INSTRUCTION MANUAL

for

MODEL 717
AUTOMATIC ANALYZER

Part No. 717-9001-2
YY-Y (NMG-LT)

WARNING

The Model 717 operates on the line power supply.
For checking or replacing inner parts other than specified, contact the nearest Hitachi service engineer. Be sure to ground the instrument before attempting an operation.
Disconnect the 717 from the main power supply before touching any of the inner parts.

GUARANTEE

Any failure or trouble occurring in this analyzer under the normal operating conditions within one year after the date of delivery will be repaired free of charge. This guarantee, however, will not be valid for the following faults and/or failures.

(1) When the analyzer is disassembled by the customer and cannot be put back in the normal status.

(2) When corrosion of electric circuits and/or deterioration of optical elements occurs, especially if the analyzer is carelessly exposed to an environment containing highly corrosive gases (hydrogen chloride gas, for example).

(3) The consumables will not be replaced even within the guaranteed period free of charge.

(4) Damage caused by disaster is not included in the guarantee.

AFTER-SALES SERVICE

For the after-sales service of the analyzer, contact the nearest Hitachi service agent.
For the principal parts incorporated in the analyzer, the names and numbers (7 digit numbers) are specified in the figures and photos. When ordering a part, specify the name and number.

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1. INSTALLATION

1. INSTALLATION

1-1 Installation Location

1-1-1 Installation Requirements

Select a location satisfying the following conditions:

(1) Room free from dust and well ventilated. (The reaction cuvettes of this analyzer are not covered.)

(2) Not exposed to direct sunlight.

(3) Level floor (gradient 1/200 or less).

(4) Sturdy floor; the analyzer weighs approximately 450 kg.

(5) Ambient temperature should be 15° to 32°C throughout the year, and variations of it during the operation should be within ±2°C.

(6) Relative humidity should be 45 to 85 %.

(7) Unaffected by vibration.

(8) Power distribution board is within 5 m of the analyzer.

(9) Minimum power fluctuation (voltage fluctuation ±10 % or less).

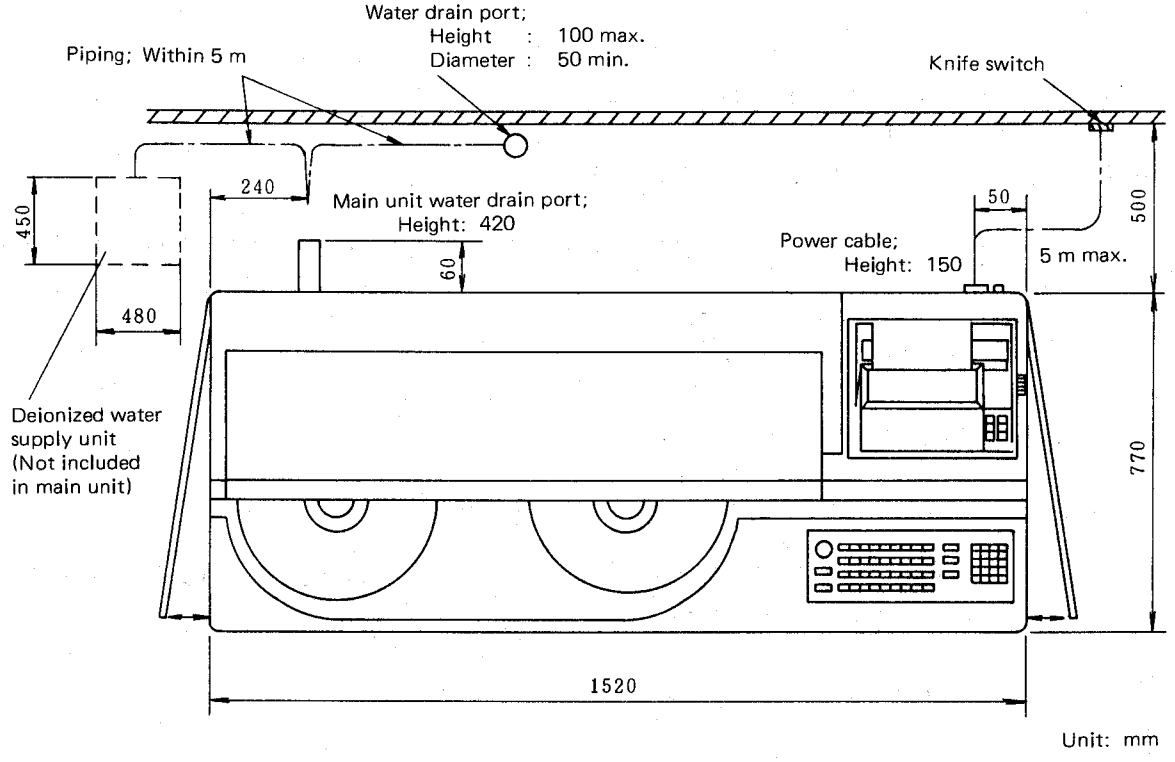
(10) Away from a machine producing a high frequency (centrifuge, discharge unit, etc.).

Caution: A grounding terminal whose resistance is 10 Ω or less should be provided in the vicinity of the installation location. (See Fig. 1-4.)

1-1-2 Installation Layout

Install the analyzer referring to "Fig. 1-1 Instrument Layout".

Caution: Leave space of at least 50 cm behind the analyzer and at least 1 m in front of it for maintenance and service.



Installation Conditions

1.	Space	:	Main unit dimensions; 1520 (W) X 770 (D) X 1150 (H) mm Rear space ; 500 mm or more Front space ; 1000 mm or more Left side space ; 1000 mm or more
2.	Weight	:	Approx. 450 kg
3.	Power requirements	:	100, 115, 127, 220, 230, 240 VAC ±10 % 50/60 Hz, 3 kVA (knife switch)
4.	Grounding	:	With ground resistance of 10 Ω or less
5.	Ambient temperature	:	15 to 32°C (Temperature variation during measurement: Within ±2°C)
6.	Ambient humidity	:	45 to 85 %RH
7.	Deionized water supply unit	:	With water pressure of 0.5 to 3.5 kg/cm²
8.	Water drain port	:	With bore diameter of 50 mm min. Located at height of 100 mm max.

Fig. 1-1 Instrument Layout

1-2 Items to Be Prepared by Customer

Table 1-1 shows the items to be prepared by the customer.

Table 1-1 Items to Be Prepared by Customer

Item	Specifications	Remarks
Power source	Power distribution board with knife switch Voltage : 100, 115, 127, 220, 230, 240 V AC single phase Power : 3 kVA or more	
Grounding terminal	Grounding resistance 10 Ω or less	
Distilled water or deionized water	100 ℓ during installation and adjustment	
Reagents	Reagents to be used after the installation should be prepared by the customer	
Refrigerator	Refrigerator necessary to store reagents	

Notes: 1. Connection of Deionized Water Supply Unit
The Model 717 requires distilled water (20 ℓ or less/600 tests) which is supplied from a built-in distilled water tank (10 ℓ). To prepare additional water, connect a deionized water supply unit to the analyzer. The supply of deionized water can be controlled directly from the analyzer.
Tubing should be connected to the distilled water supply port above the water drain port at the rear panel of the analyzer. Connect the control signal cord to the connector (J220) at the rear panel of the analyzer.

2. Water Drain Facility
In installation of the analyer, be sure to provide a water drain facility so that waste water can be drained directly from the analyzer.

1-3 Standard Accessories

Unpack the crates for the main unit and accessories, and then check the accessories referring to the parts list. If there is any missing or damaged part, contact your agent.

1-4 Assembly

The following assembly procedures should be carried out by qualified installation engineers dispatched from Hitachi or the local representative.

1-4-1 Installation of Analyzer

Unpacking

(1) Remove the adhesive tapes fastening the exterior parts of the main unit.

(2) Remove the cotton tapes securing the pipetting system.

(3) Remove the cotton tapes securing the rinsing unit and stirring unit.

(4) Open the front cover, and remove the cotton tapes securing the waste solution container and distilled water reservoir.

(5) Remove the cotton tapes securing the power cable.

1-4-2 Wiring

Before connecting cords and wires, make sure that the MAIN POWER switch (located on the right side of the main unit) is turned OFF.

(1) Connection of Power Cord

Cut the power cord extending from the rear right side of the analyzer to the specified length, and connect the ends of the wires to the knife switch on the power distribution board.
If the power distribution board is provided with a grounding terminal (ground resistance: 10 Ω or less), be sure to connect the grounding wire to the terminal (Fig. 1-2).

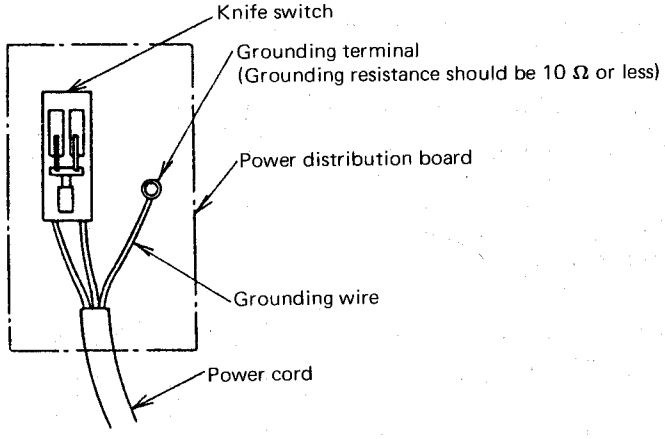


Fig. 1-2 Connection of Power Cord

Caution: Connect the L wire (brown) of the power cord to the HOT side on the power distribution board, the N wire (blue) to the COLD side, and the grounding wire (yellow/green) to the grounding terminal.
The HOT side and COLD side can be determined by measuring the voltage (AC range) to the grounding terminal. The voltage on the HOT side is higher than that on the COLD side.

(2) Connection of Grounding Wire

If a grounding terminal is not provided on the power distribution board, connect a wire to the grounding terminal ⏚ shown in Figs. 1-3 and 1-4. In this case, the grounding wire (yellow/green) of the power cord should be folded and fastened to the power cord with adhesive tape.

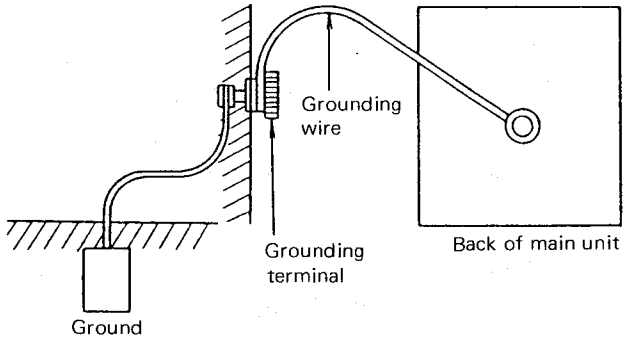


Fig. 1-3 Connection of Grounding Wire

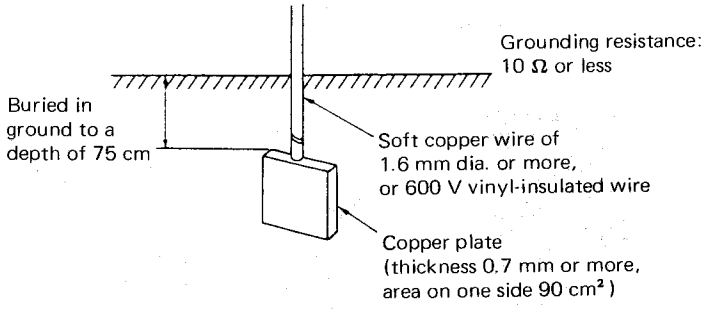


Fig. 1-4 Standard Grounding Work

(3) Connection of Printer Cords

Power and signal cords of the printer should be connected as shown in Fig. 1-5.

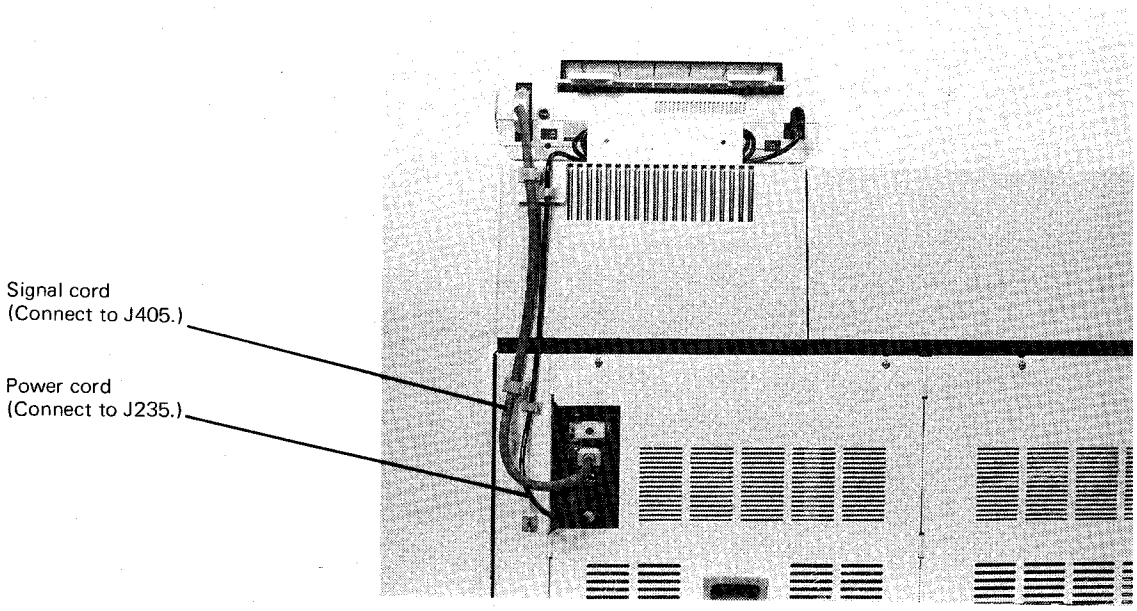


Fig. 1-5 Connection of Printer Cords

(4) Backup Battery for Internal Clock and Nonvolatile Memory

Open the front right cover of analyzer, and plug in the J483 connector as shown in Fig. 1-6.

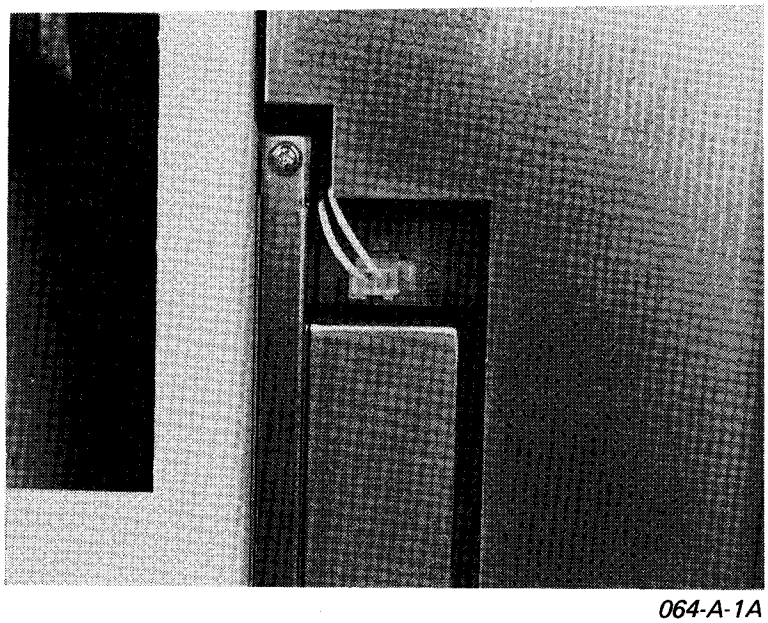


Fig. 1-6 Backup Battery Connection

1-4-3 Water Supply and Drain

(1) Water Supply to Cold Water Tank

Remove the rear cover from the main unit. (The cold water tank can be seen at the lower right side of the main unit.)
Remove the rubber cap.

Fill the bath with distilled water or deionized water by using the attached hose pump, as shown in Fig. 1-7.

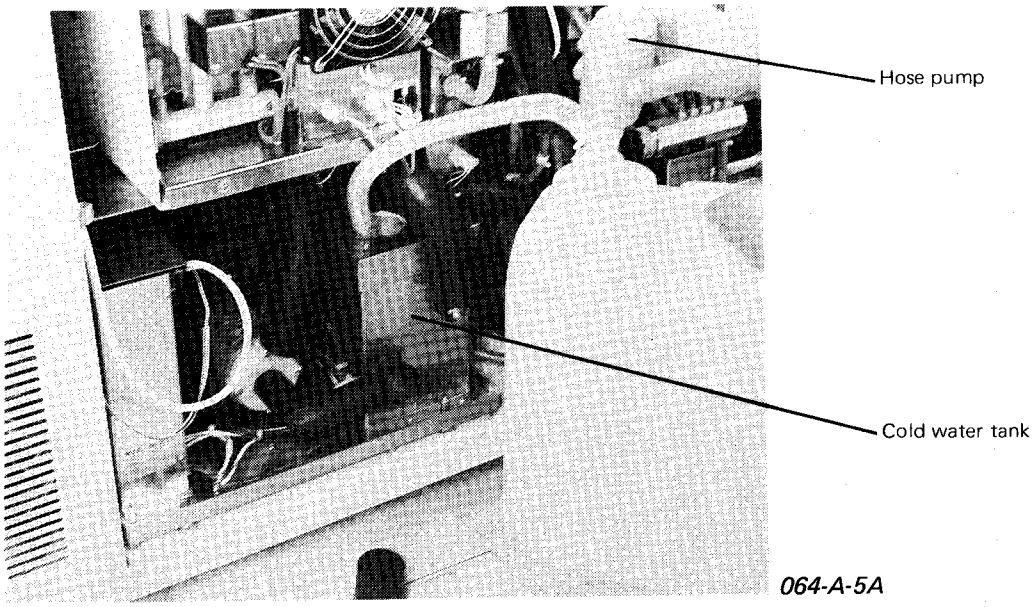


Fig. 1-7 Water Supply to Cold Water Tank

(2) Water Supply to Distilled Water Tank

Open the front cover of the main unit, and fill the distilled water tank with distilled water or deionized water by using the hose pump.

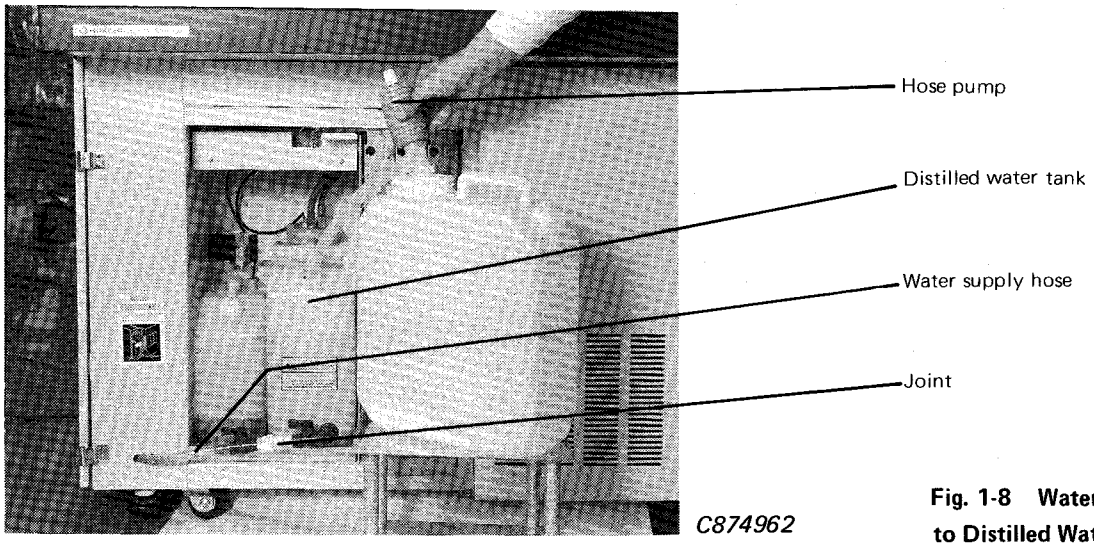


Fig. 1-8 Water Supply to Distilled Water Tank

(3) Connection of Water Supply and Drain Tubes

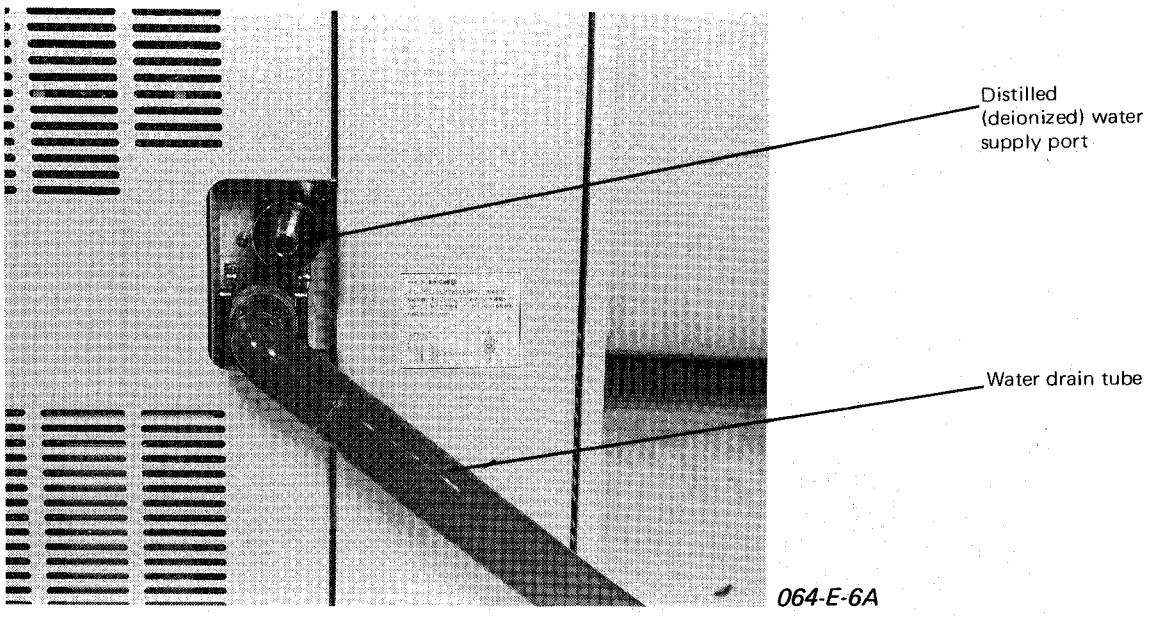


Fig. 1-9 Connection of Water Supply and Drain Tubes

1-4-4 Mounting of Parts

(1) Placement of Sample Disk

Place the sample disk onto the rotating shaft by inserting the guide pin on the rotating shaft into the pin hole of the sample disk as shown in Fig. 1-10.

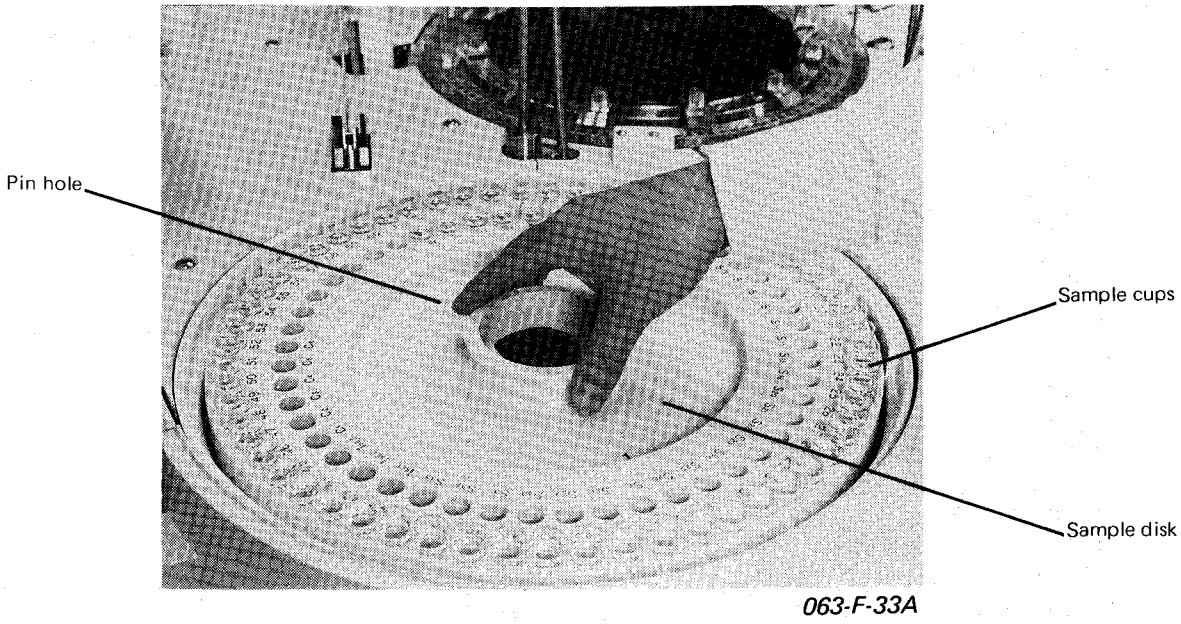


Fig. 1-10 Placement of Sample Disk

(2) Placement of Reagent Disk

Place the reagent disk onto the rotating shaft by inserting the guide pin on the rotating shaft into the pin hole of the reagent disk while pushing the latches and fix the reagent disk on the rotating shaft as shown in Fig. 1-11.

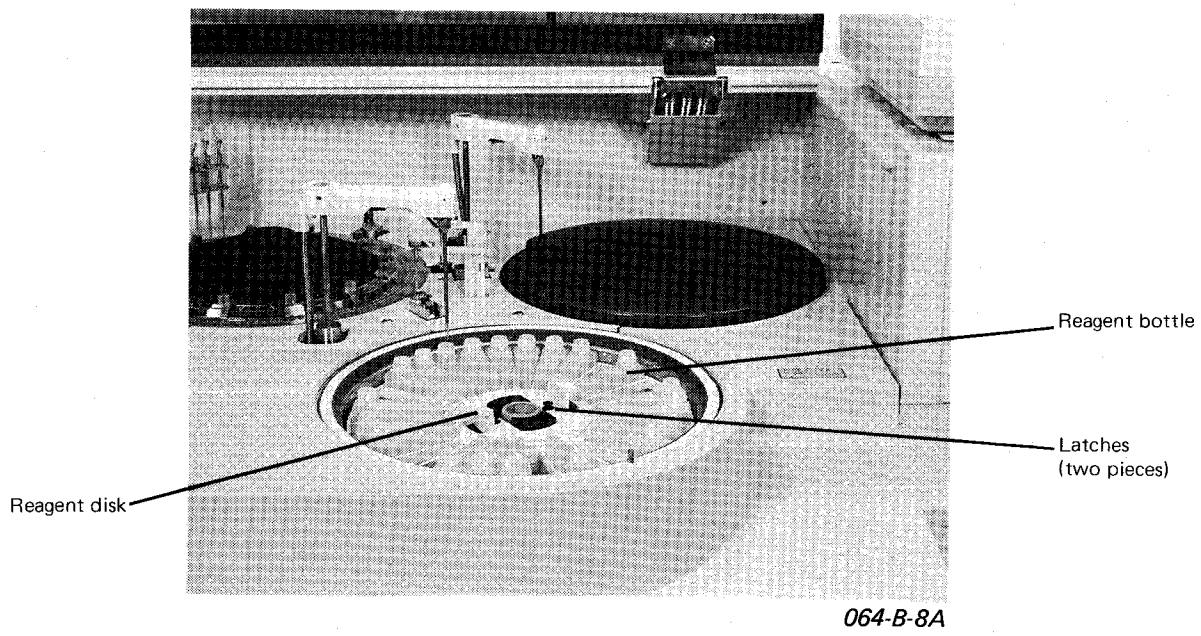


Fig. 1-11 Securing the Reagent Disk

(3) Loading of Serum and Reagent Probes

Load the serum probe (orange) on the serum sampling mechanism located at the top left of analyzer unit. See Fig. 1-12. Be sure to secure the retaining screw located at the end of probe. Also, be sure to connect the liquid level sensor lead wire to the relevant connector.
In the same manner, load the reagent probe (green) on each of the two reagent pipetting mechanisms located at the top right of analyzer unit.

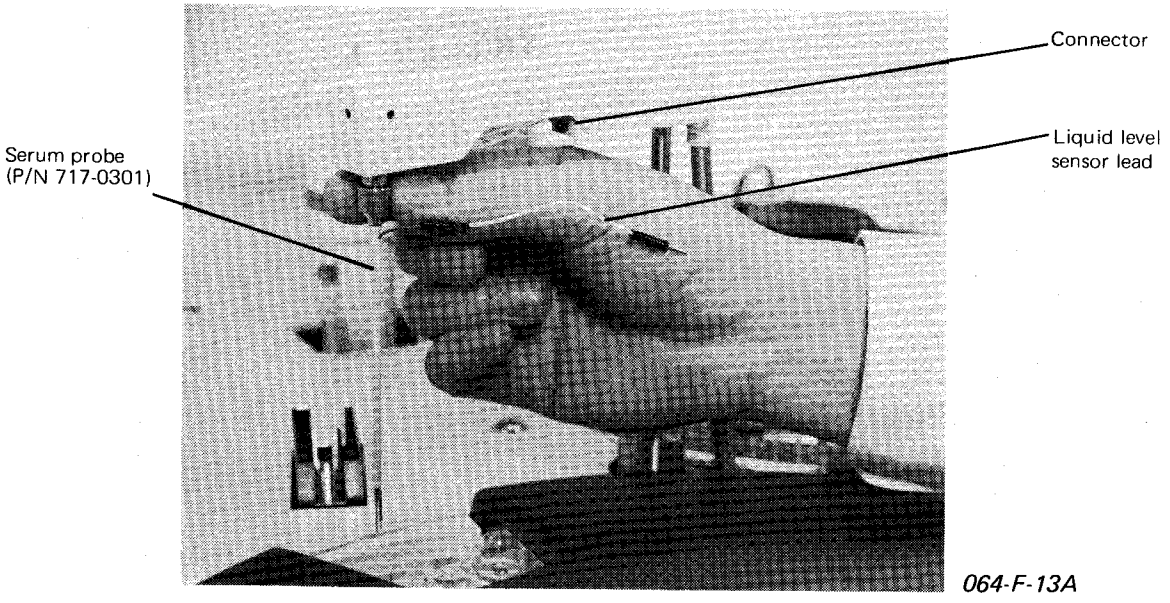


Fig. 1-12 Mounting of Serum Probe

(4) Mounting of Reaction Cuvettes

Mount the furnished reaction cuvettes (P/N 717-0300) along the periphery on reaction disk.

1) Put a reaction cuvette into a guide hole on the reaction disk periphery, and secure it by tightening the setscrew of cuvette support as shown in Fig. 1-13.

2) In the above manner, mount six reaction cuvettes along the periphery on reaction disk.

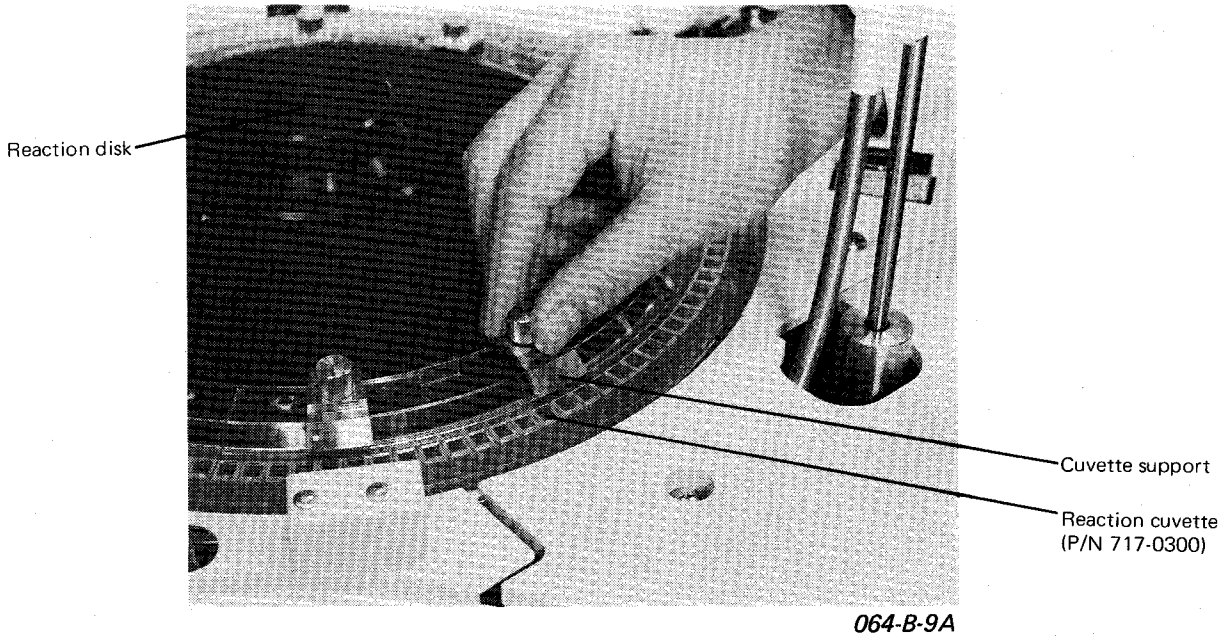


Fig. 1-13 Mounting of Reaction Cuvettes

(5) Mounting of Extran Tank

Open the front left cover, and place the Extran (undiluted solution) tank as shown in Fig. 1-14. Then, connect the Extran suction tube to the Extran tank.

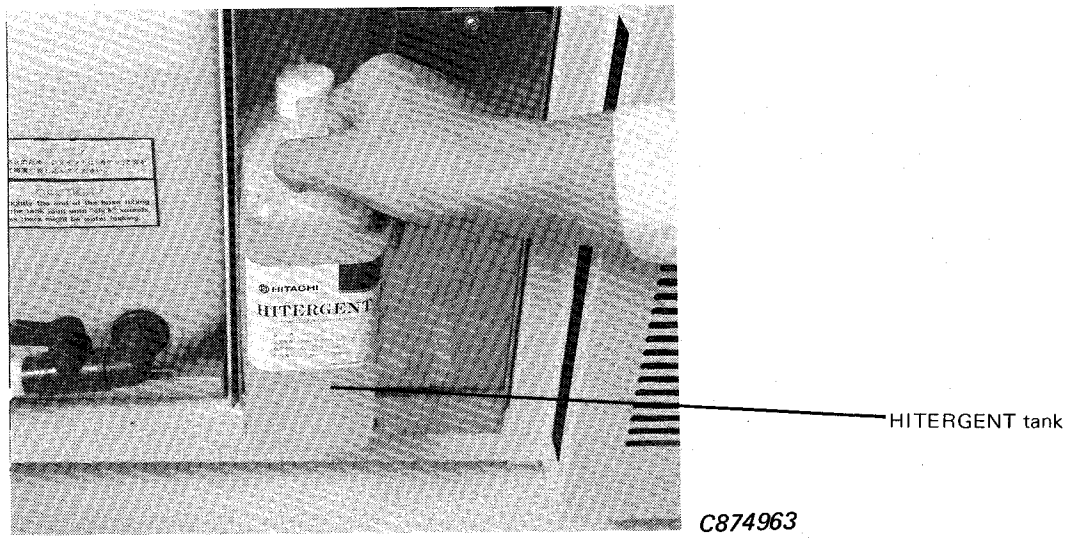


Fig. 1-14 Mounting of Extran Tank

1-5 Power ON

(1) Put the program file floppy disk (P/N 717-6000) into drive 1 (the left drive of the two floppy disk drives), with its labeled side facing up.

(2) Put the data file floppy disk (P/N 717-6001) into drive 2 (the right drive of the two floppy disk drives), with its labeled side facing up.

(3) Turn on the knife switch on the power distribution board.

(4) Throw the POWER switch (red switch located under CRT display) to position "1".

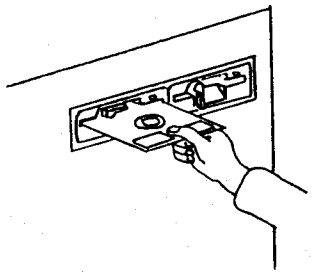


Fig. 1-15 Insertion of the Floppy Disk

Notes: 1. The water cooling unit is wired to receive power even if the POWER switch on the front of Model 717 is not turned on. That is, the water cooling unit is activated when the knife switch on the power distribution board is turned on.

To ensure safety during maintenance servicing, the internal power switch is provided in the instrument. Both the water cooling unit power and main unit power can be controlled using this internal power switch.

It has been preset to OFF position at factory, and should be turned on by the qualified installation serviceman.

2. When power is turned on initially after installation, the reaction bath may not be supplied with sufficient distilled water.

In this event, carry out "INC. WATER EXCHANGE" on the MAINTENANCE screen several times repeatedly.
Thereby, sufficient distilled water can be fed to the reaction bath.

3. When the analyzer is powered up initially after installation, the amount of water in the cooling bath is reduced because of circulation.

So, replenish distilled or deionized water into the cooling bath as required.

- **Mounting of Paper Rack**

Remove the printer AC cord from under the hook of the printer stand and hang the paper rack on the hook.

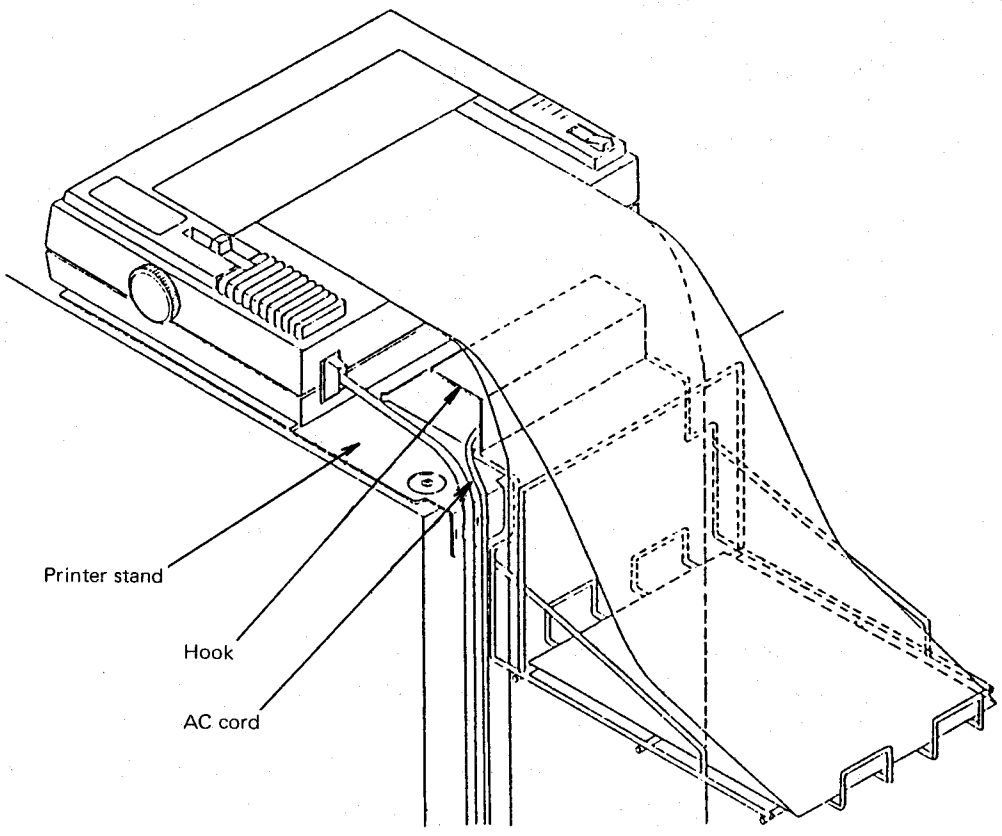


Fig. 1-16

- **Loading of Paper**

Put the continuous paper under the paper rack and pull its end upward through the space of rack wire to set it in the printer.

Note: Be sure that the printed paper passes on the pole.

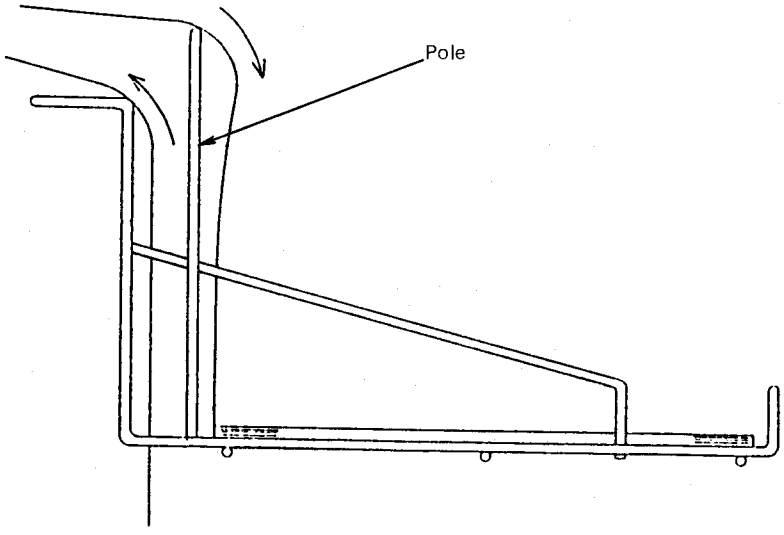


Fig. 1-17

2. FUNCTIONS

2. FUNCTIONS

2-1 Application

The Model 717 is designed for biochemical analyses at hospitals, clinical laboratories and research laboratories. It is capable of analyzing up to 32 test items simultaneously, and has a powerful throughput of 600 tests per hour.

2-2 Components

Table 2-1 lists the components of Model 717 and their functional descriptions. Figs. 2-1 and 2-2 show the locations of these components.

Table 2-1 Components

	No.	Name	Description
Analysis section	1	Sample disk	Accommodates samples
	2	Serum sampling mechanism	Samples pipetted from sample cup into reaction cuvettes
	3	Reagent disk	Accommodates reagent bottles
	4	Reagent pipetting mechanism	Pipets each reagent from reagent bottle into reaction cuvette
	5	Reaction disk	Holds reaction cuvettes
	6	Stirrer	Stirs reaction solution
	7	Rinsing mechanism	Rinses reaction cuvettes
	8	Reagent cooling unit	Stores reagents at low temperature
	9	Photometer	Measures absorbance of the reaction solutions
	10	Distilled water tank	Stores distilled water to be circulated
	11	Waste solution tank	Stores waste solution forced out after measurement
	12	Vacuum system	Aspirates waste solution
	13	Temperature-controlled water circulation system	Maintains the reaction cuvettes at a constant temperature
	14	Deaerator	Purges air dissolved in distilled water

(cont'd)

	No.	Name	Description
Operation section	15	Keyboard	Used for input/output of analytical parameters and data
	16	CRT display	
	17	Floppy disk drive 1	
	18	Floppy disk drive 2	Used for storing analytical results
	19	Printer	Prints out analytical results and produces a hard copy of display screen
Control section	20	Control unit	Controls mechanisms, carries out data processing, and communicates with external computer
	21	Power supply	

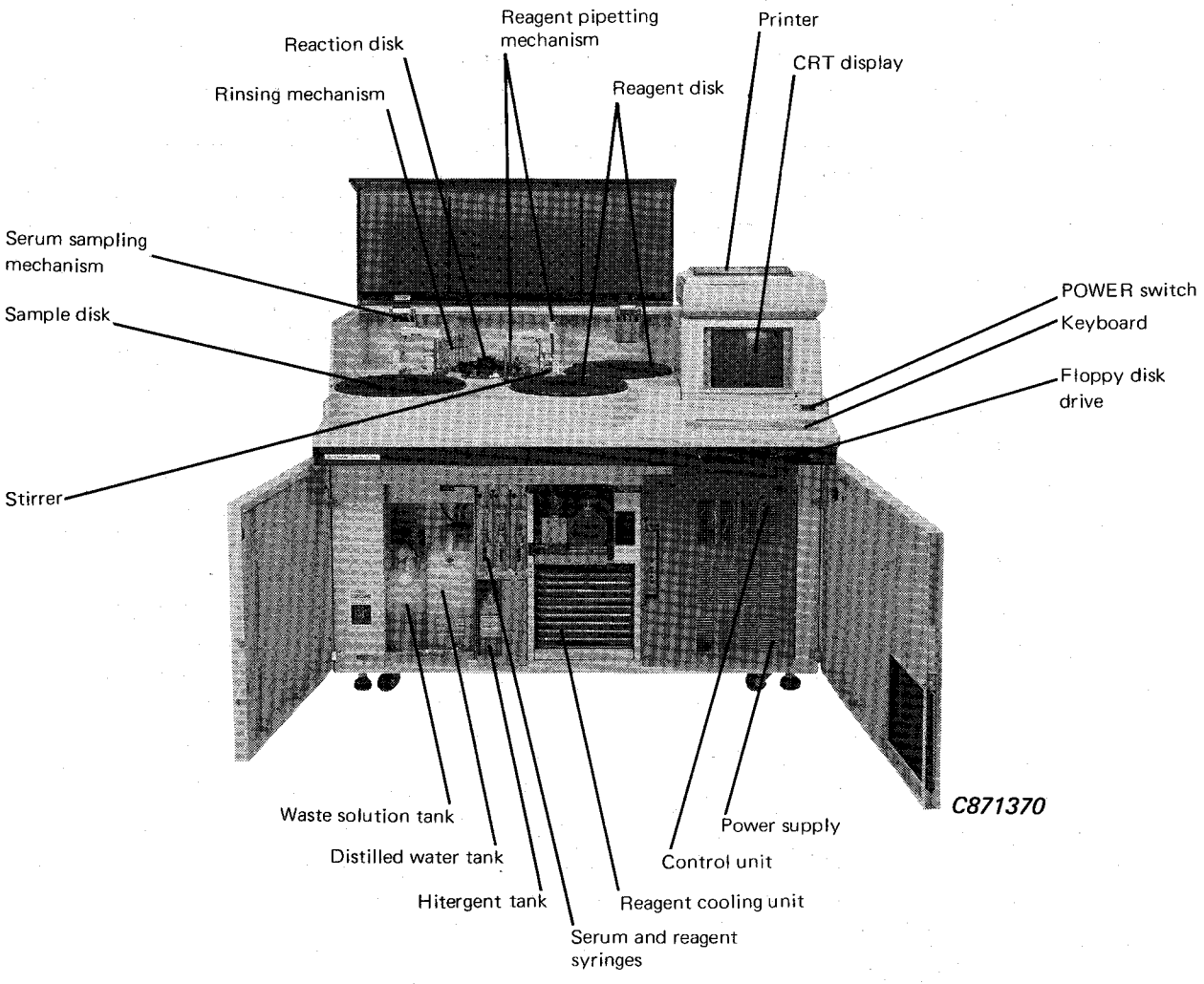


Fig. 2-1 Front View of Analyzer

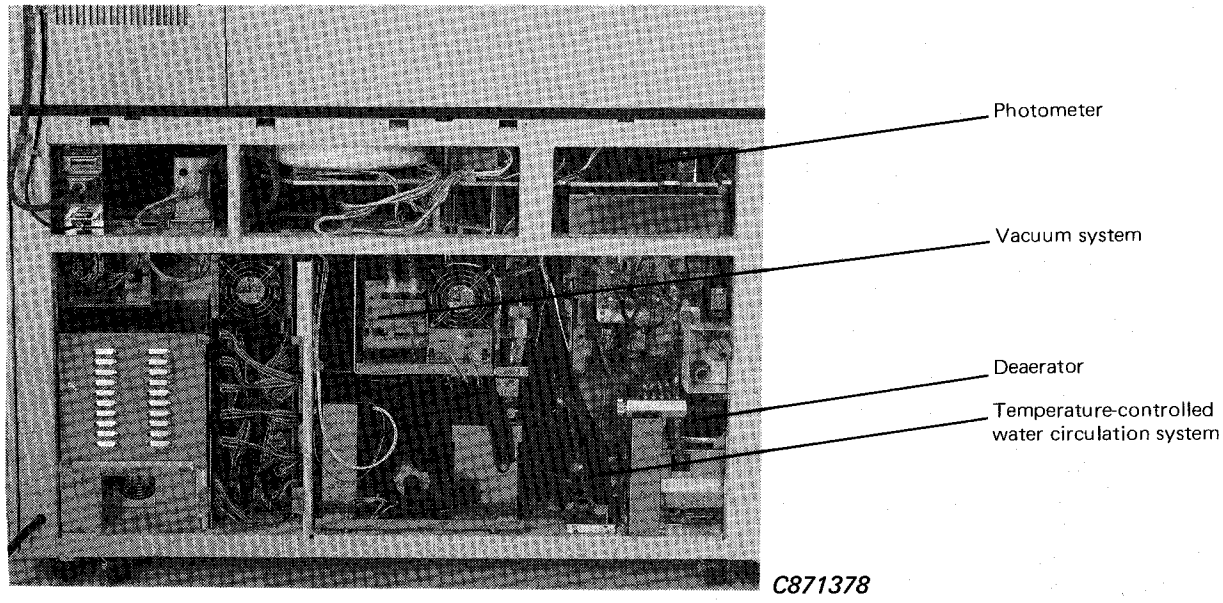


Fig. 2-2 Rear View of Analyzer

2-3 Operating Principles

2-3-1 Mechanisms

The Model 717 Automatic Analyzer consists of the sample disk section, reagent disk section, reaction disk section, data processing section, control panel, and output section. Figure 2-3 illustrates these components of Model 717.
The sample disk is used for holding sample cups, and the reagent disk for holding reagent vials. The test items for each sample and analytical parameters can be instructed through the control panel.
An analytical reaction sequence takes ten minutes; it begins at the moment the first reagent (R1) is added and ends at the moment the final photometric measurement is accomplished. After each of the first and second reagents (R1 and R2) is added to a sample, these solutions are automatically mixed with the stirrer. Absorbance measurement is carried out every 12 seconds, i.e. it is repeated 50 times for ten minutes in an analytical reaction sequence. On completion of photometric measurement, each reaction solution is sucked by the vacuum mechanism, and the reaction cuvette is rinsed with deionized water for the next analysis.
Each of the automated operational steps is described below in detail. The machine cycle of this analyzer is 6 seconds, i.e. absorbance of solution contained in each reaction cuvette is measured every two machine cycles.

(1) Water Blank Measurement:

The rinsing mechanism dispenses deionized water into the reaction cuvette. With water contained in the reaction cuvette, absorbance is measured four times. These absorbance values are used to determine a reference absorbance value of reaction cuvette. On completion of water blank measurement, the reaction cuvette is emptied of water through vacuum suction.

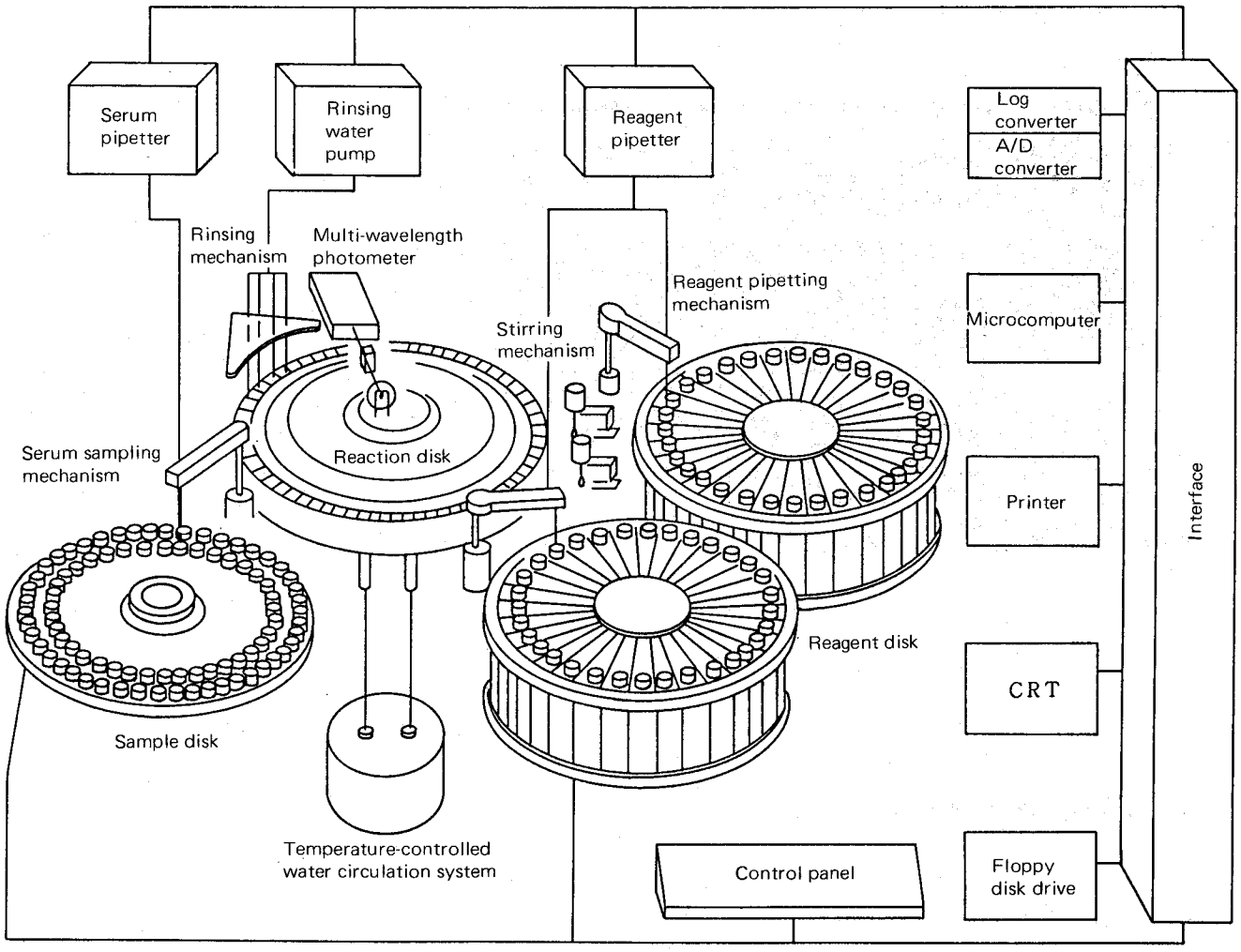


Fig. 2-3 Operating Principle

(2) Sampling:

The sample disk rotates to carry the relevant sample cup as required. The sampling probe moves to the relevant sample cup position, and then it comes down into the sample cup. Equipped with a liquid level sensor, the sampling probe stops when it comes in contact with the sample solution. Then, the specified amount of sample is aspirated. After aspiration, the sampling probe moves to the relevant reaction cuvette position. It then comes down to the bottom of reaction cuvette and discharges sample into it.
After dispensing sample solution, both the inside and outside of sampling probe are rinsed with deionized water thoroughly.

(3) Reagent Pipetting:

The reaction cuvette containing sample solution is carried to the R1 pipetting position. Then, the reagent pipetting mechanism aspirates relevant reagent, and the pipetting probe moves to the reaction cuvette. It then pipets the specified amount of reagent into the reaction cuvette.
About five minutes later, the reaction cuvette is carried to the R2 pipetting position. Then, another reagent is pipetted into the reaction cuvette in the same fashion. If the second reagent (R2) is not required, the R2 pipetting step is skipped over. Note that reagent is pipetted only when the relevant test item is specified.

(4) Stirring:

After the first and second reagents (R1 and R2) are pipetted into the reaction cuvette, the stirrer comes down into it and starts rotating. Thus, serum (sample) is stirred with reagents. Upon completion of mixing, the stirrer is rinsed with deionized water thoroughly.

(5) Rinsing:

The reaction solution (mixture of serum and reagents) is vacuum-sucked after photometric measurements are completed. Then, deionized rinsing water is injected into the reaction cuvette and aspirated from it. This injection-and-aspiration rinsing sequence is repeated four times. When rinsing with deionized water is completed, vacuum-suction is performed twice to make reaction cuvette ready for accepting the next sample.

(6) Photometry:

Every reaction cuvette passes across the optical beam of photometer every 12 seconds. Absorbance of solution contained in the reaction cuvette is thus measured.

(7) Data Output:

The data processing section converts absorbance into concentration. It can output data onto the printer, transfer data to an external computer online, and store data onto the floppy disk.

2-3-2 Analytical Sequence

The analytical sequence is based on the photometric monitoring of whole reaction process. Figure 2-4 shows this analytical sequence. After measurement of water blank, the first reagent (R1) is added to each sample. Then, for ten minutes, absorbance of reaction solution is measured repetitively every 12 seconds. In data processing a water blank value is offset from measured absorbance values of reaction solution. The absorbance value acquisition timing differs from analysis to analysis in practice. (Refer to Section 2-5 — Analytical Methods.)

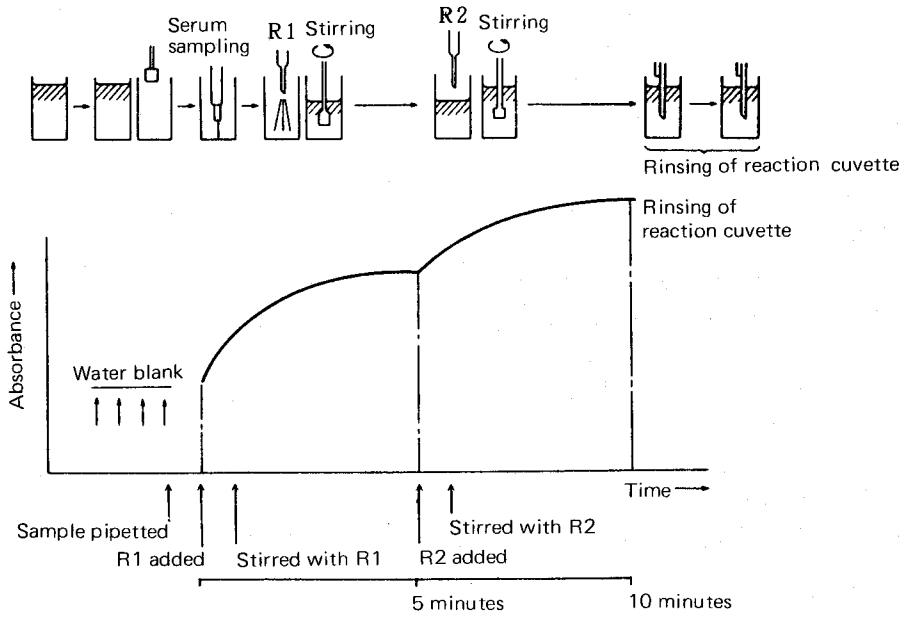


Fig. 2-4 Analytical Sequence based on Photometric Monitoring of Whole Reaction Process

2-4 Functional Description of Components

2-4-1 Sample Disk

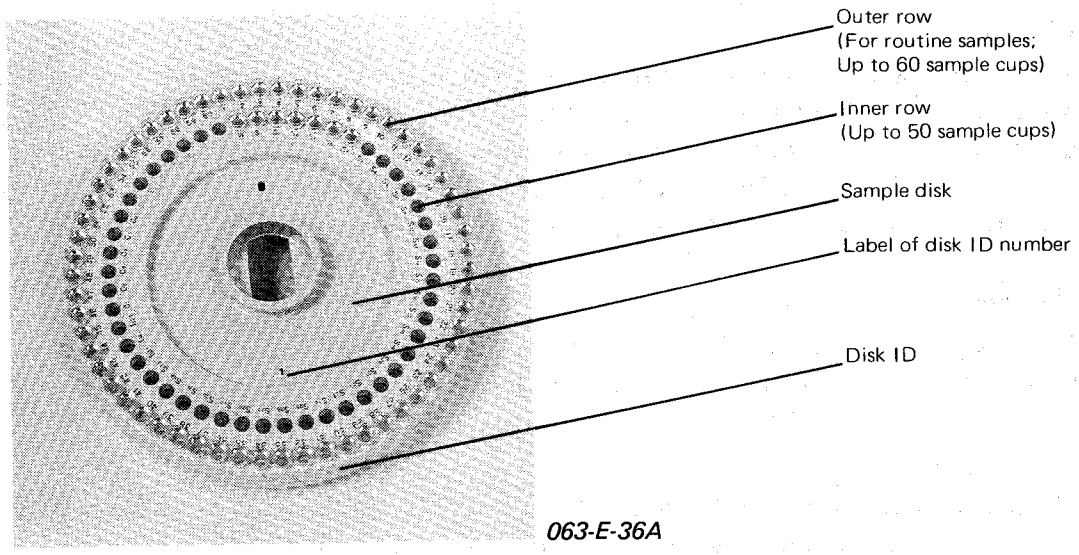


Fig. 2-5 Sample Disk

(1) Function

Used for accommodating sample, standard and control serum solutions. (With disk ID number)

(2) Specifications

This sample disk is capable of holding samples as follows.

- Outer row : Routine samples (1 to 60) . . . . . 60 cups
- Inner row : Standard solutions (S1 to S33) . . . . . 33 cups
  Stat samples (E1 to E7) . . . . . 7 cups
  Control sera (C1 to C6) . . . . . 6 cups
  Washing solution for sample probe (W) . . . . . 1 cup
  Electrolyte standard solutions (ISE1 to ISE3) . . . . 3 cups

(3) Precautions

i) The P/N 716-0425 sample cups should be used on this sample disk.
ii) Never touch the sample disk while it is rotating.
iii) Fill each sample cup with a specific amount of sample solution wherever practicable.
iv) When mounting the sample disk, align the guide pin of spindle with the guide hole of disk.
v) During analytical operation, close the top cover to prevent rapid evaporation of sample solutions.
vi) If residual solution is left in a sample cup, discard it immediately.

2-4-2 Serum Sampling Mechanism

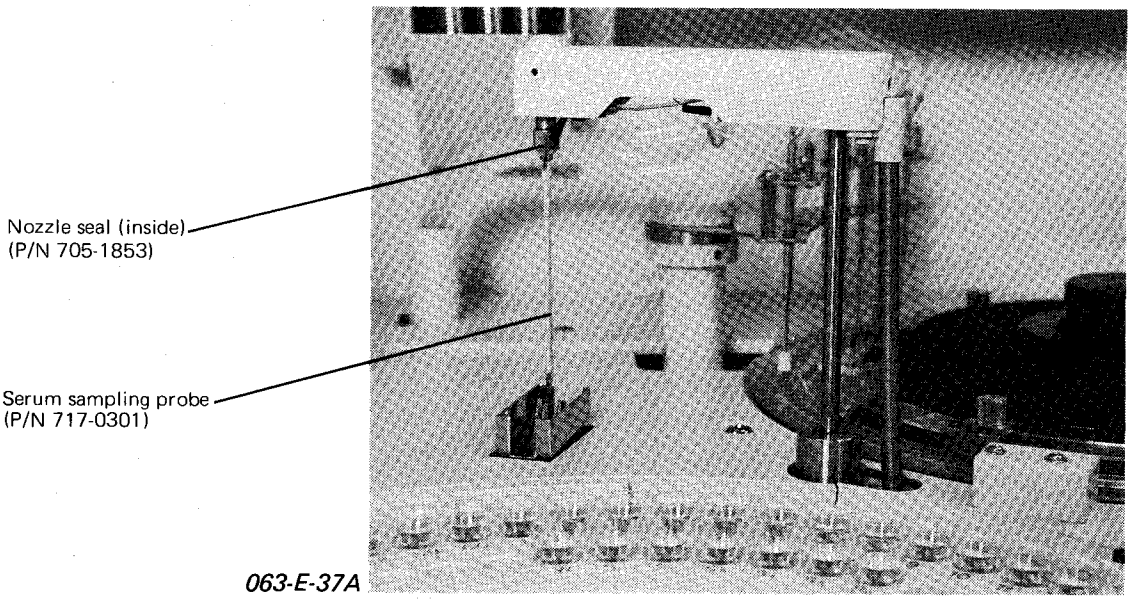


Fig. 2-6 Serum Sampling Mechanism

(1) Function

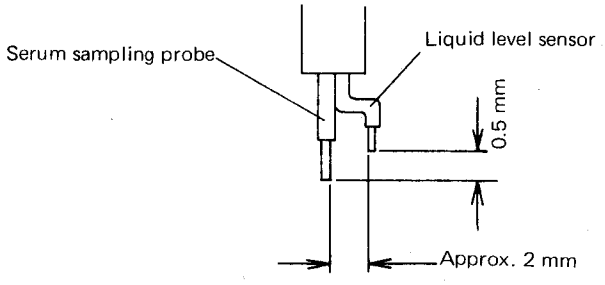
Aspirates a specified amount of sample solution from each sample cup and pipettes it into a reaction cuvette.
The sampling probe is equipped with a liquid level sensor.

(2) Specifications

Serum volume pipetted: 3 to 20 $\mu\ell$ (1 to 20 $\mu\ell$ for RERUN)

(3) Precautions

i) Use the nozzle seal (P/N 705-1853) for sampling probe.
ii) Never touch the sampling mechanism during operation.
iii) If the tip of sampling probe encounters an obstacle when moving down, an alarm is issued to indicate occurrence of irregularity in probe action. In this event, the sampling operation is forced to stop immediately. For restart, remove the obstacle (cause of trouble).
iv) The sampling probe and the liquid level sensor are preadjusted as shown below. If the relative positions of these parts do not meet the dimensions indicated here, a droplet of solution may adhere to the sampling probe to cause malfunction.



[Flow Path Scheme of Serum Sampling Mechanism]

Figure 2-7 shows the flow path scheme of serum sampling mechanism. The sampling mechanism and distilled water tank are located inside the front door.

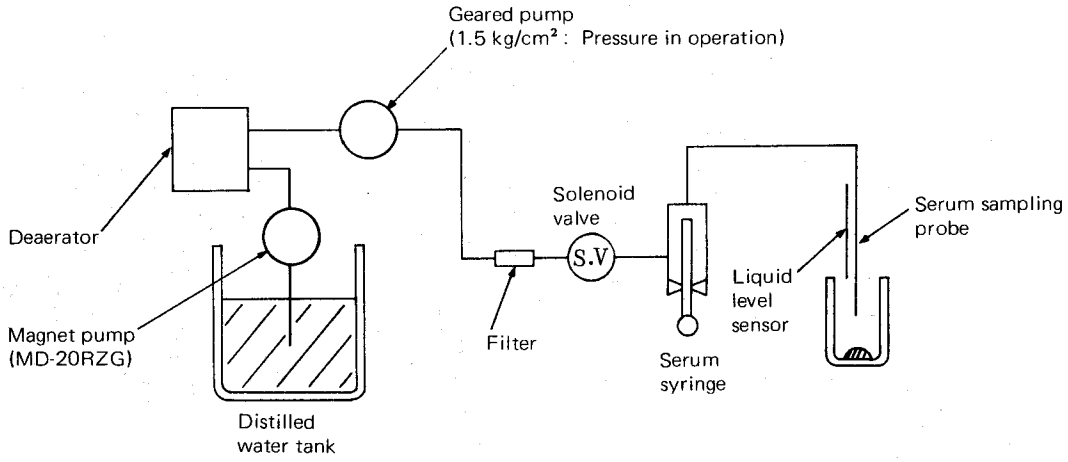


Fig. 2-7 Flow Path of Serum Sampling Mechanism

2-4-3 Reagent Disk

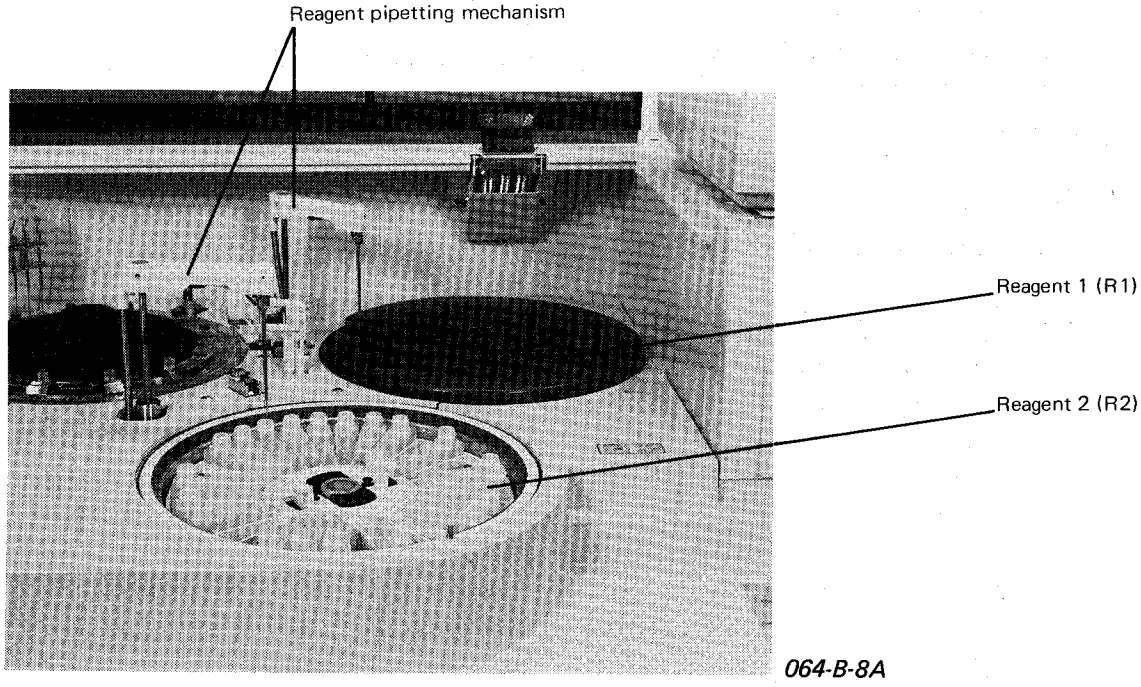


Fig. 2-8 Reagent Disk

(1) Function

Accommodates reagent vials and carries each specific reagent to the reagent pipetting position.

(2) Specifications

i) Reagent vials accommodable
For reagent 1 : 32 reagent vials
For reagent 2 : 32 reagent vials

ii) Reagent vial capacity:
20 mℓ or 100 mℓ vials available

Note: When using 20 mℓ reagent vials, attach the furnished special holders.

(3) Precautions

i) Never touch the reagent disk while it is rotating.
ii) When mounting the reagent disk, align the guide pin of spindle with the guide hole of disk. Then, be sure to lock the latch.
iii) Keep the top cover closed except when replacing the reagent vials.

2-4-4 Reagent Pipetting Mechanism

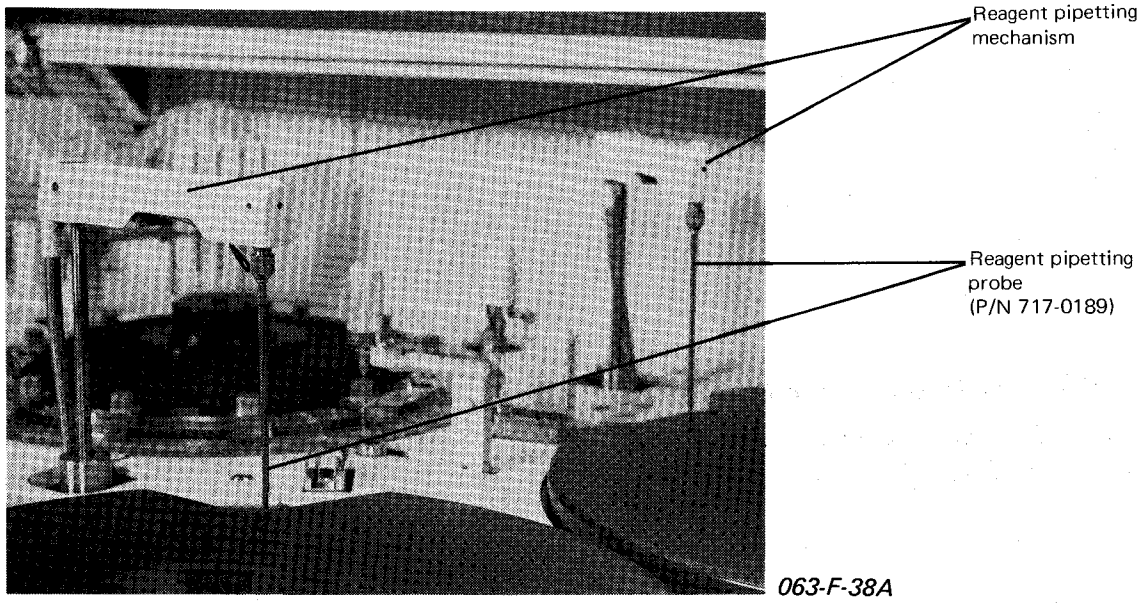


Fig. 2-9 Reagent Pipetting Mechanism

(1) Function

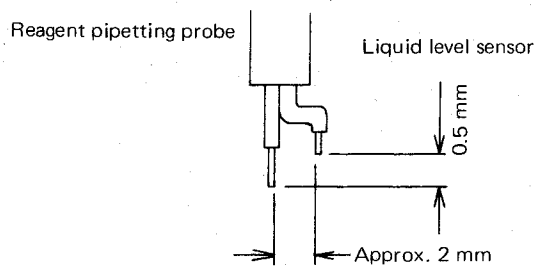
Aspirates a specified amount of reagent (R1 or R2) out of each reagent vial, and pipets it into a reaction cuvette.
This mechanism is equipped with a liquid level sensor. It also provides a diluting function for a concentrated reagent.
The remaining amount of reagent in a vial is detected by the liquid level sensor and calculated by the internal circuit.

(2) Specifications

Reagent volume pipetted	:	50 to 350 $\mu\ell$
Dilution of concentrated reagent	:	After aspirating a concentrated reagent, the pipetting probe dispenses it with distilled water. Note that the maximum allowable total volume of reagent and diluent (distilled water) is 350 $\mu\ell$.

(3) Precautions

i) Use the nozzle seal (P/N 705-1853) for reagent pipetting probe.
ii) Never touch the reagent pipetting mechanism during measurement.
iii) If the tip of reagent pipetting probe encounters an obstacle when moving down, an alarm is issued to indicate occurrence of irregularity in probe action. In this event, the reagent pipetting mechanism is forced to stop immediately. For restart, remove the obstacle (cause of trouble).
iv) The reagent pipetting probe and the liquid level sensor are preadjusted as shown below. If the relative positions of these parts do not meet the dimensions indicated here, a droplet of solution may adhere to the pipetting probe to cause malfunction.



[Flow Path Scheme of Reagent Pipetting Mechanism]

Figure 2-10 shows the flow path scheme of reagent pipetting mechanism. The same flow path is used for reagents 1 and 2.

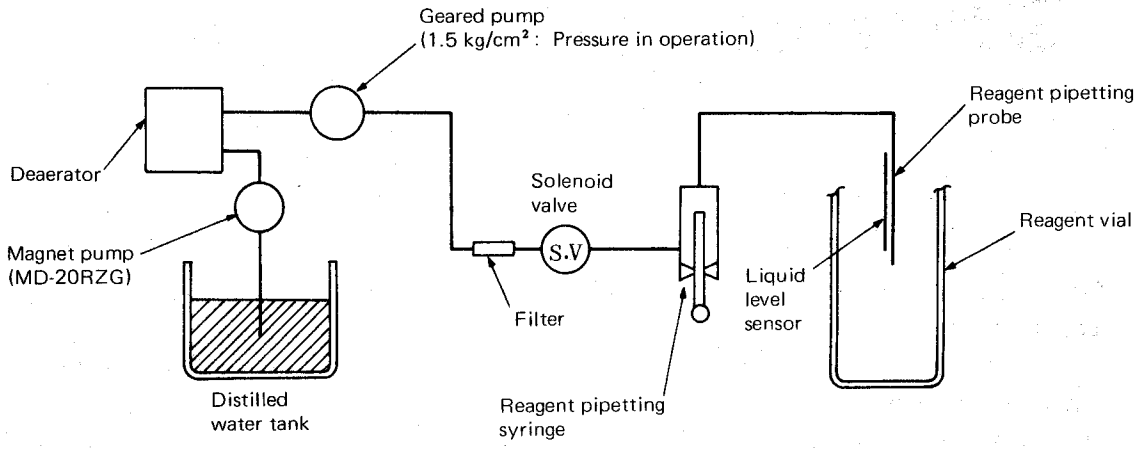


Fig. 2-10 Flow Path of Reagent Pipetting Mechanism

2-4-5 Reaction Disk

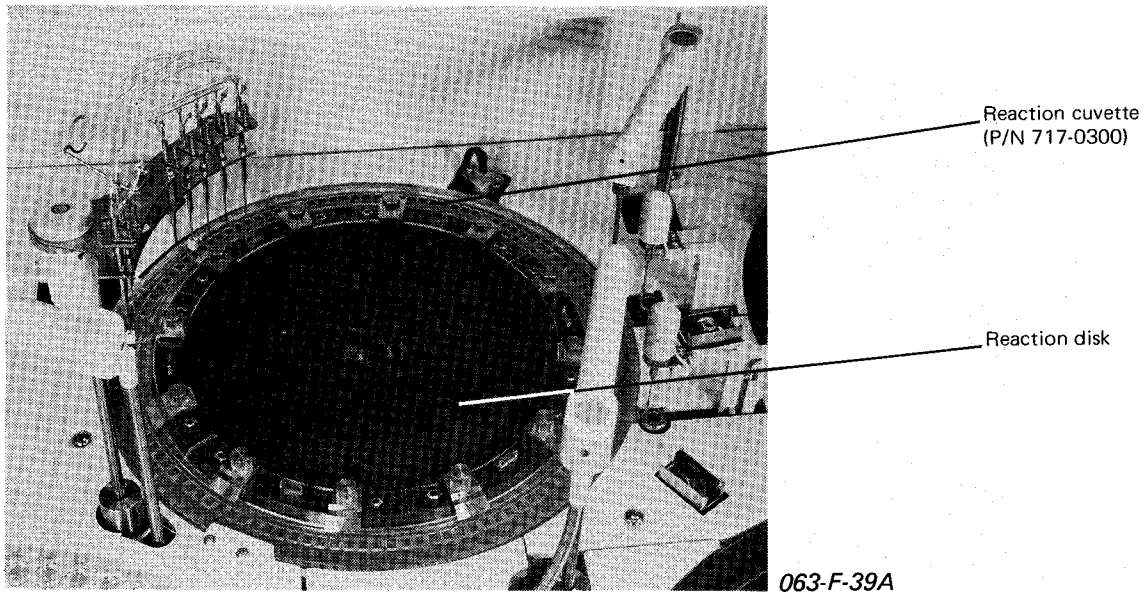


Fig. 2-11 Reaction Disk

(1) Function

Accommodates reaction cuvettes for chemical reaction of a sample and reagent (s) (with assistance of incubation bath).
Each reaction cuvette also serves as a photometric cell for absorbance measurement.

(2) Specifications

i)	Reaction cuvettes accommodable	:	20 cuvettes/set × 6 sets (120 cuvettes in total)
ii)	Optical path length	:	6 mm

(3) Precautions

i) Use the dedicated reaction cuvettes (P/N 717-0300).
ii) Never touch the reaction disk during measurement.
iii) Never remove a reaction cuvette during measurement.
iv) When handling a reaction cuvette, be extremely careful not to flaw it.
v) Avoid leaving solution in a reaction cuvette for a long period of time.

2-4-6 Stirring Mechanism

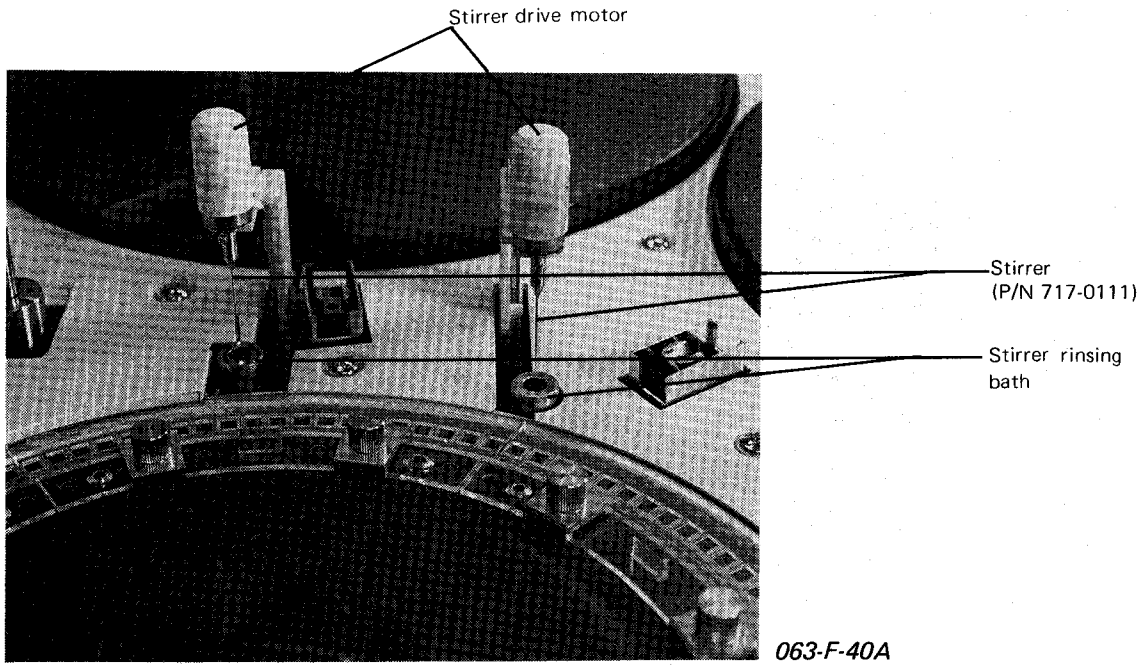


Fig. 2-12 Stirring Mechanism

(1) Function

Stirs a mixture solution of sample and reagents in each reaction cuvette after dispensing R1 and R2 reagents respectively. (Twin type)

(2) Precautions

i) Never touch the stirring mechanism during measurement.
ii) Never touch the tip of stirrer with bare hand.

