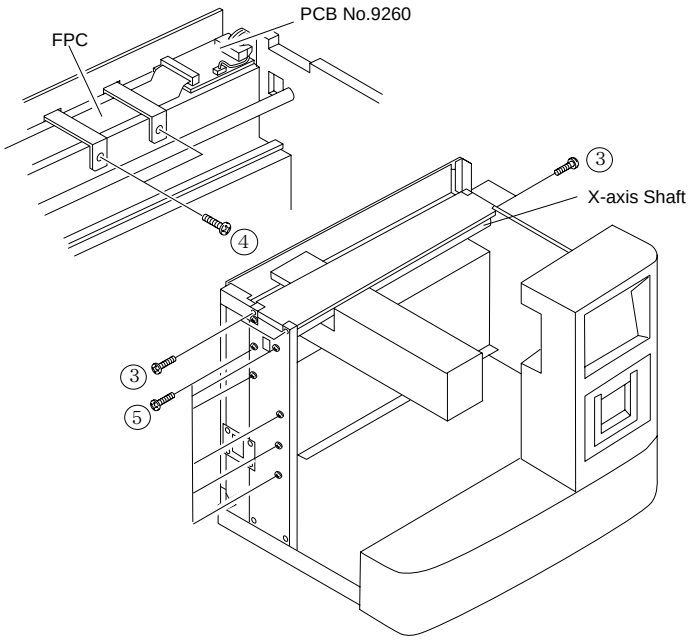


Figure C-7: Removing FPC

(6) Open the left side aluminum plate and remove the shaft and Drive Arm Assembly.
(7) Remove the tubing from the clamp by removing two left screws, two screws of your side, three screws on the top and the four right screws in order to remove Drive Arm Assembly. (The cover can be removed without removing Drive Arm Assembly from the main unit. Be careful not to catch or crush the tubing.)

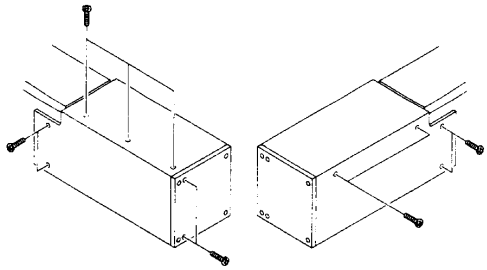


Figure C-8: Removing Drive Probe Unit Cover

(8) After removing the cover, you can access PCB No. 2134.

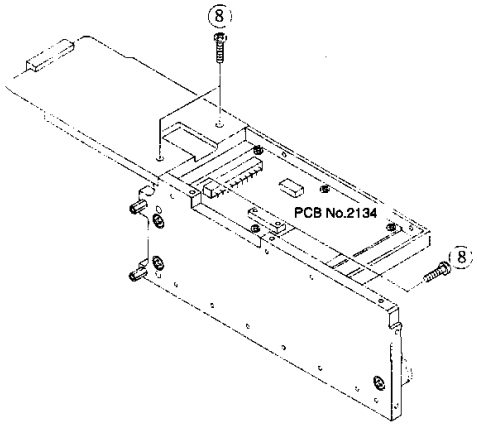


Figure C-9: Accessing PCB No. 2134

(9) The X-slider can be removed after removing the chassis.
(10) The linear slider and the bearing block on the lower side are included in the X-slider.
(11) After removing six screws fixing the resin cover at the back side of the Z-axis base, you can access PCB No. 9264 (Z-Axis Home Position Sensor).

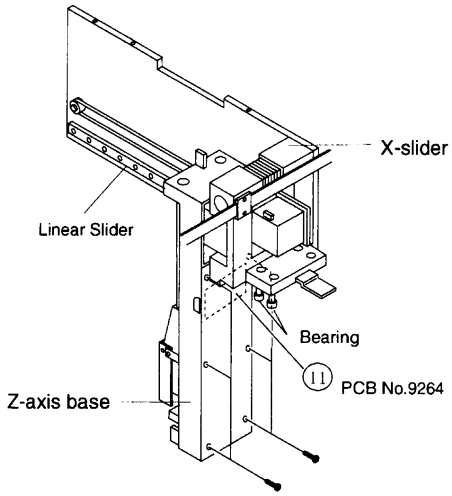


Figure C-10: Accessing PCB No. 9264

(12) Loosen the tension of the Y-axis Motor by loosening two screws (item 12) and remove the belt by sliding the motor.
(13) Remove four screws fixing the Z-axis base on the linear slider, and Z-Axis Base Assembly can be removed (item 13).

