Sysmex™

Service Manual

AUTOMATED HEMATOLOGY ANALYZER

MODEL K-1000

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Sysmex

SECTION ONE

SPECIFICATIONS AND PERFORMANCE CHARACTERISTICS

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Specifications and Performance Characteristics

Section 1. Specifications and Performance Characteristics

1.1. Specifications

Name: AUTOMATED HEMATOLOGY ANALYZER
Model: K-1000

1.1.1. Dimensions and Weights

Dimensions: (Main Unit)
Approx. 480 mm(W) x 555 mm(H) x 298 mm(D), excluding projections
(Pneumatic Unit)
Approx. 195 mm(W) x 295 mm(H) x 395 mm(D), excluding projections

Weight: (Main Unit)
Approx. 28 kg
(Pneumatic Unit)
Approx. 14 kg

1.1.2. Power Supply and Consumption

Power supply: 117 VAC ± 10%, 50/60 Hz
220 VAC ± 10%, 50/60 Hz
240 VAC ± 10%, 50/60 Hz

Power Consumption:

117 VAC, 50 Hz	320 VA + 10% /30%
117 VAC, 60 Hz	360 VA + 10% /30%
220 VAC, 50 Hz	380 VA + 10% /30%
220 VAC, 60 Hz	380 VA + 10% /30%
240 VAC, 50 Hz	370 VA + 10% /30%
240 VAC, 60 Hz	370 VA + 10% /30%

1.1.3. Pneumatic Supply

Pressure: 2.0 ± 0.3 kg/cm^2
Vacuum: 600 ± 100 mmHg

1.1.4. Environment Requirement

Compensation Required: 462 kcal /h (1835 BTU/h)

Ambient Temperature: 15ºC - 30ºC
Diluent Temperature: 15ºC - 30ºC
Relative Humidity: 45%-85%,
non-condensing

1.1.5. Parameters

WBC: White Blood Cell or Leukocyte Count
RBC: Red Blood Cell or Erythrocyte Count
HGB: Hemoglobin Concentration
HCT: Hematocrit, true relative percentage volume of Erythrocytes
MCV: Mean Corpuscular (Erythrocyte) Volume
MCH: Mean Corpuscular Hemoglobin
MCHC: Mean Corpuscular Hemoglobin Concentration
PLT: Platelet Count

(The followings are added when the optional PDA unit is attached.)
W-SCR or LYMP%:
WBC Small Cell Ratio or Lymphocyte Percent
W-MCR or MXD%:
WBC Middle Cell Ratio or Mixed Cell Percent
W-LCR or NEUT%:
WBC Large Cell Ratio or Neutrophil Percent
W-SCC or LYMP#:
WBC Small Cell Count or Lymphocyte Count
W-MCC or MXD#:
WBC Middle Cell Count or Mixed cell Count
W-LCC or NEUT#:
WBC Large Cell Count or Neutrophil Count
RDW-CV or RDW-SD:
RBC Distribution Width, selectable
PDW: Platelet Distribution Width
MPV: Mean Platelet Volume
P-LCR: Platelet Large Cell Ratio

1.1.6. Description Principles

WBC: Electric Resistance Detection
RBC: Electric Resistance Detection
Hgb: Cyanmethemoglobin at wavelength 540 nm
Hct: Cumulative Pulse Height Detection
MCV: Computed from RBC and Hct
MCH: Computed from RBC and Hgb
MCHC: Computed from Hct and Hgb
PLT: Electric Resistance Detection

(The followings are added when the optional PDA unit is attached.)
W-SCR: Particle Distribution Analysis
W-MCR: Particle Distribution Analysis
W-LCR: Particle Distribution Analysis
W-SCC: Particle Distribution Analysis
W-MCC: Particle Distribution Analysis
W-LCC: Particle Distribution Analysis
RDW-CV/SD: Particle Distribution Analysis
PDW: Particle Distribution Analysis
MPV: Particle Distribution Analysis
P-LCR: Particle Distribution Analysis

1.1.7. Measurement Conditions

Analysis mode: (1) Whole Blood mode
(2) Capillary mode
Dilution Ratio:

(1) Whole Blood mode

WBC final dilution ratio: 1:250
Sample volume: 0.012 mL
Diluent volume: 1.988 mL
Lysing reagent volume: 1.0 mL
(WBC dilution without lysing reagent: 1 : 167)

RBC, Hct, PLT final dilution ratio:1 : 25000
1st dilution ratio: 1 : 500
Sample volume: 0.004 mL
Diluent volume: 1.996 mL
2nd dilution ratio: 1 : 50
1st dilution sample volume: 0.04 mL
Diluent volume: 1.96 mL

Hgb final dilution ratio: 1 : 500
Sample volume: 0.006 mL
Diluent volume: 1.994 mL
Lysing reagent volume: 1.0 mL
(Hgb dilution without lysing reagent: 1 : 333)

(2) Capillary mode

1/5 diluted sample is used. Instrument dilution is the same as Whole Blood mode.

Detector Block:

WBC:

Counting Time: approx. 8 seconds
Diluted Sample for Counting: 0.4 mL
(Total of 8 000 cells are actually counted, assuming a whole blood WBC of 5 000/µL)
Aperture Size: 100 µm in diameter

RBC/Hct/PLT:
Counting Time: approx. 9 seconds
Diluted Sample for Counting: 0.25 mL
(Total of 50 000 cells are actually counted, assuming a whole blood RBC of 5 000 000/µL)
Aperture Size: 75 µm in diameter

Hgb Determination
Method: Cyanmethemoglobin
Wave length: 540 ± 5 nm
Photo detector: CdS (Cadmium Sulfur)
Flow Cell length: 10 mm

1.1.8. Analytical Performance

Throughput:
Whole Blood mode: 80 samples/hour (72 samples/hour when the optional PDA unit is attached)
Capillary mode: 60 samples/hour (53 samples/hour when the optional PDA unit is attached)

Cycle Time:

Whole Blood mode:
approx. 45 seconds (approx. 50 seconds when the optional PDA unit is attached) Printout time is not included.

Capillary mode:
approx. 60 seconds (approx. 67 seconds when the optional PDA unit is attached) Printout time is not included.

Printable Range:
WBC: 0.0 - 300.0 x 10^3/μL
RBC: 0.00 - 20.00 x 10^6/μL
Hgb: 0.0 - 25.0 g/dL
Hct: 0.0 - 100.0 %
PLT: 0 - 2000 x 10^3/μL

1.1.9. Sample Volume Required

Whole Blood mode: Approx. 0.1 mL

Capillary mode: 0.04 mL with 0.16 mL of diluent
(Capillary dilution ratio: 1 : 5)

Applicable Blood Sample Collection Tube: Height should be 75 mm or less

1.1.10. Reagent and Supply Consumption

Diluent: CELLPACK: Approx. 28 mL per cycle made up as follows;

(1) 1st Dilution: 6 mL
(2) 2nd Dilution (RBC): 2 mL
(3) Mix Chamber Rinse: 4 mL
(4) RBC Transducer Chamber Rinse: 2 mL
(5) WBC Transducer Chamber Rinse: 3 mL
(6) Hgb Blank: 2 mL
(7) Hgb Rinse: 2 mL
(8) WBC Transducer Rinse: approx. 3.5 mL
(9) RBC Transducer Rinse: approx. 3.5 mL

Lysing Reagents:
STROMATOLYSER-3WP (WBC):
1.0 mL per cycle
STROMATOLYSER-C (Hgb):
1.0 mL per cycle

Detergent:
CELLCLEAN: as required for clog removal

1.1.11. Built-in Printer Specification

Printer :Thermal Graphic Printer
Line Head Width :128 dots per line
Character :5 x 7 dots, 21 characters per line
Paper Width :60 +0/-2 mm (58 mm - 60 mm)
Paper Thickness :66 ± 5 µm
Outer diameter of the new roll :50 mm
Inner diameter of the core :12 mm

(The specified Thermal Paper must be used. One roll of Thermal Paper will print out approx. 317 samples, if no error message is printed. When the optional PDA unit is attached, one roll of Thermal Paper will print out approx. 135 samples, if no error message is printed.)

1.2. Performance Characteristics

1.2.1. Precision

Expressed as the coefficient of variation in values obtained from 10 consecutive analyses of the same normal patient blood sample. Before the first analysis, the same sample is analyzed to eliminate carryover effects.

Whole Blood mode:

WBC : C.V. 3.0 % or less
RBC : C.V. 1.5 % or less
Hgb : C.V. 1.5 % or less
Hct : C.V. 1.5 % or less
MCV : C.V. 1.5 % or less
MCH : C.V. 1.5 % or less
MCHC : C.V. 1.5 % or less
PLT : C.V. 4.0 % or less
(The followings are added when the optional PDA unit is attached.)
W-SCR : C.V. 15.0 % or less
W-MCR : C.V. 30.0 % or less
W-LCR : C.V. 15.0 % or less
W-SCC : C.V. 15.0 % or less
W-MCC : C.V. 30.0 % or less
W-LCC : C.V. 15.0 % or less
RDW-CV : C.V. 3.0 % or less
(RDW-SD : C.V. 3.0 % or less)
PDW : C.V. 6.5 % or less
MPV : C.V. 4.0 % or less
P-LCR : C.V. 18.0 % or less

Capillary mode:
WBC : C.V. 9.0 % or less
RBC : C.V. 4.5 % or less
Hgb : C.V. 4.5 % or less
Hct : C.V. 4.5 % or less
MCV : C.V. 4.5 % or less
MCH : C.V. 4.5 % or less
MCHC : C.V. 4.5 % or less
PLT : C.V. 12.0 % or less

1.2.2. Accuracy

Expressed as deviations from the values obtained from analysis of fresh normal patient blood sample using a reference volumetric manometer instrument.

Whole Blood Mode:
WBC: Within ± 3.0 %
RBC: Within ± 2.0 %
PLT: Within ± 5.0 %

Capillary Mode:
WBC: Within ± 5.0 %
RBC: Within ± 3.0 %
PLT: Within ± 7.0 %

1.2.3. Performance Specification

Performance Specification determined using one fresh sample, counted 20 times consecutively in the Whole Blood mode with optional PDA unit.

WBC:	C.V.	1.45 %	($\overline{X}$= 7.2 x 10^3/mL)
RBC:	C.V.	1.06 %	($\overline{X}$= 4.32 x 10^6/mL)
Hgb:	C.V.	0.79 %	($\overline{X}$= 14.8 g/dL)
Hct:	C.V.	1.43 %	($\overline{X}$= 42.6 %)
MCV:	C.V.	0.83 %	($\overline{X}$= 98.7 fL)
MCH:	C.V.	0.87 %	($\overline{X}$= 34.3 pg)
MCHC:	C.V.	1.33 %	($\overline{X}$= 34.8 g/dL)
PLT:	C.V.	2.23 %	($\overline{X}$= 332 x 10^3/mL)
W-SCR:	C.V.	4.98 %	($\overline{X}$= 25.5 %)
W-MCR:	C.V.	13.34 %	($\overline{X}$= 5.7 %)
W-LCR:	C.V.	1.76 %	($\overline{X}$= 68.8 %)
W-SCC:	C.V.	6.22 %	($\overline{X}$= 1.8 x 10^3/mL)
W-MCC:	C.V.	16.15 %	($\overline{X}$= 0.4 x 10^3/mL)
W-LCC:	C.V.	1.85 %	($\overline{X}$ = 5.0 x 10^3/mL)
RDW-CV:	C.V.	2.23 %	($\overline{X}$= 13.0 %)
PDW:	C.V.	2.46 %	($\overline{X}$= 11.7 fL)
MPV:	C.V.	3.03 %	($\overline{X}$= 9.7 fL)
P-LCR:	C.V.	7.32 %	($\overline{X}$= 23.0 %)

1.2.4. Linearity

Whole Blood mode:

WBC : Within ± 0.2 x 10^3/μL for the range 1.0 - 6.6 x 10^3/μL
Within ± 3.0 % for the range 6.7 - 99.9 x 10^3/μL
RBC : Within ± 0.03 x 10^6/μL for the range 0.30 - 0.99 x 10^6/μL
Within ± 3.0 % for the range 1.00 - 9.99 x 10^6/μL
Hgb : Within ± 0.1 g/dL for the range 0.1 - 10.0 g/dL
Within ± 1.0 % for the range 10.1 - 20.0 g/dL
Within ± 2.0 % for the range 20.1 - 25.0 g/dL
Hct : Within ± 1.0 Hct % for the range 10.0 - 33.3 %
Within ± 3.0 % for the range 33.4 - 60.0 %
PLT : Within ± 10 x 10^3/μL for the range 10 - 199 x 10^3/μL
Within ± 5.0% for the range 200 - 999 x 10^3/μL
(provided that RBC < 7.00 x 10^6/μL)

(Condition: The background count is assumed as zero.)

Capillary mode:

WBC: Within ± 0.5 x 10^3/μL for the range 1.0 - 9.9 x 10^3/μL
Within ± 5.0 % for the range 10.0 - 99.9 x 10^3/μL
RBC: Within ± 0.06 x 10^6/μL for the range 1.00 - 1.99 x 10^6/μL
Within ± 6.0 % for the range 2.00 - 9.99 x 10^6/μL
Hgb: Within ± 0.7 g/dL for the range 2.0 - 10.0 g/dL
Within ± 7.0 % for the range 10.1 - 20.0 g/dL
Within ± 7.0 % for the range 20.1 - 25.0 g/dL
Hct: Within ± 2.0 Hct% for the range 10.0 - 33.3 %
Within ± 6.0 % for the range 33.4 - 60.0 %
PLT: Within ± 20 x 10^3/μL for the range 10 - 199 x 10^3/μL
Within ± 10.0% for the range 200 - 999 x 10^3/μL
(provided that RBC < 7.00 x 10^6/μL)

(Condition: The background count is assumed as zero.)

1.2.5. Carryover

The carryover ratio of a measured value of fresh blood is as follows;

WBC : 3 % or less
RBC, Hgb, Hct : 1.5 % or less
PLT : 5 % or less

1.2.6. Limitations

1.2.6.1. Limitation on Cell Count Parameters

Some abnormal samples may give incorrect measured values by automated cell counting methods. The following table shows examples of specific specimens causing errors, the affected parameter, the error occurring, and indicators of the error. These samples may require assay by an alternate reference method.

Table 1-1 Abnormal Samples

Parameter	Specimen	Error	Possible Indicator of Error
WBC	Cold Agglutinin Disease	(+)	Increased Red Cell MCV; Decreased Hct causing increased MCHC; Evidence of Red Cell clumping on stained smear
	Platelet aggregation	(+)	Evidence of Platelet aggregates on stained smear
	Erythroblastosis	(+)	Evidence of Erythroblast on stained smear
	Nucleated RBC	(+)	Evidence of NRBC on stained smear
	Cryoglobulins	(+)	
RBC	Cold Agglutinin Disease	(–)	Increased MCV;Increased MCHC due to low Hct
	Microcytosis (sever)	(–)	
	Fragmented RBC (schistocytes)	(–)	
	Leukocytosis (>100,000)	(+)	Elevation of WBC
Hgb	Leukocytosis (>100,000)	(+)	Elevation of WBC
	Lipemia	(+)	Elevation of MCHC; "milky" appearance of plasma or serum
	Abnormal protein	(+)	Elevation of MCHC; Lysed Hgb/WBC sample (Paraprotein) turns cloudy (time dependent, but minimized by STROMATOLYSER method)
Hct	Cold Agglutinin Disease	(–)	Elevation of MCHC; Elevation of MCV
	Leukocytosis	(+)	Elevation of WBC
	Abnormal Fragility of Red Cell	(?)	
	Spherocytosis	(?)	Decreased MCV; Evidence of spherocytes on stained smear
PLT	Pseudothrombocytopenia	(–)	Platelet Satellitism noted on stained smear
	Platelet Aggregation	(–)	Aggregation observed on stained smear
	Microcytic RBCs (marked)	(+)	low MCV
	Megalocytic Platelets	(–)	

(+): Instrument count is affected by increase in result.
(–): Instrument count is affected by decrease in result.
(?): Instrument count is affected by either increase or decrease in result, depending upon sample.

1.2.6.2. Limitations on Histogram and Parameters (When optional PDA Unit is Attached.)

Specimens show changes in cell volume and particle densities over a period of time after collection of the specimen. The degree of change varies depending upon the specimen and upon circumstances.

The particle distribution analysis by the optional PDA unit is subject to the following limitations. Interpretation and correct analysis depend on the following conditions and limitation.

Utilization of the Sysmex Leukocyte Tri-modal Cell Size Distribution Analysis is intended for use as a screening device. Each laboratory should establish an acceptable protocol for determining the use of this Tri-modal Distribution Analysis and its associated screening of normal versus abnormal samples. Establishment of this protocol should be based upon the instrument Abnormal Distribution error alarms and Codes, analysis parameters, clinical information and data available, any additional requirements as determined by the laboratory medical director, and the visual review of histograms by a qualified individual who has been instructed in instrument operation and histogram interpretation.

It is suggested that all histograms be reviewed, and that the qualified reviewer indicates by their initials in an appropriate area on the report form whether the histogram appears normal or abnormal. This normal or abnormal indicator may then be utilized in routing the sample for further study if so indicated by the laboratory's established protocol.

Additionally the Mean Platelet Volume (MPV) measurement in blood samples collected in EDTA anticoagulant is subject to influence by variables which include sample storage temperature, and the length of time the sample remains in the anticoagulant. Inaccuracies associated with measurement of this parameter have been examined and documented in the publications listed below. This parameter (MPV) should be utilized within the constraints as noted in these articles.

References:

(a) Threatte GA, Adrados C, Ebbe S, Brecher G: Mean Platelet Volume: The Need for a Reference Method, Am J Clin Pathol 1984; 81: 769-772

(b) Corash L: Platelet Sizing: Techniques, Biological Significance and Clinical Applications, Current Topics in Hematology. Alan R. Liss, Inc. 1983; PP 99-122

(c) Thompson CB, Diaz DD, Quinn PG, Lapins M, Kurtz SR, Valeri CR: The Role of Anticoagulation in the Measurement of Platelet Volumes. Am J Clin Pathol 1983; 80: 327-332

1.2.6.3. Diluent Temperature

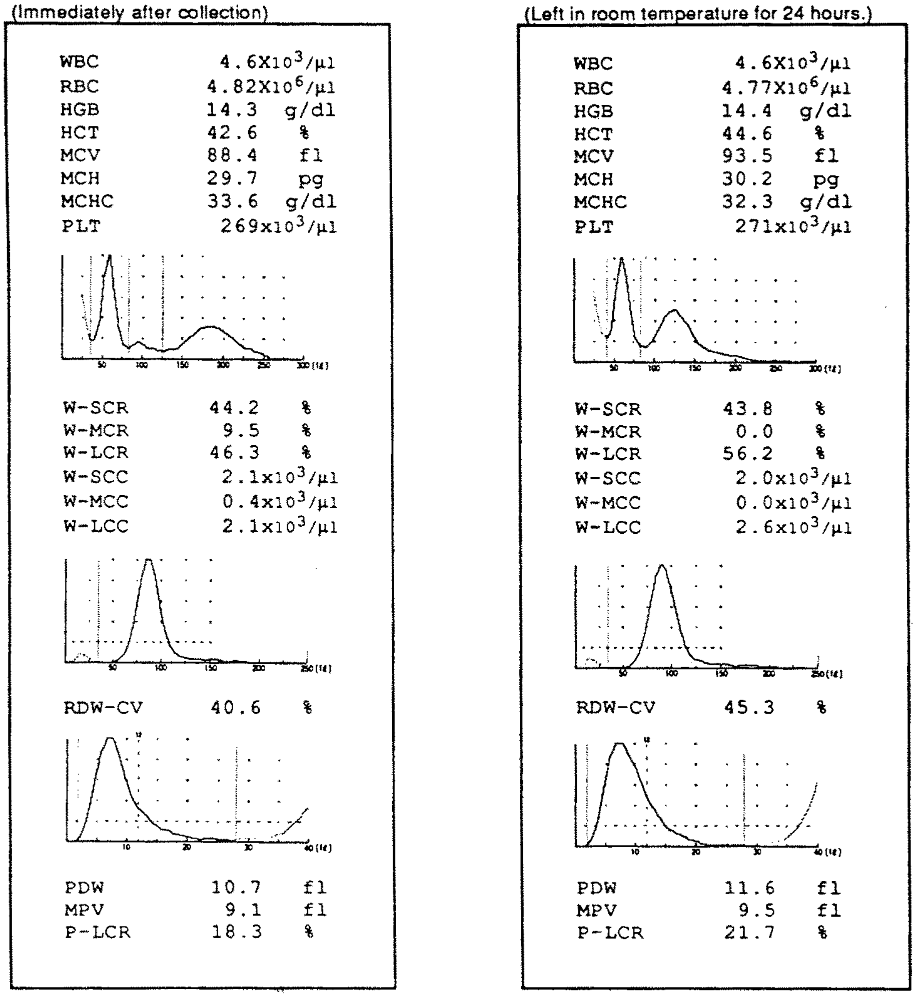
The diluent temperature should not fall outside the range of 15ºC to 30ºC. If the temperature is lower than 15ºC, the WBC particle size distribution analysis will be influenced by RBC ghosts which are produced by an insufficient reaction of the lysing reagent. If the temperature is higher than 30ºC, the WBC histogram may not clearly produce a tri-modal distribution.

1.2.6.4. Stability of the whole Blood Sample

The cell size distribution analysis of a patient sample should be performed within a 12-hour period.

When the specimen is left at room temperature, the resistance of the WBC membrane generally becomes weakened and the shrink ratio of the WBC volume increases against lysing reagent. When the optional PDA unit is attached, granulocytes shrink remarkably and the tri-modal distribution curve becomes a bi-modal curve whose valley between two peaks becomes shallow. The WBC count may also decreases depending on specimens and circumstances. When the specimen is left at room temperature, erythrocytes generally swells and the MCV increases. Accordingly the RDW-SD increases in the cell size distribution. Platelets also swell and indicate an increased MPV and P-LCR.

These phenomena may be reduced if the specimen is kept in the refrigerator (2 - 8°C).



(Immediately after collection)

```
WBC          4.6X10³/µl
RBC          4.82X10⁶/µl
HGB          14.3   g/dl
HCT          42.6    %
MCV          88.4    fl
MCH          29.7    pg
MCHC         33.6   g/dl
PLT           269x10³/µl

W-SCR        44.2    %
W-MCR         9.5    %
W-LCR        46.3    %
W-SCC         2.1x10³/µl
W-MCC         0.4x10³/µl
W-LCC         2.1x10³/µl

RDW-CV       40.6    %

PDW          10.7    fl
MPV           9.1    fl
P-LCR        18.3    %
```

(Left in room temperature for 24 hours.)

```
WBC          4.6X10³/µl
RBC          4.77X10⁶/µl
HGB          14.4   g/dl
HCT          44.6    %
MCV          93.5    fl
MCH          30.2    pg
MCHC         32.3   g/dl
PLT           271x10³/µl

W-SCR        43.8    %
W-MCR         0.0    %
W-LCR        56.2    %
W-SCC         2.0x10³/µl
W-MCC         0.0x10³/µl
W-LCC         2.6x10³/µl

RDW-CV       45.3    %

PDW          11.6    fl
MPV           9.5    fl
P-LCR        21.7    %
```

Figure 1-1 Tri-modal Distribution of a specimen; Immediately after collection (left) and 24-hours left in room temperature (right)

1.2.6.5. Example of some Abnormal Specimens

The K-1000 will not produce reliable data for the following abnormal specimens:

a. Specimens containing aggregated platelets may show incorrect W-SCC and W-SCR as indicated by an elevation of the histogram curve at the lower discriminator. See Figure 1-2.
b. Specimens having low concentration of platelets may report incorrect PDW and MPV. Operator is requested to confirm the platelet count by the reference method. See Figure 1-3.
c. Specimens obtained from cryoglobulinemia patients may contain agglutinated protein particles of which size is similar to blood cell.
d. Specimens containing microcytic RBC may affect the platelet count and the PLT distribution. See Figure 1-3.

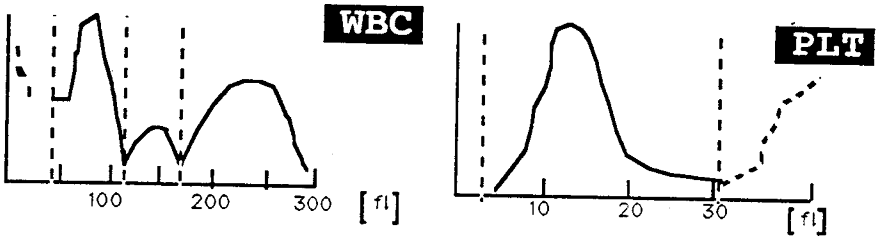


Figure 1-2 White Blood Cells with the Platelet Aggregation

Numerous specimens have partial aggregation in platelets, caused by the incorrect amount of anticoagulant, venipuncture technique, and pseudothrombocytopenia. Left of Figure 1-2 shows the WBC histogram, and the right shows the PLT histogram. In some cases specimens having platelet aggregation may indicate similar particle size distribution to that of clotted specimens, but in most cases show a rough slope on the right side shoulder of the PLT particle size distribution histogram. However, such a distribution cannot be found in every specimen having platelet aggregation, since the depth of the valley in the WBC distribution (indicated with the up arrow) varies depending upon the size and the number of the aggregated mass. Similar distribution is also shown in the case of thrombocytosis or when the number of platelets is greatly increased. When the PLT count is low and both WBC and PLT distributions are abnormal, platelet aggregation should be considered as a possible cause.

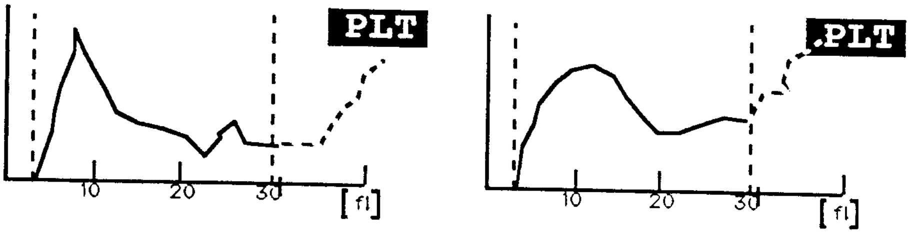


Figure 1-3 PLT Distribution at Decreased Platelets

Both platelet counts are approximately 31,000/µL. The specimen in the left of Figure 1-3 includes slightly smaller platelets and partial aggregation of platelets. The specimen in the right of Figure 1-3 includes macrocytic platelets and microcytic erythrocytes. The effect of the microcytic RBCs on the PLT count has been minimized by computer placement of the discriminator at the optimum position which separates PLTs from the microcytic RBCs. The particle size distribution of specimens having lower concentration of platelets provides decreased reproducibility since a fewer number of platelets are actually counted. In the cases of decreased platelets, partial aggregation of platelets occurs with considerable frequency, and erythrocyte fragments and microcytic erythrocytes may be expressed within the PLT particle size distribution. Therefore, the PLT particle size distribution should be used after understanding that the reliability of distribution is reduced and the overlap with the RBC distribution is emphasized when the platelet count is less than 50,000/µL. Note that the peak of the PLT histogram shown in the right of Figure 1-3 is not expressed 100%.

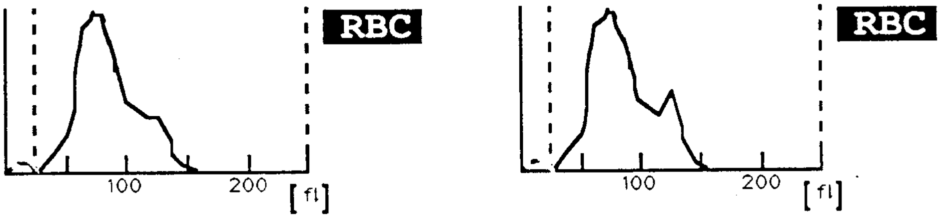


Figure 1-4 RBC Histograms of Abnormal Cell Sizes

Some RBC specimens show either two peak or skewed particle size distributions rather than the normal Gaussian distribution. This is caused by the presence of two or more cell size populations. The histogram in the left of Figure 1-4 shows a specimen containing normocytes and macrocytes, and the histogram in the right shows a specimen containing microcytes and macrocytes. Note that the microcytic distribution continues into the platelet distribution.

1.3. Reagent System

The required reagents are a diluent, two lysing reagents, and a detergent. The diluent and lysing reagents are drawn from their individual external containers and dispensed automatically in measured amounts for each operating cycle. Refer to the package insert for more information before using the reagents.

1.3.1. Diluent

CELLPACK™ is the only recommended diluent compatible with the K-1000 reagent system. CELLPACK is an isotonic saline solution used to dilute whole blood specimens to determine the hemoglobin, to count and size the blood cells (WBC, RBC and PLT) and to obtain Hct. Approximately 28 mL is consumed per operating cycle. CELLPACK is azide-free, and a colorless transparent liquid.

The active ingredients are;

Sodium Chloride	6.38 g/L
Boric Acid	1.00 g/L
Sodium Tetraborate	0.20 g/L
EDTA-2K	0.20 g/L

Store CELLPACK at controlled room temperature (15 - 30°C). If frozen, thaw and mix thoroughly before use. CELLPACK displaying any signs of contamination, instability or color change should be replaced. CELLPACK has a product life of 18 months after the date of production.

1.3.2. Lysing Reagents

1. Lysing Reagent for WBC Measurement

STROMATOLYSER-3WP™ is a lysing reagent to eliminate red blood cell stroma for accurate WBC count and for tri-modal distribution. 1.0 mL is consumed per operating cycle. STROMATOLYSER-3WP is azide-free, and a colorless transparent liquid. The active ingredients are;

Organic Quaternary Ammonium Salt	10.2 g/L
Sodium Chloride	2.0 g/L

Store STROMATOLYSER-3WP at controlled room temperature (15 - 30ºC). If frozen, thaw, dissolve ingredients completely and mix thoroughly before use. STROMATOLYSER-3WP displaying any signs of contamination, instability or color change should be replaced. STROMATOLYSER-3WP has a product life of 12 months after the date of production.

NOTE:

STROMATOLYSER-3WP Packaged in the 500 mL bottle is stable for 60 days after opening the bottle. This is because air is drawn inside the bottle when reagent is used, and the potential to grow bacteria will increase.

2. Lysing Reagent for Hgb Measurement

STROMATOLYSER-C™ is a lysing reagent to lyse red blood cells in the sample, and release their hemoglobin to be measured by Hemiglobincyanide (cyanmethemoglobin) method. 1.0 mL is consumed per operating cycle. STROMATOLYSER-C is azide-free, and a colorless transparent liquid. The active ingredients are;

Potassium Cyanide	1.3	g/L
Organic Quaternary Ammonium Salt	4.0	g/L
Sodium Sulfate, Anhydrous	11.0	g/L

WARNING:

POISONOUS IF INGESTED! Avoid breathing vapor. Keep away from food products.
ANTIDOTE: Call a physician. Give inhalations of amyl nitrite or ammonia 15 - 30 seconds every 15 minutes for one hour. Give artificial respiration if necessary.

Store STROMATOLYSER-C at controlled room temperature (15 - 30ºC). If frozen, thaw, dissolve ingredients completely and mix thoroughly before use. STROMATOLYSER-C displaying any signs of contamination, instability or color change should be replaced. STROMATOLYSER-C has a product life of 12 months after the date of production.
STROMATOLYSER-C produces toxic hydrogen cyanide gas when subjected to an acid environment; never leave the bottle uncapped.

NOTE:

STROMATOLYSER-C Packaged in the 500 mL bottle is stable for 60 days after opening the bottle. This is because air is drawn inside the bottle when reagent is used, and the potential to grow bacteria will increase.

1.3.3. Detergent

CELLCLEAN™ is a strong alkaline detergent to remove lysing reagents, cellular residuals and blood proteins remaining in the hydraulics. CELLCLEAN is azide-free, and a light yellow liquid. The active ingredient is Sodium Hypochlorite (available chlorine concentration 5.0%). Store CELLCLEAN in a dark place. Avoid exposing to direct sunlight, or chlorine component will be deformed and the effectiveness of CELLCLEAN will be lost depending upon the time period of exposure. CELLCLEAN has a product life of 8 months after the date of production.

See Section 6.3.1. for Cleaning Procedure of Transducer Aperture, Section 6.4.2. for Cleaning Sample Rotor Valve, Section 6.3.8. for Cleaning Waste Chamber & Trap Chamber, Section 6.3.6. for Cleaning Rinse Cup and Section 6.5.2. for Cleaning of Hgb Flow Cell.

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SECTION TWO

PRINCIPLES OF OPERATION

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Principle of Operation

Section 2. Principle of Operation

2.1. General

The K-1000 is comprised of hydraulic, pneumatic and electronic systems. The hydraulic system performs the sample dilution, mixing and hemolysis for CBC test. The electronic system analyzes and computes the signals processed by the detector circuit. The results are printed out on the built-in printer and/or optional peripheral printer. The pneumatic system produces the constant air pressure and the vacuum for operating master valves and sample transfer in the hydraulic system. The K-1000 has a self-diagnosis soft-ware program to monitor the whole system.

2.1.1. Electric Resistance Detection

The K-1000 counts and sizes blood cells using the electric resistance detection method.

The instrument aspirates samples, dilutes and routes them through the transducer aperture. As blood cells pass through the aperture, where a constant DC current flows between an internal electrode and an external electrode, they produce the change in the resistance of conductive diluent. These changes are recorded as the increase in the voltage between the electrodes, which is in proportion to the size of each cell. These voltage changes are amplified and sent to the discriminator circuit to screen out electronic noise. The cell signals which are greater than a preset threshold level will be sent to the wave-form processor circuit. The signals are then analog/digital converted and sent to the counting circuit, where they are counted, and computed.

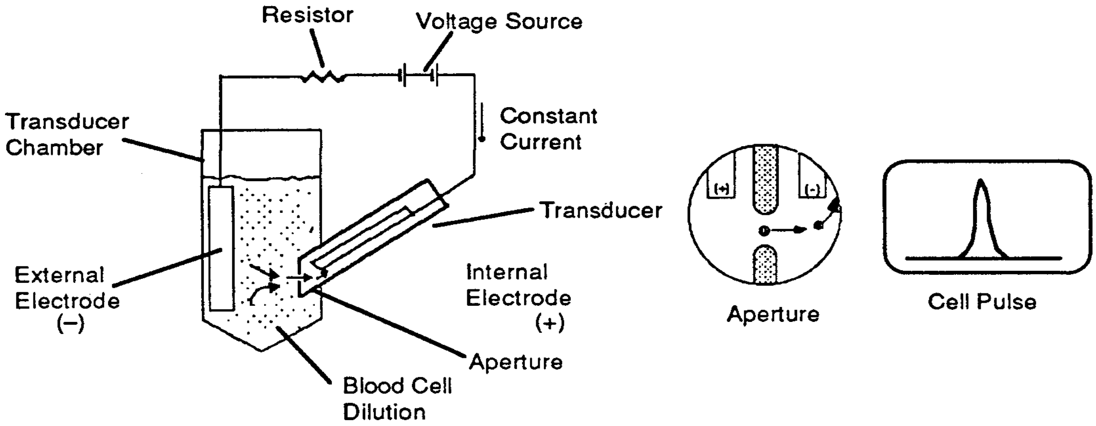


Figure 2-1 Electric Resistance Detection

2.2. Principle of Cell Counting and Sizing

Blood cells and platelets are counted and sized by detecting the difference of conductivity between the particle and the diluent in which they are suspended. Measurement utilizes the electric resistance detection method coupled with a volumetric nonmercury ball-float manometer.

Blood cells are suspended in an electrolytic diluent. The relatively large differences between the conductivity (or resistance) of the cells and the diluent are detected as pulses, measured, and collated to count and size the cells, as follows:

1. The suspended cells are aspirated through a transducer aperture. A constant DC current flows from an electrode inside to an electrode outside the transducer (see Fig 2-1).
2. When a cell passes through the aperture, the electric resistance between the electrodes increases, causing an increase in voltage between the electrodes which is proportional to this increase in resistance. This voltage change is proportional to the volume of the cell passing through the aperture.

Ohm's Law expresses this occurrence, $I = \frac{E}{R}$, or $E = IR$

where E = voltage, I = current, and R = resistance. Since I is constant current, I_k makes the equation $E = I_kR$. Cells passing through the aperture cause R to increase as they inhibit electron flow. If current I_k is constant, an increase in R will cause an increase in E. Voltage, E, is proportional to resistance, R, which is proportional to cell volume.

3. These small voltage changes are amplified. Electrical interference or spurious signals caused by air bubbles are denoted the noise and eliminated by a filtering circuit. In addition, a microprocessor in the K-1000 constantly monitors the pulses and screens out the noise.
   If optional PDA board is installed, the amplified and wave-form processed signals are sent to the size distribution analysis circuit where they are converted into size distribution data, which will be expressed in a size distribution histogram.

4. Conductivity of the diluent varies with changes in temperature and osmotic pressure. Even the diluent is manufactured to have a constant osmotic pressure, it is necessary to compensate for the conductivity change of the diluent by temperature. High temperature increases conductivity and yield smaller cell signals. Diluent temperature is monitored by the thermistor mounted near the aperture, and compensated in the electronic circuitry.

5. Particle pulses are collated for each size level, and the optimum discrimination level is determined upon completion of the count cycle. Then the number of pulses between the lower and the upper discriminator levels are computed. The result is then transmitted to the printer or host computer.

6. In the WBC assay, 12 µL of whole blood measured by the sample rotor valve is diluted approximately into 1:250 with diluent and lysing reagent as WBC sample. RBCs and a part of membrane of WBC would be lysed, and cytoplasm is dissolved, remaining only the nuclei of WBC as countable particles. Exactly 0.4 mL of this 1:250 dilution is measured by the volumetric ball-float manometer, and aspirated through the aperture (100µm diameter) of the WBC transducer.
   WBC result will be computed after counting particles of those nuclei which are greater than the lower discrimination level
   The particles of which size is over 36 fL are counted as WBC.
   The final report is displayed as n x 10^3/µL. (i.e. "n" indicates the number of WBCs per 1 µL in the whole blood) (or n x 10^9/l in SI units).

   If the optional PDA board is installed, a distribution curve (histogram) is also obtained, and then the lower discrimination level of WBC is automatically determined to the ideal position of each sample between 30 and 60 fL.

7. In the RBC and PLT assays, 4 µL of the whole blood measured by the sample rotor valve is finally diluted to 1:25,000 with diluent. Exactly 0.25 mL of the sample is measured by the volumetric ball-float manometer in the RBC detector unit.
   RBC and PLT are discriminated by their respective comparators, The lower discrimination level of RBC is fixed at 30 fL and the upper level is fixed at 250 fL. The RBC result is counted from the number of pluses between these two discrimination levels, multiplied by a constant involving the dilution ratio, and indicated as the number "n" of RBCs per 1 µL of whole blood. The final report is displayed as n x 10^6/µL (or n x 10^{12}/l in SI units).

   If the optional PDA board is installed, a cell size distribution curve (histogram) is also obtained. Then, the lower discrimination level of RBC is automatically determined to ideal position between 25 fL and 75 fL, and the upper level is determined between 200 fL and 250 fL.

8. K-1000 has different discrimination points for the PLT measurement. These are used for the accurate PLT determination and to discriminate the larger PLT and the smaller RBC. From these data, K-1000 compute the ideal position of the PLT upper discriminator level, and the PLT count is also calculated, i.e.the number of pulses between lowest discriminator and computed ideal upper discrimination level. PLT result will be obtained by compensating the number of pulses between the lowest discriminator and computed ideal upper discrimination level.
   PLT count is indicated as the number "n" of PLTs per 1 µL of whole blood. The final report is displayed as n x 10^3/µL (or n x 10^9/L in SI units).

   If the optional PDA board is installed, the PLT lower discrimination level is automatically determined between 2 fL and 6 fL, and the PLT upper discrimination level is automatically determined between 12 fL and 30 fL. PLT count is computed between these two discrimination levels.

2.3. Principle of HCT Measurement

The K-1000 measures hematocrit (Hct) electrically. The pulse height (voltage change) produced by blood cell passing through a transducer aperture is proportional to each cell volume. These pulse heights are converted to proportional number of serial pulses simultaneously. The total number of serial pulses are counted and computed to get the Hct result. The Hct result is indicated as the ratio of total RBC volume to the whole blood. This ratio is expressed as a percent (%).
If the optional PDA board(KPU-1) is installed, the Hct value is computed directly from its RBC histogram.

The hematocrit value (Hct) is defined as:

$$\text{Hct}(\%) = \frac{V}{Vt} \times 100\ \% \qquad \text{.......... (1)}$$

where, V = volume of red cells in the blood sample
Vt = total volume of the blood sample

Since pulse height (PH) is proportional to the volume of one red blood cell, then

$$PH = K \times V_{RBC} \qquad \text{.......... (2)}$$

where, K = proportional constant
V_{RBC} = volume of one blood cell

Therefore, the volume (V) of (n) red blood cells suspended and falling in the range between the lower and the upper discrimination levels is:

$$V = \sum_{i=1}^{n} V_{RBCi} = \frac{1}{K} \sum_{i=1}^{n} PHi \qquad \text{.......... (3)}$$

by substituting equation (3) for equation (1)

$$\text{Hct}(\%) = \frac{1}{V_T\ K} \sum_{i=1}^{n} PHi \times 1.00 \qquad \text{.......... (4)}$$

Since a precisely measured volume of a 1:25,000 final dilution of whole-blood sample passes through the aperture, the volume V_T (cumulative volume of all red cells analyzed) in equation (4) can be calculated. For simplicity's sake, a proportional constant (1/K) is chosen in which pulse height PH is equal to the volume of one red cell. The hematocrit value is then reported as the number "n" percent (or n/100 in SI Unit l/l).

NOTE: To ensure accurate test result, the K-1000 monitors aperture clogging, and electronic noise. The K-1000 alarms the operator by printing out error message on the built-in printer with beep sound, or halts operation depending on the abnormality.

2.4. Principle of HGB Measurement

In the HGB assay, 6µL of whole blood measured by sample rotor valve is finally diluted to 1:500 with 1.994 mL of diluent and 1.0 mL of lysing reagent (STROMATOLYSER-C™) as the Hgb sample. This diluted sample flows into the Hgb flow cell where it will be analyzed by a variation method of the internationally standardized Cyanmethemoglobin method. Red Blood Cell membrane will be lysed by a surfactant and releasing hemoglobin. Hemoglobin iron is converted from the Ferrous (Fe^{+2}) to the Ferric (Fe^{+3}) state to form Methemoglobin, which combines with Potassium-Cyanide to produce the stable Cyanmethemoglobin or Hemoglobin-Cyanide (HiCN). The concentration of this compound is then measured by Light Absorbance Methods, using a glass filter with a center wavelength of 540 nm. The Hgb value is computed by subtracting Blank-Absorbance from Sample-Absorbance:

Sample Absorbance - Blank Absorbance = Hgb Absorbance.

To insure the reliability of analysis data, a Hgb Error Monitor has been incorporated into the computer program.
A sample which contains a high number of WBCs can affect the Hgb result because of increased absorbance. However, the K-1000 is designed to minimize this affect. The actual error depends on the clarity of the sample and the number of WBCs involved.

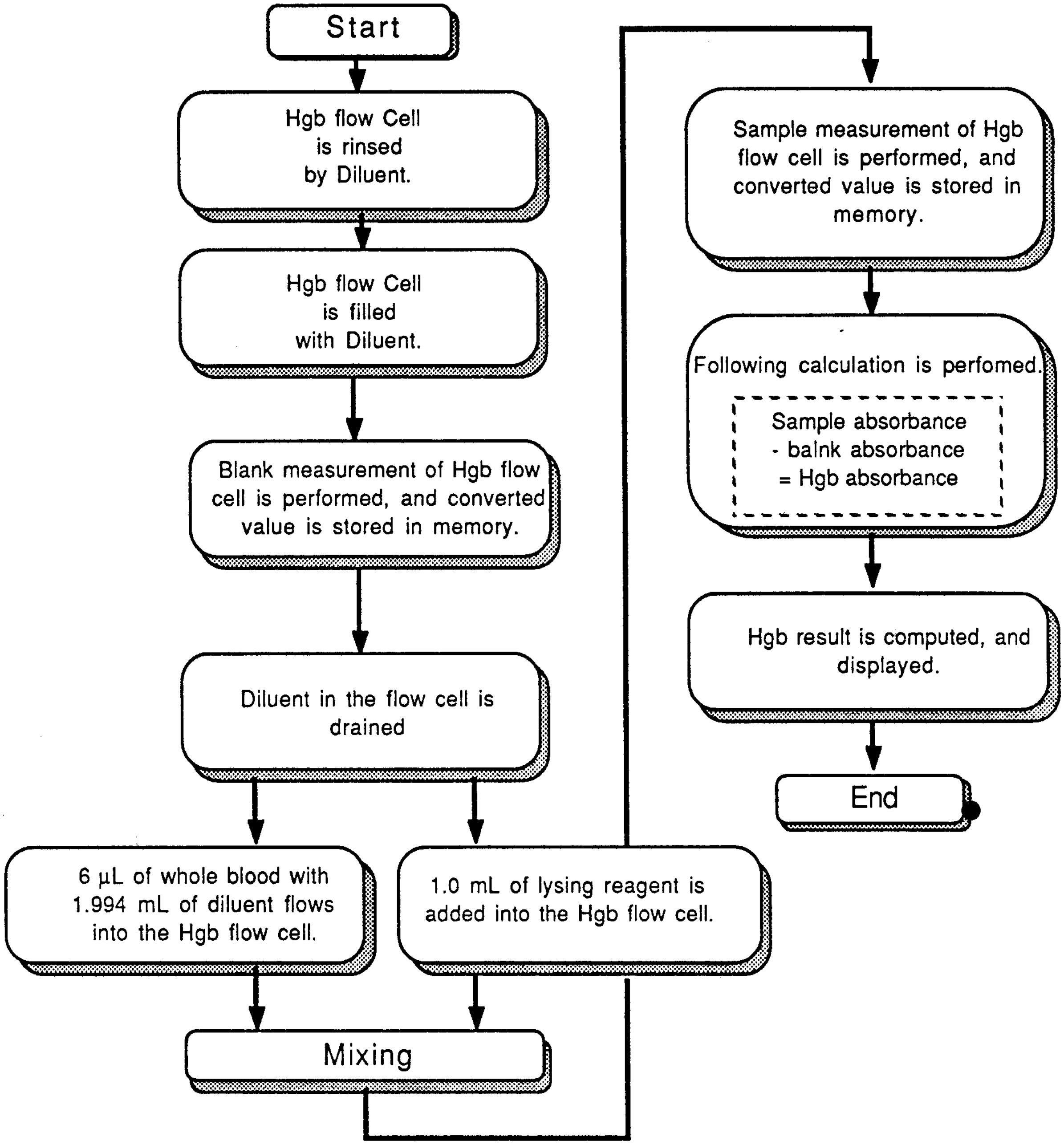


Figure 2-2 Hgb Measurement Flow Chart

2.5.Erythrocyte Indices

Erythrocyte indices are calculated as follows:

1. Mean Corpuscular Volume (MCV)
   The MCV value is calculated from the RBC and the Hct.

$$\mathrm{MCV\ (fL)} = \frac{\mathrm{Hct\ (\%)}}{\mathrm{RBC\ (10^6\ cells/\mu L\ )}} \times 10$$

2. Mean Corpuscular Hemoglobin (MCH)
   The MCH value is calculated from the RBC and the Hgb.

$$\mathrm{MCH\ (pg)} = \frac{\mathrm{Hgb\ (g/dl)}}{\mathrm{RBC\ (10^6\ cells/\mu L\ )}} \times 10$$

3. Mean Corpuscular Hemoglobin Concentration (MCHC)
   The MCH value is calculated from the Hct and the Hgb.

$$\mathrm{MCHC\ (g/dl)} = \frac{\mathrm{Hgb\ (g/dl)}}{\mathrm{Hct\ (\%)}} \times 100$$

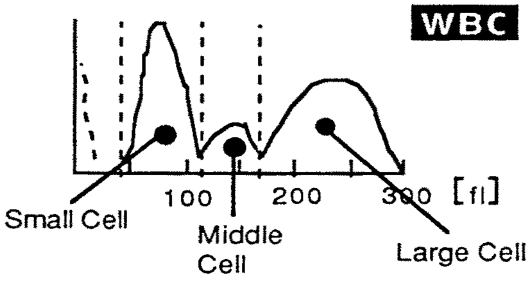
2.6.Analysis of Cell Size Distribution (K-PDA Unit KPU-1)

Cell size distributions of WBC, RBC, and PLT are analyzed in the following respective ranges.
WBC: Approximately 30 - 300 fL (after adding lysing reagent)
RBC: Approximately 25 - 250 fL
PLT: Approximately 2 - 30 fL

2.6.1.WBC Size Distribution

The WBC particle size distribution analysis is performed as follows:

(1) The lower discriminator (LD) will be set automatically at the optimum position between 30 and 60 fL.
(2) The upper discriminator (UD) is fixed at 300 fL.
(3) The two troughs (T1 and T2) to separate the three cell population (after Lyse is added) will be determined automatically by the computer one sample to another.



W-SCR	28.6 %
W-MCR	15.9 %
W-LCR	55.5 %
W-SCC	1.9x10^3/µl
W-MCC	1.1x10^3/µl
W-LCC	3.8x10^3 /µl

Figure 2-3 Range of small cell, Middle Cell, and Large Cell Populations

W-SCR (WBC-Small Cell Ratio):

The ratio obtained by dividing the number of small cells, which fall in the range between the lower discriminator (LD) and the lower trough discriminator (T1), by the total number of cells which are greater than or equal to the lower discriminator (LD). W-SCR (%) is highly correlated with the lymphocyte percent.

W-MCR (WBC-Middle Cell Ratio):

The ratio obtained by dividing the number of middle cells in the range between the lower trough discriminator (T1) and the upper trough discriminator (T2), by the total number of cells which are greater than or equal to the lower discriminator (LD). The W-MCR (%) is highly correlated with the mixed cell percentage of monocytes, basophils, and eosinophils.

W-LCR (WBC-Large Cell Ratio):.

The ratio obtained by dividing the number of large cells, greater than or equal to the upper trough discriminator (T2), by the total number of cells which are greater than or equal to the lower discriminator (LD). W-LCR (%) is highly correlated with the neutrophil percent.

W-SCC (WBC-Small Cell Count):

The absolute number of small cells computed by multiplying WBC by W-SCR. W-SCC is expressed as “n” cells x 10^3/fL.

W-MCC (WBC-Middle Cell Count):

The absolute number of middle cells computed by multiplying WBC by W-MCR. W-MCC is expressed as “n” cells x 10^3/fL.

W-LCC (WBC-Large Cell Count):

The absolute number of large cells, computed by multiplying WBC by W-LCR. W-LCC is expressed as “n” cells x 10^3/fL.

2.6.2 RBC Size Distribution

The RBC size distribution analysis is performed as follows;

(1) The lower discriminator (LD) will be set automatically at the optimum position between 25 and 75 fL.
(2) The upper discriminator (UD) will be set automatically at the optimum position between 200 and 250 fL.
(3) RBC histogram abnormality is monitored in the relative frequency at the lower discriminator (LD), the relative frequency at the upper discriminator (UD), the existence of two or more peaks, the arithmetic distribution width in femtoliters (fL), and the fitness to the normal distribution curve.

RDW-CV (RBC Distribution Width-Coefficient of Variation)

RDW-CV and RDW-SD are two measures of the dispersion of a group of values. Both RDW-CV and RDW-SD indicate the clustering of data around a mean and SD. The SD, however, is expressed in absolute units, while the CV is a percent (%) that relates the SD to the level of measurement. RDW-CV is computed as follows:

(1) The mean cell volume (fL) is obtained at the peak of the RBC distribution.
(2) The standard deviation is obtained to determine the two points where the 60.65% level intersects the RBC distribution, taking the histogram peak as 100% (Figure 2-4).

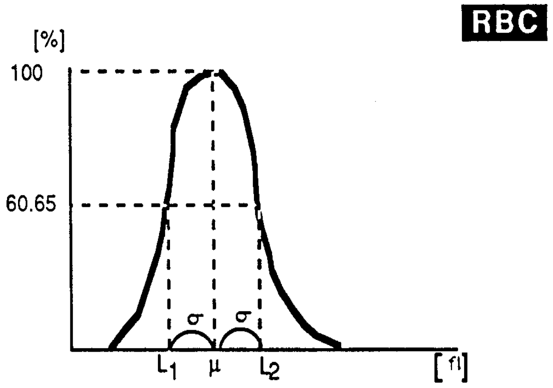


Figure 2-4 RDW-CV Computation

The RDW-CV is computed as:

$$\text{RDW-CV} = 100 \times \frac{\delta}{\mu} = 100 \times \frac{(L_2-L_1)}{(L_2+L_1)}$$

$$\text{where } \mu = \frac{(L_2+L_1)}{2} \text{ and } \delta = \frac{(L_2-L_1)}{2}$$

RDW-SD (RBC Distribution Width-Standard Deviation):

RDW-SD is the arithmetic distribution width measured at the 20 % relative frequency level, taking the histogram peak as 100%. The RBC histogram of a normal blood sample crosses this 20% level twice. RDW-SD is reported in femto-liter.

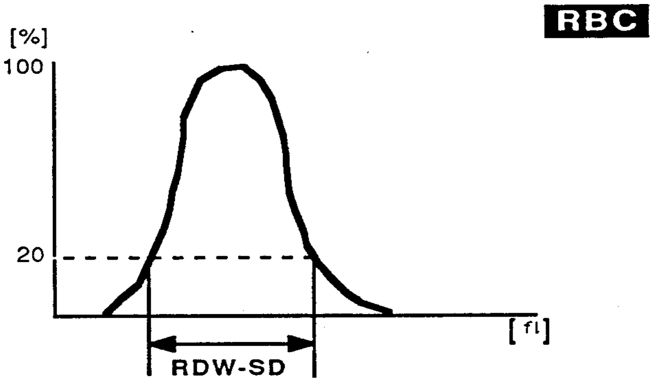


Figure 2-5 Definition of RDW-SD

2.6.3 PLT Size Distribution

The PLT size distribution analysis is performed as follows;

(1) The lower discriminator (LD) will be set automatically at the optimum position between 2 and 6 fL.

(2) The upper discriminator (UD) will be set automatically at the optimum position between 12 and 30 fL. The fixed discriminator for P-LCR is set at 12 fL.

(3) PLT histogram abnormality is monitored in the relative frequency at the lower discriminator (LD), the relative frequency at the upper discriminator (UD), the arithmetic distribution width in femtoliters (fL), and the existence of two or more peaks.

PDW (PLT Arithmetic Distribution Width)
PDW is the arithmetic distribution width, measured at the 20% relative frequency level, taking the histogram peak as 100%. The PLT histogram of a normal blood sample crosses this 20% level twice. PDW is reported in femtoliters (fL).

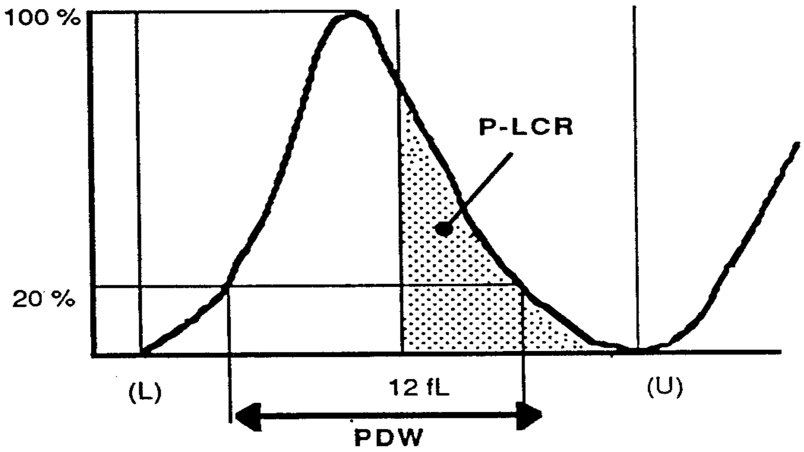


Fig.2-6 Definition of PDW and P-LCR

MPV (Mean Platelet Volume)

MPV is calculated by following formula:

$$\text{MPV (fL)} = \frac{\text{Pct (\%)}}{\text{PLT } (10^3/\mu\text{L})}$$

(Pct (%) is obtained by accumulating the PLT pulse height which is proportional to each platelet volume.)

P-LCR (Platelet-Large Cell Ratio)

P-LCR is the ratio obtained by dividing the number of platelets which fall in the range between the fixed discriminator (12 fL) and the upper discriminator (UD), by the total number of platelets which fall between the lower discriminator (LD) and the upper discriminator (UD).

Sysmex

SECTION THREE

OPERATOR CONTROLS
AND
INDICATORS

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Operator Controls and Indicators

Section 3. Operator Controls and Indicators

The nomenclature, function and instructions for use of the various keys, switches and indicators are showed below.

3.1. K-1000 MAIN UNIT

The main parts of the K-1000 Main Unit are shown in Figure 3-1, Figure 3-2, Figure 3-3 and Figure 3-4.

3.1.1. Front and Right View

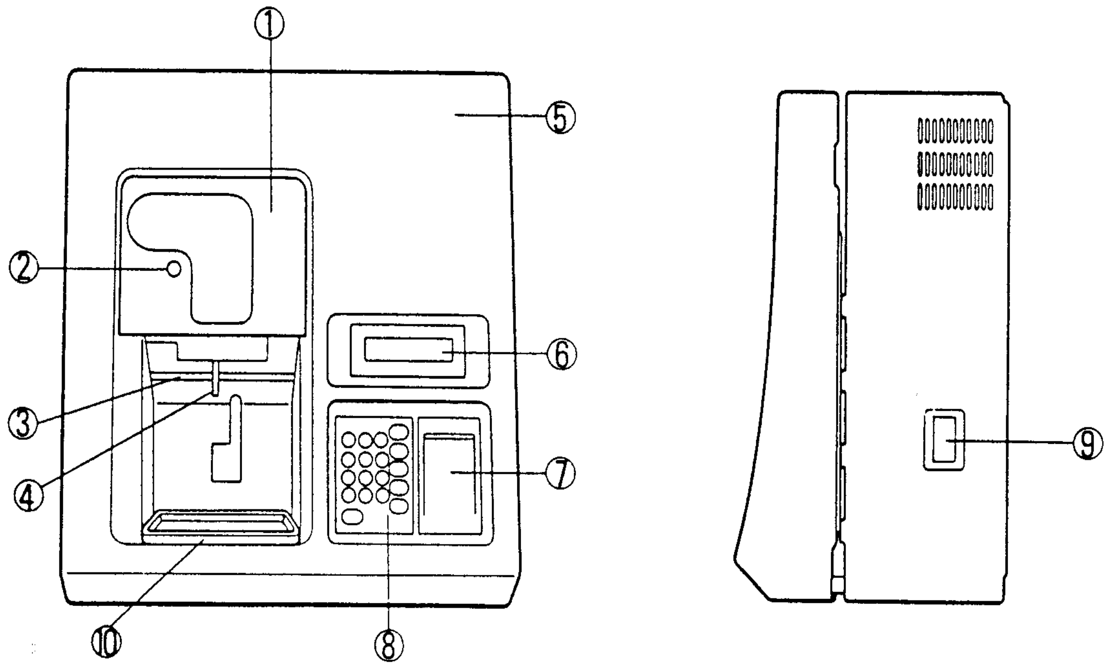

Figure 3-1 K-1000 Main Unit Front and Right Views

1 **Detector Block**
Includes the WBC Detector Unit, RBC Detector Unit and Preamplifier Circuit Boand.

2 **Ready LED**
Lights when the system is in the Ready mode, Capillary (Cap.) Ready mode or $\overline{X}$ QC Ready mode, and flashes when the system is aspirating whole blood or 1 : 5 diluted sample.

3 **Start Switch**
Starts the whole blood analysis or the capillary analysis.

4 **Aspiration Pipette**
The whole blood sample is aspirated through this pipette in the Whole Blood mode. The 1 : 5 diluted sample is also aspirated through this pipette in the Capillary mode.

5 **Front Cover**
Is fixed at the right corner of the chassis with two hinges and can be opened by pulling the left side edge of the Front cover toward you.

6 **LCD**
Displays the status, error and instruction messages. This LCD (Liquid Crystal Display) has a capability to display 16 characters and 2 lines.

7 **Built-in Printer**
Prints the test result, and status, error and instruction messages.

8 **Control Panel**

Has SELECT key, WBC FLUSH key, RBC FLUSH key, FEED key, PRINT key, ENTER key, 0 - 9 Numeric keys, C key and ·/- key. Numeric 2, 4, 6 or 8 key also functions as ↓, ←, → or ↑ key, respectively. Selection of Numeric or cursor function is automatic and depending on the selected program.

9 **Power Switch**
Turns the main power ON and OFF. This switch also controls the power for the Pneumatic Unit. Turn OFF the power only when the instrument is in the Ready mode. Do not turn this switch ON and OFF repeatedly. This could cause fuse overload and instrument failure.

10 **Tray**
is provided to prevent sample and liquid from being spilled from the Aspiration Pipette and Sample Rotor Valve of the Main Unit.

3.1.2. Rear and Left View

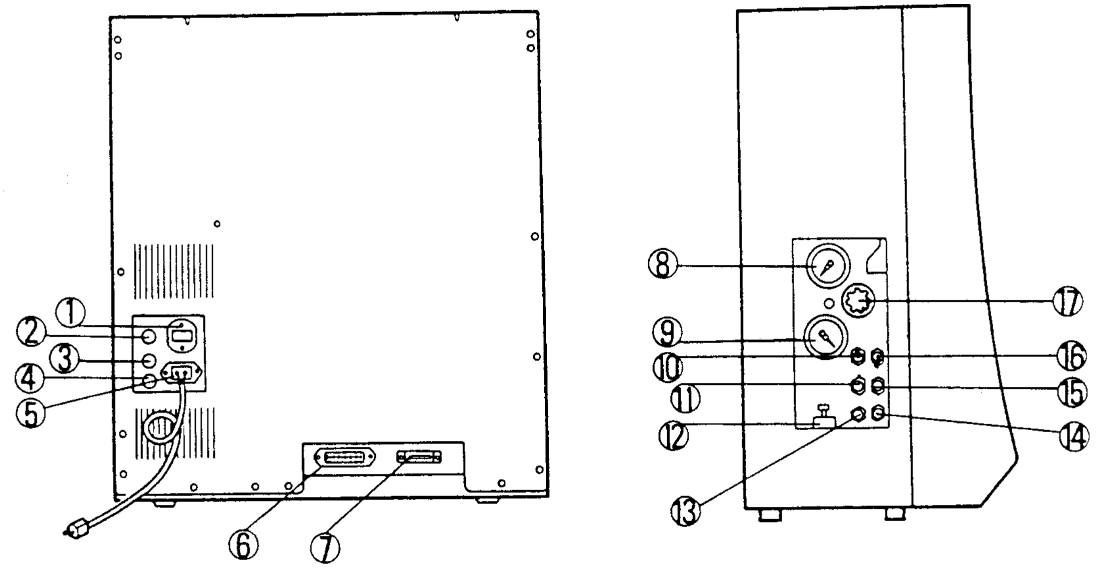

Figure 3-2 K-1000 Main Unit Rear and Left Views

1 **Pneumatic Power Outlet**
Power outlet for the Pneumatic Unit. Electric power is switched by the Power Switch in the right of the Main Unit.

2 **Fuse (F1)**
125 V 2 A slow blow for 117 V Specification
250 V 1 A slow blow for 220 V or 240 V Specification

3 **Fuse (F2)**
125 V 7 A slow blow for 117 V Specification
250 V 4 A slow blow for 220 V or 240 V Specification

4 **Fuse (F3)**
125 V 7 A slow blow for 117 V Specification
250 V 4 A slow blow for 220 V or 240 V Specification

5 **Power Inlet**
Use only the grounded power cord provided.

6 **Connector J1 [PRINTER (CARD)]**
For the optional Data Printer or Line Printer which has a parallel interface.

7 **Connector J2 [COMPUTER]**
For the optional host computer or Line Printer which has an RS-232C serial interface.

8 **0.5 kg/cm^2 Pressure Gauge**
Indicates the pressure supplied to drain the waste, and to mix the diluted sample. Pressure reading should be 0.50 ± 0.05 kg/cm^2.

9 **250 mmHg Vacuum Gauge**
Indicates the vacuum supplied to the Hydraulic system. Vacuum reading should be 250 ± 10 mmHg.

10 **Pressure Inlet Nipple (2 kg/cm^2**
Pressure is supplied from the Pneumatic Unit via this nipple.

11 **Hgb Reagent Inlet Nipple (HGB)**
Hgb reagent is aspirated from the STROMATOLYSER-C container via this nipple.

12 **Bellows Unit**
Adjusts the vacuum to the specified range.

13 **Waste Outlet Nipple (WASTE)**
Waste is drained via this nipple.

14 **Diluent Inlet Nipple (DILUENT)**
Diluent is aspirated from the CELLPACK container via this nipple.

15 **WBC Reagent Inlet Nipple (WBC)**
WBC reagent is aspirated from the STROMATOLYSER-3WP container via this nipple.

16 **Vacuum Inlet Nipple (VACUUM)**
Vacuum is supplied from the Pneumatic Unit via this nipple.

17 **0.5 kg/cm^2 Pressure Regulator**
Adjusts the pressure to the specified range. If adjustment is required, pull the knob toward you unlock and turn it clockwise to increase the pressure or counterclockwise to decrease. Push the knob when completed.

3.1.3. Front Interior

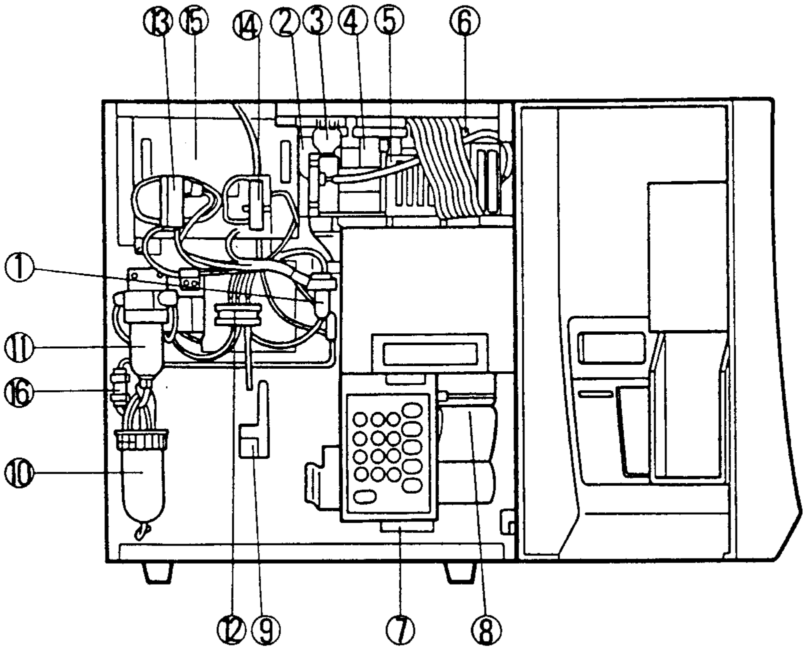

Figure 3-3 K-1000 Main Unit Front Interior

1 **Mixing Chamber**
The 1 : 500 diluted sample is mixed in this chamber.

2 **WBC Reagent Chamber**
An internal reservoir chamber for WBC lysing reagent.

3 **Hgb Flow Cell**
6 mL of the whole blood, 2 mL of diluent, and 1.0 mL of the Hgb lysing reagent are fed into the Hgb Flow Cell to make the final dilution of 1 : 500, and Hgb Concentration is measured calorimetrically in Hgb Flow Cell after conversion to stable cyanmethemoglobin.

4 **Hgb Reagent Chamber**
An internal reservoir chamber for Hgb lysing reagent.

5 **Hgb Unit**
Consists of the Hgb Lamp, Optical lens, Optical Filter, Photo sensor (CdS) and Hgb Flow Cell.

6 **Diluent Chamber**
An internal reservoir chamber for diluent.

7 **Cycle Counter**
Indicates the cumulative number of operations.

8 **Built-in Printer**
Prints the test result, and status, error and instruction messages.

9 **Rinse Cup**
Receives Rinse solution flew through the Aspiration Pipette.

10 **Waste Chamber**
Aspirates waste liquid from the hydraulic lines.

11 **Drain Trap Filter**
Condensed water in the pressure from the Pneumatic Unit is drained through this Filter.

12 **Sample Rotor Valve (SRV)**
Measures 4 mL of the whole blood for 1 : 500 dilution, 12µ L of the whole blood used for the WBC and 6 µL of the whole blood used for the Hgb. Then 40 µL of the 1 : 500 diluted sample for 1 : 50 dilution (final ratio 1 : 25000) used for the RBC/PLT/Hct.

13 **RBC Detector Unit**
The 1 : 25000 diluted sample is fed into this Unit, and RBC, PLT and Hct are measured.

14 **WBC Detector Unit**
12 µL of whole blood, 2.0 mL of diluent and 1.0 mL of the WBC lysing reagent are fed into this Unit to make the final dilution of 1 : 250, RBC are lysed, and WBC are counted.

15 **Detector Block**
Includes the WBC Detector Unit, RBC Detector Unit and Pre-Amp Unit.

16 **Trap Chamber**
This provides a safety vacuum trap to prevent waste fluid from entering into the vacuum line.

3.1.4. Control Panel

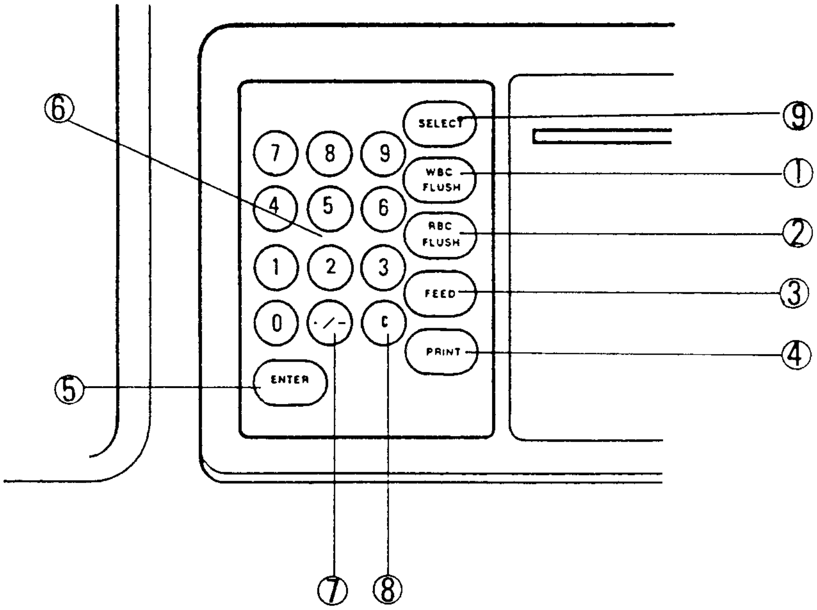

Figure 3-4 K-1000 Main Unit Control Panel

1 **WBC FLUSH key**
When this key is pressed, the Clog Removal operation is performed on the WBC aperture, and Fill process is performed on the WBC manometer. It takes approximately 7 seconds until this process is completed.

2 **RBC FLUSH key**
When this key is pressed, the Clog Removal operation is performed on the RBC aperture, and Fill process is performed on the RBC manometer. It takes approximately 7 seconds until this process is completed.

3 **FEED key**
Feeds paper on the built-in printer while pressing.

4 **PRINT key**
Starts the built-in printer to print out menu, settings and test results of the latest sample.

5 **ENTER key**
Enters the information from the numeric keys into the computer, and completes the menu selection, the parameter setting or the entry mode for the Sample ID Number setting.

6 **0 - 9 Numeric key**
Used to set the sample ID number, to select menu, or to enter the setting values.

7 **·/- key**
Sets hyphens in the sample ID number, or periods in analysis limits.

8 **C key**
Clears the incorrectly placed number either in the sample ID number setting mode, in the menu selection mode, or in the parameter setting mode. This key is also used to stop the alarm beep sound which indicates an error.

9 **SELECT key**
When the instrument is in the Ready mode, pressing this key enters to the PROGRAM SELECT menu. This key is also used to exit from the program and to return to the Ready mode.

3.2. K-1000 Pneumatic Unit

The main parts of the K-1000 Pneumatic Unit are shown in Figure 3-5.

3.2.1. Front and Right View

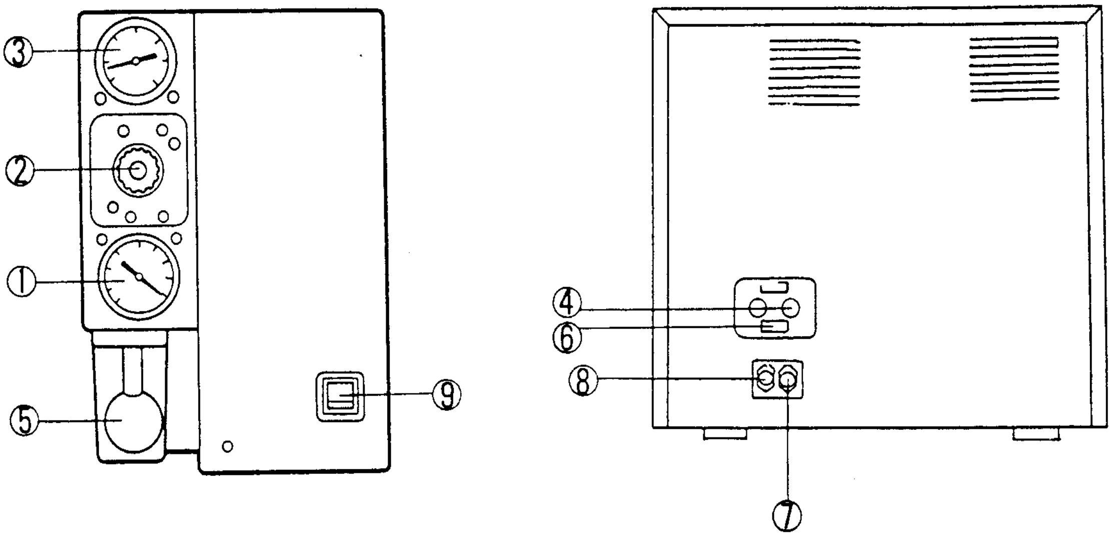

Figure 3-5 K-1000 Pneumatic Unit Front and Right Views

1 **Vacuum Gauge (480)**
Indicates the vacuum supplied to the Main Unit. Proper value is over 450 mmHg.

2 **Relief Valve**
Adjusts the pressure to the specified range. If adjustment is required, pull the knob toward you to unlock and turn it clockwise to increase the pressure or counterclockwise to decrease. Push the knob when completed.

3 **2 kg/cm^2 Pressure Gauge (2.0)**
Indicates the pressure supplied to the Main Unit. Approximate value is 2.0 ± 0.1 kg/cm^2.

4 **Fuse**
125 V 4 A slow blow for 117 V Specification.
250 V 3.15 A slow blow for 220 V or 240 V Specification.

5 **Trap Chamber**
Provides a safety vacuum trap to prevent fluid from entering the compressor in case of an instrument failure. This chamber should include a plastic ball float.

6 **Power Inlet**
Use the grounded power cord provided.

7 **Pressure Outlet Nipple (PRESSURE)**
Pressure is supplied via this nipple to the Main Unit. Connect this nipple to the Pressure inlet nipple on the Main Unit Left side by using the provided Flat Tube (polyurethane); color coded by red.

8 **Vacuum Outlet Nipple (VACUUM)**
Vacuum is supplied via this nipple to the Main Unit. Connect this nipple to the vacuum inlet nipple on the Main Unit Left side by using the provided Flat Tube (polyurethane); color coded by blue.

9 **Power Switch**
Supplies or removes electric power to the Pneumatic Unit. Do not turn this switch ON and OFF repeatedly as this may cause fuse overload and the instrument failure.

SECTION FOUR

HYDRAULIC OPERATION

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Hydraulic Operation

Section 4 Hydraulic Operation

4.1. Pneumatic System

The hydraulic operation of the K-1000 is performed by controlling pneumatic pressure and vacuum with the computer program. The pressure and vacuum are produced by the compressor in the pneumatic unit. Pneumatic system block diagram is shown in Figure 4-1.

1. Pressure

The positive air pressure is regulated into 2 kg/cm^2 in the pneumatic unit, and is output to the main unit. The solenoid valves in the main unit control the 2 kg/cm^2 air pressure according to the programed sequential operation. Through the solenoid valves, 2 kg/cm^2 air pressure is applied to the master valves and the air cylinder of SRV mechanism to drive them.
The regulator in Main Unit regulates 2 kg/cm^2 pressure into 0.5 kg/cm^2 pressure. Several master valves in the main unit switch 0.5 kg/cm^2 air pressure flow. The 0.5 kg/cm^2 pressure is applied to the nipple of diaphragm pump to let dispense the constant volume of liquid, and/or is used as the exhaust pressure of waste chamber.

2. Vacuum

The vacuum (480 mmHg or more) produced by the compressor is applied to the main unit through the trap chamber. Several master valves in the main unit switch the 480 mmHg vacuum flow. The vacuum is applied to the nipple of diaphragm pump to let aspirate the constant volume of liquid and to Reagent Chambers to prime reagent into each chamber.
The 480 mmHg vacuum is regulated into 250 mmHg vacuum by the bellows in Regulator Unit Assembly.
The 250 mmHg vacuum is applied into the waste chamber through the master valves, to aspirate the waste liquid.

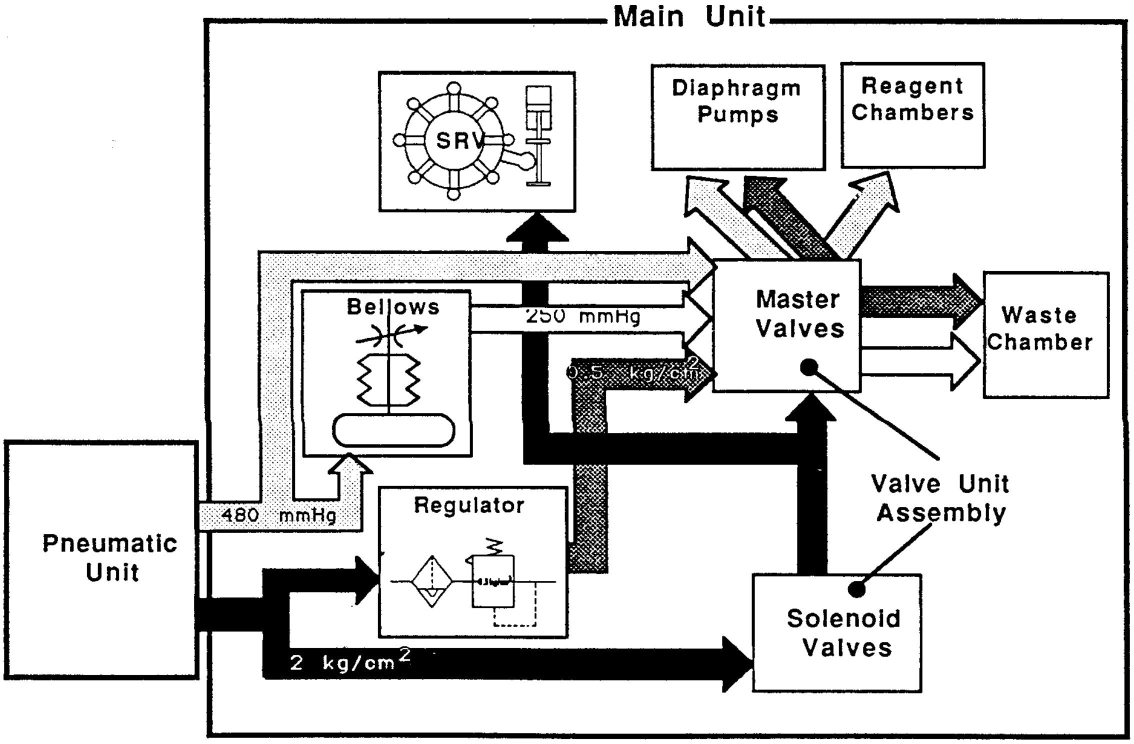


Figure 4-1 Pneumatic System Block Diagram

4.2.Pneumatic & Hydraulic Parts

Pneumatic Controls are used to regulate the air flow, and to change the direction of flow.

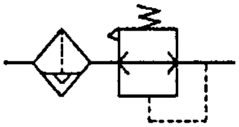
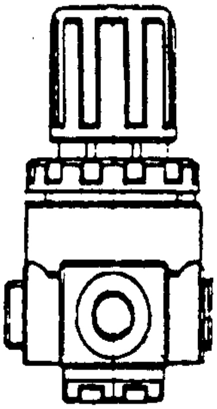
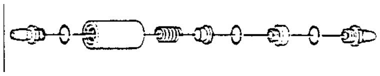
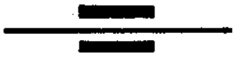
Name & Symbol	Figures	Used for
Regulator 		Regulator is used to regulate air flow rate which is adjusted by turning the Adjustment Knob. Only one regulator which is shown in left figure is used in the K-1000. This regulator is used to regulate 2.0 kg/cm^2 air pressure into 0.5 kg/cm^{2}pressure with an air filter and auto draining mechanism.
Non-Return Valve 		The Non-return Valve permits hydraulic flow in only one direction from, A to B. No hydraulic flow will occur from B to A.
Orifice 		An orifice controls the rate of air flow or the volume of air with respect to time. These orifice are identical to those used in the pneumatic and hydraulic system. There are several kinds of orifices each of which permits a different flow rate.

Table 4-1 Pneumatic and Hydraulic Parts (1)

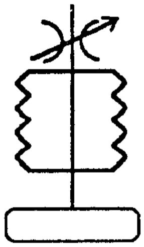
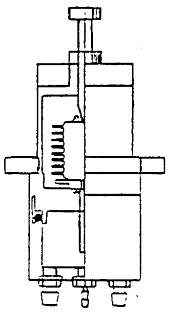
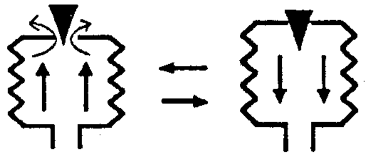
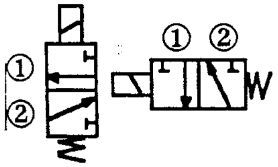
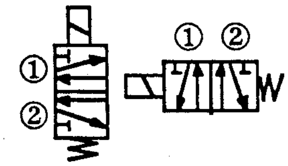
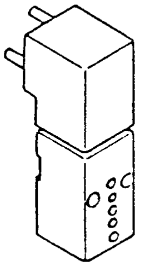
Name & Symbol	Figures	Used for
Bellows 		The bellows unit in the K-1000 is used to regulate the vacuum (480 mmHg or more) into 250 mmHg. This unit consists of bellows and small air tank. If the inner vacuum exceeds the mechanical pressure of bellows, vacuum is released from its top port. If the mechanical pressure exceeds the inner vacuum of bellows, vacuum increases after the top port is closed by the needle valve. (See below figures.) 
3-ports type Solenoid Valve  **5-ports type Solenoid Valve**  Status of Solenoid Valve ① SV is turned ON. ② SV is OFF.		Two types of Solenoid valves (3-ports and 5-ports type) are used in the hydraulic system. Solenoid Valves are driven by applying 12 V-DC which are controlled by computer program, and are used to control the pneumatics pressure to drive Master valves, Air cylinder, or Air Bubble Mixing. Solenoid valve symbol has two boxes in its drawing. Arrows in these boxes indicate the status of connection. Status ① or ② shown in "Name & symbol" column will be switched by the activation of solenoid valve by the activation or deactivation of solenoid valve respectively.

Table 4-1 Pneumatic and Hydraulic Parts (2)

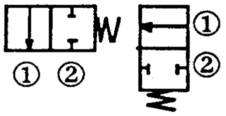
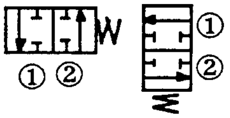
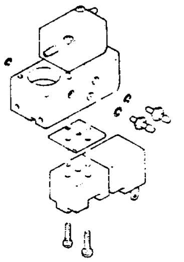
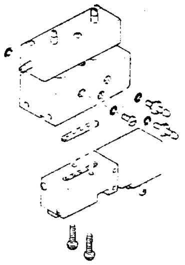
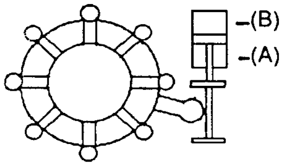
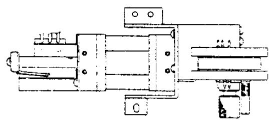
Name & Symbol	Figures	Used for
2 ports type Master Valve  **3 ports type Master Valve**  Status of Master Valve ① MV is turned ON. ② MV is OFF.	 	Master valves in K-1000 are used to switch Hydraulic lines (liquid, 0.5 kg/cm^{2}pressure, and 480 mmHg/250 mmHg vacuum). Two types of Master Valve (2 ports and 3ports type) are used in the hydraulic system. Master Valves are driven by 2 kg/cm^2 air pressure controlled by Solenoid valves. Master valve symbols has also two boxes in its drawing. Arrows and lines in these boxes indicates hydraulic ways. Status ① or ② shown in "Name and symbol" Column will be switched by the activation or deactivation of master valve, respectively
Sample Rotor Valve & Air Cylinder 		Sample Rotor Valve mechanism is driven by the air cylinder. The air cylinder is provided with two (A and B) ports, (A) for pneumatic activation to rotate the SRV counterclockwise and the other (B) for pneumatic deactivation to reset the SRV The 2 kg/cm^2 pressure for these action are supplied by a 3 ports type solenoid valve.

Table 4-1 Pneumatic and Hydraulic Parts (3)

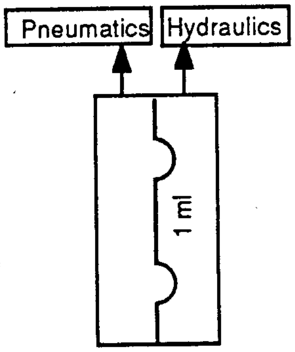
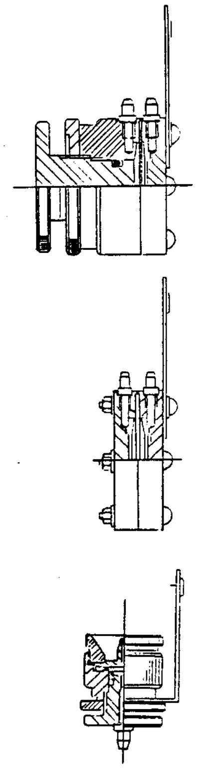
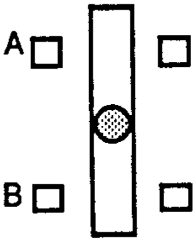
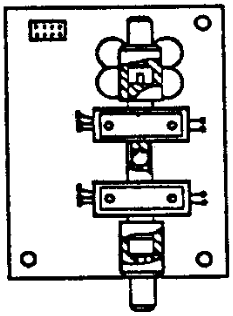
Name & Symbol	Figure	Used for
Diaphragm Pump  		Seven Diaphragm Pumps are used in the hydraulic system. Diaphragm Pumps are driven by 0.5 kg/cm^2 air pressure and 500 mmHg vacuum controlled by Master valves, and dispenses or aspirates constant volume of liquid. Diaphragm Pumps are drawn by left symbols in sequence flow charts. Diaphragm Pump has two nipples on it. One is to connect to pneumatic system (0.5 kg/cm^2 pressure or 480 mmHg Vacuum), and the other is to hydraulic system. Either of pressure or vacuum is always supplied to the pneumatic side nipple. If the vacuum is supplied to the pneumatic side nipple the fixed volume of liquid is aspirated into the diaphragm pump. If the pressure is supplied, fixed volume of liquid is dispensed from the diaphragm pump.
Manometer  		Ball float manometers are located in detector blocks, and are used to detect constant volume of diluted sample which are aspirated though the transducer aperture.
Isolation Chamber 		These Isolation Chambers are used to isolate the liquid in detector block from the remained hydrauric line in the system in order not to be influenced by the externel noise through the hydraulic line.

Table 4-1 Pneumatic and Hydraulic Parts (4)

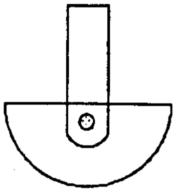
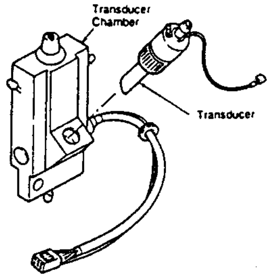
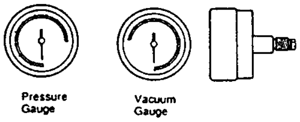
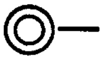
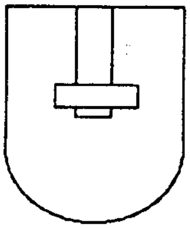
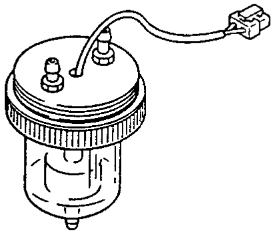
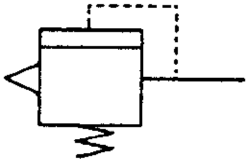
Name & Symbol	Figures	Used for
Transducer Chamber 		Diluted samples of WBC or RBC are dispensed into each transducer chamber, mixed by air bubbles, and constant volume of the sample are aspirated through the aperture.
Pressure Gauge 		Four pressure gauges are used in the system to check the following pressures or vacuums. Pneumatic unit 1: 2.0 kg/cm^2 pressure 2: 480 mmHg Vacuum Main Unit 3: 0.5 kg/cm^2 pressure 4: 250 mmHg Vacuum
2 kg/cm^2 pressure source 		2 kg/cm^2 pressure is used to drive the master valves and SRV air cylinder. To make simple the hydraulic flow chart, the symbol in the column "Name and symbol" is used.
 **Glass Chamber**		Glass chambers with float switches are used as Waste Chamber, Diluent chamber, and lyse reagent chamber. 480 mmHg or 250 mmHg vacuum is applied into these chamber to aspirate or prime liquid. When exhausting the waste liquid in Waste Chamber, 0.5 kg/cm^2 is applied instead of vacuum.Float switch is provided with these chambers to prevent overflow of these chamber.
Relief Valve 		The Relief Valve releases air pressure if the supplied air pressure exceed the preset value. This valve is adjusted by turning the knurled knob.

Table 4-1 Pneumatic and Hydraulic Parts (5)

4.3 Sample Flow

All tubings and chambers are rinsed thoroughly with diluent before each sample is introduced into the instrument. Contamination or carryover from a previous sample is therefore held to a minimum level. Thus, accuracy and precision are greatly enhanced by this hydraulic design. The K-1000 Sample Flow Chart is shown in Figure 4-2.

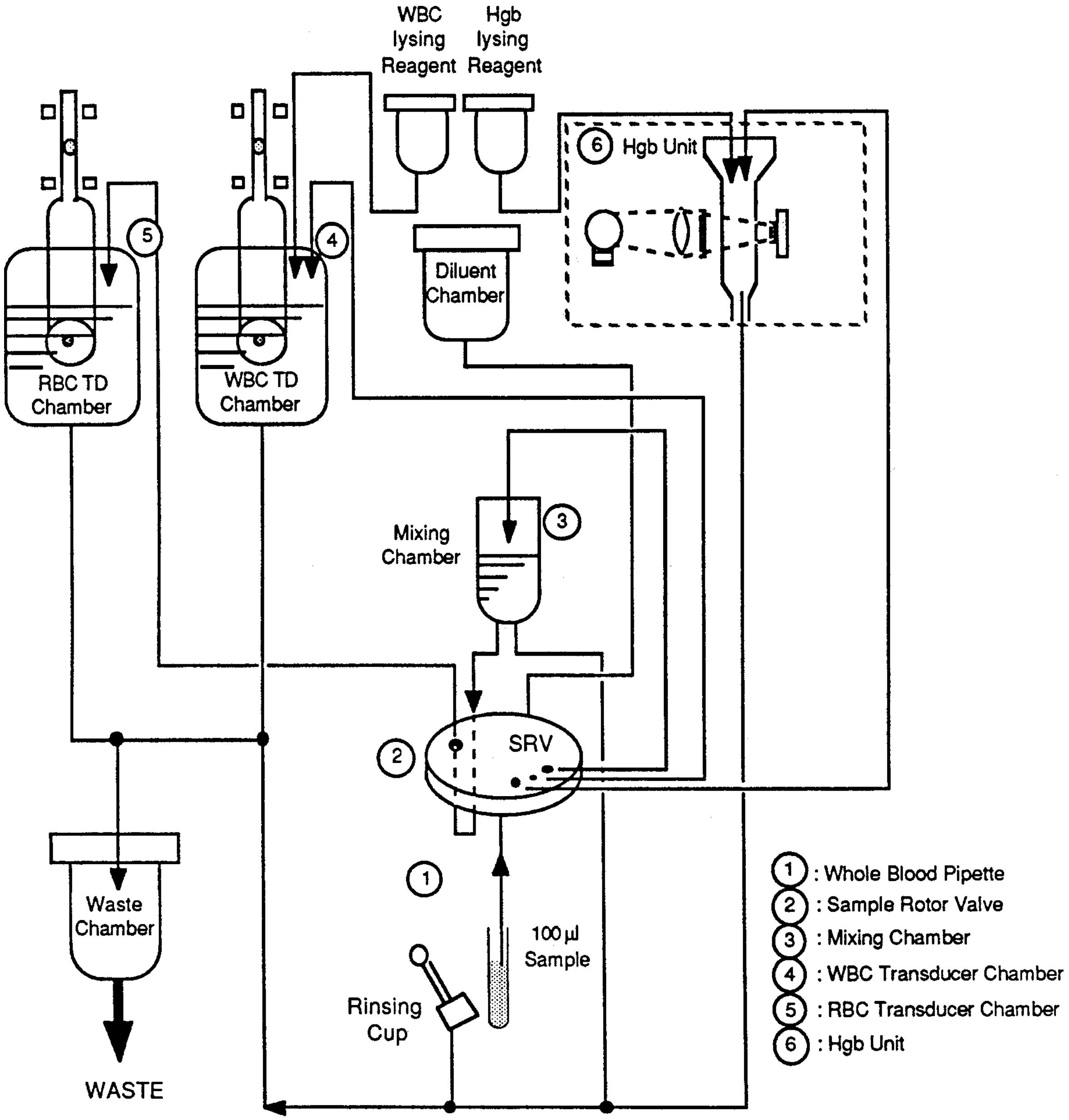


Figure 4-2 K-1000 Sample Flow

4.3.1. WBC Sample Flow

Refer to the sample flow chart shown in Figure 4-3. The WBC sample flow is shown with bold lines. The blood sample, with EDTA as an anti-coagulant, is aspirated through the Whole Blood Pipette ① into the Sample Rotor Valve ②. The 12 µL of the whole blood sample is measured and diluted into 1 : 250 by adding approximately 2 mL of diluent and 1 mL of WBC lysing reagent in the WBC Transducer Chamber ④. The diluted WBC sample (1 : 250) in the Transducer Chamber is aspirated through the aperture and counted. The 0.4 mL of final diluted samples are used for counting by the electric resistance detection method.

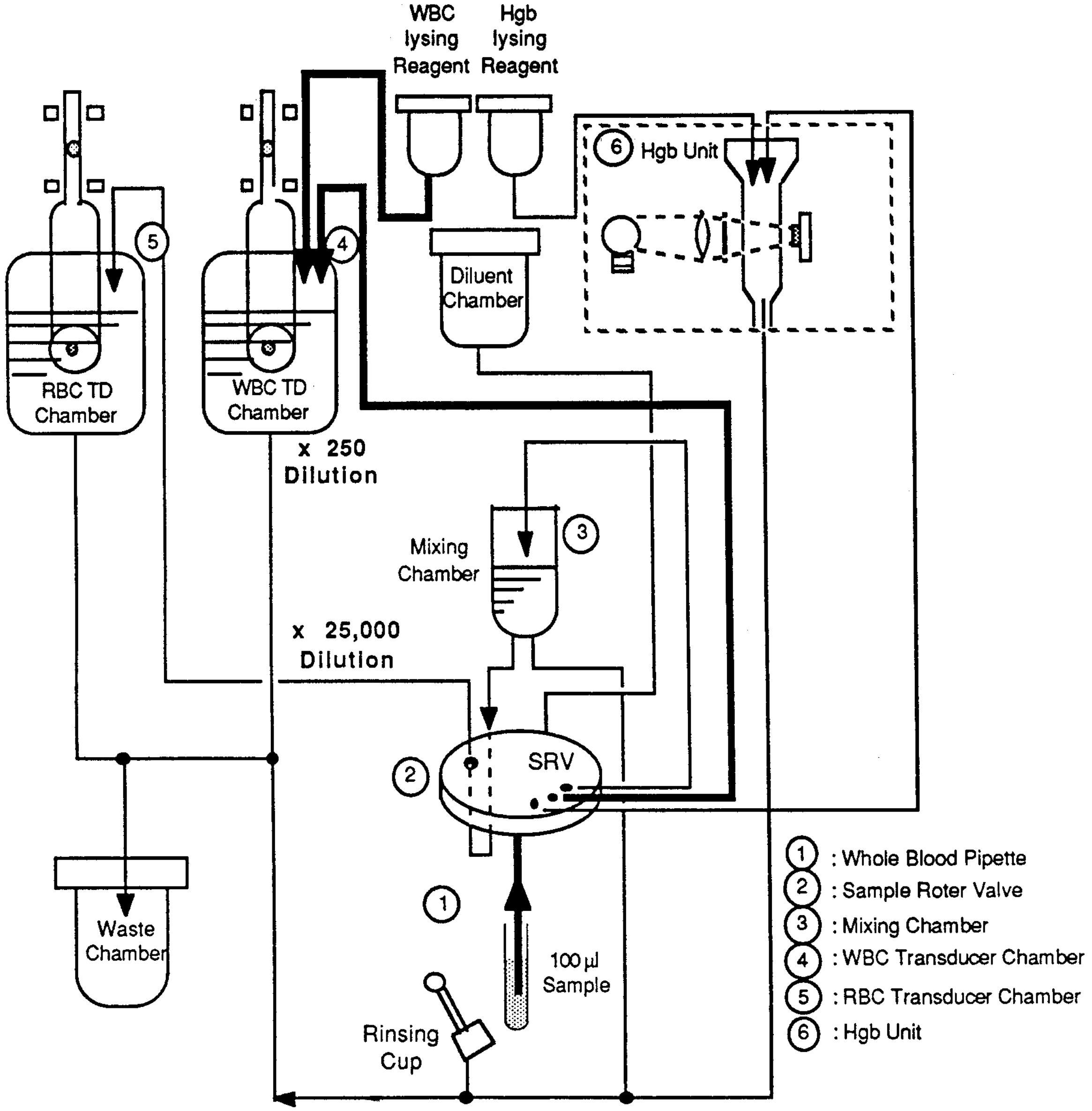


Figure 4-3 Sample Flow - WBC

4.3.2. RBC Sample Flow

The RBC sample flow chart is illustrated by the bold lines in Figure 4-4. The 4 μL of the whole blood sample, measured by the Sample Rotor Valve ②, is diluted into 1 : 500 by adding approximately 2 mL of diluent in the Mixing Chamber ③. The 1 : 500 diluted sample in the Mixing Chamber is aspirated into the Sample Rotor Valve again, and 40 μL of the 1 : 500 diluted sample is measured and diluted into 1 : 50 by adding approximately 2 mL of diluent in the RBC Transducer Chamber ⑤. The 0.25 mL of final dilution volume (final dilution ratio 1 : 25000) in the Transducer Chamber is aspirated through the aperture and counted. RBC and PLT are counted simultaneously by the electric resistance detection method. The Hct value is computed by the cumulative pulse height detection method.

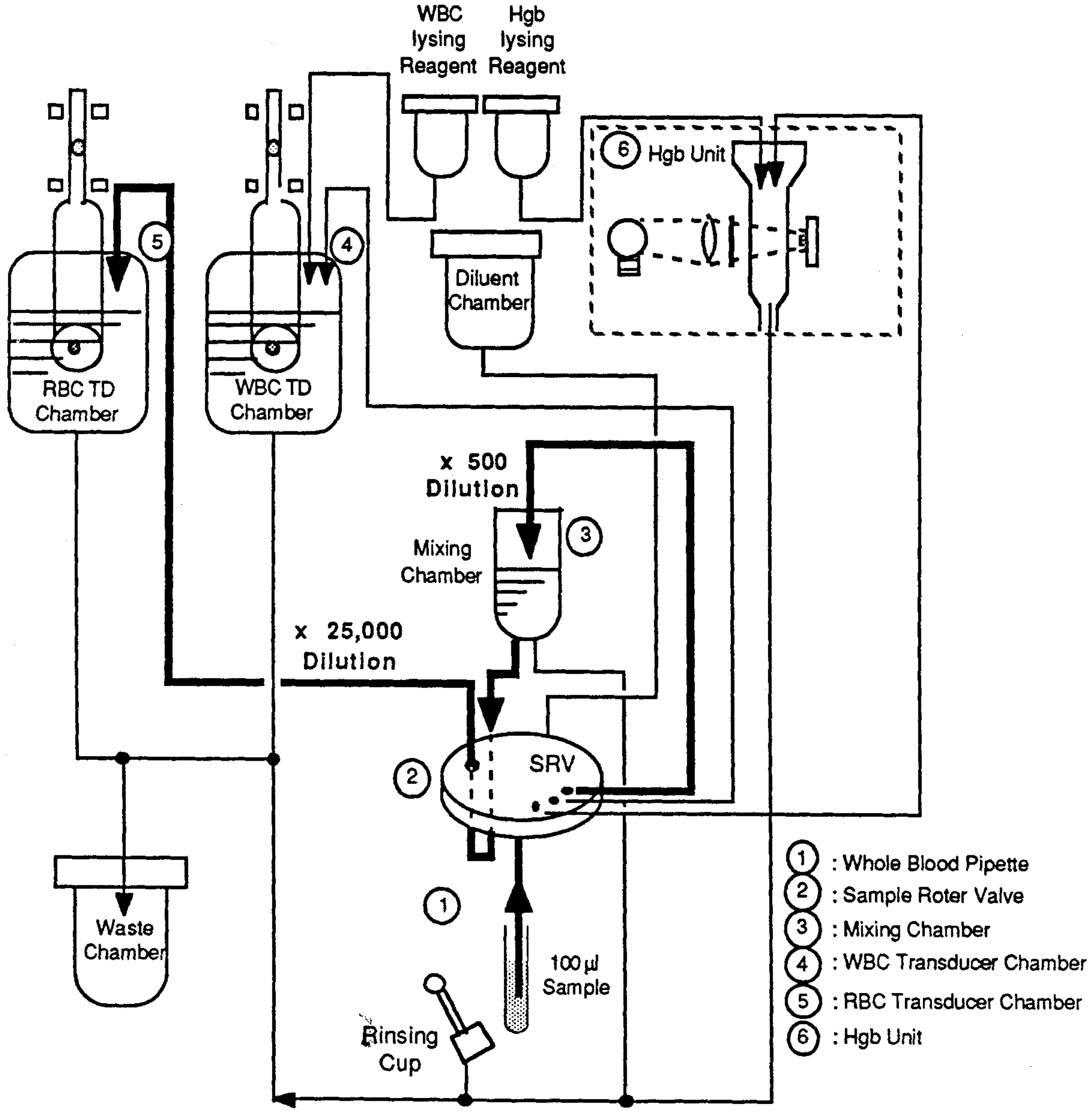


Figure 4-4 Sample Flow - RBC/PLT/Hct

4.3.3. Hgb Sample Flow

The Hgb sample flow system is illustrated by the bold lines in Figure 4-5. The 6 µL of the whole blood sample, measured by the Sample Rotor Valve ②, is diluted into 1:500 by adding approximately 2 mL of diluent and 1 mL of Hgb lysing reagent in the Hgb Flow Cell ⑥. The intensity of color change produced by cyanmethemoglobin is measured as absorbance in the Hgb Flow Cell. This value is stored in memory as the Sample Data. During each operation, absorbance is measured when the Flow Cell is filled with the diluent before transferred the diluted sample into the Flow Cell. This value is stored in memory as the Blank Data.

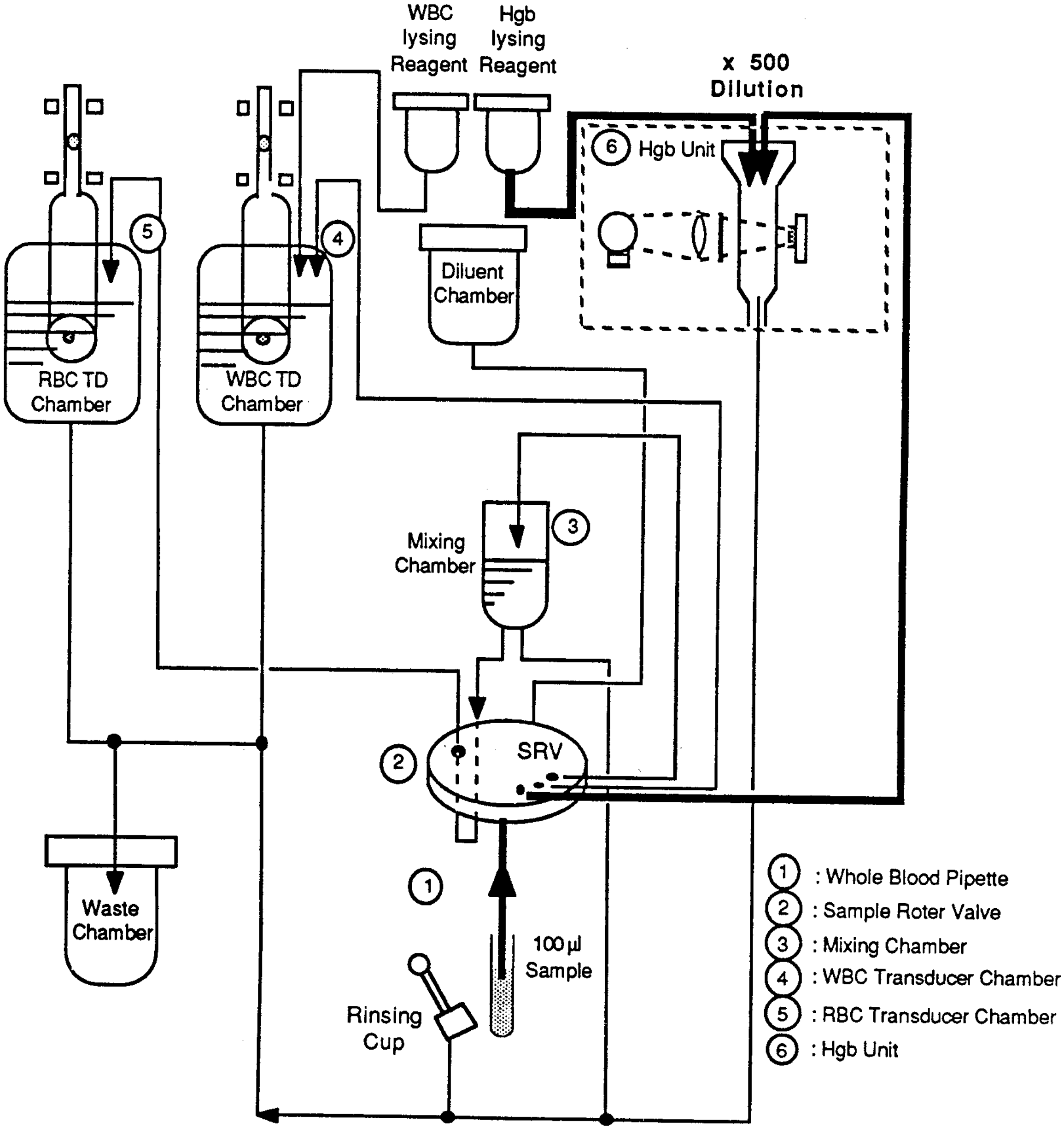


Figure 4-5 Sample Flow - Hgb

4.4. Diluting Sequence Operation

4.4.1. Hydraullc System Timing Chart

The hydraulic and pneumatic operation are performed according to the Timing Chart.
This Timing Chart indicates time and sequence in which each solenoid valve is energized or deenergized. (when the main program "1K1" is provided)

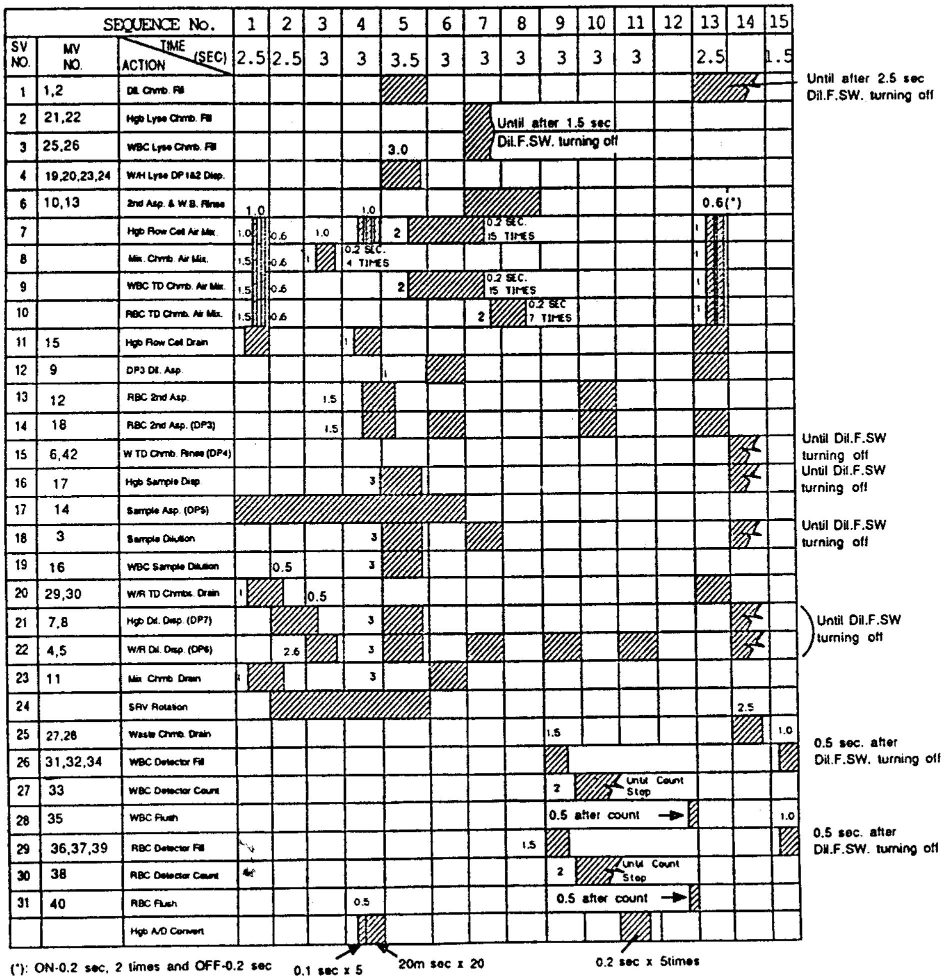
NOTE :

When optional cap piercing unit KCP-1 is installed to the system, the main program is provided by EP-ROM "4K1" and the hydraulic system is modified for cap piercing. The hydraulic system operates according to other timing chart. (Refer Appendix A. Cap Piercing Unit KCP-1)

Basic Operation Timing Chart

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R B C	Drain			2 nd ASP				N.P. Bubble Removal	COUNT				Drain	Rinse	Fill
W B C	Drain				Dilution	Air Bubble Mixing	N.P. Bubble Removal		COUNT				Drain	Rinse	Fill
H G B	Drain	Blank Dispense	(Blank Convert) ▶	Drain	Dilution	Air Bubble Mixing	N.P. Bubble removal				Sample Convert		Drain	Rinse	
M I X	Drain		Dilution			Drain			Rinse		Rinse				
S R V	Sample Aspiration	SRV arm goes to the Right					Aspiration Line Rinse						Diluent Priming into Dil. Chamber		

NOTE : N.P. : No Operation



(*): ON-0.2 sec, 2 times and OFF-0.2 sec

Table 4-2 Sequence flow Timing Chart

4.4.2. Solenoid Valve Function Table

The function and the location of each solenoid valve is shown in Table 4-3

Table 4-3 Solenoid Valve Function Table

SV-No.	Function	Location
1	MV-1, MV-2 ON	A
2	MV-21, MV-22 ON	A
3	MV-25, MV-26 ON	A
4	MV-19, MV-20, MV-23, MV-24 ON	A
5 (KCP-1)	MV-41 ON	F
6	MV-10,MV-13 ON, 4PP ON	B
7	Hgb Flow Cell Air Mixing	B
8	Mixing Chamber Air Mixing	B
9	WBC Transducer Chamber Air Mixing	B
10	RBC Transducer Chamber Air Mixing	B
11	MV-15 ON	B
12	MV-9 ON	B
13	MV-12 ON	B
14	MV-18 ON	B
15	MV-6, MV-42 ON	C
16	MV-17 ON	C
17	MV-14 ON	C
18	MV-3 ON	C
19	MV-16 ON	C
20	MV-29,MV-30 ON	C
21	MV-7, MV-8 ON	D
22	MV-4, MV-5 ON	D
23	MV-11 ON	D
24	*SRV Rotation	D
25	MV-27,MV-28 ON	D
26	MV-31, MV-32,MV-34 ON	E
27	MV-33 ON	E
28	MV-35 ON	E
29	MV-36, MV-37,MV-39 ON	E
30	MV-38 ON	E
31	MV-40 ON	E
33 (KCP-1)	*RV* Rotation	F
34 (KCP-1)	Piercer UP/DOWN	F
35 (KCP-1)	MV-46,MV-47 ON	F
36 (KCP-1)	Air Flush on Piercer needle	F

A: Valve Unit Assembly No. 19
B: Valve Unit Assembly No. 20
C: Valve Unit Assembly No. 21
D: Valve Unit Assembly No. 22
E: Detector block No. 17
F: Valve Unit Assembly No. 38 (Option)

REMARKS :

1. SV5, SV33, SV34, SV35, and SV36 are used when the Optional Cap Piercer Unit (KCP-1) is installed to the system.
2. SV32 is not used in the system.

***SRV : S**ample **R**oter **V**alve ***RV :** Switching **R**otor **V**alve

4.4.3. Master Valve Function Table

The function and the location of each master valve is shown in Table 4-4

Table 4-4 Master Valve Function Table

MV-No.	Function	Location
1	Diluent Chamber Vacuum	A
2	Aspiration of Diluent	A
3	Dilution of RBC & WBC Sample	C
4	Selection of Dilution or Diluent Aspiration	D
5	Diluent D.P.Posi./Nega. Pressure	D
6	WBC Rinse D.P.Posi./Nega. Pressure	C
7	Hgb D.P.Posi./Nega. Pressure	D
8	Dilution of Hgb Sample	D
9	Selection of Diluent/W.B. Rinse Line	B
10	Rinsing Cup Drain	F
11	Mixing Chamber Drain	D
12	Aspiration from Mixing Chamber	B
13	Selection of 1st/2nd Sampling Line	B
14	W.B. Asp. D.P. Posi./Nega. Pressure	C
15	Hgb Flow Cell Drain	F
16	Selection of WBC/RBC Dilution	C
17	Selection of Hgb Dilution/Rinse	C
18	W.B. Rinse D.P. Posi./Nega. Pressure	B
19	Selection of Hgb Lyse Deliv./Asp.	A
20	Hgb Lyse D.P. Posi./Nega. Pressure	A
21	Hgb Lyse Reagent Aspiration	A
22	Hgb Lyse Chamber Vacuum	A
23	WBC Lyse D.P. Posi./Nega. Pressure	A
24	Selection of WBC Lyse Deliv./Asp.	A
25	WBC Lyse Reagent Aspiration	A
26	WBC Lyse Chamber Vacuum	A
27	Waste Chamber Posi./Nega. Pressure	D
28	Waste Chamber Drain	F
29	RBC TD Chamber Drain	C
30	WBC TD Chamber Drain	C
31	Filling / RBC	E
32	Filling / RBC	E
33	Counting / RBC	E
34	Filling / RBC	E
35	Clog Removal / RBC	E
36	Filling /WBC	E
37	Filling /WBC	E
38	Counting / WBC	E
39	Filling /WBC	E
40	Clog Removal / WBC	E
41 (KCP-1)	Make the Air gap in the Aspiration Line	G
42 (KCP-1)	Selection of WBC TD C.Rinse/Dil.Asp.	C
43 (KCP-1)	W.B. Rinse DP (DP8) Posi Nega Pressure	A
44 (KCP-1)	Selection of diluent/ W.B. Line	A
45 (KCP-1)	Piercer Rinsing Cup Drain	F
46 (KCP-1)	Piercer Rinsing Diaphragm Pump Posi./Nega	G
47 (KCP-1)	Selection of Diluent / Piercer Rinsing Line	G

A: Valve Unit Assembly No.19	B: Valve Unit Assembly No.20
C: Valve Unit Assembly No.21	D: Valve Unit Assembly No.22
E: Detector block No.17	F: Valve Unit Assembly No.23
G: Cap Piercing Unit KCP-1	

REMARKS :

1 MV10, 15 and 28 are the Pinch Type Master Valves.

2. MV41 is not used in the system.

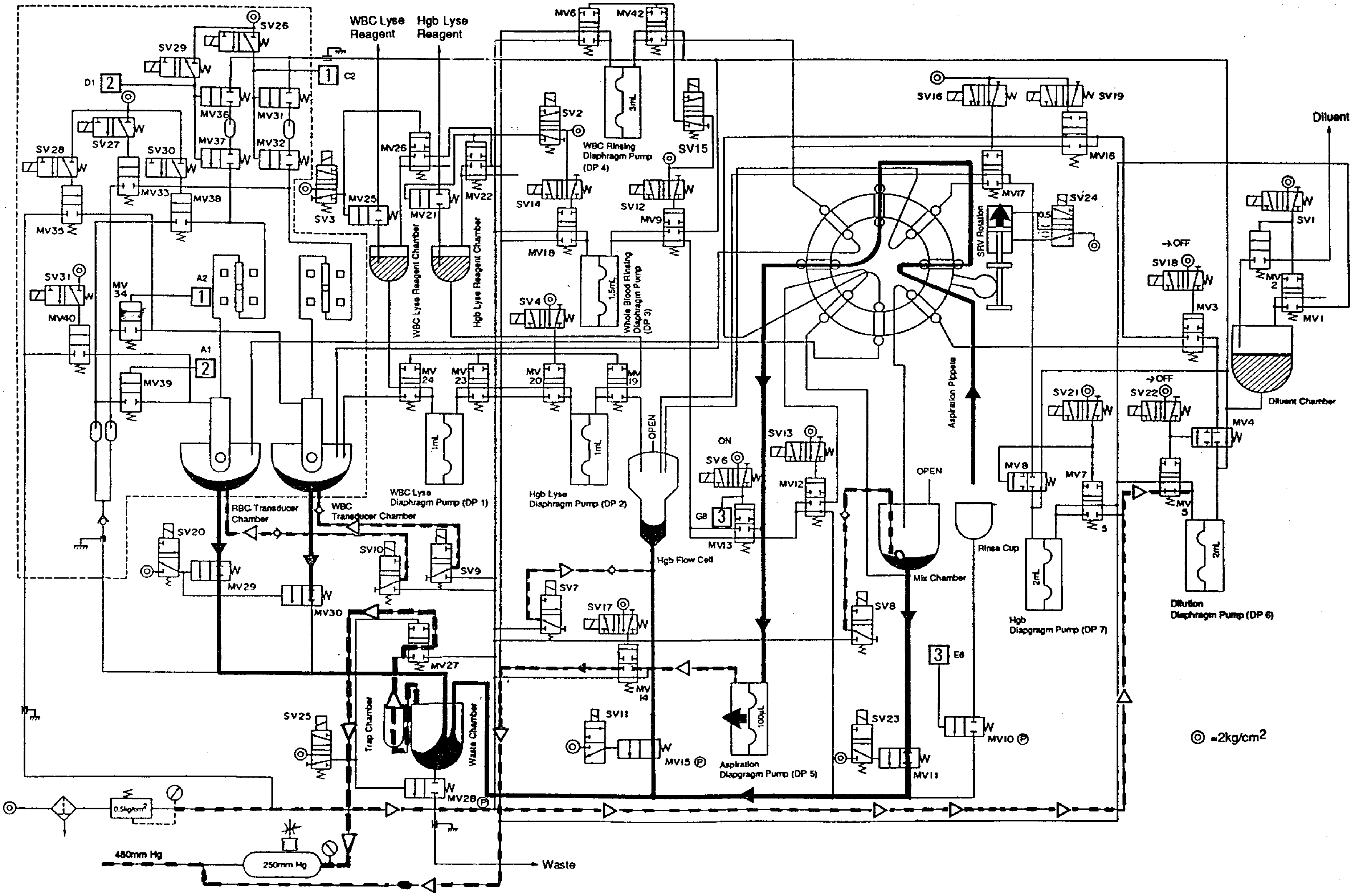


Figure 4-6 Hydraulic Flow Chart Sequence-1

4.4.4. Sequence Flow Chart

Hydraulic and Pneumatic operation are performed as follows;

Trace your hydraulic circuit diagram according to the Hydraulic System Timing Chart (Refer to Section 4.4.1.) and check action of Hydraulic components for your troubleshooting.