2-4-7 Rinsing Mechanism

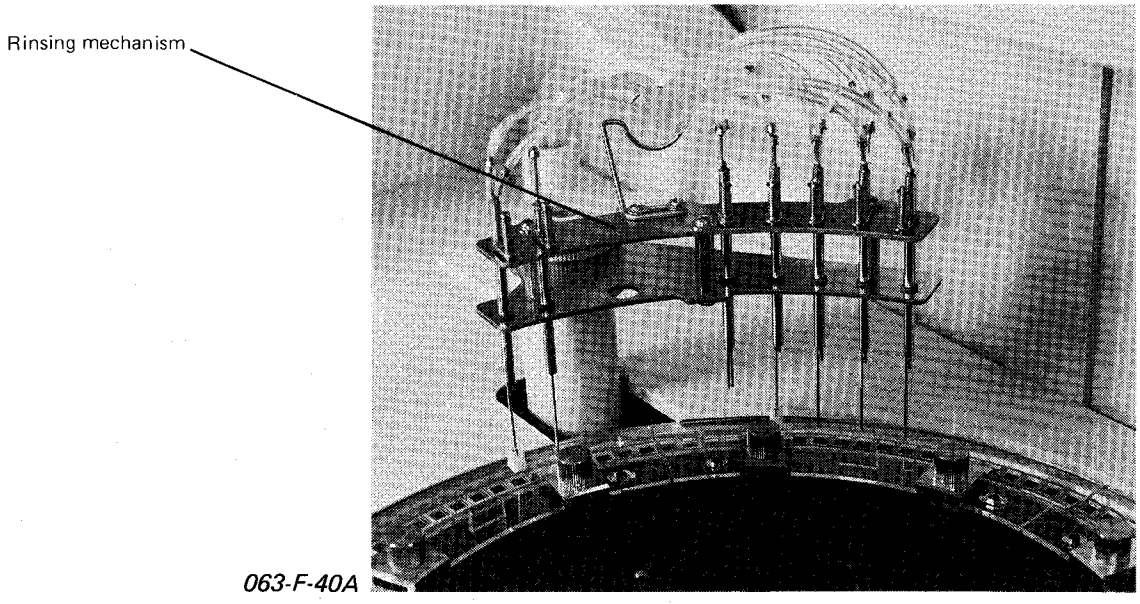


Fig. 2-13 Rinsing Mechanism

(1) Function

On completion of measurement, this rinsing mechanism removes a reaction solution and cleans the reaction cuvette by repeating injection and suction of rinsing water. At the last step of cleaning, distilled water (water blank) is used.

(2) Specifications

Listed below are the rinsing nozzles equipped (15 nozzles in total).

For sucking reaction solution	:	One nozzle
For discharging rinsing water	:	Three nozzles
For sucking rinsing water	:	Three nozzles
For sucking overflow of rinsing water	:	Four nozzles
For discharging distilled water (water blank)	:	One nozzle
For sucking distilled water (water blank)	:	Two nozzles
For discharging rinsing water immediately after the start of analysis	:	One nozzle

(3) Handling

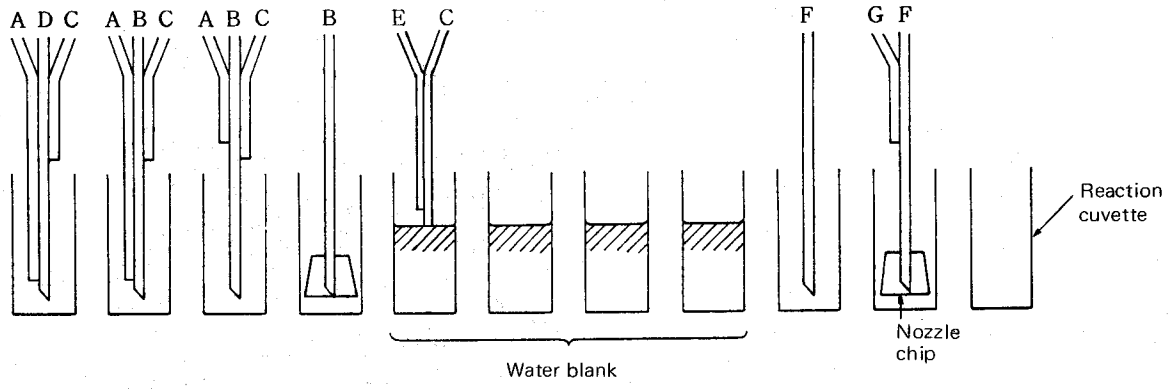
By loosening the setscrew located at the top of rinsing mechanism, it can be shifted away from the reaction disk.
When returning it in place, be sure to align the tip of nozzle with the reaction cuvette.

(4) Precautions

i) Never touch the tip of nozzle by hand.
ii) When handling the rinsing nozzle, be careful not to clog its hole.
iii) Never remove the chips attached to a pair of nozzles.

[Nozzle Arrangement of Rinsing Mechanism]

The rinsing nozzles are arranged as illustrated below.



A . . . . . For discharging rinsing water.
B . . . . . For sucking rinsing water.
C . . . . . For sucking overflow of rinsing water.
D . . . . . For sucking reaction solution.
E . . . . . For discharging distilled water (water blank).
F . . . . . For sucking distilled water (water blank).
G . . . . . For discharging rinsing water immediately after the start of analysis.

Fig. 2-14 Nozzles in Rinsing Mechanism

2-4-8 Reagent Cooler

The reagent cooler is located under the jacket on which the reagent disk is mounted.

(1) Function

Used for keeping reagents cool.

(2) Specifications

All reagents are kept cool.

(3) Precautions

i) Do not open the top cover of reagent disk except when replacing reagents.
ii) Power is supplied to the reagent cooler even when the POWER switch of analyzer is turned off. To disconnect power to the reagent cooler, turn off the power distribution board.
iii) Use this cooler for storing the specified reagent vials and reagent disk. Do not put other items in it.

2-4-9 Photometer

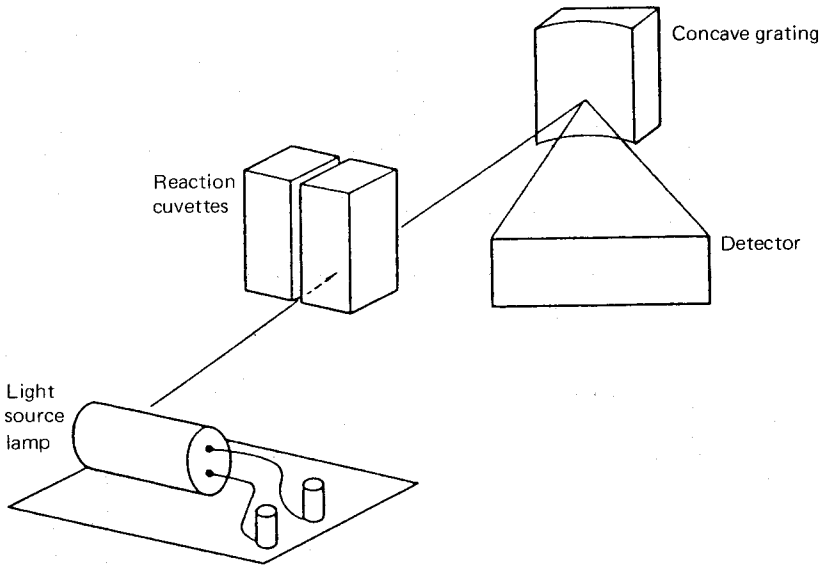


Fig. 2-15 Photometer Scheme

(1) Function

Measures absorbance values of water blank and reaction solution as the reaction disk rotates. Single-wavelength or double-wavelength photometry is selectable.

(2) Specifications

This multi-wavelength photometer is capable of measuring absorbance at the following wavelengths:

340, 405, 450, 480, 505, 546, 570, 600, 660, 700, 750, and 800 nm } (12 wavelengths in total)

(3) Precautions

i) Use the specified light source lamp (P/N 705-0840).

ii) When replacing the light source lamp, be careful not to hook its lead wire on the protruding bottom part of reaction disk. Also, be sure to secure the lead wire to the guide so that it will not obstruct the optical path.

2-4-10 Temperature Controlled Water Circulation System

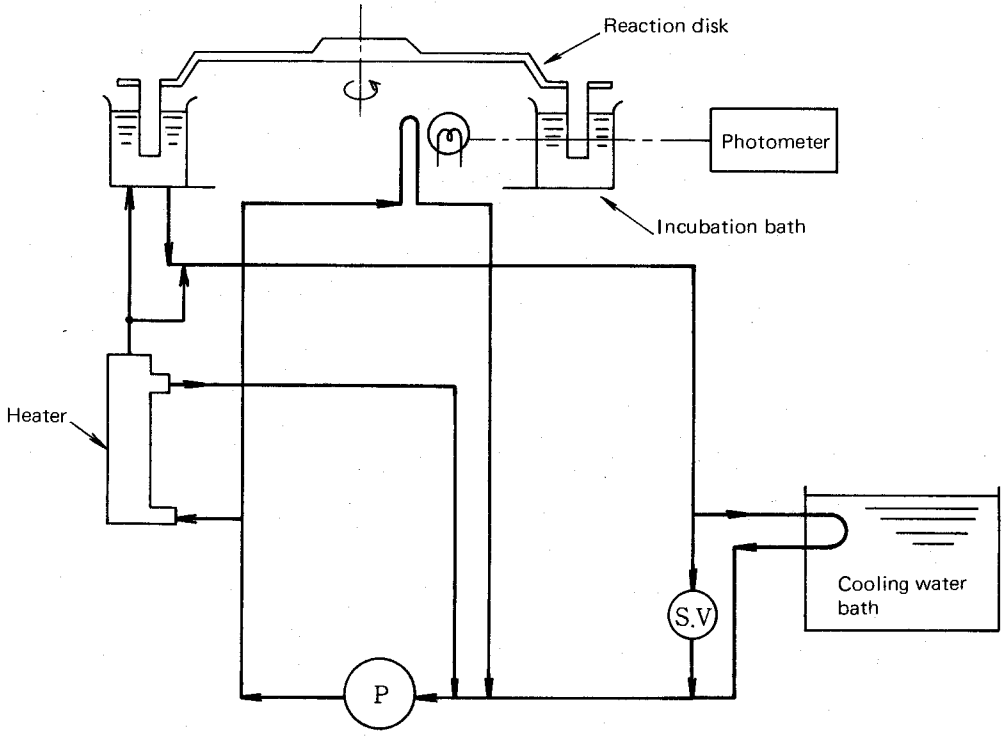


Fig. 2-16 Temperature Controlled Water Circulation System

(1) Function

Keeps reaction solutions at a constant temperature (25, 30 or 37°C).

(2) Specifications

i) Circulates water through the incubation bath.

ii) Circulating water is kept at a constant temperature by turning on/off the heater equipped on the circulation path.

iii) Increase in the temperature of incubation bath is prevented by cooling down the circulation path with water.

(3) Precautions

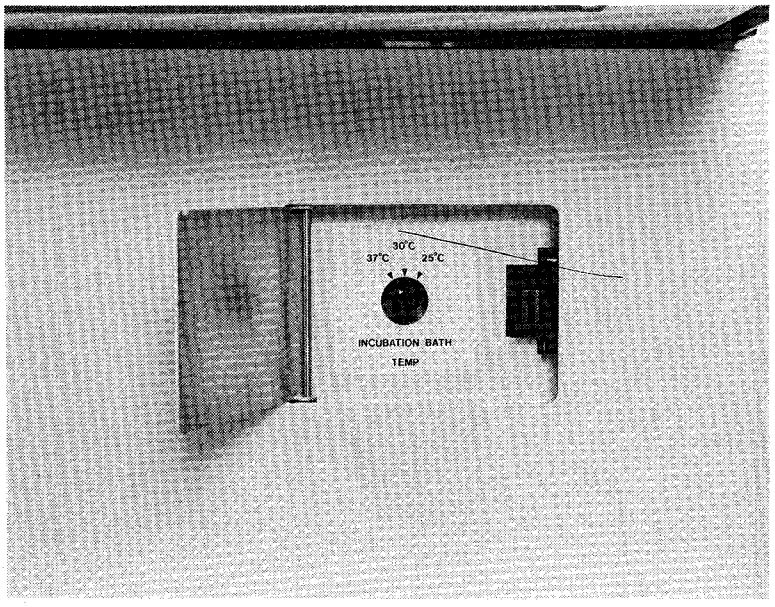
i) Remember that constant-temperature water in the incubation bath flows across the photometric beam. If it is contaminated, an error will occur in analytical data. To prevent this, constant-temperature water is replaced automatically when the POWER switch is turned on.

If the analyzer is powered on continuously, execute 'INC. WATER EXCHANGE' through the MAINTENANCE screen as required.

ii) Should 'INC. WATER EXCHANGE' be executed with the distilled water tank empty, air will be introduced into the temperature controlled water circulation system. Under this condition, even if 'INC. WATER EXCHANGE' is executed after filling up the distilled water tank, water may not be circulated.

On occurrence of this irregularity, repeat 'INC. WATER EXCHANGE' three or four times in succession. Thus, air can be forced out of the circulation path to allow water supply to the incubation bath.

iii) To select a temperature of the incubation bath, open the upper right lid on the right front cover of analyzer. Turn the INCUBATION BATH TEMP switch to the desired position (25, 30, or 37°C selectable). See the photo below.



064-F-15A

2-4-11 Deaerator

(1) Function

Deaerates water to be used for rinsing the serum sampling path and reagent pipetting path.

(2) Specifications

Water is vacuum-pumped through the special synthetic resin membrane.
With pressure decreased on the outside of this membrane, light-weight gaseous molecules are forced out through the membrane. With this principle, water is degassed or deaerated.
Deaerated water is then supplied to the serum sampling path and reagent pipetting path by the geared pump.
Figure 2-17 shows the piping connections of deaerator.

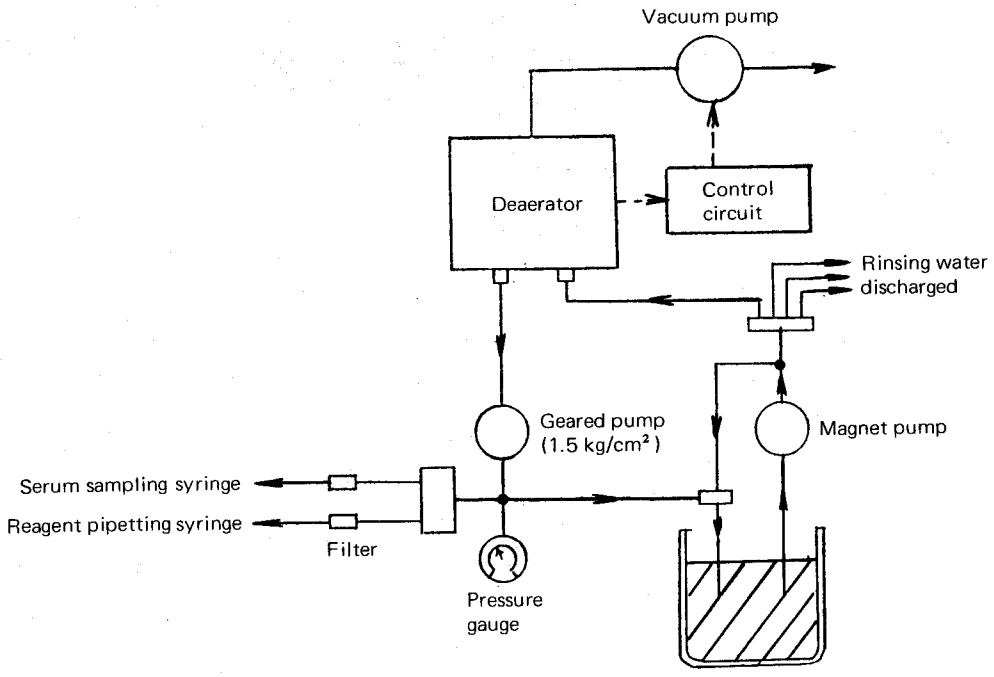


Fig. 2-17 Piping Connections of Deaerator

2-4-12 Keyboard

Figure 2-18 shows the keyboard layout and key functions.

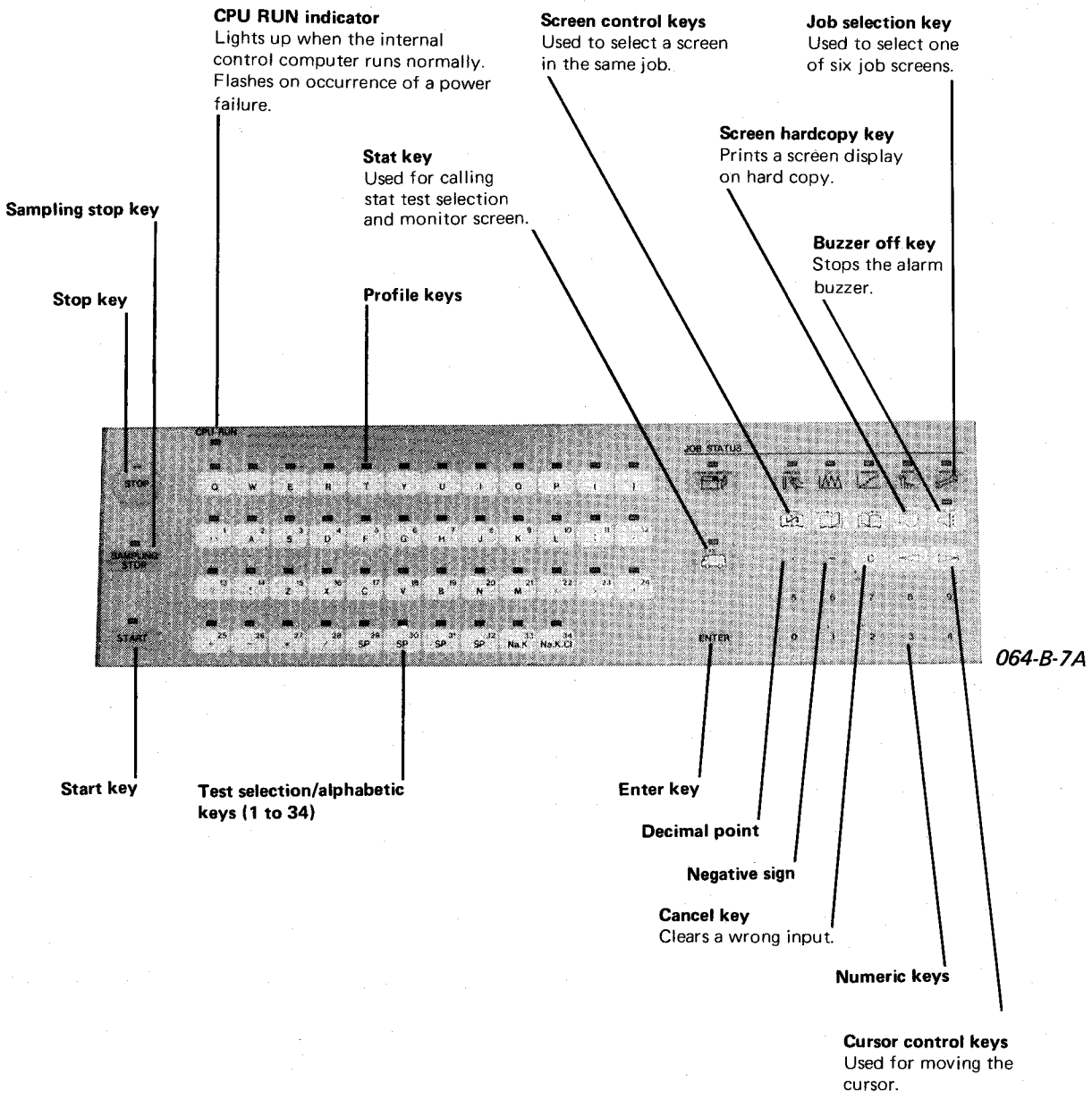
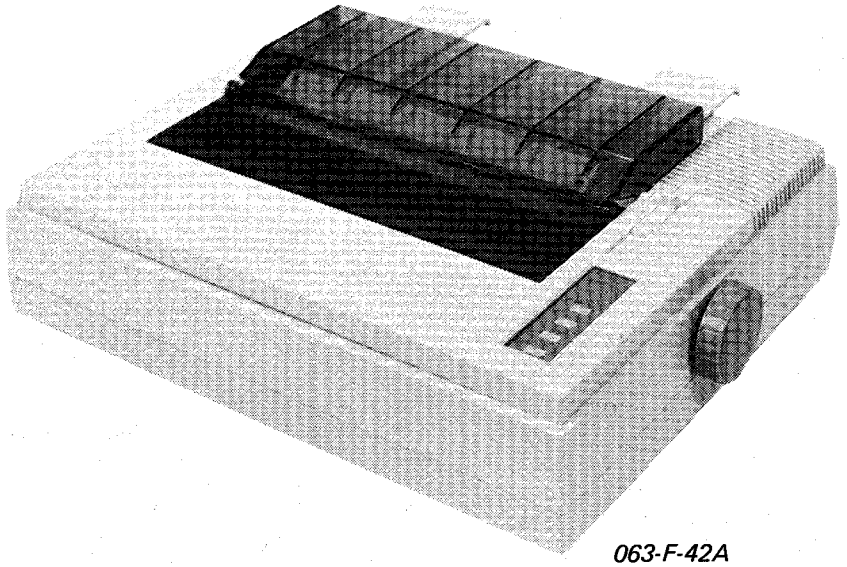


Fig. 2-18 Operator Keyboard

2-4-13 Printer



063-F-42A

Fig. 2-19 Appearance of Printer

(1) Function

Prints out reports and makes hard copies of screens.

(2) Specifications

Number of characters per line	:	80 characters
Printing speed	:	220 characters per sec
Line feed time	:	100 msec
Lifetime of print head	:	More than 50 million characters

(3) Precautions

i) Never press the SELECT switch on the printer during printing operation or measurement. When the printing paper runs out or an error is encountered with the printer, load new paper or remove the cause of error. Then, press the SELECT switch. Make sure that the green indicator lights up.

ii) If the red indicator lights up on the printer, it indicates that an irregularity has taken place. In this state, the printing operation is disabled.

iii) Use the dedicated ribbon cassette (P/N 717-1528) on this printer.

2-4-14 Floppy Disk Drive (FDD) Unit

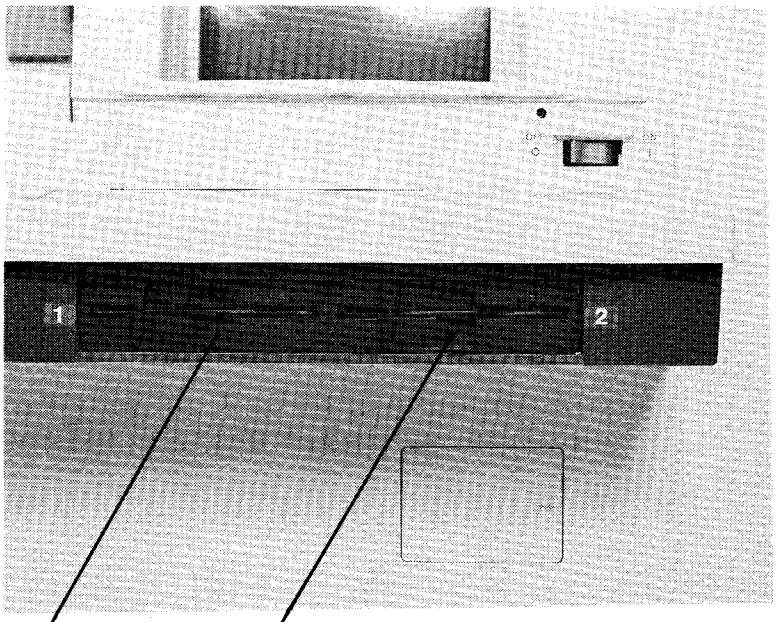


Fig. 2-20 FDD Unit

(1) Function

The floppy disk drives 1 and 2 are used as mentioned below.

Drive 1 is used for : Loading the analyzer system programs.
Storing the analytical parameters and other input parameters specified through screen. Logging the operating status of analyzer after power-up.

Drive 2 is used for : Saving the analytical result data.

(2) Specifications

Floppy disk	:	5-1/4", double sided, double density		
Storage capacity	:	1 Mbyte		
Data storable	:	Routine sample data	:	For 1000 samples
		Re-run sample data	:	For 1000 samples
		Stat sample data	:	For 100 samples

(3) Precautions

i) Be sure to use the following floppy disk.
Product type code : MD2-HD Manufactured by Hitachi Maxell

ii) Never let the floppy disk get dirty.
If the floppy disk is contaminated, avoid inserting it into the disk drive.

iii) Keep the floppy disk away from magnetic fields (e.g. television set).
Do not leave the floppy disk in a high-temperature or high-humidity environment (near an airconditioner or exposed to direct sunlight).

iv) When producing a copy of floppy disk, execute the 'COPY' command available on the maintenance screen.
If disk copying cannot be accomplished normally, try the 'FORMAT' command before execution of 'COPY'.

v) If an FDD alarm is issued, clean the disk drive using the cleaning disk specified below.
For the drive cleaning procedure, refer to Section 4 - Maintenance.
Cleaning disk MD-CW; Manufactured by Hitachi Maxell

2-4-15 System Interface

The system interface is used to connect the Model 717 online to an external computer system (clinical laboratory, hospital).
The data to be communicated are as follows.

(1) Measured Results

Transmitted from the Model 717 to an external computer system.

(2) Test Selection Data

a) Transmission of Sample Information
Transmitted from the Model 717 to an external computer system.

b) Down-Load of Test Selection Data
Down-loaded from an external computer system to the Model 717.

Note: The Model 717 has to be modified when it is connected online to an external computer system. For details of modification, contact your local Hitachi sales representative.

2-5 Analytical Methods and Data Management

2-5-1 Analytical Sequence

This instrument carries out its operation in the following sequence.

(1) Rinsing of reaction cuvette to be used for measurement.

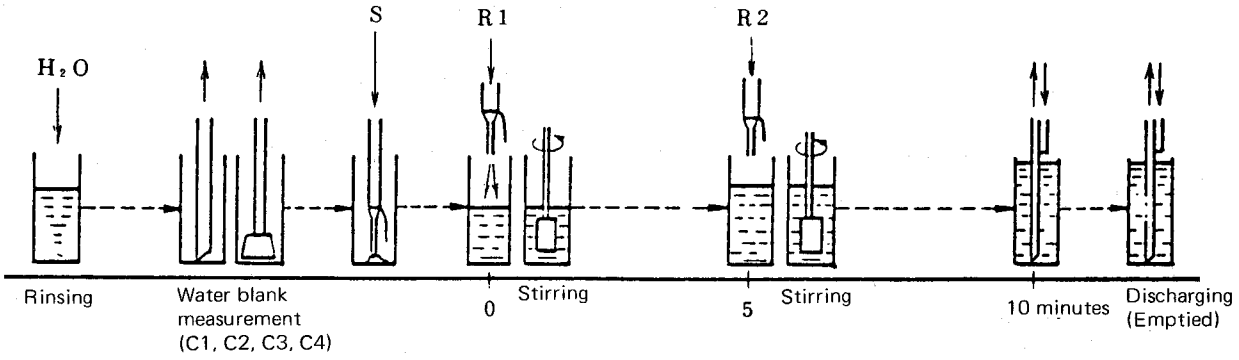
(2) Measurement of water blank contained in reaction cuvette (repeated four times). (For cell blank compensation)

(3) Pipetting of sample.

(4) Pipetting and stirring of reagent 1.

(5) Pipetting and stirring of reagent 2.

After reagent is pipetted into a sample, absorbance of mixture (reaction solution) is measured repetitively in a cycle of approx. 12 seconds for ten minutes.



S : Sample, standard solution, or blank solution dispensed
R1 : Reagent 1 pipetted
R2 : Reagent 2 pipetted

Fig. 2-21 Analytical Sequence

2-5-2 Analytical Methods

(1) Wide Repertoire of Analyses

As mentioned in 2-5-1, absorbance measurement is repeated in a cycle of approx. 12 seconds in the Model 717. Therefore, different analytical calculations and different calculation intervals are specifiable at the user's option. Listed below are eight analytical methods available with this instrument. Select the most suitable analytical method for each test.

a)	One-point assay	:	Conventional endpoint analysis
b)	One-point assay with prozone check	:	Endpoint analysis including prozone check
c)	Two-point assay	:	Endpoint analysis with automatic compensation for sample blank
d)	Three-point assay	:	Twin tests through combination of endpoint assay and that with automatic compensation for sample blank
e)	One-point and rate assay	:	Twin tests through combination of endpoint assay and rate assay
f)	Rate assay A	:	Conventional rate assay
g)	Rate assay A with serum index measurement	:	Combination of rate assay and serum index measurement
h)	Rate assay B	:	Twin tests through combination of single-shot rate assay and that with automatic compensation for sample blank Modes 1 and 2 are available.

For analytical method selection, use 'ASSAY CODE' on the CHEMISTRY PARAMETERS (PARAMETER JOB) screen.

```
 CHEMISTRY PARAMETERS

TEST                [GOT   ]
ASSAY CODE          [   *    ]:[ * ]-[ * ]
SAMPLE VOLUME       [10][10]
R1 VOLUME           [320][100][ NO]
R2 VOLUME           [ 80][100][ NO]
WAVE LENGTH         [405][340]
CALIB. METHOD       [K-FACTOR ][0][0]
STD.(1) CONC.-POS.[     0]-[ 1]
STD.(2) CONC.-POS.[     0]-[ 0]
STD.(3) CONC.-POS.[     0]-[ 0]
STD.(4) CONC.-POS.[     0]-[ 0]
STD.(5) CONC.-POS.[     0]-[ 0]
STD.(6) CONC.-POS.[     0]-[ 0]
SD LIMIT            [     0]
DUPLICATE LIMIT     [     0]
SENSITIVITY LIMIT   [     0]
ABS.LIMIT(INC/DEC)[ 3000][DECREASE]
PROZONE LIMIT       [     0][LOWER]
EXPECTED VALUE      [   8.0]-[  40.0]
PANIC VALUE         [   0.0]-[ 200.0]
INSTRUMENT FACTOR [1.00]
```

```
ASSAY CODE          "*** 1:1POINT 2:2POINT 3:3POINT
                         4:1POINT&R 5:RATE-A 6:RATE-B
                    "*** MEASURE POINT 1-50
                    "*** MEASURE POINT 0-50
```

Fig. 2-22 CHEMISTRY PARAMETERS Screen

[**Explanation of Analytical Methods**]

(a) One-Point Assay

This endpoint analysis is employed commonly in practice.

ASSAY CODE key-in format:

[1] : [ℓ] – [0] $1 \leqq \ell \leqq 50$

Absorbance is determined at the specified photometric point [ℓ].

Absorbance arithmetic applied for data processing:

$(A_\ell + A_{\ell-1})/2$

Where,

A_ℓ : Absorbance measured at point ℓ

$A_{\ell-1}$: Absorbance measured at point $\ell - 1$

For enhancement of accuracy, this endpoint assay uses absorbance values measured at the specified photometric point ℓ and its preceding point $\ell - 1$. Using these absorbance values, a mean value is determined as shown above.

Note that stirring is not performed at point 1 after pipetting of reagent 1 and at point 25 after pipetting of reagent 2.

Test examples: TP, ALB, T-CHO, etc.

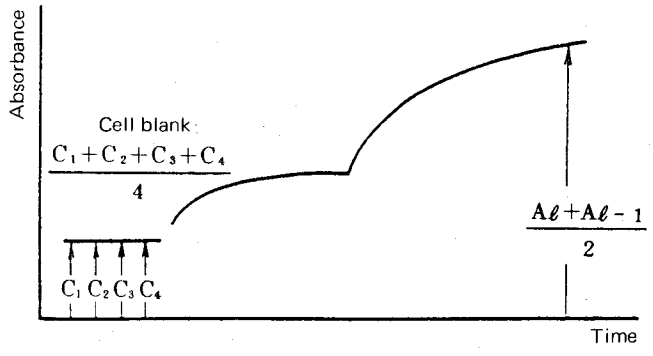


Fig. 2-23 One-Point Assay

(b) One-Point Assay with Prozone Check

This endpoint assay includes prozone check for immunological test. For details of the prozone check, refer to subsection 3-6-1 – Check of Measured Values.

ASSAY CODE key-in format:

[1] : [ℓ] – [m] $1 \leqq \ell < m \leqq 50$

Absorbance arithmetic applied for data processing

$(A_\ell + A_{\ell-1})/2$

Prozone check value:

$\{ (Am + A_{m-1}) - k (A_\ell + A_{\ell-1}) \} /2$

Where,

k: Liquid volume correction coefficient

Test examples: IgG, IgA, IgM, etc.

Note: ℓ and m indicate photometric points.

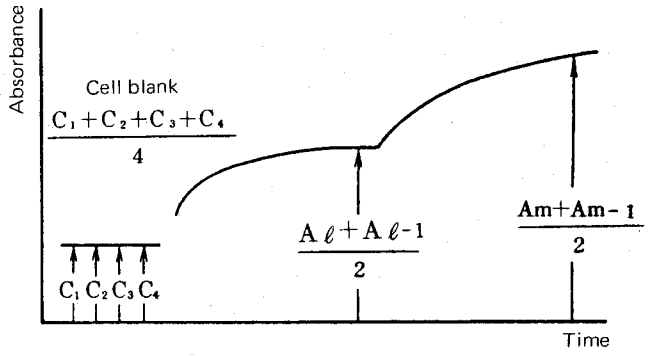


Fig. 2-24 One-Point Assay with Prozone Check

(c) Two-Point Assay

This endpoint assay can perform automatic compensation for sample blank. Using absorbance varying after addition of reagent 2, the prozone check is available for immunological test. For details of the prozone check, refer to subsection 3-6-1 – Check of Measured Values.

ASSAY CODE key-in format:

[2] : [ℓ] – [m] $\quad 1 \leqq \ell < m \leqq 50$

Absorbance arithmetic applied for data processing:

$\{ (Am + A_{m-1}) - k\ (A_\ell + A_{\ell-1}) \}/2$

Prozone check value:

$(\Delta A_{26.m} / \Delta A_{26.27}) \times 100$

$\Delta A_{26.m}$: Rate of absorbance variation between photometric points 26 and m

$\Delta A_{26.27}$: Rate of absorbance variation between photometric points 26 and 27

Test examples: T-BIL, CRP, etc.

Note: The prozone check is carried out when $m \geqq 28$.

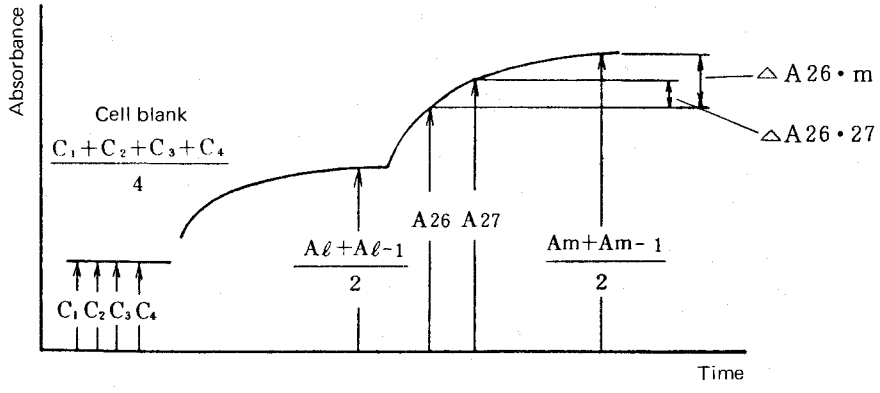


Fig. 2-25 Two-Point Assay

(d) Three-Point Assay

In this endpoint analysis, two test items are examined simultaneously on a single channel with automatic compensation for sample blank.
Test A is measured for the first five-minute period of ten-minute reaction time, and test B is measured for the last five-minute period. For details of the twin test refer to subsection 3-6 (7).

ASSAY CODE key-in format:

Test A [3] : [ℓ] – [0]
Test B [3] : [m] – [n]

$1 \leqq \ell \leqq m \leqq 24 \qquad 26 \leqq n \leqq 50$

Absorbance arithmetic applied for data processing:

Test A $(A_\ell + A_{\ell-1})/2$

Test B $\{(An + A_{n-1}) - K\,(Am + A_{m-1})\}/2$

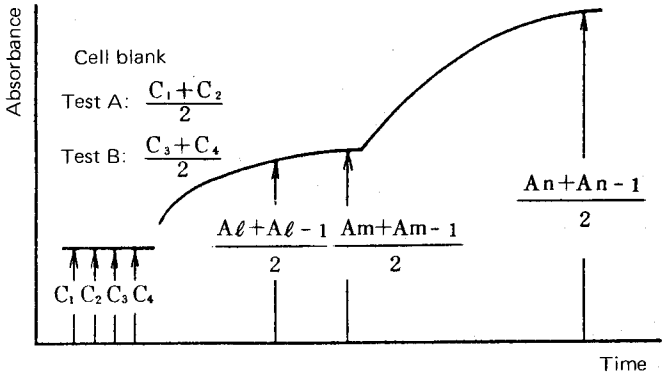


Fig. 2-26 Three-Point Assay

(e) One-Point & Rate Assay

In this combination of endpoint assay and rate assay, two tests are examined simultaneously on a single channel. For the first five-minute period of ten-minute reaction time, test A is examined with endpoint assay. And, for the last period of five minutes, test B is examined with rate assay.
To attain high accuracy in the rate assay, an absorbance variation rate is calculated using the least squares method.

ASSAY CODE key-in format:

Test A [4] : [ℓ] – [m]
Test B [4] : [m] – [p]

$1 \leqq \ell < m \leqq 24 \qquad 25 \leqq n < p \leqq 50$
$\ell + 2 < M \qquad n + 2 < p$

Absorbance arithmetic applied for data processing:

Test A $(A_{23} + A_{24})/2$

Test B $\Delta An \cdot p - k \cdot \Delta A\ell \cdot m$

Where,

$\Delta An \cdot p$: Rate of absorbance variation between photometric points n and p

$\Delta A\ell \cdot m$: Rate of absorbance variation between ℓ and m

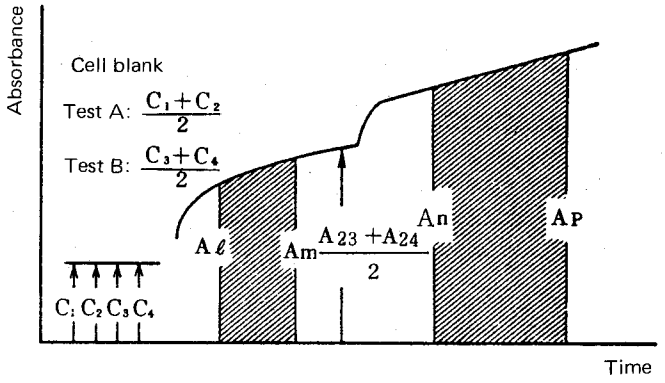


Fig. 2-27 One-Point & Rate Assay

(f) Rate Assay A

This method is employed as a conventional rate assay. A rate of absorbance variation over the specified period is calculated using the least squares method.

ASSAY CODE key-in format:

[5] : [ℓ] – [m] $1 \leqq \ell < m \leqq 50$ $\ell + 2 < m$

Absorbance variation rate applied for data processing:

$\Delta A\ell \cdot m$

Test examples: GOT, GPT, LDH, ALP, LAP, etc.

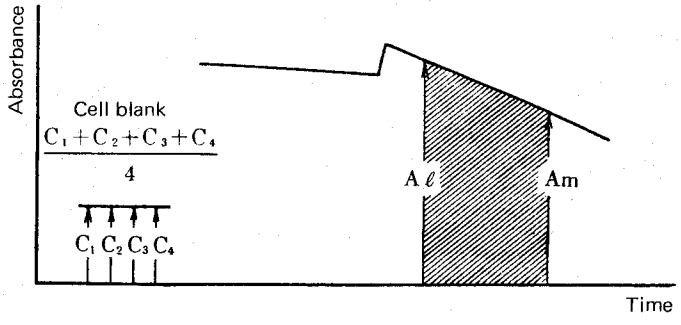


Fig. 2-28 Rate Assay A

(g) Rate Assay A with Serum Index Measurement

In this rate assay, the serum index values (icteric, hemolytic and lipemic indexes) are also measured. For details of the serum indexes, refer to subsection 3-6 (3).

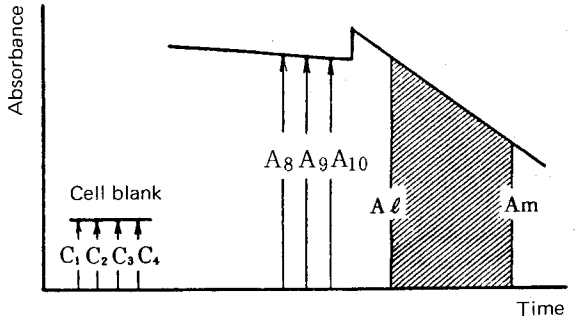
ASSAY CODE key-in format:

[5] : [ℓ] – [m] $\quad 11 \leqq \ell < m \leqq 50 \quad \ell + 2 < m$

Absorbance variation rate applied for data processing:

$\triangle A\ell \cdot m$

Test examples: GOT, GPT, etc.



Cell blank C1: For rate assay
Cell blank C2: For icteric index measurement
Cell blank C3: For hemolytic index measurement
Cell blank C4: For lipemic index measurement

Fig. 2-29 Rate Assay A with Serum Index Measurement

(h) Rate Assay B

In this single-shot rate assay, two tests are examined simultaneously on a single channel with automatic compensation for sample blank.
For the first five-minute period of ten-minute reaction time, test A is measured with rate assay. And, for the last period of five minutes, test B is measured with rate assay.

The blank compensation modes 1 and 2 are available for tests B and A.
In mode 1, blank compensation is carried out only when the measuring wavelengths of test A and B are identical. In mode 2, blank compensation is performed regardless of the measuring wavelengths of test A and B.
Either mode 1 or 2 is automatically established according to the specified analytical parameters.

ASSAY CODE key-in Format

	Test A	Test B
Mode 1	[6] : [ℓ] – [m] $3 \leqq \ell < m \leqq 24$ $m \leqq 20 \quad \ell + 2 < m$	[6] : [n] – [p] $25 \leqq n < p \leqq 50$ $n + 2 < p$
Mode 2	[6] : [ℓ] – [m] $3 \leqq \ell < m \leqq 19$ $\ell + 2 < m$	[6] : [n] – [p] $25 \leqq n < p \leqq 50$ $n + 2 < p$

Absorbance variation rate applied for data processing:

	Test A	Test B
Mode 1 (Different measuring wavelengths in tests A and B)	$\Delta A\ell \cdot m$	$\Delta An \cdot p$
Mode 1 (Identical measuring wavelengths in tests A and B)	$\Delta A\ell \cdot m$	$\Delta An \cdot p - k\Delta A\ell \cdot m$
Mode 2	$\Delta A\ell \cdot m$	$\Delta An \cdot p - k\Delta A_{20.24}$

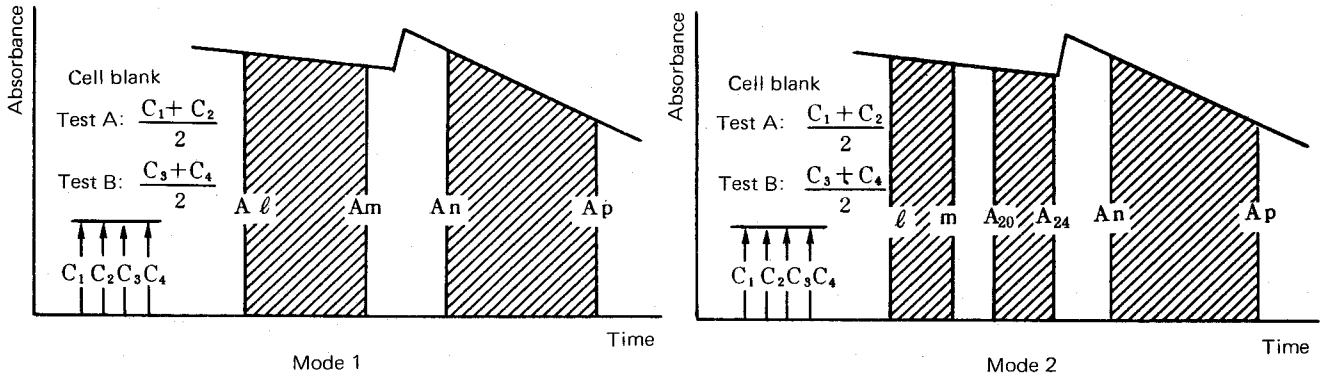


Fig. 2-30 Rate Assay B

Table 2-2 Analytical Methods Available in Model 717

	Test	System Parameter		Cell Blank	Absorbance Arithmetic	
		ASSAY CODE	MIN.REGENT VOL.			
One-point assay	TEST 1	$1-\ell-0$ $1\leq\ell\leq 50$	$R_1+R_2\geq 250$ $\mu\ell$	$\frac{C_1+C_2+C_3+C_4}{4}$	$\frac{A\ell+A\ell-1}{2}$	
One-point assay with prozone check	TEST 1	$1-\ell-m$ $1\leq\ell<m\leq 50$	$R_1\geq 250$	$\frac{C_1+C_2+C_3+C_4}{4}$	$\frac{A\ell+A\ell-1}{2}$	Prozone check value $=\frac{1}{2}\{(Am+Am-1)-k(A\ell+A\ell-1)\}$
Two-point assay	TEST 1	$2-\ell-m$ $1<\ell<m\leq 50$	$R_1\geq 250$	$\frac{C_1+C_2+C_3+C_4}{4}$	$\frac{(Am+Am-1)-k(A\ell+A\ell-1)}{2}$	Prozone check value $(\triangle A26\cdot m/\triangle A26\cdot 27)\times 100$
Three-point assay	TEST 1	$3-\ell$ $1\leq\ell<m\leq 24$	$R_1\geq 250$	$\frac{C_1+C_2}{2}$	$\frac{A\ell+A\ell-1}{2}$	
	TEST 2	$3-m-n$ $25\leq n\leq 50$		$\frac{C_3+C_4}{2}$	$\frac{(An+An-1)-k(Am+Am-1)}{2}$	
One-point and rate assay	TEST 1	$4-\ell-m$ $1\leq\ell<m\leq 24$ $\ell+2<m$	$R_1\geq 250$	$\frac{C_1+C_2}{2}$	$\frac{A_{23}+A_{24}}{2}$	
	TEST 2	$4-n-p$ $25\leq n<p\leq 50$ $n+2<p$		$\frac{C_3+C_4}{2}$	$\triangle An\cdot p-k\triangle A\ell\cdot m$	
Rate assay A with serum index measurement	TEST 1	$5-\ell-m$ $11\leq\ell<m\leq 50$ $\ell+2<m$	$R_1\geq 250$	C_1: Sample C_2: (480/505 nm) C_3: (570/600 nm) C_4: (660/700 nm)	$\triangle A\ell\cdot m$	
Rate assay A	TEST 1	$5-\ell-m$ $1\leq\ell<m\leq 50$ $\ell+2<m$	$R_1\geq 250$	$\frac{C_1+C_2+C_3+C_4}{4}$	$\triangle A\ell\cdot m$	
Rate assay B Mode 1	TEST 1	$6-\ell-m$ $3\leq\ell<m\leq 24$ $m\geq 20,\ \ell+2<m$	$R_1\geq 250$	$\frac{C_1+C_2}{2}$	$\triangle A\ell\cdot m$	
	TEST 2	$6-n-p$ $25\leq n<p\leq 50$ $n+2<p$		$\frac{C_3+C_4}{2}$	$\triangle An\cdot p$	*1
					$\triangle An\cdot p-k\triangle A\ell\cdot m$	*2
Rate assay B Mode 2	TEST 1	$6-\ell-m$ $3\leq\ell<m\leq 19$ $\ell+2<m$	$R_1\geq 250$	$\frac{C_1+C_2}{2}$	$\triangle A\ell\cdot m$	
	TEST 2	$6-n-p$ $25\leq n<p\leq 50$ $n+2<p$		$\frac{C_3+C_4}{2}$	$\triangle An\cdot p-k\triangle A20\cdot 24$	

*1 Different wavelength from TEST 1

*2 Identical wavelength to TEST 1

Note that a reaction solution is not stirred in measurements at point 1 after pipetting of reagent 1 and at point 25 after pipetting of reagent 2.

*k: Liquid volume correction coefficient

$$k=\frac{S.VOL+R1\ VOL}{S.VOL+R_1VOL+R_2VOL}$$

2-5-3 Calibration

(1) Calibration Methods Available

In the Model 717, four calibration methods are available for broad applications and new tests. The operator can thus select a calibration procedure most suitable for each test.

(a) One-Point Calibration Line Method
A calibration line is developed through measurement of a blank solution and a standard solution.

(b) K-Factor Method
In this calibration method, blank solution measurement is carried out. Instead of measuring the standard solution, the molar absorption coefficient and the K factor determined from sample/reagent volume are keyed in to generate a calibration line.

(c) Isozyme Calculation Method
The 'Isozyme P' and 'Isozyme Q' measurements are conducted. The former measures a total activity, and the latter is dedicated to isozyme measurement.

(d) Multi-Point Calibration Curve Method
Three to six standard solutions including blank are used to create a calibration curve. The built-in curve fitting program is run to draw a nonlinear calibration curve. One of four model functions is operator-specifiable.

(2) Calibration Procedures

To carry out calibration, select 'CALIB. METHOD' on the CHEMISTRY PARAMETERS (PARAMETER JOB) screen. Specify the concentration and preset position of standard solution for 'STD. (N) CONC.-POS.'

```
 CHEMISTRY PARAMETERS

TEST                [GOT  ]
ASSAY CODE          [RATE-A  ]:[30]-[50]
SAMPLE VOLUME       [10][10]
R1 VOLUME           [320][100][ NO]
R2 VOLUME           [ 80][100][ NO]
WAVE LENGTH         [405][340]
CALIB. METHOD       [K-FACTOR ][0][0]
STD.(1) CONC.-POS.[     0]-[ 1]
STD.(2) CONC.-POS.[     0]-[ 0]
STD.(3) CONC.-POS.[     0]-[ 0]
STD.(4) CONC.-POS.[     0]-[ 0]
STD.(5) CONC.-POS.[     0]-[ 0]
STD.(6) CONC.-POS.[     0]-[ 0]
SD LIMIT            [     0]
DUPLICATE LIMIT     [     0]
SENSITIVITY LIMIT   [     0]
ABS.LIMIT(INC/DEC)[ 3000][DECREASE]
PROZONE LIMIT       [     0][LOWER]
EXPECTED VALUE      [   8.0]-[  40.0]
PANIC VALUE         [   0.0]-[ 200.0]
INSTRUMENT FACTOR [1.00]

*** 0-350 MICRO
```

```
CALIB. METHOD       *** 1:LINEAR 2:K FACTOR 3:NONLINEAR
                        4:ISOZYME P 5:ISOZYME Q
                    *** NONLINEAR MODEL NO. 1-4 (0:CLEAR)
                    *** NONLINEAR CALIB.POINTS 3-6 (0:CLEAR)
STD.(1-6) CONC.     *** CONC.
          -POS.     *** S.DISK POSITION 0-33 (0:CANCEL)
```

Notes: 1. The decimal point position in analytical result data depends on the decimal point position specified for 'STD. (1)'.

2. In execution of calibration, each standard solution is measured twice. A calibration curve is created using the mean absorbance or mean rate of absorbance variation.

Fig. 2-31 Calibration Method Selection

(a) One-Point Calibration Line Method

The blank and standard solutions are measured to prepare a calibration line.

- Setting

Item	Entry
CALIB. METHOD	[LINEAR] – [–]
STD. (1) CONC.-POS. **STD. (2) CONC.-POS.**	[Concentration of blank solution] – [P_1] [Concentration of standard solution] – [P_2]

P_1, P_2: Enter the position number assigned to each standard solution.

- Calibration Line Parameter and Calculation Formula

Parameter : K

Calculation formula : $K = \dfrac{C_2 - C_1}{A_2 - B}$

B ; Measured absorbance or absorbance variation rate of blank solution STD. (1)

A_2 ; Measured absorbance or absorbance variation rate of standard solution STD. (2)

C_1 ; Input concentration value of blank solution STD. (1)

C_2 ; Input concentration value of standard solution STD. (2)

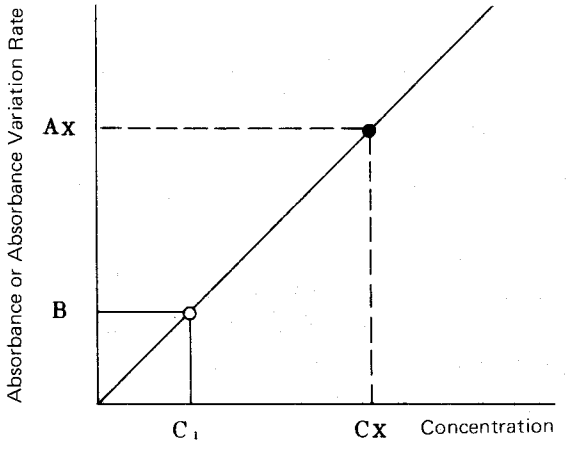
Sample concentration conversion expression

$Cx = \{ K(Ax - B) + C_1 \} \cdot IF$

Ax : Measured absorbance or absorbance variation rate of sample

Cx : Concentration of sample

IF : Instrument factor



- **Applicable assays**
  One-point assay
  Two-point assay
  Three-point assay
  One-point and rate assay
  Rate assay A
  Rate assay B

Fig. 2-32 One-Point Calibration Line Method

(b) K-Factor Method

A calibration line is yielded using the measured value of blank solution and the input K-factor value.

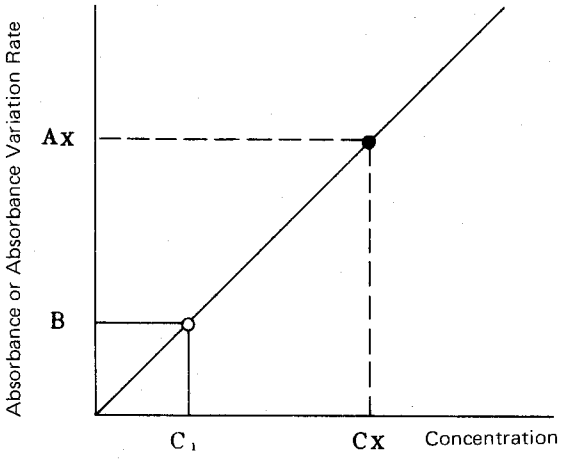
- Setting

Item	Entry
CALIB. METHOD	[K FACTOR] [–]
STD. (1) CONC.-POS.	[Concentration of blank solution] – [P_1]

Note that only the blank solution is measured in K-factor method. It is therefore required to enter STD. (1) only.

- K-factor input
  Enter K-factor through the keyboard.
  (MONITOR JOB/CALIBRATION MONITOR (1) screen)
- Sample concentration conversion expression

$$Cx = \{ K(Ax - B) + C_1 \} \cdot IF$$



- **Applicable assays**
  One-point assay
  Two-point assay
  Three-point assay
  One-point rate assay
  Rate assay A
  Rate assay B

Fig. 2-33 K-Factor Method

(c) Isozyme Calculation Method

This calibration method is used for isozyme measurement.
'Isozyme P' and 'Isozyme Q' are evaluated for calibration. The total activity and isozyme activity are determined using the values of 'Isozyme P' and 'Isozyme Q'.

[Prerequisite]

Assuming that test 'F' includes isozyme 'F_M' and isozyme 'F_N', the following relational expression can be established:

$$C_F = C_{FM} + C_{FN}$$

C_F : Total activity of test F
C_{FM} : Activity of isozyme F_M included in item F
C_{FN} : Activity of isozyme F_N included in item F

[Principle of Calibration]

Two channels are used for isozyme measurement.
One channel is used for the calibration type of isozyme P. On this channel, the total activity C_F is determined with the total activity analysis reagent. The other channel is used for the calibration type of isozyme Q. On this channel, the activity C_{FM} of isozyme F_M or activity C_{FN} of isozyme F_N is determined with the reagent containing inhibitor that selectively inhibits the effect of either isozyme F_N or F_M.
In the following example, isozyme F_M is measured through use of the inhibitor of isozyme F_N.
Note that the inhibitor isozyme F_N cannot completely inhibit the activity of isozyme F_N. Also, activity of isozyme F_M is inhibited to some extent.
In the isozyme measurement procedure described below, the standard solutions of isozymes F_M and F_N are measured on two channels, and each residual activity ratio after inhibition is determined. Thus, accurate isozyme activity can be figured out automatically.

[Reagents and Standard Solutions Used for Isozyme Measurement]

Reagents : Reagent for total activity C_F measurement
Reagent for residual isozyme activity measurement (including inhibitor of isozyme F_N)
Standard solutions : Blank solution
Standard solution F (including isozymes F_M and F_N)
Standard solution F_M (standard solution of isozyme F_M)
Standard solution F_N (standard solution of isozyme F_N)

[Specification for Reagents, Standard Solutions and Calibration Type]

Specify the analytical parameters as shown below:

	Total Activity Channel		Isozyme Activity Channel	
Required Reagents	**Total Activity Measurement**		**Residual Isozyme Activity Measurement**	
TEST	F		F_M	
CALIB. METHOD	[ISOZYME P]	[–]	[ISOZYME Q]	[–]
STD. (1) CONC.-POS.	[Activity of blank]	[P_1]	[Activity of blank]	[P_1]
STD. (2) CONC.-POS.	[Activity of standard solution F]	[P_2]	[–]	[–]
STD. (3) CONC.-POS.	[–]	[P_3]	[–]	[P_3]
STD. (4) CONC.-POS.	[–]	[P_4]	[–]	[P_4]

The input values for STD. (1), (3) and (4) are identical on both channels.
On the STD. (3) position 'P_3', load the standard solution of isozyme F_M (the isozyme standard solution to be measured on the isozyme measuring channel).
It is not required to assign the values for STD. (2) CONC.-POS. on isozyme measuring channel [ISOZYME Q] and for STD. (3) CONC. and (4) CONC. on both channels.

[Calibration Line Preparation]

- Total Activity Channel
  A calibration line for total activity measurement is created using the measured absorbance values of black solution and standard solution F or using the rate of absorbance variation. Also, to determine a residual activity ratio of isozyme, the standard solutions F_M and F_N are measured (details will be explained later).

  (Calculation of Calibration Factor K)

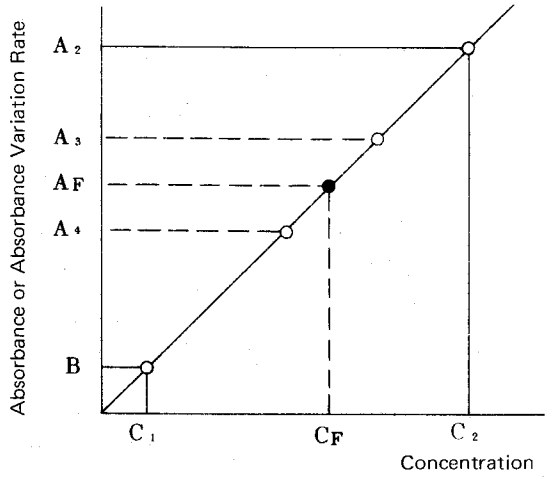
$$K = \frac{C_2 - C_1}{A_2 - B}$$

  B : Measured absorbance or absorbance variation rate of blank solution (STD. (1))
  A_2 : Measured absorbance or absorbance variation rate of standard solution F (STD. (2))
  C_1 : Input activity value of blank solution (STD. (1))
  C_2 : Input activity value of standard solution F (STD. (2))

  (Total Activity Conversion for Sample)

$$C_F = \{K (A_F - B) + C_1\} \cdot IF$$

  A_F : Measured absorbance or absorbance variation rate of sample
  C_F : Total activity of sample
  IF : Instrument factor



A_3: Measured absorbance or absorbance variation rate of standard solution F_M (STD. (3))
A_4: Measured absorbance or absorbance variation rate of standard solution F_N (STD. (4))

Fig. 2-34 Calibration Line Prepared with Isozyme Calculation Method (On total activity measuring channel)

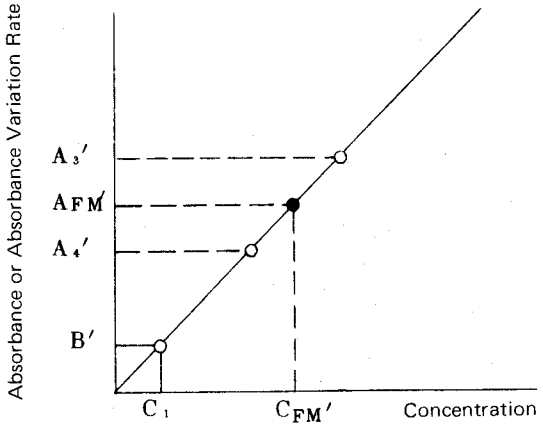
- Isozyme Measuring Channel (Isozyme F_N inhibitor reagent)
  An absorbance value of reagent blank is determined through measurement of blank solution. As factor K of calibration line, 'K' determined on the total activity measuring channel is used automatically.
  Also, to determine a residual activity ratio of isozyme, the standard solutions F_M and F_N are measured (details will be explained later).

  (Residual Isozyme Activity Conversion for Sample)

  $$C_{FM}' = \{ K (A_{FM}' - B') + C_1 \} \cdot IF$$

  B' : Measured absorbance or absorbance variation rate of blank solution (STD. (1))
  A_{FM}' : Measured absorbance or absorbance variation rate of sample
  C_{FM}' : Residual isozyme activity of sample

Note: As stated in 'Principle of Calibration', the activity of isozyme F_N cannot be completely inhibited even with use of the inhibitor reagent of isozyme F_N.



A_3' : Measured absorbance or absorbance variation rate of standard solution F_M (STD. (3))
A_4' : Measured absorbance or absorbance variation rate of standard solution F_N (STD. (4))

Fig. 2-35 Calibration Line Prepared with Isozyme Calculation Method (On isozyme activity measuring channel)

The Model 717 analyzer possesses a built-in arithmetic function for isozyme calculation. It figures out each isozyme residual activity ratio (through measurement of inhibitor) and determines a true activity value of isozyme.

(Residual Activity Ratio Calculation)

A residual activity ratio is derived from the absorbance value or absorbance variation rate of each standard solution measured for calibration.

Residual activity ratio of isozyme F_M 'α'

$$\alpha = \frac{\{ K (A_3' - B') + C_1 \} \cdot IF}{\{ K (A_3 - B) + C_1 \} \cdot IF}$$

Residual activity ratio of isozyme F_N 'β'

$$\beta = \frac{\{K(A_4' - B') + C_1\} \cdot IF}{\{K(A_4 - B) + C_1\} \cdot IF}$$

(Activity Value Calculation for Isozyme F_M)

Using the above residual activity ratios 'α' and 'β', a true activity value of isozyme is derived from the following equation.

$$C_{FM} = \frac{C_{FM}' - \beta \cdot C_F}{\alpha - \beta}$$

[Output of Measured Values]

- The total activity value C_F is output through the total activity channel.
- The activity value of C_{FM} of isozyme F_M is output through the isozyme channel.
- The activity value of C_{FN} of isozyme F_N can be output specifying test-to-test calculation.

[Applicable Analytical Methods]

- One-point assay
- Two-point assay
- Rate assay A

(d) Multi-Point Calibration Curve Method

This method uses three to six standard solutions including blank. A multi-point calibration curve is yielded through curve fitting. Four model functions are available for curve approximation; any one of these model functions can be selected by the operator.

- Parameter Input:

Item	Entry
CALIB. METHOD	[NONLINEAR] ["N_1"] ["N_2"]
STD. (1) CONC.-POS.	[Concentration of blank solution] – [P_1]
STD. (2) CONC.-POS.	[Concentration of standard solution (2)] – [P_2]
STD. (N) CONC.-POS.	[Concentration of standard solution (N)] – [P_N]

N_1 : Number of the model function (1 to 4)
N_2 : Number of standard solutions including blank (3 to 6)
P_1 to P_N : Position number of each standard solution (1 to 33)

In execution of calibration, each standard solution is measured and approximation is performed using the model function selected by the operator. Using virtually all of the measured values, a nonlinear calibration curve is constructed through best-bit approximation.

The following explains the four mathematical model functions for curve approximation. The basic formulas of these model functions are shown below:

< Type 1 > (Four parameters : Log-logit)

$$A = B + \frac{K}{1 + EXP\ (-a - b\ \ell nC)}$$

< Type 2 > (Five parameters : Log-logit)

$$A = B + \frac{K}{1 + EXP\ (-a - b\ \ell nC + cC)}$$

< Type 3 > (Five parameters : Exponential)

$$A = B + K \cdot EXP\ \{ a\ \ell nC + b\ (\ell nC)^2 + c\ (\ell nC)^3 \}$$

< Type 4 > (Spline function)

$$A = a(I) + b\ (I)\ (C - C(I)) + c(I)\ (C - C(I))^2 + d(I)\ (C - C(I))^3$$

Where,

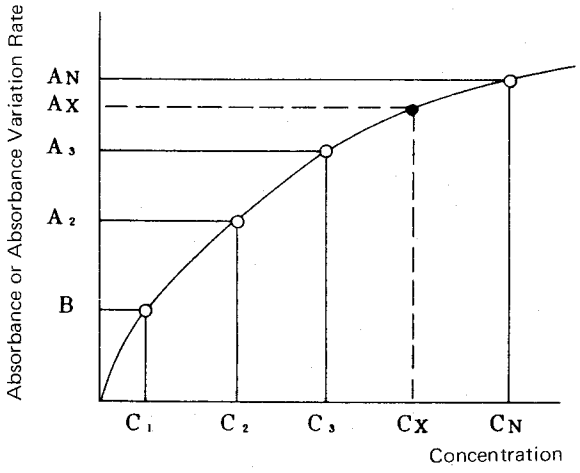
- A : Measured absorbance value or absorbance variation rate of standard solution (except blank solution)
- B : Measured absorbance value or absorbance variation rate of blank solution
- C : Concentration of standard solution
- a, b, c : Calibration curve parameters
- K : Scale parameter
- a(I), b(I), c(I), d(I): Calibration curve parameters used only in calculation of type 4. These parameters are determined according to the standard solution numbers '1' and '1 + 1'. ($1 \leqq 1 \leqq 5$)

For sample concentration conversion, refer to 'List of Calibration Methods (2)'.

The parameter values of each model function are displayed on the **MONITOR JOB/CALIBRATION LIST** screen upon completion of approximation. Parameter B is presented in 'S1ABS' column, and parameters a, b and c are indicated in the 'A, B, C' column. When the model function of type 4 is specified, only parameter a(I) is presented on the 'S1ABS' column.

The check result of nonlinear calibration curve approximation is indicated with SD* on the printout report (CALIBRATION MONITOR).

Note*: Standard deviation of the absorbance value/absorbance variation rate on approximate calibration curve with respect to the measured absorbance value/absorbance variation rate
(For the SD LIMIT, refer to subsection 3-7 (4).)



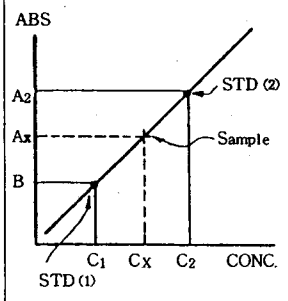
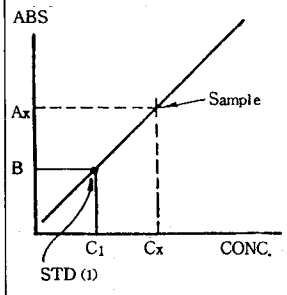
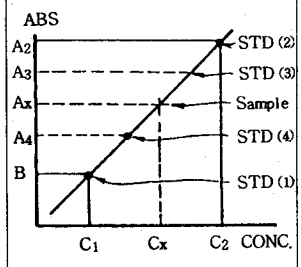
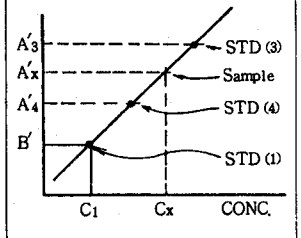
- **Applicable assays:**
  One-point assay
  Two-point assay
  Rate assay A

Ax : Absorbance value or absorbance variation rate of sample

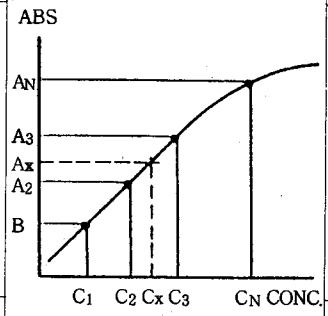
Cx : Concentration of sample

Fig. 2-36 Calibration Curve Prepared with Multi-Point Calibration Curve Method

List of Calibration Methods (1)

Calibration Method	Calibration Curve	Standard Sample	Calculation Parameter	Calculation of Concentration	Applicable Assays
Linear method		STD (1): Blank solution STD (2): Standard solution	$K = \frac{C_2 - C_1}{A_2 - B}$	$C_X = \{K \cdot (A_X - B) + C_1\} \cdot IF$ IF: Instrument factor	One-point assay Two-point assay Three-point assay One-point and rate assay Rate A assay Rate B assay
K-factor method		STD (1): Blank solution	K: Input value	$C_X = \{K \cdot (A_X - B) + C_1\} \cdot IF$	One-point assay Two-point assay Three-point assay One-point and rate assay Rate A assay Rate B assay
Isozyme method	 ISOZYME P (total activity)	STD (1): Blank solution STD (2): STD (3): STD (4): Standard solution	$K = \frac{C_2 - C_1}{A_2 - B}$ (A_3 and A_4 are used for calculating residual activity ratio of isozyme, respectively.)	$C_X = \{K \cdot (A_X - B) + C_1\} \cdot IF$ (Cx: Total activity)	One-point assay Two-point assay Rate A assay
	 ISOZYME Q (isozyme activity)	STD (1): Blank solution STD (3): STD (4): Standard solution	Calculation of residual activity ratio $\alpha = \frac{\{K \cdot (A'_3 - B') + C_1\} \cdot IF}{\{K \cdot (A_3 - B) + C_1\} \cdot IF}$ $\beta = \frac{\{K \cdot (A'_4 - B') + C_1\} \cdot IF}{\{K \cdot (A_4 - B) + C_1\} \cdot IF}$	$C_X' = \{K \cdot (A'_X - B') + C_1\} \cdot IF$ $C_X'' = \frac{C_X' - \beta \cdot C_X}{\alpha - \beta}$ (Cx': Residual isozyme activity Cx'': True isozyme activity)	

List of Calibration Methods (2)

Calibration Method	Calibration Curve	Standard Sample	Calculation Parameter	Calculation of Concentration	Applicable Assays
Non-linear method (type 1)		STD (1): Blank solution STD (2) ~ STD (N): Standard solution $3 \leqq N \leqq 6$	S 1ABS(B) K a b	$C_X = (C + C_1) \cdot IF$ * $C = \exp\left[\frac{1}{b}\left\{\ell n\left(\frac{A_X - B}{K - (A_X - B)}\right) - a\right\}\right]$ ····· ① $\left(A_X = B + \frac{K}{1+\exp(-a-b\ell nC)}\right)$	One-point assay Two-point assay Rate A assay
Non-linear method (type 2)		STD (1): Blank solution STD (2) ~ STD (N): Standard solution $3 \leqq N \leqq 6$	S 1ABS(B) K a b c	$C_X = (C + C_1) \cdot IF$ $a + b\,\ell n\,C + c \cdot C - \ell n\left\{\frac{A_X - B}{K \cdot (A_X - B)}\right\} = 0$ ② $\left(A_X = B + \frac{K}{1+\exp\{-(a+b\ell nC+c \cdot C)\}}\right)$	One-point assay Two-point assay Rate A assay
Non-linear method (type 3)		STD (1): Blank solution STD (2) ~ STD (N): Standard solution $3 \leqq N \leqq 6$	S 1ABS(B) K a b c	$C_X = (C + C_1) \cdot IF$ $a \cdot (\ell nC) + b \cdot (\ell nC)^2 + c \cdot (\ell nC)^3 - \ell n\left(\frac{A_X - B}{K}\right) = 0$ ····· ③ $(A_X = B + K \cdot \exp\{a \cdot (\ell nC) + b \cdot (\ell nC)^2 + c \cdot (\ell nC)^3\})$	One-point assay Two-point assay Rate A assay
Non-linear method (type 4)		STD (1): Blank solution STD (2) ~ STD (N): Standard solution $3 \leqq N \leqq 6$	a(I) b(I) c(I) d(I) $I = 1 \sim N$	$C_X = (C + C_1) \cdot IF$ $A_X = a(I) + b(I) \cdot (C - C_I) + c(I) \cdot (C - C_I)^2 + d(I) \cdot (C - C_I)^3$ $a(I) + b(I) \cdot (C - C_I) + c(I) \cdot (C - C_I)^2 + d(I) \cdot (C - C_I)^3 - A_X = 0$ ····· ④	One-point assay Two-point assay Rate A assay

Note*: C_X : Sample concentration
C_1 : Blank concentration
C : Sample concentration not corrected with blank concentration and instrument factor
C_I : The concentration of standard solution number I. (Same as C(I) of 2-5-3 (d))

2-6 Standard Specifications

(1) Type ..... Discrete, sample oriented random access, multi-analysis system

(2) No. of tests on line ..... 1 to 32
(1 to 35 in case of instrument with electrolyte analyzer accessory)

(3) Throughput ..... 600 tests/hr
(750 tests/hr max. in case of instrument with electrolyte analyzer accessory)

(4) Analytical method ..... One-point assay, two-point assay, three-point assay (simultaneous analysis of 2 items), one-point and rate assay (simultaneous analysis of 2 items), rate assay, double rate assay (simultaneous analysis of 2 items), electrode method (option)

(5) Sample volume ..... 3 to 20 μℓ/test (1 to 20 μℓ/test at RERUN)

(6) Reagent volume ..... Final reagent volume: 250 to 400 μℓ/test

(7) Sample disk ..... Flat disk, concentric arrangement

- Outer row: Routine sample ; 60 cups
- Inner row: Standard solution ; 33 cups
  Standard solution (for electrolyte analysis) ; 3 cups
  Control serum ; 6 cups
  Stat sample ; 7 cups
  Detergent ; 1 cup

(8) Sample cup ..... 1.5 mℓ polystyrene cup
(commonly usable with Model 7050)

(9) Reagent disk ..... Flat disk
(1st and 2nd reagent disks separately arranged)
Provided with cooling unit for refrigeration of all reagents

- 1st reagent: 32 bottles
  (100 or 20 mℓ bottle)
- 2nd reagent: 32 bottles
  (100 or 20 mℓ bottle)

(10) Sampling pipetter ..... Pipetting volume: 3 to 20 μℓ/test
Driven by stepping motor, equipped with probe rinsing mechanism and liquid level sensor

(11) Reagent pipetter ..... Pipetting volume: 50 to 350 μℓ/test
Both 1st and 2nd reagent pipetters driven by stepping motor, equipped with probe rinsing mechanism and liquid level sensor

(12) Reaction disk ..... Turntable making half turn (60 cuvettes) plus 1 cuvette/6 sec (cycle)

(13) Reaction cuvette ..... 0.75 mℓ plastic cuvette
Optical path: 6 mm
20 cuvettes × 6 blocks
(120 cuvettes in total)

(14) Incubation bath ..... Temperature-controlled water
(25, 30, 37°C)
Temperature stability: ±0.1°C

(15) Incubation time ..... 10 min

(16) Stirring ..... Both 1st and 2nd reagents stirred by stirring rod after injection

(17) Photometer ..... Multi-wavelength photometer with concave grating
- Wavelength
  340, 405, 450, 480, 505, 546, 570, 600, 660, 700, 750, 800 nm
  (12 wavelengths)

Double or single wavelength photometry selectable

(18) Data processing ..... Digital processing by microcomputer

(19) Test selection ..... Requisition of requested tests and control of instrument sample by sample

(20) Compensation ..... Water blank correction, sample blank correction, nonspecific reaction correction for enzyme

(21) Calibration curve ..... Automatic preparation of linear and non-linear calibration curves
- Non-linear function
  4-parameters Logit-Log
  5-parameters Logit-Log
  5-parameters exponential function
  Spline function
  Multi-level calibration curve (up to 6 levels)

(22) Measured value calculation ..... Calculations for endpoint assay, rate assay, serum indices, non-linear analysis, isozyme analysis, prozone check

(23) Test-to-test calculation ..... Test-to-test compensation (8 channels)
Calculation channel (8 channels)
4 rules of arithmetic freely combinable for both

(24) Stat sample processing ..... Interruption possible at any time (test items specifiable)
Preferential result output immediately after measurement in case electrolyte analysis (option) alone is specified

(25) Monitor function ..... Graphic display of reaction time course (possible at any time)
Graphic display of non-linear calibration curve
Graphic display of calibration result (last 50 traces)

(26) Quality control of data ..... Graphic display and statistic calculation of within-run precision for analytical results of control serum
Display of $\bar{X}$-R control diagram and statistic calculation of day-to-day precision for analytical results of control serum
Multi-rule realtime QC, graphic display of twin plot chart
Hard copy of the above graphic display

(27) Data storage ..... Data for 1000 routine samples
Data for 1000 rerun samples
Data for 100 stat samples

(28) Data output	Analytical results (monitor, or report format) Work sheet Rerun list Calibration report Original ABS Photometer check list QC list Alarm trace Communication trace Hard copy of all screens
(29) Graphic printout	Reaction time course, calibration curve, QC chart, twin plot chart, calibration trace
(30) Auxiliary memory	5-1/4 inch floppy disk (2 drives) Double-sided, double-density, 1 Mbyte × 2
(31) Printer	Dot matrix, 80 digits Printing speed: 220 characters/sec
(32) System interface	20 mA current loop or RS-232C
(33) Power supply	100/115/127/220/230/240 V ±10 %, 50/60 Hz
(34) Power consumption	2 kVA
(35) Ambient temperature	15 to 32° (variation within ±2°C during operation)
(36) Ambient humidity	45 to 85 %
(37) Dimensions	1520 (W) × 770 (D) × 1150 (H) mm
(38) Weight	Approx. 450 kg

3. OPERATION

3. OPERATION

3-1 Outline of Routine Operational Procedure

Table 3-1 shows the operational procedure for routine analysis. The routine operation is accomplished with a minimum required number of parameters stored on the floppy disk.

Table 3-1 Routine Operational Procedure

Procedural Step	Description
Startup check	Before starting the routine operation, check to be sure that there is no irregularity in each part.
Power on	Turn on the POWER switch located at the lower part of CRT unit.
Instrument status check	Check that no alarm is issued on **OPERATION MONITOR** screen.
Reagent check	Make sure that the amount of reagent is sufficient.
Test request	Specify requested test of each sample, standard solution and control serum.
Initial conditioning	Set up initial conditions for calibration, quality control and startup.
Sample loading	Load samples, standard solutions and control serum on the sample disk. Also, set rinsing solution* at position W on the sample disk.
Initiation of routine operation	Press the START key for initiating routine analysis.
Termination of routine operation	To keep the instrument in optimum condition for the next operation, the analytical parts should be cleaned.
Power off	Turn the POWER switch off. Discard waste solution.

* For details, refer to Figure 3-13 and section 4.

3-2 Layout of Keyboard and Screens

Figure 3-1 shows the keyboard layout and key functions.

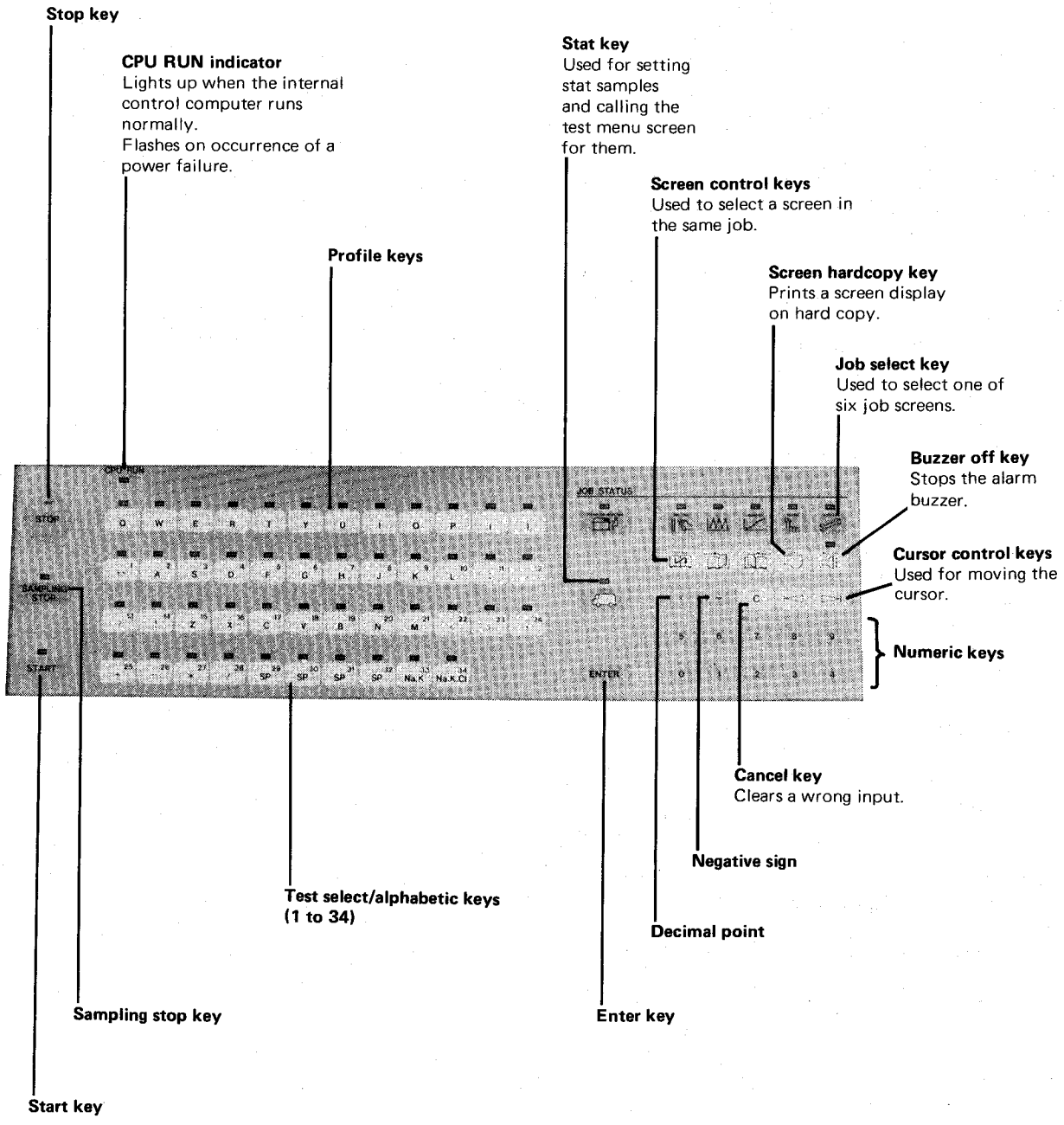


Fig. 3-1 Operator Keyboard

The operator keyboard contains the job select keys, test select keys, alphabetic keys, operation stop key, sampling stop key, start key, etc. The alphabetic keys provide multiple operational functions; they are used for test selection, profiling, and character entry.
For ease of test reference, the test name sheet is attached to the instrument.