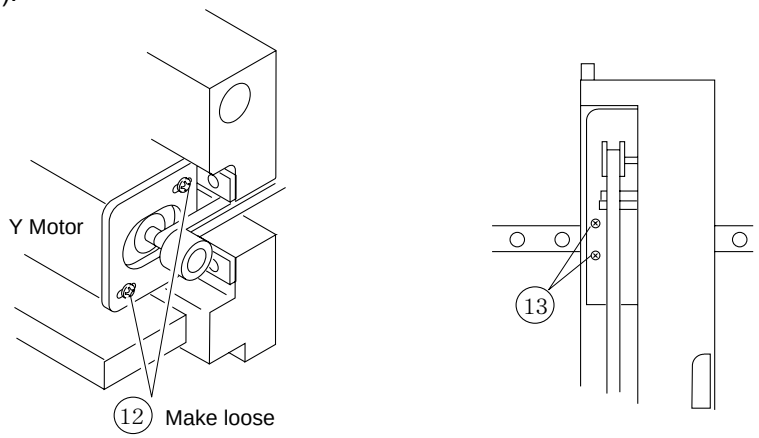


Figure C-11: Removing Z-Axis Base Assembly

(14) The pipette is fixed by a screw on the upper side.
(15) Crush Sensor is fixed in the pipette cap.
(16) Catcher holder is fixed by two screws together with Leaf Spring, Slider Base, SUS Sub Plate and SUS Case.
(17) Catcher is fixed together with O-Ring, Spacer, Fixing Metal (SCL6-13) and O-Ring in this order by two fixing screws.
(18) Z-axis motor is fixed to Z-Axis Base with the SUS plates by two screws