Sequence-1

1. **Aspiration of 100 µL Whole Blood:**
   The Sample Rotor Valve stays at its initial position (Arm Position: left). When the Start Switch is pressed, SV-17 is energized to activate MV-14. Vacuum is supplied to the Whole Blood Aspiration Diaphragm Pump (DP5) so that 100 µL of whole blood sample is aspirated through the Whole Blood Aspiration Tube into the Sample Rotor Valve. SV-17 (MV-14) will be deactivated at SEQ-7.

2. **Drain of the Rinsing Diluent in the Transducer Chambers:**
   SV-11 is energized to activate MV-15 so that previous rinsing diluent in the Hgb Flow Cell is drained into the Waste Chamber. SV-7 turns ON and OFF twice at 0.2 second interval to remove the liquid remaining in the tube between the non-return valve and T-connecter through the Hgb waste line by 0.5 kg/cm^2 pressure.
   SV-20 is energized to activate MV-29 and MV-30 to drain the rinsing diluent in the RBC and WBC Transducer Chambers into the Waste Chamber. SV-9 and SV-10 turns ON and OFF twice at 0.2 second interval to remove previous rinsing diluent remaining in each tube between the non-return valve and Transducer Chamber by 0.5 kg/cm^2 pressure.

3. **Drain of Rinsing Diluent in the Mixing Chamber:**
   SV-23 is energized to activate MV-11 so that the rinsing diluent in the Mixing Chamber is drained into the Waste Chamber.
   SV-8 turns ON and OFF twice at 0.2 second interval to remove the liquid remaining in the tube between non-return valve and Mixing Chamber by the 0.5 kg/cm^2 pressure.

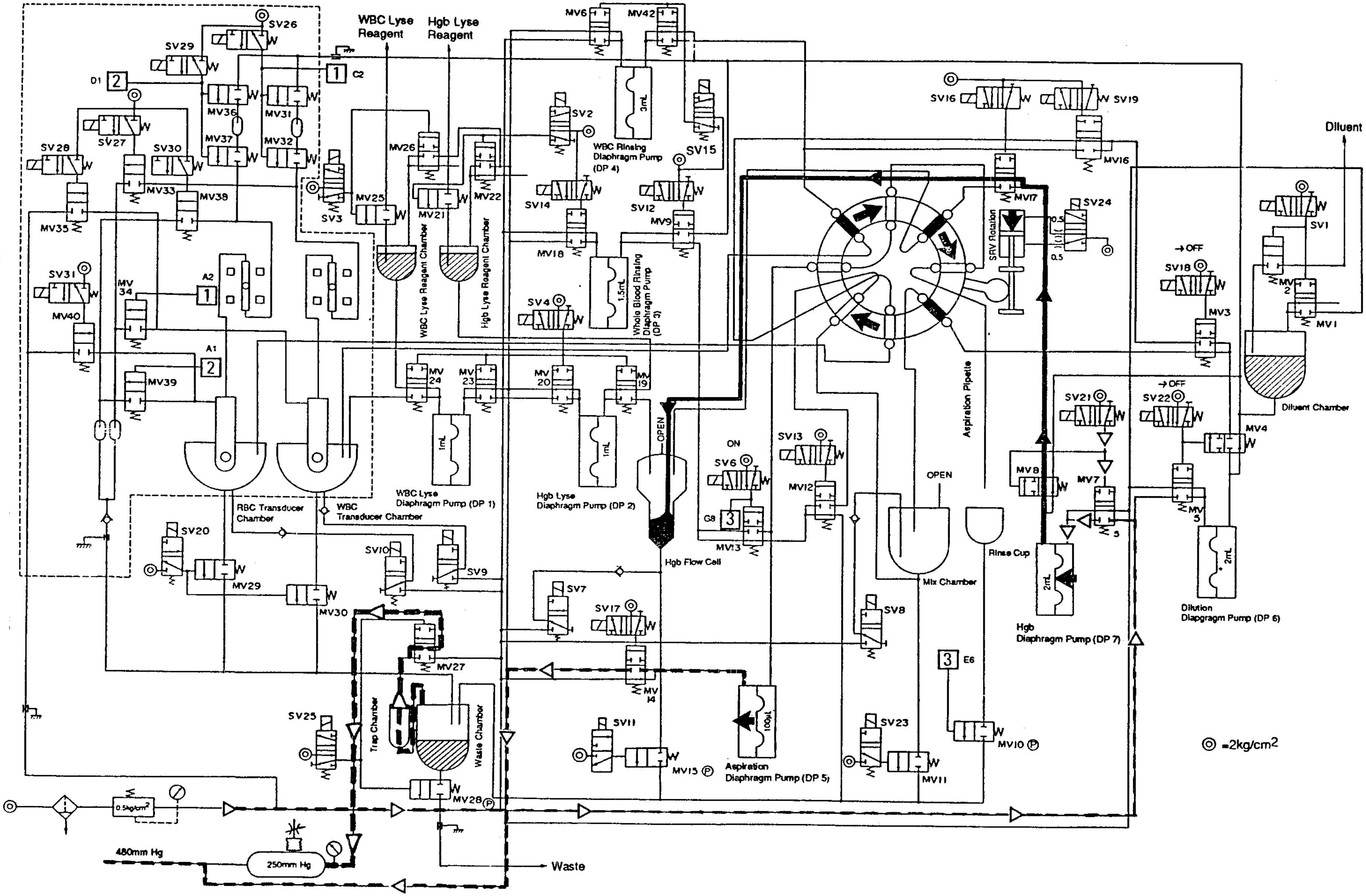


Figure 4-7 Hydraulic Flow Chart Sequence-2

Sequence-2

1. **Sampling of Whole Blood:**
   SV-24 is energized and drives the Air Cylinder to rotate Sample Rotor Valve (SRV) clockwise (The SRV Arm goes to Right). Whole blood sample 12 µL for WBC, 6 µL for Hgb, and 4 µL for RBC are cut out. SRV keeps this position until the end of SEQ-5. (Refer to Section 4.6. Sample Rotor Valve Operation.)

2. **Dispense of Hgb Blank Diluent:**
   SV-21 is energized to activate MV-7 and MV-8 to supply 0.5 kg/cm^2 pressure to the Hgb Diaphragm Pump (DP7) so that 2 mL of diluent is dispensed into the Hgb Flow Cell for Hgb Blank Measurement.

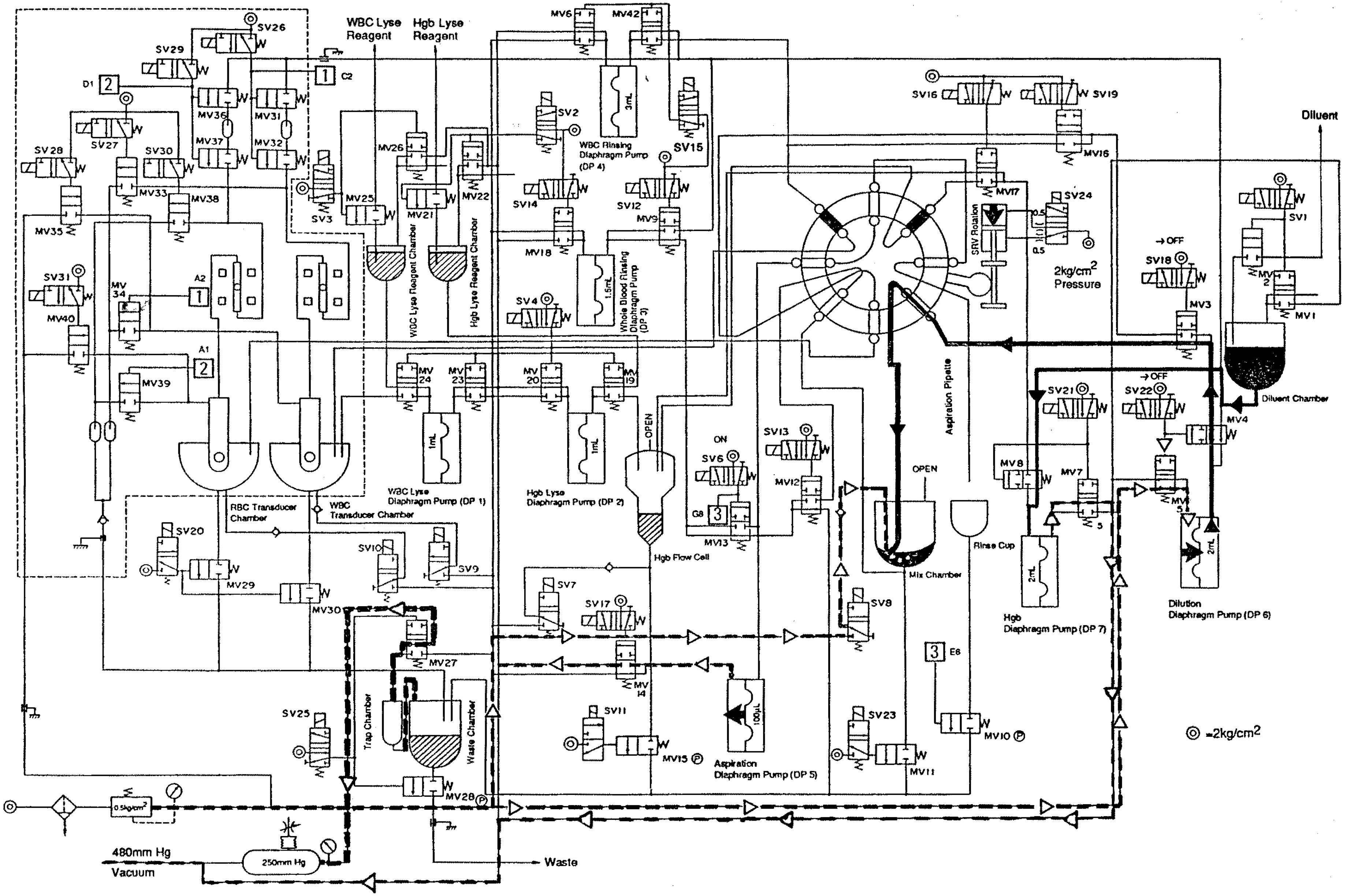


Figure 4-8 Hydraulic Flow Chart Sequence-3

Sequence-3

1. **RBC/PLT Sample 1st (x 500) Dilution with Air Bubble Mixing:**
   SV-22 is energized to activate MV-5 and MV-4. The 0.5 kg/cm^2 pressure is supplied to the Dilution Diaphragm Pump (DP6) so that the 2 mL of diluent is dispensed through the SRV into the Mixing Chamber with 4 μL of whole blood segment in the SRV. This achieves the 1:500 dilution (1st dilution for RBC/PLT).
   After one second in SEQ-3, SV-8 turns ON and OFF four times at 0.2 seconds interval to produce the air bubble using 0.5 kg/cm^2 air pressure for mixing the 1st dilution sample.

2. **Aspiration of Diluent into Hgb Diaphragm Pump:**
   SV-21 is deenergized to deactivate MV-7 and MV-8. Vacuum is supplied to the Hgb Diaphragm Pump. (DP7) so that 2 mL of the diluent is aspirated from the Diluent Chamber.

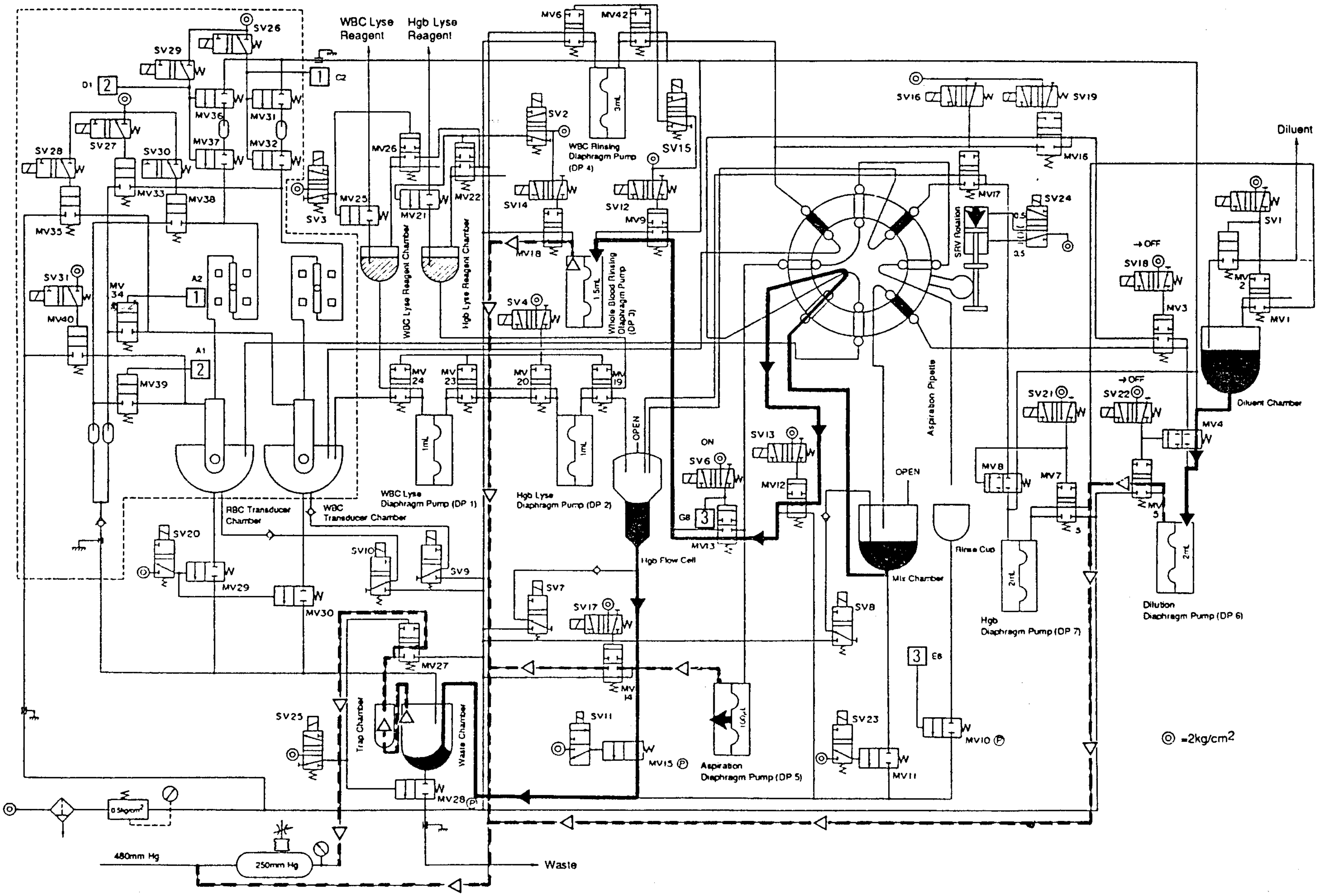


Figure 4-9 Hydraulic Flow Chart Sequence-4

Sequence-4

1. **Hgb Blank Measurement:**
   After 0.5 seconds in SEQ-4, the absorbance of diluent in the Hgb Flow Cell is measured 5 times every 0.1 seconds to obtain Hgb blank value.

2. **Drain of Hgb Blank Diluent:**
   After one second in SEQ-4, SV-11 is energized to activate MV-15 to drain Hgb blank diluent from the Hgb Flow Cell.
   The absorbance of Hgb Flow Cell is continuously measured 20 times every 20 msec. to verify drain of blank diluent (or to detect Hgb Blank Diluent Error).
   This absorbance data is shown as “MENISCUS” value on Extended Data printout in Maintenance mode (refer to Section 8.3.).

3. **Second Aspiration of 1st (1:500) Diluted Sample into SRV:**
   After 1.5 seconds in SEQ-4, SV-13 is energized to activate MV-12 and SV-14 is energized to activate MV-18. Vacuum is supplied to the 2nd RBC Aspiration & Whole Blood Line Rinsing Diaphragm Pump (DP3) so that the 1.5 mL of 1st diluted sample is aspirated through the SRV from the Mixing Chamber for 2nd dilution. SV-13 and SV-14 will be deactivated just after 1 second in SEQ-5.

4. **Aspiration of Diluent into Dilution Diaphragm Pump:**
   SV-22 is deenergized and deactivates MV-4 and MV-5. Then the vacuum is supplied to the Dilution Diaphragm Pump (DP6) so that the 2.0 mL of diluent is aspirated from the Diluent Chamber. This diluent will be used for WBC sample dilution in next sequence.

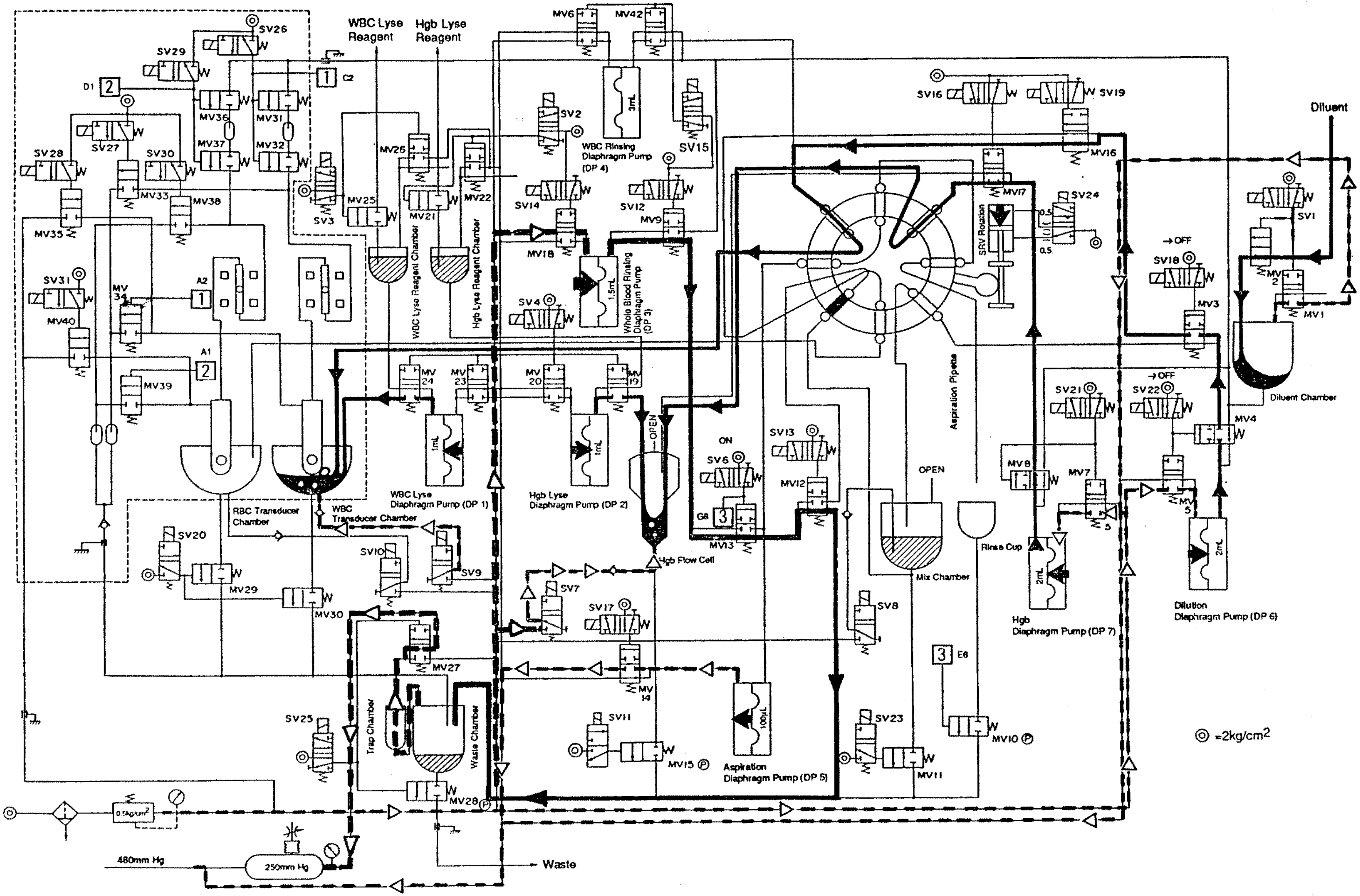


Figure 4-10 Hydraulic Flow Chart Sequence-5

Sequence-5

1. **WBC Sample Dilution and Lysing:**
SV-18 is energized to activate MV-3. SV-19 is energized to activate MV-16. SV-22 is also energized to activate MV-4 and MV-5 so that the 2 mL of diluent with 12 μL of whole blood are dispensed into the WBC Transducer Chamber through the MV-4, MV-3, MV-16, and SRV.
SV-4 is energized to activate MV-23 and MV-24 so that the 1.0 mL of WBC lysing reagent is added into the WBC Transducer Chamber by WBC Lyse Diaphragm Pump (DP1). After 2 seconds in SEQ-5, SV-9 turns ON and OFF 15 times at 0.2 seconds interval to produce air bubbles using 0.5 kg/cm^2 air pressure for WBC sample mixing.
This achieves the 1:250 dilution of WBC sample.

2. **Hgb Sample Dilution and Lysing:**
SV-21 is energized to activate MV-7 and MV-8. SV-16 is also energized to activate MV-17 so that 2.0 mL of the diluent with 6 μL of whole blood segment in the SRV are dispensed into Hgb Flow Cell through the MV-8, MV-17 and the SRV.
SV-4 is energized simultaneously to activate MV-19 and MV-20 so that the 1.0 mL of Hgb lysing reagent is added by Hgb Lyse Diaphragm pump (DP2) into the Hgb Flow Cell. After 2 seconds in SEQ-5, SV-7 turns ON and OFF 15 times at 0.2 seconds interval to produce air bubbles using 0.5 kg/cm^2 air pressure for Hgb sample mixing.
This achieves the 1:500 dilution of Hgb sample.

3. **Aspiration of Diluent into the Diluent Chamber:**
SV-1 is energized to activate MV-1 and MV-2. Diluent is primed into the Diluent Chamber through MV-2 from the diluent container.

4. **Drain of 1st Dilution Sample in the hydraulic line:**
SV-14 is deenergized and deactivates MV-18. Then the 0.5 kg/cm^2 air pressure is supplied to the RBC 2nd Aspiration & Whole Blood Line Rinsing Diaphragm Pump (DP3) to drain the remained 1st dilution sample in the hydraulic line.

REMARKS:

After 3 seconds in sequence 5, following SVs are deenergized. These status will be explained in the next Sequence-6.
SV-4, 16, 18, 19, 21, and 22.

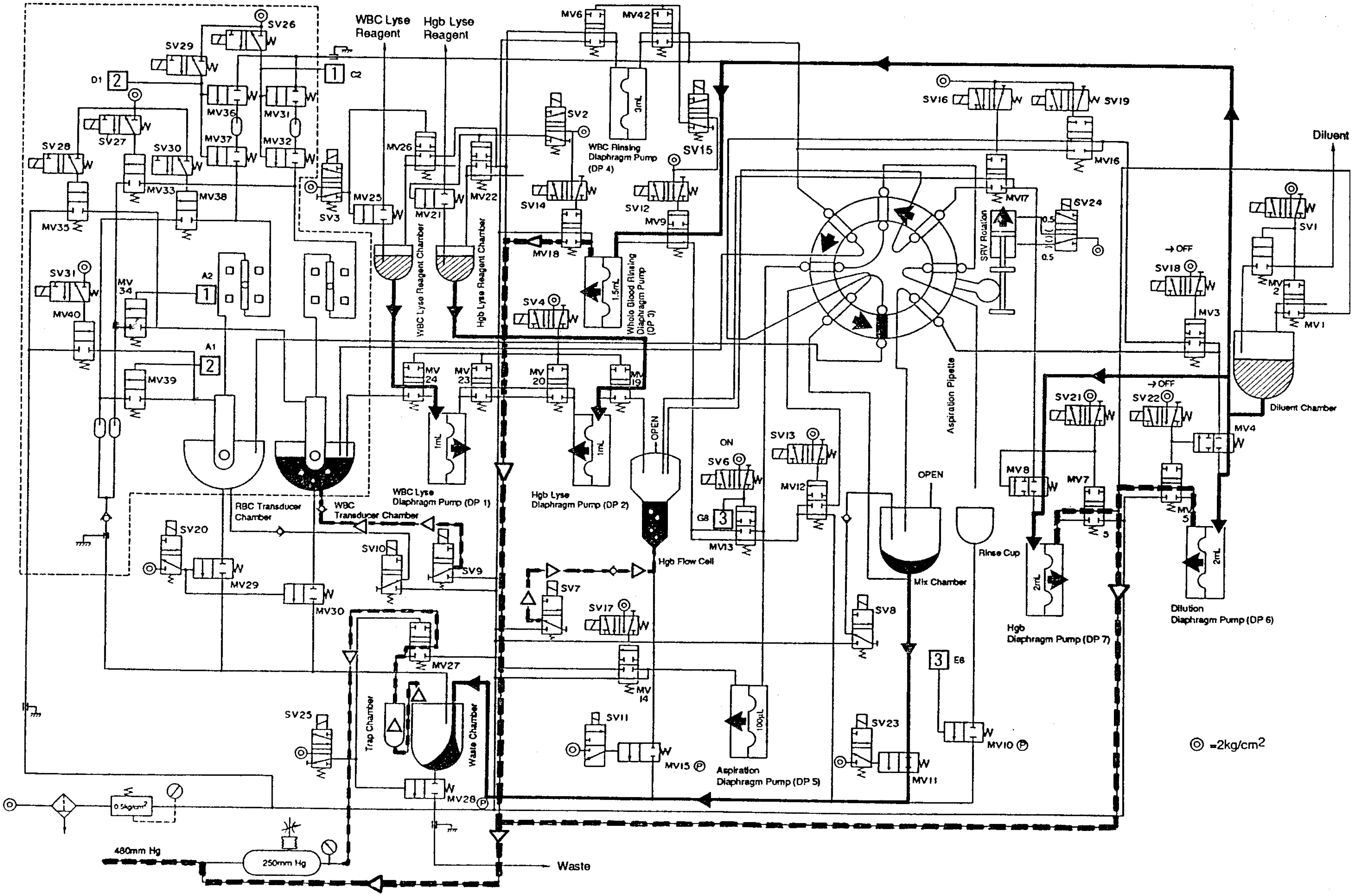


Figure 4-11 Hydraulic Flow Chart Sequence-6

Sequence-6

1. **Aspiration of WBC/Hgb Lysing Reagent:**
   SV-4 is deenergized, and MV-19, 20, 23 and 24 are deactivated at 0.5 seconds prior to sequence-6. Vacuum is supplied to WBC/Hgb Lyse Diaphragm Pumps (DP1 and DP2) to aspirate the fresh WBC/Hgb lysing reagent from each reagent chambers through MV-24 and 19, respectively.

2. **Aspiration of Diluent into Hgb Diaphragm Pump:**
   SV-21 is deenergized, and MV-7 and 8 are deactivated at 0.5 seconds prior to Sequence-6. Vacuum is supplied to Hgb Diaphragm Pump. (DP7) to aspirate the fresh diluent from the Diluent Chamber through MV-8.

3. **Aspiration of Diluent into Dilution Diaphragm Pump:**
   SV-22 is deenergized, and MV-4 and 5 are deactivated at 0.5 seconds prior to Sequence-6. Vacuum is supplied to Dilution Diaphragm Pump (DP6) to aspirate the fresh diluent from the Diluent Chamber through MV-4.
   SV-16, 18, 19, and 23 are deenergized at 0.5 seconds prior to sequence-6 to reset the MV-17, 3, 16 and 11, respectively.

4. **Reset of Sample Rotor Valve:**
   SV-24 is deenergized and Sample Rotor Valve returns to the initial position (The SRV Arm goes to left) to cut out the 40 μL of 1st diluted RBC sample. (Refer to Section 4.6. Sample Rotor Valve Operation.)

5. **Preparation of Rinsing Diluent for Whole Blood Aspiration Line:**
   SV-14 and SV-12 are energized to activate MV-9 and MV-18. Vacuum is supplied to RBC Second Aspiration & Whole Blood Line Rinsing Diaphragm Pump (DP3) so that 1.5 mL of the diluent is aspirated from the Diluent Chamber.
   The diluent primed here will be used for rinsing whole blood aspiration line in next sequence.

6. **Mixing of WBC and Hgb Sample by Air Bubble:**
   WBC sample in the Transducer Chamber and Hgb sample in the Hgb Flow Cell are continuously mixed by air bubble using 0.5 kg/cm^2 air pressure by turning SV-7 and SV-9 ON and OFF.

7. **Drain of diluted sample in the Mixing Chamber:**
   SV23 is energized to activate MV11. The 1st diluted sample for RBC/PLT analysis remaining in the Mixing Chamber is drained through MV-11 into the Waste Chamber.

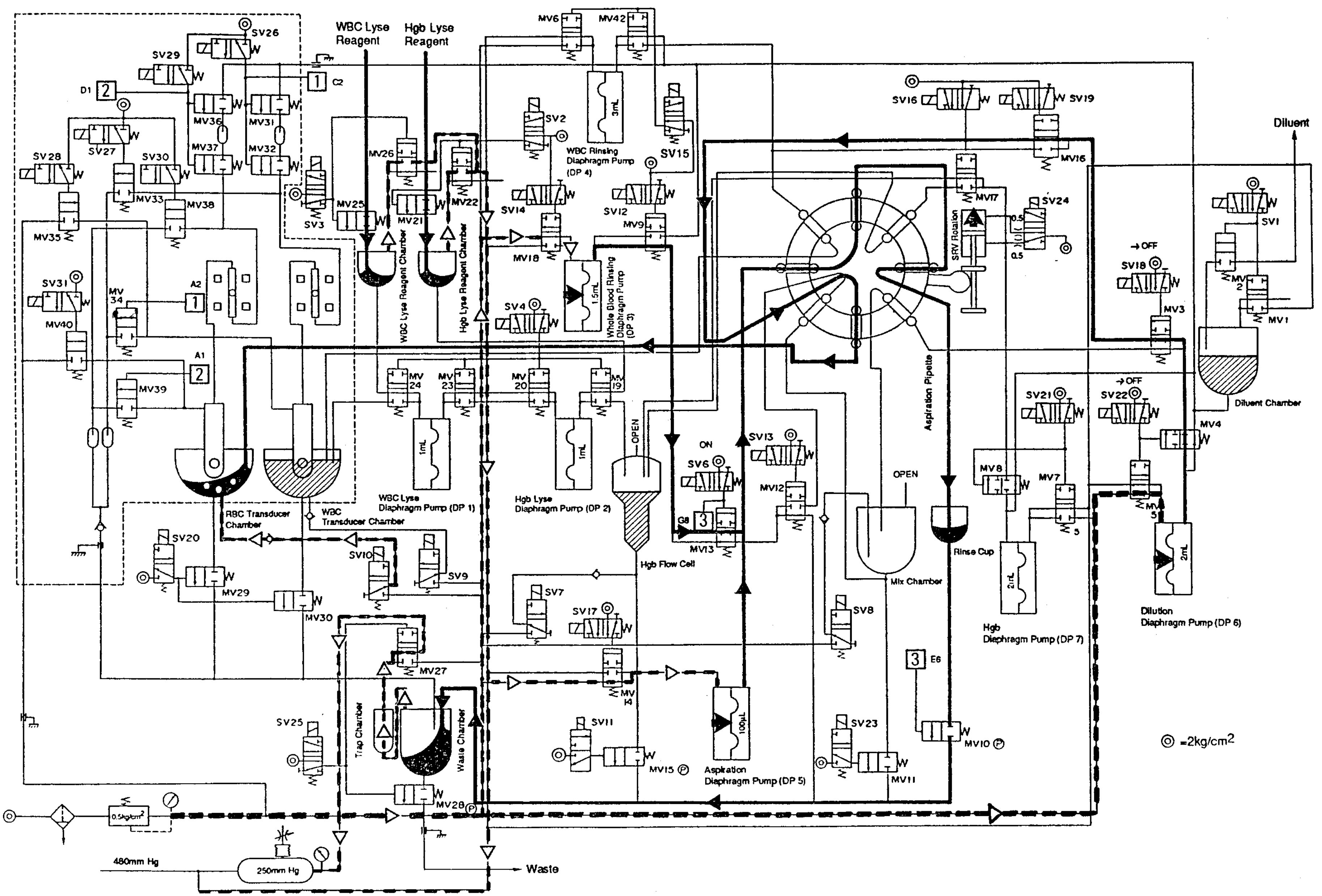


Figure 4-12 Hydraulic Flow Chart Sequence-7

Sequence-7

1. **Final (1: 25,000) Dilution of RBC/PLT sample:**
   SV-22 and SV-18 are energized to activate MV-4, MV-5 and MV-3 to make RBC/PLT dilution sample. The 2.0 mL of the diluent with 40 µL of 1st diluted (1:500) sample in the SRV are dispensed into the RBC Transducer Chamber through SRV. After 2 seconds in SEQ-7, SV-10 turns ON and OFF seven times at 0.2 seconds interval to produce the air bubble using 0.5 kg/cm^2 air pressure for mixing the RBC/PLT sample. This achieves the 1:25,000 dilution of the RBC/PLT sample.

2. **Rinsing of whole Blood Aspiration Line:**
   SV-6 is energized to activate MV-13 and MV-10. At the same time, SV-12, SV-14, and SV-17 are deenergized, therefore MV-9, MV-18 and MV-14 are deactivated simultaneously. Aspiration Diaphragm Pump (DP5) and RBC 2nd Aspiration & Whole Blood Line Rinsing Diaphragm Pump (DP3) dispenses approx. 1.5 mL of the diluent through Whole Blood Aspiration line to rinse out the hydraulic line. MV-10 (Pinch Type) opens to drain the rinsing diluent into the Waste Chamber through the Rinsing Cup.

3. **WBC/HGB Lysing Reagent Priming into Lyse Reagent Chambers:**
   SV-2 is energized to activate MV-21 and MV-22. Hgb lysing reagent is primed into the Hgb Lyse Reagent Chamber from the container.
   SV-3 is also energized to activate MV-25 and MV-26. WBC lysing reagent is primed into WBC Lyse Reagent Chamber from the container. SV-2 and SV-3 will be deenergized at 1.5 seconds after the float switch of each reagent chamber turns OFF.

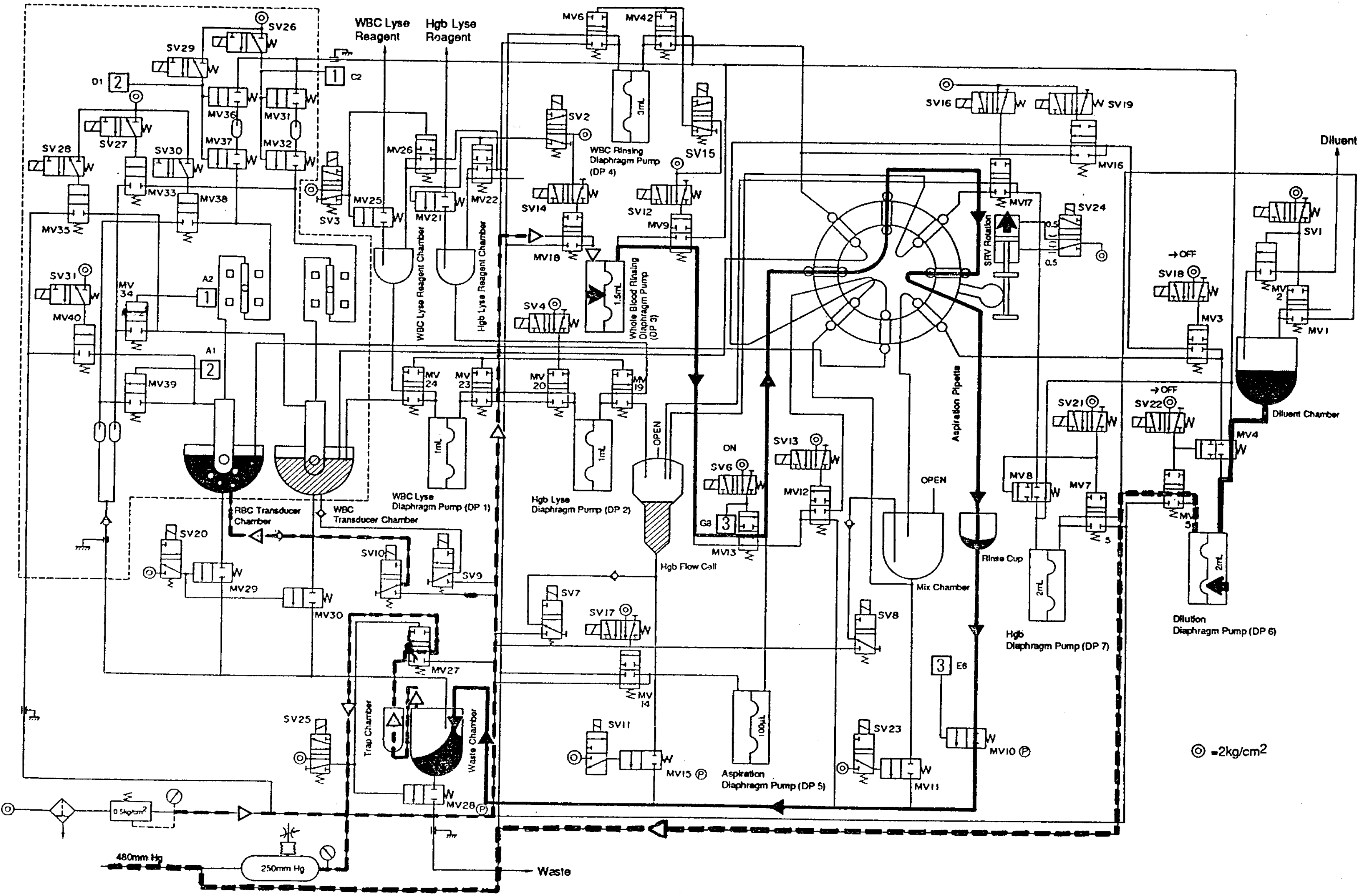


Figure 4-13 Hydraulic Flow Chart Sequence-8

Sequence-8

1. **Aspiration of Rinsing Diluent into Dilution Diaphragm Pump:**
   SV-22 is deenergized and MV-4, MV-5 are deactivated. Vacuum is supplied to the Dilution Diaphragm Pump (DP6) so that the 2.0 mL of diluent is aspirated into the pump. This diluent will be used for rinsing the Mixing Chamber in next sequence.

2. **Air Bubble Mixing of RBC/PLT Sample:**
   SV-10 is continuously repeated ON and OFF for RBC/PLT sample air bubble mixing using 0.5 kg/ cm^2 air pressure.

3. **Rinsing of Whole Blood Aspiration Line (continued):**
   SV-6 is still energized in this sequence so that rinsing of Whole Blood Aspiration Line is continuously performed.

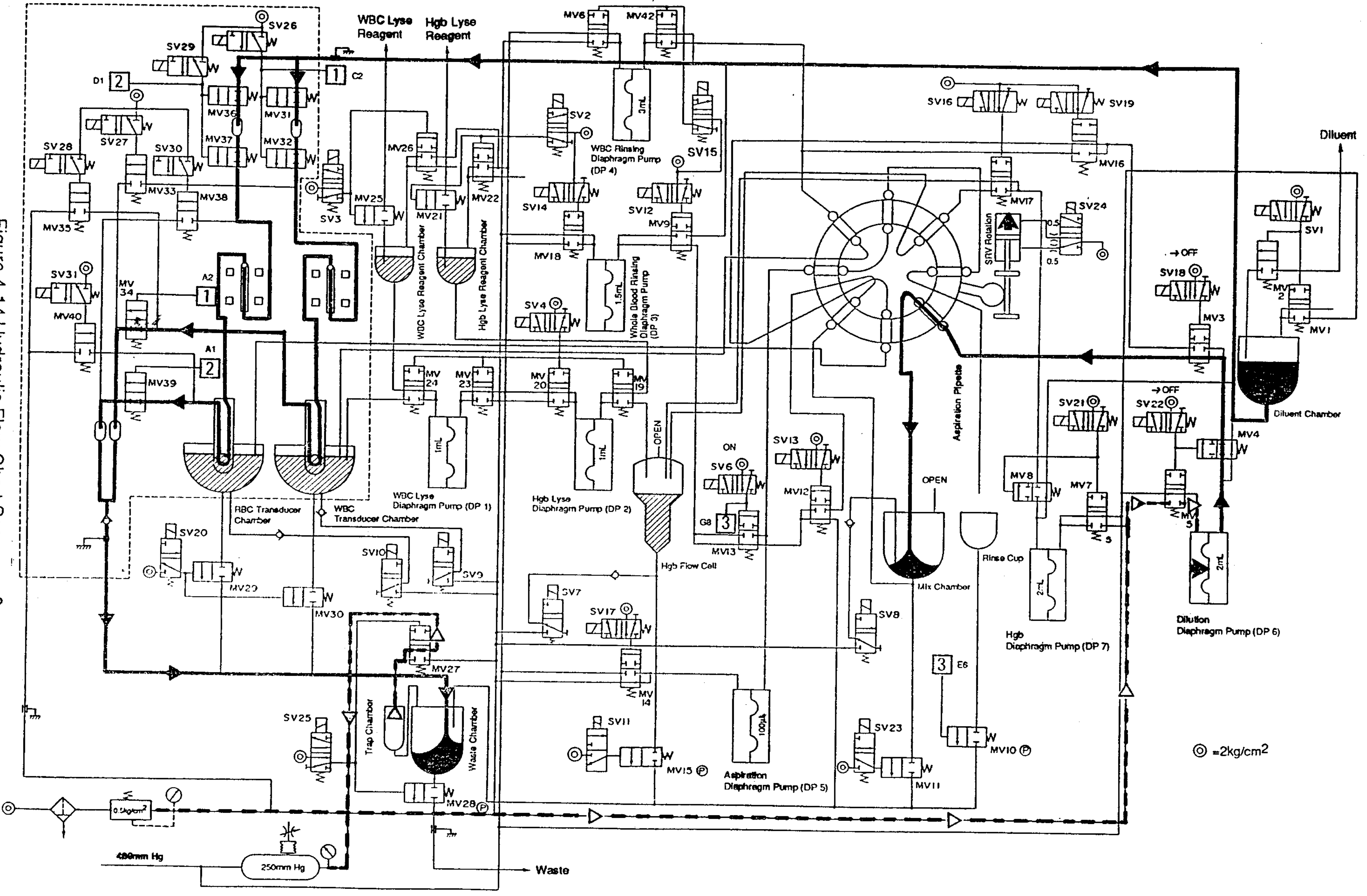


Figure 4-14 Hydraulic Flow Chart Sequence-9

Sequence-9

1. **WBC/RBC Counting:**
   The COUNT operation of Detector blocks starts from this Sequence-9 to Sequence-14. Starting this sequence, Solenoid Valves in RBC/WBC Detector Block surrounded by dotted line in Figure 4-14 will function according to COUNT Timing Chart. See Section 4.5.1 Counting Operation of Detector Block in detail.

2. **Rinsing of the Mixing Chamber:**
   SV-22 is energized to activate MV-4 and MV-5. The 0.5 kg/cm^2 pressure is applied to the Dilution Diaphragm Pump (DP6) so that the 2.0 mL of rinsing diluent is dispensed into the Mixing Chamber through MV-4, MV-3 and SRV.

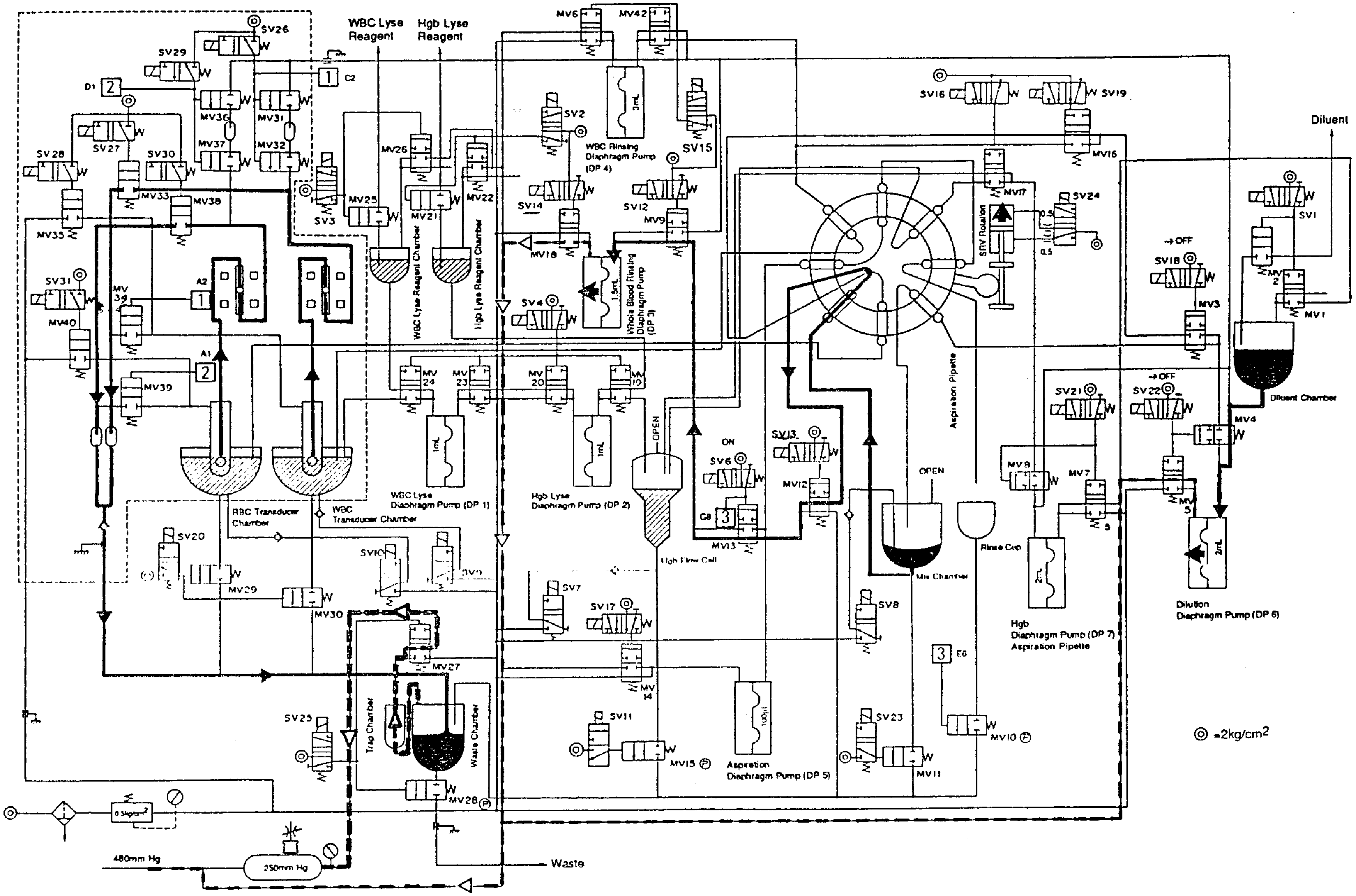


Figure 4-15 Hydraulic Flow Chart Sequence-10

Sequence-10

1. **Rinsing of RBC 2nd Aspiration Line:**
   SV-13, SV-14 are energized to activate MV-12, MV-18, respectively. Vacuum is supplied to the RBC 2nd Aspiration & Whole Blood Line Rinsing Diaphragm Pump (DP3) so that the 1.5 mL of rinsing diluent in the Mixing Chamber is aspirated into the RBC 2nd Aspiration line.

2. **Aspiration of Diluent into Dilution Diaphragm Pump:**
   SV-22 is deenergized and vacuum is supplied to the Dilution Diaphragm Pump (DP6) through MV-5 so that the 2.0 mL of diluent is primed. This diluent will be dispensed into the Mixing Chamber in next sequence.

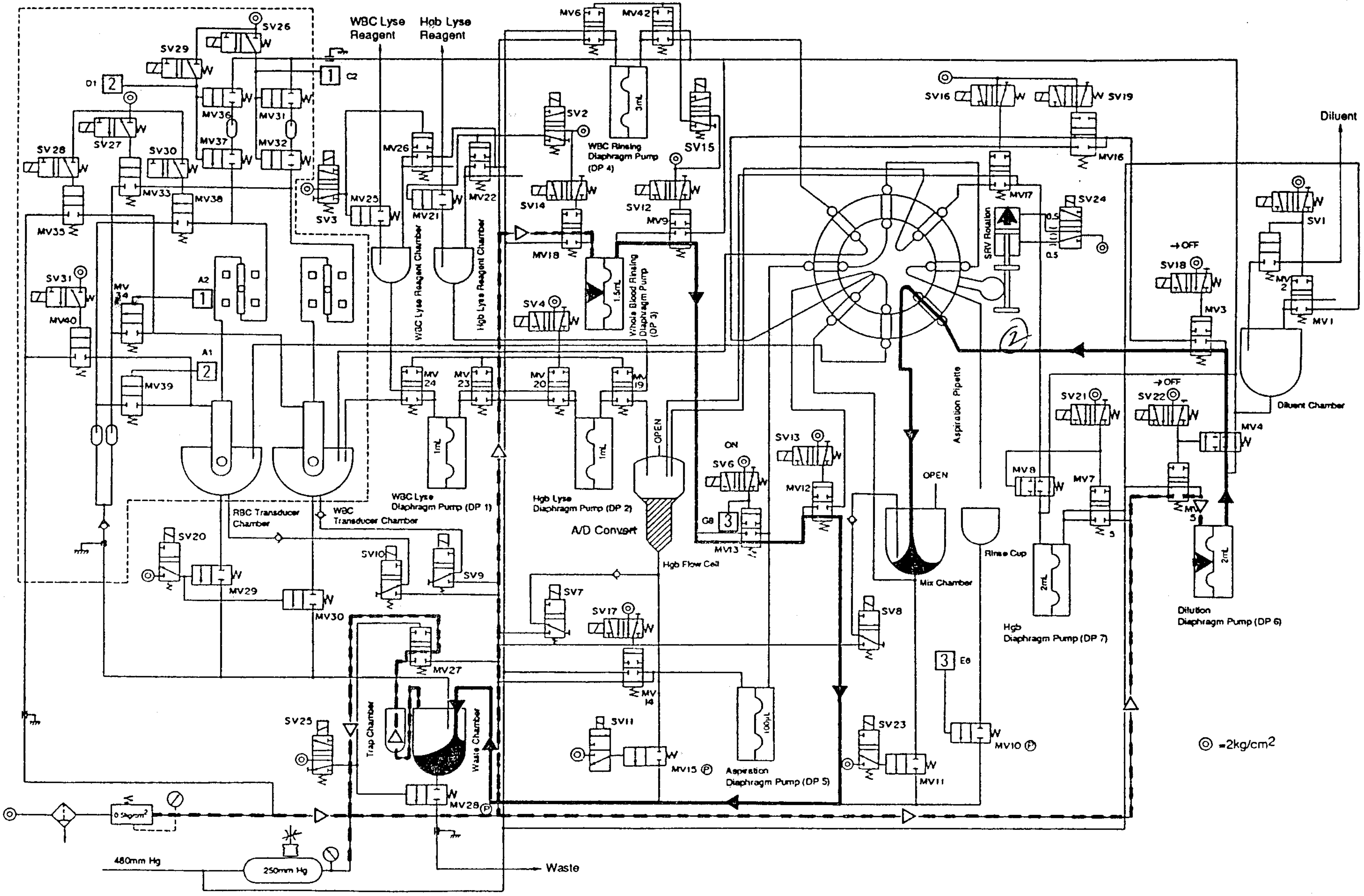


Figure 4-16 Hydraulic Flow Chart Sequence-11

Sequence-11

1. **Hgb Sample Measurement:**
   The absorbance of the Hgb sample in the Hgb Flow Cell is measured 5 times at 0.1 second interval to obtain Hgb Sample value.

2. **Aspiration of Diluent into Mixing Chamber:**
   SV-22 is energized to activate MV-4, MV-5. The 0.5 kg/cm^2 pressure is applied to the Dilution Diaphragm Pump (DP6) so that the 2.0 mL of diluent flows into the Mixing Chamber through the the SRV for rinsing purpose. This diluent is kept in the Mixing Chamber until next analysis to avoid contamination.

3. **Drain of the RBC 2nd Aspiration Line Rinse Diluent:**
   SV-14 and SV-13 are deenergized to reset MV-18 and MV-12, respectively. The 0.5 kg/cm^2 pressure is applied to the RBC 2nd Aspiration & Whole Blood Line Rinsing Diaphragm Pump (DP3) to drain the rinsing liquid of the RBC 2nd Aspiration Line.

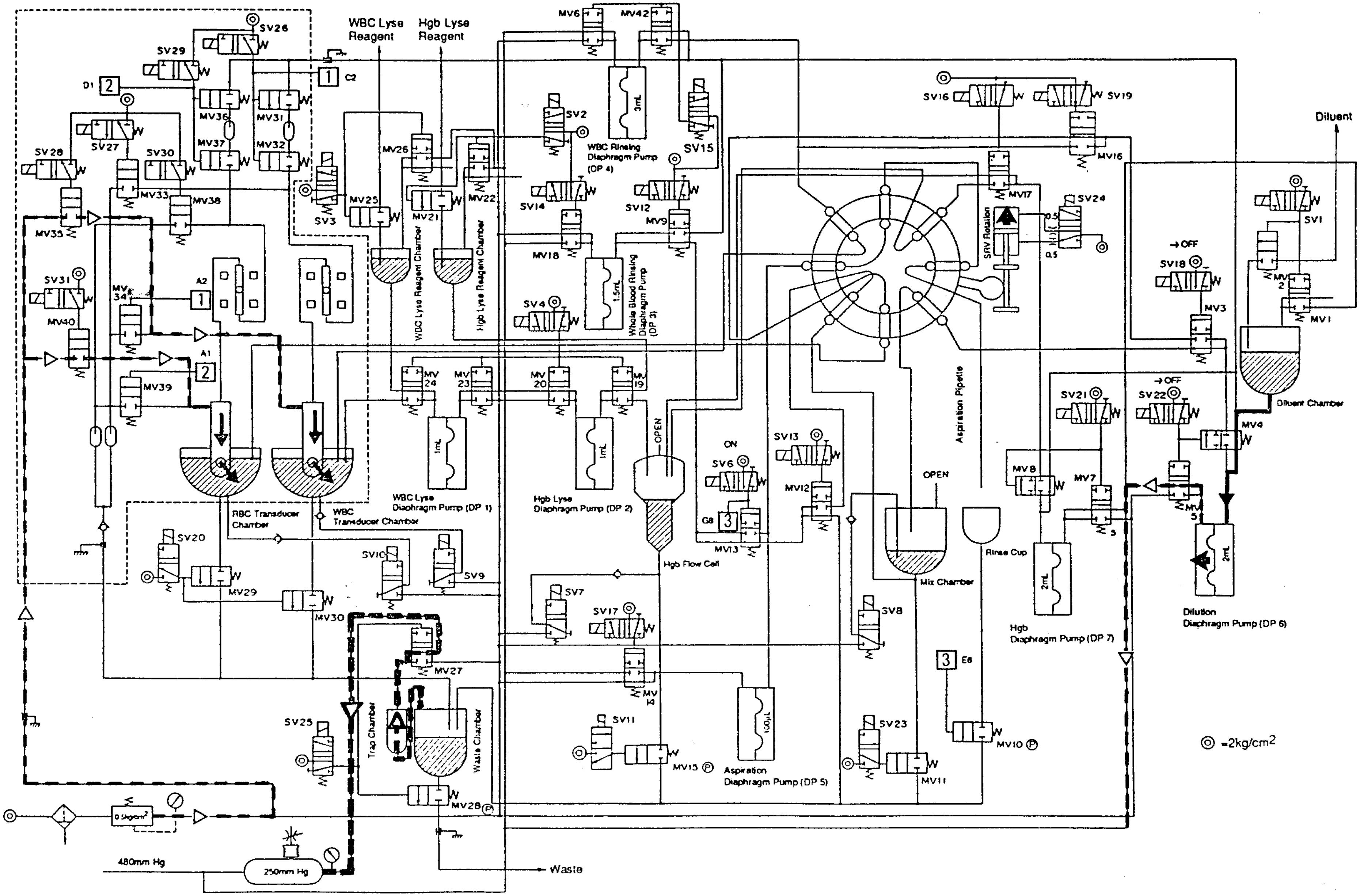


Figure 4-17 Hydraulic Flow Chart Sequence-12

Sequence-12

1. **Aspiration of Diluent into Dilution Diaphragm Pump:**
   SV-22 is deenergized, and vacuum is supplied to the Dilution Diaphragm Pump (DP6) so that 2.0 mL of diluent is aspirated from the Diluent Chamber. This diluent will be dispensed into the RBC Transducer Chamber for rinsing purpose in Sequence-14.

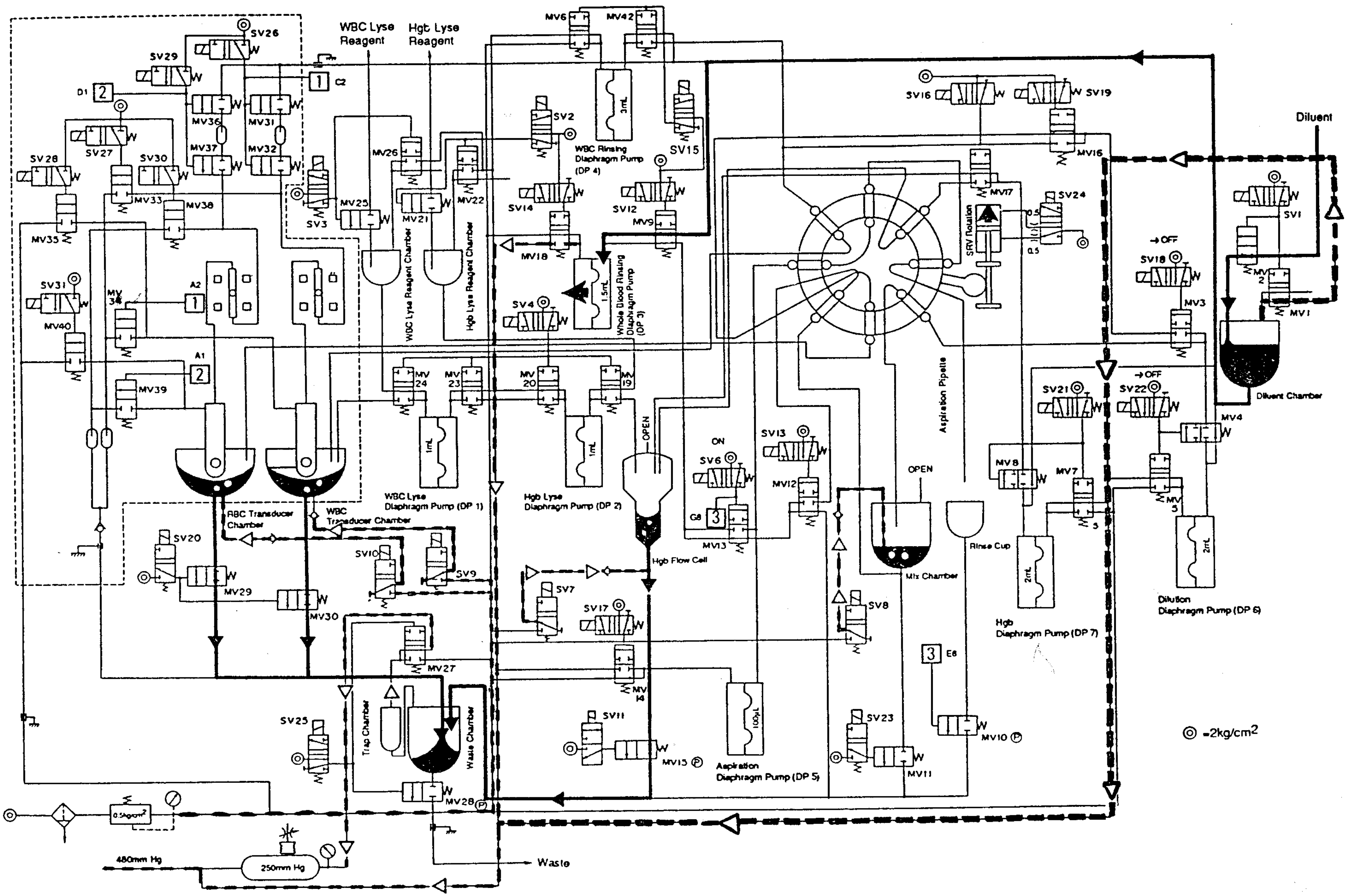


Figure 4-18 Hydraulic Flow Chart Sequence-13

Sequence-13

1. **Drain of Remaining RBC/WBC/Hgb Samples:**
   SV-11 is energized to activate MV-15 (Pinch type). The Hgb sample in the Hgb Flow Cell is drained into the Waste Chamber. SV-7 turns ON and OFF twice at 0.2 seconds interval and the sample remaining between the non-return valve and T-connecter is removed by 0.5 kg/cm^2 pressure.
   SV-20 is energized to activate MV-29, MV-30 so that the samples in the RBC and WBC Transducer Chambers are drained into the Waste Chamber. SV-9 and SV-10 turn ON and OFF twice at 0.2 seconds interval so that the sample remaining in the tube between non-return valves and the Transducer Chambers are removed by 0.5 kg/cm^2 pressure.

2. **Diluent Priming into the Diluent Chamber:**
   SV-1 is energized to activate MV-1 and MV-2. Vacuum is supplied to the Diluent Chamber so that the diluent is primed from the diluent container.

3. **Aspiration of Diluent into RBC 2nd Aspiration & Whole Blood Line Rinsing Diaphragm Pump:**
   SV-12 and 14 are energized to activate MV-9 and 18, respectively. Vacuum is applied to the RBC 2nd Aspiration & Whole Blood Line Rinsing Diaphragm Pump (DP3) to aspirate the 1.5 mL diluent from the Diluent Chamber.

4. **Air Bubble Mixing at Mixing Chamber (for rinsing purpose):**
   SV-8 turns ON and OFF twice at 0.2 seconds interval so that the sample remaining in the air bubble mixing line tube is removed by 0.5 kg/cm^2 pressure.

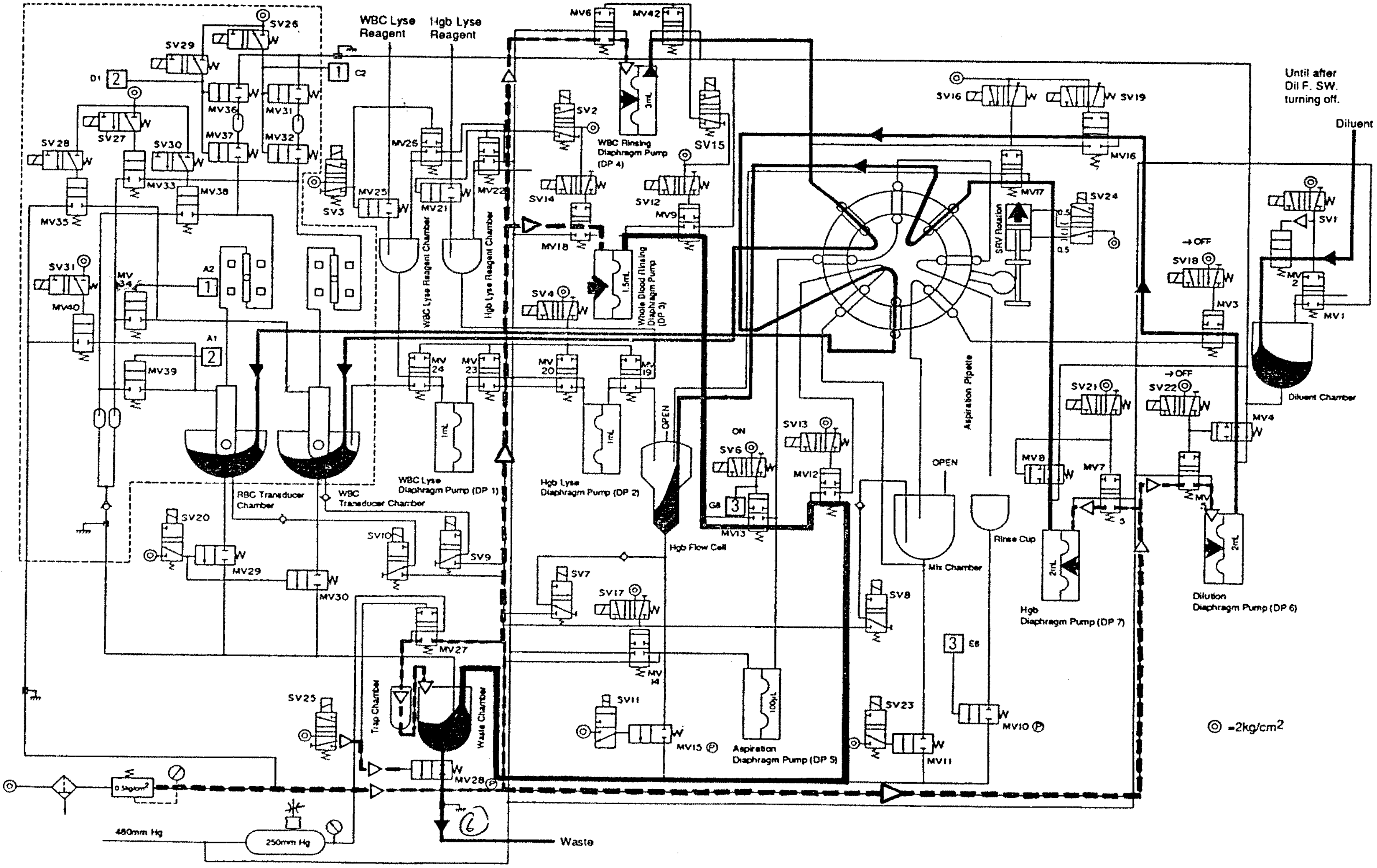


Figure 4-19 Hydraulic Flow Chart Sequence-14

Sequence-14

1. **Diluent Priming into the Diluent Chamber (continued):**
   Diluent priming into the Diluent Chamber is still performed in this sequence. SV-1 will be deenergized at 2.5 seconds after the float switch of the chamber turns OFF.

2. **Dispense of Fresh Diluent into the WBC Transducer Chamber:**
   SV-15 is energized to activate MV-6 and MV-42. The 0.5 kg/cm^2 pressure is applied to the WBC Rinsing Diaphragm Pump (DP4) so that the 3.0 mL of the diluent is supplied into the WBC Transducer Chamber. This diluent is kept in the WBC Transducer Chamber until next analysis to keep the WBC transducer immersed in the diluent. SV-15 will be deactivated when the float switch of diluent Chamber turns OFF.

3. **Dispense of Fresh Diluent into the RBC Transducer Chamber:**
   SV-18 is energized to activate MV-3. SV-22 is energized to activate MV-4 and MV-5. The 0.5 kg/cm^2 pressure is applied to the Dilution Diaphragm Pump (DP6) so that the 2 mL of diluent is supplied into the RBC Transducer Chamber for rinsing purpose. This diluent is kept in the RBC Transducer Chamber until next analysis to keep the RBC transducer immersed in the diluent. SV-18 and SV-22 will be deenergized when the float switch of Diluent Chamber turns OFF.

4. **Dispense of Fresh Diluent into the Hgb Flow Cell:**
   SV-21 and SV-16 are energized to activate MV-7, MV-8 and MV-17. The 0.5 kg/cm^2 pressure is applied to the Hgb Diaphragm Pump (DP7) so that 2.0 mL of the diluent is supplied to the Hgb Flow Cell for rinsing purpose. This diluent is kept in the Hgb Flow Cell until next analysis to avoid contamination.
   SV-16 and SV-21 will be deenergized when the float switch of Diluent Chamber turns OFF.

5. **Dispense of Fresh Diluent into the RBC 2nd Aspiration Line:**
   SV-14 and SV-12 are deenergized. The 0.5 kg/cm^2 air pressure is applied to the RBC 2nd Aspiration & Whole Blood Line Rinsing Diaphragm Pump (DP3) to rinse the hydraulic line.

6. **Drain of the Waste Liquid in the Waste Chamber:**
   SV-25 is energized to activate MV-27 and MV-28 (Pinch type). The 0.5 kg/cm^2 pressure is applied to the Waste Chamber through the Trap Chamber to exhaust the waste liquid. SV-25 will be deenergized just after 2.5 seconds in SEQ-14.

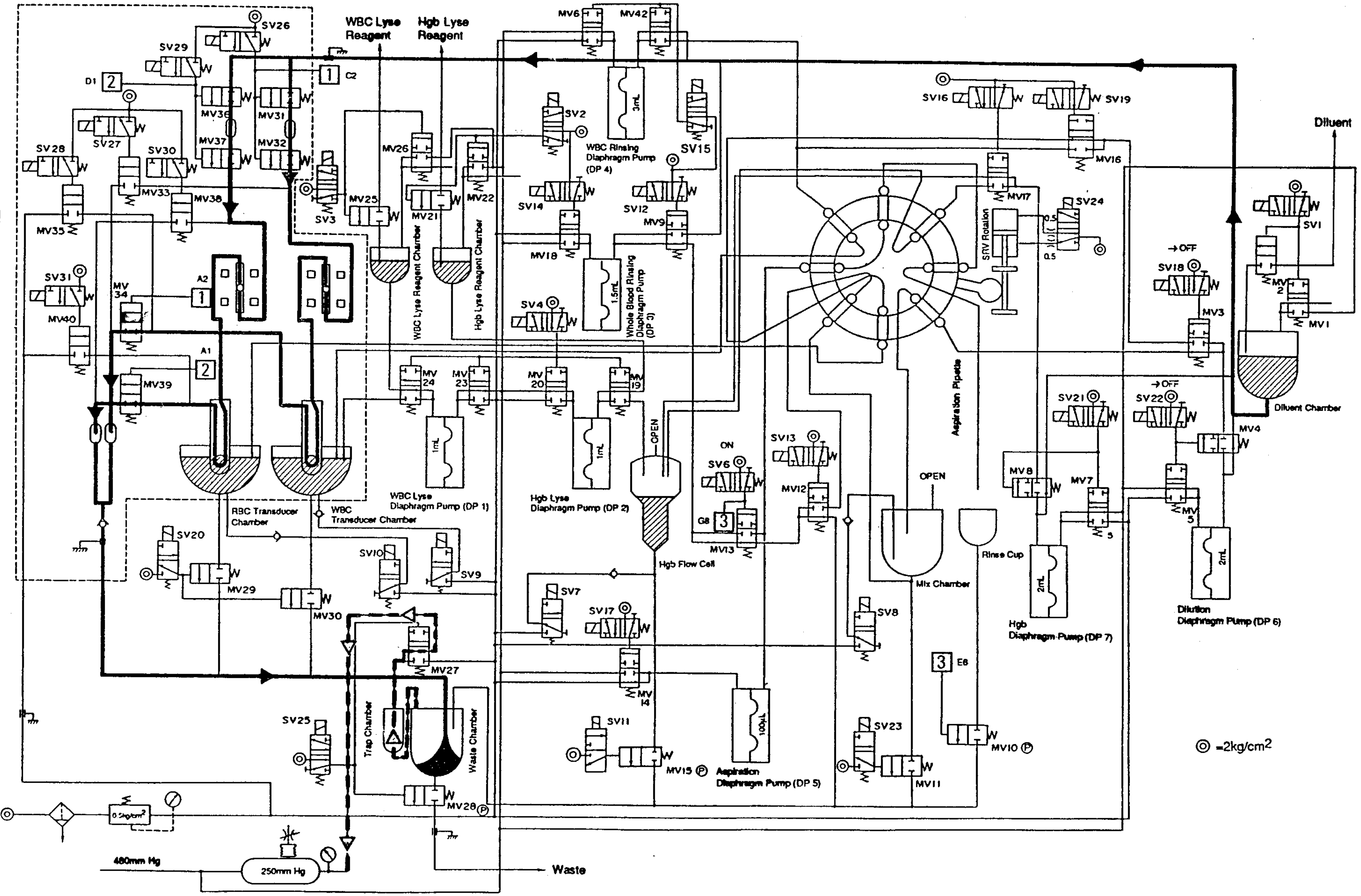


Figure 4-20 Hydraulic Flow Chart Sequence-15

Sequence-15

1. **WBC/RBC Filling Operation:**
   SV-26 and SV-29 are energized at 0.5 seconds after the Float Switch of Diluent Chamber is turned OFF. MV-31, 32, 34, 36, 37, and 39 are activated so that the diluent is aspirated through the transducers and manometers to rinse the inside transducers. This operation will be continued 1 second, and then the instrument becomes Ready for next cycle operation.

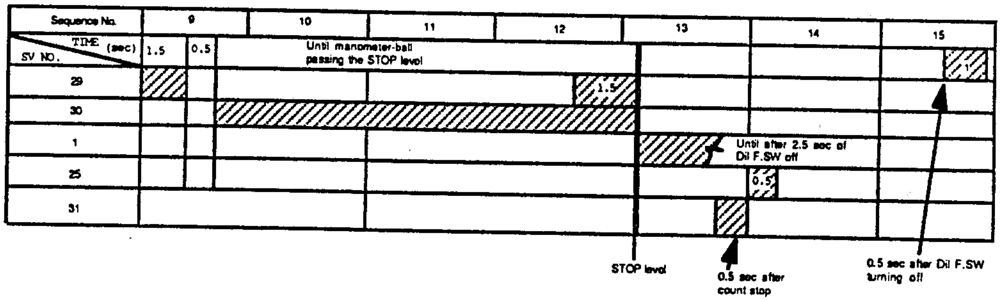
4.5. Detector Block Operation

A non-mercury volumetric manometer is utilized for WBC and RBC measurement. Exactly 0.4 mL of the 1 :250 diluted WBC sample in the WBC Transducer Chamber is aspirated through the transducer aperture. Exactly 0.25 mL of the 1 :25000 diluted RBC sample in the RBC Transducer Chamber also is aspirated through the transducer aperture. The Detector Unit is composed of Transducer, Transducer Chamber, Manometer, Isolation Chamber, Solenoid Valve and Master Valve as shown in Figure 4-22. The tubings of RBC and WBC Transducer Chamber are connected to both Sample Rotor Valve and Master Valve directly, and the tubings of diluent for rinse, of the waste liquid, of 2 kg/cm^2 pressure and of 0.5 kg/cm^2 pressure are connected to the fluid connecters at the rear of the Detector Unit.

4.5.1. Counting Operation

Counting Operation of WBC/RBC Detector Unit is performed according to the following timing chart:

WBC



RBC / PLT

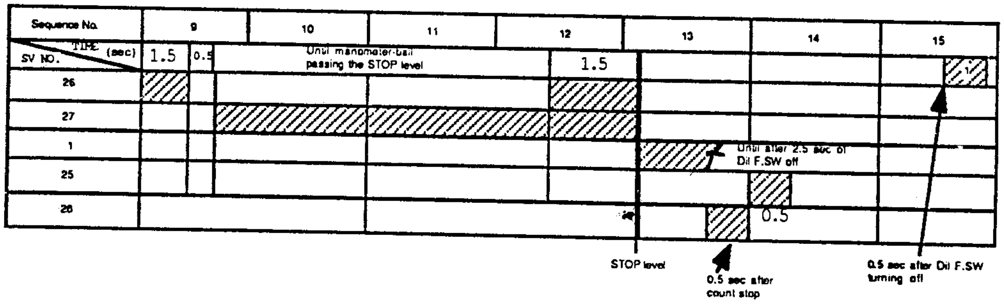
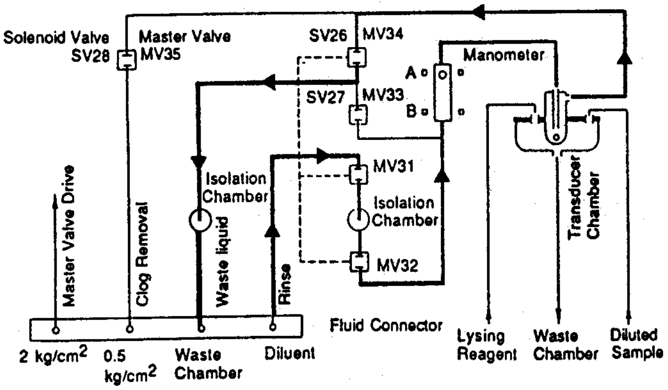


Figure 4-21 COUNT Mode Timing Chart.

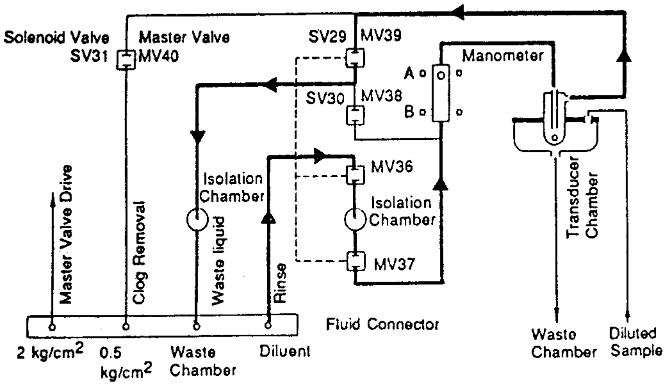
1. 0 - 1.5 seconds (Sequence -9)

WBC All Master Valves in the Detector Unit are normally closed. The Ball Float in the WBC manometer stays near at level “A”. When the instrument enters into Count cycle, SV-26 is turned ON to activate MV-31, MV-32 and MV-34 for 1.5 seconds in Seq-9 so that the 250 mmHg of vacuum is applied to the WBC Detector Unit through MV-27, Trap Chamber, and Waste Chamber. The diluent is aspirated through MV-31, 32, the manometer, the transducer, and MV-34 to rinse and to fill the tubing, manometer and transducer. This is to minimize sample-to-sample carryover effect.



WBC

RBC The Ball Float in the RBC manometer stays near at level “A”. SV-29 is energized to activate MV-36, 37 and 39 for just 1.5 seconds in Seq-9 so that the 250 mmHg of vacuum is applied to the RBC/PLT Detector Unit through MV-27, Trap Chamber, and Waste Chamber. The diluent is aspirated through MV-36, 37, the manometer, the transducer, and MV-39 to rinse and fill the tubing, manometer and transducer.

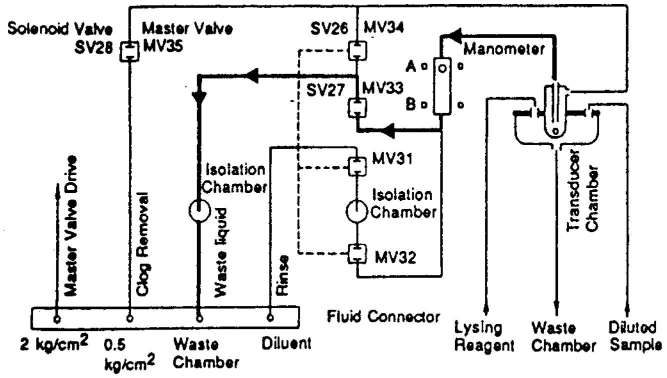


RBC

Figure 4-22.
COUNT Mode Flow Chart

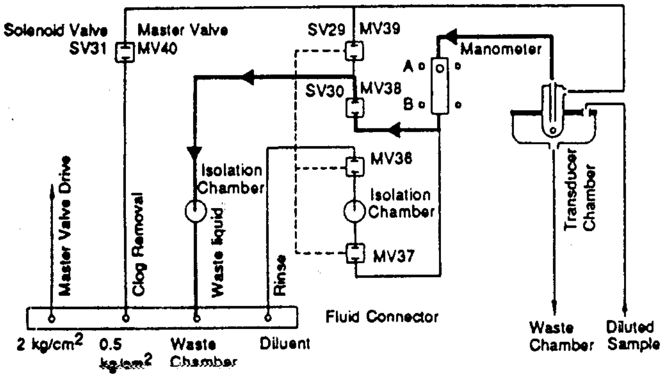
2. 1.5 - 2.0 second (Sequence-9)
SV-26 and 29 are deactivated after 1.5 seconds in Seq-9 and kept the same status for 0.5 seconds.

3. 2.0 .send -Stop Level (Sequence -10 ~ 14)



WBC

WBC SV-27 is turned ON to activate MV-33. The 250 mmHg of vacuum is applied from the Waste Chamber and the sample in the WBC TD Chamber will be aspirated through the transducer aperture. The Ball Float starts to move down.



RBC

RBC/PLT SV-30 is turned ON and activate MV-38. The 250 mmHg of vacuum is applied from the Waste Chamber and the sample in the RBC/PLT TD Chamber will be aspirated through the transducer aperture. The Ball Float starts to move down.

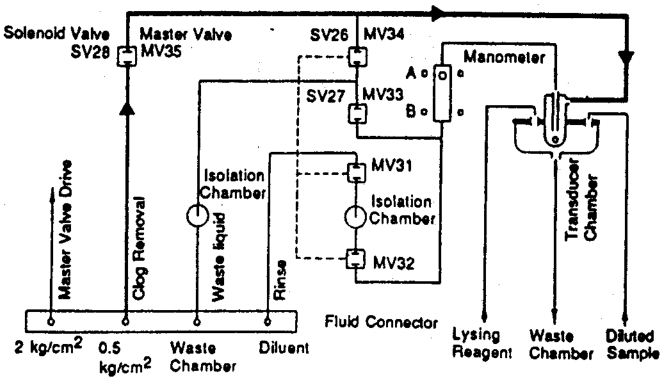
Figure 4-23

Count Mode Operation 1.5 second ~ Stop Level

The count cycle starts when the Ball Float reaches the llevel "A". During the count cycle, the 0.25 mL of RBC/PLT sample and the 0.40 mL of WBC sample are aspirated through the transducer apertures. When the Ball Float reaches the level "B", the both count cycles are completed and SV-27 and SV-30 are turned off.

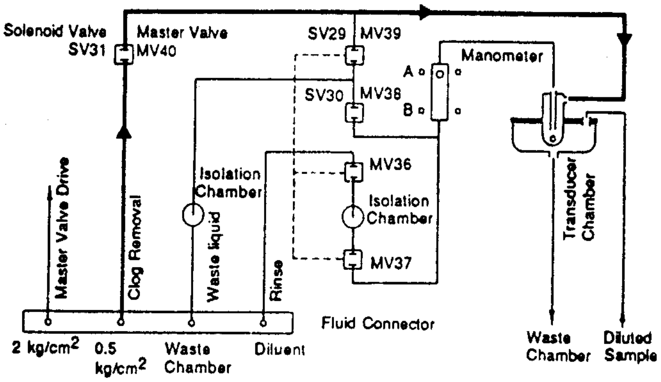
4. Flushing Apertures after COUNT

WBC SV-28 is energized to activate MV-35 for 0.5 seconds to apply the 0.5 kg/cm^2 pressure to the WBC transducer. Liquid in the WBC transducer is flushed through the aperture to prevent clog of aperture.



WBC

RBC/PLT SV-31 is energized to activate MV-40 for 0.5 seconds to apply the 0.5 kg/cm^2 pressure into the RBC transducer. Liquid in the RBC transducer is flushed through the aperture to prevent clog of aperture.



RBC

Figure 4-24.
Auto Flush after Counting

4.5.2.RECOUNT Operation (for the service use only)

Timing Chart

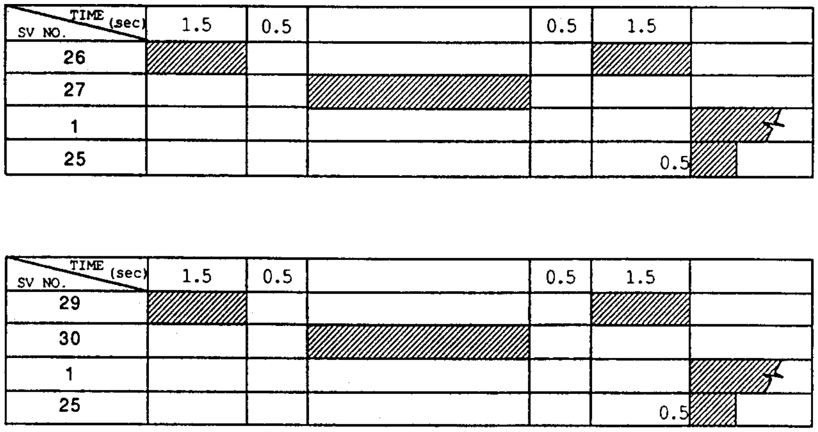


Figure 4-25 "COUNT SEQ.(RECOUNT) Mode Timing Chart.

In the COUNT SEQ. Mode, followings are different points from.the COUNT Mode.

1. Flush after Count Cycle is not performed in the COUNT SEQ. Mode.

2. Time of Auto Fill after Count

COUNT Mode	1.5 sec.
RECOUNT Mode	1.5 sec.

3. Aspiration of Diluent into the Diluent Chamber is performed in the COUNT SEQ. Mode

   In Recounting mode, SV-1 is energized after the Auto Fill operation to prime the diluent into the Diluent Chamber. SV-1 will be deenergized one second after the float switch of Diluent Chamber turns OFF.

4. Liquid in the Waste Chamber is drained after COUNT Cycle.
   SV-25 is energized to activate MV-27, MV-28 for 0.5 seconds after Auto Fill operation to exhaust the waste liquid in the Waste Chamber.

4.5.3. Flush / Fill Operation

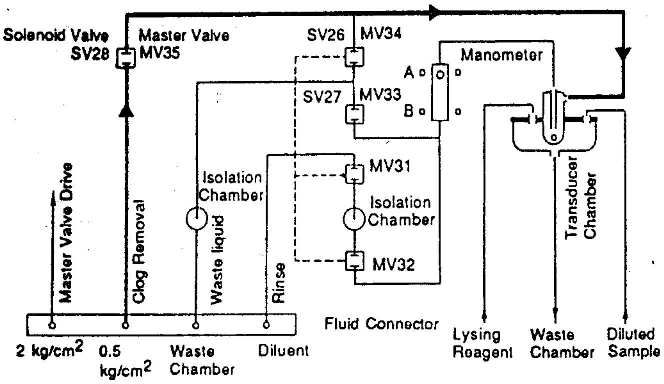
Timing Chart of Flush and Fill is shown below.

SV NO. \ TIME (sec)	3	0.5	2	
SV-26			▨	
SV-28	▨			
SV-1				▨
SV-25			0.5	▨

SV NO. \ TIME (sec)	3	0.5	2	
SV-29			▨	
SV-31	▨			
SV-1				▨
SV-25			0.5	▨

Figure 4-26 "Flush / Fill" Timing Chart.

When the transducer aperture clogs, an automatic FLUSH/FILL operation is performed, and an error message will be printed by the Built-in printer.
When the manual Flush operation is performed, SV-28 for WBC or SV-31 for RBC/PLT is activated and the 0.5 kg/cm^2 pressure is applied to the transducer to remove any debris on the transducer aperture.

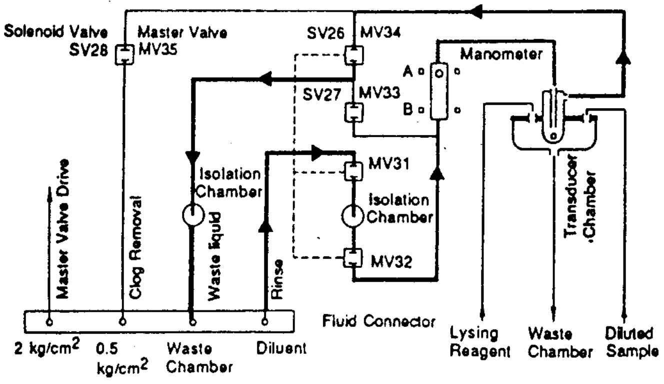


WBC

Figure 4-27.
Flush/Fill Operation (0 – 3.0 sec.)

WBC Flush/Fill

- 0 - 3.0 seconds
  - SV-28 is turned ON and activate MV-35 to apply the 0.5 kg/cm^2 pressure into the WBC transducer for 3 seconds so that any debris on the transducer aperture is removed by 0.5 kg/cm^2 pressure.
- 3.0 - 3.5 seconds
  - SV-28 is turned OFF and kept the same status for 0.5 seconds.



WBC

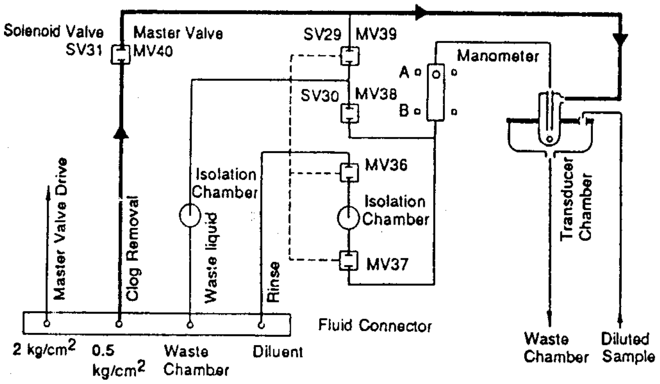
Figure 4-28
Flush/Fill Operation (3.5 – 5.5 sec.)

3.5 - 5.5 seconds

SV-26 is turned ON to activate MV-31, 32 and MV-34 for 2 seconds so that the diluent is aspirated through MV-31, 32, the manometer, the transducer, and MV-34 to rinse and to fill the tubing, manometer and transducer.

5.5 seconds -

SV-1 is energized and activate MV-1 and MV-2 to prime diluent into the Diluent Chamber. SV-1 will be turned OFF at 1 second after the float switch of the Diluent Chamber turns OFF. SV-25 is also energized to activate MV-27, MV-28 (Pinch type) to exhaust the waste liquid in the Waste Chamber. SV-25 will be deenergized just after 0.5 second.



RBC

Figure 4-29
Flush/Fill Operation (0 – 3.0 sec.)

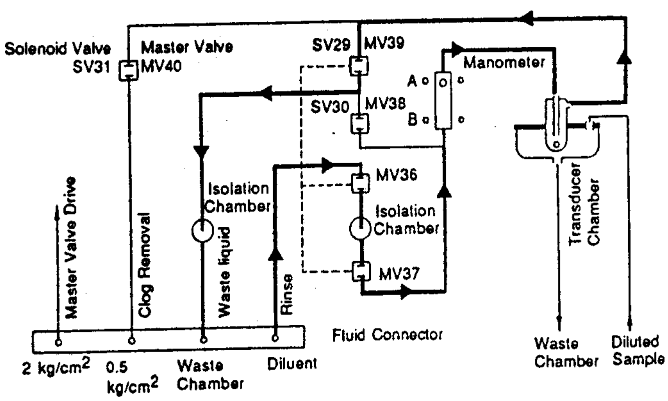
RBC Flush / Fill

0 - 3.0 seconds

SV-31 is turned ON and activate MV-40 to apply the 0.5 kg/cm^2 pressure into the RBC transducer for 3 seconds so that any debris on the transducer aperture is removed by the 0.5 kg/cm^2 pressure.

3.0 - 3.5 seconds

SV-31 is turned OFF and kept the same staus for 0.5 seconds.



RBC

Figure 4-30
Flush/Fill Operation (3.5 - 5.5 sec.)

3.5 - 5.5 seconds

SV-29 is turned ON and activates MV-36, 37 and MV-39 for 2 seconds so that the diluent is aspirated through MV-36, 37, the manometer, the transducer, and MV-39 to rinse and to fill the tubing, manometer and transducer.

5.5 seconds -

SV-1 is energized and activates MV-1 and MV-2 to prime diluent into the Diluent Chamber. SV-1 will be turned OFF at 1 second after the float switch of the Diluent Chamber turns OFF.

SV-25 is also energized and activates MV-27, MV-28 (Pinch type) to exhaust the waste liquid in the Waste Chamber. SV-25 will be deenergized just after 0.5 second.

4.6. Sample Rotor Valve

The Sample Rotor Valve is comprised of three sections; one rotor valve and two fixed valves. The lower side fixed valve and the upper side fixed valve have eight each ports. The middle rotor valve has six ports which are in line with corresponding ports on the under side and upper side valves. The rotor valve moves to right position (fully clockwise from upper view) from left position (fully counterclockwise from upper view) or in reverse, and that rotated angle is 45 degrees.

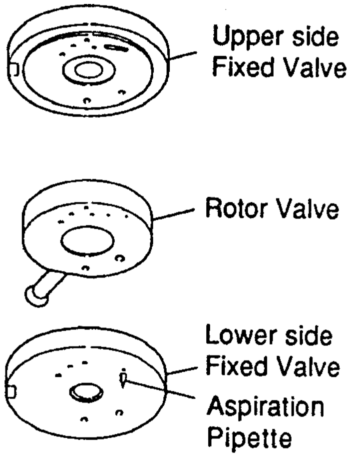


Figure 4-31 Sample Rotor Valve

4.6.1. Operation of Sample Rotor Valve (SRV)

The valve is activated sequentially as follows;

[SEQ-1]

The Rotor Valve remains at its initial (fully counterclockwise from upper view) position. When the Start Switch is pressed, 0.1 mL of the whole blood sample is aspirated through the Sample Rotor Valve.

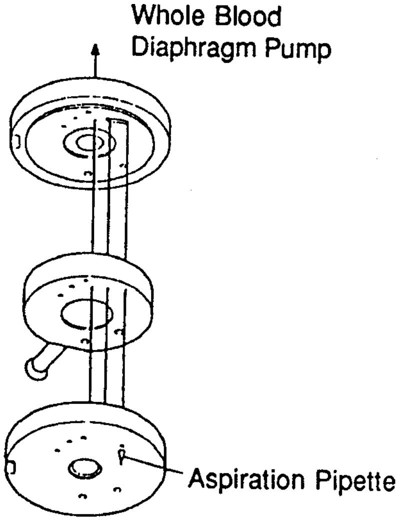


Figure 4-32 Whole Blood Aspiration (SEQ-1)

[SEQ-2]

The Sample Rotor Valve moves to right position (fully clockwise from upper view). The 22 µL (12 µL for WBC, 4 µL for RBC first dilution and 6 µL for Hgb) of the whole blood samples are cut away, and aligned with the corresponding diluent ports.

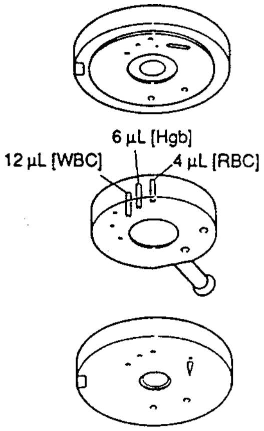


Figure 4-33 Sampling the Whole Blood (SEQ-2)

[SEQ-3]

The Dilution Diaphragm pump (DP6) dispenses approximately 2.0 mL of diluent to the Mixing Chamber along with the 4 µL of the whole blood cut in the Sample Rotor Valve to produce the dilution of 1 :500 RBC first diluted sample.

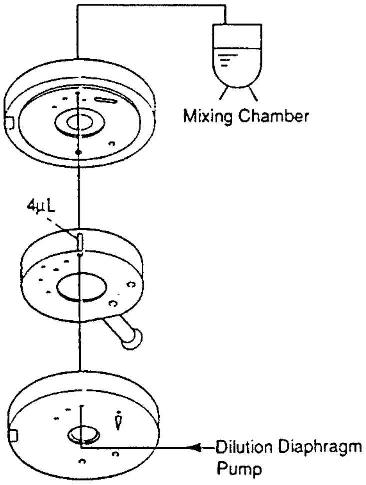


Figure 4-34 RBC Sample First Dilution (SEQ-3)

[SEQ-4]

The 1 :500 RBC first diluted sample in the Mixing Chamber is aspirated through the Sample Rotor Valve by the Second Aspiration & Whole Blood Rinsing Diaphragm Pump.

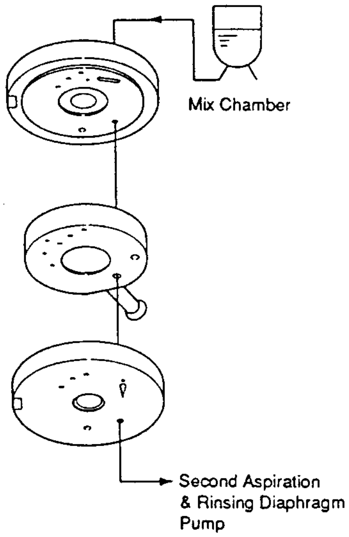


Figure 4-35 RBC Sample Second Aspiration (SEQ-4)

[SEQ-5]

The Dilution Diaphragm Pump (DP6) dispenses 1.988 mL of diluent to the WBC Transducer Chamber along with the 12 µL of the whole blood cut in the Sample Rotor Valve. At this time 1 mL of WBC lysing reagent is injected into the WBC Transducer Chamber.

Similarly, the Hgb Diaphragm Pump (DP7) dispenses approximately 2.0 mL of diluent to the Hgb Flow Cell along with the 6 µL of whole blood cut in the Sample Rotor Valve. At this time 1 mL of Hgb lysing reagent is injected into the Hgb Flow Cell.

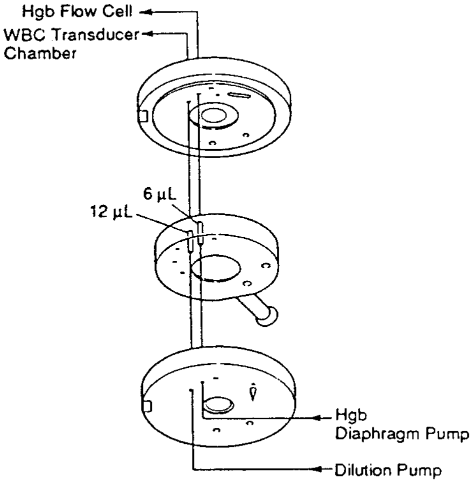


Figure 4-36 WBC & Hgb Sample Dilution (SEQ-5)

[SEQ-6]

The Sample Rotor Valve moves to initial left position (fully counterclockwise from upper view) and 40 µL of the RBC/PLT first diluted sample is cut away.

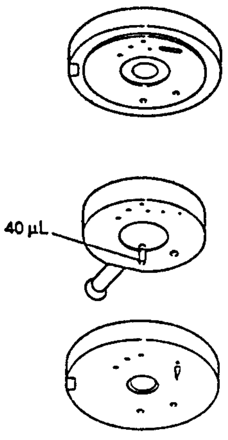


Figure 4-37 Sampling the RBC First Diluted Sample (SEQ-6)

[SEQ-7]

Approximately 2.0 mL of diluent is dispensed by the Dilution Diaphragm Pump (DP6) into the RBC Transducer Chamber with the 40 µL of 1 :500 RBC first diluted sample.

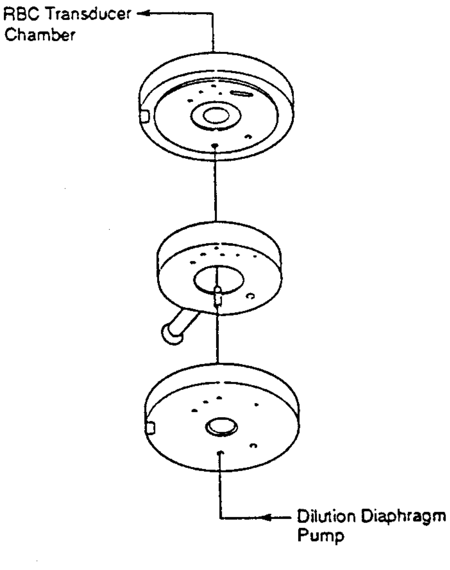


Figure 4-38 RBC Sample Second Dilution [SEQ-7]

SECTION FIVE

ELECTRONICS

- Table of Contents -

Electronics

5.1. Electronic Block Diagram

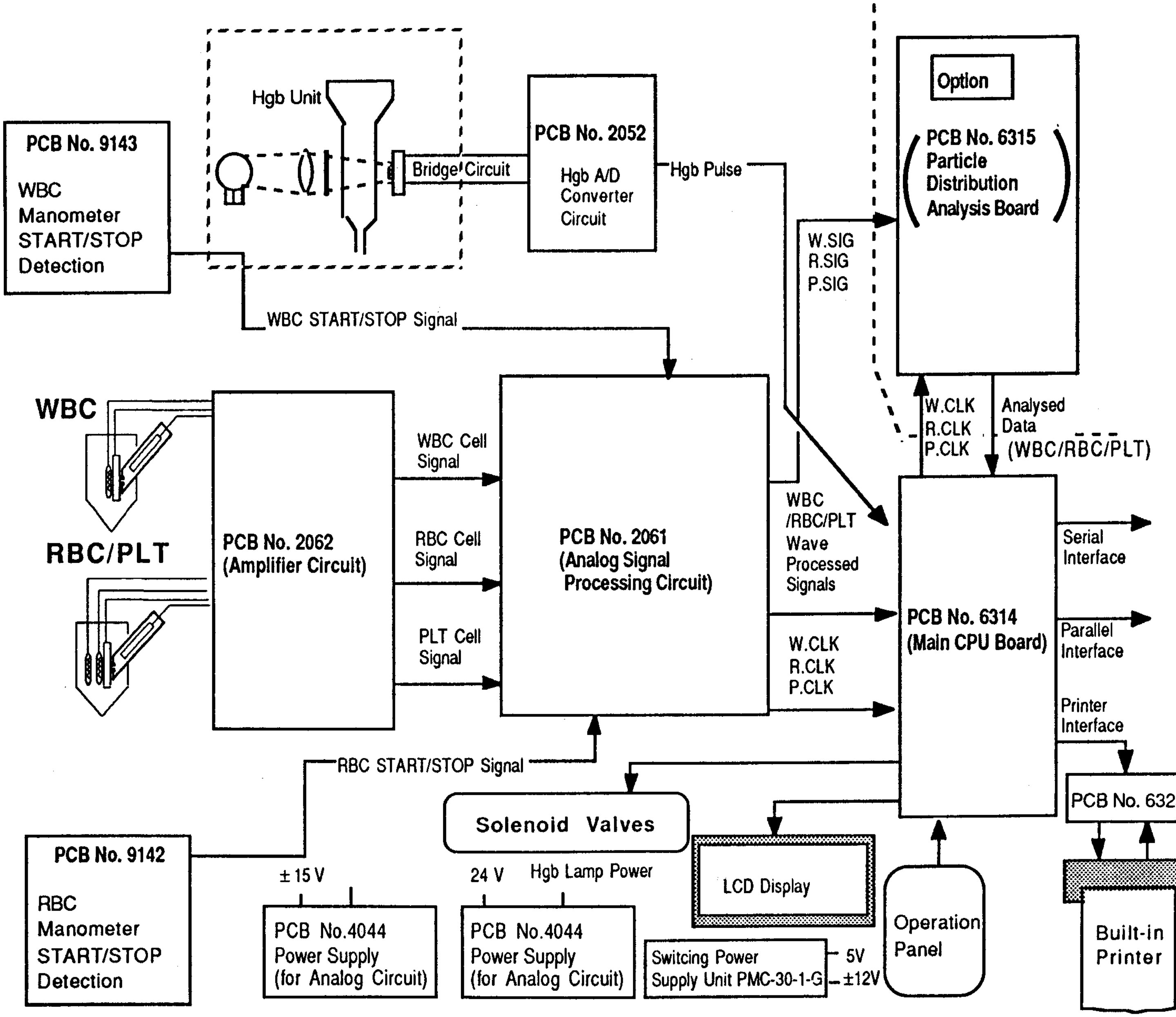


Figure 5-1 Electronic Block Diagram

This Section covers the operation and standard settings for the PCB's in the electronic system. Figure 5-1 is the electronic block diagram.

5.2 PCB No. 9142 & PCB No. 9143

PCB No. 9142 (for RBC) & PCB No. 9143 (for WBC) are used in Manometer Block NO. 14 Assy (for RBC) & Manometer Block No 15 (for WBC) Assy to detect START and STOP level of ball float manometer.

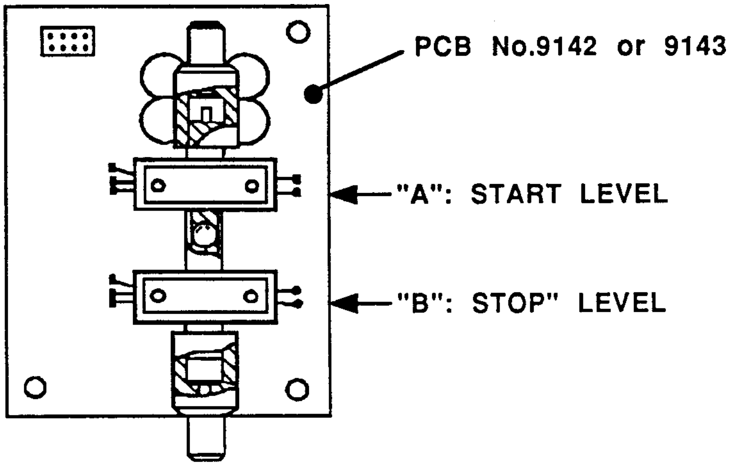


Figure 5-2 Drawing of Manometer Block No. 14 & 15

1. Function
   The manometer employed in this instrument is a non-mercury and float type. It measures the sample of exact 0.4 mL for WBC and exact 0.25 mL for RBC aspirated through the aperture. The measurement is done in the terms of the travel of the float, i.e., the sample is aspirated through the aperture while the float travels from level A to B. (See Figure 5-3.)

2. Theory

   Figure 5-3 shows the cross section of the manometer and the photo coupler. When the ball float is located within the photocoupler, the light is interrupted by the ball float and the photo transistor is cut off (top figure of Figure 5-3). When the float is not located within the sensing zone of photo coupler, the light emitted from the LED reaches the photo transistor, turning it on (bottom figure of Figure 5-3). Thus the photo transistor generates a rectangular output voltage when the float passes through the photo coupler. (See Figure 5-4)
   There are two photo couplers in Manometer Block No. 14 or Manometer Block No. 15 to generate the START and the STOP signal at each level A and B respectively. The level A is the start level, and B is the stop level. (See Figure 5-2.)

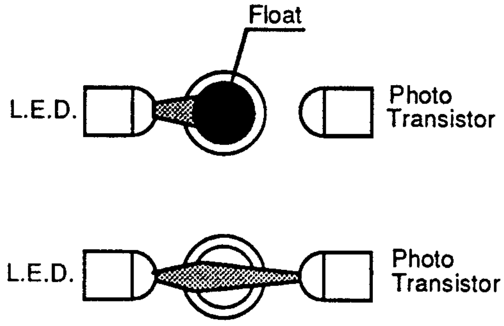


Figure 5-3 Light beam detection

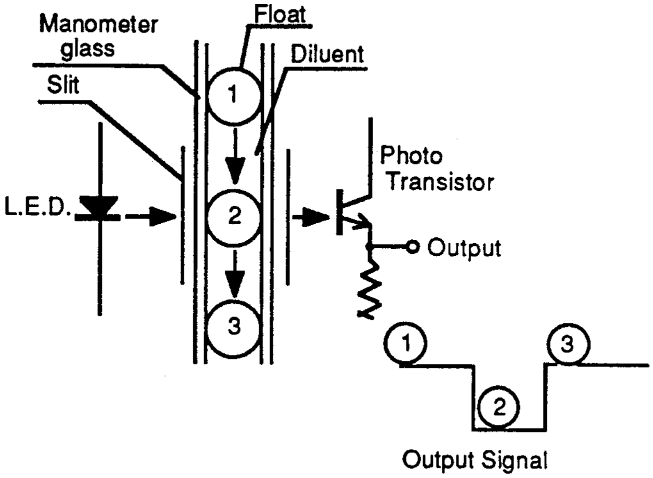


Figure 5-4 START & STOP Signal in Manometer

3. Structure

Manometer Block No. 14 & 15 are constructed as shown in Figure 5-2. It is one of the most important components in the micro cell counter. When a part of them were replaced, for instance, an LED, it might cause the incorrect sample volume to be aspirated through the aperture, since the alignment of the photo couplers can not be done in the field. Therefore, it is not allowed to replace any component forming the photo coupler in the field. When one of the components gets defective, Manometer Block No. 14 or 15 should be replaced in the whole assembly.

5.3. PCB No. 2062 Amplifier Circuit

PCB No.2062 is located on the top of detector unit.
This PCB is consisted of following circuits;

*Constant current supply circuit
*Pre-amplifier circuit
*Main amplifier circuit
*Temperature compensation circuit
*Temperature monitoring circuit

Figure shows the block diagram of PCB.No.2062.

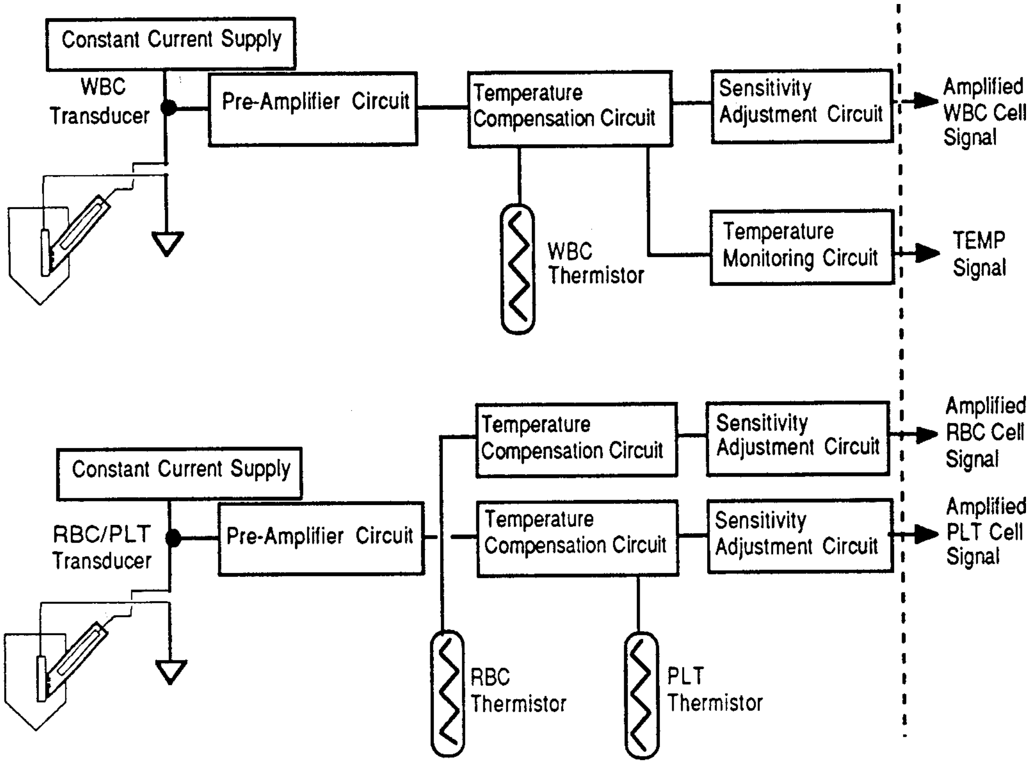


Figure 5-5 PCB No.2062 Block Diagram

5.3.1. Function

1. Constant current supply circuit

This circuit supplies a constant current between the electrodes during the counting cycle. 0.51 mA (±3%) is applied between the internal electrode (hot) and the external electrode (ground).

2. Pre-amplifier circuit

M1 (R) and M5 (W) is the pre-amplifier circuit. M1 and M5 uses the negative feed-back to stabilize the amplifier characteristics.

3. Main-amplifier circuit

The pre-amplified cell signal will be amplified approximately 100 times in the main Amp in case of PLT. Through the pre and main amplifier circuit, PLT, RBC and WBC amplified gain are totally 69 db, 58 db and 67 db, respectively.

4. Temperature compensation circuit

The cell signal from the pre-amplifier circuit is compensated by this circuit. The conductivity of diluent changes according to the diluent temperature. The conductivity change may influence on the detected cell signal, resulting the change of gain. The thermistor will compensate the change of gain to get the reliable and stable cell signal.

5. Temperature monitoring circuit

Temperature of the diluent in WBC TD chamber is measured and changed into the analog signal in this circuit (M8) and transmitted to PCB.No.2061 to monitor the diluent temperature.

5.3.2. Adjustment points for PCB 2062

Gain adjustment

VR-1: PLT Gain adjustment
VR-2: RBC Gain adjustment
VR-3: WBC Gain adjustment

Refer to the Section 6.6. “Standard sensitivity adjustment”.

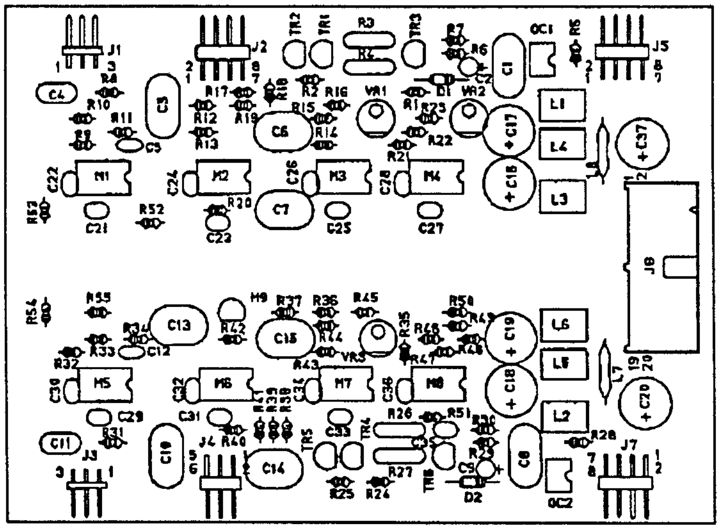


Figure 5-6 Drawing of PCB No. 2062

5.4. PCB No. 2061 Analog Signal Processing Circuit

PCB No. 2061 receives the amplified cell signals from PCB No. 2062 and discriminates them from noise and generates the pulse which has the proportional width to the height of cell signal.

PCB No. 2061 consists of the following circuits;
- * Interface Circuit
- * WBC Wave Processing Circuit
- * RBC Wave Processing Circuit
- * Hct A/D Converter Circuit
- * PLT Wave Processing Circuit
- * 2 kg/cm^2 Pressure Monitoring Circuit
- * Diluent Temp. Monitoring Circuit

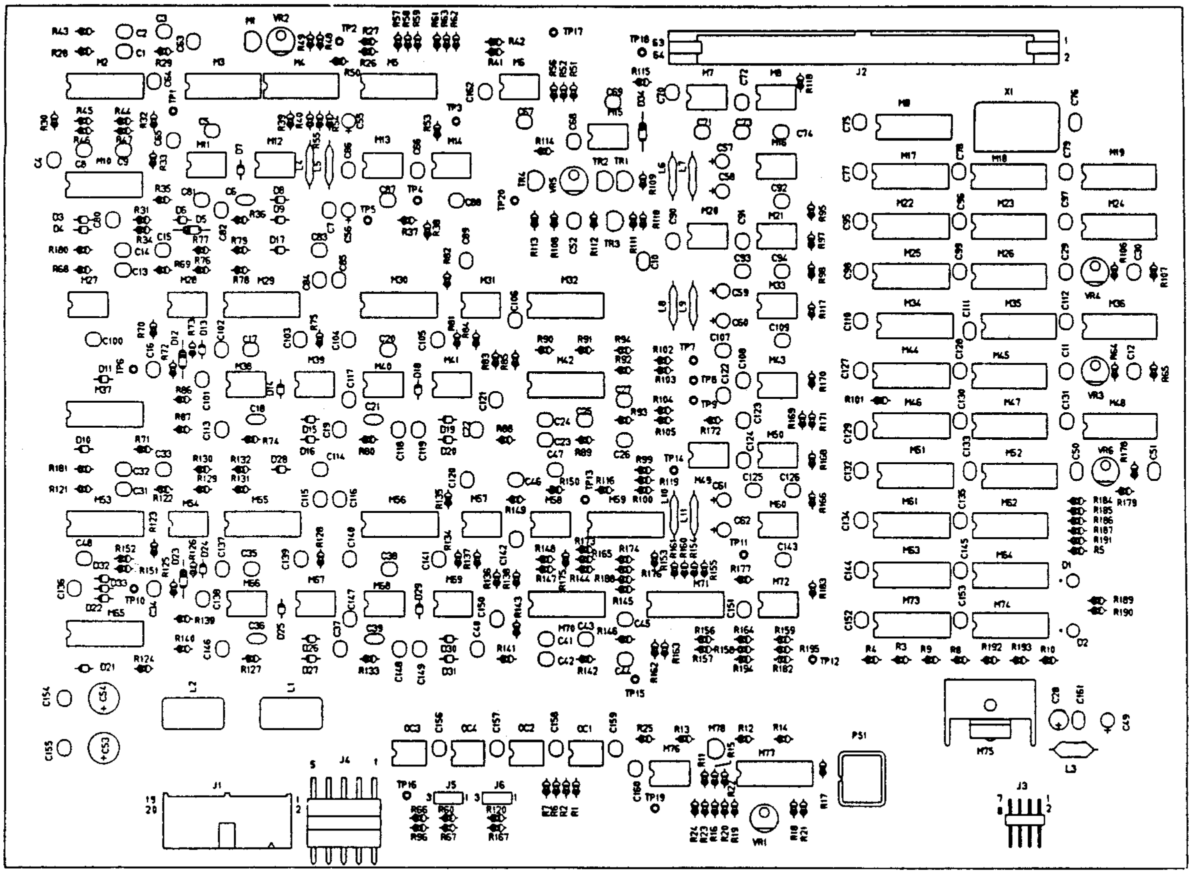


Figure 5-7 Drawing of PCB No. 2061

5.4.1. Function

1. Interface Circuit

This PCB functions as the Input/Output Control Circuit of following Signals;

1) The control signal transmitted from PCB No 6314 to PCB2062 for applying of the constant current to the electrodes.

2) The manometer START/STOP Signals are output to PCB No. 6314 (CPU) through PCB No. 2062 and this PCB 2061.

2. WBC Wave processing Circuit

The Block diagram of this circuit is shown in Figure 5-8. Output signals of this circuit are explained as follows;

1) W.SIG

Amplified WBC Cell signal is reshaped by this circuit. W.SIG. is the reshaped WBC cell signal by the Peak Hold Circuit. Electronic noise and/or air bubble signal) are eliminated by the operation of Comparator Circuit M14, M13, WBC Peak Detection Circuit, and Control Circuit (M3, M22 & M36). If optional PDA board is installed in the system, W.SIG. is sent to PDA circuit directly to obtain the cell size distribution data. W.SIG may include the hemolysed RBC fragments signals. These signals also analyzed and will be eliminated from WBC data by Auto Discrimination Analysis of the PDA circuit.

2) WBC0 and WBC1

W.SIG. is also processed by the DC Restore Circuit and peak hold Circuits. Then the WBC Cell Signal is sent to the Discriminator Circuit (Comparator M5), and output to PCB No. 6314 as WBC0 and WBC1.signal (H:5 V / L: 0 V). WBC0 and WBC1 are used for WBC plateau monitor when the optional PDA is not installed in the System. WBC0 is the signal of particles of which cell size are larger than 24 fL, and WBC1 is that of larger than 36 fL. The pulses from WBC1 is used for WBC calculation, and WBC0 is used for monitoring of incomplete hemolysing of RBC cells (monitoring WBC plateau). Normally, WBC0 and WBC1 shows almost same number, but if there were incomplete hemolysing in the WBC sample, the number of WBC0 increases than that of WBC1.

3) W.CLK

W. CLK is the Clock pulse for WBC Counter on PCB No.6314 while WBC0 or WBC1 signal is used to open gate. W.CLK pulse (6 m sec.) will be input to the counter.