This analyzer has the following primary screens to offer ease of operation. The primary screens are;

- ROUTINE JOB, QUALITY CONTROL JOB, MONITOR JOB, PARAMETER JOB, MAINTENANCE JOB (five job screens),
- TEST SELECTION & MONITOR (STAT) (stat sample test select screen), and
- OPERATION MONITOR (operating status monitoring screen).

The jobs in routine analysis are categorized according to the analytical operation descriptions. Listed below are descriptions of these jobs:

(1) ROUTINE JOB

To carry out routine analysis.

(2) QUALITY CONTROL JOB

To deal with quality control.

(3) MONITOR JOB

To monitor analytical results.

(4) PARAMETER JOB

To set up test conditions.

(5) MAINTENANCE JOB

To accomplish maintenance and checkup.

Figure 3-2 presents the entire hierarchical structure of screens.

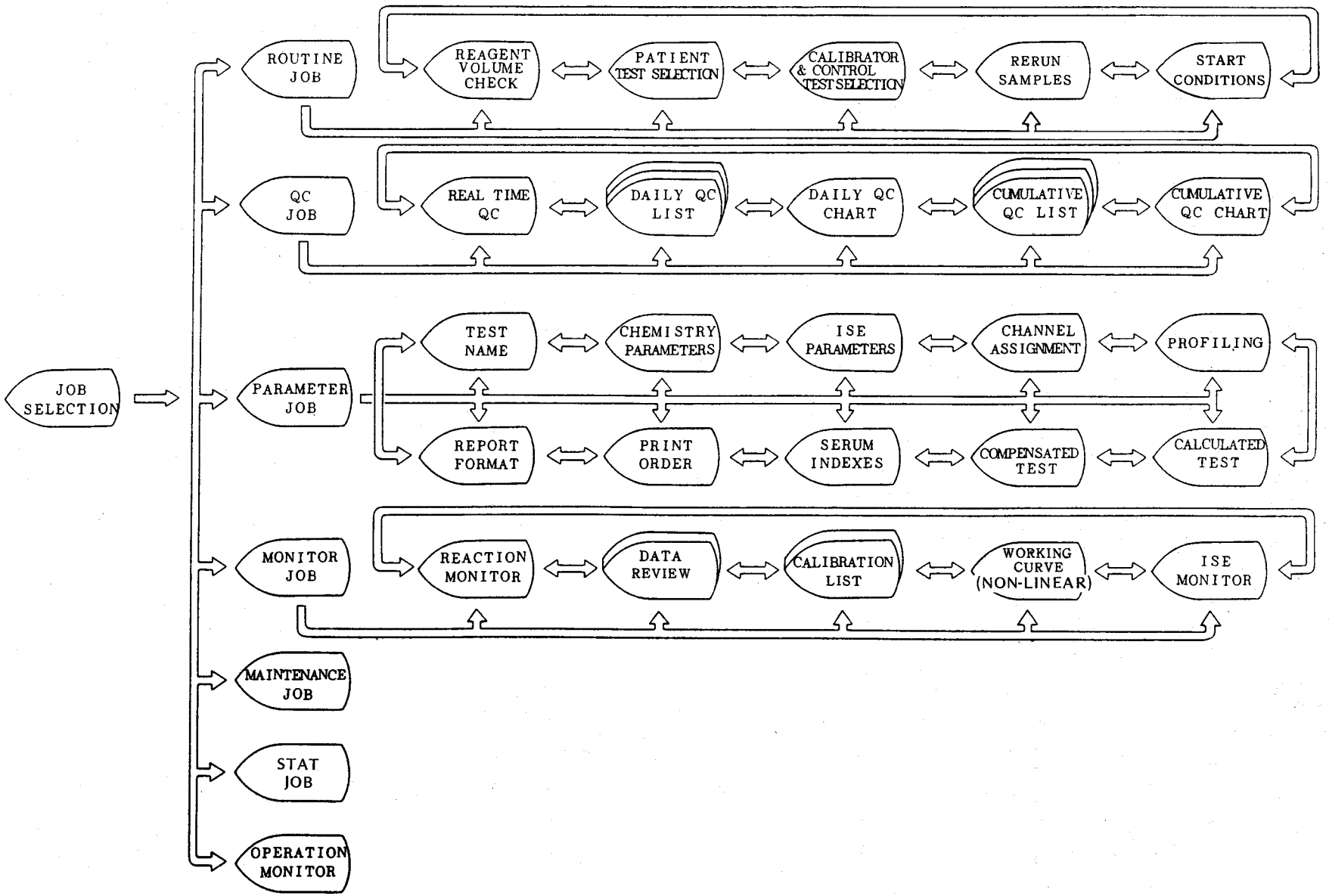


Fig. 3-2 CRT Screen Structure

After initialization, the instrument gets ready to accept a job key entry. Each of the ROUTINE JOB, QUALITY CONTROL JOB, MONITOR JOB, and PARAMETER JOB screens consists of multiple screen pages. Pressing the JOB key causes the main menu screen to appear first. Through the main menu screen, select the desired subsidiary screen by specifying its number.
To flip to the next screen or back to the previous screen in each job mode, press the **NEXT** or **BACK** key.
To move the cursor around the current screen, use the cursor control keys ◁ or ▷ .

3-3 Screen Navigation

The user can navigate through the CRT screens in an interactive operating environment. Move the cursor to the desired item on screen, then the relevant guide message appears at the bottom of screen. According to the message instruction, press a key or keys. What the user has keyed in can be input by hitting the ENTER key. When the ENTER key is pressed, the cursor goes to the next item.
If an invalid entry is made, an "INPUT ERROR" message appears at the bottom of screen. That is, an invalid or illegal input is rejected. If an "INPUT ERROR" message is issued, press the CANCEL key and then try input again.

[Explanation of Screen]

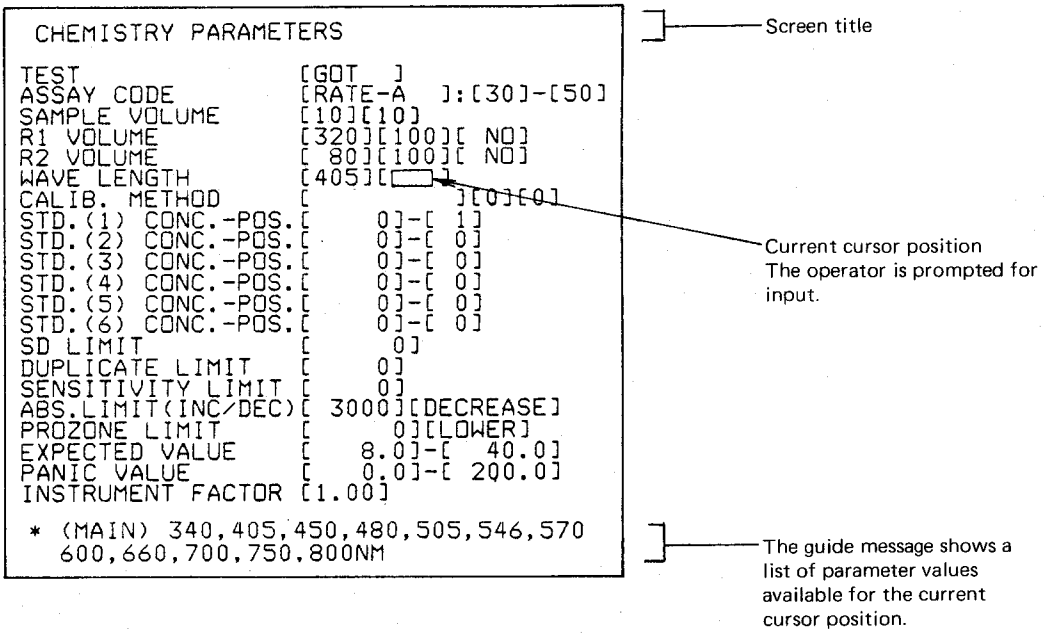


Fig. 3-3 Input through Screen

3-4 Routine Operational Procedure

Flowcharted in Figure 3-4 is the operational procedure to be taken with necessary routine analysis parameters stored on the floppy disk.

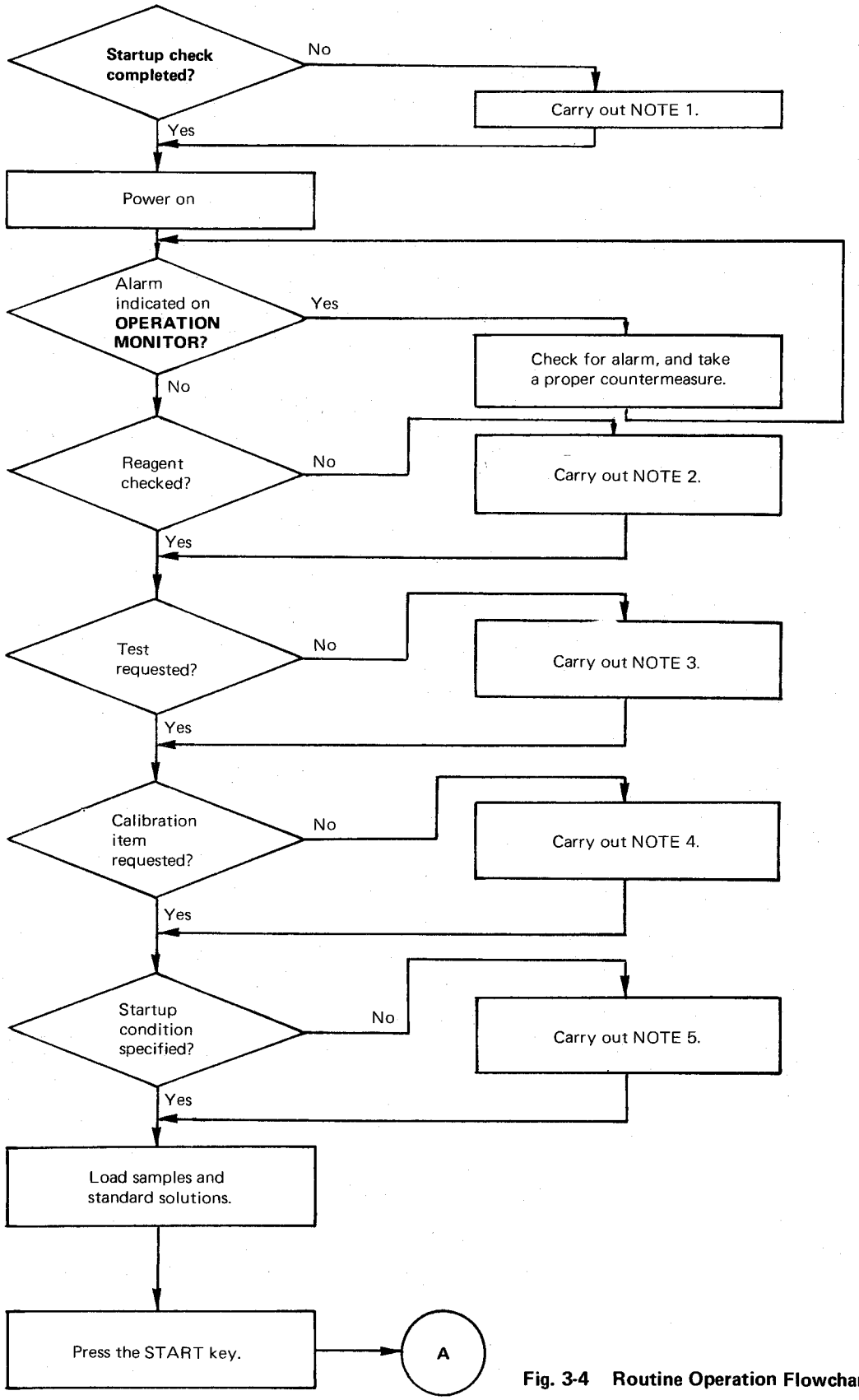
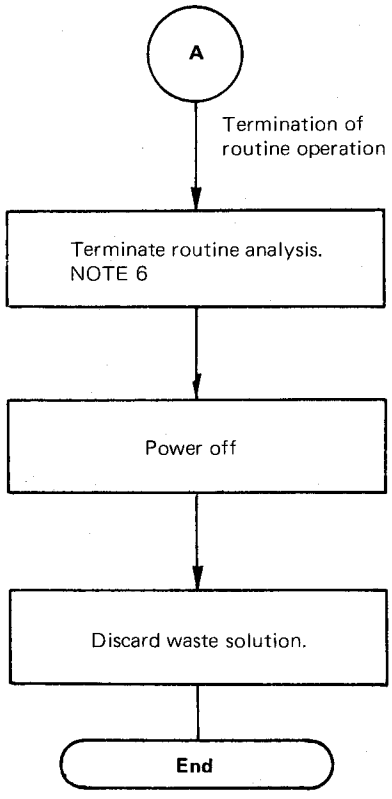


Fig. 3-4 Routine Operation Flowchart (1/2)



* For NOTES 1 to 6, refer to the description on pages 3-8 thru 3-14.

Fig. 3-4 Routine Operation Flowchart (2/2)

Note;

< Sample volume >

This instrument requires a minimum sample dead volume, but prepare sample in a sufficiently large volume considering the influence on measurement because of sample evaporation.

Volume to be prepared is "volume required for measurement + 100 $\mu\ell$".
Note the following in particular for re-run.
(See the details for re-run on P 3 – 33)

1. In case of RERUN with RERUN MODE "RERUN ONLY" after measuring with RERUN MODE "NO" and checking the results, check the volume of sample for measurement on RERUN LIST. If the volume is not enough, replenish the sample before re-run.

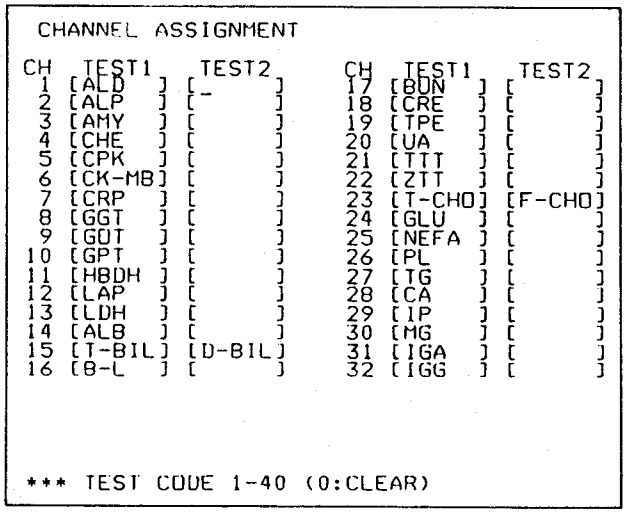
2. In case of RERUN with AUTOMATIC, sample volume to be prepared is "volume required for measurement + 100 $\mu\ell$" (as stated above) and more. So, be sure to prepare the sample anticipating RERUN in advance.

NOTE 1 (Startup check)

- Three probes not contaminated or bent?
- Distilled water tank full?
- Waste solution tank empty?
- Extran sufficient?
- System floppy disk and data file floppy disk loaded?
- Printing paper sufficient?

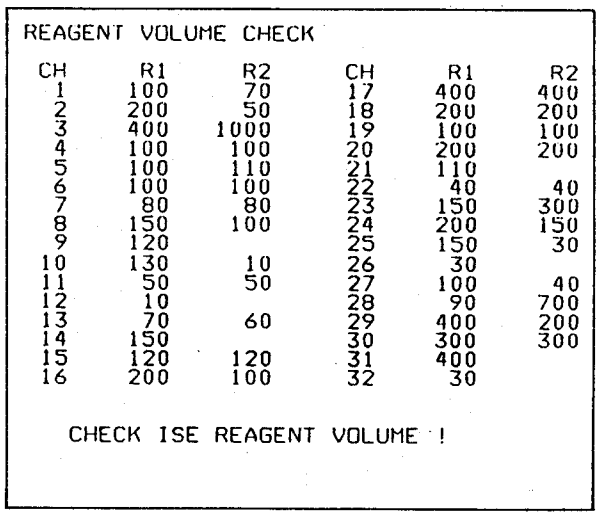
NOTE 2 (Reagent check)

- Analytical channel assignment proper?
  (Check **PARAMETER JOB – CHANNEL ASSIGNMENT.**)
- Reagents 1 and 2 set properly?
- Reagent volume sufficient?
  (Check **ROUTINE JOB – REAGENT VOLUME CHECK.**)
- Reagent not denatured?



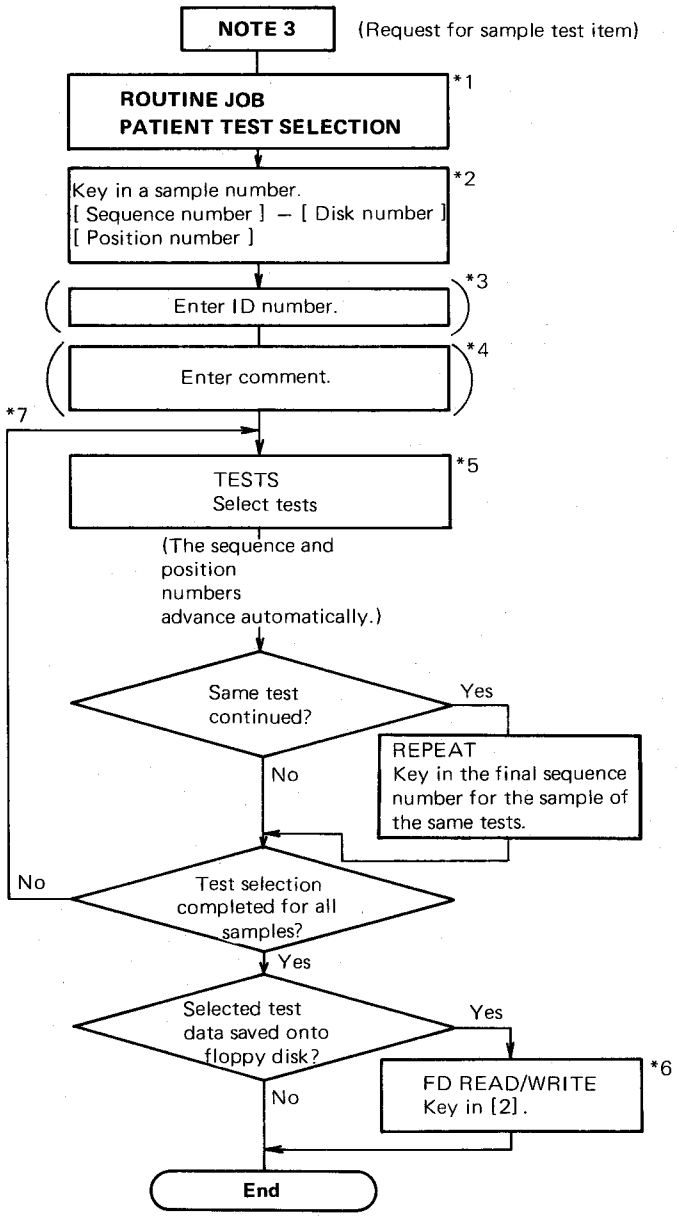
```
CHANNEL ASSIGNMENT

CH  TEST1    TEST2      CH  TEST1    TEST2
 1 [ALD   ] [-     ]    17 [BUN   ] [      ]
 2 [ALP   ] [      ]    18 [CRE   ] [      ]
 3 [AMY   ] [      ]    19 [TPE   ] [      ]
 4 [CHE   ] [      ]    20 [UA    ] [      ]
 5 [CPK   ] [      ]    21 [TTT   ] [      ]
 6 [CK-MB ] [      ]    22 [ZTT   ] [      ]
 7 [CRP   ] [      ]    23 [T-CHO ] [F-CHO ]
 8 [GGT   ] [      ]    24 [GLU   ] [      ]
 9 [GOT   ] [      ]    25 [NEFA  ] [      ]
10 [GPT   ] [      ]    26 [PL    ] [      ]
11 [HBDH  ] [      ]    27 [TG    ] [      ]
12 [LAP   ] [      ]    28 [CA    ] [      ]
13 [LDH   ] [      ]    29 [IP    ] [      ]
14 [ALB   ] [      ]    30 [MG    ] [      ]
15 [T-BIL ] [D-BIL ]    31 [IGA   ] [      ]
16 [B-L   ] [      ]    32 [IGG   ] [      ]



*** TEST CODE 1-40 (0:CLEAR)
```

Fig. 3-5 CHANNEL ASSIGNMENT Screen



```
REAGENT VOLUME CHECK

CH    R1    R2    CH    R1    R2
 1   100    70    17   400   400
 2   200    50    18   200   200
 3   400  1000    19   100   100
 4   100   100    20   200   200
 5   100   110    21   110
 6   100   100    22    40    40
 7    80    80    23   150   300
 8   150   100    24   200   150
 9   120         25   150    30
10   130    10    26    30
11    50    50    27   100    40
12    10         28    90   700
13    70    60    29   400   200
14   150         30   300   300
15   120   120    31   400
16   200   100    32    30



  CHECK ISE REAGENT VOLUME !
```

Fig. 3-6 REAGENT VOLUME CHECK Screen



*1 Use the ROUTINE JOB – PATIENT TEST SELECTION screen.

*2 Sequence number range: 1 to 1000
Disk number range : 0 to 9
Position number range : 0 to 60 (0: S. STOP)

*3 Optional
11 alphanumeric characters max.

*4 Annotation concerning sample
Optional
20 alphanumeric characters by two lines max.

*5 Use the test select keys (1 to 32) or profile keys (A to L).
Pressing the test select key or profile key causes its indicator lamp to light up and the testnames to be displayed on the screen.

*6 When '2' is keyed in, the message "FD WRITE OK? (1 : YES 0 : NO) appears on the screen.
In response to this message, key in '1'.
At this operational step, only the sample test request data is saved onto the floppy disk.
Note that other analytical parameters are not written onto the floppy disk.

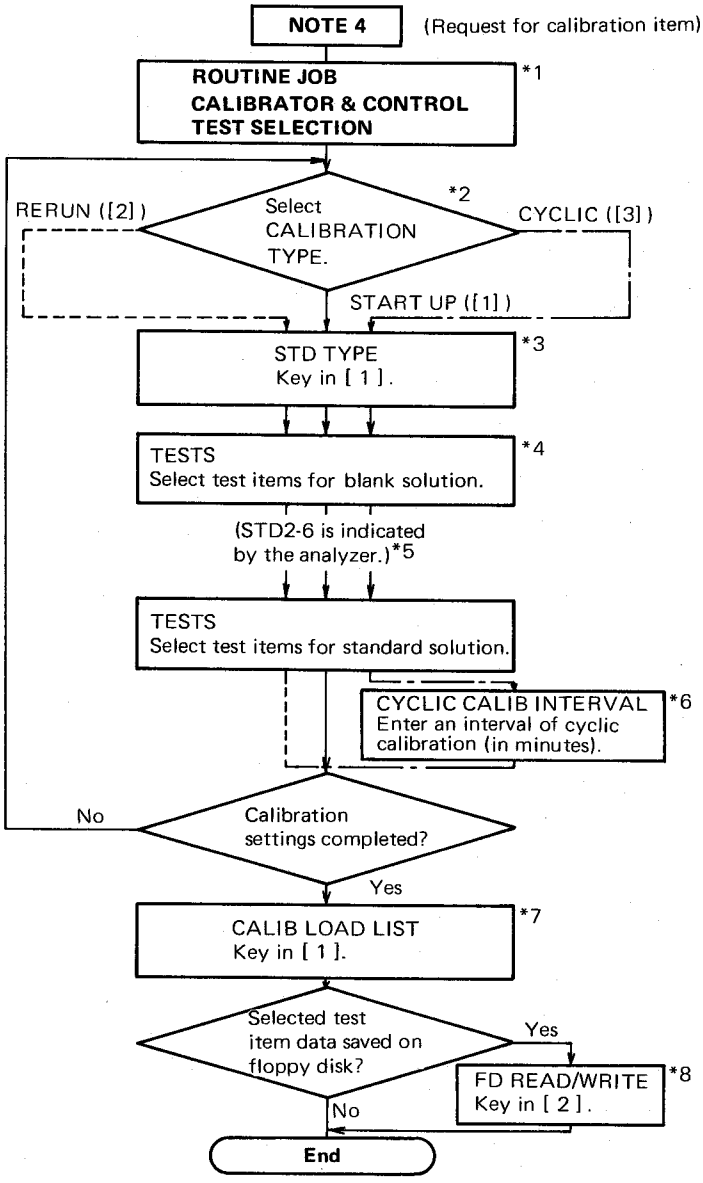
*7 To enter an ID number or command for each sample, move the cursor back to the relevant position on screen.

Fig. 3-7 Sample Test Request Procedure

```
 PATIENT TEST SELECTION

SAMPLE NO.       [  10]:[0][10]
ID NO.           [12345678910]
COMMENT          [HITACHI HANAKO        ]
                 [12345678910 F 19      ]
TESTS            [_]
REPEAT           [   ]

READ SAMPLE NO.[    1]:001-12345678901
FD READ/WRITE  [     ]
CLEAR          [   ]
DATA RECEIVE   [     ]:[  ][  ]-[     ]
WORK SHEET     [     ]-[     ]

     1-001
  ALB   ALP   AMY   T-BIL D-BIL B-LIP
  CA    CHE   T-CHO CPK   F-CHO CRE
  G-GTP GLU   GOT   GPT   HBDH  IP
  LAP   LDH   NEFA  PL    TG    TP
  UA    BUN   B     C-III CRP   PHT
  A-I   A-II

*** PROFILE KEY(A-L) & TEST KEY
```

```
PATIENT TEST SELECTION

  < ITEM >          < COMMENT >

SAMPLE NO.        *** 1-1000
                  *** DISK NO.0-9
                  *** POSITION NO.0-60(0:S.STOP)
ID NO.            *** MAX 11 CHARACTERS
COMMENT           *** 20 CHARACTERS X 2 LINES
TESTS             *** PROFILE KEY(A-L) & TEST KEY
REPEAT            *** FINAL S.NO.1-1000 FOR SAME TESTS
READ SAMPLE NO.   *** 1-1000
FD READ/WRITE     *** 1:READ 2:WRITE
                  **** FD READ OK ? (1:YES 0:NO)
                  **** FD WRITE OK ? (1:YES 0:NO)
CLEAR             *** 1:YES
                  **** CLEAR OK ? (1:YES 0:NO)
DATA RECEIVE      *** FIRST SAMPLE NO. 1-1000
                  *** DISK NO.0-9
                  *** POSITION NO.1-60
                  *** FINAL SAMPLE NO. 1-1000
WORK SHEET        *** FIRST SAMPLE NO. 1-1000
                  *** FINAL SAMPLE NO. 1-1000
```

Fig. 3-8 PATIENT TEST SELECTION Screen



*1 Use the ROUTINE JOB – CALIBRATOR & CONTROL TEST SELECTION screen.

*2 The following three types of calibration methods are available:
- START UP
  Calibration at startup of analysis.
- RETURN
  Re-calibration
- CYCLIC
  Cyclic calibration

*3 STD1: Denotes a blank solution.

*4 Use the test select keys (1 to 32) or profile keys (A to L).

*5 STD2-6: Denotes standard solutions (excluding blank solution).

*6 Specify minutes of time as a cyclic calibration interval.
For instance, if '60' is assigned, calibration is carried out for the specified test item in a cycle of 60 minutes.
Note that time counting is performed only during operation.

*7 Use this function when loading blank and standard solutions on the sample disk.

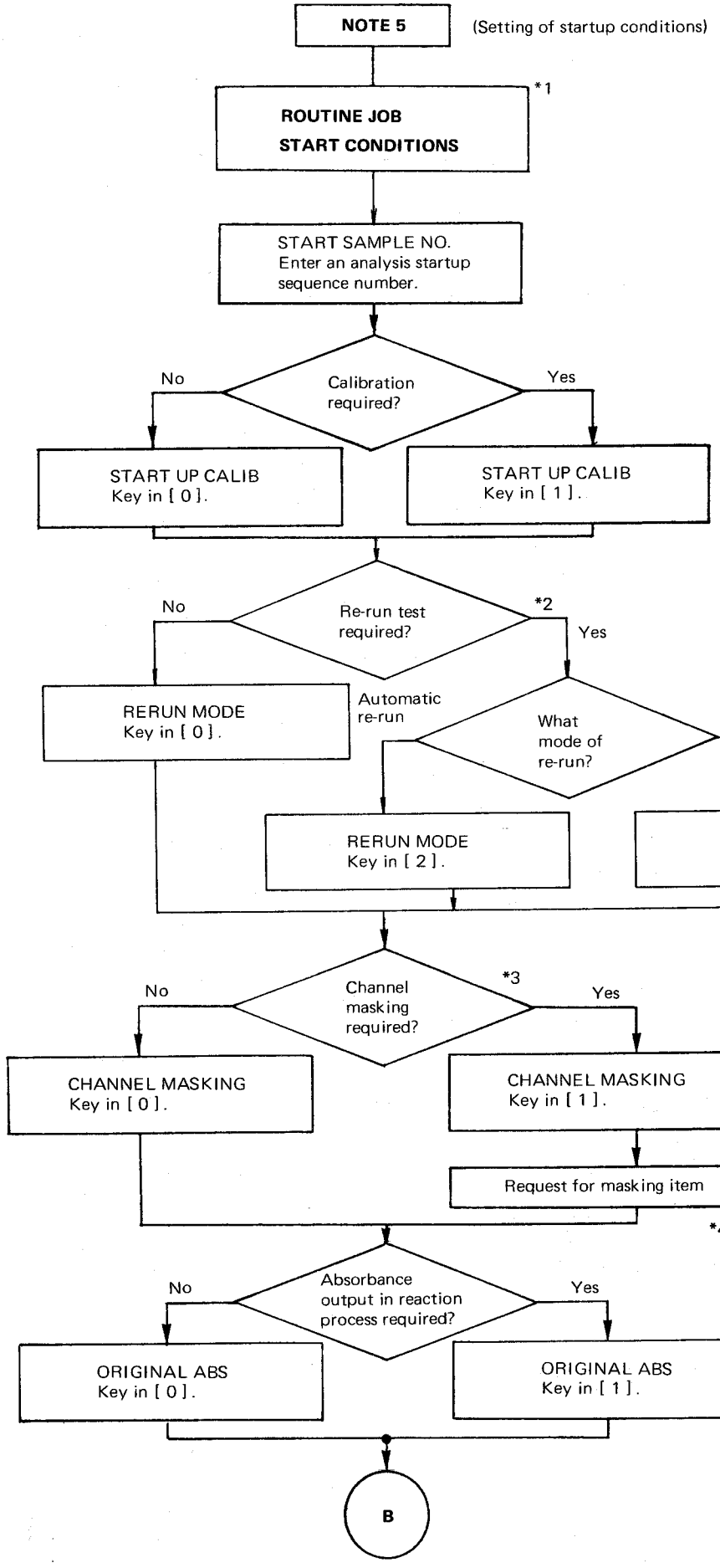
*8 When '2' is keyed in, the message "FD WRITE OK? (1 : YES 0 : NO)" appears on screen.
In response to this message, enter '1'.
At this operational step, only the blank/standard solution test request data is saved onto the floppy disk. Note that other analytical parameters (sample test request data) are not written onto the floppy disk.

Fig. 3-9 Calibration Item Request Procedure

```
 CALIBRATOR & CONTROL TEST SELECTION

CALIBRATION TYPE [START UP]
STD. TYPE        [STD1   ]
TESTS            [_]
CYCLIC CALIB.
   INTERVAL      [     ]
CALIB. LOAD LIST [     ]

CONTROL NO.      [ ]
TESTS            [ ]
FD READ/WRITE    [       ]




*** TEST KEY 1-32
```

```
CALIBRATOR & CONTROL TEST SELECTION

  < ITEM >          < COMMENT >

CALIBRATION TYPE  *** 1:START UP 2:RERUN 3:CYCLIC
STD. TYPE         *** 1:STD1 2:STD2-6 3:ISE1,2 4:ISE3
TESTS             *** TEST KEY 1-32
                  *** TEST KEY NA,K/NA,K,CL
CYCLIC CALIB.     *** MINUTES 5-1000 / 0:NO
   INTERVAL
CALIB. LOAD LIST  *** 1:YES
CONTROL NO.       *** 1-6
TESTS             *** PROFILE KEY(A-L) & TEST KEY
FD READ/WRITE     *** 1:READ 2:WRITE
                  *** FD READ OK ? (1:YES 0:NO)
                  *** FD WRITE OK ? (1:YES 0:NO)
```

Fig. 3-10 CALIBRATOR & CONTROL TEST SELECTION Screen

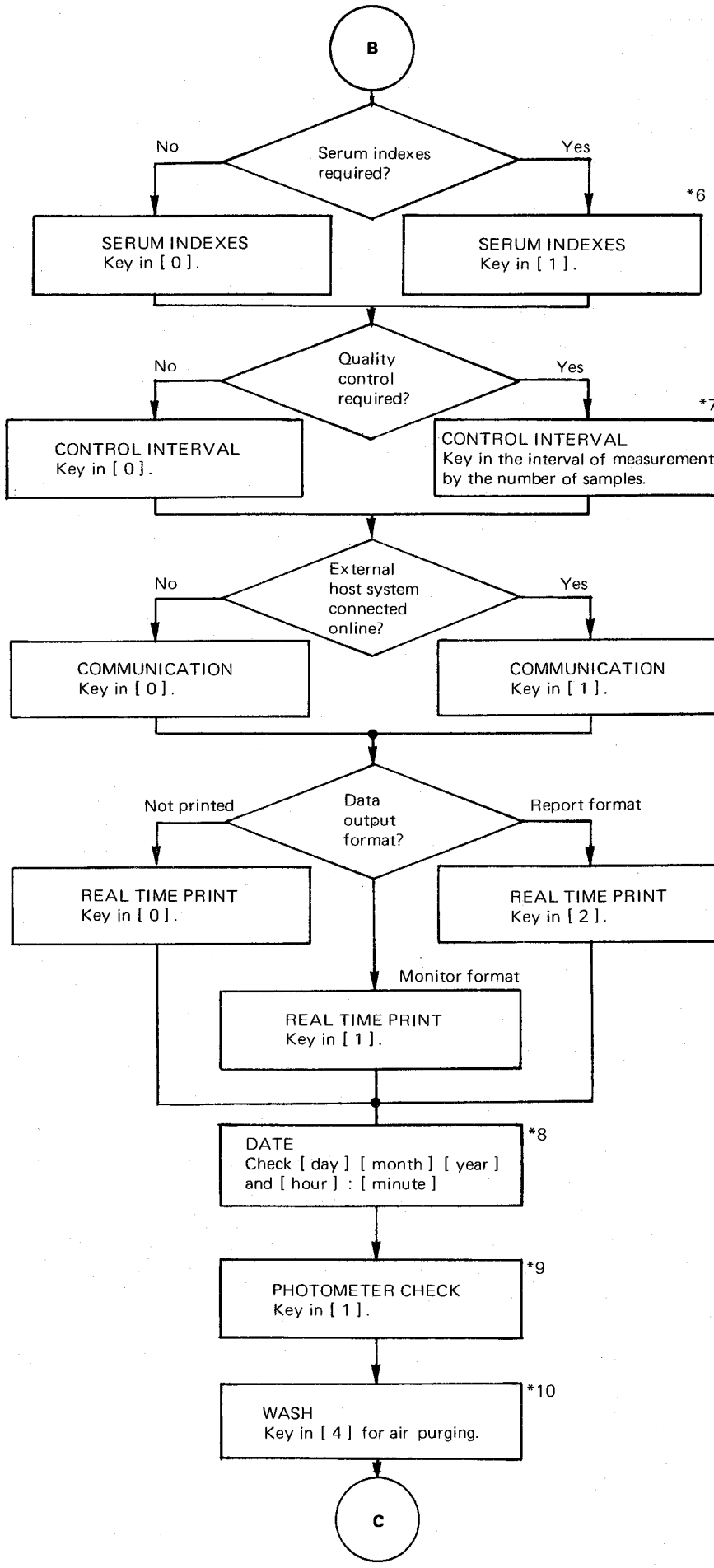


*1 Use the ROUTINE JOB – START CONDITIONS screen.

*2 For the re-run procedure, refer to section 3-6.

*3 A request for analysis is made invalid for the channel that has been masked.

*4 Absorbance data in the entire reaction process is output together with measured concentration data. For details, refer to section 6-4.



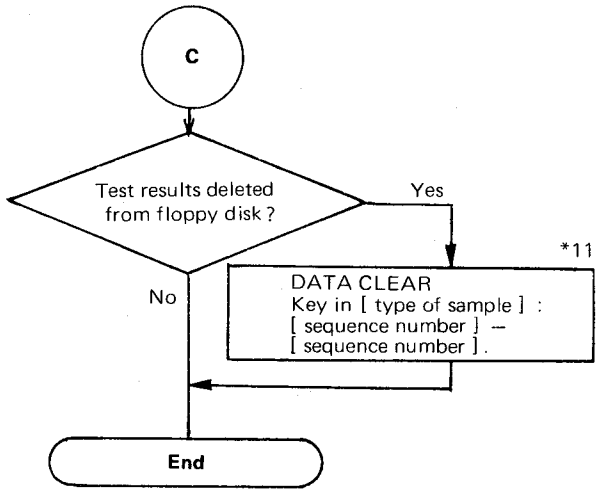
*6 The icteric, lipemic and hemolytic indexes of sample are measured. For details, refer to section 3-9.

*7 The daily/monthly $\overline{X}$-R quality control and realtime quality control are carried out. For details, refer to section 3-11.

*8 The year, month, day and time, once keyed in, are updated even if the main switch is turned off. So, just check the date and time.

*9 Check the photometer before starting routine analysis.

*10 Carry out air purge for the flow path including probes, stirrer and their rinsing mechanism.



*11 Type of sample:

- Routine sample (NORM)
- Stat sample (STAT)
- Control sample (CONT)
- All samples (ALL)

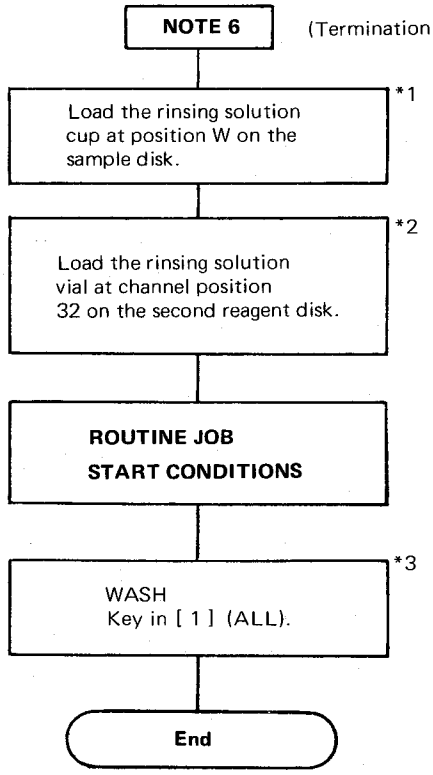
The data defined by the specified first and final sequence numbers is removed from the floppy disk.

Fig. 3-11 Startup Conditioning Procedure

```
 START CONDITIONS

START SAMPLE NO.[    1]:[0][01]-[1][50]
START UP CALIB.  [YES]
CALIB.(RERUN)    [NO ]
RERUN MODE       [AUTOMATIC ]
MASKING          [ ]
ORIGINAL ABS.    [NO ]
SERUM INDEXES    [YES]
CONTROL INTERVAL[ 100]
COMMUNICATION    [YES]
REAL TIME PRINT [MONITOR ]

PHOTOMETER CHECK[      ]
WASH             [_       ]
DATA CLEAR       [     ]:[     ]-[     ]
ISE PRIME        [        ]
DATE             [  ][  ][  ] [  ]:[  ]




*** 1:ALL 2:CELLS 3:ISE 4:AIR PURGE
```

```
START CONDITIONS

  < ITEM >          < COMMENT >

START SAMPLE NO.  °*** 1-1000 (DATA CLEAR OK ?)
                  °*** DISK NO.0-9
                  °*** POSITION NO.1-60
                  °*** FINAL DISK NO.0-9
                  °*** FINAL POSITION NO.1-60
START UP CALIB.   °*** 1:YES 0:NO
CALIB.(RERUN)     °*** 1:YES 0:NO
RERUN MODE        °*** 1:AUTOMATIC 2:RERUN ONLY 0:NO
MASKING           °*** PROFILE KEY(A-L) & TEST KEY
ORIGINAL ABS.     °*** 1:YES 0:NO
SERUM INDEXES     °*** 1:YES 0:NO
CONTROL INTERVAL  °*** BETWEEN SAMPLES 5-1000 / 0:NO
COMMUNICATION     °*** 1:YES 0:NO
REAL TIME PRINT   °*** 1:MONITOR 2:REPORT 0:NO PRINT
PHOTOMETER CHECK  °*** 1:START
WASH              °*** 1:ALL 2:CELLS 3:ISE 4:AIR PURGE
                  °*** EXCHANGE REAGENT AND PUSH START KEY
DATA CLEAR        °*** 1:NORM 2:RERUN 3:STAT 4:CONT 5:ALL
                  °*** NORM 1-1000/RERUN 1-1000/STAT 1-100
                       CONT 101-630
                  °*** DATA CLEAR OK? (1:YES 0:NO)
ISE PRIME         °*** 1:START UP 2:IS,DIL 3:KCL
DATE              °*** DAY 1-31
                  °*** MONTH 1-12
                  °*** YEAR 0-99
                  °*** HOUR 0-23
                  °*** MINUTE 0-59
```

Fig. 3-12 START CONDITIONS Screen



*1 Use IN NaOH solution for rinsing.

*2 Use 2 % Extran aqueous solution for rinsing.

*3 1) Sampling probe
2) Reaction cuvette
3) Stirrer
4) Reagent pipetting probe

The above items are cleaned with rinsing solution. On completion of rinsing, the operation is stopped automatically with rinsing solution left in the reaction cuvette.

If it is not necessary to wash ISE, then select [2] (CELLS) for WASH.

Note: Carry out PARAMETER WRITE on the **MAINTENANCE JOB** screen as required, e.g. in the following cases:
SCALE has been changed on the MONITOR JOB screens.
Quality control value has been changed on the **QUALITY CONTROL JOB** screen.

Fig. 3-13 Termination of Operation

3-5 Routine Analysis Parameters

The routine operation has been explained so far on assumption that the parameters necessary for routine analysis have already been stored on the floppy disk. The following explains how to specify these parameters.
The operator can handle most of the parameters necessary for routine analysis through the PARAMETER JOB screen. Illustrated below are the screen paths to be taken for entering routine analysis parameters.

PARAMETER JOB

- **TEST NAME**
  Input test names.
- **CHEMISTRY PARAMETERS**
  Specify analytical parameters for each test.
- **CHANNEL ASSIGNMENT**
  Assign an analytical channel for test.
- **PROFILING**
  Specify tests for each profile.
- **PRINT ORDER**
  Determine the order of printout data.
- **REPORT FORMAT**
  Specify the report format.

(For the CALCULATED TEST, COMPENSATED TEST, and SERUM INDEXES screen, refer to 3-6.)

MONITOR JOB

- **CALIBRATION LIST**
  Define a K-factor for the test to be conducted using the K-factor calibration method.

The parameter input procedure on each screen is explained below. Press the PARAMETER JOB key first.

```
 *** PARAMETER JOB ***

JOB NO. [_ ]

  1.TEST NAME

  2.CHEMISTRY PARAMETERS

  3.ISE PARAMETERS

  4.CHANNEL ASSIGNMENT

  5.PROFILING

  6.CALCULATED TEST

  7.COMPENSATED TEST

  8.SERUM INDEXES

  9.PRINT ORDER

 10.REPORT FORMAT

*** JOB NO.(1-10) & NEXT,BACK
```

Fig. 3-14 PARAMETER JOB Screen (Main menu indicating the table of contents)

The **PARAMETER JOB** screen appears to indicate the table-of-contents page.
In this example, select the **TEST NAME** screen first. Press **1** and **ENTER** keys, or **NEXT** key.

```
 TEST NAME

TEST      [13]    TEST NAME [_    ]

CODE NAME CODE NAME CODE NAME CODE NAME
   1 ALD    16 B-L    31 MG     46 I
   2 ALP    17 BUN    32 IG-G   47 A/G
   3 AMY    18 CRE    33 IG-A   48
   4 CHE    19 TP     34 IG-M   49
   5 CK-MB  20 UA     35 FE     50
   6 CRP    21 TTT    36 GLDH   51
   7 GGT    22 ZTT    37 G-6-P  52
   8 GOT    23 T-CHO  38 HPT    53
   9 GPT    24 F-CHO  39 UIBC   54
  10 HBDH   25 GLU    40 TF
  11 LAP    26 NEFA   41 NA
  12 LDH    27 PL     42 K
  13 ALB    28 TG     43 CL
  14 T-BIL  29 CA     44 L
  15 D-BIL  30 IP     45 H

 CODE  1-40:NORMAL    41-43:NA,K,CL
      44-46:L,H,I     47-54:CALCULATION

*** MAX 5 CHARACTERS
```

Fig. 3-15 TEST NAME Screen

Then, the **TEST NAME** screen is called up.
Enter a test name for each code number.
The input parameters are shown in Table 3-2.

Table 3-2 Input Parameters on TEST NAME Screen

Item	Input Parameter	Description
TEST	1 to 54	**1** to **40** : Ordinary tests **41** to **43**: NA, K, CL **44** to **46**: L, H, I (serum indexes) **47** to **54**: Calculation items
TEST NAME	5 characters max.	A test name having up to 5 characters can be entered using the alphabetic keys.

On completion of parameter entry on the TEST NAME screen, press the NEXT key.

```
CHEMISTRY PARAMETERS

TEST                [GOT  ]
ASSAY CODE          [RATE-A  ]:[30]-[50]
SAMPLE VOLUME       [10][10]
R1 VOLUME           [320][100][ NO]
R2 VOLUME           [ __ ][100][ NO]
WAVE LENGTH         [405][340]
CALIB. METHOD       [K-FACTOR ][0][0]
STD.(1) CONC.-POS.[     0]-[ 1]
STD.(2) CONC.-POS.[     0]-[ 0]
STD.(3) CONC.-POS.[     0]-[ 0]
STD.(4) CONC.-POS.[     0]-[ 0]
STD.(5) CONC.-POS.[     0]-[ 0]
STD.(6) CONC.-POS.[     0]-[ 0]
SD LIMIT            [     0]
DUPLICATE LIMIT     [     0]
SENSITIVITY LIMIT   [     0]
ABS.LIMIT(INC/DEC)[ 3000][DECREASE]
PROZONE LIMIT       [     0][LOWER]
EXPECTED VALUE      [   8.0]-[  40.0]
PANIC VALUE         [   0.0]-[ 200.0]
INSTRUMENT FACTOR [1.00]

*** 0-350 MICRO
```

You will see the CHEMISTRY PARAMETERS screen. Tap in analytical condition for each test. Table 3-3 lists the input parameters on this screen. The analytical conditions are specifiable for up to 40 tests.

Fig. 3-16 CHEMISTRY PARAMETERS Screen

Table 3-3 Input Parameters on CHEMISTRY PARAMETERS Screen

Item	Input Parameter	Description
TEST	1 to 40	Key in a test number (code number).
ASSAY CODE	[*] : [□□] – [△△] * Assay code: 1 to 6 □□ Photometric point: 1 to 50 △△ Photometric point: 0 to 50	The assay codes: **1:** One-point assay **2:** Two-point assay **3:** Three-point assay **4:** One-point and rate assay **5:** Rate assay A **6:** Rate assay B
SAMPLE VOLUME	3 to 20 μℓ	Specify the volume of sample. The right column is for rerun (decreased volume).
R1 VOLUME	[***] [□] [△] *** Reagent volume : 50 to 350 μℓ □ Reagent vial capacity : 20 or 100 mℓ △ Diluent volume : 50 to 350 μℓ	Specify the volume of reagent to be pipetted. Indicate the capacity (size) of reagent vial (20 or 100 mℓ). Determine the volume of diluent (deaerated pure water). The diluent volume should be prescribed so that the total volume of reagent and diluent will be within a range of 50 to 350 μℓ.
R2 VOLUME	Same as for R1	
WAVELENGTH	[□□□] [△△△] □□□: The following secondary (sub) wavelengths are selectable. 340, 405, 450, 480, 505, 546, 570, 600, 660, 700, 750, 800 nm △△△: Primary (main) wavelength (Same as for the secondary wavelength)	In the two-wavelength photometry mode, specify different values for the primary and secondary wavelengths. In the single-wavelength photometry mode, specify '0' for the secondary wavelength.

(cont'd)

Item	Input Parameter	Description
CALIB. METHOD	[*] [□] [△] * Calibration method number: 1 to 5 □ Calibration model function (Select one of the four types of mathematical model functions. Specifiable only for nonlinear calibration curve) △ Number of standard solutions (only for nonlinear calibration curve): 3 to 6	Calibration method numbers: **1:** Linear calibration **2:** K-factor calibration **3:** Nonlinear calibration **4:** Isozyme P calibration **5:** Isozyme Q calibration (For details of the nonlinear and isozyme calibration methods, refer to section 2-5-3)
STD. (1) CONC. – POS. to STD (6) CONC. – POS.	[xxxxxx] – [□□] xxxxxx Concentration of standard sample □□ Loading location of standard solution in sample disk: 1 to 33	For linear calibration, specify STD (1) and (2). For K-factor calibration, specify STD (1). For nonlinear calibration, specify STD (1) to (3) at least. In this case, STD (4) to (6) are also specifiable. In isozyme P calibration, specify STD (1), (2), (3) and (4). For isozyme Q calibration, specify STD (1), (3) and (4).
SD LIMIT	[xxxxxx] 0.1 to 999.9	Used for checking multi-point calibration curve.
DUPLICATE LIMIT	[xxxxxx] 0 to 32000	Used to check for difference of absorbance values obtained by measuring a standard solution twice. The DUP alarm is issued if this difference is larger than the DUPLICATE LIMIT parameter value.
SENSITIVITY LIMIT	[xxxxxx] 0 to 32000	Used to check for difference of STD (1) and STD (N) absorbance values. The SENS alarm is generated if this difference is smaller than the SENSITIVITY LIMIT parameter value.
ABS. LIMIT (INC/DEC)	[xxxxxx] [□] xxxxxx 0 to 32000 □ 0 or 1	Effective only for rate assay. □: **1** Absorbance decreasing reaction **0** Absorbance increasing reaction
PROZONE LIMIT	[xxxxxx] [upper/lower] xxxxxx –32000 to 32000 ($\times 10^{-4}$ Abs or %)	Used for checking prozone phenomenon[1].
EXPECTED VALUE	[xxxxxx] – [□□□□□□] xxxxxx Lower limit □□□□□□ Upper limit	Input normal range.

(cont'd)

Item	Input Parameter	Description
PANIC VALUE	[XXXXXX] [□□□□□□] XXXXXX Lower limit of allowable result □□□□□□ Upper limit of allowable result	Enter the upper and lower limits of allowable result.
INSTRUMENT FACTOR	[XXX] 0.50 to 9.90	Enter an instrument factor.

Note 1: Refer to subsection 3-7 (7) – Prozone Check.

On completion of entry on the **CHEMISTRY PARAMETERS** screen, press the **NEXT** key twice.

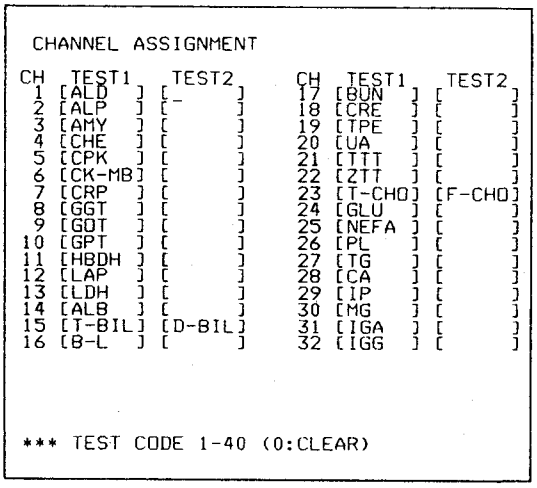


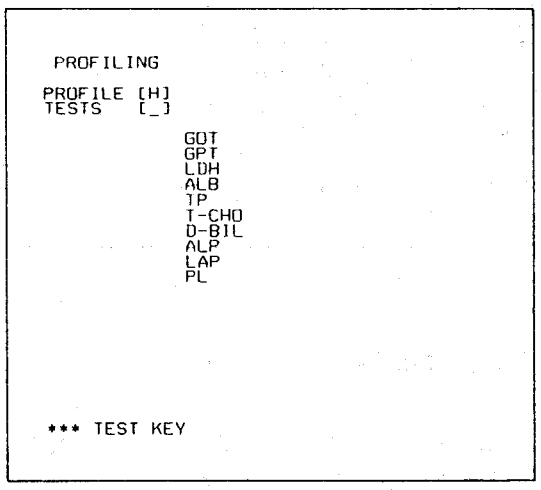
Fig. 3-17 CHANNEL ASSIGNMENT Screen

You will then see the **CHANNEL ASSIGNMENT** screen. Assign a test to each channel. Table 3-4 lists the input parameters on this screen. For the ordinary test, use 'TEST 1'. 'TEST 2' should be used only when carrying out twin tests.

Table 3-4 Input Parameters on CHANNEL ASSIGNMENT Screen

Item	Input Parameter	Description
TEST 1	[XX] 1 to 40 0: Clear	Move the cursor to each channel, and enter the desired test code.
TEST 2	[XX] 1 to 40 0: Clear	Used for three-point assay, rate assay B, or one-point and rate assay.

When you are through the **CHANNEL ASSIGNMENT** screen, press the **NEXT** key.



The **PROFILING** screen appears as shown in Figure 3-18. Key in a preset test for each profile key. Table 3-5 shows the input parameters on this screen.

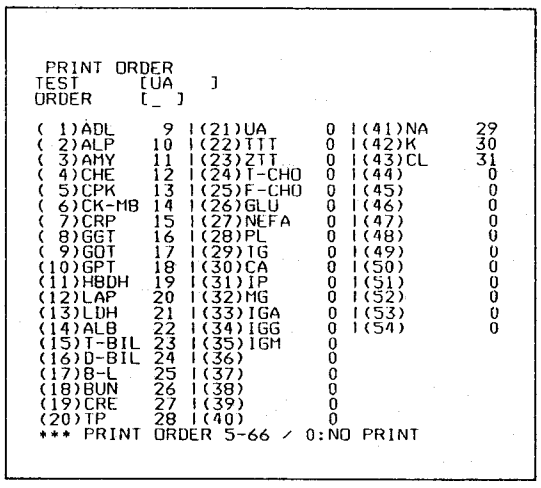
The profile keys (A to L) correspond to the top line keys on the keyboard.

Fig. 3-18 PROFILING Screen

Table 3-5 Input Parameters on PROFILING Screen

Item	Input Parameter	Description
PROFILE	A to L	Profile key A, B, C, D, E, F, G, H, I, J, K, L ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
TESTS	Press the relevant test select keys.	Keyboard Q, W, E, R, T, Y, U, I, O, P, (,)

When you are through the **PROFILING** screen, press the NEXT key four times.



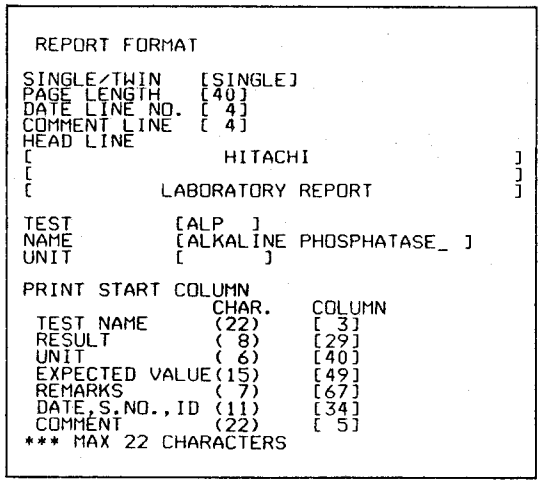
You will then see the **PRINT ORDER** screen. Specify the sequence of test results to be output onto the printer. Table 3-6 shows the input parameters on this screen.

Fig. 3-19 PRINT ORDER Screen

Table 3-6 Input Parameters on PRINT ORDER Screen

Item	Input Parameter	Description
TEST	1 to 54	Determine the printout position of each test result.
ORDER	5 to 66	Test data can be printed out on the 5th to 66th lines. To cancel print operation, key in '0'.

When you are through the **PRINT ORDER** screen, press the **NEXT** key.



You will see the **REPORT FORMAT** screen. Define the report format, and key in other report entries such as laboratory name. Table 3-7 lists the input parameters on this screen.

Fig. 3-20 REPORT FORMAT Screen

Table 3-7 Input Parameters on REPORT FORMAT Screen

Item	Input Parameter	Description
SINGLE/TWIN	1 or 2	Enter the printout number of samples per page.
PAGE LENGTH	8 to 66	Define a page length number of lines of print chart.
DATE LINE NO.	4 to 64	Select on which line the date (month, day, year) is to be printed out. The sequence number is printed on the next line, and the ID number is printed out on the line following it. If it is not desired to print out the date, specify "0".
COMMENT LINE	4 to 65	Specify the line(s) on which annotation concerning sample is to be printed out. Note that up to 2 comment lines are allowed per sample.
HEAD LINE	38 columns, 3 lines	Enter the report title, the laboratory name, etc.
TEST	1 to 54	Call up each test and enter the formal test name.
NAME	22 characters max.	
UNIT	6 characters max.	Enter a unit of measure (e.g. U/L).
PRINT START COLUMN	1 to 80 or 1 to 40 0: No print	Specify the print starting column. To print out data on single sample per page: 0 to 80 To print out data on two samples per page: 0 to 40

This completes parameterization through the **PARAMETER JOB** screen and its subsidiary screens. Proceed to the K-factor setting by pressing the **MONITOR JOB** key.

```
*** MONITOR JOB ***
JOB NO. [_]
  1.REACTION MONITOR
  2.DATA REVIEW
  3.CALIBRATION LIST
  4.WORKING CURVE (NON-LINEAR)
  5.CALIBRATION TRACE
  6.ISE MONITOR



*** JOB NO.(1-6) & NEXT,BACK
```

Fig. 3-21 MONITOR JOB Screen

The **MONITOR JOB** screen appears indicating the table of contents. For K-factor setting, select the **CALIBRATION LIST** screen. Key in **3** and **ENTER**.

```
CALIBRATION LIST
        S1ABS       K       A       B       C
LDH        -3   -6500
GOT       -23   -6500
GGT         1    7279
BUN       -11  -13309
ALB      1229     814
AMY         4    9554
CHO       312    9656
TG        734    4593
BIL       100     591
CA        915    1397
CRE        10    5848
CHE       -23   -8757
TP      -2060    2669
UA         74     584
GLU         4     574
GPT        -6   -6500
CPK         0   10000
HBDH        0   10000
            0       0
            0       0

*** ABS. X 10000                              4
```

Fig. 3-22 CALIBRATION LIST Screen

The **CALIBRATION LIST** screen is called up. This screen shows a list of K-factor calibration parameters. Move the cursor to position 'K' on the screen, and type in a K-factor value.

Note: ↓ mark located at the lower right corner on this screen indicates that the next page of CALIBRATION LIST can be made to appear by pressing

key.

This completes the parameter key-in procedure for routine analysis operation.
Now, save all of these parameters onto the floppy disk. Once the parameters are stored onto it, you need not re-enter them. Press the **MAINTENANCE JOB** key.

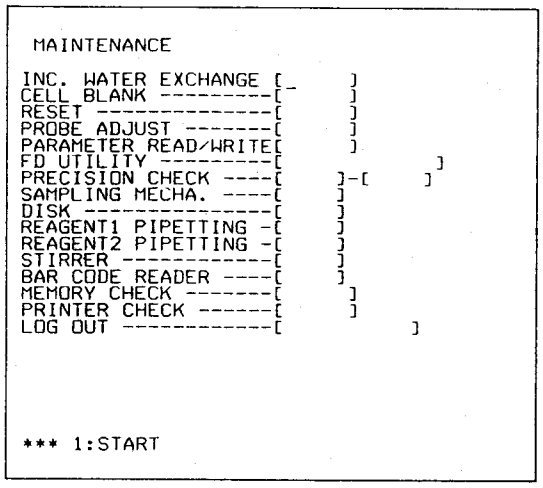


Fig. 3-23 MAINTENANCE JOB Screen

You will see the **MAINTENANCE JOB** screen. Point to 'PARAMETER READ/WRITE' with the cursor. Then, press **2** and **ENTER**. The prompt 'WRITE OK? (1 : YES 0 : NO)' appears. In response to this prompt, key in **1** and **ENTER**.
Thus, the parameters can be saved onto the floppy disk.

3-6 Advanced Operations

(1) Test-to-Test Calculation

In Model 717, the test-to-test calculation can be carried out through four fundamental arithmetics. You must first assign a test name. For this purpose, call up the **PARAMETER JOB – TEST NAME** screen.

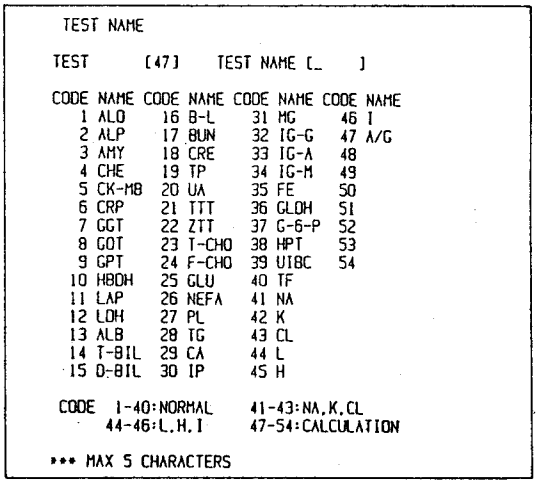


Fig. 3-24 TEST NAME Screen

In naming of test-to-test calculation, select one of code numbers 47 to 54. After entering a test name, press the **BACK** key to display the **PRINT ORDER** screen.

```
 PRINT ORDER
TEST      [UA    ]
ORDER     [_ ]

( 1)ADL     9 |(21)UA      0 |(41)NA     29
( 2)ALP    10 |(22)TTT     0 |(42)K      30
( 3)AMY    11 |(23)ZTT     0 |(43)CL     31
( 4)CHE    12 |(24)T-CHO    0 |(44)        0
( 5)CPK    13 |(25)F-CHO    0 |(45)        0
( 6)CK-MB  14 |(26)GLU     0 |(46)        0
( 7)CRP    15 |(27)NEFA    0 |(47)        0
( 8)GGT    16 |(28)PL      0 |(48)        0
( 9)GOT    17 |(29)TG      0 |(49)        0
(10)GPT    18 |(30)CA      0 |(50)        0
(11)HBDH   19 |(31)IP      0 |(51)        0
(12)LAP    20 |(32)MG      0 |(52)        0
(13)LDH    21 |(33)IGA     0 |(53)        0
(14)ALB    22 |(34)IGG     0 |(54)        0
(15)T-BIL  23 |(35)IGM     0
(16)D-BIL  24 |(36)        0
(17)B-L    25 |(37)        0
(18)BUN    26 |(38)        0
(19)CRE    27 |(39)        0
(20)TP     28 |(40)        0
*** PRINT ORDER 5-66 / 0:NO PRINT
```

Fig. 3-25 PRINT ORDER Screen

Specify the printout sequence of tests on output of test-to-test calculation. Then, press the **BACK** key three times. You will see the **CALCULATED TEST** screen.

```
 CALCULATED TEST
TEST     [A/G  ]
EXPECTED VALUE  [  0.50]-[  0.95]
FORMULA
 [(14)][/    ][(    ][(20)][-    ][(14)]
 [)    ][;    ][_    ][     ][     ][     ]
 [     ][     ][     ][     ][     ][     ]

47 A/G   = ALB / ( TP - ALB )

48

49

50

51

52

53

54

*** + - * / ( ) (TEST CODE),NUMERIC,;
```

Fig. 3-26 CALCULATED TEST Screen

On the **CALCULATED TEST** screen, enter an arithmetic expression. The four fundamental arithmetics can be prescribed using optional parentheses (for changing the hierarchy of arithmetic operations). Table 3-8 shows the input parameters on this screen.
The example demonstrated here shows that the A/G ratio is calculated with ALB assigned to channel 14 and TP to channel 20.

Table 3-8 Input Parameters on CALCULATED TEST Screen

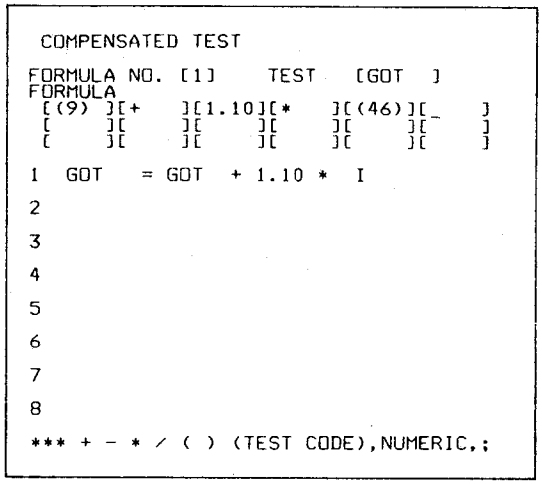
Item	Input Parameter	Description
TEST	47 to 54	
EXPECTED VALUE	6 characters	Key in the upper and lower limits.
FORMULA		An arithmetic expression can be formulated through combination of ( ), +, –, *, and / at user's discretion. e.g. (1.5* (ALB) + (TP)/2.2;

Note: At the end of an arithmetic expression, be sure to put a semicolon (;).

Thus, the test-to-test calculation can be specified.

(2) Data Compensation

According to an arithmetic expression specified by the user, measured values are compensated before printout. For establishing an arithmetic expression, invoke the **PARAMETER JOB – COMPENSATED TEST** screen.



Up to eight test items can be compensated.
A compensation formula can be expressed using the four arithmetic operators and parentheses discretionally.

Fig. 3-27 COMPENSATED TEST Screen

Table 3-9 Input Parameters on COMPENSATED TEST Screen

Item	Input Parameter	Description
FORMULA NO.	1 to 8	
TEST	1 to 43 0: Clear	
FORMULA		An arithmetic expression can be created using ( ), +, –, * and / at user's discretion.

Note: At the end of an arithemetic expression, be sure to put a semicolon (;).

Thus, the data compensation setting can be accomplished.

(3) Serum Indexes

The lipemic, hemolytic and icteric indexes of each sample can be measured without provision of a special analytical channel. These serum indexes are printed out together with measured values. The lipemic, hemolytic and icteric indexes are represented by letters 'L', 'H' and 'I', respectively.
The analytical channel assigned for a test at wavelength of 340 nm is used for measurement of serum indexes. In execution of serum index measurement, reagent 1 for the relevant test is pipetted even where test selection is not made. It is therefore advisable to use such a frequently measured test as GOT or GPT for serum index analysis.
First, call up the **PARAMETER JOB – TEST NAME** screen and check if L, H and I have been set at code numbers 44 to 46.

Then, press the **BACK** key twice to go to the **PRINT ORDER** screen. On this screen, specify the printout sequence of data.
Then, call up the **SERUM INDEXES** screen by pressing the **BACK** key once. On this screen, enter factor values necessary for serum index calculation.

```
 SERUM INDEXES
TEST      [GOT  ]
FACTOR A [_  640]
FACTOR B [ 83000]
FACTOR C [   260]
FACTOR D [   490]
FACTOR E [  9800]
FACTOR F [150000]

     BLANK ( ABS. X 10000 )
    (480/505) (570/600) (660/700)
    [   129] [   232] [   516]



*** 0-999999
```

Fig. 3-28 SERUM INDEXES Screen

In a common practice, specify factor values as follows:
A: 640 B: 83000 C: 260 D: 490
E: 9800 F: 150000
For details, refer to subsection 3-9.
Note that if factor A, C or D is assigned less than '200', the reproducibility of serum index data may be deteriorated due to variations in photometry. Table 3-10 shows the input parameters on the SERUM INDEXES screen.

Table 3-10 Input Parameters on SERUM INDEXES Screen

Item	Input Parameter	Description
TEST	1 to 40	Select one test code out of Rate A group of which measuring points must be 11 to 50.
FACTOR A ~ F	[XXXXXX]	(Example of factor input) A: 640, B: 83000, C: 260, D: 490, E: 9800, F: 150000

For execution of serum index measurement, use the **ROUTINE JOB – START CONDITIONS** screen.

```
 START CONDITIONS
START SAMPLE NO.[   1]:[0][01]-[1][50]
START UP CALIB. [YES]
CALIB.(RERUN)   [NO ]
RERUN MODE      [AUTOMATIC ]
MASKING         [ ]
ORIGINAL ABS.   [NO ]
SERUM INDEXES   [YES]
CONTROL INTERVAL[ 100]
COMMUNICATION   [YES]
REAL TIME PRINT [MONITOR ]

PHOTOMETER CHECK[     ]
WASH            [_    ]:[    ]-[    ]
DATA CLEAR      [     ]:[    ]-[    ]
ISE PRIME       [     ]
DATE            [  ][  ][  ] [  ]:[  ]



*** 1:ALL 2:CELLS 3:ISE 4:AIR PURGE
```

Fig. 3-29 START CONDITIONS Screen

On the **START CONDITIONS** screen, select 'SERUM INDEXES' and key in **1**. This sets up the serum index measurement condition.

(4) Quality Control

Analytical quality control can be carried out using a maximum of six kinds of control samples. For setting of control measurement, use the **ROUTINE JOB – CALIBRATOR & CONTROL TEST SELECTION** screen.

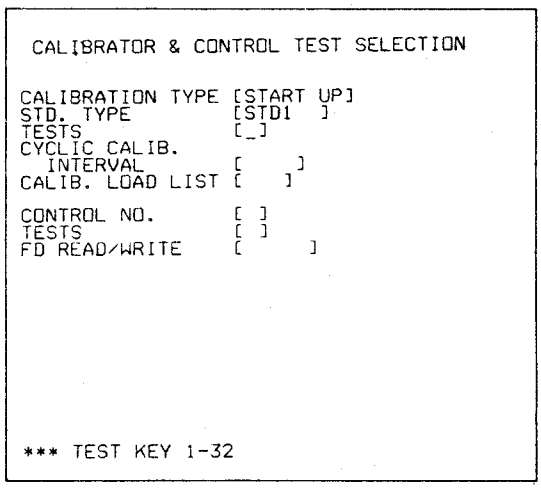


Fig. 3-30 CALIBRATOR & CONTROL TEST SELECTION Screen

On the **CALIBRATOR & CONTROL TEST SELECTION** screen, select 'CONTROL NO.' and key in a control sample number.
At TEST, key in tests to be measured for each control serum. Then, press the **NEXT** key.

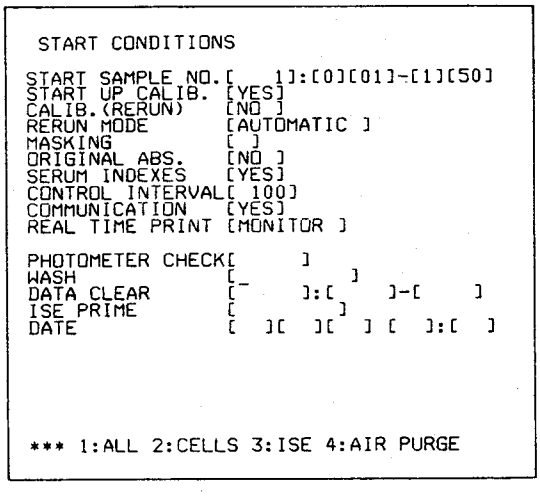


Fig. 3-31 START CONDITIONS Screen

For setting of quality control execution, use the **START CONDITIONS** screen. On this screen, select 'CONTROL INTERVAL' and specify the number of control samples, i.e. measurement interval of control samples. This completes the conditioning for quality control execution.

The following explains the two kinds of quality control methods; realtime quality control and $\bar{X}$-R quality control. The **QUALITY CONTROL JOB** screen shows a list of QC jobs.
To call up this screen, press the **QUALITY CONTROL JOB** key.

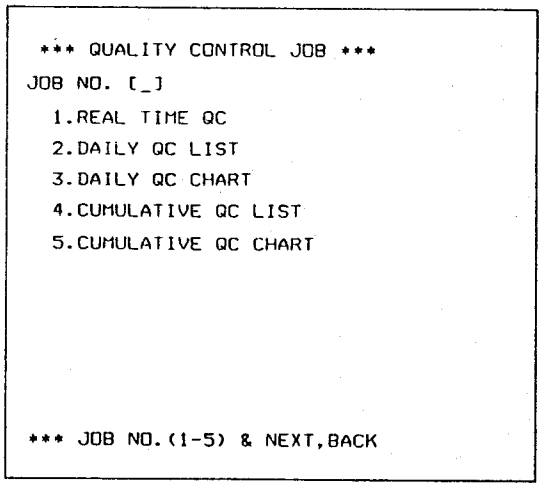


Fig. 3-32 QUALITY CONTROL JOB Screen

The **QUALITY CONTROL JOB** screen appears indicating the table of contents (main menu). The first menu option, i.e. **REAL TIME QC** screen function is described below.
To flip to the **REAL TIME QC** screen page, press the **NEXT** key.

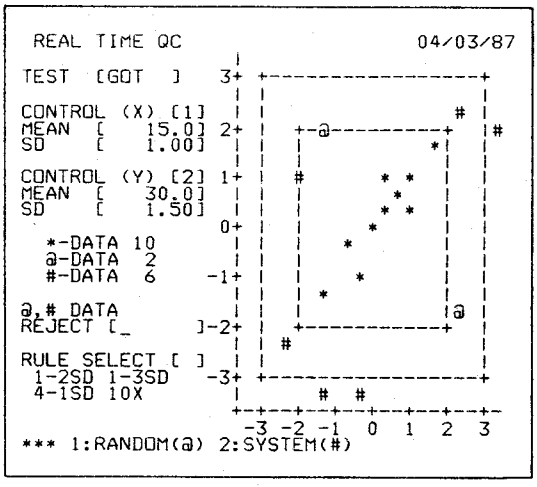


Fig. 3-33 REAL TIME QC Screen

For realtime quality control, two kinds of control serum samples having different concentrations must be measured in the same test.

* Normal data values
@ Random errors
\# Systematic errors

Table 3-11 shows the input parameters on **REAL TIME QC** screen.

Table 3-11 Input Parameters on REAL TIME QC Screen

Item	Input Parameter	Description
TEST	1 to 43	Select the desired test code.
CONTROL (X)	1 to 6	Specify one of six kinds of control sera.
MEAN	7 digits max.	Enter the target mean for control (X).
SD	7 digits max.	Enter the expected standard deviation for control (X).
CONTROL (Y)	1 to 6	Specify another kind of control serum (Y) (different from control serum X).
MEAN	7 digits max.	Enter the target mean for control (Y).
SD	7 digits max.	Enter the expected standard deviation for control (Y).
@, # DATA REJECT	1 or 2	Clear random and/or systematic error data from the displayed graph. 1: For excluding random error data 2: For excluding systematic error data
RULE SELECT*	1 or 0	Six kinds of rule windows are selectable. For selection, key in '1' (yes); for non-selection, key in '0' (no) for each rule.
RENEW QC	1	Redefine the mean and control lines on the twin plot graph displayed, using updated mean and standard deviation.

* Refer to subsection 3-11 (3) — Realtime Quality Control.

When you are through the **REAL TIME QC** screen, press the **NEXT** key.

```
 DAILY QC LIST                          04/03/87
CONTROL     [1]
DELETE TEST[_  ]
    TEST    N     MEAN RANGE      SD   CV(%)
 1 ALD     30     6.93   0.6    0.15    2.16
 2 ALP     30    109.4     9     2.1    1.92
 3 AMY     30    203.4    26     6.5    3.20
 4 CHE     30     0.73   0.1    0.03    3.42
 5 CPK     30     84.4     6     1.5    1.77
 6 CK-MB   30    248.4    16     2.8    1.13
 7 CRP     30     0.55   0.2    0.05    8.72
 8 GGT     30     30.0     3     0.7    2.36
 9 GOT     30     37.5     3     0.7    1.84
10 GPT     30     25.0     3     0.7    2.96
11 HBDH    30     97.3     9     2.2    2.26
12 LAP     30     42.6     2     0.5    1.17
13 LDH     30    223.1    11     2.7    1.20
14 ALB     30     3.78   0.2    0.04    1.05
15 T-BIL   30     0.80   0.1    0.01    1.75
16 D-BIL   30     0.52   0.1    0.02    3.84
17 B-L     30    247.0    10     2.5    1.01
18 BUN     30    193.3    14     0.3    1.70
19 CRE     30     1.33   0.2    0.04    3.23
20 TP      30     6.41   0.3    0.06    0.87
*** TEST CODE 1-43 / 99:ALL TESTS          ↵
```

Fig. 3-34 DAILY QC LIST Screen

The **DAILY QC LIST** screen appears as shown in Figure 3-34. This screen shows the mean, range, SD and CV values obtained through measurement of each control serum. Table 3-12 indicates the input parameters on the **DAILY QC LIST** screen.

Note: ↵ mark located at the lower right corner on this screen signifies that the next page of DAILY QC LIST can be made to appear by pressing

key.

Table 3-12 Input Parameters on Daily QC LIST Screen

Item	Input Parameter	Description
CONTROL	1 to 6	QC data values of 20 test items are listed in ascending order of test codes. To display the next page of QC data list, press the CONTINUE key.
DELETE TEST	1 to 43 or 99	Used to remove QC data values being displayed for each test or all QC data values. To delete all QC data values, key in '99'.

When you are through the **DAILY QC LIST** screen, press the **NEXT** key.

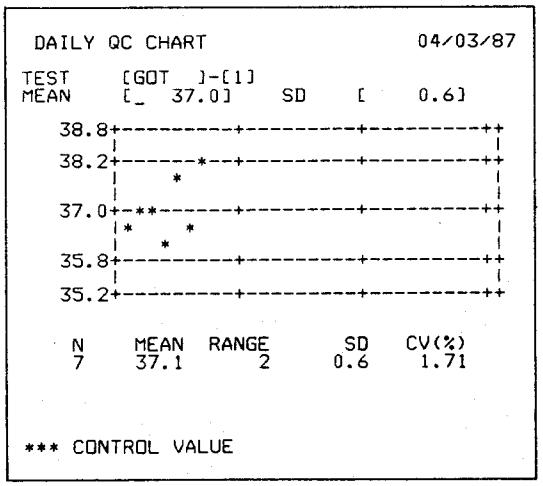


Fig. 3-35 DAILY QC CHART Screen

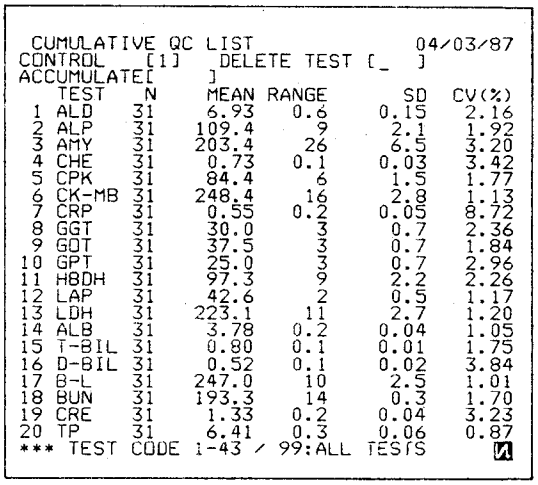
You will then see the **DAILY QC CHART** screen. It presents a QC chart indicating daily quality control. Table 3-13 shows the input parameters on **DAILY QC CHART** screen.

Note: For the ruled lines on this screen, refer to Section 7 (explanation of screens).

Table 3-13 Input Parameters on DAILY QC CHART Screen

Item	Input Parameter	Description
TEST	[**] – [□] 1 to 43 1 to 6	** Test code □ Control serum number
MEAN	7 digits max.	Key in the mean value against which data are to be plotted.
SD	7 digits max.	Key in the SD value against which data are to be plotted.