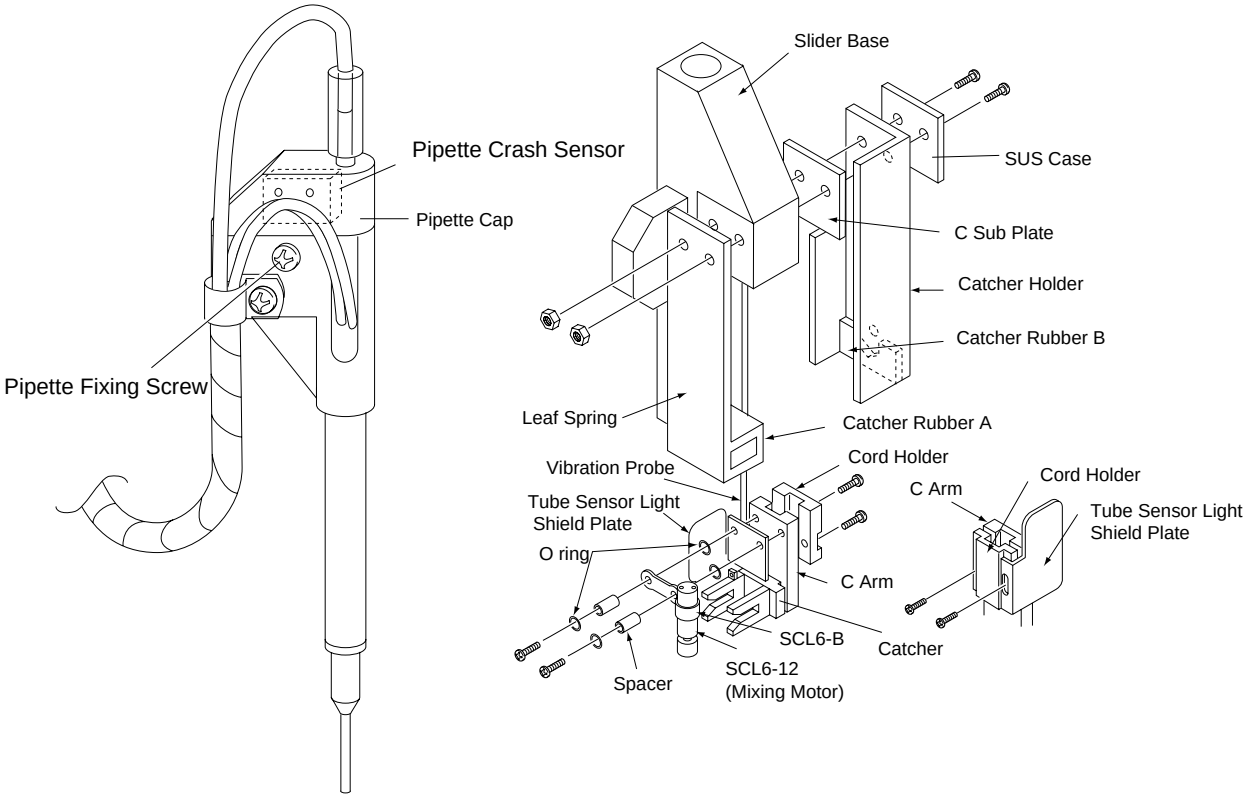


Figure C-12: Catcher Unit Assembly

C.5 Operation Panel Assembly

(1) Remove all the panels.
(2) Disconnect (PR RELAY) connector CN1, 7, 8 on PCB No.9265. Disconnect two relay Connectors, and LCD Connector (item 2).
(3) Remove two screws on the top side (item 3) and four screws on the right side (item 3) to pull Operation Panel Assembly toward you.

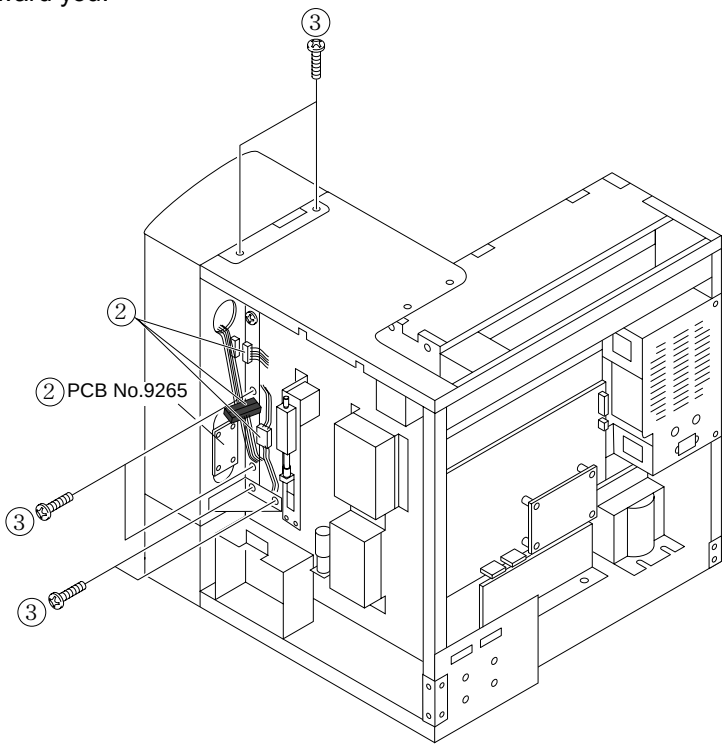


Figure C-13: Removing Operation Panel Assembly

(4) Remove six screws on the back side of Operation Panel Assembly, and you can find Printer, LCD, VR Assembly and Emergency Stop Switch inside.
(5) PCB No. 9265 is fixed by four screws.

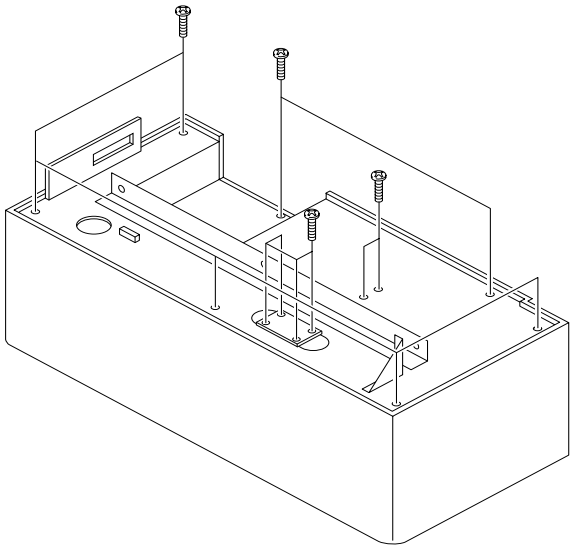


Figure C-14: Operation Panel Assembly