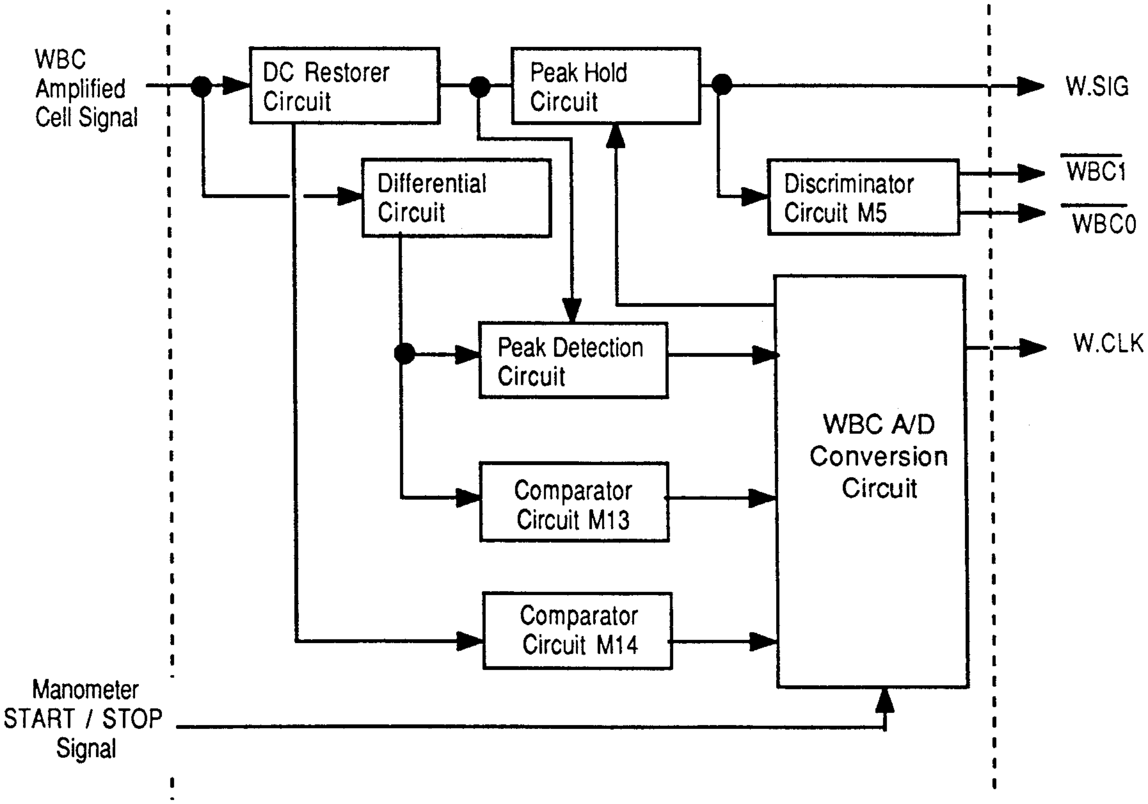


Figure 5-8 WBC Wave Processing Circuit Block Diagram

3. RBC Wave Processing Circuit

The Block diagram of this circuit is shown in Figure 5-9. Output signals of this circuit are explained as follows.

1) R.SIG

Amplified RBC Cell signals is processed by this circuit. R.SIG. is the reshaped RBC cell signal by the Peak Hold Circuit. Abnormal shape pulse of which RBC cell passes through near the edge of aperture are monitored, controlled, and reshaped to the normal shaped pulse through Peak Hold and RBC A/D Conversion Control Circuit. Smaller electronic noises in RBC Cell signals are eliminated by the Comparator Circuit. If optional PDA board is installed in the system, R.SIG. is sent to PDA board directly to obtain the RBC Cell size distribution data. R.SIG may include PLT signal, larger air bubble signal, and WBC signal. Such a signals will be controlled and eliminated from RBC data by Auto Discrimination Analysis of the PDA board.

2) RBC

If the optional PDA board is not installed, R.SIG. is also processed through the comparator Circuit(M16 and M33), and output as RBC pulse of which particle size are larger than 30 fL and smaller than 255 fL.

3) R.CLK

R. CLK is the Clock Signal for RBC Counter on PCB No.6314 while RBC signal is used to open the counter gate. R.CLK pulse (6msec by VR4) is input to the counter.

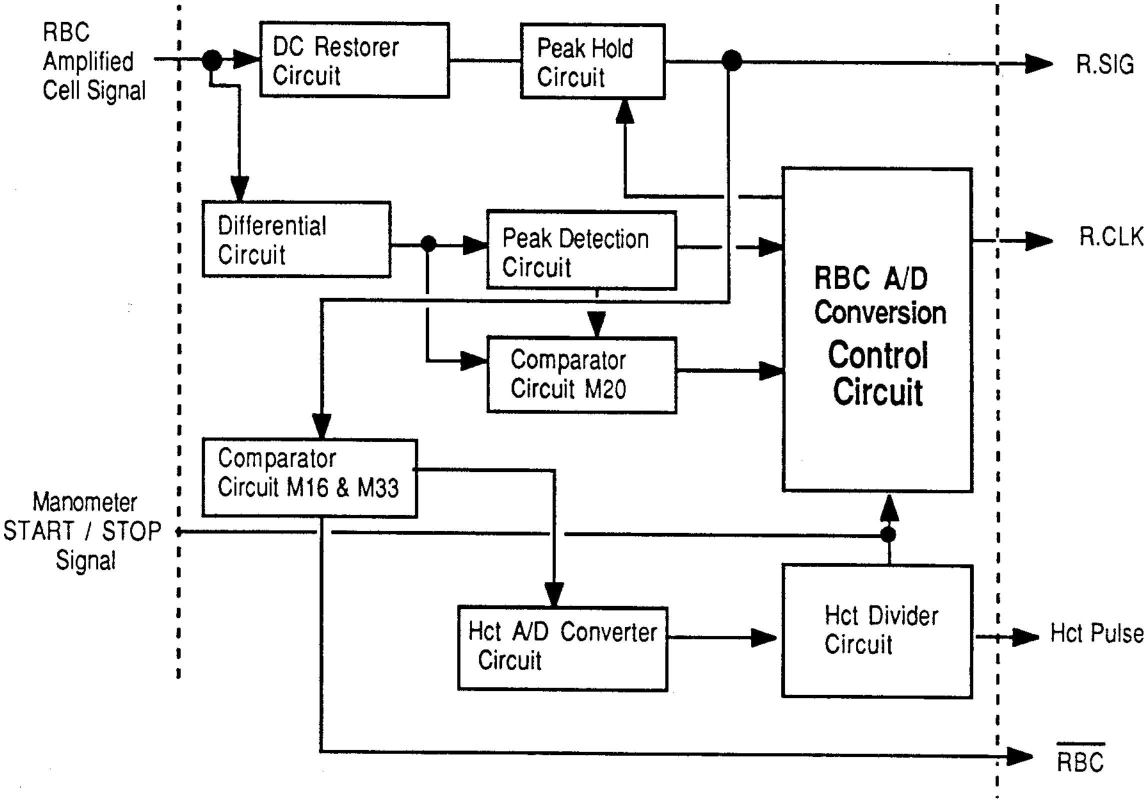


Figure 5-9 RBC Wave Processing Circuit Block Diagram
(Hct A/D Converter Circuit)

4. Hct A/D Converter and Divider Circuits

Hct A/D Converter and Divider Circuits are included in RBC Wave Processing Circuit Diagram (Figure 5-9). Saw-tooth wave form generator and Hct A/D Converter circuit generates the pulse of which width is proportional to the pulse height of each RBC cell signal. A Clock Pulse (10 MHz) Generator is provided in the Hct divider circuit. The clock pulse will be used as a Hct serial pulse after divided in M18 and M19. The clock pulse will be used as a Hct serial pulse after divided in M18 and M19. These pluses are output to Hct Counter Circuit on PCB No.6314, and counted to obtain Hct value.

5. PLT Wave Processing Circuit

Figure 5-10 shows the PLT Wave Processing Circuit Block Diagram.

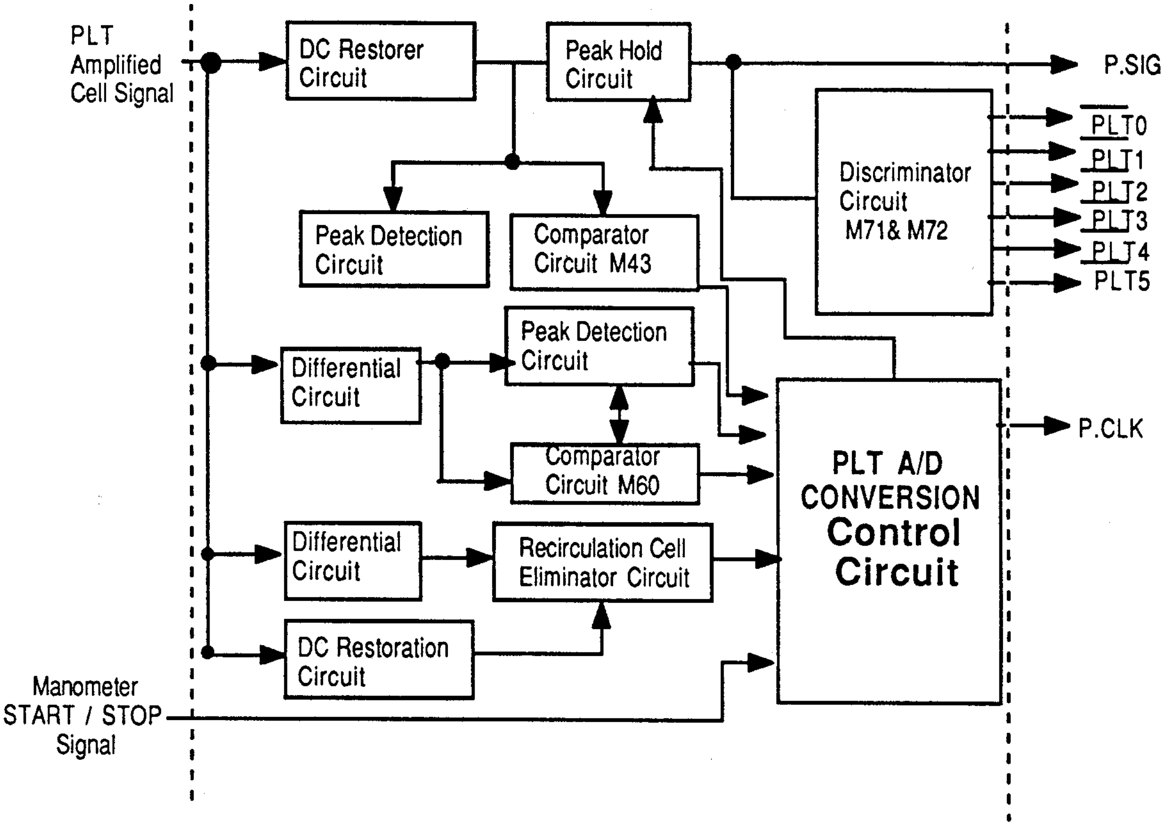


Figure 5-10 PLT Wave Processing Circuit Block Diagram

1) P.SIG

Amplified PLT Cell signals is processed by this circuit. P.SIG. is the reshaped PLT cell signal by the Peak Hold Circuit. Abnormal shape pulses of which PLT cell passes through near the edge of aperture are monitored, controlled and reshaped to the normal shaped pulse through Peak Hold and PLT A/D Conversion Control Circuit. RBC cell signal and recirculated RBC cell signal are eliminated the Recircuration Cell Eliminator Circuit, PLT Peak Detection Circuit, and PLT A/D Conversion Control Circuit. If optional PDA board is installed in the system, P.SIG. is sent to PDA board directly to obtain the PLT Cell size distribution data. P.SIG may include the small RBC signal, and electronic noise. Such a signals will be controlled and eliminated from PLT data by Auto Discrimination Analysis of the PDA board.

2) PLT0 - PLT5 SIG.

The PLT0 - PLT5 signals are the PLT pulses discriminated by the different threshold level. The PLT0 is the signal of the lowest discriminator level (PLT lower discri.). The data of PLT2 - PLT5 are used to determine the ideal upper discriminator point of respective sample by the CPU. The PLT result is computed from the number of pulses between PLT0 and expected discriminator point by CPU.

PLT1 is used to monitor small or giant platelet.

3) P.CLK

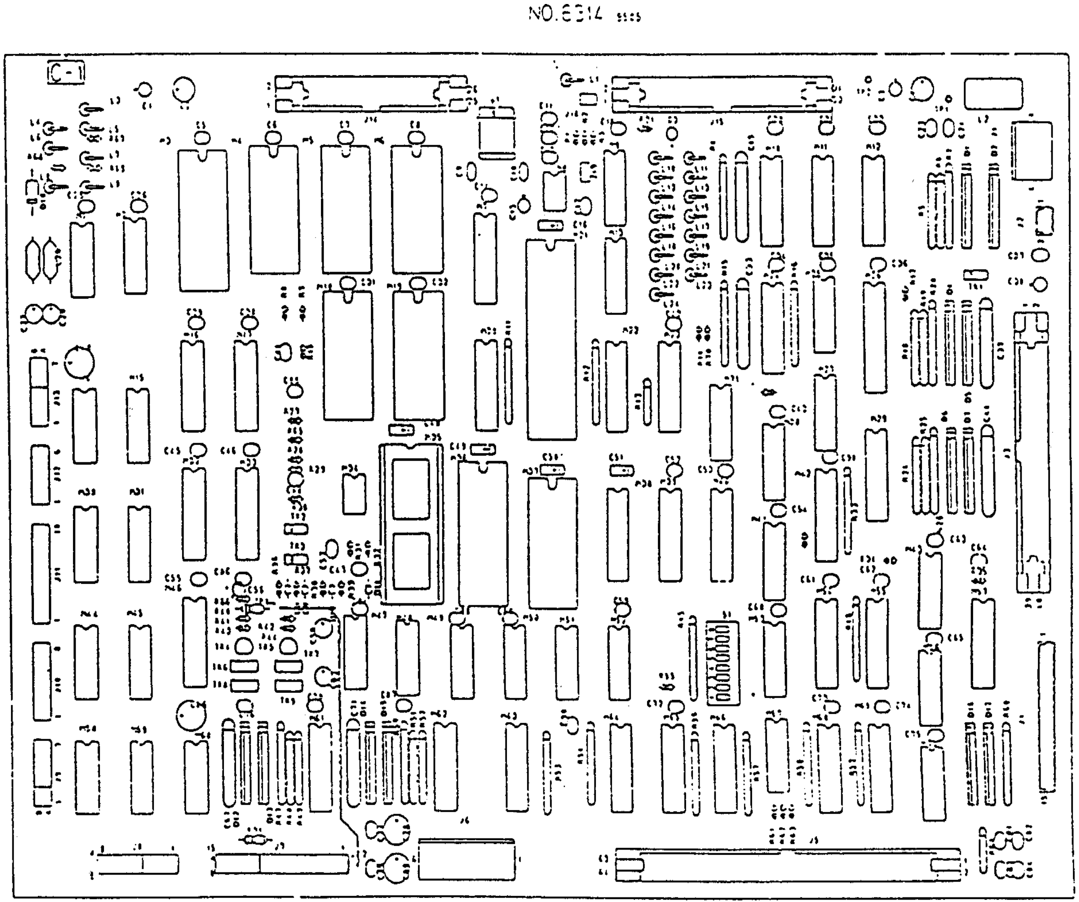
P. CLK is the Clock Signal for PLT Counter on PCB No.6314 while PLT0 - PLT5 signals are opening the counter gate. P.CLK pulse (6msec.) is input to the counter.

5.5. PCB No. 6314 (CPU board)

5.5.1 Description

PCB.No. 6314 is consisted of following circuits;

- CPU Circuit
- Reset Circuit
- Clock Generator Circuit
- Address Decoder Circuit
- Memory Circuit
- PDA Interface Circuit
- LCD, Key pad Interface Circuit
- Built-in printer Interface Circuit
- Parallel Interface Circuit
- Serial Interface Circuit
- Driver / Sensor Interface Circuit
- Analog Interface Circuit
- Counter Circuit



A Figure 5-11 Drawing of PCB No. 6314

Figure 5-12 shows the Block diagram of PCB No. 6314.

SYM	ECR NO.	SERIAL NO.
A	395G033	K-1000 B6438- K-800 A2022-

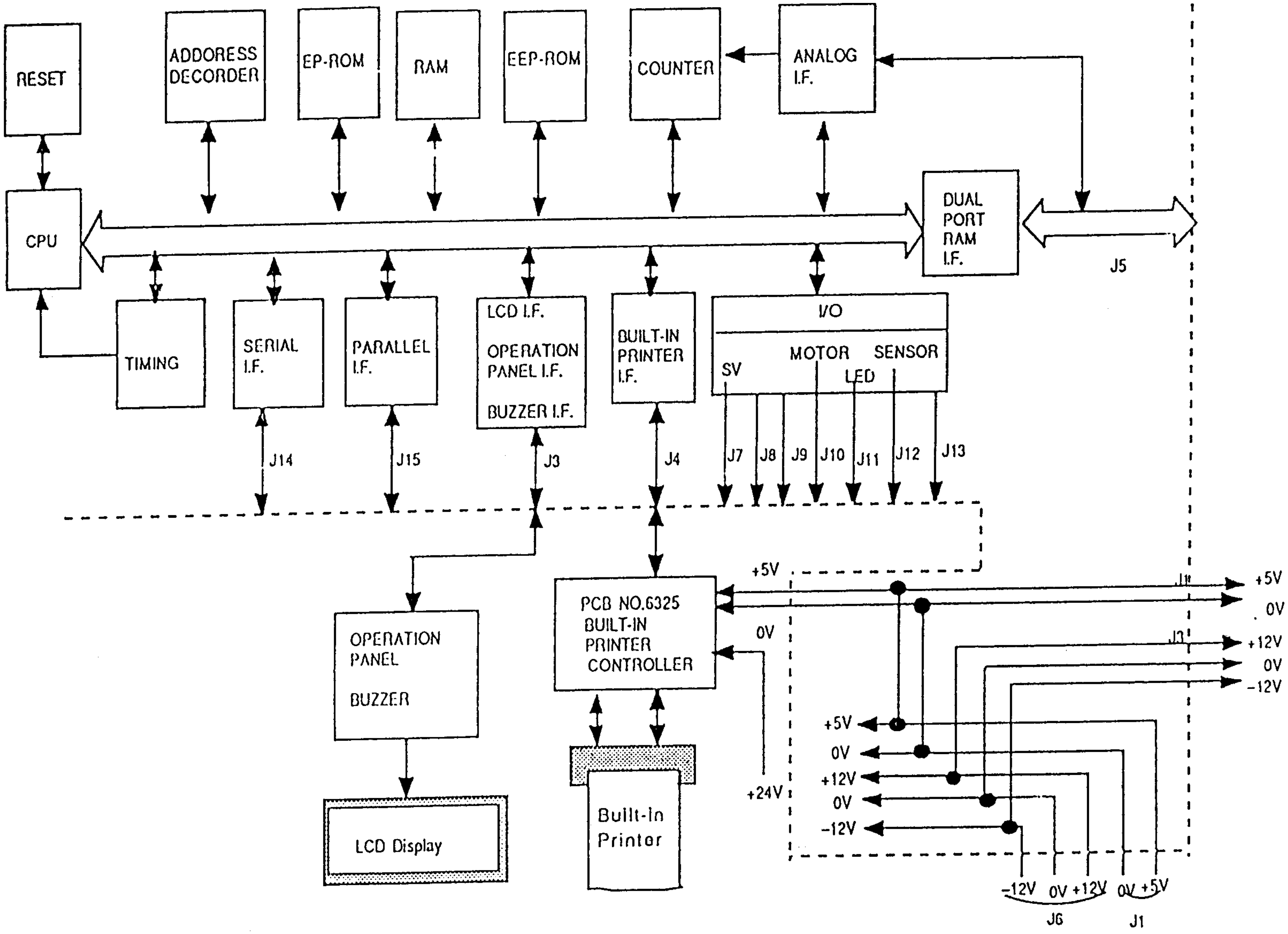


Figure 5-12 PCB No. 6314 Block Diagram

1. CPU Circuit

The 80C85A (Clock 3.072 MHz / C-MOS type of 8085A) is used as CPU. D3 lights when.ALE signal level turns High.

Interrupt Inputs of the CPU (80C85A) are used as follows;

TRAP	:not used
RST 7.5	:Clock Interrupt on every 20 ms
RST 6.5	:Built -in Printer Ready
RST 5.5	:82C51A R x RDY and T x RDY
INTR	:not used

2. Reset Circuit

This circuit monitors 5 V-DC by voltage monitoring IC (M8 / MB 3711), and reset the CPU when the power is turned on or 5.0 V-DC power source drops under 4.2 V-DC (±2.5%).

3. Clock Generator Circuit

M4 (82C53-5) makes following timing clocks by dividing CPU clock.

Counter	Dividing Rate	Clock	Use for
0	1/61440	50 Hz	Clock Interrupt on every 20 ms Alarm Timer
1			Serial Interface Baud Rate
	1/320		9600 bps
	1/640		4800 bps
	1/640		2400 bps
	1/1280		1200 bps
	1/5120		600 bps
	1/10240		300 bps
2	1/8	384 kHz	Parallel Interface (Built-in printer/Ext-printer) STB Signal Timing

Table 5-1

4. Address Decoder Circuit

In order to use the address Area effectively, Memory bank will be selected and decoded by M39 and M38 through CPU. I/O will be selected by M49, M50,M51 and M52.

5. Memory Circuit

(1) EP-ROM

Either of 128 kB (27C1001) or 64 kB (27C512) EP ROM could be mounted on ROM socket (M35) for program storage. If27C512 should be mounted on this IC socket, 1st pin of EP-ROM must be mounted into 3rd position of the ROM socket (M35).

(2) EEP-ROM

EEP-ROM (DQ2816A SEEQ / 2 k byte) is mounted on M37 for storage of Preset data. To write data on this chip 10 m sec./byte is required. This chip cannot be used for such as analyzed data storage, because re-writing for this chip is limited up to just 10000 times / byte.

(3) RAM

S-RAM (MB84256 / 32 k byte) is mounted on M36. Battery Backed-Up is not required for this S-RAM.

6. PDA (PCB No.6315) Interface Circuit

If optional PDA board (PCB No.6315) is mounted on the system, the communication to PCB No. 6315 with 6314 (CPU board) is performed through the Dual Port RAM (2 k byte) on PCB NO. 6315.

This circuit is consisted of following Input/Output Circuits.

* Address Bus
* Data Bus
* Control Signal
* Interrupt Output
* READY Input

7. LCD, Key Board Interface Circuit

This Circuit is the Input/Output circuit for 18 switches, Alarm buzzer, and LCD Display. CPU and LCD Display is connected through the Key Pad Block.

8. Built-in Printer Interface Circuit

The BUSY signal from the Built-in printer is input to RST 6.5 of CPU (80C85A). The data for the Built-in Printer (8 bit parallel) is output from J4 of PCB No. 6314 to the printer.

9. Parallel Output Interface (Centronics Type / for External Printer)

The 8 bit Data for External Printer is output from J15 (36 pins / Centronics type).

10. Serial Interface (RS232C Type)

Serial Interface (RS232C) is provided on this PCB. M3 (82C51A) is used as the Serial Interface controller, M1 (MC145406) is used as Serial I.F. Driver and Receiver.

11. Driver / Sensor Circuit

This circuit is provided to drive electrical parts and to input signals of several sensors used in the K-1000 system.
Following electrical parts are driven by this circuit;

* Solenoid Valves (12 V-DC)
* Electro Magnetic Counter
* Stepping Motor (positive / negative turn, for driving Rinse Cup)
* Output for LED (Ready)

And, following Sensor Signal is input to this circuit;

- Float Switches (Waste chamber, Diluent Chamber, WBC / Hgb Lysing Reagent Chamber)
- 2 kg/cm^2 pressure sensor
- Rinse Cup Limit Switch.(Upper, Lower)
- SRV Limit Switch (Right, Left)

12. Analog Interface Circuit

Several Interface Circuits are provided to input or output for the Analog circuit (PCB No.2062);

1) Input

* WBC Manometer START Signal
* STOP Signal
* RBC Manometer START Signal
* STOP Signal
* Diluent Temperature High Signal
* Diluent Temperature Low Signal
* 2 kg/cm^2 Pressure Error
* WBC0 and WBC1 Signal
* RBC Signal
* PLT0 - PLT5 Signal
* W.CLK (WBC Counter Clock Signal)
* R.CLK (RBC Counter Clock Signal)
* P.CLK (PLT Counter Clock Signal)
* Hct Pulse
* Hgb Pulse

2) Output

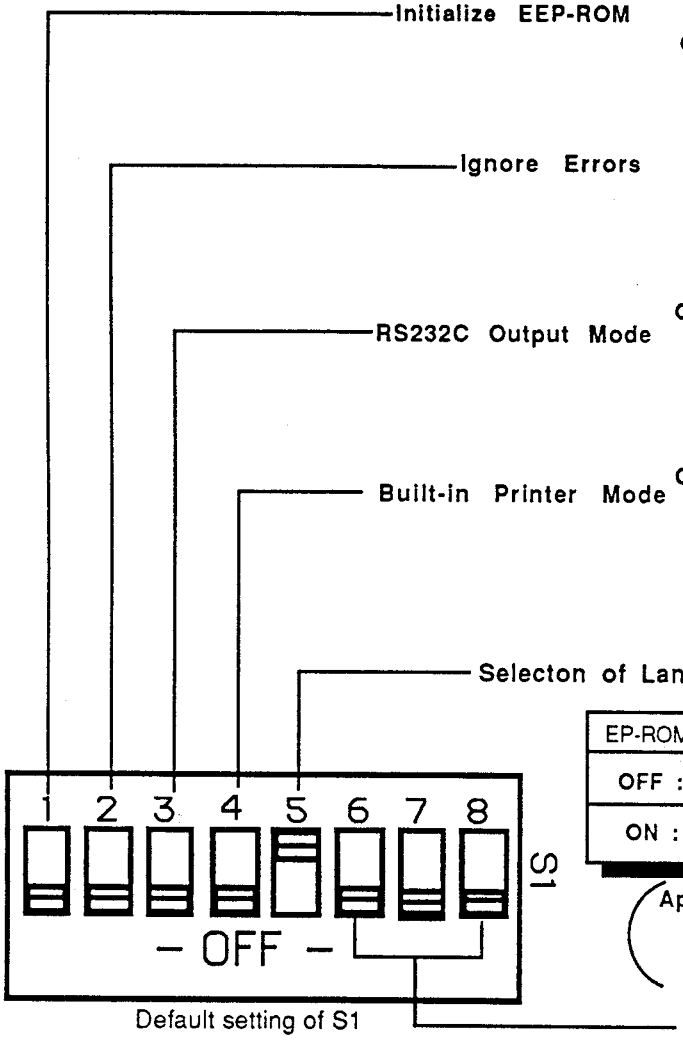
* Hgb Start Signal
* WBC Aperture Current ON Signal
* RBC Aperture Current ON Signal

13. Counter Circuit

This circuit is consisted of 11 of 16 bit’s counter by M5, M6, M18, M19, (82C53-5).

5.5.2. Hard ware setting of DIP switch S1 on PCB No.6314

The functions of DIP switch S1 on PCB No.6314 are shown as below;



Initialize EEP-ROM

OFF : Initializing EEP-ROM is not performed.(Normal operation)

ON : EEP-ROM is initialized when the Power of system is turned ON.

Ignore Errors

OFF : Normal Operation

ON : "NO DUILUENT", "NO WBC REAGENT ", and " NO HGB REAGENT" etc Errors are ignored.

RS232C Output Mode

OFF : Normal Operation

ON : Back Ground Data and Analyzed Data at sample ID No.= "0" are output from RS232C port.

Built-in Printer Mode

OFF : Normal Operation

ON : Analyzed Data are not printed out on Built-in Printer. Only Error Massages are printed out in this mode. (Factry Inspection use only)

Selecton of Language for Built-in Printer and LCD

EP-ROM	1K1 or 4K1	1K2 or 4K2	1K3 or 4K3
OFF :	Japanese	German	French
ON :	Italian	**English**	Spanish

Applicable Version Number :
1K1 – 1K3 : 00–04 and thereafter
4K1 – 4K3 : 00–00 and thereafter

Default setting of S1

Bit 6-8 are not used.

Figure 5-13 Settings for S1 on PCB No.6314

5.5.3. Input / Output Signals

Table 5-2 J1 : 5 V-DC Power Source (for Digital Circuits)

Pin.No	Mnemonic	FROM/TO	IN/OUT	Pin No.	Mnemonic	FROM/TO	IN/OUT
1	GND	PW Supply	IN	2	5V-DC	PW Supply	IN
3	5V-DC	PDA	OUT	4	5V-DC	PDA	OUT

NOTE:

"PDA" in the "FROM/TO" column indicates Particle Distribution Analysis PCB (PCB No. 6315), and "PW Supply" indicates Power supply.

Table 5-3 J2 : 5 V-DC Power Source to Built-in Printer (2 pins)

Pin.No.	Mnemonic	FROM/TO	IN/OUT	Pin No.	Mnemonic	FROM/TO	IN/OUT
1	GND	Built-in Pr.	OUT	2	5V-DC	Built-in Pr.	OUT

Table 5-4 J3 : To Key Pad / LCD Display panel (40 pins)

PIN No.	Mnemonic / Description	IN /OUT	Pin No	Mnemonic /Description	IN /OUT
1	LCD D7	OUT	2	0 V	OUT
3	LCD D6	OUT	4	0 V	OUT
5	LCD D5	OUT	6	0 V	OUT
7	LCD D4	OUT	8	0 V	OUT
9	LCD D3	OUT	10	0 V	OUT
11	LCD D2	OUT	12	0 V	OUT
13	LCD D1	OUT	14	0 V	OUT
15	LCD D0	OUT	16	0 V	OUT
17	LCD E	OUT	18	0 V	OUT
19	LCD R/W	OUT	20	0 V	OUT
21	LCD RS	OUT	22	0 V	OUT
23	Vee	IN	24	GND	IN
25	Vcc 5 V	IN	26	5 V	IN
27	Vss 0 V	IN	28	SCAN 2	OUT
29	SCAN 1	OUT	30	SCAN 0	OUT
31	ALARM	OUT	32	-	-
33	KEY 7	IN	34	KEY 6	IN
35	KEY 5	IN	36	KEY 4	IN
37	KEY 3	IN	38	KEY 2	IN
39	KEY 1	IN	40	KEY 0	IN

Table 5-5 J4 : To Built-in Printer Control Board (15 pins)

PIN No.	Mnemonic	IN /OUT	Pin No.	Mnemonic	IN /OUT
1	GND	OUT	2	INIT/	OUT
3	PE	OUT	4	FEED/	OUT
5	BUSY	OUT	6	STB/	OUT
7	D 0	OUT	8	D 1	OUT
9	D 2	OUT	10	D 3	OUT
11	D 4	OUT	12	D 5	OUT
13	D 6	OUT	14	D 7	OUT
15	ERR/	IN			

Table 5-6 J5 : To PCB No. 2062 (Analog) & PCB 6315

(64 pins)

Pin.No	Mnemonic	FROM/TO	IN/OUT	Pin No.	Mnemonic	FROM/TO	IN/OUT
1	R. STOP	ASP	OUT	2	R.START	ASP	OUT
3	W.STOP	ASP	OUT	4	W.START	ASP	OUT
5	WBC1	ASP	IN	6	WBC0	ASP	OUT
7	W.CLK	ASP	IN	8	RBC	ASP	IN
9	HCT/	ASP	IN	10	R.CLK	ASP	IN
11	PLT5	ASP	IN	12	PLT4	ASP	IN
13	PLT3	ASP	IN	14	PLT2	ASP	IN
15	PLT1	ASP	IN	16	PLT1	ASP	IN
17	P.CLK	ASP	IN	18	HGB	ASP	IN
19	HGB START	ASP	OUT	20	W.TD.ON	ASP	OUT
21	R.TD.ON	ASP	IN	22	TEMP.H	ASP	IN
23	TEMP.L	ASP	IN	24	PRESS	ASP	IN
25	+ 15 V	PDA	OUT	26	+ 15 V	PDA	OUT
27	+ 15 V	PDA	OUT	28	GND	PDA	OUT
29	W.SIG	PDA	OUT	30	GND	PDA	OUT
31	R.SIG	PDA	OUT	32	GND	PDA	OUT
33	P.SIG	PDA	OUT	34	GND	PDA	OUT
35	- 15 V	PDA	OUT	36	GND	PDA	OUT
37	-15 V	PDA	OUT	38	-15 V	PDA	OUT
39	AD 10	PDA	OUT	40	AD 9	PDA	OUT
41	AD 8	PDA	OUT	42	AD 7	PDA	OUT
43	AD 6	PDA	OUT	44	AD 5	PDA	OUT
45	AD 4	PDA	OUT	46	AD 3	PDA	OUT
47	AD 2	PDA	OUT	48	AD1	PDA	OUT
49	AD 0	PDA	OUT	50	WE	PDA	OUT
51	RD	PDA	OUT	52	DPRCE	PDA	OUT
53	S1	PDA	OUT	54	INT	PDA	OUT
55	0 V	PDA	OUT	56	READY	PDA	OUT
57	D 7	PDA	OUT	58	D 6	PDA	OUT
59	D 5	PDA	OUT	60	D 4	PDA	OUT
61	D 3	PDA	OUT	62	D 2	PDA	OUT
63	D 1	PDA	OUT	64	D 0	PDA	OUT

NOTE: “ASP.” in the “FROM/TO” column indicates Analog Signal Processing PCB (PCB No.2061), and “PDA” indicates Particle Distribution Analysis PCB (PCB No. 6315).

Table 5-7 J6 : ±12 V Power Source Connecter (6 pins)

Pin.No.	Mnemonic	FROM/TO	IN/OUT	Pin No.	Mnemonic	FROM/TO	IN/OUT
1	-12 V	PW.S.	IN	4	-12 V	PDA	OUT
				5	GND	PDA	OUT
2	GND	PW.S.	IN	6	+12 V	PDA	OUT
3	+12 V	PW.S.	IN				

NOTE: “P.S.” in the “FROM/TO” column indicates power supply, and “PDA” indicates Particle Distribution Analysis PCB (PCB No. 6315).

Table 5-8 J7 : To Sensor Connector (30 pins)

Pin.No.	Mnemonic	FROM / TO	IN/OUT	Pin No.	Mnemonic	FROM / TO	IN/OUT
1A	WC	Waste C. Float SW	IN	1B	GND	Waste C. Float SW	IN
2A	HB.REG	Hgb Lyse C. Float SW	IN	2B	GND	Hgb Lyse C. Float SW	OUT
3A	W.REG	WBC Lyse C. Float SW	IN	3B	+12 V	WBC Lyse C. Float SW	OUT
4A	DIL	Diluent C. Float SW	IN	4B	DIL GND	Diluent C. Float SW	
5A	CP. START	CP. Start Switch	IN	5B	Reserved	Reserved	
6A	-	-	IN	6B	-	-	
7A	MR. UP LM	Motor Up Limit Switch	IN	7B	GND	Motor Up Limit Switch	IN
8A	MR. DW LM	Motor Down Limit Switch	IN	8B	GND	Motor Down Limit Switch	IN
9A	START SW	START Switch	IN	9B	GND	START Switch	IN
10A	SRV R	SRV Right Switch	IN	10B	GND	SRV Right Switch	IN
11A	SRV L	SRV Left Switch	IN	11B	GND	SRV Left Switch	IN
12A	CUT	-	-	12B	-	-	-
13A	LED	LED (READY)	OUT	13B	GND	LED (READY)	OUT
14A	Reserved	-	-	14B	-	-	-
15A	MR.UP(+)	DC-Motor Power Supply	OUT	15B	MR.DW(-)	DC-Motor Power Supply	-

Table 5-9 J8 : To Optional Cap Piercer (18 pins)

Pin.No.	Mnemonic	FROM / TO	IN/OUT	Pin No.	Mnemonic	FROM / TO	IN/OUT
1A	CP. SEN.4	RV* Upper Limit SW	IN	4B	GND	RV* Upper Limit SW	IN
2A	CP.SEN.3	RV* Lower Limit SW	IN	3B	GND	RV* Lower Limit SW	IN
3A	CP.SEN.2	Piercer Upper Limit SW	IN	3B	GND	Piercer Upper Limit SW	IN
4A	CP.SEN.1	Piercer Lower Limit SW	IN	4B	GND	Piercer Lower Limit SW	IN
5A	CUT	--	OUT	5B	----		OUT
6A	0 V	SV35	OUT	6B	12 V-DC	SV35	OUT
7A	0 V	SV34	OUT	7B	12 V-DC	SV34	OUT
8A	0 V	SV33	OUT	8B	12 V-DC	SV33	OUT
9A	0 V	SV32	OUT	9A	12 V-DC	SV32	OUT

Table 5-10 J-9 : To Solenoid Valves (14 pins)

Pin.No.	Mnemonic	FROM/TO	IN/OUT	Pin No.	Mnemonic	FROM/TO	IN/OUT
1A	E.M.Counter	E.M. Counter	OUT	1B	12 V-DC	E.M. Counter	OUT
2A	0 V	SV25	OUT	2B	12 V-DC	SV25	OUT
3A	0 V	SV24	OUT	3B	12 V-DC	SV24	OUT
4A	0 V	SV23	OUT	4B	12 V-DC	SV23	OUT
5A	0 V	SV22	OUT	5B	12 V-DC	SV22	OUT
6A	0 V	SV21	OUT	6B	12 V-DC	SV21	OUT
7A	N.C.	-	-	7B	CUT	-	-

Table 5-11 J10 : Solenoid Valves Connector (16 pins)

Pin.No.	Mnemonic	FROM/TO	IN/OUT	Pin No.	Mnemonic	FROM/TO	IN/OUT
1A	N.C.	-	-	1B	12 V-DC	-	-
2A	0 V	SV20	OUT	2B	12 V-DC	SV20	OUT
3A	0 V	SV19	OUT	3B	12 V-DC	SV19	OUT
4A	0 V	SV18	OUT	4B	12 V-DC	SV18	OUT
5A	0 V	SV17	OUT	5B	12 V-DC	SV17	OUT
6A	0 V	SV16	OUT	6B	12 V-DC	SV16	OUT
7A	0 V	SV15	OUT	7B	12 V-DC	SV15	OUT
8A	CUT	-	-	8B	12 V-DC	-	-

Table 5-12 J11 : To Solenoid Valves Connector (20 pins)

Pin.No.	Mnemonic	FROM/TO	IN/OUT	Pin No.	Mnemonic	FROM/TO	IN/OUT
1A	N.C.	SV14	OUT	1B	12 V-DC	SV14	OUT
2A	0 V	SV13	OUT	2B	12 V-DC	SV13	OUT
3A	0 V	SV12	OUT	3B	12 V-DC	SV12	OUT
4A	0 V	SV11	OUT	4B	12 V-DC	SV11	OUT
5A	0 V	SV10	OUT	5B	12 V-DC	SV10	OUT
6A	0 V	SV9	OUT	6B	12 V-DC	SV9	OUT
7A	0 V	SV8	OUT	7B	12 V-DC	SV8	OUT
8A	0 V	SV7	OUT	8B	12 V-DC	SV7	OUT
9A	0 V	SV6	OUT	9B	12 V-DC	SV6	OUT
10A	CUT	-	-	10B	12 V-DC	-	-

Table 5-13 J12 : To Solenoid Valves Connector (12 pins)

Pin.No	Mnemonic	FROM/TO	IN/OUT	Pin No.	Mnemonic	FROM/TO	IN/OUT
1A	0 V	SV5	OUT	1B	12 V-DC	SV5	OUT
2A	0 V	SV4	OUT	2B	12 V-DC	SV4	OUT
3A	0 V	SV3	OUT	3B	12 V-DC	SV3	OUT
4A	0 V	SV2	OUT	4B	12 V-DC	SV2	OUT
5A	0 V	SV1	OUT	5B	12 V-DC	SV1	OUT
6A	CUT	-	OUT	6B	12 V-DC	-	-

Table 5-14 J13 : To Solenoid Valves Connector (14 pins)

Pin.No	Mnemonic	FROM/TO	IN/OUT	Pin No.	Mnemonic	FROM/TO	IN/OUT
1A	0 V	SV31	OUT	1B	12 V-DC	SV31	OUT
2A	0 V	SV30	OUT	2B	12 V-DC	SV30	OUT
3A	0 V	SV29	OUT	3B	12 V-DC	SV29	OUT
4A	0 V	SV28	OUT	4B	12 V-DC	SV28	OUT
5A	0 V	SV27	OUT	5B	12 V-DC	SV27	OUT
6A	0 V	SV26	OUT	6B	12 V-DC	SV26	OUT
7A	CUT	-	OUT	7B	12 V-DC	-	-

Table 5-15 J14 : To RS232C Serial Interface Connector (26 pins)

PIN No.	Mnemonic	IN /OUT	Pin No	Mnemonic	IN /OUT
1	FG (GND)	OUT	2	-	-
3	SD (TXD)	OUT	4	-	-
5	RXD	IN	6	-	-
7	RTS	IN	8	-	-
9	CTS	IN	10	-	-
11	DSR	IN	12	-	-
13	SG (GND)	OUT	14	DTR	OUT
15	-	-	16	-	-
17	-	-	18	-	-
19	-	-	20	-	-
21	-	-	22	-	-
23	-	-	24	-	-
25	-	-	26	-	-

Table 5-16 J-15 : To Parallel Interface (Centronics) Connector (36 pins)

PIN No.	Mnemonic	IN /OUT	Pin No	Mnemonic	IN /OUT
1	STROBE/	OUT	2	SG (GND)	OUT
3	DATA 0	OUT	4	SG (GND)	OUT
5	DATA 1	IN	6	SG (GND)	OUT
7	DATA 2	IN	8	SG (GND)	OUT
9	DATA 3	IN	10	SG (GND)	OUT
11	DATA 4	IN	12	SG (GND)	OUT
13	DATA 5	OUT	14	SG (GND)	OUT
15	DATA 6	-	16	SG (GND)	OUT
17	DATA 7	-	18	SG (GND)	OUT
19	ACK	-	20	SG (GND)	OUT
21	BUSY	-	22	SG (GND)	OUT
23	PE	-	24	SG (GND)	OUT
25	SELECT	-	26	INIT	OUT
27	-	-	28	ERR	IN
29	-	-	30	-	-
31	-	-	32	-	-
33	FG (GND)	-	34	-	-
35	-	-	36	-	-

5.6. Hgb Unit

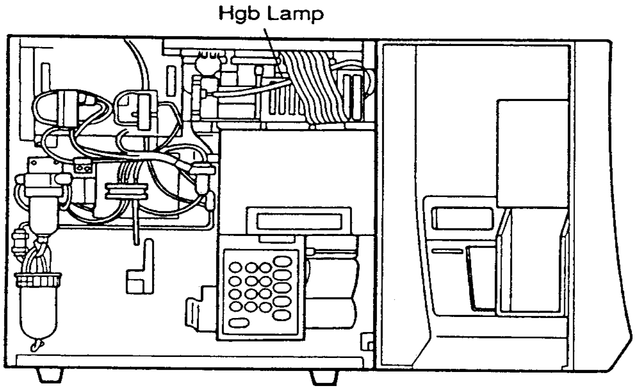


Figure 5-13 Location of Hgb Unit No.6 Assembly

5.6.1. Function

Hgb data is obtained using the following formula;
Hgb data = Sample A/D Conversion value - Blank A/D Conversion Value

Sample : Measured at sequence-11.
Blank : Measured at sequence-4.
(These values are printed out in the Extended data. Refer section 8.3.)

A/D conversion is performed five times at each sequence and the second lowest result of them is taken as the Sample and Blank value.

Hgb pulse obtained by P.C.B. No.2052 is sent to the Hgb counter circuit on the P.C.B. No. 6314 and Hgb conversion value is obtained using a reference clock pulse (1 MHz). Hgb error will be displayed if the Hgb Conversion value is out of present range as shown below.

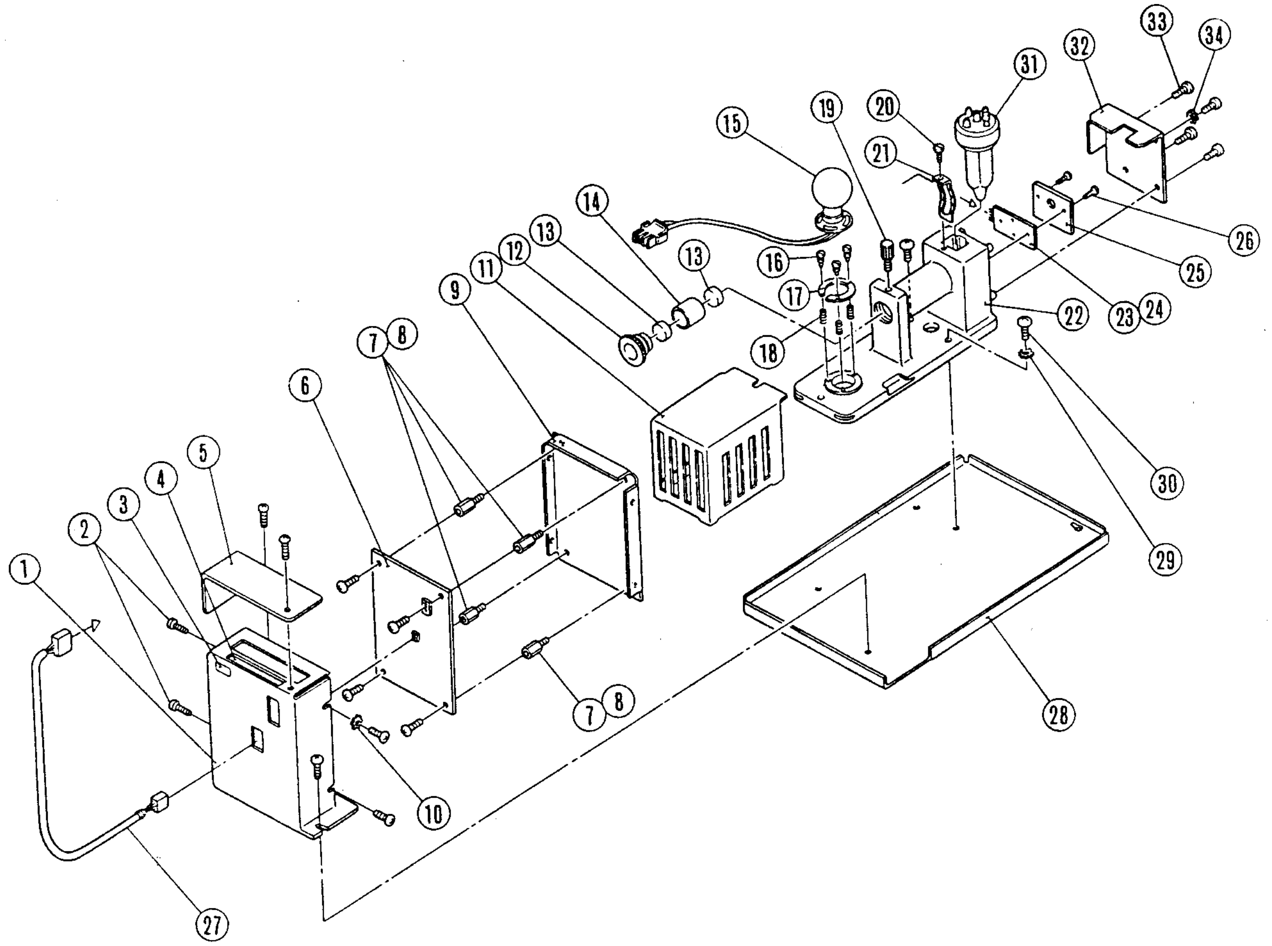
Blank Value : Less than 50 or more than 1000
Sample Value : Less than 50 or more than 4600

Drain of Hgb Blank Diluent in the Hgb Flow Cell are verified as follows;
In Seq-4, Hgb conversion is continuously performed 20 times at 20 m sec. interval after Hgb blank conversion to verify drain of blank diluent (or to detect Hgb Blank Diluent Error). The maximum value out of these 20 times conversion indicates converting value when the meniscus of Hgb blank diluent passes in front of CDS on its way to waste chamber. The maximum value (MENIS.) can be verified by the Extended data in the maintenance mode as “MENIS.:”. (Refer section 8.3.) Error message “DILUENT ERR-HGB BLANK” will be printed out by the Built-in Printer if one of following condition is satisfied;

1) Blank Value $\geqq$ MENIS.Value

2) MENIS.Value $\leqq$ Blank Value + 30

5.6.2. HGB Unit No. 10 illustration



1	322-1534-8	COVER NO. 140-A
2	348-3912-6	SCREW BINDING M3x6 (SUS)
3	369-7049-7	INDICATION MARK NO. 49
4	369-7433-0	INDICATION MARK NO.433
5	362-1126-4	COVER GRASS
6	863-2221-1	PCB NO.2052
7	365-7491-7	SPACER P-12 SN-1
8	426-3575-7	LOCK TIGHT 1401B
9	322-1355-1	COVER NO. 140-B
10	348-9343-1	WASHER TOOTH LOCK EXT M3 (FE)
11	368-9805-6	HB LAMP COVER NO.5
12	366-9649-5	LENS HOLDER NO.9
13	421-4077-3	LENS NO.7
14	863-5051-2	FILTER OPTICAL UNIT NO.3 ASSY
15	805-0401-1	HGB LAMP UNIT-2
16	344-5513-6	FIXING SCREW 5-3
17	366-5522-5	LAMP MOUNT-B
18	345-2226-4	SPRING NO. 26
19	344-5514-0	FIXING SCREW 5-4
20	348-3382-4	SCREW ROUND M2.6 x 6
21	345-5072-7	LEAF SPRING NO. 12
22	366-8120-7	HGB MOLDED BLACK
23	863-5062-3	PCB NO.9137 (C-2)
24	426-3150-2	SILICONE COMPOUND CASTLE-800
25	363-1465-3	FIXING METAL NO. 55
26	348-3913-0	SCREW BINDING M3X8 (SUS)
27	873-1401-9	WIRING CORD NO.341
28	366-2934-1	A MOUNTING PLATE NO.174
29	348-9844-5	WASHER TOOTH LOCK EXT M4 (SUS)
30	348-3929-9	SCREW BINDING M4 X 12
31	873-1761-9	FLOW CELL NO.6 ASSY
32	368-9157-2A	SPILL TRAY NO.6
33	348-3911-2	SCREW BINDING M3X4 (SUS)
34	348-9543-1	WASHER TOOTH LOCK EXT M3 (SUS)

5.6.3. PCB No.9137

A CDS cell and a silicone transistor are mounted on this board. This CDS creates an electric voltage when exposed to light. This voltage is approximately proportional to the concentration of sample in the Flow Cell. The change of light absorbance in the Flow cell can be detected by the CDS, resulting its resistance variation. The photo sensor CDS has generally a characteristics to change the resistance by the temperature. A silicone transistor is provided to cancel the temperature fluctuation of CDS.

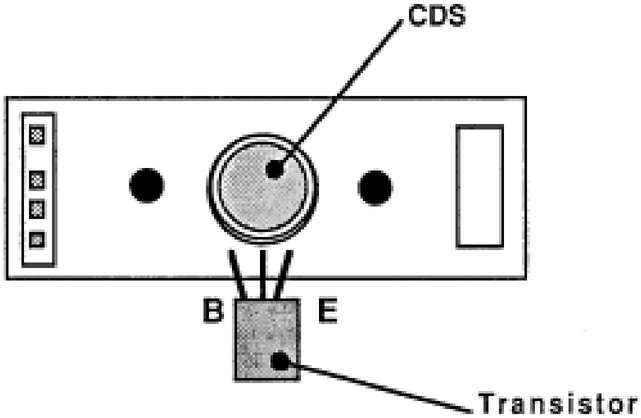


Figure 5-15 PCB No. 9137

5.6.4. PCB No.2052

This circuit board consists of the following circuits;

1. Bridge Circuit
2. Differential Amplifier Circuit
3. Saw Tooth Wave Generator Circuit
4. Comparator Circuit
5. Temperature Compensation Circuit

The Hgb sample and blank values are measured and compared at each cycle to display Hgb result. This board generates a pulse which is proportional to the sample concentration. The blank is measured 5 times at the end of sequence-4 and the second lowest blank value will be memorized in the microcomputer. At the end of sequence-11, the Hgb sample will be measured. The convert order signal (Hgb start signal) is generated five times from the microcomputer, and the 2nd lowest value is adopted to obtain a more stable Hgb data. Hgb data is obtained by the subtraction of the blank from the sample measurements. This P.C. Board is also provided with a temperature compensation circuit which cancels the temperature fluctuation of CDS.

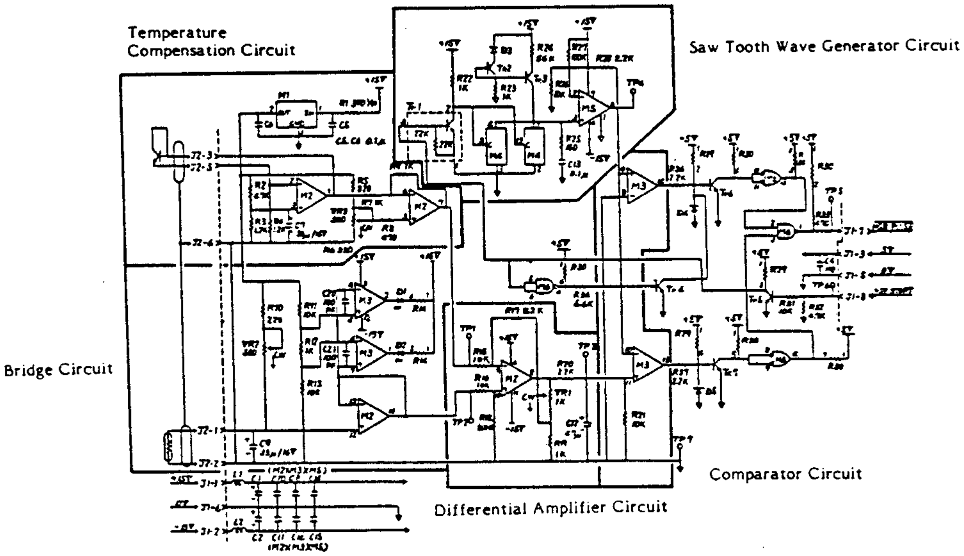


Figure 5-16 P.C.B. No.2052 Circuit Diagram

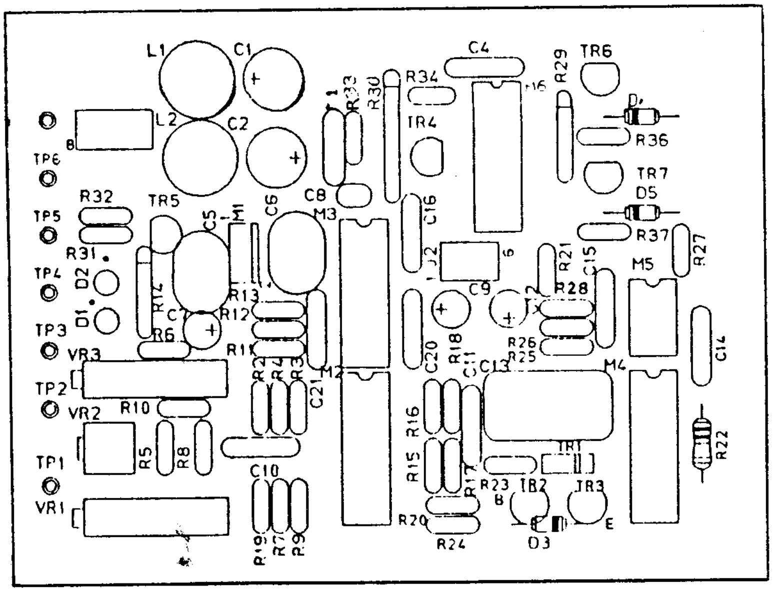


Figure 5-17 PCB No.2052 Assembly Drawing

5.6.5. VRs and Test Points

Table 5-17 Adjustment Points for PCB No. 2052

Adjusting Point	Test Point		Description
		Common	
VR1	——	———	Hgb Gain Adjustment (Refer Section 6.5.)
VR2	TP2	TP7	Offset Voltage Adjustment Adjust VR2 so that the Voltage at TP-2 falls within the following ranges: 2.50 ± 0.10 V-DC
VR3	——	———	Hgb Blank Level Adjustment (Refer Section 6.5.)

See Section 6.5. for the detail

5.7. Power Supply Unit

Block Diagram of the Power Supply Unit is shown as below;

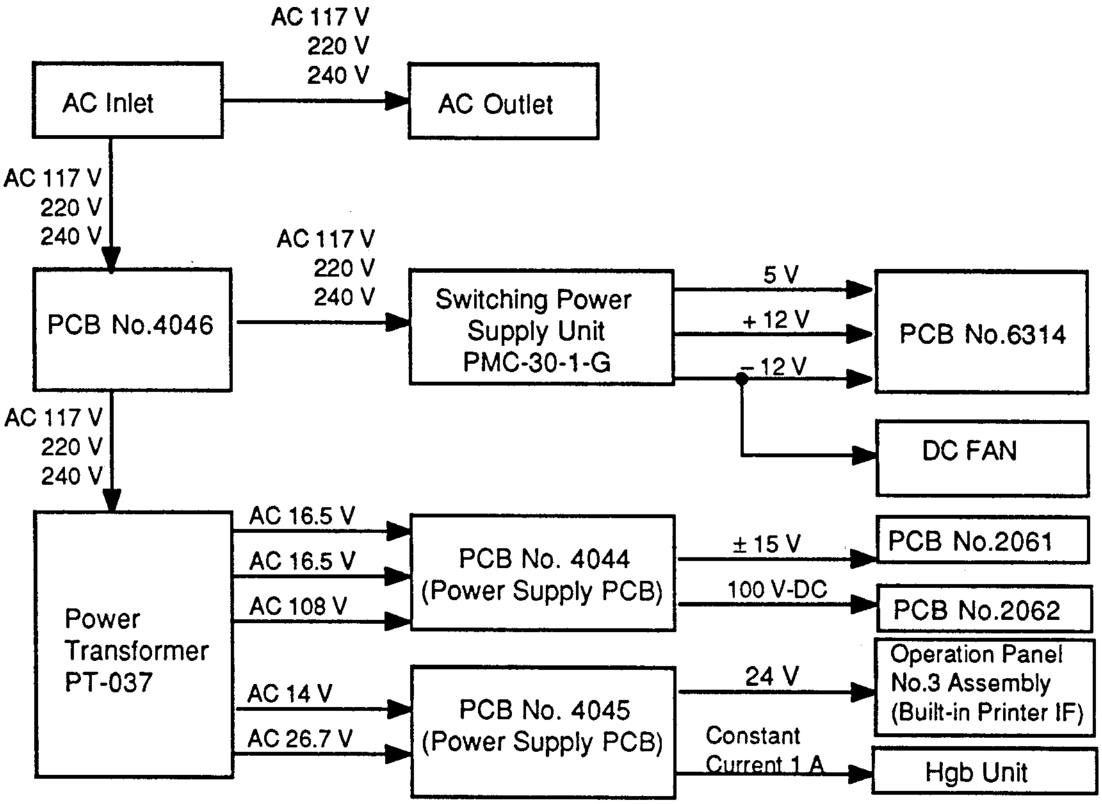


Figure 5-18 Power Supply Unit Block Diagram

5.7.1. PCB No. 4044

5.7.1.1. Function

PCB No. 4044 is the power supply for K-1000, and is consisted following completely independent circuits.

1. 100 V-DC constant voltage supply for making Constant Current in Pre-Amp.
2. ± 15 V-DC constant voltage supply for the analog circuits.

Block diagram of PCB No. 4044 is shown as below. (Figure 5-19)

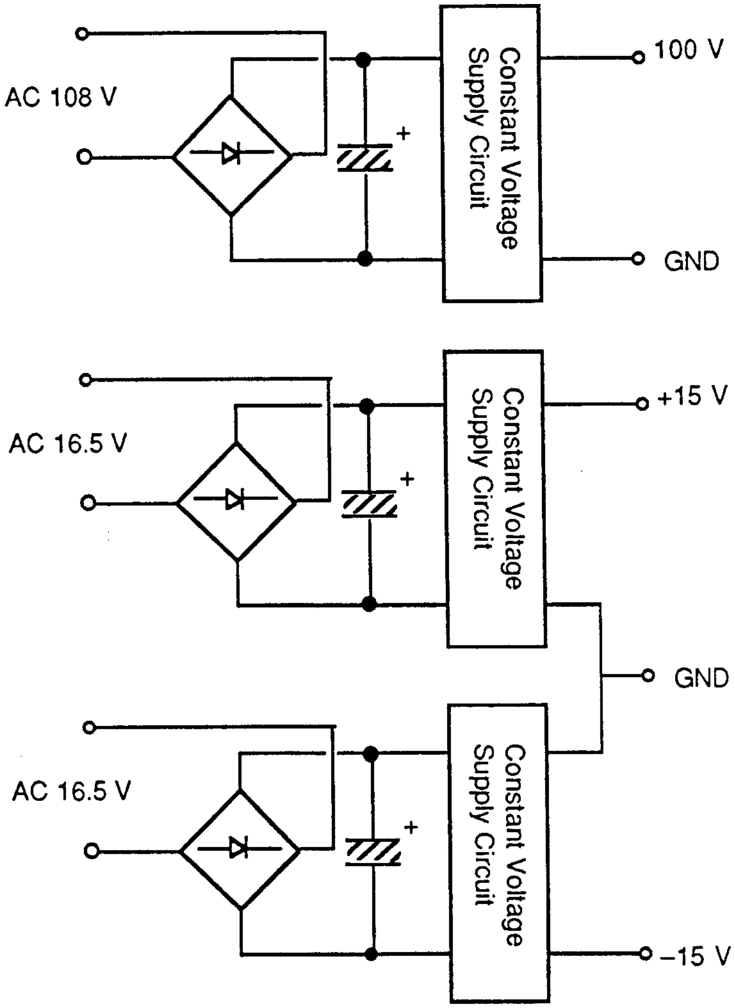


Figure 5-19 PCB .No.4044 Block Diagram

5.7.1.2. Adjustment for PCB No.4044

Table 5-18 Adjustment for PCB No. 4044

Adjusting Point	Test Point		Description
		Common	
VR1	TP1	TP2	Adjust VR1 so that the voltage at TP1 becomes 100 ± 2 V.

5.7.2. PCB No. 4045

5.7.2.1. Function

PCB No. 4045 is also the power supply for K-1000, and is consisted of following completely independent circuits.

1.) 1 A-DC Constant Current Supply for Hgb lamp.
2.) 24 V-DC Constant Voltage Supply for Built-in Printer.

Block diagram of PCB No. 4045 is shown as below. (Figure 5-20)

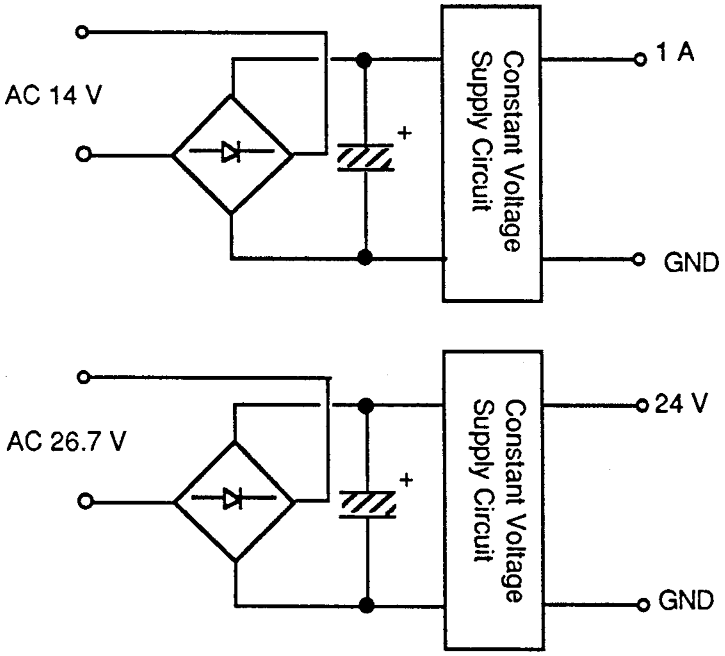


Figure 5-20 PCB .No.4044 Block Diagram

5.7.2.2. Adjustment Point for PCB No.4045

Table 5-17 Adjustment Points for PCB No. 4045

Adjusting Point	Test Point		Description
		Common	
VR1	TP1	TP2	Offset Voltage between TP1 and TP2 for Hgb Lamp Constant Current Adjustment Confirm that the voltage between TP1 and TP2 is 1.429 ± 0.02 V.
None	TP2	TP4	Reference Voltage for Hgb Lamp Constant Current Circuit
None	TP3	TP4	Confirm that the voltage at TP3 is 24 ± 1.0 V.
None	TP4 (GND)	—	—

5.8. Built-in Printer (with PCB No.6325)

1. Operation

The operation of the printer and PCB No.6325 are as follows;

1. When the initializing is performed with the paper loading after the power is turned on, the printer is ready to operate, turning the READY signal to “L” and waiting for the input data.
2. Data transmitted from the host computer is handshaken by STROBE and READY signals and stored in the buffer memory in one byte steps. When a full line data (*)^1 is reached, LF(0AH) or ESC(1BH) code is entered, the all data store in the buffer is printed out. If there is no data before LF code, only line feed takes place.
   (*): When one dot line data is entered, in case of a bit image.
3. Printing is performed in synchronism with the code wheel signal.
4. If the printer head is lifted up with the Head-up Lever during operation or when paper empty condition is encountered, the power to the printer head is shut off and the motor stops, resulting in the BUSY status. This status is maintained until the above condition is cleared. When cleared, the status changes to READY.
5. When the buffer contains no print data, the FEED signal is effective. “L” level of the FEED signal shows BUSY status, providing the paper feed by one line (9 dot lines).
6. If the motor is locked by paper jamming or other reason, the printer will activate the ERROR signal and makes an emergency stop.

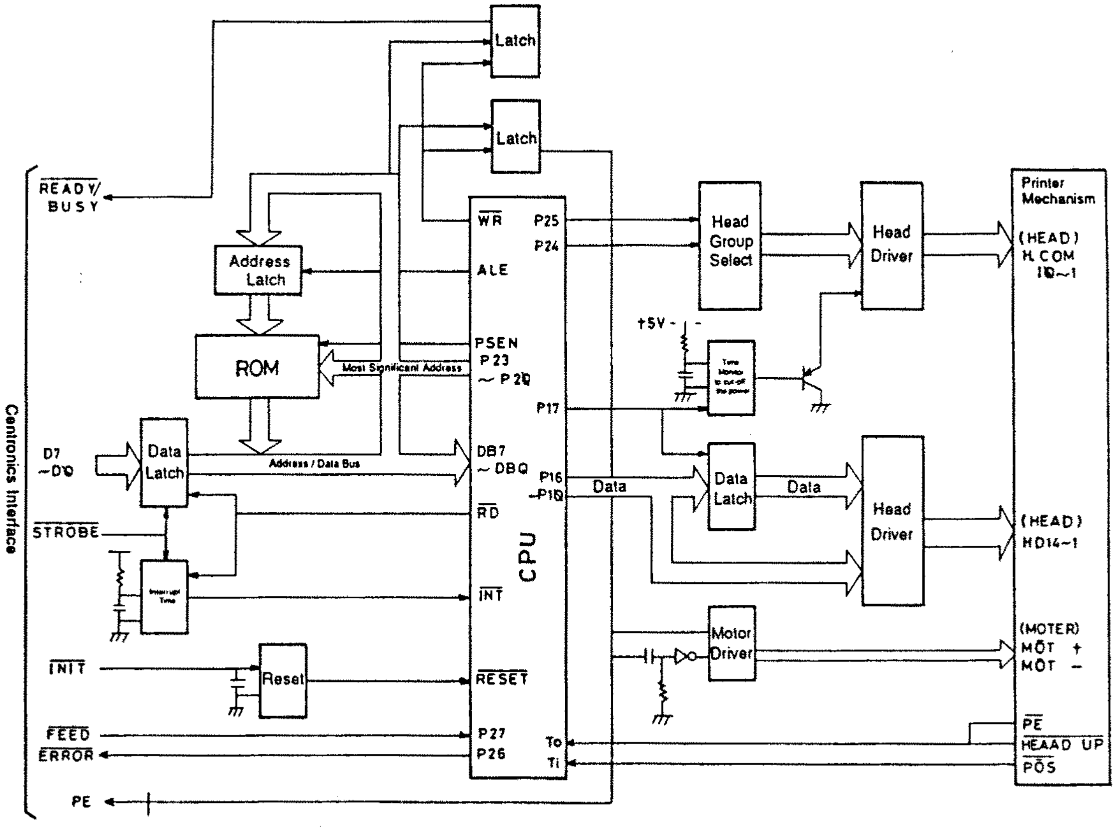


Figure 5-21 PCB No. 6325 Block Diagram

2. Input/Output Signals

    1. DATA
       Data is supplied from the host computer in 8-bit parallel signal, and entered to the printer synchronized with the STROBE signal.
    2. STROBE
       Timing Signal for data transmission. The data is read at the trailing edge of the STROBE signal.
    3. READY
       This signal notifies the host computer whether the data is able to receive or not by the printer.
    4. FEED
       This signal is for manual paper feed. It is effective only when the printer is not received the print data. While this signal is at “L” level, the paper is manually fed by dot line steps. (9 dot lines)
    5. PE(PAPER EMPTY)
       This signal is output signal from paper empty sensor. This signal becomes “L” when the paper runs out. As this signal is output from the sensor directly the level may change for a short time when the paper is being loaded. If no paper is loaded, “READY” becomes “H”, resulting DISABLE to receive the data.
    6. ERROR
       This signal is activated when the EMERGENCY STOP FUNCTION takes place during the printing operation.

3. Emergency Stop Function

If the following abnormalities are detected, the power to the printer head and the motor will be cut off.

1. When the motor is locked.
2. Fault in the position detecting mechanism (code wheel)

The emergency stop condition can only be released by resetting the power ON.

4. Interface Timing

Data Transmission: 8-bit parallel (Centronics compatible)

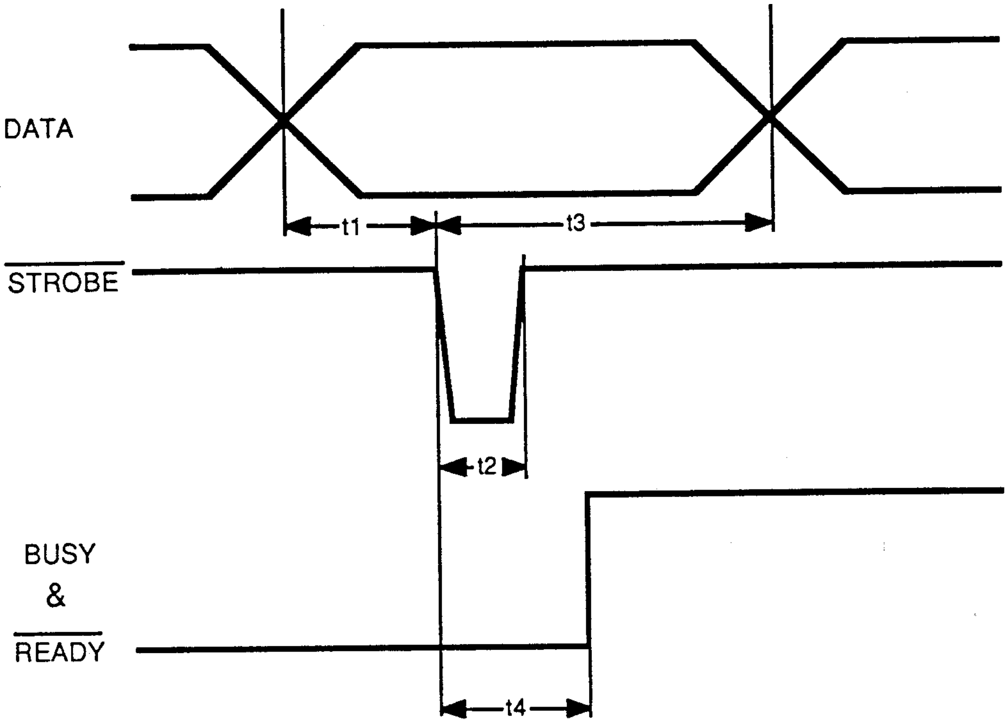


Figure 5-22 Interface timing

t1: Data output time (5µs < t1)
t2: Strobe pulse width (5µs < t2 < t3)
t3: Data holding time (t4 < t3)
t4: Time between STROBE and BUSY (15µs < t4 < 60µs)

5.9. PCB No. 6315 (Optional PDA Board)

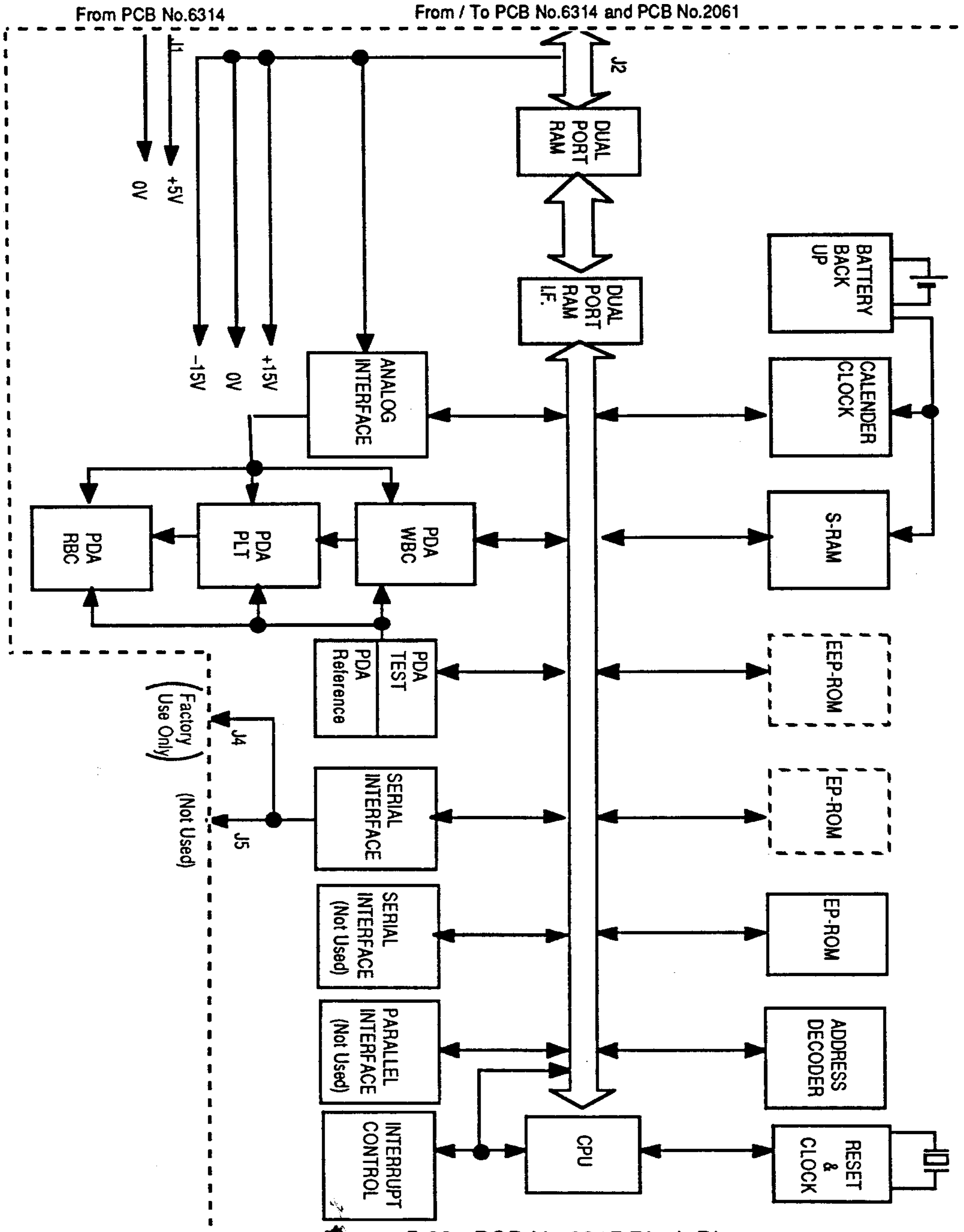


Figure 5-23 PCB No.6315 Block Diagram

PCB. No. 6315 is consisted of following circuit.

- *CPU Circuit
- *Reset Circuit
- *Clock Pulse Generator Circuit (for Timer Clock and Serial port Clock)
- *Memory Circuit (EP-ROM and S-RAM)
- *Serial Interface (for Factory Use Only)
- *PDA Test Circuit
- *PDA Reference Circuit
- *Analog Interface Circuit
- *Hybrid IC SH0005
  - PDA Counters
  - PDA Comparators

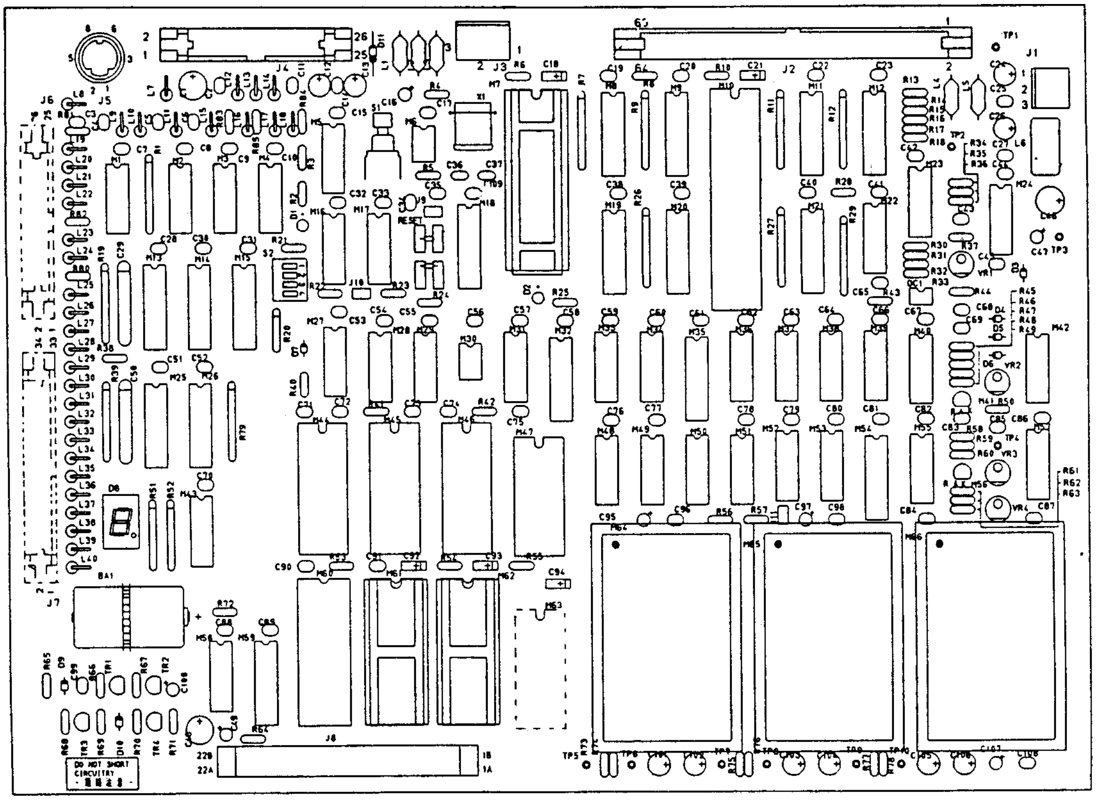


Figure 5-24 Drawing of PCB No. 6315

5.9.1. PCB No.6315 Function

1. CPU Circuit

   Either V20 (μPD70108C-8, by NEC$^{\text{TM}}$) or 80C88-2 (C-MOS) is used as CPU (M7) in PCB No.6315. The 8 MHz clock pulse is used as CPU clock. M18 μPD71084C(M18) divides the source pulse genrated by crestal(24 MHz) into the 8 MHz clock pulse.

2. Reset Circuit

This circuit monitors 5 V-DC by voltage monitoring IC (M6 / MB3711P), and reset CPU when the power is turned on or 5.0 V-DC power source drops under 4.2 V.

3. Clock Pulse Generator Circuit

This circuit (M 47 / 82C53-5) makes timing pulses (300 - 9600 bps) for the serial output by dividing the source clock (M30 / 4.9152 MHz). The CPU clock pulse is also divided into the 100 msec pulse for the Calender Clock.

4. Memory Circuit

(1) EP-ROM

Two pieces of ROM socket (M61 & M62) are provided on this PCB. Either 27C1001 (128 kB) or 27C512 (64 kB) can be mounted on these ROM sockets for program storage. When 27C512 (64 kB) should be mounted on these ROM socket, the 1st pin of P-ROM (27C512) must be mounted into the 3rd position of the ROM socket (M61). Normally, just one 27C512 (64 kB) is mounted on the M62 socket, and no EP-ROM is not mounted on the M61 socket.

(2) S-RAM

A piece of S-RAM M60 (32 kB) is mounted for working process. Battery Backed-Up is performed by lithium battery (BR-2 / 3AE2SN) for this S-RAM.

5. Dual Port RAM.

A Dual-port RAM M10 (MB8422-12 / 2 kB) is provided on this PCB. “BUSY” of this chip is connected to “READY” port of Main CPU and PDA CPU, and controls Memory accessing.

6. Serial Interface Circuit.

Two channels of serial Interface circuit are provided on this PCB J4 and J6. However, J6 is not used, resulting no connector housing for J6 connector. J4 is for factory inspection use only, and J3 is the power supply connector (± 12 V) for this (J4) Serial Interface Circuit. Normally no connection is the required to J3 and J4.

7. Calender Clock Circuit

Calender Clock RTC62421B is mounted as M59 in this board. No adjustment is required to this chip, since the crystal to generate timer clock pulse (1 Hz) is included in RTC62421B.

8. Battery Back Up Circuit

Memories in S-RAM (32 kB) and Calender Clock are backed up by lithium battery BR-2/3AE2SN. Life length of BR-2/3AE2SN mounted on PCB No, 6315 is more than 5 years.

9. Hybrid IC SH0005 (PDA counter)

A Hybrid IC SH0005 has following circuits in itself,

- 48 comparators
- 48 counters
- Address Decoder
- Bus Buffer

Three pieces of SH0005 are used in this PCB to obtain PDA data (for WBC, RBC, and PLT).

10. PDA Reference Voltage Circuit (M57, VR2,VR3, VR4)

This Circuit makes reference voltages for the PDA Comparators (WBC/RBC/PLT). If you had replaced or repaired the PCB No. 6315, confirm these settings. See Section 6.7. to adjust or confirm them. Test points concerning this circuit are explained as follows;

TP9 (Common : TP2) : PDA reference voltage for WBC (default : 4750 ± 10 mV)

TP7 (Common : TP2) : PDA reference voltage for PLT (default : 4750 ± 20 mV)

TP4 (Common : TP2) : Offset voltage of PDA reference voltage for RBC (default : 3960 ± 5 mV)

TP5 (Common : TP2) : PDA reference voltage for RBC (variable)

1) when the Hct calibration value is 89.9 % (Min)	: 6510 ± 10 mV
2) when the Hct calibration value is 100.0 % (default)	: 4750 ± 20 mV
3) when the Hct calibration value is 119.9 % (Max)	: 3960 ± 20 mV

11. RBC Gain Control Circuit (M55)

This Circuit controls PDA reference voltage for RBC of PDA comparators to change RBC gain according to Hct calibration value. To adjust or confirm this setting, see Section 6.7. to adjust VR2.

12. PDA Test Circuit (M40,VR1)

This circuit generates simulated cell pulses for PDA counter test. PDA test pulse height is surely adjusted in factory by VR1. Normally no adjustment is required on VR1. If adjustment were necessary on VR1, see section 7.6.

13. Analog Interface Circuit

The peak hold cell signals (W.SIG, R.SIG, P.SIG) to analyze PDA data are input through the Buffer Circuit (M24) and the Analog switch (M42).

5.9.2. Input / Output Signals

Table 5-19 J1 : 5 V-DC Power Supply (for Digital Circuits)

PIN No.	Mnemonic / Description	IN/OUT	Pin No	Mnemonic /Description	IN/OUT
1	0 V (GND)	IN	2	5 V	IN
3	0 V (GND)	IN	-	-	

Table 5-20 J2 : Key Pad/LCD Display Panel(64 pins)

Pin.No.	Mnemonic	FROM/TO	IN/OUT	Pin No.	Mnemonic	FROM/TO	IN/OUT
1	R. STOP	A-C	not used	2	R.START	A-C	not used
3	W.STOP	A-C	not used	4	W.START	A-C	not used
5	WBC1	A-C	not used	6	WBC0	A-C	not used
7	W.CLK	ASP	IN	8	RBC	A-C	not used
9	HCT	A-C	not used	10	R.CLK	ASP	IN
11	PLT5	A-C	not used	12	PLT4	A-C	not used
13	PLT3	A-C	not used	14	PLT2	A-C	not used
15	PLT1	A-C	not used	16	PLT1	A-C	not used
17	P.CLK	ASP	IN	18	HGB	A-C	not used
19	HGB START	C-A	not used	20	W.TD.ON	A-C	not used
21	R.TD.ON	ASP	IN	22	TEMP.H	A-C	not used
23	TEMP.L	A-C	not used	24	PRESS	A-C	not used
25	+ 15 V	ASP	IN	26	+ 15 V	A-C	not used
27	+ 15 V	ASP	IN	28	GND	ASP	IN
29	W.SIG	ASP	IN	30	GND	ASP	IN
31	R.SIG	ASP	IN	32	GND	ASP	IN
33	P.SIG	ASP	IN	34	GND	ASP	IN
35	- 15 V	ASP	IN	36	GND	ASP	IN
37	-15 V	ASP	IN	38	-15 V	ASP	IN
39	AD 10	CPU	IN	40	AD 9	CPU	IN
41	AD 8	CPU	IN	42	AD 7	CPU	IN
43	AD 6	CPU	IN	44	AD 5	CPU	IN
45	AD 4	CPU	IN	46	AD 3	CPU	IN
47	AD 2	CPU	IN	48	AD1	CPU	IN
49	AD 0	CPU	IN	50	WE	CPU	IN
51	RD	CPU	IN	52	DPRCE	CPU	IN
53	S1	CPU	IN	54	INT (PDA)	CPU	IN
55	0 V	CPU	IN	56	READY(PDA)	CPU	IN
57	D 7	CPU	IN	58	D 6	CPU	IN
59	D 5	CPU	IN	60	D 4	CPU	IN
61	D 3	CPU	IN	62	D 2	CPU	IN
63	D 1	CPU	IN	64	D 0	CPU	IN

***NOTE*:**

"CPU" in the "FROM/TO" column indicates Main CPU board (PCB No. 6314), and "A-C" indicates the signals which are transmitted from Analog Signal Processing Board (PCB No. 2061) to the Main CPU board which are not used on PDA Board (PCB No.6315).

CAUTION:

J3, J4 and J5 on PCB No.6315 are the Connectors for connection with the devices for inspection. (for Factory Inspection Use only). Normally no connection is required to these connectors.

Sysmex

SECTION SIX

MAINTENANCE AND ADJUSTMENT

Section 6 Maintenance and Adjustment

Section 6Maintenance and Adjustment

6.0. Utilities

6.0.1. Auto Rinse Skip Mode

"AUTO RINSE" Skip Mode at the power ON is as follows;

1. K-1000 without optional PDA Unit (8 Parameters)
   A. Turn the power on.
   B. Set the date with numeric keys.
   C. Press ENTER, and immediately press and hold the Start Bar (Start Switch) until the instrument becomes "READY".
2. K-1000D with optional PDA Unit (18 Parameters)
   A. Turn the power ON while pressing the START Bar (Start Switch).
   B. Hold the Start Bar until the K-1000 becomes "READY".
   C Release the Start Bar.

6.0.2. Sequence Stop

The SELECT key works as the Sequence Stop Switch while in the diluting or rinsing operation. When the SELECT is pressed in the diluting or rinsing operation, the instrument stops the operation at the end of Sequence at that time. The LCD displays the the Sequence Number at the upper right, the Sequence Stop Time (sec.) at the lower left and the Hgb converted absorbance in the Hgb Flow Cell at the lower right as Figure 6-0-1. The Sequence Stop Time increases by 1 second. The Hgb converted absorbance displays the condition of the Flow Cell dynamically. In this situation, pressing the SELECT let theinstrument release from the Sequence Stop and other keys are not available.

```
*SEQ. STOP  :  3*
00:15  HGB:  532
```

Figure 6-0-1 Sequence Stop Display

6.0.3. Removing and Opening the Panels

Remove and/or open several panels of the instrument by following procedure, when required.

(1) Opening the operation Panel

A. Unscrew and remove two Phillips screws and washers tooth lock external indicated by arrows in Figure 6-0-2.

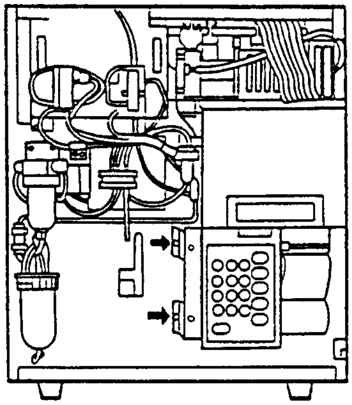


Figure 6-0-2 Removing two Phillips screws and washers

B. Open the operation panel as shown in Figure 6-0-3.

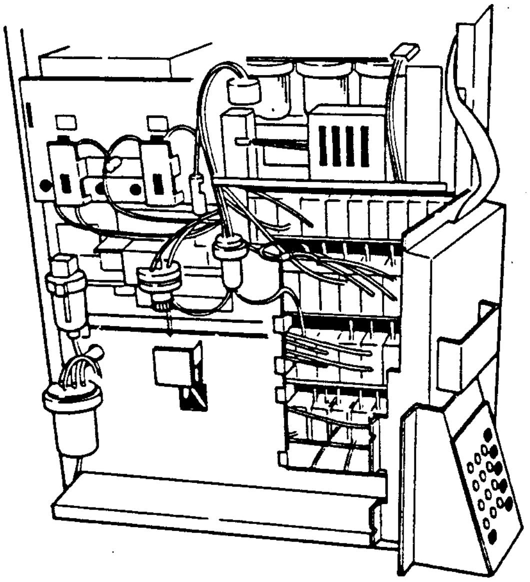


Figure 6-0-3 Opening the operation Panel

(2) Removing the top panel
Unscrew four Phillips screws and washers tooth lock external, and remove the top panel from the K-1000 indicated by arrows in Figure 6-0-4.

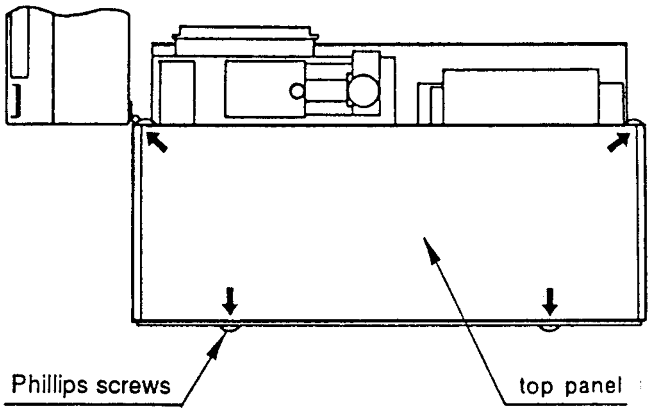


Figure 6-0-4 Removing Top panel

(3) Removing the Rear panel

A. Unscrew and remove five Phillips screws and washers tooth lock external indicated by arrows in Figure 6-0-5.

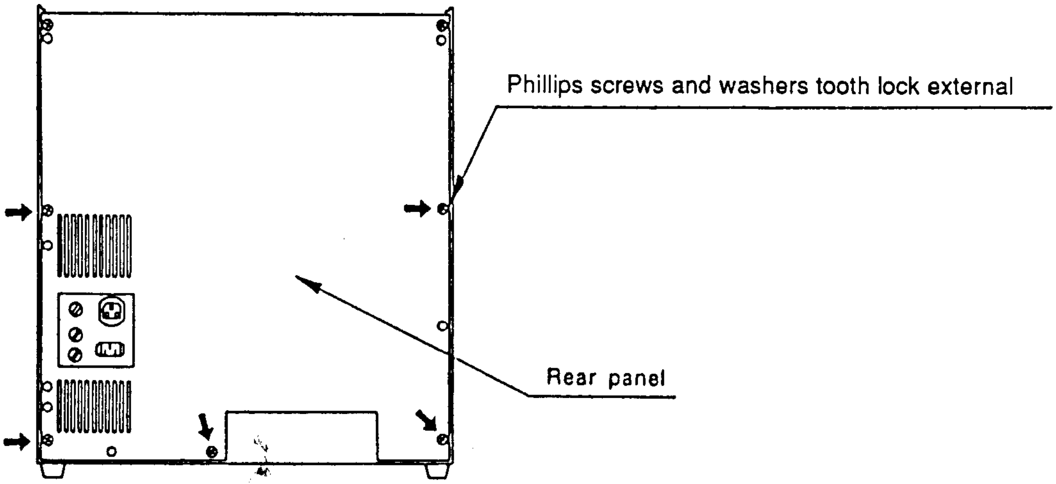


Figure 6-0-5 Removing 5 screws and washers

B. PCB No.2061, PCB No. 6314, Power Supply block, and PCB No.6315 (option) are located on the rear side of the instrument. Figure 6-0-6 shows the location of PCB No.2061, 6314, and 6315 (option).

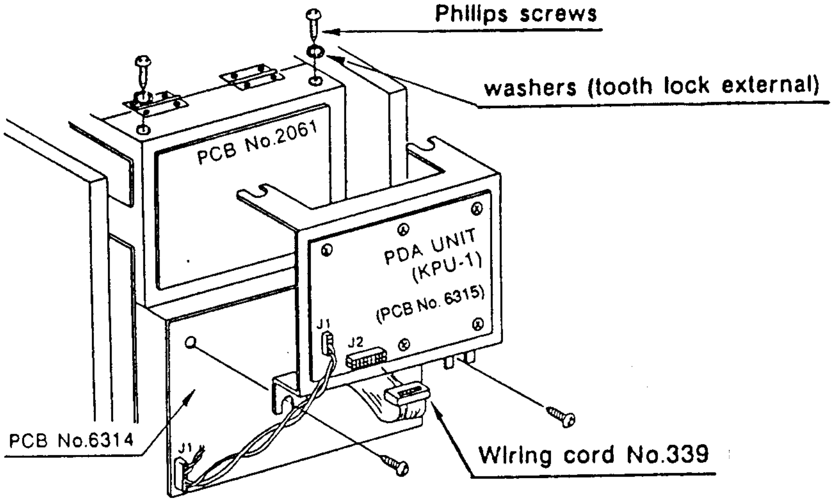


Figure 6-0-6 Location of PCB No. 2061, PCB No. 6314, and PCB No.6315 (option)

C. If any maintenance for hydraulic or pneumatic system on rear side of the instrument is required, unscrew and remove three Phillips screws indicated by arrow in Figure 6-0-7.

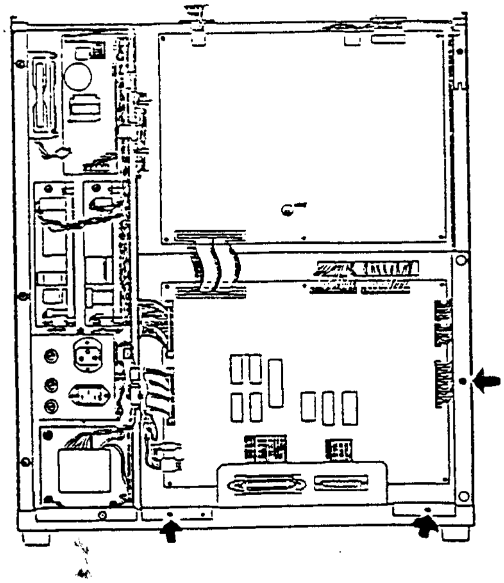


Figure 6-0-7 Removing 3 screws and washers

D. Remove the wires from two wire clamps which are located on the left side of the PCB block (from rear view) as shown in Figure 6-0-8.

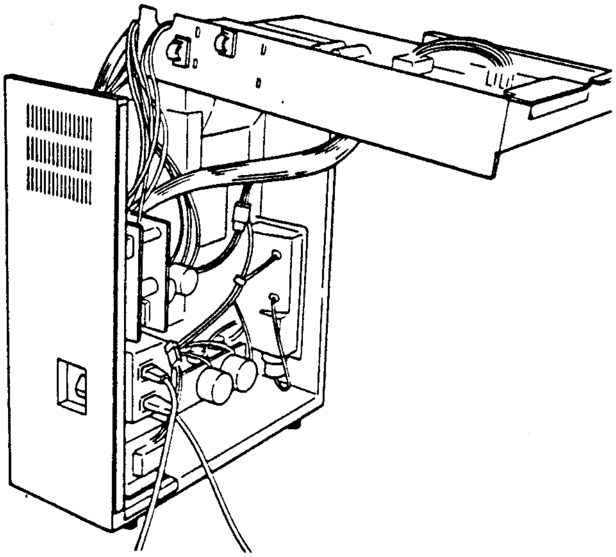


Figure 6-0-8 Removing wires from wire clamp and lifting up the PCB block

E. Lift up theCB block as shown in Figure 6-0-8. Fix the PCB block by using hook as shown in Figure 6-0-9.

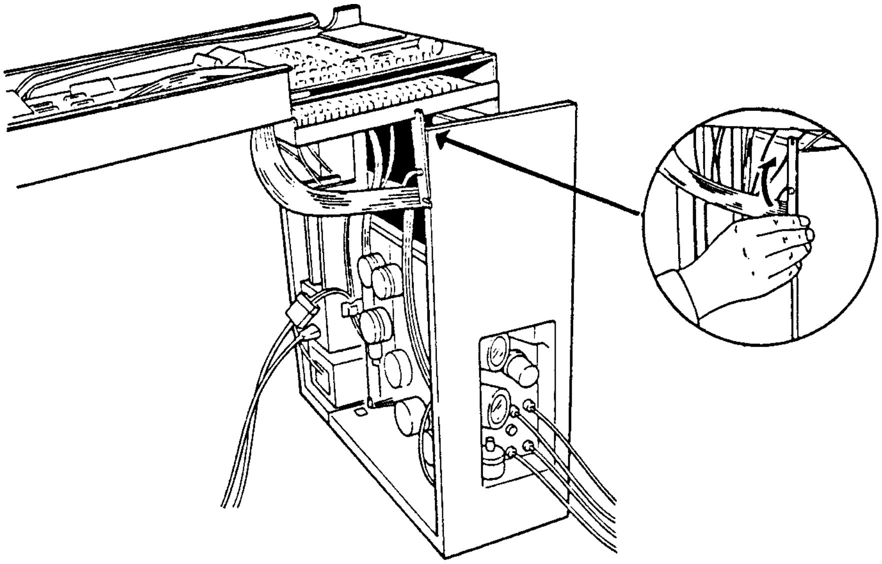


Figure 6-0-9 Fixing PCB block by using hook

6.0.4. Hydraulic Rinse & Reagent Depriming Mode for Shipment

When the K-1000 should be shipped by any transportation way, the hydraulics line of K-1000 should be rinsed and deprimed by the following procedure;

Prepare the 300 - 500 mL of de-ionized water.

A. Set the 6th and 7th bits of program switch SW3 from 0 to 1 as bellow;

```
*SETTINGS     *
*SW3 01100000
```

Figure 6-0-10 Setting of Program SW3 for reagent depriming

B. Turn off the power.

C. Disconnect the tubes from the reagent cubitainer (Diluent, WBC Lyse Reagent, Hgb Lyse Reagent).

D. Turn on the power.

CAUTION:
Do not perform “Auto Rinse Skip Mode”. Because the 6th and 7th bits of Program Switch SW3 will be reset from 1 to 0 automatically while in “AUTO RINSING”.

E. Reagent Depriming Sequence will be proceeded. It takes about 9 minutes.

F. When the Reagent Depriming Sequence is over, “NO DILUENT” will be displayed on the LCD and will be printed out by the built-in printer, with the audible alarm.

G. Turn the power off.

H. Connect the de-ionized water to reagent nipples (diluent/lyse reagents)of K-1000 instead of reagents.

I. Turn the power ON to fill the K-1000 with distilled water by “AUTO RINSE” operation.

J. Turn the power off when the”AUTO RINSING” is finished.

K. Repeat above step A to G one more time.

By the above procedure, one week is the limit for K-1000 transportation. If more longer period were required, follow the procedure below additionally;

Prepare the 300 - 500 mL of 50 % ethyl-alcohol.

L. Connect the ethyl-alcohol to reagent’s nipples of K-1000 instead of reagents.

M. Turn the power on to fill the K-1000 with 50 % ethyl-alcohol by “AUTO RINSE” operation.

N. Turn the power off when the”AUTO RINSING” is finished.

O. Repeat above step A to G one more time.

6.1. Power Supply Unit

Confirm the AC power inlet voltage is within following ranges;

117 VAC ± 10%, 50/60 Hz (for N.AMER)
220 VAC ± 10%, 50/60 Hz (for EUROPE)
240 VAC ± 10%, 50/60 Hz (for U.K.)

6.1.1. Power Supply Section Assembly No. 14

Power Supply Section Assembly No. 14 is consisted of following parts;

1) Power Supply Board No.5 (PCB No.4044)
2) Power Supply Board No.6 (PCB No.4045)
3) Switching Regulator

1. Power Supply Board No.5 (PCB No.4044)

Check PCB No.4044 as follows;

Table 6-1 Adjustment point for PCB No. 4044.

Adjusting Point	Test Point		Description
		Common	
VR1	TP1	TP2	Adjust VR1 so that the voltage at TP1 becomes 100 ± 1.6V.

(2). Power Supply Board No.6 (PCB No.4045)

Check PCB No.4045 as follows;

Table 6-2 Adjustment point for PCB No. 4044.

Adjusting Point	Test Point		Description
		Common	
VR1	TP1	TP2	Adjust VR1 so that the voltage at TP becomes 1.429 ± 0.020 V with the connection of load (9Ω/15W) at J1.
None	TP3	TP4	Confirm that the voltage at TP3 is 24 V ± 1.0 V.

6.1.2. Replacing Fuses

1. Turn OFF all power and disconnect the power cord from the source.

   CAUTION:
   To avoid electric shock hazard, disconnect power before replacing fuse.

2. To remove the fuse, turn the fuse holder cap counterclockwise while applying slight pressure with a screwdriver.

3. Install a new fuse of the same type and rating.

   WARNING:
   For continuing protection against risk of fire, replace only the specified type and current rating of fuse.

Table 6-1 Fuses on Main Unit Rear Panel

Fuse No	Rating			Type	Purpose
	117 V spec.	220 V spec.	240 V spec.		
F1	125 V 2 A	250 V 1 A	250 V 1 A	Time Delayed	Pneumatic Unit A
F2	125 V 7 A	250 V 4 A	250 V 4 A	Time Delayed	Main supply
F3	125 V 7 A	250 V 3.15 A	250 V 3.15 A	Time Delayed	Main supply

Table 6-2 Fuse on Pneumatic Unit Rear Panel

Fuse No	Rating			Type	Purpose
	117 V spec.	220 V spec.	240 V spec.		
F1	125 V 4 A	250 V 3.15 A	250 V 3.15 A	Time Delayed	Pneumatic Unit
F2	125 V 4 A	250 V 3.15 A	250 V 4.15 A	Time Delayed	Pneumatic Unit

6.2. Pneumatics

6.2.1. Trap Chamber No.4

Check the water level in the Trap Chamber No.4 of the Pneumatic Unit. If there is water in the Trap Chamber No.4, discard the water.

1. Turn OFF the power of the Main Unit. Allow about one minute to release pressure.
2. Check the water level in the trap chamber on the left low of front of the pneumatic unit.
3. If there is any water, hold the chamber and turn it counterclockwise and discard the water. Do not lose a ball float. Re-tighten the chamber.

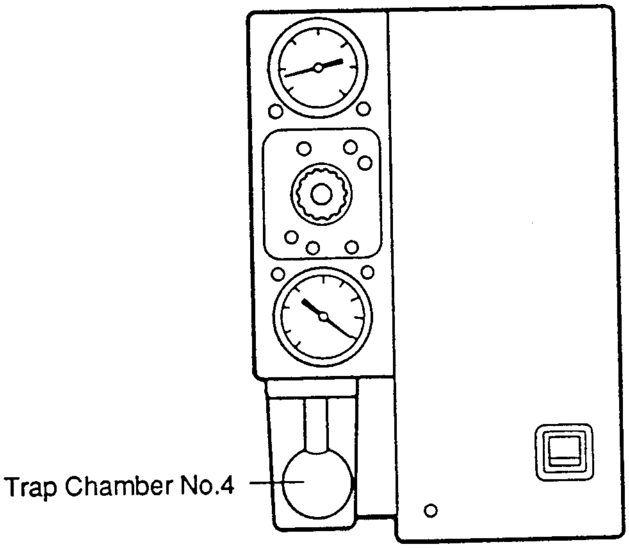


Figure 6-2-1 Trap Chamber No.4

CAUTION:

If water remained actually everyday, it may be suspected that the Main Unit is malfunctioning.

6.2.2. Pneumatic Unit Adjustment

A. 2.0 kg/cm^2 Pressure Gauge

The pressure of 2.0 kg/cm^2 to drive the Sample Rotor Valve and Master Valve is regulated by Relief Valve in the Pneumatic Unit and not regulated in the Main Unit. Turn on the power and check the pressure on the 2.0 kg/cm^2 Pressure Gauge marked “PRESSURE” on the front panel of the Pneumatic Unit in the Ready mode. If the pressure is out of the range of 2.0 ± 0.2 kg/cm^2, adjust the pressure as below.

2.0 kg/cm^2 Pressure Gauge: 2.0 ± 0.2 kg/cm^2

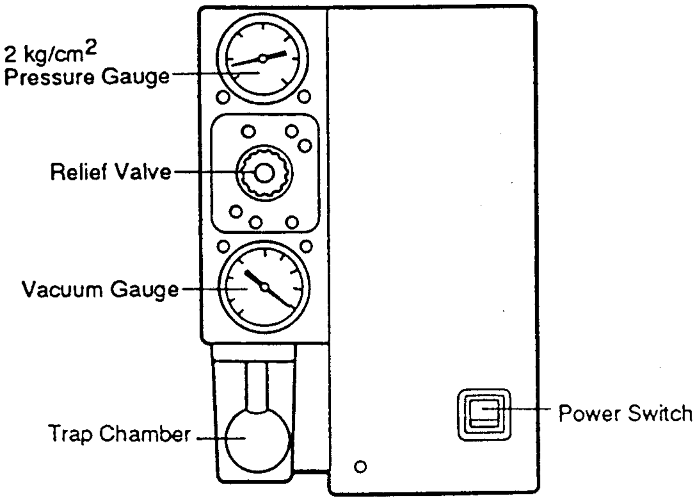


Figure 6-2-2 Gauges (Pneumatic Unit)

If the 2 kg/cm^2 pressure were lower than 2.0 kg/cm^2, and it could not adjust, perform the followings;

(1) Pinch the tube running from the Pneumatic Unit to the Main Unit. If the pressure increases above 2 kg/cm^2, it proves leaks in the Main Unit, check the pneumatic system of main unit.

(2) If the pressure did not increase by the above action, check the pneumatic tubing, Compressor, or Relief Valve inside of pneumatic unit.

NOTE:

Pressure should be always adjusted in the direction of raising it, i.e., decrease the pressure far below and then increase to an optimum setting.

CAUTION:

Do not overload the gauge with more than 3.0 kg/cm^2.

B. Vacuum Gauge (with the label "**480**")

The Vacuum Gauge (the gauge marked "VACUUM") shows the source vacuum supplied to the Main Unit from the Pneumatic Unit. The vacuum should be above **480** mmHg, which is not adjustable in the Pneumatic Unit.

Vacuum:	**480 - 599 mmHg**

NOTE:

The label "480" located on this gauge indicates the lower limit for the source vacuum of this pneumatic unit.

If the vacuum is lower than **480** mmHg, perform the followings;

A. Pinch the tube running from the Pneumatic Unit to the Main Unit. If the vacuum increases above **480** mmHg, it proves leaks in the Main Unit, check the pneumatic system of main unit.

B. If the vacuum does not increase by the above action, check the pneumatic tubing or compressor function inside of pneumatic unit.

C. If the vacuum is higher than **600** mmHg, check if there is no bending in the pneumatic tubing to the Main Unit. If no bending, check the pneumatic tubing inside of Main unit.

6.2.3. Compressor

The compressor used in the K-1000 pneumatic Unit is designed to yield maximum, trouble-free performance under recommended conditions. To assure safe and proper operation and to maximize the life of the unit, the following guidelines should be carefully observed:

NOTE:

> When installing the K-1000 Pneumatic Unit, make sure to keep it 30 cm or more away from a wall at the back. If fails, heated air inside the Pneumatic Unit will not be exhausted sufficiently, resulting in reducing the diaphragm life.

A. Be sure that the available electric power matches specifications of the electric motor of the compressor.

Please refer to page 9-2-11 for parts ordering.

B. Take care not to install the Pneumatic Unit in a confined space. If the Temperature in pneumatic Unit exceeds following range, power source for the compressor will be cut off by temperature monitoring circuit.

1) Temperature inside of the Pneumatic Unit : lower than 60 C
2) Temperature at the compressor coil : lower than 120 C

C. Use only to pump air, not liquid.

D. Avoid operating the unit in very dusty conditions. If this cannot be prevented, be sure to install an inlet filter and inspect and change it frequently.

E. If flow is throttled for any reason, care must be taken not to exceed the maximum continuous operating design pressure of the unit.

Please refer to page 9-2-11 for parts ordering.

6.2.3.1. Replacement of the Diaphragm and Leaf Valves on KNF Compressor

6.2.3.1.1. Replacement of the Vacuum Diaphragm and Leaf Valves (KNF Compressor Only)

NOTE: The vacuum diaphragm could fail prematurely due to stress caused by inappropriate installation manner.
Strictly follow the installation procedure explained below to reduce this occurrence (refer to Figure 6-2-3-2 for the nomenclature of each part).

a) Loosen the seven Hex-Socket Bolts (A) with washers, and remove the Vacuum Head Cover (B) and Rubber Gasket (C).

b) Loosen the four Hex-Socket Bolts (E) and remove the Diaphragm Head (D).

c) Locate the two Leaf Valves (G) on the Diaphragm Head (D). One is located on top, and the other at the bottom.
Loosen the Nut (F) and remove the Leaf Valves (G) with the Valve Retainer and washers.

d) Check the Leaf Valves (G). If any dirt is presented on the valve, wipe it with gauze dampened with isopropyl alcohol. If any damage is found, replace the valve with new one.

e) Reinstall the Leaf Valves (G) in their original positions. And then, reinstall the Gasket (B) and the Head Cover (B) onto the Vacuum Head (D) using Hex-Socket Bolts (A).

f) Loosen the Retainer Plate Fixing Screw (Hex-Socket Screw (H)), and carefully remove the Retainer Plate (I), Teflon Sheet (J) and Vacuum Diaphragm (K) so that the Washer(s) (M) placed between the Diaphragm Support (L) and the Spacer (N) are not lost.

NOTES: 1) Washer(s) (M) provide correct vertical positioning of the Diaphragm Support (L). The amount of washers required varies with each compressor.
2) DO NOT place the Diaphragm Support (L) upside down.
The rounded edge of the Diaphragm Support (L) must face the diaphragm as shown in Figure 6-2-3-1.

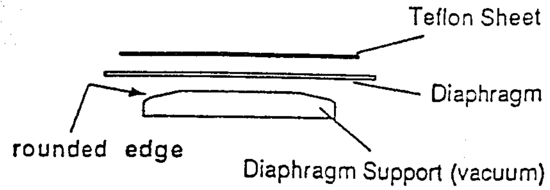


Figure 6-2-3-1 Correct Direction of Diaphragm Support (L)

g) Install new Vacuum Diaphragm (K) and Teflon Sheet (J) directly on top of the Diaphragm Support (L). The diaphragm is bi-directional, both sides being similar.

NOTE: The modified Teflon Sheet (J) is 0.5 mm thick, where the previous type was 0.25 mm thick.

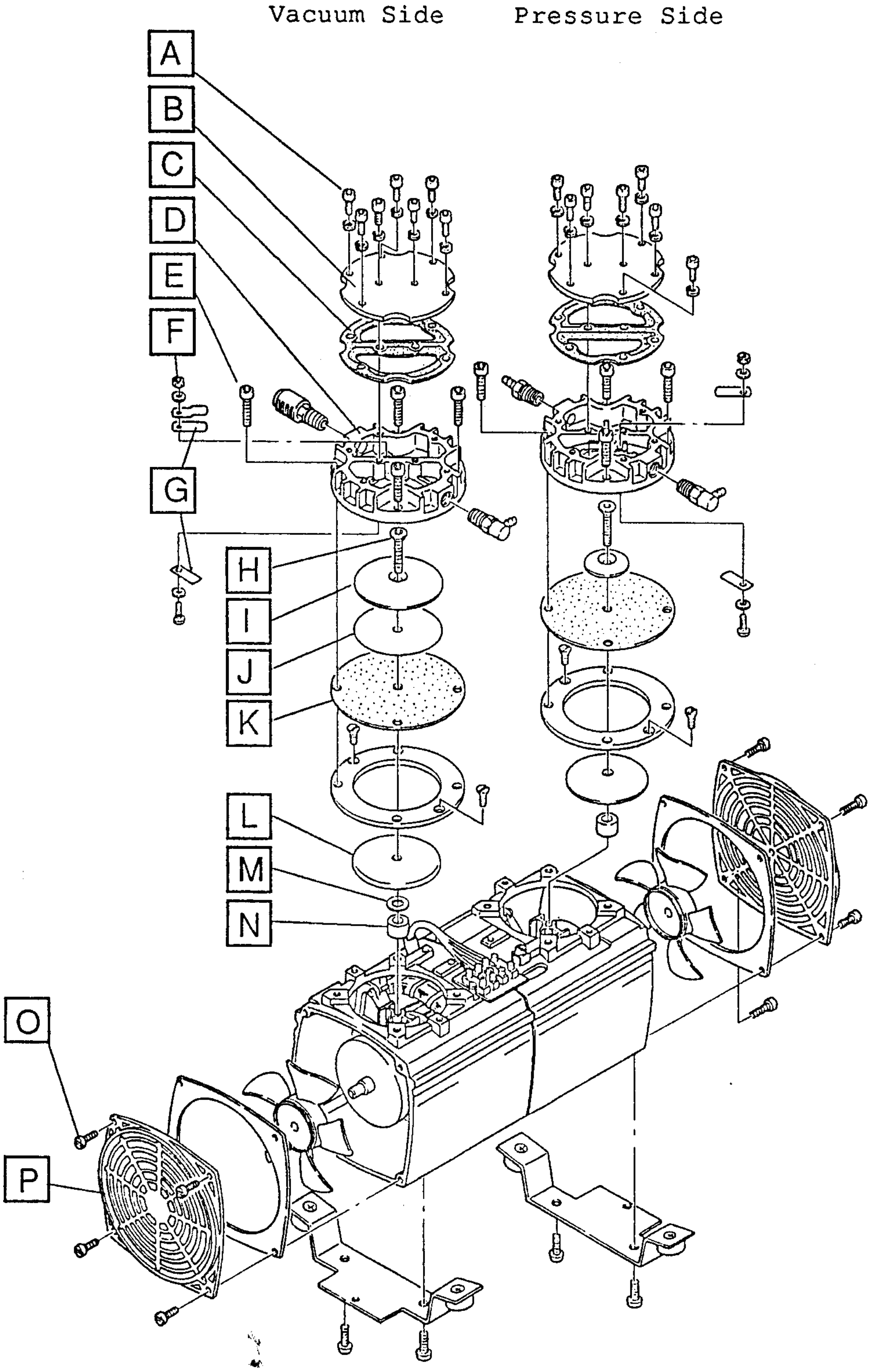


Figure 6-2-3-2 KNF Compressor Disassembly Drawing

h) Secure the Teflon Sheet (J), Vacuum Diaphragm (K) and Retainer Plate (I) with the Retainer Plate Fixing Screw (H), in the following manner;

1) Turn the Retainer Plate Fixing Screw (H) fully clockwise as tight as possible by hand to compress the diaphragm and sheet, and then loosen the screw.
2) Turn the screw clockwise with the 4mm hex key to the point where the screw rotation first becomes hard. *Refer to this as point "A".*
3) Confirm the definite location of Point "A" by loosening and tightening the screw two more times, stopping at Point "A".
4) Turn the hex key clockwise an additional 45° past Point "A" in order to acquire the correct torque, or tightness (see Figure 6-2-3-3).

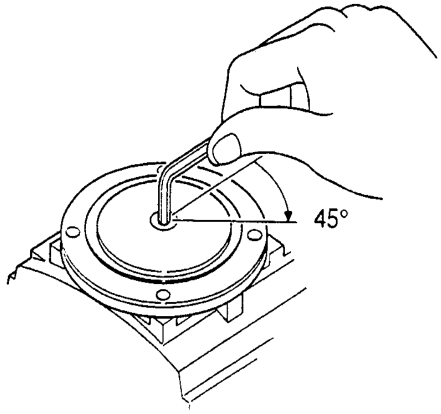


Figure 6-2-3-3 Additional 45° turn of Retainer Plate Fixing Screw (H) past Point "A"

i) Place the Vacuum Head (D) over the Vacuum Diaphragm (K), and tighten the Hex-Socket Bolts (E) with the 4 mm hex key in the following manner;

1) Insert the long stem of the hex key into the Allen hole of the bolt.
2) Turn the hex key using just your thumb and index finger until it stops as shown in Figure 6-2-3-4. This act is referred to as; *FINGER-TIGHTENING.*

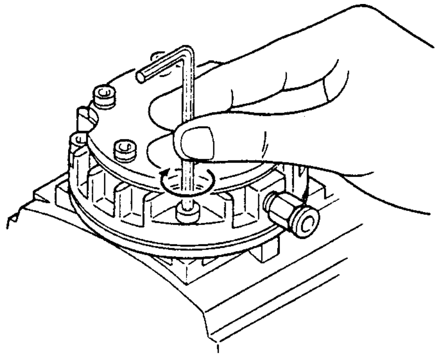


Figure 6-2-3-4 Finger-Tightened Bolt (E)

j) Loosen the four Screws (O) holding the Fan Cover (P) on the vacuum side and remove the vacuum-side fan cover (P), exposing the vacuum fan axis.

k) Grasp the round axis of the fan, avoiding the fan blades, and rotate the vacuum fan axis (see Figure 6-2-3-5). When the axis revolves, the crank moves up and down. At this time, observe the diaphragm edge moving inward and outward between the head and the compressor body. The diaphragm movement there should be 1 - 2 mm.

(1) Verify this diaphragm movement by rotating the axis 5 to 6 turns (see Figure 6-2-3-6). This diaphragm movement also removes the strain otherwise applied to the diaphragm. **THIS STRAIN RELIEF IS IMPORTANT !**
(2) If the diaphragm movement is not evident, the Hex-Socket Bolts (E) are too tight. Loosen the bolts (E) and repeat the process from Step i) above.

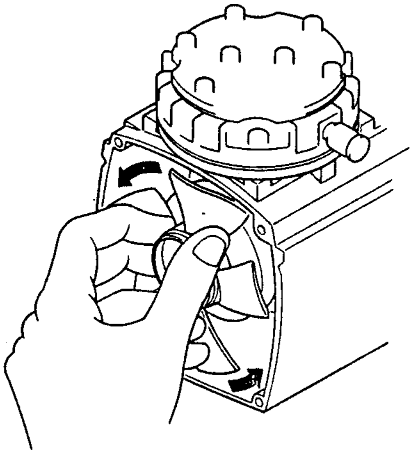


Figure 6-2-3-5 Fan Axis
(Grasp indicated area to rotate)

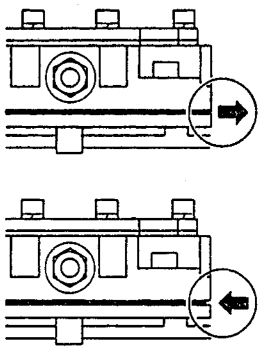


Figure 6-2-3-6 Diaphragm Movement
(between head and compressor body)

l) Stop rotating the axis where the flywheel screw hole becomes horizontal (see Figure 6-2-3-7). This position should be the centerpoint between the upper and the lower stop positions. And then, tighten the Hex-Socket Bolts (E) in the following manner.