When you are through the **DAILY QC CHART** screen, press the **NEXT** key.



```
 CUMULATIVE QC LIST                    04/03/87
CONTROL    [1]   DELETE TEST [_  ]
ACCUMULATE[    ]
   TEST    N     MEAN  RANGE      SD   CV(%)
 1 ALD    31     6.93    0.6    0.15    2.16
 2 ALP    31    109.4      9     2.1    1.92
 3 AMY    31    203.4     26     6.5    3.20
 4 CHE    31     0.73    0.1    0.03    3.42
 5 CPK    31     84.4      6     1.5    1.77
 6 CK-MB  31    248.4     16     2.8    1.13
 7 CRP    31     0.55    0.2    0.05    8.72
 8 GGT    31     30.0      3     0.7    2.36
 9 GOT    31     37.5      3     0.7    1.84
10 GPT    31     25.0      3     0.7    2.96
11 HBDH   31     97.3      9     2.2    2.26
12 LAP    31     42.6      2     0.5    1.17
13 LDH    31    223.1     11     2.7    1.20
14 ALB    31     3.78    0.2    0.04    1.05
15 T-BIL  31     0.80    0.1    0.01    1.75
16 D-BIL  31     0.52    0.1    0.02    3.84
17 B-L    31    247.0     10     2.5    1.01
18 BUN    31    193.3     14     0.3    1.70
19 CRE    31     1.33    0.2    0.04    3.23
20 TP     31     6.41    0.3    0.06    0.87
*** TEST CODE 1-43 / 99:ALL TESTS
```

Fig. 3-36 CUMULATIVE QC LIST Screen

The **CUMULATIVE QC LIST** screen appears as shown in Fig. 3-36. It displays the cumulative quality control list for each control serum. Table 3-14 shows the input parameters on **CUMULATIVE QC LIST** screen.

Note: mark located at the lower right corner on this screen indicates that you can flip to the next page of CUMULATIVE QC LIST by pressing

key.

Table 3-14 Input Parameters on CUMULATIVE QC LIST Screen

Item	Input Parameter	Description
CONTROL	1 to 6	QC data values of 20 tests are listed in ascending order of test codes. To display the next page of QC data list, press the CONTINUE key.
DELETE TEST	1 to 43 or 99	Used to remove QC data values being displayed for each test or all QC data values. To delete all QC data values, key in '99'.
ACCUMULATE	1	Used to accumulate the daily QC data of relevant control serum (currently displayed control serum number) in the cumulative QC data.

When you are through the **DAILY QC LIST** screen, press the **NEXT** key.

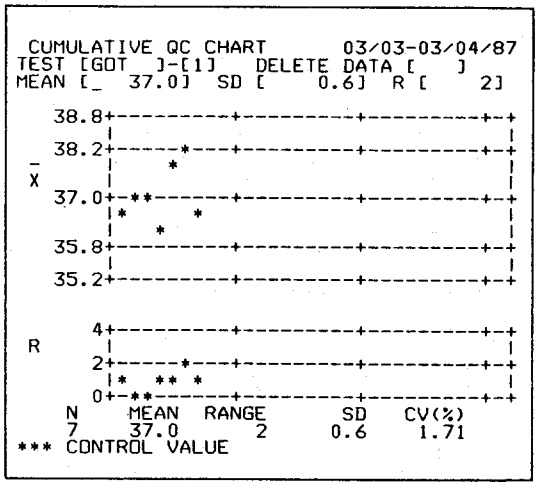


Fig. 3-37 CUMULATIVE QC CHART Screen

You will then see the **CUMULATIVE QC CHART** screen. It presents a QC chart indicating cumulative QC data. Table 3-15 shows the input parameters on **CUMULATIVE QC CHART** screen.

Note: For the ruled lines on this screen, refer to section 7 (explanation of screens).

Table 3-15 Input Parameters on CUMULATIVE QC CHART Screen

Item	Input Parameter	Description
TEST	[**] – [□] 1 to 43 1 to 6	**: Test code □: Control serum number
DELETE DATA	1 to 31 or 99	Used to remove QC data on the 'i'th day of month (i: 1 to 31) or remove all QC data (key in '99').
MEAN	7 digtis max.	Key in the mean value against which data are to be plotted.
SD	7 digits max.	Key in the SD value against which data are to be plotted.
R	5 digits max.	Key in the range value of the R control line.

(5) Rerun Mode

To use the rerun mode, call up the **ROUTINE JOB – START CONDITIONS** screen.

```
 START CONDITIONS

START SAMPLE NO.[    1]:[0][01]-[1][50]
START UP CALIB. [YES]
CALIB.(RERUN)   [NO ]
RERUN MODE      [AUTOMATIC ]
MASKING         [ ]
ORIGINAL ABS.   [NO ]
SERUM INDEXES   [YES]
CONTROL INTERVAL[ 100]
COMMUNICATION   [YES]
REAL TIME PRINT [MONITOR ]

PHOTOMETER CHECK[      ]
WASH            [_          ]
DATA CLEAR      [     ]:[    ]-[     ]
ISE PRIME       [         ]
DATE            [  ][  ][  ] [  ]:[  ]



*** 1:ALL 2:CELLS 3:ISE 4:AIR PURGE
```

Select 'RERUN MODE' on this screen, and specify 'AUTOMATIC' or 'RERUN ONLY'. Table 3-16 shows the input parameters for RERUN MODE.

Fig. 3-38 START CONDITIONS Screen

Table 3-16 Input Parameters for RERUN MODE

Item	Input Parameter	Description
RERUN MODE*	1 or 2	For 'AUTOMATIC' (automatic re-run), key in '1'. For 'RERUN ONLY', key in '2'.

* For both 'AUTOMATIC' and 'RERUN ONLY', it is required to enter necessary parameters on other relevant screens.

- 'AUTOMATIC' (Automatic re-run)

  For automatic re-run, call up the **PARAMETER JOB – CHEMISTRY PARAMETERS** screen. On this screen, select 'PANIC VALUE' and specify upper and lower limit values for abnormal test result. The automatic re-run function is carried out if a measured data value exceeds the user-specified upper/lower limit or if a data alarm is issued. (For data alarm, refer to section 8.)

  Up to six digits are specifiable for 'PANIC VALUE'.

```
 CHEMISTRY PARAMETERS

TEST                [GOT  ]
ASSAY CODE          [RATE-A  ]:[30]-[50]
SAMPLE VOLUME       [10][10]
R1 VOLUME           [320][100][ NO]
R2 VOLUME           [ 80][100][ NO]
WAVE LENGTH         [405][340]
CALIB. METHOD       [K-FACTOR ][0][0]
STD.(1) CONC.-POS.[     0]-[ 1]
STD.(2) CONC.-POS.[     0]-[ 0]
STD.(3) CONC.-POS.[     0]-[ 0]
STD.(4) CONC.-POS.[     0]-[ 0]
STD.(5) CONC.-POS.[     0]-[ 0]
STD.(6) CONC.-POS.[     0]-[ 0]
SD LIMIT            [     0]
DUPLICATE LIMIT     [     0]
SENSITIVITY LIMIT   [     0]
ABS.LIMIT(INC/DEC)[ 3000][DECREASE]
PROZONE LIMIT       [     0][LOWER]
EXPECTED VALUE      [   8.0]-[  40.0]
PANIC VALUE         [   0.0]-[ 200.0]
INSTRUMENT FACTOR [1.00]

*** 0-350 MICRO
```

If you get data alarme as below*, rerun (automatic rerun only) will be done with the sample volume of right column, specified on the CHEMISTRY PARAMETERS screen.

*(1) excessive absorbance
(2) prozone error
(3) reaction limit exceeded
(4) panic value exceeded (exceeded the upper limit)

Fig. 3-39 CHEMISTRY PARAMETERS Screen

- 'RERUN ONLY'
  For on-demand re-run, call the **ROUTINE JOB – RERUN SAMPLES** screen and specify rerun request parameters on it. This screen can also be used for checking the rerun request parameters prespecified.
  Table 3-17 shows the input parameters on **RERUN SAMPLES** screen.

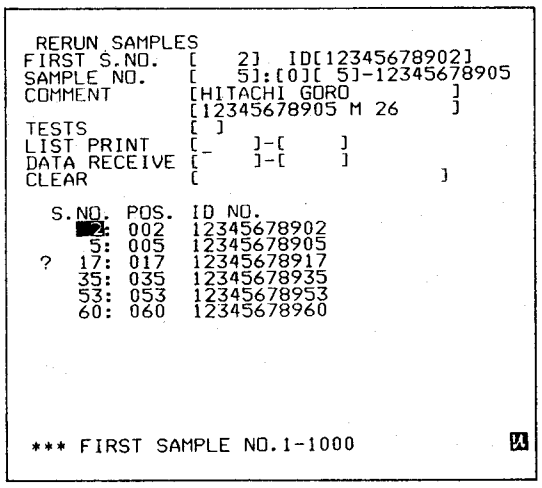


Fig. 3-40 RERUN SAMPLES Screen

Table 3-17 Input Parameters on RERUN SAMPLES Screen

Item	Input Parameter	Description
FIRST S. NO.	1 to 1000	Key in the number assigned to the first sample for which the re-run request is to be set or checked.
SAMPLE NO.	[XXXX] [□] [△△]	Key in the sequence number and the sample disk number holding the sample for which the re-run request is to be set. Also key in a position number of the sample to be re-run.
COMMENT	20 characters per line 2 lines max.	Enter annotation concerning the sample.
TESTS		Define the desired re-run item using the profile and test select keys.

One screen page indicates the first 12 samples. To list the next 12 samples, press the **CONTINUE** key. The sample number notation on **RERUN SAMPLES** screen is as follows:

1) Normal number representation

   Indicates the sample for which re-run has been requested*1 after the first analytical measurement.

2) Number representation with '?'

   Indicates the sample for which re-run has been requested*1 again after the first re-run measurement.

3) Number representation highlighted in reverse video

Indicates the sample whose measured value in re-run is proper.*2

*1 In case the data alarm (PANIC) has been indicated.
It is possible to know whether the rerun sample volume is reduced or not, on the RERUN LIST. (See the RERUN LIST of chapter 6.)

*2 In case the data alarm has not been indicated as a result of re-run.

(6) Analysis of Stat and Additional Samples

- Stat Samples
  For measurement of stat samples, call up the **TEST SELECTION & MONITOR (STAT)** screen.

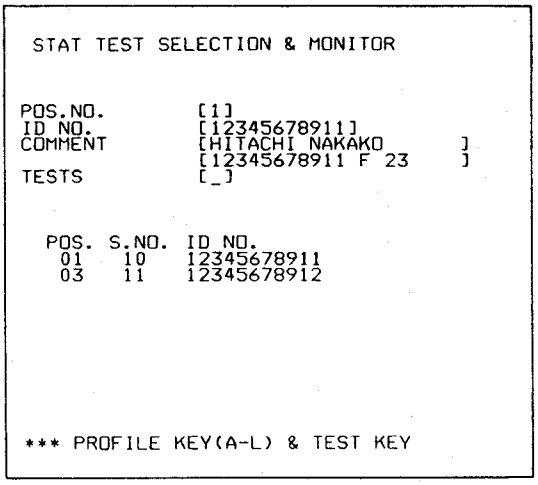


Fig. 3-41 TEST SELECTION & MONITOR (STAT) Screen

Up to seven stat samples can be specified on the **TEST SELECTION & MONITOR (STAT)** screen. The lower part of screen indicates stat samples to be tested. Table 3-18 shows the input parameters on **TEST SELECTION & MONITOR (STAT)** screen.

Table 3-18 Input Parameters on TEST SELECTION & MONITOR (STAT) Screen

Item	Input Parameter	Description
POS. NO.	1 to 7	Specify a position on the sample disk.
ID NO.	11 characters max.	
TESTS		Use the test select and/or profile keys.

- Additional Samples
  Measurement of additional samples can be specified at any time.
  In the sampling stop state, press the **START** key. Thus, the instrument carries out measurement of additional samples.

(7) Twin Tests

The following three analytical methods are available for twin tests; three-point assay, one-point and rate assay, and rate assay B. For these analytical methods, it is required to assign two test codes per channel.

For channel assignment in these methods, use the **PARAMETER JOB – CHANNEL ASSIGNMENT** screen. Table 3-19 shows the channel assignment format for twin tests.

Table 3-19 Channel Assignment Format for Twin Tests

CH	TEST 1	TEST 2
Arbitrary	(First test code)	(Second test code)

The analytical parameters are different among the above analytical methods. Refer to each of the tables presented below.

Table 3-20 Analytical Parameters for Three-Point Assay

Item	TEST 1	TEST 2	Description
TEST	1 to 40	1 to 40	
ASSAY CODE	(3 POINT) : (T_1) – (–)	(3 POINT) : (T_3) – (T_4)	T_1: 'TEST 1' photometric point T_3: 'TEST 2' blank photometric point T_4: 'TEST 2' photometirc point $1 \leqq T_1 < T_3 \leqq 24$ $25 \leqq T_4 \leqq 50$
SAMPLE VOLUME		To be specified	The contents of 'TEST 1' are not read in. Analysis is conducted according to the setting values specified for 'TEST 2'.
R1 VOLUME			
R2 VOLUME			
WAVE LENGTH	[ ] [ ] Select a wavelength for 'TEST 1'.	[ ] [ ] Select a wavelength for 'TEST 2'.	
CALIB. METHOD	LINEAR or K FACTOR	LINEAR or K FACTOR	
STD. (1) CONC.-POS.	(Conc.) – (–)	(Conc.) – (P_1)	The position number for 'TEST 1' is not read in. In case of linear calibration for 'TEST 1' and K-factor calibration for 'TEST 2', POS. of STD. (2) should be specified for 'TEST 1'.
STD. (2) CONC.-POS.	(Conc.) – (–)	(Conc.) – (P_2)	

- One-Point and Rate Assay

Table 3-21 Analytical Parameters for One-Point and Rate Assay

Item	TEST 1	TEST 2	Description
TEST	1 to 40	1 to 40	
ASSAY CODE	[1 POINT & R] : $[T_1] - [T_2]$	[1 POINT & R] : $[T_3] - [T_4]$	T_1, T_2 : 'TEST 2' blank photometric point T_3, T_4 : 'TEST 2' photometric point $1 \leqq T_1 < T_2 \leqq 24 \quad 24 \leqq T_3 < T_4 \leqq 50$ $T_1 + 2 \leqq T_2 \qquad T_3 + 2 \leqq T_4$ Photometric points 14 and 15 should be assigned for 'TEST 1'.
SAMPLE VOLUME R1 VOLUME R2 VOLUME		To be specified	The contents of 'TEST 1' are not read in. Analysis is conducted according to the setting values specified for 'TEST 2'.
WAVE LENGTH	[ ] [ ] Select wavelength for 'TEST 1'.	[ ] [ ] Select wavelength for 'TEST 2'.	
CALIB. METHOD	LINEAR or K FACTOR	LINEAR or K FACTOR	
STD. (1) CONC.-POS.	[Conc.] – [–]	[Conc.] – [P_1]	The position number for 'TEST 1' is not read in. In case of linear calibration for 'TEST 1' and K-factor calibration for 'TEST 2', POS. of STD. (2) should be specified for 'TEST 1'.
STD. (2) CONC.-POS.	[Conc.] – [–]	[Conc.] – [P_2]	
SD LIMIT ~ SENS. LIMIT	To be entered as in ordinary measurement	To be entered as in ordinary measurement	
ABS. LIMIT (INC/DEC) ~			Specify the limit values (INC/DEC) of 'TEST 1' and 'TEST 2'.

- Rate Assay B

Table 3-22 Analytical Parameters for Rate Assay B

Item	TEST 1	TEST 2	Description
TEST	1 to 40	1 to 40	
ASSAY CODE	[RATE-B] : [T_1] – [T_2]	[RATE-B] : [T_3] – [T_4]	T_1, T_2 : 'TEST 1' blank photometric point T_3, T_4 : 'TEST 2' photometric point $3 \leqq T_1 < T_2 \leqq 24$ $25 \leqq T_3 < T_4 \leqq 50$ $T_1 + 2 \leqq T_2$ $T_3 + 2 \leqq T_4$
SAMPLE VOLUME R1 VOLUME R2 VOLUME		To be specified	The contents of 'TEST 1' are not read in. Analysis is conducted according to the setting values specified for 'TEST 2'.
WAVE LENGTH	[ ] [ ] Select wavelength for 'TEST 1'.	[ ] [ ] Select wavelength for 'TEST 2'.	
CALIB. METHOD	LINEAR or K FACTOR	LINEAR or K FACTOR	
STD. (1) CONC.-POS.	[Conc.] – [–]	(Cons.) – (P_1)	The position number for 'TEST 1' is not read in. In case of linear calibration for 'TEST 1' and K-factor calibration for 'TEST 2', POS. of STD. (2) should be specified for 'TEST 1'.
STD. (2) CONC.-POS.	(Conc.) – (–)	(Cons.) – (P_2)	
ABS. LIMIT (INC/DEC)			Specify the limit values (INC/DEC) of 'TEST 1' and 'TEST 2'.

(8) Isozyme Analysis

The two calibration types dedicated for isozyme analysis are employed; 'isozyme P' and 'isozyme Q'. With 'isozyme P', the total activity value of all isozymes is determined. And, with 'isozyme Q', the residual isozyme activity value is measured (using the reagent that inhibits reaction of a particular isozyme).

Demonstrated below is the analytical procedure for amylase isozyme measurement. The salivary amylase (S-amylase) and pancreatic amylase (P-amylase) are analyzed in this example. The total amylase activity value (T) is measured through the 'isozyme P' calibration channel, and the S-amylase activity value (S) is measured through the 'isozyme Q' calibration channel. The P-amylase activity value (P) is determined by means of the test-to-test calculation (P = T – S).

Table 3-23 shows the analytical parameters for isozyme measurement. To enter these parameters, call up the **ROUTINE JOB – CHEMISTRY PARAMETERS** screen.

(For details, refer to section 2 – Calibration).

Table 3-23 Analytical Parameters for Isozyme Measurement

Item	Total Amylase Channel	S-Amylase Channel	Description
TEST	1 to 40	1 to 40	
ASSAY CODE	[ ] : [ ] [ ]	[ ] : [ ] – [ ]	Enter these parameters referring to the methodology sheet furnished with the inhibitor reagent.
WAVE LENGTH	[ ] [ ]	[ ] [ ]	
CALIB. METHOD	[ISOZYME P] [–]	[ISOZYME Q] [–]	It is not required to specify the number of standard samples.
STD. (1) CONC.-POS.	[*1] – [P_1]	[*1] – [P_1]	Specify the same parameters for both channels. *1 : Concentration of blank solution P_1 : Position number of blank solution *2 : Concentration of amylase standard solution P_2 : Position number of amylase
STD. (2) CONC.-POS.	[*2] – [P_2]		
STD. (3) CONC.-POS.	[–] – [P_3]	[–] – [P_3]	
STD. (4) CONC.-POS.	[–] – [P_4]	[–] – [P_4]	Set the S-amylase and P-amylase standard solutions for STD. (3) and (4). It is a common practice to use STD. (4) for the isozyme that exhibits stronger inhibition against reaction.

(9) Recalibration

If an abnormal calibration result for a particular test is found during routine measurement, it is allowed to carry out recalibration in this instrument. Recalibration is executable for one or more tests while the instrument is in operation.
For recalibration, call up the **CALIBRATOR & CONTROL TEST SELECTION** screen and specify the test(s) to be recalibrated. (Select 'RERUN' for CALIBRATION TYPE, and then specify the test(s).)
Then, on the **START CONDITIONS** screen, select 'YES' for CALIB. (RERUN). Thus, recalibration is carried out, and the results of recalibration are updated.
After recalibration, the concentration values of routine samples are determined using the calibration curve updated through recalibration.

(10) Cyclic Calibration

Using the cyclic calibration function, calibration for particular test(s) can be repeated cyclically.
For cyclic calibration, call up the **CALIBRATOR & CONTROL TEST SELECTION** screen and Specify the test(s) to be calibrated cyclically. (Select 'CYCLIC' for CALIBRATION TYPE, and then specify the test(s).) Then, for 'CYCLIC CALIB. INTERVAL, specify an interval of calibration in minutes. At the start of routine analysis, cyclic calibration is carried out automatically. The concentration values of samples are determined using the latest calibration curve and are output onto the printer.

3-7 Test Result Verification

In this instrument, the measured values of water blank, standard samples and sample solutions are checked as described below. If each allowable range is exceeded, a relevant comment is indicated on test result (on CRT).

(1) Excessive Absorbance Check

The absorbance of reaction solution is checked against the allowable photometric range prespecified for each of the primary wavelength (λ_2) and secondary wavelength (λ_1).
If the absorbance exceeds 3.3, **ABS!** is indicated on the printed test result.

(2) Water Blank Absorbance Check

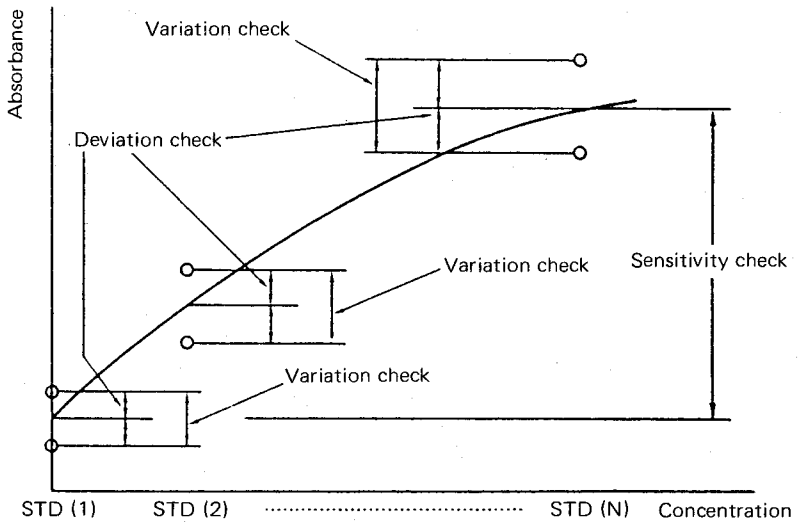
Whether the water blank value has been obtained normally is checked.
In this check, the water blank value of reaction cuvette under measurement is checked against the water blank value obtained through execution of 'CELL BLANK' on the **MAINTENANCE JOB** screen. If variation of more than ±0.1 Abs is found, the water blank measurement is judged abnormal. In this case, **CELL BLANK** is indicated on the CRT and also **CELL?** is printed out on the test result.

(3) Standard Absorbance Variation Check

In standard sample measurement, the same standard sample is measured in duplicate to check for absorbance variations. The measured absorbance variation value is checked against the allowable range prespecified for DUP on the analytical parameter screen.

(4) Calibration Check

In execution of calibration, the currently measured data is checked for the K-factor value of previously measured data and the predetermined limit of sensitivity.
Particularly, where a multi-point calibration curve is used, comparison check is performed against the predetermined limit value of standard deviation SD (deviation from a measured value on the approximate curve).
Figure 3-42 demonstrates examples of these checks.
If an error is found in each check, the alarm mark is indicated at each printout data.



(1) Variation check for STD duplicated measured values
Comparison with input value (duplicate limit)

(2) Sensitivity check
Comparison with input value (sensitivity limit)

(3) Deviation check for approximation (in nonlinear calibration only)
Comparison with input value (SD limit)

(4) K factor check
Comparison with previous K factor value
Check value: ±20 %

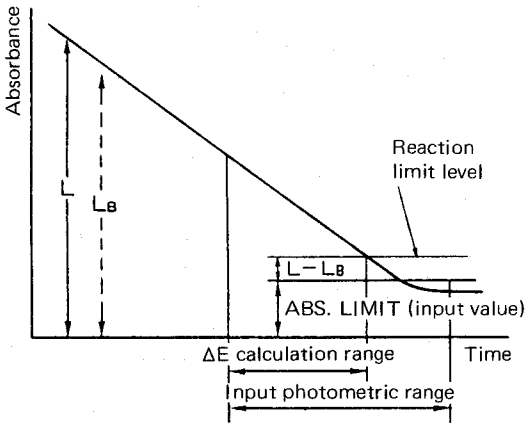
(5) STD check
Checking for occurrence of any of the following alarms (errors):
- ADC abnormal
- Cell blank abnormal
- Sample/reagent insufficient
- Excessive absorbance
- Reaction limit exceeded
- Linearity abnormal
- Prozone error
- Variation error

Fig. 3-42 Calibration Check

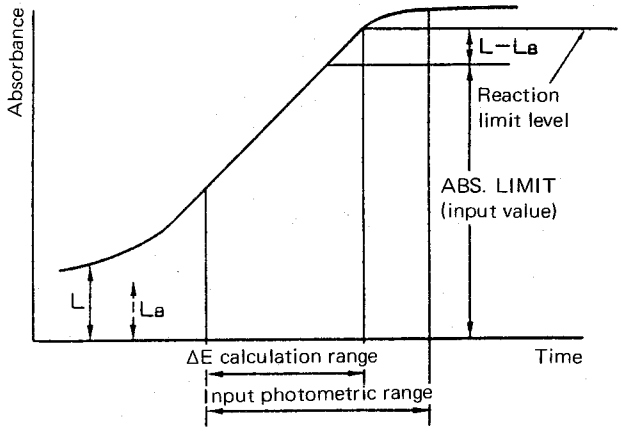
(5) Substrate Depletion Check

In rate assay of high-activity serum sample, coenzyme or substrate may be consumed completely during measurement, causing erroneous test results on output. To detect occurrence of this irregularity, the measured absorbance values are compared with the predetermined level of reaction limit. Thus, it is checked whether the reaction limit is exceeded or not. Figure 3-43 shows examples of reaction limits in rate assay.

i) **Descending Reaction Limit Level**



ii) **Ascending Reaction Limit Level**



Reaction limit level = ABS. LIMIT (input value) + K (L − L_B)

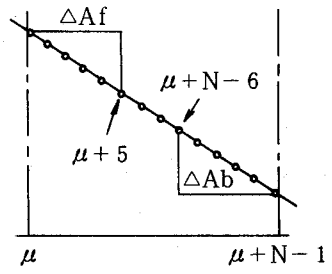
Where, K: Liquid volume correction coefficient
L: Sample absorbance level
L_B: Blank standard (STD (1)) absorbance level

In the substrate depletion check, three classes of alarms are used; LIMIT0, LIMIT1, and LIMT2. Generation of these alarms depends on the number of measurement points in absorbance (required for calculation) at which the reaction limit is exceeded.

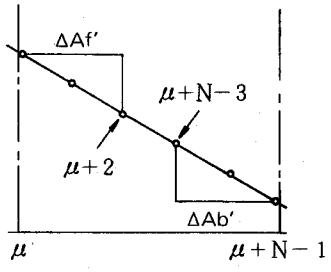
(6) Linearity Check

In this instrument, the absorbance of a sample in reaction is measured in a cycle of 12 seconds. It can therefore be checked whether the observed change in absorbance is linear or not. Figure 3-44 demonstrates how linearity is checked in reaction process.

i) **In Case N ≦ 9**



ii) **In Case of 4 ≦ N ≦ 8**



- Approximate linearity calculation using measured absorbance

↓

Comparison of absorbance variation rates in the first part and the final part

i) **In case N ≦ 9**

$$\frac{|\Delta Af - \Delta Ab|}{|\Delta A|} \times 100 > 10\ (\%) \quad \text{..... Linearity abnormal}$$

ii) **In case 4 ≦ N ≦ 8**

$$\frac{|\Delta Af' - \Delta Ab'|}{|\Delta A|} \times 100 > 30\ (\%) \quad \text{..... Linearity abnormal}$$

* ΔAf and ΔAb indicate the variation rate determined through the least squares calculation of six measurement points. ΔAf' and ΔAb' are the difference in absorbance at three measurement points.

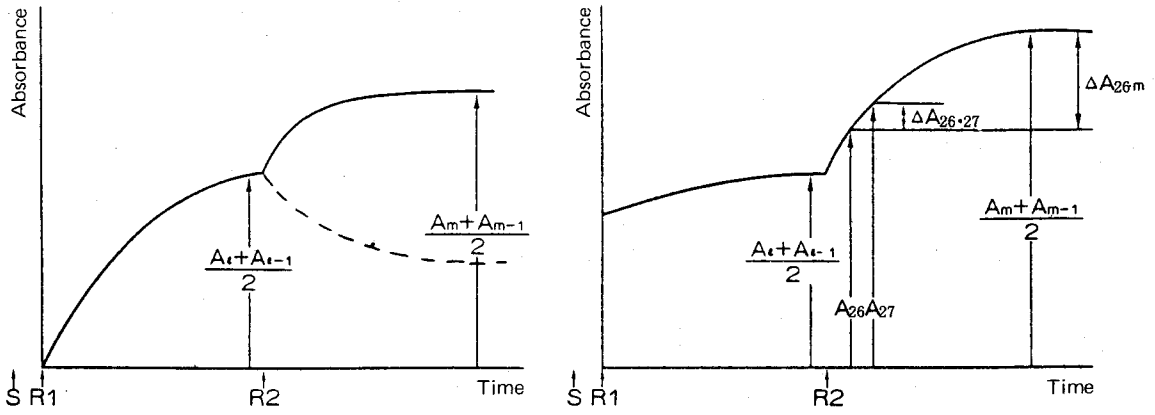
Fig. 3-44 Linearity Check

(7) Prozone Check

In immunological test, antigen excess of a high-concentration sample may cause prozone phenomenon in which the reaction process is reversed after re-addition of antigen. Figure 3-45 shows an example of prozone phenomenon. (The broken line indicates occurrence of prozone phenomenon in reaction process.)

To prevent a measurement error due to prozone phenomenon, this instrument can conduct prozone check in the one-point and two-point assays.

For an abnormal sample found in the prozone check, the prozone check value and **P** mark are indicated at its test result. Note that the prozone check value can be printed out only in the realtime monitor mode.



	One-Point Assay	Two-Point Assay
Absorbance to be converted into concentration	$X=\frac{A_{\ell}+A_{\ell-1}}{2}$	$X=\frac{A_m+A_{m-1}}{2}-k\frac{A_{\ell}+A_{\ell-1}}{2}$
Prozone check value	$PC=\frac{A_m+A_{m-1}}{2}-k\frac{A_{\ell}+A_{\ell-1}}{2}$	$PC=\frac{\triangle A_{26\cdot m}}{\triangle A_{26\cdot 27}}\times 100$
Verification	Comparison with input value	Comparison with input value

Fig. 3-45 Prozone Check

(8) Expected Range

The test results of routine and stat samples are checked against the EXPECTED VALUE specified on the analytical parameter screen. If the test result exceeds the specified upper limit of EXPECTED VALUE, **H** is suffixed to the test result.

If the result is below the specified lower limit of EXPECTED VALUE, **L** is suffixed to it.

With this instrument, the operator can obtain the photometric data in addition to the test results on completion of analysis.
Figure 3-46 shows an example of a screen indicating the reaction time course. In an instance where a data alarm is issued, it is advisable to check the reaction time course of relevant sample. This makes it easier to find out the cause of alarm.

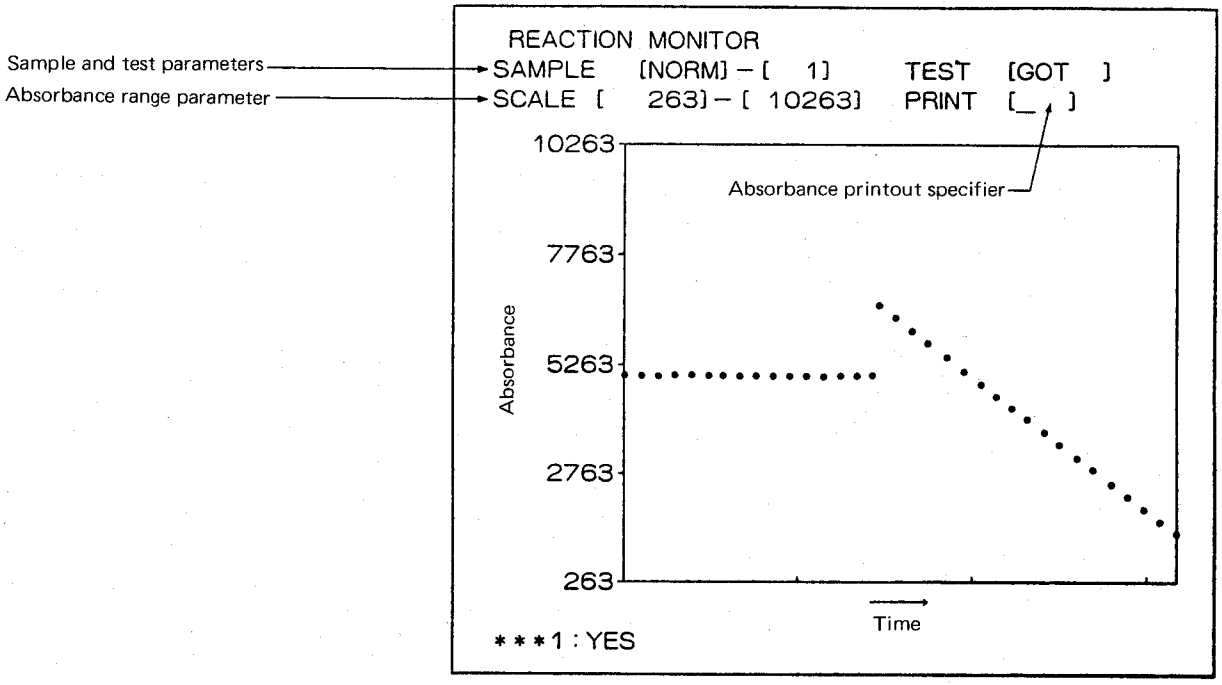


Fig. 3-46 Reaction Time Course on Screen

A hard copy of the above reaction monitor screen can be produced onto the printer. The reaction monitor data of up to 100 tests (without alarm flags) can be displayed and hard-copied including the standard samples, routine samples, stat samples, and control samples. In addition, hard-copying is allowed up to 100 tests for the standard sample data with alarm flags, or up to 100 tests of the routine, stat and control sample data with alarm flags.
If the upper limit of 100 tests is exceeded in data count, the first-in first-out stacking memory function is activated, i.e. the preceding data is pushed out of the internal memory to store the new data. This means that the internal memory holds data of the latest 100 tests always.
Note that hard-copying is not allowed during operation. A multi-point calibration curve can also be displayed through plotting absorbance values of standard solutions as shown in Figure 3-47. A hard copy of the multi-point calibration curve screen can be printed out as with the reaction monitor screen.

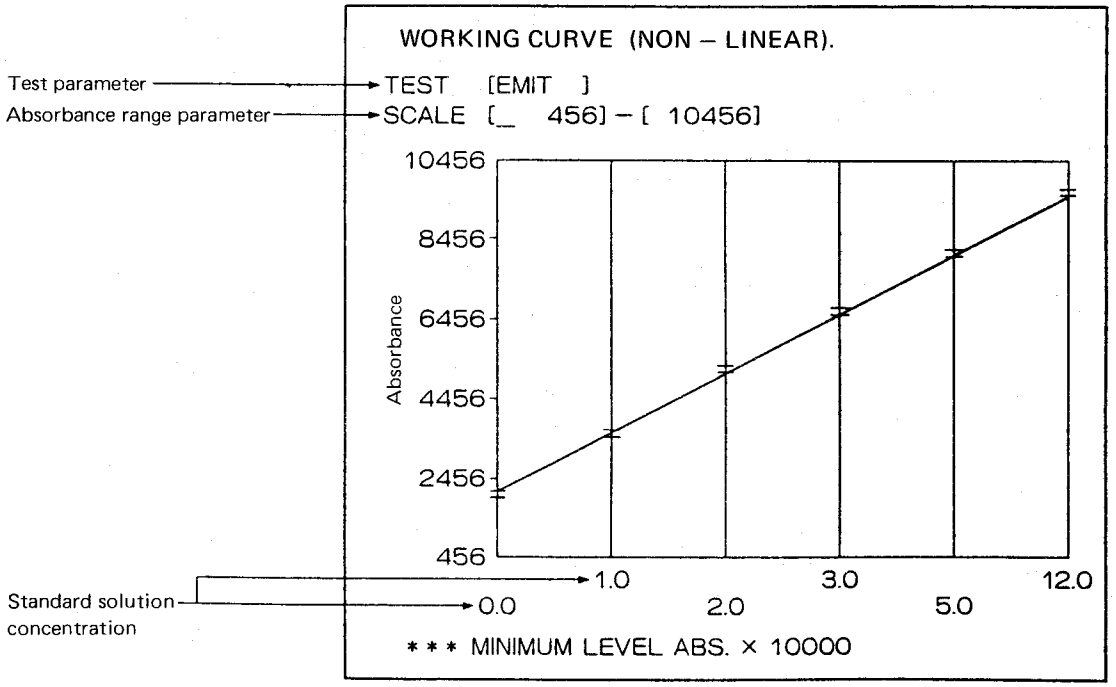


Fig. 3-47 Multi-Point Calibration Curve Screen

3-9 Serum Indexes Check

(Lipemic, hemolytic and icteric indexes)
If UV (340 nm/405 nm) measurement is requested as a test parameter, the serum index analysis is carried out through the relevant channel. To be more specific, the lipemic, hemolytic and icteric index values are measured at 660/700 nm, 570/600 nm and 480/505 nm, respectively. The measured index values are printed out as serum data.
Figure 3-48 shows the measurement principle of serum indexes in GOT test.

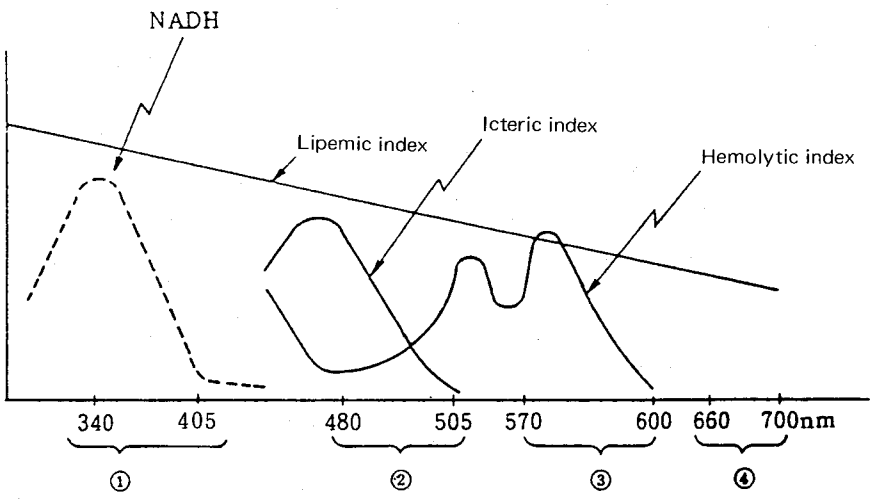


Fig. 3-48 Measurement Principle of Serum Indexes

GOT measurement is carried out in wavelength range (1). In wavelength range (2), the lipemic, hemolytic and icteric index components are overlapped. In wavelength range (3), the lipemic and hemolytic indexes are measured. And in wavelength range (4), the lipemic index is measured. The concentrations of these serum indexes are determined using the following formulas:

$$\text{Lipemic index (L)} = \frac{1}{C} \times (\Delta A660 - 700)$$

$$\text{Hemolytic index (H)} = \frac{1}{A} \times (\Delta A570 - 600) - B \times (\Delta A660 - 700)$$

$$\text{Icteric index (I)} = \frac{1}{D} \times [(\Delta A480 - 505) - E \times \{(\Delta A570 - 600) - B \times (\Delta A660 - 700)\} - F \times (\Delta A660 - 700)]$$

A to F : These constants are user-definable (constant value $\times 10^5$).
The serum index measurement function is intended to offer color and turbidity of serum samples as reference data.

3-10 Data Review

The **MONITOR JOB – DATA REVIEW** screen allows the operator to see a list of test results and edit them. The contents of **DATA REVIEW** screen can be printed out and also transferred to an external computer system (host). The data check and edit procedures are described in detail below.

(1) Data Verification

```
 DATA REVIEW
SAMPLE          [NORM][   1]ID[12345678901]
COMMENT         [HITACHI TARO          ]
                [12345678901 M 23      ]
DATA EDITION [RERUN][      ][      ][    ]
DATA PRINT      [  ][    ][    ][    ]
DATA TRANSFER[     ][     ][     ]
 TEST     1ST   RERUN  TEST     1ST   RERUN
 ALD                  BUN     19.3   19.2
 ALP                  CRE
 AMY                  TP      6.41   6.39
 CHE                  UA
 CPK                  TTT
 CK-MB                ZTT
 GGT                  T-CHO
 GOT       38     39  F-CHO
 GPT       25   25.5  GLU
 HBDH                 NEFA
 LAP                  PL
 LDH                  TG
 ALB     3.78   3.76  CRP
 T-BIL   0.80   0.79  CA
 D-BIL   0.52   0.53  IP
 B-L                  MG
*** TEST CODE 1-32                      M
```

Fig. 3-49 DATA REVIEW Screen

The **DATA REVIEW** screen is capable of displaying the 32 test results for each routine, stat and control sample. This screen contains two columns for presentation of measured results: 1ST and RERUN.
The 1ST column indicates the result data attained through the first measurement, and the RERUN column shows the result data obtained through rerun (if RERUN has been executed). If RERUN has not been carried out, the result data is exhibited only in the 1ST column.

Note: ⌐┘ mark located at the lower right corner on this screen indicates that you can flip to the next page of DATA REVIEW by pressing 

key.

The following table lists the input parameters on **DATA REVIEW** screen.

Item	Input Parameter	Description
SAMPLE	1 to 3	Specify a kind of sample. 1: NORM (routine sample) 2: STAT (stat sample) 3: CONT (control sample)
	1 to 1000 1 to 100 101 to 630	Key in a sample number for data reviewing. NORM : 1 to 1000 STAT : 1 to 100 CONT : 101 to 630
COMMENT	20 characters per line Two lines max.	If no annotation is required, skip over this entry.

(2) Data Editing

For editing the test results, use the DATA EDITION function. With this function, you can alter, add and remove data for a specific test item of a particular sample. Furthermore, through comparison of the 1ST and RERUN data, you can rearrange necessary data in the 1ST column. That is, the 1ST data can be replaced with the RERUN data to be stored. The following table lists the DATA EDITION parameters.

Item	Input Parameter	Description
DATA EDITION	1 or 2	1: To edit the 1ST column data, key in '1'. 2: To edit the RERUN column data, key in '2'.
	1 to 32 33 to 46	Enter a test code for data editing. Using the CONTINUE key, you can call up the next screen page containing test codes 33 to 46.
	6 characters max.	Specify data to be changed or added. For removal, use the SP key.
	1 or 2	1: Select '1' to store the on-screen data unchanged after editing. 2: Select '2' to replace the 1ST data with the RERUN data and store the latter.

(3) Data Printout and Transfer

The test results can be printed out or transferred to an external computer system (host) using the parameters listed in the table below. The data print and transfer functions are executable for; (1) all data in specified range, or (2) data edited by the operator.

Item	Input Parameter	Description
DATA PRINT	1 or 2	Select a printout format. 1: Monitor format 2: Report format
	1 or 2	Select a kind of data to be printed out. 1: All data in specified printout range 2: Edited data in specified printout range
	1 to 1000 1 to 100 101 to 630	Specify a range of printout. Routine sample : 1 to 1000 Stat sample : 1 to 100 Control sample : 101 to 630 Define the first and final numbers of desired range.
DATA TRANSFER	1 or 2	Select a kind of data to be transferred. 1: All data in specified transfer range 2: Edited data in specified transfer range
	1 to 1000 1 to 100	Specify a range of transfer. Routine sample : 1 to 1000 Control sample : 101 to 630
	101 to 630	Define the first and final numbers of desired range.

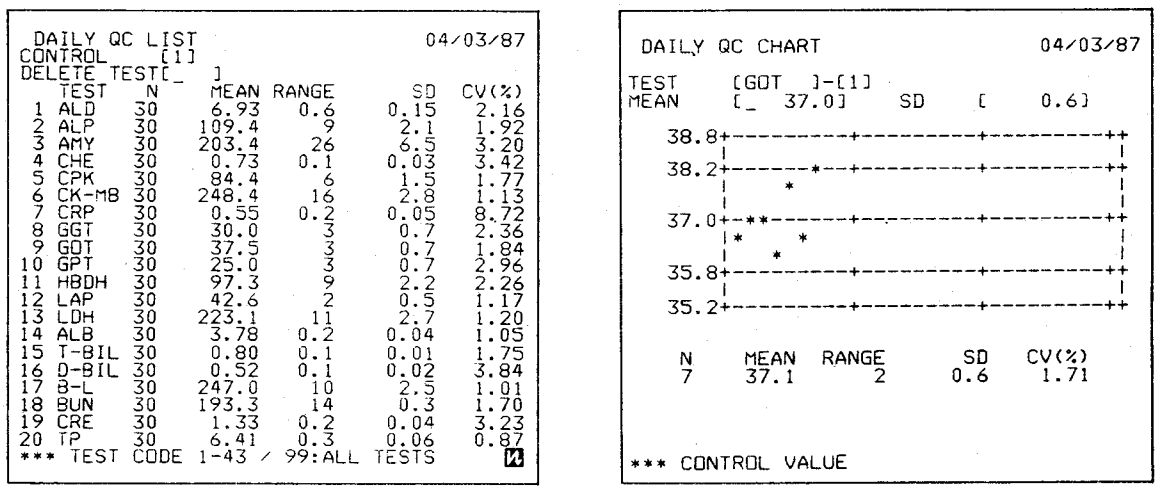
3-11 Quality Control (QC)

This instrument provides three quality control functions; daily QC, cumulative QC, and realtime QC. Each of these functions is described below.

(1) Daily QC

Using a maximum of six control samples, the user can obtain necessary control data automatically. For this purpose, specify a test item for each control sample, and define an interval of control measurement.

This instrument has the DAILY QC LIST screen through which the operator can check the control mean value ($\bar{X}$), variation range (RANGE), standard deviation (SD), and coefficient of variation (CV%) for each test. Also, the operator can check the latest 30 results graphically on the DAILY QC CHART screen. Figure 3-50 shows examples of the DAILY QC LIST and DAILY QC CHART screens.



DAILY QC LIST 04/03/87

CONTROL [1]

DELETE TEST[_]

	TEST	N	MEAN	RANGE	SD	CV(%)
1	ALD	30	6.93	0.6	0.15	2.16
2	ALP	30	109.4	9	2.1	1.92
3	AMY	30	203.4	26	6.5	3.20
4	CHE	30	0.73	0.1	0.03	3.42
5	CPK	30	84.4	6	1.5	1.77
6	CK-MB	30	248.4	16	2.8	1.13
7	CRP	30	0.55	0.2	0.05	8.72
8	GGT	30	30.0	3	0.7	2.36
9	GOT	30	37.5	3	0.7	1.84
10	GPT	30	25.0	3	0.7	2.96
11	HBDH	30	97.3	9	2.2	2.26
12	LAP	30	42.6	2	0.5	1.17
13	LDH	30	223.1	11	2.7	1.20
14	ALB	30	3.78	0.2	0.04	1.05
15	T-BIL	30	0.80	0.1	0.01	1.75
16	D-BIL	30	0.52	0.1	0.02	3.84
17	B-L	30	247.0	10	2.5	1.01
18	BUN	30	193.3	14	0.3	1.70
19	CRE	30	1.33	0.2	0.04	3.23
20	TP	30	6.41	0.3	0.06	0.87

*** TEST CODE 1-43 / 99:ALL TESTS

DAILY QC CHART 04/03/87

TEST [GOT]-[1]

MEAN [_ 37.0] SD [0.6]

38.8
38.2
37.0
35.8
35.2

N	MEAN	RANGE	SD	CV(%)
7	37.1	2	0.6	1.71

*** CONTROL VALUE

Fig. 3-50 Examples of DAILY QC Screens

Notes: 1. ↵ mark located at the lower right corner on the DAILY QC LIST screen indicates that you can flip to the next page of DAILY QC LIST by pressing CONTINUE key.

2. For the graphic ruled lines on the DAILY QC CHART screen, refer to section 7 (explanation of screens).

Shown below are the formulas used for figuring out MEAN ($\overline{X}$), RANGE (R), SD, and CV values.

Range

(RANGE) = (Maximum result) − (Minimum result)

Mean value (MEAN) $= \dfrac{\sum_{}^{N} xi}{N}$

Standard deviation (SD) $= \sqrt{\dfrac{\sum_{}^{N} (xi - (MEAN))^2}{N - 1}}$

Coefficient of variation (CV) $= \dfrac{(SD)}{(MEAN)} \times 100\ (\%)$

Where,

N : Number of results
xi : Result

(2) Cumulative QC

It is a common practice to use $\overline{X}$-R control charts (cumulative QC charts) for checking variations in test results produced for a relatively long period. In this instrument, the CUMULATIVE QC LIST screen is available for this purpose. You can check $\overline{X}$, R, SD and CV values of all tests measured for a period of one month (31 days) through this screen. Still more, on the CUMULATIVE QC CHART graphic screen, you can check $\overline{X}$ and R data for each test measured on each day for one month. Figure 3-51 shows examples of the CUMULATIVE QC LIST and CUMULATIVE QC CHART screens.

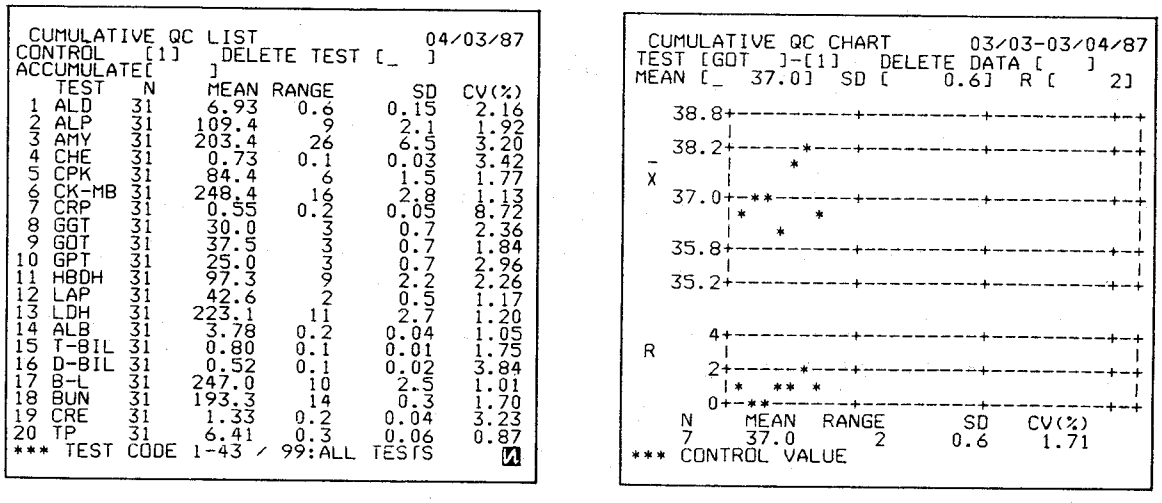


Fig. 3-51 Examples of CUMULATIVE QC Screens

Notes: 1. ↵ mark located at the lower right corner on the CUMULATIVE QC LIST screen indicates that the next screen page of CUMULATIVE QC LIST can be made to appear by pressing CONTINUE ↵ key.

2. For the graphic ruled lines on the CUMULATIVE QC CHART screen, refer to section 7 (explanation of screens).

(3) Realtime QC

As a means of QC during measurement, this instrument provides the realtime QC function that has been designed based on the multi-rule Shewart principle.
The realtime QC function uses a twin plot control chart. On the REAL TIME QC parameter screen, select two kinds of control samples (control X and control Y), and enter each mean value ($\overline{X}$ and $\overline{Y}$) and each SD value. Obtaining the control data of each test, the internal computer carries out data checking according to the algorithmic logics shown in Figure 3-53. If this algorithm finds an exception value, the relevant type of error (RANDM1, RANDM2, SYSTEM1 to SYSTEM6) is printed out at the right side of data. On detection of an abnormal data value, a warning is also indicated on the OPERATION MONITOR screen (operating status screen).
In Model 717, six kinds of decision rules (1-2SD, 1-3SD, 2-2SD, R-4SD, 4-1SD, and 10X) can be selected and combined arbitrarily for execution of judgment. For selection of these rules, call up the **REAL TIME QC** screen and specify the desired parameter for 'RULE SELECT'. Figure 3-52 shows the REAL TIME QC screen. As demonstrated in this example, random errors are indicated as '@' and systematic errors are represented as '#'. Thereby, the user can check data accuracy in realtime during measurement.

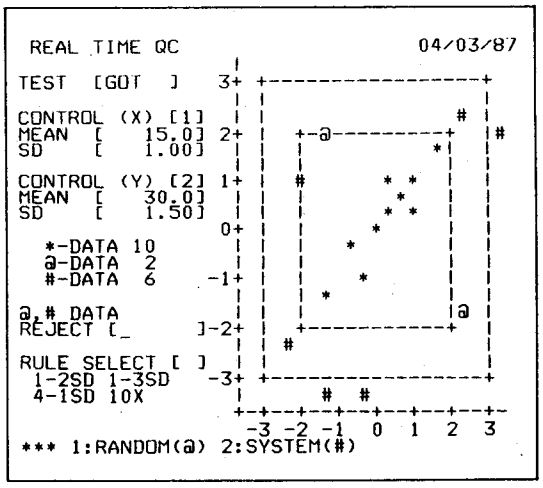


Fig. 3-52 REAL TIME QC Screen

Note: * Logic rules 1 to 6 can be selected and combined arbitrarily.

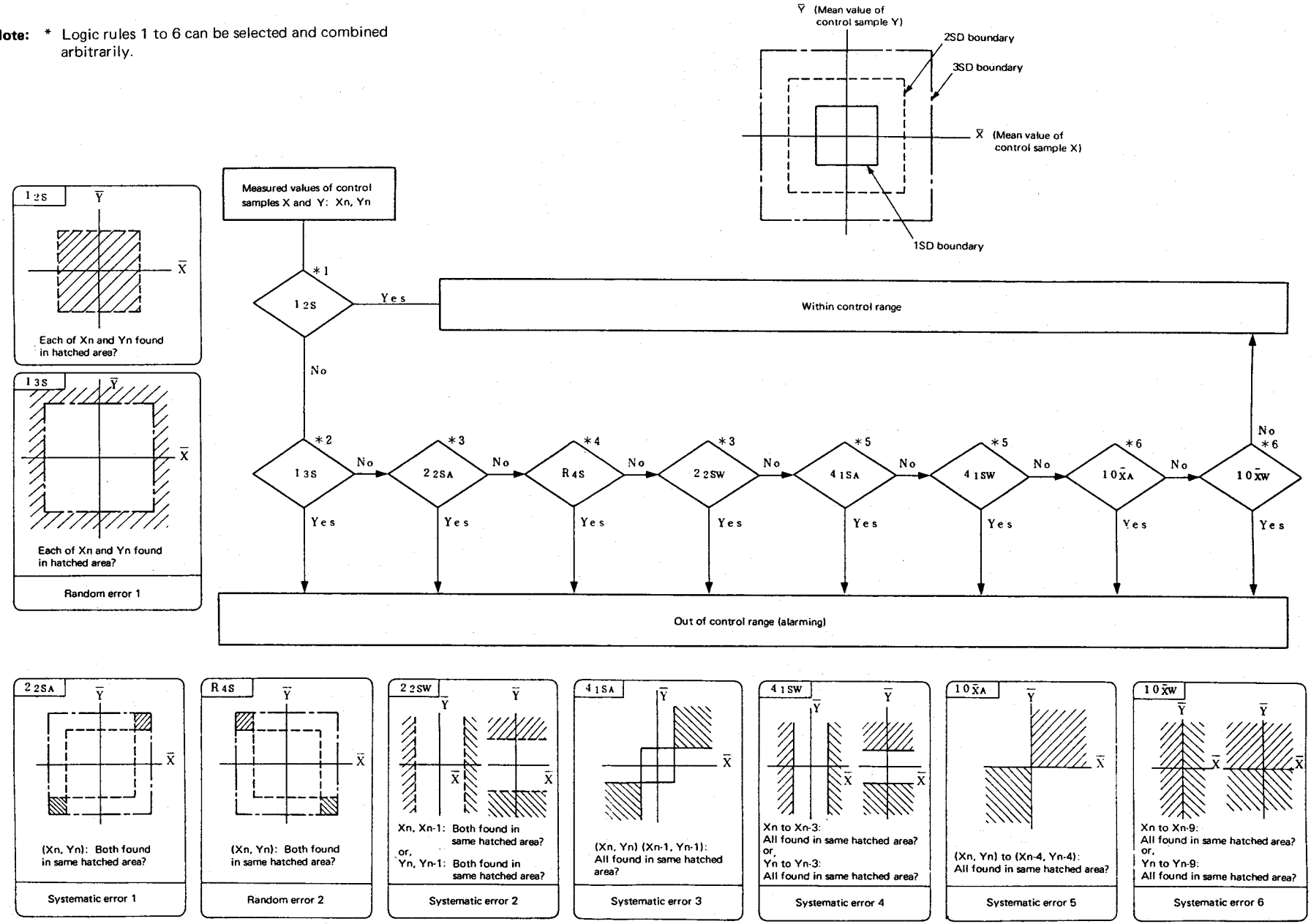


Fig. 3-53 Realtime QC Logics

4. MAINTENANCE

4. MAINTENANCE

The instrument should be kept in an optimum state according to the maintenance and checkup procedures described herein. During maintenance or checkup, be especially careful about the following:

(1) Take care not to spill chemicals over the instrument. If any chemical solution is spilled, be sure to wipe it off immediately.

(2) Be sure to carry out periodic parts replacement and periodic cleaning as instructed below. Otherwise, the functional performance of the analyzer may be degraded.

4-1 Periodic Cleaning and Periodic Parts Replacement

Table 4-1 shows a list of maintenance/checkup items. The frequency of parts replacement specified in this table is based on five hours of operation per day.

4-2 Before Maintenance/Checkup

4-2-1 Required Tools and Materials

- Phillips screwdrivers (for 2 ϕ, 3 ϕ, and 4 ϕ)
- Tweezers
- Long-nose pliers
- Stainless wires (0.5 mm dia.)
- Hose pump
- Handle (for pipetter seal piece)
- Clean gauze
- Vacuum cleaner
- Distilled water tank
- Waste solution container
- Detergent container
- Syringe

4-2-2 Water

Distilled water or deionized water should be used for maintenance as well as daily operation.

4-2-3 Detergents

Prepare the following detergents for maintenance.

(1) HITERGENT 20 and 50-fold dilution

(2) 1N NaOH aqueous solution

4-2-4 Safety Precautions

Turn off the POWER switch as instructed.
In most of the maintenance/checkup procedures, the POWER switch is turned on to put the instrument in a standby state. Note, however, that the POWER switch must be turned off at some steps to ensure safety. Be sure to observe the power-off instruction where it is given.
When checking the cooling unit, turn off the MAIN switch located at the internal right side of analyzer also.
During maintenance/checkup, be careful not to spill water or reagent over the internal mechanical parts and electrical parts.

Table 4-1 Periodic Checkup, Cleaning and Parts Replacement

• Periodic Checkup

	Item	Frequency						Page Number for Reference
		Daily	Weekly	Monthly	Quarterly	Half-yearly	Yearly	
1	Contamination/clogging at the tip of sample probe	○						P4-5
2	Clearance between sample probe and liquid level sensor	○						P4-5
3	Mounting direction of sample probe	○						P4-5
4	Contamination/clogging at the tip of reagent probe	○						P4-6
5	Clearance between reagent probe and liquid level sensor	○						P4-6
6	Mounting direction of reagent probe	○						P4-6
7	Contamination of rinsing nozzle	○						P4-13
8	Contamination of stirring rod	○						P4-13
9	Leakage at each nipple	○						
10	Remaining amount of reagent	○						Check through the screen
11	Waste solution tank (should be empty)	○						
12	Remaining amount of HITERGENT solution	○						P4-17
13	Remaining quantity of printing paper	○						
14	Printing density	○						
15	Reaction cuvette (cell blank value)		○					P4-10
16	Quality of supplied water			○				

• Periodic Cleaning

	Item	Frequency						Page Number for Reference
		Daily	Weekly	Monthly	Quarterly	Half-yearly	Yearly	
1	Sample probe	○						P4-5
2	Stirring rod (*)							P4-13
3	Rinsing nozzle (*)							P4-13
4	Reaction cuvette (*)							P4-10
5	Sample/reagent probe rinsing bath		○					P4-10
6	Stirrer rinsing bath		○					P4-10
7	Distilled water tank		○					P4-10
8	Radiator front filter			○				P4-17
9	Water supply filter			○				P4-14
10	Pump filter				○			P4-15
11	Reaction bath drain filter				○			P4-14
12	Reaction bath (removal of contamination)			○				P4-12
13	Vacuum tank	On occurrence of VACUUM TANK 31-1 alarm						P4-16
14	Floppy disk drive	On occurrence of FD alarm						P4-25

(*) Automatic rinsing (START CONDITIONS screen-WASH)

• Periodic Parts Replacement

	Item	Part Number	Frequency				Page Number for Reference
			Monthly	Quarterly	Half-yearly	Yearly	
1	Reaction cuvette (set)	717-0300	○				P4-10
2	Serum pipetter seal piece	717-1148		○			P4-9
3	Reagent pipetter seal piece	736-2754		○			P4-9
4	Light source lamp	705-0840			○		P4-7
5	Syringe filter	705-1949				○	P4-17
6	Floppy disk	R629123		○			P4-25
7	Sample/reagent probe seal piece	705-1853	After the sample/reagent probe is detached and reattached a few times				
8	Printer ribbon cassette	717-1528	When printed characters are thin				P4-18
9	Sample cup	716-0425	If contaminated or deformed				
10	HITERGENT solution	986-8010					P4-17
11	Printing paper	S222314					P4-20

4-3 Maintenance/Checkup Procedures

4-3-1 Sample Probe

The tip of sample probe may be contaminated to cause clogging against water or sample. To prevent this, clean the sample probe as instructed below.

Daily Cleaning

At the end of daily operation of the instrument, load 1N NaOH solution at position W on the sample disk and carry out automatic rinsing (WASH (ALL)).
Also, check the clearance between sample probe and liquid level sensor (see Figure 4-1).

On Detection of Clogging

Remove the lead wire from liquid level sensor, and loosen the probe retaining nut. The probe will then be free.
Run a stainless wire (0.3 mm dia.; furnished for maintenance) through the probe from its top.
Unclog the probe by sliding a stainless wire through it.

Heavily Contaminated on Inside Wall

Clean the inside wall as instructed in Figure 4-4.

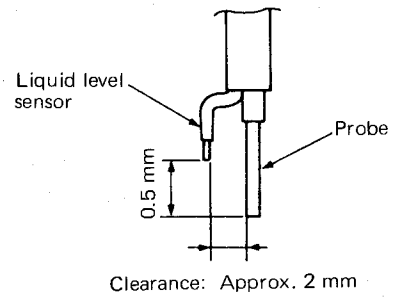
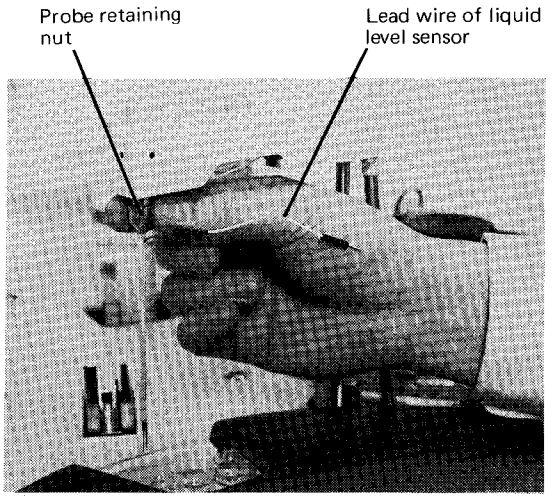


Fig. 4-1 Sample Probe



064-F-13A

Fig. 4-2 Sample Probe Replacement

How to Mount Sample Probe

For replacement/remounting of the sample probe, call up the MAINTENANCE screen and carry out 'PROBE ADJUST'. Mount the sample probe so that its tip position will be located as illustrated at right.

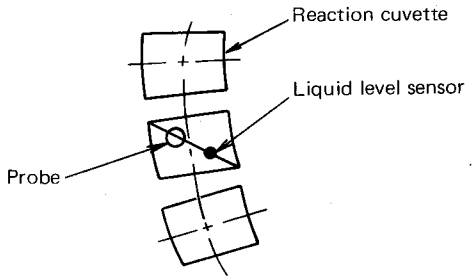


Fig. 4-3 Sample Probe Position at Reaction Cuvette

4-3-2 Reagent Probe

If the tip of reagent probe is contaminated, a water droplet may cling to it. To prevent this, clean the reagent probe as instructed below.

How to Clean Reagent Probe

Wipe the tip of probe using gauze dampened with detergent (HITERGENT 20-fold dilution). Then, wipe off detergent from the probe using gauze moistened with water.
After cleaning the probe, be sure to recheck the position of liquid level sensor equipped at probe.

Cleaning of Probe's Inside Wall

1) Pour 1N NaOH aqueous solution into a flask so that it will be about one cm deep. Then, insert the probe attached to a syringe into the flask as shown in Figure 4-4.
2) Using the syringe, repeat suction and discharge of aqueous solution 20 times. When sucking and discharging aqueous solution, be careful not to dip the lead wire of liquid level sensor into aqueous solution.
3) Rinse the inside of probe with water thoroughly, and then wipe off water with gauze.

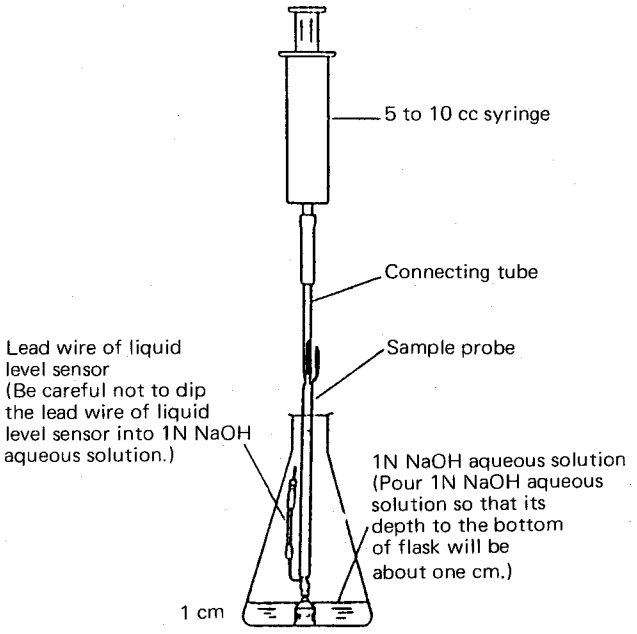


Fig. 4-4 Cleaning of Probe's Inside

Nozzle Seal Replacement

After the probe is detached/reattached a few times, replace the nozzle seal (P/N 705-1853) with a new one.

Probe Position Adjustment

Call up the MAINTENANCE screen, and carry out 'PROBE ADJUST'. Then, adjust the position of probe so that its tip will be aligned with the center of reaction cuvette.
On completion of probe position adjustment, press the STOP key for release from 'PROBE ADJUST' mode.

Note: Make sure that the probe positioning with respect to the rinsing bath is adjusted as shown in Figure 4-6.

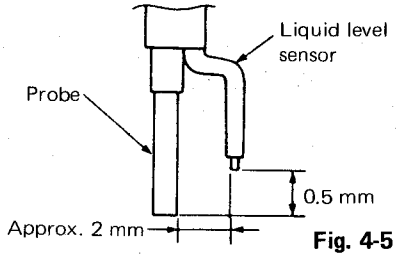


Fig. 4-5 Reagent Probe

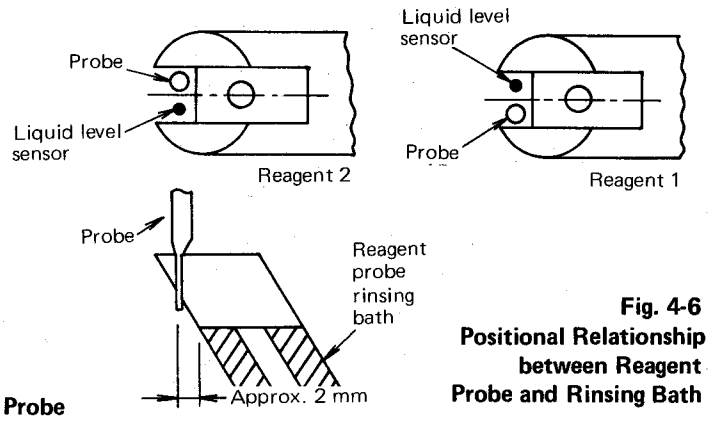


Fig. 4-6 Positional Relationship between Reagent Probe and Rinsing Bath

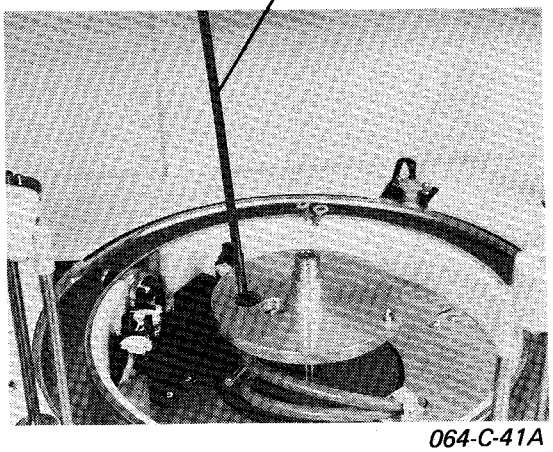
4-3-3 Light Source Lamp of Photometer

Call up the START CONDITIONS screen, and carry out 'PHOTOMETER CHECK'. If the check value exceeds '16000', replace the light source lamp with a new one. Also, when the lamp reaches the end of its six-month useful life, replace it with a new one.

How to Replace Light Source Lamp

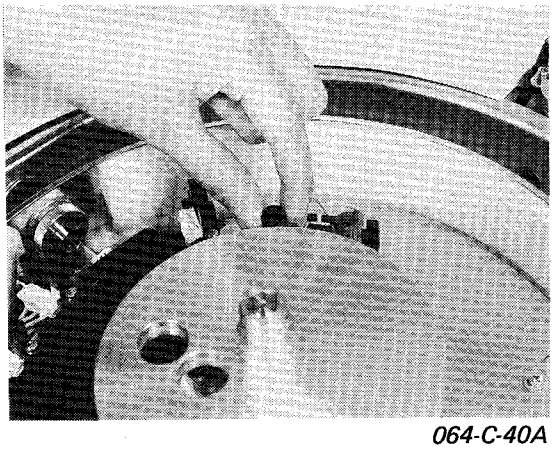
(1) Turn off the POWER switch.

(2) Remove the reaction disk.
(For removal of the reaction disk, refer to 4-3-8 (3).)



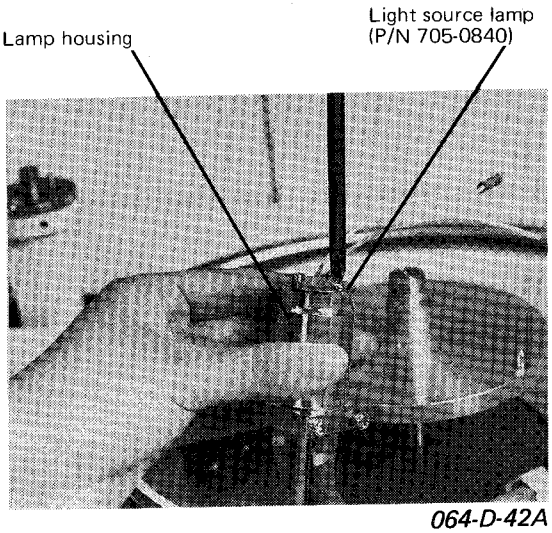
064-C-41A

(4) Loosen the retaining screw of lamp housing.
(Note that this retaining screw cannot be removed.)



064-C-40A

(3) Loosen the retaining terminal of lamp lead wire, and remove the lead wire.



064-D-42A

(5) Remove the lamp from the lamp housing by loosening the lamp retaining screw.

(6) Replace the lamp with a new one.

[**Mounting**]

Optical axis adjustment is not required by the user. Insert the guide pin into the guide groove securely, and then tighten the retaining screw.

Notes: 1. Clamp the lamp lead wires so that they will not move up.

2. Be sure to tighten the lead wire retaining terminal securely.

3. After lamp replacement, call up the MAINTENANCE screen and carry out 'CELL BLANK'.

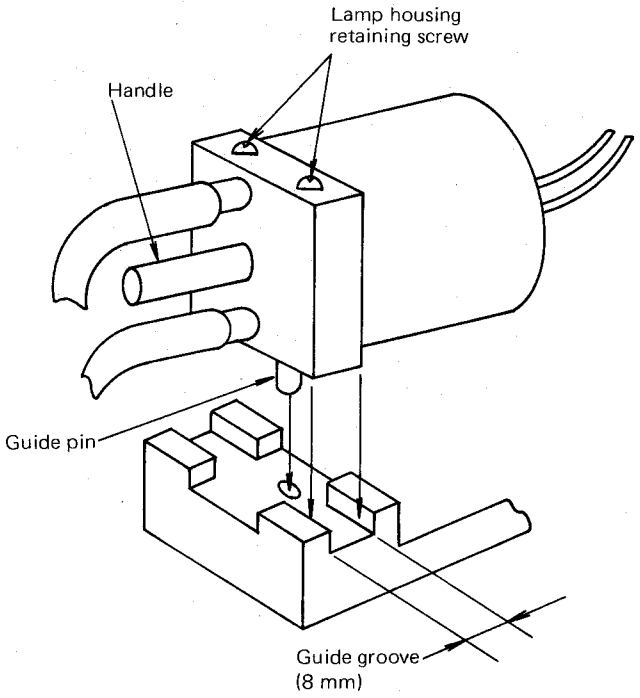


Fig. 4-7 Mounting of Lamp Housing

4-3-4 Serum Pipetter

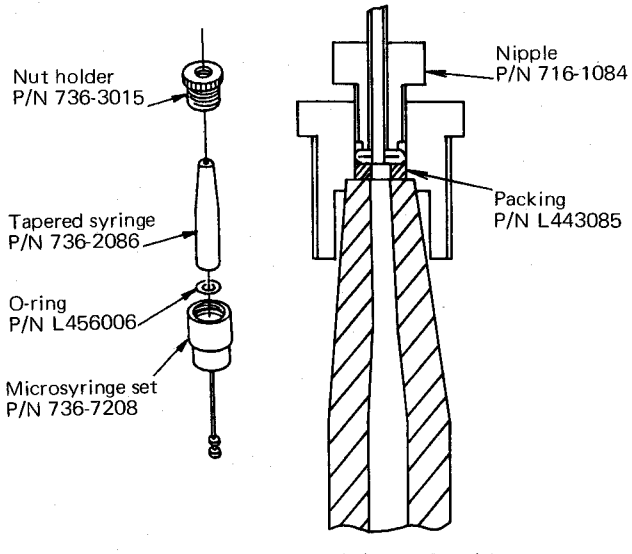
(1) How to Remove Microsyringe

(The following removal procedure is also applicable to the reagent pipetter.)

(a) Remove the nipple.

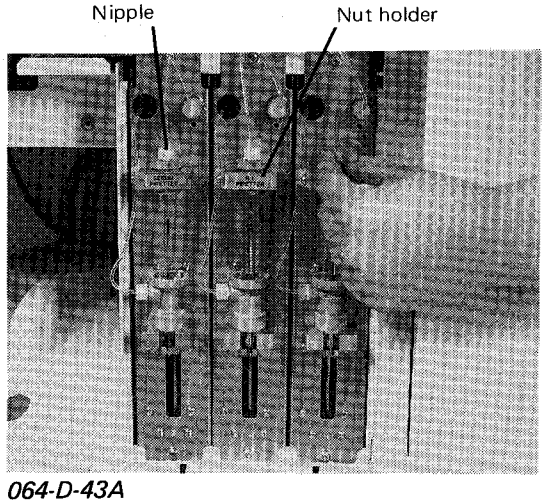
(b) Remove the nut holder by turning it counterclockwise.

(c) Lift up the syringe holder. Then, while pulling the bottom of plunger toward you gently, take out the microsyringe.

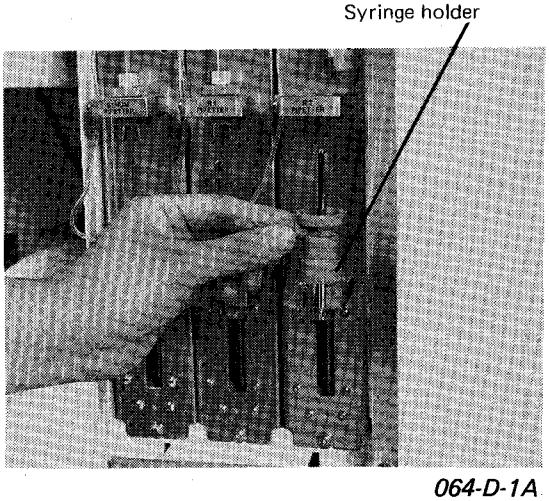


Note: The packing (P/N L443085) is attached at the top of tapered syringe (P/N 736-2086). Be careful not to lose it.

Fig. 4-8 Syringe Structure



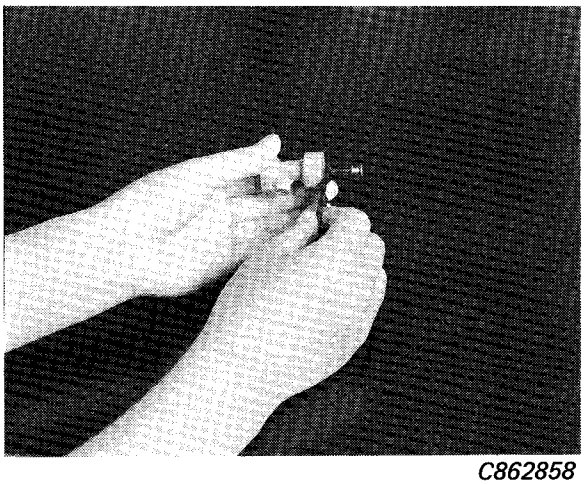
064-D-43A



064-D-1A

(2) How to Replace Seal Piece

Replace the seal piece (P/N 717-1148) with a new one every three months in the following manner.



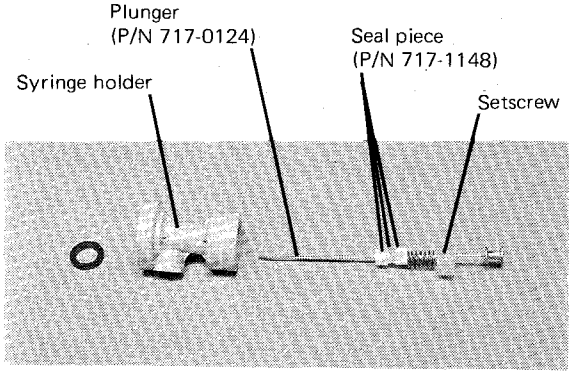
C862858

[Removal]

Using the furnished handle, loosen the setscrew of syringe holder.

[Replacement]

Remove the seal piece (three-piece set marked with arrows), and replace it with a new one. In reassembling, turn the handle until the setscrew is flush with the bottom surface of the syringe holder.



C862859

4-3-5 Reagent Pipetter

(a) The disassembly and reassembly procedures for reagent pipetter are the same as those for serum pipetter.
(b) Replace the seal piece (P/N 736-2754) with a new one every three months.
(c) In reassembling, tighten the setscrew (P/N 736-2753) using the furnished handle.

Notes: After reassembling of the serum or reagent syringe, be sure to take the following steps.

1. Flow Path Deaeration and Leakage Check
   Call up the ROUTINE JOB – START CONDITIONS screen, and carry out 'WASH (AIR PURGE)'.
2. Operation Check
   Invoke the MAINTENANCE screen, and carry out 'SAMPLING MECHA' after reassembling the serum syringe.
   Or, carry out 'REAGENT PIPETTING' after reassembling the reagent syringe.

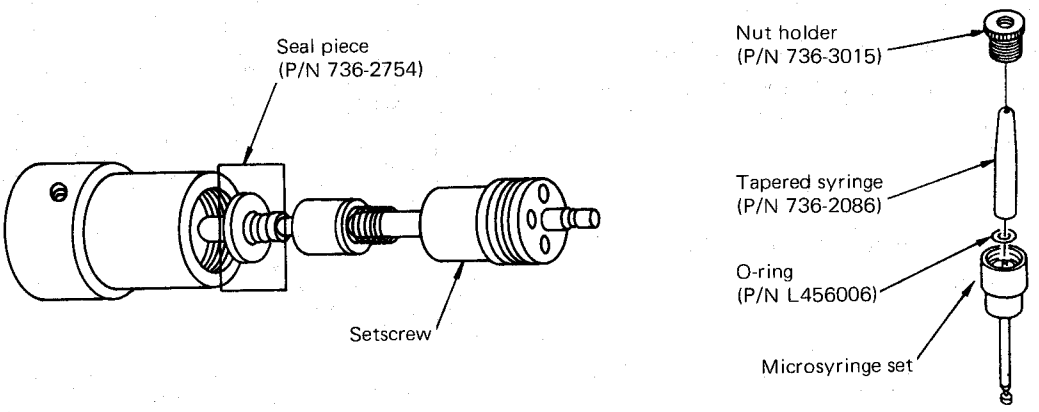


Fig. 4-9 Reagent Syringe Structure

4-3-6 Cleaning of Distilled Water Tank

Clean the distilled water tank every week.

(a) Turn off the POWER switch.
(b) Remove the joint located at the bottom part of distilled water tank. (See 4-3-13.)
(c) Remove the float switch assembly. (Take care not to bend the float switch.)
(d) Pull out the tank, and rinse it with distilled water several times.
(e) If the tank is contaminated heavily, clean it using a brush and then rinse with distilled water thoroughly.

4-3-7 Sample/Reagent Probe/Stirrer Rinsing Bath

(1) Pour 100 mℓ of detergent into each rinsing bath.
Use a 20-fold dilution of HITERGENT.

(2) Then, pour one liter of water into each rinsing bath.

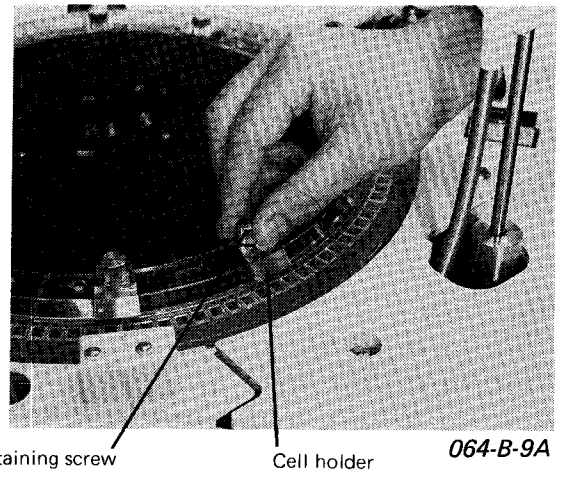
4-3-8 Reaction Disk

(1) Reaction Cuvette Replacement

Call up the MAINTENANCE screen and carry out 'CELL BLANK'. Check the data of cells no. 2 upward. If variation exceeds the allowable count range of ±800, decontaminate the reaction cuvette by immersing it into a 50-fold dilution of HITERGENT.
(After immersing the reaction cuvette into HITERGENT solution, be sure to rinse it with distilled water thoroughly.)
If variation in data is still too large, replace the reaction cuvette with a new one. Also, when the reaction cuvette reaches the end of its useful life of one month, replace it with a new one.

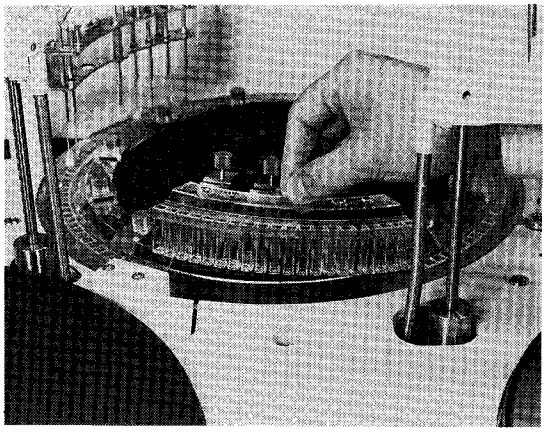
Notes:
1. After cleaning or replacing the reaction cuvette, be sure to carry out 'CELL BLANK'.
2. If a strongly alkaline detergent or dense solution is used for cleaning the reaction cuvette, it may tarnish or crack. Never use such an organic solvent as benzene or alcohol.
3. The reaction cuvette may crack if it is dried after use. So, when leaving the reaction cuvette unused for a long time, immerse it in a 50-fold dilution of HITERGENT (during storage). Also, avoid leaving the reaction bath with water drained.

- **How to Remove Reaction Cuvette**



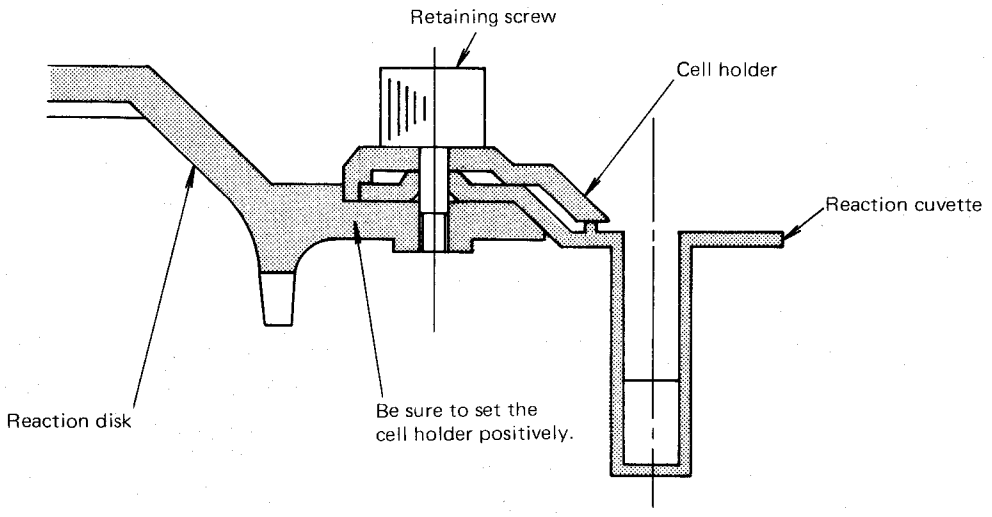
064-B-9A

Remove the retaining screw and cell holder.



064-F-12A

Lift up the reaction cuvette.



Mounting of Cell Holder

(2) Automatic Rinsing Operation

At the end of daily operation, call up the START CONDITIONS screen and carry out 'WASH' (ALL).

* This function is used for cleaning the sample probe, reaction cuvette and stirrer with detergent.

Before execution of 'WASH' function, set 1N NaOH aqueous solution at position W on sample disk and 2 % HITERGENT solution (80 mℓ or more) at channel 32 on reagent-2 disk.

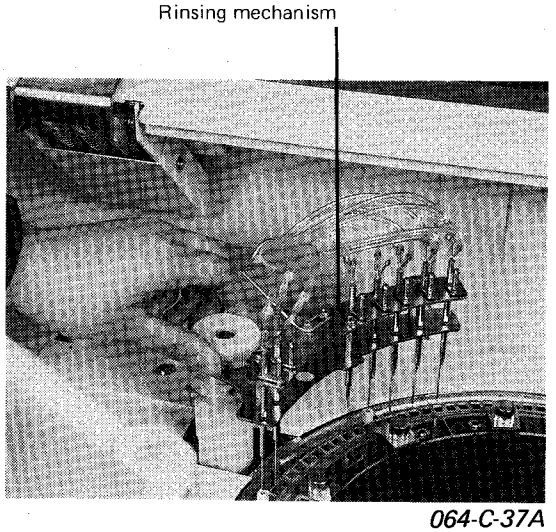
Operational Sequence

1) The sample probe aspirates NaOH solution at position W on sample disk, and discharges it into the rinsing bath.
2) The reagent-2 probe aspirates 2 % HITERGENT solution at channel 32 on reagent-2 disk, and discharges it into the reaction cuvette (500 μℓ/cell).
3) The above steps are repeated until 120 reaction cuvettes are filled with 2 % HITERGENT solution. And, the rinsing mechanism stops after aspirating HITERGENT of the cuvettes.
4) It takes about 12 minutes to complete the entire sequence.

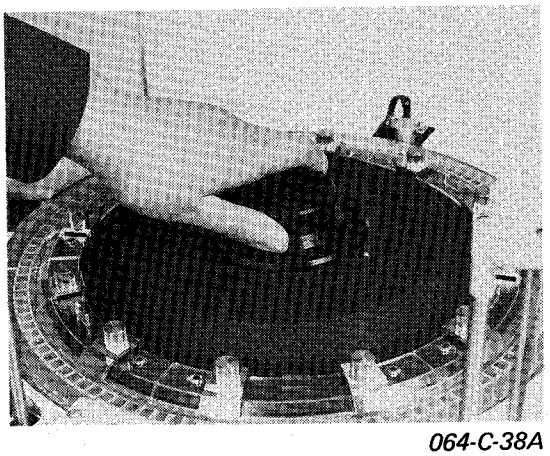
(3) Cleaning of Incubation Bath

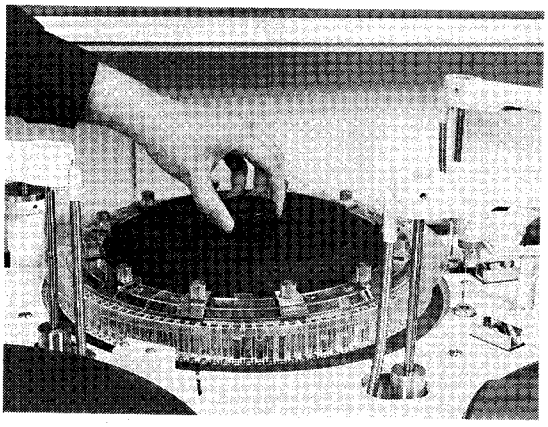
(a) Turn off the POWER switch.
(b) Loosen the rinsing mechanism retaining screw, and take out the rinsing nozzle head.
(c) Remove the reaction disk retaining screw.
Then, take out the reaction disk by lifting it up from its seat.
(d) Clean the incubation bath and photometric window with softened gauze, taking care not to make a flaw.
(For softening gauze, wash it once in advance.)

Note: After cleaning, turn on the POWER switch. Water in the incubation bath will then be exchanged automatically. On completion of this automatic water exchange, call up the MAINTENANCE screen and carry out 'INC. WATER EXCHANGE' to exchange water in incubation bath once more.

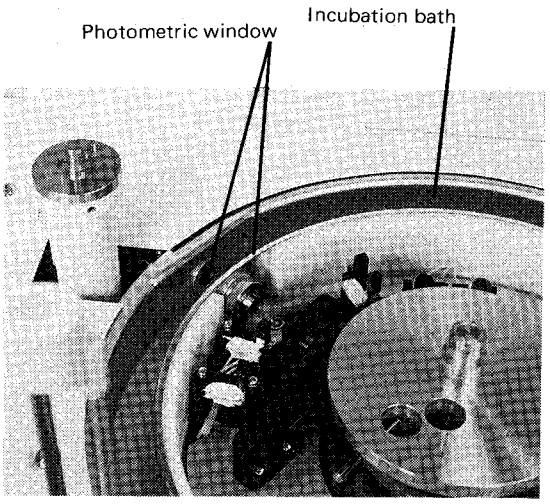


064-C-37A


064-C-38A



064-C-39A



064-F-14A

4-3-9 Rinsing Nozzle

(1) If the rinsing nozzle clogs, clean it using a stainless wire with a diameter of 0.5 mm.

(2) If the rinsing nozzle chip is contaminated heavily or has worn out, replace it with a new one.
When mounting the nozzle chip, be careful not to attach it in the wrong direction.

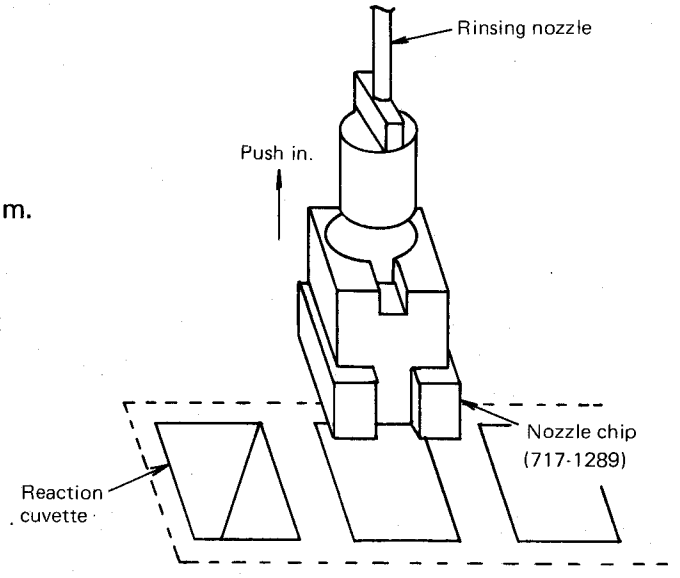


Fig. 4-10 How to Mount Nozzle Chip

4-3-10 Stirrer

(1) If the stirring rod is contaminated, wipe it with gauze dampened with water.
When wiping the stirring rod, take care not to bend it with excessive force.

(2) When replacing the stirring rod, loosen two setscrews (2 mm dia.), and pull the rod down.
When mounting the rod, be sure to secure it as illustrated in Figure 4-11.

(3) After cleaning or replacing the stirring rod, call up the MAINTENANCE screen and carry out 'PROBE ADJUST'. This causes the stirrer to stop at the cell side. Check that the stirring rod is positioned at the center of reaction cuvette.
For adjustment of the stirrer position, use two 3 ϕ screws.

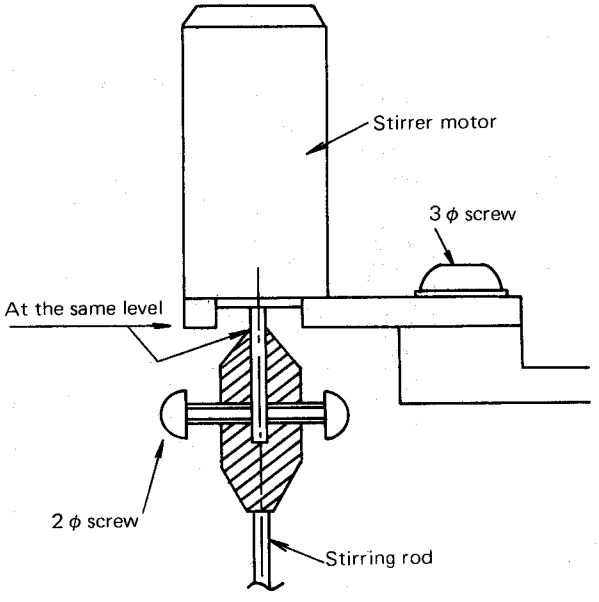
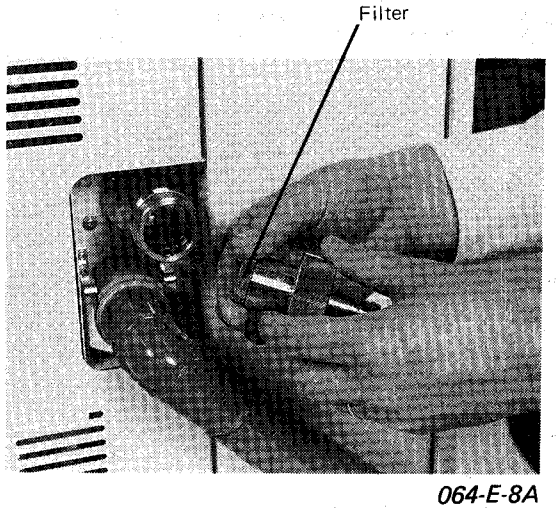


Fig. 4-11 How to Mount Stirring Rod

4-3-11 Cleaning of Water Supply Filter

The water supply filter is equipped at the water inlet port located at the rear left.
Clean the water supply filter every month.

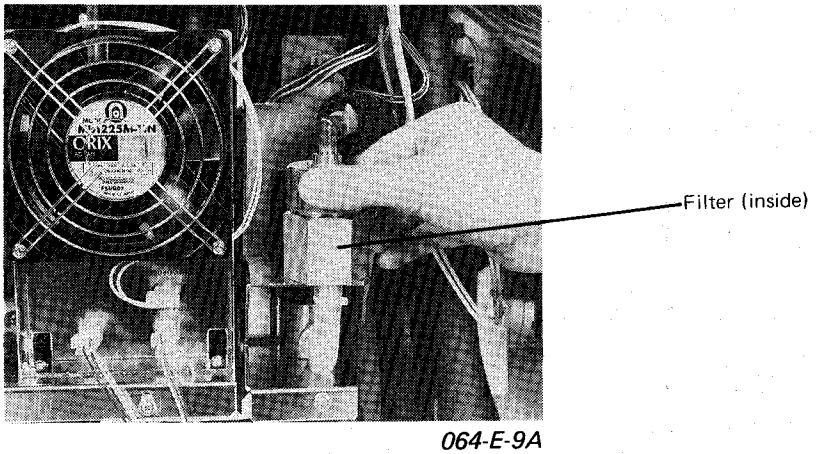
(a) Turn power off.
(b) Stop water supply to the deionizer by closing its cock.
(c) Place a bucket or reservoir under the location of water supply filter. Then, loosen the filter cap and pull out the filter tube.
(d) Take out the filter element, and wash it with pure water.



064-E-8A

4-3-12 Cleaning of Incubation Bath Drain Filter

The incubation bath drain filter is located at the center on the rear.
Clean this drain filter every three months.

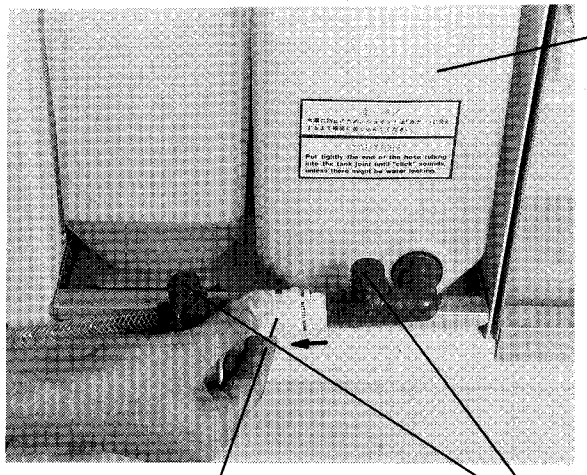


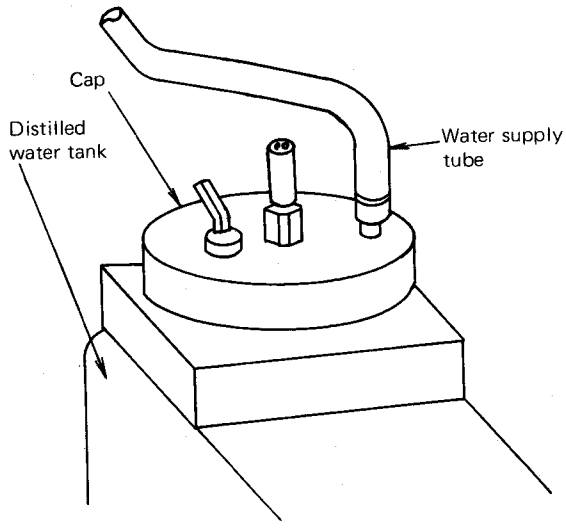
064-E-9A

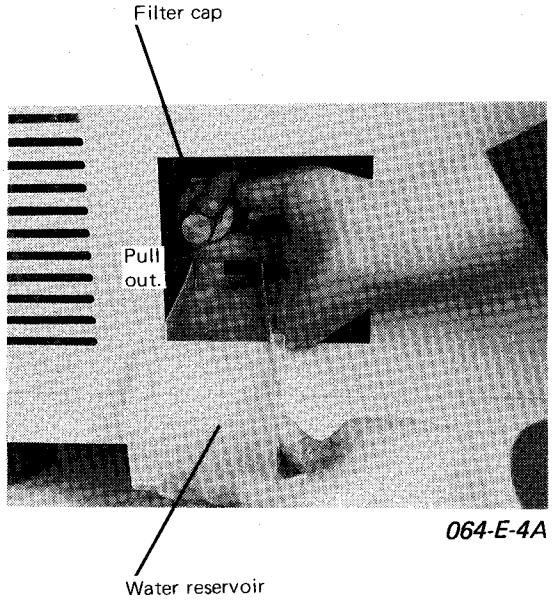
4-3-13 Cleaning of Pump Filter

The pump filter is located at the lower part on the left side.
Clean the pump filter every three months.

(a) Turn power off.
(b) Remove the snap-in joint from the distilled water tank (see the figure below).
(c) Lift up the distilled water tank cap and pull the tank in front.
(d) Loosen the filter cap screw, and remove the filter.
At this step, place the furnished water reservoir under the location of filter.
(e) Disassemble the filter element (made of plastic) by loosening its screw, and wash it with pure water.
(f) After cleaning, remount the filter in the reverse order of removal.







4-3-14 Cleaning of Vacuum Tank

(a) Turn off the POWER switch.
(b) Loosen the cover locking screw located at the right on the front, and open the cover.
(c) Clean the vacuum tank if waste solution has intruded into it.
Remove the rubber cap and the tank retaining screw. Thus, the tank can be taken out.
Discard waste solution from the tank, and clean it with distilled water thoroughly.

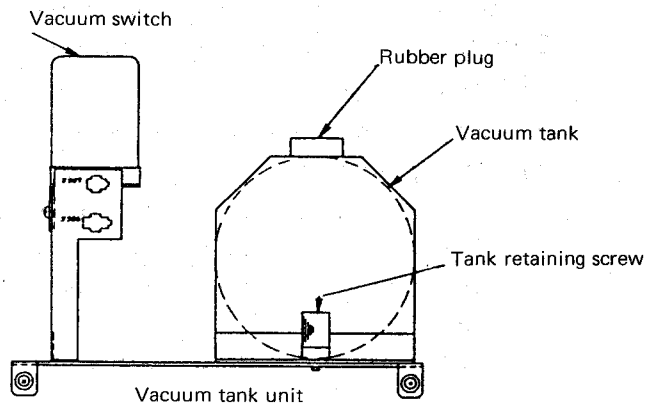


Fig. 4-12 Cleaning of Vacuum Tank

4-3-15 Water Exchange in Cooling Bath

Exchange water in the cooling bath once a year.

(a) Turn off the power switch located at the lower part on the right side (note that it is not the POWER switch mentioned before).
(b) Loosen the rear cover retaining screw, and remove the rear cover.
(c) Remove the rubber plug from the cooling bath.
Exchange water in it using the hose pump.
(d) For this water exchange, it is required to prepare about five liters of distilled water.
(e) Turn on the power switch. When water is circulated through the reagent cooler, it results in the water level being decreased in the cooling bath. Then, replenish distilled water to fill the cooling bath as illustrated at right.

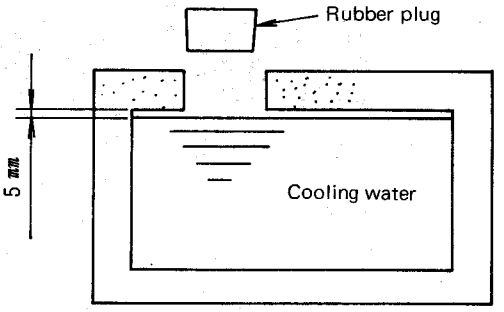


Fig. 4-13 Replenishing Water into Cooling Bath (Reference)

4-3-16 HITERGENT Solution

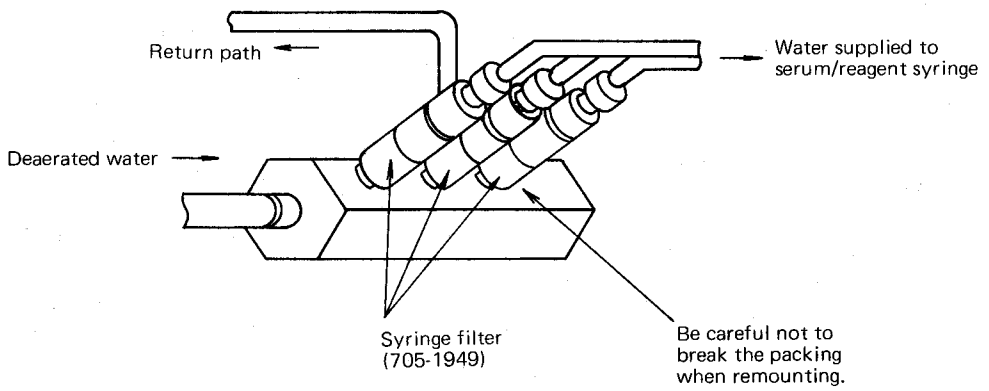
Open the front left door, and you will find the HITERGENT tank location under the pipetter syringe mechanism. At this location, set the HITERGENT tank containing undiluted solution. HITERGENT solution is added to constant-temperature water to be circulated through the incubation bath. It prevents air bubbles from lodging on the outside wall of reaction cuvette. If HITERGENT solution is not added to constant-temperature water, it may cause an error in photometry. To circumvent this, be sure to check the remaining amount of HITERGENT solution occasionally. About 1.5 cc of HITERGENT is consumed in each water exchange. If the HITERGENT tank becomes empty, replace it with a new one. Then, call up the MAINTENANCE screen and carry out 'INC. WATER EXCHANGE' at least three times.

4-3-17 Cleaning of Radiator Filter

The radiator filter is equipped at the lower part of front right cover. It can be removed without opening the front right cover.
Take out the radiator filter and clean it once a month.

4-3-18 Replacement of Syringe Filter

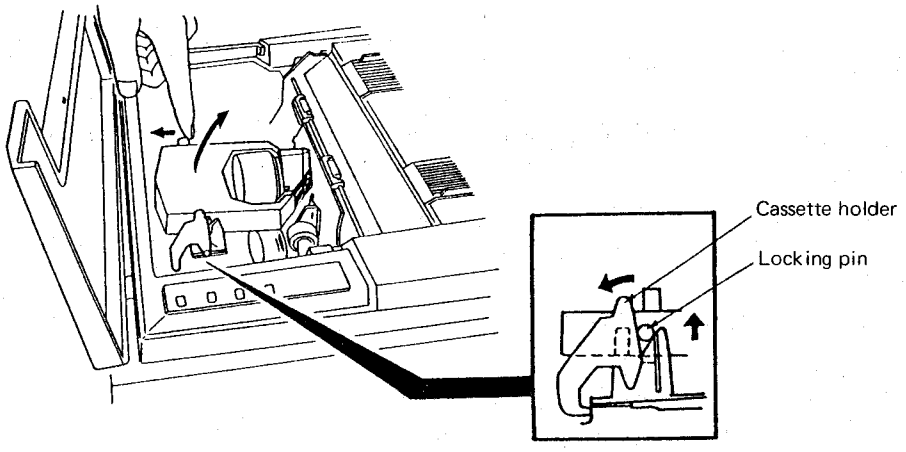
Open the front left door, and the syringe filter will appear above the distilled water tank.
Replace the syringe filter with a new one once a year.



4-3-19 Replacement of Ribbon Cassette

When replacing the printer's ribbon cassette, follow the instructions given below.

1) Check to be sure that the printer is powered off.
2) Open the front cover of printer. Then, hooking your thumbs to the inside of top cover, open it with both hands.
3) Move the print head to the center position of printer.
4) Pull the ribbon cassette holder forward until the locking pin of ribbon cassette is released. The ribbon cassette will then be free.



5) For how to install a new ribbon cassette, refer to 4-3-20.
6) After replacement of ribbon cassette, close the top cover and front cover.

4-3-20 Loading of Ribbon Cassette

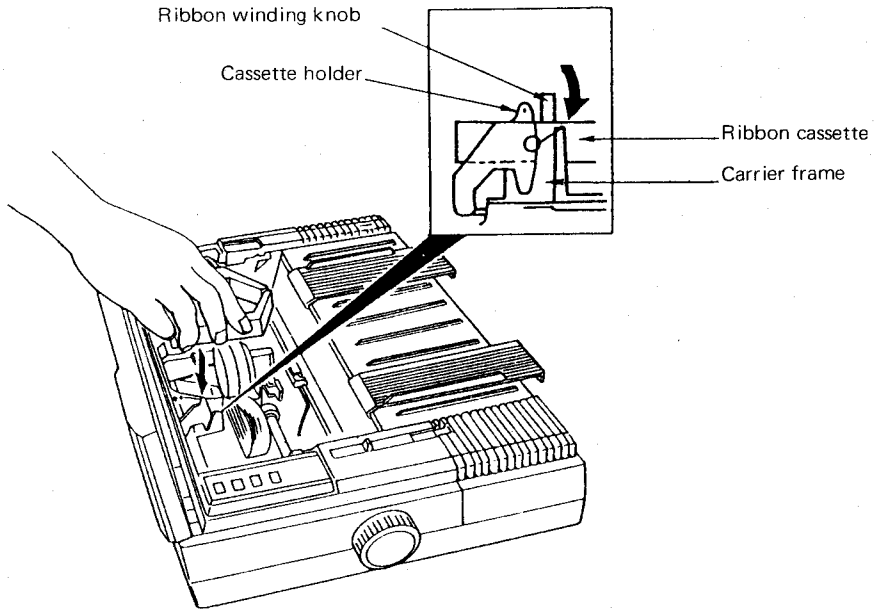
When using a new ribbon cassette, remove the red stopper from it and turn the ribbon winding knob clockwise to take up excess slack inside the cassette.

Caution: Never turn the ribbon winding knob counterclockwise.

After unslacking the ribbon, install the ribbon cassette on the printer as instructed below.

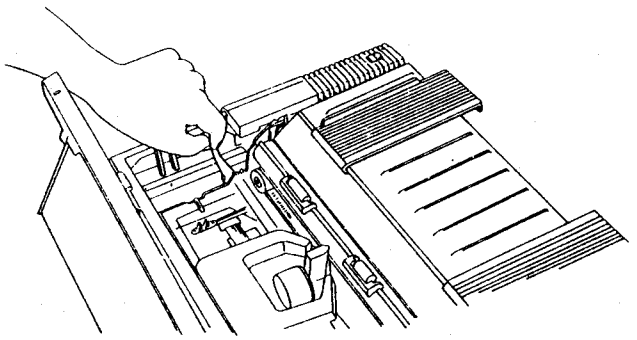
1) Check to be sure that the printer is powered off.
2) Open the front cover of printer. Then, hooking your thumbs to the inside of top cover, open it with both hands.
3) Move the print head to the center position of printer.
4) Place the ribbon cassette on its seat so that the side locking pin is located between the ribbon cassette holder's hook and the carrier frame.
   Make sure that the ribbon is inserted in between the print head and card guide.
5) Push down the ribbon cassette gently until it is firmly seated onto the ribbon cassette holder.

Note: While turning the ribbon winding knob clockwise, push down the ribbon cassette gently. Then, the ribbon cassette can be made to fit onto its seat.



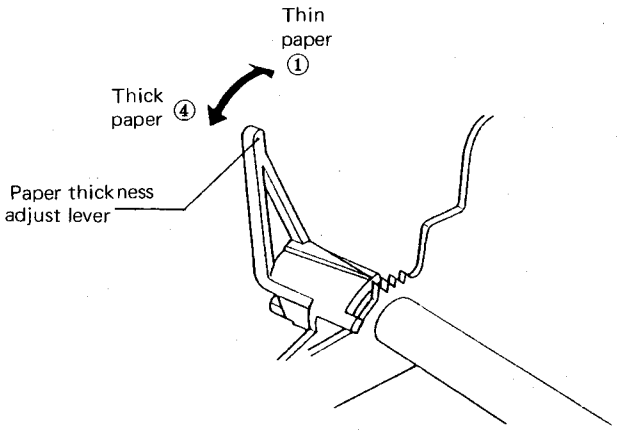
4-3-21 Adjustment for Paper Thickness

For proper printing, adjust the gap between print head and platen according to the thickness of paper to be loaded.
For printhead-to-platen gap adjustment, open the front and top covers. Set the paper thickness adjust lever equipped at the left side of frame.



How to Set the Paper Thickness Adjust Lever:

- Position (1) provides the narrowest gap between print head and platen.
- Turn the paper thickness adjust lever so that its indicator mark will point to the desired position of (1) to (4).
  (The paper thickness adjust lever is set to position (4) in the figure at right.)



The recommended positions of paper thickness adjust lever are listed below for the purpose of reference.

Setting of Paper Thickness Adjust Lever

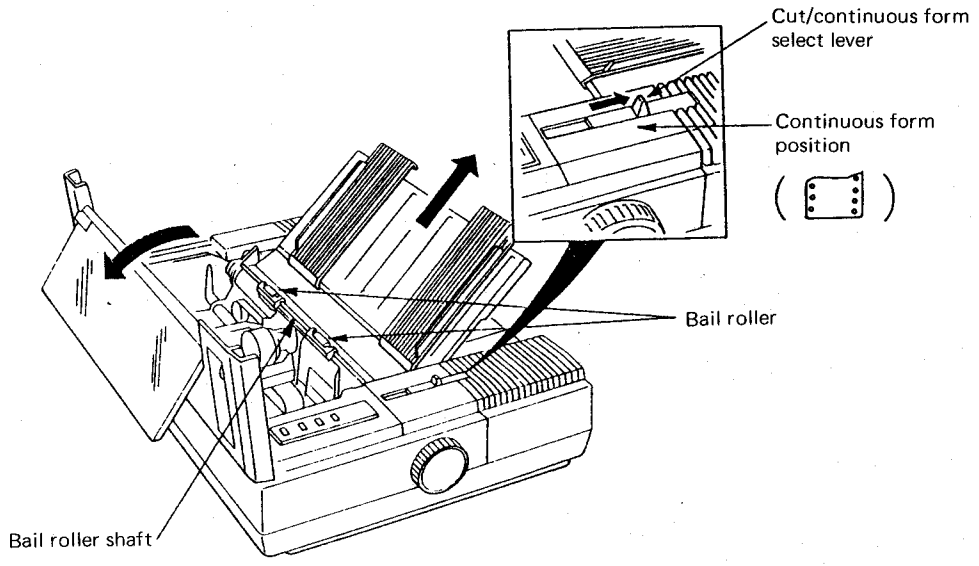
Number of Copies	Thickness of Paper: kg in ream weight (g/m^2)	Condition	Lever Position
5	34 (40)		4
4	34 (40)		4
3	34, 45, 55 (40, 52, 64)	45, 55: One sheet only as the lowermost part	3
2	45, 55, 70 (52, 64, 81)	70: One sheet only as the lowermost part	2
1	45, 55, 70 (52, 64, 81)		1

Notes:
1. The number of copies includes an original copy.
2. The number of copies indicates the quantity of back-carbon-coated sheets or non-carbon sheets.
3. Where carbon sheets are interleaved, each carbon sheet should be counted as one copy.
4. The entire thickness of multi-part sheets should be limited below 0.3 mm.
5. Ream weight (kg) indicates a weight of 1000 sheets of paper (788 mm × 1091 mm), which is used as a reference value representing thickness of paper.

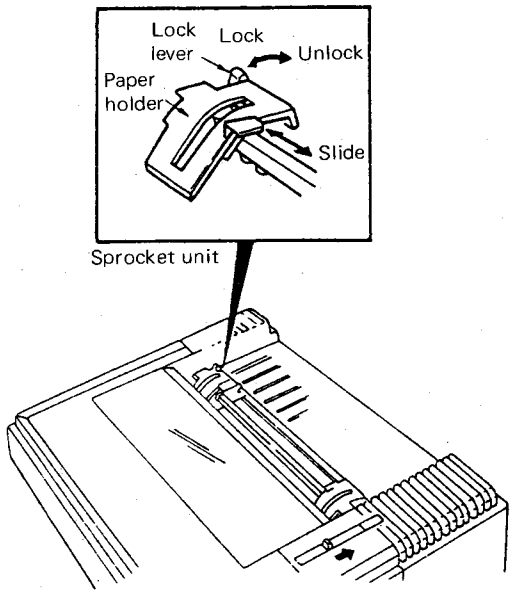
4-3-22 Loading of Paper

(1) How to Load Continuous Paper

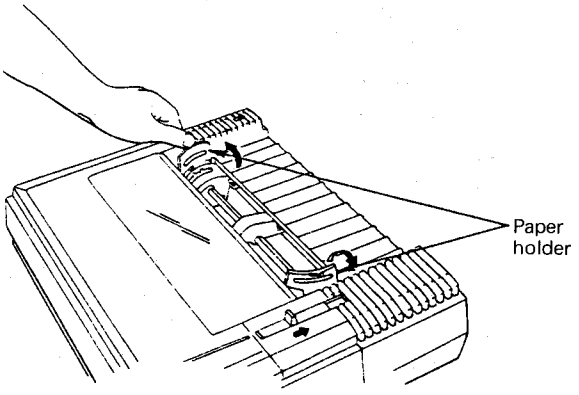
1) Turn on the power of printer. The printer carries out its initialization.
2) Remove the rear cover by lifting its end part up.

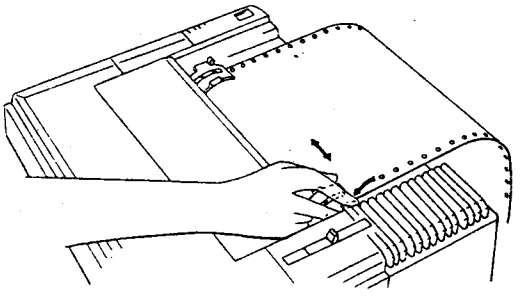


3) Turn the cut/continuous form select lever to 'continuous form' position (far side).
4) Open the front cover. Then, hooking your thumbs onto the inside of top cover, open it with both hands.
Set the paper thickness adjust lever (located at the left end inside) according to the thickness of paper to be loaded.
5) Release the lock lever of right sprocket unit by pushing it toward the rear of printer.



6) Move the right sprocket unit to the right-most position of printer.
7) Unlock the left sprocket unit, and move it to the left margin position.
8) Turn the lock lever of left sprocket unit to the near position to secure it.
9) Set the left and right bail rollers to the paper-edge positions.
10) Close the top and front covers.
11) Open the paper holders of left and right sprocket units toward the sides of printer.
12) Align the left-side sprocket holes of continuous paper with the wheel pins of left sprocket unit. Then, close the left paper holder.
13) Move the right sprocket unit to the right-side sprocket holes of continuous paper. Align the holes of paper with the wheel pins of right sprocket unit. Then, close the right paper holder. Turn the lock lever of right sprocket unit to the near position to secure it.

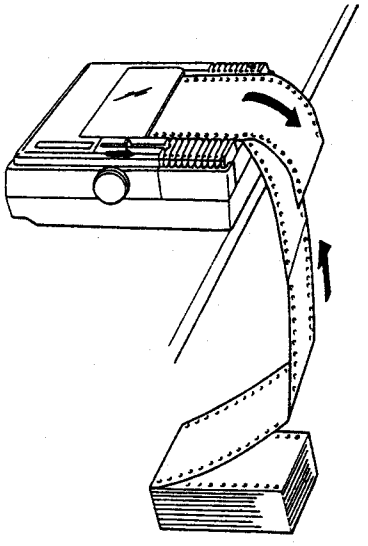




Note: If the paper is slack, make it taut by sliding the right sprocket unit slightly.

How to Feed Paper

1) The auto-load function is not available for continuous form.
Open the front cover, and lift up the bail roller shaft. By pressing the LF switch or turning the platen knob clockwise, feed the paper until its top emerges from the print head about one inch (about 25 mm).



2) Press the bail roller shaft back against the platen, and close the front cover.

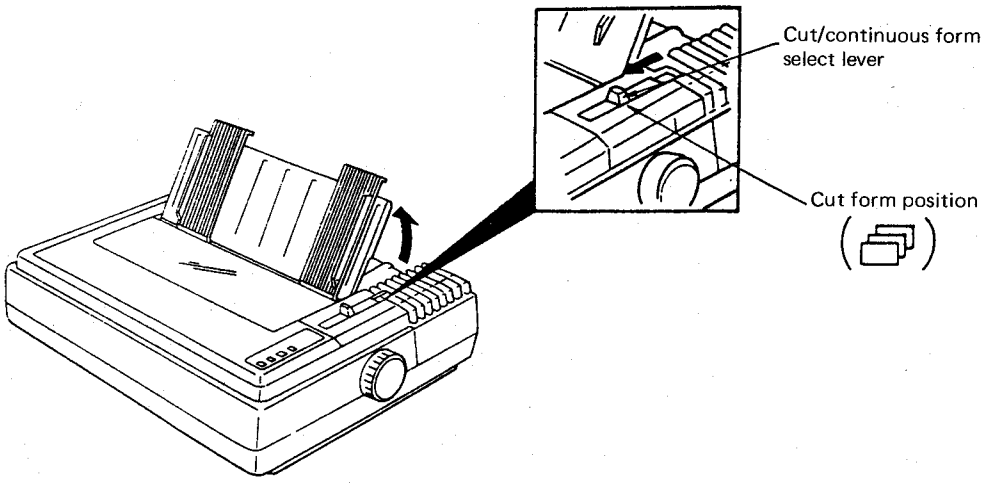
3) Put the rear cover back on.

4) Press the ONLINE switch to set up an online state.

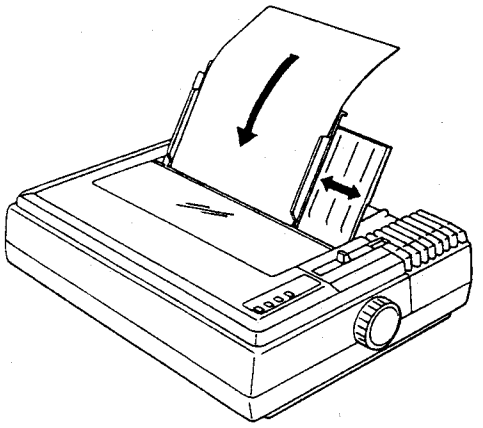
Note: Place a stack of continuous paper under the rear of printer as illustrated at right. It is advisable to use the fanfold paper stand (though the continuous paper may be placed on floor).

(2) How to Load Cut-Form Paper

1) Power up the printer. The printer carries out its initialization.
2) Stand up the rear cover by lifting its back end.
3) Turn the cut/continuous form select lever to 'cut form' position (near side).
4) Open the front cover. Then, hooking your thumbs onto the inside of top cover, open it with both hands.
Set the paper thickness adjust lever (located at the left end inside) according to the thickness of paper to be loaded.



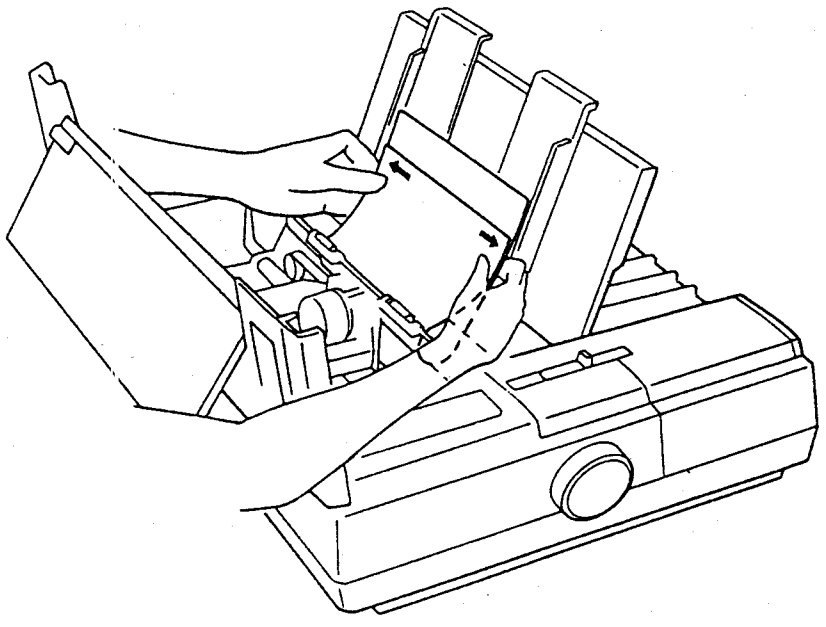
5) Set the left and right bail rollers to both edge positions of cut sheet.
6) Close the top and front covers.
7) If it is necessary to keep the same line format on multiple cut sheets, set the left and right paper guides on the rear cover properly.
8) Insert the cut form sheet in between the rear cover and platen, taking care not to make it skew.



9) Press the FF switch. The print head moves to its home position, and then the paper is fed so that printing will be started on a line about 1/6 inch (4.2 mm) apart from the top of paper.

Note: The auto-load function equipped in this printer is applicable up to ISO A4 size width (216 mm). The auto-loadable range is indicated on the scale of platen.
If the width of cut form paper exceeds the auto-loadable range, lift up the bail roller shaft and set the cut form paper by pressing the LF switch or turning the platen knob.
In this case, feed the paper until its top emerges from the bail roller position on the platen. Then, press the bail roller shaft back against the platen.
If the paper skews on the platen, turn the cut/continuous form select lever to 'continuous form' position to release the paper. Align both edges of paper to correct the skewing.
Then, return the cut/continuous form select lever to 'cut form' position (near side), and feed the paper back to the print starting line by turning the platen knob.

10) Press the ONLINE switch to set up an online state.



(3) How to Switch over from 'Continuous Form' to 'Cut Form'

For using cut form paper with continuous paper on the printer, take the following procedure.

Unloading of Continuous Paper

1) Check to be sure that the printer is powered up and is in an online state.
   If not, turn on the printer and put it in an online state.
2) Make sure that the cut/continuous form select lever is set at 'continuous form' position, and then press the FF switch. The continuous paper goes back until the paper-out lamp lights up and the buzzer sounds.

Notes: 1. If the cut/continuous form select lever is set to 'cut form' position, the paper can be fed back manually by turning the platen knob counterclockwise.

2. If the continuous paper is at the position of sprocket unit, the cut form sheet can be loaded without removing the continuous paper.
   When the FF switch is pressed, the continuous paper goes back to the position of sprocket unit.

Loading of Cut Sheet

Refer to (2).

Note: For printing on the cut sheet paper, be sure to set the cut/continuous form select lever to 'cut form' position. As long as the 'cut form' position is selected, the continuous paper is not fed even if it is set on the sprocket unit.

(4) How to Switch over from 'Cut Form' to 'Continuous Form'

1) Make sure that the cut form sheet is ejected.
   If the cut sheet lodges on the printer still, press the FF switch with power on or turn the platen knob clockwise. The cut sheet will then be ejected.
2) Turn the cut/continuous form select lever to 'continuous form' position (far side).
3) If the continuous paper is already set on the sprocket unit, refer to 'How to Feed Paper' (p. 4-22).
   If not, refer to 'How to Load Continuous Paper' (p. 4-20).

4-3-23 Cleaning of Floppy Disk

The floppy disk, after used for a long time, may encounter read/write errors due to contamination on its surface.
So, when the specified usage count of floppy disk (100 thousand times accessed) is reached, the FLOPPY DISK-17 alarm is issued.
On occurrence of this alarm, replace the floppy disk with a new one, and also clean the inside of disk drive as instructed below.

(1) Call up the MAINTENANCE screen, and place the cursor to FD-UTILITY.

(2) Key in **3 ENTER** to select FD-CLEANING.

(3) Input the number assigned to the disk drive to be cleaned.
Key in **1 ENTER** to clean drive 1; **2 ENTER** to clean drive 2.

(4) Eject the floppy disk from the disk drive to be cleaned, and insert the cleaning disk coated with cleaning agent into it.
Instructed next is how to apply cleaning agent to the cleaning disk.

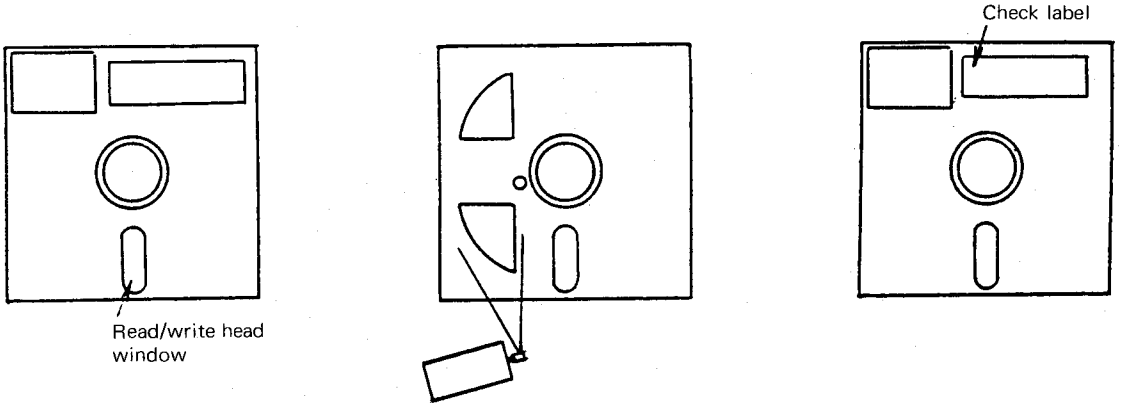


Fig. 4-14 Handling of Cleaning Disk

(5) After replacing the aged floppy disk with the cleaning disk, "FD EXCHANGE?" appears on the CRT.
Key in **1 ENTER.**
The CPU starts the cleaning of disk drive, and the cleaning disk is accessed repeatedly.

(6) For about three minutes after cleaning, the keyboard is locked to allow drying up the read/write head.

Then, the cursor moves automatically to indicate the completion of disk drive cleaning.

(7) After the keyboard is unlocked, it is allowed to insert a new floppy disk.

Note: Be sure to use the cleaning disk specified in 2-4-14.

5. REPLACEMENT PARTS

5. REPLACEMENT PARTS

5-1. Periodic Replacement Parts List

Listed below are the periodic replacement parts to be prepared at hand.

Table 5-1 Periodic Replacement Parts

Part Number	Part Name/Type	Description	Quantity Required
705–0840	Halogen lamp	12 V, 20 W (threaded)	2
737–1189	Inlet filter	For water supply pipe connection	2
717–0307	Packing 1.5 (10 pieces per set)	For serum pipetter (717-1148 x 10 pieces)	1
704–0407	Seal piece 5.5 (10 pieces per set)	For reagent pipetter (736-2754 x 10 pieces)	1
705–1949	Syringe filter	For syringe	3
704–0409	O-ring P9NBR (5 pieces per set)	For syringe (L456006 x 5 pieces)	1
717–1528	Ribbon cassette (2 pieces per set)	Ink ribbon for printer	6
704–0410	Minifloppy disk MD2-256HD	For 5-inch FDD (2 disks per set, with holder)	2
717–0090	Parts set for yearly periodic replacement	Periodic replacement parts (quantity required)	1

5-2. Maintenance Spare Parts List

Listed below are the spare parts to be prepared where the instrument is put into service for a long period of time.

Table 5-2 Spare Parts

Part Number	Part Name/Type	Description	Quantity Required
705–0840	Halogen lamp	12 V, 20 W (threaded)	1
717–0300	Reaction cuvette set (72 pieces per set)	(717-1001 x 72 pieces)	1
F274152	Junflon tube with inside diameter of 1.51 mm (10 m)	For reagent	1
G153001	Tygon tube with inside diameter of 3.17 mm (5 m)	For general tubing connection	1
G153005	Tygon tube with inside diameter of 1.58 mm (10 m)	For rinsing mechanism	1
F274168	Junflon tube with inside diameter of 0.8 mm (10 m)	For serum sampling mechanism	1
717–1528	Ribbon cassette (2 pieces per set)	Ink ribbon for printer	6
S222314	Chart 1013-1P	Chart paper for printer	1
737–1189	Inlet filter	For water supply pipe connection	1
704-0411	O-ring P4 NBR (5 pieces per set)	(L456001 × 5 pieces)	1
704–0409	O-ring P9 NBR (5 pieces)	(L456006 x 5 pieces)	1
736–2086	Tapered syringe	For syringe assembly	1
717–0301	Nozzle S	For serum sampling	1
717–0189	Nozzle R	For reagent sampling	2
717–0111	Stirring rod		2
717–0209	Nozzle 1	For rinsing	1
717–0205	Nozzle 2	For injecting blank water	1
717–0210	Nozzle 3	For aspiration	1
717–0206	Nozzle 4	For aspiration through chip	1
717–0232	Nozzle 5	For rinsing	1
704–0408	Nozzle seal	For sample/reagent probe (705-1853 x 10 pieces)	1
705–0939	Double-check valve	For HITERGENT pump	1
737–1587	Diaphragm	For vacuum pump	1
717–0307	Packing 1.5 (10 pieces per set)	For serum pipetter	1
704–0407	Seal piece 5.5 (10 pieces per set)	For reagent pipetter	1

(cont'd)

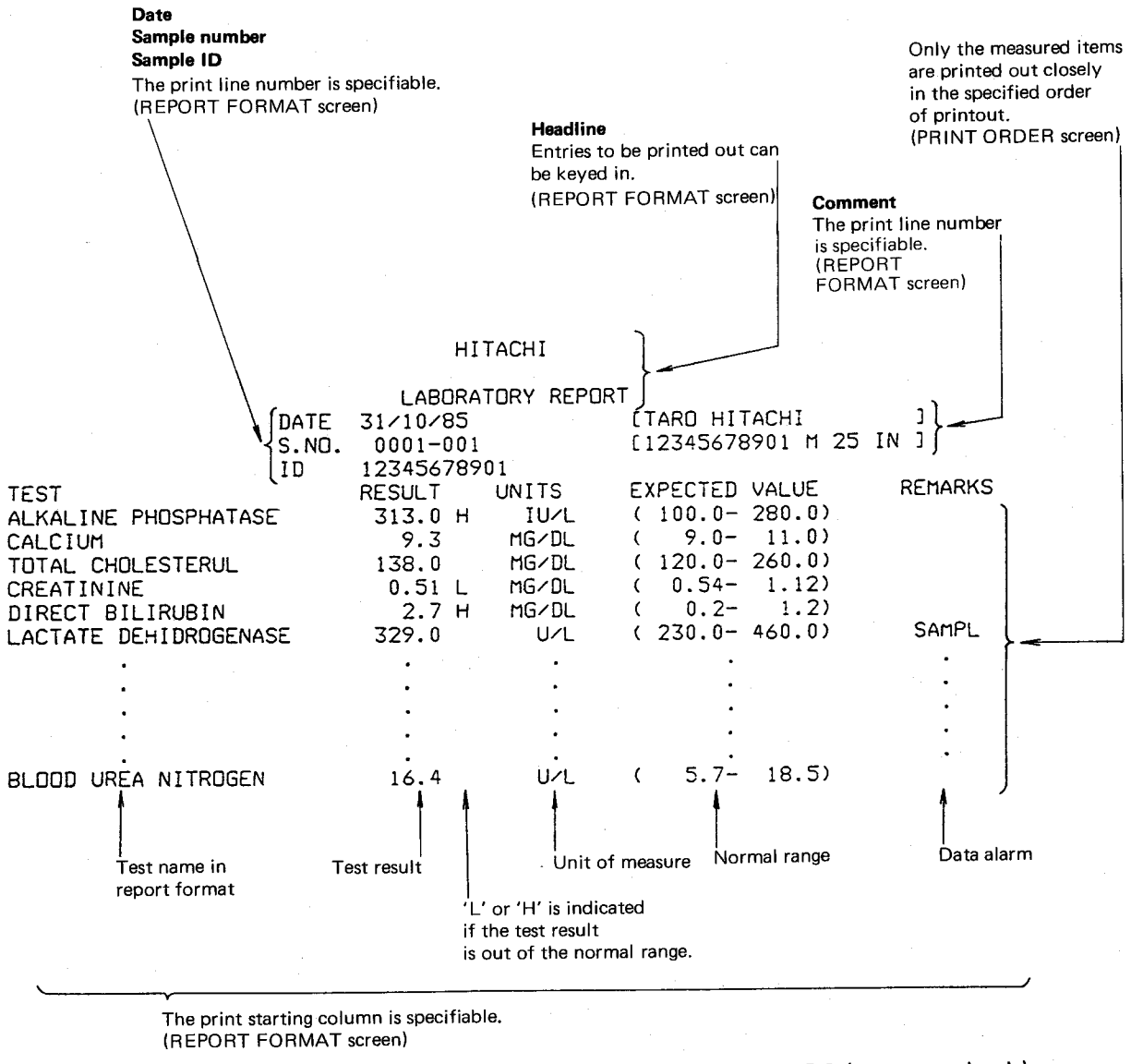
Part Number	Part Name/Type	Description	Quantity Required
L443085	Packing	For pipetter/dispenser syringe	10
705–1949	Syringe filter	For pipetter/dispenser syringe	3
717–1289	Nozzle chip (1)	For aspiration in rinsing	1
704–0412	Nylatch grommet H322-2-1 (10 pieces per set)	For reagent disk (L936002 x 10 pieces)	1
704–0413	Nylatch plunger H323-3-5-1 (10 pieces per set)	For reagent disk (L936002 x 10 pieces)	1
717–4026	Fuse set (2)	For DC power supply	1
J821592	Alarm fuse P-430H 3A		2
J821594	Alarm fuse P-450H 5A		2
J821595	Alarm fuse PL-475H 7.5A		2
J821596	Alarm fuse PL-4100H 10A		2
704–0410	Minifloppy disk MD2-256HD	For 5-inch FDD (two disks per set, with holder)	2
736–1874	Pressure bar spring	For rinsing nozzle	2
704–0416	E-type retaining washer 2 (10 pieces per set)	For rinsing nozzle (M883003 x 10 pieces)	1
704–1061	V packing	For sample/reagent disk	1
704–1065	Jacket packing	For sample/reagent jacket	2
717–0091	Spare parts set for maintenance	Maintenance spare parts (quantity required)	1

6. REPORTS

6-1 Patient Report: Report Format

6-1-1 Single Patient Report (for printout on plain chart)

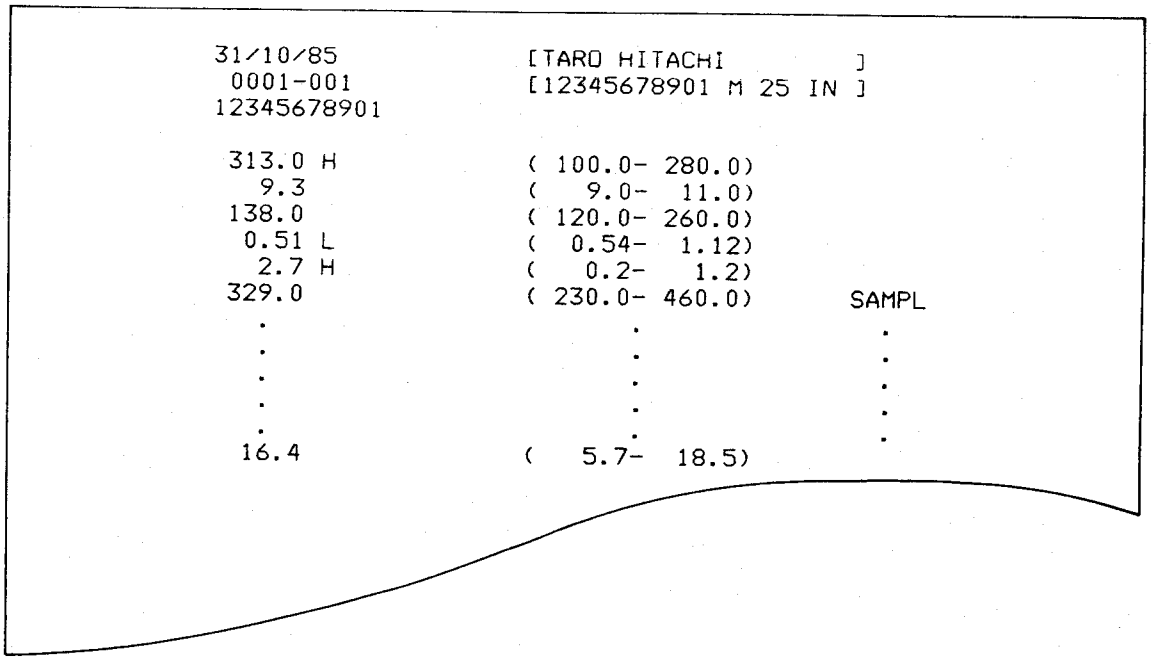
Shown below is an example of patient report produced with the following print parameter setting:
On the START CONDITIONS screen, 'REPORT' has been specified for REAL TIME PRINT.
On the REPORT FORMAT screen, 'SINGLE' has been specified for SINGLE/TWIN option, and 'nonzero' has been assigned as the print start column for TEST NAME.



Note: If printout is commanded from the DATA REVIEW screen, the PC (prozone check) value is not printed out.

6-1-2 Single Patient Report (for printout on user form)

Shown below is an example of patient report produced with the following print parameter setting:
On the START CONDITIONS screen, 'REPORT' has been specified for REAL TIME PRINT.
On the REPORT FORMAT screen, 'SINGLE' has been specified for SINGLE/TWIN option, and 'zero' has been assigned as the print start column for TEST NAME.



In this example, the print starting column for concentration unit is preset to zero. Also, 'all blank spaces' are specified for HEAD LINE. (REPORT FORMAT screen)

- Differences from 6-1-1 are as follows:
  1) Character strings DATE, S. NO., and ID are not printed out.
  2) Field names such as TEST and RESULT are not printed out and a blank line is left instead.
  3) The test result is printed out on the line specified on the PRINT ORDER screen. The non-requested test line is left blank.

6-1-3 Twin Patient Report (for printout on plain chart)

Shown below is an example of patient report produced with the following print parameter setting:
On the START CONDITIONS screen, 'REPORT' has been specified for REAL TIME PRINT.
On the REPORT FORMAT screen, 'TWIN' has been specified for SINGLE/TWIN option, and 'nonzero' has been assigned as the print start column for TEST NAME.

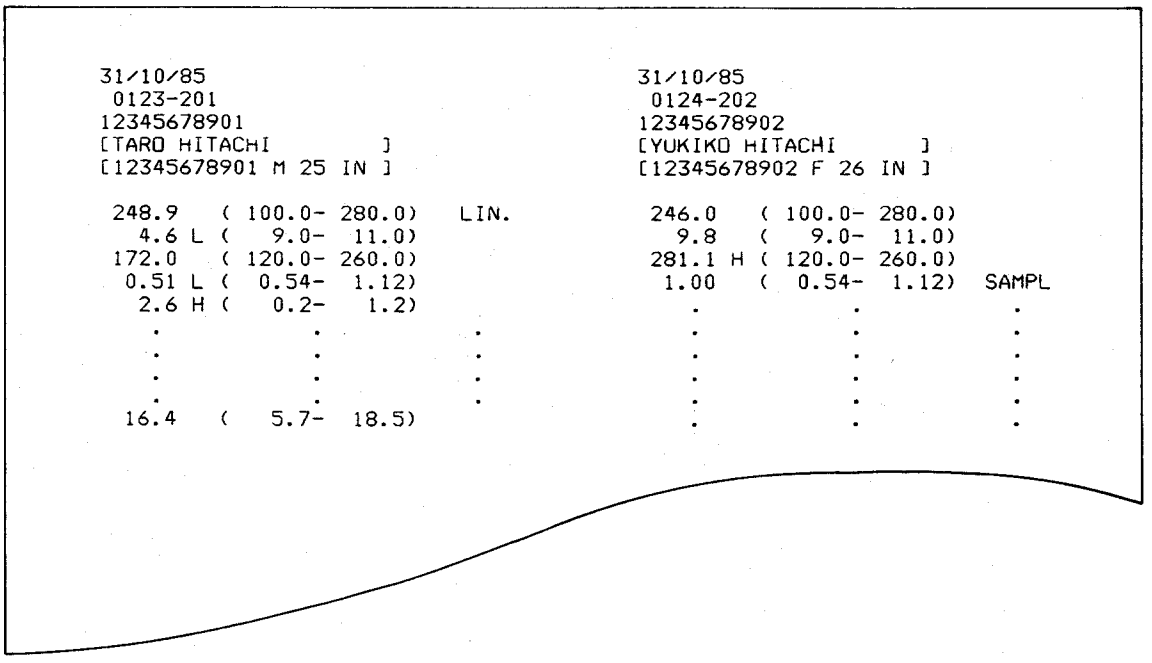
```
                HITACHI                                          HITACHI

            LABORATORY REPORT                                LABORATORY REPORT
DATE  31/10/85                                   DATE  31/10/85
S.NO.  0123-201                                  S.NO.  0124-202
ID    12345678901                                ID    12345678902
      [TARO HITACHI          ]                         [YUKIKO HITACHI       ]
      [12345678901 M 25 IN ]                           [12345678902 F 26 IN ]
TEST  RESULT    EXPECTED VALUE   REMARKS   TEST  RESULT    EXPECTED VALUE   REMARKS
ALP    248.9    ( 100.0- 280.0)   LIN.     ALP    246.0    ( 100.0- 280.0)
CA       4.6 L  (   9.0-  11.0)            CA       9.8    (   9.0-  11.0)
T-CHO  172.0    ( 120.0- 260.0)            T-CHO  281.1 H  ( 120.0- 260.0)
CRE      0.51 L (   0.54-  1.12)           CRE      1.00    (   0.54-  1.12)  SAMPL
D-BIL    2.6 H  (   0.2-   1.2)             .       .          .               .
  .       .          .          .          .       .          .               .
  .       .          .          .          .       .          .               .
  .       .          .          .          .       .          .               .
  .       .          .          .          .       .          .               .
BUN     16.4    (   5.7-  18.5)             .       .          .               .
```

In this example, the print starting column for concentration unit is preset to zero.
(REPORT FORMAT screen)
One sample data is printed out in each of left and right 40 columns.
Note that if a test name is too long, its trailing characters are not printed out.

6-1-4 Twin Patient Report (for printout on user form)

Shown below is an example of patient report produced with the following print parameter setting:

On the START CONDITIONS screen, 'REPORT' has been specified for REAL TIME PRINT.
On the REPORT FORMAT screen, 'TWIN' has been specified for SINGLE/TWIN option, and 'zero' has been assigned as the print start column for TEST NAME.

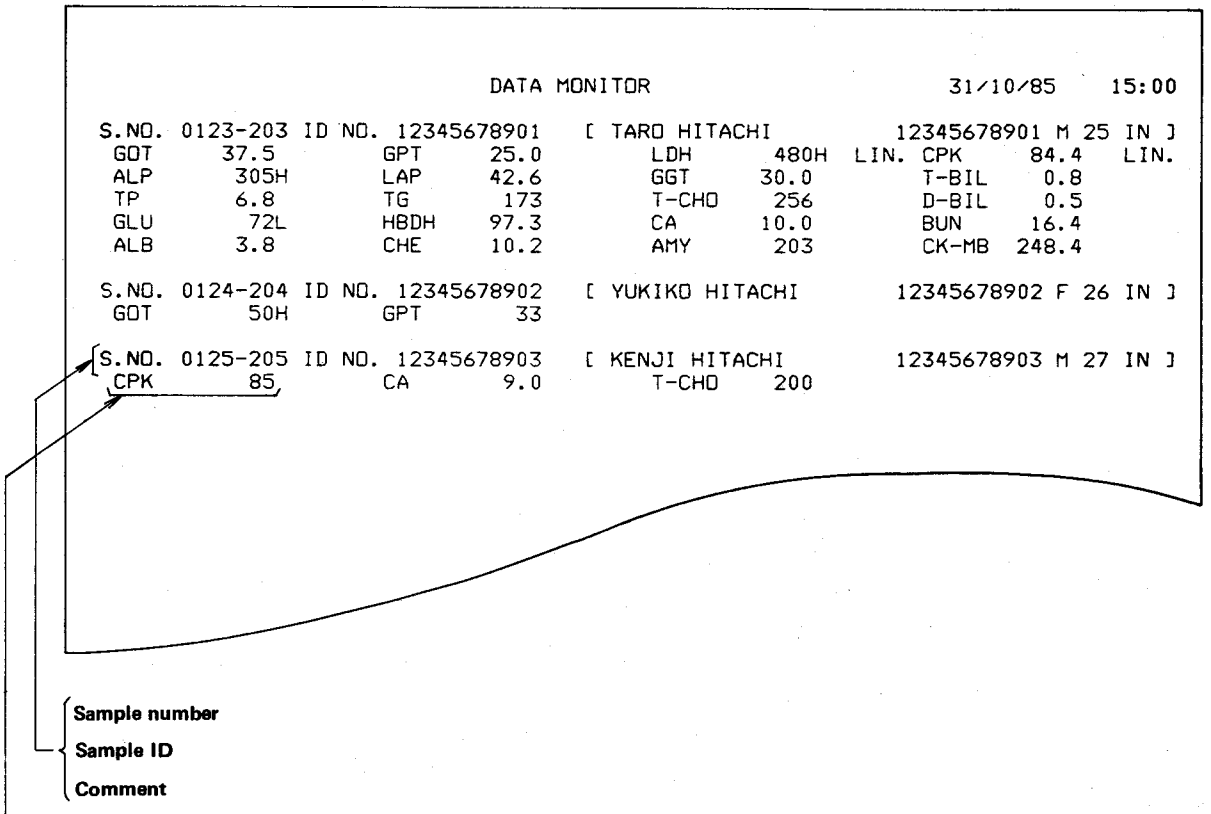


```
31/10/85                                  31/10/85
 0123-201                                  0124-202
12345678901                               12345678902
[TARO HITACHI          ]                  [YUKIKO HITACHI       ]
[12345678901 M 25 IN ]                    [12345678902 F 26 IN ]

 248.9    ( 100.0- 280.0)   LIN.           246.0    ( 100.0- 280.0)
   4.6 L  (   9.0-  11.0)                    9.8    (   9.0-  11.0)
 172.0    ( 120.0- 260.0)                 281.1 H  ( 120.0- 260.0)
  0.51 L  (  0.54-  1.12)                   1.00    (  0.54-  1.12)  SAMPL
   2.6 H  (   0.2-   1.2)                     .            .            .
     .          .          .                 .            .            .
     .          .          .                 .            .            .
     .          .          .                 .            .            .
     .          .          .                 .            .            .
  16.4    (   5.7-  18.5)                    .            .            .
```

In this example, the print starting columns for TEST NAME and concentration unit are preset to zero. Also, the head lines are all prespecified as blanks. (REPORT FORMAT screen)

6-2 Test Report in Monitor Format

Shown below is an example of test report produced by selecting 'MONITOR' for REAL TIME PRINT on the START CONDITIONS screen.



```
                              DATA MONITOR                          31/10/85    15:00

S.NO. 0123-203 ID NO. 12345678901   [ TARO HITACHI          12345678901 M 25 IN ]
 GOT      37.5        GPT      25.0        LDH      480H  LIN. CPK      84.4   LIN.
 ALP       305H       LAP      42.6        GGT      30.0        T-BIL     0.8
 TP         6.8       TG        173        T-CHO     256        D-BIL     0.5
 GLU        72L       HBDH     97.3        CA       10.0        BUN      16.4
 ALB        3.8       CHE      10.2        AMY       203        CK-MB   248.4

S.NO. 0124-204 ID NO. 12345678902   [ YUKIKO HITACHI        12345678902 F 26 IN ]
 GOT       50H        GPT        33

S.NO. 0125-205 ID NO. 12345678903   [ KENJI HITACHI         12345678903 M 27 IN ]
 CPK        85        CA        9.0        T-CHO     200
```

Sample number

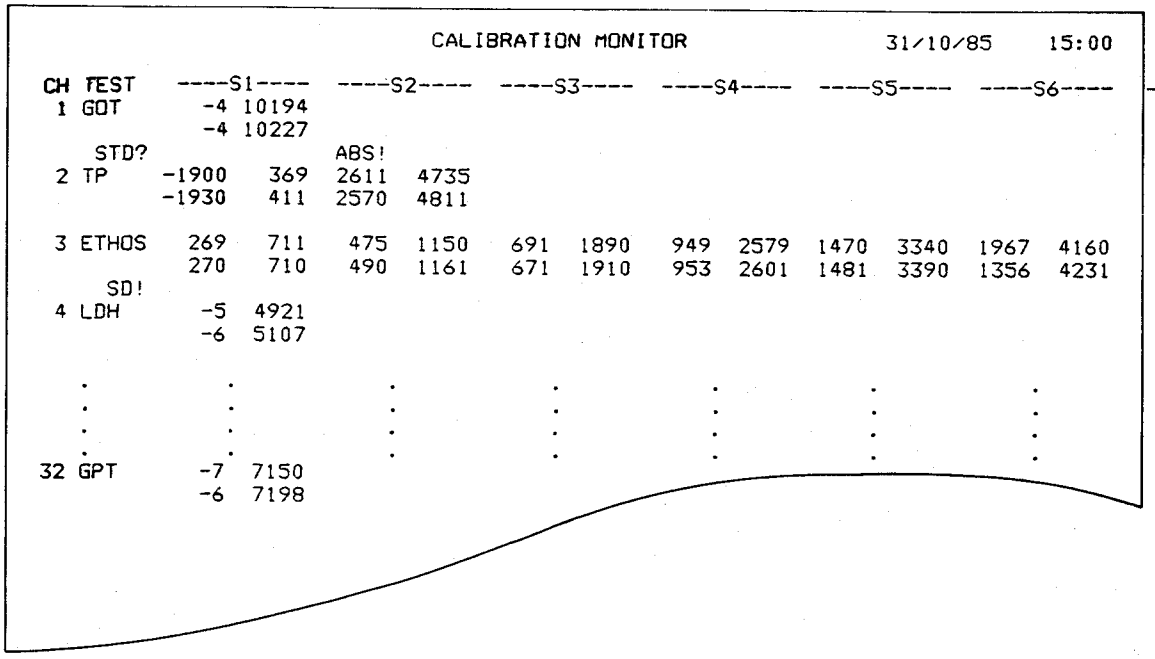
Sample ID

Comment

- **Test result:** Four test names and their results are printed out on each line in the sequence specified on the PRINT ORDER screen. At an test for which the printing is not specified, the rest of test names and results closes in to fill the space.
  If a data alarm is encountered, it is indicated at the right of test result.
  On occurrence of a prozone error, the PC (prozone check) value is printed out together with a data alarm indicator.

Note: If printout is commanded from the DATA REVIEW screen, the PC (prozone check) value is not printed out.

6-3 Calibration Report



CALIBRATION MONITOR 31/10/85 15:00

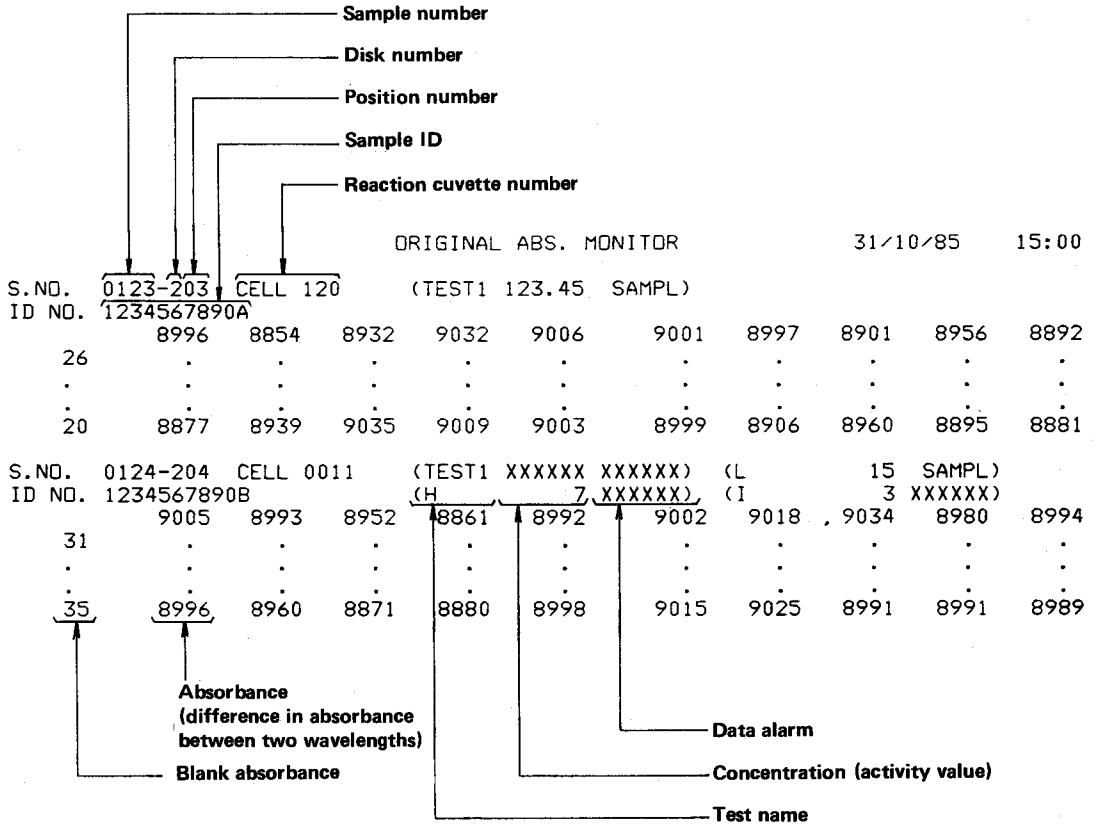
CH	TEST	S1		S2		S3		S4		S5		S6	
1	GOT	-4	10194										
		-4	10227										
	STD?			ABS!									
2	TP	-1900	369	2611	4735								
		-1930	411	2570	4811								
3	ETHOS	269	711	475	1150	691	1890	949	2579	1470	3340	1967	4160
		270	710	490	1161	671	1910	953	2601	1481	3390	1356	4231
	SD!												
4	LDH	-5	4921										
		-6	5107										
32	GPT	-7	7150										
		-6	7198										

→ **STD numbers 1 to 6**

In each column, a two wavelength absorbance is indicated on the left side, and an absorbance of main (primary) wavelength is indicated on the right side. (Rate assay . . . Initial absorbance; End-point assay . . . Final absorbance)
The results of first and second measurements are printed on the upper and lower rows, respectively.
On occurrence of a data alarm, its code is indicated below the relevant measured data.
The absorbance unit is '1 x 10^{-4}'.

6-4 ORIGINAL ABS. Report

Output procedure : Call up the START CONDITIONS screen, and specify '1' for ORIGINAL ABS. Then, start the instrument.



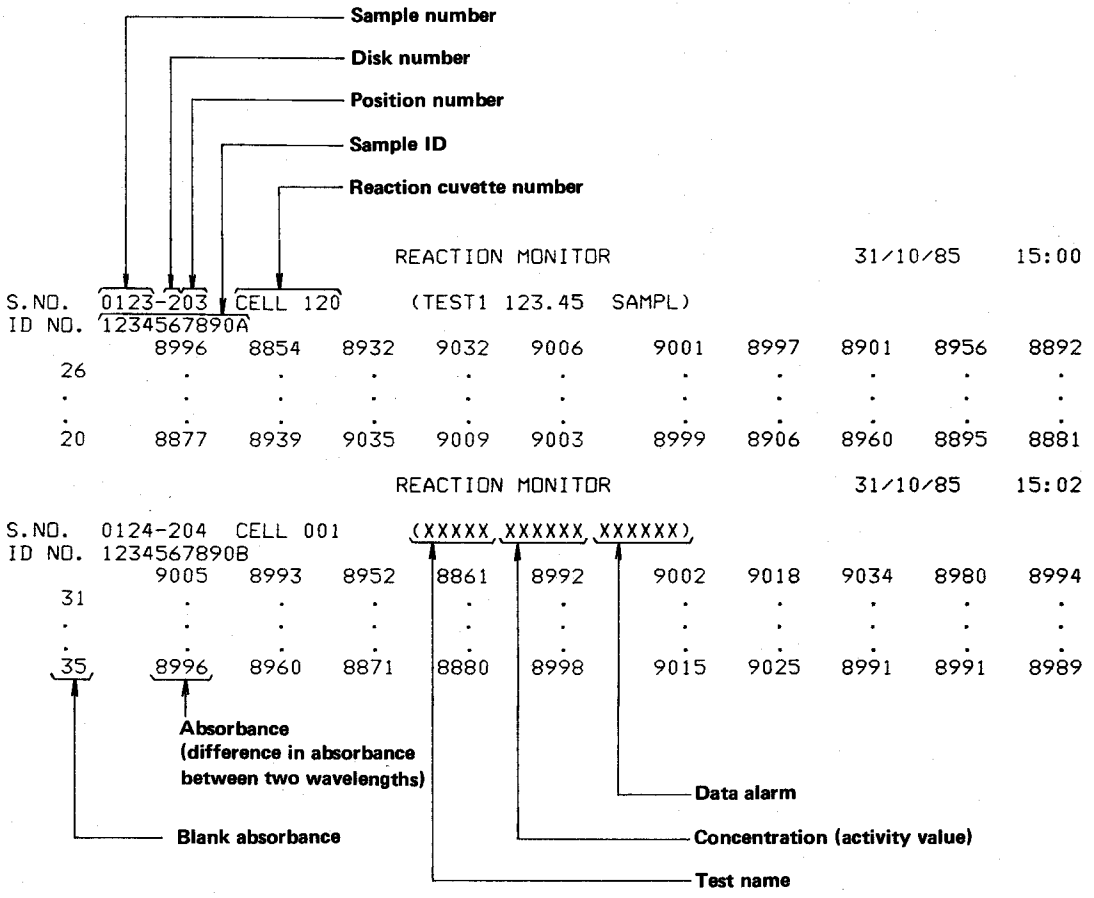
Blank absorbance : Indicates an absorbance value of water blank under measurement. (Difference in absorbance between two wavelengths; Unit: 1×10^{-4})

Absorbance (difference in absorbance between two wavelengths) : Indicates an absorbance at each photometric point in reaction process (unit: 1×10^{-4}).
An absorbance of water blank is subtracted as an offset value. The time series of data is as follows.

From top to bottom in the first column: 1, 2, 3, 4, 5
From top to bottom in the second (next right) column: 5, 6, ... , 10
From top to bottom in the last (rightmost) column: 46, 47, ... , 50

6-5 Printout of REACTION MINITOR Screen

Output procedure : Call up the REACTION MONITOR screen, specify SAMPLE and TEST, and then select '1' for PRINT.

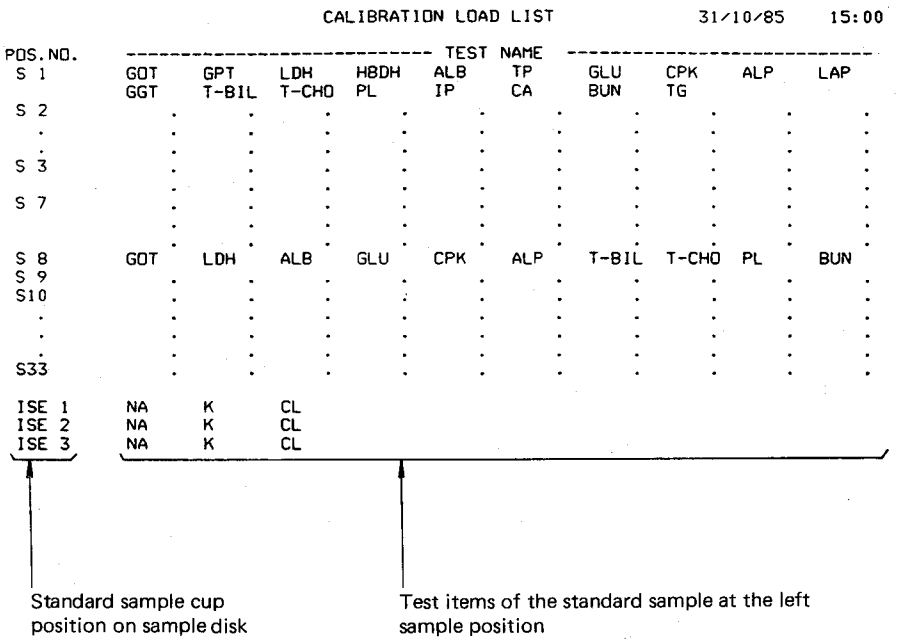


Blank absorbance : Indicates an absorbance value of water blank under measurement. (Difference in absorbance between two wavelengths; Unit: 1×10^{-4})

Absorbance (difference in absorbance between two wavelengths) : Indicates an absorbance at each photometric point in reaction process (unit: 1×10^{-4}). An absorbance of water blank is subtracted as an offset value. The time series of data is the same as that in printout of ORIGINAL ABS. (6-4).