(1) Insert the short stem of the hex key into the Allen hole of the bolt (E).
(2) Turn the hex key an additional 30º to further tighten each of the bolts in a crisscross manner (see Figure 6-2-3-8).

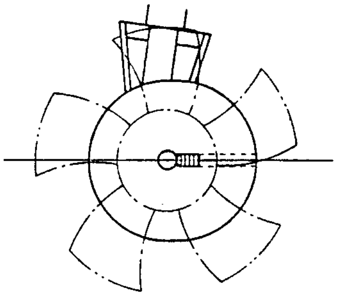


Figure 6-2-3-7 Stop rotating where the screw hole becomes horizontal

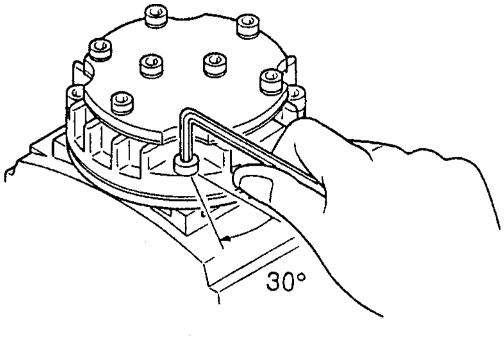


Figure 6-2-3-8 Tighten Bolts (E) 30° more in a crisscross manner

m) Reinstall the Fan Cover (P) with Screws (O) on the compressor body.

n) After re-installing all parts, verify that the Pneumatic Unit supplies more than 480 mm Hg vacuum, and the vacuum does not decrease less than 400 mmHg when operating the Main Unit.
If the vacuum is lower than the specified range, repeat from Step (a) above.

6.2.3.1.2. Replacement of the Pressure Diaphragm and Leaf Valves on KNF Compressor

Replace the diaphragm and leaf valves on the pressure side according to the same procedure as the vacuum side one explained in Section 6.2.3.1.1. except for the following differences.

1) Hex-Socket Bolts on the Pressure Diaphragm Head should be tightened securely using the hex key, where the same bolts on the Vacuum Diaphragm Head must be tightened with precise torque and tightness.
   Therefore, Steps i), j), k), l) and m) in the Section 6.2.3.1.1. are not necessary when securing the Pressure Diaphragm Head.
2) Pressure side compressor has no Teflon Sheet between the Retainer Plate and the Diaphragm Support.
3) Pressure side compressor has no washer between the Diaphragm Support and the Spacer.
4) Pressure Diaphragm Retainer Plate is smaller than that of the vacuum one.

6.2.3.2. Replacement of the Piston Ring and Leaf Valves on the TOSHIBA Compressor

It is recommended that Piston Ring in TOSHIBA compressor (no Piston Ring is used in KNF compressor) should be replaced approximately every 10,000-hours working according to the following procedure;

a) Removing the compressor head, and checking leaf valves:

(1) Remove six head screws on the compressor head cover (see Figure 6-2-3-9).
NOTE:
Four longer screws at corners are used to fix the head onto the compressor body while remaining two shorter screws are used to fix the head cover onto the head.

(2) Remove the compressor head with the head cover (see Figure 6-2-3-9).

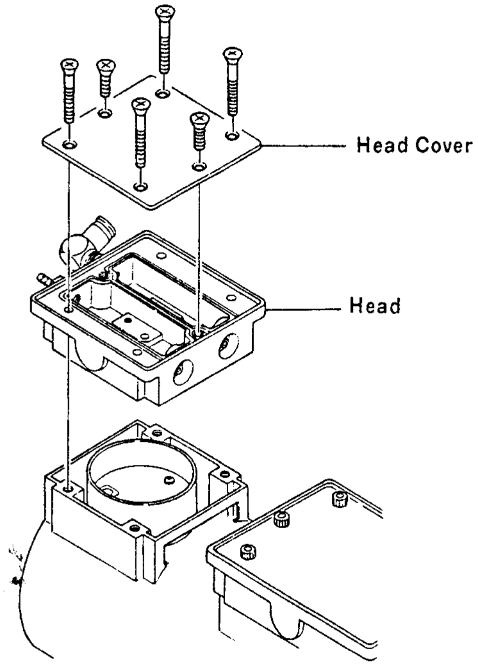


Figure 6-2-3-9 Removing Compressor Head

(3) Locate two leaf valves on the head (see Figures 6-2-3-10 and 6-2-3-11).

(4) Check the leaf valves after removing the valve retainers. If any dirt is presented on the valve, wipe it with gauze dampened with isopropyl-alcohol. If any damage is found, replace it.

NOTE

Ensure to reinstall the leaf valve in its original position after checking and cleaning referring to following illustrations.

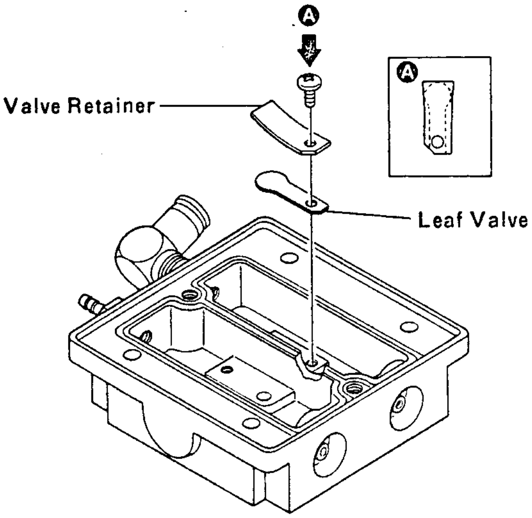


Figure 6-2-3-10 Upper Leaf Valve and Retainer

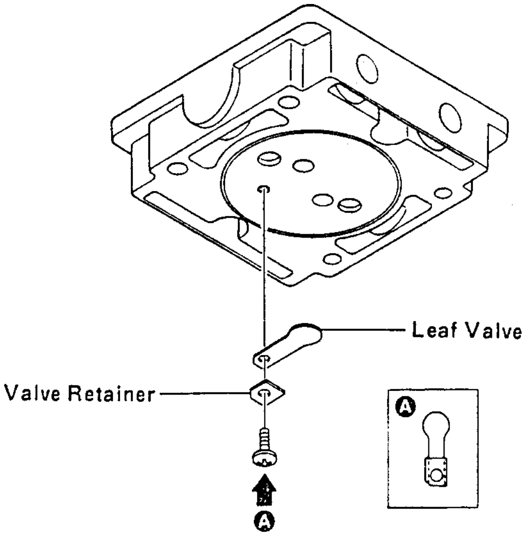


Figure 6-2-3-11 Lower Leaf Valve and Retainer

(b) Replacing Piston Ring (see Figure 6-2-3-12).

(1) Remove Piston Cylinder by lifting straight up.

(2) Remove Piston Ring with the Fixture from the piston base by loosening two fixing screws.

NOTE:

Pressure side compressor has a spacer under the Piston Ring to adjust the piston stroke.

(3) Replace the Piston Ring with the new one.

(4) Reinstall the Piston Ring and the Fixture onto the piston base.

(5) Reinstall the Piston Cylinder. Ensure to fit the cylinder into the groove of the compressor body.

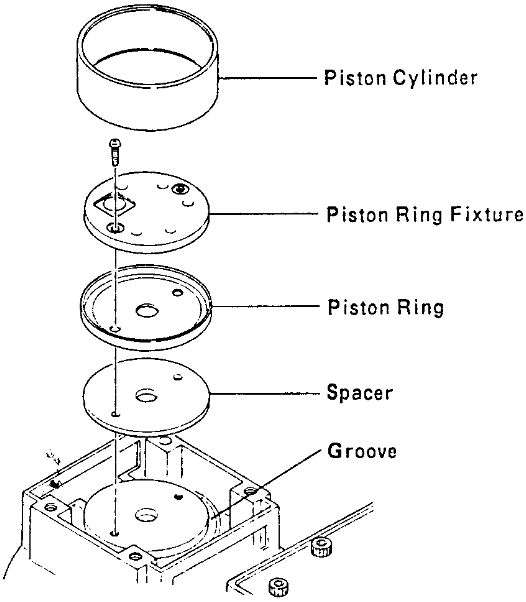


Figure 6-2-3-12 Removing Piston Ring

c) Reinstalling the compressor head and entire compressor unit.

(1) Reinstall the compressor head and the head cover on the compressor body using six screws (see Figure 6-2-3-9).
Ensure to fit the Piston Cylinder into the groove with O-Ring located at the bottom of the head.

(2) After reinstalling the all parts and the entire compressor unit, verify that the Pneumatic Unit supplies vacuum or pressure as follows.
If not, repeat from Step a) above.

Vacuum:
More than 480 mm Hg vacuum is supplied when the Main Unit is in Ready status.
Vacuum does not decrease less than 400 mmHg when operating the Main Unit.

Pressure:
Pressure does not decrease less than 1.7 Kg/cm^2 when operating the Main Unit.

6.2.4. Relief Valve

Relief Valve is attached in pneumatic unit to regulate the pressure into the 2.0 kg/cm^2. Under usual condition, almost no maintenance is required.to the Relief Valve. If the Relief Valve is required to be disassembled, follow the procedure given below.

a) Stop supplying air to the relief valve.
b) Free the locked adjusting knob and turn the knob fully counterclockwise to loosen it completely.
c) Remove four screws ① with a screwdriver and separate the bonnet assembly ②.
d) Remove the spring rest and diaphragm ⑤.
e) Loosen the sheet plug ⑥ with a spanner.

For reassembling;

1) Tighten the sheet plug ⑥ to 125 to 150 kg-cm torque with a torque wrench.
2) The bonnet assembly ② can not be disassembled.

①	Screw
②	Bonnet assembly
③	Spring
④	Spring rest
⑤	Diaphragm
⑥	Sheet plug
⑦	Gasket
⑧	Body
⑨	Nut

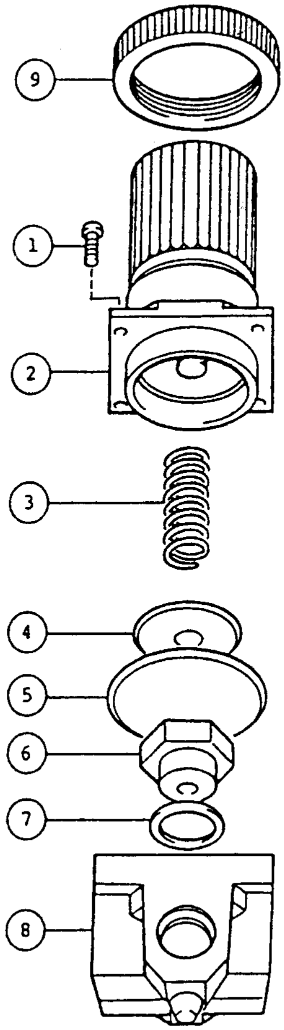


Figure 6-2-4 Disassembling Relief Valve

Courtesy of CKD™

6.2.5. Regulator

The 0.5 kg/cm^2 Pressure is used to drive the Diaphragm Pump, drain the waste liquid and remove the transducer clog. Regulator knob is located to the left side of the Main Unit.

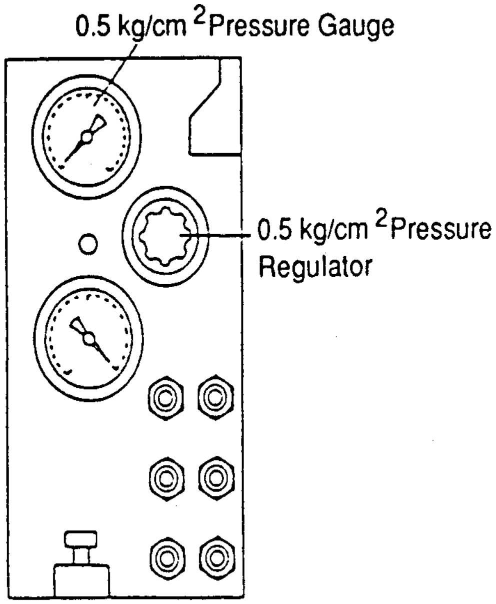


Figure 6-2-5 Regulator Unit No.5

If the respective gauges indicate values out of the following normal range, check the connections of tubing for any leakage.

0.5 kg/cm^2 Pressure Gauge : 0.5 ± 0.05 kg/cm^2

Adjustment for 0.5 kg/cm^2 Pressure:
To adjust the pressure, pull out the adjusting knob, and turn it clockwise to increase the secondary pressure, and counterclockwise to decrease. After completion of adjustment, press the knob to lock it.

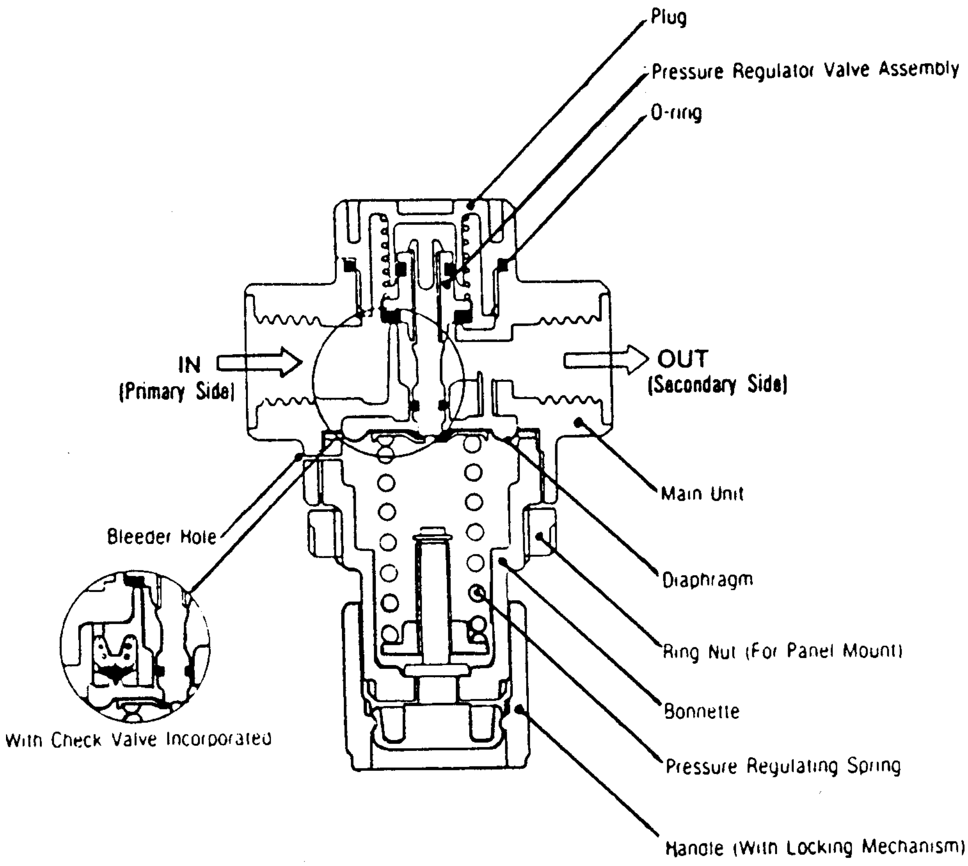


Figure 6-2-6 Structure of the Regulator

NOTE:

Pressure should be always adjusted in the direction of raising it, i.e., first, decrease the pressure far below and then increase to an optimum setting.

6.2.6. Bellows Unit

If the respective gauges indicate values out of the following normal range, check the connections of tubing for any leakage.

250 mmHg Vacuum Gauge : 250 ± 10 mmHg

If there is no leak, adjust the bellows unit.

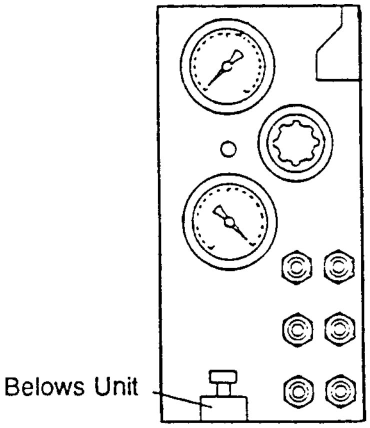


Figure 6-2-7 Location of Bellows Unit

Adjustment for 250 mmHg Vacuum:
Loosen the Lock Nut located below the Adjustment Screw for the 250 mmHg Bellows Unit and turn it clockwise to raise the vacuum or turn counterclockwise to lower it. After finishing adjustment, fasten the Lock Nut.

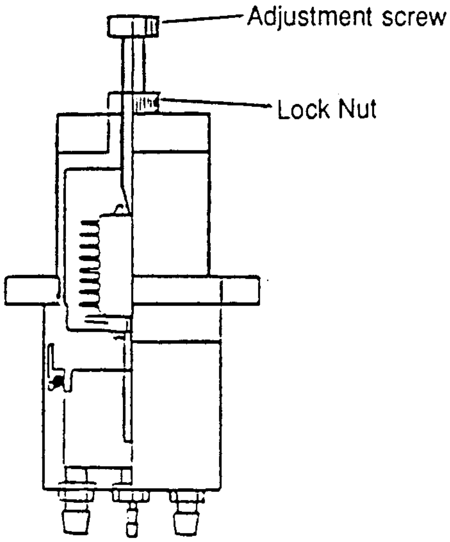


Figure 6-2-8 Bellows Unit

6.2.7. Solenoid Valves

Replacement of Solenoid Valve (SV)

1. Loosen the Fixing screw of the Solenoid Valve Connector. Then Pull the Connector out as arrow mark in Figure 6-2-9.

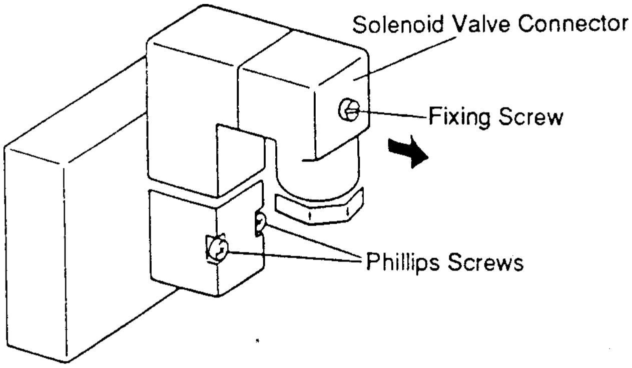


Figure 6-2-9 Removing Solenoid Valve

NOTE:
Fixing screw of the connector may not be removed completely.

1. Remove Solenoid Valve by loosing two Phillips screws.
2. Assemble new Solenoid Valve by reverse process.
3. Be careful not to lose the gasket of Solenoid Valve.

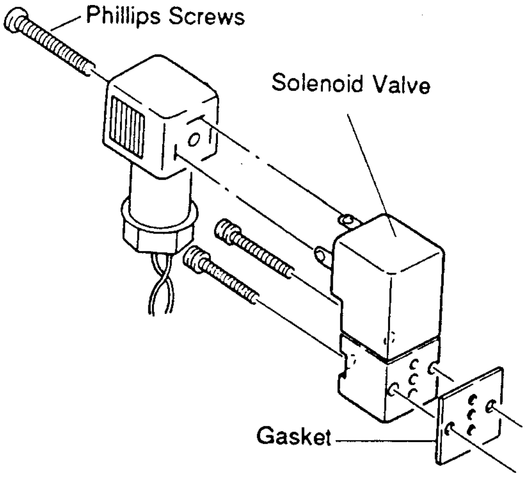


Figure 6-2-10 Assembly of Solenoid Valve

6.2.8. Filter Assembly No.6

After the daily analysis or at least every 24 hours, precipitated water in the filter assembly must be drained. Note that the amount of water that precipitates in the Filter Assembly No.6 varies with the moisture contained in the air of the environment in which the system is set up.

1. Pull the Front Cover forward to open, while power is on.
2. Check the level of water in the Filter assembly on the left front of the Main Unit.
3. If there is water, push up the knob as shown in Figure 6-2-11 to drain the water out to the waste line through Silicone Tube.

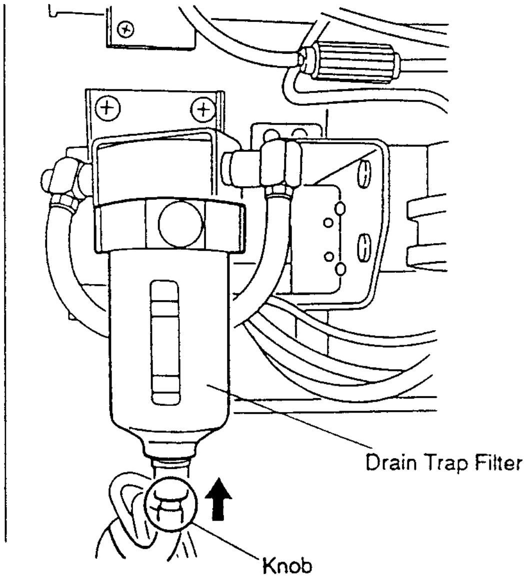


Figure 6-2-11 Filter Assembly No.6

6.3. Hydraulics

6.3.1. Cleaning Transducer Aperture

Follow the procedure below;

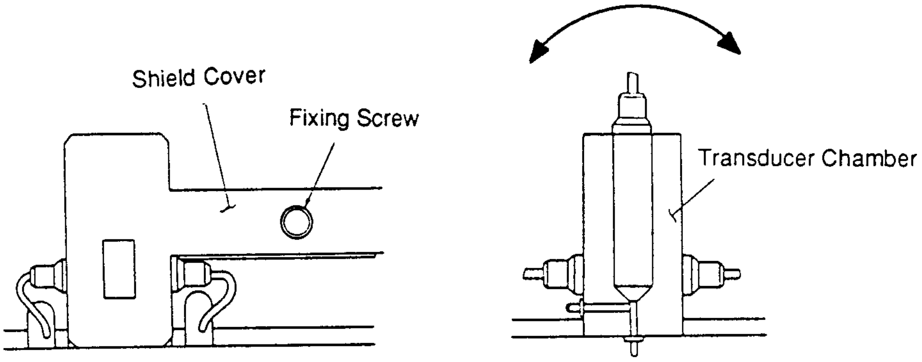


Figure 6-3-1 Transducer Chamber Layout

A. Press SELECT key in the Ready mode to access the PROGRAM SELECT, and select the DRAIN SAMPLE program with the **2** or **8** keys (cursor key ↑ or ↓). When the ENTER key is pressed, the diluent in the Transducer Chamber is drained.

B. Loosen the Fixing Screw of Transducer Chamber to remove the Shield Panel. After removing Shield Panel, pull the Transducer Chamber out down-forward rotating counterclockwise or clockwise slightly.

C. Pick at the Aperture to clean with Brush which is wet with CELLCLEAN.

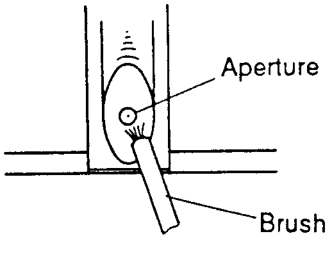


Figure 6-3-2 Cleaning Transducer Aperture

D. Re-assemble the Transducer Chamber and the Shield Panel.

E. After cleaning, perform AUTO RINSE program in the PROGRAM SELECT menu. Verify that all parameters are below the background count limit.

NOTE:
After using, wash away the CELLCLEAN on the Brush with water.

6.3.2. Master Valves

1. Checking Master Valve Operation

   A. Turn OFF the power of Main Unit. Wait about 1 minute until the vacuum becomes low.
   B. Loosen three screws to remove the Valve Seal.

Valve Seal/Manifold

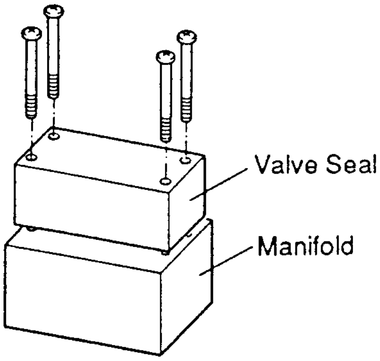


Figure 6-3-3 Removal of Valve Seal

   C. If there were any debris on the diaphragm or in the valve seal, clean it completely.

   D. When there is no pressure, Piston head should be lifted up by the tension of spring coil. Easy checking can be performed by pressing the Diaphragm downward with finger.

(Diaphragm)

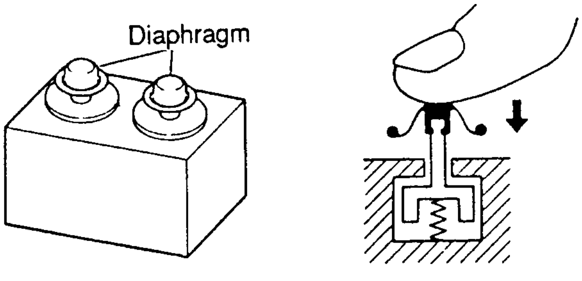


Figure 6-3-4 Checking Piston Operation

2. Replacing the cylinder Unit No. 6

When the diaphragm is broken (tear or fissure), on the master valve, replace the entire Cylinder Unit as described below;

A. There are two types of Cylinder Units; one is the taller type, Cylinder Unit No. 6-H Assy (P/N 873-0341-9), and the other is the lower type, Cylinder Unit No. 6-L (P/N 873-0351-6) as shown in Figure 6-3-5. Remove old cylinder unit and verify which type is the one you have problem.

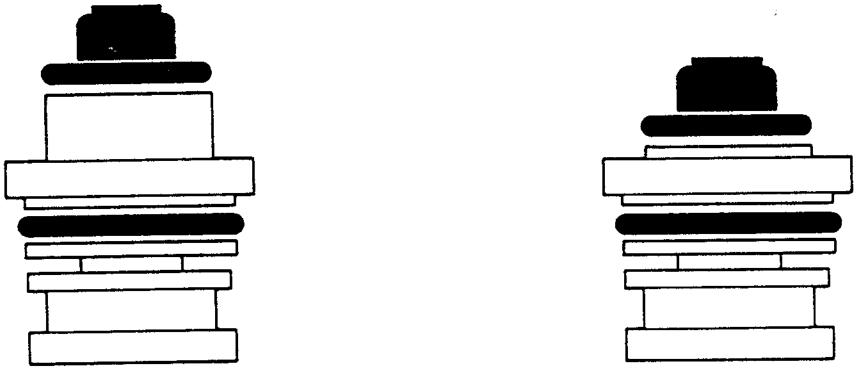
B. Apply a sufficient amount of silicone grease (P/N 426-4475-5) to the Mini-Y Packing MY-10 (P/N 346-2510-9), and place it to the Cylinder Unit in the correct direction shown in Fig. 6-3-6.

C. Set the Spring No.62 to the deepest position until it fits in with a pop sound. Verify that there is no gap between the Spring and the Cylinder Unit throughout its circumference (see Figure 6-3-8).

D. Install the greased and assembled Cylinder Unit in the Manifold, wipe the top surface of the diaphragm with ethyl-alcohol to remove the oil and debris.

E. Tighten four screws by pressing the valve seal with fingers.

F. Turn ON the power and see the master valve operates properly.



(873-0341-9) Cylinder Unit No. 6-H

(873-0351-6) Cylinder Unit No. 6-L

Figure 6-3-5 Drawing of Cylinder Unit No.6 (H and L)

Correct

Incorrect

Figure 6-3-6 Correct Direction of Mini-Y Packing

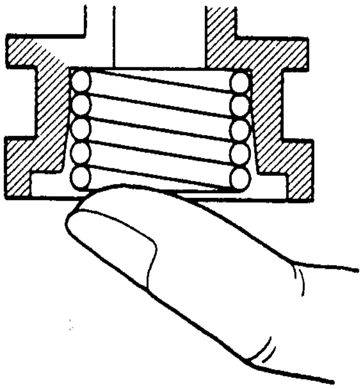


Figure 6-3-7 Setting Spring No. 62

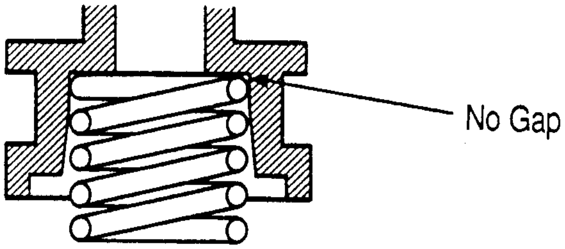


Figure 6-3-8 No gap between Spring and Cylinder Unit

6.3.3. Verification of dispensing volume of Diaphragm Pumps

Following seven Diaphragm pumps are used in the Hydraulic system of K-1000.

Table 6-3-1 Diaphragm Pumps

DP No.	Function	Type	Dispense/Aspiration volume (mL)
DP1	WBC Lyse Dispense	Diaphragm Pump No.5 Assy	1.0 ± 0.02 mL
DP2	Hgb Lyse Dispense	Diaphragm Pump No.5 Assy	1.0 ± 0.02 mL
DP3	RBC Sample 2nd Aspiration	Diaphragm Pump No.8 Assy	1.5 ± 0.05 mL
DP4	WBC Rinse	Diaphragm Pump No.6 Assy	3.0 ± 1.0 mL
DP5	Sample Aspiration	Diaphragm Pump No.7 Assy	0.100 - 0.115 mL
DP6	WBC/RBC Sample Dilution	Diaphragm Pump No.9 Assy	2.0 ± 0.02 mL
DP7	Hgb Dilution Rinse	Diaphragm Pump No.9 Assy	2.0 ± 0.1 mL

Figure 6-3-9 shows locations of each diaphragm pump.

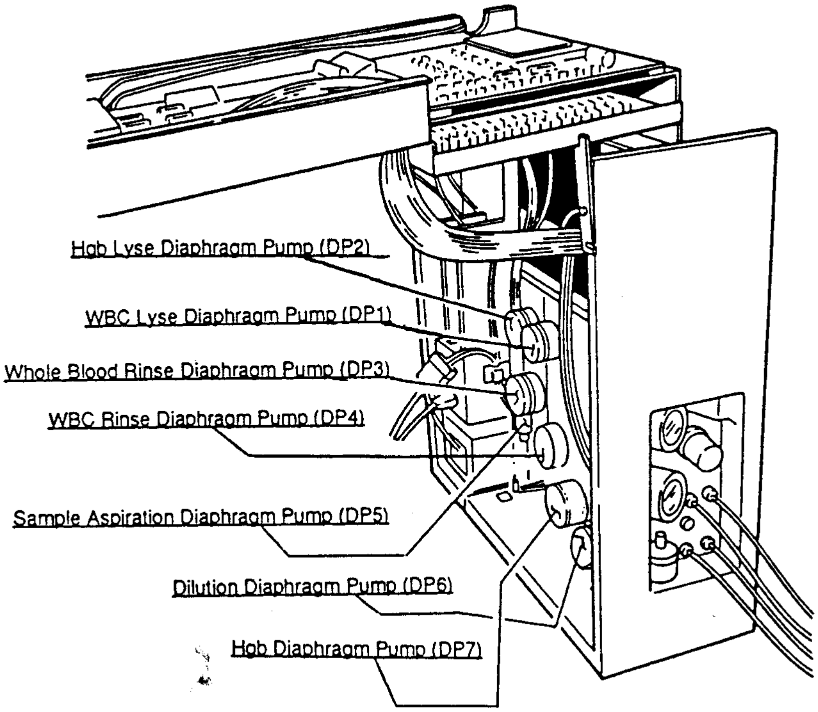


Figure 6-3-9 Location of Diaphragm pumps

Verify the dispensing volume according to following step;

1) WBC Lyse Reagent Diaphragm Pump (DP1)

A. Prepare some disposable beakers (DB-1), a polyurethane tube (3.4 x 1.8 mm, 10 cm length) and an electric balance.

B. Weigh a DB-1 by electric balance or by proper weight technique.

C. Enter into the Maintenance Mode for displaying the sequence number in the operation on the LCD (Refer Section 8.1.).

D. Open the Operation Panel and disconnect the tube from the nipple (a) of Master Valve MV24. Figure 6-3-10 shows the location of tube.

E. Insert the free end of tube into the disposable beaker.

F. Cycle the instrument by pressing START switch. Lyse reagent will be dispensed at Seq-5.

G. Measure the total weight of DB-1 and calculate dispense volume of Lyse Reagent per cycle.

H. Repeat above steps E to G at least 3 times.

I. Verify the weight of dispensed diluent. The first sampling should be disregarded and the weight should be in the following ranges;

Weight of Dispensed Volume of DP1;

(Reagent : Storomatolyser 3WP)

Temp. (◦C)	Dispense volume
15◦C	0.984 - 1.024 g
20◦C	0.982 - 1.023 g
25◦C	0.980 - 1.020 g
30◦C	0.980 - 1.019 g

If the dispensing volume of the diaphragm pump is out of specification, See section 6.3.4. to adjust it.

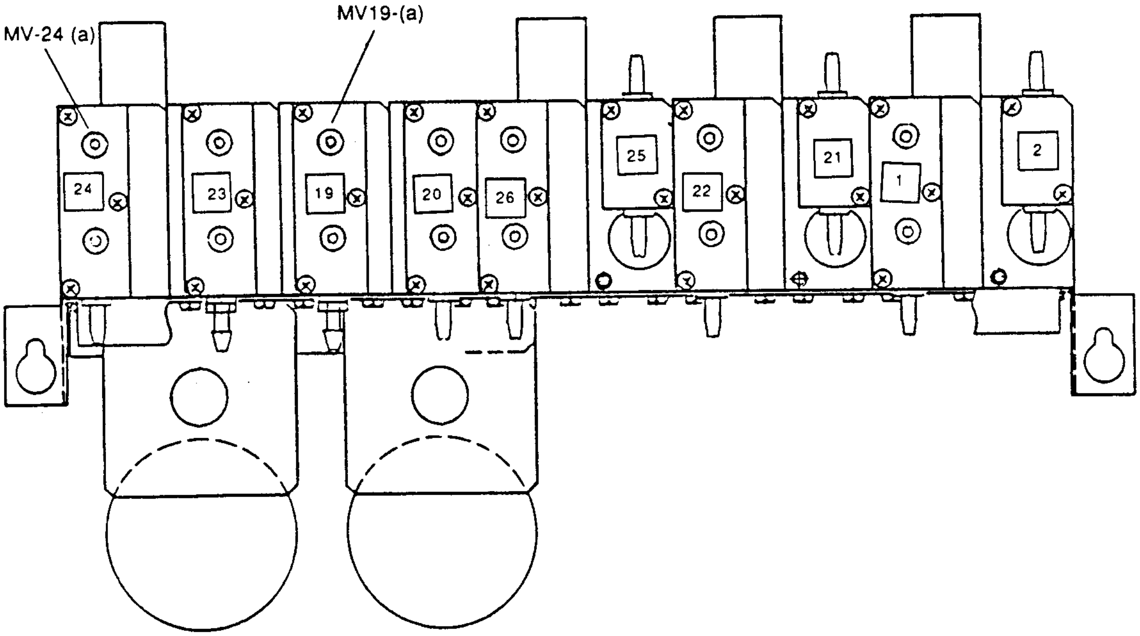


Figure 6-3-10 Location of the nipples for the adjustment of DP1 and DP2

2) Hgb Lyse Reagent Diaphragm Pump (DP2)

A. Prepare some pieces of disposable beaker (DB-1).

B. Weigh a DB-1 by using electric balance or proper weight technique.

C. Enter into the Maintenance Mode (Refer section 8.1.).

D. Open the Operation Panel and disconnect the tube from the nipple (a) of the Master valve MV-19. Figure 6-3-10 shows the Location of the tube.

E. Connect polyurethane tube (3.4 x 1.8 mm, 10 cm length) to the above nipple.

F. Insert the free end of the tube into the disposable beaker.

G. Cycle the instrument by pressing START switch, and Lyse Reagent will be dispensed at Seq-5.

H. Measure the total weight of the disposable beaker (DB-1) and calculate dispense volume of the Lyse Reagent per cycle.

I. Repeat above steps F to H at least 3 times.

J. Verify the weight of dispensed diluent. The first sampling should be disregarded and the weight from 2nd sampling should be in the following range;

Dispensing Volume Specification of DP2;
(Reagent: Storomatolyser C)

Temp. (◦C)	Dispense volume
15◦C	0.984 - 1.024 g
20◦C	0.982 - 1.023 g
25◦C	0.980 - 1.020 g
30◦C	0.980 - 1.020 g

If the dispensing volume of the diaphragm pump is out of specification, See section 6.3.4. to adjust it.

3) Whole Blood Rinsing Diaphragm Pump (DP3)

A. Prepare some empty disposable beakers (DB-1). Dispense proper volume (more than 10 mL) of diluent or de-ionized water into the DB-1.

B. Weigh a DB-1 by using electric balance or proper weight technique.

C. Open the Operation Panel and disconnect the tube from the nipple (a) of MV-12. Figure 6-3-11 shows the location of the tube.

D. Connect polyurethane tube (3.4 x 1.8 mm, 10 cm length) to the above nipple

E. Insert the free end of the tube connected in above step into the disposable beaker.

F. Cycle the instrument by pressing START switch, and diluent will be aspirated at Seq-4 and again in Seq-10.

G. Measure the total weight of the disposable beaker (DB-1) and calculate dispense volume of the diluent per cycle.

H. Repeat above steps B to G at least 3 times.

I. Verify the weight of aspirated liquid. The first sampling should be disregarded and the weight from 2nd sampling should be in the following range;

Weight of aspirated diluent of DP3/one aspiration;

(Reagent : Cellpack)

Temp. (◦C)	Aspirate volume
15◦C	1.457 - 1.557 g
20◦C	1.455 - 1.555 g
25◦C	1.453 - 1.554 g
30◦C	1.451 - 1.551 g

If the weight exceeds the range, Refer to section 6.3.4. for adjustment.

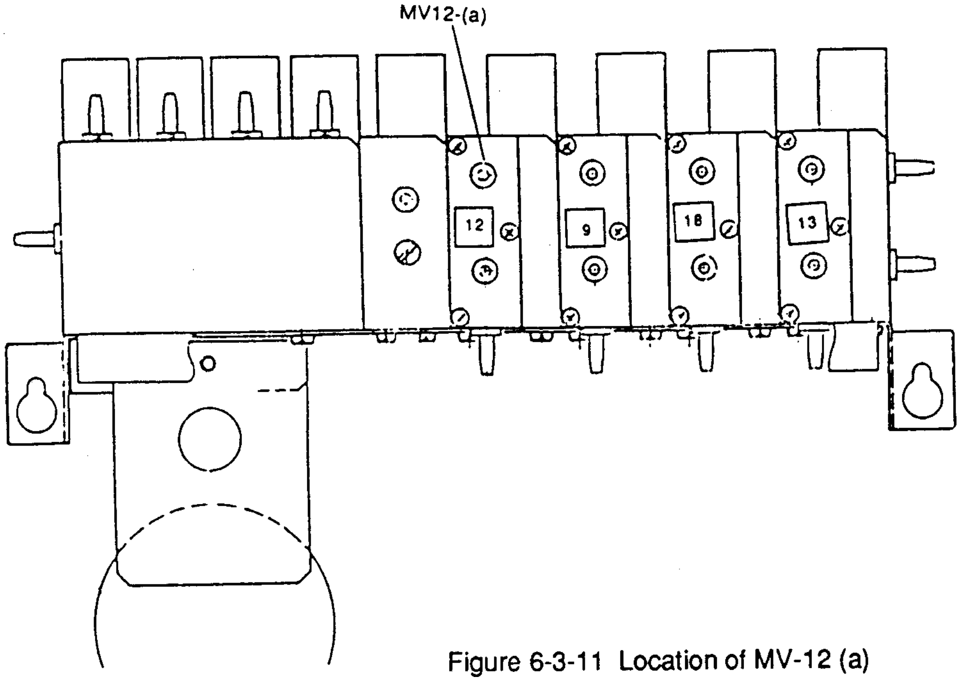


Figure 6-3-11 Location of MV-12 (a)

4) WBC Rinsing Diaphragm Pump (DP4)

A. Prepare some pieces of disposable beaker (DB-1) and polyurethane tube (3.4 x 1.8 mm, 10 cm length).

B. Weigh a the disposable beaker (DB-1) by using electric balance or proper weight technique.

C. Disconnect the tube from the nipple (2) of the Upper fixed value of SRV. Figure 6-3-12 shows the location of the nipple.

D. Insert the free end of the tube disconnected in above step C into the any waste bottle.

E. Cycle the instrument by pressing START switch. First, diluent will be dispensed at Seq-5, but the diluent which is dispensed in Seq-5 is not required.

F. Press the SELECT key to stop the sequence of the cycle after seq-5, and insert the free end of the tube connected in above step D into the disposable beaker measured in step B, and press SELECT key again, to start the sequence.

G. The diluent to be measured is dispensed at Seq-14.

H. Measure the total weight of the disposable beaker (DB-1) and calculate dispense volume of the diluent at seq-14 per cycle.

I. Repe at above steps B to H at least 3 times.

J. Verify the weight of dispensed diluent. The first sampling should be disregarded and the weight from 2nd sampling should be in the following range;

Dispensing Volume Specification of DP4;

Temp. (°C)	Dispense volume
15°C	2.009 - 4.019 g
20°C	2.007 - 4.014 g
25°C	2.005 - 4.002 g
30°C	2.001 - 4.002 g

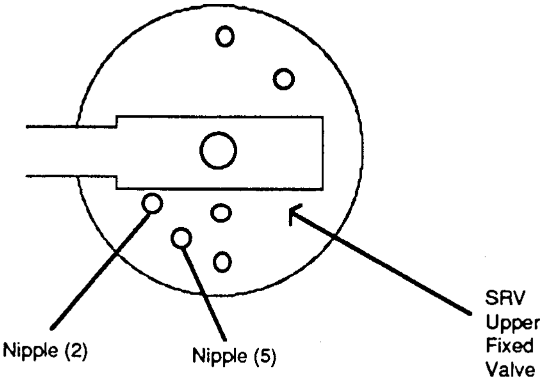


Figure 6-3-12

5) Aspiration Diaphragm Pump (DP5)

A. Prepare some of disposable beakers (DB-1). Prepare a diluent 5 mL or more in DB-1.

B. Measure the total weight of the disposable beaker (DB-1) by using electric balance or proper weight technique.

C. Wipe the Aspiration tube by lint-free tissue, and aspirate.the liquid in the disposable beaker from the Aspiration pipette.by pressing START switch.

D. Measure the total weight of the disposable beaker (DB-1) again and calculate aspirate volume of the liquid per cycle.

E. Repeat above steps B to D at least 5 times.

F. Verify the weight of aspirated liquid. The first sampling should be disregarded and the weight from 2nd sampling should be in the following ranges;

Aspirating Volume Specification of DP5;
(Reagent : Cellpack)

Temp. (°C)	Aspirate volume
15°C	100.47 - 115.54 μg
20°C	100.35 - 115.40 μg
25°C	100.23 - 115.26 μg
30°C	100.06 - 115.07 μg

If the weight exceed the range, refer to Section 6.3.4. for adjustment.

6) Dilution Diaphragm Pump (DP6)

A. Prepare two empty disposable beakers (DB-1) and polyurethane tube (3.4 x 1.8 mm, 10 cm length).

B. Weigh one disposable beaker by using electric balance or proper weight technique, and dispense some volume of diluent into the other one.

C. Disconnect the tube from the nipple (2) of the Upper fixed valve of SRV. Figure 6-3-12 shows the location of nipple.

D. Insert the free end of tube disconnected in above step into the disposable beaker which weight are measured in Step B.

E. Set the diluent in the other disposable beaker.at the aspiration pipette, and press START switch to let the instrument aspirate the diluent, and Diluent which should be measured will be dispensed from the tube disconnected in step C at Seq-5. Press the (SELECT) key to stop the sequence after seq-5, if necessary.

F. Measure the total weight of the disposable beaker (DB-1) and calculate dispensed volume of diluent per cycle.

G. Press (SELECT) key again and insert the free end of tube disconnected in the above step "D" into any waste bottle. Diluent will be also dispensed at Seq-14. It is not required.to measure the weight of diluent at Seq-14.

H. Repeat above steps B to G at least 3 times.

I. Verify the weight of dispensed diluent. The first sampling should be disregarded and the weight should be in the following range;

The weight of Dispensed Diluent of DP6;

(Reagent : Cellpack)

Temp. (°C)	Dispense volume
15°C	1.989 - 2.029 g
20°C	1.987 - 2.027 g
25°C	1.985 - 2.025 g
30°C	1,981 - 2.021 g

If the weight exceeds the range, refer to Section 6.3.4. for adjustment.

7) Hgb diaphragm Pump (DP7)

A. Prepare some pieces of disposable beaker (DB-1) and polyurethane tube (3.4 x 1.8 mm, 10 cm length).

B. Weigh a DB-1 by using electric balance or proper weight technique.

C. Disconnect the tube from the nipple (5) of Upper fixed valve of SRV. Figure 6-3-12 shows location of nipple.

D. Connect polyurethane tube (3.4 x 1.8 mm, 10 cm length) to the above nipple

E. Insert the free end of tube connected in above step into the disposable beaker.

F. Cycle the instrument by pressing START switch, and diluent will be dispensed into the disposable beaker at Seq-5 and again in Seq-14.

G. Measure the total weight of the disposable beaker (DB-1) and calculate the dispensed volume of diluent per cycle.

H. Repeat above step B to G at least 3 times.

I. Verify the weight of dispensed diluent. The first sampling should be disregarded and the weight from 2nd sampling should be in the following range;

Weight of Dispensed Diluent of DP7;

(Reagent : Cellpack)

Temp. (◦C)	Dispense volume
15◦C	1.909 - 2.110 g
20◦C	1.907 - 2.107 g
25◦C	1.904 - 2.105 g
30◦C	1,901 - 2.102 g

If the weight exceeds the range, refer to Section 6.3.4. for adjustment.

6.3.4. Volume Adjustment of Diaphragm Pump

Following five types of Diaphragm Pump are used in the Hydraulic system of the K-1000.

Adjustable-type

1) Diaphragm Pump No.5 Assembly (as DP1 and DP2)
2) Diaphragm Pump No.7 Assembly (as DP5)
3) Diaphragm Pump No.8 Assembly (as DP3)
4) Diaphragm Pump No.9 Assembly (as DP6 and DP7)

Un-adjustable type

1) Diaphragm Pump No.6 Assembly (as DP4)

If there were any diaphragm pump (adjustable-type) that were out of specification, adjust the dispensing (or aspirating) volume as follows;

A. Loosen the locking Nut which are shown in Figure 6-3-13 while keeping the piston not to move.

B. Turn the piston counterclockwise (to increase dispensing volume) or clockwise (to decrease).

C. Tighten the locking nut and check the dispensing (or aspirating) volume by above procedure (6.3.3.).

DP type	Part Description		
	Piston	Locking Nut	Fixing Material
Diaphragm Pump No.5 assembly	Piston No.28	Nut No.19	Fixing Material No.13A & 13B
Diaphragm Pump No.7 assembly	Piston No. 26	Nut No.17	Fixing material No.11A & 11B
Diaphragm Pump No.8 assembly	Piston No. 27	Nut No.18	Fixing material No.14 & 12B
Diaphragm Pump No.9 assembly	Piston No. 27	Nut No.18	Fixing material No.12 & 12B

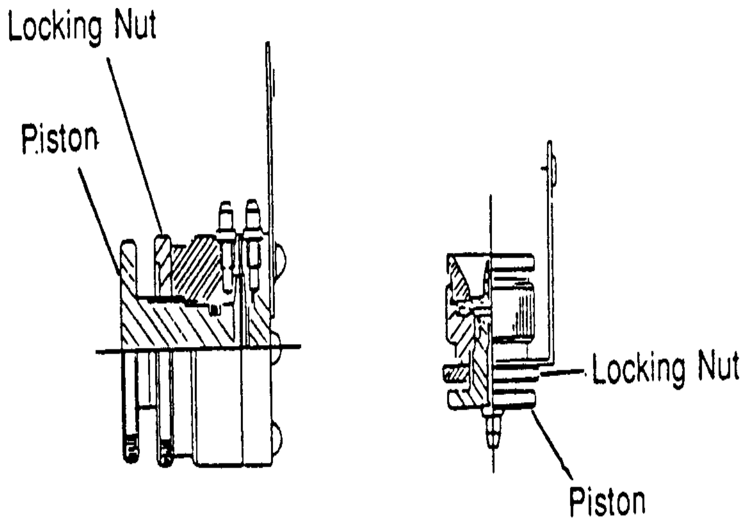


Figure 6-3-13 Locking nut and Piston of Diaphragm Pump Assy

6.3.5. Disassembling Diaphragm Pumps

When disassembling of diaphragm pump is required, follow the procedure as below;

A. Disassemble the diaphragm pump as shown in Figure 6-3-14

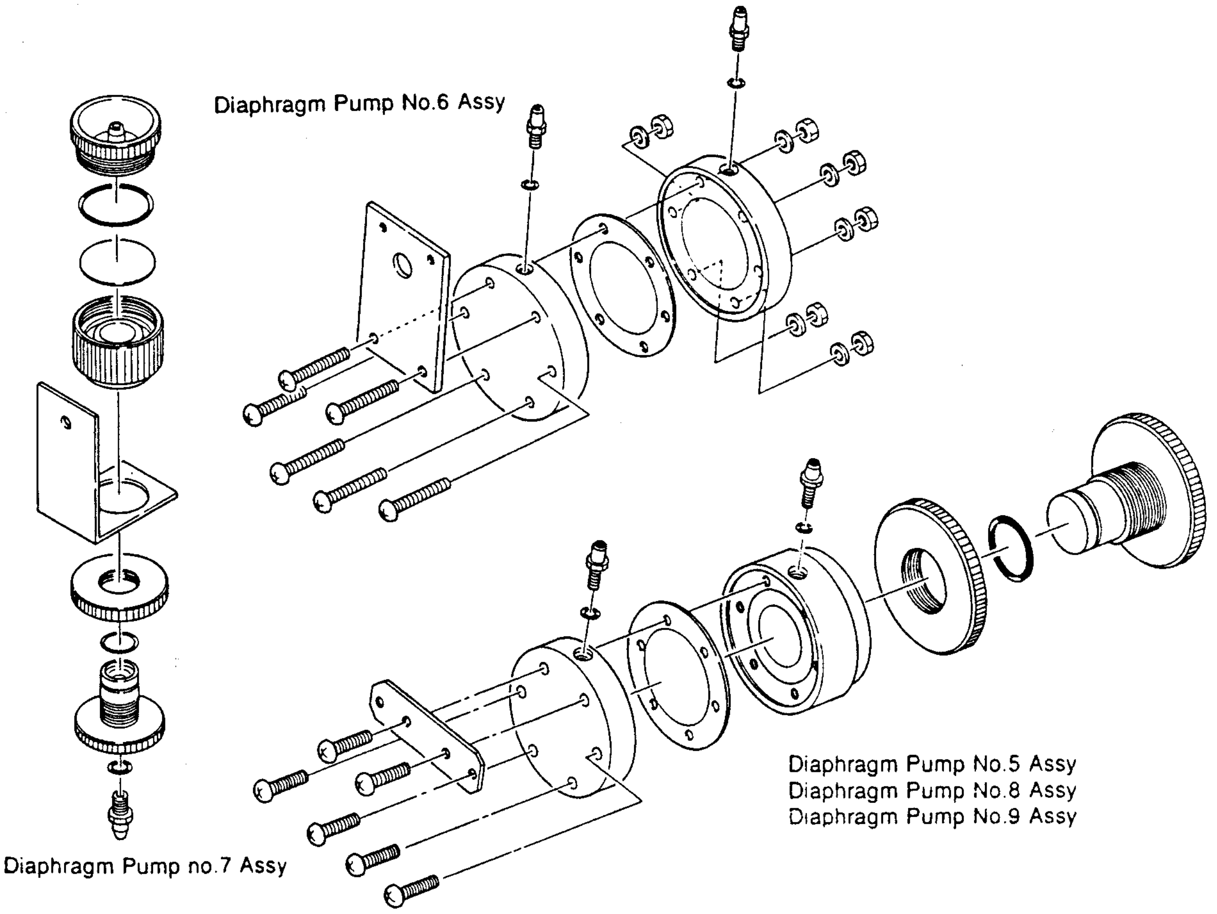


Figure 6-3-14 Dis-assembly of Diaphragm Pumps

B. Remove the O-ring from piston.

C. Check and replace the O-ring if necessary, after inspection. Lubricate the O-ring with Sysmex silicone grease.

D. Install the O-ring to the piston.

E. Install the locking nut to the piston until it fits to the bottom.

F. Install the piston to the Fixing material so that the surface of Fixing material and that of Piston becomes smooth as shown in Figure 6-3-15. Fix the piston temporarily by the locking nut,and wipe the surface with a int-free tissue which is moistened with ethyl-alcohol to remove silicon grease on the surface.

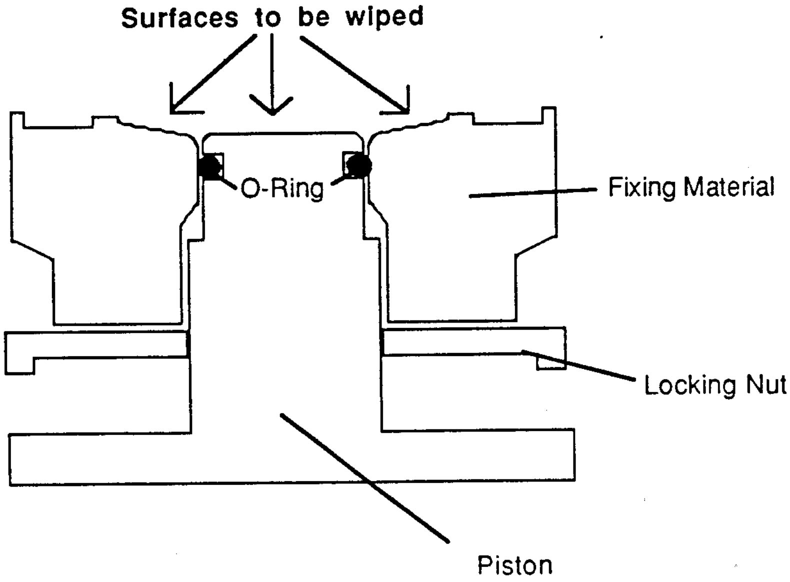


Figure 6-3-15

G. If any crack were found on the diaphragm, replace the diaphragm. Wipe the surface of new diaphragm well with a lint-free tissue which is moistened with ethyl-alcohol.

I. Assemble the diaphragm pump in the reverse order. Take care to assemble the diaphragm correctly. Correct and incorrect example are shown in Figure 6-3-16.

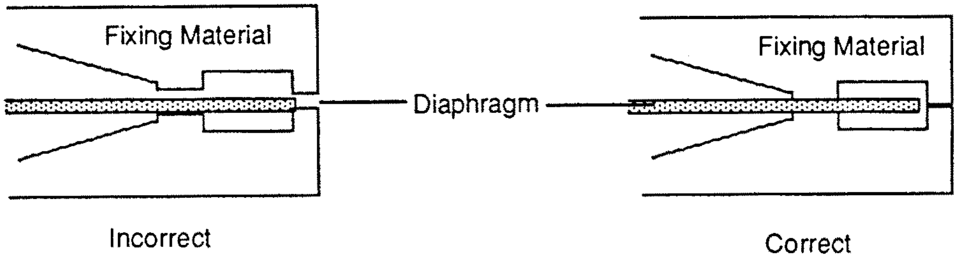


Figure 6-3-16 Incorrect and Correct assembling DP Assy

J. Adjust the volume of the diaphragm pump according to Section 6.3.4.

6.3.6. Rinsing Cup Cleaning

Clean the Rinse Cup once a month, as follows, or more often if the workload demands.

WARNING:
Wear gloves when cleaning the Rinse Cup. This component may contain residual biological material, and constitute a bio-hazard.

NOTE:
Ensure instrument power is off.

A. Pull out the Rinse Cup as shown in Figure 6-3-17

B. Pull the Rinse Cup upward to remove it. And disconnect the tube at the lower potion of Rinse Cup.

C. Remove a dirt from the Rinse Cup with CELLCLEAN moistened gauze. Then wash away CELLCLEAN with water.

D. Re-assemble the Rinse Cup in reverse order.

NOTE:
Ensure instrument power is off and be careful not to bend the Sample Aspiration Tube when the Rinse Cup is disassembled or re-assembled.

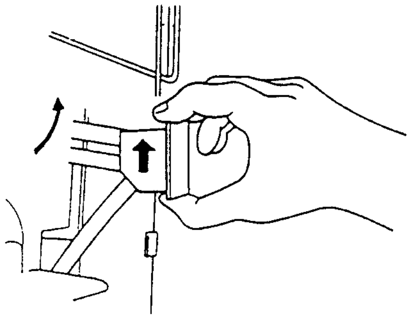


Figure 6-3-17 Removing Rinse Cup

6.3.7. Non-return Valve

Checking procedure for Non-return Valve CV-1 is as follows.

A. Turn CV-1 base in the direction indicated by the arrow in Figure 6-3-18.

B. Clean valve CV-1 and side A of seal CV-1 with gauze dampened with water.

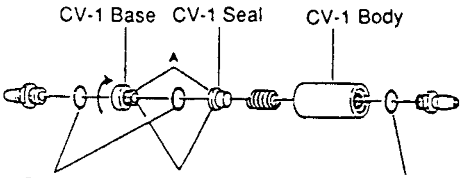


Figure 6-3-18 Checking Non-return Valve

C. Make sure that the side A of CV-1 seal is dust-free and flat. If the side A of CV-1 is not flat, replace the CV-1 seal with new one.

D. Re-assemble the non-return valve.

6.3.8. Waste Chamber & Trap Chamber No.5

Clean the Waste Chamber and Trap Chamber No.5, as follows.
(This procedure is also described in operator's manual to clean these chambers once a month.)

WARNING:
Wear gloves when cleaning the Waste Chamber and Trap Chamber No.5. These components may contain residual biological material, and constitute a bio-hazard.

1. Cleaning of Trap Chamber No.5

A. Turn OFF the power of the Main Unit. Wait for the pressure to release (about 1 minute).

B. Pull the Front Cover forward to open.

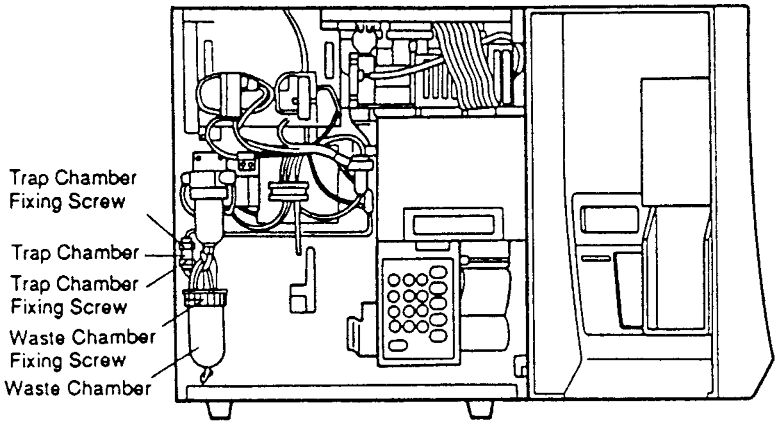


Figure 6-3-19 Waste Chamber & Trap Chamber No.5

C. Turn counterclockwise the Trap Chamber Fixing Screw and remove the Trap Chamber No.5.

D. Wipe up inside surface of Trap Chamber with CELLCLEAN moistened gauze. After that, wipe away CELLCLEAN in the Trap Chamber with distilled water moistened gauze.

E. Re-assemble the Trap Chamber by the reverse procedure.

2. Cleaning of Waste Chamber

Normally perform the cleaning method-1. If Waste Chamber is heavily dirty, perform the cleaning method-2.

Cleaning method-1

A. Make 30 mL of the 1/3 diluted CELLCLEAN solution with distilled water. (CELLCLEAN 10 mL + Distilled Water 20 mL)

B. Pull the Front Cover forward to open while the power is turned on.

C. Execute the DRAIN SAMPLE program in the PROGRAM SELECT menu.

D. Turn OFF the power of the Main Unit.

E. Fill the chamber with 30 mL of the 1/3 diluted CELLCLEAN solution.

F. After 5 minutes, turn ON the power of Main Unit and the automatic rinsing is performed.

Cleaning method-2

A. Turn OFF the power of the Main Unit. Wait for the pressure to release (about 1 minute).

B. Pull the Front Cover forward to open.

C. Turn counterclockwise the Waste Chamber Fixing Screw and remove the Waste Chamber.

D. Wipe up inside surface of Waste Chamber and nipples with CELLCLEAN moistened gauze. After that, wipe away CELLCLEAN in the Waste Chamber with distilled water moistened gauze.

E. Disassemble the Float Switch and clean it in the same way as Waste Chamber. Removing the C-ring frees the float, as shown in Figure 6-3-20.

F. Re-assemble the Waste Chamber by the reverse procedure.

CAUTION:
Install the float with the magnet side facing up. Do not install it upside down.

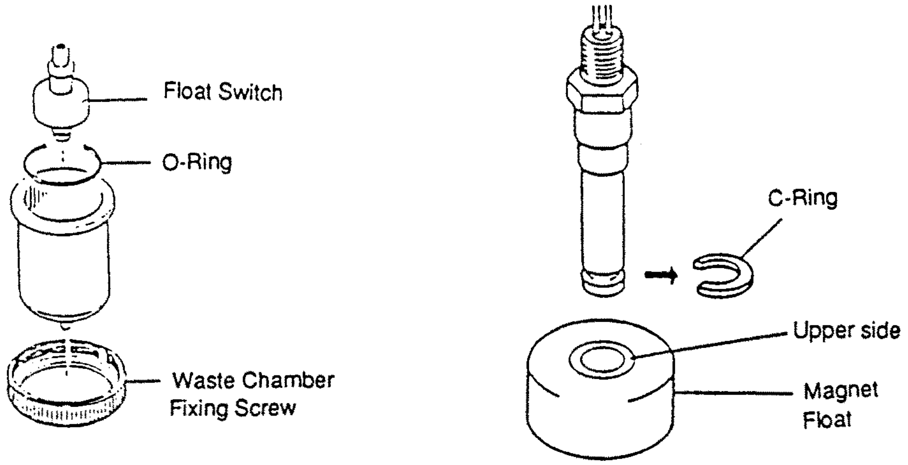


Figure 6-3-20 Float Switch

6.4. Sample Rotor Valve

6.4.1. Replacing Sample Aspiration Tube

A. Turn OFF the power of the Main Unit. Pull the Front Cover forward.

B. The Sample Aspiration Tube is connected to the Sample Rotor Valve as shown in Figure 6-4-1.

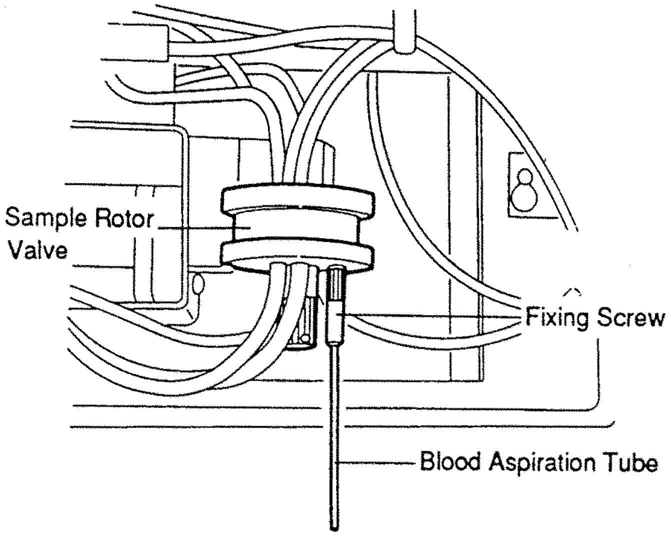


Figure 6-4-1 Location of Sample Aspiration Tube

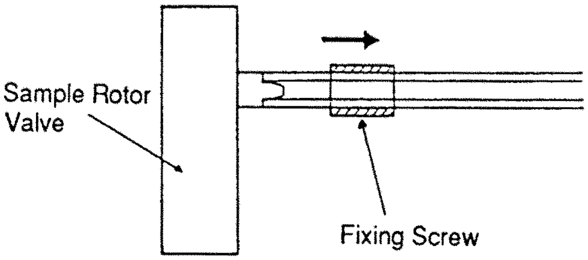


Figure 6-4-2 Removing Sample Aspiration Tube

C. Loosen the Fixing Screw which tighten the Sample Aspiration Tube as shown in Figure 6-4-2. Remove Blood Aspiration Tube from Sample Rotor Valve.

D. Prepare a new sample aspiration tube (P/N 442-5417-4/Tube Teflon 0.5 x 2.0 x 69 mm), with a bevelled cut as shown in Figure 6-4-3. Do not stretch or bend the tube.

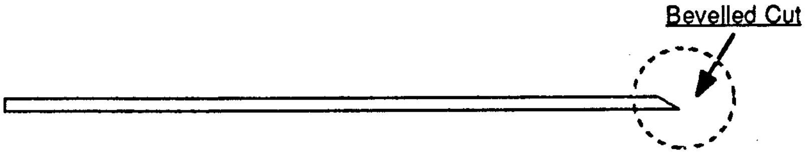


Figure 6-4-3 Sample Aspiration Tube

NOTE:

The sample aspiration tube should be bevelled to prevent its tip from getting stuck on the bottom of the blood collection bottle.

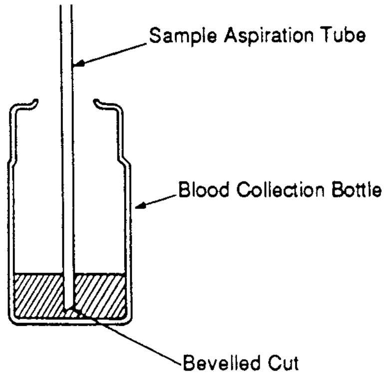


Figure 6-4-4 Blood Collection Bottle

E. Widen the opening of the Sample Aspiration Tube at the end of leading to the Sample Rotor Valve using the provided Awl. Insert the Sample Rotor valve nipple into it.

CAUTION:

Insert the nipple into the tube carefully to prevent burrs inside the tube.

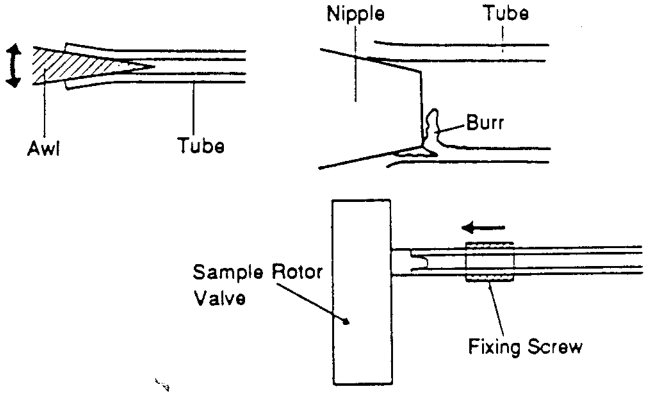


Figure 6-4-5 Connecting Sample Aspiration Tube

F. Make sure that the tube is parallel to the nipple.
G. Tighten the tube to the Sample Rotor Valve with Fixing Screw.

6.4.2. SRV Cleaning

Clean the Sample Rotor Valve once a week, as follows, or more often if the workload demands.

CAUTION:

Because the CELLCLEAN is very alkaline detergent, wear a pair of gloves to prevent CELLCLEAN adhering when the Sample Rotor Valve is cleaned.

A. Turn OFF the power of the Main Unit. Wait for the pressure to release (about 1 minute).

B. Pull the Front Cover forward to open.

C. Turn counterclockwise the SRV Fixing Screw and remove it from the shaft on which Sample Rotor Valve is fit.

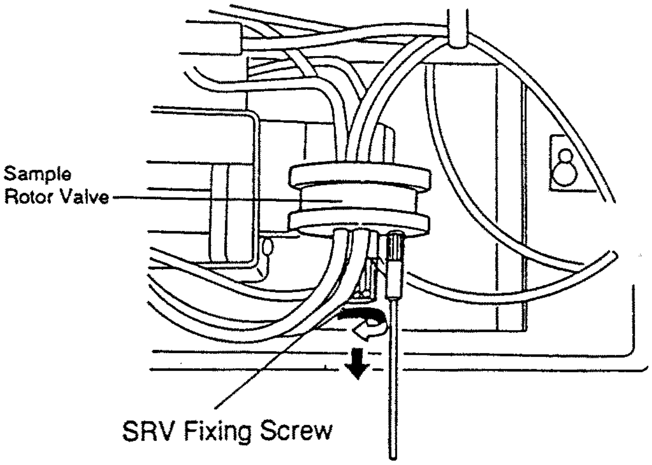


Figure 6-4-6 Removing the Sample Rotor Valve Fixing Screw

D. Remove the Lower Fixed Valve, and the Rotor Valve. The Three Valves fit together tightly and are not easily separated; pull them slightly out downward, and gently twist off one by one.

CAUTION:

Do not pull the valves out too far, or the whole blood aspiration tube connected to the Upper Fixed Valve will be strained. Have tissue ready to absorb the diluent that will drip from the tube when the Lower Fixed Valve is removed.

E. Clean the surfaces of the Fixed Valves and Rotary Valve with gauze moistened with distilled water. Remove deposits and heavy dirt, if any, with CELLCLEAN and gauze. Do not use other solvents. The Valves are resistant to CELLCLEAN, but even this should be thoroughly removed to prevent corrosion.

F. The contact surfaces of the valves must be free from dirt and dust; check them. Dirt or dust could cause a permanent damage to the Sample Rotor Valve. Reassemble the Sample Rotor Valve. Turn the SRV Fixing Screw clockwise to screw it onto the shaft.

CAUTION:

Do not reverse the rotary valve. The side with the metal knob should be toward the rear, and the metal knob should be located between both SRV Air cylinder's stoppers.

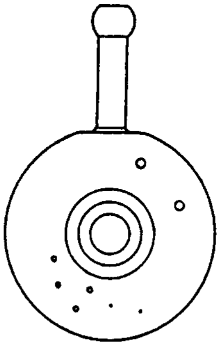


Figure 6-4-7 Rotor Valve (Upper View)

G. Turn ON the power of the Main Unit. Verify that all background values are below the thresholds after auto-rinsing.

H. Perform quality control and verify satisfactory performance.

CAUTION:

1. CELLCLEAN is strong alkaline detergent. If CELLCLEAN adheres to your hands, finger or clothes, wash away CELLCLEAN with large amount of water.
2. All reagent may affect the paint of instrument. If CELLCLEAN is spilled on the instrument, wipe it with moistened tissue etc. immediately.

6.4.3. SRV Adjustment

This section contains procedure for the following adjustments on the Sampling Rotor Valve. Adjustments for SRV are not usually required. When installing a new S.R.V., stop position adjustments should be performed before attempting to operate the instrument.

* Alignment tools required:

Code No.	**Description**
462-9351-1	SRV Alignment Tool K-A
462-9352-5	SRV Alignment Tool K-B

Stop position Adjustment Procedure:

A Turn the power off and wait at least one minute to release the vacuum and pressure accumulated inside the pneumatic line.

B Turn the knurled sample rotor valve fixing screw counterclockwise and remove it from the Sample Rotor Valve.

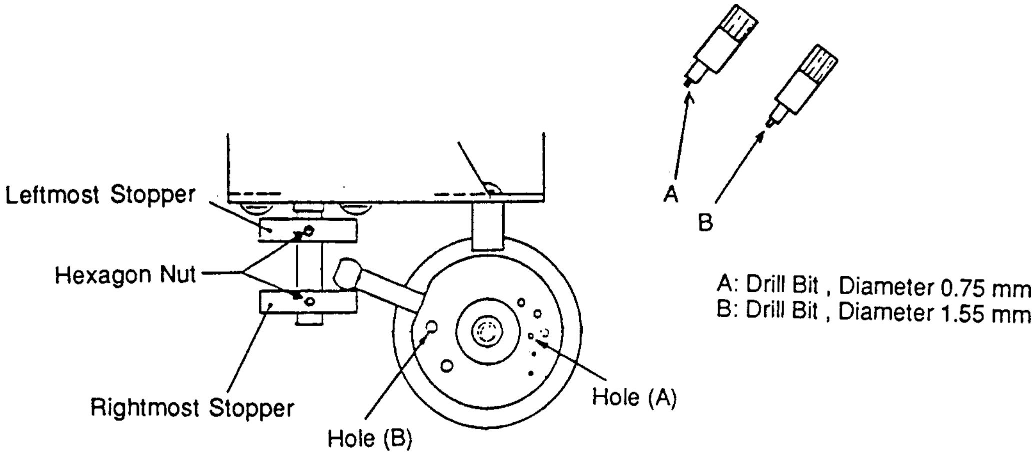


Figure 6-4-8 SRV Stop Position Adjustment

CAUTION:

When performing this adjustment, pay attention to the following points.

- * There should be no gap between the Sample Rotor valve and Upper Fixed Valve and/or Upper Fixed Valve and Support.
- * There should be no gap between the lever of Sample Rotor Valve and each Stopper.

1) Leftmost stop position adjustment

A. Set the SRV Arm at leftmost position.
B. Insert the alignment tool-A into the hole (A).
C. Confirm that the alignment tool is inserted into the S.R.V. If the alignment tool can not be inserted smoothly, adjustment is required:
E. Loosen the hexagon nut of the Leftmost Stopper.as shown Figure.6-4-8.
F. Adjust the Leftmost stop position properly and tighten the hexagon nut.
G. After removing the tool-A, repeat the above procedure C. to F. for the confirmation.
H. Install the Lower portion of the S.R.V.

2) Rightmost stop position adjustment

A. Set the SRV Arm at rightmost position.
B. Insert the alignment tool-B into the hole (B).
C. Confirm that the alignment tool (B) is inserted into the S.R.V. If the alignment tool can not be inserted smoothly, adjustment is required:
E. Loosen the hexagon nut of the Rightmost Stopper.
F. Adjust the Rightmost position properly and tighten the hexagon nut.
G. After removing the alignment tool, repeat the above C to F for the confirmation.
H. Install the lower portion of the S.R.V.

CAUTION:

Do not activate the instrument while the alignment tool is inserted in the Sample Rotor Valve. This could result in permanent damage to the S.R.V.

6.4.4. SRV Replacement

[Reserved]

Figure 6-4-9 [Reserved]

6.5. Hgb Unit

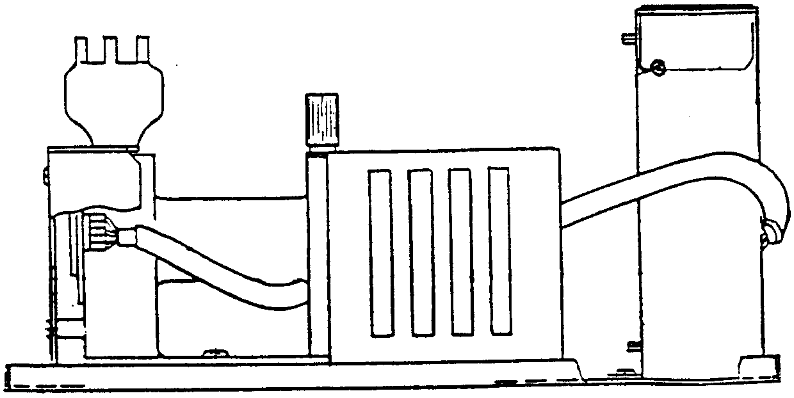


Figure 6-5-1 Hgb Unit

6.5.1. Hgb Lamp Replacement

The Hgb Lamp attached in K-1000 should be replaced at least once in two years. If old lamp used over 5,000 hours was attached in the K-1000, it may cause of Hgb data fluctuation or Hgb Blank Error even if the lamp was not burnt out.

Procedure;

A. Turn OFF the power of the Main Unit.

B. Pull Front Cover forward to open and access the Hgb lamp on the upper right.

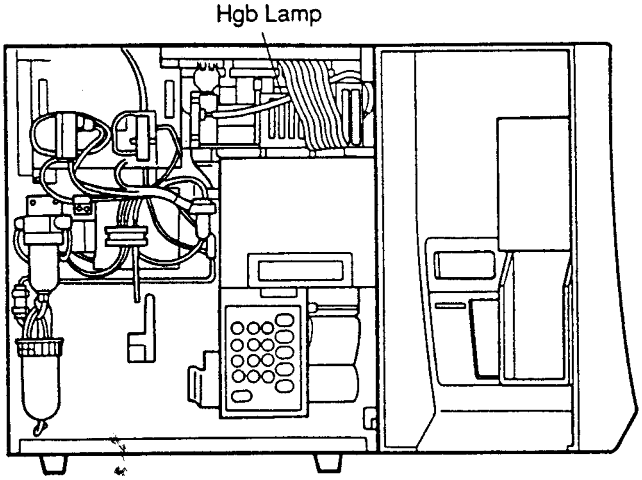


Figure 6-5-2 Hgb Lamp

C. Disconnect the Hgb lamp connector to open the Hgb Lamp Cover. To remove the Hgb Lamp Cover, loosen the fixing screw on the top and draw it rightward.

D. The Hgb lamp may be hot; if so, grasp it with a thick pad. Twist it counterclockwise.

E. Install a new Lamp. Pay attention that the Lamp can be inserted in only one direction. Place Hgb Lamp so that filament of lamp will be parallel to lens of Hgb Unit, and insert the lamp connector.

F. Wipe the Lamp clean with gauze moistened with alcohol to remove dirt, dust, and grease.

G. Turn ON the power of the Main Unit: the Lamp will light. Wait 30 minutes for warm up.

H. Open the Front Cover.

I. Perform a background check in the Whole Blood mode. (Sequence 3 will start about 5 seconds after pressing the Start Switch.) In sequence 3, press SELECT key to perform the sequence stop. The blank Hgb level converted value will be shown.

J. Verify that the Hgb blank level is 500 ± 150. If it is outside this range, adjust it (see Section 6.5.3.2.) and verify the value again.

6.5.2. Hgb Flow Cell Cleaning

The Hgb Flow Cell should be cleaned once a month, as follows, or more often if the workload demands.

A. Make 3 mL of the 1/3 diluted CELLCLEAN solution with distilled water. (CELLCLEAN 1 mL + Distilled Water 2 mL)

B. When the power is turned on, pull the Front Cover forward to open.

C. Execute the DRAIN SAMPLE program in the PROGRAM SELECT menu.

D. Pull the Hgb Flow Cell upward and remove the rubber cap on the top of Hgb Flow Cell.

F. Verify that the liquid in the Flow Cell is drained and fill the Hgb Flow Cell with 3 mL of the 1/3 diluted CELLCLEAN solution by using an injector.

NOTE:

After filling the Hgb Flow Cell with 1/3 diluted CELLCLEAN solution, wipe the nipple of Hgb Flow Cell with dried gauze and insert the Rubber Cap.

G. After 5 minutes, execute the DRAIN SAMPLE program and the AUTO RINSE program in the PROGRAM SELECT menu.

H. After the automatic rinsing, press Start Switch for background count. After 5 seconds of pressing Start Switch, press SELECT key to stop operation in the sequence 3. Hgb Blank level is displayed on the LCD.

I. Verify that Hgb Blank level is 500 ± 150. If it is out of range, adjust Hgb Blank level according to Section 6.5.3.2. Adjustment Of Hgb Blank Level.

6.5.3. Hgb PCB Adjustment (PCB No.2052)

The following procedure must be performed at least 30 minutes after turning on the power, since the Hgb Lamp requires an adequate warm-up period.
The Adjustment procedure must be performed as follows;

1. Offset Voltage Adjustment.
2. Hgb Blank Level Adjustment.
3. Hgb Gain Adjustment.

6.5.3.1. Hgb Offset Voltage Adjustment procedure.

A. Open the Front Panel.

B. Measure a blank sample.

C. Adjust VR2 so that the Voltage at TP-2 falls within the following ranges:2.50 ± 0.10 V-DC

6.5.3.2. Hgb Blank Level Adjustment

A. Enter into Maintenance Mode. (Refer Section 8.1)

B. Measure a blank sample (diluent) in the Manual mode and stop the sequence at Seq. 3 by pressing the SELECT key. Sequence Number will be displayed on the upper right of LCD, the Sequence Stop Time (sec) on the lower left of LCD and the Hgb Blank level at the lower right of LCD as shown in Figure 6-5-3.

```
*SEQ. STOP  :  3*
00:15  HGB:  532
```

Figure 6-5-3 Sequence Stop at sequence-3

C Verify that the Hgb Blank level is 500 ± 150. If the readout of Hgb Blank level is outside of the range, Hgb Blank level adjustment is required. VR3 for Blank level adjustment could be found at the upper and right corner of the Hgb Unit. (See Figure 6-5-4).

	Normal range	Adjustment range
Hgb Blank level	500 ± 150	500 ± 50

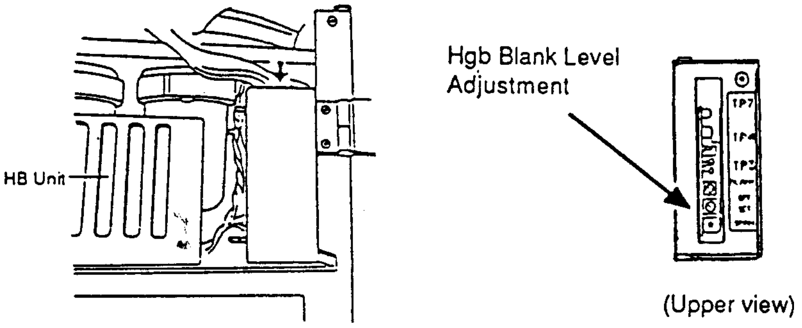
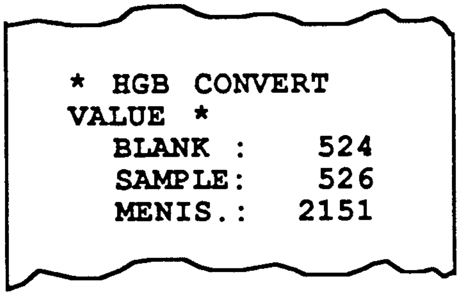


Figure 6-5-4 Hgb Unit

D. Turn VR3 located on the Hgb Unit so that the Hgb Blank Level falls within 500 ± 50. To increase the Blank level, turn the variable resistor slowly clockwise watching the LCD display.

E. Close the front panel and press the SELECT key to release the Sequence Stop.

F. Measure a blank sample (diluent) again and verify that the Hgb Blank level is within 500 ± 150. Hgb Blank level can be also confirmed in Extended Data printout by pressing PRINT after the cycle. Printout example is shown in Figure 6-5-5.



```
* HGB CONVERT
VALUE *
   BLANK :    524
   SAMPLE:    526
   MENIS.:   2151
```

Figure 6-5-5 Printout of Hgb Convert value in Extended Data

6.5.3.3. Hgb Gain Adjustment

Hgb Gain is adjusted by following procedure;

A. Set the Hgb manual calibration value at 100% in the Calibration Program.
B. Measure the blood sample of which Hgb value is established using reference method.
C. Adjust VR1 so that the indicated Hgb value meets with above Hgb value by turning it clockwise to increase the value or counterclockwise to decrease the value.
D. Measure again the same sample to confirm the Hgb value.
E. If necessary, repeat steps C and D until the indicated Hgb value meets the established value.
F. After Hgb Gain Adjustment has been performed, verify that the Hgb Blank Level is within 500 ± 50. If the Blank Level is out of the range, re-adjust the Hgb Blank Adjustment.

6.6. Standard Sensitivity Adjustment (WBC / RBC / PLT)

The standard sensitivity adjustments are established on each instrument during the production. Adjustment may be required in the field if a sensitivity-affecting part is replaced. The WBC and RBC sensitivity adjustments are performed by using Cellcheck-400. The PLT sensitivity adjustment is performed by using PLT Latex Calibrator (E). All sensitivity adjustments must be performed in the room temperature range 15ºC to 30ºC.
There are two way of sensitivity adjustments as follows;

1. K-1000 with optional PDA unit (18 parameter)
2. K-1000 only (8 parameter).

(Reagents Required):	CELLCHECK-400 PLT LATEX CALIBRATOR CELLPACK
(Tools Required)	Screwdriver Phillips
(Disposables Required)	DB-1 DISPOSABLE BEAKERS

6.6.1. Sensitivity Adjustment for K-1000 with optional PDA Unit.

1.WBC and RBC sensitivity adjustment

A. Enter into the Maintenance Mode to set the K-1000 print out program “PRESET DATA” (Refer to Section 8.4.2.)

B. Set the Hct calibration value in the customer calibration program at 100%.

C. Confirm that the room temperature and CELLCHECK-400 liquid temperature are both in the range of 15ºC to 30ºC.

D. Confirm that the WBC and RBC background counts are within the acceptable background limits as shown below;

$\text{WBC} \le 0.3 \times 10^3/\mu\text{L}$
$\text{RBC} \le 0.02 \times 10^6/\mu\text{L}$

E. Drain the liquid in the transducer chamber by the “6. DRAIN SAMPLE” in the PROGRAM SELECT menu. Remove the top caps for the WBC and RBC transducer chambers as shown in Figure 6-6-1.

F. Mix two CELLCHECK-400 ampules vigorously more than 30 times to mix the contents of the ample until the solution changes to a white color due to the formation of micro air bubbles, and pour them into the DB-1 sample beaker. See package insert of the CELLCHECK-400 for more information.

G. Pour approximately 4.5 mL of CELLCHECK-400 into the WBC transducer chamber and approximately 3.0 mL into RBC transducer chamber, respectively. Drain these samples by the “6. DRAIN SAMPLE” in the PROGRAM SELECT menu. This is to rinse the transducers and inside of each transducer chambers to eliminate any carryover by the previous sample (or diluent).

H. Pour approximately 4.5 mL of CELLCHECK-400 into the WBC transducer chamber and approximately 3.0 mL into the RBC transducer chamber, respectively.

I. Perform the “2. COUNT SEQ. MODE” in the MAINTENANCE PROGRAM four times consecutively. Discard the first data.

[For WBC sensitivity adjustment]

Calculate the mean of three W-MFV (Most Frequent Volume). Confirm that the mean W-MFV is (the assay value of CELLCHECK-400) ± 2 fL. If not, adjust VR3 on the PCB No.2062 located on upper side of detector block, and repeat steps H. and I. (W-MFV can be confirmed in Extended Data printout by pressing PRINT after each counting. Refer Section 8.3.)

Confirm the analyzed W-MFV is in range of following table;

Table 6-6-1 CELLCHECK 400 Assay Value of W-MFV for sensitivity adjustment

WBC Calibrator	Lot. Number	W-MFV
CELLCHECK 400	A4E08 through A6J05B	126.0 ± 3.0 (fL)
	A6J05C through A0005	125.0 ± 3.0 (fL)
	A0006 through A2017	124.0 ± 3.0 (fL)
	A2018 through A3007	126.0 ± 3.0 (fL)
	A3008 through A5022	128.0 ± 3.0 (fL)
	A5023 and thereafter	127.0 ± 3.0 (fL)

[For RBC sensitivity adjustment]

Calculate the mean of three MCV. Confirm that the mean MCV is (the assay value of CELLCHECK-400/CC-108) x 0.950 ± 2 fL. If not, adjust VR2 on the PCB No.2062, and repeat steps H. and I. If there were no need to adjust WBC/RBC sensitivity adjustment, go step K.

NOTE :

1) The original Hct calibration value is print out in step A. If there were no need to adjust the RBC sensitivity, Hct calibration value must be reset to original value. But if the sensitivity adjustment of RBC were needed, new Hct calibration should also required after the adjustment.

2) There are no need to reset RBC C.O.C. when RBC standard sensitivity adjustment is required, since Hct calculation of Sysmex Blood Cell Analyzer is performed by following order.

   a) Raw MCV value is calculated from the raw RBC and the raw Hct data.

   b) The MCV which should be indicated is calculated as follow; MCV (corrected) = raw MCV * Hct calibration value .... (1)

   c) The Hct value which should be indicted is calculated as follows; Hct (corrected) = corrected MCV * corrected RBC .... (2)

J. Pour approximately 4.5 mL of diluent into the WBC transducer chamber and approximately 3.0 mL of diluent into RBC transducer chamber, and drain them by performing “6. DRAIN SAMPLE”. Repeat these three times. This procedure will rinse the remained CELLCHECK-400 at the upper portion of the inside transducer chambers. Confirm the background count by analyzing the diluent sample or without any sample.

2. PLT Sensitivity Adjustmenl

K. Confirm that the PLT background counts are within the acceptable background limits;

PLT $\leq 10 \times 10^3/\mu L$

L. Dispense the 10 mL of diluent into the DB-1 SAMPLE BEAKER, and add the 20 μL of PLT LATEX CALIBRATOR by using micro pipette. Mix the DB-1 well to make diluted PLT LATEX CALIBRATOR (1:500).

M. Drain the sample in the transducer chamber by the “6. DRAIN SAMPLE” in the PROGRAM SELECT menu. Remove the top covers for the WBC/RBC transducer chambers. (See Figure 6-6-1).

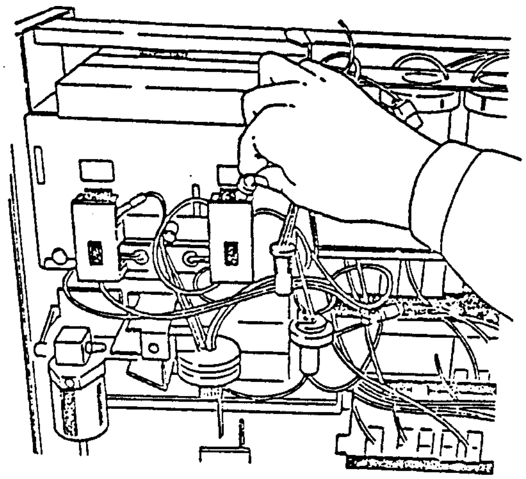


Figure 6-6-1 Removing Top Cap of Transducer Chamber

N. Pour approximately 3.0 mL of diluted PLT LATEX CALIBRATOR into the RBC/PLT transducer chamber and pour approximately 4.5 mL of diluent into WBC transducer chamber. Drain these samples by the “6. DRAIN SAMPLE” of PROGRAM SELECT menu.

O. Pour approximately 3.0 mL of diluted PLT LATEX CALIBRATOR into the RBC/PLT transducer chamber and approximately 4.5 mL of diluent into the WBC transducer chamber, respectively.

P. Perform the “2. COUNT SEQ. MODE” in the MAINTENANCE PROGRAM four times consecutively. Discard the first data.

[For PLT sensitivity adjustment]

Calculate the mean of three P-MFV (Most Frequent Volume). Confirm that the mean P-MFV is (the assay value of PLT LATEX CALIBRATOR) ± 0.2 fL. If not, adjust VR1 on the PCB No.2062 so that P-MFV meets the table 6-6-2, and repeat steps N and O. (P-MFV can be confirmed on Extended data printout by pressing $\boxed{\text{PRINT}}$ after each counting. Refer Section 8.3.)

Confirm the analyzed P-MFV is in the range of Table 6-6-2;

Table 6-6-2 PLT LATEX CALIBRATOR Assay Value

PLT Calibrator	Lot Number	Set Value
LATEX CALIBRATOR	0385 through 0987 1088 1089 through 0395 0997 and 9909	14.3 ± 0.2 (fL) 13.0 ± 0.2 (fL) 12.7 ± 0.2 (fL) 13.7 0 ±.2 (fL)

Q. Pour approximately 3.0 mL of diluent into the RBC/PLT transducer chamber, and drain them by the "6. DRAIN SAMPLE". Repeat these three times. This procedure will rinse the remained PLT LATEX CALIBRATOR at the upper portion of the inside transducer chambers. Confirm the background count by analyzing the air sample.

6.6.2. Sensitivity Adjustment for K-1000 without optional PDA Unit

1.WBC and RBC sensitivity adjustments.

A. Enter into the Maintenance Mode to set the K-1000 Maintenance Program "PRESET DATA" (Refer to Section 8.1. and 8.4.2.).

B. Set the Hct calibration value to 100 %.

C. Confirm that the room temperature and CELLCHECK-400 liquid temperature are both in the range of 15ºC to 30ºC.

D. Confirm that the WBC and RBC background counts are within the following background limits;

WBC $\leq 0.3 \times 10^3/\mu L$
RBC $\leq 0.02 \times 10^6/\mu L$

E. Short the 2nd and 3rd pins of J5 on the PCB No. 2061 by jumper pin J7 which is commonly used to short the 1st and 2nd pins of J5.

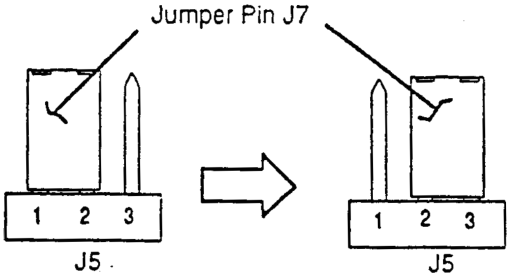


Figure 6-6-2 J5 on PCB No. 2061

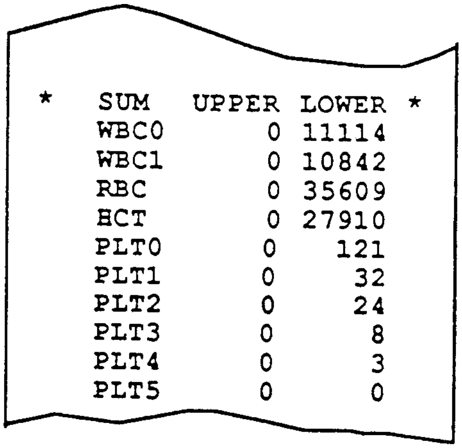
F. Drain the sample in the transducer chamber by performing "6. DRAIN SAMPLE" of PROGRAM

G. Mix two CELLCHECK-400 ampules vigorously, and pour them into the DB-1 sample beaker. See package insert of the CELLCHECK-400 for more information.

H. Pour approximately 4.5 mL of CELLCHECK-400 into the WBC transducer chamber and approximately 3.0 mL into RBC transducer chamber, respectively. Drain these samples by the “6. DRAIN SAMPLE” of PROGRAM SELECT menu. This is to rinse the transducers and inside of each transducer chambers to eliminate the carryover of CELLCHECK-400 by the previous sample (diluent).

I. Pour again approximately 4.5 mL of CELLCHECK-400 into the WBC transducer chamber and approximately 3.0 mL into the RBC transducer chamber.

J. Perform the “2. COUNT SEQ. MODE” in the MAINTENANCE PROGRAM four times, and press (PRINT) after each counting to get the data of WBC0 and WBC1 in extended data four times consecutively. Discard the first data. Printout data is shown in Figure 6-6-3.



```
*  SUM    UPPER LOWER  *
   WBC0       0 11114
   WBC1       0 10842
   RBC        0 35609
   HCT        0 27910
   PLT0       0   121
   PLT1       0    32
   PLT2       0    24
   PLT3       0     8
   PLT4       0     3
   PLT5       0     0
```

Figure 6-6-3

[For WBC sensitivity adjustment]
Calculate the each mean of three WBC0 and WBC1. Calculate W_D by the following formula (1).

$$W_D (\%) = \frac{WBC0}{WBC1} \times 100\ \% \text{ ....} (1)$$

Confirm the W_D is in the range of Table 6-6-3;

Table 6-6-3 CELL CHECK 400 Set Value for W_D

WBC Calibrator	Lot. Number	W_D
CELLCHECK 400	A4E08 through A6J05B	---------------
	A6J05C through A0005	62.5 ± 2.5 (%)
	A0006 through A2017	57.5 ± 2.5 (%)
	A2018 through A3007	66.1 ± 3.0 (%)
	A3008 through A5022	60.1 ± 3.0 (%)
	5023 and thereafter	61.8 ± 3.0 (%)

Adjust VR3, if necessary, on the PCB No.2062 located on upper side of detector block, and repeat steps G to J.

K. [For RBC sensitivity adjustment] Calculate the mean of three MCV. Confirm that the mean of MCV is within (the assay value of CELLCHECK-400/for CC-108) x 0.950 ± 2 fL. If not, adjust VR2 on the PCB No. 2062, and repeat steps I and J. If there were no need to adjust RBC sensitivity adjustment, proceed to step L.

NOTE: The original Hct calibration value is print out in step A. If there were no need to adjust the RBC sensitivity as the result of this procedure, Hct calibration value must be reset to original value. But if the sensitivity adjustment of RBC were needed to the K-1000, New Hct calibration value should be set up on the K-1000 after the adjustment.

L. Reset the jumper pin J7 on J5 to short the 1st and 2nd pins of J5.

M. Pour approximately 4.5 mL of diluent into the WBC transducer chamber and approximately 3.0 mL of diluent into RBC transducer chamber, and drain them by the “6. DRAIN SAMPLE”. Repeat these three times. This procedure will rinse the remained CELLCHECK-400 at the upper portion of the inside transducer chambers. Confirm the background count by analyzing the diluent.

2. PLT Sensitivity Adjustment

N. Confirm that the Ambient temperature, Diluent Temperature and PLT background counts are within the acceptable range;

Ambient Temperature --- 15ºC-30ºC

Diluent Temperature --- 15ºC-30ºC

PLT $\leq 10 \times 10^{3}\mu L$ or $10 \times 10^{9}/L$

O. Turn the power off and remove the rear panel of K-1000 Main Unit.

NOTE: There are two types of PCB No.2061. K-1000 S/N A1001 - A1715 will have the old type of PCB No.2061 having the marking “8712” or “8806” next to the label “NO.2061” on the foil. K-1000 S/N A1716 and thereafter will have the new type one having the marking “8902” next to the label No.2061 on the foil.
When the PCB No.2061 is the old type, the step P and the step Q must be performed before the step R.
When the PCB No.2061 is the new type, the step P’ and the step Q’ must be performed insterd of the step P and the step Q.

P. (For the old type of PCB No.2061 only)
Prepare the special tool, PCB No.9169 Assembly (Code Number 883-4791-7).
Connect clips from PCB No.9169 to the specified side of the resistors R174 and R175 on PCB No.2061 as shown in Figure 6-6-4.

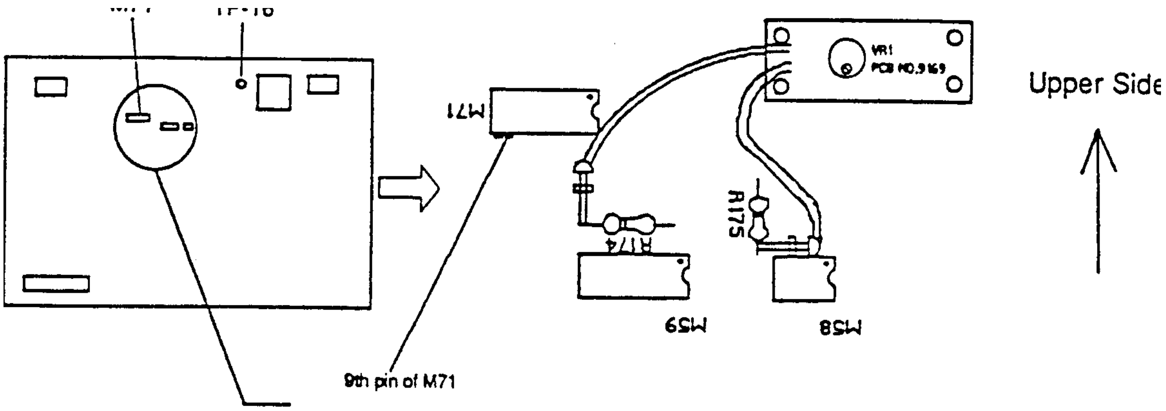


Figure 6-6-4 PCB No.9169 Connection

Q. (For the old type of PCB No.2061 only)
Turn the power on with Auto Rinse Skip Mode (see K-1000 Service Manual Page 6-1) and turn VR1 on PCB NO.9169 so that the voltage between 9th pin of M71 and TP-16 (GND) on PCB No.2061 will become the PLT-4 voltage (see Figure 6-6-4).
PLT-4 voltage is derived from the following equation using the P-MFV Assay Value of PLT Latex Calibrator.

PLT-4 voltage = P-MFV Assay Value X 100 ± 50 (mV)

For example, when P-MFV Assay Value is 13.0 fL,

PLT-4 voltage = 13.0 X 100 ± 50 = 1300 ± 50 mV

P'. (For the new type of PCB No.2061 only)
Shorten the 2nd pin and the 3rd pin of J6 on the PCB NO.2061 by jumper pin J8. In factory setting, the 1st pin and the 2nd pin of J6 is shortened by J8 (see Figure 6-6-5).

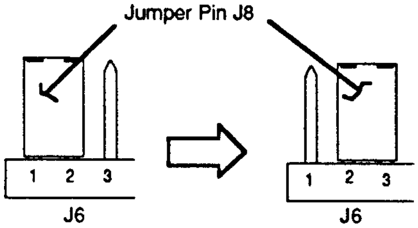


Figure 6-6-5 J6 on PCB No.2061

Q'. (For the new type of PCB No.2061 only)
Turn the power on with Auto Rinse Skip Mode (see K-1000 Service Manual Page 6-1) and turn VR7 on PCB No.2061 so that the voltage between TP-15 and TP-16 (GND) on PCB No.2061 will become the PLT-4 voltage using the digital voltmeter.
PLT-4 voltage is derived from the following equation by the P-MFV Assay Value of PLT Latex Calibrator.

PLT - 4 voltage = P-MFV Assay Value x 100 ± 50 (mV)

For example, when P-MFV Assay Value is 13.0 fL,

PLT - 4 voltage = 13.0 X 100 ± 50 = 1300 ± 50 mV

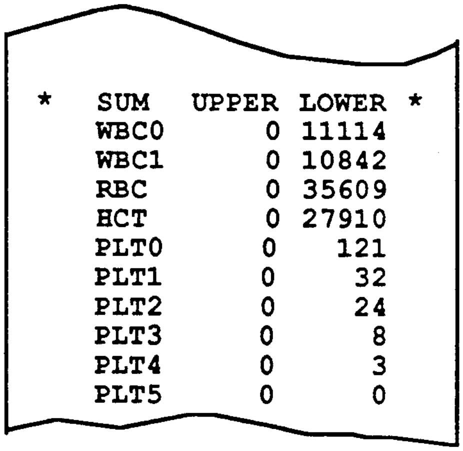
R. Dispense 10 mL of the diluent into the DB-1 SAMPLE BEAKER, and add the 20 μL of PLT LATEX CALIBRATOR using a micro pipette. Mix this diluted PLT LATEX CALIBRATOR (1:500) by gently swirling the DB-1.

S. Drain the sample in the both transducer chambers by the "6. DRAIN SAMPLE" of PROGRAM SELECT menu.

T. Pour approximately 3.0 mL of diluted PLT LATEX CALIBRATOR into the RBC transducer chamber and approximately 4.5 mL of the diluent into the WBC transducer chamber after removing the rubber cap on the both transducer chambers. Drain the sample by the "6. DRAIN SAMPLE" of PROGRAM SELECT menu.

U. Pour approximately 3.0 mL of diluted PLT LATEX CALIBRATOR into the RBC transducer chamber and approximately 4.5 mL of the diluent into the WBC transducer chamber again.

V. Perform the "2. COUNT SEQ. MODE" in the MAINTENANCE PROGRAM, and press PRINT after counting to get the data of PLT3, PLT4 and PLT5 in EXTENDED DATA. Repeat this action four times consecutively. Discard the first data. Print example is shown in Figure 6-6-6.



```
*  SUM   UPPER LOWER *
   WBC0      0 11114
   WBC1      0 10842
   RBC       0 35609
   HCT       0 27910
   PLT0     0    121
   PLT1     0     32
   PLT2     0     24
   PLT3     0      8
   PLT4     0      3
   PLT5     0      0
```

Figure 6-6-6 Print Example when PLT Sensitivity Adjustment

[For PLT sensitivity adjustment]
Calculate the each mean of three PLT3, PLT4 and PLT5. Calculate PLT sensitivity adjustment value P_D by the following formula (2).

$$P_D\ (\%) = \frac{PLT4 - PLT5}{PLT3 - PLT5} \times 100\ \% \quad \ldots\ldots\ldots\ldots (2)$$

Confirm the P_D is within the range of Table 6-6-4;

Table 6-6-4 LATEX CALIBRATOR Set Value for P_D

PLT Calibrator	Lot. Number	**P_D**
Latex Particle	1089	52.5 ± 8.0 (%)
	0192	52.5 ± 8.0 (%)
	1092	52.5 ± 8.0 (%)
	0493	71.9 ± 8.0 (%)
	1093 through 1094	66.6 ± 8.0 (%)
	0395	64.7 ± 8.0 (%)
	0997	62.2 ± 8.0 (%)
	9909	66.43 ± 8.0 (%)

W. If necessary, adjust VR1 on the PCB No.2062 located at the top of the detector block, and repeat steps U and V.

X. Pour approximately 3.0 mL of the diluent into the RBC transducer chamber and approximately 4.5 mL of the diluent into the WBC transducer chamber, and drain them by the “6. DRAIN SAMPLE”. Repeat this action three times. Remained PLT LATEX CALIBRATOR will be rinsed out from the RBC transducer chamber by this action. Confirm the PLT background count by analyzing the diluent.

Y. Turn the power off and shorten the 1st pin and the 2nd pin of J6 on PCB NO.2061 by jumper pin J8 (for the new type of PCB No.2061 only) and reinstall the rear panel on the K-1000 Main Unit.

6.7. K-PDA Unit Adjustment (PCB No. 6315)

PDA board is surely checked in factory, and under usual condition, almost no adjustment is required. If this board was replaced or repaired, check the following points and adjust, if necessary;

6.7.1. PDA reference voltage for WBC and PLT

Check the voltage between TP-9 and TP2 (analog GND) is 4750 ± 10 mV. If not, adjust the voltage by turning VR4.

6.7.2. Offset voltage for RBC PDA reference level

Check the voltage between TP-4 and TP2 (analog GND) is 3960 ± 10 mV. If not, adjust the voltage by turning VR3.

6.7.3. RBC PDA reference voltage level

This voltage is variable by M55 (gain attenuator) to change RBC PDA Reference Voltage according to Hct calibration value. To check the voltage, follow the procedure below;

A. Turn the power off.

B. Set up the DIP switch S2 all ON position.

Table 6-7-1 DIP SW S2 setting

Bit No.				Function
1	2	3	4	
OFF	OFF	OFF	OFF	: Normal Operation
ON	ON	ON	ON	: Setting to adjust RBC refference voltage

PDA reference voltage will be stabilized by this setting.

C. Turn the power on.

D. Push S1 on PCB No.6315 twice, and check the voltage between TP5 and TP2 (analog GND) is 3960 ± 20 mV.

E. Push S1 on PCB No.6315 once, and check the voltage between TP5 and TP2 (analog GND) is 6510 ± 10 mV. If not, adjust the voltage by turning VR2.

F. Push S1 on PCB No.6315 once, and check the voltage between TP5 and TP2 (analog GND) is 4750 ± 20 mV.

REMARK:
Above checkings from step D to F can be repeated by pushing S1 continuously.

G. Turn the power Off.

H. Reset the DIP switch S2 for normal operation. (Refer Table 6-7-1.)

6.7.4. PDA Test - Pulse Height Gain Adjustment

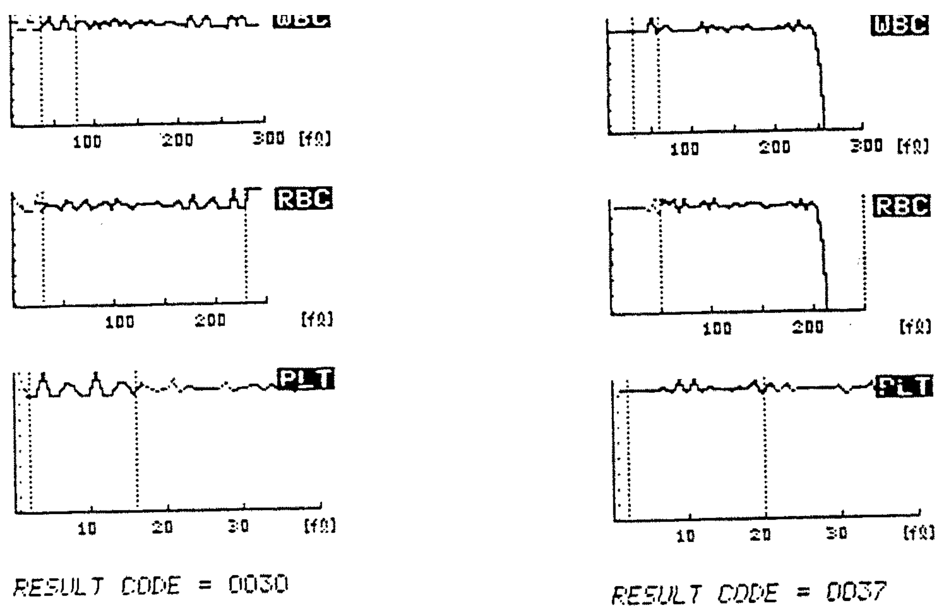
Pulse height for PDA Test should be set so that the flat distribution curves are obtained when “PDA TEST” in Maintenance Menu is performed. This is to check the function of PDA counter (hybrid IC SH0005). Follow the procedure below to check the function;

A. Turn the power on.

B. Enter Maintenance Mode, and perform “PDA TEST” / “DEVICE TEST” in the “MAINTENANCE PROGRAM”. (Refer Section 8.1. and Confirm the Result code “030” is obtained. If not, adjust VR1 so that Result code “030” is obtained. Figure 6-7-1 shows print example.

```
Max = 00720
Min = 00589
WBC Count[47] = 00480
WBC Count[0] = 30360
Max = 00745
Min = 00600
RBC Count[47] = 00480
RBC Count[0] = 30360
Max = 00720
Min = 00600
PLT Count[47] = 00480
PLT Count[0] = 30360
```

```
Max = 00808
Min = 00000
WBC Count[47] = 00000
WBC Count[0] = 30240
Max = 00771
Min = 00000
RBC Count[47] = 00000
RBC Count[0] = 30240
Max = 00782
Min = 00690
PLT Count[47] = 00000
PLT Count[0] = 30240
```



RESULT CODE = 0030

RESULT CODE = 0037

PDA Test-Pulse Height is Correct

PDA Test-Pulse is short

Figure 6-7-1 Correct and Incorrect Example of PDA Test

6.8. Program Version Up Procedure

When Program Version Up of the main CPU board (PCB No. 6314) is required, follow the procedure as below;

A. Enter into the Maintenance mode. (Refer Section 8.1.)

B. Execute “PRESET DATA” in the “MAINTENANCE PROGRAM” to print out “PRESET DATA” which are stored in EEP-ROM.

C. Tum the power off.

D. Remove the rear panel.

E. Remove the EP-ROM from the ROM socket (M35) on the PCB No. 6314 carefully.

F. Mount the new EP-ROM to the ROM socket (M35).

> ***CAUTION:***
> Either of EP-ROM 27C1001 (128 kB / 32 pins) or 27C512 (64 kB / 28 pins) could be mounted on the socket M35. If 27C512 (28 pins) should be mounted on this socket M35, the 1st pin of EP-ROM must be mounted into the 3rd position of the socket M35.

G. Turn ON the 1st bit of DIP switch S1 on PCB No. 6314 to initialize the EEP-ROM.

H. Initialize the EEP-ROM as follows;

1) K-1000 without optional PDA Unit (8 parameters)

   a. Turn the power On and wait until “ENTER DATE” is indicated on the LCD.

   b. Turn the power Off.

2) K-1000D with the optional PDA Unit (18 parameters)

   a. Turn the power ON while pressing the START Bar (Start Switch).

   b. Hold the Start Bar until “READY” is indicated on the LCD.

   c. Turn the power off.

I. Turn Off the 1st bit of DIP Switch S1 on the PCB No. 6314.

J. Turn the power ON.

K. All the Preset data on the EEP-ROM are reset to default by above procedure. Reset the Preset data of which are printed out in Step A. (Refer Section 8.4.2.)

6.9. Adjustment Points for PCB No. 2061

A Reference Voltages

a. Disconnect the J1 of PCB No. 2061

b. Confirm that the voltage between TP2 and TP17 (GND) is following ranges, if not adjust VR2 so that the following voltage is obtained.

Voltage between TP2 and TP16 (GND): 400 ± 5 mV

c. Confirm that voltages at TP3, TP5, TP7, TP9, and TP11 are in following ranges; (GND: TP16 or TP17)

TP3: 400 ± 5 mV
TP5: 600 ± 5 mV
TP7: 200 ± 5 mV
TP9: 600 ± 5 mV
TP11: 800 ± 10 mV

c. Confirm that voltages at TP15 and 7th pin of M5 are in following ranges; (GND: TP16 or TP17)

TP15: when 1st and 2nd pin of J5 are shortened: 400 ± 5 mV
when 2nd and 3rd pin of J5 are shortened: 2083 ± 10 mV

M5
7th when 1st and 2nd pin of J6 are shortened: 5100 ± 30 mV
pin: when 2nd and 3rd pin of J6 are shortened: 1870 ± 20 mV

d. Confirm that voltages at the following points are in their ranges respectively. (GND: TP16 or TP17)

	Voltage
8th pin of M5:	1300 ± 10 mV
11th pin of M5:	3200 ± 20 mV
2nd pin of M6:	8200 ± 30 mV
2nd pin of M33:	5100 ± 30 mV
5th pin of M71:	1500 ± 10 mV
7th pin of M71:	2700 ± 20 mV
9th pin of M71:	3900 ± 30 mV
3rd pin of M72:	1200 ± 30 mV
5th pin of M72:	200 ± 5 mV

NOTE:
VR2 must be locked after adjustment

B. Control Signals

(GND: TP16 or TP17)

a. Confirm that J1-12 is high (5V) while J2-20 is in high level (while 5V on the same board is connected to J2-20).

b. Confirm that LED D1 is lighting on and J2-4 becomes low level while J1-4 is in low level (while GND TP-16 or TP17 is connected to J1-4).

c. Confirm that LED D2 is on and J2-2 becomes low level while J1-2 is in low level.

d. Confirm that LED D1 is on but J2-4 becomes high level when J1-4 is in floating status (when nothing is connected to J1-4).

e. Confirm that LED D2 is on but J2-2 becomes high level when J1-2 is in floating status.

f. Confirm that if floating signal is input to the J1-4, J2-3 becomes high level but LED D1 is off.

g. Confirm that if floating signal is input to the J1-1, J2-1 becomes high level but LED D1 is off.

h. Confirm that if J3-7 is turned high, 10 MHz of square wave which is output from J2-18 is terminated and J2-18 becomes High level (5V).

I. Apply DC Voltage to J1-10, and confirm that J2-23 becomes low level when the voltage applying to J1-10 becomes lower than 1300 mV, and confirm that J2-22 becomes low level when the voltage at J1-10 becomes higher than 3200 mV.

C. Pressure Sensor Circuit.

a. Apply the 1.7 kg/cm^2 Pressure exactly into pressure sensor

b. Confirm that the voltage at TP 19 (GND: TP16 or TP17) is not vibrating by oscilloscope.

c. Confirm that the voltage at TP19 is in the following range, if not, adjust VR1 so that the voltage fits the range;

VPress = 3400 ± 5 mV

d. Confirm that the voltage at the 7th pin of M76 becomes high level when the pressure become lower than 1.7 ± 0.01 kg/cm^2.

NOTE:
VR1 must be locked after adjustment.

Sysmex

SECTION SEVEN

TECHNICAL INFORMATION

- Table of Contents -

Technical Information

Section 7 Technical Information

7.1. Peripherals

7.1.1. Output Port & Device

The K-1000 has following two data output ports to connect external device.

(1) Parallel Interface (Centronics)
(2) V24 Serial Interface (RS232C)

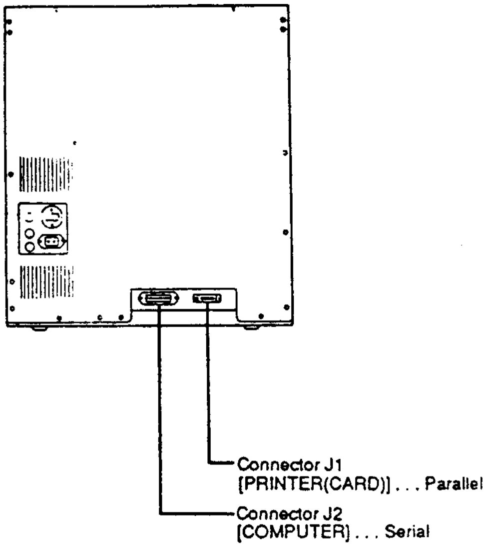


Figure 7-1 Location of the Parallel and the Serial Ports of K-1000

And, following Output Devices are able to connect through these ports.

Parallel Interface (Centronics):	(1) DP-480 (Card Printer) (2) DP-490 (Card Printer) (3) DP-455 (Card Printer) (4) Line Printer
V24 Serial Interface (RS232C):	(1) Host Computer (Class A) (2) Host Computer (Class B) (3) Line Printer

7.1.2. Configuration for Output Device

The program switch SW-1 should be appropriately set up to connect the device to the serial or the parallel port. The program switches are included in “SETTINGS” out of the SELECT MENU. When the Program switch SW-1 is selected, LCD displays as follows.

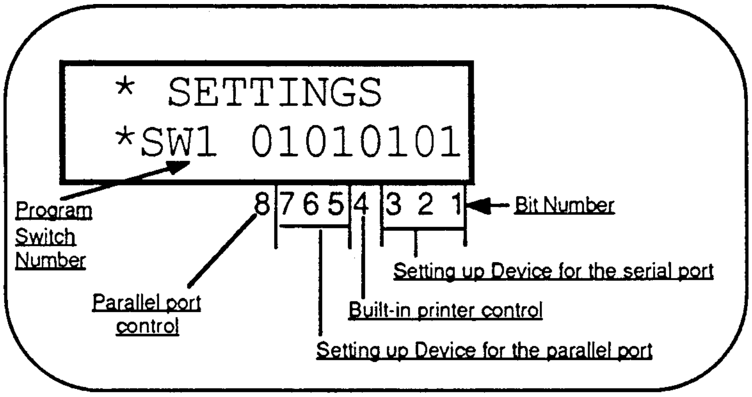


Figure 7-2 Program Switch SW-1 Display

The functions of each bit on Program switch SW-1 are listed as follows; (If it is necessary, refer to K-1000 Operator’s Manual Section 5.9.8.4. to change these settings)

Table 7-1 Program Switch SW-1 Functions

Program switch SW-1				Function
Bit Number	**3**	**2**	**1**	Peripheral Selection for the Serial Port
Settings	0	0	0	Line Printer
	0	0	1	Host Computer (Class A)
	0	1	0	Host Computer (Class B)
	0	1	1	Device for Inspection (Factory Use Only)
	Except above			Device for Inspection (Factory Use Only)
Bit Number	**4**			Built-in Printer Control
Settings	0			Messages, Only abnormal data and ID??0 data are printed
	1			All data are printed

Program switch SW-1				Function
Bit Number	**7**	**6**	**5**	Peripheral Selection for the Parallel Port
Settings	0	0	0	Line Printer
	0	0	1	DP-455
	0	1	0	DP-470 (Japanese Market only)
	0	1	1	DP-480 (1)
	1	0	0	DP-480 (2)
	Except above			DP-490
Bit Number	**8**			Parallel port Control
Settings	0			Offline
	1			Online

Bit number 1 through 3 of program switch SW-1 are used for peripherals to connect to the serial port, and bit number 5 to 8 are used for the parallel port.
Function of Built-in printer can be also selected by program switch SW-1 (Bit No. 4).

NOTE:

When DP-480(1) is selected as the device for the parallel port, 8 or 18 (with KPU-1) parameters data will be printed out by DP-480 in Sysmex standard print paper format. and If DP-480(2) is selected 8 or 17 (with KPU-1/except P-LCR) parameters data will be printed out.

7.2. Serial Interface

7.2.1. Hardware

1. Summary
   The Serial Interface is used for a host computer or a line printer connector. Device for the serial interface can be selected by Program Switch in the ‘SETTING’ out of ‘SELECT MENU’.

2. Connection

   Connect a JIS C6361 standard 25-pin connector or an EIA RS-232C V.24 standard 25-pin delta, female (body=male and pins=female) connector (DB-25P) to the connector J-2 (DB-25S) on Main Unit rear panel.