6-6 CALIBRATION LOAD LIST

Output procedure: Call up the CALIBRATOR & CONTROL TEST SELECTION screen, and specify '1' for CALIB. LOAD LIST.



Note: The RERUN/CYCLE calibration worksheet is not printed out.

6-7 WORK SHEET

Output procedure: Call up the PATIENT TEST SELECTION screen, and enter the desired first and final sample numbers for WORK SHEET.

```
                              WORK SHEET                          31/10/85    15:00

S.NO.   POS.NO.      ID NO.          5    10    15    20    25    30
 0001    0-01    12345678901   *****|*****|*****|**---|-----|*****|****
 0002    0-02    12345678902   -----|*****|*****|-----|*****|-----|*---
 0003    0-03    12345678903   -----|-----|*-*-*|-*-*-|*****|*****|**--
   .       .          .                                .
   .       .          .                                .
   .       .          .                                .
 1000.   9-60    77777777777   *****|*****|*****|-----|*****|*****|****
```

Channel number
*: Requested
-: Not requested

TEST COUNT

CHANNEL	TEST NAME	COUNT	CHANNEL	TEST NAME	COUNT
1	GOT	100	18	T-BIL	105
2	GPT	250	19	T-CHO	135
3	TG CHO	180	.	. .	.
.	. .	.	.	. .	.
.	. .	.	.	. .	.
XX	XXXXX XXXXX	XXXX	XX	XXXXX XXXXX	XXXX
.	. .	.	.	. .	.
.	. .	.	.	. .	.
16	CPK	360	33	NA,K	1000
17	BUN	200	34	NA,K,CL	80

Channel number

Test name

Number of requests

6-8 RERUN LIST

The test selection data of rerun samples can be printed out as demonstrated below.

Output procedure: Call up the RERUN SAMPLES screen, and enter the desired first and final sample numbers for LIST PRINT.

```
                              RERUN LIST                          31/10/85    15:00

S.NO.   POS.NO.      ID NO.          5    10    15    20    25    30
R0001    0-01     12345678901   *****|*****|*****|**---|-----|*****|****
R0002    0-02     12345678902   -----|*****|*****|-----|*****|-----|*---
R0003    0-03     12345678903   -----|-----|*-*-*|-*-*-|*****|@*@**|**--
  .        .          .                                .
  .        .          .                                .
  .        .          .                                .
R1000    9-60     77777777777   *****|*****|*****|-----|*****|*****|****.
```

Channel number
@, *: Rerun requested
-: Rerun not requested

TEST COUNT

CHANNEL	TEST NAME	COUNT	CHANNEL	TEST NAME	COUNT
1	GOT	10	18	T-BIL	5
2	GPT	50	19	T-CHO	35
3	TG CHO	2	.	. .	.
.	. .	.	.	. .	.
.	. .	.	.	. .	.
XX	XXXXX XXXXX	XXXX	XX	XXXXX XXXXX	XXXX
.	. .	.	.	. .	.
.	. .	.	.	. .	.
16	CPK	5	33	NA,K	21
17	BUN	12	34	NA,K,CL	7

Number of rerun requests

Test name

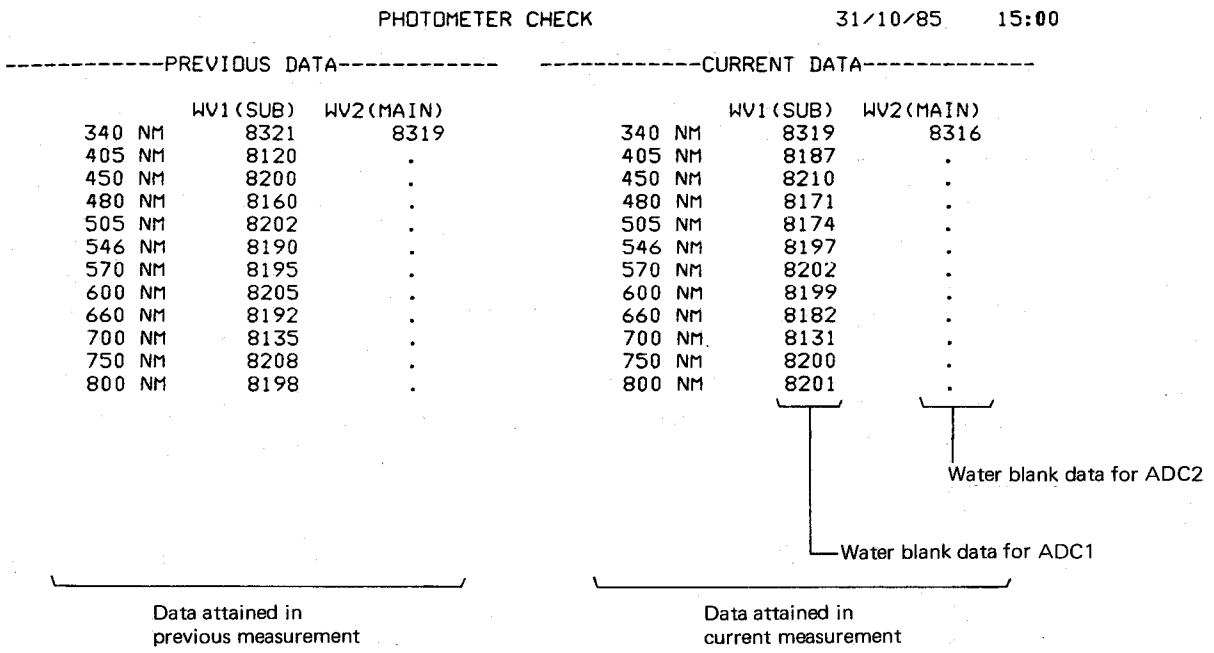
Channel number

Notes: 1. ' @ ' is the rerun request using the sample volume of right column which is specified on the CHEMISTRY PARAMETERS screen.

2. (*) is the rerun request using the sample volume of left column.

6-9 Report of PHOTOMETER CHECK

Output procedure: Call up the START CONDITIONS screen, and specify '1' for PHOTOMETER CHECK.

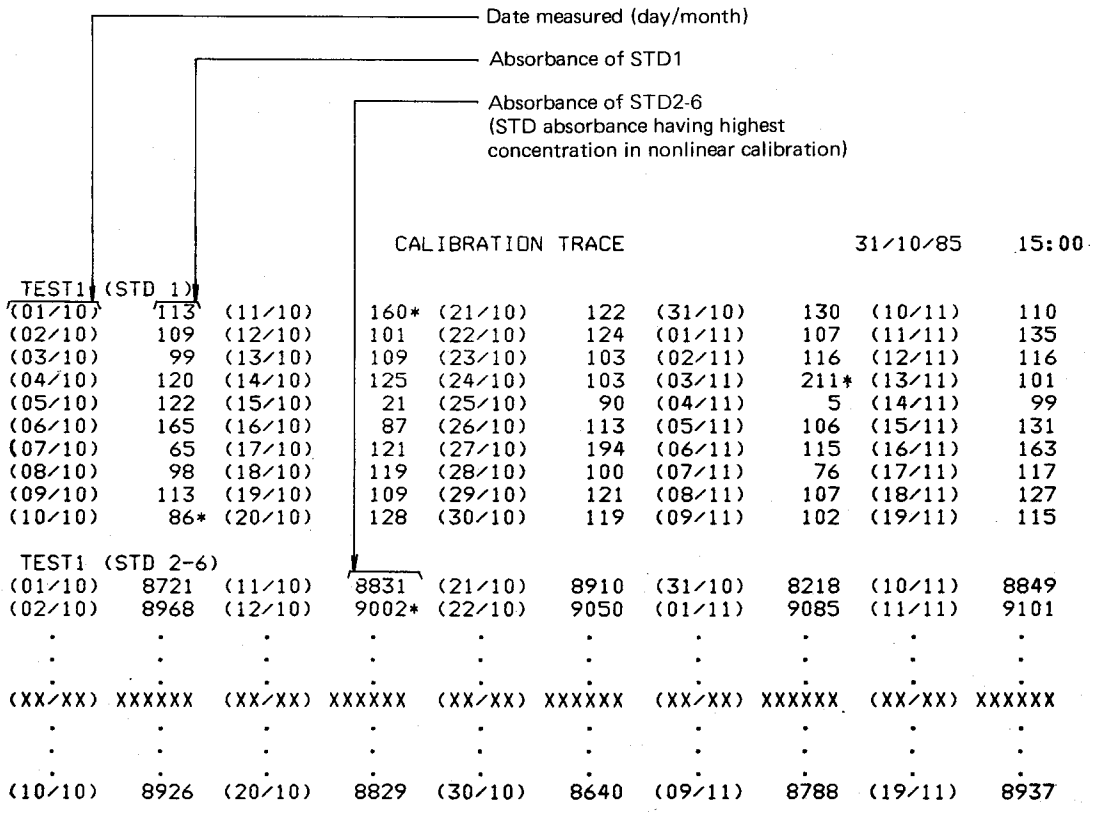


The mean absorbance values of reaction cuvettes 1 and 119 are printed out.

Note: Water blank data should be zero in principle of photometric analysis. However, to eliminate the user readjustment after replacement of the photometer lamp, a bias of 1000 to 16000 (Abs 0.1 to 1.6) is given to it.

6-10 CALIBRATION TRACE

Output procedure: On the CALIBRATION TRACE screen, specify the desired test code, and then select '1' for PRINT.



CALIBRATION TRACE 31/10/85 15:00

TEST1 (STD 1)

(01/10)	113	(11/10)	160*	(21/10)	122	(31/10)	130	(10/11)	110
(02/10)	109	(12/10)	101	(22/10)	124	(01/11)	107	(11/11)	135
(03/10)	99	(13/10)	109	(23/10)	103	(02/11)	116	(12/11)	116
(04/10)	120	(14/10)	125	(24/10)	103	(03/11)	211*	(13/11)	101
(05/10)	122	(15/10)	21	(25/10)	90	(04/11)	5	(14/11)	99
(06/10)	165	(16/10)	87	(26/10)	113	(05/11)	106	(15/11)	131
(07/10)	65	(17/10)	121	(27/10)	194	(06/11)	115	(16/11)	163
(08/10)	98	(18/10)	119	(28/10)	100	(07/11)	76	(17/11)	117
(09/10)	113	(19/10)	109	(29/10)	121	(08/11)	107	(18/11)	127
(10/10)	86*	(20/10)	128	(30/10)	119	(09/11)	102	(19/11)	115

TEST1 (STD 2-6)

(01/10)	8721	(11/10)	8831	(21/10)	8910	(31/10)	8218	(10/11)	8849
(02/10)	8968	(12/10)	9002*	(22/10)	9050	(01/11)	9085	(11/11)	9101
.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.
(XX/XX)	XXXXXX	(XX/XX)	XXXXXX	(XX/XX)	XXXXXX	(XX/XX)	XXXXXX	(XX/XX)	XXXXXX
.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.
(10/10)	8926	(20/10)	8829	(30/10)	8640	(09/11)	8788	(19/11)	8937

Notes: 1. If a data alarm is detected in calibration data, an asterisk '*' is suffixed to data.
2. Absorbance unit is '1 x 10^{-4}'.
3. The output of absorbances has the following meanings.
   (1) ENDPOINT : STD1 . . . . . measured absorbance
   STD2-6 . . . . . measured absorbance
   (2) RATE : STD1 . . . . . absorbance of the first measured point (main wavelength)
   STD2-6 . . . . . measured absorbance variation rate

6-11 Report of CELL BLANK

Output procedure: On the MAINTENANCE screen, specify '1' for CELL BLANK.

CELL BLANK 31/10/85 15:00

NO.	WAVE LENGTH (NM) 340	405	450	480	505	546	570	600	660	700	750	800 ← Measurement wavelength
1	8041	7956	7416	7510	7621	7345	7243	7649	7681	7761	7865	7768
2	-26	46	13	6	24	36	41	53	39	42	63	55
3	-6	3	19	-4	-2	21	-9	16	12	27	-3	36
4	.											
5	.											
6	.											
7	.											
8	.											
9	.											
10	.											
11	.											
12	.											
.	.											
.	.											
.	.											
.	.											
117	.											
118	.											
119	.											
120	32	21	9	-3	18	26	5	30	28	24	24	43

Water blank data: The absorbance value for reaction cuvette 1 is original and the absorbance of reaction cuvette 1 is subtracted for reaction cuvettes 2 upward.

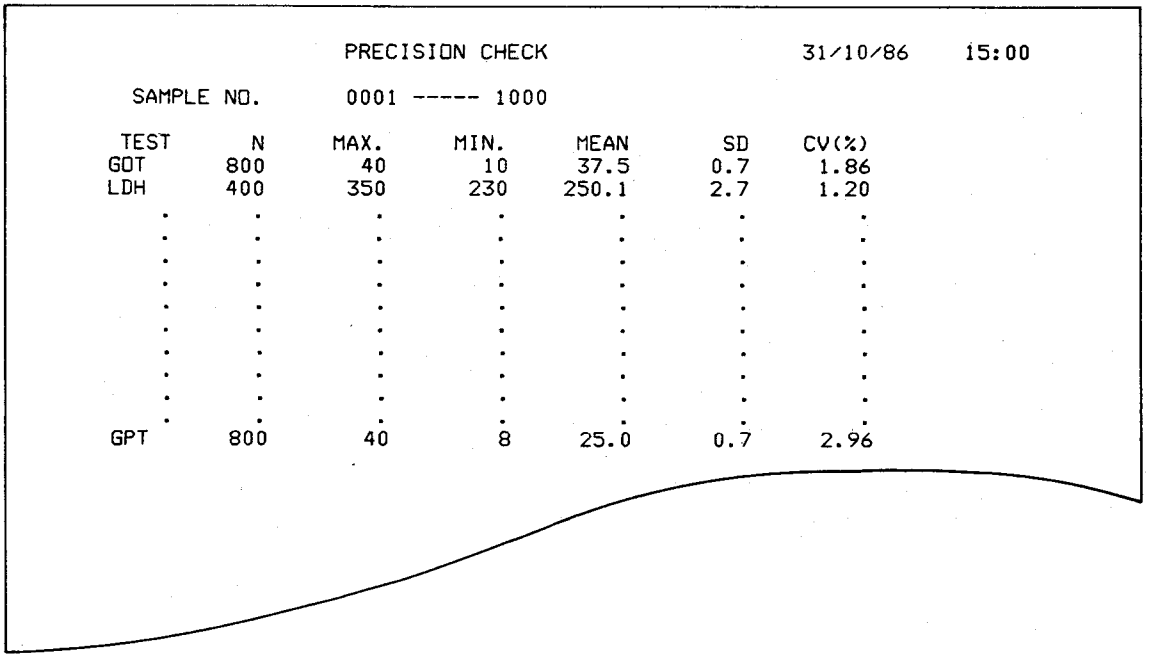
Reaction cuvette number

Note: Water blank data should be zero in principle of photometric analysis. However, to eliminate the user readjustment after replacement of the photometer lamp, a bias of 1000 to 16000 (Abs 0.1 to 1.6) is given to it.

6-12 Report of PRECISION CHECK

The statistical data of routine samples can be printed out for each test as demonstrated below.

Output procedure: On the MAINTENANCE screen, specify the first and final sample numbers for PRECISION CHECK.



PRECISION CHECK 31/10/86 15:00

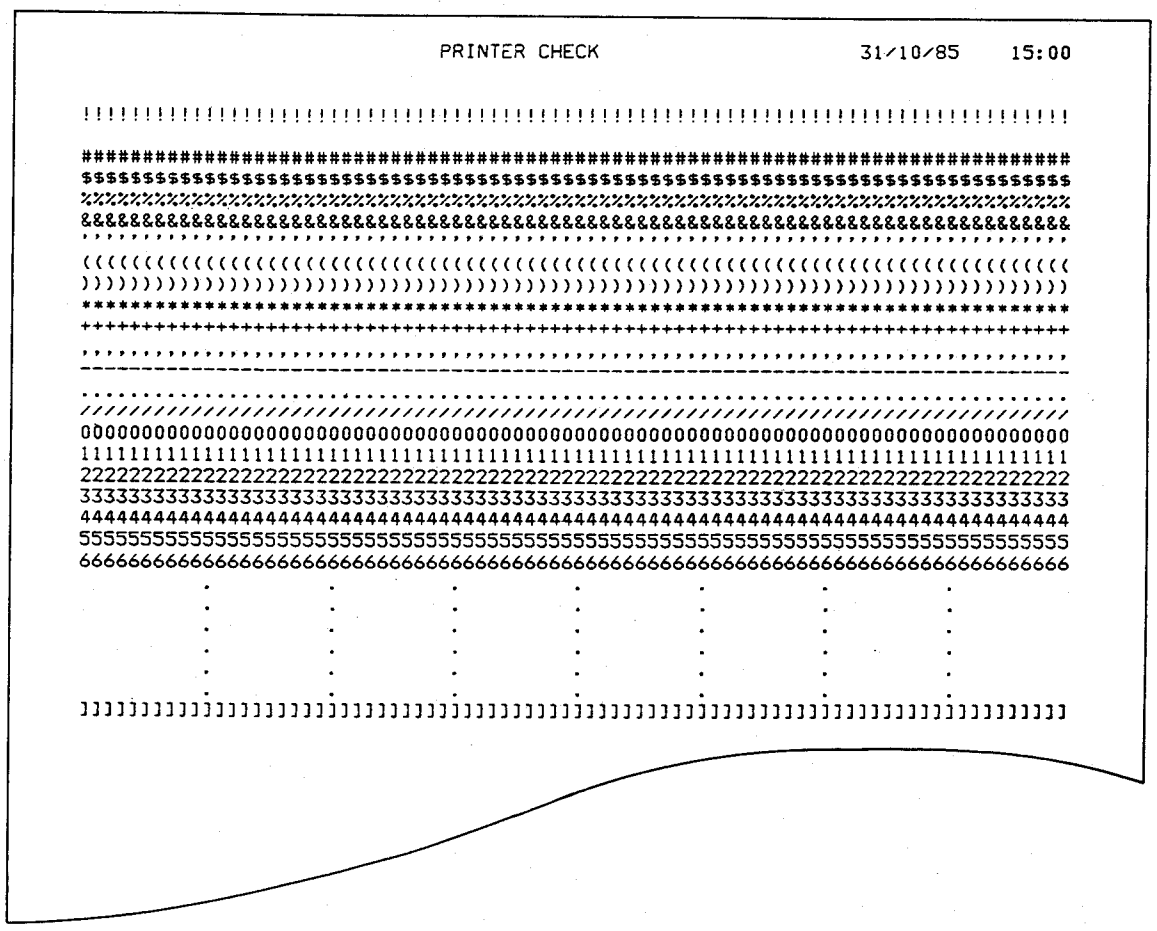
SAMPLE NO. 0001 ----- 1000

TEST	N	MAX.	MIN.	MEAN	SD	CV(%)
GOT	800	40	10	37.5	0.7	1.86
LDH	400	350	230	250.1	2.7	1.20
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
GPT	800	40	8	25.0	0.7	2.96

6-13 Report of PRINTER CHECK

The printer operation can be checked as demonstrated below.

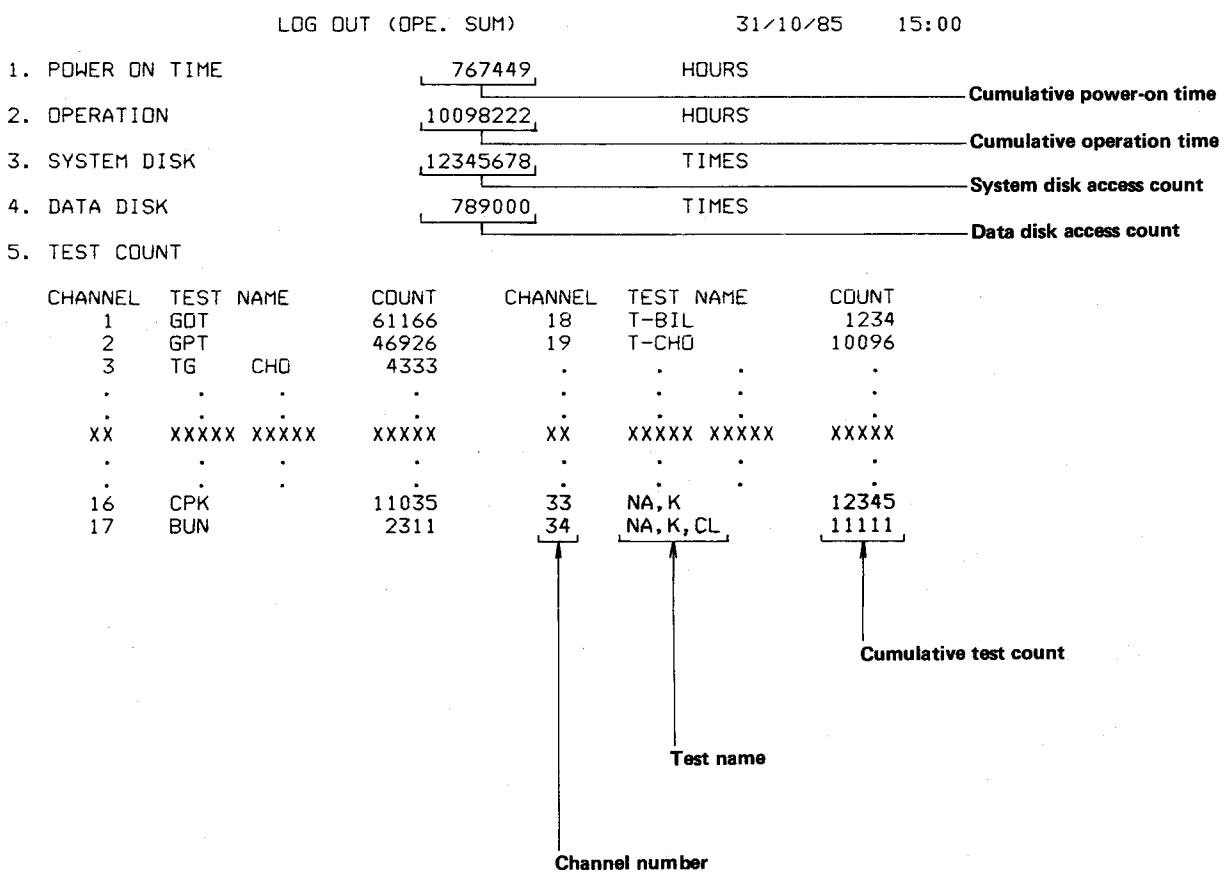
Output procedure: On the MAINTENANCE screen, select '1' for PRINTER CHECK.



6-14 LOG OUT

The log data of cumulative operation time and measurement count for each test can be printed out as demonstrated below.

Output procedure: On the MAINTENANCE screen, specify '3' for LOG OUT.



7. SCREENS

7. SCREENS

7-1 ROUTINE JOB

```
 *** ROUTINE JOB ***
JOB NO. [_]
  1.REAGENT VOLUME CHECK
  2.PATIENT TEST SELECTION
  3.CALIBRATOR & CONTROL TEST SELECTION
  4.RERUN SAMPLES
  5.START CONDITIONS




*** JOB NO.(1-5) & NEXT,BACK
```

7-2 QUALITY CONTROL JOB

```
 *** QUALITY CONTROL JOB ***
JOB NO. [_]
  1.REAL TIME QC
  2.DAILY QC LIST
  3.DAILY QC CHART
  4.CUMULATIVE QC LIST
  5.CUMULATIVE QC CHART




*** JOB NO.(1-5) & NEXT,BACK
```

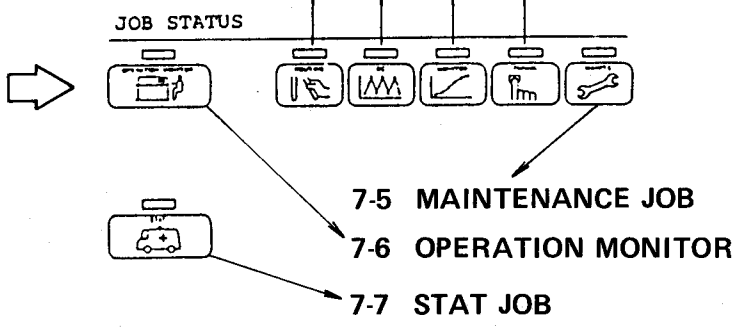
7-3 MONITOR JOB

```
 *** MONITOR JOB ***
JOB NO. [_]
  1.REACTION MONITOR
  2.DATA REVIEW
  3.CALIBRATION LIST
  4.WORKING CURVE (NON-LINEAR)
  5.CALIBRATION TRACE
  6.ISE MONITOR




*** JOB NO.(1-6) & NEXT,BACK
```

7-4 PARAMETER JOB

```
 *** PARAMETER JOB ***
JOB NO. [_ ]
  1.TEST NAME
  2.CHEMISTRY PARAMETERS
  3.ISE PARAMETERS
  4.CHANNEL ASSIGNMENT
  5.PROFILING
  6.CALCULATED TEST
  7.COMPENSATED TEST
  8.SERUM INDEXES
  9.PRINT ORDER
 10.REPORT FORMAT
*** JOB NO.(1-10) & NEXT,BACK
```

```
      HITACHI AUTOMATIC ANALYZER
   COPYRIGHT (C) HITACHI, LTD. 1987

SYSTEM FD VERSION:7176000-02-02
DATA FD VERSION  :7176001-00-01

         JOB SELECTION KEY?
```



7-5 MAINTENANCE JOB

7-6 OPERATION MONITOR

7-7 STAT JOB

7-1-1 REAGENT VOLUME CHECK

REAGENT VOLUME CHECK

CH	R1	R2	CH	R1	R2
1	100	70	17	400	400
2	200	50	18	200	200
3	400	1000	19	100	100
4	100	100	20	200	200
5	100	110	21	110	
6	100	100	22	40	40
7	80	80	23	150	300
8	150	100	24	200	150
9	120		25	150	30
10	130	10	26	30	
11	50	50	27	100	40
12	10		28	90	700
13	70	60	29	400	200
14	150		30	300	300
15	120	120	31	400	
16	200	100	32	30	

CHECK ISE REAGENT VOLUME !

Purpose	To check the remaining volume of reagent.

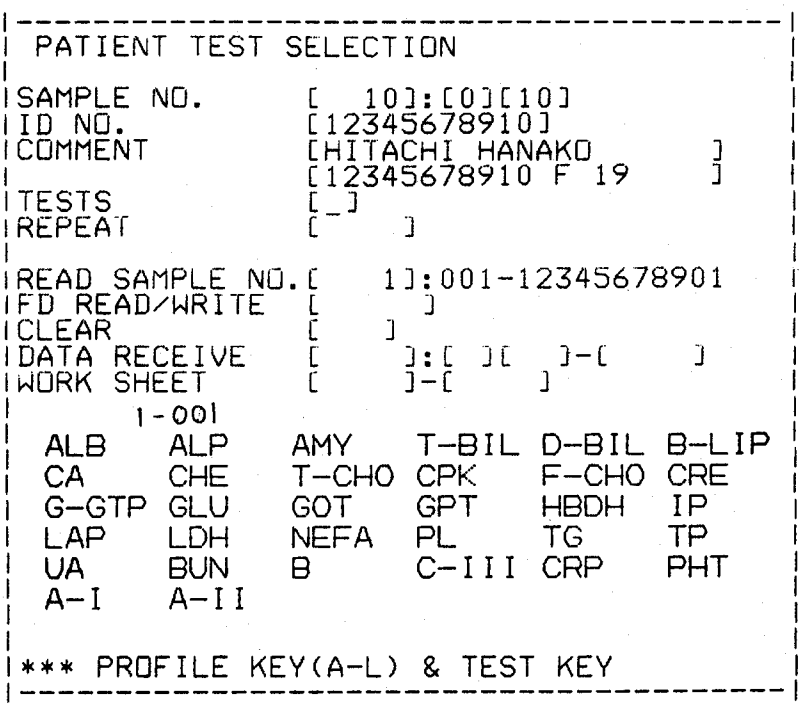
Notes: 1. The remaining volume of reagent is represented in the number of samples. If the count is less than '10', it is truncated.

2. For unused reagent ('0' selected for R1 or R2 VOLUME on the CHEMISTRY PARAMETERS screen) and unspecified test channel (on the CHANNEL ASSIGNMENT screen), the remaining reagent volume is left blank.

3. When the remaining reagent volume count reaches zero (less than ten samples), the alarm message 'REAGENT SHORT' is displayed on the OPERATION MONITOR screen.

4. On completion of each analysis, the remaining reagent volume data is written onto the floppy disk.

7-1-2 PATIENT TEST SELECTION

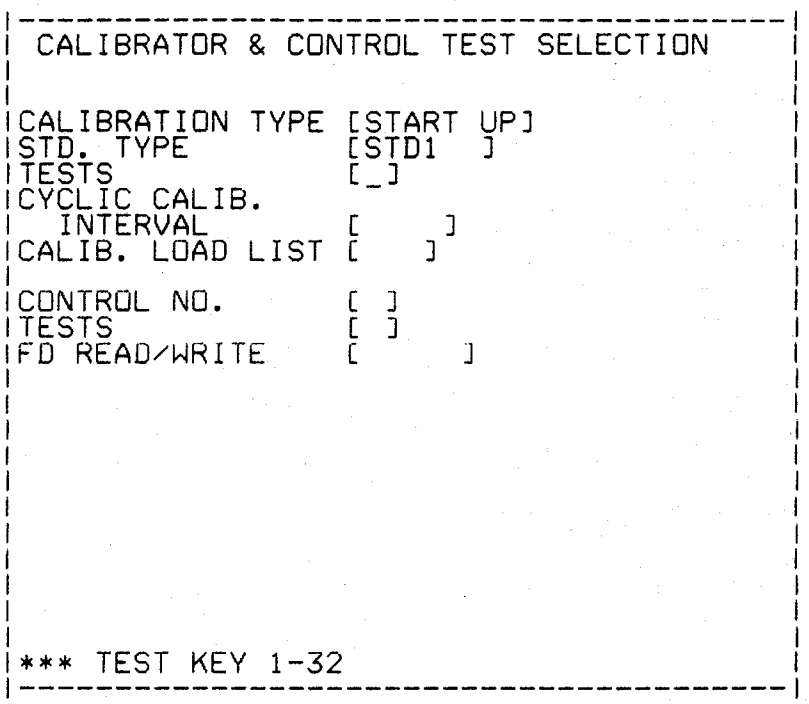


< ITEM >	< COMMENT >
SAMPLE NO.	°*** 1-1000
	°*** DISK NO.0-9
	°*** POSITION NO.0-60(0:S.STOP)
ID NO.	°*** MAX 11 CHARACTERS
COMMENT	°*** 20 CHARACTERS X 2 LINES
TESTS	°*** PROFILE KEY(A-L) & TEST KEY
REPEAT	°*** FINAL S.NO.1-1000 FOR SAME TESTS
READ SAMPLE NO.	°*** 1-1000
FD READ/WRITE	°*** 1:READ 2:WRITE
	°°*** FD READ OK ? (1:YES 0:NO)
	°°*** FD WRITE OK ? (1:YES 0:NO)
CLEAR	°*** 1:YES
	°°*** CLEAR OK ? (1:YES 0:NO)
DATA RECEIVE	°*** FIRST SAMPLE NO. 1-1000
	°*** DISK NO.0-9
	°*** POSITION NO.1-60
	°*** FINAL SAMPLE NO. 1-1000
WORK SHEET	°*** FIRST SAMPLE NO. 1-1000
	°*** FINAL SAMPLE NO. 1-1000

Purpose	To enter and check the test request parameters for routine samples.

Input Item	Key-in Procedure
SAMPLE NO.	1) Key in the sequence number of a routine sample for test request. When the sequence number is entered, the already specified test items are displayed together with the relevant sample disk number, sample position number, sample ID and comment. Also, the relevant profile and test key lamps light up. 2) Enter a sample disk number. 3) Specify a position number of sample disk.
ID NO.	Key in a sample ID. If a sample ID is not necessary, skip over it.
COMMENT	Enter a comment for sample. If no comment is required, skip over it.
TESTS	Specify test request items. Press the desired profile and test keys. After making sure that the lamps of these keys are turned on, hit the ENTER key. Thus, test request items can be specified. On completion of entering test requests, the key-in fields for the next sample are presented (sample number, disk number, position number, sample ID, and comment). Also, the profile and test key lamps light up according to the test item of relevant sample. At this step, the cursor remains at the same position. So, if it is desired to specify test requests for consecutive sample numbers, enter test request items as many times as required. If a disk number or position number is unassigned, the next disk or position number is selected as a default value and displayed in the key-in field.
REPEAT	Used to set up the same test request items in succession. After specifying the test request items for the first sample number in the above manner, enter the final sample number in this key-in field.
READ SAMPLE NO.	Used to display the test names on the screen corresponding to the already specified test request items. Key in a sample number for which it is desired to check the test request item. After the relevant test names are displayed, the cursor remains at the same position. To check the test request items for consecutive sample numbers, press the ENTER key.
FD READ/WRITE	To read the test request data from the floppy disk, select '1:READ'. To write the test request data onto the floppy disk, select '2:WRITE'. After this selection, the prompt message appears asking whether it is really what you want. After reconfirming your selection, key in '1' for yes. Then a read from or write to the floppy disk is carried out.
CLEAR	Used to delete the entire test request data for routine samples. Key in "1" for yes. Then, the message appears confirming your intention. If OK'ed, answer with '1' for yes. Then the entire test item data is removed from the internal main memory. The contents stored on the floppy disk are not cleared through this procedure.
DATA RECEIVE	Where this instrument is hooked up to a host computer system, it can receive the test request data of specified samples. For this data communication, key in the first sample's number, disk number and position number, and the final sample's number in succession.
WORK SHEET	Used to printout a worksheet. Specify a range of sample data to be printed out with the first and final sample numbers.

7-1-3 CALIBRATOR & CONTROL TEST SELECTION

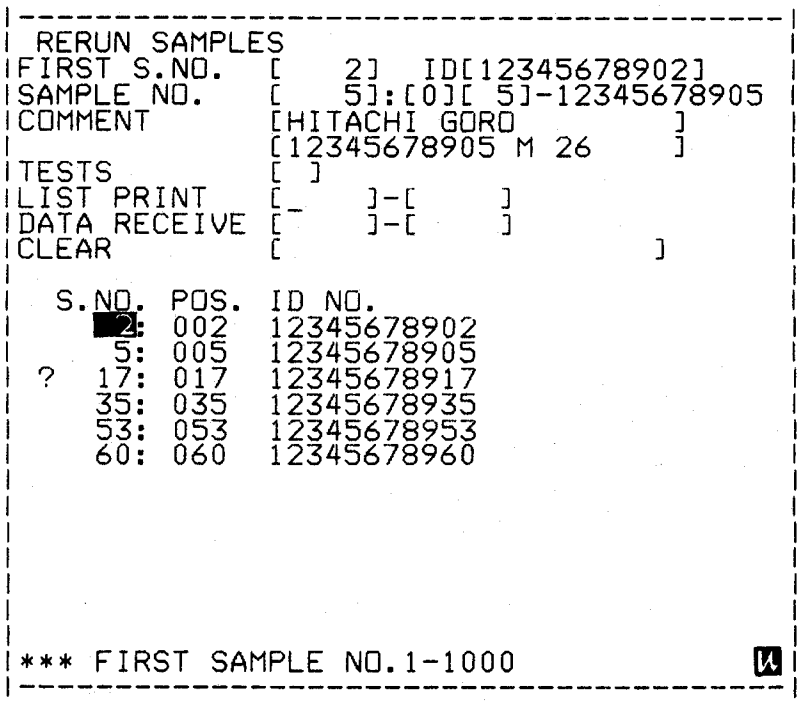


< ITEM >	< COMMENT >
CALIBRATION TYPE	°*** 1:START UP 2:RERUN 3:CYCLIC
STD. TYPE	°*** 1:STD1 2:STD2-6 3:ISE1,2 4:ISE3
TESTS	°*** TEST KEY 1-32
	°*** TEST KEY NA,K/NA,K,CL
CYCLIC CALIB. INTERVAL	°*** MINUTES 5-1000 / 0:NO
CALIB. LOAD LIST	°*** 1:YES
CONTROL NO.	°*** 1-6
TESTS	°*** PROFILE KEY(A-L) & TEST KEY
FD READ/WRITE	°*** 1:READ 2:WRITE
	°°*** FD READ OK ? (1:YES 0:NO)
	°°*** FD WRITE OK ? (1:YES 0:NO)

Purpose	To specify and check the test request parameters of standard and control samples.

Input Item	Key-in Procedure
CALIBRATION TYPE	Select a type of calibration. START UP, RERUN and CYCLIC are selectable.
STD. TYPE	Define a kind of standard sample for which the test request item is to be specified. For the already specified test request item, the relevant profile and test key lamps are turned on.
TESTS	Key in test request items for the above standard sample. Press the desired profile and test keys, and their lamps will light up. Then, hit the ENTER key. Thus, the desired test request item can be set up. On completion of entering a test request, the STD. TYPE key-in field for the next standard sample is presented, and the relevant profile and test key lamps are turned on. Since the cursor remains at the same position, you can specify test request items for the next standard sample in succession.
CYCLIC CALIB. INTERVAL	Used to specify an interval of cyclic calibration in minutes. Key in '0' if it is not desired to carry out cyclic calibration.
CALIB. LOAD LIST	Key in '1' for yes, and the calibration load list is printed out. This list indicates the sample cup position of standard sample for which start-up calibration (test request item) has been specified.
CONTROL NO.	Key in a control serum number for which the test request items are to be assigned. For the already specified test request items, the relevant profile and test key lamps are turned on.
TESTS	Enter test request items for the above control serum sample. Press the desired profile and test keys, and their lamps will light up. Then, tap the ENTER key. On completion of entering test request items, the CONTROL NO. key-in field for the next control serum number is presented, and the relevant profile and test key lamps for the next control sample are turned on. At this step, the cursor remains at the same position. So, set up test request items in succession.
FD READ/WRITE	To read out the test request items from the floppy disk, select '1:READ'. To write the test request items onto the floppy disk, select '2: WRITE'. After this selection, the message appears asking whether the test request items may be read or written. After reconfirmation, answer '1' for yes. Then, a read from the floppy disk or a write onto it is carried out.

7-1-4 RERUN SAMPLES



< ITEM >	< COMMENT >
FIRST S.NO.	°*** FIRST SAMPLE NO.1-1000
ID	°*** MAX 11 CHARACTERS
SAMPLE NO.	°*** 1-1000
	°*** DISK NO.0-9
	°*** POSITION NO.0-60 (0:S.STOP)
COMMENT	°*** 20 CHARACTERS X 2 LINES
TESTS	°*** PROFILE KEY(A-L) & TEST KEY
LIST PRINT	°*** FIRST SAMPLE NO.1-1000
	°*** FINAL SAMPLE NO.1-1000
DATA RECEIVE	°*** FIRST SAMPLE NO.1-1000
	°*** FINAL SAMPLE NO.1-1000
CLEAR	°*** 1:ALL 2:REVERSED S.NO. ONLY
	°°*** CLEAR OK ? (1:YES 0:NO)

Purpose	To specify and check the test request items of rerun samples.

Input Item	Key-in Procedure
FIRST S.NO.	Enter the first sample number for which test request items are to be set up or checked. The lower half of screen presents the test request parameters of 12 samples. It includes the sample numbers, sample disk numbers and sample ID codes of rerun-requested samples and rerun-measured samples. To flip to the next page of this list, press the CONTINUE key.
SAMPLE NO.	1) Key in a rerun sample number for which test request items are to be set up. When a sample number is entered, the already specified sample disk number, sample position number, are displayed together with sample ID, and comment. Also, the relevant profile and test key lamps are turned on. 2) Tap in a sample disk number. 3) Key in a sample position number on sample disk.
COMMENT	Enter a comment for sample. If no comment is required, skip over this parameter.
TESTS	Used for setting up test request items. Press the desired profile and test keys, and their lamps will light up. Then, hit the ENTER key. Thus, the desired test request items can be specified. On completion of entering test request items, the cursor goes to the SAMPLE NO. key -in field. So, if it is desired to set up test request items for the next sample, repeat the above key-in procedure.
LIST PRINT	Used to printout a rerun list onto the printer. Define a range of sample data to be printed out, i.e. specify the relevant first sample number and final sample number.
DATA RECEIVE	Where this instrument is hooked up to an external host computer, it can receive the test request parameters of specified samples. To receive this data, specify the first sample's number, disk number and position number and also the final sample's number in succession.
CLEAR	Used to delete the test request parameters for rerun samples. To remove the test request parameters of all rerun samples, select '1: ALL'. To erase only the test request data of successful rerun samples, select '2: REVERSED S.N. ONLY'. After this selection, the message appears asking if it is really what you want. After reconfirming your intention, answer '1' for yes. Then, the test request data is removed from the internal main memory. Note that the contents of floppy disk are not cleared.

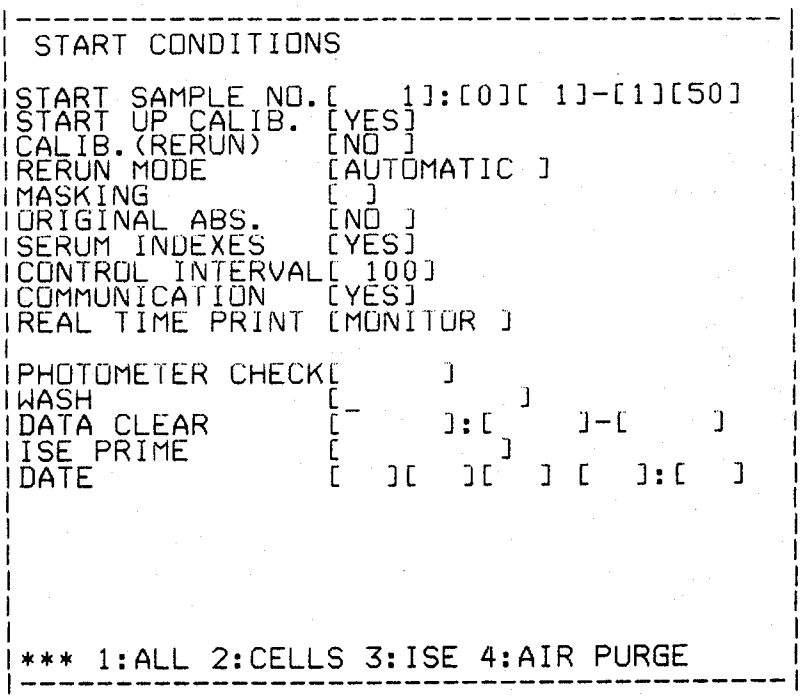
Note: The lower half of screen presents sample numbers as follows:

(1) Sample numbers alone:
Rerun-requested samples after checking of the result of first run.
(e.g. Sample numbers 5, 35, 53, 60)

(2) Sample numbers prefixed with '?':
Rerun-requested samples after checking of the result of rerun measurement.
(e.g. Sample number 17)

(3) Sample numbers highlighted in reverse video:
Rerun-requested samples with no data alarm in rerun measurement.
(e.g. Sample number 2)

7-1-5 START CONDITIONS



< ITEM >	< COMMENT >
START SAMPLE NO.	°*** 1-1000 (DATA CLEAR OK ?)
	°*** DISK NO.0-9
	°*** POSITION NO.1-60
	°*** FINAL DISK NO.0-9
	°*** FINAL POSITION NO.1-60
START UP CALIB.	°*** 1:YES 0:NO
CALIB.(RERUN)	°*** 1:YES 0:NO
RERUN MODE	°*** 1:AUTOMATIC 2:RERUN ONLY 0:NO
MASKING ,	°*** PROFILE KEY(A-L) & TEST KEY
ORIGINAL ABS.	°*** 1:YES 0:NO
SERUM INDEXES	°*** 1:YES 0:NO
CONTROL INTERVAL	°*** BETWEEN SAMPLES 5-1000 / 0:NO
COMMUNICATION	°*** 1:YES 0:NO
REAL TIME PRINT	°*** 1:MONITOR 2:REPORT 0:NO PRINT

Purpose	(1) To set up parameters at the start of analysis. (2) To initiate execution of the routine maintenance program.

Input Item	Key-in Procedure
START SAMPLE NO.	Key in a sample number to be addressed at the start of analysis. Where this instrument is hooked up to a host computer system and 'YES' is specified for the COMMUNICATION parameter, key in the sample disk number and position number of first sample to be measured and also the sample disk number and position number of final sample.
START UP CALIB.	Select 'YES' if it is desired to carry out start-up calibration.
CALIB. (RERUN)	Select 'YES' to carry out re-calibration.
RERUN MODE	Used to select a test mode for rerun. To carry out automatic rerun, select '1: AUTOMATIC'. To conduct rerun only, select '2: RERUN ONLY'. And, if it is not desired to perform rerun, select '0: NO'.
MASKING	Used to deactivate channels from analysis. Press the profile and test keys corresponding to channels to be masked, and their lamps will light up. Then, press the ENTER key. Thus, channels to be deactivated can be specified. Note that this masking is specifiable even during analytical operation.
ORIGINAL ABS.	If you want to check absorbance data measured during reaction process, select 'YES'. Pressing the START key causes analytical operation to start. Concentration values and absorbances measured during the entire reaction process are printed out. For this parameter, only the routine and stat samples are measured.
SERUM INDEXES	If it is desired to obtain serum index data, select 'YES'. Even for a sample whose test is not requested on the SERUM INDEXES channel, the serum index measurement can be carried out. Note, however, that the serum index measurement is not carried out if no test item is specified for the sample.
CONTROL INTERVAL	Used to define an interval of control serum measurement. This parameter is specifiable even during analytical operation. As an interval, key in the number of samples. One standard sample should be counted as '1' in this parameterization. If it is not desired to measure the control serum sample, key in '0'.
COMMUNICATION	Where this instrument is hooked up with an external host computer, select '1: YES' to allow data communication during analytical operation.
REAL TIME PRINT	Used for determining a realtime printout format for test report. Select the monitor or report format. If realtime printout is not required, select '0: NO PRINT'.

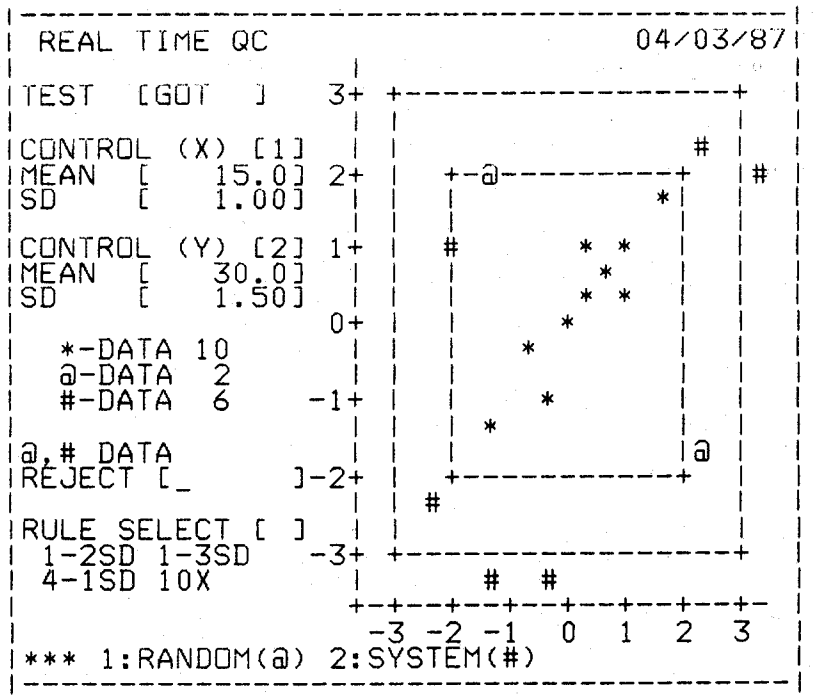
```
START CONDITIONS

START SAMPLE NO.[   1]:[0][01]-[1][50]
START UP CALIB. [YES]
CALIB.(RERUN)   [NO ]
RERUN MODE      [AUTOMATIC ]
MASKING         [ ]
ORIGINAL ABS.   [NO ]
SERUM INDEXES   [YES]
CONTROL INTERVAL[ 100]
COMMUNICATION   [YES]
REAL TIME PRINT [MONITOR ]

PHOTOMETER CHECK[     ]
WASH            [_      ]
DATA CLEAR      [     ]:[     ]-[     ]
ISE PRIME       [      ]
DATE            [  ][  ][  ] [  ]:[  ]




*** 1:ALL 2:CELLS 3:ISE 4:AIR PURGE
```

< ITEM >	< COMMENT >
PHOTOMETER CHECK	°*** 1:START
WASH	°*** 1:ALL 2:CELLS 3:ISE 4:AIR PURGE
	°*** EXCHANGE REAGENT AND PUSH START KEY
DATA CLEAR	°*** 1:NORM 2:RERUN 3:STAT 4:CONT 5:ALL
	°*** NORM 1-1000/RERUN 1-1000/STAT 1-100 CONT 101-630
	°*** DATA CLEAR OK? (1:YES 0:NO)
ISE PRIME	°*** 1:START UP 2:IS,DIL 3:KCL
DATE	°*** DAY 1-31
	°*** MONTH 1-12
	°*** YEAR 0-99
	°*** HOUR 0-23
	°*** MINUTE 0-59

Input Item	Key-in Procedure
PHOTOMETER CHECK	Used to activate the photometer check function. With this parameter specified, water blank absorbances of reaction cuvettes 1 and 119 are measured at all wavelengths, and the mean absorbance value is printed out for checking.
WASH	Used to activate the rinsing function. (1) Entire system rinsing: Set a rinsing solution cup at position W on the sample disk, and place a 100-ml reagent vial containing rinsing solution at channel 32 on the R2 reagent disk. Then, select '1: ALL'. (This is not only main unit but also the daily maintenance for ISE unit.) (2) Photometric system rinsing: To rinse only the photometric system in the instrument equipped with the electrolyte measurement unit, select '2: CELLS'. (3) ISE system rinsing: To perform the monthly maintenance for the ISE system in the instrument equipped with the ISE unit, select '3: ISE'. (4) Air purging: To deaerate the flow paths of sampling pipetter, reagent pipetter, sampling probe, reagent probe, and stirrer rinsing bath, select '4: AIR PURGE'.
DATA CLEAR	Used for deleting the test result data. Key in the sample type of data to be deleted (routine, rerun, stat, control), and then specify a range of data to be erased, using sample numbers. For elimination of data of control samples, define a data range to be deleted as follows: 101 to 130, 201 to 230, ..., 601 to 630 To clear the measured data of all types of samples, select '4: ALL'.
ISE PRIME	Used to substitute a new ISE reagent. This parameter is valid only where the instrument is equipped with the ISE unit.
DATE	Enter day, month, year, hours, and minutes in that order.

7-2 QUALITY CONTROL JOB Screens

7-2-1 REAL TIME QC



< ITEM >	< COMMENT >
TEST	°*** TEST CODE 1-43
CONTROL(X)	°*** 1-6
MEAN	°*** CONTROL VALUE
SD	°*** CONTROL VALUE
CONTROL(Y)	°*** 1-6
MEAN	°*** CONTROL VALUE
SD	°*** CONTROL VALUE
@,# DATA REJECT	°*** 1:RANDOM(@) 2:SYSTEM(#)
	°°*** DELETE OK? (1:YES 0:NO)
RULE SELECT	°*** RULE 1-2SD (1:YES 0:NO)
	°*** RULE 1-3SD (1:YES 0:NO)
	°*** RULE 2-2SD (1:YES 0:NO)
	°*** RULE R-4SD (1:YES 0:NO)
	°*** RULE 4-1SD (1:YES 0:NO)
	°*** RULE 10X (1:YES 0:NO)

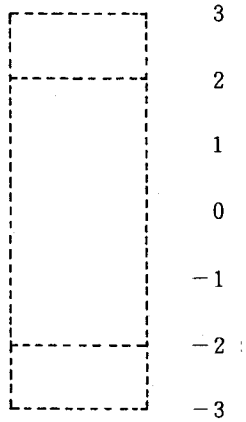
Purpose	To display the quality control data of twin plot in realtime.

Input Item	Key-in Procedure
TEST	Key in a test code (1 to 43) corresponding to the quality control data to be displayed.
CONTROL (X)	Enter a control serum number (1 to 6) to be assigned to X axis.
MEAN	Specify the mean value of control sample (X).
SD	Assign the target SD value of control sample (X).
CONTROL (Y)	Enter a control number (1 to 6) to be assigned to Y axis.
MEAN	Specify the mean value of control sample (Y).
SD	Specify the target SD value of control serum sample (Y).
***-DATA**	This mark is indicated to represent a normal data count.
@-DATA	This mark is indicated to represent a random error count.
#-DATA	This mark is indicated to represent a systematic error count.
@, #DATA REJECT	Used for clearing random errors (key in '1') or systematic errors (key in '2').
RULE SELECT	Used for selecting a quality control rule. Six kinds of rules are selectable. On completion of selection, the specified rules are displayed on the screen.

Notes: 1. For parameter input of CONTROL(X), (Y), MEAN, SD, @, #DATA REJECT, preassignment of a test code is required. If no test code is preassigned, an error is indicated.

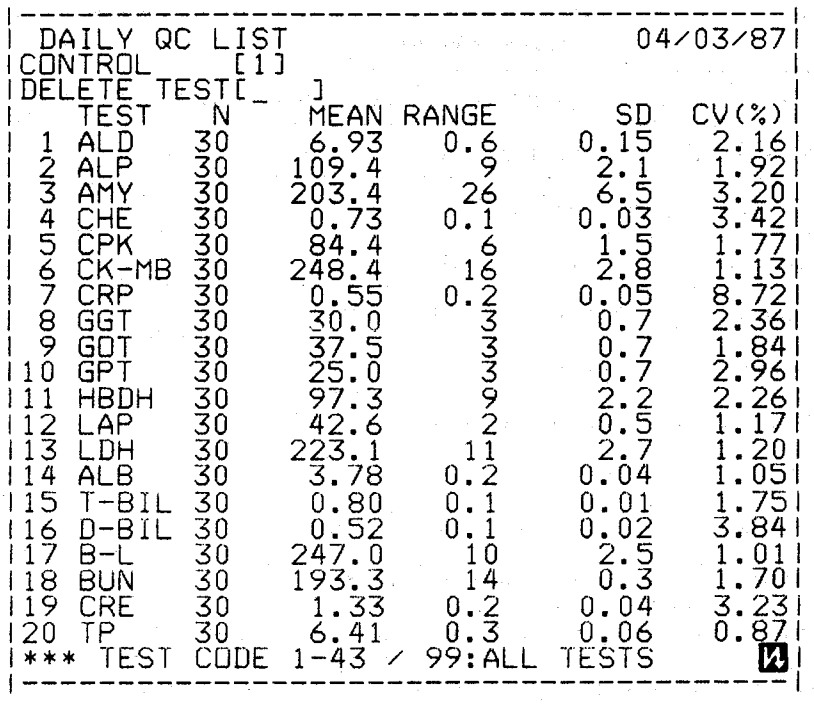
2. The values on X and Y axes indicate –3SD, –2SD, ..., 3SD.

3. The SD evaluation is carried out as shown below.



$10/3SD \leqq x$	
$3SD \leqq x < 10/3SD$	QC line
$8/3SD \leqq x < 3SD$	
$7/3SD \leqq x < 8/3SD$	
$2SD \leqq x < 7/3SD$	QC line
$5/3SD \leqq x < 2SD$	
$4/3SD \leqq x < 5/3SD$	
$1SD \leqq x < 4/3SD$	
$2/3SD \leqq x < 1SD$	
$1/3SD \leqq x < 2/3SD$	
$-1/3SD < x < 1/3SD$	
$-2/3SD \leqq x \leqq -1/3SD$	
$-1SD < x \leqq -2/3SD$	
$-4/3SD < x \leqq -1SD$	
$-5/3SD < x \leqq -4/3SD$	
$-2SD < x \leqq -5/3SD$	
$-7/3SD < x \leqq -2SD$	QC line
$-8/3SD < x \leqq -7/3SD$	
$-3SD < x \leqq -8/3SD$	
$-10/3SD \leqq x \leqq -3SD$	QC line
$x < -10/3SD$	

7-2-2 DAILY QC LIST



DAILY QC LIST 04/03/87

CONTROL [1]

DELETE TEST[_]

	TEST	N	MEAN	RANGE	SD	CV(%)
1	ALD	30	6.93	0.6	0.15	2.16
2	ALP	30	109.4	9	2.1	1.92
3	AMY	30	203.4	26	6.5	3.20
4	CHE	30	0.73	0.1	0.03	3.42
5	CPK	30	84.4	6	1.5	1.77
6	CK-MB	30	248.4	16	2.8	1.13
7	CRP	30	0.55	0.2	0.05	8.72
8	GGT	30	30.0	3	0.7	2.36
9	GOT	30	37.5	3	0.7	1.84
10	GPT	30	25.0	3	0.7	2.96
11	HBDH	30	97.3	9	2.2	2.26
12	LAP	30	42.6	2	0.5	1.17
13	LDH	30	223.1	11	2.7	1.20
14	ALB	30	3.78	0.2	0.04	1.05
15	T-BIL	30	0.80	0.1	0.01	1.75
16	D-BIL	30	0.52	0.1	0.02	3.84
17	B-L	30	247.0	10	2.5	1.01
18	BUN	30	193.3	14	0.3	1.70
19	CRE	30	1.33	0.2	0.04	3.23
20	TP	30	6.41	0.3	0.06	0.87

*** TEST CODE 1-43 / 99:ALL TESTS

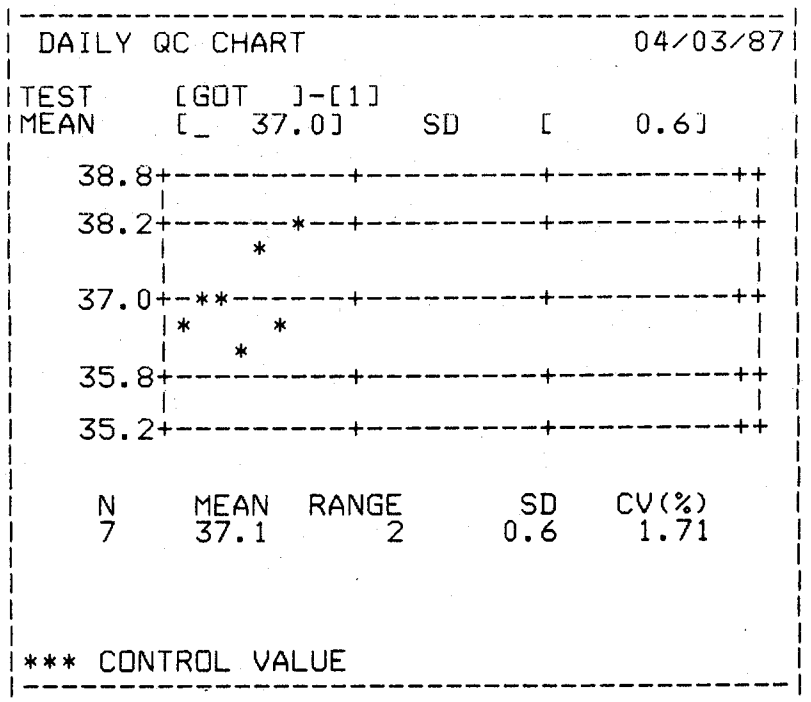
< ITEM >	< COMMENT >
CONTROL	°*** 1-6
DELETE TEST	°*** TEST CODE 1-43 / 99:ALL TESTS
	°°*** DELETE OK? (1:YES 0:NO)

Purpose	To display a list of daily quality control data.

Input Item	Key-in Procedure
CONTROL	Key in a control serum number (1 to 6) corresponding to the daily quality control data to be displayed. To flip to the next page of quality control list (containing 20 items), press the CONTINUE key.
DELETE TEST	Used for clearing the control data. With this parameter, you can clear all data of one control serum or data of one test.

Note: After a control number is entered, the message 'QC CALCULATING' is displayed until the quality control calculation is completed for it.

7-2-3 DAILY QC CHART

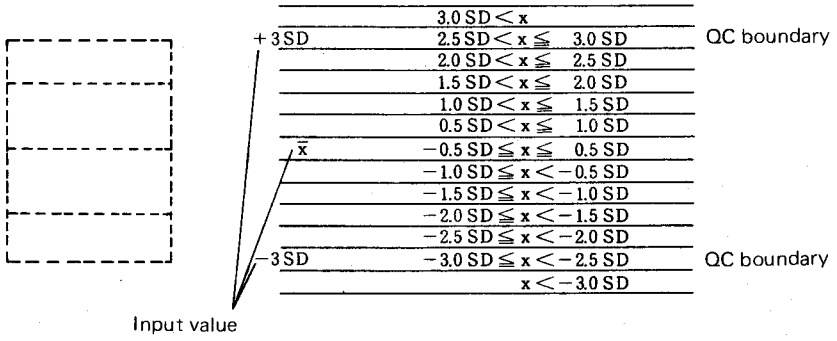


< ITEM >	< COMMENT >
TEST	°*** TEST CODE 1-43 °*** CONTROL (1-6)
MEAN	°*** CONTROL VALUE
SD	°*** CONTROL VALUE

Purpose	To display the daily quality control chart.

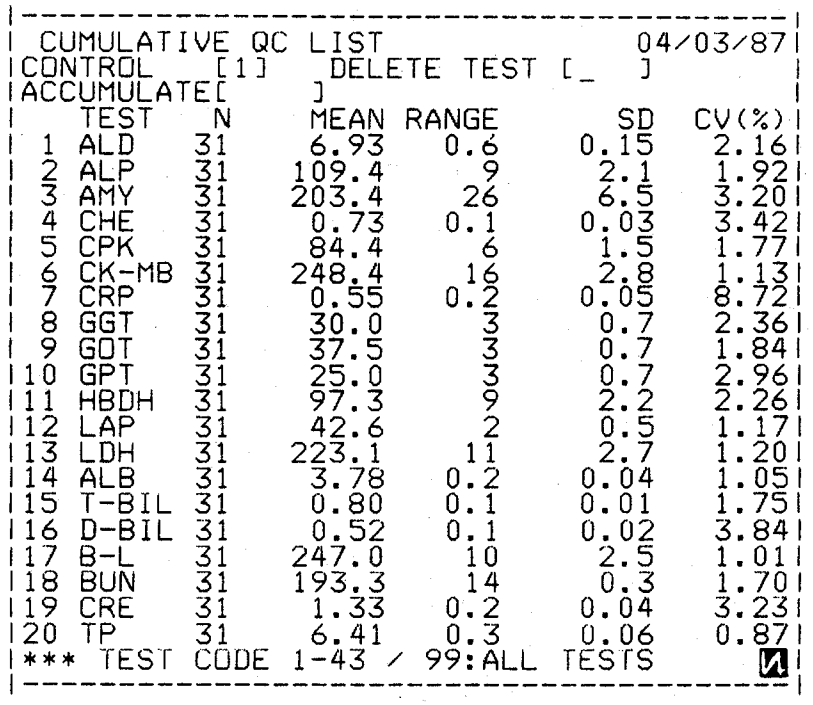
Input Item	Key-in Procedure
TEST	Key in a test code (1 to 43) corresponding to the daily quality control data to be charted. For the specified test, key in a control serum number (1 to 6) to be addressed for charting.
MEAN	Enter a mean value for plotting $\bar{X}$ quality control line to be displayed.
SD	Define the target SD value for plotting quality control boundaries.

Notes: 1. 0.5SD is assigned as a gradient on graph (defined using input SD value). If ±3SD is exceeded, plotting is made out of the quality control boundaries. The quality control boundaries are determined as shown below.



2. The lower part of screen presents statistical data used for plotting.

7-2-4 CUMULATIVE QC LIST



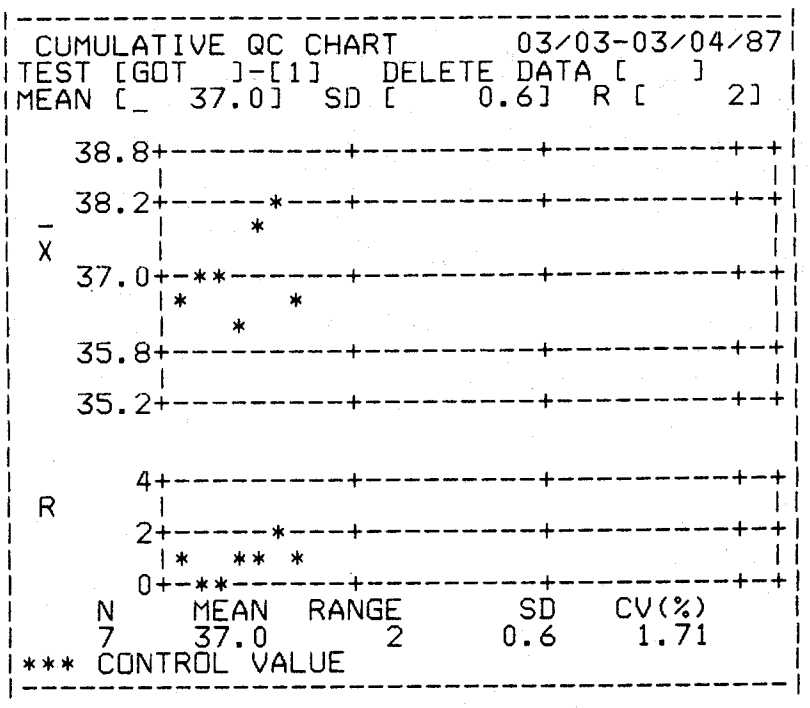
```
 CUMULATIVE QC LIST                    04/03/87
CONTROL    [1]    DELETE TEST [_   ]
ACCUMULATE[     ]
    TEST    N     MEAN  RANGE      SD   CV(%)
 1 ALD     31     6.93    0.6    0.15    2.16
 2 ALP     31    109.4      9     2.1    1.92
 3 AMY     31    203.4     26     6.5    3.20
 4 CHE     31     0.73    0.1    0.03    3.42
 5 CPK     31     84.4      6     1.5    1.77
 6 CK-MB   31    248.4     16     2.8    1.13
 7 CRP     31     0.55    0.2    0.05    8.72
 8 GGT     31     30.0      3     0.7    2.36
 9 GOT     31     37.5      3     0.7    1.84
10 GPT     31     25.0      3     0.7    2.96
11 HBDH    31     97.3      9     2.2    2.26
12 LAP     31     42.6      2     0.5    1.17
13 LDH     31    223.1     11     2.7    1.20
14 ALB     31     3.78    0.2    0.04    1.05
15 T-BIL   31     0.80    0.1    0.01    1.75
16 D-BIL   31     0.52    0.1    0.02    3.84
17 B-L     31    247.0     10     2.5    1.01
18 BUN     31    193.3     14     0.3    1.70
19 CRE     31     1.33    0.2    0.04    3.23
20 TP      31     6.41    0.3    0.06    0.87
*** TEST CODE 1-43 / 99:ALL TESTS
```

< ITEM >	< COMMENT >
CONTROL	°*** 1-6
DELETE TEST	°*** TEST CODE 1-43 / 99:ALL TESTS
	°°*** DELETE OK? (1:YES 0:NO)
ACCUMULATE	($\bar{X}$-R)°*** 1:YES
	(X-R)°*** DATA NO.1-30 / 99:MEAN
	°°*** ACCUMULATE OK? (1:YES 0:NO)

Purpose	To display a list of cumulative quality control data.

Input Item	Key-in Procedure
CONTROL	Key in a control serum number (1 to 6) corresponding to the cumulative quality control data to be displayed. To advance to the next page of cumulative quality control data (containing 20 items), press the CONTINUE key.
DELETE TEST	Used for clearing all data of one control serum or data of one test. Note that an input error is indicated if other test item number than those displayed on the screen is specified for the test item parameter (1 to 43).
ACCUMULATE	Specify this parameter if it is desired to accumulate daily variation data of one control serum to day-to-day variation data.

7-2-5 CUMULATIVE QC CHART



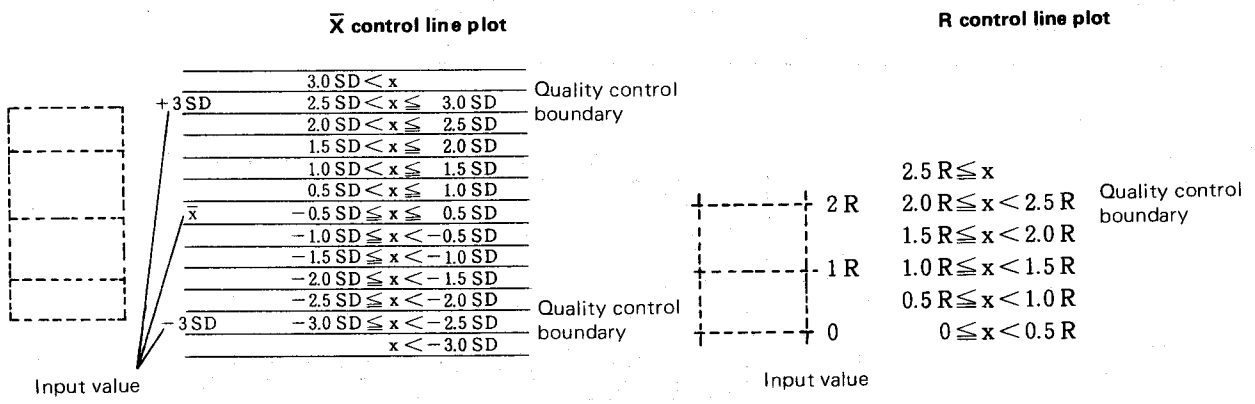
< ITEM >	< COMMENT >
TEST	°*** TEST CODE 1-43 °*** CONTROL (1-6)
DELETE DATA	°*** DATA NO. 1-31 / 99:ALL DATA °°*** DELETE OK? (1:YES 0:NO)
MEAN	°*** CONTROL VALUE
SD	°*** CONTROL VALUE
R	°*** CONTROL VALUE

Purpose	To display a cumulative quality control chart.

Input Item	Key-in Procedure
TEST	Enter a test code (1 to 43) corresponding to the cumulative quality control data to be charted. For the specified test item, key in a control serum number (1 to 6) to be addressed in charting.
DELETE DATA	Used for clearing data. To eliminate the particular day's data, key in any one of '1' to '31'. To eliminate all data of 31 days, key in '99'.
MEAN	Specify a mean value to be used for $\bar{X}$ quality control line plotting.
SD	Enter the target SD value to be used for quality control boundary plotting.
R	Enter a value of data range to be applied for R control line plotting.

Notes: 1. Up to 31 days of QC data can be stored. If '31' is exceeded, the entire data is popped up to force the first day's data out of memory. Thus, new data is stored.

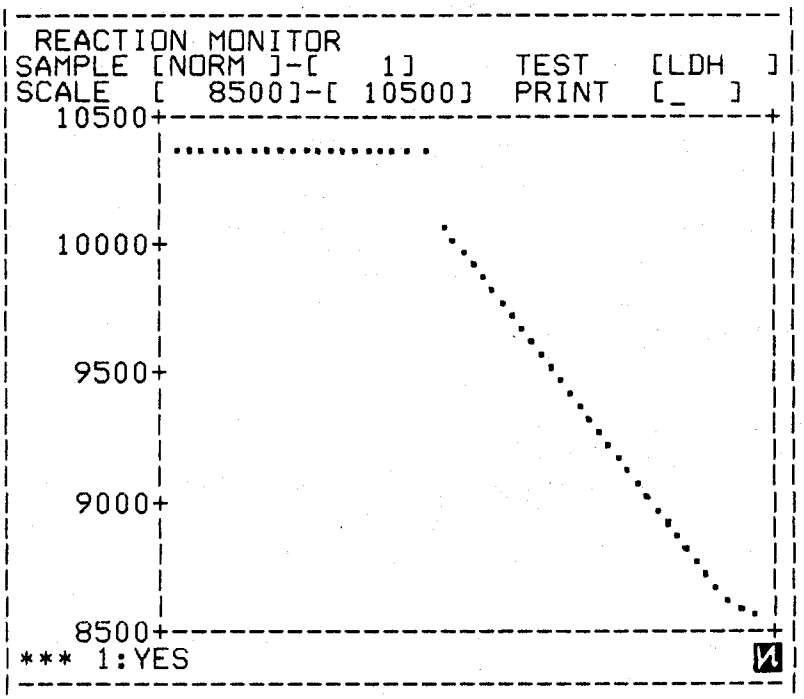
2. In each graph, 0.5SD per scale is used for $\bar{X}$ and 0.5 RANGE per scale for R. These are defined by input SD and R values. If ±3SD is exceeded for $\bar{X}$ or 2.5R is exceeded for R, plotting is made out of the quality control boundaries. Illustrated below is how the quality control boundaries are determined.



3. The lower part of screen presents statistical data used for plotting.

4. When (X-R) quality control is specified, the R quality control line is not plotted.

7-3-1 REACTION MONITOR



< ITEM >	< COMMENT >
SAMPLE	°*** 1:NORM 2:RERUN 3:STAT 4:CONT 5:STD
	°*** 1-1000
	°*** 1-1000
	°*** 1-100
	°*** 101-630
	°*** 11,12,21,22,31,32,41,42,51,52,61,62
TEST	°*** TEST CODE 1-40
SCALE	°*** MIN. LEVEL ABS. (-40000 - 40000)
	°*** MAX. LEVEL ABS. (-40000 - 40000)
PRINT	°*** 1:YES

Purpose	To display the reaction time course of test graphically.

Input Item	Key-in Procedure
SAMPLE	Key in a sample type and number corresponding to the test to be displayed. Type of sample specifiable: 1: Routine sample 2: Rerun sample 3: Stat sample 4: Control sample 5: Standard solution sample
TEST	Enter a test code to be displayed. If the same sample or same test item has been measured repeatedly, data can be displayed in reverse chronological sequence using the CONTINUE key. The test with alarm takes precedence over those without alarm.
SCALE	Specify a scale width (upper and lower limits) on the axis of ordinate (Abs).
PRINT	With this parameter, the on-screen raw absorbance and cell blank values can be printed out.

Notes: 1. If the raw data exceeds the specified upper limit, plotting is made at the level of upper limit. And, if it exceeds the specified lower limit, plotting is made at the level of lower limit.

2. Listed below are the time durations at respective photometric points.

Photometric Point	Time Duration (sec.)	Time Interval (sec.)	Remarks	Photometric Point	Time Duration (sec.)	Time Interval (sec.)	Remarks
1	0.00	Approx. 11.87	Sample/R1 discharged R1 stirred	26	294.72	Approx. 11.87	
2	11.87			27	306.59		
3	23.74			28	318.46		
4	35.60			29	330.33		
5	47.47			30	342.20		
6	59.34			31	354.07		
7	71.21			32	365.93		
8	83.08			33	377.80		
9	94.95			34	389.67		
10	106.81			35	401.54		
11	118.68			36	413.41		
12	130.55			37	425.28		
13	142.42			38	437.14		
14	154.29			39	449.01		
15	166.16			40	460.88		
16	178.02			41	472.75		
17	189.89			42	484.62		
18	201.76			43	496.49		
19	213.63			44	508.35		
20	225.50			45	520.22		
21	237.37			46	532.09		
22	249.23			47	543.96		
23	261.10	Approx. 11.87		48	555.83		
24	272.97	Approx. 9.89		49	567.70	Approx. 11.87	
25	282.86		R2 discharged R2 stirred	50	579.56		

3. Key-in format for STD sample:

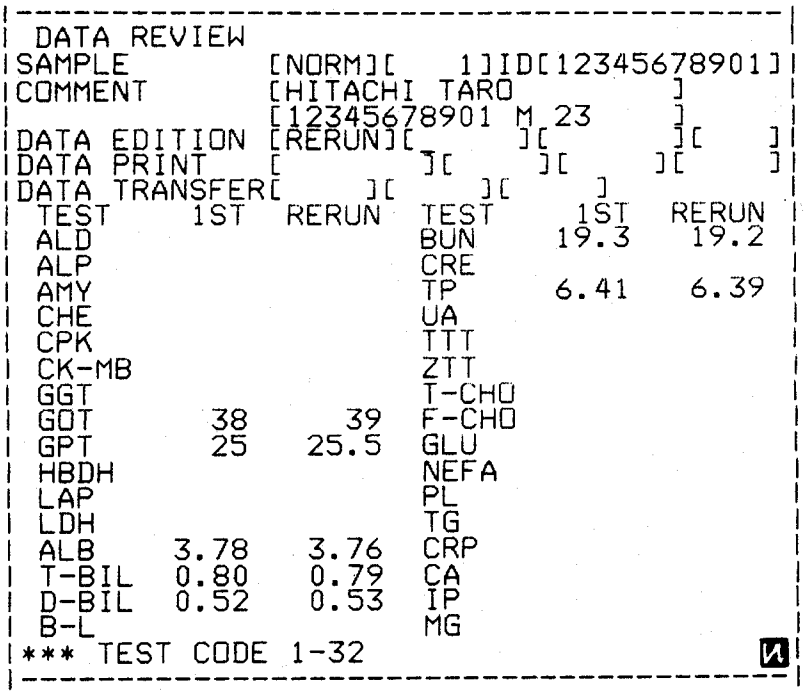
(Example) 1 1

1 — STD (1)

1 — Data in the first sampling

4. This instrument is capable of storing standard sample data (with alarm) of 100 tests, non-standard sample data (with alarm) of 100 tests, and any sample data (without alarm) of 100 tests. That is, it can store sample data of 300 tests in total. If 100 tests are exceeded in each sample data storing, the instrument cannot display the preceding data.
Also, if the instrument is powered off, it results in all stored sample data being cleared.

7-3-2 DATA REVIEW



```
 DATA REVIEW
SAMPLE          [NORM][   1]ID[12345678901]
COMMENT         [HITACHI TARO             ]
                [12345678901 M 23         ]
DATA EDITION    [RERUN][      ][         ][    ]
DATA PRINT      [      ][      ][      ][      ]
DATA TRANSFER[      ][      ][      ]
 TEST     1ST   RERUN   TEST     1ST   RERUN
 ALD                    BUN     19.3   19.2
 ALP                    CRE
 AMY                    TP      6.41   6.39
 CHE                    UA
 CPK                    TTT
 CK-MB                  ZTT
 GGT                    T-CHO
 GOT       38     39    F-CHO
 GPT       25   25.5    GLU
 HBDH                   NEFA
 LAP                    PL
 LDH                    TG
 ALB     3.78   3.76    CRP
 T-BIL   0.80   0.79    CA
 D-BIL   0.52   0.53    IP
 B-L                    MG
*** TEST CODE 1-32                        M
```

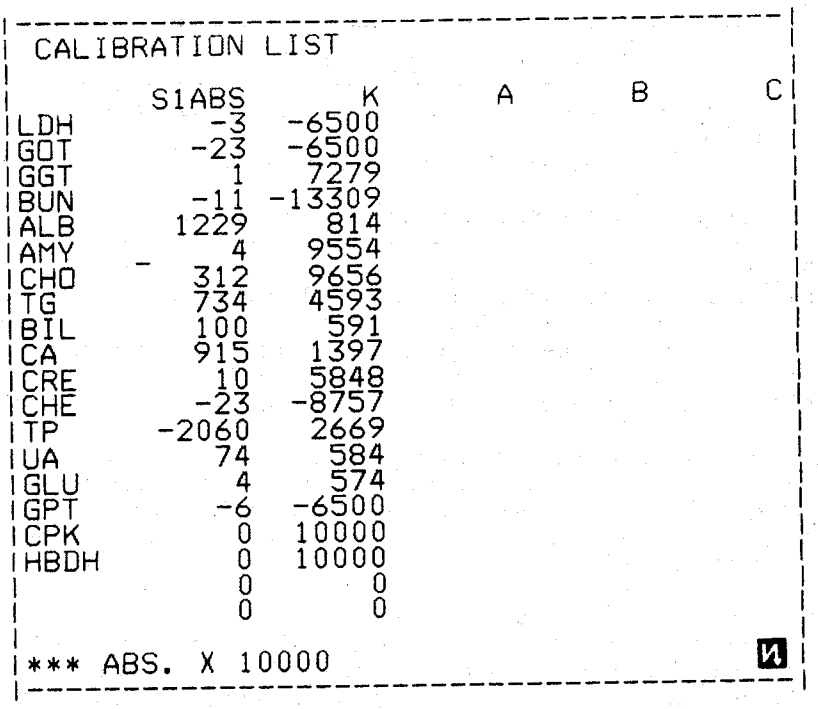
< ITEM >	< COMMENT >
SAMPLE	° *** 1:NORM 2:STAT 3:CONT
	° *** NORM 1-1000/STAT 1-100/CONT 101-630
ID	° *** MAX 11 CHARACTERS
COMMENT	° *** 20 CHARACTERS X 2 LINES
DATA EDITION	° *** 1:1ST 2:RERUN
	° *** TEST CODE 1-32
	° *** TEST CODE 33-46
	° *** DATA / SP KEY (DELETE)
	° *** 1:SAVE(S) 2:RERUN→1ST & SAVE(E/S)
	° ° *** SAVE OK ? (1:YES 0:NO)
	° ° *** RERUN-1ST & SAVE OK ? (1:YES 0:NO)
DATA PRINT	° *** FORMAT 1:MONITOR 2:REPORT
	° *** 1:ALL 2:EDIT
	° *** FIRST SAMPLE NO. (1-1000)
	° *** FIRST SAMPLE NO. (1-100)
	° *** FIRST SAMPLE NO. (101-630)
	° *** FINAL SAMPLE NO. (1-1000)
	° *** FINAL SAMPLE NO. (1-100)
	° *** FINAL SAMPLE NO. (101-630)
DATA TRANSFER	° *** 1:ALL 2:EDIT
	° *** FIRST SAMPLE NO. (1-1000)
	° *** FIRST SAMPLE NO. (1-100)
	° *** FIRST SAMPLE NO. (101-630)
	° *** FINAL SAMPLE NO. (1-1000)
	° *** FINAL SAMPLE NO. (1-100)
	° *** FINAL SAMPLE NO. (101-630)

Purpose	To check, edit and print out data, and transfer it to an external host computer system.

Input Item	Key-in Procedure
SAMPLE	Key in sample types and numbers in succession. The results of 32 tests can be displayed on the screen. To flip to the next page of measured result data, press the CONTINUE key.
COMMENT	Enter a comment for sample. If not required, skip over this parameter.
DATA EDITION	Used for editing data. First, specify a kind of data to be edited (first result: 1ST, rerun result: RERUN). Then, key in a test code of data to be edited. Alter, add or delete data as required. (Note that entry of a decimal point is not allowed for serum index data.) For routine and stat samples, the original test result of at least one test is required for data input. Finally, save the edited data. To save the current on-screen data intact, select '1: SAVE(S)'. To replace the first test result with the rerun test result and save the latter, select '2: RERUN → 1ST & SAVE (E/S). After this selection, the message appears asking if it is really what you want. After reconfirmation, key in '1' for yes. Then, data saving is carried out.
DATA PRINT	Used for producing report onto the printer. First, define a printout format. Then, determine whether all patient reports (included in a range to be specified) or only the edited patient reports are to be printed out. Finally, to specify a range of printout, key in the printout starting sample number and printout ending sample number.
DATA TRANSFER	Used for sending data to a host computer system. First, determine whether all patient reports (included in the transfer range to be specified) or only the edited patient reports are to be transferred. Then, key in the transfer starting sample number and transfer ending sample number.

Note: Acceptance of other parameters than 'SAMPLE' is valid only when the instrument is in a standby state.

7-3-3 CALIBRATION LIST



CALIBRATION LIST

	S1ABS	K	A	B	C
LDH	-3	-6500			
GOT	-23	-6500			
GGT	1	7279			
BUN	-11	-13309			
ALB	1229	814			
AMY	4	9554			
CHO	312	9656			
TG	734	4593			
BIL	100	591			
CA	915	1397			
CRE	10	5848			
CHE	-23	-8757			
TP	-2060	2669			
UA	74	584			
GLU	4	574			
GPT	-6	-6500			
CPK	0	10000			
HBDH	0	10000			
	0	0			
	0	0			

*** ABS. X 10000

< ITEM >	< COMMENT >
S1ABS	*** ABS. X 10000
K	*** FACTOR K
A	*** FACTOR A
B	*** FACTOR B
C	*** FACTOR C

Purpose	To display the results of calibration.

Input Item	Key-in Procedure
S1ABS	This column indicates reagent blank absorbances measured in calibration of each test item. It is allowed to enter altered data.
K	Indicates the K factor value in calibration of each test item. It is allowed to enter the K factor value.
A	Indicates the factor A in nonlinear calibration or the isozyme residual activity rate A.
B	Indicates the factor B in nonlinear calibration or the isozyme residual activity rate B.
C	Indicates the factor C in nonlinear calibration.

Notes: 1. The calibration results are displayed in ascending order of test codes. The calibration list of first 20 tests is presented on the first page. To flip to the calibration list of second 20 tests, press the CONTINUE key.

2. The input/output ranges in respective calibration modes are listed below.

Input/Output Ranges in Respective Calibration Modes

Mode \ Parameter	S1ABS	K	A	B	C
Linear	○	○	△	△	△
	○	○			
K factor	○	○	△	△	△
	○	○			
Nonlinear (model 1)	○	○	△	△	△
	○	○	△	△	
Nonlinear (model 2)	○	○	△	△	△
	○	○	△	△	△
Nonlinear (model 3)	○	△	△	△	△
	○	△	△	△	△
Nonlinear (model 4)	○	○	△	△	△
	○				
Isozyme P	○	○	△	△	△
	○	○			
Isozyme Q	○	○	□	□	△
	○	○	□	□	

Upper row: Key input and its indication
Lower row: Indication after calibration

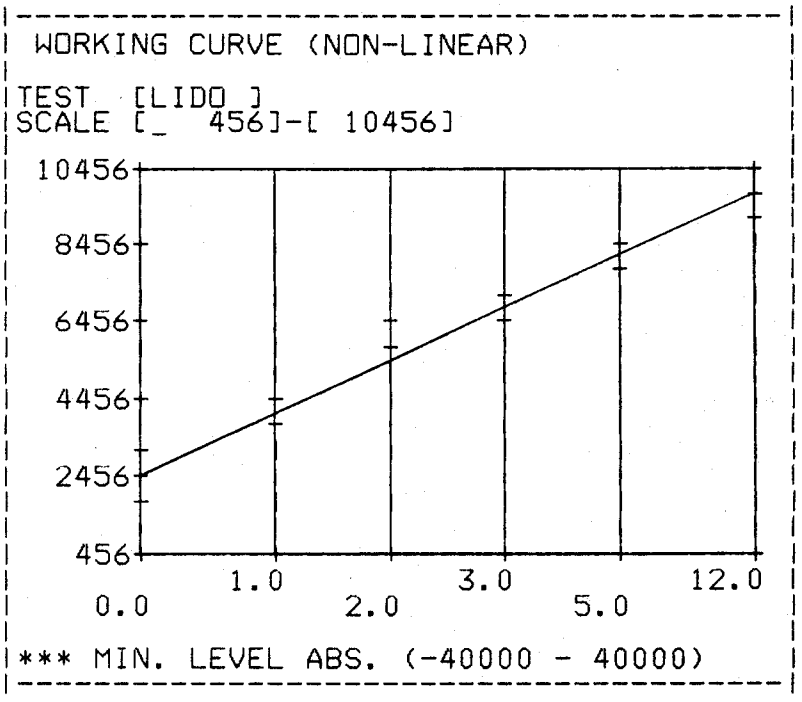
○ : Signed six-digit integer value

△ : Signed six-digit real value with decimal point

□ : Signed six-digit real value with decimal point; down to the third decimal digit

: Blank space

7-3-4 WORKING CURVE (NON-LINEAR)



< ITEM >	< COMMENT >
TEST	°*** TEST CODE 1-40
SCALE	°*** MIN. LEVEL ABS. (-40000 - 40000)
	°*** MAX. LEVEL ABS. (-40000 - 40000)

Purpose	To present a graphic chart of calibration results.

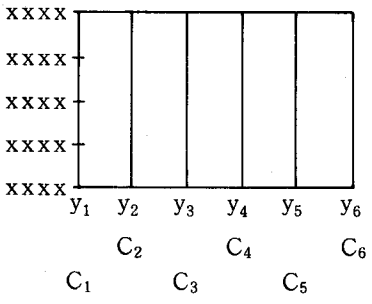
Input Item	Key-in Procedure
TEST	Key in a test code (1 to 40) of the data to be displayed graphically.
SCALE	Enter the upper and lower limits on the axis of ordinate (Abs).

Notes: 1. If the lower limit value is larger than or equal to the upper limit value, a working curve is cleared.

2. If less than six standards are used, a graphic chart is developed in the same screen size using only the specified number of standards.

3. The scaling on the axis of abscissa is as follows.
(Example: Number of standards = 6)

Using the mathematical function Yn = F (a, b, c, C$\acute{h}$) (n = 1 ~ 6), $Y_1 \sim Y_6$ are determined.



Then, $Yn = \frac{Yn}{Y_6} \times$ dot count (500) is evaluated to provide a scale line. Each input concentration Cn is indicated under it.
Where, Y_1 means the left base line, and Y_6 signifies the right base line.
Mathematical function Yn = F (a, b, c, C$\acute{h}$) of each model is as shown below.

(1) Model 1 $$Yn = \frac{1}{1+\exp\{-(a+b\ln C'n)\}} \qquad (C'n = 0 \rightarrow Yn = 0)$$

(2) Model 2 $$Yn = \frac{1}{1+\exp\{-(a+b\ln C'n+cC'n)\}} \qquad (C'n = 0 \rightarrow Yn = 0)$$

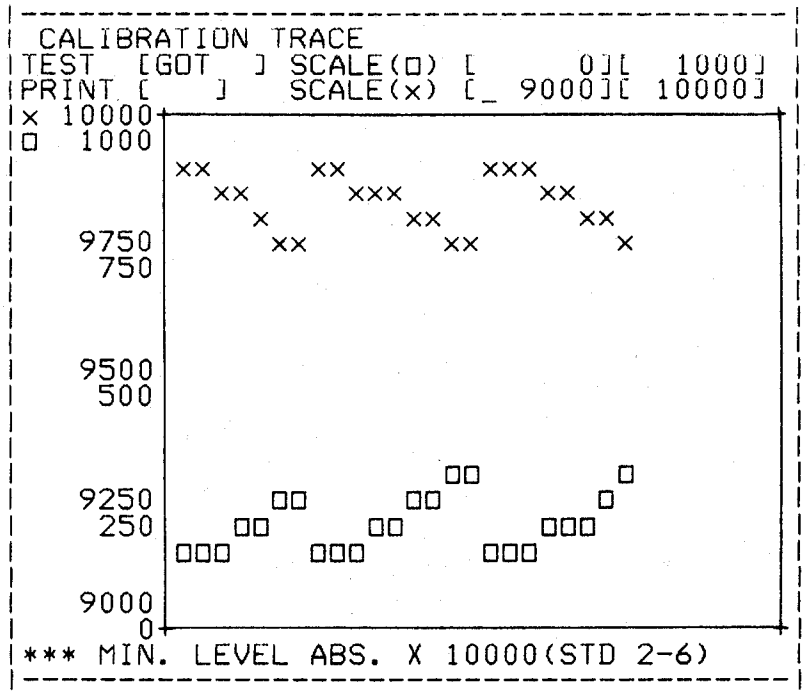
(3) Model 3 $$Yn = \exp\{a\ln C'n+b(\ln C'n)^2+C(\ln C'n)^3\} \qquad (C'n = 0 \rightarrow Yn = 0)$$

(4) Model 4 $$Yn = C'n$$

a : Factor A determined in calibration
b : " B "
c : " C "
Cn: Input concentration of STD (n)
C$\acute{h}$: Cn − C_1

4. The working curve plotting is accomplished as follows.
(Example: Number of standards = 6)
(1) Models 1 to 3
Under conditions R_1 = S1ABS and $R_6 = R_1 + K \cdot F(a, b, c, c'_6)$, two points ($R_1$ and R_6) are connected with a straight line.
(2) Model 4
For each of five sections (Cn, Cn+1) (N = 1 to 5), absorbance values at three points are calculated using each formula, and plotting is made through determined absorbance values.

7-3-5 CALIBRATION TRACE



<ITEM>	<COMMENT>
TEST	°*** TEST CODE 1-43
PRINT	°*** 1:YES
SCALE(□)	°*** MIN. LEVEL ABS. X 10000(STD 1)
	°*** MIN. LEVEL STD(3) CONC.
	°*** MAX. LEVEL ABS. X 10000(STD 1)
	°*** MAX. LEVEL STD(3) CONC.
SCALE(x)	°*** MIN. LEVEL ABS. X 10000(STD 2-6)
	°*** MIN. LEVEL SLOPE
	°*** MAX. LEVEL ABS. X 10000(STD 2-6)
	°*** MAX. LEVEL SLOPE

Purpose	To present a graphic chart showing the results of previous 50 calibrations.

Input Item	Key-in Procedure
TEST	Key in a test code (1 to 43) of the desired calibration data to be displayed graphically.
PRINT	The results of previous 50 calibrations displayed on screen can be hard-copied onto the printer.
SCALE (□)	Specify a scale width (upper and lower limits) on the axis of ordinate for plotting with '□'.
SCALE (X)	Specify a scale width (upper and lower limits) on the axis of ordinate for plotting with 'X'.

Notes: 1. '□' and 'X' plotting marks have the following meanings.

(1) Test codes 1 to 40

□: Absorbance of STD (1) (ENDPOINT: measured absorbance, RATE: absorbance of the first measured point (main wavelength)

X: Absorbance of STD (n) (ENDPOINT: measured absorbance, RATE: measured absorbance variation rate (n = 2 to 6))

(2) Test codes 41 to 43

□: Concentration of STD (3) (electrolyte calibrator concentration)

X: Slope value

2. The allowable input ranges for SCALE (□) and SCALE (X) are as follows.

(1) Test codes 1 to 40

□: –40000 to 40000 (integer)

X: –40000 to 40000 (integer)

(2) Test codes 41 to 43

□: 0 to 999999 (real)

X: –99999 to 999999 (real)

7-4-1 TEST NAME

```
TEST NAME

TEST       [14]     TEST NAME [_     ]

CODE NAME  CODE NAME  CODE NAME  CODE NAME
   1 ALD     16 D-BIL   31 IP      46 I
   2 ALP     17 B-L     32 MG      47 A/G
   3 AMY     18 BUN     33 IGG     48
   4 CHE     19 CRE     34 IGA     49
   5 CPK     20 TP      35 IGM     50
   6 CK-MB   21 UA      36         51
   7 CRP     22 TTT     37         52
   8 GGT     23 ZTT     38         53
   9 GOT     24 T-CHO   39         54
  10 GPT     25 F-CHO   40
  11 HBDH    26 GLU     41 NA
  12 LAP     27 NEFA    42 K
  13 LDH     28 PL      43 CL
  14 ALB     29 TG      44 L
  15 T-BIL   30 CA      45 H

 CODE  1-40:NORMAL      41-43:NA,K,CL
       44-46:L,H,I      47-54:CALCULATION

*** MAX 5 CHARACTERS
```

< ITEM >	< COMMENT >
TEST	°*** TEST CODE 1-54
TEST NAME	°*** MAX 5 CHARACTERS

Purpose	To display and input test codes and names.

Input Item	Key-in Procedure
TEST	Key in a desired test code. 1 to 40: Photometric assay 41: NA 42: K 43: CL 44: L (Lipemic index) 45: H (Hemolytic index) 46: I (Icteric index) 47 to 54: Calculation tests
TEST NAME	Enter a desired test name within five characters.

7-4-2 CHEMISTRY PARAMETERS

```
|-----------------------------------------|
| CHEMISTRY PARAMETERS                    |
|                                         |
|TEST                 [GOT  ]             |
|ASSAY CODE           [RATE-A  ]:[30]-[50]|
|SAMPLE VOLUME        [10][10]            |
|R1 VOLUME            [320][100][ NO]     |
|R2 VOLUME            [ 80][100][ NO]     |
|WAVE LENGTH          [405][340]          |
|CALIB. METHOD        [K-FACTOR ][0][0]   |
|STD.(1) CONC.-POS.[     0]-[ 1]          |
|STD.(2) CONC.-POS.[     0]-[ 0]          |
|STD.(3) CONC.-POS.[     0]-[ 0]          |
|STD.(4) CONC.-POS.[     0]-[ 0]          |
|STD.(5) CONC.-POS.[     0]-[ 0]          |
|STD.(6) CONC.-POS.[     0]-[ 0]          |
|SD LIMIT             [      0]           |
|DUPLICATE LIMIT      [     0]            |
|SENSITIVITY LIMIT    [     0]            |
|ABS.LIMIT(INC/DEC)[ 3000][DECREASE]      |
|PROZONE LIMIT        [      0][LOWER]    |
|EXPECTED VALUE       [   8.0]-[  40.0]   |
|PANIC VALUE          [   0.0]-[ 200.0]   |
|INSTRUMENT FACTOR [1.00]                 |
|                                         |
|*** 0-350 MICRO                          |
|-----------------------------------------|
```

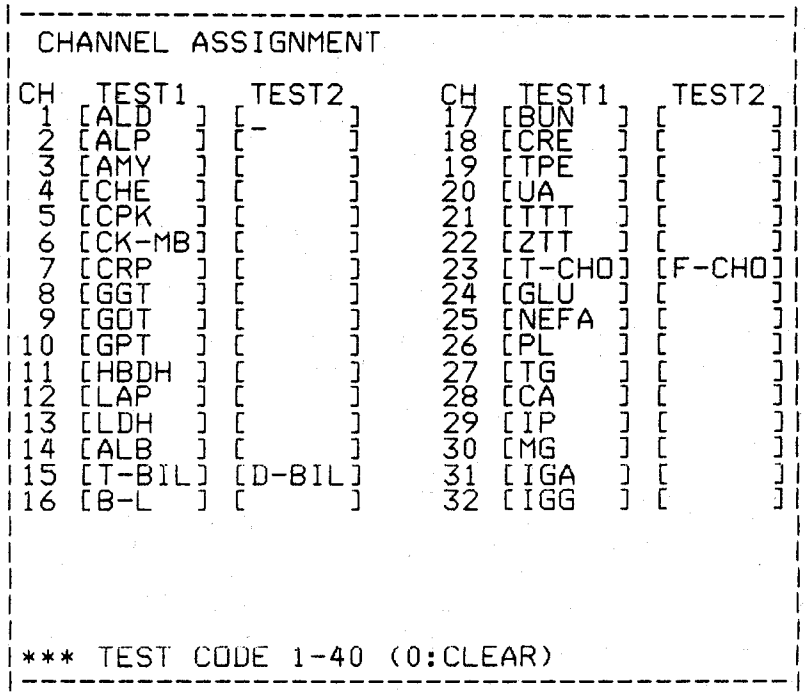
< ITEM >	< COMMENT >
TEST	°*** TEST CODE 1-40
ASSAY CODE	°*** 1:1POINT 2:2POINT 3:3POINT 4:1POINT&R 5:RATE-A 6:RATE-B
	°*** MEASURE POINT 1-50
	°*** MEASURE POINT 0-50
SAMPLE VOLUME	°*** 1-20 MICRO
	***** RERUN SAMPLE VOLUME 1-20 MICRO**
R1,R2 VOLUME	°*** 0-350 MICRO
	°*** BOTTLE SIZE 20 OR 100(ML)
	°*** DILUENT 1-350 MICRO(0:NO)
WAVE LENGTH 1	°*** (SUB) 340,405,450,480,505,546,570 600,660,700,750,800NM (0:SINGLE)
WAVE LENGTH 2	°*** (MAIN) 340,405,450,480,505,546,570 600,660,700,750,800NM
CALIB. METHOD	°*** 1:LINEAR 2:K FACTOR 3:NONLINEAR 4:ISOZYME P 5:ISOZYME Q
	°*** NONLINEAR MODEL NO. 1-4 (0:CLEAR)
	°*** NONLINEAR CALIB.POINTS 3-6 (0:CLEAR)
STD.(1-6) CONC.	°*** CONC.
-POS.	°*** S.DISK POSITION 0-33 (0:CANCEL)
SD LIMIT	°*** 0.1-999.9 (ABS. X 10000)
DUPLICATE LIMIT	°*** 0-32000 (ABS. X 10000)
SENSITIVITY LIM.	°*** 0-32000 (ABS. X 10000)
ABS.LIMIT	°*** 0-32000 (ABS. X 10000)
(INC/DEC)	°*** 1:DECREASE 0:INCREASE
PROZONE LIMIT	°* -32000 - 32000 (ABS. X 10000) [1POINT] % [2POINT]
	°*** LIMIT(1:UPPER 0:LOWER)
EXPECTED VALUE	°*** LOW VALUE
	°*** HIGH VALUE
PANIC VALUE	°*** LOW VALUE
	°*** HIGH VALUE
INSTRUMENT FACTOR	°*** 0.50-9.99

Purpose	To enter analytical parameters for each test.

Input Item	Key-in Procedure
TEST	Key in a desired test code (1 to 40).
ASSAY CODE	Enter an analytical method corresponding to each test. Then, specify the photometric points.
SAMPLE VOLUME	Determine the volume of sample to be pipetted through the sample probe (μL).
R1, R2 VOLUME	Specify the volume of reagent to be pipetted through the reagent probe (μL). Define the size of reagent vial (bottle) (20 mL or 100 mL). Where a concentrated reagent is used, specify the volume of diluent (μL). For R1 (first reagent) and R2 (second reagent), take the same key-in procedure.
WAVELENGTH	Enter a subordinate (secondary) wavelength (λ1) on the left side, and a main (primary) wavelength (λ2) on the right side.
CALIB. METHOD	Select a calibration mode suited for the assay. Enter the number of standard samples (3 to 6) only when nonlinear (isozyme) measurement is specified. In other cases, key in '0'.
STD (1) to (6)	Specify concentration of each standard sample (in five digits with decimal point). The test results are represented down to the same number of decimal digits that are specified for STD (1). Key in a standard sample position on the sample disk.
SD LIMIT	Determine an allowable range of convergent SD value after calculation of nonlinear calibration.
DUPLICATE LIMIT	Key in an allowable value for difference in duplicate measurement in calibration.
SENSITIVITY LIMIT	Specify an allowable range of sensitivity (absorbance difference between blank and standard (N)) in calibration. (N: Maximum input value)
ABS. LIMIT (INC/DEC)	Enter a reaction limit absorbance of substrate depletion in rate assay. Specify whether the rate assay is conducted through absorbance increasing reaction or absorbance decreasing reaction.
PROZONE LIMIT	Enter a reaction limit absorbance in antigen reaction or a rate of reaction of limit (%). Specify whether the limit value is of upper or lower level.
EXPECTED VALUE	Enter normal upper and lower limits for test item. (For both the upper and lower limits, use a six-digit value with decimal point. Down to the third decimal digit is specifiable.)
PANIC VALUE	Specify acceptable upper and lower limits for test. (For both the upper and lower limits, use a six-digit value with decimal point. Down to the third decimal digit is specifiable.)
INSTRUMENT FACTOR	Enter a constant factor of instrument.

Note: For details, refer to Section 3.

7-4-3 CHANNEL ASSIGNMENT



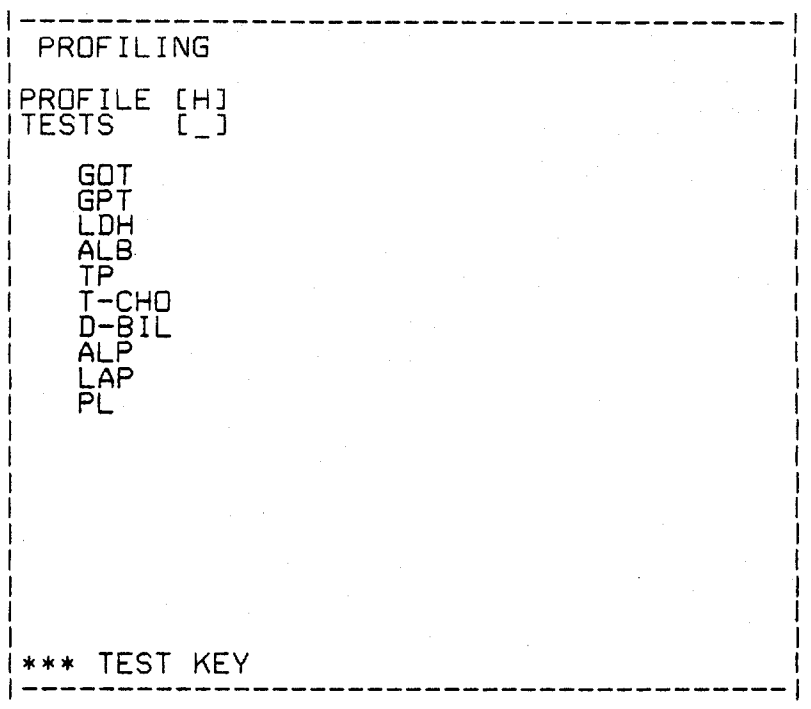
< ITEM >	< COMMENT >
TEST1	°*** TEST CODE 1-40 (0:CLEAR)
TEST2	°*** TEST CODE 1-40 (0:CLEAR)

Purpose	To assign a measurement channel for each test.

Input Item	Key-in Procedure
TEST1	Enter a test code corresponding to each channel. For clearing, key in '0'.
TEST2	Same as for TEST1. Use this parameter when measuring two test items through the same channel.

Note: The same test item cannot be specified for both TEST1 and TEST2.

7-4-4 PROFILING



< ITEM >	< COMMENT >
PROFILE	°*** PROFILE KEY (A-L)
TESTS	°*** TEST KEY

Purpose	To determine test items for each profile key.

Input Item	Key-in Procedure
PROFILE	Enter a profile name code (A to L). If the relevant profile name is already registered, it is indicated and also the corresponding test switch's LED indicator lights up on the keyboard.
TESTS	Key in test items to be registered through test item keys. The relevant test switch indication (turned on) is registered, and the corresponding test name is displayed on the screen.

Note: To cancel any registered test, turn off the relevant test key by pressing it.

7-4-5 CALCULATED TEST

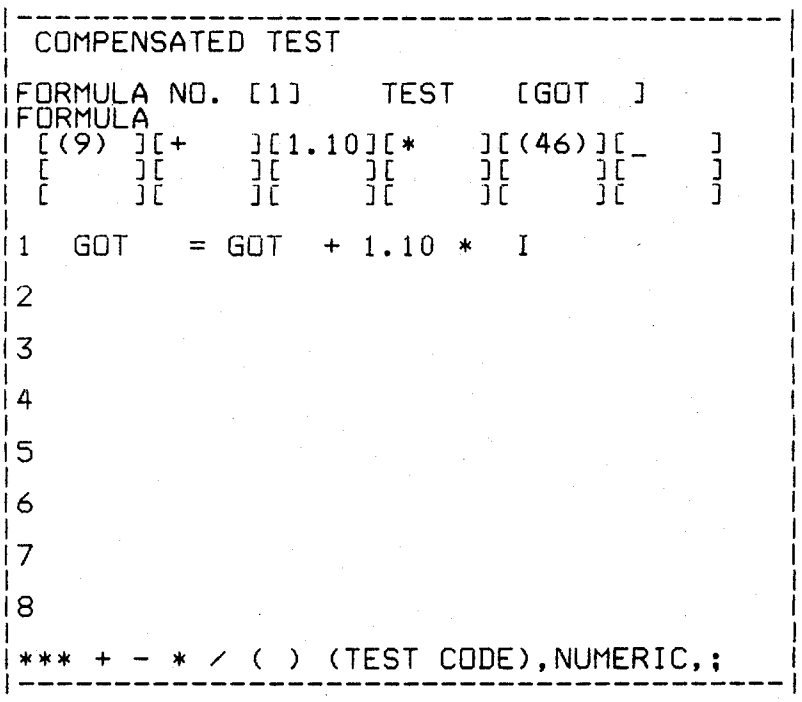
```
|-----------------------------------------|
| CALCULATED TEST                         |
|TEST    [A/G   ]                         |
|EXPECTED VALUE  [  0.50]-[  0.95]        |
|FORMULA                                  |
| [(14)][/   ][(   ][(20)][-   ][(14)]    |
| [)   ][;   ][_   ][    ][    ][    ]    |
| [    ][    ][-   ][    ][    ][    ]    |
|                                         |
|47 A/G   = ALB / ( TP - ALB )            |
|                                         |
|48                                       |
|                                         |
|49                                       |
|                                         |
|50                                       |
|                                         |
|51                                       |
|                                         |
|52                                       |
|                                         |
|53                                       |
|                                         |
|54                                       |
|                                         |
|*** + - * / ( ) (TEST CODE),NUMERIC,;    |
|-----------------------------------------|
```

< ITEM >	< COMMENT >
TEST	°*** TEST CODE 47-54
EXPECTED VALUE	°*** LOW VALUE
	°*** HIGH VALUE
FORMULA CODE	°*** + - * / ( ) (TEST CODE),NUMERIC,;

Purpose	To input/output calculation parameters.

Input Item	Key-in Procedure
TEST	Key in a calculation test code (47 to 54).
EXPECTED VALUE	Specify normal upper and lower limit for calculation test. For both the upper and lower limits, use a signed six-digit value with decimal point (down to the third decimal digit is specifiable).
FORMULA	Enter a calculation formula. For test code entry, enclose a test code in "(" ")". If not enclosed, it is treated as a numeric value. To define the end of calculation formula, enter " ; " as a terminator. If " ; " is entered at the beginning of formula, it results in the formula being cleared.

7-4-6 COMPENSATED TEST

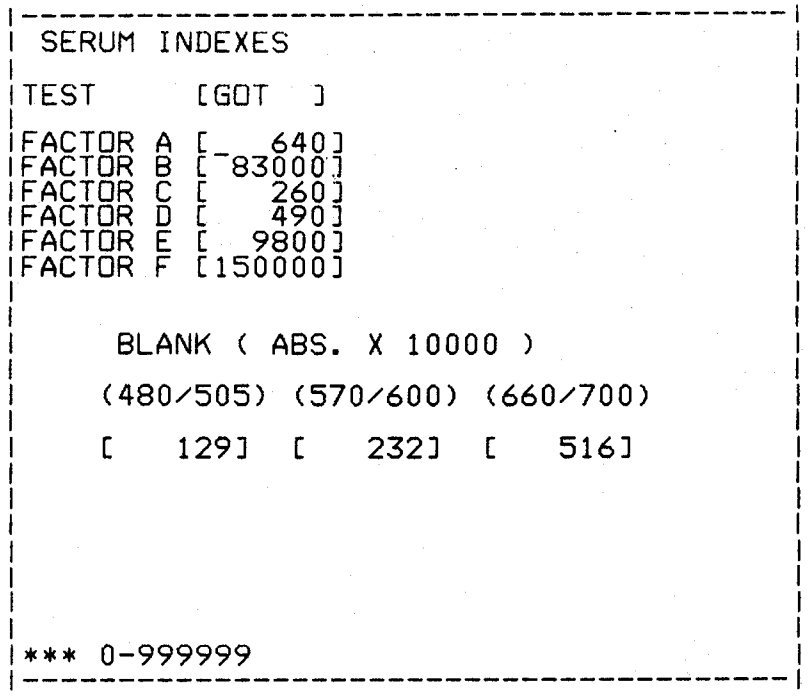


< ITEM >	< COMMENT >
FORMULA NO.	°*** 1-8
TEST	°*** TEST CODE 1-43(0:CLEAR)
FORMULA CODE	°*** + - * / ( ) (TEST CODE),NUMERIC,;

Purpose	To input/output a compensation formula.

Input Item	Key-in Procedure
FORMULA NO.	Key in a code number of compensation formula to be checked or input.
TEST	Enter a test code (1 to 43) corresponding to the desired test to be compensated.
FORMULA	Enter a compensation formula. For the input procedure, refer to the explanation given in 'CALCULATED TEST'.

7-4-7 SERUM INDEXES

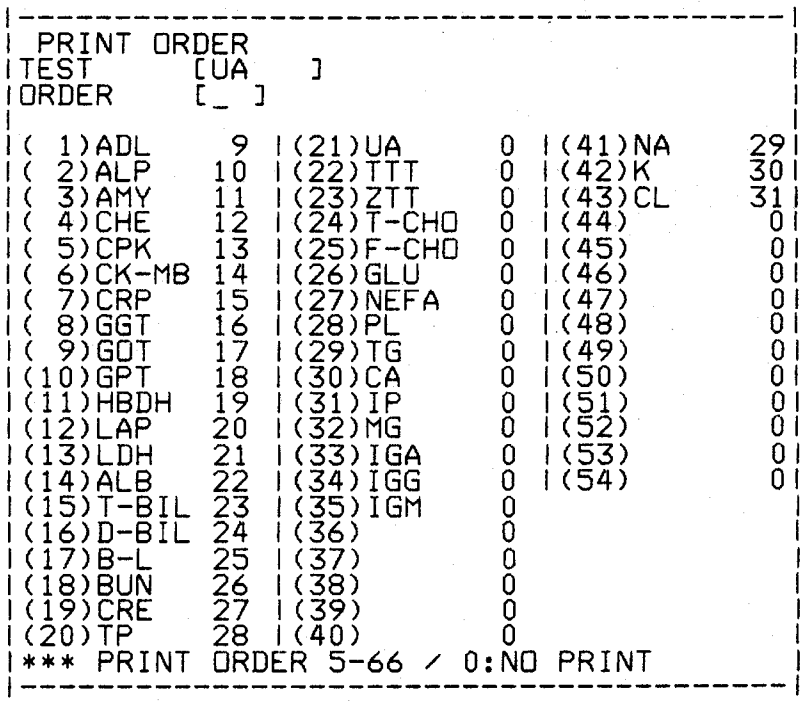


< ITEM >	< COMMENT >
TEST	°*** TEST CODE 1-40 (0:CLEAR)
FACTOR A	°*** 0-999999
FACTOR B	°*** 0-999999
FACTOR C	°*** 0-999999
FACTOR D	°*** 0-999999
FACTOR E	°*** 0-999999
FACTOR F	°*** 0-999999
BLANK (480/505)	°*** -32000 - 32000 (ABS. X 10000)
BLANK (570/600)	°*** -32000 - 32000 (ABS. X 10000)
BLANK (660/700)	°*** -32000 - 32000 (ABS. X 10000)

Purpose	To input/output parameters for serum index measurement.

Input Item	Key-in Procedure
TEST	Key in a test code (1 to 40) for serum index measurement (UV method).
FACTOR A to F	Enter a factor for determining serum index.
BLANK I, H, L	Indicate a difference in index blank absorbance between two wavelengths. It is possible to change data.

7-4-8 PRINT ORDER



PRINT ORDER
TEST [UA]
ORDER [_]

(1)ADL 9	(21)UA 0	(41)NA 29
(2)ALP 10	(22)TTT 0	(42)K 30
(3)AMY 11	(23)ZTT 0	(43)CL 31
(4)CHE 12	(24)T-CHO 0	(44) 0
(5)CPK 13	(25)F-CHO 0	(45) 0
(6)CK-MB 14	(26)GLU 0	(46) 0
(7)CRP 15	(27)NEFA 0	(47) 0
(8)GGT 16	(28)PL 0	(48) 0
(9)GOT 17	(29)TG 0	(49) 0
(10)GPT 18	(30)CA 0	(50) 0
(11)HBDH 19	(31)IP 0	(51) 0
(12)LAP 20	(32)MG 0	(52) 0
(13)LDH 21	(33)IGA 0	(53) 0
(14)ALB 22	(34)IGG 0	(54) 0
(15)T-BIL 23	(35)IGM 0	
(16)D-BIL 24	(36) 0	
(17)B-L 25	(37) 0	
(18)BUN 26	(38) 0	
(19)CRE 27	(39) 0	
(20)TP 28	(40) 0	

*** PRINT ORDER 5-66 / 0:NO PRINT

< ITEM >	< COMMENT >
TEST	°*** TEST CODE 1-54
ORDER	°*** PRINT ORDER 5-66 / 0:NO PRINT

Purpose	To specify a printout line of test result for each test (report format) or a printout sequence of test result (monitor format).

Input Item	Key-in Procedure
TEST	Key in a test code (1 to 54) for which printout order is to be specified.
ORDER	In report format, specify a printout line. In monitor format, specify a printout sequence value (5 to 66; Starting with '5').

7-4-9 REPORT FORMAT

```
REPORT FORMAT

SINGLE/TWIN    [SINGLE]
PAGE LENGTH    [40]
DATE LINE NO.  [ 4]
COMMENT LINE   [ 4]
HEAD LINE
[                  HITACHI                    ]
[                                             ]
[            LABORATORY REPORT                ]

TEST           [ALP   ]
NAME           [ALKALINE PHOSPHATASE_ ]
UNIT           [      ]

PRINT START COLUMN
                     CHAR.    COLUMN
 TEST NAME           (22)     [ 3]
 RESULT              ( 8)     [29]
 UNIT                ( 6)     [40]
 EXPECTED VALUE      (15)     [49]
 REMARKS             ( 7)     [67]
 DATE,S.NO.,ID       (11)     [34]
 COMMENT             (22)     [ 5]
*** MAX 22 CHARACTERS
```

< ITEM >	< COMMENT >
SINGLE/TWIN	°*** 1:SINGLE 2:TWIN
PAGE LENGTH	°*** 8-66
DATE LINE NO.	°*** 4-64 / 0:NO PRINT
COMMENT LINE	°*** 4-65 / 0:NO PRINT
HEAD LINE	°*** 38 CHARACTERS A LINE
TEST	°*** TEST CODE 1-54
NAME	°*** MAX 22 CHARACTERS
UNIT	°*** MAX 6 CHARACTERS
PRINT START	°*** 1-80 / 0:NO PRINT
COLUMN	°*** 1-40 / 0:NO PRINT
	°*** 1-80 / 0:NO PRINT
	°*** 1-40 / 0:NO PRINT
	°*** 1-80 / 0:NO PRINT
	°*** 1-40 / 0:NO PRINT
	°*** 1-80 / 0:NO PRINT
	°*** 1-40 / 0:NO PRINT
	°*** 1-80 / 0:NO PRINT
	°*** 1-40 / 0:NO PRINT
	°*** 1-80 / 0:NO PRINT
	°*** 1-40 / 0:NO PRINT
	°*** 1-80 / 0:NO PRINT
	°*** 1-40 / 0:NO PRINT

Purpose	To specify printout parameters for report format.

Input Item	Key-in Procedure
SINGLE/TWIN	Determine the number of samples per print chart page. When this parameter is specified, 'PRINT START COLUMN' is set to zero.
PAGE LENGTH	Specify the number of lines per print chart page.
DATE LINE NO.	Specify a sequence number of the line on which year, month and day are to be printed out. The date line is followed by the sample number line, which is then followed by the sample ID line.
COMMENT LINE	Specify lines on which a comment for sample is to be printed out. Note that two comment lines are used always.
HEAD LINE	Enter a character string for headline. (A maximum of 38 characters can be entered per line.)
TEST, NAME, UNIT	Specify a test code (1 to 54), name (within 22 characters), and concentration unit (within six characters) for printout in report format.
PRINT START COLUMN	Determine the starting column of each data printout. When 'SINGLE' parameter is selected, a range of 1 to 80 can be specified. When 'TWIN' parameter is selected, a range of 1 to 40 can be specified. Entering '0' causes no printout. The number of columns necessary for printout of each test is parenthesized.

Note: When loading a user-form sheet, specify '0' for the test name of PRINT START COLUMN. For other printout parameters, take the key-in procedure as described above.

7-5 MAINTENANCE JOB Screen

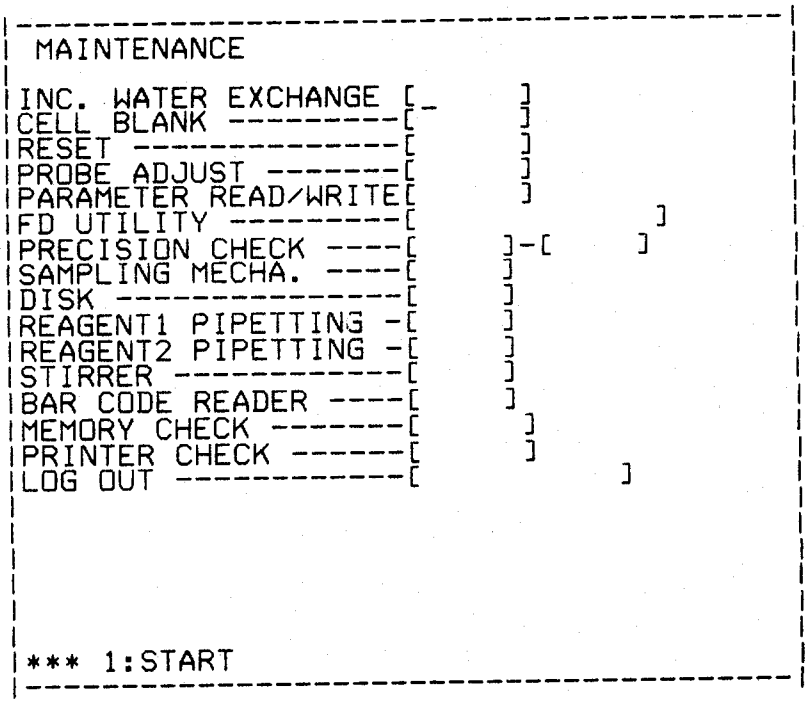
MAINTENANCE

```
|-----------------------------------------|
| MAINTENANCE                             |
|                                         |
|INC. WATER EXCHANGE [_     ]             |
|CELL BLANK ---------[      ]             |
|RESET --------------[      ]             |
|PROBE ADJUST -------[      ]             |
|PARAMETER READ/WRITE[      ]             |
|FD UTILITY ---------[           ]        |
|PRECISION CHECK ----[     ]-[     ]      |
|SAMPLING MECHA. ----[     ]              |
|DISK ---------------[     ]              |
|REAGENT1 PIPETTING -[     ]              |
|REAGENT2 PIPETTING -[     ]              |
|STIRRER ------------[     ]              |
|BAR CODE READER ----[     ]              |
|MEMORY CHECK -------[      ]             |
|PRINTER CHECK ------[      ]             |
|LOG OUT ------------[           ]        |
|                                         |
|                                         |
|                                         |
|                                         |
|                                         |
|                                         |
|*** 1:START                              |
|-----------------------------------------|
```

< ITEM >	< COMMENT >
INC. WATER EXCHA	°*** 1:START
CELL BLANK	°*** 1:START
RESET	°*** 1:START
PROBE ADJUST	°*** 1:START
PARAMETER	°*** 1:READ 2:WRITE
READ/WRITE	°°*** FD READ OK ? (1:YES 0:NO)
	°°*** FD WRITE OK ? (1:YES 0:NO)

Purpose	To activate the maintenance program.

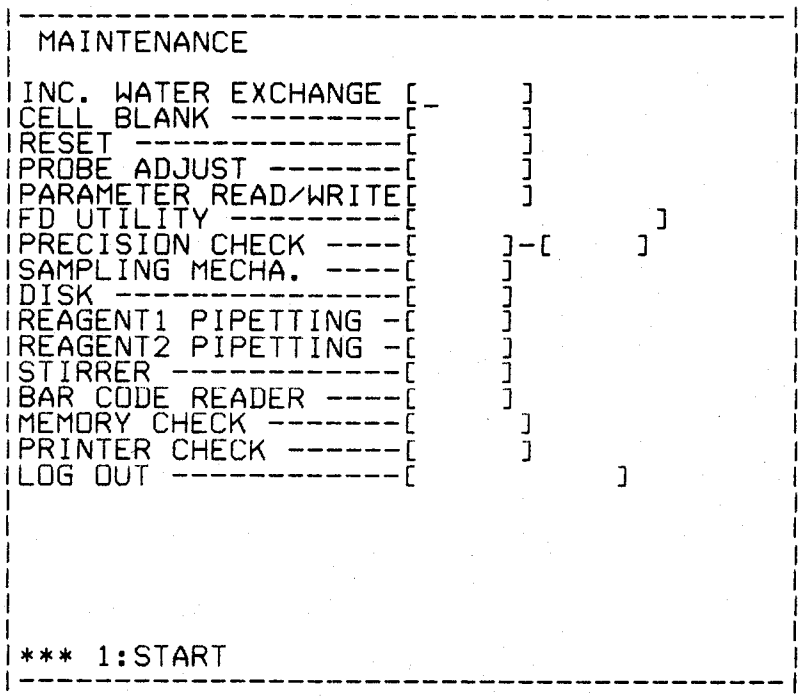
Input Item	Key-in Procedure
INC. WATER EXCHANGE	Used for carrying out water exchange in the incubation (reaction) bath. Selection of '1: START' causes water exchange operation to start.
CELL BLANK	Used for checking reaction cuvettes for contamination. Selection of '1: START' causes checking operation to start. The checking operational sequence is as follows: All the mechanisms are reset, and then the reaction disk rotates one cuvette position. The rinsing of relevant reaction cuvette is thus started. On completion of rinsing, the reaction cuvette goes to the photometer position, where absorbance is measured at all wavelengths. The results are produced onto the printer. The above sequence is repeated for all reaction cuvettes. On completion of water blank absorbance measurements for all reaction cuvettes, the results (absorbances) are saved onto the floppy disk.
RESET	Used for resetting all the mechanisms to initial state. Selection of '1: START' causes the resetting operation to start.
PROBE ADJUST	Used for adjusting the positions of sampling probe, reagent probe and stirrer at the reaction cuvettes. Selection of '1: START' causes the probe adjusting operation to start. In execution of this operation, the probe and stirrer stop above the reaction cuvette. Then, adjust the probes and stirrer positions. After adjustment, press the STOP key. The probe and stirrer are reset to initial state.
PARAMETER READ/WRITE	To read all the parameters from the floppy disk, select '1: READ'. To write all the on-memory parameters onto the floppy disk, select '2: WRITE'. After this selection, the message appears asking whether it is really what you want. After reconfirming your intention, key in '1' for yes. Then, a read from the floppy disk or a write onto it is carried out.



< ITEM >	< COMMENT >
FD UTILITY	°*** 1:COPY 2:CHECK 3:CLEANING 4:FORMAT 5:SPECIAL COPY
1:COPY	°°*** COPY DRIVE 1 TO 2 OK ? (1:YES 0:NO)
3:CLEANING	°°*** DRIVE NO. 1 OR 2
	°°°*** EXCHANGE FD 1 OK ? (1:YES 0:NO)
	°°°*** EXCHANGE FD 2 OK ? (1:YES 0:NO)
4:FORMAT	°°*** FORMAT DRIVE 2 OK ? (1:YES 0:NO)
5:SPECIAL COPY	°°*** COPY DRIVE 1 TO 2 OK ? (1:YES 0:NO)
PRECISION CHECK	°*** FIRST SAMPLE NO. 1-1000
	°*** FINAL SAMPLE NO. 1-1000
SAMPLING MECHA	°*** 1-9999
DISK	°*** 1-9999
REAGENT1 PIPET.	°*** 1-9999
REAGENT2 PIPET.	°*** 1-9999
STIRRER	°*** 1-9999
BAR CODE READER	°*** 1-9999

(cont'd)

Input Item	Key-in Procedure
FD UTILITY	Used for copying or checking the contents of floppy disk. (1) COPY Insert the original floppy disk (system disk or data disk) into drive 1 and the destination (target) disk into drive 2. Then, select '1: COPY'. After this selection, the message appears to confirm your intention. In response to this message, key in '1' for yes. Then, the copy operation is carried out. (2) CHECK Select '2: CHECK'. This causes the printer to output the check sum result and revision number for each file of system/data disk. It also prints out the version number of disk and total check sum result. For judgment on check sum result, contact the service agent. (3) CLEANING Put the cleaning disk into the relevant drive, and then select '3: CLEANING' and specify the drive unit number. Then, the message appears asking whether the cleaning disk has been inserted. After reconfirmation, key in '1' for yes. Then, the drive cleaning operation is carried out. (4) FORMAT If the error message 'FD WRITE?' (103-30) appears in attempt of disk copying (1), carry out formatting of the disk. Select '4: FORMAT', and the message appears asking whether the copy-disabled floppy disk has been inserted in drive 2. After reconfirmation, key in '1' for yes. Then, the disk formatting operation is carried out. After completion of formatting, retry the disk copying operation (1). (5) SPECIAL COPY Used for referencing the 717 floppy disk (data disk) in the HILAS (Hitachi Laboratory System). For this special copying operation, take the same procedure as for (1).
PRECISION CHECK	With this parameter specified, statistical calculation is performed for routine samples. The maximum value, minimum value, mean value, SD value and CV value are printed out. Specify a range of statistical calculation using the sample numbers.
SAMPLING MECHA	For checking operation of the sampling mechanism. Specify the number of operation cycles. Load Hitergent solution cups at routine sample position 1 and set IN NaOH aqueous solution cups at rinsing solution position W on the sample disk. A predetermined value of Hitergent solution is dispensed from these cups to the reaction curvette.
DISK	For checking operation of the reaction disk, sample disk, reagent disks 1 and 2. Specify the number of operation cycles.
REAGENT1 PIPETTING	For checking operation of the reagent 1 pipetting mechanism. Specify the number of operation cycles. Load the Hitergent solution vial on channel 32 on the reagent disk R1. At each cycle, a predetermined volume of Hitergent is pipetted from the R1 reagent vial into the reaction cuvette.
REAGENT2 PIPETTING	For checking operation of the reagent 2 pipetting mechanism. Specify the number of operation cycles. Load the Hitergent solution vial on channel 32 on the reagent disk R2. At each cycle, a predetermined volume of Hitergent is pipetted from the R2 reagent vial into the reaction cuvette.
STIRRER	For checking operation of the stirring mechanism. Specify the number of operation cycles. At each cycle, stirring is performed for R1 and R2.



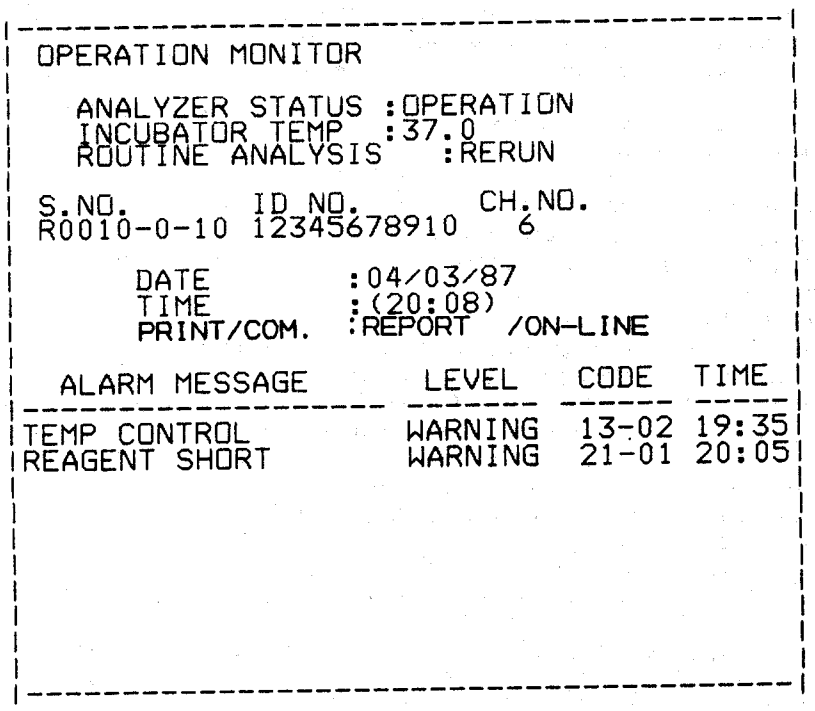
< ITEM >	< COMMENT >
MEMORY CHECK	°*** 1:START
PRINTER CHECK	°*** 1:START
LOG OUT	°*** 1:DAILY 2:CUMULATIVE 3:OPE. SUM. 4:COM. TRACE

(cont'd)

Input Item	Key-in Procedure
MEMORY CHECK	For each memory holding program, the check sum is performed and its result is printed out. For execution of memory check, select '1: START'. For judgment on the check sum result, contact the service agent.
PRINTER CHECK	All the characters (font) used by the printer are output. Selection of '1: START' initiates the printer check operation.
LOG OUT	The logged monitoring data is output onto the printer. (1) DAILY (Printout of daily alarm and retry data) The alarm data and retry data (for recovery from malfunction) after power-on are printed out. For execution of this function, select '1: DAILY'. (2) CUMULATIVE (Printout of cumulative alarm data and retry data) The cumulative alarm data and retry data are printed out. For execution of this function, select '2: CUMULATIVE'. (3) OPE.SUM. (Printout of cumulative data recorded from the time of installation) The printer outputs the following cumulative logged data: 1) Total turn-on time of instrument, total operation time 2) Read/write access count of floppy disk (after copying) 3) Total test counts on each channel For execution of this function, select '3: OPE.SUM'. (4) COM. TRACE (Printout of communication data interchanged with host computer) Where this instrument is hooked up to an external host computer, the communication data can be printed out. For execution of this function, select '4: COM. TRACE'. If execution of (1), (2) or (4) is aborted by pressing the STOP key, the stored data is deleted.

7-6 OPERATION MONITOR Screen

OPERATION MONITOR



Purpose	For monitoring the operational status of instrument.

Display Item	Description
ANALYZER STATUS	Indicates the status of analyzer.
INCUBATOR TEMP	Indicates the temperature of incubation (reaction) bath.
Line under INCUBATOR TEMP	During analytical operation: Indicates the analytical mode. During maintenance job operation: Indicates the name of maintenance job. If the maintenance job function is activated with the cycle count specified, the remaining number of cycles is indicated.
SAMPLE NO. **ID NO. CH. NO.**	During analytical operation: Indicates the sample number, sample ID and channel number for next sampling.
DATE	Indicates day, month and year (two digits of calendar year).
TIME	Indicates hours and minutes.
PRINT/COM.	Indicates the printout format and communication mode (specified on the START CONDITIONS screen).
ALARM MESSAGE **LEVEL** **CODE** **TIME**	On occurrence of an alarm, this field presents the alarm message, alarm level, alarm code, and time of detection. For details, refer to Section 8.

STAT TEST SELECTION & MONITOR

```
 STAT TEST SELECTION & MONITOR


POS.NO.          [1]
ID NO.           [12345678911]
COMMENT          [HITACHI NAKAKO       ]
                 [12345678911 F 23     ]
TESTS            [_]


  POS. S.NO. ID NO.
   01   10   12345678911
   03   11   12345678912









*** PROFILE KEY(A-L) & TEST KEY
```

< ITEM >	< COMMENT >
POS.NO.	°*** 1-7
ID NO.	°*** MAX 11 CHARACTERS
COMMENT	°*** 20 CHARACTERS X 2 LINES
TESTS	°*** PROFILE KEY(A-L) & TEST KEY

Purpose	For setting and displaying a test request for stat sample.

Input Item	Key-in Procedure
POS. NO.	Set the stat sample cup on any of positions E1 to E7 on the sample disk, and then, key in its position number (1 to 7).
ID NO.	Enter an ID number of stat sample. If not required, skip over this parameter.
COMMENT	Enter a comment for stat sample. If not required, skip over this parameter.
TESTS	Enter a test request for stat sample. Press the relevant profile and test keys, and their lamps will light up. Then, press the ENTER key. Thus, a test request can be set up. The sample number is assigned automatically.

Note: The lower half of screen presents the position numbers, sample numbers and sample IDs of all the test-request stat samples.
When water blank absorbance of the specified stat sample is measured, the sample's position number is highlighted in reverse video. For the highlighted sample, it is not allowed to change its test request item.
On completion of sampling for all test items, the relevant sample data disappears from the screen. Then, take out the samples from the sample disk. After that, it is possible to put another stat sample at an empty position. Then, another test item can be specified.

8. ALARMS

8. ALARMS

8-1 Notes on Alarms

(1) The alarms to be issued are classified into the following four levels.

EMERGENCY STOP (E. STOP)	:	The instrument is forced to stop immediately.
STOP	:	The analytical operation is forced to stop within 12 seconds.
SAMPLING STOP (S. STOP)	:	Only the sampling operation is forced to stop.
WARNING	:	Just for warning to attract operator's attention.

(2) On occurrence of E. STOP alarm, the 24 V DC power supply is shut off immediately. This may cause issuance of another alarm. In such an event, pay attention only to the cause of the first E. STOP alarm. To turn on the 24 V DC power supply again, carry out 'RESET' on the MAINTENANCE screen.

(3) An alarm of WARNING level is issued just for attracting operator's attention. However, if a WARNING alarm is issued immediately after the start of analytical operation due to an illegal input parameter, the sampling operation is not performed (alarm codes 70-1 to 75-40).

(4) If the CPU RUN lamp on control panel does not light up, turn power off once and then turn it on. If the CPU RUN lamp fails to light up still, contact the service agent.

(5) If the CPU RUN lamp flashes, it means that a momentary power failure has been encountered with the instrument. In this case also, turn power off once and then turn it on. Then, call up the OPERATION MONITOR screen, and check if the POWER FAIL alarm is present. If this alarm is present, press the BUZZER OFF key to extinguish it. Then, proceed to analytical operation of the instrument.

(6) If the instrument does not start up at power-on, it is suspected that a failure has occurred in the floppy disk drive or internal computer circuit. Notify the service agent of what error message is displayed on the CRT screen.

8-2 Data Alarms

Listed below are the data alarms to be issued in this instrument.

Table 8-1 Data Alarms (1/3)

<table>
<tr><th>Alarm</th><th>Printout Message</th><th>Display on Data Review</th><th>Meaning</th><th>Countermeasure</th></tr>
<tr><td>ADC abnormal</td><td>ADC?</td><td>A</td><td>The ADC counter for photometry/electrolyte assay does not work normally.</td><td>(1) See alarm code ADC? (27-1 to 27-4).</td></tr>
<tr><td>Abnormal cell blank</td><td>CELL?</td><td>Q</td><td>A difference in absorbance is more than 0.1 Abs between the current cell blank and the previous cell blank measured with 'CELL BLANK' maintenance function.</td><td>(1) See alarm code CELL BLANK (22-1 to 22-6).</td></tr>
<tr><td>Insufficient sample</td><td>SAMPL</td><td>V</td><td>Sample volume is insufficient in the sample cup.</td><td>(1) Add sample and rerun.</td></tr>
<tr><td>Insufficient reagent</td><td>REAGN</td><td>T</td><td>The remaining volume of reagent is below the minimum level of 10-test volume.</td><td>(1) See alarm code REAGENT SHORT (21-1 to 21-64).</td></tr>
<tr><td>Excessive absorbance</td><td>ABS!</td><td>Z</td><td>The upper absorbance limit of 3.3 Abs is exceeded.</td><td>(1) Check if there is an obstacle on the photometric path.
(2) Check if the reaction (incubation) bath is contaminated.
(3) Check if the reagent has been prepared properly.
(4) Check if the reagent is placed at a proper position.</td></tr>
<tr><td>Prozone error</td><td>xxxxxP ('xxxxx' indicates the prozone check value.)</td><td>P</td><td>In two-point assay or one-point prozone check assay, the prozone check (PC) value exceeds the specified upper or lower limit. Shown below is the relationship between PC values and upper/lower limit.
<table>
<tr><th rowspan="2">Analytical method</th><th rowspan="2">PC value</th><th colspan="2">Erroneous PC value and upper/lower limit</th></tr>
<tr><th>L LOWER</th><th>UPPER</th></tr>
<tr><td>One-point assay</td><td>$\frac{1}{2}(A_m + A_{m-1}) - k(A\ell + A\ell-1)$</td><td rowspan="2">PC value < Limit value</td><td rowspan="2">PC value > Limit value</td></tr>
<tr><td>Two-point assay</td><td>$\frac{\frac{A_m - A_{26}}{m - 26}}{\frac{A_{27} - A_{26}}{27 - 26}} \times 100$</td></tr>
</table>
Note: (ℓ) and (m) are photometric points.</td><td>(1) Verify the specified upper/lower limit.
(2) Check if the reagent has been prepared properly or it is placed at a proper position.</td></tr>
<tr><td rowspan="3">Reaction limit exceeded (only for rate assay)</td><td>LIMT0</td><td>I</td><td>The main wavelength absorbance exceeds the reaction limit (ABS. LIMIT input value corrected automatically) at all photometric points used for calculation.</td><td rowspan="3">(1) Dilute the sample and rerun.</td></tr>
<tr><td>LIMIT1</td><td>J</td><td>The main wavelength absorbance exceeds the reaction limit at the second and subsequent photometric points used for calculation (except the first photometric point).</td></tr>
<tr><td>LIMIT2</td><td>K</td><td>The main wavelength absorbance exceeds the reaction limit at the third or fourth and subsequent photometric points used for calculation (except the first and second photometric points).
Note: If the input photometric range parameters (ℓ) and (m) do not satisfy 'ℓ + 2 < m', the reaction limit is exceeded always.</td></tr>
</table>

Table 8-1 Data Alarms (2/3)

Alarm	Printout Message	Display on Data Review	Meaning	Countermeasure
Abnormal linearity (only for rate assay)	LIN.	W	!n comparison check of the absorbance variation rates at the first and last six points in the specified photometric range, it has been found that there is a difference exceeding the allowable value. (For details, refer to 3-7 (6) — Linearity Check in Reaction Process.)	(1) Check the stirring mechanism. (2) Dilute the sample and rerun.
	LIN. 8	F	Where there are less than eight photometric points within the reaction limit range, comparison check of the absorbance variation rates at the first and last three points has found a difference exceeding the allowable value. (For details, refer to 3-7 (6) — Linearity Check in Reaction Process.)	
Duplicate error	DUP	—	In calibration, a difference between standard solution absorbances measured twice is larger than the duplicate limit.	(1) Verify the duplicate limit value. (2) Carry out calibration again.
Standard error	STD?	—	(1) In calibration, any one of the following alarms is encountered: ADC abnormal, abnormal cell blank, insufficient sample, insufficient reagent, excessive absorbance, reaction limit exceeded, abnormal linearity, prozone error, duplicate error, calculation disabled. Noise error, level error (for electrolyte analysis) (2) In calibration, the APU error has occurred (error in arithmetic processor: code 95-1 to 95-4)	(1) See alarm code STANDARD? (50-1 to 50-40).
Sensitivity error	SENS	—	Sensitivity is checked for linear, nonlinear and isozyme-P calibration. This error is indicated if a difference between the absorbance of STD(1) and STD(N)[Note 1] is smaller than the sensitivity limit (input value). **Note 1)** N: { = 2 ..... Linear, or isozyme-P calibration = 3 to 6 ..... Nonlinear calibration (Calibration point input) **Note 2)** If only either one of STD(1) and STD(N) is measured, the previous absorbance of currently non-measured STD is used for sensitivity check.	(1) See alarm code SENSITIVITY? (53-1 to 53-40).
Calibration error	CALIB	—	In calibration for photometric assay, the current K factor differs from the previous value by more than ±20%.	(1) See alarm code CALIBRATION (51-1 to 51-40).
Convergence error	SD!	—	In nonlinear calibration, the residual value is larger than the SD limit (input value).	(1) See alarm code CALIB. SD? (52-1 to 52-40).
Test-to-test compensation error	CMP.T	C	(1) In test-to-test compensation calculation, other than the data alarms shown below is indicated at the compensation data. (2) In isozyme-Q concentration calculation, other than the data alarms shown below is indicated at isozyme-P concentration data. Calculation disabled, test-to-test compensation disabled, overflow, random error, systematic error, normal upper/lower limit exceeded	(1) Check related data.
Test-to-test compensation disabled	CMP. T!	M	1) Denominator becomes zero in test-to-test compensation calculation. 2) The test used for test-to-test compensation has not been measured yet. 3) Any test used for test-to-test compensation has the data alarm 'calculation disabled' or 'test-to-test compensation disabled'. **Note:** Blank space is left for data.	(1) Same as above.
Panic value exceeded	PANIC	$	The measured value is out of the panic value range.	(1) Rerun and verify the rerun result.

Table 8-1 Data Alarms (3/3)

Alarm	Printout Message	Display on Data Review	Meaning	Countermeasure
Random error			A random error has been found in the realtime quality control. (For details, refer to 3-11 (3) — Realtime Quality Control.)	(1) See alarm code CONTROL RANDOM (54-1 to 54-43).
Random error 1	RANDM1	@		
Random error 2	RANDM2	@		
Systematic error			A systematic error has been found in the realtime quality control. (For details, refer to 3-11 (3) — Realtime Quality Control.)	(1) See alarm code CONTROL SYSTEM (55-1 to 55-43).
Systematic error 1	SYSTM1	#		
Systematic error 2	SYSTM2	#		
Systematic error 3	SYSTM3	#		
Systematic error 4	SYSTM4	#		
Systematic error 5	SYSTM5	#		
Systematic error 6	SYSTM6	#		
Calculation test error	CALC?	—	Other than the data alarms shown below is indicated at the test used for calculation. Calculation disabled, test-to-test compensation disabled, normal upper/lower limit exceeded	(1) Check related data.
Overflow	OVER	O	The concentration or activity value cannot be output within the specified number of digits. **Note:** Blank space is left for data.	(1) Try rerun.
Calculation disabled	???	X	(1) Denominator becomes zero in calculation. (2) An overflow occurs in logarithmic or exponentiation calculation. (3) The APU (arithmetic processor unit) error occurs during calculation. (4) In isozyme-Q concentration calculation, the data alarm 'calculation disabled' is indicated at isozyme-P channel data or the isozyme-P channel is not measured. (5) With ORIGINAL ABS., concentration calculation is attempted through isozyme-Q channel. **Note:** Blank space is left for data.	(1) Check if there is a logical error in formulas.
Normal upper/lower limit exceeded	H	—	The test result is larger than the normal upper limit. **Note:** This error is not indicated for the control sample and serum index data.	
	L		The test result is smaller than the normal lower limit. **Note:** This error is not indicated for the control sample and serum index data.	

8-3 Instrument Alarms

Table 8-2 Instrument Alarms (1/15)

Alarm	Code	Level	Description	Note	Check and Remedy
STIRRER	1-1	STOP	The stirrer does not stop at the upper dead point in ascending motion.		(1) Call up the MAINTENANCE screen, and carry out the STIRRER check program. If it is not easy for the user to remove the cause of trouble, notify the service agent.
	1-2	STOP	The stirrer does not reach the upper dead point in ascending motion (on the rinsing bath side).		(1) Same as above.
	1-3	STOP	The stirrer does not reach the upper dead point in ascending motion (on the cuvette side).		(1) Same as above.
	1-4	STOP	The stirrer does not stop at the lower dead point in descending motion.		(1) Same as above.
	1-5	STOP	The stirrer does not reach the lower dead point in descending motion (on the rinsing bath side).		(1) Same as above.
	1-6	STOP	The stirrer does not reach the lower dead point in descending motion (on the cuvette side).		(1) Same as above.
	1-7	STOP	The stirrer does not stop at the cuvette position.		(1) Same as above.
	1-8	STOP	The stirrer does not reach the cuvette position.		(1) Same as above.
	1-9	STOP	The stirrer does not stop at the rinsing bath position.		(1) Same as above.
	1-10	STOP	The stirrer does not reach the rinsing bath position when it moves to the rinsing bath side.		(1) Same as above.
	1-11	STOP	In resetting, the stirrer is not at the upper nor lower dead point on the cuvette side, and also the reaction disk is not at the stop position.		(1) Manually raise the stirrer until it reaches the upper dead point, and then carry out 'RESET' on the MAINTENANCE screen.
	1-12	STOP	In resetting, the stirrer is not at the upper dead point, lower dead point, cuvette side position, nor rinsing bath side position.		(1) Same as above.
	1-13	STOP	In resetting, the stirrer cannot be removed from the rinsing bath side.		(1) Same as for code 1-1.
RINSE	2-1	STOP	The rinsing mechanism does not stop at the upper dead point in ascending motion.		(1) Call up the MAINTENANCE screen, and carry out 'DISK'. If it is no easy for the user to remove the cause of trouble, notify the service agent.
	2-2	STOP	The rinsing mechanism does not reach the upper dead point in ascending motion.		(1) Same as above.
	2-3	STOP	The rinsing mechanism does not stop at the lower dead point in descending motion.		(1) Same as above.
	2-4	STOP	The rinsing mechanism does not reach the lower dead point in descending motion.		(1) Same as above.

Table 8-2 Instrument Alarms (2/15)

Alarm	Code	Level	Description	Note	Check and Remedy
RINSE	2-5	STOP	In resetting, the rinsing mechanism is not at the upper nor lower dead point, and also the reaction disk is not at the stop position.		(1) Manually raise the rinsing mechanism until it reaches the upper dead point, and then carry out 'RESET' on the MAINTENANCE screen.
R. DISK	3-1	STOP	The reaction disk cannot detect its stop position.		(1) This trouble is liable to occur after the reaction disk is cleaned. Be sure to wipe water droplets off the bottom side of reaction disk thoroughly. (2) Check if water droplets adhere to the detector located below the reaction disk. (3) Contact the service agent.
	3-2	STOP	The reaction disk does not stop at the specified position.		(1) Same as above.
	3-3	STOP	In resetting, the reaction disk cannot detect its home position.		(1) Same as above.
	3-4	STOP	In resetting, the first cuvette on reaction disk does not stop at the specified position.		(1) Same as above.
SAMPLE PROBE	4-1	S. STOP	The serum probe does not reach the upper dead point in ascending motion (on other than the cuvette side).		(1) Call up the MAINTENANCE screen, and carry out 'SAMPLING MECHA.' If the sample probe cannot be restored to normal, notify the service agent.
	4-2	STOP	The sample probe does not reach the upper dead point in ascending motion (on the cuvette side).		(1) Same as above.
	4-3	S. STOP	The sample probe moves down abnormally in descending action (on other than the cuvette side).		(1) Same as above. (2) Check if the sample probe is bent. If so, carry out 'PROBE ADJUST' on the MAINTENANCE screen, and repair the sample probe. (3) Check if the sample cup is distorted.
	4-4	STOP	The serum probe moves down abnormally in descending action (on the cuvette side).		(1) Same as for code 4-3.
	4-5	S. STOP	The serum probe does not go down from the upper dead point in descending motion (on other than the cuvette side).		(1) Same as for code 4-1.
	4-6	STOP	The serum probe does not go down from the upper dead point in descending motion (on the cuvette side).		(1) Same as above.
	4-7	WARNING	Detection of abnormal descending motion of sample probe remains on.		(1) Check if the cushioning of sample probe is normal.
	4-8	S. STOP	The liquid level sensor of sample probe remains on.		(1) Remove water droplets settling in between the sample probe and liquid level sensor.
	4-9	S. STOP	When the sample probe travels to the cuvette side, the cuvette position cannot be detected.		(1) Same as for code 4-1.

Table 8-2 Instrument Alarms (3/15)

Alarm	Code	Level	Description	Note	Check and Remedy
SAMPLE PROBE	4-10	S. STOP	The sample probe does not move off from the cuvette position in its traveling action from the cuvette side to other position.		(1) Same as for code 4-1.
SAMPLE DISK	5-1	S. STOP	The sample disk cannot detect its stop position on outer track.		(1) Call up the MAINTENANCE screen, and carry out 'DISK'. If the sample disk cannot be restored to normal, notify the service agent.
	5-2	S. STOP	The sample disk does not stop at the specified position on outer track.		(1) Same as above.
	5-3	S. STOP	The sample disk cannot detect its stop position on inner track.		(1) Same as above.
	5-4	S. STOP	The sample disk does not stop at the specified position on inner track.		(1) Same as above.
	5-5	S. STOP	In resetting, the sample disk cannot detect its home position.		(1) Same as above.
	5-7	S. STOP	The sample disk is not mounted at the start of operation.		(1) Mount the sample disk.
	5-8	S. STOP	The sample disk ID is found to have other than '0' to '9' at the start of operation.		(1) Notify the service agent.
SAMPLE SYRINGE	6-1	S. STOP	The serum syringe does not reach the upper dead point.		(1) Call up the MAINTENANCE screen, and carry out 'SAMPLING MECHA.' If the serum syringe cannot be restored to normal, notify the service agent.
	6-2	S. STOP	The serum syringe does not go down from the upper dead point.		(1) Same as above.
REAGENT 1 PROBE	7-1	STOP	The R1 probe does not reach the upper dead point in ascending motion (on other than the cuvette side).		(1) Call up the MAINTENANCE screen, and carry out 'REAGENT 1 PIPETTING'. If the R1 probe cannot be restored to normal, notify the service agent.
	7-2	STOP	The R1 probe does not reach the upper dead point in ascending motion (on the cuvette side).		(1) Same as above.
	7-3	STOP	The R1 probe moves down abnormally in descending action (on other than the cuvette side).		(1) Check if the reagent vial is not covered with the lid. (2) Check if the acrylic cover position is deviated. (3) Check that the lead wire of liquid level sensor and the acrylic cover do not come in contact with each other when the probe moves down into the reagent vial containing a small amount of reagent.
	7-5	STOP	The R1 probe does not go down from the upper dead point in descending motion (on other than the cuvette side).		(1) Same as for code 7-1.

Table 8-2 Instrument Alarms (4/15)

Alarm	Code	Level	Description	Note	Check and Remedy
REAGENT 1 PROBE	7-6	STOP	The R1 probe does not go down from the upper dead point in descending motion (on the cuvette side).		(1) Same as for code 7-1.
	7-7	WARNING	Detection of abnormal descending motion of R1 probe remains on.		(1) Check if the R1 probe cushioning is normal.
	7-8	STOP	The liquid level sensor of R1 probe remains on.		(1) Remove water droplets settling in between the R1 probe and liquid level sensor.
	7-9	STOP	When the R1 probe travels to the cuvette side, the cuvette position cannot be detected.		(1) Same as for code 7-1.
	7-10	STOP	The R1 probe does not move off from the cuvette position in its traveling action from the cuvette side to other position.		(1) Same as above.
REAGENT 2 PROBE	8-1	STOP	The R2 probe does not reach the upper dead point in ascending motion (on other than the cuvette side).		(1) Call up the MAINTENANCE screen, and carry out 'REAGENT 2 PIPETTING'. If the R2 probe cannot be restored to normal, notify the service agent.
	8-2	STOP	The R2 probe does not reach the upper dead point in ascending motion (on the cuvette side).		(1) Same as above.
	8-3	STOP	The R2 probe moves down abnormally in descending action (on other than the cuvette side).		(1) Check if the reagent vial is not covered with the lid. (2) Check if the acrylic cover position is deviated. (3) Check that the lead wire of liquid level sensor and the acrylic cover do not come in contact with each other when the probe moves down into the reagent vial containing a small amount of reagent.
	8-5	STOP	The R2 probe does not go down from the upper dead point in descending motion (on other than the cuvette side).		(1) Same as for code 8-1.
	8-6	STOP	The R2 probe does not go down from the upper dead point in descending motion (on the cuvette side).		(1) Same as above.
	8-7	WARNING	Detection of abnormal descending motion of R2 probe remains on.		(1) Check if the R2 probe cushioning is normal.
	8-8	STOP	The liquid level sensor of R2 probe remains on.		(1) Remove water droplets settling in between the R2 probe and liquid level sensor.
	8-9	STOP	When the R2 probe travels to the cuvette side, the cuvette position cannot be detected.		(1) Same as for code 8-1.
	8-10	STOP	The R2 probe does not move off from the cuvette position in its traveling action from the cuvette side to other position.		(1) Same as above.

Table 8-2 Instrument Alarms (5/15)

Alarm	Code	Level	Description	Note	Check and Remedy
REAGENT 1 DISK	9-1	STOP	The R1 disk cannot detect its stop position.		(1) Call up the MAINTENANCE screen, and carry out 'DISK'. If the R1 disk cannot be restored to normal, notify the service agent.
	9-2	STOP	The R1 disk does not stop at the specified position.		(1) Same as above.
	9-3	STOP	The R1 disk cannot detect its home position.		(1) Same as above.
REAGENT 2 DISK	10-1	STOP	The R2 disk cannot detect its stop position.		(1) Same as above.
	10-2	STOP	The R2 disk does not stop at the specified position.		(1) Same as above.
	10-3	STOP	The R2 disk cannot detect its home position.		(1) Same as above.
REAGENT 1 SYRINGE	11-1	STOP	The R1 syringe does not reach the upper dead point.		(1) Call up the MAINTENANCE screen, and carry out 'REAGENT 1 PIPETTING'. If the R1 syringe cannot be restored to normal, notify the service agent.
	11-2	STOP	The R1 syringe does not go down from the upper dead point.		(1) Same as above.
REAGENT 2 SYRINGE	12-1	STOP	The R2 syringe does not reach the upper dead point.		(1) Call up the MAINTENANCE screen, and carry out 'REAGENT 2 PIPETTING'. If the R2 syringe cannot be restored to normal, notify the service agent.
	12-2	STOP	The R2 syringe does not go down from the upper dead point.		(1) Same as above.
TEMP CONTROL	13-1	WARNING	The temperature of reaction (incubation) bath exceeds 39°C.		(1) Check if the radiator filter equipped on the front right cover is clogged with dust or dirt. (2) Notify the service agent.
	13-2	WARNING	The temperature of reaction (incubation) bath is out of the following ranges: 25 ± 0.5°C 30 ± 0.5°C 37 ± 0.5°C	Check during operation only.	(1) Check if the room temperature is within a range of 15 to 32°C. (2) Check if the radiator filter equipped on the front right cover is clogged with dust or dirt. (3) Notify the service agent.
INCUBATOR WATER	14-1	WARNING	The water level of reaction (incubation) bath is too low.		(1) Check if the snap-in joint of distilled water tank is connected securely. (2) Check if the pump (MD-20RZG) contains air. If so, call up the MAINTENANCE screen, and carry out 'INC. WATER EXCHANGE' several times. (3) Check if the pump filter is clogged. (Refer to 4-3-13 — Cleaning of Pump Filter.)
REFRESH WATER	15-1	WARNING	A time period of 24 hours has elapsed after exchanging water in the reaction (incubation) bath.		(1) Carry out 'INC. WATER EXCHANGE', or turn power off and then on.
SIPPER	16-1	STOP	The negative pressure of vacuum pump is not enough.	Check when vacuum sucking is performed.	(1) Check if there is air leakage from the rubber plug on vacuum tank.

Table 8-2 Instrument Alarms (6/15)

Alarm	Code	Level	Description	Note	Check and Remedy
DISTILLED WATER	17-1	S. STOP	The water level of distilled water tank is too low.		(1) Check if the distilled water tank is supplied with water. Also, check the water pressure, water cock, deionizer, and water supply paths. (2) Check if the water supply filter is clogged. (Refer to 4-3-11 – Cleaning of Water Supply Filter.)
RESERVOIR	18-1	WARNING	The waste solution tank (reservoir) is full.		(1) Make the waste solution tank empty.
ROOM TEMP	19-1	WARNING	The temperature of power supply unit exceeds 70°C.		(1) Check if the cooling fan is running. (2) Check if the room temperature is too high.
DC POWER	20-1	E.STOP	24V DC power supply abnormal (for other than pulse motor drive)		(1) Check if the fuse is blown (located on the right side of instrument). (2) Notify the service agent.
	20-3	STOP	15 V DC power supply abnormal		
	20-4	STOP	–15 V DC power supply abnormal		
	20-5	WARNING	12 V DC power supply abnormal (for lamp)		
	20-6	STOP	12 V DC power supply abnormal (for FDD)		
	20-7	E.STOP	24 V DC power supply abnormal (for pulse motor drive)		
REAGENT SHORT	21-1 to 64	WARNING	The remaining reagent volume is insufficient, i.e. its count is less than ten tests. R1: Channels 1 to 32 . . . Codes 1 to 32 R2: Channels 1 to 32 . . . Codes 33 to 64	Not checked for ISE.	(1) Call up the REAGENT VOLUME CHECK screen, and check if any reagent is insufficient. (2) Set a new volume of reagent. (3) Check if distilled water is set mistakenly in place of reagent.
CELL BLANK	22-1 to 6	WARNING	In four repeated measurements of cell blank (after injection of cell blank water), abnormal blank absorbance is encountered twice or more (Note). Relevant cell block number is indicated with code.	**Note:** A difference from the blank absorbance measured in execution of 'CELL BLANK' on the MAINTENANCE screen exceeds the allowable limit of 0.1 Abs.	(1) Check if the reaction cuvette has contamination or crack. (2) Check if air bubbles are generated in the reaction cuvette. (3) Check if dust or dirt is left in the reaction (incubation) bath. (4) Check if the rinsing water is sufficient. (5) Check if 'CELL BLANK' has been executed (after replacement of lamp, cuvettes or floppy disk).
PHOTOMETER LAMP	23-1	S. STOP	In cell blank measurements, abnormal blank absorbance is encountered three times or more.	Abnormal if approx. 3.3 Abs is exceeded.	(1) Check if the lamp filament is burned out.
	23-2	WARNING	In cell blank measurements, abnormal blank absorbance is encountered less than three times.		
ADC? **(ADC abnormal)**	27-1	WARNING	The ADC for subordinate (secondary) wavelength in photometric assay does not work properly.		(1) Call up the MAINTENANCE screen, and carry out 'RESET'. (2) Notify the service agent.
	27-2	WARNING	The ADC for main (primary) wavelength in photometric assay does not work properly.		
	27-4	WARNING	The ADC for temperature control does not work properly.		

Table 8-2 Instrument Alarms (7/15)

Alarm	Code	Level	Description	Note	Check and Remedy
ADC CALIB?	28-1	WARNING	In the photometric assay subordinate wavelength ADC, the reference voltage ADC count is abnormal.		(1) Call up the MAINTENANCE screen, and carry out 'RESET'. (2) Notify the service agent.
	28-2	WARNING	In the photometric assay main wavelength ADC, the reference voltage ADC count is abnormal.		
	28-4	WARNING	In the temperature control ADC, the reference voltage ADC count is abnormal.		
CRAM	29-1	WARNING	An error is encountered with the CRAM.		(1) Notify the service agent.
FUSE	30-1	E. STOP	The fuse has blown.		(1) Check if the fuse has blown. (2) Notify the service agent.
VACUUM TANK	31-1	WARNING	The vacuum tank contains water.		(1) Check if the vacuum tank contains water. (2) Check if the solenoid valves are clogged (SV30, SV31 and SV33 located on the left side of instrument).
COLD WATER TANK	32-1	WARNING	The water level of cooling water bath is too low.		(1) Replenish the cooling water bath with purified water. (Refer to 4-3-15 — Water Exchange in Cooling Water Bath.)
ROUTINE START NO.?	33-1	WARNING	The start sample number assigned on the START CONDITIONS screen is illegal.		(1) Verify Disk NO. of START SAMPLE NO. on the START CONDITIONS screen.
SAMPLING END	34-1	WARNING	There is no routine sample to be measured. The end of sampling is indicated.		
INTERRUPT ERROR	35-1	WARNING	Interrupt error in FIRQ	○ Displayed on the screen at power-on.	(1) Notify the service agent.
	35-2	WARNING	Interrupt error in IRQ		
	35-3	WARNING	Interrupt error in NMI		
POWER FAIL	36-1	WARNING	AC power supply has gone down.	○ Displayed on the screen at power-on.	(1) This warning informs the user of occurrence of power failure (momentary power failure).
	36-2	WARNING	5 V DC power supply has gone down.		
MOTOR CONTROLLER	37-1 to 16	STOP	In data writing to the motor controller, the previous data is not taken in yet. Or, in data reading from it, the relevant data is not found. (For codes 1 to 16, see the next column.)	Code / Motor: 1 Serum sampling arm up/down 2 Serum sampling arm rotation 3 Reaction disk rotation 4 Sample disk rotation 5 R1 disk rotation 6 R1 pipetting arm up/down 7 R1 pipetting arm rotation 8 R2 pipetting arm up/down 9 R2 pipetting arm rotation	(1) Notify the service agent.