   It is important that the shielded cables and connectors should be used to reduce the interference by radios, television sets and other electronic devices. To resolve radio interference problems, the following booklet prepared by the Federal Communications Commission is recommended.
   “How to Identify and Resolve Radio-TV Interference Problems”
   This booklet can be purchased from the U.S. Government Printing Office, Washington, D.C. 20402, U.S.A.

3. Output Signal

Table 7-2 Pin Assignment of serial interface

Pin	RS-232C		Direction
1	Protect Ground	(FG)	
2	Transmit Data	(Tx)	from K-1000 to HOST
3	Receive Data	(Rx)	to K-1000 from HOST
4	Request to Send	(RTS)	from K-1000 to HOST
5	Clear to Send	(CTS)	to K-1000 from HOST
6	Data Set Ready	(DSR)	to K-1000 from HOST
7	Signal Ground	(SG)	
20	Data Terminal Ready	(DTR)	from K-1000 to HOST

4. Communication Format
   Asynchronous, Half Duplex Mode.

5. Signal Level
   Signal Level of the RS-232C conforms to JIS C6361 (EIA RS232C) V.24.

Table 7-3 Signal Level of serial interface

Level	Binary State	Function
+3V	Logic "0", Start Bit	ON
-3V	Logic "1", Stop Bit	OFF

8. Interface Circuit

8.1 Output Circuit

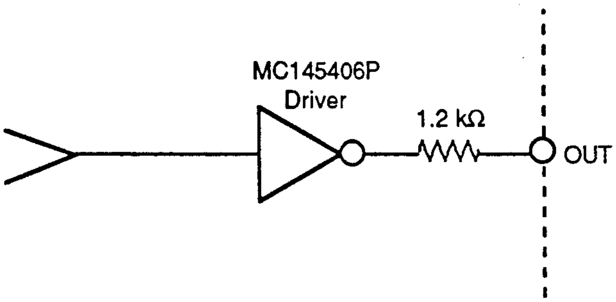


Figure 7–3 Output Circuit of serial interface

8.2 Input Circuit

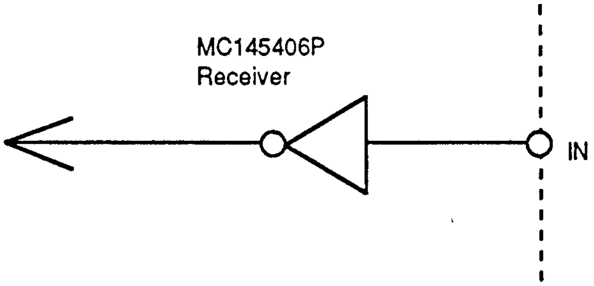


Figure 7-4 Input Circuit of Serial interface

7.2.2. Software

1. Code
   ASCII code

2. Compatibility
   To keep data compatibility between the K-1000 and the Device connected through the serial interface, following parameters should be set up properly by Program Switch SW-2.

   (1) Baud rate
   (2) Data bit length
   (3) Parity
   (4) Stop bit
   (5) Serial port control

When the Program switch SW-2 is selected, LCD displays as follows.

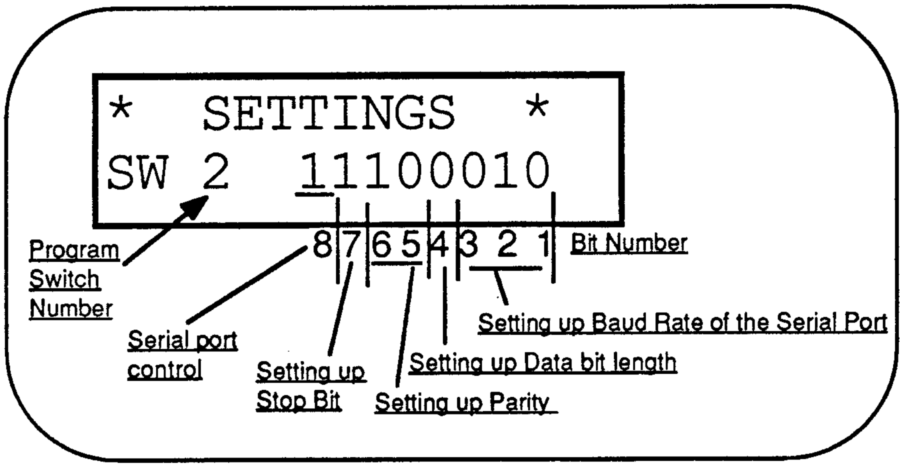


Figure 7-5 **Program Switch SW-2 Display**

Program switch SW-2 is used for the peripheral device connection of serial port K-1000 directly. The function of each bit of Program switch SW-2 is as follows. (If it is necessary, refer to K-1000 Operator's Manual section 5.9.9.4. to change these settings)

Table 7-4 Function of Program Switch SW-2

Program switch SW-2				Function
Bit Number	**3**	**2**	**1**	Baud rate Selection
Settings	0	0	0	300 BPS
	0	0	1	600 BPS
	0	1	0	1200 BPS
	0	1	1	2400 BPS
	1	0	0	4800 BPS
	Except above			9600 BPS
Bit Number	**4**			Data Bit Length
Settings	0			7 bits
	1			8 bits

Program switch SW-2			Function
Bit Number	**6**	**5**	Parity bit Selection
Settings	0	0	None
	0	1	Odd
	1	0	None
	1	1	Even
Bit Number	**7**		Stop Bit
Settings	0		1 bit
	1		2 bits
Bit Number	**8**		Serial port control
Settings	0		Off line.
	1		On line.

NOTE: To connect FACIT Model 4512 as line printer to the serial port, program switch SW-2 of the K-1000 and DIP-switches of the FACIT 4512 should be set up accordingly. Recommended settings for SW-2 are as follows;

K-1000 Program Switch SW-2 (Serial Port Settings for FACIT 4512)

Bit Number	8 7 6 5 4 3 2 1
SW-2	11100010

Baud Rate : 1200 BPS
Data Bit : 7
Parity : None
Stop-bit : 2 bits

FACIT 4512 DIP Switches (on rear panel)

K-1000 Main Program Version

EP-ROM 1K1, 1K2, or 1K3,
Version 00-04 and thereafter
and
EP-ROM 4K1, 4K2, or 4K3
Version 00-00 and thereafter

BIT	1	2	3	4	5	6	7	8
SW-1	F	F	F	F	F	F	N	F
SW-2	F	F	F	N	N	F	F	F
SW-3	N	F	F	F				

(IBM mode)

EP-ROM 1K1
Version 00-00 to 00-03

BIT	1	2	3	4	5	6	7	8
SW-1	F	F	F	F	F	F	N	F
SW-2	F	F	F	N	N	F	F	F
SW-3	F	F	F	F				

(FACIT mode)

Here, Findicates OFF position, and N indicates ON position

3. Transmission Procedure (Class A and Class B)

Following two classes can be selected by changing the setting of program switch SW-1.
(Refer to Section 7.1.2.)
Class B is only applied for connection with Host Computer.
When the Line Printer was selected for the Serial interface, Class A should be selected.

(1) Class A

Data is transmitted in the form of a text or blocks. The host computer checks the start and stop characters as well as the parity bit after each character received, but does not transmit any response. Accordingly, K-1000 would not wait for the response signal 'ACK (06H)' or 'NAK (15H)' from the host computer.

(2) Class B

This class is identical to Class A, with the exception that the host, upon receiving transmitted data, transmits a response followed by a sequence. If necessary the host also check the contents of the text (or block). K-1000 waits for the response 'ACK (06H)' or 'NAK (15H)' from the host computer in addition to two control signals (CTS and DSR) and transmits next sample data upon receiving 'ACK (06H)' from the host computer.
Data flow in Class B is shown in Figure 7-6.

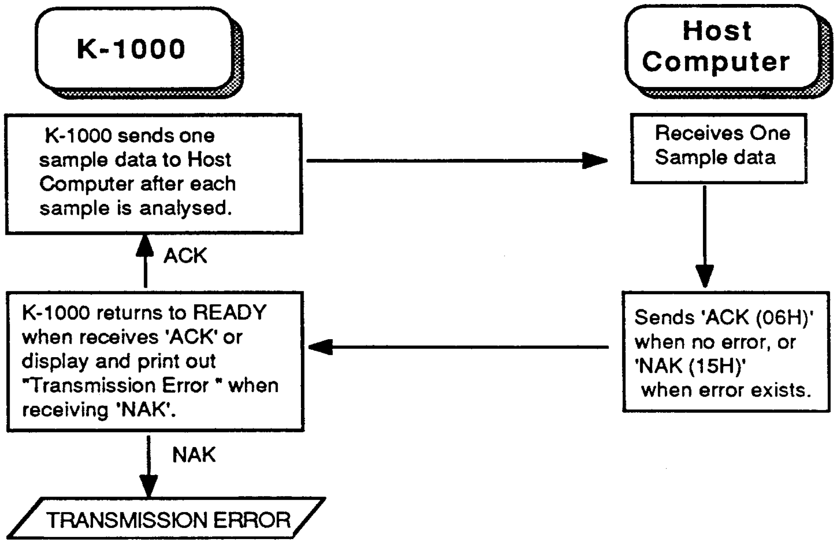


Figure 7-6 Data flow in class B is selected

4. Text Format

The K-1000 has following four Text Formats to output data through the Serial Interface.

(1) Sample Data Format A

If the Host computer is selected and connected in the program, the patient sample data are sent when each count sequence is finished.

(2) Quality Control Data Format

If the Host computer or DA-1000 is selected and connected in the program, X-bar QC data is sent after X-bar Q.C. are performed.

NOTE:

QC data will not be output from the serial port when Line Printer is selected as the device for the serial port.

(3) Sample Data Format B

If the Line Printer is selected in the program, the patient sample data are output immediately each count sequence is finished.

When Host computer is selected as the device for the serial port in the program, following five codes are used to frame the data and/or to distinguish these data formats though text length of each data formats are different.

(1) ‘STX’ (Start of Text)

To detect the beginning of Text Data, “STX” (02H) is transmitted before these formats.

(2) Text Distinction Code I

The first character of these formats is Text Distinction Code I. K-1000 always sends ‘D” as the Text Distinction Code I, since the K-1000 outputs only analysis data text.

(3) Text Distinction Code II

The second character is Text Distinction Code II. When the text length is within 255 bytes, Text Distinction Code II is always ‘1’. If the text length exceeds 255 bytes, one text will be separated into some blocks to fit each within 255 bytes.

(4) Sample Distinction Code

The third character is Sample Distinction Code. Sample Distinction Code is ‘U’ for the patient sample data and histogram data, ‘C’ for the quality control data. Available data are output after this code.

(5) ‘ETX’ (End of Text)

To verify the end of text data, “ETX”(03H) is transmitted after the last character of these format was transmitted.

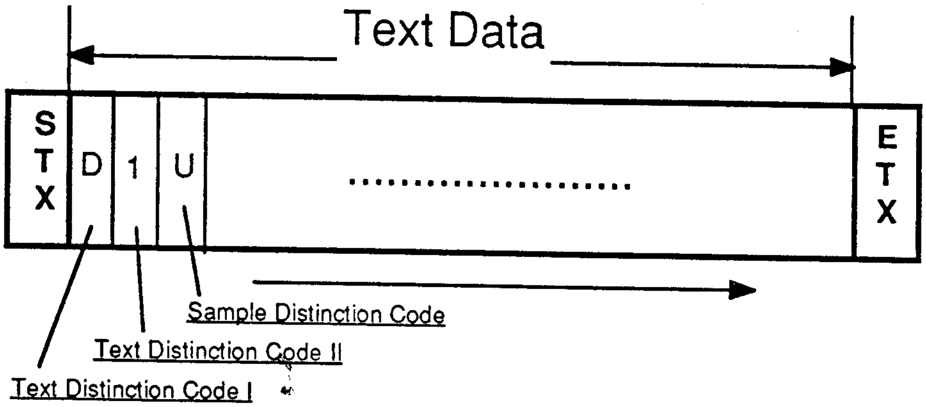


Figure 7-7 Framing of Text

[1]. SAMPLE DATA FORMAT-A

Text Length: 119 characters

(When the K-1000 is in Maintenance Mode, RDW-CV and SD is appended to this format. Text length becomes 129 characters.)

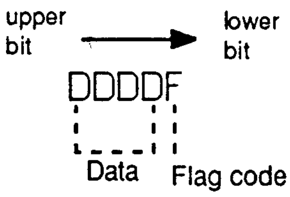
Table. 7-5 Structure of Sample Format A

Parameter	**No. of Character**	**Example**
Text Distinction Code I	1	’D’
Text Distinction Code II	1	’1’
Sample Distinction Code	1	’U’
Month (Day or Year)	2	’08’ (or ’87’)
Date (or Month)	2	’31’ (or ’08’)
Year (or Day)	2	’87’ (or ’31’)
Analysis Information	1	’A’ See Table 7-6
Sample ID Number	12	123 → ’000000000123"
WBC Histogram Information	1	Normal → ’0’ abnormal → ’1’
WBC Histogram Flag	1	See Table 7-7
RBC Histogram Information	1	normal → ’0’ abnormal→ ’1’
RBC Histogram Flag	1	See Table 7-7
PLT Histogram Information	1	normal → ’0’ abnormal → ’1’
PLT Histogram Flag	1	See Table 7-7
RDW Selection Information	1	’C’:RDW-CV ’S’:RDW-SD
WBC ($X10^3$ /µL) Data& Flag	5 (4 N +1 Flag)	55.0 $X10^3$ /µL → ’05500’
RBC ($X10^6$ /µL) Data& Flag	5 (4 N +1 Flag)	+ 5.86 $X10^6$ /µL → ’05861’
HGB (g/dL) Data& Flag	5 (4 N +1 Flag)	- 7.0 g/dL → ’00702’
HCT (%) Data& Flag	5 (4 N +1 Flag)	45.0% → ’04500’
MCV (fL) Data& Flag	5 (4 N +1 Flag)	92.5 fL → ’09250’
MCH (pg) Data& Flag	5 (4 N +1 Flag)	32.3 pg → "03230’
MCHC (g/dL) Data& Flag	5 (4 N +1 Flag)	34.8 g/dl → ’03480’
PLT ($X10^3$ /µL) Data& Flag	5 (4 N +1 Flag)	255 $X10^3$ /µL → ’02550’
W-SCR (%) Data& Flag	5 (4 N +1 Flag)	35.5% → ’03550’
W-MCR (%) Data& Flag	5 (4 N +1 Flag)	15.3% → ’01230’
W-LCR (%) Data& Flag	5 (4 N +1 Flag)	55.6% → ’05560’
W-SCC ($X10^3$ /µL) Data& Flag	5 (4 N +1 Flag)	23.4 $X10^3$ /µL → ’02340’
W-MCC ($X10^3$ /µL) Data& Flag	5 (4 N +1 Flag)	6.3 $X10^3$ /µL → ’00630’
W-LCC ($X10^3$ /µL) Data& Flag	5 (4 N +1 Flag)	28.2 $X10^3$ /µL → ’02820’
RDW-CV(%) or RDW-SD(fL) D&F	5 (4 N +1 Flag)	13.0% → ’01300’
PDW (fL) Data& Flag	5 (4 N +1 Flag)	12. 4 fL → ’01240’
MPV (fL) Data& Flag	5 (4 N +1 Flag)	11.2 fL → ’01120’
P-LCR (%) Data& Flag	5 (4 N +1 Flag)	31.2% → ’03120’

The order of transmission is from the top parameter to the bottom, and data is sent most significant digit, i.e. left to right. The zero suppress program is not employed.

The decimal point is not sent. If necessary, add the decimal point to the appropriate position on the computer side.

Analyzed Data and Flag of each sample is transmitted in five characters. The structure of these characters is as follows;

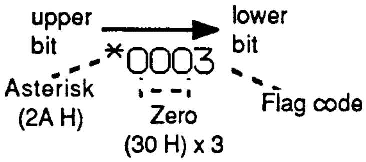


Explanation of Flag

'0' : Normal
'1' : Abnormal (High)
'2' : Abnoraml (Low)
'3': Out of linearity limit

(1) If there were any parameters which data cannot be obtained by analysis error, or cannot be calculated when background measurement was performed, five bits of asterisk ‘2A H’ “* * * * *” are placed instead of five bits data of the parameter.

(2) If there were any parameters which data are overflow, an asterisk mark (*) will appear in the most significant digit and later three digits of five bits data of the parameter will be 0 (Zero);



(3) If there were any histogram analysis parameters which data cannot be analyzed since the histogram of the sample were abnormal, five bits of hyphen ‘2D H’ “——” are placed instead of five bits data of the parameter.

(4) If the optional PDA board is not installed, five bits of space ’20 H’ are placed instead of 10 histogram analysis parameters.
The 10th character of this format indicates Analysis Information of each sample. Details of Analysis Information are shown in following Table 7-6;

Table 7-6 Analysis Information

Analysis Infomation	PLT, P-LCR, & PDW Printout to DP	WBC Recount	Sample Temp Err	Analysis Mode
A	ON	OFF	OFF	Whole Blood
B	ON	OFF	OFF	Capillary
C	ON	OFF	ON	Whloe Blood
D	ON	OFF	ON	Capillary
E	ON	ON	OFF	Whole Blood
F	ON	ON	OFF	Capillary
G	ON	ON	ON	Whole Blood
H	ON	ON	ON	Capillary
I	OFF	OFF	OFF	Whole Blood
J	OFF	OFF	OFF	Capillary
K	OFF	OFF	ON	Whole Blood
L	OFF	OFF	ON	Capillary
M	OFF	ON	OFF	Whole blood
N	OFF	ON	OFF	Capillary
O	OFF	ON	ON	Whole Blood
P	OFF	ON	ON	Capillary
Q	ON	OFF	OFF	W.B. (CLOSED)
R	ON	OFF	ON	W.B. (CLOSED)
S	ON	ON	OFF	W.B. (CLOSED)
T	ON	ON	ON	W.B. (CLOSED)
U	OFF	OFF	OFF	W.B. (CLOSED)
V	OFF	OFF	ON	W.B. (CLOSED)
W	OFF	ON	OFF	W.B. (CLOSED)
X	OFF	ON	ON	W.B. (CLOSED)

Between 11th and 22nd Characters indicate Sample ID Number. These characters may includes hyphens ‘-’(2DH).

The 23rd character of this format indicates Histogram Information for WBC, the 25th is for RBC, and the 27th is for PLT. Histogram Information code is explained as below;

- '0': is placed when the histogram of the sample is normal.
- '1': is placed when the histogram of the sample is abnormal.

The 24th character of this format indicates Histogram Flag for WBC, 26th is for RBC, and 28th is for PLT. Histogram Flag codes are explained as below;

- '0': is placed when the normal distribution was obtained.
(WBC/RBC/PLT)
- '1': is placed when the relative number at the Lower Discriminator exceeds 20%.
(WBC/RBC/PLT)
- '2': is placed when the relative number at the Upper Discriminator exceeds 20%.
(WBC/RBC/PLT)
- '3': is placed when the DW analysis failed. The RBC and PLT histogram do not cross the 20% relative frequency level twice.
(RBC/PLT)
- '4': is placed when Multi-Peaks are found. Two or more RBC or/and PLT populations are detected.
(RBC/PLT)
- '5': is placed when the relative number at the Low Trough Discriminator (T1) is not decided.
(WBC)
- '6': is placed when the relative number at the Upper Discriminator (T2) is not decided.
(WBC)
- '7': is placed when the relative number at the Lower Trough Discriminator (T1) exceeds 40%.
(WBC)
- '8': is placed when the relative number at the Lower Trough Discriminator (T1) exceeds 40% and the Upper Trough Discriminator (T2) exceeds 50%.
(WBC)
- '9': is placed when the relative number at the Upper Trough Discriminator (T2) exceeds 50%.
(WBC)

Table 7-7 Flagging character which is printed out on Built-in printer

FLAG	WBC	RBC	PLT
0	NORMAL	NORMAL	NORMAL
1	WL	RL	PL
2	WU	RU	PU
3	-	DW	DW
4	-	MP	MP
5	T1	-	-
6	T2	-	-
7	F1	-	-
8	F2	-	-
9	F3	-	-

The 29th character of this format indicates RDW Selection Information. RDW Selection is explained as follows;

'C' indicates that RDW-CV is selected.
'S' indicates that RDW-SD is selected.

[2] QUALITY CONTROL DATA FORMAT

Text Length : 97 characters

Table 7-8 Structure of Quality Control Circuit

Item	**No. of Character**	**Example**
Text Distinction Code I	1	’D’
Text Distinction Code II	1	’1’
Sample Distinction Code	1	’C’
Data Distinction Code	1	’X’
Month (Date or Year)	2	’08’ (or ’87’)
Date (or Month)	2	’31’ (or ’08’)
Year (or Date)	2	’87’ (or ’31’)
Hour	2	
Minute	2	
Control Material ID Number	1	
Not Used	1	
RDW-CV or RDW-SD Selection	1	’C’: RDW-CV ’S’: RDW-SD
WBC (X10^{3} /μL)	4	55.0 X10^{3} /μL→ ’0550’
W-SCR (%) Data	4	35.5%→ ’0355
W-MCR (%) Data	4	15.3% → ’0153’
W-LCR (%) Data	4	55.6% → ’0556’
W-SCC (X10^{3} /μL) Data	4	23.4 X10^{3} /μL → ’0234’
W-MCC (X10^{3} /μL) Data	4	6.3 X10^{3} /μL → ’0063’
W-LCC (X10^{3} /μL) Data	4	28.2 X10^{3} /μL → ’0282’
RBC (X10^{6} /μL) Data	4	4.86 X10^{6} /μL → ’0486’
HGB (g/dL) Data	4	12.0 g/dL → ’0120’
HCT (%) Data	4	45.0% → ’0450’
MCV (fL) Data	4	92.5 fL → ’0925’
MCH (pg) Data	4	32.3 pg → "0323’
MCHC (g/dL) Data	4	34.8 g/dL → ’0348’
RDW-CV(%) or RDW-SD (fL) Data	4	13.0% → ’0130’
PLT (X10^{3} /μL) Data	4	255 X10^{3} /μL → ’0255’
PDW (fL) Data	4	12.4 fL → ’0124’
MPV (fL) Data	4	11.2 fL → ’0112’
P-LCR (%) Data	4	31.2% → ’0312’
W-SMV	4	22.2 fL → ’0222’
W-LMV	4	35.2 fL → ’0352’

(1) Data Distinction Code is ‘X’ for the X-bar Control data.

(2) Control Material ID Number indicates one digit out of ‘1’ through ‘9’ which is entered in X-bar Control program.

(3) Data will not accompany any flag information, such as linearity limit flag, patient mark limit flag, and so on.

(4) If there were the parameter which data was not reported, asterisks ‘* * * *’will be transmitted instead of the data.

[3] SAMPLE DATA FORMAT-B

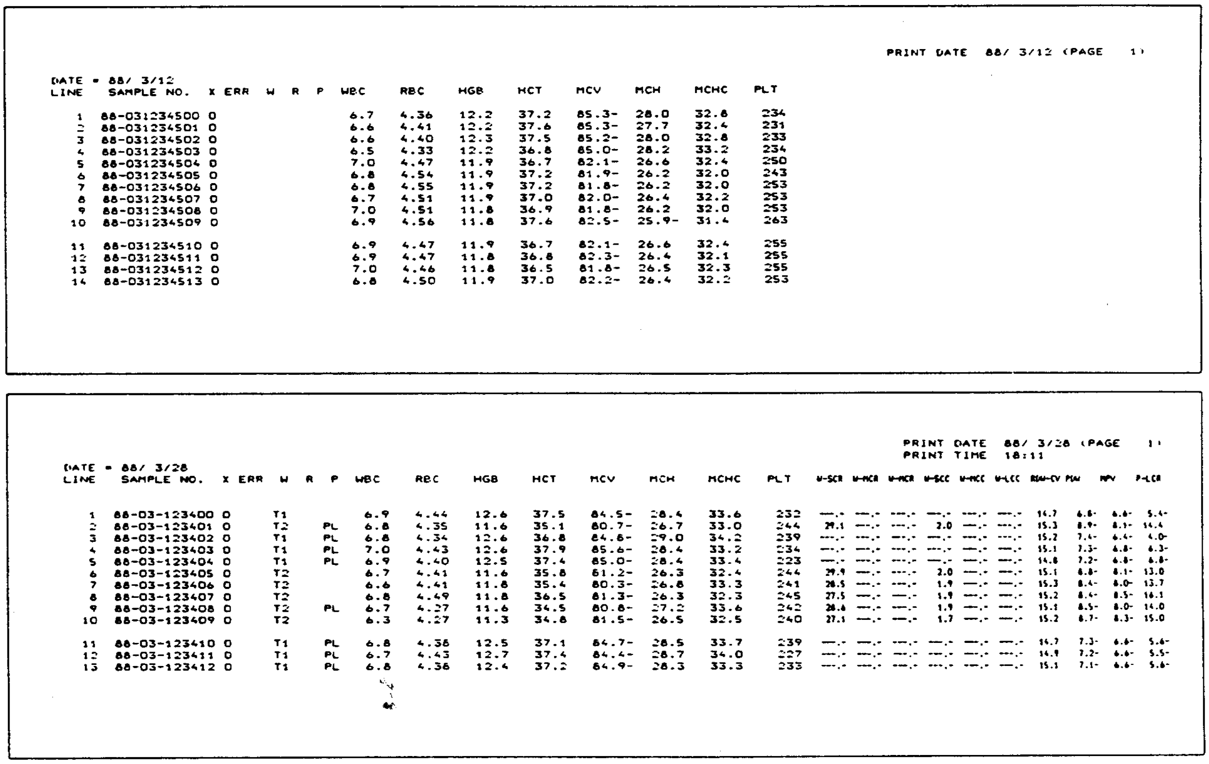
When the Line Printer is selected as the device for the serial port, analized data are printed out in this format. Total of 50 patient data are printed out in page with a header and line spaces in every 10 patient data.
Character code is provided in ASCII codes and font selection comand codes (control comands) to select compressed character are provided in **IBM-Epson** mode. If any general line printer of which control codes are provided by other mode is utilized, this page format may be broken and some character may be printed incorrectly.

CAUTION:

If the main program "1K1" Ver.00-00 — 00-03 is installed on the system, font selection comand codes (control codes) to select condensed character are provided in **FACIT** mode.

One page is consisted of;

(1) form feed, page header, including print date, print time, page number, analysis date, and parameter names.
(2) 10 patient data, following one line feed.
(3) 10 patient data, following one line feed.
(4) 10 patient data, following one line feed.
(5) 10 patient data, following one line feed.
(6) 10 patient data. Printout example by Line Printer (FACIT 4512) is shown in Figure 7-8.



```
                                                                                PRINT DATE  88/ 3/12 (PAGE    1)

DATE = 88/ 3/12
LINE    SAMPLE NO.  X ERR  W   R   P  WBC     RBC     HGB     HCT     MCV     MCH     MCHC    PLT

   1  88-031234500 O                   6.7    4.36    12.2    37.2    85.3-   28.0    32.8     234
   2  88-031234501 O                   6.6    4.41    12.2    37.6    85.3-   27.7    32.4     231
   3  88-031234502 O                   6.6    4.40    12.3    37.5    85.2-   28.0    32.8     233
   4  88-031234503 O                   6.5    4.33    12.2    36.8    85.0-   28.2    33.2     234
   5  88-031234504 O                   7.0    4.47    11.9    36.7    82.1-   26.6    32.4     250
   6  88-031234505 O                   6.8    4.54    11.9    37.2    81.9-   26.2    32.0     243
   7  88-031234506 O                   6.8    4.55    11.9    37.2    81.8-   26.2    32.0     253
   8  88-031234507 O                   6.7    4.51    11.9    37.0    82.0-   26.4    32.2     253
   9  88-031234508 O                   7.0    4.51    11.8    36.9    81.8-   26.2    32.0     253
  10  88-031234509 O                   6.9    4.56    11.8    37.6    82.5-   25.9-   31.4     263

  11  88-031234510 O                   6.9    4.47    11.9    36.7    82.1-   26.6    32.4     255
  12  88-031234511 O                   6.9    4.47    11.8    36.8    82.3-   26.4    32.1     255
  13  88-031234512 O                   7.0    4.46    11.8    36.5    81.8-   26.5    32.3     255
  14  88-031234513 O                   6.8    4.50    11.9    37.0    82.2-   26.4    32.2     253
```

```
                                                                                PRINT DATE  88/ 3/28 (PAGE    1)
                                                                                PRINT TIME  18:11
DATE = 88/ 3/28
LINE    SAMPLE NO.  X ERR  W   R   P   WBC     RBC     HGB     HCT     MCV     MCH     MCHC    PLT   W-SCR W-MCR W-LCR W-SCC W-MCC W-LCC RDW-CV PDW  MPV  P-LCR

   1  88-03-123400 O      T1           6.9    4.44    12.6    37.5    84.5-   28.4    33.6     232  ---.- ---.- ---.- ---.- ---.- ---.-  14.7  6.8-  6.6-  5.4-
   2  88-03-123401 O      T2      PL   6.8    4.35    11.6    35.1    80.7-   26.7    33.0     244   29.1 ---.- ---.-   2.0 ---.- ---.-  15.3  8.9-  8.1- 14.4
   3  88-03-123402 O      T1      PL   6.8    4.34    12.6    36.8    84.8-   29.0    34.2     239  ---.- ---.- ---.- ---.- ---.- ---.-  15.2  7.4-  6.4-  4.0-
   4  88-03-123403 O      T1      PL   7.0    4.43    12.6    37.9    85.6-   28.4    33.2     234  ---.- ---.- ---.- ---.- ---.- ---.-  15.1  7.3-  6.8-  6.3-
   5  88-03-123404 O      T1      PL   6.9    4.40    12.5    37.4    85.0-   28.4    33.4     223  ---.- ---.- ---.- ---.- ---.- ---.-  14.8  7.2-  6.8-  6.8-
   6  88-03-123405 O      T2           6.7    4.41    11.6    35.8    81.2-   26.3    32.4     244   29.9 ---.- ---.-   2.0 ---.- ---.-  15.1  8.8-  8.1- 13.0
   7  88-03-123406 O      T2           6.6    4.41    11.8    35.4    80.3-   26.8    33.3     241   28.5 ---.- ---.-   1.9 ---.- ---.-  15.3  8.4-  8.0- 13.7
   8  88-03-123407 O      T2           6.8    4.49    11.8    36.5    81.3-   26.3    32.3     245   27.5 ---.- ---.-   1.9 ---.- ---.-  15.2  8.4-  8.5- 16.1
   9  88-03-123408 O      T2      PL   6.7    4.27    11.6    34.5    80.8-   27.2    33.6     242   28.6 ---.- ---.-   1.9 ---.- ---.-  15.1  8.5-  8.0- 14.0
  10  88-03-123409 O      T2           6.3    4.27    11.3    34.8    81.5-   26.5    32.5     240   27.1 ---.- ---.-   1.7 ---.- ---.-  15.2  8.7-  8.3- 15.0

  11  88-03-123410 O      T1      PL   6.8    4.38    12.5    37.1    84.7-   28.5    33.7     239  ---.- ---.- ---.- ---.- ---.- ---.-  14.7  7.3-  6.6-  5.6-
  12  88-03-123411 O      T1      PL   6.7    4.43    12.7    37.4    84.4-   28.7    34.0     227  ---.- ---.- ---.- ---.- ---.- ---.-  14.9  7.2-  6.6-  5.5-
  13  88-03-123412 O      T1      PL   6.8    4.36    12.4    37.2    84.9-   28.3    33.3     233  ---.- ---.- ---.- ---.- ---.- ---.-  15.1  7.1-  6.6-  5.6-
```

Figure 7-8 Printout example of Line Printer

(1) Format of the Header (the 1st line)

Table 7-9 Structure of Sample Data Format B Header (the 1st line)

Parameter	**No. of characters**
Form Feed (FF; 0C Hex)	1
Select Normal Font (DC2: 12 Hex)	1
spaces	100
’PRINT$_{SP}$DATE$_{SP}$ $_{SP}$##/##/##’	21
’$_{SP}$ (PAGE####)’	10
Carriage Return (CR; 0D Hex)	1
Line Feed (LF; 0A Hex)	1

(2) Format of the Header (the 2nd line)

Table 7-10 Structure of Sample Data Format B Header (the 2nd line)

Parameter	**No. of characters**
Select Normal Font (DC2: 12 Hex)	1
space’$_{SP}$’s	100
’PRINT$_{SP}$TIME$_{SP}$ $_{SP}$##:##’	17
Carriage Return (CR; 0D Hex)	1
Line Feed (LF; 0A Hex)	1

(3) Format of the Header (the 3rd line)

Table 7-11 Structure of Sample Data Format B Header (the 3rd line)

Parameter	**No. of characters**
Select Normal Font (DC2: 12 Hex)	1
’DATE$_{SP}$=$_{SP}$##/##/##’	15
Carriage Return (CR; 0D Hex)	1
Line Feed (LF; 0A Hex)	1

(4) Format of the Header (the 4th line)

Table 7-12 Structure of Sample Data Format B Header (the 4th line)

Parameter	No. of characters
Select No (DC2 : 12 Hex)	1
’LINE$_{SP\ SP\ SP}$’	7
’SAMPLE$_{SP}$NO.$_{SP}$’	12
’X$_{SP}$’	2
’ERR$_{SP}$’	4
’W$_{SP\ SP}$’	4
’R$_{SP\ SP}$’	3
’P$_{SP\ SP}$’	3
’WBC$_{SP\ SP\ SP\ SP}$’	7
’RBC$_{SP\ SP\ SP\ SP}$’	7
’HGB$_{SP\ SP\ SP\ SP}$’	7
’HCT$_{SP\ SP\ SP\ SP-}$’	7
’MCV$_{SP\ SP\ SP\ SP}$’	7
’MCH$_{SP\ SP\ SP\ SP}$’	7
’MCH$_{SP\ SP\ SP}$’	7
’PLT$_{SP\ SP\ SP}$’	6
Select compressed Font (Sl; OF H)	1
’W-SCR$_{SP\ SP}$W-MCR$_{SP\ SP'}$	14
’W-LCR$_{SP\ SP}$W-SCC$_{SP\ SP}$’	14
’W-MCC$_{SP\ SP}$W-LCC$_{SP\ SP}$’	14
’RDW-CV’ or ’RDW-SD’	7
’PDW$_{SP\ SP\ SP\ SP}$MPV$_{SP\ SP\ SP\ SP}$’	14
’P-LCR’	5
space’$_{SP}$’S	40
Carriage Return (CR; 0D Hex)	1
Line Feed (LF; 0A Hex)	1

If Optional PDA board is not installed, PDA analysis parameter would not be output.

(5) Format of the patient data transmission

Table 7-13 Structure of Sample Data Format B (Sample Data)

Parameter	No. of characters
Selelct Normal Font (DC2 : 12 Hex)	1
’# # # #$_{SP}$’ (Line Number)	5
’# # # # # # # # # # # # #$_{SP}$’ (Sample Number)	14
’#’ (Analysis Information)	2
’# # #$_{SP}$’ (Error)	4
’# #$_{SP}$’ (WBC Histogram Flag)	3
’# #$_{SP}$’ (RBC Histogram Flag)	3
’# #$_{SP}$’ (PLT Histogram Flag)	3
’# # # # # #$_{SP}$’ (WBC)	7
’# # # # # #$_{SP}$’ (RBC)	7
’# # # # # #$_{SP}$’ (HGB)	7
’# # # # # #$_{SP}$’(HCT)	7
’# # # # # #$_{SP}$’ (MCV)	7
’# # # # # #$_{SP}$’ (MCH)	7
’# # # # # #$_{SP}$’ (MCHC)	7
’# # # # # #$_{SP}$’ (PLT)	6
Shift In (SI; 0FH)	1
space’$_{SP}$’	1
’# # # # # #$_{SP}$’ (W-SCR)	7
’# # # # # #$_{SP}$’ (W-MCR)	7
’# # # # # #$_{SP}$’ (W-LCR)	7
’# # # # # #$_{SP}$’ (W-SCC)	7
’# # # # # #$_{SP}$’ (W-MCC)	7
’# # # # # #$_{SP}$’ (W-LCC)	7
’# # # # # #$_{SP}$’ (RDW-CV or RDW-SD)	7
’# # # # # #$_{SP}$’ (PDW)	7
’# # # # # #$_{SP}$’ (MPV)	7
’# # # # # #$_{SP}$’ (P-LCR)	7
Carriage Return (CR; 0DH)	1
Line Feed (LF; 0AH)	1

The counted data of one parameter is indicated in six characters. These six characters consists of 4 numerical characters, decimal point, and Flag (‘+’, ‘-’, or ‘*’). If there are any parameters which are no need to indicate a decimal point, one space code is added in the six characters.
Analysis Information Code indicated in this format is all the same as that used in Sample Data format A (Refer page 7-9).
If Optional PDA board is not installed, PDA analysis parameter would not be output.

5. Transmission Error

If the K-1000 detects error after transmitting data, an error message is printed out and terminated the data transmission.
Customer can select either to re-trying by pressing the 1 key or quitting by pressing the 2 key.
The error occurs when one of the following conditions exists while the K-1000 is selected in the program to connect the host computer;

(1) ‘DSR’ is OFF,
(2) Computer does not send the control signal ‘ACK (06H)’ or ‘NAK (15H)’ to the K-1000 within 3 seconds after transmitting data.
(3) K-1000 receives ‘NAK (15H)’ after tripple re-tries.

NOTE: Error (2) or (3) occurs only in the Class B.

7.3. Parallel Interface

1. Summary
The K-1000 parallel interface is available fo connecting the Data Printers and the Line printer. Device for the parallel port can be selected by program switch in the ‘SETTING’ out of ‘SELECT MENU’ (Refer § 7.1).

2. Interface
The centronics type interface.

3. Connection
Connect a AMPHENOL DDK 57-30360 to connector J-1 for Data Printer on the K-1000 rear panel.

4. Input/Output Signals

Table 7-14 I/O Signals of Pallalel Interface

Pin	Symbol	I/O	Pin	Symbol	I/O
1	STB/	OUT	19	GND(for signal)	
2	DATA0	OUT	20	GND(for signal)	
3	DATA1	OUT	21	GND(for signal)	
4	DATA2	OUT	22	GND(for signal)	
5	DATA3	OUT	23	GND(for signal)	
6	DATA4	OUT	24	GND(for signal)	
7	DATA5	OUT	25	GND(for signal)	
8	DATA6	OUT	26	GND(for signal)	
9	DATA7	OUT	27	GND(for signal)	
10	ACK/	IN	28	GND(for signal)	
11	BUSY	IN	29	GND(for signal)	
12	PE	IN	30	GND(for signal)	
13	LINE	IN	31		
14			32	FAULT/	IN
15			33		
16			34		
17	Protect GND		35		
18			36		

Table 7-15 Description of symboles

Symbol	Description
STB/	Strobe Signal
ACK/	Acknowledge Signal
BUSY	Busy Signal
PE	Paper Empty Signal: High level when paper is empty
LINE	Line Signal: Low level when off line
FAULT/	Fault Signal: Low level when error exist

NOTE:

To connect the FACIT 4512 as the Line printer to the pallarel port, Dip switches of Printer should be set up as follows;

FACIT 4512 DIP Switches (on rear panel)

K-1000 Main Program Version

EP-ROM 1K1, 1K2, or 1K3,
Version 00-04 and thereafter
and
EP-ROM 4K1, 4K2, or 4K3
Version 00-00 and thereafter

BIT	1	2	3	4	5	6	7	8
SW-1	F	F	F	F	F	F	N	F
SW-2	F	F	N	N	N	F	F	F
SW-3	N	F	F	F				

(IBM mode)

EP-ROM 1K1
Version 00-00 to 00-03

BIT	1	2	3	4	5	6	7	8
SW-1	F	F	F	F	F	F	N	F
SW-2	F	F	N	N	N	F	F	F
SW-3	F	F	F	F				

(FACIT mode)

The printout format of Line printer (FACIT 4512) which is connected to the parallel port is the same as that of serial port (Refer previous page of this section)

7.4. Specificarion of Print Tickets

7.4.1. DP-480 (Card Printer)

Paper : Regular paper, pressure sensitive paper, or carbon paper.
Single-Part : 0.20 mm thick minimum, and 0.25 mm thick maximum (equivalent to minimum 157 Kg/m^2 and maximum 197 Kg/m^2 paper).
Multi-Part : Original and up to 5 copies, including the base card.
Thickness, 0.09 mm minimum and 0.25 mm maximum in total.
0.09-0.05 mm thick each for the original and copies (equivalent to 64 to 40 Kg/m^2 paper), and 0.20-0.09 mm thick for the base card (equivalent to 157 to 64 Kg/m^2 paper). Carbon paper approximately 0.035 mm thick.

NOTE:

Multi-part forms should have only one card part. The card must be the last part.

Recommended Structure : Original: 40 Kg/m^2, non-carbon
1st copy: 40 Kg/m^2, pressure sensitive paper
2nd copy (base card): 128 Kg/m^2, pressure sensitive paper

NOTE:

The top original must use the ribbon. First surface impact paper is not recommended.

Physical Dimensions : Width: 60 mm minimum and 120 mm maximum
Length: 158 mm minimum.

Space Requirements : Header: 35 mm
Footer: 30 mm minimum
Left hand:side 0 mm
Right hand side: 13 mm minimum

Printable Area, Horizontal : 83 mm (22 columns) maximum
Printable Area, Vertical : 99.0 (18 lines) when the line pitch is 5.46 mm, or 91.4 mm (18 lines) when the line pitch is 5.08 mm.

NOTE:

Dimensions of Print Ticket No. 19 are shown in Figure 7-9.

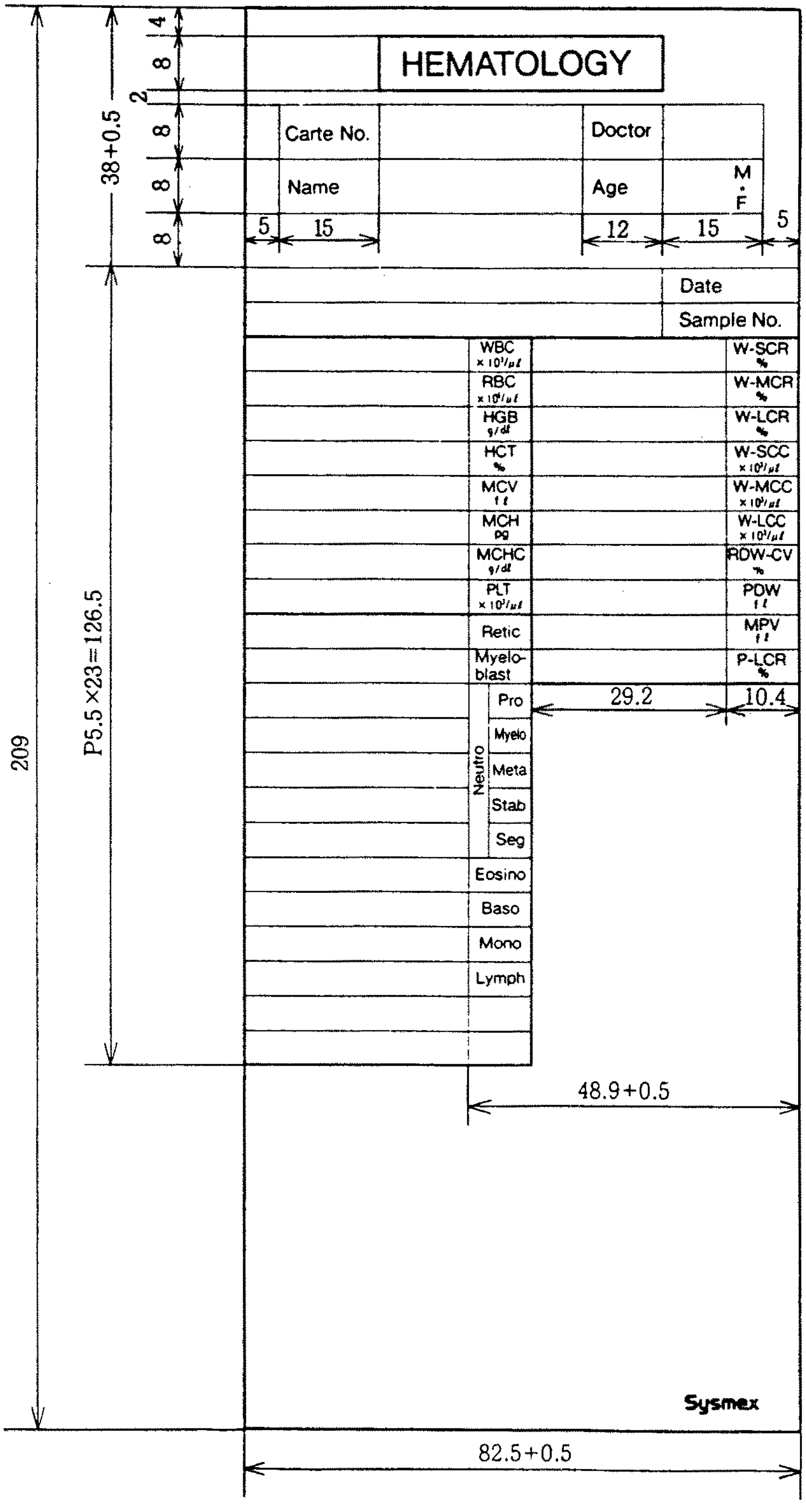


Figure 7-9 Dimensions of Print Ticket No.19 (unit in mm)

7.4.2. DP-490 (Z-fold Printer)

Paper : Regular paper, pressure sensitive paper, or carbon paper.
Single-Part : 0.05 mm thick minimum, and 0.20 mm thick maximum.
Multi-Part : Original and up to 2 copies (triplicate).
Thickness, 0.05 mm minimum and 0.20 mm maximum in total. 0.05 to 0.09 mm thick each (equivalent to 47 to 64 Kg/m^2 sheet paper).
NOTE: The top original must use the ribbon. First surface impact paper is not recommended.
Physical Dimensions : Width, 127 ± 0.5 mm (5 inches)
Length, 177.5 mm (7 inches) maximum to fit ticket hopper.
Number of Line Feed : Adjustable, 0 to 31 (Factory configuration: 11)
Feed Hole Pitch : Horizontal, 115 ± 0.1 mm (4.528 ± 0.004 inches), center-to-center.
Vertical, 12.7 ± 0.05 mm (0.500 ± 0.002 inches), center-to-center.
Feed Hole Dimensions : Left hand side, 4.0 ± 0.1 mm x 6.0 ± 0.1 mm (0.157 ± 0.004 inches x 0.236 ± 0.004 inches), center-to-center.
Right hand side, 4.0 ± 0.1 mm (0.157 ± 0.004 inches) diameter.
Printable Area, Horizontal : 84 ± 1 mm (22 columns) maximum.
Character Size : 2.1 mm(W) x 3.1 mm(H)
Pitches : Character pitch, 3.85 mm
Line Pitch, 1/6 inches (approx. 4.23 mm)
NOTE: Dimensions of Print Ticket No.20 are shown in Figure 7-10.

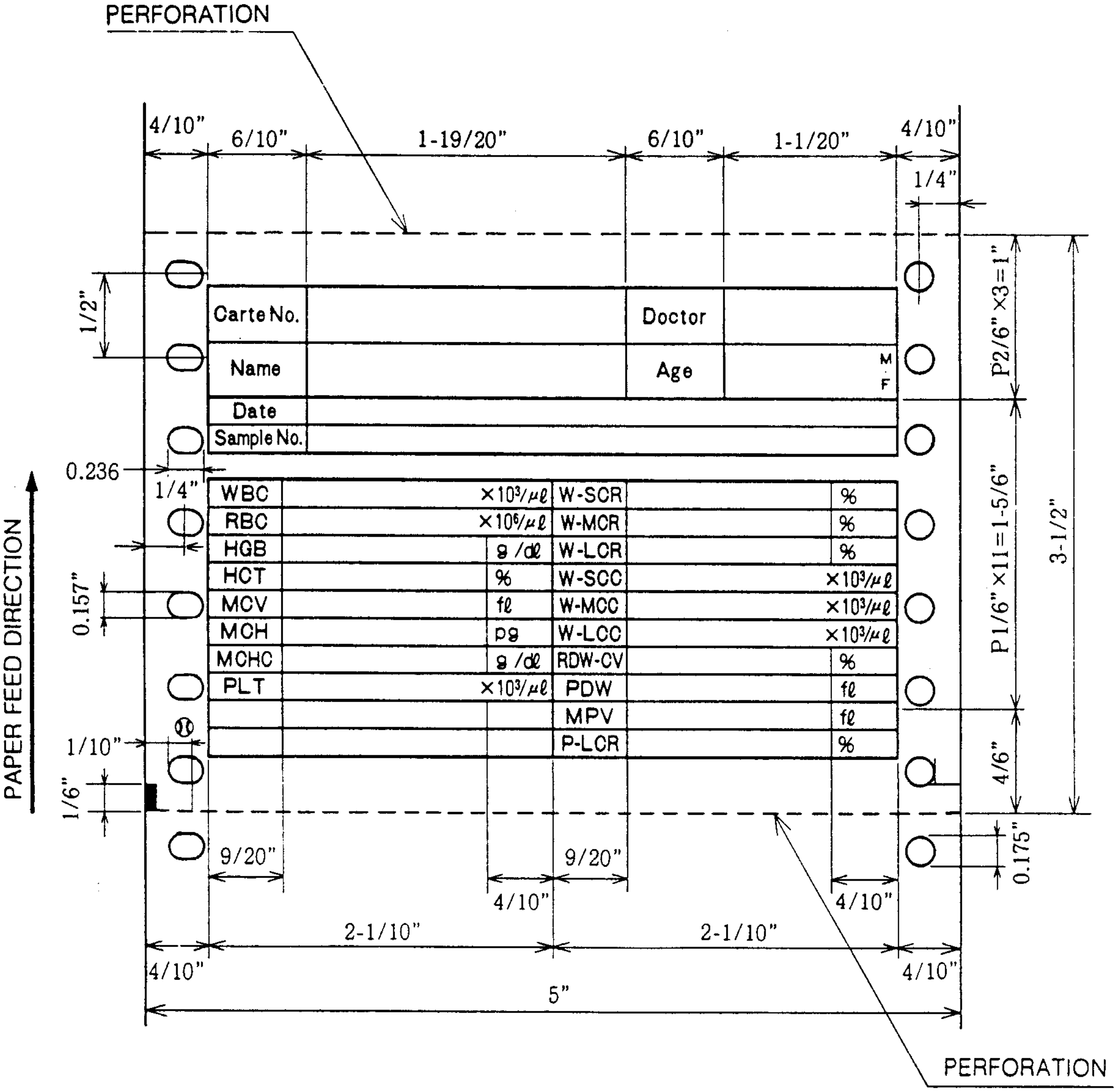


Figure 7-10 Dimensions of Print Ticket No.20 (unit in inches)

7.4.3. DP-455 (Card Printer)

Paper : Regular paper, pressure sensitive paper, or carbon paper.
Single-Part : 0.09 mm thick minimum, and 0.45 mm thick maximum (equivalent to minimum 64 Kg/m^2 maximum 420 Kg/m^2 paper).
Multi-Part : Original and up to 2 copies, including the base card.
Thickness, 0.09 mm minimum and 0.45 mm maximum in total.
0.09-0.05 mm thick each for the original and copies (equivalent to 64 Kg/m^2 to 40 Kg/m^2 paper), and 0.20-0.09 mm thick for the base card (equivalent to 157 to 64 Kg/m^2 paper). Carbon paper approximately 0.035 mm thick.

NOTE: Multi-part form should have only one card; the card must be the last part.

Recommended Structure : Original: 40 Kg/m^2,non-carbon
1st copy: 40 Kg/m^2,pressure sensitive paper
2nd copy (base card): 128 Kg/m^2 pressure sensitive paper.
Physical Dimensions : Width, 82.5 ± 0.5 mm
Length: 174.5 mm minimum
Space Requirements : Left hand side: applox. 3.7 mm
Right hand side: 13 mm
Header, 38 ± 0.5 mm minimum, 48 mm maximum, adjustable
Footer, 60 mm minimum
Printable Area, Horizonta: 66.7 mm (17 columns)
Printable Area, Vertical : 51.0 mm (10 lines)

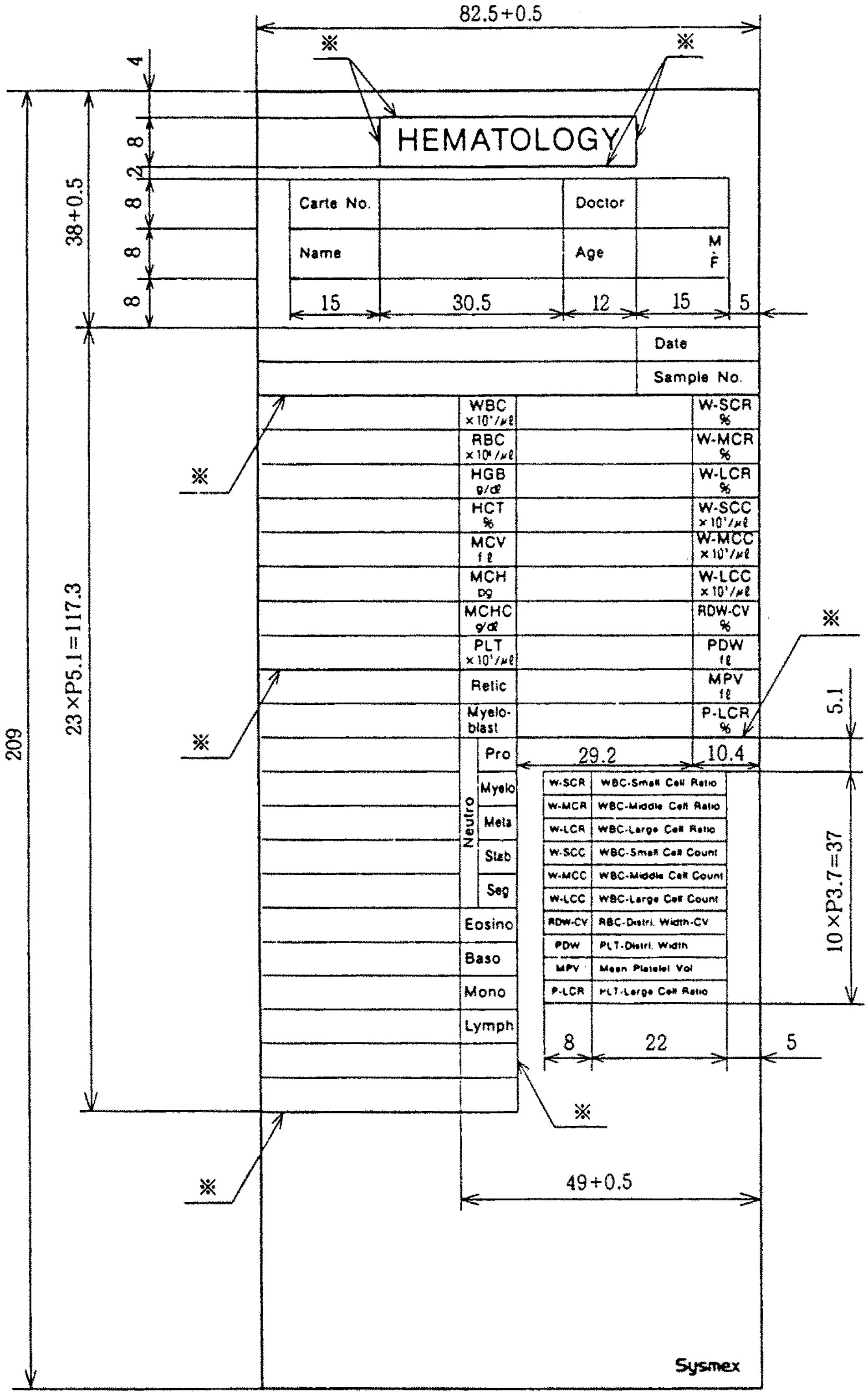


Figure 7-11 Dimensions of Print Ticket No.26 (unit in mm)

SECTION EIGHT

MAINTENANCE MODE

- Table of Contents -

Maintenance Mode

Section 8 Maintenance Mode

Introduction

K-1000 has two major modes in its computer program system, one is the User Mode and the other is the Maintenance Mode. When the power of K-1000 is turned on, computer program is commonly running in the User Mode. By accessing the Maintenance Mode, several functions for Service Engineer becomes available. To access Maintenance Mode, Password should be entered.

8.1. Password

Enter the following Password by pressing keys to access Maintenance Mode or to return User Mode, <u>while the instrument is in Ready</u>.

Password to access Maintenance Mode: C, 9 , ·/– , 0
Password to return User Mode: C , 0

8.2. Sequence No.

1. Display
   Sequence No. will be additionally indicated on LCD display in the Maintenance Mode as shown in Figure 8-1.

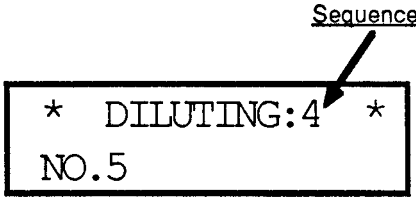
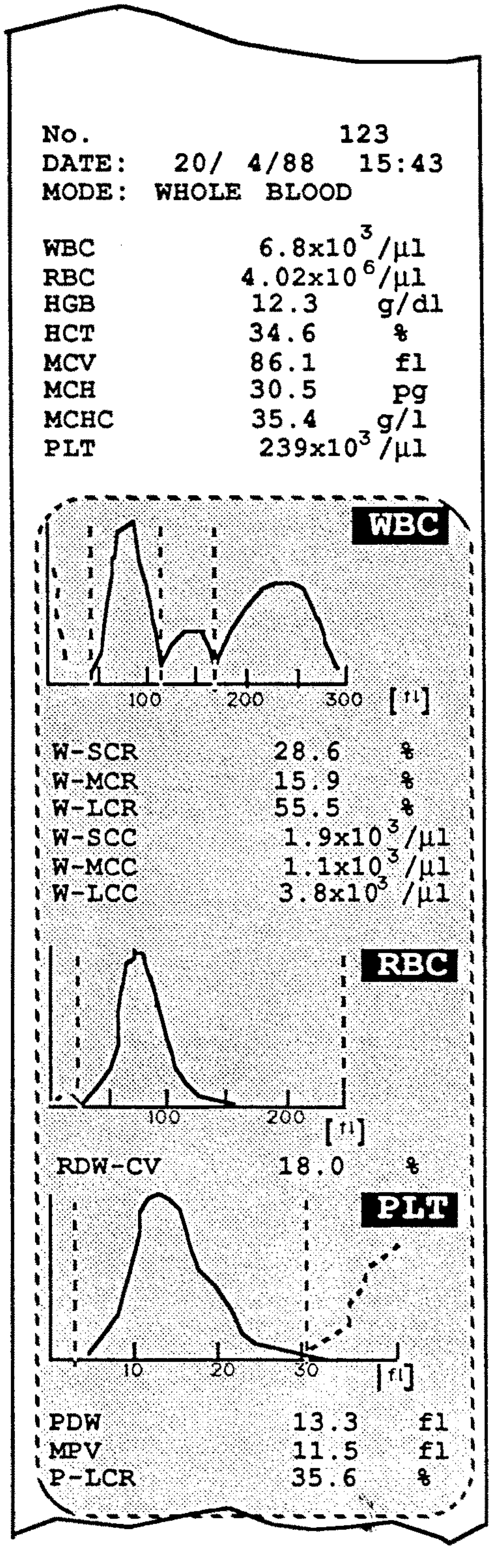


Figure 8-1 Sequence No. Display

8.3. Extended Data

If the PRINT is pressed while the instrument is in READY status in Maintenance Mode, following data are printed out with last analyzed sample data by built-in printer. Printout example is shown in Figure 8-2.



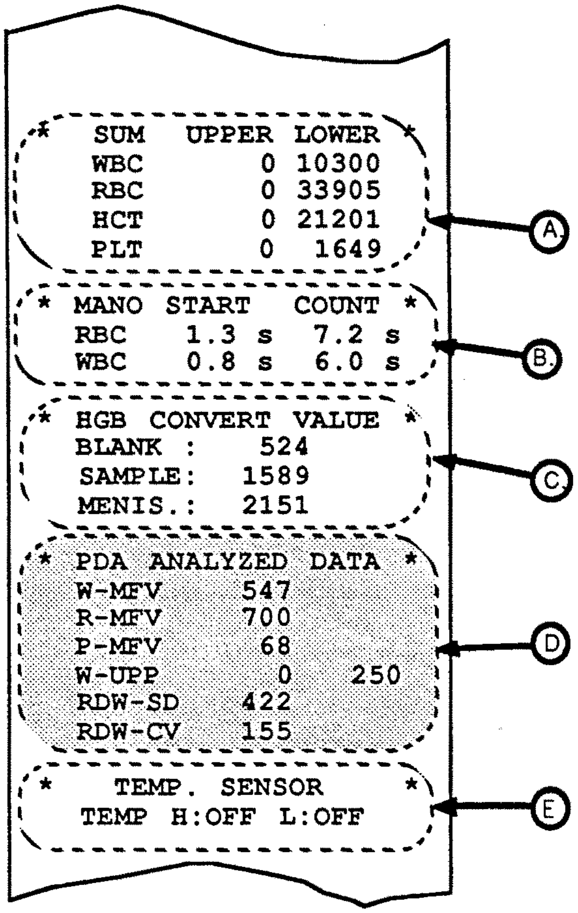
No. 123
DATE: 20/ 4/88 15:43
MODE: WHOLE BLOOD

WBC 6.8x10^3/µl
RBC 4.02x10^6/µl
HGB 12.3 g/dl
HCT 34.6 %
MCV 86.1 fl
MCH 30.5 pg
MCHC 35.4 g/l
PLT 239x10^3/µl

W-SCR 28.6 %
W-MCR 15.9 %
W-LCR 55.5 %
W-SCC 1.9x10^3/µl
W-MCC 1.1x10^3/µl
W-LCC 3.8x10^3/µl

RDW-CV 18.0 %

PDW 13.3 fl
MPV 11.5 fl
P-LCR 35.6 %



```
*  SUM   UPPER LOWER  *
   WBC       0 10300
   RBC       0 33905
   HCT       0 21201
   PLT       0  1649

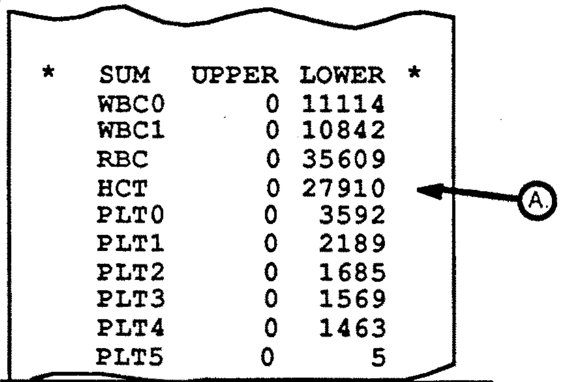
* MANO  START   COUNT *
  RBC    1.3 s   7.2 s
  WBC    0.8 s   6.0 s

* HGB CONVERT VALUE  *
  BLANK :     524
  SAMPLE:   1589
  MENIS.:   2151

* PDA ANALYZED DATA  *
  W-MFV      547
  R-MFV      700
  P-MFV       68
  W-UPP        0    250
  RDW-SD     422
  RDW-CV     155

*     TEMP. SENSOR     *
   TEMP  H:OFF  L:OFF
```

When optional PDA board is not installed on the system, printout of "SUM UPPER LOWER" will be as follows;



```
*   SUM   UPPER LOWER  *
    WBC0      0 11114
    WBC1      0 10842
    RBC       0 35609
    HCT       0 27910
    PLT0      0  3592
    PLT1      0  2189
    PLT2      0  1685
    PLT3      0  1569
    PLT4      0  1463
    PLT5      0     5
```

Caution:

Data in ▢ area are printed out only when the optional PDA board is installed.

Figure 8-2 Extend Data Printout

These Extended Data gives you following information.

A. SUM UPPER LOWER

The actual sum number of WBC, RBC, PLT pulses and serial pulses counted by Hct counter are obtained in 8 bytes of Hexadecimal code. These upper four bytes are translated into decimal code and printed out as the UPPER number, and lower four bytes are also translated and printed out as the LOWER number.

Therefore, to obtain the actual sum number of these pulses in a decimal code, following calculation by the formula (1) should be performed.

$$Ap = (Un \times 65536) + Ln \quad \text{..} (1)$$

where
Ap = Total number of pluses in decimal code
Un = UPPER number
Ln = LOWER number

WBC0, WBC1, RBC, PLT0 - PLT5 show the number of pulses which exceed the different discriminator level.

If the Optional PDA board were installed, the pulses of WBC, RBC, and PLT will be calculated in PCB No. 6315 (PDA board) and are sent to the Main CPU board.

B. MANO START COUNT

The “START” indicates the time of the ball float movement from the beginning of ball movement downward to the reaching Start level of manometer, and the “COUNT” indicates the time between Start and Stop level of each manometer. (unit : second)

C. HGB CONVERT VALUE

i) BLANK:

This is the analog to digital converted data of optical density obtained by the Hgb blank measurement.

ii) SAMPLE:

This is the analog to digital converted data of optical density obtained by the Hgb sample measurement.

iii) MENIS.:

This is the analog to digital converted data of optical density obtained during the surface (meniscus) of blank diluent passes through the detection level of Hgb sensor (CDS).

D. PDA ANALYZED DATA

If optional PDA board is installed, PDA ANALYZED DATA are printed out.

i) W-MFV:

This is WBC Most Frequent Volume, i.e. the WBC particle size counted most frequently.(unit:fl). This data is useful to confirm the Sensitivity Setting for WBC. Refer Section 6.6.

ii) R-MFV

This is RBC Most Frequent Volume, i.e. the RBC particle size counted most frequently.(unit:fl). This data is not used at all, and is just a reference data.

iii) P-MFV

This is PLT Most Frequent Volume, i.e. the PLT particle size counted most frequently.(unit:fl). This data is useful to confirm Sensitivity Setting for PLT. Refer Section 6.6.

iv) W-UPP

This is the number of larger size of WBC particles which exceeds Upper discriminator level (300 fl). W-UPP is divided in two numbers and is printed out in the same way as above (A) “SUM UPPER LOWER”. The left side number indicates UPPER, and the right side indicates LOWER number.

v) RDW-CV:

This is RBC Distribution width in Coefficient Variation (unit:%). Since no decimal point is printed out on RDW-CV “####” or “###”, read it as RDW-CV “###.# %” or “##.# %”.

vi) RDW-SD:

This is RBC Distribution width in Standard Deviation (unit:fl). No decimal point is printed out on RDW-SD. For instance, #### or ###. Read it as RDW-SD “###.# fL” or “##.# fL”.

vi) TEMP. SENSOR

This monitors the temperature of WBC sample in the transducer chamber just before count. If the temperature were higher than 32 °C “ON” will be printed as “H:”. If this temperature were lower than 13 °C “ON” will be printed as “L:”.

CAUTION: The specification of Environmental Requirement for Diluent temperature is in 15 °C ~ 30 °C.

8.4. MAINTENANCE PROGRAM

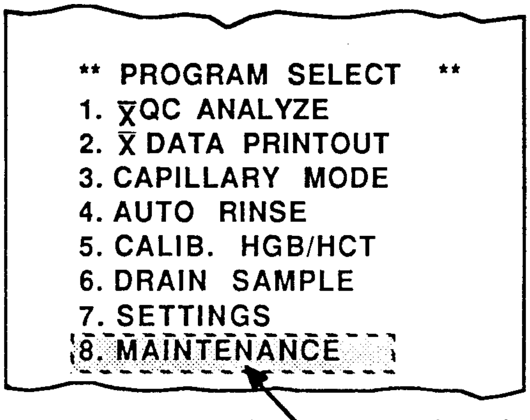
8.4.1. Executing MAINTENANCE PROGRAM

To execute the MAINTENANCE PROGRAM, press the (SELECT) when the instrument is in the Ready mode. Then the PROGRAM SELECT menu will run and the LCD will display as below.

```
*SELECT [MENU 1]*
X̄ QC ANALYZE
```

Figure 8-3 Display of PROGRAM SELECT Menu

The right side number in the first line corresponds to the program menu number. During this display, the READY LED does not light.
PROGRAM SELECT menu list as shown in Figure 8-4 can be printed out by pressing the (PRINT) ,during the display of Figure 8-3 is indicated on the LCD.



** PROGRAM SELECT **
1. X̄QC ANALYZE
2. X̄ DATA PRINTOUT
3. CAPILLARY MODE
4. AUTO RINSE
5. CALIB. HGB/HCT
6. DRAIN SAMPLE
7. SETTINGS
8. MAINTENANCE

"8. MAINTENANCE" is added in SELECT menu in the Maintenance Mode

Figure 8-4 Printout of PROGRAM SELECT menu

When LCD displays as Figure 8-3, press key ② (or by ▼) to select Maintenance program. The LCD display will be shown as below;

```
*SELECT [MENU 8]*
MAINTE.
```

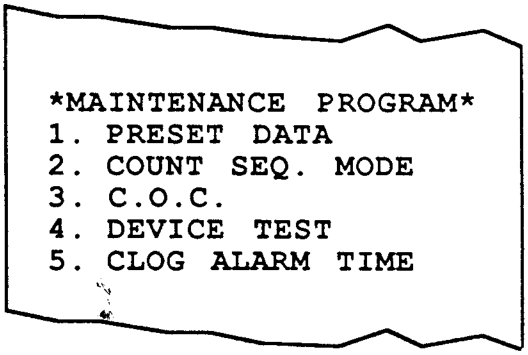
Figure 8-5 Selection of Maintenance Program

Press ENTER to access Maintenance Program and the LCD displays as below.

```
*MAINTE. [MENU 1]*
PRESET DATA
```

Figure 8-6 Accessing Maintenance Program

MAINTENANCE PROGRAM will be printed out by pressing the PRINT while the LCD display shows as Figure 8-6 is indicated from built-in printer so that the selected processing program can be verified.



MAINTENANCE PROGRAM
1. PRESET DATA
2. COUNT SEQ. MODE
3. C.O.C.
4. DEVICE TEST
5. CLOG ALARM TIME

Figure 8-7 Printout of MAINTENANCE PROGRAM menu list

There are two ways to select a program when the LCD displays as Figure 8-6.

The first way is by the cursor key. The numeric keys are used as cursor keys for Program Selection. The numeric ② key is used as a downward cursor (▼). The numeric ⑧ key is used as a upward cursor (▲). Press the cursor keys to turn over the appropriate program downward or upward. If the "C.O.C." is needed, press the (▲) key twice. For other program, press cursor key as required until the desired program appears on LCD. It is not necessary to refer to the program menu number. After the selection of program, press ENTER to execute the program. That program will be executed. Press SELECT key to interrupt and/or return to the Ready mode.

The second way is by the numeric key. This way might be useful to select the higher numeric program because it is not necessary to press the cursor key many times.

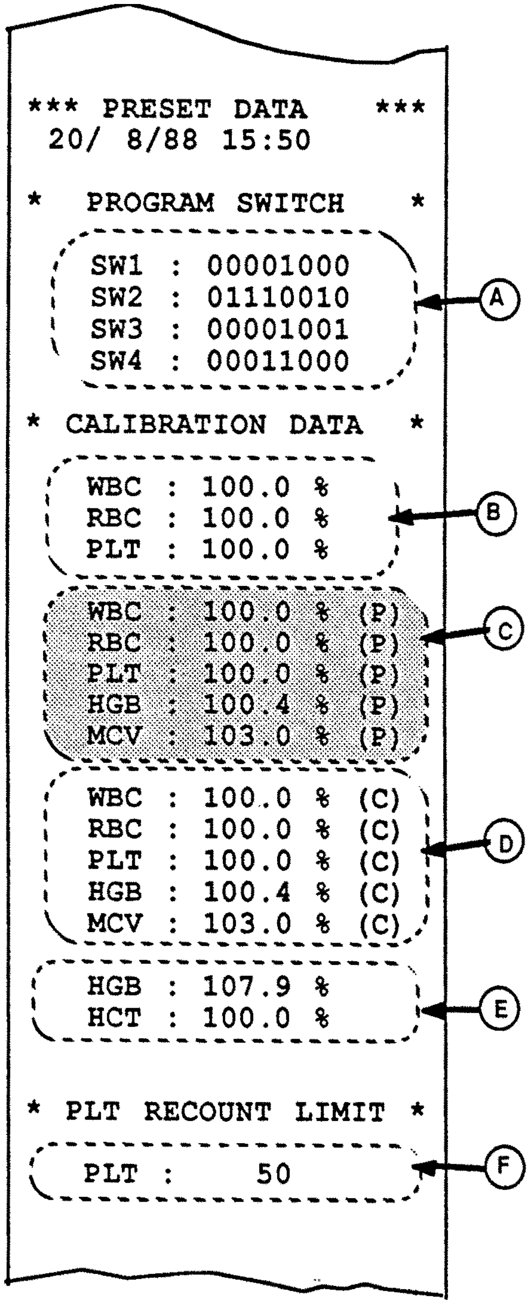
As an example to select the program "4.C.O.C.", press the keys as follows;

C → 4 → ENTER

Press SELECT key to interrupt and/or return to the Ready mode.

8.4.2. PRESET DATA (Maintenance Menu 1)

If the maintenance menu 1 is selected, and the ENTER key is pressed, following data are printed out by the built-in printer. Printout examples are shown in Figure 8-8 and Figure 8-9.



```
*** PRESET DATA      ***
 20/ 8/88 15:50

*  PROGRAM SWITCH    *
  SW1  :  00001000
  SW2  :  01110010
  SW3  :  00001001
  SW4  :  00011000
* CALIBRATION DATA   *
  WBC  :  100.0 %
  RBC  :  100.0 %
  PLT  :  100.0 %
  WBC  :  100.0 %  (P)
  RBC  :  100.0 %  (P)
  PLT  :  100.0 %  (P)
  HGB  :  100.4 %  (P)
  MCV  :  103.0 %  (P)
  WBC  :  100.0 %  (C)
  RBC  :  100.0 %  (C)
  PLT  :  100.0 %  (C)
  HGB  :  100.4 %  (C)
  MCV  :  103.0 %  (C)
  HGB  :  107.9 %
  HCT  :  100.0 %

* PLT RECOUNT LIMIT *
  PLT  :      50
```

A: PROGRAM SWITCH
The settings of the PROGRAM SWITCH are printed out as shown in Figure 8-8. Execute "PROGRAM SWITCH" in Program Select menu to change this Settings.

B: CALIBRATION DATA (1)
There are the current C.O.C (Carryover Correction) settings for WBC, RBC and PLT in **Whole Blood Mode** which are kept in EEPROM on PCB No. 6314. See section 8.4.4.to change these settings, if necessary.
CAUTION:
This data affects other data which are obtained in Cap Piercing mode and Capillary mode.

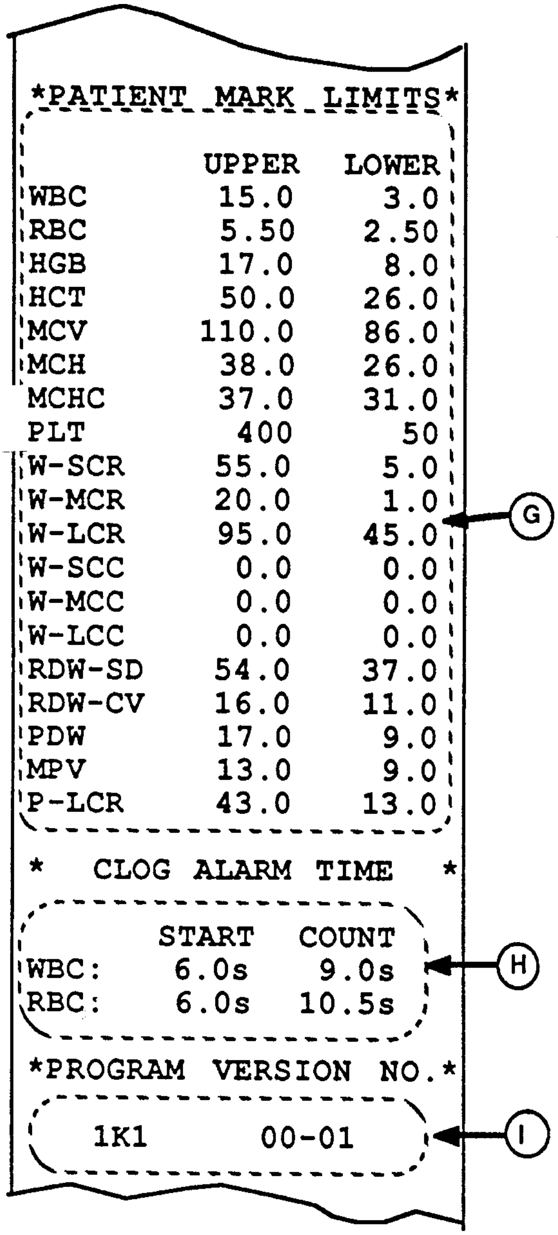
C: CALIBRATION DATA (2)
There is the current calibration settings for WBC, RBC, PLT, Hgb, and MCV for **Cap Piercing Mode** (close mode) which are kept in EEP-ROM on PCB No. 6314. See section 8.4.4.to change these settings, if necessary.

D: CALIBRATION DATA (3)
There are the current C.O.C (Carryover Correction) settings for WBC, RBC, PLT, Hgb, and MCV in **Capillary Mode** which are kept in EEP-ROM on PCB No. 6314. See section 8.4.4.to change these settings, if necessary.

E: CALIBRATION DATA (4)
There is the current calibration settings for Hgb/Hct for Whole Blood Mode which kept in EEP-ROM on PCB No. 6314. Execute "CALIB. HGB/HCT" in Program Select Menu to change these settings.

F: PLT RECOUNT LIMIT
This is a current limit for the PLT Recount which are kept in EEP-ROM on PCB No. 6314. Select "6. SETTINGS" in Program Select menu and execute "3. PLT RECOUNT LIMIT" to change this limit, if necessary.

Figure 8-8 Printout Example of PRESET DATA (1)



```
*PATIENT MARK LIMITS*

           UPPER   LOWER
WBC         15.0     3.0
RBC         5.50    2.50
HGB         17.0     8.0
HCT         50.0    26.0
MCV        110.0    86.0
MCH         38.0    26.0
MCHC        37.0    31.0
PLT          400      50
W-SCR       55.0     5.0
W-MCR       20.0     1.0
W-LCR       95.0    45.0
W-SCC        0.0     0.0
W-MCC        0.0     0.0
W-LCC        0.0     0.0
RDW-SD      54.0    37.0
RDW-CV      16.0    11.0
PDW         17.0     9.0
MPV         13.0     9.0
P-LCR       43.0    13.0

*  CLOG ALARM TIME   *

        START   COUNT
WBC:     6.0s    9.0s
RBC:     6.0s   10.5s

*PROGRAM VERSION NO.*

   1K1       00-01
```

Figure 8-9 Printout of PRESET DATA (2)

G: PATIENT MARK LIMITS
These are the Patient Mark Limits (default settings are shown in Table 8-1) which are kept in EEP-ROM on PCB No. 6314. Select “6. SETTINGS” in Program Select menu and execute “2. PATIENT MARK LIMITS” to change these settings, if necessary.

H: CLOG AREAM TIME
These are the current Clog Alarm Time settings of WBC, RBC which are kept in EEP-ROM on PCB No. 6314. Execute “6. CLOG ALARM TIME” in Maintenance Program menu to change these preset time, if necessary.

I: PROGRAM VERSION NO.
This is a current Program Version No. of the Program-ROM on PCB No. 6314.

Table 8-1 PATIENT MARK LIMITS (default)

	LL	UL
WBC	3.0	15.0
RBC	2.50	5.50
HGB	8.0	17.0
HCT	26.0	50.0
MCV	86.0	110.0
MCH	26.0	38.0
MCHC	31.0	37.0
PLT	50	400
W-SCR	5.0	55.0
W-MCR	1.0	20.0
W-LCR	45.0	95.0
W-SCC	0.0	0.0
W-MCC	0.0	0.0
W-LCC	0.0	0.0
RDW-SD	37.0	54.0
RDW-CV	11.0	16.0
PDW	9.0	17.0
MPV	9.0	13.0
P-LCR	13.0	43.0

8.4.3. COUNT SEQ. MODE (Maintenance Menu 2)

"COUNT SEQ.MODE" will be used to perform "RECOUNT" operation. This program is provided for standard sensitivity adjustment and/or detector operation test. Operation procedure is as follows.

1. Select MAINTE. [MENU 3] so that the LCD displays as below.

```
*MAINTE. [MENU 2]*
COUNT SEQ. MODE
```

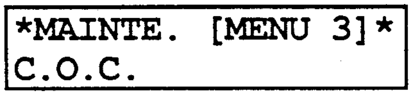
Figure 8-10 LCD display of Count / Seq. Mode

2. Press ENTER after the selection of COUNT SEQ. MODE. RECOUNT cycle of WBC/RBC detector is performed to count the liquid in each transducer chamber. If necessary, dispense the material for inspection or sensitivity adjustment (Refer Sec. 6.6.) into each TD chamber after executing "DRAIN SAMPLE" in the SELECT MENU. Analyzed results are printed out on the built-in printer. No rinsing operation are performed on this mode, and the liquid in the transducer Chamber should remain after the operation.

8.4.4. C.O.C. (Maintenance Menu 3)

"C.O.C." is the program to enter the Carryover Correction factor for following parameter- WBC, RBC, PLT in <u>Whole Blood mode</u> and in <u>Capillary mode.</u> Carryover correction (C.O.C) factors are kept in EEP-ROM on PCB No. 6314.
If it is required to change the C.O.C., follow the procedure as below.

1. Selection of C.O.C.
   Select MAINTE. [MENU 3] so that the LCD displays as follows;

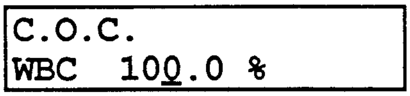


```
*MAINTE. [MENU 3]*
C.O.C.
```

Figure 8-11 LCD display of C.O.C. Mode

2. Entry of C.O.C. Factor for WBC

   Press ENTER when the C.O.C. is selected on the LCD, Current Correction Factor (%) for WBC appears on LCD as shown in Figure 8-12.



```
C.O.C.
WBC  100.0 %
```

Figure 8-12 LCD display of C.O.C. (WBC)

Under these status, the function of keys are as follows;

key	**purpose to**
0 — 9 :	: Entry of the numerical number.
x̲	: Set the decimal point.
ENTER	: Proceed to the next step.
SELECT .	: Interrupt the numeric preset and return to READY mode.
C	: Clear the numerical number

Enter the new number, if required,. If there were no need to change the current value, you may press just ENTER to go to next C.O.C. entry Mode (RBC).

3. Entry of C.O.C. factor for RBC

Current Correction Factor (%) for RBC appears on LCD as shown in Figure 8-13 after pressing ENTER of the previous step.

```
C.O.C.
RBC  100.0 %
```

Figure 8-13 LCD display of C.O.C. (RBC)

Enter the new number, if required. If there were no need to change the current value, you may press just ENTER to go to next entry Mode (PLT).

4. Entry of C.O.C. factor for PLT

Current Correction Factor (%) for PLT appears on LCD as shown in Figure 8-14 after pressing ENTER of the previous step.

```
C.O.C.
PLT  100.0 %
```

Figure 8-14 LCD display of C.O.C. (RBC)

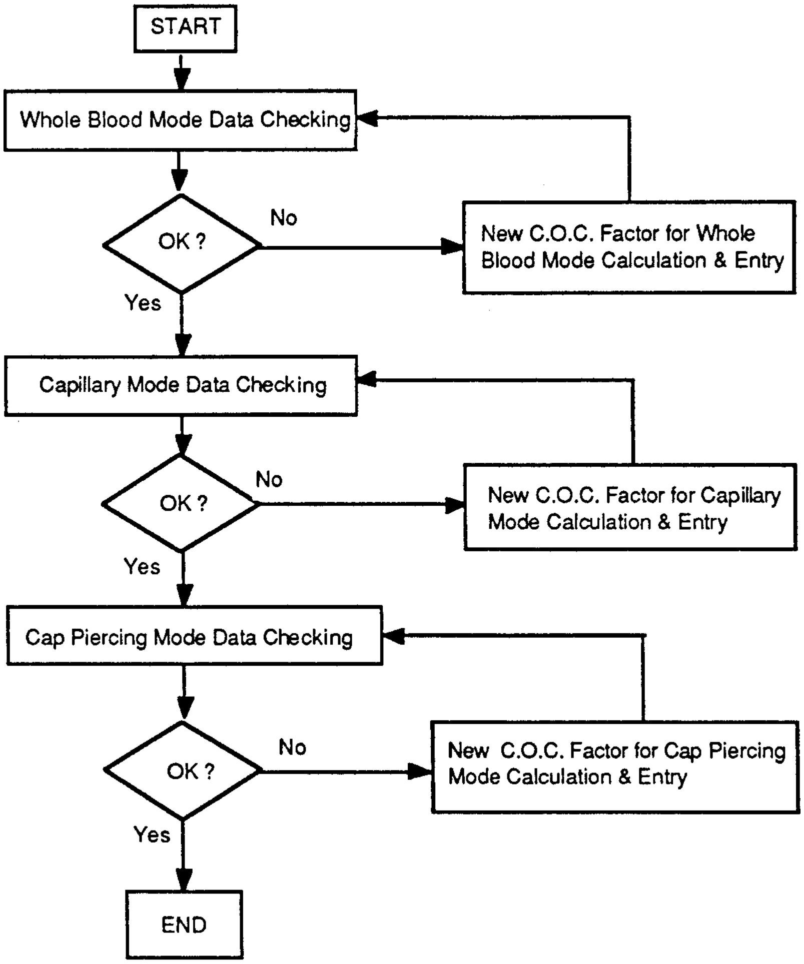
Enter the new number, if required. If there were no need to change the current value, you may press just ENTER to go to next entry Mode (WBC(C)).

5. Entry of C.O.C. Factors for for Capillary mode and/or cap Piering Mode.

Follow the same way as stated in the above whole blood mode. If optional Cap Piercing Unit is installed, C.O.C. factors for Cap piercing Mode must be entered.

CAUTION :

1. Newly appointed C.O.C. factor should be memorized (changed) just after pressing ENTER key at the end of MCV (C) carry-over correction procedure.
2. If SELECT is pressed instead of ENTER , no change of C.O.C. factor would be done and returns to READY mode.
3. C.O.C. factors for “Whole Blood Mode” affects the results of other modes (Cap piercing Mode and Capillary Mode).
   When current C.O.C. factor must be changed, it should be performed according to following Flow Chart.



8.4.5. DEVICE TEST (Maintenance Menu 4)

When DEVICE TEST is selected in MAINTE. MENU, the LCD displays as follow;

```
*MAINTE. [MENU 4]*
DEVICE TEST
```

Figure 8-15 LCD display when DEVICE TEST is selected

By pressing ENTER when the LCD displays as Figure 8-15, Sub Menu-1 will be displayed on LCD. Only one item "PDA TEST" is selected by this program

1: PDA TEST .... (Optional PDA board function test)

Sub Menu-1: PDA TEST

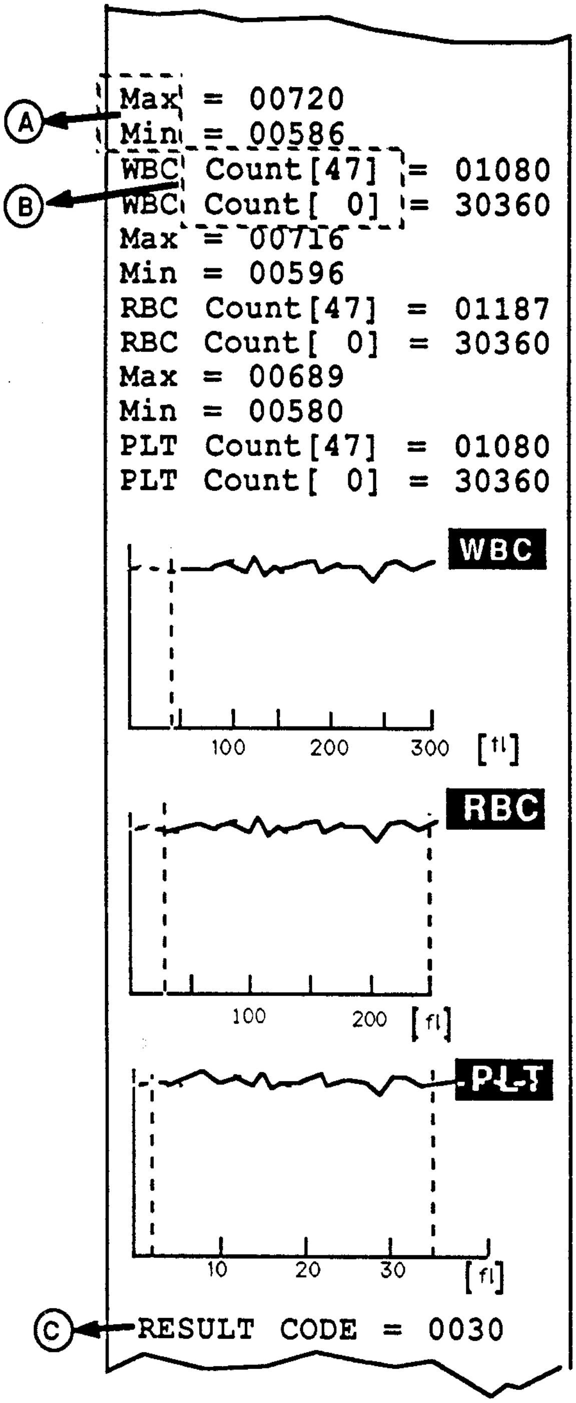
By pressing ENTER while "1: PDA TEST" is displayed on LCD, simulated cell pulses are supplied to the PDA Board to check the function of PDA circuit for the WBC, RBC and PLT histograms. The simulated cell pulses are designed to represent each cell size and to be in the same number over the range of each parameter. In a few seconds, the result will be printed out by the built-in printer with "RESULT CODE" as shown in Figure 8-17. After that K-1000 returns to READY.

```
*MAINTE. [MENU 4]*
1:PDA TEST
```

Figure 8-16 LCD display of PDA TEST

CAUTION :

If optional PDA Unit (KPU-1) is not installed on the system, no operation is performed, and the K-1000 returns to Ready.



```
Max = 00720
Min = 00586
WBC Count[47] = 01080
WBC Count[ 0] = 30360
Max = 00716
Min = 00596
RBC Count[47] = 01187
RBC Count[ 0] = 30360
Max = 00689
Min = 00580
PLT Count[47] = 01080
PLT Count[ 0] = 30360

RESULT CODE = 0030
```

Figure 8-17 Printout of PDA TEST

About the PDA Test Circuit;

The PDA test circuit on the PCB No.6315 generates 30720 of simulated cell pulses exactly and supplies to each PDA circuit so that flat histogram is obtained through the minimum PDA comparator to the maximum comparator out of 48 channels.

A: Max and Min

"Max" indicates the maximum sampling number, and "Min" indicates the minimum sampling number out of 48 PDA channels

B: Count [0] - Count[47]

"Count[**n**]" indicates the number of counted simulated pulses at the **n**-th PDA comparator.

Count[0] indicates the counted number through the lowest comparator, i.e. the number of whole pulses which were counted by the PDA circuit. So, all of pulses which height were grater than the lowest level are counted as Count[0].

Count[47] indicates the counted number of pulses which passed through the highest comparator, i.e. the number of pulses which were not used as histogram data, since the height of the counted pulses were grater than the highest comparator level.

Therefore, the actual total number of pluses which were used to obtain the histogram can be calculated as follow.

N = Count[0] - Count [47] .... (1)

where N is the total number of pluses used to obtain the histogram

C. Result CODE for PDA Board TEST

Table 8-2 shows the RESULT CODE for PDA Board TEST.

Table 8-2 RESULUT CODE of PDA TEST CODE

Code	WBC	RBC	PLT	Result
30	O	O	O	Passed
31	O	O	X	Failed (PLT)
32	O	X	O	Failed (RBC)
33	O	X	X	Failed (RBC/PLT)
34	X	O	O	Failed (WBC)
35	X	O	X	Failed (WBC/PLT)
36	X	X	O	Failed (WBC/RBC)
37	X	X	X	Failed (WBC,RBC,PLT)

X: Passed
O: Failed

In order to check wether PDA Board Test were passed or failed, following conditions (Four (4) kinds of equations) were used to monitor the abnormality of PDA Board.

PDA TEST is monitored by following four subjects.
[A]: $\text{Count}[\ 0] \geqq 27640$ (90 % or more of 30720)
[B]: $\text{Count}[47] \leqq 3072$ (10 % or less of 30720)
[C]: $\text{Max} \leqq \text{mean} \times 1.2$

$$\left(\text{mean} = \frac{\text{Count}[\ 0] - \text{Count}[47]}{47}\right)$$

[D]: $\text{Min} \geqq \text{mean} \times 0.8$

If One (or more) of above conditions were satisfied, CPU would judge the PDA Board Test “Failed”.

Built-in printer prints out the “RESULT CODE” at the end of “Sub Menu-4 PDA TEST”. (See Figure 8-20.)

CAUTION:
Even if there were some PDA errors at the end of PDA test, only the Result code will be printed out.

8.4.6. CLOG ALARM TIME. (Maintenance Menu 5)

CAUTION:

This item is removed from following version program.

Program **1K1**: **00-05** and thereafter
Program **1K4**: **00-01** and thereafter

This item “CLOG ALARM TIME” is provided to change the monitoring time for Clog alarm. Normary no change is requierd to these settings.

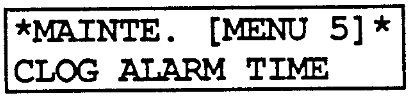
In the program 1K1 Version 00-05 and thereafter (4K1 Version 00-01 and thereafter), following values are not avalable to change.

The default value for “CLOG ALARM TIME”

	START LIMIT	STOP LIMIT
WBC	6.0 seconds	9.0 seconds
RBC	6.0 seconds	10.0 seconds

If it were required to change these settings in paticurar situation, follow the procedure as follows;

If you select MAINTE. [MENU 5], LCD displays as below.

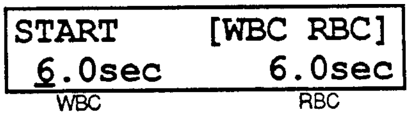


```
*MAINTE. [MENU 5]*
CLOG ALARM TIME
```

Figure 8-18 LCD display of CLOG ALARM TIME

Procedure to set CLOG ALARM TIME

By pressing ENTER while Figure 8-18 is displayed on LCD, current START LIMIT are displayed on LCD as shown in Figure 8-19.



```
START      [WBC RBC]
 6.0sec       6.0sec
```

Figure 8-19 LCD display of START LIMIT

Under these status, the avalable keys and functions are as follows;

key	purpose to
0 — 9:	: Entry of the numerical number.
.	: Set the decimal point.
ENTER	: Proceed to the next step.
SELECT	: Interrupt the numeric preset and return to READY mode.
C	: Clear the numerical number

A. START and STOP LIMITS should be the following range.;

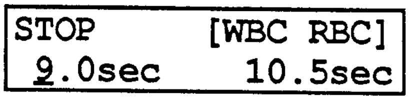
	WBC	RBC
START LIMIT	4.0 - 8.0 sec	4.0 - 8.0 sec
STOP LIMIT	7.0 - 11.0 sec	8.5 - 12.5 sec

If erroneously preset STRAT and/or STOP LIMIT exceeding the above range, the alarm sounds just after pressing ENTER key. Then return to the re-entry status.

B. Newly appointed START or STOP LIMIT with the above range will be memorized just after the ENTER key is pressed

The time displayed left side is current setting of START LIMIT of WBC and right side is that of RBC, and press ENTER. If it was no need to change current setting, you may press just ENTER to go to next step (STOP LIMIT).

After START LIMIT entry, it changes to STOP LIMT entry mode. Current STOP LIMIT are displayed on LCD as shown in Figure 8-23.



```
STOP        [WBC RBC]
 9.0sec      10.5sec
```

Figure 8-20 LCD display of STOP LIMIT

Enter the STOP LIMIT properly. If it is no need to change current setting, you may press just ENTER.

After the entry of STOP LIMIT, K-1000 returns to READY.

Procedure to find the Optimum START and STOP LIMIT

(1) Confirm EXTENDED data that both RBC and WBC START time (mean of at least five times) are in range of 4.0 - 8.0 seconds in normal operation. (Default settings of START LIMIT are 6.0 sec. for WBC and RBC)

(2) Confirm EXTENDED data that RBC and WBC COUNT time (mean of at least five times) is in range of 7.0 - 11.0 seconds for WBC and that of RBC is in 8.5 - 12.5 seconds in normal operation. (Default settings of STOP LIMIT are 9.0 sec. for WBC and 10.5 sec. for RBC.)

(3) Decide proper START LIMIT and STOP LIMIT according to the following formula.

(START LIMIT) = (actual START time) + 1.5 (seconds)

(STOP LIMIT) = (actual COUNT time) + 1.5 (seconds)

A. START LIMIT (WBC / RBC)
"START LIMIT" are used for monitoring "START" time of manometer. "START" time is time between beginning of ball movement downward and reaching START level in the manometer. (Refer page 8-3 "MANO START COUNT")

B. STOP LIMIT (WBC / RBC)
"STOP LIMIT" are used for monitoring "COUNT" time of manometer. "COUNT" time is the time between START and STOP level. (Refer page 8-3 "MANO START COUNT")

"START" and "STOP" times are printed out with Extended data. Refer Page 8-1 - 8-3 to verify it.

SECTION NINE

PARTS LIST

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ALPHABETICAL INDEX (Continued) page

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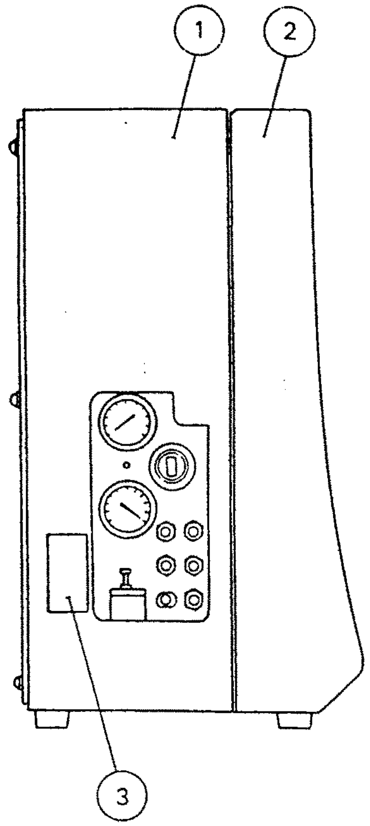
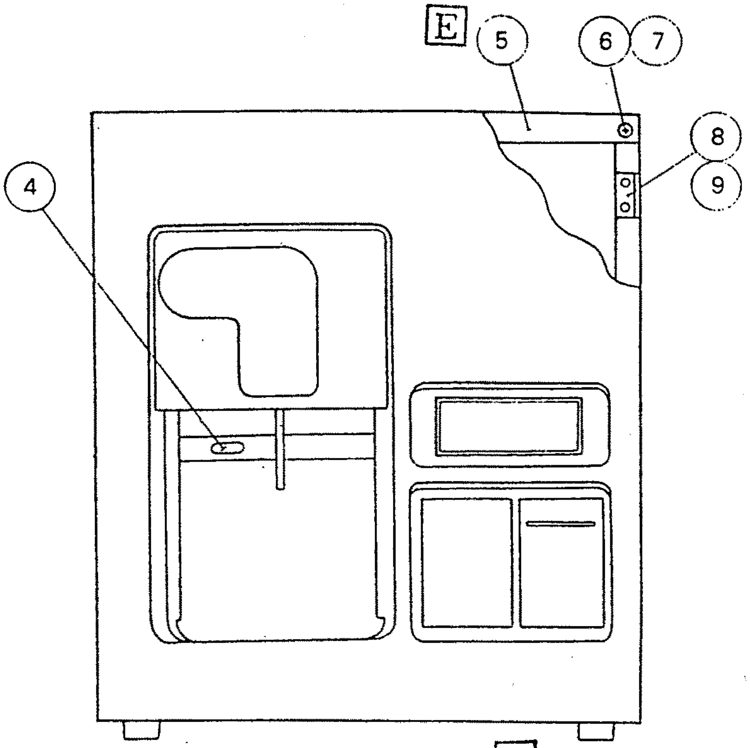
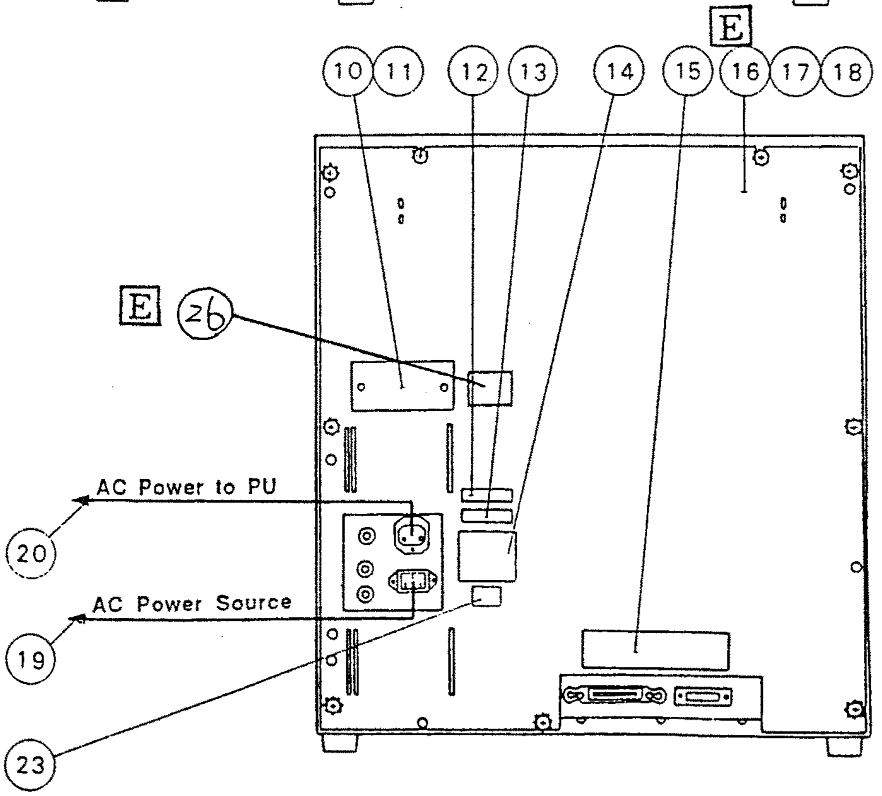
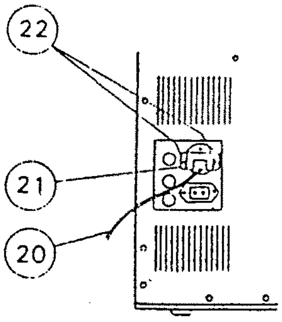
K-1000/K-800 MAIN UNIT EXTERIOR









Electrical Safety Requirement by British Standards

K-1000/K-800 MAIN UNIT EXTERIOR DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	873-0422-3	1$*	CHASSIS ASSY K-1000 (N.AMER)	UNSALABLE	
	873-0423-7	1$**	CHASSIS ASSY K-1000 (EUROPE)	UNSALABLE	
	873-0424-1	1$+	CHASSIS ASSY K-1000 (U.K.)	UNSALABLE	
	923-9102-1	1#*	CHASSIS ASSY K-800 (C2/N.AMER)	UNSALABLE	
	923-9103-5	1#**	CHASSIS ASSY K-800 (C3/EUROPE)	UNSALABLE	
	923-9104-9	1#+	CHASSIS ASSY K-800 (C4/U.K.)	UNSALABLE	
	873-0591-6	2$	FRONT COVER NO. 22 ASSY (C-1)	1	
	873-0593-3	2#	FRONT COVER NO. 22 ASSY (C-3)	UNSALABLE	
	369-7443-7	3	INDICATION MARK NO. 443	10	
	369-7497-8	4	INDICATION MARK NO. 497 (START)	5	
E C	322-2505-0A	5	COVER NO. 115-1	1	
	348-3913-0	6	SCREW BINDING M3X8 (SUS)	100	
	348-9543-1	7	WASHER TOOTH LOCK EXT M3 (SUS)	100	
	344-4594-4	8	HINGE TH-10-B-N (2126) LEFT	5	
	348-3613-3	9	SCREW FLAT M3X8 (SUS)	100	
	369-3251-1	10$	RATED PLATE K-1000 MAIN UNIT	UNSALABLE	
	369-3254-2	10#	RATED PLATE K-800 MAIN UNIT	UNSALABLE	
	348-1401-1	11	SCREW BINDING M2X4 (BS)	100	
	369-8023-4A	12	CAUTION MARK NO. 23	10	
	369-8038-0	13	CAUTION MARK NO. 38	10	
	369-7445-4	14*	INDICATION MARK NO.445 (N.AMER)	10	
	369-7446-8	14**+	INDICATION MARK NO.446 (EURO/UK	10	
	369-7448-5	15	INDICATION MARK NO.448	10	
E C	323-2046-2A	16	REAR PANEL NO.16-1	1	
	348-3913-0	17	SCREW BINDING M3X8 (SUS)	100	
	348-9543-1	18	WASHER TOOTH LOCK EXT M3 (SUS)	100	
	793-0012-1	19*	POWER CORD NO. 4 (N.AMER)	1	
	~~265-4715-5B~~	~~19**~~	~~POWER CORD 4622-001-0333 (EUROP~~	~~1~~	D
A	265-4723-5	19+	POWER CORD F1686 (U.K.)	1	
B	265-4708-9	20*	POWER CORD 6002+3020	1	
	265-4725-2	20**+	POWER CORD 6002+3030	1	
	363-1371-1	21+	FIXING METAL NO. 81	1	
	348-3912-6	22+	SCREW BINDING M3X6 (SUS)	100	
B	369-8113-2	23+	CAUTION MARK NO.102	5	
	369-8075-8	24	CAUTION MARK NO. 70	10	
	369-8074-4	25	CAUTION MARK NO. 69	1	
	265-4719-0	19**	POWER CORD 4622-007-0092 (EUROP	1	
E	369-8600-1	26**+	CE INDICATION MARK	1	D

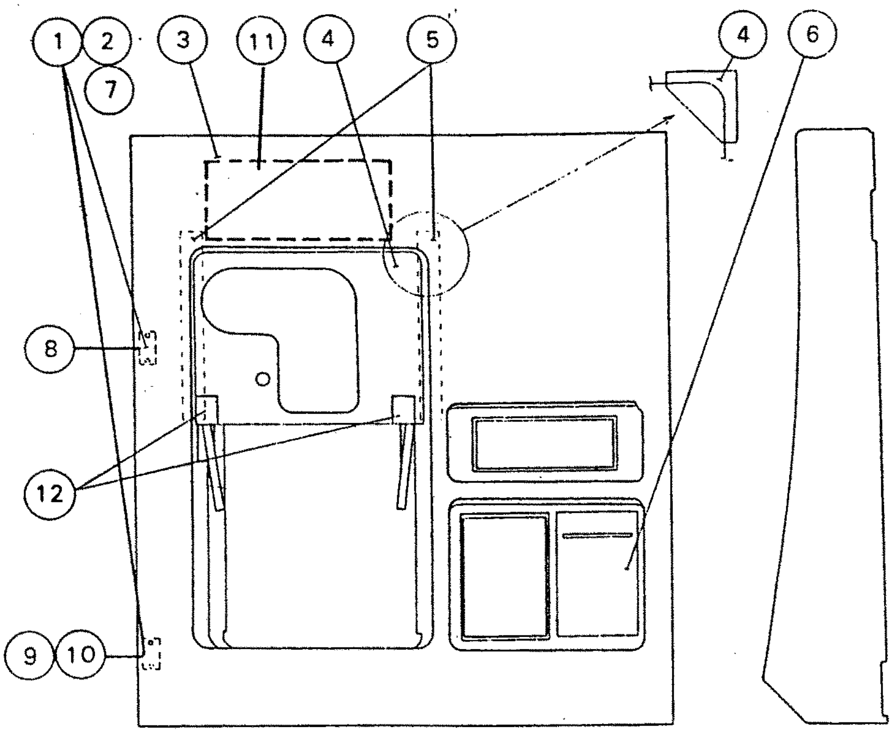
Before 04.93 update

	ECR NO.	K-1000
A	392C040	A4537-
B	392J046	A4969-
C	393A077	B5149-

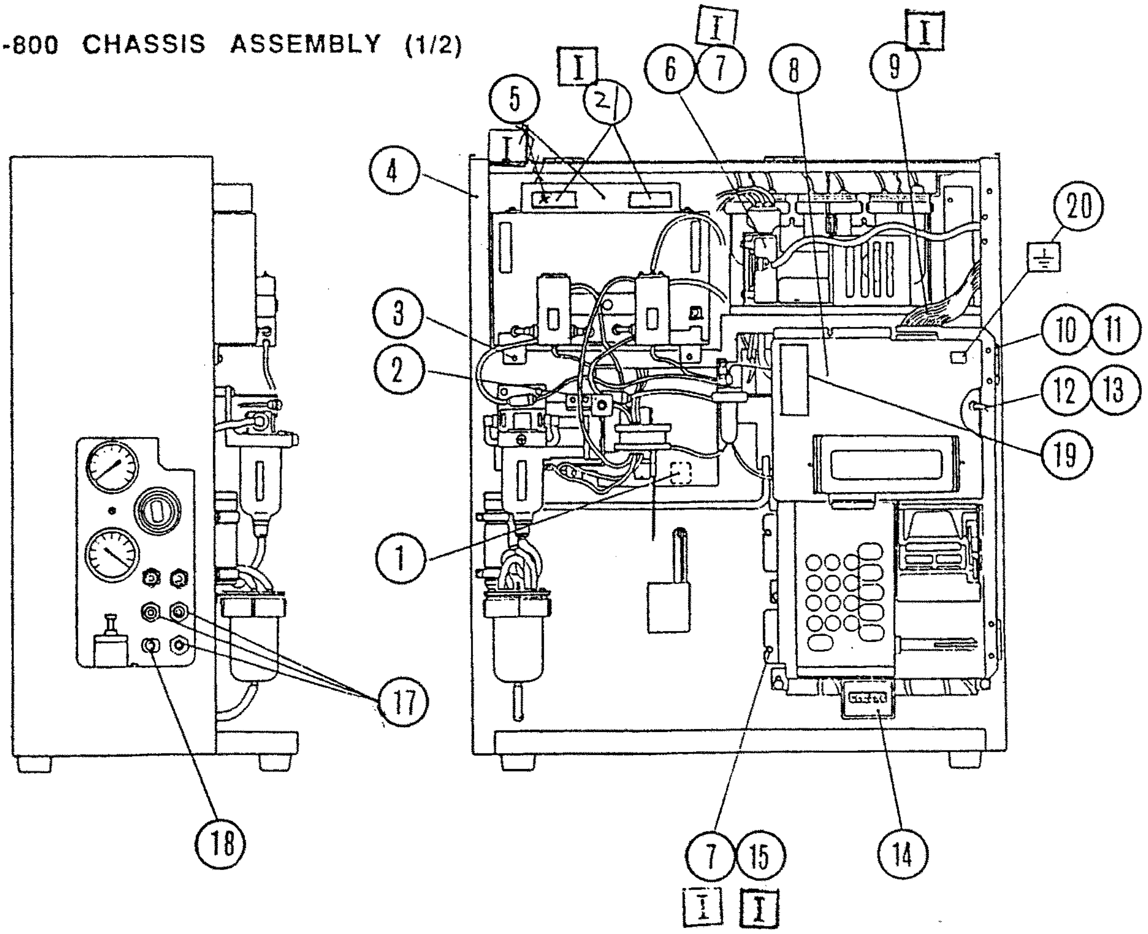
$ for K-1000 only
# for K-800 only
* for 117 VAC only
** for 220 VAC only
+ for 240 VAC only

SYM	ECR NO.	SERIAL NO.	
D	394E052	————	
E	396E051	K1 B6858-	K8 A2272-

FRONT COVER NO.22 ASSEMBLY



K-1000/K-800 CHASSIS ASSEMBLY (1/2)



Revised AUG.97

FRONT COVER NO. 22 ASSEMBLY

DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0591-6	1-12$	FRONT COVER NO.22 ASSY (C-1)	1
	873-0592-0	1-12%	FRONT COVER NO.22 ASSY (C-2)	UNSALABLE
H	873-0593-3	1-12#	FRONT COVER NO.22 ASSY (C-3)	UNSALABLE
A	367-9199-1	1	MAGNET CATCHER TL-105S	10
A	348-3911-2	2	SCREW BINDING M3X4 (SUS)	100
H	322-1612-8	3$%	FRONT COVER NO.22-1	1
H	322-1613-1	3#	FRONT PANEL NO.22-2	1
H	362-1148-6	4$	COVER GLASS NO.19-1	1
	362-1128-1	4%	COVER GLASS NO.28	5
H	362-1149-0	4#	COVER GLASS NO.19-2	1
	368-0066-8	5$	RUBBER PLATE NO.26	5
C, H	322-2420-1	6	PAPER COVER NO. 9-1	1
A	348-3914-3	7	SCREW BINDING M3X10 (SUS)	100
A	366-6952-2	8	MOUNTING METAL NO.190	5
A	366-6951-9	9	MOUNTING METAL NO.189	5
A	342-1335-8	10	GUIDE NO. 54	1
E	369-8074-4	11	CAUTION MARK NO. 69	1
H	365-2545-2	12	SHAFT FIXTURE NO.37	UNSALABLE

CHASSIS ASSY K-1000/K-800

DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0422-3	$*	CHASSIS ASSY K-1000 (N.AMER)	UNSALABLE
	873-0423-7	$**	CHASSIS ASSY K-1000 (EUROPE)	UNSALABLE
	873-0424-1	$+	CHASSIS ASSY K-1000 (U.K.)	UNSALABLE
	923-9102-1	#*	CHASSIS ASSY K-800 (C2/N.AMER)	UNSALABLE
	923-9103-5	#**	CHASSIS ASSY K-800 (C3/EUROPE)	UNSALABLE
	923-9104-9	#+	CHASSIS ASSY K-800 (C4/U.K.)	UNSALABLE
	266-6312-7	1	CLAMP CKN-10	50
	873-0491-1	2	LED ASSEMBLY NO. 9	1
	348-3913-0	3	SCREW BINDING M3X8 (SUS)	100
	883-0281-8	4	HYDRAULIC UNIT NO. 3 COMPLETE	UNSALABLE
	873-0831-9	5	DETECTOR UNIT K-1000 ASSY	UNSALABLE
	873-0932-8	6	HB UNIT NO. 10 ASSEMBLY	UNSALABLE
	348-3912-6	7	SCREW BINDING M3X6 (SUS)	100
	873-0972-7	8	KEY PAD BLOCK NO. 3 ASSY	UNSALABLE
I	~~873-1231-0~~	~~9~~	~~WIRING CORD NO. 328~~	~~1~~
	344-3416-4	10	HINGE B-1100-3	10
	348-1512-7	11	SCREW FLAT M3X6 (FE)	100
	348-3928-5	12	SCREW BINDING M4X10 (SUS)	100
	348-9544-5	13	WASHER TOOTH LOCK EXT M4 (SUS)	100
	873-0941-1	14	ELECTROMAGNETIC COUNTER NO. 5	1
	348-9543-1	15	WASHER TOOTH LOCK EXT M3 (SUS)	100
	368-8454-4A	16	SHEET NO. 4	10
B, F	442-3705-9	17	PLUG 5-5	10
B, F				
D	369-8072-7	19	CAUTION MARK NO. 68	5
G	369-7857-1	20	INDICATION MARK NO. 554	10
I	266-9926-2	21	SHIELD FORM 71TS13-10(D)	Uns.
I	873-1232-3	9	WIRING CORD NO. 328 (C-2)	1

Before 04.93 update

	ECR NO.	K-1000
A	388H175	A1441-
B	388G064	A1396-
C	388L050	A1441-
D	389C026	A1716-
E	389C027	A1716-
F	392E036	A4472-
G	392J046	A4989-
H	393A077	B5149-

* for 117 VAC only
** for 220 VAC only
\+ for 240 VAC only

$ for K-1000 without KCP-1
% for K-1000 with KCP-1
# for K-800 only

SYM	ECR NO.	SERIAL NO.
I	396E051	K1 B6858-

K8 A2272

Revised AUG.97

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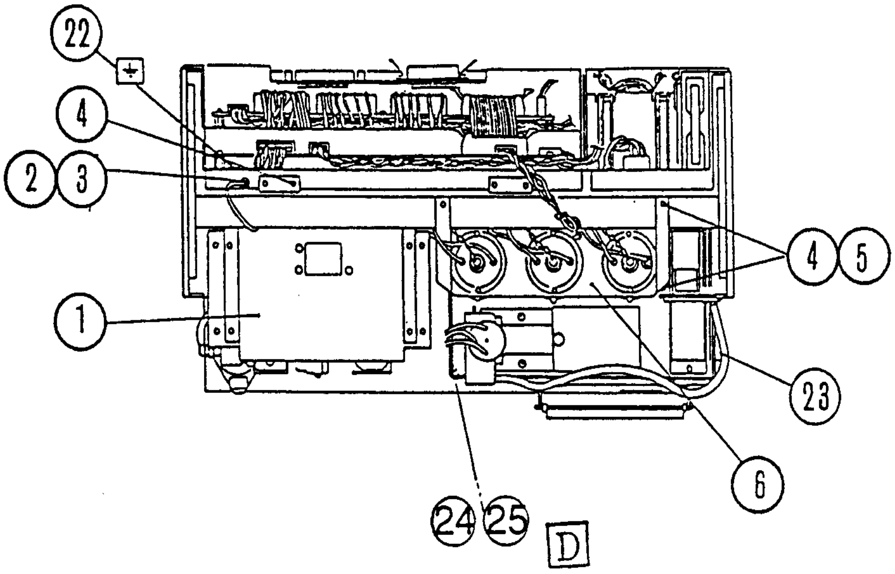
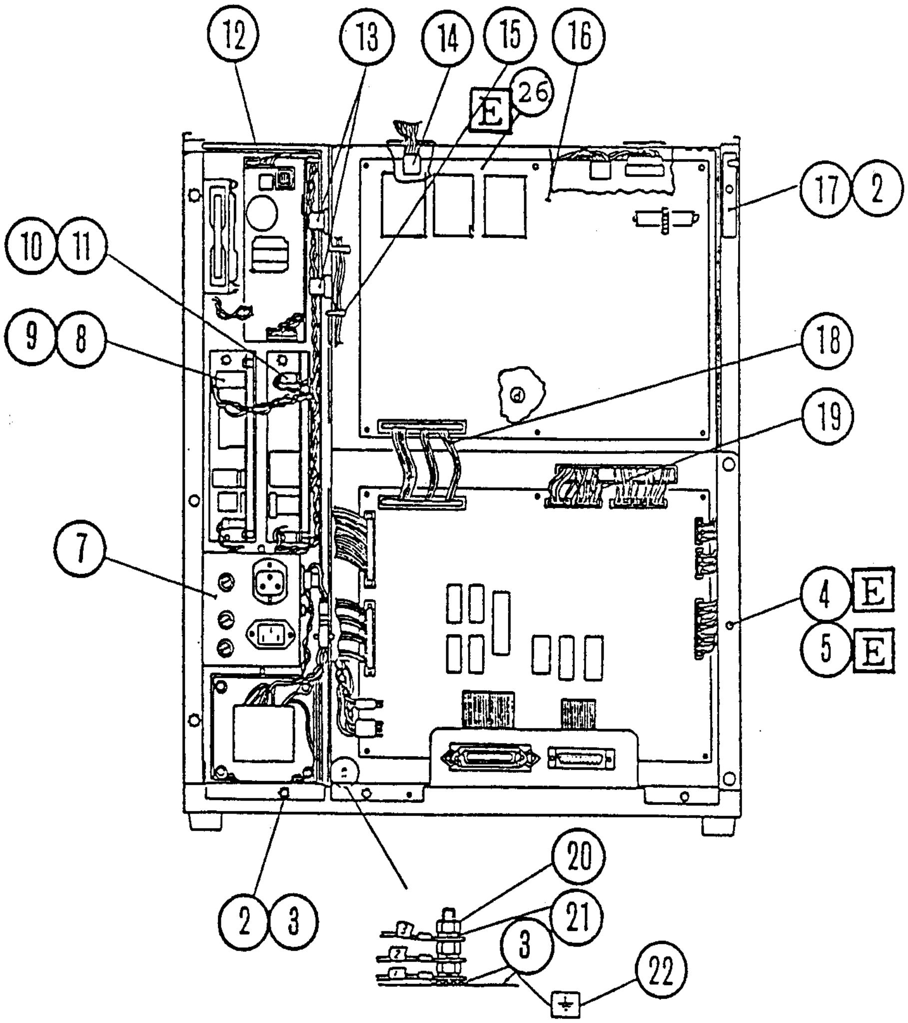
K-1000/K-800 CHASSIS ASSEMBLY (2/2)





	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0831-9	1	DETECTOR UNIT K-1000 ASSY	UNSALABLE
	348-3928-5	2	SCREW BINDING M4X10 (SUS)	100
	348-9544-5	3	WASHER TOOTH LOCK EXT M4 (SUS)	100
E	348-3912-6	4	SCREW BINDING M3X6 (SUS)	100
E	348-9543-1	5	WASHER TOOTH LOCK EXT M3 (SUS)	100
	883-0271-1	6	CHAMBER UNIT NO. 2 ASSEMBLY	UNSALABLE
	873-1012-8	7*	POWER SUPPLY NO.14 (N.AMER)	UNSALABLE
	873-1013-1	7**	POWER SUPPLY NO.14 (EUROPE)	UNSALABLE
	873-1014-5	7+	POWER SUPPLY NO.14 (U.K.)	UNSALABLE
	873-1201-8	8	WIRING CORD NO. 325	1
	873-1211-5	9	WIRING CORD NO. 326	1
	873-1191-8	10	WIRING CORD NO. 324	1
	873-1261-1	11	WIRING CORD NO. 331	1
	873-1181-1	12	WIRING CORD NO. 323	1
	266-6312-7	13	CLAMP CKN-10	50
	873-1221-2	14	WIRING CORD NO. 327	1
	266-4461-8	15	TIE WRAP CV-100	1000
	873-0991-8	16$	MICROCOMPUTER UNIT NO.14 (C-1)	UNSALABLE
	923-9112-9	16#	MICROCOMPUTER UNIT NO.26 (C-2)	UNSALABLE
	363-1544-1A	17	SUPPORT METAL NO. 20	1
	873-1381-1	18	WIRING CORD NO. 339	1
	873-1281-6	19	WIRING CORD NO. 333	1
	348-8514-0	20	NUT HEX M4 (SUS)	100
	348-9514-3	21	WASHER SPRING M4 (SUS)	100
A, C	369-7857-1	22	INDICATION MARK NO.554	10
B	266-6306-4	23	BUSH FREE SIZE CE-016	5 M
	266-6716-3	24	BUSH FREE SIZE KG-016 (250MM)	10 D
	426-2780-3	25	SUPER GLUE 1741 (20 GRAMS)	1 D
E	891-0351-2	26	PCB NO. 6315 WITHOUT ROM (PM)	UNSALABLE

$ K-1000
# K-800

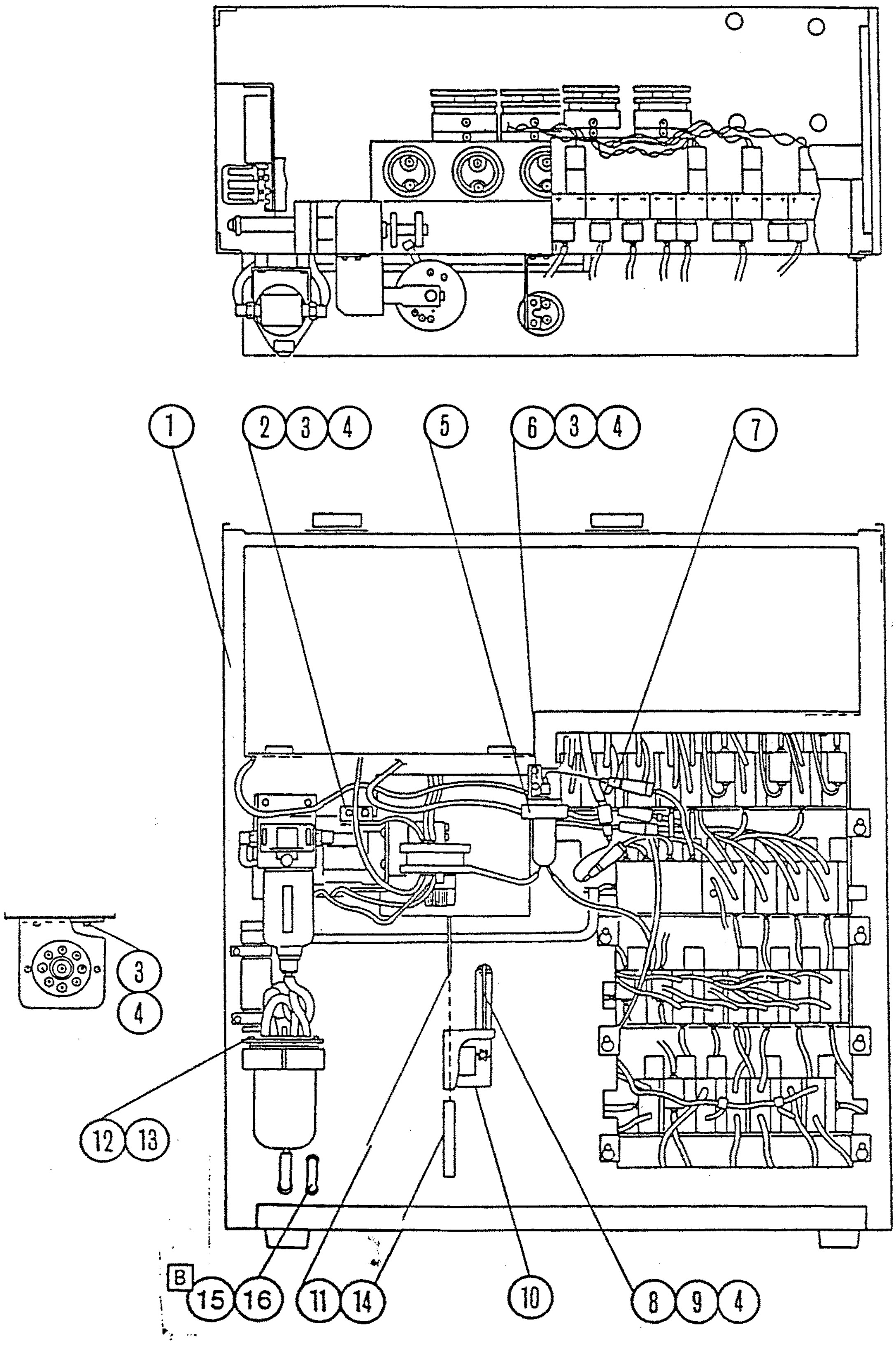
Before 04.93 update

	ECR NO.	K-1000
	388L074	A1566-
	392E034	A4709-
C	392J046	A4989-

* for 117 VAC only
** for 220 VAC only
\+ for 240 VAC only

SYM	ECR NO.	SERIAL NO.
D	393E040	K1 B5469-, K8 A1286-
E	396L030/397B014	B7048-

HYDRAULIC UNIT NO. 3 COMPLETE ASSEMBLY (1/2)



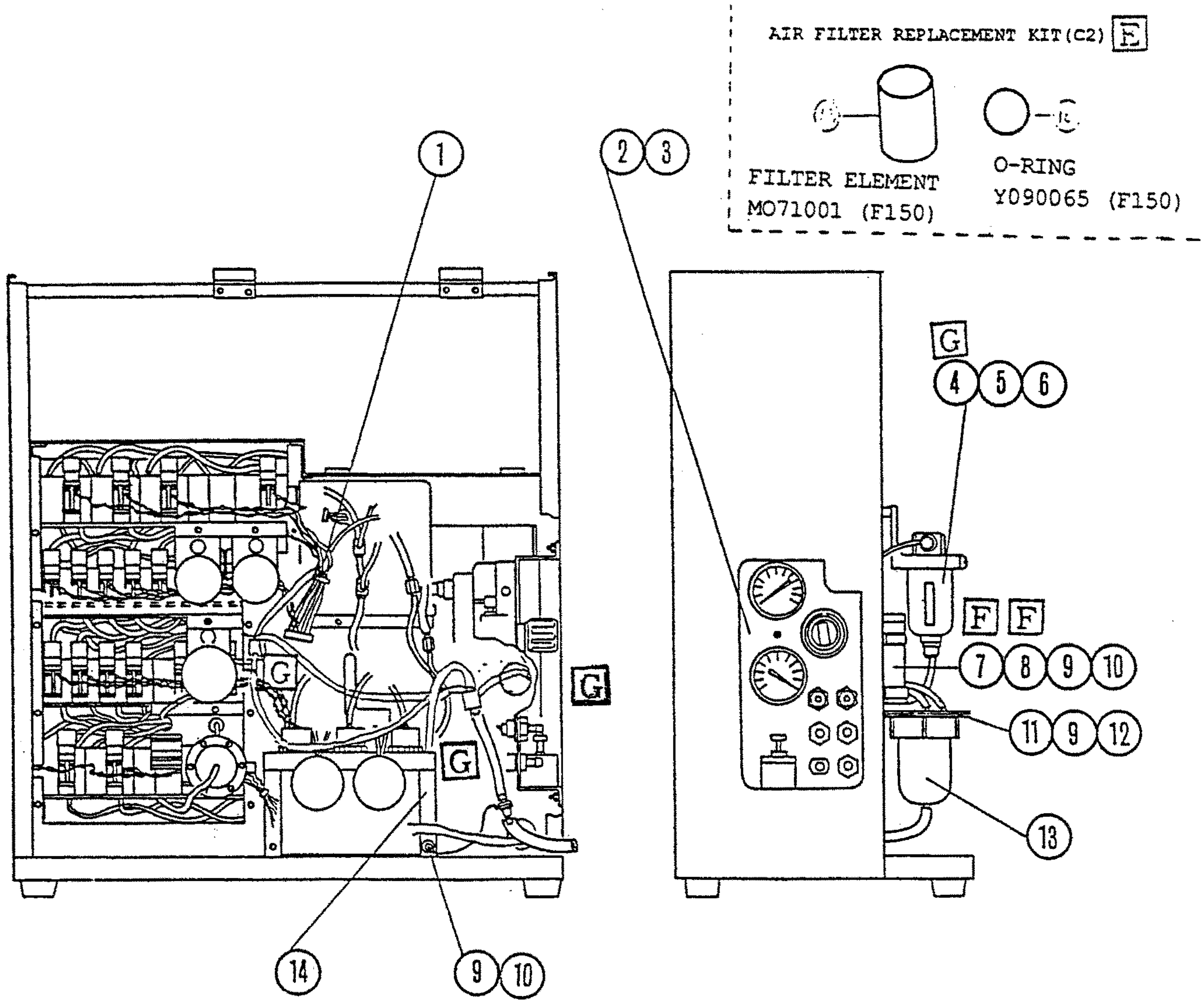
HYDRAULIC UNIT NO. 3 COMPLETE ASSEMBLY (1/2) DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	883-0281-8		HYDRAULIC UNIT NO. 3 COMPLETE	UNSALABLE
	873-0501-1	1	HYDRAULIC UNIT NO. 3 ASSY	UNSALABLE
	873-0521-5	2	SRV MECHANISM NO. 5 ASSEMBLY	UNSALABLE
	348-3912-6	3	SCREW BINDING M3X6 (SUS)	100
	348-9543-1	4	WASHER TOOTH LOCK EXT M3 (SUS)	100
	873-0791-7	5	MIXING CHAMBER NO. 3 ASSEMBLY	UNSALABLE
	366-2612-2A	6	CHAMBER MOUNTING PLATE NO. 2	1
B	~~442-3351-9~~	~~7~~	~~RUBBER JOINT NO.11~~	~~10~~
C	442-3351-9	7	RUBBER JOINT NO.11	10
	873-0801-7	8	RINSE CUP MECHANISM NO. 6 ASSY	1
	348-8513-6	9	NUT HEX M3 (SUS)	100
	441-8340-9C	10	RINSING SPIT NO. 8	1
	442-5417-4	11	TUBE TEFLON 0.5 X 2.0 X 69 MM	5
	366-3951-8	12	WC MOUNTING PLATE NO. 1	1
	369-7274-1A	13	INDICATION MARK NO.274	10
A	442-5338-7	14	TUBE POLYURETHANE 4MMIDX6MMOD	10 M
B	442-3564-8	15	NIPPLE NO. 62	1
B	442-5271-5	16	TUBE SR-1560 1MMID X 5MMOD	1 M

Before 04.93 update

SYM	ECR NO.	SERIAL NO.
A	389A059	K1 A1051-
B	393A077	K1 B5149-
C	393K016	K1 B5649- K8 A1381-

HYDRAULIC UNIT NO. 3 COMPLETE ASSEMBLY(2/2)



HYDRAULIC UNIT NO. 3 COMPLETE ASSEMBLY (2/2)DATE: 20-FEB-90

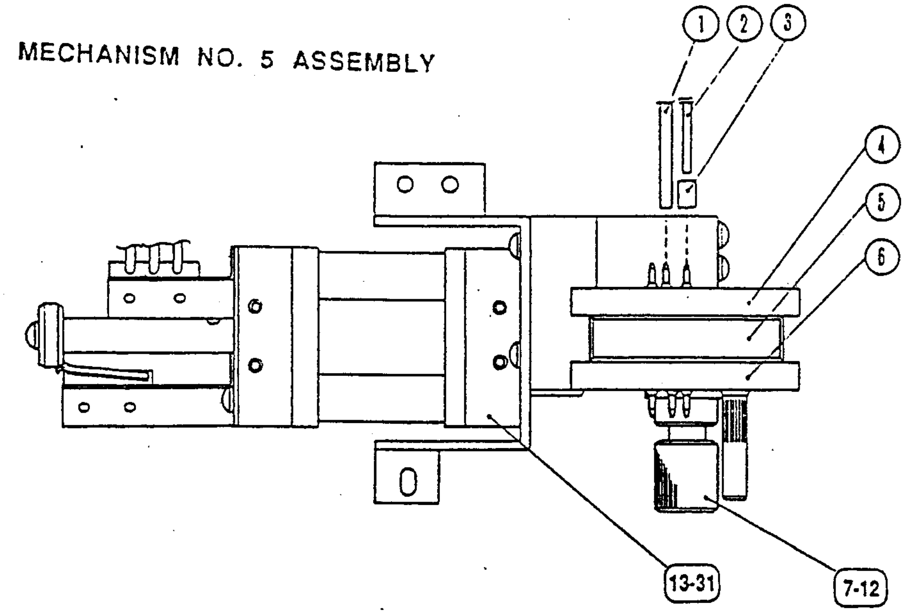
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	266-4461-8	1	TIE WRAP CV-100	1000	
	873-0581-9	2	REGULATOR SECTION NO. 5 ASSY	UNSALABLE	
	348-8513-6	3	NUT HEX M3 (SUS)	100	
A E	~~443-2474-3~~	~~4~~	~~AIR FILTER F150-01-BG-F1-B-GW~~	~~1~~	
	443-2479-1	4	AIR FILTER F150-01-BG-B-18W	1	G
	348-3926-8	5	SCREW BINDING M4X6 (SUS)	100	
	348-9544-5	6	WASHER TOOTH LOCK EXT M4 (SUS)	100	
B, C F	~~873-0771-2~~	~~7~~	~~TRAP CHAMBER NO. 5 ASSY/K-1000~~	~~UNSALABLE~~	
D F	~~366-6867-2A~~	~~8~~	~~MOUNTING METAL NO.106~~	~~1~~	
	348-3912-6	9	SCREW BINDING M3X6 (SUS)	100	
	348-9543-1	10	WASHER TOOTH LOCK EXT M3 (SUS)	100	
	366-3951-8	11	WC MOUNTING PLATE NO. 1	1	
	369-7274-1A	12	INDICATION MARK NO.274	10	
	873-0761-5	13	WASTE CHAMBER NO. 5 ASSEMBLY	UNSALABLE	
	873-0811-4	14	VALVE UNIT NO.23 ASSEMBLY	1	
E	~~443-2474-3A~~	~~4~~	~~AIR FILTER F150-01-BG-F1-B-6W~~	~~1~~	G
E	951-0182-9	15-16	AIR FILTER REPLACEMENT KIT (C2)(PM)	1	
E	443-2495-1	15	FILTER ELEMENT MO71001 (F150)	1	
E	443-2496-5	16	O-RING Y090065 (F150)	1	
F	963-0361-1	7	TRAP CHAMBER NO.21 ASSY (C-1)	UNSALABLE	
F	366-0766-1	8	CHAMBER MOUNTING PLATE NO.46	1	

Before 04.93 update

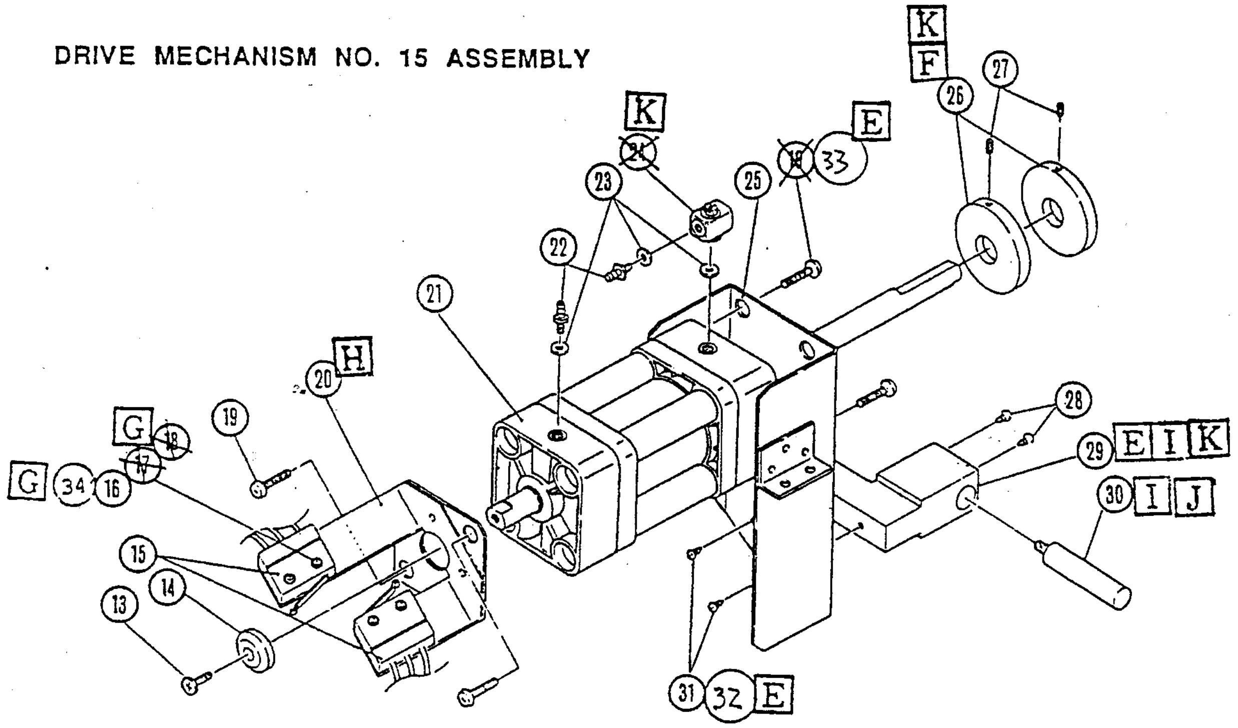
	ECR NO.	K-1000
A	3881073	A1486-
B	390E060	A2631-
C	392E068	A4709-
D	392E036	A4772-

SYM	ECR NO.	SERIAL NO.
E	395F042	----
F	396E032	K1 B6888- K8 A2302-
G	397F072	K1 B7143-, K8 A2757-

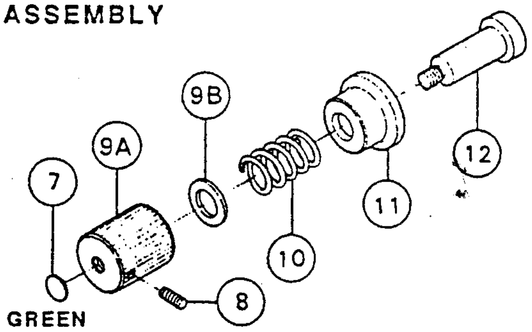
SRV MECHANISM NO. 5 ASSEMBLY



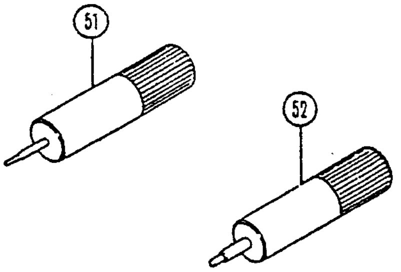
DRIVE MECHANISM NO. 15 ASSEMBLY



SAMPLE ROTOR FIXTURE NO. 3 ASSEMBLY



SRV ALIGNMENT TOOLS



SRV MECHANISM NO. 5 ASSEMBLY / SRV ALIGNMENT TOOLS DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	873-0521-5	1-31	SRV MECHANISM NO. 5 ASSEMBLY	UNSALABLE	
	442-5055-4	1	TUBE POLYURETHANE 1.8MMX3.4MM	10 M	
	442-5409-4	2	TUBE TEFLON 0.75MMID X 1.5MMOD	10 M	
	442-5331-1	3	TUBE POLYURETHANE 1.35 X 3.35	1 M	
	881-0071-5	4-6	SRV SET NO. 5 (PM)	1	
C	873-0561-4	4	SRV FIXED VALVE NO.11-A ASSY	UNSALABLE	
C	873-0551-7	5	SRV SAMPLE ROTOR VALVE NO. 9	UNSALABLE	
C	873-0571-1	6	SRV FIXED VALVE NO.11-B ASSY	UNSALABLE	
	873-0532-6	7-12	SAMPLE ROTOR FIXTURE NO. 3/C-2	1	
D					
	369-9612-0	7	LABEL MYTACK NO.120 (1 SET)	1	
	348-4901-9	8	SCREW HEX-SOCKET M3X4 (SUS)	100	
	362-3421-0A	9A	KNOB NO.21	1	
	365-9270-5	9B	SPACER NO. 30	10	
	345-2274-3	10	SPRING NO. 74	5	
D					
	363-2478-5	11	HOLDER NO.27	1	
	341-1539-6	12	SHAFT NO. 39	1	
	873-0541-0	13-31	DRIVE MECHANISM NO.15 ASSY	UNSALABLE	
	348-3954-2	13	SCREW BINDING M5X10 (SUS)	100	
	367-1781-9	14	DOG NO. 1	10	
	873-1061-1	15	SWITCH NO.24 ASSEMBLY	1	
	348-1275-5	16	SCREW ROUND M2.3X10	100	
	~~348-9310-8~~	~~17~~	~~WASHER SPRING M2.3 (SWRH14)~~	~~100~~	G
	~~348-9006-6~~	~~18~~	~~WASHER FLAT M2.3~~	~~100~~	G
E	~~348-3847-1~~	~~19~~	~~SCREW ROUND M5X25 (SUS)~~	~~100~~	
B	366-2544-6A	20	SW MOUNTING PLATE NO. 44	1	H
	443-7603-8	21	AIR CYLINDER 25X35 ST T1099	1	
	442-3508-9	22	NIPPLE NO. 8	50	
	346-1750-5	23	GASKET TAC 89-14	100	
K	~~442-4605-7~~	~~24~~	~~FITTING U.E.F.~~	~~10~~	
A	323-1672-9	25	CHASSIS NO.130	1	
	~~367-1224-9B~~	~~26~~	~~ADJUSTMENT PLATE NO. 4~~	~~1~~	F
	348-4717-7	27	SCREW HEX-SOCKET M4X6 W-P (SCM)	50	
	348-3912-6	28	SCREW BINDING M3X6 (SUS)	100	
K E	~~365-2579-9B~~	~~29~~	~~SHAFT FIXTURE NO. 9~~	~~1~~	I I J
	341-1537-9B	30	SHAFT NO. 37	1	
E	~~348-3926-8~~	~~31~~	~~SCREW BINDING M4X6 (SUS)~~	~~100~~	
E	~~367-1227-0B~~	~~26~~	~~ADJUSTMENT PLATE NO. 7~~	~~1~~	F K
E	348-3958-7	19	SCREW BINDING M5X25 (SUS)	100	
	462-9351-1	51	SRV ALIGNMENT TOOL K-A	1	
	462-9352-5	52	SRV ALIGNMENT TOOL K-B	1	
E E	348-9514-3	32	WASHER SPRING M4 (SUS)	100	
	348-9515-7	33	WASHER SPRING M5 (SUS)	100	
	426-3575-7	34	LOCK TIGHT 1401B	1	G
K	367-1239-4A	26	ADJUSTMENT PLATE NO.17	1	
	365-2549-7B	29	SHAFT FIXTURE NO.40	1	K

SYM	ECR NO.	??
	393B046	K10(B5224-), K8(A1071-)
	393A086	K10(B5224-), K8(A1071-)
	393G032	K10(B5519-), K8(A1331-)
	394F058	K10(B5940-), K8(A1646-)
	394E022	K10(B5815-), K8(A1541-)

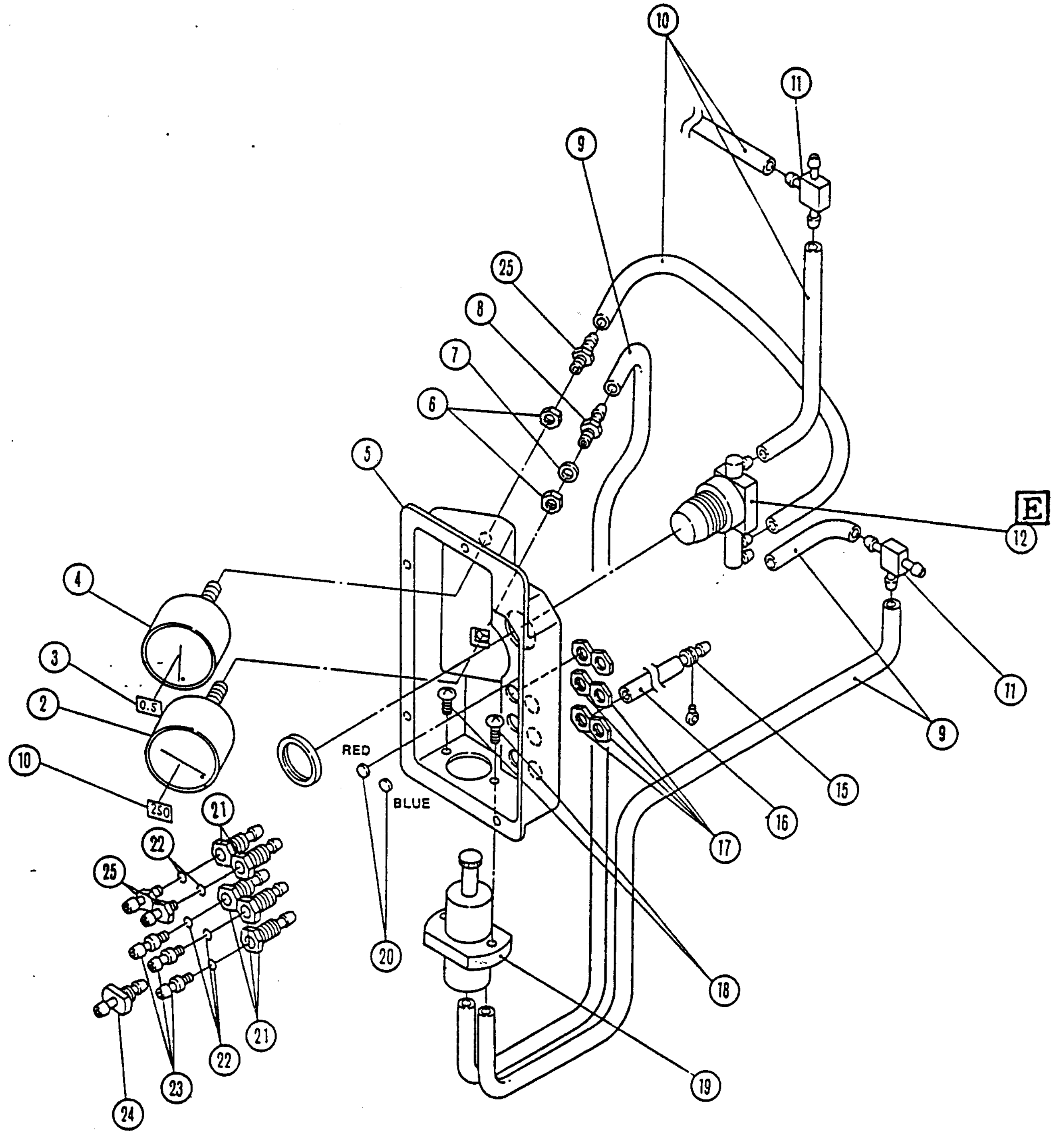
Before 04.93 update

	ECR NO.	K-1000
A	388G090	------
B	389G032	A1936-
C	389L018	A2266-
D	389L022	A2346-

J 394G028 ----- -----

K 396B070 K1 (B6763-), K8 (A2232-)

REGULATOR SECTION NO. 5 ASSEMBLY



REGULATOR SECTION NO. 5 ASSEMBLY

DATE: 20-APR-93

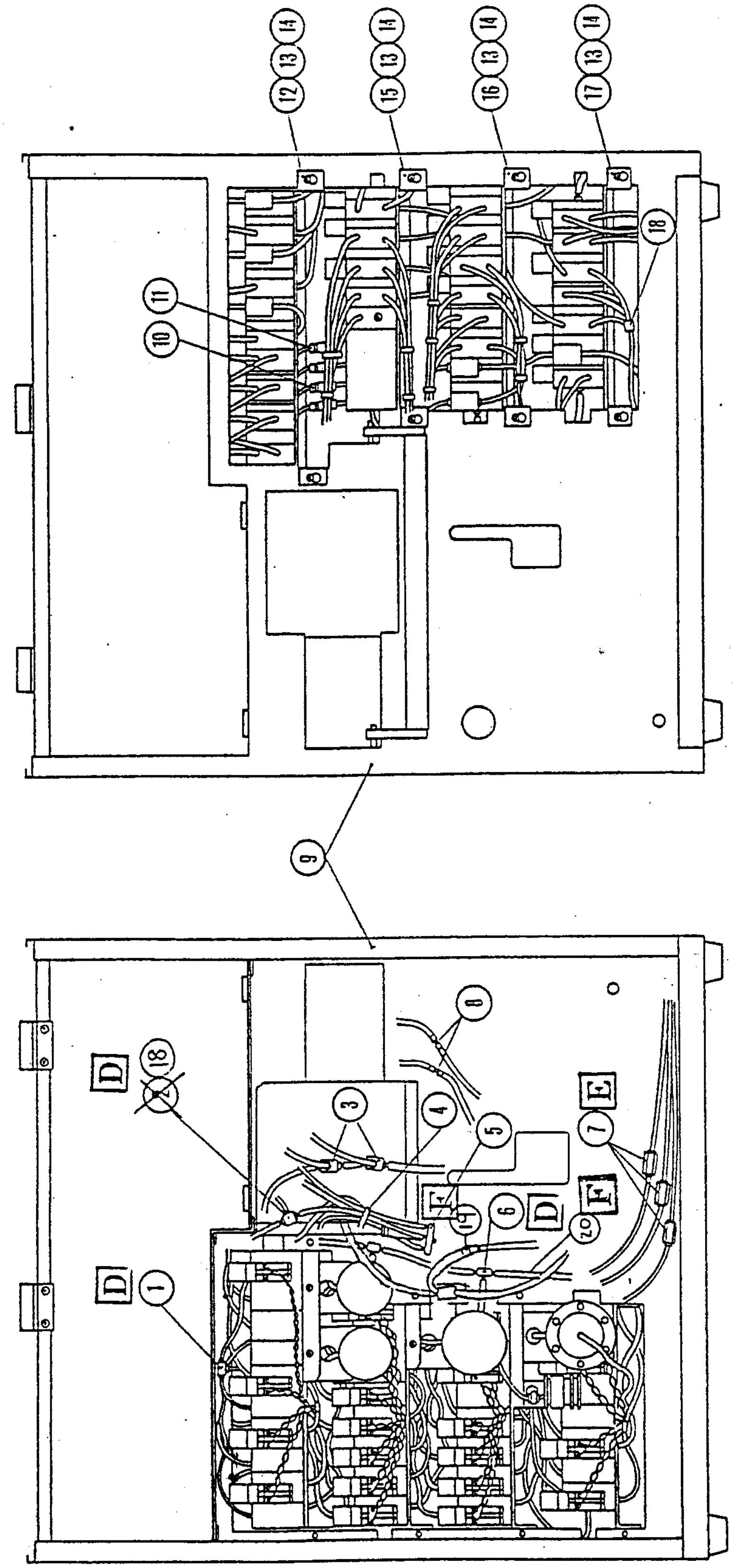
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	873-0581-9	1-25	REGULATOR SECTION NO. 5 ASSY	UNSALABLE	
	369-7459-6	1	INDICATION MARK NO.459 (250)	10	
	441-9186-2	2	GAUGE DU50-760 (760 MMHG)	1	
	369-7457-9	3	INDICATION MARK NO.457 (0.5)	10	
	441-9188-0	4	GAUGE DU50-001 (1 KG/CM2)	1	
C, D	323-1833-4	5	REGULATOR SECTION NO.5 CHASS-1	1	
	348-8420-7	6	NUT HEX M10 (FE)	100	
	346-1750-5	7	GASKET TAC 89-14	100	
	442-3508-9	8	NIPPLE NO. 8	50	
	442-5055-4	9	TUBE POLYURETHANE 1.8MMX3.4MM	10 M	
	442-5338-7	10	TUBE POLYURETHANE 4MMIDX6MMOD	10 M	
	442-3430-6	11	HYDRAULIC CONNECTOR NO.20	10	
A, B	~~903-7141-9~~	~~12~~	~~REGULATOR UNIT NO.25 ASSY~~	~~1~~	E
D	443-6999-8	12	REGULATOR PR100-8WY	1	E
C					
C, D	863-1621-9	15	EARTH NIPPLE NO. 8 ASSEMBLY	1	
C, D	442-5295-4	16	TUBE SILICONE 6MMID X10MMOD	10 M	
	344-8075-1	17	NUT HEX 110-21	10	
	348-3913-0	18	SCREW BINDING M3X8 (SUS)	100	
	873-0601-6	19	BELLOWS UNIT NO. 2	UNSALABLE	
	369-9612-0	20	LABEL MYTACK NO.120 (1 SET)	1	
	442-3009-5	21	ADAPTOR NO. 9	10	
	343-2425-7	22	O-RING NG-2 (NITRIL)	100	
	442-4552-7	23	SUS NIPPLE 2	10	
C, D	442-3763-5	24	HOSE NIPPLE NO.13	1	
	442-4125-4	25	FITTING BF- 6	5	

Before 04.93 update

	ECR NO.	K-1000
A	388i073	A1486-
B	390E024	A2631-
C	392E036	A4772-
D	393A077	B5149-

SYM	ECR NO.	SERIAL NO.
E	393G007	K1 B5419-, K8 A1251·

HYDRAULIC UNIT NO. 3 ASSEMBLY



HYDRAULIC UNIT NO. 3 ASSEMELY DATE: 20-APR-93

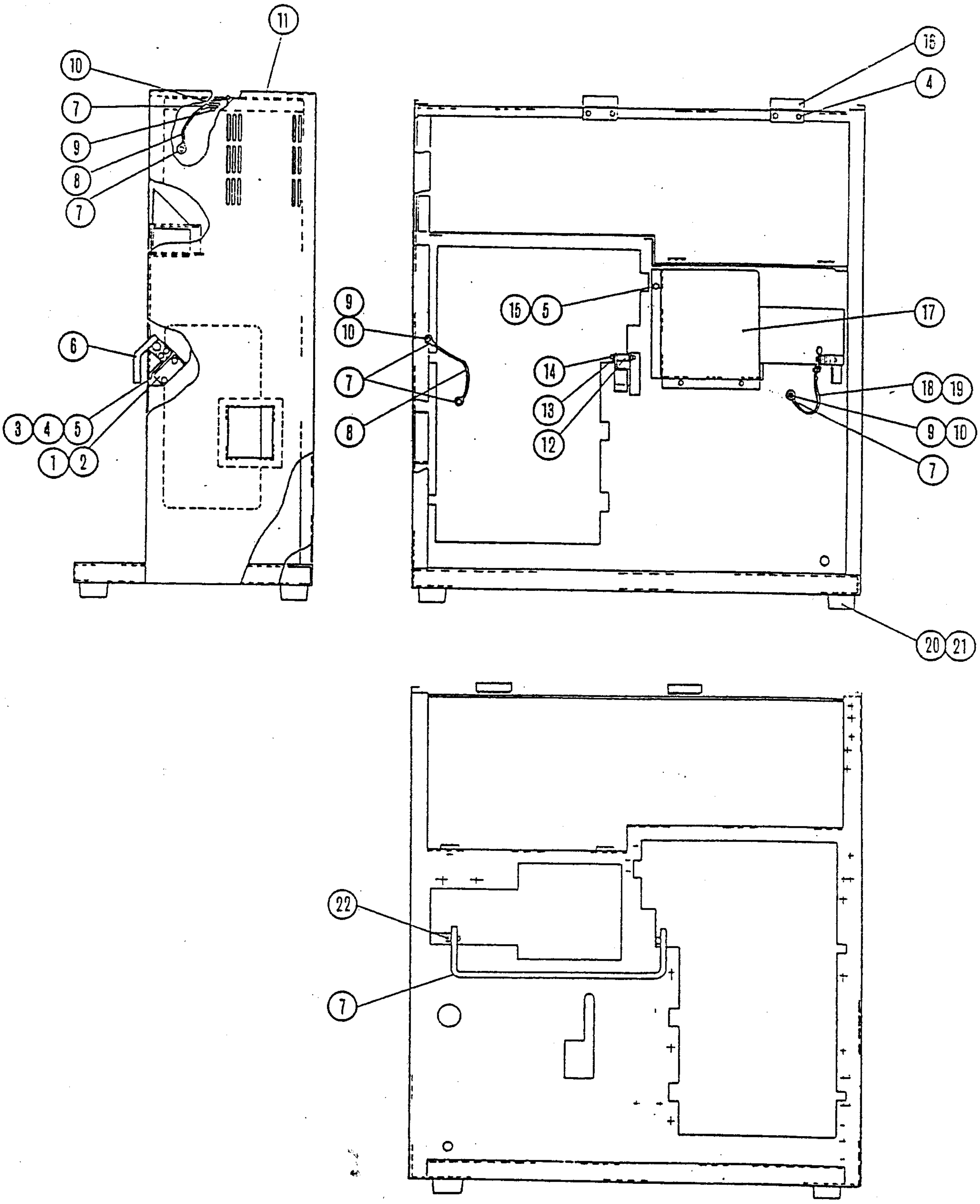
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	873-0501-1		HYDRAULIC UNIT NO. 3 ASSY	UNSALABLE	
D	442-3429-1	1	HYDRAULIC CONNECTOR NO.19	10	
D	~~442-3430-6~~	~~2~~	~~HYDRAULIC CONNECTOR NO.20~~	~~10~~	
	442-3431-0	3	HYDRAULIC CONNECTOR NO.21	10	
	266-4461-8	4	TIE WRAP CV-100	1000	
	833-1151-7	5	FLUID CONNECTOR 3-A ASSY	5	
D	442-3424-3	6	HYDRAULIC CONNECTOR NO.14	10	
E	442-3433-7	7	HYDRAULIC CONNECTOR NO.23	10	
	443-0213-8	8	ORIFICE NO.13 (BROWN)	10	
	873-0511-8	9	CHASSIS NO.129 ASSEMBLY	UNSALABLE	
A B C	~~442-5271-5~~	~~10~~	~~TUBE SR-1560 1MMID X 5MMOD~~	~~1 M~~	
	833-1221-1	11	NON-RETURN VALVE NO. 2	5	
	873-0621-1	12	VALVE UNIT NO.19 COMPLETE ASSY	UNSALABLE	
	348-3912-6	13	SCREW BINDING M3X6 (SUS)	100	
	348-9543-1	14	WASHER TOOTH LOCK EXT M3 (SUS)	100	
	873-0651-2	15	VALVE UNIT NO.20 COMPLETE ASSY	UNSALABLE	
	873-0691-1	16	VALVE UNIT NO.21 COMPLETE (C-1)	UNSALABLE	
	873-0721-6	17	VALVE UNIT NO.22 COMPLETE ASSY	UNSALABLE	
	442-3432-3	18	HYDRAULIC CONNECTOR NO.22	10	
E	442-5055-4		TUBE POLYURETHANE 1.8MMX3.4MM	10 M	
	442-5333-9		TUBE POLYURETHANE 2.4MM X 4MM	10 M	
	442-5338-7		TUBE POLYURETHANE 4MMIDX6MMOD	10 M	
	442-5409-4		TUBE TEFLON 0.75MMID X 1.5MMOD	10 M	
E	442-5274-6		TUBE SILICONE 1.5MMID X 4MMOD	10 M	
	442-5289-1		TUBE SILICONE 4MMID X 6MMOD	10 M	
C	442-3351-9	10	RUBBER JOINT NO.11	10	
	443-0217-2	19	ORIFICE NO.17 (RED)	10	F
	426-1139-3	20	ADHESIVE TAPE NO.471 (RED)	1	F

Before 04.93 update

SYM	ECR NO.	SERIAL NO.
A	388G090	--------
B	393A077	K1 B5149-
C	393K016	K1 B5649- K8 A1381-
D	396G045	K1 B6903- K8 A2332-

SYM	ECR NO.	SERIAL NO.
E	396H058	------
F	397F072	K1 B7143-, K8 A2757-

CHASSIS NO. 109 ASSEMBLY



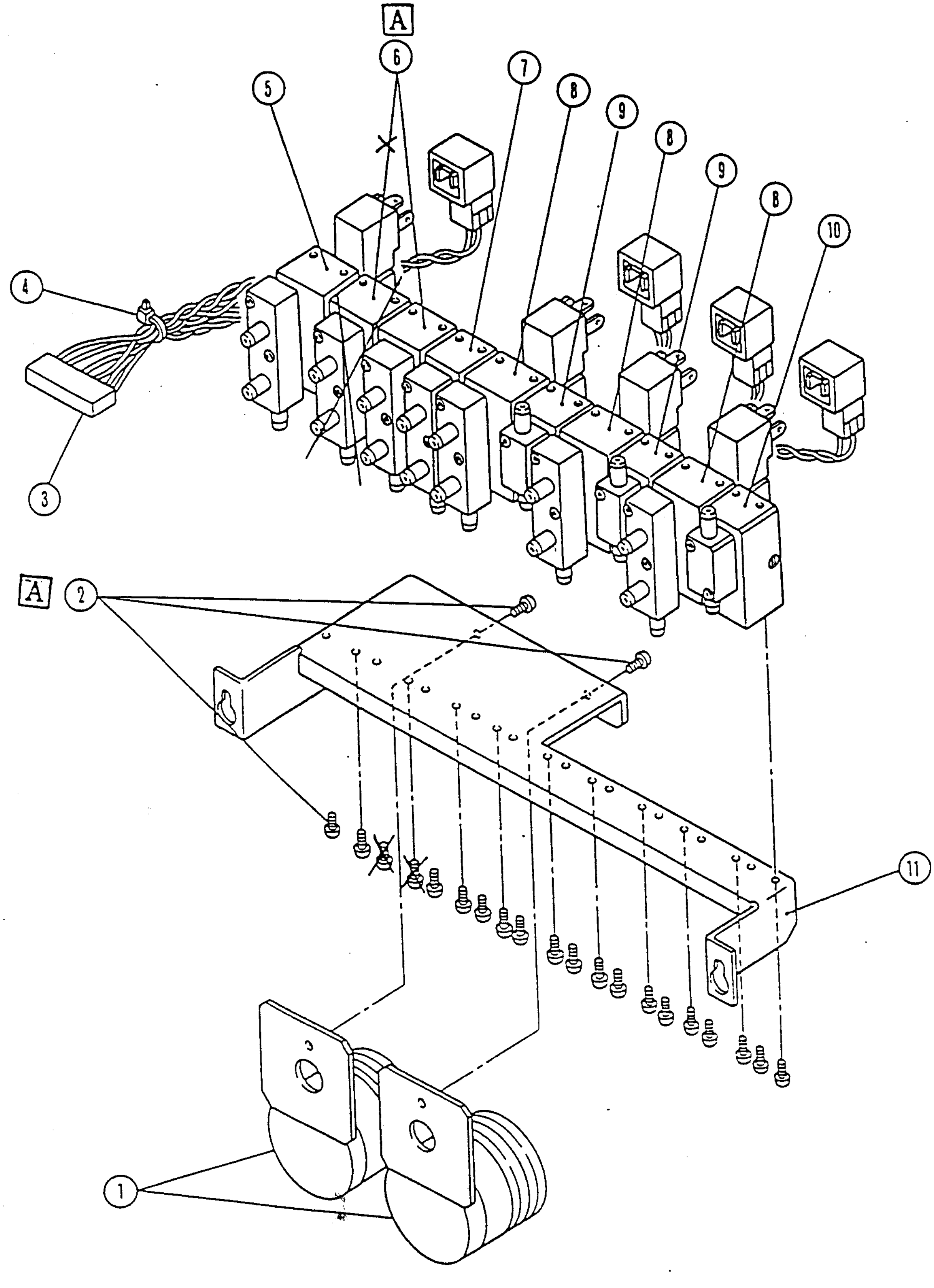
CHASSIS NO. 129 ASSEMBLY DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
A	873-0511-8	1-23	CHASSIS NO.129 ASSEMBLY	UNSALABLE
	873-0781-0	1	SWITCH NO.23 ASSEMBLY	1
	348-3917-4	2	SCREW BINDING M3X16 (SUS)	100
	367-1497-1	3	STOPPER NO. 17	1
	348-3912-6	4	SCREW BINDING M3X6 (SUS)	100
	348-9543-1	5	WASHER TOOTH LOCK EXT M3 (SUS)	100
E	367-1455-5	6	SWITCH LEVER NO. 5	1
	266-3581-4	7	SOLDERLESS LUG 170722-1 (M4)	100
	268-0281-1	8	WIRE UL1015-16AWG GRN/YEL	UNSALABLE
	348-8514-0	9	NUT HEX M4 (SUS)	100
	348-9544-5	10	WASHER TOOTH LOCK EXT M4 (SUS)	100
C, E	323-1718-2	11	CHASSIS NO.129-1	1
	365-8480-0	12	PLASTIC SUPPORT PS-410	10
	348-8904-4	13	NUT PUSH M4 (SUS)	100
	344-3723-7	14	PIN PARALLEL 4X25 (SUS)	10
	348-8513-6	15	NUT HEX M3 (SUS)	100
	344-3416-4	16	HINGE B-1100-3	10
	322-1324-6A	17	COVER NO.119	1
	268-0441-3	18	WIRE UL1015-18AWG GRN/YEL	UNSALABLE
	266-3575-1	19	SOLDERLESS LUG 170720-1 (M3)	100
	368-0036-6	20	RUBBER SHOE C-30-RK-38	10
	348-3931-7	21	SCREW BINDING M4X16 (SUS)	100
	345-2260-1	22	SPRING NO. 60	5
D	369-7857-1	23	INDICATION MARK NO.554	10

Before 04.93 update

	ECR NO.	K-1000
A	388G090	------
B	390K084	A3096-
C	392E036	A4772-
D	392J046	A4989-
E	393A077	B5149-

VALVE UNIT NO. 19 COMPLETE ASSEMBLY

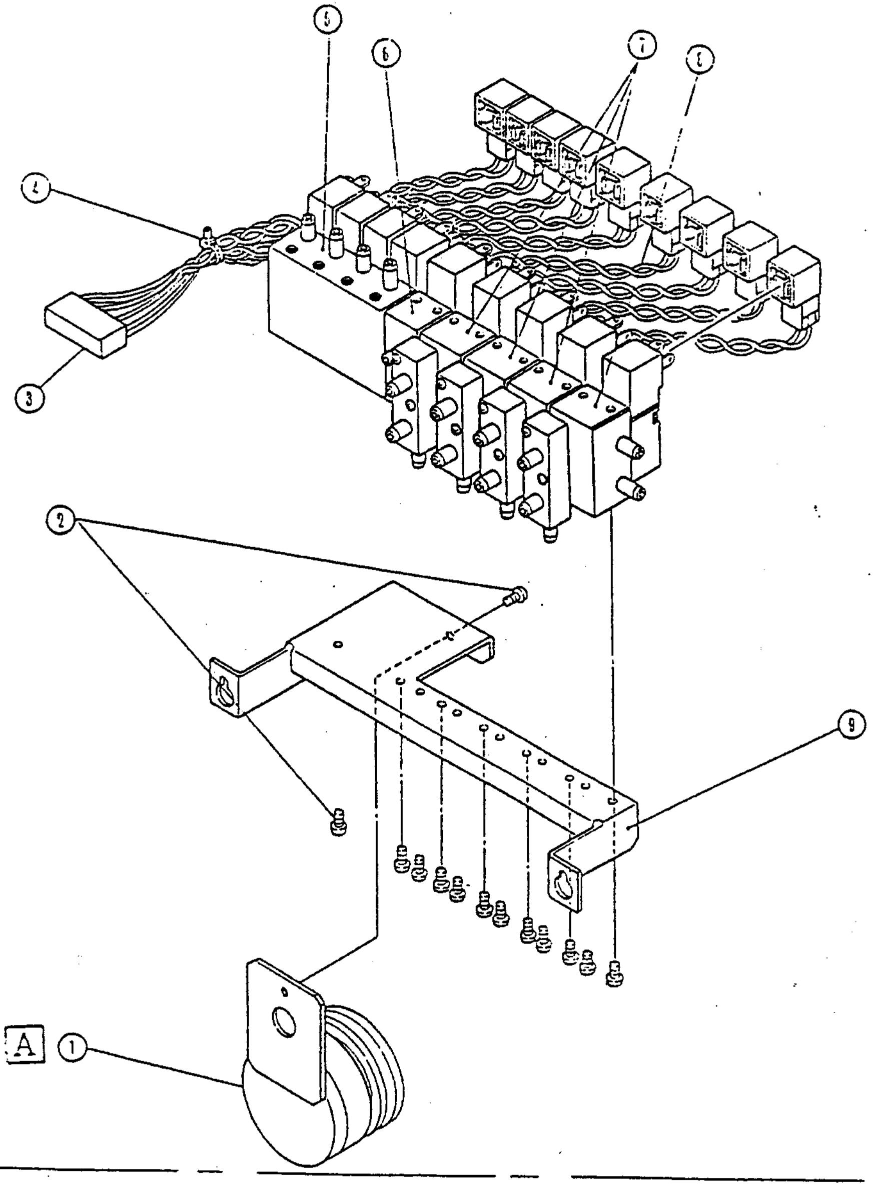


VALVE UNIT NO.19 COMPLETE ASSEMBLY DATE: 21-APR-88

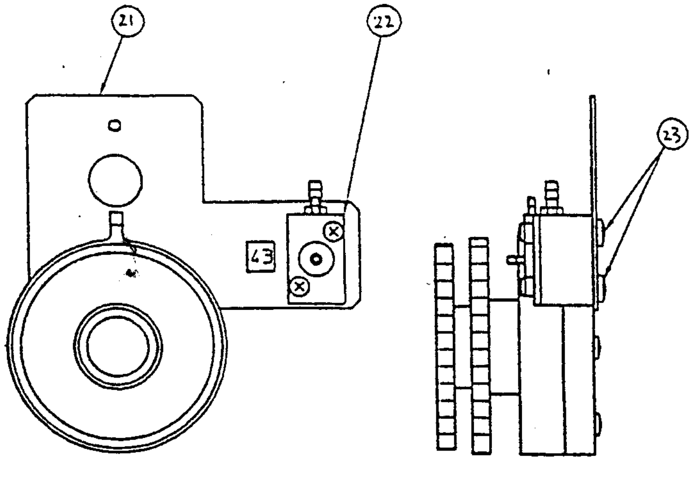
	CODE NUMBER	RAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0621-1	1-11	VALVE UNIT NO.19 COMPLETE ASSY	UNSALABLE
	873-0641-5	1	DIAPHRAGM PUMP NO. 5 ASSY (C-1)	1
A	~~348-3912-6~~	~~2~~	~~SCREW BINDING M3x6 (SUS)~~	~~100~~
	873-1311-1	3	WIRING CORD NO. 335-A	1
	266-4461-8	4	TIE WRAP CV-100	1000
	873-0631-8	5-11	VALVE UNIT NO.19 ASSEMBLY	1
	873-1511-1	5	MASTER VALVE 3MV14-R ASSEMBLY	UNSALABLE
A	873-1541-3	6	MASTER VALVE 3MV17-A ASSEMBLY	UNSALABLE
	873-1531-6	7	MASTER VALVE 3MV15-C ASSEMBLY	UNSALABLE
	873-1501-4	8	MASTER VALVE 3MV14-Q ASSEMBLY	UNSALABLE
	873-1441-8	9	MASTER VALVE 2MV15-C ASSEMBLY	UNSALABLE
	873-1451-5	10	MASTER VALVE 2MV15-D ASSEMBLY	UNSALABLE
	366-3864-1	11	MV MOUNTING PLATE NO.19	1
A	348-3812-1	2	SCREW BINDING M3X6 (SUS)	100

SYM	ECR NO.	K-1000 SERIAL NO.	K-800 SERIAL NO.
A	396G045	B6903-	A2332-
B			
C			
D			
E			

VALVE UNIT NO. 20 COMPLETE ASSEMBLY



A DP UNIT NO. 4



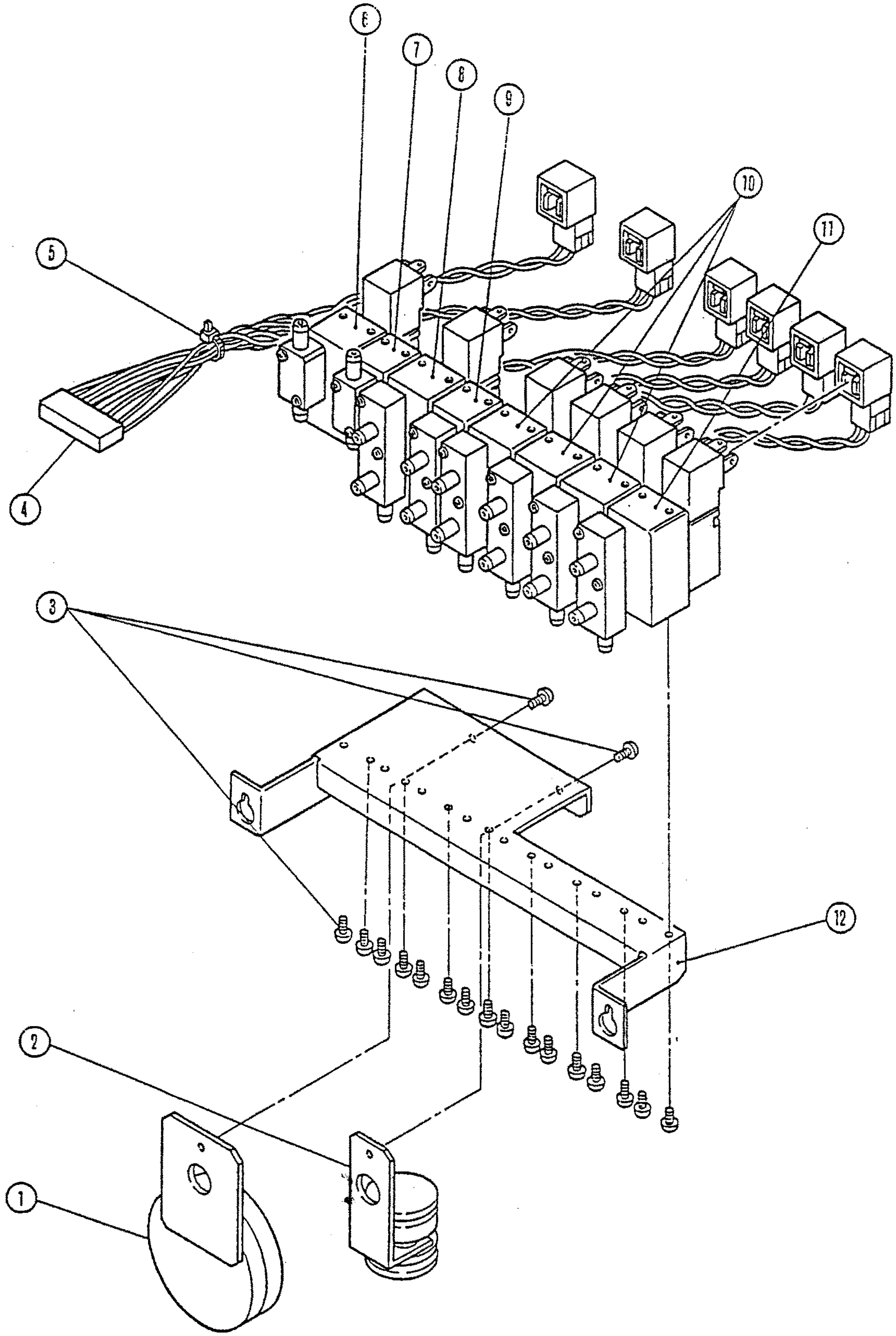
VALVE UNIT NO. 20 COMPLETE ASSEMBLY DATE: 21-APR-88

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0651-2	1-9	VALVE UNIT NO.20 COMPLETE ASSY	UNSALABLE
A	~~873-0741-1~~	~~1~~	~~DIAPHRAGM PUMP NO. 8 ASSEMBLY~~	~~1~~
A	973-1311-4	1	DP UNIT NO. 4	1
	348-3912-6	2	SCREW BINDING M3X6 (SUS)	100
	873-1331-5	3	WIRING CORD NO. 336-A	1
	266-4461-8	4	TIE WRAP CV-100	1000
	873-0661-0	5-9	VALVE UNIT NO.20 ASSEMBLY	1
	873-0681-4	5	MANIFOLD PSV NO. 3 ASSY	UNSALABLE
	873-1561-8	6	MANIFOLD 3SV NO. 6 ASSY	UNSALABLE
	873-1481-7	7	MASTER VALVE 3MV14-N ASSEMBLY	UNSALABLE
	873-1461-2	8	MASTER VALVE 3MV14-L ASSEMBLY	UNSALABLE
	366-3865-4	9	MV MOUNTING PLATE NO.20	1

A	973-1311-4	21-23	DP UNIT NO. 4	1
	873-0741-1	21	DIAPHRAGM PUMP NO. 8 ASY (CA/K1)	1
	923-6012-2	22	MANIFOLD MV NO.14 ASSY(CS/SEM2)	1
	348-3812-1	23	SCREW BINDING M3X6 (SUS)	100

SYM	ECR NO.	SERIAL NO.
A|	397F072	K1 B7143-, K8 A2757-

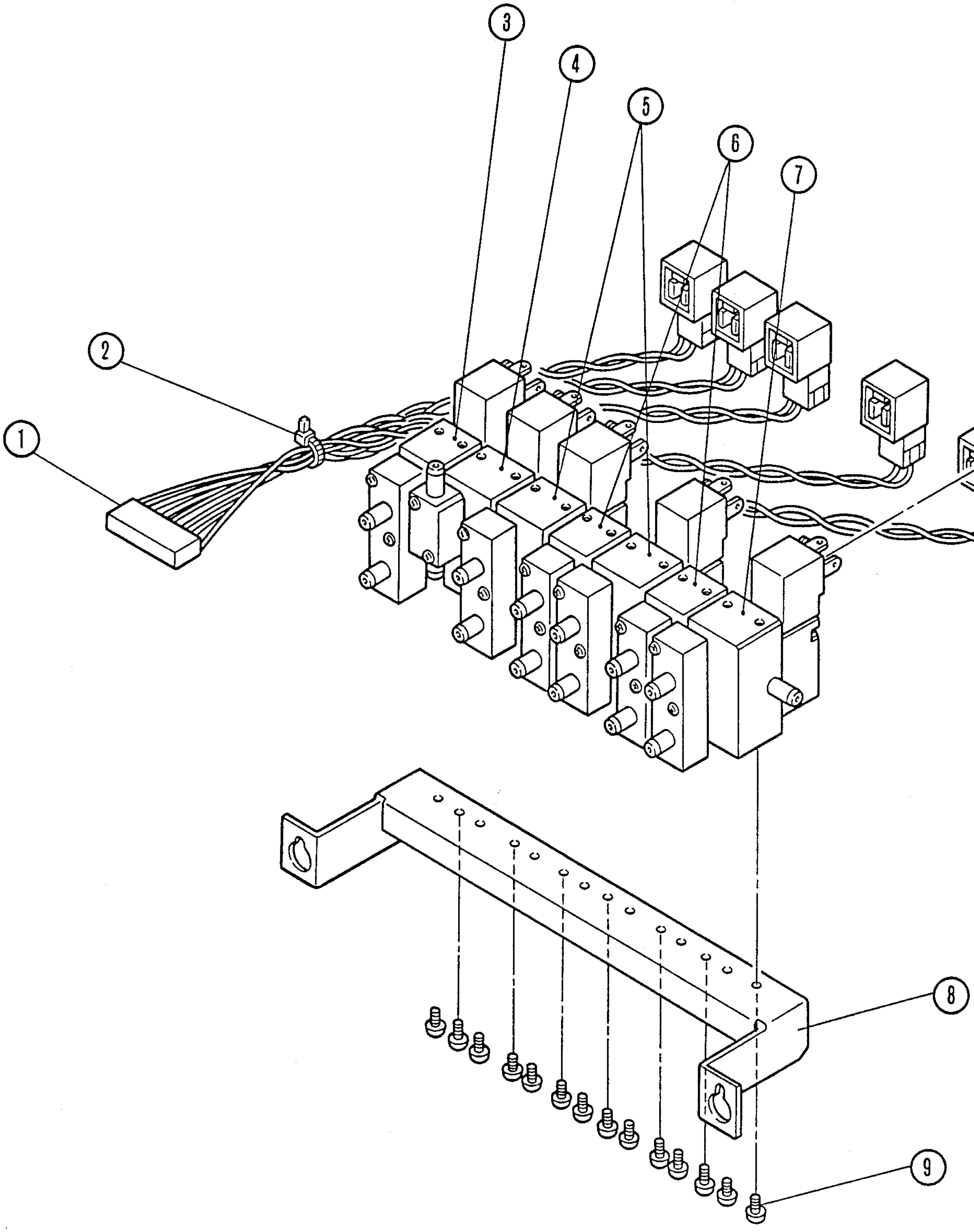
V ALVE UNIT NO. 21 COMPLETE ASSEMBLY



VALVE UNIT NO. 21 COMPLETE ASSEMBLY DATE: 20-AUG-88

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
873-0692-5	1-12#	VALVE UNIT NO.21 COMPLETE(C-2)	UNSALABLE
873-0691-1	1-12$	VALVE UNIT NO.21 COMPLETE(C-1)	UNSALABLE
873-0671-7	1	DIAPHRAGM PUMP NO. 6 ASSEMBLY	1
883-3721-2	2#	DIAPHRAGM PUMP NO.13 ASSEMBLY	1
873-0711-9	2$	DIAPHRAGM PUMP NO. 7 ASSEMBLY	1
348-3912-6	3	SCREW BINDING M3X6 (SUS)	100
873-1351-0	4	WIRING CORD NO. 337-A	1
266-4461-8	5	TIE WRAP CV-100	1000
873-0701-1	6-12	VALVE UNIT NO.21 ASSEMBLY	1
873-1411-6	6	MASTER VALVE 2MV14-H ASSEMBLY	UNSALABLE
873-1441-8	7	MASTER VALVE 2MV15-C ASSEMBLY	UNSALABLE
873-1491-4	8	MASTER VALVE 3MV14-P ASSEMBLY	UNSALABLE
873-1531-6	9	MASTER VALVE 3MV15-C ASSEMBLY	UNSALABLE
873-1481-7	10	MASTER VALVE 3MV14-N ASSEMBLY	UNSALABLE
873-1471-0	11	MASTER VALVE 3MV14-M ASSEMBLY	UNSALABLE
366-3866-8	12	MV MOUNTING PLATE NO.21	1

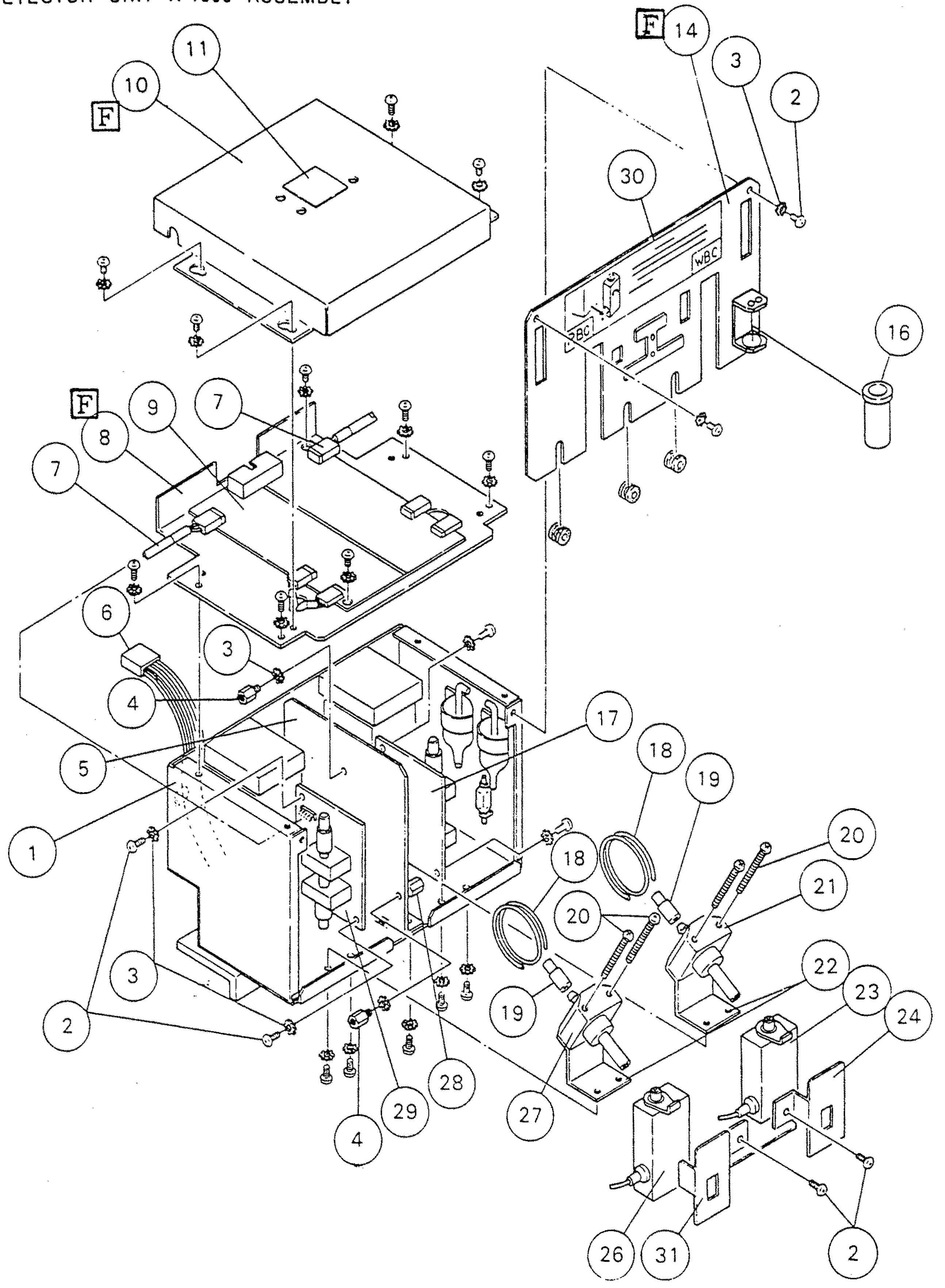
VALVE UNIT NO. 22 COMPLETE ASSEMBLY



VALVE UNIT NO. 22 COMPLETE ASSEMBLY DATE: 21-APR-88

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
873-0721-6	1-9	VALVE UNIT NO.22 COMPLETE ASSY	UNSALABLE
873-1651-6	1	WIRING CORD NO. 332-A	1
266-4461-8	2	TIE WRAP CV-100	1000
873-0731-3	3-9	VALVE UNIT NO.22 ASSEMBLY	1
873-1581-2	3	MANIFOLD 4SV NO. 5 ASSY	UNSALABLE
873-1431-1	4	MASTER VALVE 2MV14-J ASSEMBLY	UNSALABLE
873-1491-4	5	MASTER VALVE 3MV14-P ASSEMBLY	UNSALABLE
873-1531-6	6	MASTER VALVE 3MV15-C ASSEMBLY	UNSALABLE
873-1521-9	7	MASTER VALVE 3MV14-S ASSEMBLY	UNSALABLE
366-3867-1	8	MV MOUNTING PLATE NO.22	1
348-3912-6	9	SCREW BINDING M3X6 (SUS)	100

DETECTOR UNIT K-1000 ASSEMBLY



DETECTOR UNIT K-1000 ASSEMBLY DATE: 20-APR-93

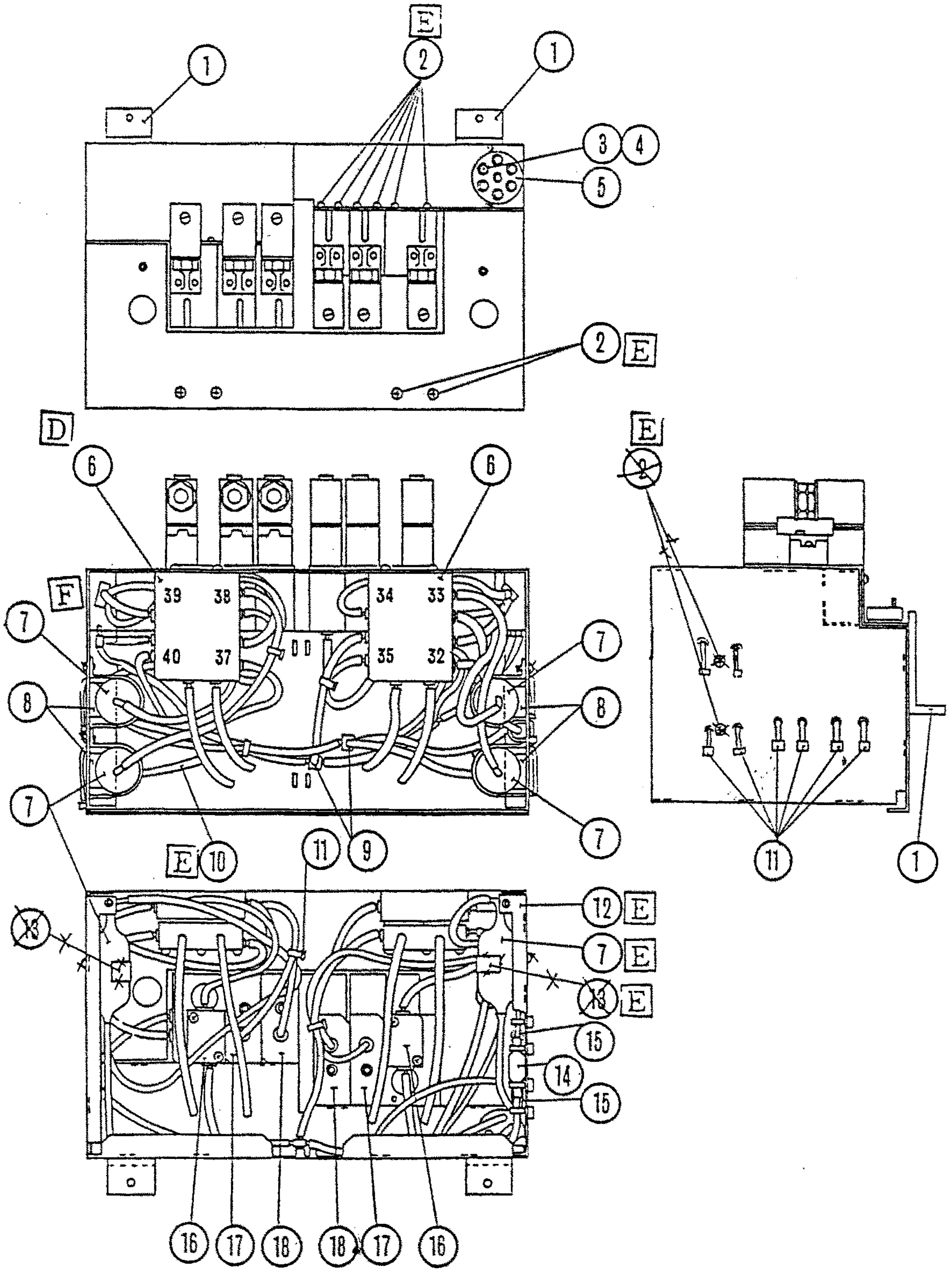
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	873-0831-9	1-31	DETECTOR UNIT K-1000 ASSY	UNSALABLE	
	873-0841-6	1	DETECTOR BLOCK NO.17 ASSY	UNSALABLE	
	348-3912-6	2	SCREW BINDING M3X6 (SUS)	100	
	348-9543-1	3	WASHER TOOTH LOCK EXT M3 (SUS)	100	
	365-7491-7	4	SPACER P-12 SN- 1	10	
C	366-2252-0A	5	PCB MOUNTING PLATE NO. 10	1	
	873-1291-3	6	WIRING CORD NO. 334-A	1	
	873-1371-4	7	WIRING CORD NO. 338	1	
A	323-1673-2D	8	CHASSIS NO.131	1	F
	873-1081-5	9	PCB NO.2062	1	
	322-1322-9C	10	COVER NO.117	1	F
	369-7461-4	11	INDICATION MARK NO.461	10	
E E E	322-2504-6A	14	COVER NO.223	1	F
	424-1250-6	16	SAMPLE CUP CONICAL 2 ML	10	
	873-1771-6	17	MANOMETER BLOCK NO.15 (W/400)	1	
	442-5452-5	18	TUBE TEFLON 1.5MMID X 2.5MMOD	10 M	
	442-3307-4	19	RUBBER TUBE NO. 7	5	
	348-3920-6	20	SCREW BINDING M3X25 (SUS)	100	
	873-1961-0	21	TRANSDUCER ER NO.18 UNIT (WBC)	1	
	363-1353-3A	22	FIXING METAL NO. 63	1	
	873-0881-5	23	TD CHAMBER NO. 5 ASSY (WBC)	UNSALABLE	
C D	364-1302-1	24	SHIELD COVER NO. 45-B	1	
	873-0871-8	26	TD CHAMBER NO. 4 ASSY (RBC)	UNSALABLE	
	873-1671-1	27	TRANSDUCER ER NO.17 UNIT (RBC)	1	
	365-7475-7	28	SPACER P-11 S- 1	10	
	873-0911-0	29	MANOMETER BLOCK NO.14 (R/250)	1	
B	369-8066-4	30	CAUTION MARK NO. 65	10	
C	364-1301-7	31	SHIELD COVER NO. 45-A	1	

Before 04.93 update

	ECR NO.	K-1000
A	388G090	------
B	388H140	A1441-
C	389A034	A1621-
D	392E036	A4772-
E	393A077	B514a9-

SYM	ECR NO.	SERIAL. NO.
F	393E040	K1 B5469-, K8 A1286-

DETECTOR BLOCK NO. 17 ASSEMBLY



DETECTOR BLOCK NO.17 ASSEMBLY

DATE: 20-APR-93

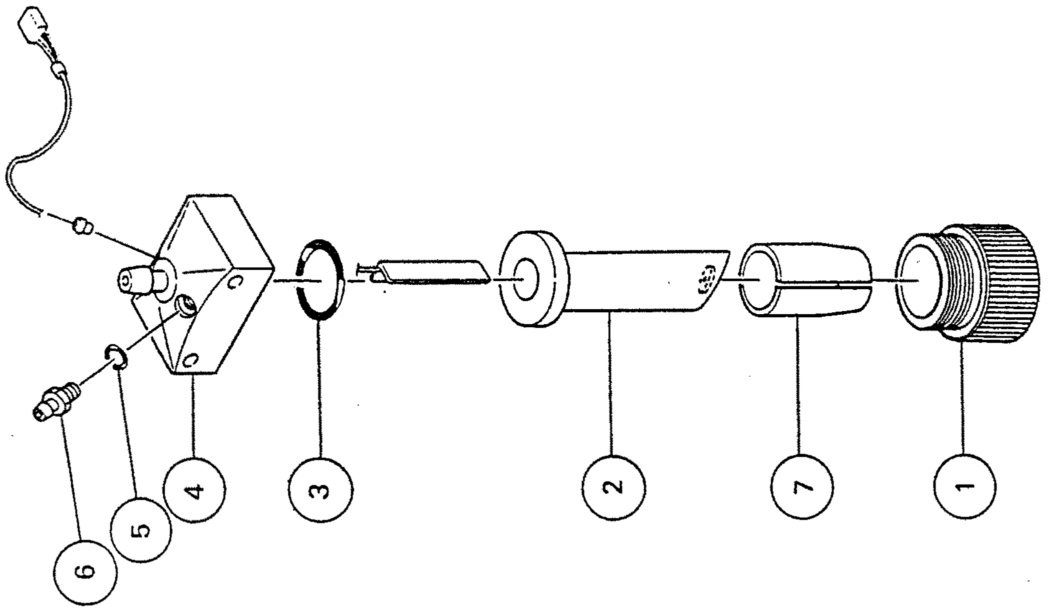
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	873-0841-6	1-18	DETECTOR BLOCK NO.17 ASSY	UNSALABLE	
C	365-9269-1D	1	SPACER NO. 29	1	
E	~~348-3912-6~~	~~2~~	~~SCREW BINDING M8X6 (SUS)~~	~~100~~	
	348-3915-7	3	SCREW BINDING M3X12 (SUS)	100	
	348-9543-1	4	WASHER TOOTH LOCK EXT M3 (SUS)	100	
B	873-0861-1	5	FLUID CONNECTOR 13-B ASSY	1	
D	~~873-0851-3~~	~~6~~	~~VALVE UNIT NO.24 ASSEMBLY~~	~~1~~	
E	~~443-2514-5~~	~~7~~	~~GLASS CHAMBER CC 14~~	~~1~~	
	368-2496-9	8	SPONGE PACKING NO.16	10	
	442-3424-3	9	HYDRAULIC CONNECTOR NO.14	10	
E	442-5055-4	10	TUBE POLYURETHANE 1.8MMX3.4MM	10 M	
	266-4461-8	11	TIE WRAP CV-100	1000	
A	323-1670-1B	12	CHASSIS NO.128	1	E
E	~~366-6863-8~~	~~13~~	~~MOUNTING METAL NO.102~~	~~1~~	
	443-2335-2	14	NON-RETURN VALVE 2 (GLASS)	5	
	442-5475-1	15	TUBE TOALONE 3MMID X 6MMOD	10 M	
	873-1421-3	16	MASTER VALVE 2MV14-I ASSEMBLY	UNSALABLE	
	873-1571-5	17	MANIFOLD 3SV NO. 7 ASSY	UNSALABLE	
	873-1561-8	18	MANIFOLD 3SV NO. 6 ASSY	UNSALABLE	
D	933-3271-8	6	VALVE UNIT NO.88 ASSY	1	
E	443-0691-1	7	ISOLATION CHAMBER NO.1	1	
E	348-3812-1	2	SCREW BINDING M3X6 (SUS)	100	

Before 04.93 update

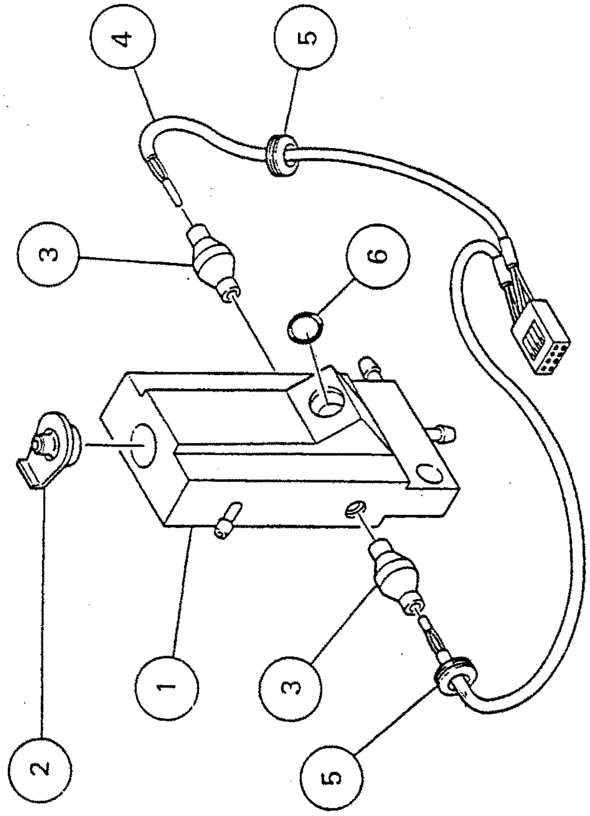
	ECR NO.	K-1000
A	388G090	------
B	390D033	A2561-
C	393A077	B5149-

SYM	ECR NO.	SERIAL NO.
D	395L112	K-800 A2197- K-1000 B6703-
E	396J075	————————
F	397F072	K1 B7143-, K8 A27
G		

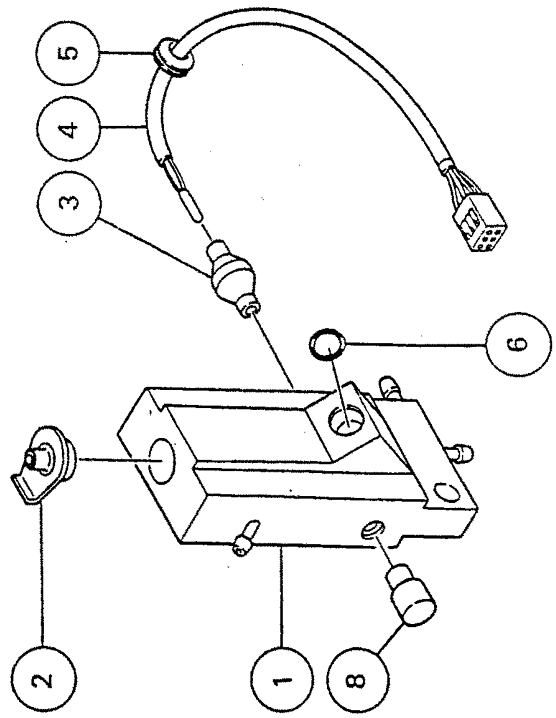
TRANSDUCER ER NO. 17/18 UNIT



TD CHAMBER NO. 4 ASSEMBLY



TD CHAMBER NO. 5 ASSEMBLY



TRANSDUCER ER NO.17/18 UNIT

DATE: 20-FEB-90

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-1671-1	1-7$	TRANSDUCER ER NO.17 UNIT (RBC)	1
	873-1961-0	1-7#	TRANSDUCER ER NO.18 UNIT (WBC)	1
A	442-3666-1	1	FLANGE NO.13	1
	873-0891-2	2$	TRANSDUCER ER NO.17 (RBC)	1
	873-0901-2	2#	TRANSDUCER ER NO.18 (WBC)	1
	346-3912-1	3	O-RING P-10	50
	881-0171-1	4	ELECTRODE NO.21 ASSEMBLY (PM)	1
	343-2457-6	5	O-RING NO. 7 (NITRIL)	100
	442-3509-2	6	NIPPLE NO. 9	50
A	363-1406-3	7	TD RECEPTACLE NO. 6	1

TD CHAMBER NO. 4 AND NO. 5 ASSEMBLIES

DATE: 20-AUG-88

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
873-0871-8	1-6	TD CHAMBER NO. 4 ASSY (RBC)	UNSALABLE
443-0824-1C	1	CHAMBER NO. 5	1
424-4683-1C	2	LID NO.13	1
368-0260-7A	3	RUBBER CAP NO.20	10
229-8706-3	4	THERMISTOR K-1000 (RBC)	1
368-1108-1	5	GROMMET C-30-KG-1350	10
346-6559-5	6	SEAL NO. 9	1

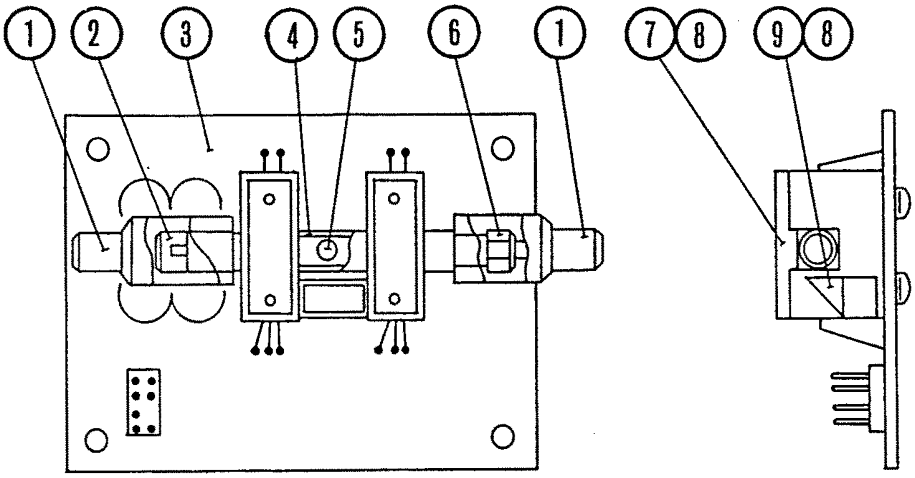
CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
873-0881-5	1-8	TD CHAMBER NO. 5 ASSY (WBC)	UNSALABLE
443-0824-1C	1	CHAMBER NO. 5	1
424-4683-1C	2	LID NO.13	1
368-0260-7A	3	RUBBER CAP NO.20	10
424-4683-1C	2	LID NO.13	1
368-0260-7A	3	RUBBER CAP NO.20	10
229-8705-0	4	THERMISTOR K-1000 (WBC)	1
368-1108-1	5	GROMMET C-30-KG-1350	10
346-6559-5	6	SEAL NO. 9	1
368-0259-2A	8	RUBBER CAP NO.19	10

Before 04.93 update

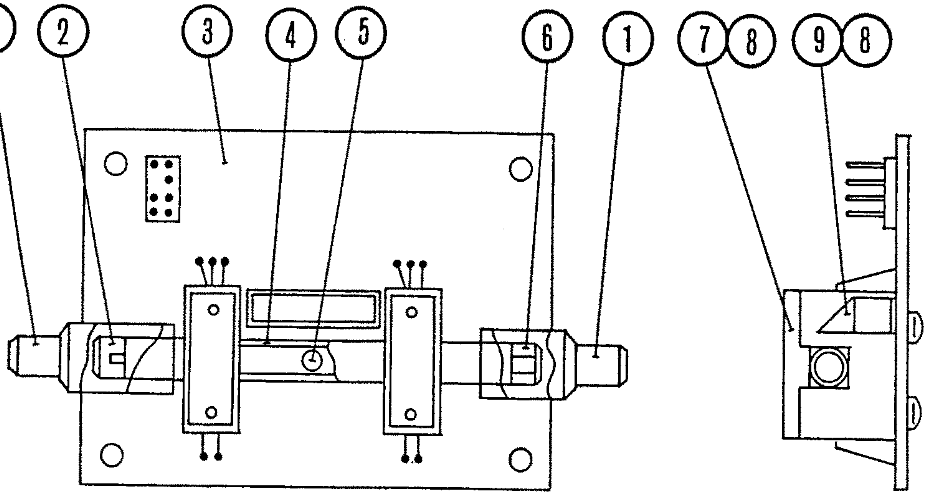
	ECR NO.	K-1000
A	388G065	A1396-

$ for RBC
# for WBC

MANOMETER BLOCK NO. 14 (R/250)



MANOMETER BLOCK NO. 15 (W/400)

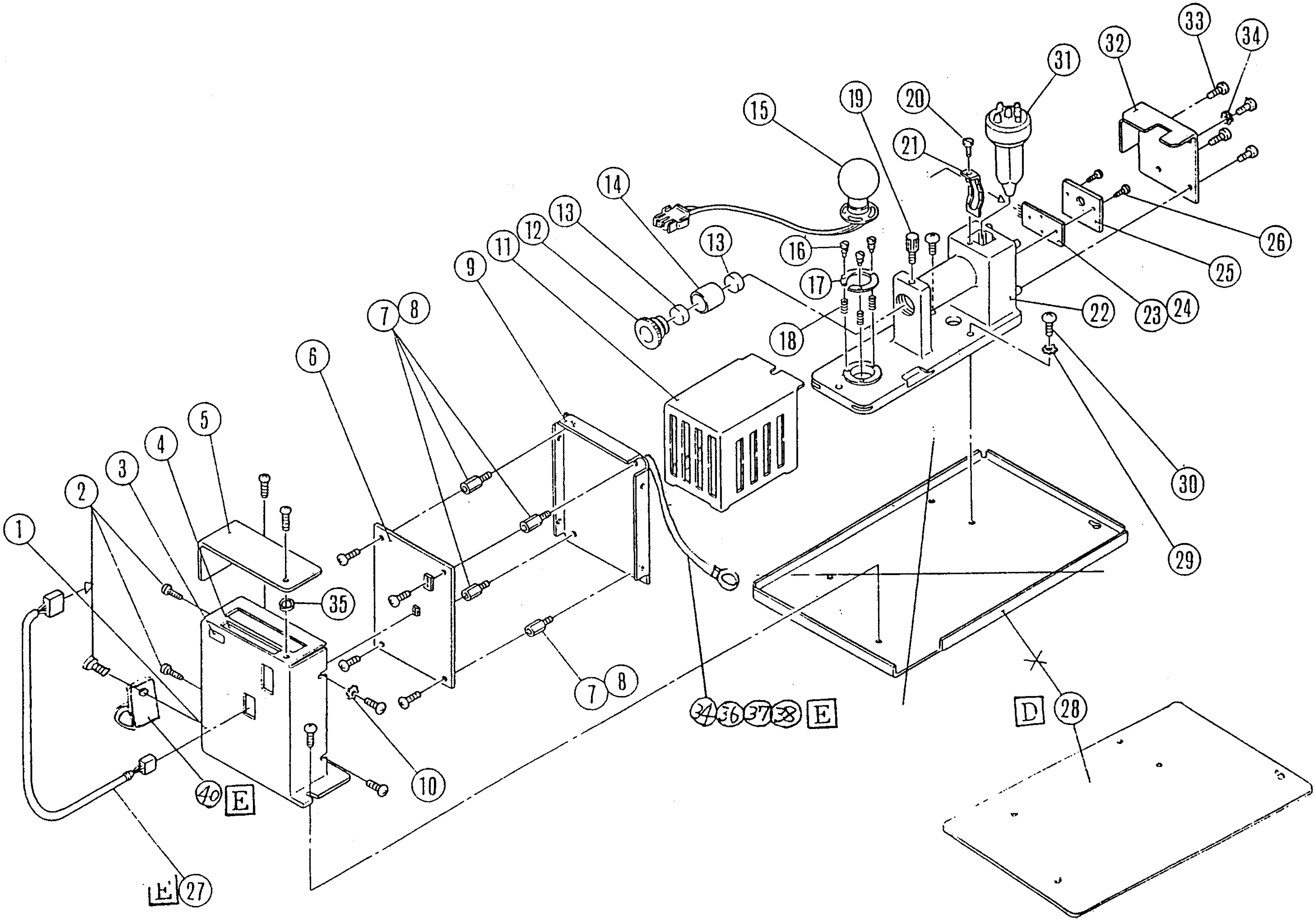


MANOMETER BLOCK NO.14 AND NO.15 ASSEMBLIES

DATE: 21-APR-88

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
873-0911-0	1-9#	MANOMETER BLOCK NO.14 (R/250)	1
442-3308-8	1	RUBBER TUBE NO. 8	5
367-1484-3A	2	STOPPER NO. 4	5
873-1111-0	3#	PCB NO.9142	UNSALABLE
441-1452-3	4#	MANOMETER GLASS NO. 3	1
367-1230-1	5	CARBON BALL 5/32" DIAMETER	5
367-1486-1	6	STOPPER NO. 6	5
363-1953-6	7	PLATE NO. 3	10
426-2780-3	8	SUPER GLUE 1741 (20 GRAMS)	1
421-1691-9	9#	PRISM NO. 1	10
873-1771-6	1-9$	MANOMETER BLOCK NO.15 (W/400)	1
442-3308-8	1	RUBBER TUBE NO. 8	5
367-1484-3A	2	STOPPER NO. 4	5
873-1121-7	3$	PCB NO.9143	UNSALABLE
441-1453-7	4$	MANOMETER GLASS NO. 4	1
367-1230-1	5	CARBON BALL 5/32" DIAMETER	5
357-1486-1	6	stopper no. 6	5
363-1953-6	7	plate no. 3	10
426-2780-3	8	super glue 1741 (20 grams)	1
421-1692-2	9$	PRISM NO. 2	10

HB UNIT NO. 10 ASSEMBLY



HB UNIT NO. 10 ASSEMBLY

DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	873-0932-8	1-35	HB UNIT NO.10 ASSEMBLY	UNSALABLE	
	883-0262-7	1-10	HB COUNTER UNIT NO. 2 ASSEMBLY	1	
E	322-1354-8B	1	COVER NO.140-A	1	
	348-3912-6	2	REF.348-3812-1	100	
	369-7049-7	3	INDICATION MARK NO. 49 (C-2)	10	
	369-7433-0	4	INDICATION MARK NO.433	10	
A	362-1126-4A	5	COVER GLASS NO.26	5	
	863-2221-1	6	PCB NO.2052	1	
	365-7491-7	7	SPACER P-12 SN- 1	10	
	426-3575-7	8	LOCK TIGHT 1401B	1	
	322-1355-1	9	COVER NO.140-B	1	
	348-9343-1	10	WASHER TOOTH LOCK EXT M3 (FE)	100	
	863-0683-6	11-26	DETECTOR BLOCK NO.14 ASSY(C-3)	1	
C	368-9805-7B	11	HGB LAMP COVER NO. 5	1	
	366-9649-5	12	LENS HOLDER NO. 9	1	
	421-4007-3	13	LENS NO. 7	1	
	863-5051-2	14	FILTER OPTICAL UNIT NO. 3 ASSY	1	
	805-0401-1	15	HGB LAMP UNIT-2	10	
B	344-5200-1	16	THUMBSCREW TYPE NO.1 M3X8(FE)	10	
	366-5522-5	17	LAMP MOUNT-B	5	
	345-2226-4	18	SPRING NO. 26	10	
	344-5514-0	19	FIXING SCREW 5-4	10	
	348-3382-4	20	SCREW ROUND M2.6X6 (SUS)	100	
	345-5032-7	21	LEAF SPRING NO.12	1	
	366-8120-7E	22	HGB MOLDED BLOCK	1	
	863-5062-3	23	PCB NO.9137 (C-2)	1	
	426-3150-2	24	SILICONE COMPOUND CASTLE-800	1	
	363-1465-3	25	FIXING METAL NO. 55	5	
	348-3913-0	26	SCREW BINDING M3X8 (SUS)	100	
E	~~873-1401-9~~	~~27~~	~~WIRINS CORD NO. 341~~	~~1~~	
	366-2934-1D	28	MOUNTING PLATE NO.174	1	D
	348-9544-5	29	WASHER TOOTH LOCK EXT M4 (SUS)	100	
	348-3929-9	30	SCREW BINDING M4X12 (SUS)	100	
	873-1761-9	31	FLOW CELL NO. 6 ASSEMBLY	1	
	368-9157-2A	32	SPILL TRAY NO. 6	5	
	348-3911-2	33	SCREW BINDING M3X4 (SUS)	100	
	348-9543-1	34	WASHER TOOTH LOCK EXT M3 (SUS)	100	
A	266-6219-7	35	ISOLATION WASHER AC-311	100	
E	963-0761-3	27	WIRING CORD NO.2184	1	
E	266-3575-1	36	SOLDERLESS LUG 170720-1	100	
E	268-0441-3	37	WIRE UL 1015-18 AWG 250MM	Uns.	
E	348-8513-6	38	NUT HEX M3 (SUS)	100	
E	266-6450-4	40	CLAMP FGC-5(M3)	100	

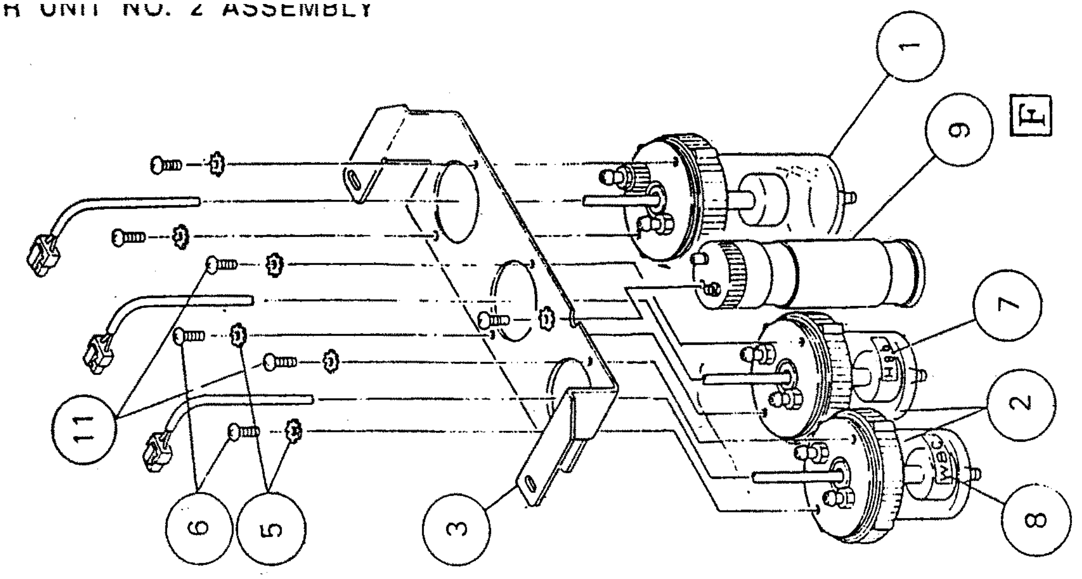
Before 04.93 update

	ECR NO.	K-1000
A	388i181	A1486-
B	392J055	A4989-
C	393A077	B5149-

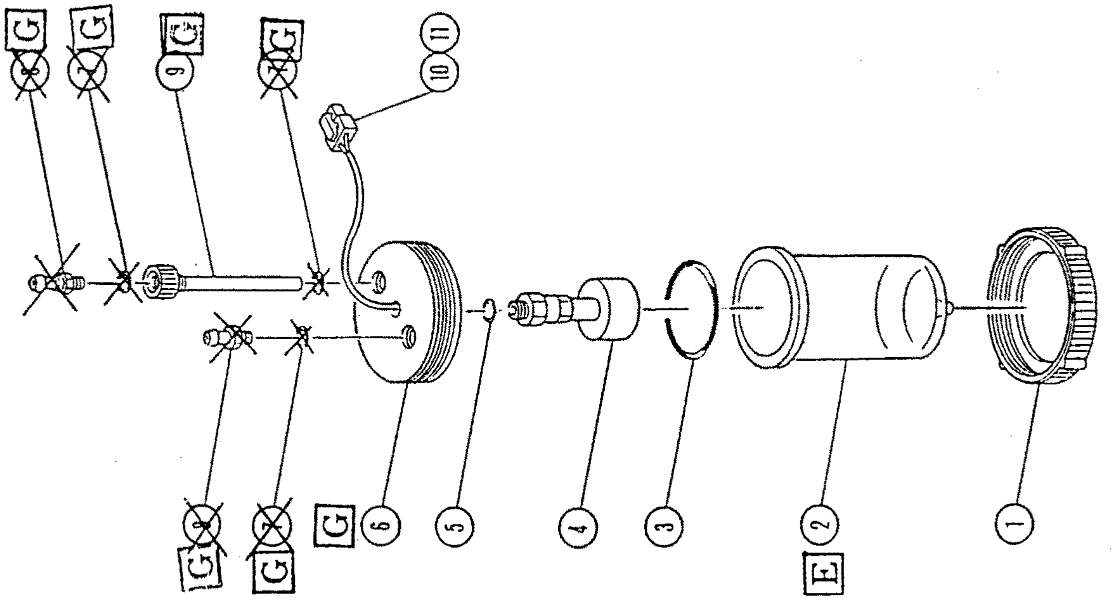
SYM	ECR NO.	SERIAL NO.	
D	393E040	K1 B5469-,	K8 A1286-
E	396E051	K1 B6858-	K8 A2272-

Revised AUG.97

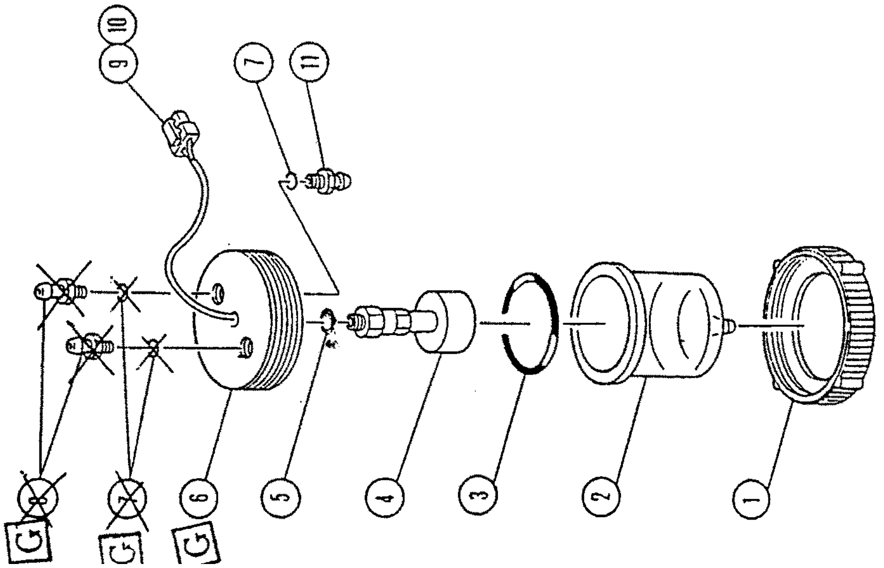
CHAMBER UNIT NO. 2 ASSEMBLY



DILUENT CHAMBER NO. 6 ASSEMBLY



LYSE CHAMBER NO. 2 ASSEMBLY



CHAMBER UNIT NO. 2 ASSEMBLY DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	883-0271-1	1-11	CHAMBER UNIT NO. 2 ASSEMBLY	UNSALABLE	
	873-0951-9	1	DILUENT CHAMBER NO. 6 ASSEMBLY	UNSALABLE	
	873-0961-6	2	LYSE CHAMBER NO. 2 ASSEMBLY	UNSALABLE	
D	366-2635-8	3	CHAMBER MOUNTING PLATE NO.25	1	
D					
	348-9543-1	5	WASHER TOOTH LOCK EXT M3 (SUS)	100	
	348-3912-6	6	SCREW BINDING M3X6 (SUS)	100	
A	369-8504-1	7	LABEL 5- 4 (HGB)	10	
A	369-8505-4	8	LABEL 5- 5 (WBC)	10	
C, D	~~923-9021-7~~	~~9~~	~~TRAP CHAMBER NO.15 ASSY~~	~~UNSALABLE~~	F
C, D	963-0362-5	9	TRAP CHAMBER NO.21 ASSY (C-2)	-- UNSALABLE	F
C	348-3913-0	11	SCREW BINDING M3X8 (SUS)	100	

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0951-9	1-11	DILUENT CHAMBER NO. 6 ASSEMBLY	UNSALABLE
	363-5015-0	1	FIXING MATERIAL NO. 15	1
E	443-0823-8 B	2	CHAMBER NO. 4	1
	346-3939-1	3	O-RING P-39	50
B	263-9132-0	4	FLOAT SWITCH FS-0146-101	5
	346-3909-0	5	O-RING P- 8 (NITRIL)	50
G	~~365-1549-3~~	~~6~~	~~SUPPORT NO. 48~~	~~1~~
G	~~343-2425-7~~	~~7~~	~~O-RING NO 2 (NITRIL)~~	~~100~~
G	~~442-3507-5~~	~~8~~	~~NIPPLE NO. 7~~	~~50~~
G	~~442-1583-1~~	~~9~~	~~DRAIN PIPE NO. 3~~	~~1~~
	264-3131-1	10	CONNECTOR 5557-02R	10
	264-9881-8	11	PIN 5556T	100
	365-1333-3	6	SUPPORT NO. 247	1
	442-1660-1	9	PIPE NO. 30	1

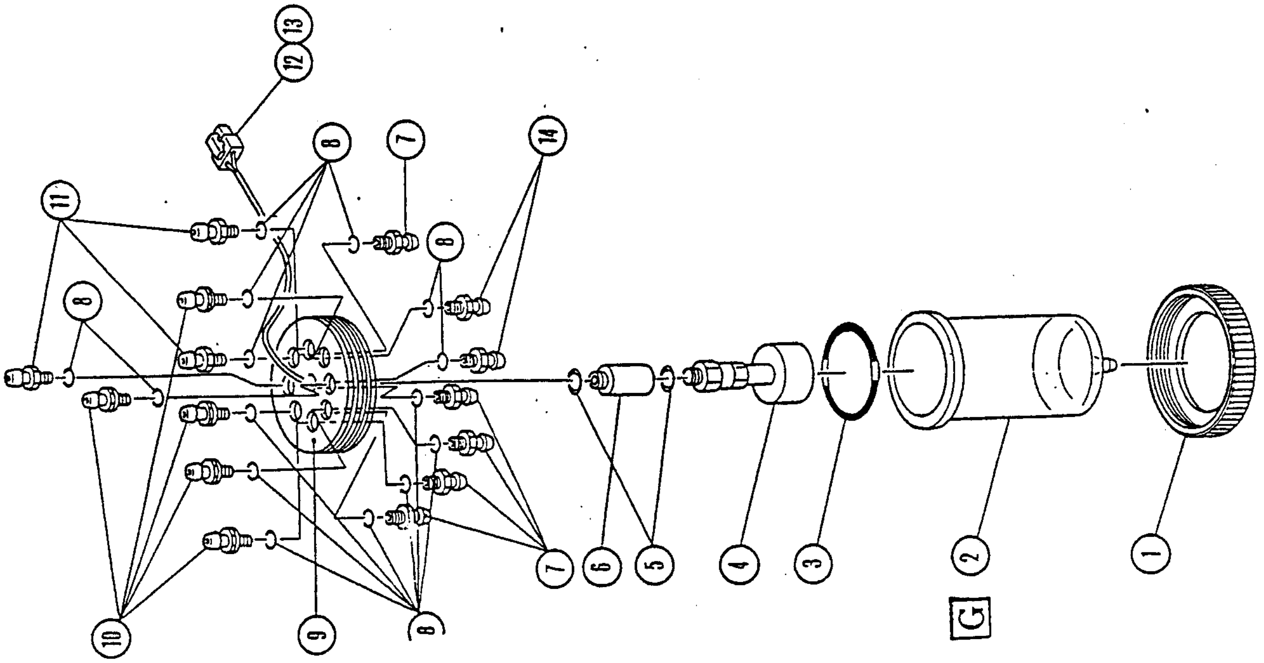
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0961-6	1-11	LYSE CHAMBER NO. 2 ASSEMBLY	UNSALABLE
	363-5015-0	1	FIXING MATERIAL NO. 15	1
	443-0830-4	2	CHAMBER NO.11	1
	346-3939-1	3	O-RING P-39	50
B	263-9132-0	4	FLOAT SWITCH FS-0146-101	5
	346-3909-0	5	O-RING P- 8 (NITRIL)	50
G	~~365-1549-3~~	~~6~~	~~SUPPORT NO. 48~~	~~1~~
G	343-2425-7	7	O-RING NG-2 (NITRIL)	100
G	~~442-3507-5~~	~~8~~	~~NIPPLE NO. 7~~	~~50~~
	264-3131-1	9	CONNECTOR 5557-02R	10
	264-9881-8	10	PIN 5556T	100
	442-3757-2	11	HOSE NIPPLE NO. 7	100
G	365-1333-3	6	SUPPORT NO. 247	1

Before 04.93 update

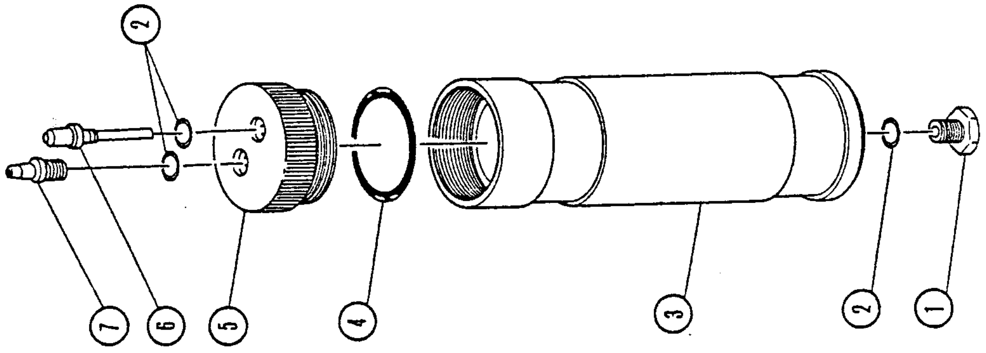
	ECR NO.	K-1000
A	388E014	A1156-
B	389L053	A2346-
C	390E060	A2631-
D	393A077	B5149-

SYM	ECR NO.	K-1000	K-800
E	396B065	B6763-	A2232-
F	396E032	B6888-	A2302-
G	396H058	------	------
H			

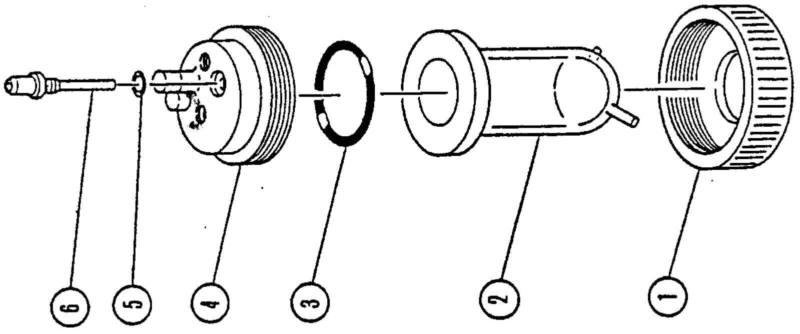
WASTE CHAMBER NO. 5 ASSEMBLY



TRAP CHAMBER NO. 5 ASSEMBLY



MIXING CHAMBER NO. 3 ASSEMBLY



CHAMBERS ASSEMBLIES DATE: 20-APR-93

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
873-0761-5	1-14	WASTE CHAMBER NO. 5 ASSEMBLY	UNSALABLE
363-5015-0	1	FIXING MATERIAL NO. 15	1
G 443-0823-8B	2	CHAMBER NO. 4	1
346-3939-1	3	O-RING P-39	50
C 263-9132-0	4	FLOAT SWITCH FS-0146-101	5
346-3909-0	5	O-RING P- 8 (NITRIL)	50
365-1522-3A	6	SUPPORT NO. 22	5
442-3758-6	7	HOSE NIPPLE NO. 8	100
343-2425-7	8	O-RING NG-2 (NITRIL)	100
365-1548-0	9	SUPPORT NO. 47	1
442-3507-5	10	NIPPLE NO. 7	50
442-4552-7	11	SUS NIPPLE 2	10
264-3131-1	12	CONNECTOR 5557-02R	10
264-9881-8	13	PIN 5556T	100
442-3757-2	14	HOSE NIPPLE NO. 7	100

D	873-0771-2	1-9$	TRAP CHAMBER NO. 5 ASSY (C1/K1)	UNSALABLE
D	873-0772-6	1-9#	TRAP CHAMBER NO. 5 ASSY (C2/R3)	UNSALABLE
D	442-3702-8	1	PLUG 5-2	10
	343-2425-7	2	O-RING NG-2 (NITRIL)	100
	443-0828-6	3	CHAMBER NO. 9	1
	346-3917-0	4	O-RING P-16	50
D F	442-3014-4A	5	ADAPTOR NO.14	1
D	----------		----------	----------
D	442-3507-5	7	NIPPLE NO. 7	50
D	442-3579-3	8$	NIPPLE NO. 77	1
D	442-3578-0	8#	NIPPLE NO. 76	1
E	442-5287-4	9	TUBE SILICONE 1/8" X 1/4"F7398	5 M
	----------		----------	----------
	873-0791-7	1-7	MIXING CHAMBER NO. 3 ASSEMBLY	UNSALABLE
	363-5022-6	1	FIXING MATERIAL NO. 22	1
	443-2537-1	2	GLASS CHAMBER GC-37	1
	346-3918-3	3	O-RING P-20	50
B, F	363-5382-6	4	FIXING MATERIAL NO.639	1
A	343-2457-6	5	O-RING NO. 7 (NITRIL)	100
F	442-3511-1	6	NIPPLE NO. 11	10
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Before 04.93 update

	ECR NO.	K-1000
A	389E032	A1831-
B	389J037	A2191-
C	389L053	A2346-
D	390E060	A2631-
E	392E068	A4709-
F	393A077	B5149-

SYM	ECR NO.	K-1000	K-800
G	396B065	B6763-	A2232-
H			
I			
J			

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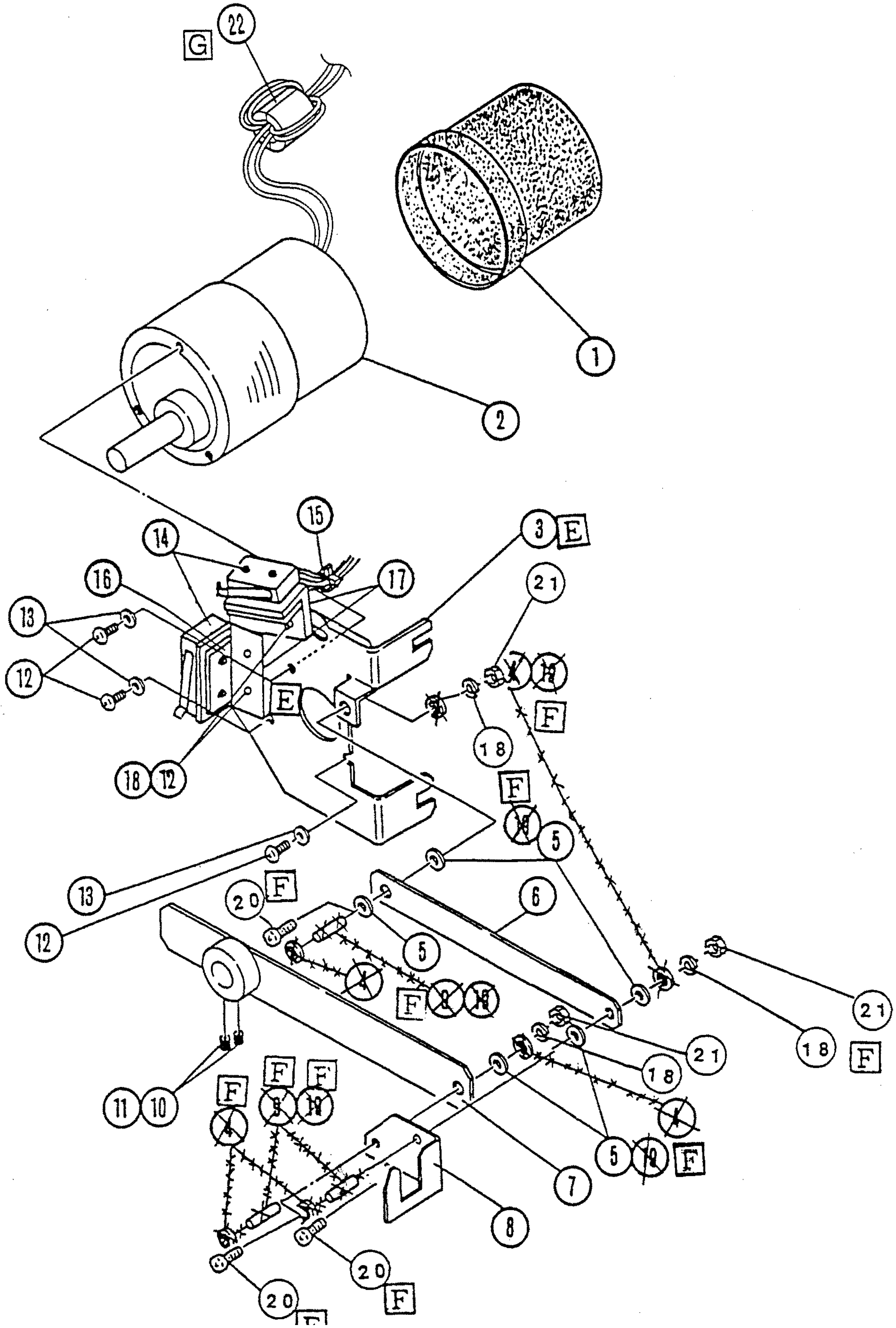
RINSE CUP MECHANISM NO. 6 ASSEMBLY



RINSE CUP MECHANISM NO. 6 ASSEMBLY

DATE: 20-APR-93

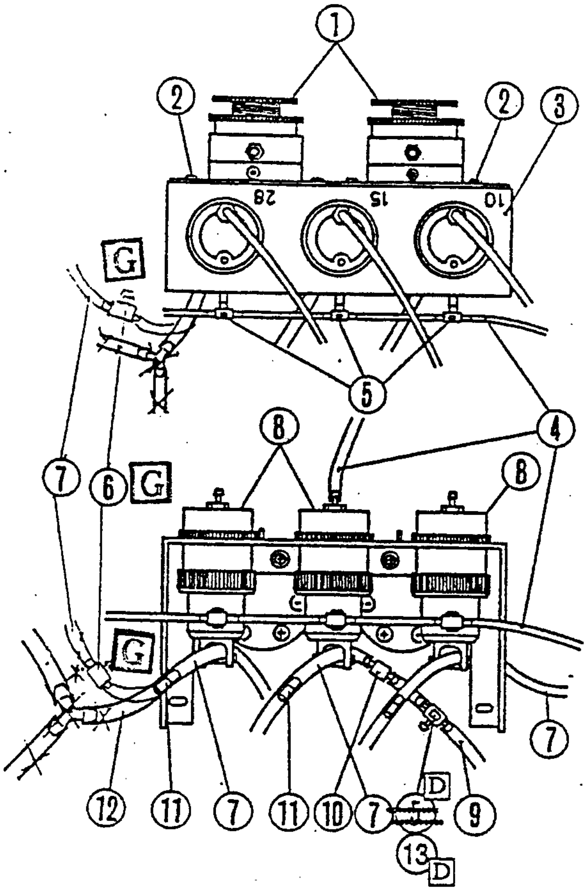
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	873-0801-7	1-19	RINSE CUP MECHANISM NO. 6 ASSY	1	
	368-0261-1A	1	RUBBER CAP NO.21	1	
	873-1751-1	2	MOTOR BLOCK NO.14 ASSEMBLY	1	
E B, C	366-3383-4E	3	MOTOR MOUNTING PLATE NO.23	1	
F	~~348-8903-1~~	~~4~~	~~NUT PUSH M3 (SUS)~~	~~100~~	
	266-6219-7	5	ISOLATION WASHER AC-311	100	
	342-2282-1	6	GUIDE BOARD NO. 29	1	
A	342-2200-6C	7	GUIDE BOARD NO. 30	1	
	363-1546-8	8	SUPPORT METAL NO. 21	1	
D F	~~344-3733-4~~	~~9~~	~~PIN PARALLEL M6A 3X10 (S20C)~~	~~10~~	
	348-5146-6	10	SCREW HEX-SOCKET M3X4 (BS) WPOIN	100	
	426-3575-7	11	LOCK TIGHT 1401B	1	
	348-3912-6	12	SCREW BINDING M3X6 (SUS)	100	
	348-9513-0	13	WASHER SPRING M3 (SUS)	100	
B	348-1276-9	14	SCREW ROUND M2.3X12 (C3602)	100	
	266-4461-8	15	TIE WRAP CV-100	1000	
B	363-1096-7	16	METAL PLATE NO. 96	5	
C	366-2578-2	17	SW MOUNTING PLATE NO. 76	1	
C	348-9303-1	18	WASHER FLAT M3 (FE)	100	
D F	~~426-3666-9~~	~~19~~	~~LUBRICANT BIRAL T&D SPRAY 100C~~	~~1~~	
	348-3913-0	20	SCREW BINDING M3X8 (SUS)	100	F
	348-8513-6	21	NUT HEX M3 (SUS)	100	F
	241-9216-0	22	EMI CORE ESD-R-12C	1	G