Table 8-2 Instrument Alarms (8/15)

Alarm	Code	Level	Description	Note	Check and Remedy
MOTOR TIMEOUT	38-1 to 16	E.STOP	The motor controller does not accept other than the stop command while the motor is running. (For codes 1 to 16, see the next column.)	Code / Motor: 10 R2 disk rotation 11 Rinsing/stirring mechanism up/down 12 Pump x 5 13 Stirring mechanism back/forth, or serum syringe up/down 14 R1 and R2 syringe up/down 15 Internal standard syringe up/down (ISE) 16 Sipper or diluent syringe up/down (ISE)	(1) Notify the service agent.
PM DRIVE TEMP	40-1	WARNING	Excessively high temperature on the pulse motor drive circuit board 1.	This alarm is issued if the temperature is higher than 80°C.	(1) Check if the cooling fun is running properly. (2) Check if the room temperature is too high.
	40-2	WARNING	Excessively high temperature on the pulse motor drive circuit board 2.		
DEGASSER	41-1	WARNING	The vacuum level of degasser (deaerator) is too low.		(1) Notify the service agent.
STANDARD?	50-1 to 40 (test codes)	WARNING	In photometric assay: (1) STD absorbance data is alarmed during calibration. (2) Nonlinear calibration calculation is disabled. (3) The APU error (arithmetic processor unit error: codes 95-1 to 4) is encountered during calibration.	Neither updating of calibration result nor saving to FD is performed.	In photometric assay: (1) Verify the duplicate limit value specified on the CHEMISTRY PARAMETERS screen. (2) Check if the standard solution and reagent are sufficient. (3) Check if the cell blank alarm has been issued. (4) Check if an absorbance of 3.3 Abs is exceeded. (5) Check if the reaction limit is exceeded. (6) Check if the ADC alarm has been issued. (7) Check if the linear alarm has been issued.
CALIBRATION	51-1 to 40 (test codes)	WARNING	In photometric assay: The K factor determined in calibration differs from the previous value by more than ±20%.	Updating of calibration result is carried out, but saving to FD is not performed.	In photometric assay: (1) Verify the previous K factor value stored on floppy disk. (2) Check if the standard sample material has been changed. (3) Check if the quality of reagent has been changed.
CALIB. SD?	52-1 to 40 (test codes)	WARNING	In nonlinear calibration, the residual convergence error is larger than the SD limit (input value).	Same as above.	(1) Verify the SD limit value specified on the CHEMISTRY PARAMETERS screen. (2) Check if the quality of reagent has been changed. (3) Check if the standard solution is set properly. (4) Verify the input concentration value of standard solution.

Table 8-2 Instrument Alarms (9/15)

Alarm	Code	Level	Description	Note	Check and Remedy
SENSITIVITY?	53-1 to 40 (test codes)	WARNING	In linear, nonlinear or isozyme-P calibration, a difference between mean STD(1) absorbance and mean STD(N)[Note 1] is smaller than the sensitivity limit (input value). **Note 1)** N: = 2 . . . . . Linear, or isozyme-P calibration = 3 to 6 . . . Nonlinear calibration (Calibration point input) **Note 2)** If only either one of STD(1) and STD(N) is measured, the previous absorbance of currently non-measured STD is used for sensitivity check.	Neither updating of calibration result nor saving to FD is performed.	(1) Verify the sensitivity limit value specified on the CHEMISTRY PARAMETERS screen. (2) Check if the quality of reagent has been changed. (3) Verify the input concentration value of standard solution. (4) Check if the quality of standard solution has been changed.
CONTROL RANDOM	54-1 to 43 (test codes)	WARNING	A random error has occurred in realtime quality control.		(1) Verify the $\bar{X}$ and SD values specified on the REAL TIME QC screen. (2) Check if there are air bubbles on the inside or outside wall of reaction cuvette. (3) Check if reproducibility is normal. (4) Check if the degasser (deaerator) and seal piece are normal. (5) Check if the reagent or deionized water is contaminated. (6) Check if the photometer is normal (carry out 'PHOTOMETER CHECK').
CONTROL SYSTEM	55-1 to 43 (test codes)	WARNING	A systematic error has occurred in realtime quality control.		(1) to (6) Same as above. (7) Check if the control serum is proper. (8) Check if the quality of control serum has been changed. (9) Check if the control serum has been adjusted properly.
CH. ASSIGN.? (CH.)	70-1 to 32 (ch.)	WARNING	The channel assignment is erroneous as mentioned below. (1) The channel assignment is made only for TEST2. (2) Although the channel assignment is made for both TEST1 and TEST2, the assay codes assigned for them are not identical. (3) Although the channel assignment is made for both TEST1 and TEST2, the twin test assay codes are not given to them. (4) The same test code is specified for TEST1 and TEST2. (5) Where only TEST1 is selected, the twin test assay code is given.	Analytical operation cannot be started.	(1) Cancel 'TEST2' assignment except for the channel where twin test assay (3-point assay, 1-point and rate assay, rate-B assay) is specified. (2) Enter necessary parameter for 'TEST2' corresponding to the twin test channel.

Table 8-2 Instrument Alarms (10/15)

Alarm	Code	Level	Description	Note	Check and Remedy
ISOZYME CH.? (QCH.)	71-1 to 32 (ch.)	WARNING	The isozyme-P calibration method is not parameterized for the preceding channel.	Analytical operation cannot be started.	(1) Use consecutive channels for isozyme-P and isozyme-Q assays.
CHEM. PARA.? (T.C.)	72-1 to 40 (test codes)	WARNING	The parameter setting for relevant test is improper. (1) The relationship between assay code and photometric point is improper.* (2) The relationship between assay code and calibration method is improper. (3) Necessary STD position is not specified. (4) For nonlinear calibration method, a model number or calibration points are not specified. (5) The R1 or R2 pipetting volume (including diluent) exceeds 350 μL.	(1) Analytical operation cannot be started. (2) Not checked for tests undefined on the CHANNEL ASSIGNMENT screen.	(1) Examine the relationship between analytical method and test parameters. (2) For the nonlinear calibration test, specify a model number and calibration points on the CHEMISTRY PARAMETERS screen. (3) Reduce the R1 or R2 pipetting volume below 350 μL. * Use the photometric point except of 8, 9, 10 for the serum indexes condition.
RANGE? (T.C.)	73-1 to 43, 47 to 54 (test codes)	WARNING	In parameterization of expected or panic value corresponding to the relevant test, the low value is larger than the high value.	Analytical operation cannot be started.	(1) Verify test parameters specified on the CHEMISTRY PARAMETERS screen.
CMP. TEST? (F. NO.)	74-1 to 8 (formula numbers)	WARNING	The formula number setting is improper. (1) An undefined compensation test is specified. (2) A compensated test is not included in the formula. (3) Where the photometric assay is selected as a compensated test, the electrolyte parameter is specified.	(1) Analytical operation cannot be started. (2) Not checked for ORIGINAL ABS.	(1) Check the related original parameters.
SERUM INDEXES (T.C.)	75-1 to 40 (test codes)	WARNING	Although the serum index measurement is selected, the rate-A assay code is not specified.	Analytical operation cannot be started.	(1) Specify the rate-A assay code for serum index channel.
PRINTER	90-1	WARNING	(1) Hardware failure (The acknowledge signal is not returned from printer.) (2) Timeout error		(1) Notify the service agent.
	90-2	WARNING	(1) Chart paper is not loaded on the printer. (2) The printer select button is off. (3) The printer connector is unplugged.		(1) Load chart paper on the printer. (2) Turn on the select button. (3) Plug in the connector securely.
	90-3	WARNING	(1) Self-check error		(1) Notify the service agent.
	90-4	WARNING	(1) An illegal character has been transferred.	Illegal characters: Other than ASCII codes $20 to $7B, $CD, $CA, $OC, and $04.	(1) Same as above.
	90-5	WARNING	(1) In report mode, the result data (routine, stat and control samples) cannot be printed within a line count range specified by PAGE LENGTH parameter.	Output timing: On completion of printing out the result data of one sample.	(1) Verify the PAGE LENGTH parameter value specified on the REPORT FORMAT screen.

Table 8-2 Instrument Alarms (11/15)

Alarm	Code	Level	Description	Note	Check and Remedy
SYSTEM I/F	91-1	WARNING	The text cannot be received from the system within the predetermined period of time.	Timeout error in data transfer from host to 717	(1) Check if the host computer is put in service. (2) Check if the connector is plugged in properly. (3) Check if the connector remains plugged in during data transmission. (4) Notify the service agent.
	91-2	WARNING	The received text contains an illegal character.	Character error in data transfer from host to 717	
	91-3	WARNING	The character count in received test is out of the allowable range. (1) The character count between STX to ETX is out of the predetermined range. (2) The communication protocol is ignored in text transfer from system to 717.	Format error in data transfer from host to 717	
	91-4	WARNING	A vertical parity error has been found in data reception.	Receiving error in data transfer from host to 717	
	91-5	WARNING	An overrun error has occurred in data reception.	Same as above.	
	91-6	WARNING	A framing error has occurred in data reception.	Same as above.	
	91-7	WARNING	A BCC error has been found in received test.	BCC error in data transfer from host to 717	
	91-8	WARNING	Data cannot be transmitted to the system within the predetermined period of time.	Timeout error in data transfer from 717 to host	
	91-9	WARNING	In batch mode communication, the system has returned an NAK signal for the fourth transfer retry.		
	91-10	WARNING	Communication has been attempted regardless of an unsuccessful initialization of the buffered controller.		
	91-11	WARNING	A command cannot be issued to the buffered controller.		
	91-12	WARNING	The end-of-command interrupt is not returned from the buffered controller.		
	91-13	WARNING	An illegal command or invalid data write has been attempted to the buffered controller.		
	91-14	WARNING	An error has occurred in accessing the FIFO memory of buffered controller.		
	91-15	WARNING	The serial interface LSI circuit of buffered controller is faulty.		
	91-16	WARNING	An invalid interrupt has been issued from the buffered controller.		
	91-17	WARNING	The comment data received from the system is not displayable.	The comment data is handled as blank.	
KEY CODE?	92-1	WARNING	An nonexistent keycode has been input.		(1) Contact the service agent.

Table 8-2 Instrument Alarms (12/15)

Alarm	Code	Level	Description	Note	Check and Remedy
C-RAM ERROR	93-1	WARNING	An error has occurred in the C-RAM for control ID No. 1.	The codes 1 to 6 correspond to the control ID numbers.	(1) Notify the service agent.
	93-2	WARNING	An error has occurred in the C-RAM for control ID No. 2		
	93-3	WARNING	An error has occurred in the C-RAM for control ID No. 3.		
	93-4	WARNING	An error has occurred in the C-RAM for control ID No. 4.		
	93-5	WARNING	An error has occurred in the C-RAM for control ID No. 5.		
	93-6	WARNING	An error has occurred in the C-RAM for control ID No. 6.		
REAL TIME CLOCK	94-1	WARNING	A read error has been encountered with the realtime clock.		(1) Same as above.
APU ERROR	95-1	WARNING	An APU reset timeout has occurred (APU: Arithmetic processor unit).	Checked once at power-on.	(1) Same as above.
	95-2	WARNING	A data ready timeout has occurred.		
	95-3	WARNING	A status ready timeout has occurred.		
	95-4	WARNING	A command execution timeout has occurred.		
FD DOOR OPEN	100-1	WARNING	The FDD door is left open, or the disk is not inserted completely (on the system FDD).	FDD: Floppy disk drive	(1) Insert the disk properly.
	100-2	WARNING	The FDD door is left open, or the disk is not inserted completely (on the data FDD).		
WRONG FD?	101-1	WARNING	A wrong disk has been inserted (on the system FDD).		(1) Put the system disk into drive 1, and the data disk into drive 2.
	101-2	WARNING	A wrong disk has been inserted, or the disk has been exchanged during analytical operation (on the data FDD).		
FD READ?	102-1	WARNING	During execution of logout (daily QC alarm), a hardware error has occurred in a read of alarm data.		(1) Clean the floppy disk drive. (Refer to 4-3-23 — Cleaning of Floppy Disk Drive.) (2) Check if the floppy disk (medium) has reached the end of its useful time. (Lifetime: Up to 100 thousand accesses are allowed.) (For the access count of the disk being used, refer to 6-14 — LOG OUT.) (3) Notify the service agent.
	102-2	WARNING	During execution of logout (cumulative alarm), a hardware error has occurred in a read of alarm data.		
	102-3	WARNING	A hardware error has occurred in a read of cumulative quality control data.		
	102-4	WARNING	A hardware error has occurred in a read of calibration trace data.		
	102-5	WARNING	A hardware error has occurred in a read of parameters.		

Table 8-2 Instrument Alarms (13/15)

Alarm	Code	Level	Description	Note	Check and Remedy
FD READ?	102-13	WARNING	A hardware error has occurred in a read of routine/rerun smaple test selection data.		
	102-14	WARNING	A hardware error has occurred in a read of calibration/control test selection data.		
	102-15	WARNING	During execution of photometer check, a hardware error has occurred in a read of previously measured value.		
	102-16	WARNING	A hardware error has occurred in a read of test results of routine/rerun samples.		
	102-18	WARNING	A hardware error has occurred in a read of test results of stat samples.		
	102-19	WARNING	A hardware error has occurred in a read of calibration data for realtime printout.		
	102-20	WARNING	During execution of logout (communication trace), a hardware error has occurred in a read of trace data.		
	102-30	WARNING	(1) During execution of FD copy command, a hardware error has occurred in the drive 1. (2) During execution of FD check command, a hardware error has occurred. (3) During execution of logout (operation count), a hardware error has occurred in a read of operation count. (4) During power initialization, an error has occurred in a read of FD part number/ revision number.		
FD WRITE?	103-1	WARNING	A hardware error has occurred in a write of daily alarm.		(1) Same as for 'FD READ?' alarm.
	103-2	WARNING	A hardware error has occurred in a write of cumulative alarm.		
	103-3	WARNING	A hardware error has occurred in accumulation/ deletion of daily quality control data.		
	103-4	WARNING	A hardware error has occurred in a write of trace data of photometric/electrolyte assay calibration result.		
	103-5	WARNING	A hardware error has occurred in a write of parameters.		
	103-7	WARNING	A hardware error has occurred in a write of remaining reagent volume.		
	103-8	WARNING	A hardware error has occurred in a write of photometric assay calibration result.		

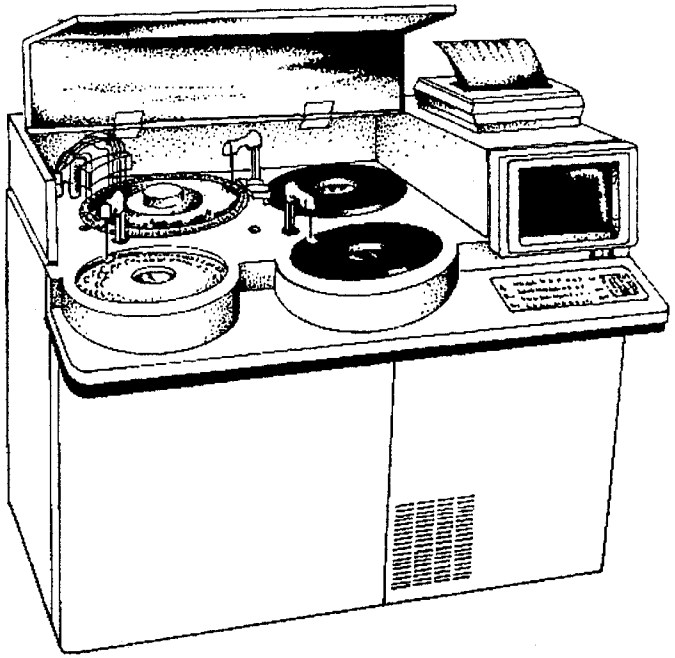
Table 8-2 Instrument Alarms (14/15)

Alarm	Code	Level	Description	Note	Check and Remedy
FD WRITE?	103-9	WARNING	A hardware error has occurred in a write of electrolyte assay calibration result.		
	103-10	WARNING	A hardware error has occurred in a write of serum index blank value.		
	103-11	WARNING	A hardware error has occurred in a write of reagent blank level value.		
	103-12	WARNING	During cell blank measurement, a hardware error has occurred in a write of all cell's measured results.		
	103-13	WARNING	A hardware error has occurred in a write of routine/rerun sample test selection data.		
	103-14	WARNING	A hardware error has occurred in a write of calibration/control test selection data.		
	103-15	WARNING	During execution of photometer check, a hardware error has occurred in a write of current measured value.		
	103-16	WARNING	A hardware error has occurred in a write of test results of routine samples.		
	103-17	WARNING	A hardware error has occurred in a write of test results of return samples.		
	103-18	WARNING	A hardware error has occurred in a write of test result of stat samples.		
	103-19	WARNING	An error has occurred in an attempt of temporarily saving the calibration result for realtime printout into floppy disk.		
	103-20	WARNING	A hardware error has occurred in a write of communication trace data.		
	103-30	WARNING	(1) During execution of FD copy command, a hardware error has occurred in the drive 2. (2) The FD head cleaning or FD formatting has been unsuccessful.		
FD WRITE PROTECT	104-1	WARNING	The write-protected disk has been inserted (on the system FDD).		(1) Check if the correct floppy disk has been loaded.
	104-2	WARNING	The write-protected disk has been inserted (on the data FDD).		
EXCHANGE FD	105-1	WARNING	The disk operation count exceeds '100,000' (on the system FDD).	Alarm indicated only at power-up	(1) Clean the FDD read/write head using the cleaning disk. Then, replace the floppy disk with a new one. (For operation count, refer to 6-14 — LOG OUT. For cleaning, refer to 4-3-23 — Cleaning of Floppy Disk Drive.)
	105-2	WARNING	The disk operation count exceeds '100,000' (on the data FDD).		

Table 8-2 Instrument Alarms (15/15)

Alarm	Code	Level	Description	Note	Check and Remedy
TEST SELECTION?	46-XX	WARNING	"XX" shows disk No. At test selecting, sample position No. is registered, but test item is not inputted in time and not registered.		Rerun for unmeasured tests and input test selection as soon as possible.
DIP. SW.?	45-01	WARNING	In case of modifying to use sample sequence No. 1 to 9999, DIP SW setting of PCB is incorrect.		Notify the service agent.

Boehringer Mannheim/Hitachi 717 Analyzer



User's Guide

BOEHRINGER
MANNHEIM
CORPORATION

mannheim boehringer

Version C, January, 1994

Boehringer Mannheim/Hitachi 717 Analyzer

User's Guide

BOEHRINGER MANNHEIM CORPORATION
CUSTOMER TECHNICAL SUPPORT

Chemistry assistance and instrument troubleshooting is available through the Boehringer Mannheim/Hitachi Customer Technical Support Department at:

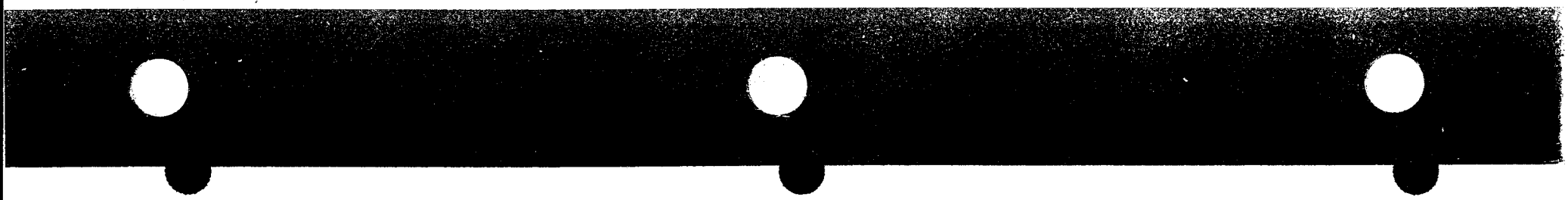
(800) 428-2336*

When calling, please have your account number and serial number ready. For quick reference, this information may be written in the space provided below:

Account Number _____ Serial Number _____

* In the event of an apparent failure of this line, a *fail safe* number, (317) 252-3123, is available.

NOTES



Overview

Introduction

This User Guide contains procedures for operating the Boehringer Mannheim/ Hitachi 717 Analyzer, and is intended as a memory aid for trained operators.

Prerequisites

You must read and understand Operator's Manual (OM) Chapters 1 (Introduction) and 2 (Operation) before utilizing the procedures in this guide.

Rules for the User Guide Entry prompts OM Section 2.15

- Keystrokes are indicated as boxed keycaps.
  example: [1] [ENTER]
- An underlined, uppercase word, or term at the start of any step represents the required cursor location (entry field). Example: START
- Remarks in parentheses show result of the action taken.
- If necessary, move the cursor to its required location with the cursor control keys [◁] [▷] .

(continued on back of card)

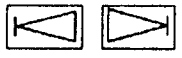
Overview (continued)

Entry prompts
OM Section
2.15

At the bottom of each display is an ENTRY PROMPT.
The entry prompt indicates format and type of information required for the entry field where the cursor is positioned.

Input errors
OM Section
2.15

The term "INPUT ERROR" appears at the ENTRY PROMPT field when information is not entered correctly, or when entry is not allowed.
To clear this type of error:

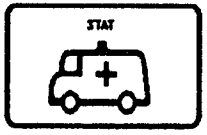
1. Press [C] (clear).
2. Move the cursor  back to the desired entry field.
3. Read the prompt to determine correct entry format.
4. Enter desired information.

(continued on next card)

Overview (continued)

Software Menu
Layout
OM Section
2.15

```
   STAT TEST SELECTION & MONITOR

POS. NO.              [ ]
ID NO.                [          ]
COMMENT               [                    ]
                      [                    ]
TESTS                 [ ]


   POS.   S. NO.   ID NO.



***  1-7
```




```
OPERATION MONITOR

   ANALYZER STATUS   : STAND-BY
   INCUBATOR TEMP    : 37.0

S. NO.                ID NO.              CH. NO.
N0020-0-05                      3198        23

       DATE                     : 28/02/88
       TIME                     :  (10:51)
       PRINT/COM.     : REPORT    /OFF-LINE

   ALARM MESSAGE      LEVEL     CLASS      TIME
---------------- ----- ----- ------
```

(continued on back of card)

Overview (continued)

Software Menu
Layout
OM Section
2.15

```
   *** ROUTINE JOB ***

JOB NO.    [  ]

      1.   REAGENT VOLUME CHECK

      2.   PATIENT TEST SELECTION

      3.   CALIBRATOR & CONTROL TEST SELECTION

      4.   RERUN SAMPLES

      5.   START CONDITIONS


***   JOB NO. (1-5) & NEXT, BACK
```

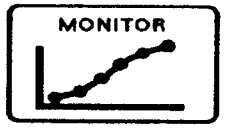

```
    *** QUALITY CONTROL JOB ***

JOB NO. [ ]

      1. REAL TIME QC

      2. DAILY QC LIST

      3. DAILY QC CHART

      4. CUMULATIVE QC LIST

      5. CUMULATIVE QC CHART


***   JOB NO. (1-5) & NEXT,BACK
```

(continued on next card)

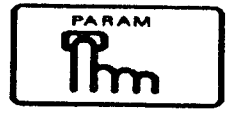
Overview (continued)

Software Menu
Layout
OM Section
2.15

```
      *** MONITOR JOB ***

JOB NO. [  ]
     1.REACTION MONITOR
     2.DATA REVIEW
     3.CALIBRATION LIST
     4.WORKING CURVE (NON-LINEAR)
     5.CALIBRATION TRACE
     6.ISE MONITOR

*** JOB NO. (1-6) & NEXT, BACK
```



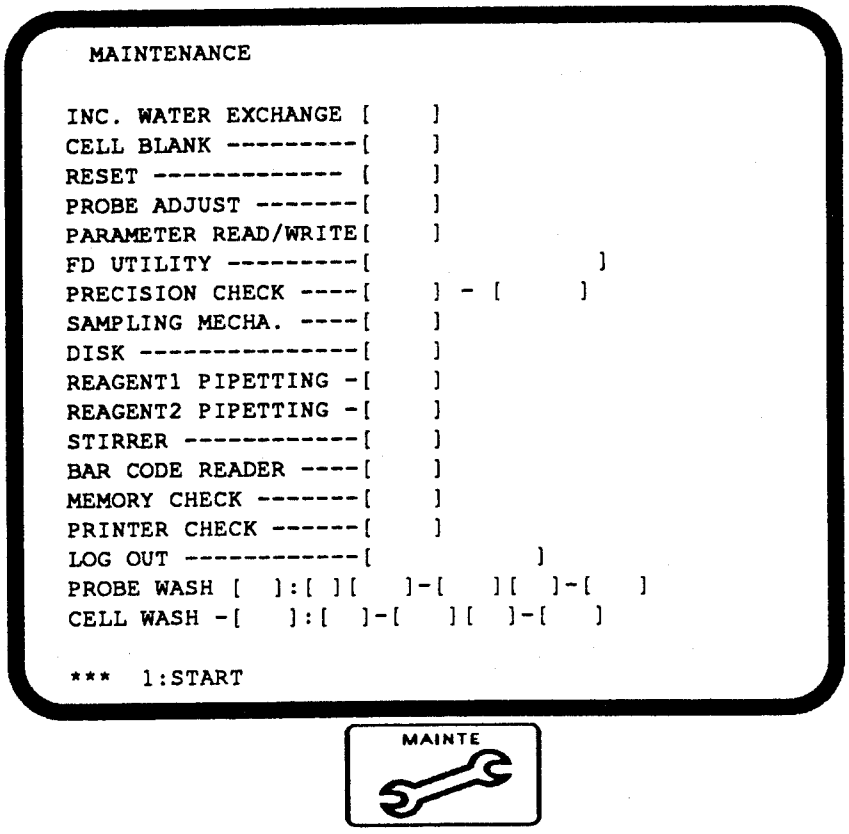

```
    *** PARAMETER JOB ***

JOB NO.   [  ]
      1.  TEST NAME
      2.  CHEMISTRY PARAMETERS
      3.  ISE PARAMETERS
      4.  CHANNEL ASSIGNMENT
      5.  PROFILING
      6.  CALCULATED TEST
      7.  COMPENSATED TEST
      8.  SERUM INDEXES
      9.  PRINT ORDER
     10.  REPORT FORMAT
***  JOB NO. (1-10) & NEXT, BACK
```



(continued on back of card)

Overview (continued)

Software Menu
Layout
OM Section
2.15



Data Disk

Introduction

The Data Disk may be used either for temporary or permanent storage of patient files. If it is used for temporary storage, files must be cleared from the disk once it is full.

Rules for use
OM Section
2.10

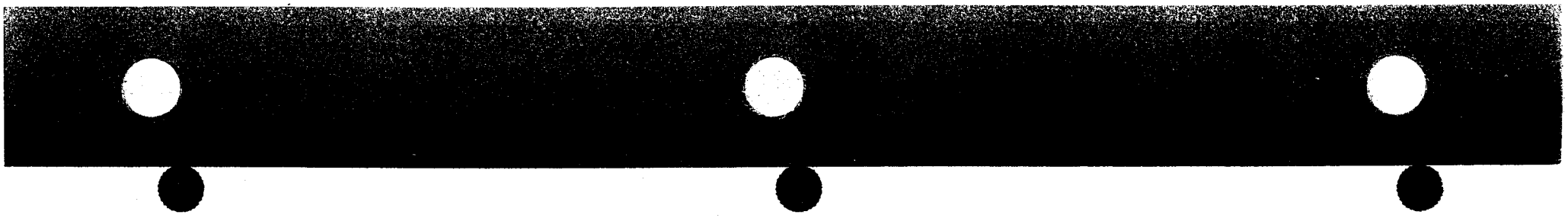
1. Never use the same sequence number more than once on the same Data Disk, unless the disk has been cleared first.
2. During routine specimen test selection, when you reach sequence number 1000:
   a. Stop programming patient samples for analysis.
   b. Run the samples that are programmed.
   c. Once all results have been printed:
      - clear Data Disk if used for temporary storage.
      - replace Data Disk if used for permanent storage.
   d. Change the START SAMPLE NO. (Start Conditions display) to 1 (one).

(continued on back of card)

Data Disk (continued)

e. Program the remaining samples on the Patient Test Selection display starting with routine sequence no. 1.

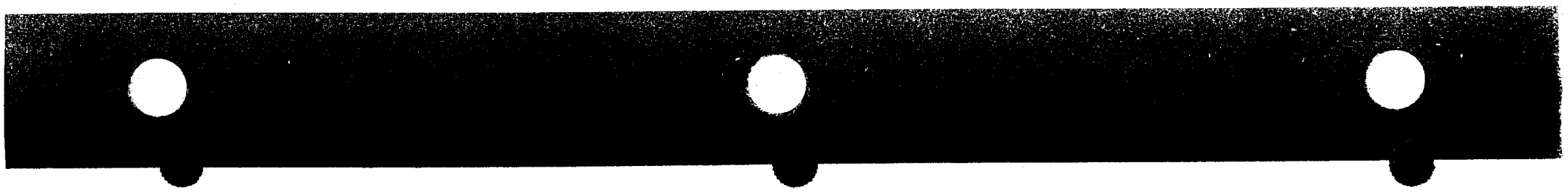
3. During stat test selection, when you reach stat sequence number 100:
   a. Stop programming stat samples for analysis.
   b. Run the samples that are programmed.
   c. Wait until all results have been printed, then clear all stat files from the Data Disk.



Start-up/Prep

Start-up OM Section 2.2	Perform the following steps only if the analyzer is OFF: 1. Turn on water supply, or fill internal reservoir. 2. Turn ON/OFF switch ON.
Calibrators & controls OM Section 2.3	Prepare all calibrators and controls for the day's run.
Reagents OM Section 2.3	Check remaining reagent volumes and prepare necessary reagents: 1. [ROUTINE] [NEXT] (Reagent Volume Check display). 2. Note and replace depleted and outdated reagents. 3. Visually check ISE reagents, and replace if necessary.

NOTES



Daily Check

Introduction

The following procedures must be performed at least once every day, whenever most convenient for your laboratory.

Daily checks
OM Section
2.2

1. Visually check Hitergent supply and replace if necessary.
2. Visually check Cell Clean 90 supply, replace if necessary and reset the counter (if using the Optional Integral Cell Wash Unit).
3. Check that the System and Data disks are in latched drives.
4. Check printer paper supply.
5. Check that the printer is on-line.

(continued on back of card)

Daily Check (continued)

Photometer check
OM Section 2.3

1. [ROUTINE] [5] [ENTER] (Start Conditions display).
2. PHOTOMETER CHECK: [1] [ENTER] .
3. Read the values that are printed. If any value exceeds 16000, refer to Operator's Manual, Section 2.3.4.

NOTE: The following procedures must be performed if the analyzer has just been powered on, or if you have not assayed any samples within an 8-hour period.

(continued on next card)

Daily Check (continued)

Air purge
OM Section
2.3

1. [ROUTINE] [5] [ENTER] (Start Conditions display).
2. WASH [4] [ENTER] (Air Purge).
3. Wait for the analyzer to enter Standby before continuing.

Clear stat files from Data Disk

1. [ROUTINE] [5] [ENTER] (Start Conditions display).
2. DATA CLEAR: [3] [ENTER] (Clear Stat files)
   [1] [ENTER] [100] [ENTER] (Clear stat sequence numbers 1-100).
   The entry prompt displays:
   "CLEAR OK?"
3. [1] [ENTER] (Yes).

NOTE: The following procedure (ISE Start-Up Prime) must be performed if the analyzer has just been powered on, or if you have not assayed any samples within an 8-hour period.

(continued on back of card)

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Daily Check (continued)

Prime ISE reagents
OM Section 2.3

The type of ISE prime required is dependent upon whether ISE reagents have been replaced.

1. [ROUTINE] [5] [ENTER] (Start Conditions display).
2. ISE PRIME Use the following table to determine the required entry.

IF	KEY IN . . .	TYPE OF PRIME
No reagents were replaced	[1] [ENTER]	Start-Up
Fresh Internal Standard (IS) or Diluent (DIL)	[2] [ENTER]	IS, DIL
Fresh KCl	[3] [ENTER]	KCl

NOTE: Recalibration is required if fresh reagent is added.

Calibration

Select tests for calibration
OM Section 2.4

The following procedures may be used to calibrate ISE and photometric chemistries simultaneously. (See also ISE Calibration card.)

1. [ROUTINE] [3] [ENTER] (Calibrator & Control Test Selection display).
2. CALIBRATION TYPE: [1] [ENTER] (Start-up calibration).
3. STANDARD TYPE: [1] [ENTER] (Blank calibrator).
4. TESTS (STD 1): [Select tests] for blank, then press [ENTER].
5. TESTS (STD 2-6): [Select tests] for STD 2, then press [ENTER].
6. TESTS (ISE 1, 2): [Na,K,Cl] [ENTER] (if calibrating ISE's).
7. TESTS (ISE 3): [Na,K,Cl] [ENTER] (if calibrating ISE's).

(continued on back of card)

Calibration (continued)

Write calibration test selections on disk
OM Section 2.4

This step is suggested as a safeguard in case of laboratory power outages or "brown-outs."

1. FD READ/WRITE: [2] [ENTER] .
   The CRT displays: "WRITE OK?"
2. [1] [ENTER] (YES).

Load sample disk

Place calibrator sample cups on the sample disk. Calibrator positions are specified on the Chemistry Parameters display or by requesting the Calib. Load List.

What's next

Proceed to the card labelled: "Controls."

Controls

Select tests for controls
OM Section 2.5

1. [ROUTINE] [3] [ENTER] (Calibrator & Control Test Selection display).
2. CONTROL NO: [1] [ENTER] (Control level 1).
3. TESTS: [Select tests] for control #1, then press [ENTER] (CONTROL NO. will automatically increment by one).
4. Repeat step #3 for each level of control in use.

Write control test selections on disk
OM Section 2.5

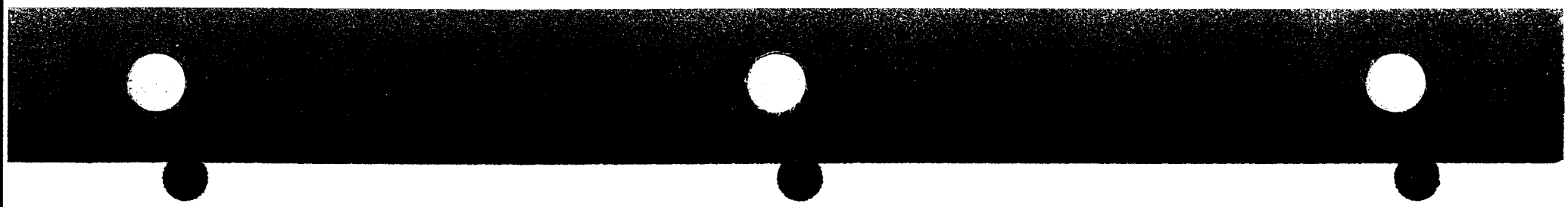
This step is suggested as a safeguard in case of laboratory power outages or "brown-outs."

1. FD READ/WRITE: [2] [ENTER] .
   The entry prompt displays: "WRITE OK?"
2. [1] [ENTER] (YES).

(continued on back of card)

Controls (continued)

Load sample disk	Place control sample cups in position on the sample disk. Place control level 1 in position C1, control level 2 in position C2, etc.
How to start	Proceed to the card labelled "Initiate Run."



Routine Patient Samples

Without Bar Code Reader

Prerequisites

You must read and understand the card labelled "Data Disk."

Select tests
OM Section 2.6

1. ROUTINE 2 ENTER (Patient Test Selection display).
2. SAMPLE NO. The sample No. line has three entry fields:
   a. Type the sample sequence number (1-1000), then press ENTER
   b. Type the sample disk number (0-9), then press ENTER
   c. Type the sample position (1-60), then press ENTER
3. ID NO: Type the patient ID, then press ENTER .
4. COMMENT: Type a comment about the sample, then press ENTER .
5. TESTS: Press the appropriate test or profile keys to select the desired tests, then press ENTER . The sample number will increment automatically.
6. Is the sample sequence number equal to 1000?
   - If YES, consult the card labelled "Data Disk" for instructions.
   - If NO, proceed to step 7.
7. Repeat steps 3, 4 and 5 (or 5 only) for all additional samples.

(continued on back of card)

Routine Patient Samples (continued)

Without Bar Code Reader

Write test selection on disk OM Section 2.6	This step is suggested as a safeguard in case of laboratory power outages or "brown-outs." This step is necessary if you have cleared old test selection data from memory. 1. FD READ/WRITE: [2] [ENTER] . The entry prompt displays: "WRITE OK?" 2. [1] [ENTER] (YES).
Load samples	Place the samples onto sample disk, in the positions specified on preceding page (Select tests, step #2).
How to start	Proceed to the card labelled "Initiate Run."

Routine Patient Samples

With Bar Code Reader

Prerequisite

You must read and understand the card labelled "Data Disk."

Introduction

When using the Bar Code Reader, patient test selections can be made in one of three ways: Manual Entry, Batch Download from a host computer or Real Time Download from a host computer.

Manual entry
OM Section 2.7

1. [ROUTINE] [2] [ENTER] (Patient Test Selection).
2. ID NO: Type the [barcode ID number] (including leading zeroes), then press [ENTER] .
3. COMMENT: Type any [comment] .
4. TESTS: Press the appropriate [test or profile keys] to select the desired tests, then press [ENTER] .
5. Repeat steps 2, 3, and 4 for additional specimens, then proceed to "Initiate Run."

(continued on back of card)

Routine Patient Samples (continued)

With Bar Code Reader

Batch down-loading from host computer	1. Move cursor to RECEIVE T.SEL. 2. RECEIVE T.SEL: press [2] [ENTER] (All) or [1] [ENTER] (Next Data)
Real Time downloading from host computer	1. [ROUTINE] [BACK] (Start Conditions). 2. Move cursor to COMMUNICATIONS. 3. Press [1] [ENTER] to initiate real time communication.
Load Samples	Place the samples onto sample disk.
How to Start	Proceed to the card labelled "Initiate Run."

Stat Samples

Select tests
OM Section
2.8

1. [STAT] (Stat Test Selection display).
2. Place the stat specimen in one of the sample disk stat positions (E1-E7).
3. POS NO: Type the [stat position number (1-7)], then press [ENTER] .
4. ID NO: Type the [patient ID], then press [ENTER] .
5. COMMENT: Type any pertinent [comments] about the sample, then press [ENTER] .
6. TESTS: Press the appropriate [test or profile keys] for the stat sample, then press [ENTER] .
7. Is the stat sequence number equal to 100?
   - If YES, consult the card labelled "Data Disk" for instructions.
   - If NO, proceed to step #8.
8. Repeat steps 4, 5 and 6 (or 6 only) for additional stats.

How to start

If the analyzer is in Standby or S. Stop, proceed to the card labelled "Initiate Run." If the analyzer is in Operate, no further action is necessary.

Initiate Run

Procedure
OM Section
2.10

1. [ROUTINE] [BACK] (Start Conditions display).
2. Check each of the entry fields below, and enter appropriate changes to the displayed information where necessary.

ENTRY FIELD	ENTRY
START SAMPLE NO.	Do not change unless you clear or replace Data Disk
START UP CALIB	Press [1] [ENTER] (Yes) if you are calibrating
CALIB (RERUN)	Press [1] [ENTER] (Yes) only for rerun calibration
RERUN MODE	Press [1] [ENTER] for Automatic reruns or
	Press [2] [ENTER] for Rerun only (operator initiated) or
	Press [0] [ENTER] no rerun at this time
MASKING	Press [individual test keys] of the tests which you wish to mask (key will be illuminated), [ENTER]

(continued on back of card)

Initiate Run (continued)

ENTRY FIELD	ENTRY
ORIGINAL ABSORBANCE	Must Say "No" when calibrating
	Press [1] [ENTER] (Yes)
	Press [0] [ENTER] (No)
SERUM INDEXES	Press [1] [ENTER] (Yes)
	Press [0] [ENTER] (No)
CONTROL INTERVAL	Type the [number of patients] between control samples, then press [ENTER]
COMMUNICATION	Press [1] [ENTER] (Yes) (Host Computer)
	Press [0] [ENTER] (No)
REAL TIME PRINT	Press [1] [ENTER] (Monitor)
	Press [2] [ENTER] (Report)
	Press [0] [ENTER] (No Print)

(continued on next card)

Initiate Run (continued)

3. Place cup of 1.05 N NaOH in sample disk position "W."
4. Remove reagent bottle caps and replace reagent disk covers.
5. OPERATION MONITOR (Operation Monitor display).
6. Correct any existing alarm conditions, if necessary.
7. START .

NOTES

ISE Calibration

Select ISE test
OM Section 2.4

ISE channels may be calibrated along with photometric chemistries (refer to card labelled "Calibration"), or may be calibrated independently.

1. [ROUTINE] [3] [ENTER] (Calibrator & Control Test Selection display).
2. CALIBRATION TYPE: [1] [ENTER] (Start-up calibration) or [2] [ENTER] (Rerun calibration).
3. STANDARD TYPE: [3] [ENTER] (ISE 1, 2).
   Std type 1 and Std type 2-6 should have no chemistries selected.
4. TESTS (ISE 1, 2): [Na,K,Cl] [ENTER] .
   The "STANDARD TYPE" will automatically change to ISE 3.
5. TESTS (ISE 3): [Na,K,Cl] [ENTER] .

(continued on back of card)

ISE Calibration (continued)

Load sample disk

Place ISE calibrators in the sample disk positions indicated:

CALIBRATOR	SAMPLE DISK POSITION
LOW Standard	ISE 1
HIGH Standard	ISE 2
Precical	ISE 3

How to start

1. Routine 5 ENTER (Start Conditions Display).
2. START UP CALIB 1 ENTER (YES)

   or

   CALIB RERUN 1 ENTER (YES).

Within-Run Recalibration

Introduction

If any test fails calibration, it can be recalibrated while the instrument is in the Operate mode. If the analyzer is not in the Operate mode, follow instructions on the card labelled "Calibration."

Identify and correct problem
OM Section 2.12

Refer to Operator's Manual, Chapter 4 (Troubleshooting). Identify and correct whatever problem caused the calibration to fail.

1. [ROUTINE] [3] [ENTER] (Calibrator & Control Test Selection display).
2. CALIBRATION TYPE: [2] [ENTER] (Rerun calibration).
3. STD TYPE: [1] [ENTER] (Blank calibrator).
4. TESTS (STD 1): [Select tests] for blank, then press [ENTER].
5. TESTS (STD 2-6): [Select tests] for standard, then press [ENTER].
6. TESTS (ISE 1,2): [Na,K,Cl] [ENTER] (if recalibrating ISE).
7. TESTS (ISE 3): [Na,K,Cl] [ENTER] (if recalibrating ISE).

(continued on back of card)

Within-Run Recalibration (continued)

Load sample disk

Place calibrator sample cups in position on the sample disk.

1. OPERATION MONITOR (Operation Monitor display).
2. Correct any existing alarm conditions, if necessary.
3. [ROUTINE] [5] [ENTER] (Start Conditions display).
4. ORIGINAL ABS: [0] [ENTER] (NO).
5. CALIB (RERUN): [1] [ENTER] (YES).
6. If the analyzer has entered S. STOP, press [START] .

Rerun Samples

Introduction

Samples with data flags (other than H and L) are listed on the Rerun Samples display and may be rerun by the analyzer in either the "automatic" or the "rerun only" (operator initiated) mode. Samples also can be reassayed for verification of results.

Automatic rerun
OM Section 2.9

1. [ROUTINE] [BACK] (Start Conditions display).
2. RERUN MODE: [1] [ENTER] (Automatic).

The analyzer does not go into S. STOP at the end of the original run. It will instead go into the rerun mode until all results have been calculated.

(continued on back of card)

Rerun Samples (continued)

Rerun only
OM Section
2.9

After original run is complete:

1. [ROUTINE] [4] [ENTER] (Rerun Samples display).
2. While on the RERUN SAMPLES display, test requests for rerun samples may be edited.
3. [ROUTINE] [BACK] (Start Conditions display).
4. RERUN MODE: [2] [ENTER] (Rerun Only).
5. [START] .

After reruns are complete, results may be edited or deleted via Monitor Job, Data Review Display.

Edit or Delete Results

Introduction
OM Section
2.22

Results may be added, edited, or deleted by use of the Data Editing field of the Data Review display.

1. [MONITOR] [2] [ENTER] (Data Review Display).

2. SAMPLE:
   Choose the sample type:
   - [1] [ENTER] (Normal sample)
   - [2] [ENTER] (Stat sample)
   - [3] [ENTER] (Control sample)

   Enter the appropriate sequence #:
   - [1-1000] (Normal sequence number)
   - [1-100] (Stat sequence number)
   - [101-630] (Control sequence number)

(continued on back of card)

Edit or Delete Results (continued)

3. DATA EDITING: [1] [ENTER] (First run specimen)
   [2] [ENTER] (Rerun specimen)

4. Enter the number of appropriate [test code], [ENTER].

5. If a result is to be edited, type the [correct result] or the [space key] to delete the existing result, [ENTER].

6. Once all editing is complete for the sample, advance the cursor to the last field on the Data Editing line.

7. [1] [ENTER] (Saves the edited results on the data disk).
   [2] [ENTER] (Puts rerun result in the first run file and saves the results on the data disk).
   SAVE OK? [1] [ENTER] (YES).

Reprint Reports

Introduction
OM Section
2.22.3

Reports may be reprinted through the **Data Review** display.

1. [MONITOR] [2] [ENTER].

2. SAMPLE:
   Choose the sample type:
   [1] [ENTER] (Normal sample)
   [2] [ENTER] (Stat sample)
   [3] [ENTER] (Control sample).

3. Enter the sample number desired.

4. Move the cursor to DATA PRINT.
   [1] [ENTER] (Monitor)
   [2] [ENTER] (Report).

(continued on back of card)

Reprint Reports (continued)

5. 1 ENTER (All)
   2 ENTER (Edit).

6. Enter the first sample number.

7. Enter the final sample number.

QC File Maintenance

Introduction

Work on one level of control at a time: edit, accumulate and delete one level of control before working on the next.

There are 3 basic steps to QC File Maintenance:

a. Evaluate Daily QC values for all tests and delete those which are to be excluded from Cumulative QC.
b. Accumulate Daily QC values into Cumulative QC.
c. Delete all Daily QC values.

These 3 procedures (a, b, and c) are outlined in detail on the following cards.

(continued on back of card)

QC File Maintenance

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(continued on back of card)

QC File Maintenance (continued)

Edit daily file
OM Section
2.14

NOTE: Daily QC values may be deleted via REAL TIME QC, DAILY QC LIST, DATA REVIEW, OR START CONDITIONS.

REAL TIME QC

1. [QC] [1] [ENTER] **(Real Time QC)**.
2. TEST: Type the [test code] for the test to be viewed.
3. Delete any random or systematic QC error results via the data reject entry field. This procedure deletes both x and y values.
   @,# Data Reject [Press] [1] [ENTER] to clear random error data (@).
   [Press] [2] [ENTER] to clear system error data (#).
   Delete OK? [Press] [1] [ENTER] (yes) to complete.

DAILY QC LIST

1. [QC] [2] [ENTER] **(Daily QC list)**.
2. CONTROL NO.: [1] [ENTER].
3. Note test codes of tests to be excluded from the QC file.

(continued on next card)

QC File Maintenance (continued)

4. DELETE TEST: Type the [test code] of a test that is to be excluded from the file, then press [ENTER].
   The entry prompt displays: "DELETE OK?"
5. [1] [ENTER] (YES).
6. Repeat steps 4 & 5 for each test that is not to be accumulated into the cumulative file.

NOTE: This command deletes all results on the specified test and level.

DATA REVIEW

1. [MONITOR] [2] [ENTER] (**Data Review**).
2. SAMPLE:
   [3] [ENTER] (Control).
3. Enter the appropriate control level and sequence #:
   [101-630] [ENTER].

(continued on back of card)

QC File Maintenance (continued)

4. DATA EDITING: [1] [ENTER] (First).
5. Enter the number of the appropriate [test code], [ENTER].
6. Press the [space key] to delete the existing result, [ENTER].
7. Once all editing is complete for the sample, advance the cursor to the last field on the DATA EDITING line.
8. [1] [ENTER]
   SAVE OK? [1] [ENTER] (YES).

NOTE: This deletes a specific result on a specific test on a specific control sample #.

START CONDITIONS

1. [ROUTINE] [5] [ENTER] (**Start Conditions**).
2. DATA CLEAR: [4] [ENTER] (Control).
3. Enter the beginning level and sequence number [101-630].
4. Enter the ending level and sequence number [101-630].
5. DATA CLEAR OK? [1] [ENTER] (YES).

(continued on next card)

QC File Maintenance (continued)

NOTE: The steps on the previous page delete all results on a specific control sample number or range of control sample numbers.

Accumulate daily QC

1. [QC] [4] [ENTER] (Cumulative QC List display).
2. CONTROL: [1] [ENTER] (for control level 1).
3. ACCUMULATE: [1] [ENTER] (YES).
   The entry prompt displays: "ACCUMULATE OK?"
4. [1] [ENTER] (YES).

Repeat the above procedure for each level of control in use. Be certain to enter the appropriate control number when working on a control other than level 1. (Reference line 2 above.)

(continued on back of card)

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QC File Maintenance (continued)

Delete daily QC data

1. [BACK] [BACK] (Daily QC List display).
2. CONTROL NO: [1] [ENTER] (for control level 1).
3. DELETE TEST: [9] [9] [ENTER] (delete all).
   The entry prompt displays: "DELETE OK?"
4. [1] [ENTER] (YES).

Repeat the above procedure for each level of control in use. Be certain to enter the appropriate control number when working on a control other than level 1. (Reference line 2 above.)

Daily Maintenance

Introduction

This is a list of daily maintenance procedures. For complete instructions, read Operator's Manual Chapter 3, Maintenance.

List of procedures OM Section 3.2-3.3

1. Discard expired reagents.
2. Dispose of serum waste container contents in an appropriate manner.
3. Place 1.05 N NaOH in sample disk "W" position, and 2% Hitergent in reagent channel 32, R2 position.
4. Execute WASH ALL (Start Conditions display).

NOTES

DATA ALARMS

PRINTOUT MESSAGE	DATA REVIEW	DESCRIPTION	REMEDY
ADC?	A	ADC malfunction	a. MAINTENANCE display: execute "RESET." b. Call Technical Support.
CELL?	Q	Abnormal cell blank: >0.1 ABS difference between current and stored cell blank	See CELL BLANK (Class 22).
SAMPL	V	a. Insufficient sample b. Sample liquid level sensor not properly adjusted.	a. Rerun with more specimen b. Adjust sample probe liquid level sensor (OM, Chapter 3).
REAGN	T	a. Insufficient reagent b. Reagent liquid level sensor not properly adjusted	a. Replenish reagent b. Adjust reagent probe liquid level sensor (OM, Chapter 3).
ABS!	Z	Absorbance $\geq$ 3.3 ; initiates automatic rerun with reduced sample volume for routine samples (excluding ISEs)	a. Verify photometric path is clear b. Check reagent preparation and position c. Exchange reaction bath water
LIMT 0	I	Reaction limit exceeded at all points used for calculation; initiates automatic rerun with reduced sample volume for routine samples (excluding ISEs)	a. Further dilute specimen and rerun b. Check reagent preparation
LIMT 1	J	Reaction limit exceeded for all except one point used for calculation; initiates automatic rerun with reduced sample volume for routine samples (excluding ISEs)	a. Further dilute specimen and rerun b. Check reagent preparation
LIMT 2	K	Reaction limit exceeded for all except two points used for calculation	a. Further dilute specimen and rerun

DATA ALARMS (continued)

PRINTOUT MESSAGE	DATA REVIEW DISPLAY	DESCRIPTION	REMEDY
CALIB	-----	During photometric calibration, the K factor obtained differs from the most recent value written onto the System Disk by more than ± 20 %. During ISE calibration, the slope and ISE 3 values differed from the previous calibration by a value greater than the Calib. Limit.	If controls are out of range, check standards, reagents, and controls. If controls are in range and reagents are all right, no action is required; perform Parameter Write on the Maintenance display.
CMP. T	C	Data error in compensated test; initiates automatic rerun.	Check compensated test data, correct all other alarm conditions, then repeat analysis.
CMP. T!	M	Unable to calculate compensated test because compensated test has not been measured yet (OR) the test has the data alarm "calculation disabled" or "test-to-test compensation disabled;" initiates automatic rerun.	Check compensated test data, correct all other alarm conditions, then repeat analysis.
RANDM 1	@	Random QC error (1 3s)	See CONTROL RANDOM (class 54).
RANDM 2	@	Random QC error (R 4s)	
ALERT	$	a. Value exceeds lower technical limit; initiates automatic rerun b. Value exceeds upper technical limit; initiates automatic rerun with reduced sample volume for routine samples (excluding ISEs).	Rerun specimen and verify the re-run result.
SYSTM 1	#	Systematic QC error (2 2s A)	See CONTROL SYSTEM (class 55).
SYSTM 2	#	Systematic QC error (2 2s W)	
SYSTM 3	#	Systematic QC error (4 1s A)	
SYSTM 4	#	Systematic QC error (4 1s W)	

DATA ALARMS (continued)

PRINTOUT MESSAGE	DATA REVIEW DISPLAY	DESCRIPTION	REMEDY
SYSTM 5	#	Systematic QC error (10X A)	See CONTROL SYSTEM (class 55).
SYSTM 6	#	Systematic QC error (10X W)	
CALC?	-----	Data alarm for calculated test; initiates automatic rerun	Check calculated test data, repeat analysis
PREP	-----	For the specified electrolyte cartridge, slope is outside of the optimal range, but within acceptable limits.	If control values are in range, no action is necessary. Be prepared to replace a cartridge soon (when SLOPE alarm occurs); as long as the slope has decreased gradually over time. Otherwise, examine ISE system for other abnormalities: check standards, reagents, priming, leaks. Correct abnormalities and recalibrate.
SLOPE?	-----	For the specified electrolyte cartridge, slope is outside of the acceptable range.	If slope has decreased gradually over time, replace cartridge. Otherwise, examine ISE system for other abnormalities: check standards, reagents, priming, leaks. Clean ISE sample flowpath (OM, Chapter 3).
I. STD	-----	Internal Reference (IS) value is outside of acceptable range.	a. Check Internal Reference (IS) reagent volume.
LEVEL	L	Internal Reference (IS) EMF is outside of acceptable range. Na+, K+ : -90 to -10 mV Cl- : 80 to 160 mV	b. Check ISE compartment for liquid leakage and/or air bubbles. c. If other ISE alarms are present, correct those alarm conditions and recalibrate.
NOISE	-----	Electronic noise detected during measurement beyond: leaks. Na+ : 0.7 mV K+ : 1.0 mV Cl- : 0.8 mV	Check for air in ISE reagent lines; examine pipettors and cartridges for If alarm occurred during calibration, correct problem and recalibrate.

DATA ALARMS (continued)

PRINTOUT MESSAGE	DATA REVIEW DISPLAY	DESCRIPTION	REMEDY
LIN.	W	a. Abnormal linearity (N ≥ 9)	a. Dilute specimen and rerun
		b. Hitergent depleted	b. Replenish Hitergent, exchange reaction bath water and rerun specimen
LIN.8	F	Abnormal linearity (4 ≤ N ≤ 8)	c. Check stirring unit function
			d. Check photometer lamp
XXXXXP	P	Prozone limit exceeded; initiates automatic rerun with reduced sample volume for routine samples (excluding ISEs)	a. Verify Prozone Limit on Chemistry Parameters display; further dilute specimen and rerun.
			b. Check preparation and position of reagent.
DUP	-----	Duplicate limit exceeded during calibration	a. Verify correct Duplicate limit on Chemistry Parameters display.
			b. If pipettor maintenance has been performed recently, verify pipettor reassembly.
			c. If new reagent, verify complete reconstitution and mixing.
			NOTE: Recalibration is necessary.
SENS	-----	Sensitivity is checked for linear, nonlinear and isozyme-P calibration. This error occurs when the difference between the absorbance of STD 1 and STD N is smaller than the sensitivity limit.	a. Verify Sensitivity limit on Chemistry Parameters display; check reagent preparation, expiration date, and channel position.
		NOTE: N: =2....Linear, or isozyme-P calibration = 3 to 6...Nonlinear calibration	b. Check calibrator preparation and disk position.
			c. Check sample pipettor for leaks.
		If only one of STD 1 or STD N is measured, the previous absorbance of currently non-measured STD is used for sensitivity check.	d. Recalibrate affected test.

DATA ALARMS (continued)

PRINTOUT MESSAGE	DATA REVIEW DISPLAY	DESCRIPTION	REMEDY
STD?	-----	Cell blank abnormal, insufficie standard or reagent, absorba limit exceeded, linearity abno prozone error or duplicate err during calibration and SENS. For ISE: this also occurs in conjunction with ADC, ISE NC ISE LEVEL alarms.	If this alarm occurs together with other alarm(s), correct the other alarm conditions, then recalibrate. Ensure that sufficient standard is placed in the correct sample disk position. Check reagents and standards, correct other alarm conditions, then recalibrate.
SD!	-----	Convergence error in non-line calibration - residual value is l than the SD limit.	Verify SD limit on Chemistry Parameters display, check standard and reagent preparation, expiration date, and disk position, then recalibrate affected test.
OVER	O	No result is printed. Concentr cannot be printed within speci number of digits. Initiates aut rerun.	a. Check decimal placement for STD 1 in Chemistry Parameters. b. Correct all other alarm conditions, then repeat analysis.
???	X	Initiates automatic rerun: Denominator in calculated tes An overflow occurred in calcul APU error during calculation. In isozyme-Q concentration calculation, the data alarm 'ca disabled' is indicated for isozy channel data. With Original ABS., concentrat calculation is attempted throug isozyme-Q channel. Can also occur when running t peutic drug assays as a result samples with high drug concen tions; the high enzyme rate cau the non-linear math model to at to take the natural log of a nega number.	a. Check for a logic error in formulas. b. Correct all other alarm conditions; then repeat analysis. Check the Reaction Monitor display for the test listed with "???" and verify that a high enzyme rate has occurred. If yes, dilute the sample with the appropriate zero calibrator and reassay.
H	H	Value exceeds patient reference ge	Follow your laboratory's guidelines for values outside the reference range.
L	L	Value is below patient reference ge	Follow your laboratory's guidelines for values outside the reference range.

INSTRUMENT ALARMS

The most *commonly occurring* Instrument Alarms are listed in the table on the following pages in order of class and code. A table containing *all* Instrument Alarms can be found in Chapter 4 of your Operator's Manual. Shown below is an example of the Instrument Alarms table and a brief explanation of its contents:

Class: The alarm classes are listed in numerical order. When an alarm occurs, look for the Class first, then proceed to Code.

Alarm Message: This line indicates the descriptive name of the alarm situation.

Code: The alarm codes are listed vertically in the far left column. Look down the column for the appropriate code number, then proceed to Level.

Level: The alarm level indicates the severity of the alarm condition. Chapter 4 explains each of these levels in detail.

Description: This column describes the cause of the alarm condition. Note that there may be more than one cause (description) for a single alarm. Read the entire description before proceeding to remedy the situation.

Remedy: This column is arranged in a sequential order. Perform each step or procedure as it is listed, until the condition is remedied. Note that one remedy (or set of remedies) may apply to several different alarm codes.

Code	Level	Description	Remedy
Class: 3		**Alarm Message: R. DISK**	
1	STOP	Reaction disk cannot detect its stop position. This alarm may occur if the disk is prevented from moving freely. If the reaction disk has recently been removed, there may be water on the detector plate beneath it.	a. Check placement of reaction disk, dry detector plate if necessary. b. MAINTENANCE display: execute 'RESET'. c. Resume operation; if alarm recurs, call Technical Support.
2	STOP	The reaction disk does not stop at the specified position.	
3	STOP	Home position cannot be detected.	
4	STOP	When RESET, the first cuvette does not stop at the specified position.	

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 4		**Alarm Message: SAMPLE PROBE**	
1	S. STOP	Sample probe doesn't reach the uppermost position over its rinse station.	a. Inspect probe where it attaches to the sample probe arm. The probe is spring mounted and should travel freely up and down. b. MAINTENANCE display: execute 'SAMPLING MECHA'. c. MAINTENANCE display: execute 'PROBE ADJUST'. d. Resume operation; if alarm recurs, call Technical Support.
2	STOP	Sample probe doesn't reach the uppermost position over the reaction disk.	
5	S. STOP	Sample probe will not descend from the uppermost position (other than cell side).	
6	STOP	Sample probe will not lower into reaction cell.	
7	WARNING	Probe descends abnormally.	
9	S. STOP	Cell position cannot be detected.	
10	S. STOP	Sample probe arm does not rotate from the cell position.	
11	S. STOP	Sample probe lowered abnormally at ISE station.	
8	S. STOP	Sample probe is carrying a drop of liquid between the probe and the liquid level sensor.	a. Clean probe tip surface. b. Perform "Check/Adjust Probe Alignment", OM, Chapter 3. c. Resume operation; if alarm recurs, replace probe as shown in the OM, Chapter 3. d. Resume operation; if alarm recurs, call Technical Support.
3	S. STOP	Sample probe moves abnormally while descending (other than cell side).	a. Ensure that sample disk cover is aligned properly. b. MAINTENANCE display: PROBE ADJUST. Verify proper probe alignment. c. Resume operation; if alarm recurs, call Technical Support.
4	STOP	Sample probe moves abnormally while descending on cell side.	

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 7		**Alarm Message: REAGENT 1 PROBE**	
1	STOP	Reagent probe doesn't reach the uppermost position (other than cell side).	a. Verify that probe is properly attached to probe arm, and that spring action is not impeded. b. MAINTENANCE display: execute 'REAGENT 1 PIPETTING'. c. Resume operation; if alarm recurs, call Technical Support.
2	STOP	Reagent probe doesn't reach the uppermost position (cell side).	
5	STOP	Reagent probe doesn't descend from the uppermost position (other than cell side).	
6	STOP	Reagent probe doesn't descend from the uppermost position (cell side).	
7	WARNING	Probe descends abnormally.	
9	STOP	Reagent probe cell position cannot be detected.	
10	STOP	Reagent probe will not move from cell position.	
8	STOP	Probe is carrying a drop of liquid between the probe tip and liquid level sensor.	a. Clean reagent probe tip surface. b. Perform "Check/Adjust Probe Alignment," OM, Chapter 3. c. Resume operation; if alarm recurs, replace probe as shown in the OM, Chapter 3. d. Resume operation; if alarm recurs, call Technical Support.
3	STOP	Reagent probe moves abnormally while descending (other than cell side).	a. Do not touch probe during operation. b. Remove all reagent bottle caps. c. Verify that reagent disk cover is properly positioned. d. MAINTENANCE display: PROBE ADJUST. Verify proper probe alignment. e. Resume operation; if alarm recurs, call Technical Support.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 8		**Alarm Message: REAGENT 2 PROBE**	
1	STOP	Reagent probe doesn't reach the uppermost position (other than cell side).	a. Verify that probe is properly attached to probe arm, and that spring action is not impeded. b. MAINTENANCE display: execute "REAGENT 2 PIPETTING." c. Resume operation; if alarm recurs, call Technical Support.
2	STOP	Reagent probe doesn't reach the uppermost position (cell side).	
5	STOP	Reagent probe doesn't descend from the uppermost position (other than cell side).	
6	STOP	Reagent probe doesn't descend from the uppermost position (cell side).	
7	WARNING	Probe descends abnormally.	
9	STOP	Reagent probe cell position cannot be detected.	
10	STOP	Reagent probe will not move from the cell position.	
8	STOP	Probe is carrying a drop of liquid between the probe tip and liquid level sensor.	a. Clean reagent probe tip surface. b. Adjust liquid level sensor gap. c. MAINTENANCE display: execute "PROBE ADJUST." d. Resume operation; if alarm recurs, replace probe. e. Resume operation; if alarm recurs, call Technical Support.
3	STOP	Reagent probe moves abnormally while descending (other than cell side).	a. Do not touch probe during operation. b. Remove all reagent bottle caps. c. Verify that reagent disk cover is properly positioned. d. MAINTENANCE display: PROBE ADJUST. Verify proper probe alignment. e. Resume operation; if alarm recurs, call Technical Support.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 15		**Alarm Message: REFRESH WATER**	
1	WARNING	More than 24 hours has elapsed since the last incubation bath water exchange.	MAINTENANCE display: execute "INC. WATER EXCHANGE."
Class: 16		**Alarm Message: SIPPER**	
1	STOP	Vacuum pump is not supplying enough negative pressure.	a. Ensure that rubber stoppers are properly seated in vacuum reservoir. b. Check all vacuum lines and connections. c. Call Technical Support.
Class: 17		**Alarm Message: DISTILLED WATER**	
1	S. STOP	Deionized water reservoir level is too low.	a. If water is supplied from an external source, ensure that water supply is ON. b. Ensure that water supply pressure is 15-25 psi. c. Ensure that external supply water flow rate is 100 liters (26.4 gallons) per hour. d. Clean inlet water filter. e. If water is not supplied from an external source, manually fill the reservoir.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 18		**Alarm Message: RESERVOIR**	
1	WARNING	Waste reservoir full.	a. Empty waste reservoir. b. If reservoir is <u>not</u> full, ensure that liquid level sensor wires in drain tubing cap are not in contact with each other, or with the cap. c. Call Technical Support.
Class: 21		**Alarm Message: REAGENT SHORT**	
1 - 64	WARNING	Remaining reagent volume sufficient for less than 10 tests. R1 Channels 1-32 —— CODE 1-32 R2 Channels 1-32 —— CODE 33-64	a. Reagent Volume Check display: less than 10 tests remaining for specified reagent? b. Replenish specified reagent, and if necessary, recalibrate affected channel. c. If reagent container appears to have more than 10 tests remaining, check CHEMISTRY PARAMETERS display to ensure that reagent bottle size and dispense volume are correctly specified. d. If reagent probe is carrying a drop of liquid, clean probe tip surface, adjust liquid level sensor and follow procedure for probe adjust. e. Resume operation. If alarm recurs for the same reagent, replace the probe. f. Resume operation. If alarm recurs, call Technical Support.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 22		**Alarm Message: CELL BLANK**	
1 - 6	WARNING	In four repeated measurements of Cell Blank, blank absorbance values exceeded limit of 0.1 ABS at two or more measurements. NOTE: The code (1-6) indicates the section of cells where the abnormal measurement was detected.	a. If new System Disk, photometer lamp or reaction cells are in use, perform CELL BLANK (Maintenance display) prior to performing any analyses. b. Observe the cell rinse unit while in operation. If it does not deliver at least 0.5 mL water into each reaction cell, call Technical Support. c. Ensure that reaction cells are clean and not scratched. d. Replace reaction cells, if necessary. e. If reaction bath is not full, or if the bath water is cloudy, perform INCUBATION WATER EXCHANGE (Maintenance display). f. Call Technical Support.
Class: 23		**Alarm Message: PHOTOMETER LAMP**	
1	S. STOP	During normal operation, cell blank absorbances are abnormal at three or more measurements (ABS > 3.3).	a. Ensure that reaction bath is full, and water is not cloudy. b. If reaction bath is not full, or if the bath water is cloudy, perform INCUBATION WATER EXCHANGE (Maintenance display). c. Ensure that lamp leads are not touching and that lead wires are securely fastened. d. Replace photometer lamp.
2	WARNING	Cell blank absorbances are abnormal at less than three measurements (ABS > 3.3).	

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 25		**Alarm Message: ISE SYRINGE**	
1	WARNING/ STOP	ISE sipper syringe cannot reach uppermost position.	a. If syringe was recently reassembled, check for proper assembly.
2	WARNING/ STOP	ISE sipper syringe stopped at uppermost position.	b. MAINTENANCE display: execute "SAMPLING MECHA."
3	WARNING/ STOP	ISE diluent syringe cannot reach uppermost position.	c. Call Technical Support.
4	WARNING/ STOP	ISE diluent syringe stopped at uppermost position.	
5	WARNING/ STOP	ISE internal reference syringe cannot reach uppermost position.	
6	WARNING/ STOP	ISE internal reference syringe stopped at uppermost position.	
Class: 26		**Alarm Message: ISE DOOR**	
1	WARNING	The ISE door is open.	Securely close the ISE door.
Class: 31		**Alarm Message: VACUUM TANK**	
1	WARNING	Liquid detected in vacuum tank.	a. Verify that drain hose to waste container is properly placed and not pinched. b. Verify that main drain tubing from instrument is not pinched. c. Remove vacuum reservoir; drain, clean and replace. d. If alarm recurs, call Technical Support.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 33		**Alarm Message: ROUTINE START NO.?**	
1	WARNING	Sample disk No. does not agree with disk number in "Start Sample No."	Verify 'Start Sample No." on the START CONDITIONS display.
Class: 34		**Alarm Message: SAMPLING END**	
1	WARNING	There are no more routine samples to be measured. The instrument has detected a sequence number with a sample position number of zero, or has detected a disk number change.	No action. (Normal Operation.) If the next sample disk is ready for sampling, replace sample disk, replace evaporation cover and press START.
Class: 36		**Alarm Message: POWER FAIL**	
1	WARNING	AC power abnormal. This alarm is normally seen following a power failure.	Check all mechanisms for proper positioning. If improper positioning is observed: a. MAINTENANCE display: execute "RESET." b. Resume operation; if alarm recurs, call Technical Support.
2	WARNING	5V DC power supply abnormal.	
Class: 39		**Alarm Message: BARCODE READER?**	
1 - 60	WARNING	1) Parity error in barcode reader communication. 2) Framing error in barcode reader communication. 3) Overrun error in barcode reader communication. 4) BCC error in barcode reader communication. 5) Data reception from Barcode Reader not completed before ID reception time was exceeded. NOTE: Code numbers 1 - 60 represent sample position numbers.	a. Check that bar code label is present and properly oriented/ positioned. b. MAINTENANCE display: execute "Bar Code Reader." c. Call Technical Support.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 42		**Alarm Message: REQ. FULL**	
1	WARNING	Cannot request further samples with barcode. 1) Request for Patient Test Selection is ≥ 1001 samples. 2) Request for inquiry of real time test selection is more than 997 samples when reading barcode. 3) Request for inquiry of batch test selection is ≥ 1001 samples.	Clear data or transmit data to host computer, and resume operation.
Class: 43		**Alarm Message: ISE STOP OK?**	
1	WARNING	ISE function is stopped due to an alarm.	Remedy the presented alarm, then resume operation.
Class: 46		**Alarm Message: TEST SELECTION?**	
1	WARNING	1) A sample was programmed with no test selection. 2) A sample has been placed on the sample disk with no tests selected.	Program tests for the sample in question.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 50		**Alarm Message: STANDARD?**	
1-43 (test code)	WARNING	Alarm is issued for STD absorbance during calibration. Duplicate or sensitivity limit exceeded, abnormal ADC, insufficient sample, noise error, level error, or calculation disabled during non-linear calibration. Alarm is issued for ISE standard or internal standard. NOTE: This alarm appears when a CELL BLANK alarm occurs during calibration.	a. Verify Duplicate and Sensitivity Limit value on CHEMISTRY PARAMETERS display. b. Check quantity of standard, sample and reagents. c. Check for air or leakage in ISE lines. d. Recalibrate affected channel. e. Call Technical Support.
Class: 51		**Alarm Message: CALIBRATION**	
1-43 (test code)	WARNING	K factor determined through calibration differs from the previous value by more than ±20%. This alarm may occur if you are using a new System Disk. Display values for ISE calibration, slope or ISE3 differed from the previous calibration by a value greater than the Calib. Limit.	a. If alarm occurs at same time as other alarms, correct the other alarm conditions. b. If a new System Disk is in use, and controls are in range, execute PARAMETER WRITE (MAINTENANCE display), and continue operating. c. Check standards, reagents and controls. If controls are in range and standards and reagents are all right, execute PARAMETER WRITE (MAINTENANCE display), and continue operating. Otherwise correct abnormalities and recalibrate.
Class: 52		**Alarm Message: CALIB. SD?**	
1-40 (test code)	WARNING	During non-linear calibration, residual convergence error is larger than the SD limit.	a. Verify SD limit, STD concentrations, and positions on the CHEMISTRY PARAMETERS display. b. Check preparation and expiration dates of standards and reagents. c. Recalibrate affected test.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 53		**Alarm Message: SENSITIVITY**	
1 - 40 (test code)	WARNING	In linear, nonlinear, or isozyme-P calibration, the difference between mean STD(1) absorbance and mean STD(N) is smaller than the sensitivity limit on the Chemistry Parameters display. NOTE: N: = 2 for linear or isozyme-P calibration. = 3 to 6 for nonlinear calibration. If only STD(1) or STD(N) is measured, the previous absorbance is used for sensitivity check.	a. Verify the sensitivity limit specified on the CHEMISTRY PARAMETERS display. b. Check reagents and calibrators. c. Check sample pipettor for leaks. d. Recalibrate affected test.
Class: 54		**Alarm Message: CONTROL RANDOM**	
1 - 43 (test code)	WARNING	Random error occurs in real time Q.C.	a. Are the $\bar{X}$ and SD for the specified assay entered correctly on the REAL TIME QC display. b. Check calibrators, controls, and reagents: Have they been properly prepared? Have they been stored properly? Have they been used beyond their recommended expiration date? Are calibrators and controls in the correct positions on the sample disk? Are reagents in the correct positions on the reagent disk? c. Check Extran bottle. If empty, replace and perform "INC. WATER EXCHANGE" on Maintenance display. d. Perform Photometer Check. e. Call Technical Support.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 55		**Alarm Message: CONTROL SYSTEM**	
1 - 43 (test code)	WARNING	Systematic error occurs in real time QC.	a. Are the $\bar{X}$ and SD for the specified assay entered correctly on the REAL TIME QC display? b. Is all information entered correctly on the CHEMISTRY PARAMETERS display? c. Check calibrators, controls, and reagents: Have they been properly prepared? Have they been stored properly? Have they been used beyond their recommended expiration date? Are you using a different lot (number) of calibrator; have you entered the new calibrator value on each Chemistry Parameters display? Are calibrators and controls in the correct positions on the sample disk? d. Has maintenance been performed properly on sample and reagent pipettors? e. Perform Photometer Check. f. Call Technical Support.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 60		**Alarm Message: ISE LEVEL**	
		During measurement of internal reference, potential is not within the following range:	a. Check for air in sipper line. b. Check Internal Reference Solution. c. Check ISE cartridge for leakage. d. Check Reference and Ground electrodes for leakage.
1	WARNING	Na^+: -90 to -10 mV	
2	WARNING	K^+: -90 to -10 mV	
3	WARNING	Cl^-: 80 to 160 mV	
Class: 61		**Alarm Message: ISE NOISE**	
		Noise level exceeds the following values during measurement:	a. Prime ISE lines if air is present. b. Check sipper line and syringe for proper assembly and function. c. Check ISE cartridges for leakage. d. Check Reference and Ground electrodes for leakage.
1	WARNING	Na^+: 0.7 mV	
2	WARNING	K^+: 1.0 mV	
3	WARNING	Cl^-: 0.8 mV	
Class: 62		**Alarm Message: ISE PREPARE**	
		During calibration, slope is within the following range:	If control values are in range, no action is necessary. Be prepared to replace a cartridge soon (when SLOPE alarm occurs).
1	WARNING	Na^+: 32 to 37.9, or slope greater than 68.1	
2	WARNING	K^+: 32 to 37.9, or slope greater than 68.1	
3	WARNING	Cl^-: -29.9 to -25, or slope less than -68	
Class: 63		**Alarm Message: ISE SLOPE**	
		During calibration, slope is the following:	If slope has decreased gradually over time, replace cartridge. Otherwise, examine ISE system for other abnormalities: check standards, reagents, priming, leaks in cartridges. Correct abnormalities and recalibrate. If slope is acceptable, clean ISE sample flowpath (OM, Chapter 3).
1	WARNING	Na^+: Less than 32	
2	WARNING	K^+: Less than 32	
3	WARNING	Cl^-: Higher than -25	

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 64		**Alarm Message: ISE I. STD**	
		Internal Reference (IS) concentration calculated from a generated calibration curve is not within the following range.	a. Check ISE standards on sample disk. b. Check ISE reagents. c. Correct any other alarms. d. Recalibrate.
1	WARNING	Na^+: 120 to 160 mEq/L	
2	WARNING	K^+: 3.0 to 7.0 mEq/L	
3	WARNING	Cl^-: 80 to 120 mEq/L	
Class: 70		**Alarm Message: CH. ASSIGN.? (CH)**	
1 - 32 (channel)	WARNING	Channel setting is wrong in one of the following: 1) Only Test 2 is entered on the channel assignment display. 2) Two tests are assigned to a single channel, but both tests don't have the same assay codes. 3) Two tests are assigned to a single channel, but twin test assay codes have not been assigned. 4) When only Test 1 is entered on the Channel Assignment display, the Assay Code must be 1-point, 2-point, or Rate A. 5) The same test code is specified for Test 1 and Test 2.	Correct abnormalities and resume operation.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 72		**Alarm Message: CHEM. PARA.? (T.C.)**	
1 - 40 (test code)	WARNING	1) Relation between assay code and photometric point is invalid. 2) Relation between Assay Code and Calib. Method is invalid. 3) For Nonlinear Calib. Method, the model number, number of STD's, or the STD CONC. POS. was not entered. 4) The volume of R1 or R2 (including dilution) exceeds 350 uL. 5) STD position, required for calibration, is not entered.	Program CHEMISTRY PARAMETERS display as indicated on Chemistry Application Sheet. When running a nonlinear assay, assign three or more standards for that test.
Class: 73		**Alarm Message: RANGE? (T.C.)**	
1 - 43 47 - 54 (test code)	WARNING	The low value exceeds the high value for the expected value or technical limit.	Verify test parameters specified on the CHEMISTRY PARAMETERS, ISE PARAMETERS, or CALCULATED TEST display.
Class: 75		**Alarm Message: SERUM INDEXES (T.C.)**	
1 - 40 (test code)	WARNING	The test selected for serum index measurement does not have the Rate A assay code specified.	Specify the Rate A assay code for the test selected for serum index measurement.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 90		**Alarm Message: PRINTER**	
1	WARNING	1) Hardware is faulty. (Acknowledgment is not returned from printer.) 2) Timeout error occurs.	a. Is printer ON? b. Is printer SELECT light ON? If not, press SELECT button on printer. c. Is printer connected to instrument? d. Call Technical Support.
2	WARNING	1) Printer paper is not set.	Remove and replace paper. Ensure that paper detector switch is engaged.
		2) Printer select button is OFF.	Press SELECT button on printer.
		3) Connector is disconnected.	Connect Printer.
3	WARNING	Self check error is found.	Call Technical Support.
4	WARNING	Invalid character is sent.	Call Technical Support.
5	WARNING	When the print mode selected is report mode, measurement data cannot print out within PAGE LENGTH.	Verify the page length parameter value specified on the REPORT FORMAT display.
Class: 91		**Alarm Message: SYSTEM I/F**	
all codes	WARNING	System Interface	a. Check host computer. Is it ON? b. Check cable connections between instrument and host computer. c. Check host computer transmit condition. d. Ensure that host and instrument are utilizing same BAUD rate. Call Technical Support.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 100		**Alarm Message: FD DOOR OPEN**	
1 2	WARNING DRIVE #1 WARNING DRIVE #2	FDD is not ready for operation at access. (FDD: Floppy Disk Drive) 1) FDD door is open. 2) Diskette is not inserted into slot. 3) Diskette is not inserted correctly (may be upside-down or backwards).	a. Ensure that both floppy disks are inserted correctly in proper disk drives. b. Ensure that both disk drive latches are in place. c. Call Technical Support.
Class: 101		**Alarm Message: WRONG FD?**	
1 2	WARNING DRIVE #1 WARNING DRIVE #2	1) Wrong diskette is inserted in drive 1. 2) Wrong diskette is inserted in drive 2.	a. Ensure that both floppy disks are correctly inserted in the proper disk drives. b. Call Technical Support.
Class: 102		**Alarm Message: FD READ?**	
all codes		Hardware error when reading data.	a. Clean the floppy disk drive as shown in the OM, Chapter 3. b. Check if floppy disk needs to be replaced. Useful life of floppy disk is approximately 100,000 accesses. Refer to LOG OUT (OPE.SUM), for the access count of the disk currently in use. c. Call Technical Support.
Class: 103		**Alarm Message: FD WRITE?**	
all codes		Hardware error when writing data.	a. Clean the floppy disk drive as shown in the OM, Chapter 3. b. Check if floppy disk needs to be replaced. Useful life of floppy disk is approximately 100,000 accesses. Refer to LOG OUT (OPE.SUM), for the access count of the disk currently in use. c. Call Technical Support.

INSTRUMENT ALARMS (continued)

Code	Level	Description	Remedy
Class: 104	**Alarm Message: FD WRITE PROTECT**		
1	WARNING DRIVE #1	WRITE PROTECT diskette is inserted in the system disk drive.	a. Uncover the write protect notch on the diskette.
2	WARNING DRIVE #2	WRITE PROTECT diskette is inserted in the data disk drive.	b. Be sure that you are writing appropriate information on the correct disk.
Class: 105	**Alarm Message: EXCHANGE FD**		
1	WARNING DRIVE #1	System disk has been accessed 100,000 times.	a. Clean the FDD read/write head using the cleaning disk (see OM, Chapter 3 for the procedure).
2	WARNING DRIVE #2	Data disk has been accessed 100,000 times.	b. Replace floppy disk.