Before 04.93 update

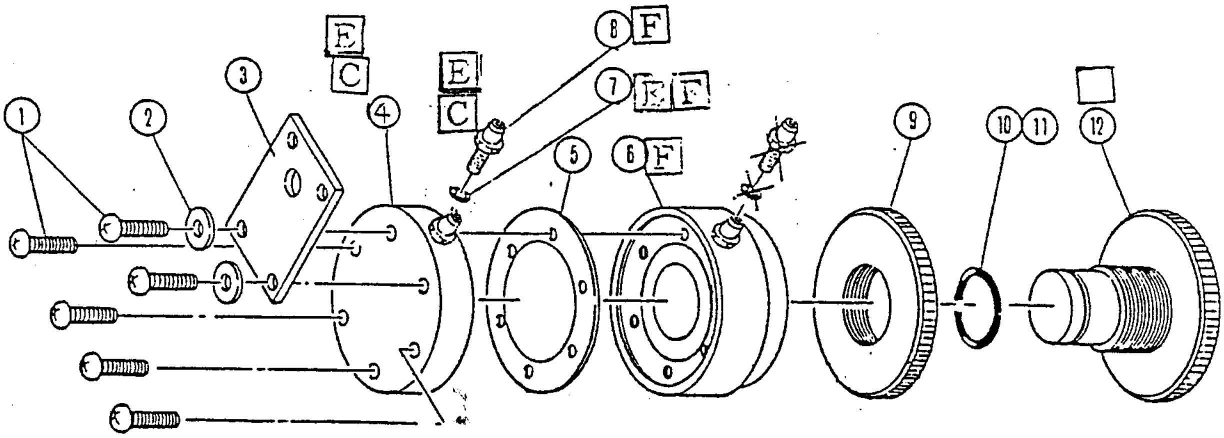
SYM	ECR NO.	SERIAL NO.
A	388K133	A1506-
B	388L078	A1566-
C	389J059	A2266-
D	392B034	A4379-
E	394E040	K1 B5519-, K8 A1331-

SYM	ECR NO.	SERIAL NO.
F	395F019	K1 B6343-, K8 A1872-
G	396I014	K1 B6903-, K8 A2322-

VALVE UNIT NO. 23 COMPLETE ASSEMBLY



DIAPHRAGM PUMP NO. 5
DIAPHRAGM PUMP NO. 8



Revised Jun. 98

VALVE UNIT NO. 23 COMPLETE ASSEMBLY DATE: 14-DEC-94

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0811-4		VALVE UNIT NO.23 ASSEMBLY	1
	873-0821-1	1	DIAPHRAGM PUMP NO. 9 ASSEMBLY	1
	348-3912-6	2	SCREW BINDING M3X6 (SUS)	100
	366-2942-1A	3	MOUNTING PLATE NO.179	1
	442-5055-4	4	TUBE POLYURETHANE 1.8MMX3.4MM	10 M
D	442-3424-3	5	HYDRAULIC CONNECTOR NO.14	10
G	~~442-1403-8~~	~~6~~	~~CONNECTING TUBE NO. 3~~	~~10~~
B	442-5287-4	7	TUBE SILICONE 1/8" X 1/4"F7398	1 M
	805-0022-8	8	MASTER VALVE 2MV-6 (E-SERIES)	1
	442-5333-9	9	TUBE POLYURETHANE 2.4MM X 4MM	10 M
	442-3433-7	10	HYDRAULIC CONNECTOR NO.23	10
A	442-5430-3	11	TUBE TEFLON 3.2MMID X 4.2 MMOD	10
A	442-5301-0	12	TUBE SILICONE 3MMID X 6.5MMOD	10
D	442-1437-4	13	CONNECTING TUBE NO. 37	10
G	442-3429-1	6	HYDRAULIC CONNECTOR NO. 19	10

Before 04.93 update

SYM	ECR NO.	SERIAL NO.
A	392E036	A4772-
B	392I036	A4804-

C	393E022	K1 B5328-, K8 A1238-
D	394I045	K1 B6087-, K8 A1711-
E	395G011	K1 B6463-, K8 A2047-
F	396D017	K1 B6793-, K8 A2242-
G	397F072	K1 B7143-, K8 A2757-

DIAPHRAGM PUMP NO. 5 AND NO. 8 ASSEMBLIES DATE: 20-OCT-91

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	873-0641-5	1-12	DIAPHRAGM PUMP NO. 5 ASSY (C-1)	1	
	348-3915-7	1	SCREW BINDING M3X12 (SUS)	100	
	348-9503-2	2	WASHER FLAT M3 (SUS)	100	
	366-2940-3	3	MOUNTING PLATE NO.177	1	
	~~363-1815-9~~	~~4~~	~~DIAPHRAGM FIXTURE NO.13-A~~	~~1~~	C
	443-0769-3A	5	DIAPHRAGM NO.19	10	
F	363-1816-2C	6	DIAPHRAGM FIXTURE NO.13-B	1	
E	~~343-2457-6~~	~~7~~	~~O-RING NO. 7 (NITRIL)~~	~~100~~	
F	442-3509-2	8	NIPPLE NO. 9	50	
	344-7519-5	9	NUT NO.19	1	
	346-3915-2	10	O-RING P-12	50	
	426-4475-5	11	SILICONE GREASE SH-SCG	1	
	~~443-1329-6~~	~~12~~	~~PISTON NO.28~~	~~1~~	C
E	363-1835-3	4	DIAPHRAGM FIXTURE NO.25	1	C
	443-1276-6	12	PISTON NO.62	5	C
E	363-1815-9	4	DIAPHRAGM FIXTURE NO.13-A	1	
F E	343-2466-0A	7	O-RING NO.16	50	

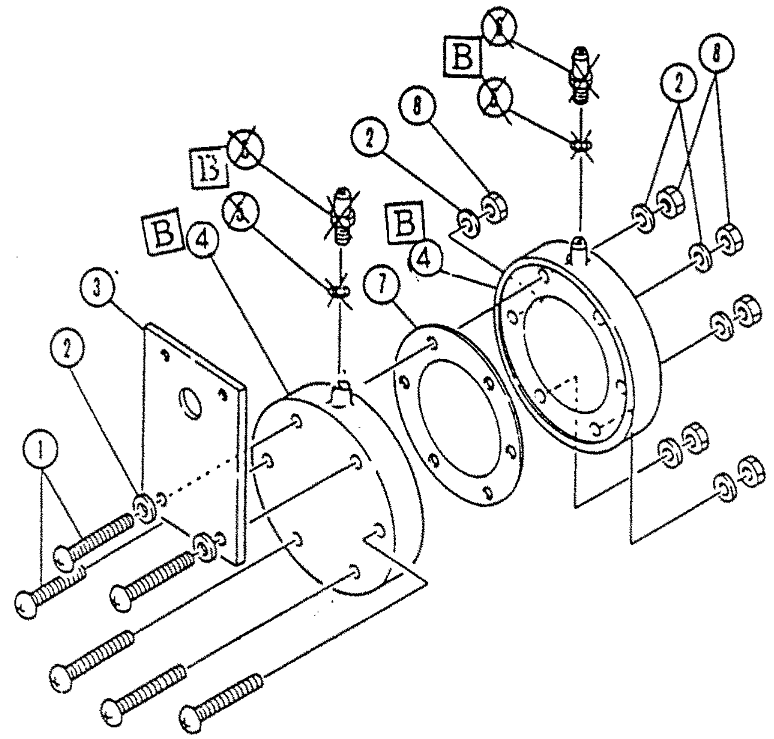
	873-0741-1	1-12	DIAPHRAGM PUMP NO. 8 ASSEMBLY	1	
	348-3915-7	1	SCREW BINDING M3X12 (SUS)	100	
	348-9503-2	2	WASHER FLAT M3 (SUS)	100	
	366-2940-3	3	MOUNTING PLATE NO.177	1	
	~~363-1017-6~~	~~4~~	~~DIAPHRAGM FIXTURE NO. 14~~	~~1~~	C
	443-0768-OB	5	DIAPHRAGM NO. 18	10	
F	363-1814-5C	6	DIAPHRAGM FIXTURE NO. 12-B	1	
F	~~343-2457-6~~	~~7~~	~~O-RING NO. 7 (NITRIL)~~	~~100~~	
F	~~442-3509-2~~	~~8~~	~~NIPPLE NO. 9~~	~~50~~	
	344-7518-1	9	NUT NO. 18	1	
	346-3968-0	10	O-RING P-18	50	
	426-4475-5	11	SILICONE GREASE SH-SCG	1	
F	443-1328-2A	12	PISTON NO. 27	1	
	363-1836-7	4	DIAPHRAGM FIXTURE NO. 26	1	C

Before 04.93 update

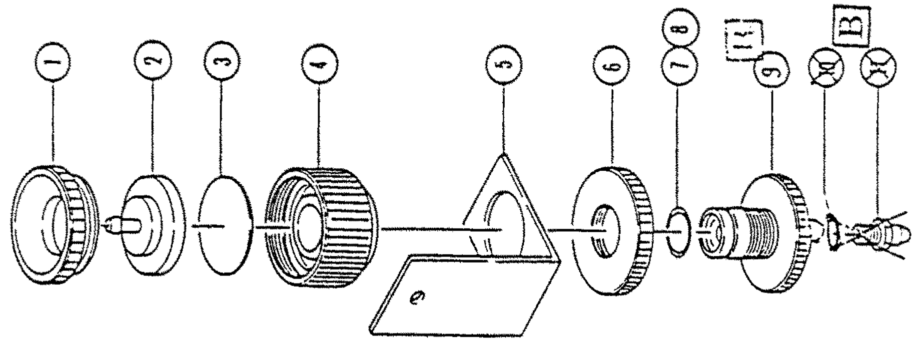
SYM	ECR NO.	SERIAL NO.
A	392E036	A4772-
B	392I036	A4804-

C	393E022	K1 B5328-, K8 A1238-
D	394I045	K1 B6087-, K8 A1711-
E	395G011	K1 B6463-, K8 A2047-
F	396D017	K1 B6793-, K8 A2242-
G	397F072	K1 B7143-, K8 A2757-

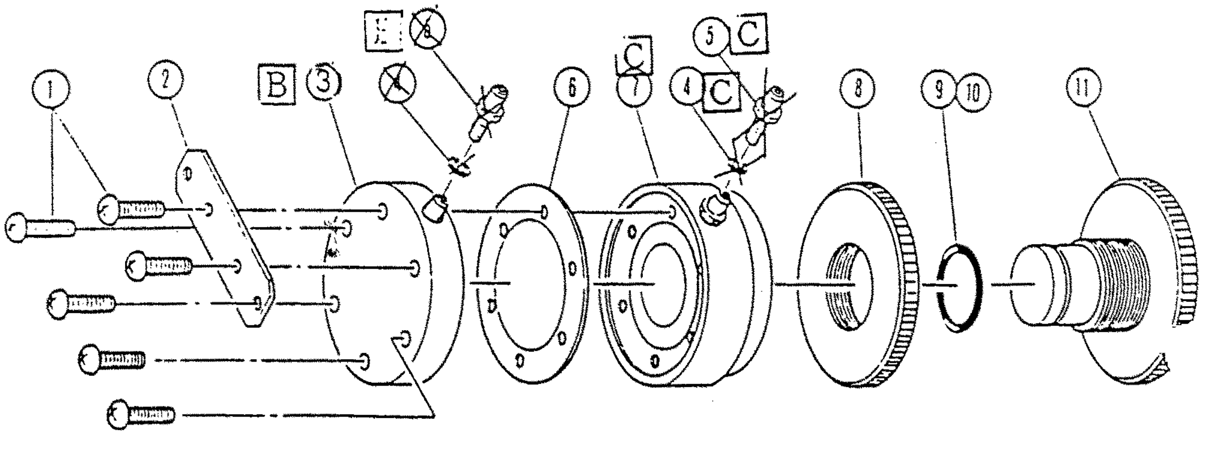
DIAPHRAGM PUMP NO. 6 ASSEMBLY



DIAPHRAGM PUMP NO. 7 ASSEMBLY



DIAPHRAGM PUMP NO. 9 ASSEMBLY



Revised DEC. 96

DIAPHRAGM PUMP NO. 6 NO. 7 AND NO. 9 ASSEMBLIES DATE: 20-OCT-91

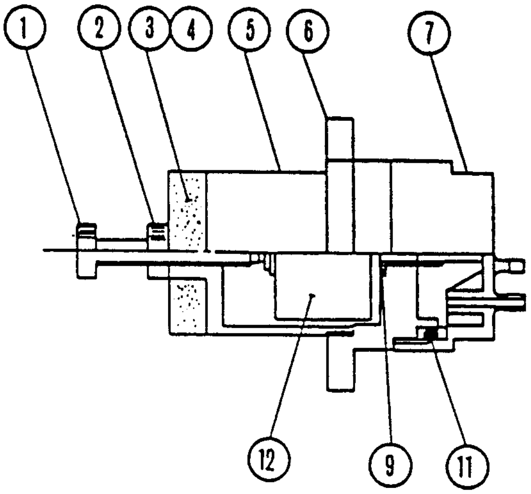
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	873-0671-7	1-8	DIAPHRAGM PUMP NO. 6 ASSEMBLY	1	
	348-3919-1	1	SCREW BINDING M3X20 (SUS)	100	
	348-9503-2	2	WASHER FLAT M3 (SUS)	100	
	366-2940-3	3	MOUNTING PLATE NO.177	1	
	~~363-1818-0~~	~~4~~	~~DIAPHRAGM FIXTURE NO.15~~	~~1~~	B
	~~343-2457-6~~	~~5~~	~~O-RING NO. 7 (NITRIL)~~	~~100~~	B
	~~442-3509-2~~	~~6~~	~~NIPPLE NO. 9~~	~~50~~	B
	443-0768-0B	7	DIAPHRAGM NO.18	10	
	348-8513-6	8	NUT HEX M3 (SUS)	100	
	363-1837-1	4	DIAPHRAGM FIXTURE NO.27	1	B
	873-0711-9	1-11	DIAPHRAGM PUMP NO. 7 ASSEMBLY	1	
	363-5100-0	1	FIXING MATERIAL NO. 95	1	
	363-1811-4	2	DIAPHRAGM FIXTURE NO.11-A	1	
	443-0767-6A	3	DIAPHRAGM NO.17	10	
	363-1812-8	4	DIAPHRAGM FIXTURE NO.11-B	1	
	366-2939-9	5	MOUNTING PLATE NO.176	1	
	344-7517-8	6	NUT NO.17	1	
	346-3908-6	7	O-RING P- 7 (NITRIL)	50	
	426-4475-5	8	SILICONE GREASE SH-SCG	1	
	~~443-1327-9~~	~~9~~	~~PISTON NO.26~~	~~1~~	B
	~~343-2457-6~~	~~10~~	~~O-RING NO. 7 (NITRIL)~~	~~100~~	B
	~~442-3509-2~~	~~11~~	~~NIPPLE NO. 9~~	~~50~~	
	443-1275-2	9	PISTON NO.61	5	B
	873-0821-1	1-11	DIAPHRAGM PUMP NO. 9 ASSY (C-1)	1	
	348-3915-7	1	SCREW BINDING M3X12 (SUS)	100	
	366-2935-4	2	MOUNTING PLATE NO.175	1	
A	~~363-1013-1A~~	~~3~~	~~DIAPHRAGM FIXTURE NO. 12-A~~	~~1~~	B
C	~~343-2457-6~~	~~4~~	~~O-RING NO. 7 (NITRIL)~~	~~100~~	
C	~~442-3509-2~~	~~5~~	~~NIPPLE NO. 9~~	~~50~~	
	443-0768-0B	6	DIAPHRAGM NO.18	10	
C	363-1814-5C	7	DIAPHRAGM FIXTURE NO.12-B	1	
	344-7518-1	8	NUT NO.18	1	
	346-3968-0	9	O-RING P-18	50	
	426-4475-5	10	SILICONE GREASE SH-SCG	1	
	443-1328-2	11	PISTON NO.27	1	
	363-1834-0	3	DIAPHRAGM FIXTURE NO.24	1	B

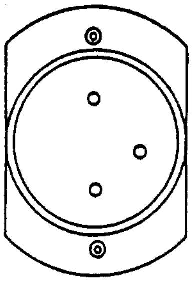
Before 04.93 update

	ECR NO.	K-1000
A	388F078	A1216-

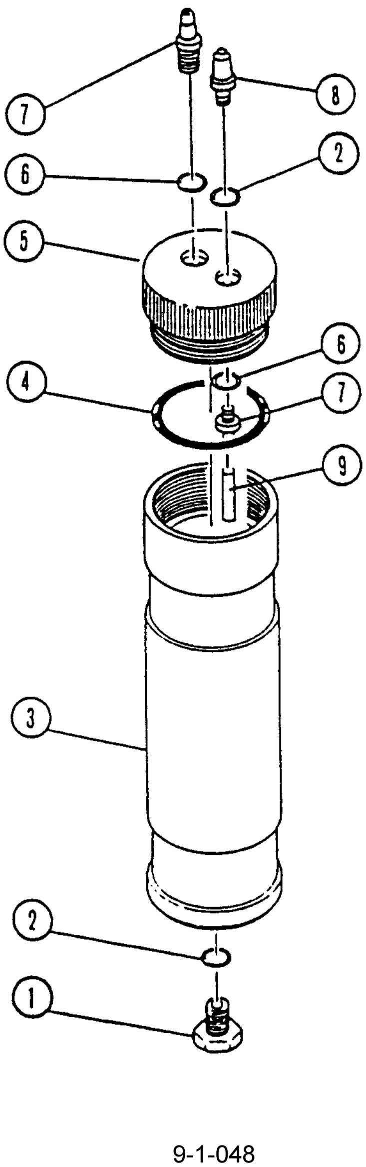
SYM	ECR NO.	SERIAL NO.	
B	393E022	K1 B5328-,	K8 A1238-
C	396D017	K1 B6793-	K8 A2242-

BELLOWS UNIT NO. 2 ASSEMBLY





TRAP CHAMBER NO. 15 ASSEMBLY



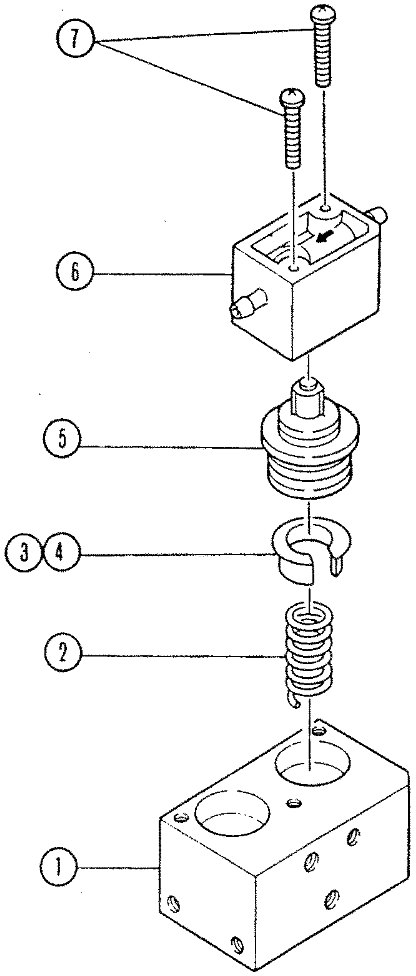
BELLOWS UNIT N0. 2 ASSY / TRAP CHAMBER NO. 15 ASSY DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0601-6	1-12	BELLOWS UNIT NO. 2	UNSALABLE
	443-2862-1	1	NV-2 ROD	5
	344-7600-1	2	NEEDLE FIXING NUT	10
	443-1471-9	3	BELLOWS FILTER	5
	426-1266-0	4	GLUE G-17	5
	363-2480-3	5	HOLDER NO.29	5
C	365-1581-3A	6	SUPPORT NO. 70	1
D, E	443-0739-1	7	TANK NO.18	1
E				
	343-2425-7	9	O-RING NG-2 (NITRIL)	100
A, E				
	346-3930-9	11	O-RING P-30	50
	367-8202-2	12	BELLOWS WITH METAL NO.2	1
E	923-9021-7	1-9	TRAP CHAMBER NO.15 ASSY	UNSALABLE
	442-3702-8	1	PLUG 5-2	10
	343-2425-7	2	O-RING NG-2 (NITRIL)	100
	443-0828-6	3	CHAMBER NO. 9	1
	346-3917-0	4	O-RING P-16	50
	442-3016-1A	5	ADAPTOR NO.16	1
	343-2457-6	6	O-RING NO. 7 (NITRIL)	100
	442-3509-2	7	NIPPLE NO. 9	50
	442-3507-5	8	NIPPLE NO. 7	50
	442-5055-4	9	TUBE POLYURETHANE 1.8MMX3.4MM	10 M

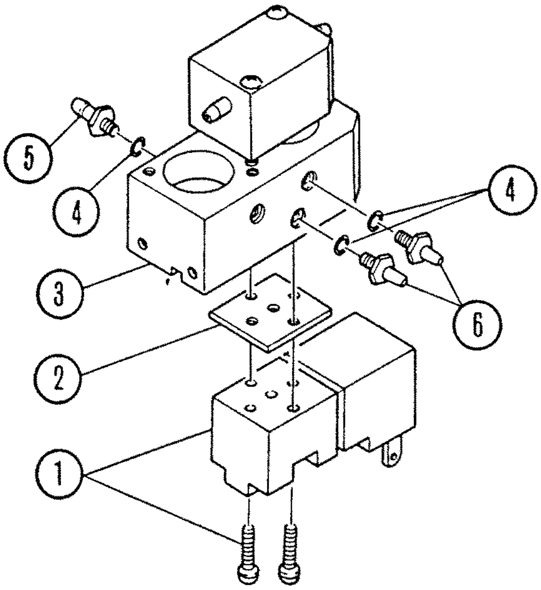
Before 04.93 update

	ECR NO.	K-1000
	389B051	A1681-
	389D044	A1716-
	390A002	A2416-
	390E060	A2631-
	393A077	A5138-

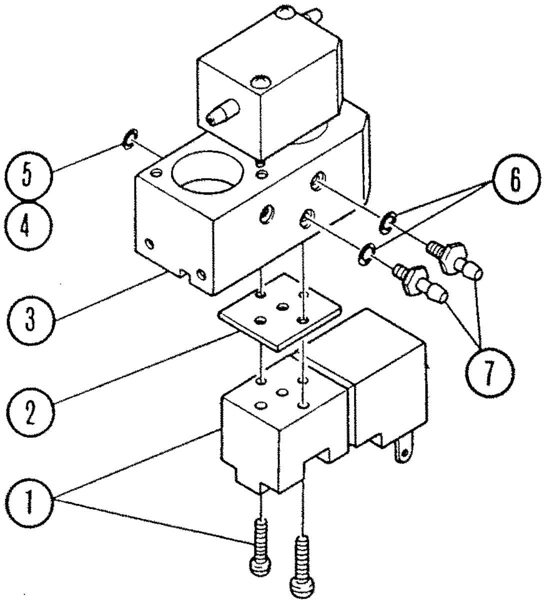
MASTER VALVE 2MV14 ASSEMBLY



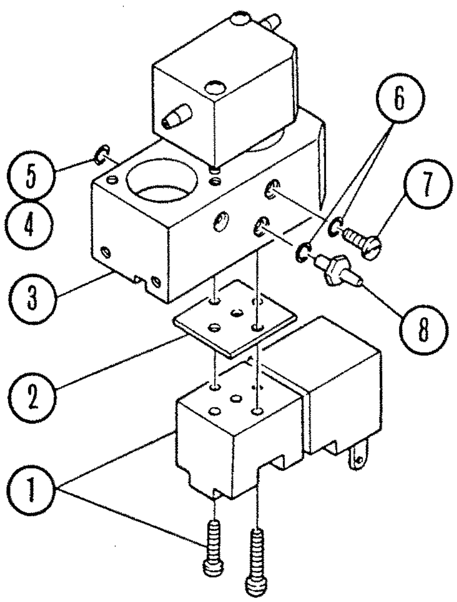
MASTER VALVE 2MV14-H ASSEMBLY



MASTER VALVE 2MV14-I ASSEMBLY



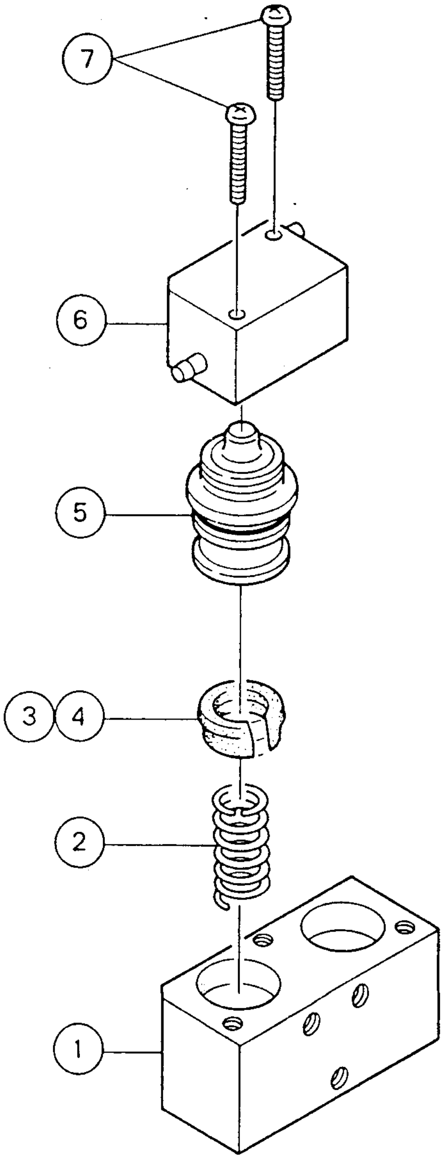
MASTER VALVE 2MV14-J ASSEMBLY



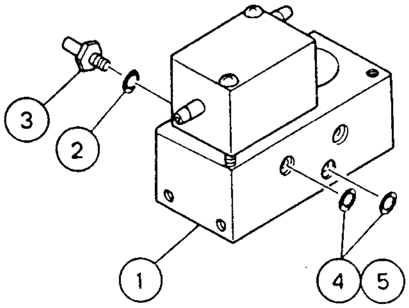
MASTER VALVE 2MV14-x ASSEMBLY DATE: 21-APR-88

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
863-1151-3	1-7$	MASTER VALVE 2MV14 (C1/2.4X4)	1
863-1152-7	1-7#	MASTER VALVE 2MV14 (C2/1.8X3.4)	1
443-1513-8A	1	MANIFOLD NO.13	1
345-2262-9	2	SPRING NO. 62	10
346-2510-9	3	MINI-Y PACKING MY-10	10
426-4475-5	4	SILICONE GREASE SH-SCG	1
873-0351-6	5	CYLINDER UNIT NO. 6-L	10
443-1151-8A	6$	VALVE SEAL NO.11	1
443-1166-3A	6#	VALVE SEAL NO.26	10
348-1310-9	7	SCREW ROUND M2.6X20 (BS)	100
873-1411-6	1-6	MASTER VALVE 2MV14-H ASSEMBLY	UNSALABLE
443-6961-7	1	S.V. P5136 NBV	1
368-0209-6	2	ANTI-SHOCK RUBBER NO. 9	10
863-1152-7	3	MASTER VALVE 2MV14 (C2/1.8X3.4)	1
343-2457-6	4	O-RING NO. 7 (NITRIL)	100
442-3509-2	5	NIPPLE NO. 9	50
442-3535-0	6	NIPPLE NO. 34	10
873-1421-3	1-7	MASTER VALVE 2MV14-I ASSEMBLY	UNSALABLE
443-6961-7	1	S.V. P5136 NBV	1
368-0209-6	2	ANTI-SHOCK RUBBER NO. 9	10
863-1152-7	3	MASTER VALVE 2MV14 (C2/1.8X3.4)	1
346-3600-1	4	O-RING IN-3 (NITRIL)	100
426-4475-5	5	SILICONE GREASE SH-SCG	1
343-2457-6	6	O-RING NO. 7 (NITRIL)	100
442-3509-2	7	NIPPLE NO. 9	50
873-1431-1	1-8	MASTER VALVE 2MV14-J ASSEMBLY	UNSALABLE
443-6961-7	1	S.V. P5136 NBV	1
368-0209-6	2	ANTI-SHOCK RUBBER NO. 9	10
863-1152-7	3	MASTER VALVE 2MV14 (C2/1.8X3.4)	1
346-3600-1	4	O-RING IN-3 (NITRIL)	100
426-4475-5	5	SILICONE GREASE SH-SCG	1
343-2457-6	6	O-RING NO. 7 (NITRIL)	100
442-3709-3	7	PLUG NO. 9	10
442-3535-0	8	NIPPLE NO. 34	10

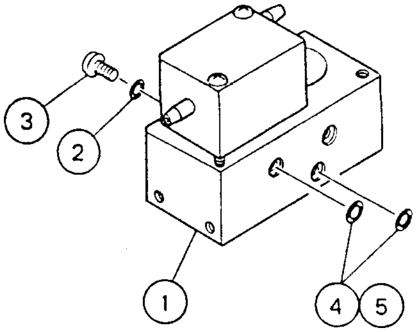
MASTER VALVE 2MV15 ASSEMBLY



MASTER VALVE 2MV15-C ASSEMBLY



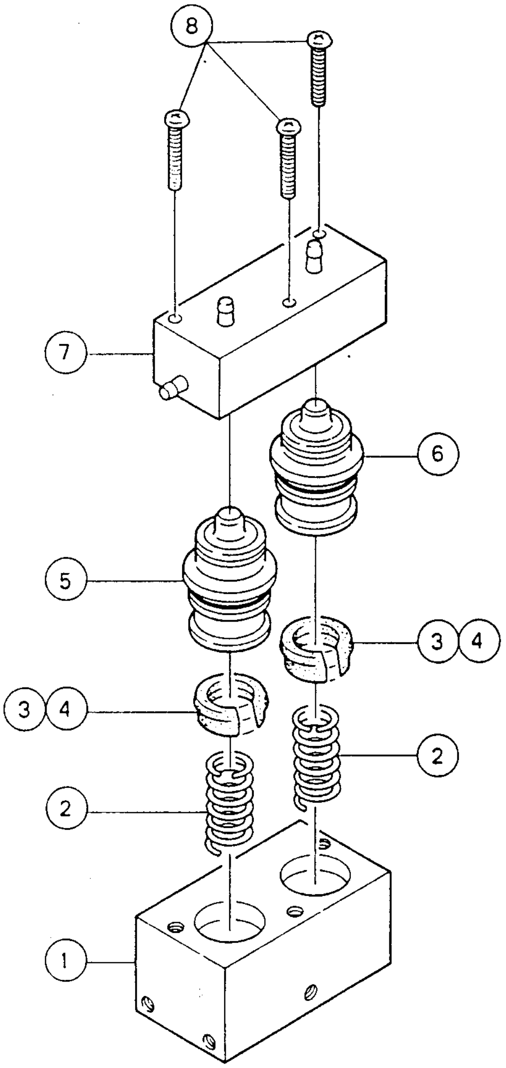
MASTER VALVE 2MV15-D ASSEMBLY



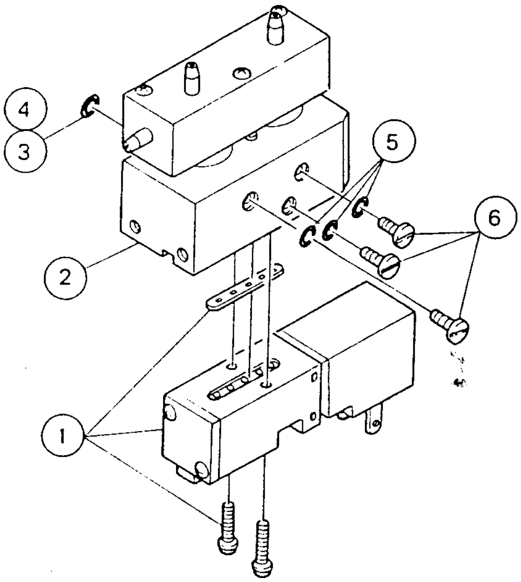
MASTER VALVE 2MV15-x ASSEMBLY DATE: 21-APR-88

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
863-1181-5	1-7$	MASTER VALVE 2MV15 (C1/2.4X4)	1
863-1182-9	1-7#	MASTER VALVE 2MV15 (C2/1.8X3.4)	1
443-1511-1A	1	MANIFOLD NO.11	1
345-2262-9	2	SPRING NO. 62	10
346-2510-9	3	MINI-Y PACKING MY-10	10
426-4475-5	4	SILICONE GREASE SH-SCG	1
873-0351-6	5	CYLINDER UNIT NO. 6-L	10
443-1151-8A	6$	VALVE SEAL NO.11	1
443-1166-3A	6#	VALVE SEAL NO.26	10
348-1310-9	7	SCREW ROUND M2.6X20 (BS)	100
873-1441-8	1-5	MASTER VALVE 2MV15-C ASSEMBLY	UNSALABLE
863-1182-9	1	MASTER VALVE 2MV15 (C2/1.8X3.4)	1
343-2457-6	2	O-RING NO. 7 (NITRIL)	100
442-3535-0	3	NIPPLE NO. 34	10
346-3600-1	4	O-RING IN-3 (NITRIL)	100
426-4475-5	5	SILICONE GREASE SH-SCG	1
873-1451-5	1-5	MASTER VALVE 2MV15-D ASSEMBLY	UNSALABLE
863-1182-9	1	MASTER VALVE 2MV15 (C2/1.8X3.4)	1
343-2457-6	2	O-RING NO. 7 (NITRIL)	100
442-3709-3	3	PLUG NO. 9	10
346-3600-1	4	O-RING IN-3 (NITRIL)	100
426-4475-5	5	SILICONE GREASE SH-SCG	1

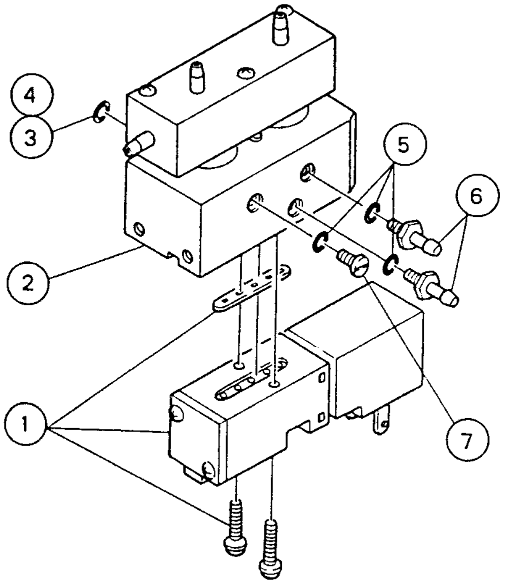
MASTER VALVE 3MV14 ASSEMBLY



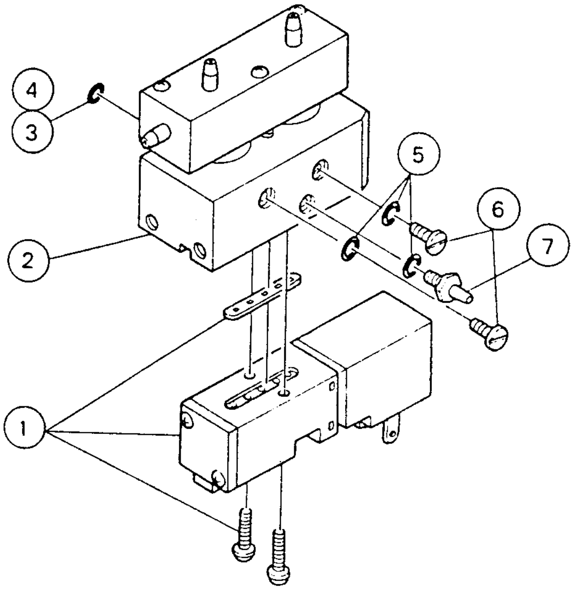
MASTER VALVE 3MV14-M ASSEMBLY



MASTER VALVE 3MV14-L ASSEMBLY



MASTER VALVE 3MV14-N ASSEMBLY



MASTER VALVE 3MV14-x ASSEMBLY (1/2)   DATE: 21-APR-88

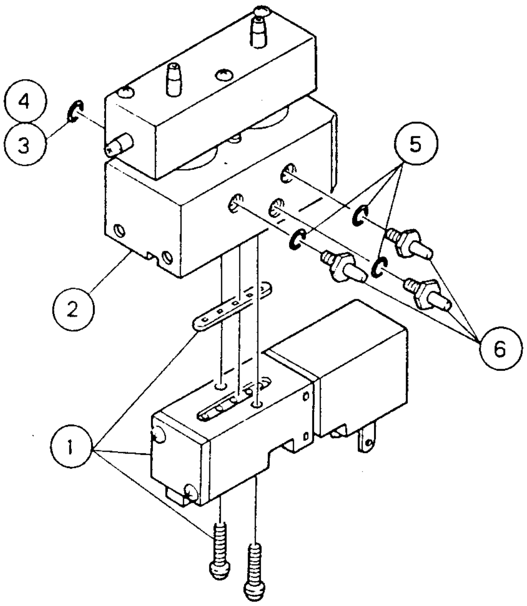
CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
863-1291-8	1-8$	MASTER VALVE 3MV14 (C1/2.4X4)	1
863-1292-1	1-8#	MASTER VALVE 3MV14 (C2/1.8X3.4)	1
443-1513-8A	1	MANIFOLD NO.13	1
345-2262-9	2	SPRING NO. 62	10
346-2510-9	3	MINI-Y PACKING MY-10	10
426-4475-5	4	SILICONE GREASE SH-SCG	1
873-0341-9	5	CYLINDER UNIT NO. 6-H	10
873-0351-6	6	CYLINDER UNIT NO. 6-L	10
443-1150-4B	7$	VALVE SEAL NO.10	1
443-1165-0A	7#	VALVE SEAL NO.25	10
348-1310-9	8	SCREW ROUND M2.6X20 (BS)	100

873-1461-2	1-7	MASTER VALVE 3MV14-L ASSEMBLY	UNSALABLE
443-6962-1	1	S.V. P5142 M6B	1
863-1292-1	2	MASTER VALVE 3MV14 (C2/1.8X3.4)	1
346-3600-1	3	O-RING IN-3 (NITRIL)	100
426-4475-5	4	SILICONE GREASE SH-SCG	1
343-2457-6	5	O-RING NO. 7 (NITRIL)	100
442-3509-2	6	NIPPLE NO. 9	50
442-3709-3	7	PLUG NO. 9	10

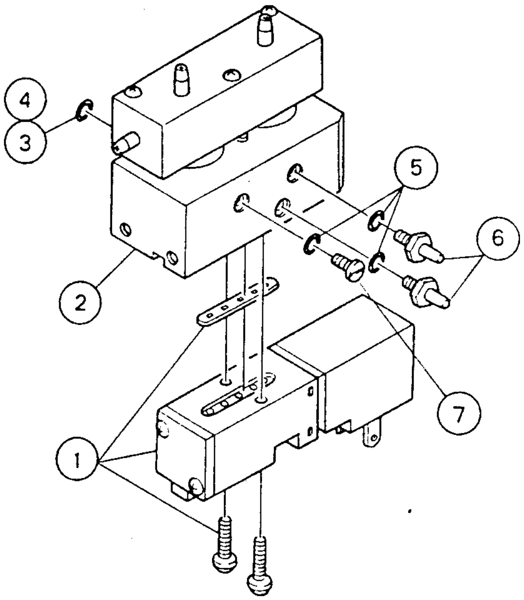
873-1471-0	1-6	MASTER VALVE 3MV14-M ASSEMBLY	UNSALABLE
443-6962-1	1	S.V. P5142 M6B	1
863-1292-1	2	MASTER VALVE 3MV14 (C2/1.8X3.4)	1
346-3600-1	3	O-RING IN-3 (NITRIL)	100
426-4475-5	4	SILICONE GREASE SH-SCG	1
343-2457-6	5	O-RING NO. 7 (NITRIL)	100
442-3709-3	6	PLUG NO. 9	10

873-1481-7	1-7	MASTER VALVE 3MV14-N ASSEMBLY	UNSALABLE
443-6962-1	1	S.V. P5142 M6B	1
863-1292-1	2	MASTER VALVE 3MV14 (C2/1.8X3.4)	1
346-3600-1	3	O-RING IN-3 (NITRIL)	100
426-4475-5	4	SILICONE GREASE SH-SCG	1
343-2457-6	5	O-RING NO. 7 (NITRIL)	100
442-3709-3	6	PLUG NO. 9	10
442-3535-0	7	NIPPLE NO. 34	10

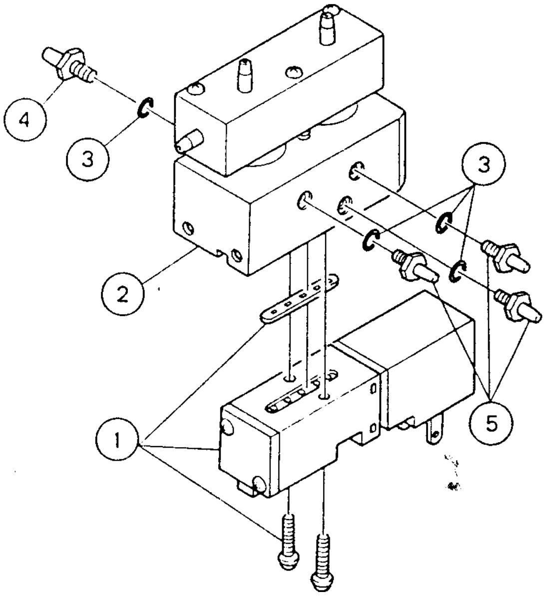
MASTER VALVE 3MV14-P ASSEMBLY



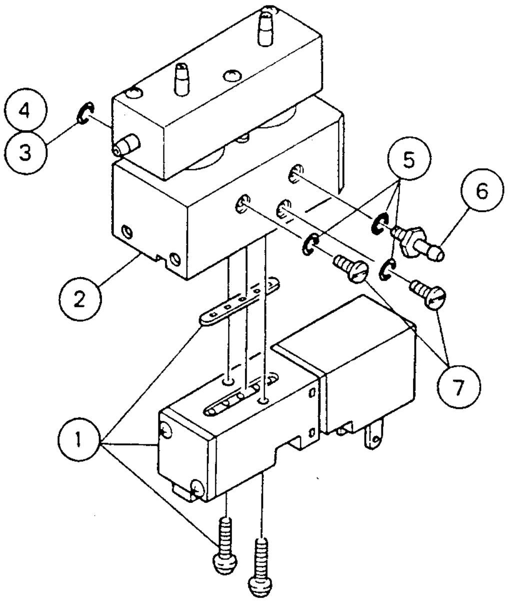
MASTER VALVE 3MV14-Q ASSEMBLY



MASTER VALVE 3MV14-R ASSEMBLY



MASTER VALVE 3MV14-S ASSEMBLY



MASTER VALVE 3MV14-x ASSEMBLY (2/2) DATE: 21-APR-88

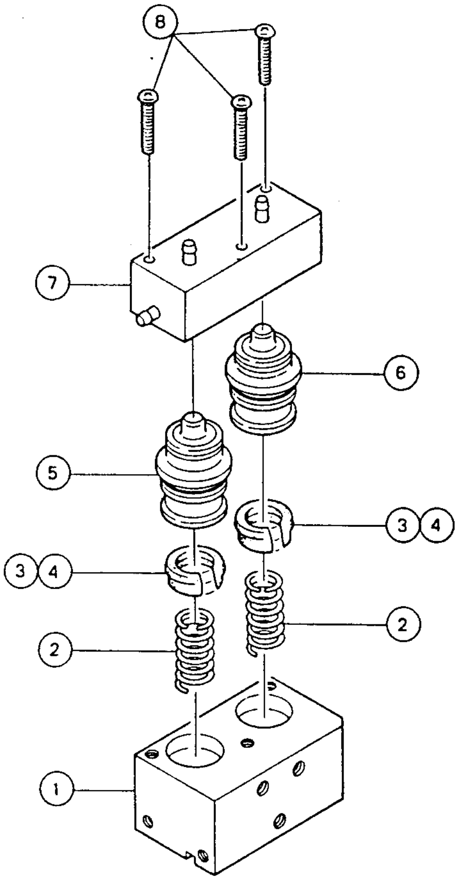
CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
873-1491-4	1-6	MASTER VALVE 3MV14-P ASSEMBLY	UNSALABLE
443-6962-1	1	S. V. P5142 M6B	1
863-1292-1	2	MASTER VALVE 3MV14 (C2/1.8X3.4)	1
346-3600-1	3	O-RING IN-3 (NITRIL)	100
426-4475-5	4	SILICONE GREASE SH-SCG	1
343-2457-6	5	O-RING NO. 7 (NITRIL)	100
442-3535-0	6	NIPPLE NO. 34	10

873-1501-4	1-7	MASTER VALVE 3MV14-Q ASSEMBLY	UNSALABLE
443-6962-1	1	S.V. P5142 M6B	1
863-1292-1	2	MASTER VALVE 3MV14 (C2/1.8X3.4)	1
346-3600-1	3	O-RING IN-3 (NITRIL)	100
426-4475-5	4	SILICONE GREASE SH-SCG	1
343-2457-6	5	O-RING NO. 7 (NITRIL)	100
442-3535-0	6	NIPPLE NO. 34	10
442-3709-3	7	PLUG NO. 9	10

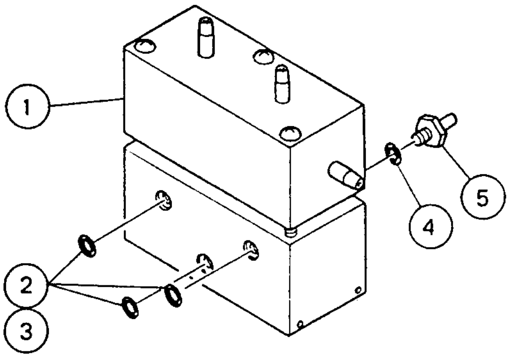
873-1511-1	1-5	MASTER VALVE 3MV14-R ASSEMBLY	UNSALABLE
443-6962-1	1	S.V. P5142 M6B	1
863-1292-1	2	MASTER VALVE 3MV14 (C2/1.8X3.4)	1
343-2457-6	3	O-RING NO. 7 (NITRIL)	100
442-3509-2	4	NIPPLE NO. 9	50
442-3535-0	5	NIPPLE NO. 34	10

873-1521-9	1-7	MASTER VALVE 3MV14-S ASSEMBLY	UNSALABLE
443-6962-1	1	S.V. P5142 M6B	1
863-1292-1	2	MASTER VALVE 3MV14 (C2/1.8X3.4)	1
346-3600-1	3	O-RING IN-3 (NITRIL)	100
426-4475-5	4	SILICONE GREASE SH-SCG	1
343-2457-6	5	O-RING NO. 7 (NITRIL)	100
442-3509-2	6	NIPPLE NO. 9	50
442-3709-3	7	PLUG NO. 9	10

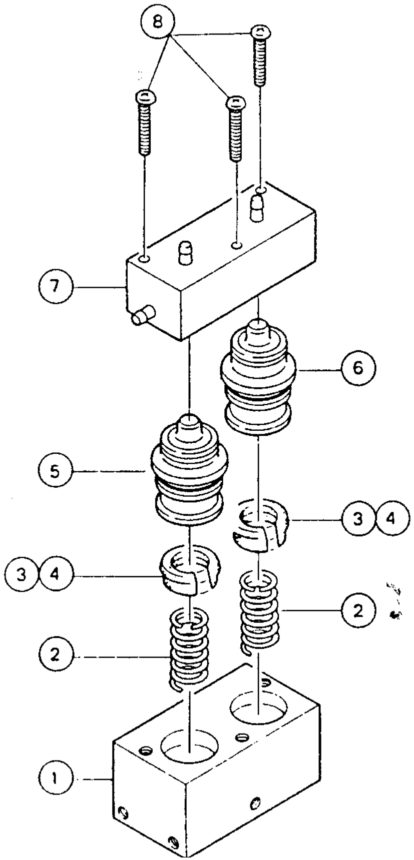
MASTER VALVE 3MV15 ASSEMBLY



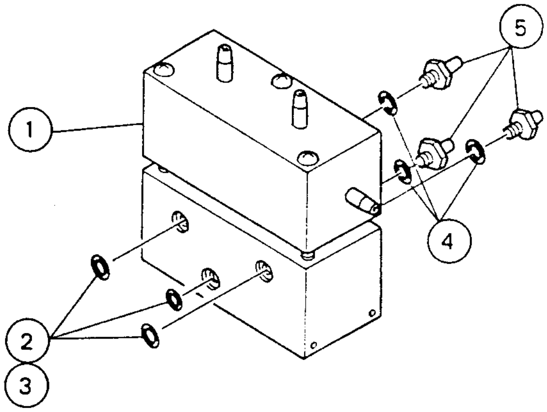
MASTER VALVE 3MV15-C ASSEMBLY



MASTER VALVE 3MV17 ASSEMBLY



MASTER VALVE 3MV17-A ASSEMBLY



MASTER VALVE 3MV15-C ASSEMBLY

DATE: 21-APR-88

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
863-1321-2	1-8$	MASTER VALVE 3MV15 (C1/2.4X4)	1
863-1322-6	1-8#	MASTER VALVE 3MV15 (C2/1.8X3.4)	1
443-1511-1A	1	MANIFOLD NO.11	1
345-2262-9	2	SPRING NO. 62	10
346-2510-9	3	MINI-Y PACKING MY-10	10
426-4475-5	4	SILICONE GREASE SH-SCG	1
873-0341-9	5	CYLINDER UNIT NO. 6-H	10
873-0351-6	5	CYLINDER UNIT NO. 6-L	10
443-1150-4B	7$	VALVE SEAL NO.10	1
443-1165-0A	7#	VALVE SEAL NO.25	10
348-1310-9	8	SCREW ROUND M2.6X20 (BS)	100

873-1531-6	1-5	MASTER VALVE 3MV15-C ASSEMBLY	UNSALABLE
863-1322-6	1	MASTER VALVE 3MV15 (C2/1.8X3.4)	1
346-3600-1	2	O-RING IN-3 (NITRIL)	100
426-4475-5	3	SILICONE GREASE SH-SCG	1
343-2457-6	4	O-RING NO. 7 (NITRIL)	100
442-3535-0	5	NIPPLE NO. 34	10

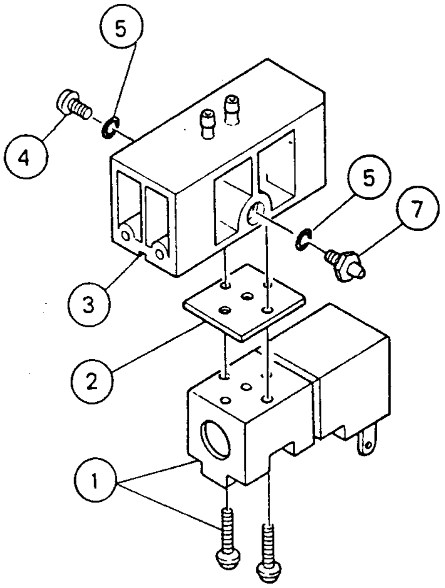
MASTER VALVE 3MV17-A ASSEMBLY

DATE: 21-APR-88

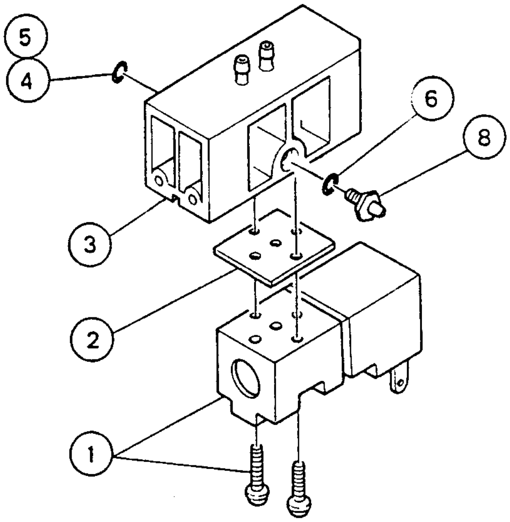
CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
873-1551-1	1-8	MASTER VALVE 3MV17 ASSY	1
443-1515-5	1	MANIFOLD NO.15	1
345-2262-9	2	SPRING NO. 62	10
346-2510-9	3	MINI-Y PACKING MY-10	10
426-4475-5	4	SILICONE GREASE SH-SCG	1
873-0351-6	5	CYLINDER UNIT NO. 6-L	10
873-0341-9	6	CYLINDER UNIT NO. 6-H	10
443-1165-0A	7	VALVE SEAL NO.25	10
348-1310-9	8	SCREW ROUND M2.6X20 (BS)	100

873-1541-3	1-5	MASTER VALVE 3MV17-A ASSEMBLY	UNSALABLE
873-1551-1	1	MASTER VALVE 3MV17 ASSY	1
346-3600-1	2	O-RING IN-3 (NITRIL)	100
426-4475-5	3	SILICONE GREASE SH-SCG	1
343-2457-6	4	O-RING NO. 7 (NITRIL)	100
442-3535-0	5	NIPPLE NO. 34	10

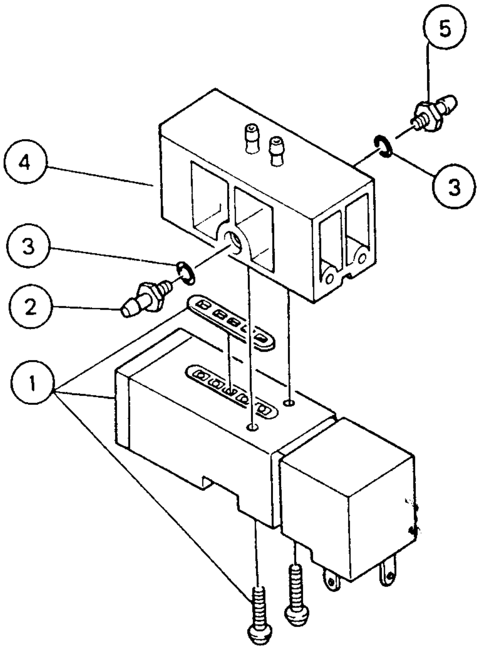
MANIFOLD 3SV NO. 6 ASSEMBLY



MANIFOLD 3SV NO. 7 ASSEMBLY



MANIFOLD 4SV NO. 5 ASSEMBLY



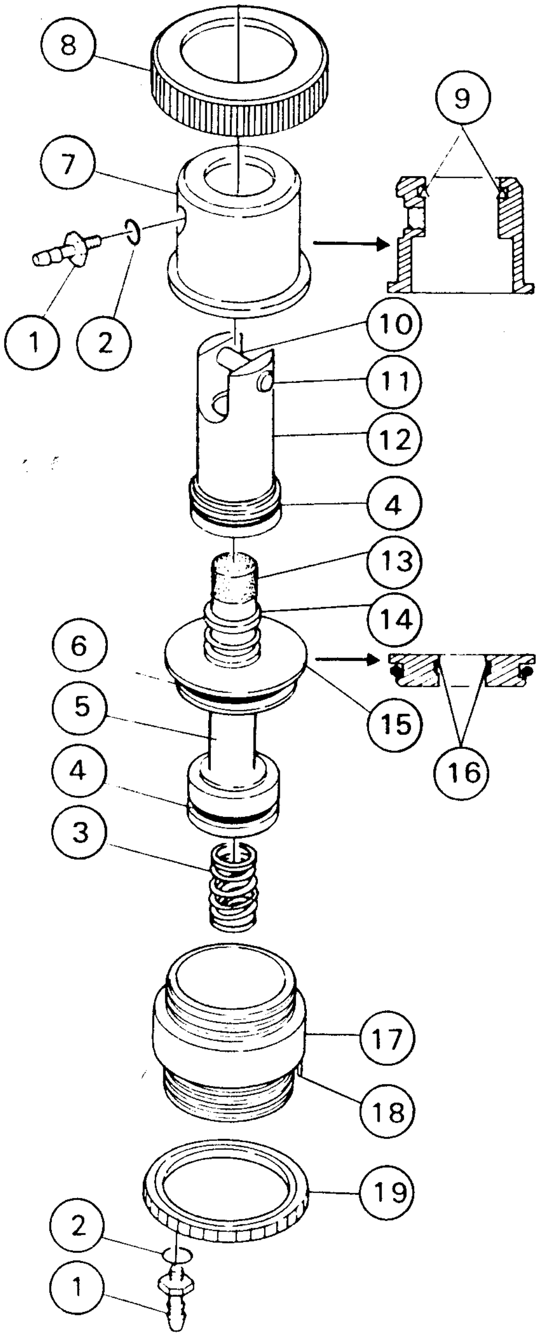
MANIFOLD 3SV NO. 6/NO. 7 AND 4SV NO. 5 ASSEMBLY DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-1561-8	1-7	MANIFOLD 3SV NO. 6 ASSY	UNSALABLE
	443-6961-7	1	S.V. P5136 NBV	1
	368-0209-6	2	ANTI-SHOCK RUBBER NO. 9	10
A	443-1566-5	3	MANIFOLD NO.66	1
	442-3709-3	4	PLUG NO. 9	10
	343-2457-6	5	O-RING NO. 7 (NITRIL)	100
A				
	442-3535-0	7	NIPPLE NO. 34	10
	873-1571-5	1-8	MANIFOLD 3SV NO. 7 ASSY	UNSALABLE
	443-6961-7	1	S.V. P5136 NBV	1
	368-0209-6	2	ANTI-SHOCK RUBBER NO. 9	10
A	443-1566-5	3	MANIFOLD NO.66	1
	346-3600-1	4	O-RING IN-3 (NITRIL)	100
	426-4475-5	5	SILICONE GREASE SH-SCG	1
	343-2457-6	6	O-RING NO. 7 (NITRIL)	100
A				
	442-3535-0	8	NIPPLE NO. 34	10
	873-1581-2	1-5	MANIFOLD 4SV NO. 5 ASSY	UNSALABLE
	443-6962-1	1	S.V. P5142 M6B	1
	442-3535-0	2	NIPPLE NO. 34	10
	343-2457-6	3	O-RING NO. 7 (NITRIL)	100
A	443-1566-5	4	MANIFOLD NO.66	1
	442-3509-2	5	NIPPLE NO. 9	50

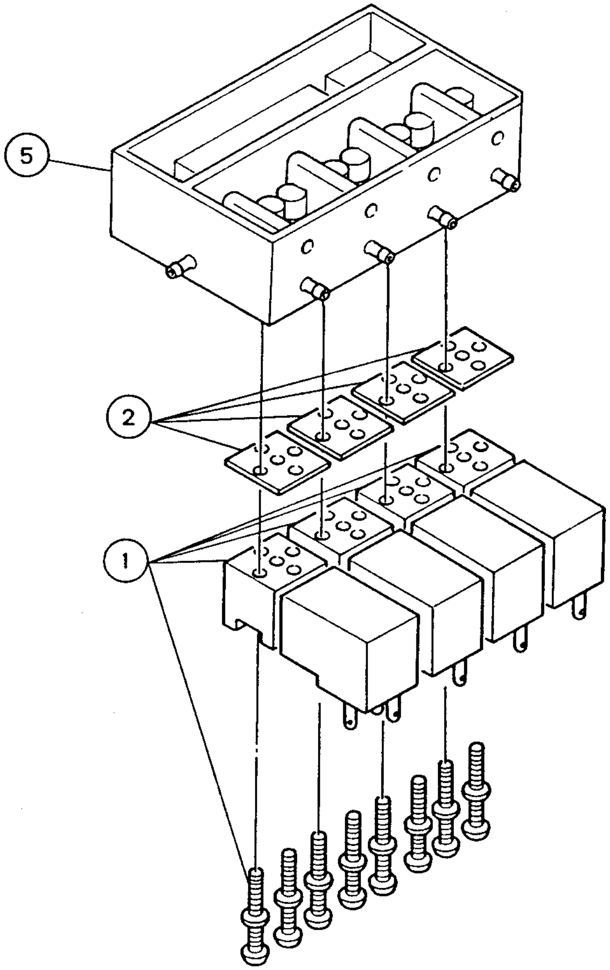
Before 04.93 update

	ECR NO.	K-1000
A	393A077	A5138-

MASTER VALVE 2MV-6 (PINCH TYPE) ASSEMBLY



MANIFOLD PSV NO. 3 ASSEMBLY



MANIFOLD PSV NO. 3 ASSEMBLY DATE: 20-APR-93

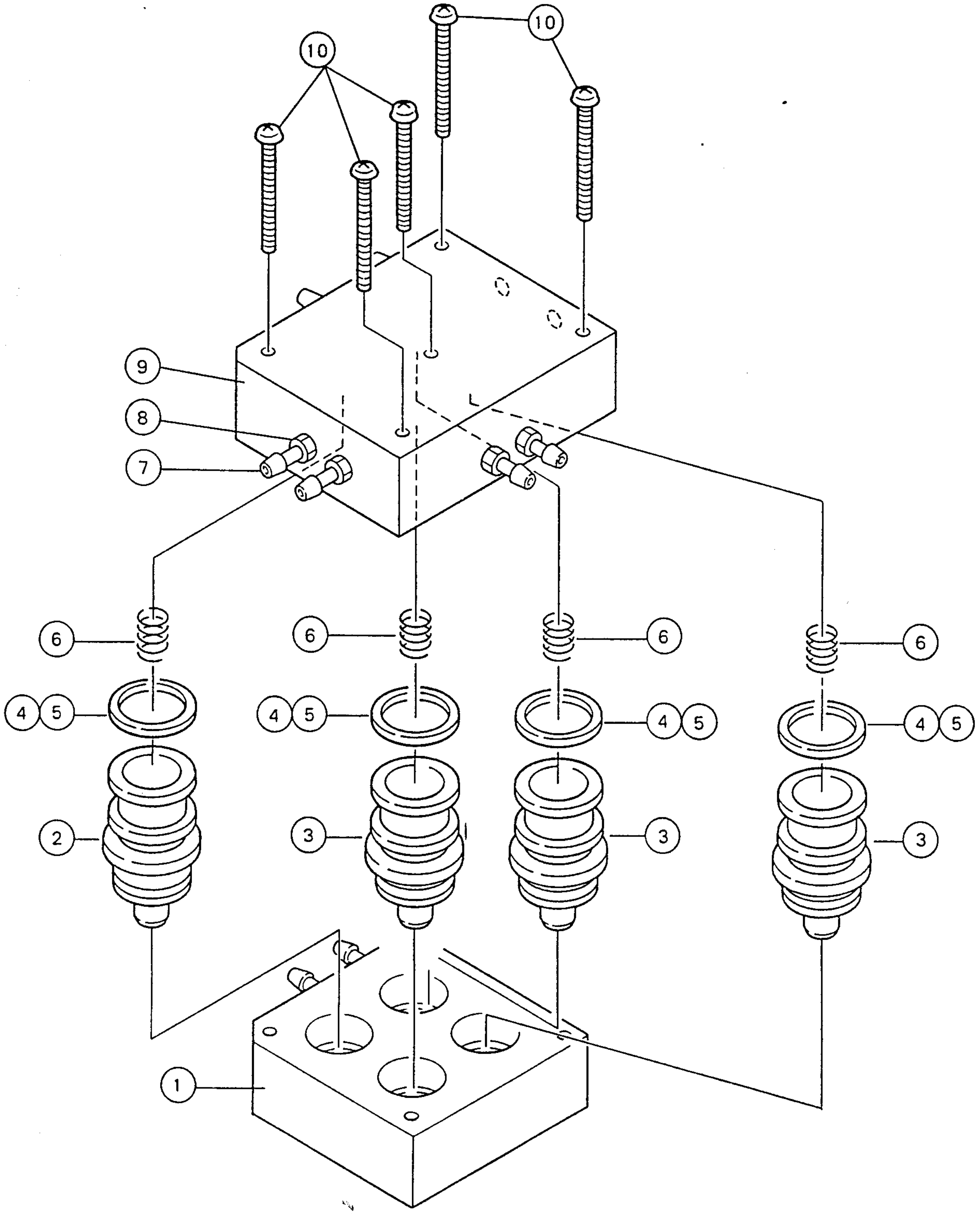
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0681-4	1-5	MANIFOLD PSV NO. 3 ASSY	UNSALABLE
	443-6961-7	1	S.V. P5136 NBV	1
	368-0209-6	2	ANTI-SHOCK RUBBER NO. 9	10
A	443-1567-9	5	MANIFOLD NO.67	1

MASTER VALVE 2MV-6 (PINCH TYPE) ASSEMBLY DATE: 20-APR-93

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
805-0021-4	1-19$	MASTER VALVE 2MV-6 (CC&M-SERIE	1
805-0022-8	1-19#	MASTER VALVE 2MV-6 (E-SERIES)	1
442-3501-3	1$	NIPPLE NO. 1	100
442-3508-9	1#	NIPPLE NO. 8	50
343-2425-7	2	O-RING NG-2 (NITRIL)	100
345-2248-6	3	SPRING NO. 48	10
346-2516-1	4	MINI-Y PACKING MY-16	10
443-2835-0B	5	MV-6 PISTON 1	1
346-3921-5	6	O-RING P-22	50
443-2832-9B	7	MV-6 CYLINDER 2	1
365-3806-7A	8	MV-6 FIXTURE	1
346-2514-3	9	MINI-Y PACKING MY-14	10
443-2838-1	10	MV-6 PIN	5
344-2203-1	11	E-SHAPE SNAP RING M3	100
443-2836-3C	12	MV-6 PISTON 2	1
443-2839-4	13	MV-6 HEAD 1	5
345-5110-1A	14	SPRING 5-10	10
443-2831-5C	15	MV-6 CYLINDER 1	1
346-2508-1	16	MINI-Y PACKING MY- 8	10
363-2467-4	17	HOLDER NO.16	1
344-2075-9	18	ROLL PIN 1.2 X 5	100
344-8400-3	19	MV-1 FIXING NUT	10

Before 04.93 update

	ECR NO.	K-1000
A	393A077	A5138-


10
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4 5
4 5
4 5
4 5
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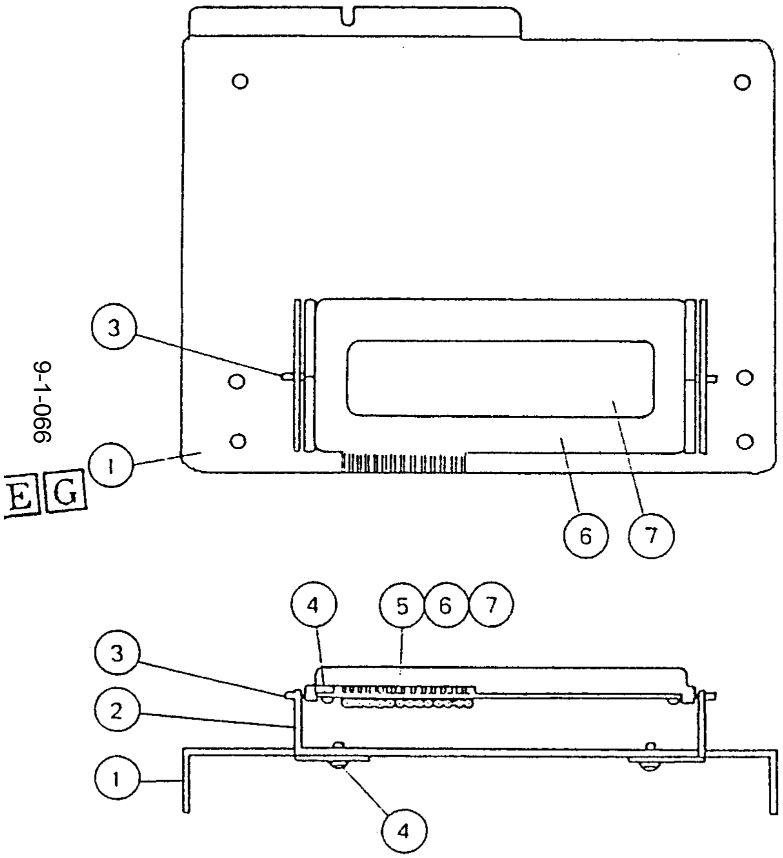
3
3
3
1

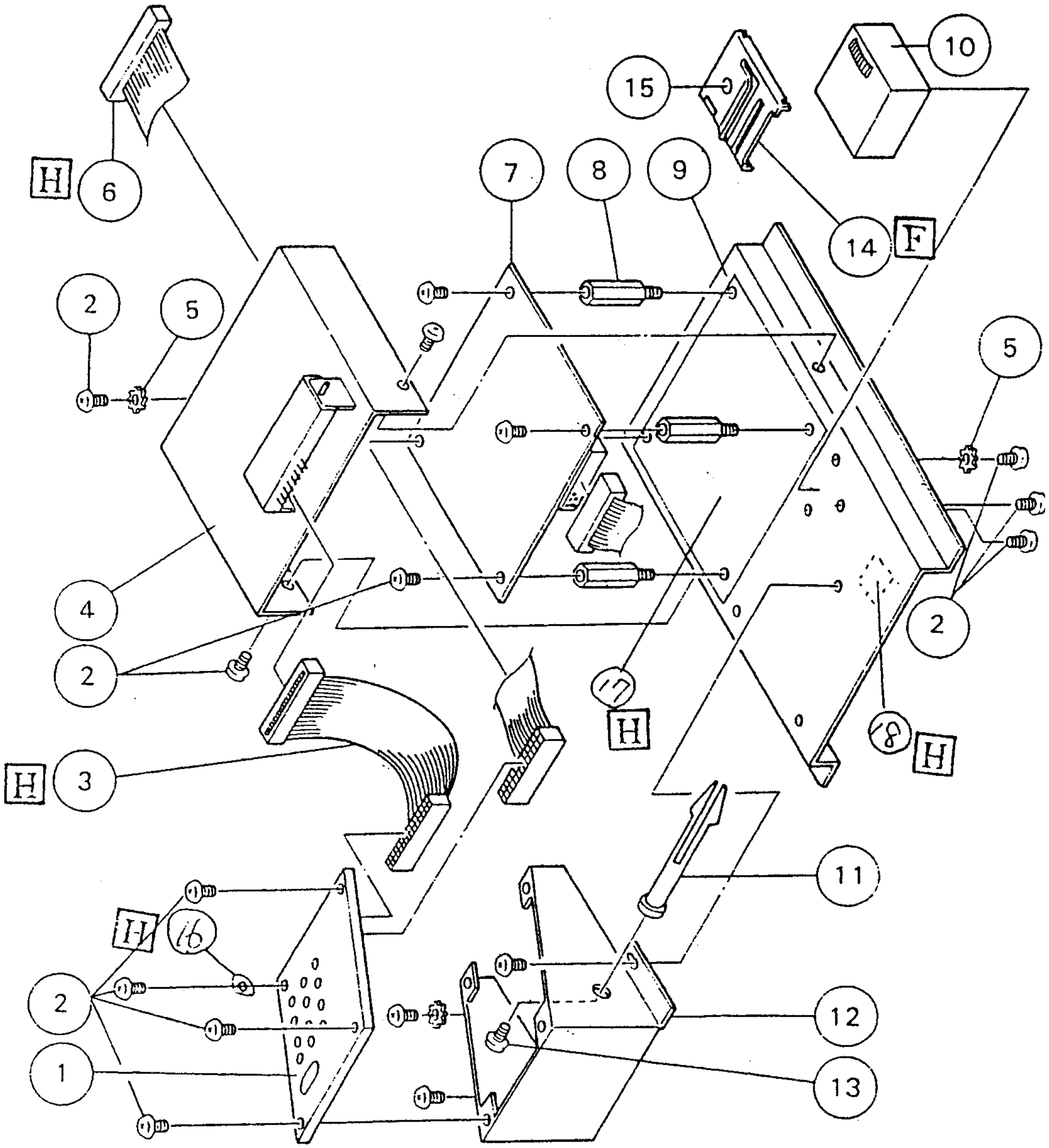
VALVE UNIT NO. 24 ASSEMBLY DATE: 20-FEB-90

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
873-0851-3	1-10	VALVE UNIT NO.24 ASSEMBLY	1
443-1149-0C	1	VALVE SEAL NO. 9	1
873-0341-9	2	CYLINDER UNIT NO. 6-H	10
873-0351-6	3	CYLINDER UNIT NO. 6-L	10
346-2510-9	4	MINI-Y PACKING MY-10	10
426-4475-5	5	SILICONE GREASE SH-SCG	1
345-2262-9	6	SPRING NO. 62	10
442-3509-2	7	NIPPLE NO. 9	50
343-2457-6	8	O-RING NO. 7 (NITRIL)	100
443-1514-1A	9	MANIFOLD NO.14	1
348-1310-9	10	SCREW ROUND M2.6X20 (BS)	100

DISPLAY SECTION NO. 3 ASSEMBLY



KEY PAD BLOCK NO. 3 ASSEMBLY



KEY PAD BLOCK NO. 3/ DISPLAY SECTION NO. 3 DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	873-0972-7	1-15	KEY PAD BLOCK NO. 3 ASSY	UNSALABLE	
	263-9517-5A	1	REF. 263-9533-5	UNSALABLE	E
	348-3912-6	2	SCREW BINDING M3X6 (SUS)	100	
H	~~873-1241-7~~	~~3~~	~~WIRING CORD NO 329~~	~~1~~	
	873-0981-1	4	DISPLAY SECTION NO. 3 ASSEMBLY	UNSALABLE	
	348-9543-1	5	WASHER TOOTH LOCK EXT M3 (SUS)	100	
H	~~873-1291-9~~	~~6~~	~~WIRING CORD NO. 340~~	~~1~~	
C	923-0091-5	7	PCB NO.634501 WITH ROM	1	
C	923-0061-3	7	PCB NO.6345 WITHOUT ROM	1	
	883-0151-1	7	ROM 3K1 ASSY (SET OF 1 PROM)	1	
	365-7494-8	8	SPACER P-12 SN-11	10	
B	366-2933-7C	9	MOUNTING PLATE NO.173	1	
C	281-7228-9	10	PRINTER FTP-020MCS 507	1	
D I	~~921-0451-3~~	~~10&7~~	~~PRINTER FTP-020 W/PCB 6345 (C1)~~	~~1~~	SEE 9-1-079
B	365-2460-3B	11	SUPPORT BAR NO.10	1	
B	366-2946-5	12	MOUNTING PLATE NO.183	1	
	348-3928-5	13	SCREW BINDING M4X10 (SUS)	100	
B F	322-2410-3	14	PAPER COVER NO.10	1	
C	369-9612-0	15	LABEL MYTACK NO.120 (1 SET)	1	
	263-9533-5	1	SWITCH FLAT-KEYPAD K-1000-1	1	G TB 155
H	963-0791-5	3	WIRING CORD NO.2187	1	
H	963-0771-1	6	WIRING CORD NO.2185	1	
H	368-8565-1	17	ISOLATION SHEET NO.15	Uns.	
H H	266-6311-3	18	CLAMP CKN-05	100	
H	348-9503-2	16	WASHER FLAT M3 (SUS)	100	

	873-0981-1	1-7	DISPLAY SECTION NO. 3 ASSEMBLY	UNSALABLE
H	366-2941-7B	1	MOUNTING PLATE NO.178	1
	363-1552-1B	2	SUPPORT METAL NO. 26	1
	344-3331-5	3	SPRING PIN BW2.5X8	100
	348-3912-6	4	SCREW BINDING M3X6 (SUS)	100
	228-3351-4	5	LCD BOARD DMC16230-2	1
A	362-2678-9	6	HOOD NO. 1-1	5
	362-1112-2	7	COVER GLASS NO.12	5

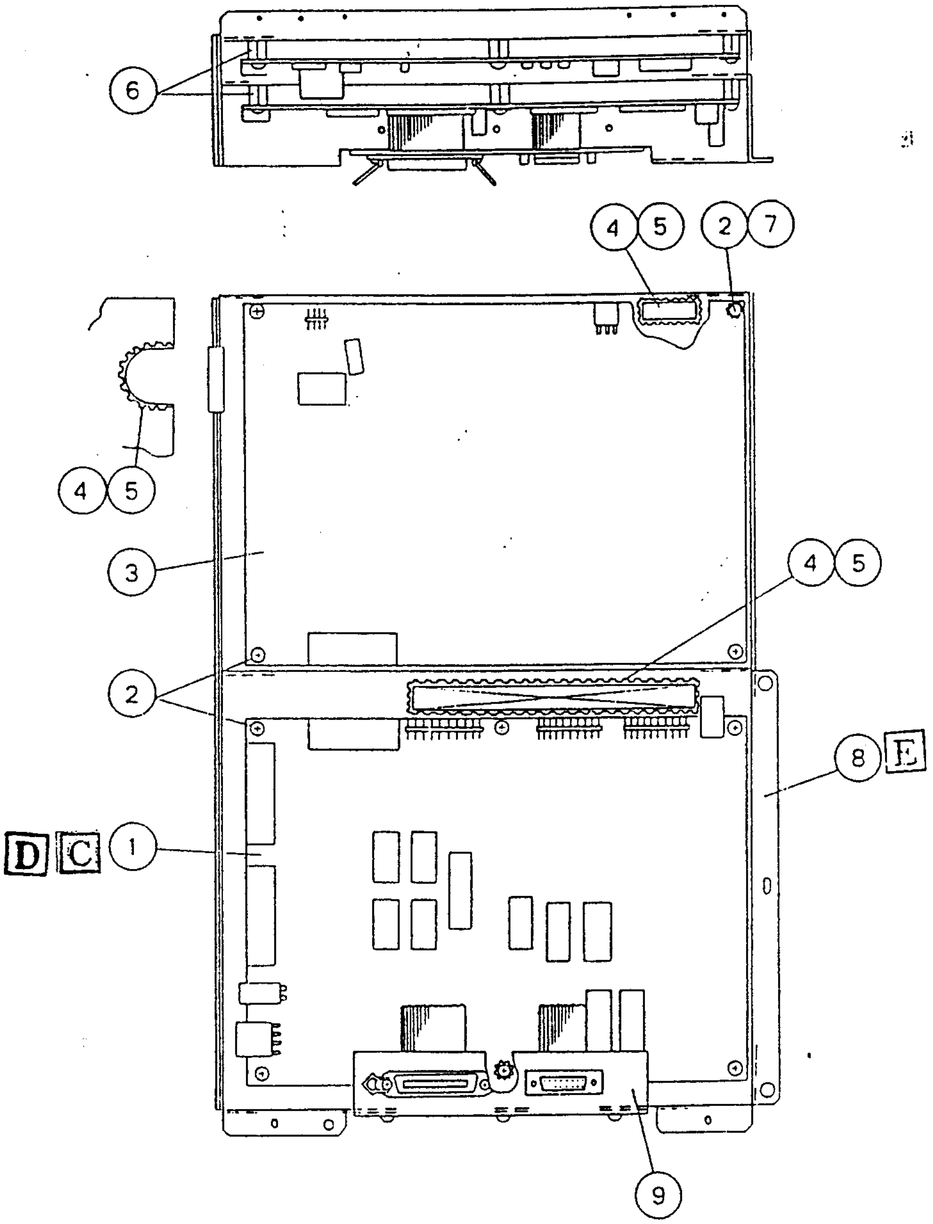
Before 04.93 update

	ECR NO.	K-1000
A	388F071	A1156-
B	388L050	A1441-
C	392D047	A4694-
D	392H031	------
E	393A077	B5149-

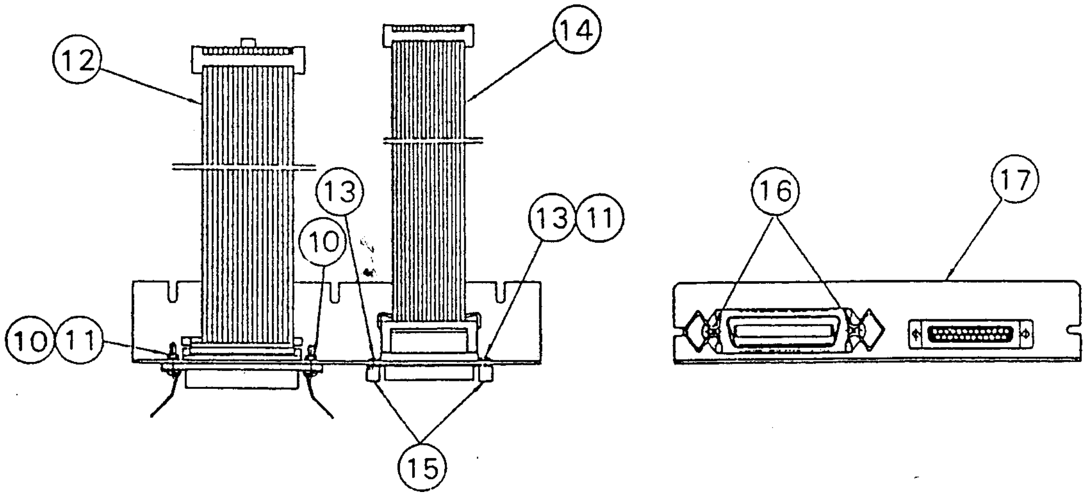
SYM	ECR NO.	SERIAL NO.	
F	395J049	————	
G	396E045	K-1000,	B6858-, K-800 A2272-
H	396E051	K1 B6858-	K8 A2272-
I	398B060	————	

Revised OCT. 98

MICROCOMPUTER UNIT NO. 14/26 ASSEMBLY



OUTPUT PORT NO. 5 ASSEMBLY



MICROCOMPUTER UNIT NO. 14/26 ASSEMBLIES DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	873-0991-8	1-9$	MICROCOMPUTER UNIT NO.14 (C-1)	UNSALABLE	
B	923-9112-9	1-9#	MICROCOMPUTER UNIT NO.26 (C-2)	UNSALABLE	
	~~873-1141-1~~	~~1~~	~~PCB NO. 6314 WITHOUT ROM~~	~~1~~	C
A	881-0251-1	1 *	ROM 1K1 ASSY PM(SET OF 1 PROM)	1	
A	881-0261-9	1 **	ROM 1K2 ASSY PM (SET OF 1 PROM)	1	
A	881-0231-7	1 ***	ROM 1K3 ASSY PM(SET OF 1 PROM)	1	
A	881-0271-6	1 +	ROM 4K1 ASSY PM(SET OF 1 PROM)	1	
A	881-0281-3	1 ++	ROM 4K2 ASSY PM(SET OF 1 PROM)	1	
A	881-0241-4	1 +++	ROM 4K3 ASSY PM(SET OF 1 PROM)	1	
	348-1912-9	2	SCREW BINDING M3X6 (FE)	100	
	873-1091-2	3	PCB NO.2061	1	
	266-6716-3	4	BUSH FREE SIZE KG-016 (250MM)	10	
	426-2780-3	5	SUPER GLUE 1741 (20 GRAMS)	1	
	365-7491-7	6	SPACER P-12 SN- 1	10	
	348-9343-1	7	WASHER TOOTH LOCK EXT M3 (FE)	100	
E B	366-2519-2A	8	C UNIT MOUNTING PLATE NO. 2	1	
B	923-8861-6	9$	OUTPUT PORT NO. 5 ASSY	1	
B	363-1147-0	9#	METAL PLATE NO.147	5	
	873-1141-1	1-	PCB NO.6314 W/O ROM (C1/K-1000)	1	C D
	873-1142-5	1+	PCB NO.6314 W/O ROM (C2/K-800)	1	C D

B	923-8861-6	1-8	OUTPUT PORT NO. 5 ASSY	1
	348-8313-5	1	NUT HEX M3 (FE)	100
	348-9343-1	2	WASHER TOOTH LOCK EXT M3 (FE)	100
	873-1631-1	3	WIRING CORD NO. 342	1
	348-1302-9	4	SCREW ROUND M2.6X6 (BS)	100
	873-1641-9	5	WIRING CORD NO. 343	1
	266-6520-8	6	SPACER GM25-R3	10
	348-1815-4	7	SCREW ROUND M3X12 (FE)	100
	366-1921-9	8	CONNECTOR FIXTURE NO. 70	1

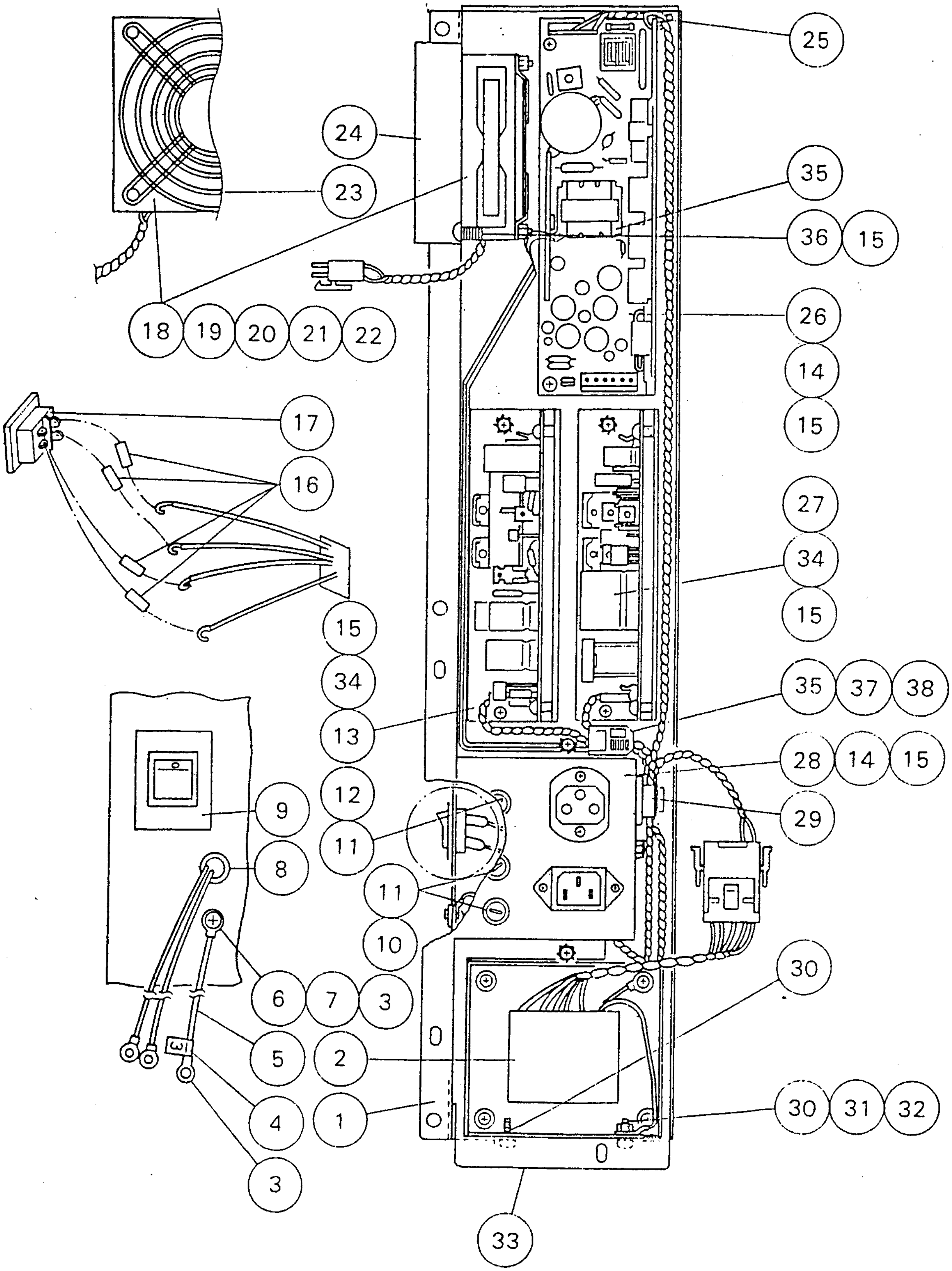
Before 04.93 update

	ECR NO.	K-1000
A	388L070	A1526-
B	393A077	B5149-

\# for K-1000 with KCP-1
$ for K-1000 without KCP-1
* for Japanese & Italian
** for English & German
*** for French & Spanish
¥ for K-1000
\+ for K-800

SYM	ECR NO.	SERIAL NO.	
C	393G005	K1 B5149-,	K8 A1001-
D	394E057	K1 B5760-	K8 A1506-
E	396E051	K1 B6858-	K8 A2272-

POWER SUPPLY NO. 14 ASSEMBLY



POWER SUPPLY NO. 14 ASSEMBLY DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-1012-8	1-38*	POWER SUPPLY NO.14 (N.AMER)	UNSALABLE
	873-1013-1	1-38**	POWER SUPPLY NO.14 (EUROPE)	UNSALABLE
E	873-1014-5	1-36+	POWER SUPPLY NO.14 (U.K.)	UNSALABLE
E	323-1922-9F	1	POWER SUPPLY UNIT CHASSIS #22	1
	873-1021-1	2	TRANSFORMER POWER PT-037 ASSY	1
	266-3581-4	3	SOLDERLESS LUG 170722-1 (M4)	100
	369-7082-1	4	INDICATION MARK NO. 82	10
	268-0281-1	5	WIRE UL1015-16AWG GRN/YEL	UNSALABLE
	348-3926-8	6	SCREW BINDING M4X6 (SUS)	100
	348-9544-5	7	WASHER TOOTH LOCK EXT M4 (SUS)	100
	368-1129-9	8	RUBBER BUSHING GROMMET G- 84	10
	369-7441-0	9	INDICATION MARK NO.441	10
C	266-5277-0	10*	FUSE 125V7A JISMF61T (N.AMER)	10
	266-5297-4	10**+	FUSE 250V4A NO.19195 (EUROPE)	10
	266-3531-8	11*	FUSE HOLDER CAP 031-1661 (N.AME	10
	266-3533-5	11**+	FUSE HOLDER CAP 031-1663 (EUROP	10
	266-5272-1	12*	FUSE 125V2A JISMF61T (N.AMER)	10
	266-5291-2	12**+	FUSE 250V1A NO.19195 (EUROPE)	10
	873-1041-6	13	POWER SUPPLY BOARD NO. 5 ASSY	1
	348-1912-9	14	SCREW BINDING M3X6 (FE)	100
	348-9343-1	15	WASHER TOOTH LOCK EXT M3 (FE)	100
	267-0004-6	16	HEAT SHRINK TUBE 4MM DIA GRY	10
	263-1676-1	17	SWITCH 1802-0120 WHITE	10
A	883-3931-1	18	FAN ASSEMBLY NO. 8	1
	348-1936-8	19	SCREW BINDING M4X35 (FE)	100
	348-9304-5	20	WASHER FLAT M4 (FE)	100
	348-9314-2	21	WASHER SPRING M4 (SWRH4)	100
	348-8314-9	22	NUT HEX M4 (FE)	100
	289-9475-1	23	FINGER GUARD PG-36	5
	322-2257-7A	24	EXHAUST HOOD NO. 7	5
	266-4461-8	25	TIE WRAP CV-100	1000

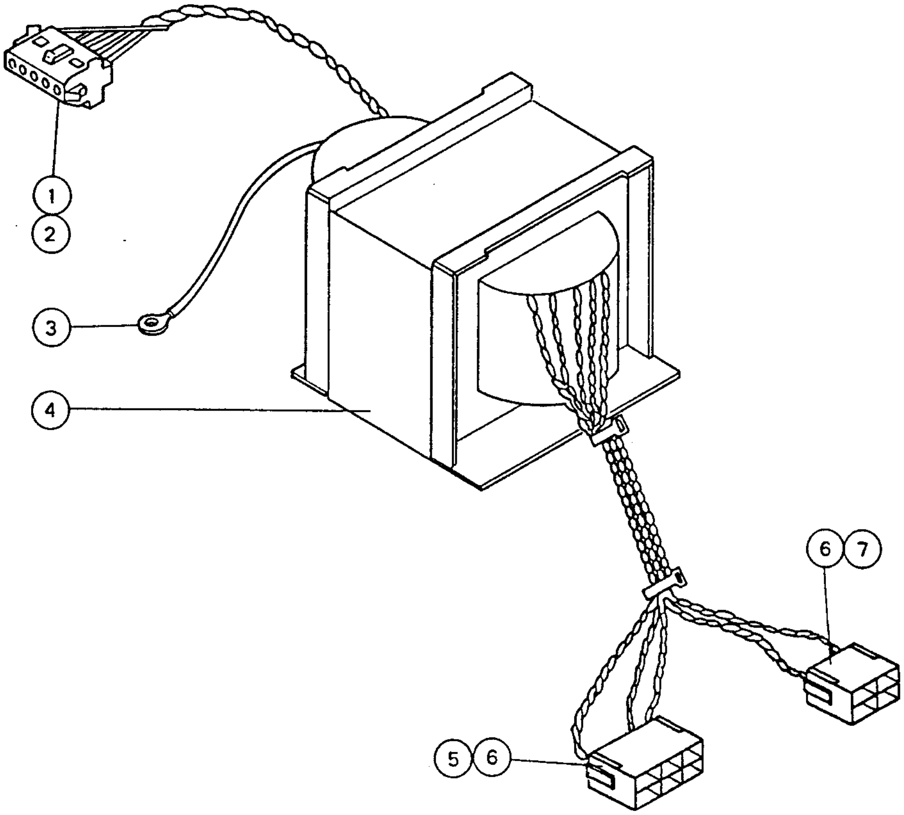
	289-9485-8	26	SWITCHING REGULATOR PMC30-1-G	1
	873-1051-3	27	POWER SUPPLY BOARD NO. 6 ASSY	1
	873-1031-9	28	LINE FILTER NO. 4 ASSEMBLY	1
	266-6312-7	29	CLAMP CKN-10	50
B	348-1944-8	30	SCREW BINDING M5X16 (FE)	100
	348-9345-8	31	WASHER TOOTH LOCK EXT M5 (FE)	100
B	348-8315-2	32	NUT HEX M5 (FE)	100
B	363-1094-0	33	METAL PLATE NO. 94	1
D	348-1913-2	34	SCREW BINDING M3X8 (FE)	100
E	921-0501-2	35+	FUSE UNIT NO. 3 ASSY (PM)	1
E	266-5291-2	35+	FUSE 250V1A NO.19195 (EUROPE)	10
E	266-5293-0	35+	FUSE 250V3.15A NO. 19195 (EUROP)	10
E	266-5286-3	35+	FUSE 250V0.200A NO. 19195 (EURO)	10
E	266-5289-4	35+	FUSE 250V1.6A NO. 19195 (EUROPE)	10
E	266-5292-6	35+	FUSE 250V2A NO. 19195 (EUROPE)	10
E	348-3912-6	36+	SCREW BINDING M3X6 (SUS)	100
E	923-4781-1	37***	WIRING CORD NO.1395	1
E	923-4791-8	38***	WIRING CORD NO.1396	1

Before 04.93 update

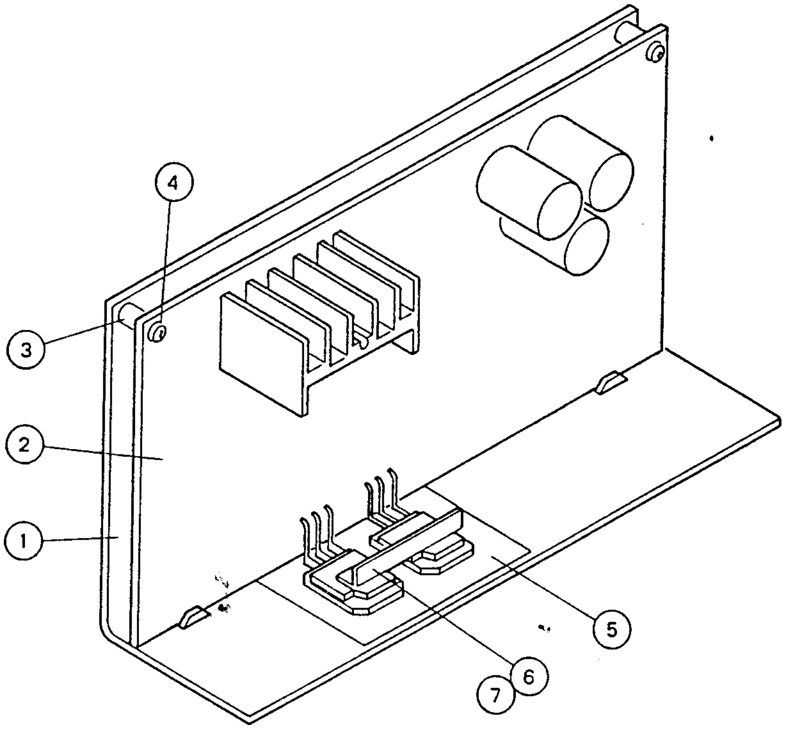
	ECR NO.	K-1000
A	388F030	A1131-
B	388F035	A1311-
C	388i077	A1396-
D	391J084	A3874-
E	392J046	A4989-

* for 117 VAC only
** for 220 VAC only
\+ for 240 VAC only

TRANSFORMER POWER PT-037 ASSEMBLY



POWER SUPPLY BOARD NO. 5/6 ASSEMBLY



TRANSFORMER POWER PT-037 / POWER SUPPLY BOARD #5/6 DATE: 20-APR-93

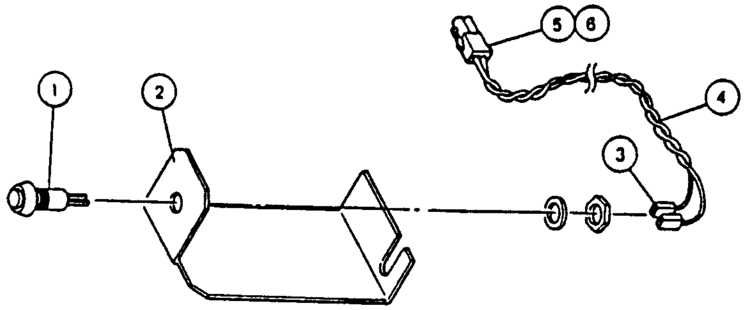
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-1021-1	1-7	TRANSFORMER POWER PT-037 ASSY	1
	264-6684-7	1	CONNECTOR 1-480764-0 5-PIN	10
	264-6927-1	2	PIN MALE 350547-1	100
	266-3585-9	3	SOLDERLESS LUG 170721-2 (M5)	100
A	921-0491-2	4	TRANSFORMER POWER PT-037 (PM)	1
A	264-3143-6	5	CONNECTOR 5559-06P	10
A	264-9882-1	6	PIN 5558T	100
A	264-3142-2	7	CONNECTOR 5559-04P	10

873-1041-6	1-7$	POWER SUPPLY BOARD NO. 5 ASSY	1
873-1051-3	1-7#	POWER SUPPLY BOARD NO. 6 ASSY	1
366-2251-6A	1	PCB MOUNTING PLATE NO. 9	1
873-1151-9	2$	PCB NO.4044	UNSALABLE
873-1161-6	2#	PCB NO.4045	UNSALABLE
365-8200-1	3	SPACER ER- 5	10
348-1914-6	4	SCREW BINDING M3X10 (FE)	100
267-1100-1	5	ISOLATION SHEET 30F36 (36X50MM)	5
363-1351-6	6	FIXING METAL NO. 61	1
348-1515-8	7	SCREW FLAT M3X12 (FE)	100

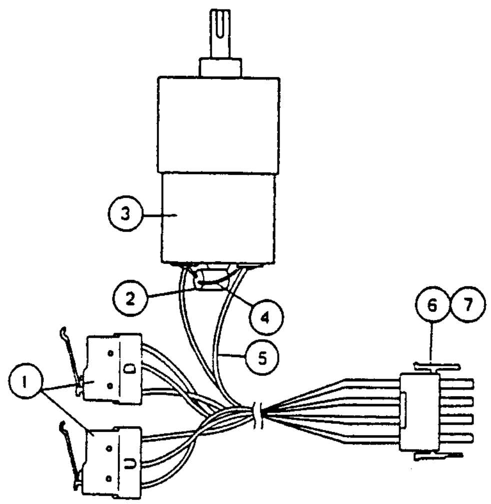
Before 04.93 update

	ECR NO.	K-1000
A	392J046	A4989-

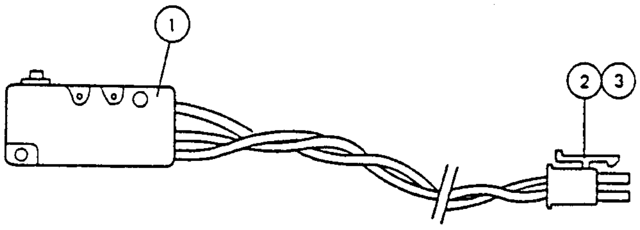
LED ASSEMBLY NO. 9



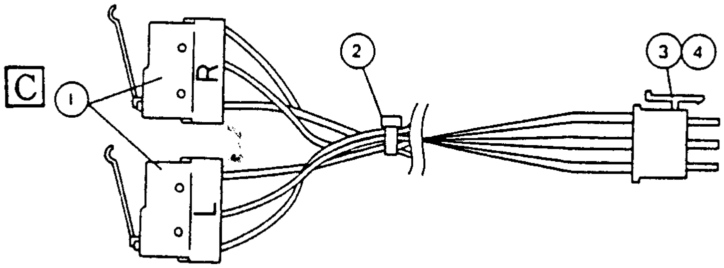
MOTOR BLOCK NO. 14 ASSEMBLY



SWITCH NO. 23 ASSEMBLY



SWITCH NO.24 ASSEMBLY



ELECTRONICS PART ASSEMBLIES DATE: 20-APR-93

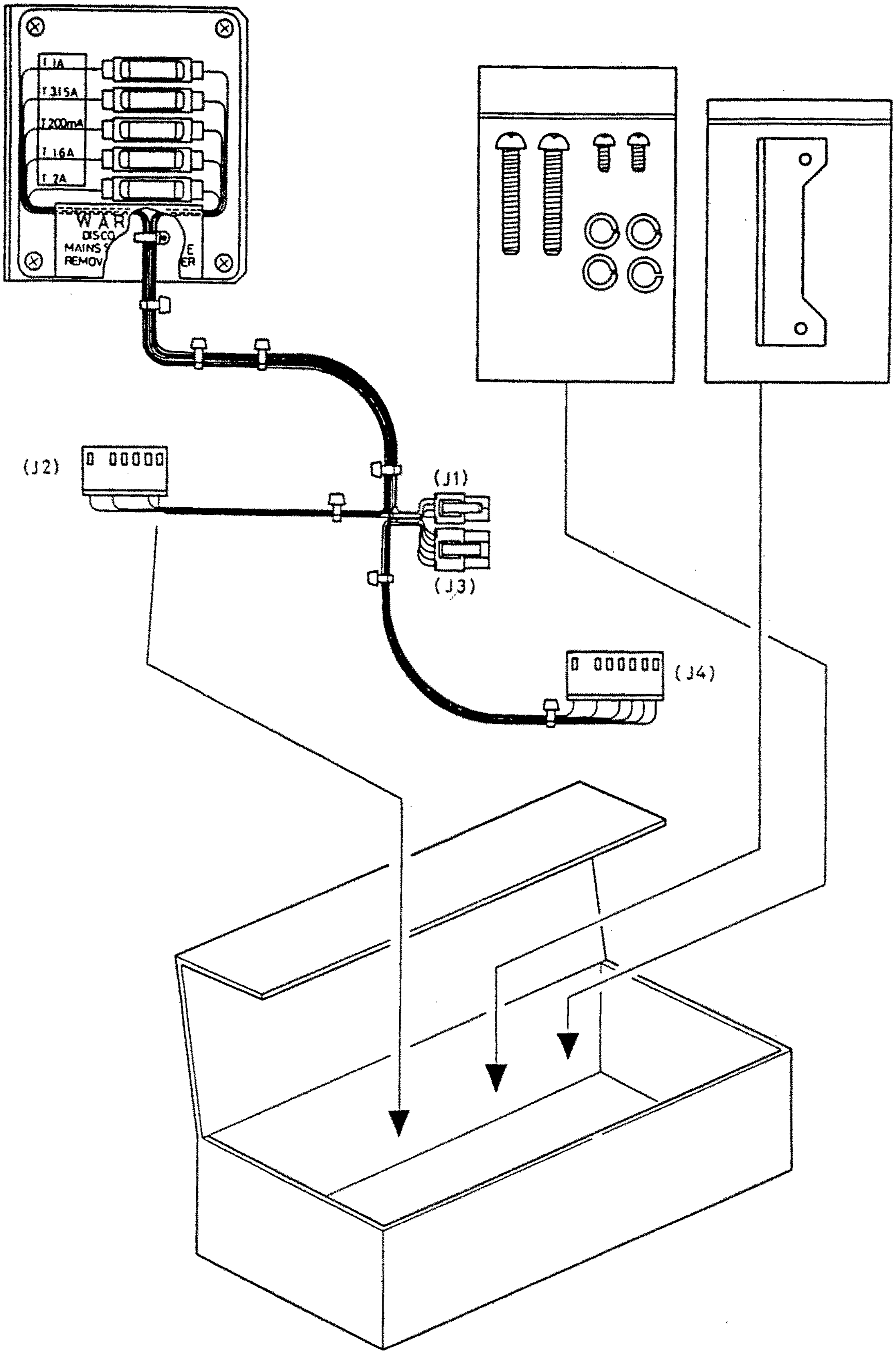
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0491-1	1-6	LED ASSEMBLY NO. 9	1
	225-4969-5	1	DIODE LED TLG-147K	10
B	366-2944-8A	2	MOUNTING PLATE NO.181	1
	267-0002-9	3	HEAT SHRINK TUBE 2MM DIA GRY	10
	268-0705-5	4	WIRE UL1007-22AWG TWIST-P B&W	UNSALABLE
	264-3131-1	5	CONNECTOR 5557-02R	10
	264-9881-8	6	PIN 5556T	100
	873-1751-1	1-7	MOTOR BLOCK NO.14 ASSEMBLY	1
	263-3459-4	1	SWITCH SS-01L13W55	1
	245-2066-9	2	CAPACITOR 25V 47MF NW	10
	281-0101-8	3	MOTOR CN35-00207	1
	267-0002-9	4	HEAT SHRINK TUBE 2MM DIA GRY	10
	268-0705-5	5	WIRE UL1007-22AWG TWIST-P B&W	UNSALABLE
	264-3134-2	6	CONNECTOR 5557-08R	10
	264-9881-8	7	PIN 5556T	100
	873-0781-0	1-3	SWITCH NO.23 ASSEMBLY	1
A	263-3017-6	1	SWITCH ABV-161061	5
	264-3132-5	2	CONNECTOR 5557-04R	10
	264-9881-8	3	PIN 5556T	100
	873-1061-1	1-4	SWITCH NO.24 ASSEMBLY	1
C	~~263-3459-4~~	~~1~~	~~SWITCH SS-01L13W55~~	~~1~~
	266-4461-8	2	TIE WRAP CV-100	1000
	264-3133-9	3	CONNECTOR 5557-06R	10
	264-9881-8	4	PIN 5556T	100
C	263-4078-7	1	SWITCH D2SW-01L3M	1

SYM	ECR NO.	SERIAL NO.
C	396B036	——

Before 04.93 update

	ECR NO.	K-1000
A	392G050	A4819-
B	393A077	B5149-

FUSE UNIT NO. 3 ASSEMBLY (PM)



FUSE UNIT NO. 3 ASSEMBLY (PM) DATE: 20-APR-93

CODED NUMBER	RAWING NUMBER	DESCRIPTION	QTY PER UNIT
921-0501-2	1+	FUSE UNIT NO. 3 ASSY (PM)	1
266-5291-2	2+	FUSE 250V1A NO.19195 (EUROPE)	10
266-5293-0	3+	FUSE 250V3.15A NO.19195 (EUROP)	10
266-5286-3	4+	FUSE 250V0.200A NO.19195 (EURO)	10
266-5289-4	5+	FUSE 250V1.6A NO.19195 (EUROPE)	10
266-5292-6	6+	FUSE 250V2A NO.19195 (EUROPE)	10
348-1937-1	7+	SCREW BINDING M4X40 (FE)	100
348-3912-6	8+	SCREW BINDING M3X6 (SUS)	100
348-9544-5	9+	WASHER TOOTH LOCK EXT M4 (SUS)	100
366-3631-7	10+	FUSE UNIT NO. 3 FIXTURE	1

+ for 240 VAC only

K-1000/K-800 ACCESSORIES DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
J	923-9152-8	*	PARTS BOX NO.19 (C-2/N.AMER)	UNSALABLE
J	923-9153-1	**+	PARTS BOX NO.19 (C-3/EUROPE+UK	UNSALABLE
	793-0012-1	*	POWER CORD NO. 4 (N.AMER)	1
D L	~~265-4715-5B~~	~~**~~	~~POWER CORD 4622-001-0333 (EUROP~~	~~1~~
E	265-4723-5	+	POWER CORD F1686 (U.K.)	1
	363-1371-1	+	FIXING METAL NO. 81	1
	348-3912-6	+	SCREW BINDING M3X6 (SUS)	100
I	265-4708-9	*	POWER CORD 6002+3020	1
I	265-4725-2	**+	POWER CORD 6002+3030	1
J	424-3733-7		BOTTLE STAND NO. 2-1	1
	752-2102-8		CUBITAINER SPOUT KIT CS-60	1
	883-0192-3		DISPENSER KIT NO. 1	5
	462-1635-9		DUST PROOF COVER NO.35	1
	461-2250-OZ	$	OPERATOR'S MANUAL K-1000	1
	461-2258-9	#	OPERATOR'S MANUAL K-800	1
	462-4842-7		PAPER THERMAL F1-2 (1/PACK)	1
J	367-1100-4		TRAY NO. 9-1	5
G				
	442-5338-7		TUBE POLYURETHANE 4MMIDX6MMOD	10 M
G, J	442-5340-5		TUBE POLYURETHANE 6MMIDX9MMOD	10 M
G				
C	369-7862-0		INDICATION MARK NO.559	5
F	921-0351-8	+	PAPER THERMAL F1-2 (5/BOX)	1
G	442-5301-0		TUBE SILICONE 3MMID X 6.5MMOD	5 M
H	369-5744-0		INDICATION MARK NO.547	10
J	368-8469-0A		SHEET NO.18	5 K
J	341-1347-5		SHAFT NO.195	10
L	265-4719-0	**	POWER CORD 4622-007-0092 (EUROP	1
M	971-0422-2	OPTION K-1000 AUTO DRAIN MODIF. KIT		1

SYM	ECR NO.	SERIAL NO.
K	393H004	K1 B5499- K8 A1309-
L	394E052	————
M	397J004	————

J CONTENTS OF PARTS BOX NO. 19 DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	462-2121-3		AWL	10
	462-2422-3		CUTTING PLIER NO.104-R (150MM)	1
J	----------		----------	
J	266-5277-0	*	FUSE 125V7A JISMF61T (N.AMER)	10
A	266-5274-9	*	FUSE 125V4A JISMF61T (N.AMER)	10
	266-5272-1	*	FUSE 125V2A JISMF61T (N.AMER)	10
	266-5297-4	**+	FUSE 250V4A NO.19195 (EUROPE)	10
	266-5293-0	**+	FUSE 250V3.15A NO.19195 (EUROP)	10
	266-5291-2	**+	FUSE 250V1A NO.19195 (EUROPE)	10
	805-0401-1		HGB LAMP UNIT-2	10
	462-2762-9		NEEDLE NOSE PLIER NO.101-R	1
J	----------		----------	
	462-2381-8		SCREWDRIVER PHILLIPS NO.1300#2	5
J	----------		----------	
	462-2391-5		SCREWDRIVER REGULAR	5
	345-5103-4		SPRING 5- 3	10
	266-4461-8		TIE WRAP CV-100	1000
B	883-4921-7		TRANSDUCER BRUSH K-SERIES	10
J	442-5331-1		TUBE POLYURETHANE 1.35 X 3.35	1 M
	442-5055-4		TUBE POLYURETHANE 1.8MMX3.4MM	10 M
	442-5417-4		TUBE TEFLON 0.5 X 2.0 X 69 MM	5

Before 04.93 update

	ECR NO.	K-1000
A	388i077	A1396
B	389A009	A1621
C	389B068	A1681
D	391E091	A3596
E	392C040	A4537
F	392G115	--------
G	392E036	A4772
H	392K021	A4989
J	392J046	A4989
I	393A077	A5138

* for 117 VAC only
** for 220 VAC only
\+ for 240 VAC only

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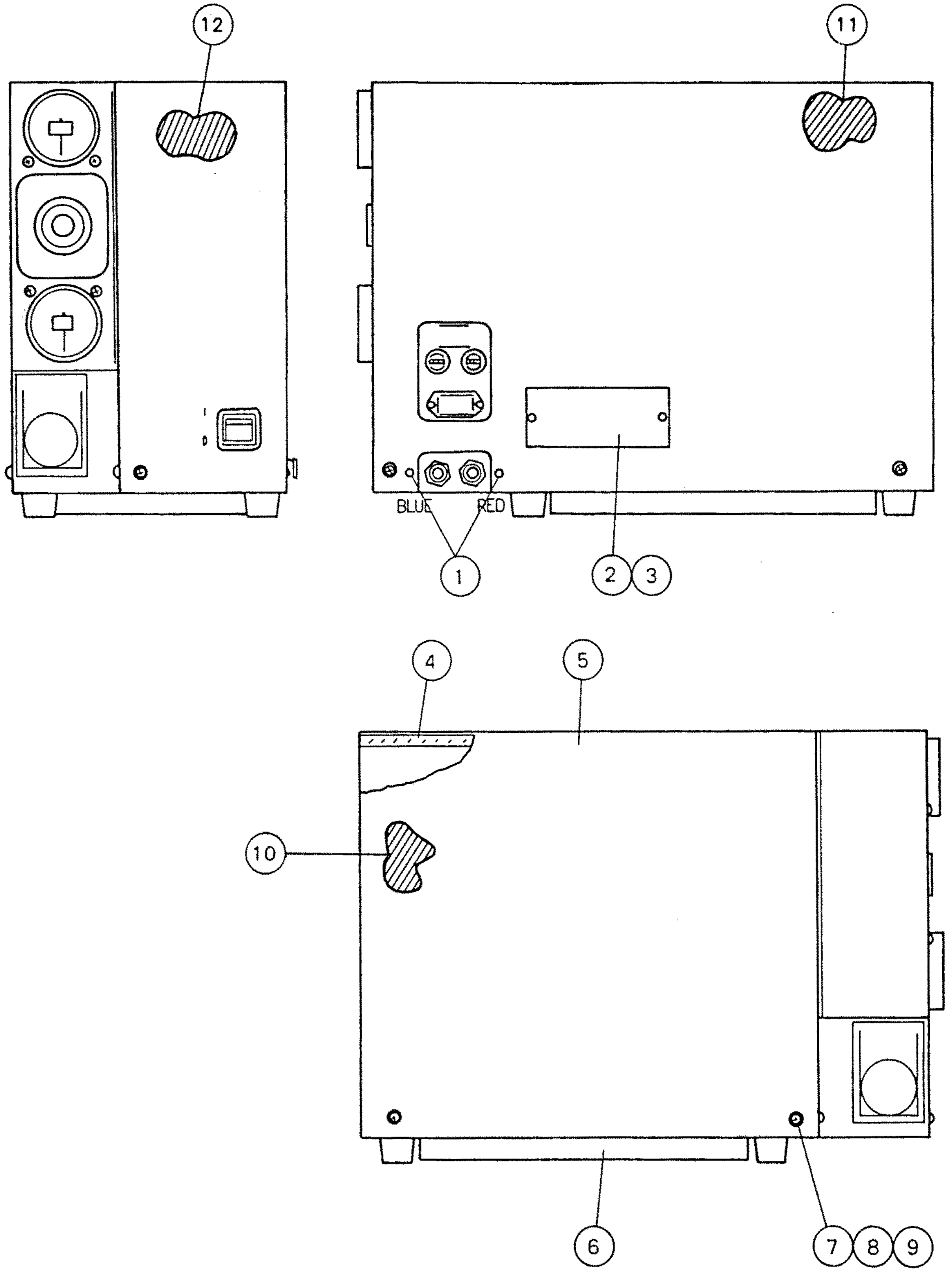
PNEUMATIC UNIT PU-6 ASSEMBLY(1/3)



PNEUMATIC UNIT PU-6 ASSEMBLY (1/3) DATE: 20-APR-93

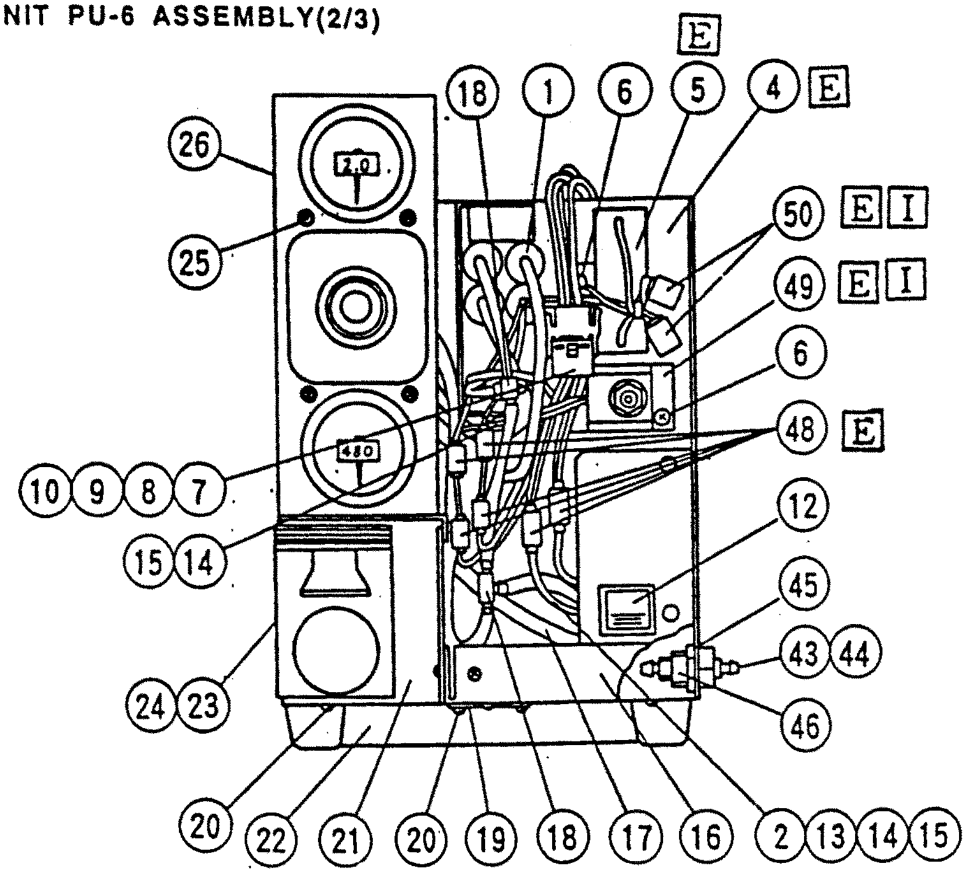
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0432-1	1-12*	PNEUMATIC UNIT PU-6 (N.AMER)	UNSALABLE
	873-0433-4	1-12**	PNEUMATIC UNIT PU-6 (EUROPE)	UNSALABLE
	873-0434-8	1-13+	PNEUMATIC UNIT PU-6 (U.K.)	UNSALABLE
	369-9612-0	1	LABEL MYTACK NO.120 (1 SET)	1
	369-3393-3	2	RATED PLATE PU- 6	UNSALABLE
	348-1401-1	3	SCREW BINDING M2X4 (BS)	100
A	368-5263-6B	4	ANTI-NOISE SPONGE NO.11-E	1
C	322-2506-3	5	COVER NO.120-1	1
	873-0442-8	6*	CHASSIS ASSY PU-6 (C-2/N.AMER)	UNSALABLE
	873-0443-1	6**	CHASSIS ASSY PU-6 (C-3/EUROPE)	UNSALABLE
	873-0444-5	6+	CHASSIS ASSY PU-6 (C-4/U.K.)	UNSALABLE
	343-3501-7	7	WASHER NYLON NO. 1	10
	348-1112-5	8	SCREW OVAL M3X6 (BS)	100
	348-9053-1	9	WASHER ROSETTE M3 (BS)	100
A	368-5213-0	10	ANTI-VIBRATION RUBBER NO.10-C	1
A	368-5214-3	11	ANTI-VIBRATION RUBBER NO.10-D	1
A	368-5215-7	12	ANTI-VIBRATION RUBBER NO.10-E	1
B	369-8113-2	13+	CAUTION MARK NO.102	5

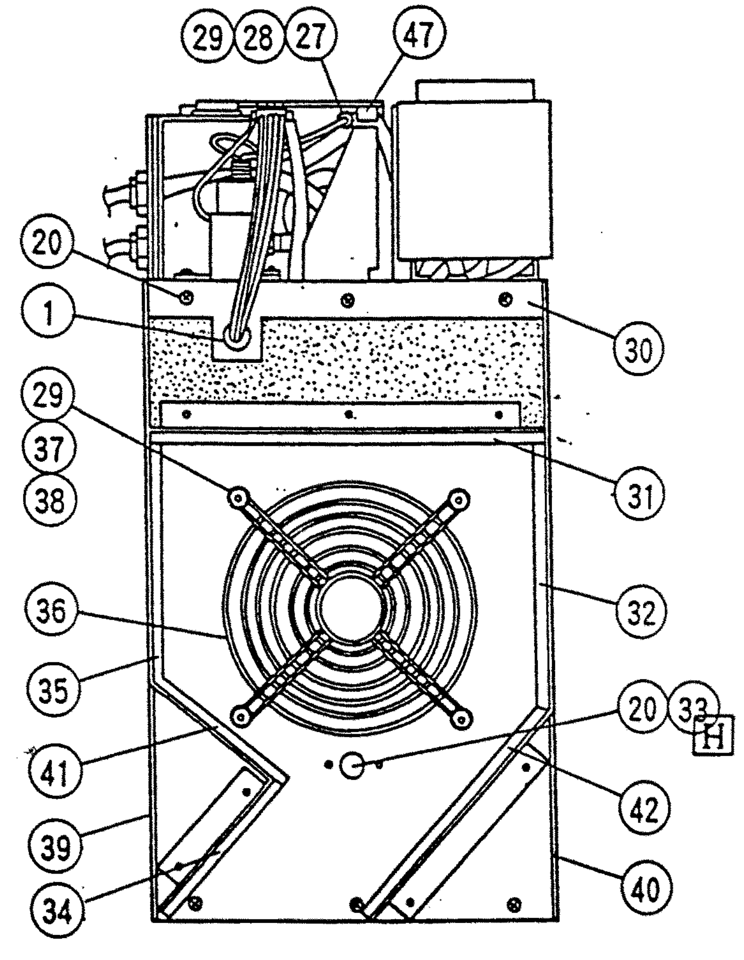
Before 04.93 update

	ECR NO.	K-1000
A	388J156	A1506-
B	392J046	A4989-
C	393A077	B5149-

* for 117 VAC only
** for 220 VAC only
\+ for 240 VAC only

PNEUMATIC UNIT PU-6 ASSEMBLY(2/3)





PNEUMATIC UNIT PU-6 ASSEMBLY (2/3) DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	368-1106-3	1	RUBBER BUSHING GROMMET C30BW62	10	
	267-0004-6	2	HEAT SHRINK TUBE 4MM DIA GRY	10	
E	268-0431-6	3	WIRE UL1015-18AWG BROWN	1	
E	~~??~~	~~??~~	~~??~~		
E	~~??~~	~~??~~	~~??~~		
E	~~??~~	~~??~~	~~??~~		
E	~~??~~	~~??~~	~~??~~		
	348-3927-1	6	SCREW BINDING M4X8 (SUS)	100	I
	264-6927-1	7	PIN MALE 350547-1	100	
	264-6930-2	8	PIN FEMALE 350550-1	100	
	264-6720-4	9	CONNECTOR 1-480702-0 4-PIN	10	
	264-6721-8	10	CONNECTOR 1-480703-0 4-PIN	10	
E	~~264-1309-2~~	~~11~~	~~?? ELEMENT CONNECTOR NO. 558~~	~~10~~	
	263-1676-1	12	SWITCH 1802-0120 WHITE	10	
	268-0281-1	13	WIRE UL1015-16AWG GRN/YEL	UNSALABLE	
	268-0440-0	14	WIRE UL1015-18AWG LIGHT BLUE	1	
	268-0431-6	15	WIRE UL1015-18AWG BROWN	1	
	323-1354-5B	16	PNEUMATIC CHASSIS NO. 3-B	1	
	442-5338-7	17	TUBE POLYURETHANE 4MMIDX6MMOD	10 M	G I
	442-4147-6	18	FITTING BTU-6X4-BSN	5	I
	363-1570-8	19	SUPPORT METAL NO. 41	1	
	348-3912-6	20	SCREW BINDING M3X6 (SUS)	100	
	366-2613-6B	21	CHAMBER MOUNTING PLATE NO. 3	1	
	323-1756-4	22	DUCT CHASSIS NO. 3	1	
	348-4363-7	23	SCREW TAPPING BINDING M3X8 (FE)	100	
	873-0461-9	24	TRAP CHAMBER NO. 4 ASSEMBLY	UNSALABLE	
	348-1822-1	25	SCREW ROUND M3X50 (FE)	.100	
	873-0451-1	26	REGULATOR SECTION NO. 4 ASSY	UNSALABLE	
	266-3580-1	27	SOLDERLESS LUG 170721-1 (M4)	100	
	348-9544-5	28	WASHER TOOTH LOCK EXT M4 (SUS)	100	
	348-8514-0	29	NUT HEX M4 (SUS)	100	
E G	323-1353-1B	4	PNEUMATIC CHASSIS NO. 3-A	1	
E	----------	5*	CAPACITOR 250V 25MF	UNSALABLE	
E	----------	5**+	CAPACITOR 440V 6MF	UNSALABLE	

B	323-1674-6C	30	CHASSIS NO.132	1	
A	368-5251-1C	31	ANTI-NOISE SPONGE NO.11-A	10	
A	368-5254-2C	32	ANTI-NOISE SPONGE NO.11-D	10	
B F	~~269-8302-9~~	~~33~~	~~THERMOSTAT CS-7??A (60-C)~~	~~1~~	
A	368-5252-5C	34	ANTI-NOISE SPONGE NO.11-B	10	
A	368-5253-9C	35	ANTI-NOISE SPONGE NO.11-C	10	
	289-9225-3	36	FINGER GUARD FG-120	5	
	348-3939-6	37	SCREW BINDING M4X50 (SUS)	100	
	348-9502-9	38	WASHER FLAT M4 (SUS)	100	
A	368-5211-2	39	ANTI-VIBRATION RUBBER NO.10-A	1	
A	368-5212-6	40	ANTI-VIBRATION RUBBER NO.10-B	1	
A	368-5276-4	41	ANTI-NOISE SPONGE NO.11-F	10	
A	368-5277-8	42	ANTI-NOISE SPONGE NO.11-G	10	
C	442-4125-4	43	FITTING BF- 6	5	
C	343-2425-7	44	O-RING NG-2 (NITRIL)	100	
C	344-8075-1	45	NUT HEX 110-21	10	
C	442-3009-5	46	ADAPTOR NO. 9	10	
D	369-7857-1	47	INDICATION MARK NO.554	10	
E	264-1310-7	48	U ELEMENT CONNECTOR NO.560	10	
E	~~443-7561-9~~	~~49*~~	~~S.V. 151J2XGM (120VAC/60HZ)~~	~~1~~	G
E	~~443-7562-2~~	~~49**~~	~~S.V. 151J2XGM (220VAC/50HZ)~~	~~1~~	G
E	~~443-7563-6~~	~~49+~~	~~S.V. 151J2XGM (240VAC/50HZ)~~	~~1~~	G
E I	264-1307-5	50	U ELEMENT CONNECTOR NO.557	10	
H F	~~269-8303-2~~	~~33~~	~~THERMOSTAT CS-12 (60 C)~~	~~1~~	
I	443-6451-2	49*	S.V. FAG21-X0305 (100-120VAC)	1	G
I	443-6452-6	49**+	S.V. FAG21-X0305 (220-240VAC)	1	G
H	269-8304-6	33	THERMOSTAT CS-12A (60 C)	1	

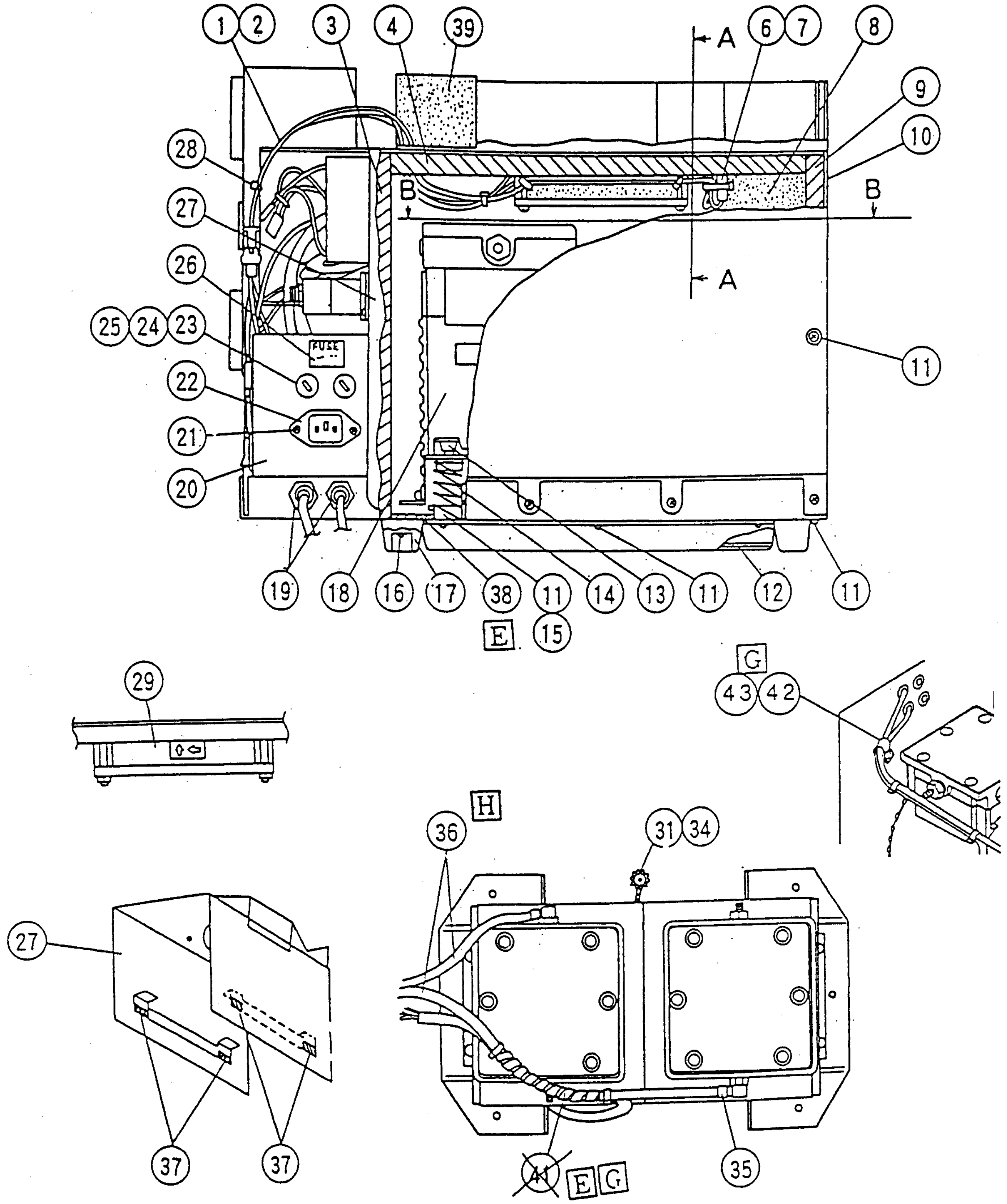
Before 04.93 update

	ECR NO.	K-1000
A	388J156	A1506-
B	3891031	A2086-
C	392E036	A4772-
D	392J046	A4989-

* for 117 VAC only
** for 220 VAC only
* for 240 VAC only

	ECR NO.	K-1000	K-800
E	393F004	B5328-	A1238-
F	394B007	———	———
G	394I041	PU -6 C6087-	
H	395E121	PU -6 C6438	PU 6 H2022-
I	396B006	PU -6 C6763	PU -6 H2232-

PNEUMATIC UNIT PU-6 ASSEMBLY(3/3)



PNEUMATIC UNIT PU-6 ASSEMBLY (3/3) DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	268-0431-6	1	WIRE UL1015-18AWG BROWN	1
	265-7500-0	2	FAN PLUG CORD 07100-1M	5
C F	~~368-5191-5??~~	~~3~~	~~??~~	~~1~~
C, D	368-5192-9D	4	ANTI-NOISE SPONGE NO. 9-D	1
	289-9225-3	5	FINGER GUARD FG-120	5
	264-1109-1	6	SOLDERLESS LUG LP-41729	100
	264-6656-2	7	INSULATOR 1-480416-0	100
C	368-5189-7C	8	ANTI-NOISE SPONGE NO. 9-A	1
C	368-5190-1B	9	ANTI-NOISE SPONGE NO. 9-B	1
	323-1356-2	10	PNEUMATIC CHASSIS NO. 3-D	1
	348-3912-6	11	SCREW BINDING M3X6 (SUS)	100
	368-5205-0B	12	ANTI-VIBRATION RUBBER NO. 4	5
	368-0040-1	13	RUBBER SHOE SJ-5018	10
	345-2261-5	14	SPRING NO. 61	5
	363-5105-8	15	FIXING MATERIAL NO. 99	1
	348-3931-7	16	SCREW BINDING M4X16 (SUS)	100 G
	368-0037-0	17	RUBBER SHOE C-30-RK-2320	10
	873-0472-0	18*	COMPRESSOR NO. 3 ASSY (C2/N.AME	UNSALABLE
	873-0473-3	18**	COMPRESSOR NO. 3 ASSY (C3/EUROP	UNSALABLE
	873-0474-7	18+	COMPRESSOR NO. 3 ASSY (C4/U.K.)	UNSALABLE
E	442-4125-4	19	FITTING BF- 6	5
	366-2948-2B	20	MOUNTING PLATE NO.185	1
	264-1505-9	21	AC INLET PA-125	5
	348-3612-0	22	SCREW FLAT M3X6 (SUS)	100
B	266-5274-9	23*	FUSE 125V4A JISMF61T (N.AMER)	10
	266-5293-0	23**+	FUSE 250V3.15A NO.19195 (EUROP)	10
F G	368-9151-5D	3	ANTI-NOISE SPONGE NO, 9-C	1

	266-3543-2	24	FUSE HOLDER 031-1673	10	
	266-3531-8	25*	FUSE HOLDER CAP 031-1661 (N.AME	10	
	266-3533-5	25**+	FUSE HOLDER CAP 031-1663 (EUROP	10	
	369-7428-1A	26*	INDICATION MARK NO.428 (N.AMER)	10	
	369-7429-4A	26**+	INDICATION MARK NO.429(EURO/UK	10	
A, D	323-1674-6C	27	CHASSIS NO.132	1	
	266-4461-8	28	TIE WRAP CV-100	1000	
	281-1002-0A	29*	FAN UP12D12 (120 VAC)	1	
	281-1003-3A	29**	FAN UP12D22 (220 VAC)	1	
	281-1004-7A	29+	FAN UP12D24 (240 VAC)	1	
	266-3580-1	30	SOLDERLESS LUG 170721-1 (M4)	100	
	348-9544-5	31	WASHER TOOTH LOCK EXT M4 (SUS)	100	
F	~~348-??26-8~~	~~32~~	~~SCREW BIND?? (SUS)~~	~~100~~	
	268-0281-1	33	WIRE UL1015-16AWG GRN/YEL	UNSALABLE	
	348-8514-0	34	NUT HEX M4 (SUS)	100	
	365-6401-8	35	SLEEVE METAL MS-06	10	
H	442-5516-6	36	TUBE JUNLON 4MMID X 6MMOD	10 M	
	368-2496-9	37	SPONGE PACKING NO.16	10	
C F	~~363-5266-7~~	~~38~~	~~ANTI NOISE SPONGE NO. 9-E~~	~~1~~	
C	368-5267-1	39	ANTI-NOISE SPONGE NO. 9-F	1	
E	442-3009-5	40	ADAPTOR NO. 9	10	
F	368-5266-7A	38	ANTI-NOISE SPONGE NO. 9-E	1	
F G	~~266-7110-2~~	~~41~~	~~COIL TUBE SS-10~~	~~10~~	
	266-6865-1	42	CLAMP NYLON NK-9N	100	G
	365-8207-6	43	SPACER 4EP-8	10	G

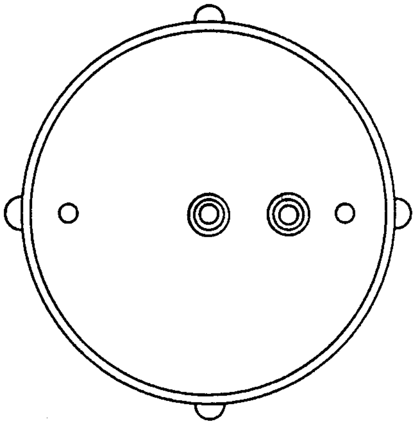
Before 04.93 update

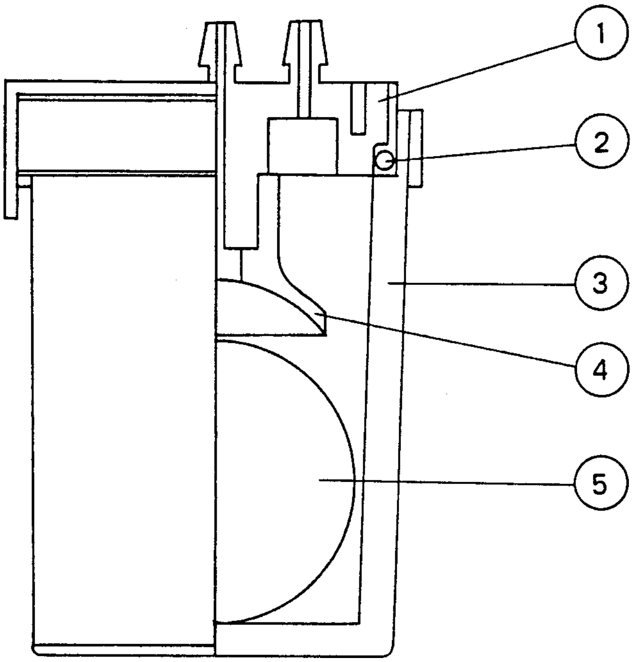
	ECR NO.	K-1000
A	388G090	------
B	3881077	A1396-
C	388J156	A1506-
D	3891031	A2086-
E	392E036	A4772

*	for 117 VAC only
**	for 220 VAC only
+	for 240 VAC only

SYM	ECR No.	K-1000	K-800
F	393F004	B5328-	A1238-
G	394I041	PU-6 C6087	
H	396B006	PU-6 C6763-	PU-6 H2232-

TRAP CHAMBER NO. 4 ASSEMBLY





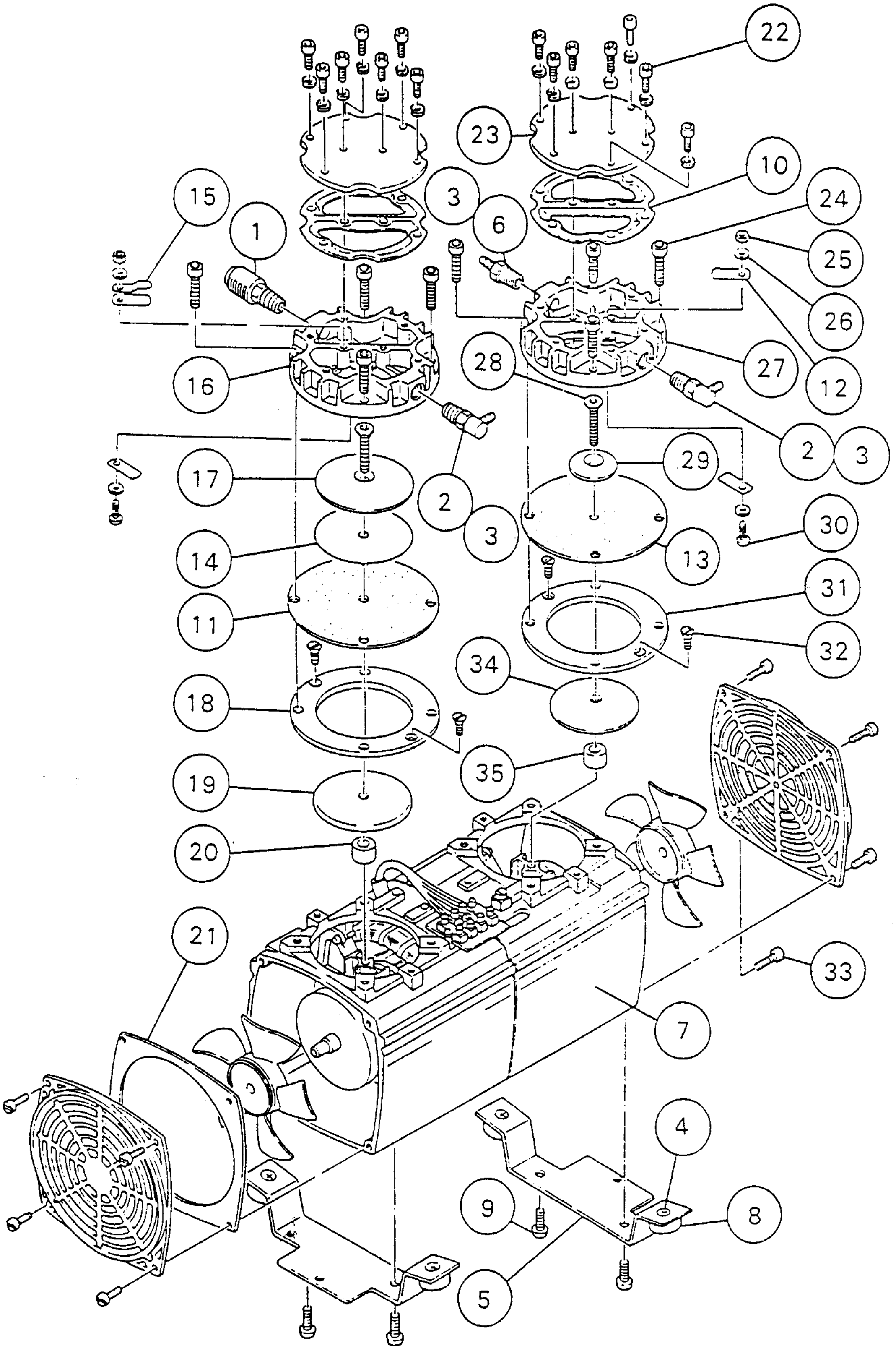
TRAP CHAMBER NO. 4 ASSEMBLY DATE: 21-APR-88

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0461-9	1-5	TRAP CHAMBER NO. 4 ASSEMBLY	UNSALABLE
	365-1580-0	1	SUPPORT NO. 69	1
	346-3942-3	2	O-RING P-42	50
A	443-0731-2	3	TANK NO.11	1
	443-1164-6	4	VALVE SEAL NO.24	5
	883-0161-8	5	FLOAT BALL NO. 2	1

Before 04.93 update

	ECR NO.	K-1000
A	390K097	A3126-

COMPRESSOR NO. 3 ASSEMBLY (OLD STYLE WITH KNF COMPRESSOR)



COMPRESSOR NO. 3 ASSEMBLY & ITS REPLACEMENT PARTS

DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0472-0	1-9*	COMPRESSOR NO. 3 ASSY (C2/N.AME	UNSALABLE
	873-0473-3	1-9**	COMPRESSOR NO. 3 ASSY (C3/EUROP	UNSALABLE
	873-0474-7	1-9+	COMPRESSOR NO. 3 ASSY (C4/U.K.)	UNSALABLE
	449-1506-5	1	SILENCER SLW-6A	1
	442-4149-3	2	FITTING BL-6 X 4 X PT 1/8 BSN	10
	426-1301-3	3	SEALING TAPE	5
	348-1512-7	4	SCREW FLAT M3X6 (FE)	100
	323-1355-9A	5	PNEUMATIC CHASSIS NO. 3-C	1
	442-4145-9	6	FITTING BN-6 X 4 X PT 1/8 BSN	5
B	281-4952-6	7*	COMPRESSOR PJ5554-026.0 (117VAC	1
B	281-4953-0	7**	COMPRESSOR PJ5555-026.0 (220VAC	1
B	281-4954-3	7+	COMPRESSOR PJ5556-026.0 (240VAC	1
	363-5105-8	8	FIXING MATERIAL NO. 99	1
	348-1955-9	9	SCREW BINDING M6X10 (FE)	100
	281-4956-1	10	GASKET KNF-5.03690	5
B	281-4960-6	11	DIAPHRAGM VACUUM KNF-5.06044	5
	281-4959-1	12	LEAF VALVE KNF-5.03400	5
	281-4957-4	13	DIAPHRAGM PRESSURE KNF-5.03440	5
A	368-8720-4	14	TEFLON SHEET KNF-5393-6.05692	5
C	281-4964-1	15	STOPPER LEAF VALVE KNF-5.04550	1
C	281-4978-2	16	DIAPHRAGM HEAD VAC KNF-3.06550	1
C	281-4974-8	17	RETAINER PLATE VAC KNF-4.09840	1
C	281-4980-1	18	DIAPHRAGM RING VAC KNF-4.11378	1
C	281-4973-4	19	SUPPORT VACUUM KNF-4.09850	1
C	281-4976-5	20	SPACER VACUUM KNF-4.11462	1

Parts listed on this page are applicable only to S/Ns listed below, by ECR 393F004:

K-1000 S/N A1001-B5327
K-800 S/N A1001-A1237

C	281-4981-4	21	SPACER FAN KNF-5.05776	1
C	281-4965-4	22	SCREW HEX-SOCKET KNF-14.002	10
C	281-4966-8	23	PLATE COMP. HEAD KNF-4.075801	1
C	281-4967-1	24	SCREW HEX-SOCKET KNF-14.011	10
C	281-4961-0	25	NUT LEAF VALVE KNF-18.031	10
C	281-4962-3	26	WASHER FLAT KNF-5.03410	10
C	281-4977-9	27	DIAPHRAGM HEAD PRS KNF-3.06549	1
C	281-4968-5	28	SCREW FLAT KNF-11.117	10
C	281-4969-9	29	RETAINER PLATE PRS KNF-4.11275	1
C	281-4963-7	30	SCREW LEAF VALVE KNF-4.07660	10
C	281-4979-6	31	DIAPHRAGM RING PRS KNF-4.11374	1
C	281-4970-3	32	SCREW DIAPHRAGM RING KNF11.053	10
C	281-4975-1	33	SCREW FAN COVER KNF-08.080	10
C	281-4971-7	34	SUPPORT PRESSURE KNF-4.07600	1
C	281-4972-1	35	SPACER PRESSURE KNF-4.11373	1

Parts listed on this page are applicable only to S/Ns listed below, by ECR 393F004:

K-1000 S/N A1001-B5327
K-800 S/N A1001-A1237

Before 04. 93 update

	ECR NO.	K-1000
A	389A010	------
B	390K116	A3096-
C	391F060	------

* for 117 VAC only
** for 220 VAC only
\+ for 240 VAC only

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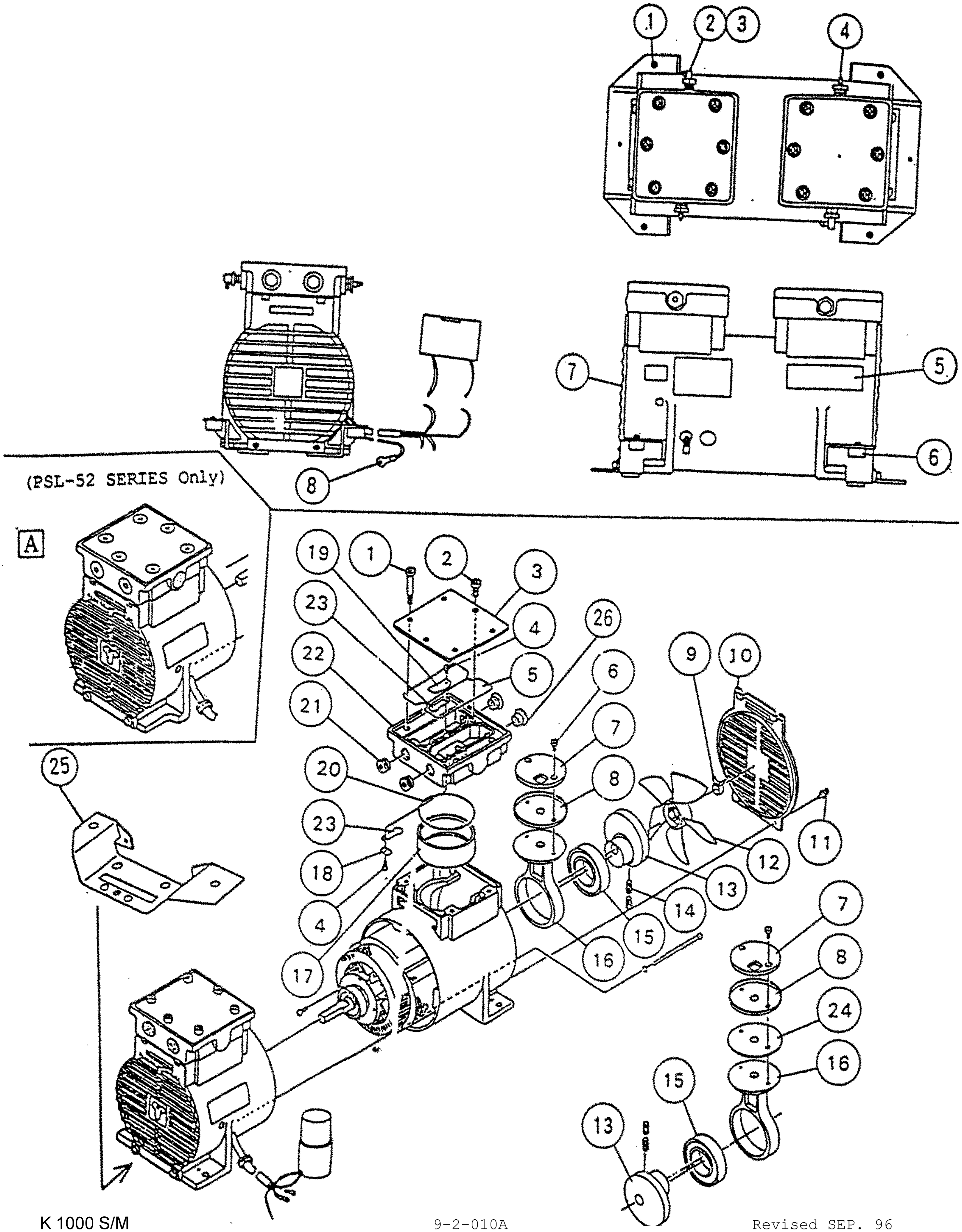
COMPRESSOR NO. 3 ASSEMBLY (NEW STYLE WITH TOSHIBA COMPRESSOR)


(PSL-52 SERIES Only)

COMPRESSOR NO. 3 ASSEMBLY (NEW STYLE; TOSHIBA)

DATE: 30-JUL-93

	CODE NUMBER	DRAWIN NUMBER	DESCRIPTION	QTY PER UNIT
	873-0472-0	1-8*	COMPRESSOR NO. 3 ASSY (C2/N.AME	UNSALABLE
	873-0473-3	1-8**	COMPRESSOR NO. 3 ASSY (C3/EUROP	UNSALABLE
	873-0474-7	1-8+	COMPRESSOR NO. 3 ASSY (C4/U.K.	UNSALABLE
	348-1913-2	1	SCREW BINDING M3X8 (FE)	100
	442-4141-4	2	FITTING BL-6 X 4 X PT 1/4 BSN	10
	426-1301-3	3	SEALING TAPE	5
	442-4143-1	4	FITTING BN-6 X 4 X PT 1/4 BSN	10
	369-8034-5	5	CAUTION MARK NO. 34	5
	363-5105-8	6	FIXING MATERIAL NO. 99	1
	281-4486-5	7*	COMPRESSOR PSL- 51A (117 VAC)	1
A	443-6946-1	7*	COMPRESSOR PSL- 52A (117 VAC)	1
	281-4487-9	7**	COMPRESSOR PSL- 51B (220 VAC)	1
A	443-6947-4	7**	COMPRESSOR PSL- 52B (220 VAC)	1
	281-4488-2	7+	COMPRESSOR PSL- 51C (240 VAC)	1
A	443-6948-8	7+	COMPRESSOR PSL- 52C (240 VAC)	1
	266-3580-1	8	SOLDERLESS LUG 170721-1 (M4)	100

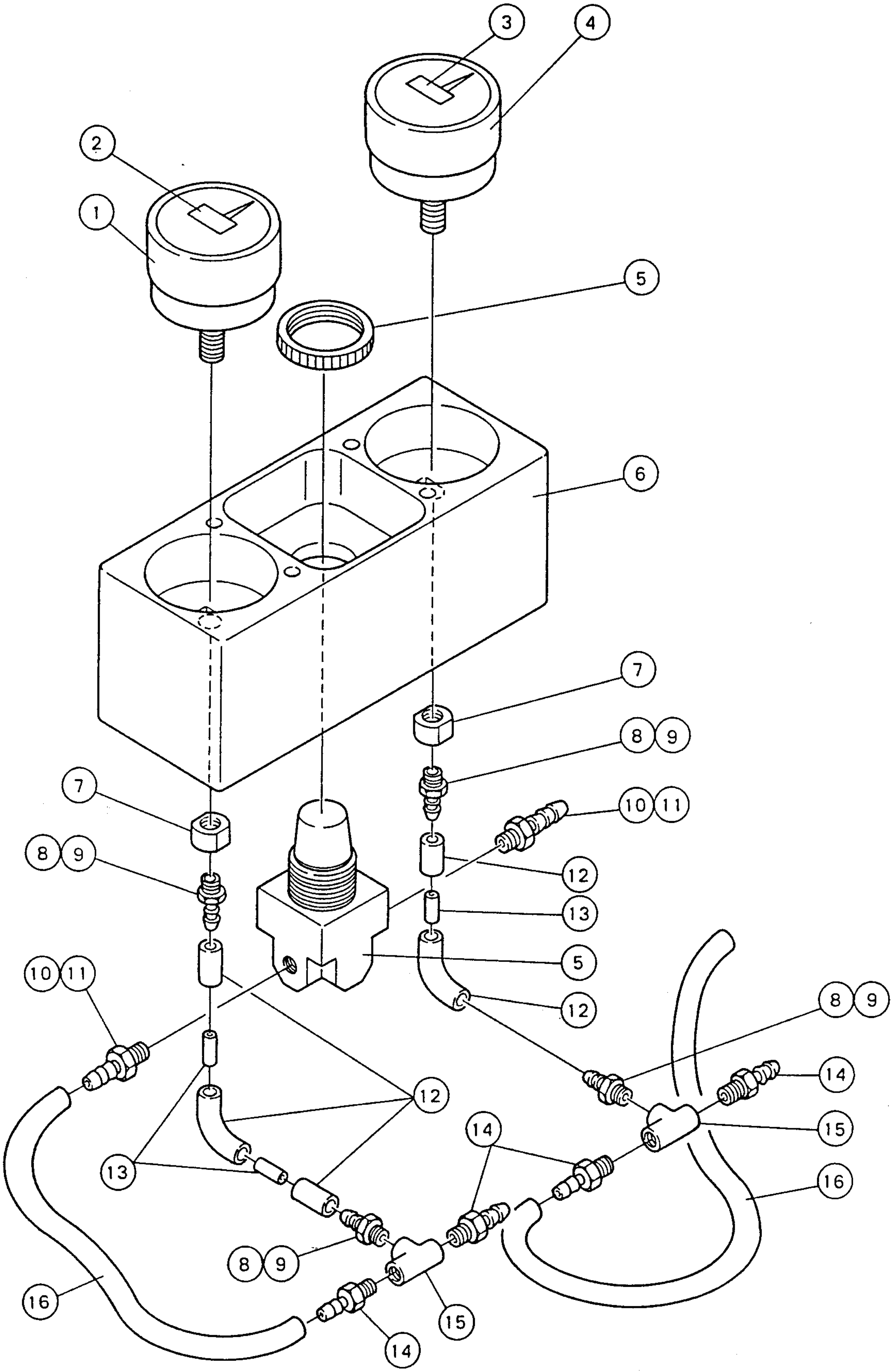
281-4486-5	1-26*	COMPRESSOR PSL- 51A (117 VAC)	1
931-0412-3	1-26*PM	COMPRESSOR # 3 MODIF.KIT (117V)	1
281-4487-9	1-26**	COMPRESSOR PSL- 51B (220 VAC)	1
931-0413-7	1-26**PM	COMPRESSOR # 3 MODIF.KIT (220V)	1
281-4488-2	1-26+	COMPRESSOR PSL- 51C (240 VAC)	1
931-0414-1	1-26+PM	COMPRESSOR # 3 MODIF.KIT (1240V)	1
348-1541-5	1	SCREW FLAT M6X35 (FE)	100
348-1540-4	2	SCREW FLAT M6X10 (FE)	100
443-6851-4	3	HEAD COVER NO. 01B014740	1
348-3150-4	4	SCREW TRUSS M4X10 (SUS)	100
443-6837-1	5	GASKET NO. A01B008510	1
348-3828-0	6	SCREW ROUND M4X12 (SUS)	100
443-6840-3	7	PACKING FIXTURE NO. A01B008440	1
443-6841-7	8	PISTON RING NO. A01B012180	1
443-6853-1	9	HOSE CLAMP NO. A01P014330	1
443-6838-5	10	COVER NO. A01B008470	1
348-2835-2	11	SCREW ROUND SEMS M4X12 (SWRM)	100
443-6843-4	12	FAN NO. A01B008520	1
443-6854-5	13	ECCENTRIC CAM 013470	1
348-4933-8	14	SCREW HEX-SOCKET M6X10 (SWRM)	100
341-2402-7	15	BEARING 6006VV (NSK)	1
443-6844-8	16	PISTON NO. A01B011620	1
443-6852-8	17	CYLINDER NO. A01B014950	1
443-6835-4	18	VALVE FIXTURE NO. A01B012050	1
443-6848-2	19	VALVE FIXTURE NO. A01B012060	1
443-6833-7	20	O-RING S-63 NO. A01P	1
443-6842-1	21	PLUG NO. A01P009180	1
443-6849-6	22	CYLINDER HEAD NO. A01B014940	1
443-6836-8	23	VALVE NO. A01B012070	1
443-6855-9	24	SPACER NO. A01B010790	1
443-6856-2	25	BRACKET NO. A01B014980	1
443-6850-1	26	PLUG NO. A01P000250	1

* For 117 VAC only
** For 220 VAC only
\+ For 240 VAC only

Parts listed in this page are applicable only to S/Ns listed below, by ECR 393F004.
K-1000 S/N B5328-
K-800 S/N A1238-

	ECR NO.	K-1000	K-800
A	396B006	PU-6 C6763-	PU-6 H2232
B			
C			
D			

REGULATOR SECTION NO. 4 ASSEMBLY



REGULATOR SECTION NO. 4 ASSEMBLY DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-0451-1	1-16	REGULATOR SECTION NO. 4 ASSY	UNSALABLE
	441-9187-6	1	GAUGE DU50-003 (3 KG/CM2)	1
	369-7458-2	2	INDICATION MARK NO. 458	10
	369-7460-1	3	INDICATION MARK NO. 460	10
	441-9186-2	4	GAUGE DU50-760 (760 MMHG)	1
	443-1970-2	5	RELIEF VALVE 247L-1-V	1
🄰, 🄱	323-1822-3A	6	REGULATOR SECTION NO. 4 CHASSI	1
	348-8420-7	7	NUT HEX M10 (FE)	100
	442-3508-9	8	NIPPLE NO. 8	50
	346-1750-5	9	GASKET TAC 89-14	100
	442-4145-9	10	FITTING BN-6 X 4 X PT 1/8 BSN	5
	426-1301-3	11	SEALING TAPE	5
	442-5055-4	12	TUBE POLYURETHANE 1.8MMX3.4MM	10 M
	443-0221-8	13	ORIFICE NO.21	10
	442-4125-4	14	FITTING BF- 6	5
	442-4596-1	15	FITTING TF	10
	442-5338-7	16	TUBE POLYURETHANE 4MMIDX6MMOD	10 M

Before 04.93 update

	ECR NO.	K-1000
🄰	388J156	A1506-
🄱	389G070	A1936-

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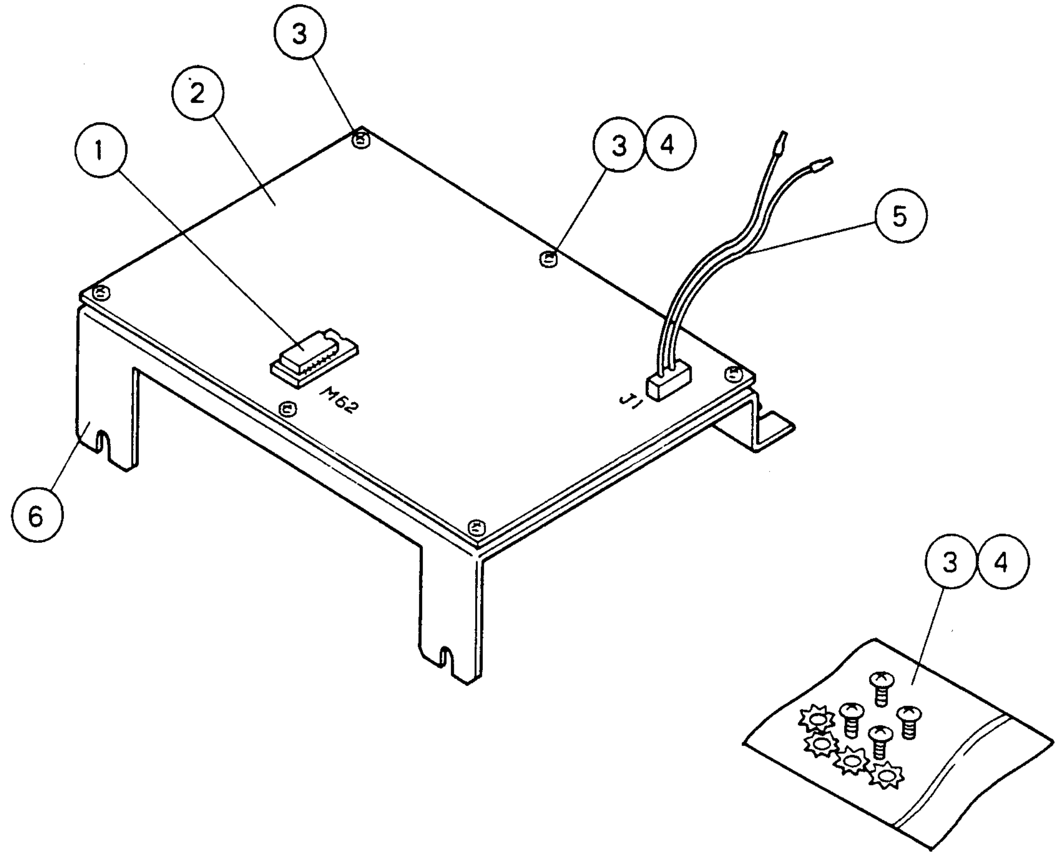
K-1000 PDA UNIT KPU-1 ASSEMBLY



K-1000 PDA UNIT KPU-1 ASSEMBLY DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	873-1981-4	1	ROM 2K1 ASSY (SET OF 1 PROM)	1
B	921-0021-0	OPTION	ROM 2K1 (01-XX) (SET OF 1 PROM)	1
A	891-0351-2	2	PCB NO.6315 WITHOUT ROM (PM)	1
	348-3912-6	3	SCREW BINDING M3X6 (SUS)	100
	348-9543-1	4	WASHER TOOTH LOCK EXT M3 (SUS)	100
	873-1251-4	5	WIRING CORD NO. 330	1
	366-2253-3A	6	PCB MOUNTING PLATE NO. 11	1

Before 04.93 update

	ECR NO.	KPU-1
A	389G067	------
B	392A029	------

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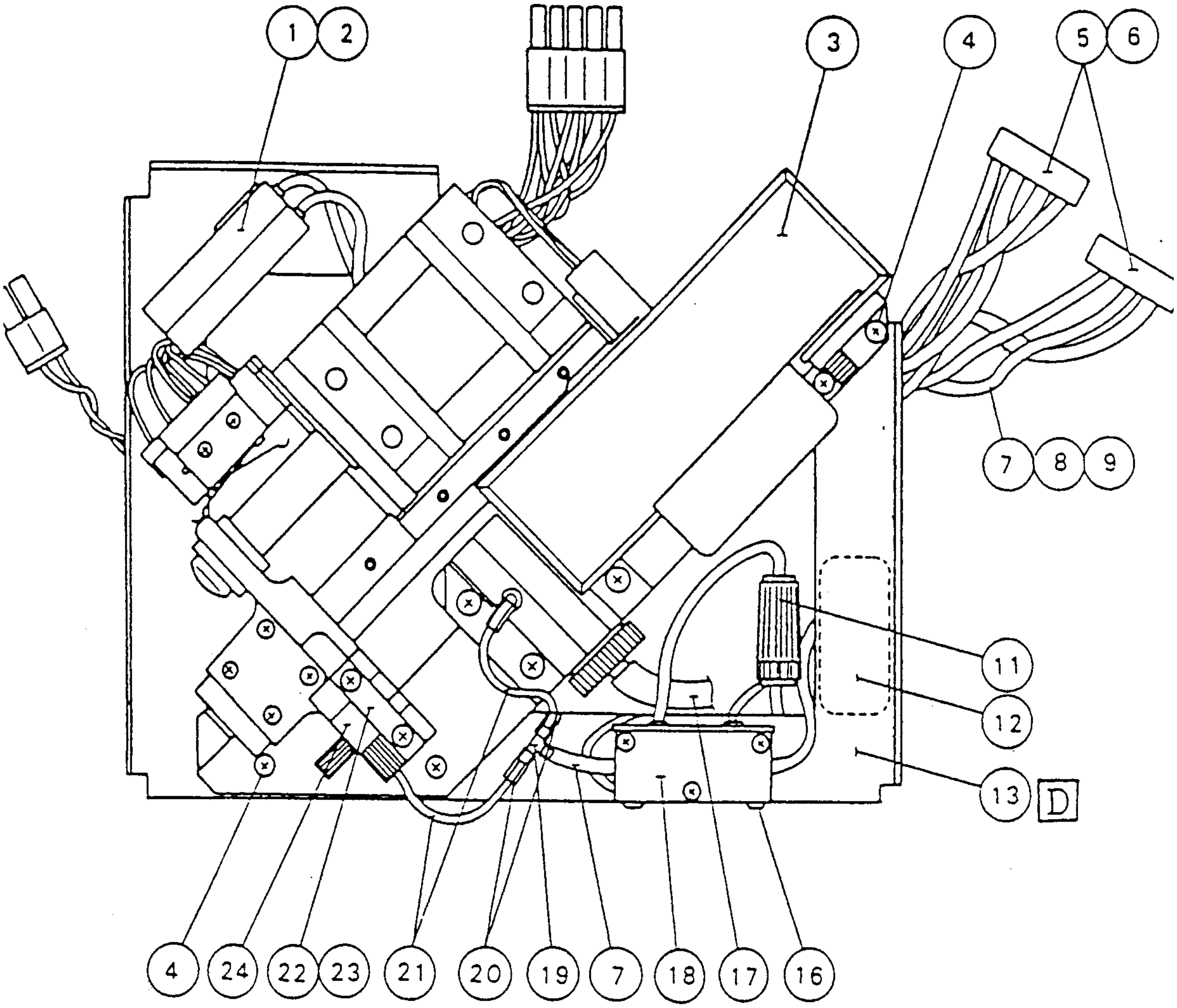
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PIERCING UNIT NO. 2 COMPLETE ASSEMBLY

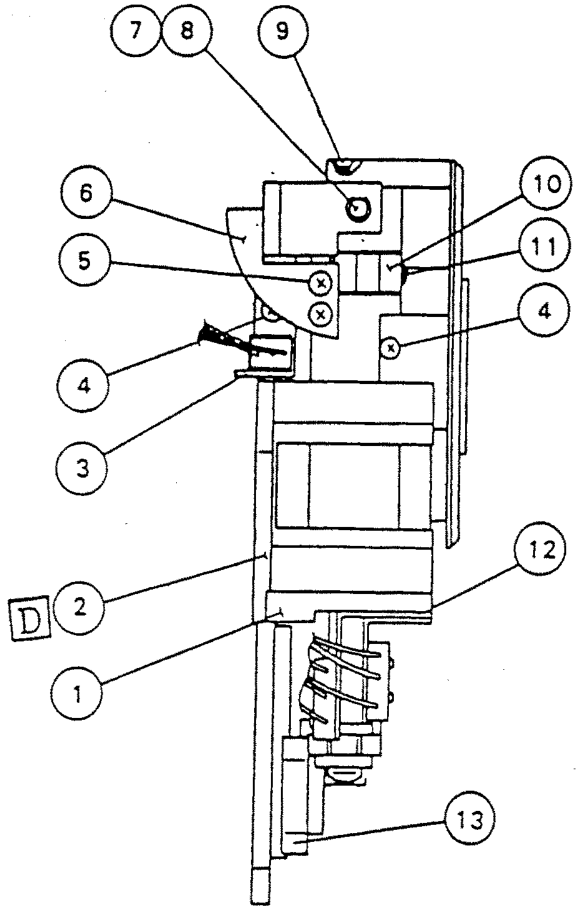
DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	883-3811-1	1-24	PIERCING UNIT NO. 2 COMP ASSY	UNSALABLE
	883-3621-7	1	DIAPHRAGM PUMP NO.12 ASSEMBLY	1
	348-3912-6	2	SCREW BINDING M3X6 (SUS)	100
	883-3601-2	3	PIERCING UNIT NO. 2	UNSALABLE
	348-3913-0	4	SCREW BINDING M3X8 (SUS)	100
	442-3288-1B	5	FLUID CONNECTOR NO. 6	1
B	346-6564-4	6	SEAL NO.14	10
	443-0213-8	7	ORIFICE NO.13 (BROWN)	10
	442-5055-4	8	TUBE POLYURETHANE 1.8MMX8.4MM	10 M
	266-4461-8	9	TIE WRAP CV-100	1000
A C				
	833-1221-1	11	NON-RETURN VALVE NO. 2	5
	369-9722-2	12	UV LIGHT SHIELD LABEL DAT-20	100
	321-2167-1C	13	FRAME NO. 12	1 D
C				
C				
	348-3919-1	16	SCREW BINDING M3X20 (SUS)	100
	442-5287-4	17	TUBE SILICONE 1/8" X 1/4"F7398	5 M
	883-3611-0	18	MASTER VALVE 3MV25 ASSY	1
	442-4251-7	19	T JOINT G-3	5
	442-5273-2	20	TUBE SR-1560 1MMID X 3MMOD	1 M
	442-5427-1	21	TUBE TEFLON 0.5MMID X 2.0MMOD	1 M
	363-5199-8	22	FIXING MATERIAL NO.183	1
	348-3917-4	23	SCREW BINDING M3X16 (SUS)	100
	901-0291-1	24	PIERCER UNIT NO. 2 ASSY (PM)	1
C				

Before 04. 93 update

	ECR NO.	KCP-1
A	389B056	A1188-
B	390D033	A1233-
C	390G068	A1258-

SYM	ECR NO.	SERIAL NO.
D	394E046	KCP-1 A1573-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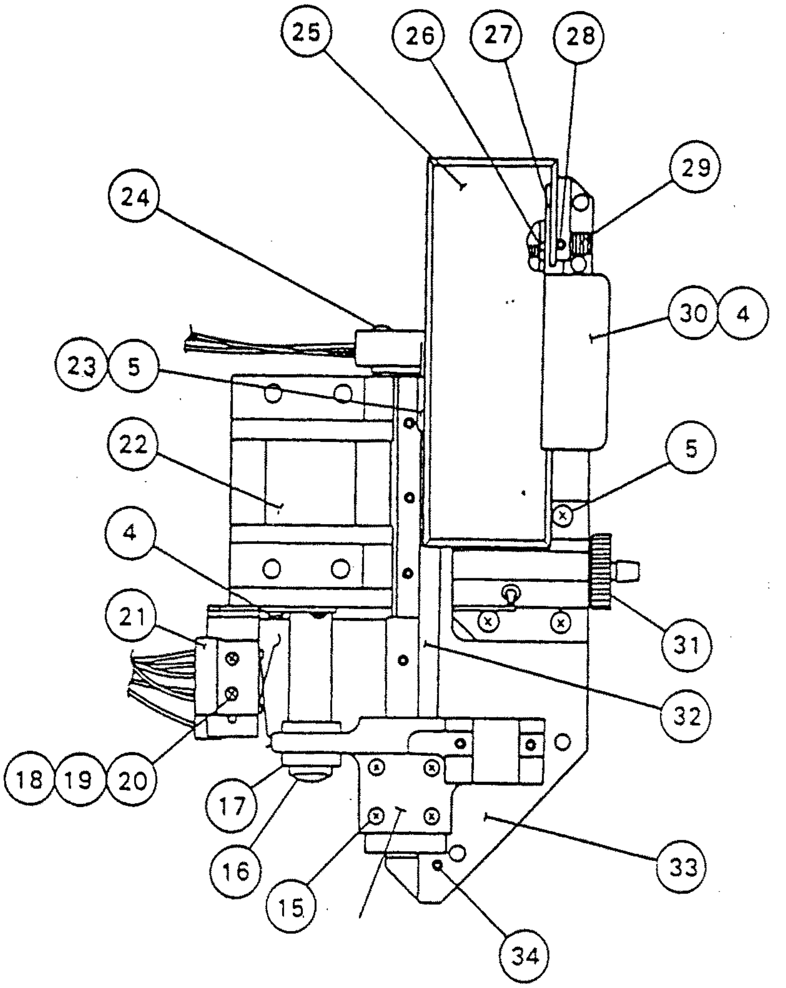
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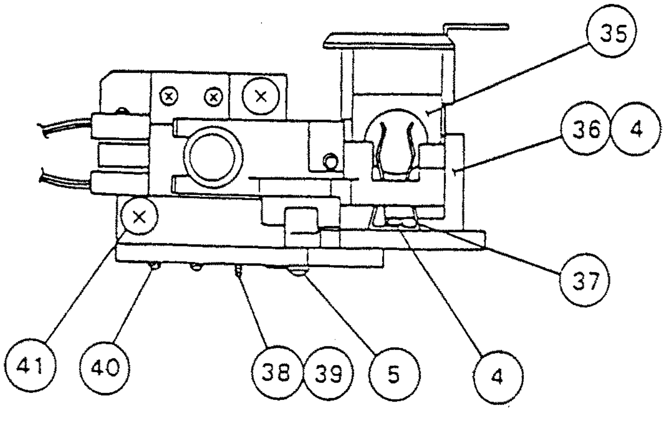
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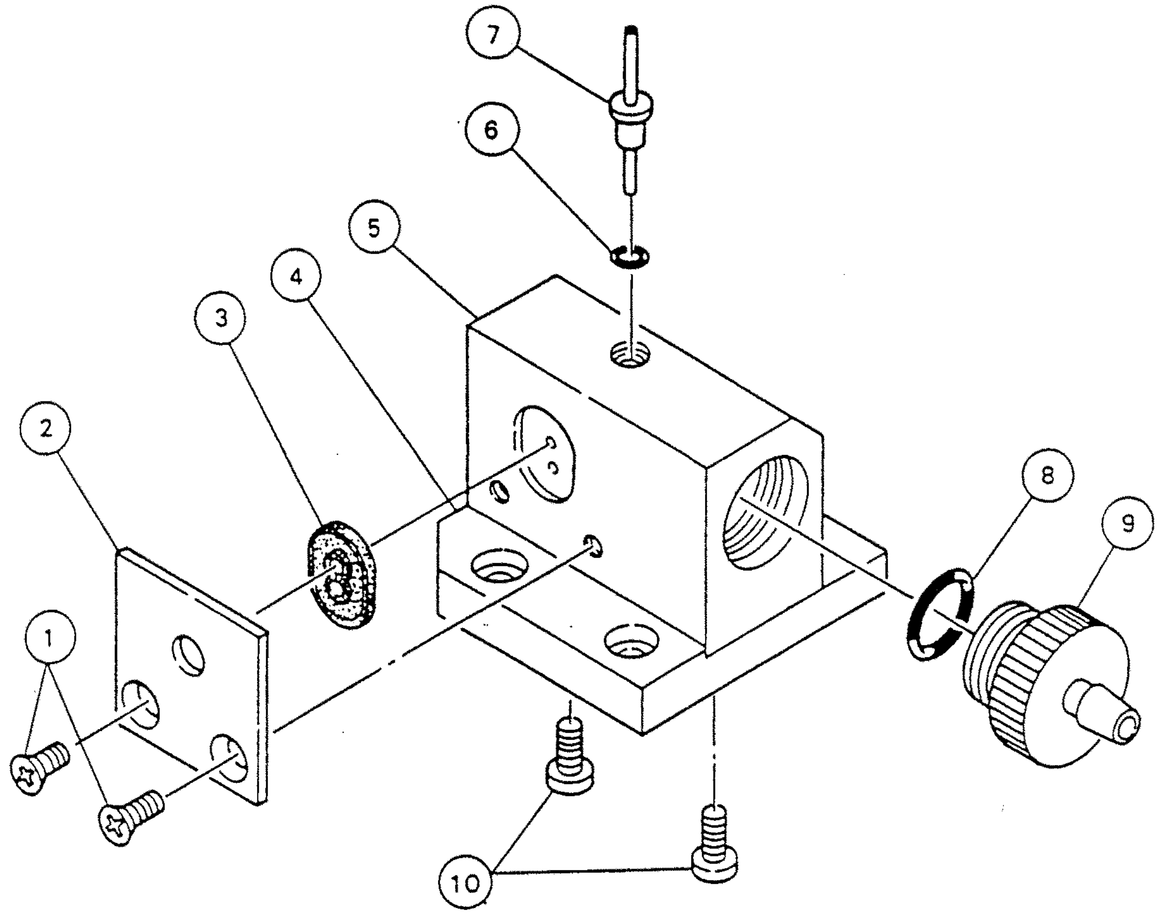
PIERCING UNIT NO. 2 DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	883-3601-2	1-41	PIERCING UNIT NO. 2	UNSALABLE	
	363-5202-2	1	FIXING MATERIAL NO.186	1	
	363-5200-5A	2	FIXING MATERIAL NO.184	1	D
	366-2568-5	3	SW MOUNTING PLATE NO. 67	1	
	348-3912-6	4	SCREW BINDING M3X6 (SUS)	100	
	348-3913-0	5	SCREW BINDING M3X8 (SUS)	100	
	367-1551-6A	6	STOPPER NO. 40	1	
	341-1492-9	7	SHAFT NO. 97	1	
	344-2213-9	8	E-SHAPE SNAP RING E-4 (SUS)	100	
	348-3615-1	9	SCREW FLAT M3X12 (SUS)	100	
	367-2002-0A	10	HAND CLIPPER NO. 3	1	
	348-3911-2	11	SCREW BINDING M3X4 (SUS)	100	
B	366-2569-9	12	SW MOUNTING PLATE NO. 68	1	
	341-3793-6	13	LINEAR SLIDER LWL-9C1R-60H	1	
A	342-2801-2A	14	SLIDER NO.25	1	
	348-3902-9	15	SCREW BINDING M2X6 (SUS)	100	
	348-3964-0	16	SCREW BINDING M6X20 (SUS)	100	
	443-9060-5B	17	ROD EDGE METAL NO. 9	1	
	348-1275-5	18	SCREW ROUND M2.3X10	100	
	348-9006-6	19	WASHER FLAT M2.3	100	
	348-9310-8	20	WASHER SPRING M2.3 (SWRH14)	100	
	883-3641-1	21	SWITCH NO.41 ASSEMBLY	1	
	443-3300-6A	22	AIR CYLINDER WSK-32-29	1	
	342-2210-3A	23	GUIDE BOARD NO. 40	1	
	348-3915-7	24	SCREW BINDING M3X12 (SUS)	100	
	322-1370-8A	25	COVER NO.154	1	
	348-1003-6	26	SCREW FLAT M2.6X6 (BS)	100	
	363-5201-9A	27	FIXING MATERIAL NO.185	1	
	348-4901-9	28	SCREW HEX-SOCKET M3X4 (SUS)	100	
	367-1512-1	29	BALL PLUNGER SBP-6	1	
	362-9580-7	30	KNOB A-405	5	
	883-3781-6	31	RINSING SPIT NO.14 ASSY	1	
	341-1491-5A	32	SHAFT NO. 96	1	
A	321-2324-2B	33	PIERCER BASE NO. 2	1	
	348-5001-3	34	SCREW HEX-SOCKET BOLT M3X4 (SUS	100	
	363-2494-5	35	HOLDER NO.42	1	
	363-5198-4A	36	FIXING MATERIAL NO.182	1	
C	367-1979-1	37	HAND CLIPPER NO.15	1	
	442-3508-9	38	NIPPLE NO. 8	50	
	346-1750-5	39	GASKET TAC 89-14	100	
	348-3927-1	40	SCREW BINDING M4X8 (SUS)	100	
	348-3848-4	41	SCREW ROUND M5X30 (SUS)	100	

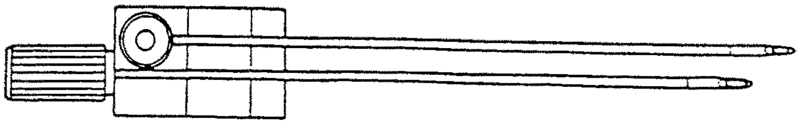
Before 04. 93 update

	ECR NO.	KCP-1
A	388K091	A1188-
B	389G032	A1200-
C	390D029	A1503-

SYM	ECR NO.	SERIAL NO.
D	394E046	KCP-1 A1573-



ΙERCER NO. 2 ASSEMBLY



RINSING SPIT NO. 14 ASSEMBLY

DATE: 20-FEB-90

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	883-3781-6	1-10	RINSING SPIT NO.14 ASSY	1
	348-3612-0	1	SCREW FLAT M3X6 (SUS)	100
	363-1388-3	2	FIXING METAL NO. 94	1
	368-2392-9B	3	RUBBER PACKING NO.32	10
A	363-5197-1A	4	FIXING MATERIAL NO.181	1
A, B	441-8350-6B	5	RINSING SPIT NO.14	1
	343-2457-6	6	O-RING NO. 7 (NITRIL)	100
	442-3555-4	7	NIPPLE NO. 54	1
	346-3915-2	8	O-RING P-12	50
	442-3559-9	9	NIPPLE NO. 58	1
	348-3912-6	10	SCREW BINDING M3X6 (SUS)	100

PIERCER UNIT NO. 2 ASSEMBLY

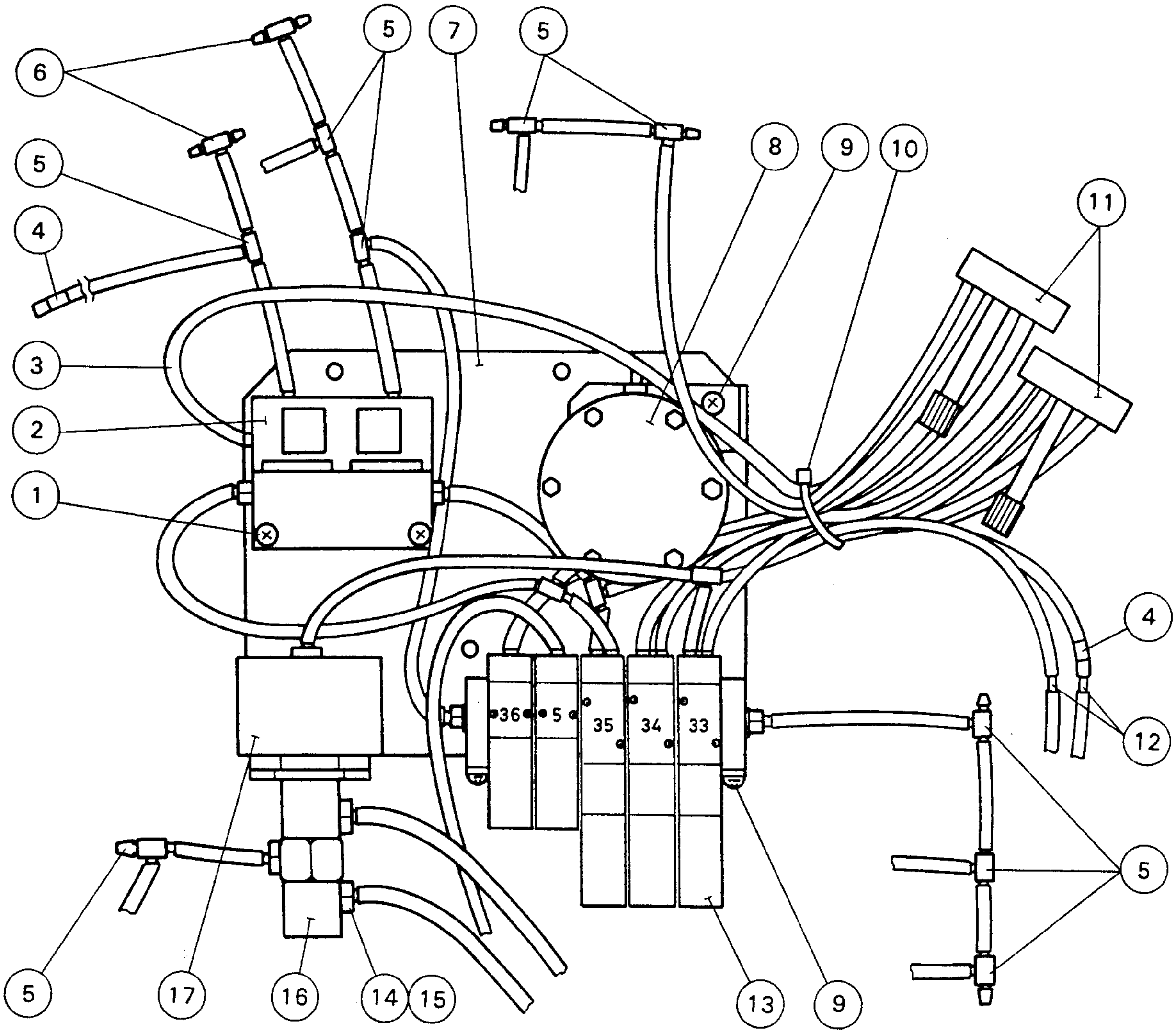
DATE: 20-APR-93

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
901-0291-1	11	PIERCER UNIT NO. 2 ASSY (PM)	1

Before 04.93 update

	ECR NO.	KCP-1
A	388K091	A1188-
B	389B048	A1188-

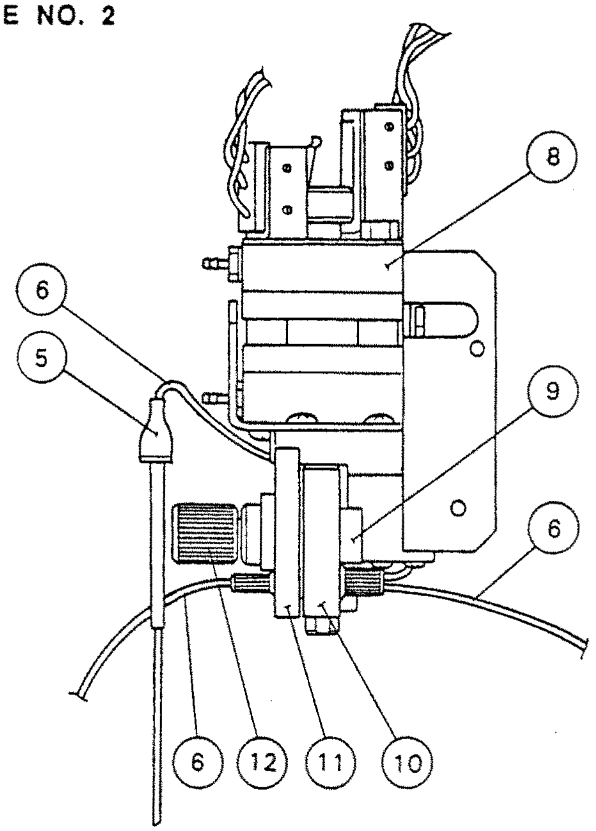
VALVE UNIT NO. 38 ASSEMBLY



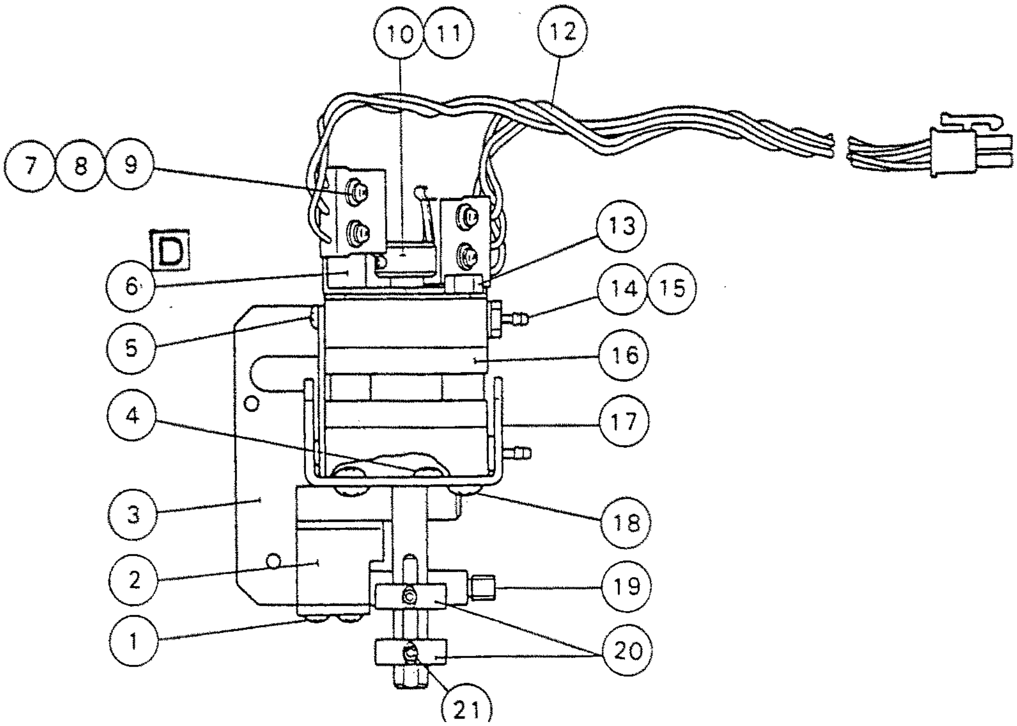
VALVE UNIT NO. 38 ASSEMBLY DATE: 20-AUG-88

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
883-3661-6	1-17	VALVE UNIT NO. 38 ASSEMBLY	UNSALABLE
348-3919-1	1	SCREW BINDING M3X20 (SUS)	100
883-3671-3	2	MASTER VALVE 3MV26 ASSY	1
442-5055-4	3	TUBE POLYURETHANE 1.8MMX3.4MM	10 M
426-1135-9	4	ADHESIVE TAPE NO.471 (BLUE)	1
442-3424-3	5	HYDRAULIC CONNECTOR NO.14	10
442-3429-1	6	HYDRAULIC CONNECTOR NO.19	10
366-3925-1	7	SV MOUNTING PLATE NO.15	1
883-3621-7	8	DIAPHRAGM PUMP NO.12 ASSEMBLY	1
348-3912-6	9	SCREW BINDING M3X6 (SUS)	100
266-4461-8	10	TIE WRAP CV-100	1000
833-1151-7	11	FLUID CONNECTOR 3-A ASSY	5
443-0213-8	12	ORIFICE NO.13 (BROWN)	10
883-3651-9	13	MANIFOLD SV NO. 3 ASSY	UNSALABLE
442-3508-9	14	NIPPLE NO. 8	50
346-1750-5	15	GASKET TAC 89-14	100
443-3701-1	16	AIR VALVE 4P	1
443-3686-2	17	ACTUATOR 34AL	1

SWITCHING ROTOR VALVE NO. 2



DRIVE MECHANISM NO. 30 ASSEMBLY



SWITCHING ROTOR VALVE NO. 2 DATE: 20-OCT-91

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	883-3681-1	5-12	SWITCHING ROTOR VALVE NO. 2	UNSALABLE
C	442-3297-4	5	RUBBER JOINT 7	50
	442-5427-1	6	TUBE TEFLON 0.5MMID X 2.0MMOD	1 M
	883-3691-8	8	DRIVE MECHANISM NO.30 ASSY	UNSALABLE
	365-7172-0	9	COLLAR NO. 72	1
	883-3711-5	10	SWITCHING VALVE NO. 1 ASSY	1
	883-3701-8	11	SRV FIXED VALVE NO.14 ASSY	1
	873-0531-2	12	SAMPLE ROTOR FIXTURE NO. 3/C-1	1
A, C	344-3708-1	13*	PIN PARALLEL 2X25 (SUS)	10

DRIVE MECHANISM NO. 30 ASSEMBLY DATE: 20-FEB-90

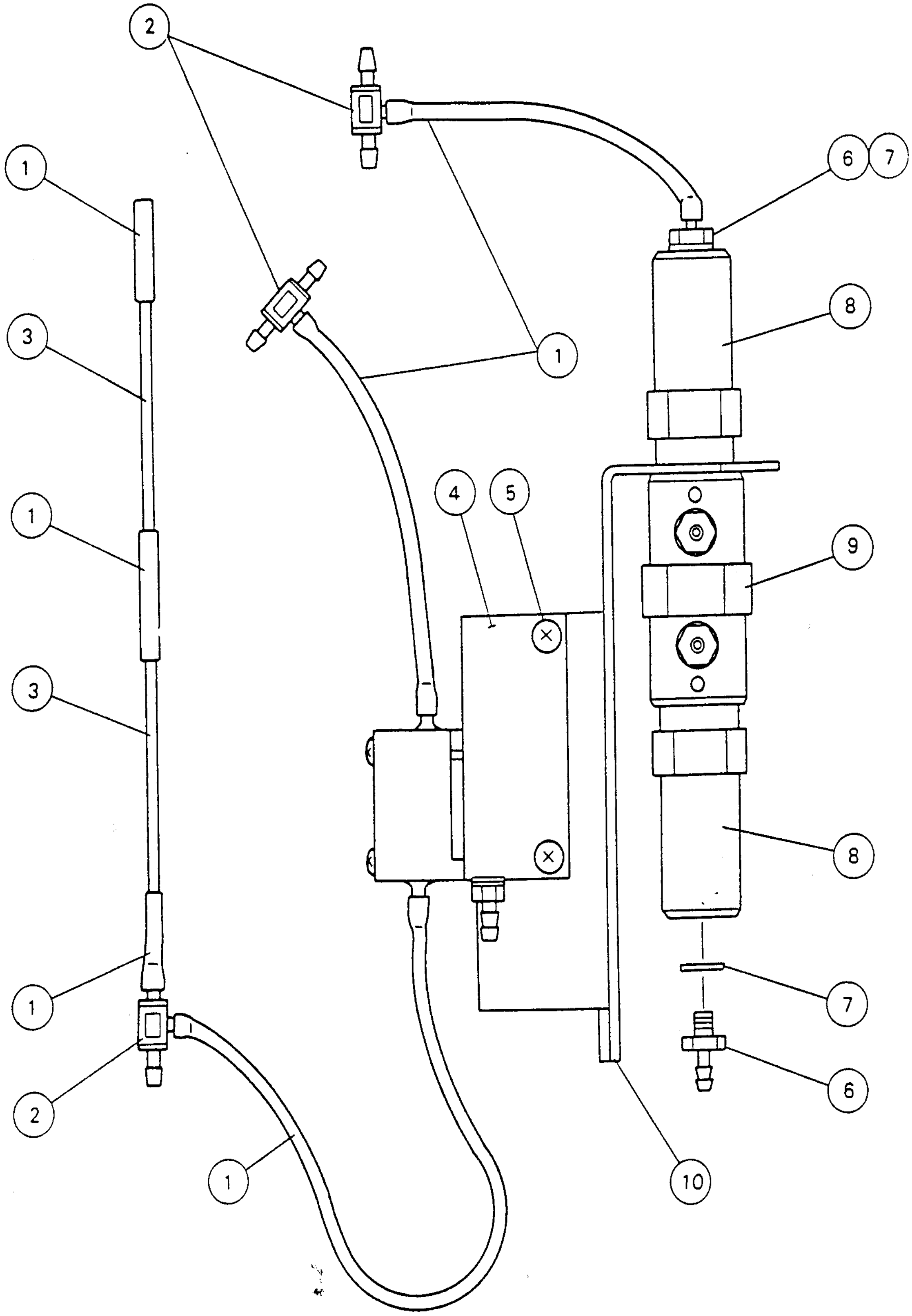
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	883-3691-8	1-21	DRIVE MECHANISM NO.30 ASSY	UNSALABLE
	348-3912-6	1	SCREW BINDING M3X6 (SUS)	100
	365-2560-9	2	SHAFT FIXTURE NO.16	1
	366-2992-7	3	MOUNTING PLATE NO.227	1
	348-3926-8	4	SCREW BINDING M4X6 (SUS)	100
	348-3827-6	5	SCREW ROUND M4X8 (SUS)	100
B D	366-2566-8	6	SW MOUNTING PLATE NO. 65	1
	348-9006-6	7	WASHER FLAT M2.3	100
	348-9310-8	8	WASHER SPRING M2.3 (SWRH14)	100
	348-1275-5	9	SCREW ROUND M2.3X10	100
	367-1782-2	10	DOG NO. 2	1
	348-3642-1	11	SCREW FLAT M5X12 (SUS)	100
	873-1061-1	12	SWITCH NO.24 ASSEMBLY	1
	348-8515-3	13	NUT HEX M5 (SUS)	100
	442-3508-9	14	NIPPLE NO. 8	50
	346-1750-5	15	GASKET TAC 89-14	100
	443-3583-6	16	AIR CYLINDER 25X15 ST T1135	1
	366-2993-1	17	MOUNTING PLATE NO.228	1
	348-3852-0	18	SCREW ROUND M5X50 (SUS)	100
	341-1537-9	19	SHAFT NO. 37	1
	367-1228-3A	20	ADJUSTMENT PLATE NO. 8	1
	348-4717-7	21	SCREW HEX-SOCKET M4X6 W-P (SCM)	50

Before 04. 93 update

	ECR NO.	KCP-1
A	389C017	A1181-
B	3906068	A1208-
C	3906068	A1258-

SYM	ECR NO.	KCP-1 S/N
D	394F058	A1598-

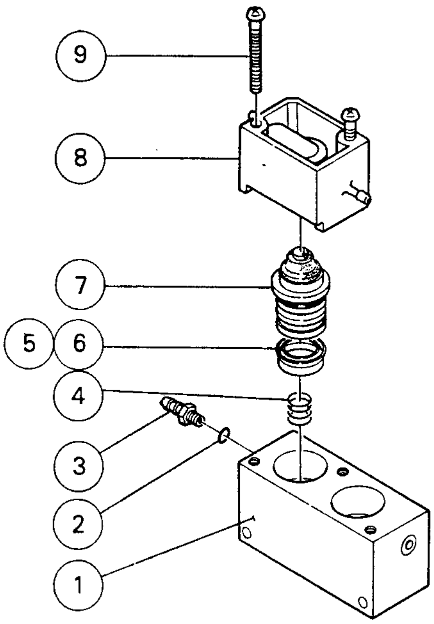
SWITCHING VALVE NO. 3 ASSEMBLY



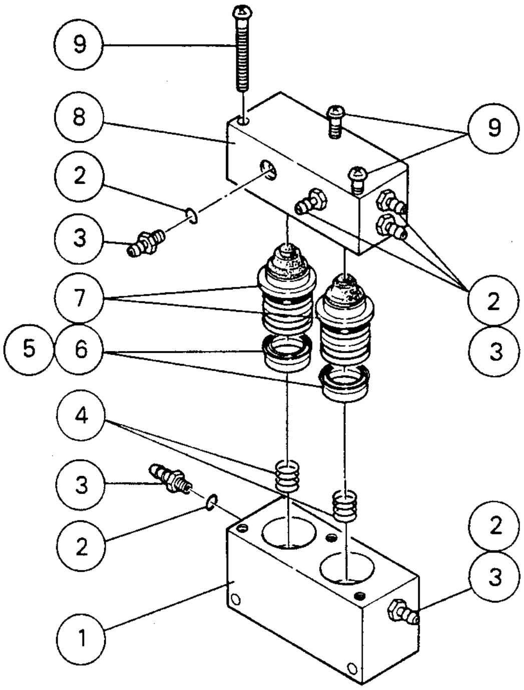
SWITCHING VALVE NO. 3 ASSEMBLY DATE: 20-FEB-90

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
883-3801-3	1-10	SWITCHING VALVE NO. 3 ASSY	UNSALABLE
442-5055-4	1	TUBE POLYURETHANE 1.8MMX3.4MM	10 M
442-3424-3	2	HYDRAULIC CONNECTOR NO.14	10
443-0212-4	3	ORIFICE NO.12	1
883-3861-7	4	MASTER VALVE 2MV26 ASSY	1
348-3919-1	5	SCREW BINDING M3X20 (SUS)	100
442-3508-9	6	NIPPLE NO. 8	50
346-1750-5	7	GASKET TAC 89-14	100
443-3685-9	8	34A	1
443-3704-2	9	AIR VALVE 4PP	1
366-3026-5B	10	VALVE MOUNTING PLATE NO. 5	1

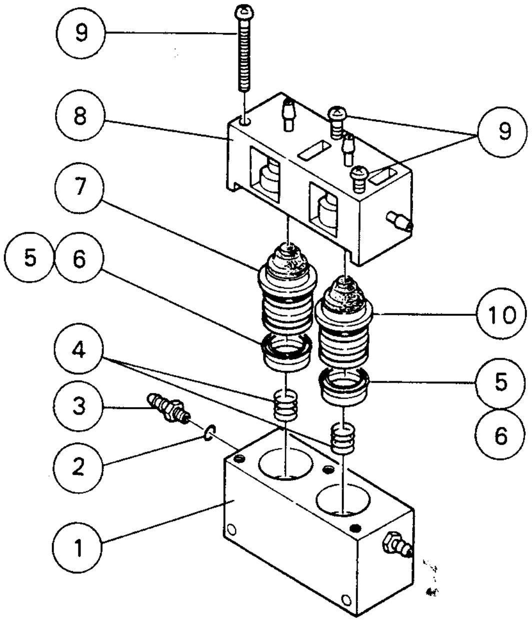
MASTER VALVE 2MV26



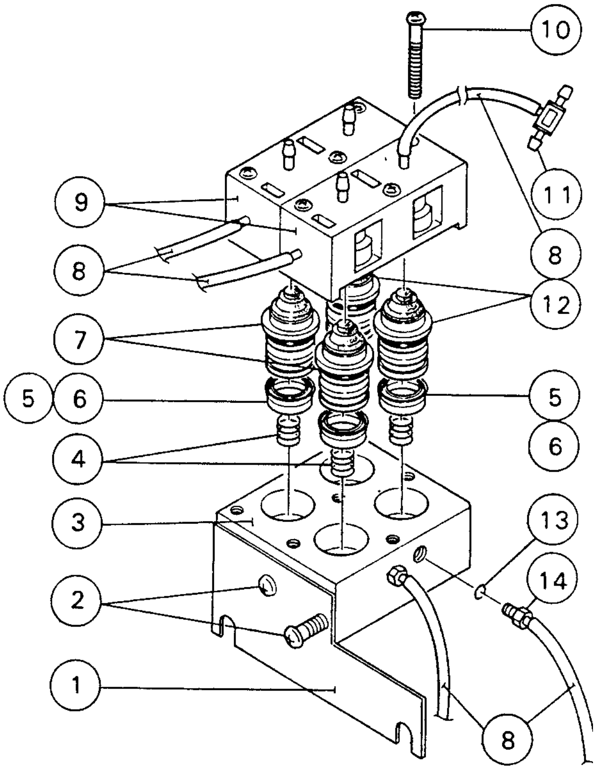
MASTER VALVE 3MV25



MASTER VALVE 3MV26



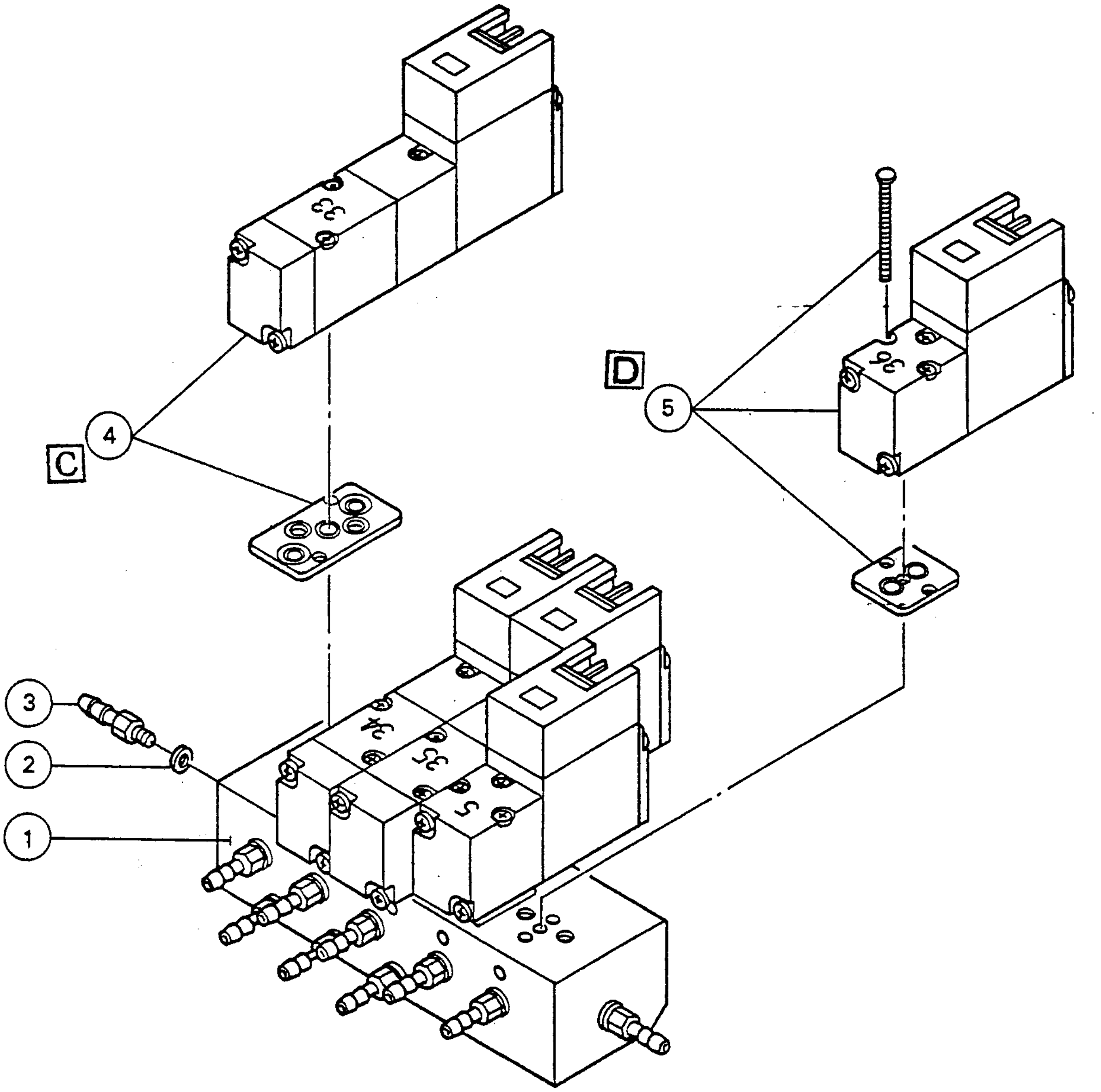
MASTER VALVE 3MV27



MASTER VALVE ASSEMBLIES DATE: 20-AUG-88

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
883-3861-7	1-9	MASTER VALVE 2MV26 ASSY	1
443-1535-0	1	MANIFOLD NO. 35	1
343-2457-6	2	O-RING NO. 7 (NITRIL)	100
442-3509-2	50	NIPPLE NO. 9	50
345-2262-9	4	SPRING NO. 62	10
346-2510-9	5	MINI-Y PACKING MY-10	10
426-4475-5	6	SILICONE GREASE SH-SCG	1
873-0351-6	7	CYLINDER UNIT NO. 6-L	10
443-1166-3A	8	VALVE SEAL NO.26	10
348-1310-9	9	SCREW ROUND M2.6X20 (BS)	100
883-3611-0	1-9	MASTER VALVE 3MV25 ASSY	1
443-1535-0	1	MANIFOLD NO.35	1
343-2457-6	2	O-RING NO. 7 (NITRIL)	100
442-3509-2	3	NIPPLE NO. 9	50
345-2262-9	4	SPRING NO. 62	10
346-2510-9	5	MINI-Y PACKING MY-10	10
426-4475-5	6	SILICONE GREASE SH-SCG	1
873-0351-6	7	CYLINDER UNIT NO. 6-L	10
443-1165-0A	8	VALVE SEAL NO.25	10
348-1310-9	9	SCREW ROUND M2.6X20 (BS)	100
883-3671-3	1-10	MASTER VALVE 3MV26 ASSY	1
443-1535-0	1	MANIFOLD NO.35	1
343-2457-6	2	O-RING NO. 7 (NITRIL)	100
442-3509-2	3	NIPPLE NO. 9	50
345-2262-9	4	SPRING NO. 62	10
346-2510-9	5	MINI-Y PACKING MY-10	10
426-4475-5	6	SILICONEGREASE SH-SCG	1
873-0351-6	7	CYLINDER UNIT NO. 6-L	10
443-1165-0A	8	VALVE SEAL NO.25	10
348-1310-9	9	SCREW ROUND M2.6X20 (BS)	100
873-0341-9	10	CYLINDER UNIT NO. 6-H	10
883-3751-4	1-14	MASTER VALVE 3MV27 ASSY	1
366-3878-2	1	MV MOUNTING PLATE NO.32	1
348-3912-6	2	SCREW BINDING M3X6 (SUS)	100
443-1537-7	3	MANIFOLD NO.37	1
345-2262-9	4	SPRING NO. 62	10
346-2510-9	5	MINI-Y PACKING MY-10	10
426-4475-5	6	SILICONE GREASE SH-SCG	1
873-0341-9	7	CYLINDER UNIT NO. 6-H	10
442-5055-4	8	TUBE POLYURETHANE 1.8MMX3.4MM	10 M
443-1165-0A	9	VALVE SEAL NO.25	10
348-1310-9	10	SCREW ROUND M2.6X20 (BS)	100
442-3424-3	11	HYDRAULIC CONNECTOR NO.14	10
873-0351-6	12	CYLINDER UNIT NO. 6-L	10
343-2457-6	13	O-RING NO. 7 (NITRIL)	100
442-3509-2	14	NIPPLE NO. 9	50

MANIFOLD SV NO. 3 ASSEMBLY



MANIFOLD SV NO. 3 ASSEMBLY

DATE: 20-OCT-91

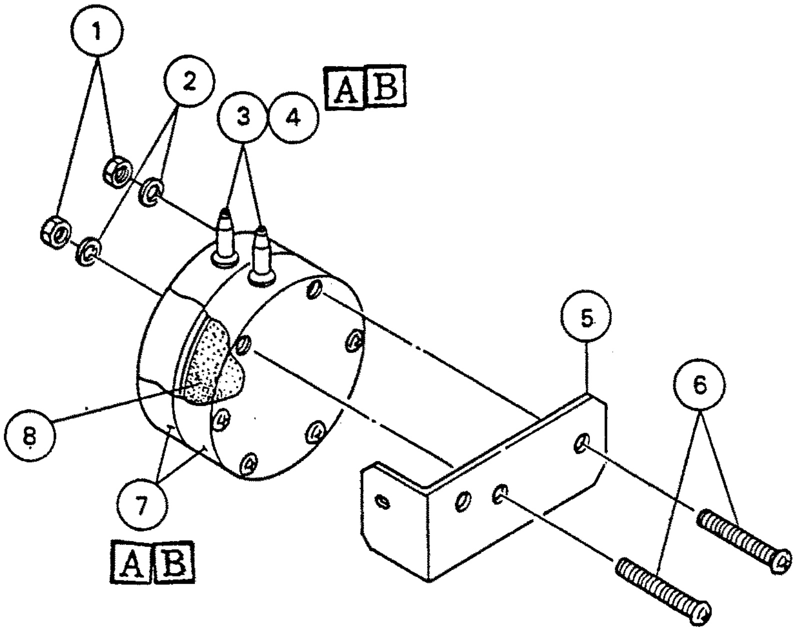
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT	
	883-3651-9	1-5	MANIFOLD SV NO. 3 ASSY	UNSALABLE	
	443-1536-3	1	MANIFOLD NO.36	1	
	346-1751-9	2	GASKET TAC 89-141 (M3)	100	
	442-3509-2	3	NIPPLE NO. 9	50	
A, B	~~443-2115-7~~	~~4~~	~~S.V. A040-4E1-PSL 27W~~	~~1~~	C
A	443-2106-3	5	S.V. A010- E1-PSL-15W	1	D
	443-2122-3	4	S.V. A040-4E1-PSL 37W	1	C

Before 04.93 update

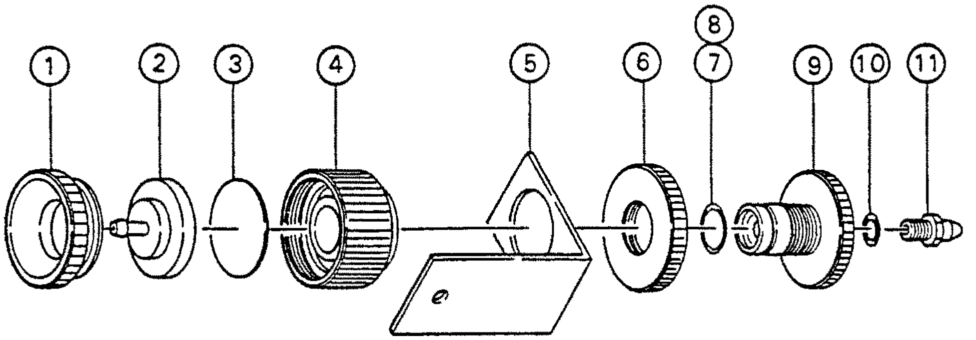
	ECR NO.	KCP-1
A	390H099	A1268-
B	391E031	A1403-

SYM	ECR NO.	SERIAL NO.
C	395H072	
D	397A025	_____
E		_____
F		

DIAPHRAGM PUMP NO. 12 ASSEMBLY



DIAPHRAGM PUMP NO. 13 ASSEMBLY



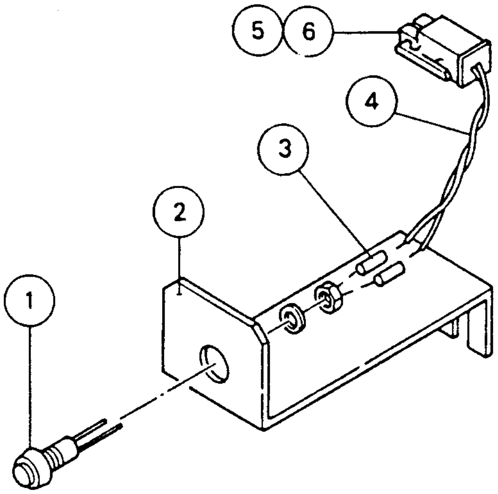
DIAPHRAGM PUMP NO. 12 AND NO. 13 ASSEMBLIES

DATE: 20-OCT-91

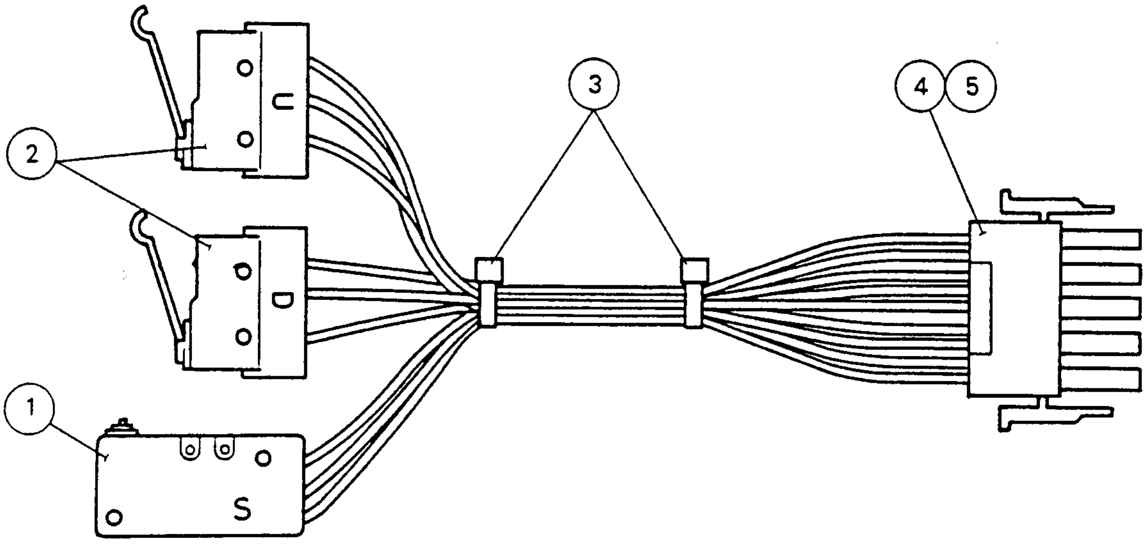
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	883-3621-7	1-8	DIAPHRAGM PUMP NO.12 ASSEMBLY	1
	348-8513-6	1	NUT HEX M3 (SUS)	100
	348-9503-2	2	WASHER FLAT M3 (SUS)	100
B A	442-3509-2	3	NIPPLE NO. 9	50
B	~~343-2457-6~~	~~4~~	~~O-RING NO. 7 (NITRIL)~~	~~100~~
B	343-2466-0A	4	O-RING NO. 16	50
	366-2995-8	5	MOUNTING PLATE NO.230	1
	348-3919-1	6	SCREW BINDING M3X20 (SUS)	100
B A	363-1815-9	7	DIAPHRAGM FIXTURE NO.13-A	1
B A	~~363-1035-3~~	~~7~~	~~DIAPHRAGM FIXTURE NO. 25~~	~~1~~
	443-0769-3A	8	DIAPHRAGM NO.19	10
	883-3721-2	1-11	DIAPHRAGM PUMP NO.13 ASSEMBLY	1
	363-5100-0	1	FIXING MATERIAL NO. 95	1
	363-1819-3	2	DIAPHRAGM FIXTURE NO.16-A	1
	443-0767-6A	3	DIAPHRAGM NO.17	10
	363-1820-8	4	DIAPHRAGM FIXTURE NO.16-B	1
	366-2939-9	5	MOUNTING PLATE NO.176	1
	344-7517-8	6	NUT NO.17	1
	346-3906-9	7	O-RING P- 5	50
	426-4475-5	8	SILICONE GREASE SH-SCG	1
	443-1340-8	9	PISTON NO.36	1
	343-2457-6	10	O-RING NO. 7 (NITRIL)	100
	442-3509-2	11	NIPPLE NO. 9	50

SYM	ECR NO.	SERIAL NO.
A	393F064	K1(B5328-), K8(A1238-), (KCP-1 A1533-
B	395G011	K1(B6463-), K8(A2047-), (KCP-1 A1633-
C		
D		

LED ASSEMBLY NO. 10



SWITCH NO. 41 ASSEMBLY



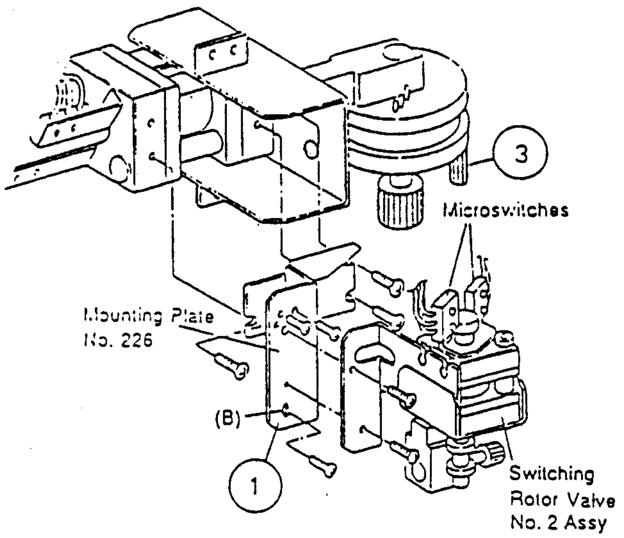
	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	883-3791-3	1-6	LED ASSEMBLY NO.10	1
	225-4969-5	1	DIODE LED TLG-147K	10
	366-2994-4	2	MOUNTING PLATE NO.229	1
	267-0002-9	3	HEAT SHRINK TUBE 2MM DIA GRY	10
	268-0705-5	4	WIRE UL1007-22AWG TWIST-P B&W	UNSALABLE
	264-3131-1	5	CONNECTOR 5557-02R	10
	264-9881-8	6	PIN 5556T	100

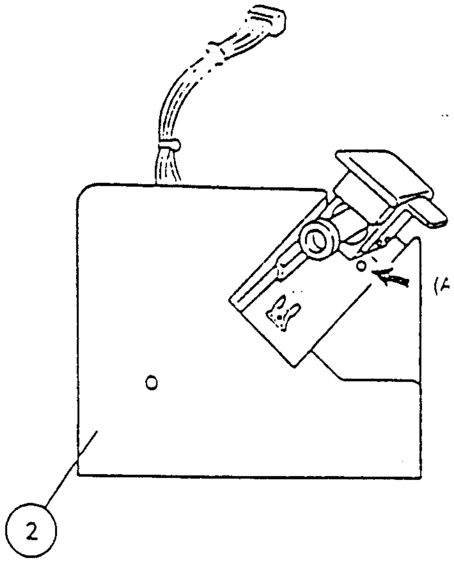
	883-3641-1	1-5	SWITCH NO.41 ASSEMBLY	1
A	263-3017-6	1	SWITCH ABV-161061	5
	263-3459-4	2	SWITCH SS-01L13W55	1
	266-4461-8	3	TIE WRAP CV-100	1000
	264-3138-7	4	CONNECTOR 5557-10R	10
	264-9881-8	5	PIN 5556T	100

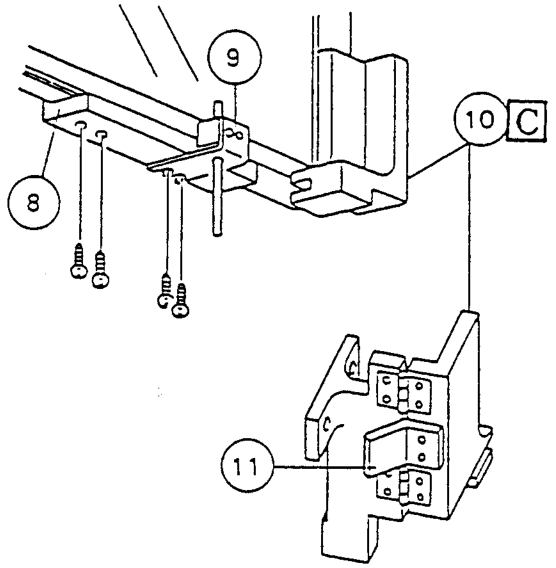
Before 04.93 update

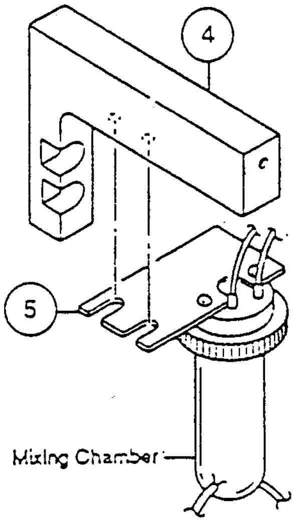
	ECR NO.	KCP-1
A	392G050	A1513-

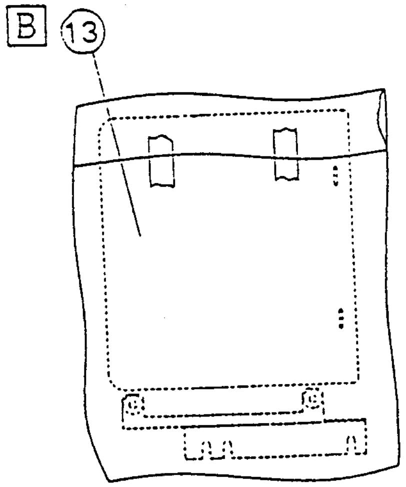
LANEOUS PARTS

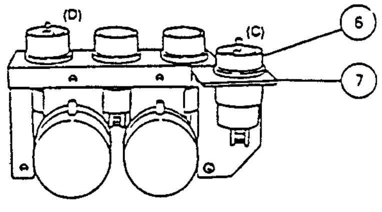




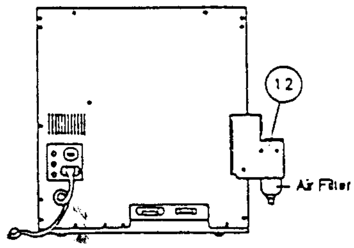








Valve Unit No. 23



KCP-1 MISCELLANEOUS PARTS DATE: 20-OCT-91

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	366-2991-3	1	MOUNTING PLATE NO.226	1
A	322-1116-5	2	COVER NO.196	1
A	365-1816-7	3	TUBE SUPPORT NO.16	1
A	363-5312-5	4	FIXING MATERIAL NO.563	1
A	366-3181-6	5	MOUNTING PLATE NO.302	1
	805-0022-8	6	MASTER VALVE 2MV-6 (E-SERIES)	1
A	366-3025-1A	7	VALVE MOUNTING PLATE NO. 4	1
A	365-1661-4	8	SUPPORT NO.143	1
A	903-7361-4	9	PIPE NO.18 ASSEMBLY	1
A C	903-7371-1	10	SUPPORT UNIT NO.10 ASSY	1
A	367-1587-0	11	STOPPER NO. 75	1
A	366-7009-6	12	MOUNTING METAL NO.243	1
B	931-0651-0	13	SAFETY SHIELD FOR KCP-1	1

Before 04. 93 update

	ECR NO.	KCP-1
A	390G068	A1258-

SYM	ECR NO.	SERIAL NO.
B	393J026	-
C	393G017	A1513-

CONTENTS OF KCP-1 DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
	442-1403-8		CONNECTING TUBE NO. 3	10
	362-1128-1		COVER GLASS NO.28	5
A	322-1116-5		COVER NO.196	1
	883-3721-2		DIAPHRAGM PUMP NO.13 ASSEMBLY	1
A	363-5312-5		FIXING MATERIAL NO.563	1
A	461-9354-5		INSTALLATION MANUAL KCP-1 MOD.	1
A	883-3791-3		LED ASSEMBLY NO.10	1
	805-0022-8		MASTER VALVE 2MV-6 (E-SERIES)	1
A	883-3751-4		MASTER VALVE 3MV27 ASSY	1
	366-7009-6		MOUNTING METAL NO.243	1
	366-2991-3		MOUNTING PLATE NO.226	1
A	366-3181-6		MOUNTING PLATE NO.302	1
A	348-8513-6		NUT HEX M3 (SUS)	100
A	461-2251-3J		OPERATOR’S MANUAL KCP-1	1
	883-3811-1		PIERCING UNIT NO. 2 COMP ASSY	UNSALABLE
A	903-7361-4		PIPE NO.18 ASSEMBLY	1
	881-0271-6	+	ROM 4K1 ASSY PM (SET OF 1 PROM)	1
	881-0281-3		ROM 4K2 ASSY PM (SET OF 1 PROM)	1
	881-0241-4	++	ROM 4K3 ASSY PM (SET OF 1 PROM)	1
	873-0532-6		SAMPLE ROTOR FIXTURE NO. 3/C-2	1
	348-3912-6		SCREW BINDING M3X6 (SUS)	100
A	348-3913-0		SCREW BINDING M3X8 (SUS)	100
A	348-3914-3		SCREW BINDING M3X10 (SUS)	100
A	348-3917-4		SCREW BINDING M3X16 (SUS)	100
A	348-3926-8		SCREW BINDING M4X6 (SUS)	100
	348-3928-5		SCREW BINDING M4X10 (SUS)	100
A	348-3613-3		SCREW FLAT M3X8 (SUS)	100
	348-3827-6		SCREW ROUND M4X8 (SUS)	100
A	367-1587-0		STOPPER NO. 75	1
A	365-1661-4		SUPPORT NO.143	1
A	903-7371-1		SUPPORT UNIT NO.10 ASSY	1
	883-3681-1		SWITCHING ROTOR VALVE NO. 2	UNSALABLE
	883-3801-3		SWITCHING VALVE NO. 3 ASSY	UNSALABLE
A	442-5331-1		TUBE POLYURETHANE 1.35 X 3.35	1 M
	442-5338-7		TUBE POLYURETHANE 4MMIDX6MMOD	10 M
A	365-1816-7		TUBE SUPPORT NO.16	1
	442-5427-1		TUBE TEFLON 0.5MMID X 2.0MMOD	1 M
	442-5409-4		TUBE TEFLON 0.75MMID X 1.5MMOD	10 M
	366-3025-1A		VALVE MOUNTING PLATE NO. 4	1
	883-3661-6		VALVE UNIT NO.38 ASSEMBLY	UNSALABLE
	883-3741-7		WIRING CORD NO. 693	1

Before 04. 93 update

	ECR NO.	KCP-1
A	390G068	A1258-

* Optional (Italian)
** Optional (French/Spanish)

K-1000 RECOMMENDED PARTS LIST <CLASS A> DATE: 20-APR-93

	CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
A	443-0823-8B		CHAMBER NO. 4	1
	443-0824-1C		CHAMBER NO. 5	1
	281-4952-6		COMPRESSOR PJ5554-026.0 (117VAC	1
	281-4953-0		COMPRESSOR PJ5555-026.0 (220VAC	1
	281-4954-3		COMPRESSOR PJ5556-026.0 (240VAC	1
	873-0341-9		CYLINDER UNIT NO. 6-H	10
	873-0351-6		CYLINDER UNIT NO. 6-L	10
	443-0768-0B		DIAPHRAGM NO.18	10
	281-4957-4		DIAPHRAGM PRESSURE KNF-5.03440	5
	281-4960-6		DIAPHRAGM VACUUM KNF-5.06044	5
	263-9132-0		FLOAT SWITCH FS-0146-101	5
	873-1761-9		FLOW CELL NO. 6 ASSEMBLY	1
	281-4956-1		GASKET KNF-5.03690	5
	443-2514-5		GLASS CHAMBER GC-14	1
	443-2537-1		GLASS CHAMBER GC-37	1
	281-4959-1		LEAF VALVE KNF-5.03400	5
	346-2510-9	*	MINI-Y PACKING MY-10	10
	443-2335-2	*	NON-RETURN VALVE 2 (GLASS)	5
	833-1221-1	*	NON-RETURN VALVE NO. 2	5
	863-2221-1		PCB NO.2052	1
	873-1091-2		PCB NO.2061	1
	873-1081-5		PCB NO.2062	1
	873-1141-1		PCB NO.6314 WITHOUT ROM	1
	863-5062-3		PCB NO.9137 (C-2)	1
	923-0061-3		PCB NO.6345 WITHOUT ROM	1
	873-1041-6		POWER SUPPLY BOARD NO. 5 ASSY	1
	873-1051-3		POWER SUPPLY BOARD NO. 6 ASSY	1
	281-7228-9		PRINTER FTP-020MCS 507	1
	441-8340-9C		RINSING SPIT NO. 8	1
	443-6961-7	*	S.V. P5136 NBV	1
	443-6962-1	*	S.V. P5142 M6B	1
	873-1061-1		SWITCH NO.24 ASSEMBLY	1
	289-9485-8		SWITCHING REGULATOR PMC30-1-G	1
	443-0739-1		TANK NO.18	1
	368-8720-4		TEFLON SHEET KNF-5393-6.05692	5
	873-0891-2		TRANSDUCER ER NO.17 (RBC)	1
	873-0901-2		TRANSDUCER ER NO.18 (WBC)	1
	442-5417-4		TUBE TEFLON 0.5 X 2.0 X 69 MM	5

SYM	ECR NO.	K-1000	K-800
A	396B065	B6763-	A2232-
B			
C			
D			

K-1000 RECOMMENDED PARTS LIST < CLASS B> DATE: 20-APR-93

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
443-7603-8		AIR CYLINDER 25X35 ST T1099	1
443-2474-3		AIR FILTER F150-01-BG-F1-B-6W	1
367-8202-2		BELLOWS WITH METAL NO.2	1
873-0641-5		DIAPHRAGM PUMP NO. 5 ASSY (C-1)	1
873-0711-9		DIAPHRAGM PUMP NO. 7 ASSEMBLY	1
873-0741-1		DIAPHRAGM PUMP NO. 8 ASSEMBLY	1
873-0821-1		DIAPHRAGM PUMP NO. 9 ASSY (C-1)	1
883-3931-1		FAN ASSEMBLY NO. 8	1
228-3351-4		LCD BOARD DMC16230-2	1
873-0911-0		MANOMETER BLOCK NO.14 (R/250)	1
873-1771-6		MANOMETER BLOCK NO.15 (W/400)	1
805-0022-8		MASTER VALVE 2MV-6 (E-SERIES)	1
891-0351-2	+	PCB NO.6315 WITHOUT ROM (PM)	1
903-7141-9		REGULATOR UNIT NO.25 ASSY	1
443-1970-2		RELIEF VALVE 247L-1-V	1
873-0801-7		RINSE CUP MECHANISM NO. 6 ASSY	1
881-0251-1		ROM 1K1 ASSY PM (SET OF 1 PROM)	1
873-1981-4	+	ROM 2K1 ASSY (SET OF 1 PROM)	1
881-0071-5		SRV SET NO. 5 (PM)	1
263-9517-5A		SWITCH FLAT-KEYPAD K-1000	1
873-0781-0		SWITCH NO.23 ASSEMBLY	1
229-8706-3		THERMISTOR K-1000 (RBC)	1
229-8705-0		THERMISTOR K-1000 (WBC)	1
443-1165-0A		VALVE SEAL NO.25	10

K-1000 RECOMMENDED PARTS LIST <CLASS C>   DATE: 20-FEB-90

CODE NUMBER	DRAWING NUMBER	DESCRIPTION	QTY PER UNIT
443-0830-4		CHAMBER NO.11	1
873-0671-7		DIAPHRAGM PUMP NO. 6 ASSEMBLY	1
873-0491-1		LED ASSEMBLY NO. 9	1
863-1151-3		MASTER VALVE 2MV14 (C1/2.4X4)	1
863-1182-9		MASTER VALVE 2MV15 (C2/1.8X3.4)	1
863-1292-1		MASTER VALVE 3MV14 (C2/1.8X3.4)	1
863-1322-6		MASTER VALVE 3MV15 (C2/1.8X3.4)	1
873-1551-1		MASTER VALVE 3MV17 ASSY	1
873-0851-3		VALVE UNIT NO.24 ASSEMBLY	1

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345-2261-5  9-2-07   (14
345-2262-9  9-1-051  (2       9-1-053  (2      9-1-055  (2          9-1-059  (2
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345-5032-7  9-1-037  (21
345-5103-4  9-1-078  (
345-5110-1A 9-1-063  (14
346-1750-5  9-1-013  (23      9-1-015  (7      9-2-13   (9          9-4-05   (39
            9-4-09   (15      9-4-11   (15     9-4-13   (7
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346-3915-2  9-1-045  (10      9-4-07   (8
346-3917-0  9-1-041  (4       9-1-049  (4
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            9-1-051 (7      9-1-055 (6       9-1-057  (4         9-1-057 (6
            9-1-061 (5      9-1-065 (7       9-4-15   (14        9-4-15  (3
            9-4-15  (3      9-4-15  (3       9-4-17   (3         9-4-19  (11
            9-4-19  (3
442-3511-1  9-1-041 (6
442-3535-0  9-1-051 (6      9-1-051 (8       9-1-053  (3         9-1-055 (7
            9-1-057 (5      9-1-057 (6       9-1-057  (6         9-1-059 (5
            9-1-059 (5      9-1-061 (2       9-1-061  (7         9-1-061 (8
442-3555-4  9-4-07  (7
442-3559-9  9-4-07  (9
442-3564-8  9-1-009 (15
442-3578-0  9-1-041 (8#
442-3579-3  9-1-041 (8$
442-3666-1  9-1-033 (1
442-3702-8  9-1-041 (1      9-1-049 (1
442-3705-9  9-1-005 (17
442-3709-3  9-1-051 (7      9-1-053 (3       9-1-055  (6         9-1-055 (6
            9-1-055 (7      9-1-057 (7       9-1-057  (7         9-1-061 (4
442-3757-2  9-1-039 (11     9-1-041 (14
442-3758-6  9-1-041 (7
442-3763-5  9-1-015 (24
442-4125-4  9-1-015 (25     9-2-05  (43      9-2-07   (19        9-2-13  (14
442-4145-9  9-2-11  (6      9-2-13  (10
442-4147-6  9-2-05  (18
442-4149-3  9-2-11  (2
442-4251-7  9-4-03  (19
442-4552-7  9-1-015 (23     9-1-041 (11
442-4596-1  9-2-13  (15
442-4605-7  9-1-013 (24
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863-5062-3  9-1-037 (23      9-5-01  (
873-0341-9  9-1-055 (5       9-1-059 (5       9-1-059 (6           9-1-065 (2
            9-4-15  (10      9-4-15  (7       9-5-01  (
873-0351-6  9-1-051 (5       9-1-053 (5       9-1-055 (6           9-1-059 (5
            9-1-059 (6       9-1-065 (3       9-4-15  (12          9-4-15  (7
            9-4-15  (7       9-4-15  (7       9-5-01  (
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873-0423-7  9-1-003 (1$★★    9-1-005 ($★★
873-0424-1  9-1-003 (1$+     9-1-005 ($+
873-0432-1  9-2-03  (1-12★
873-0433-4  9-2-03  (1-12★★
873-0434-8  9-2-03  (1-13+
873-0442-8  9-2-03  (6★
873-0443-1  9-2-03  (6★★
873-0444-5  9-2-03  (6+
873-0451-1  9-2-05  (26      9-2-13  (1-16
873-0461-9  9-2-05  (24      9-2-09  (1-5
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873-0571-1  9-1-013 (6
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873-0651-2  9-1-017 (15      9-1-023 (1-9
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873-0671-7  9-1-025 (1       9-1-047 (1-8     9-5-03  (
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873-0851-3  9-1-031 (6       9-1-065 (1-10
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873-0911-0  9-1-029 (29     9-1-035 (1-9#   9-5-02  (
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873-0941-1  9-1-005 (14
873-0951-9  9-1-039 (1      9-1-039 (1-11
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873-1014-5  9-1-007 (7+     9-1-071 (1-36+
873-1021-1  9-1-071 (2      9-1-073 (1-7
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873-1041-6  9-1-071 (13     9-1-073 (1-7$   9-5-01  (
873-1051-3  9-1-071 (27     9-1-073 (1-7#   9-5-01  (
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873-1471-0  9-1-025 (11     9-1-055 (1-6
873-1481-7  9-1-023 (7      9-1-025 (10     9-1-055 (1-7
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873-1521-9  9-1-027 (7      9-1-057 (1-7
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873-1581-2  9-1-027 (3       9-1-061 (1-5
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881-0261-9  9-1-069 (1 ★★
881-0271-6  9-1-069 (1 +     9-4-24  (
881-0281-3  9-1-069 (1 ++    9-4-24  (+
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883-0192-3  9-1-078 (
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903-7141-9  9-1-015 (12      9-5-02  (
903-7361-4  9-4-23  (9       9-4-24  (
903-7371-1  9-4-23  (10      9-4-24  (
921-0021-0  9-3-03  (OPTION
921-0351-8  9-1-078 (+
921-0451-3  9-1-067 (10&7
921-0491-2  9-1-073 (4
921-0501-2  9-1-071 (35+     9-1-077 (1+
923-0061-3  9-1-067 (7       9-5-01  (
```

Sysmex

SECTION TEN

SCHEMATICS

- Table of Contents -

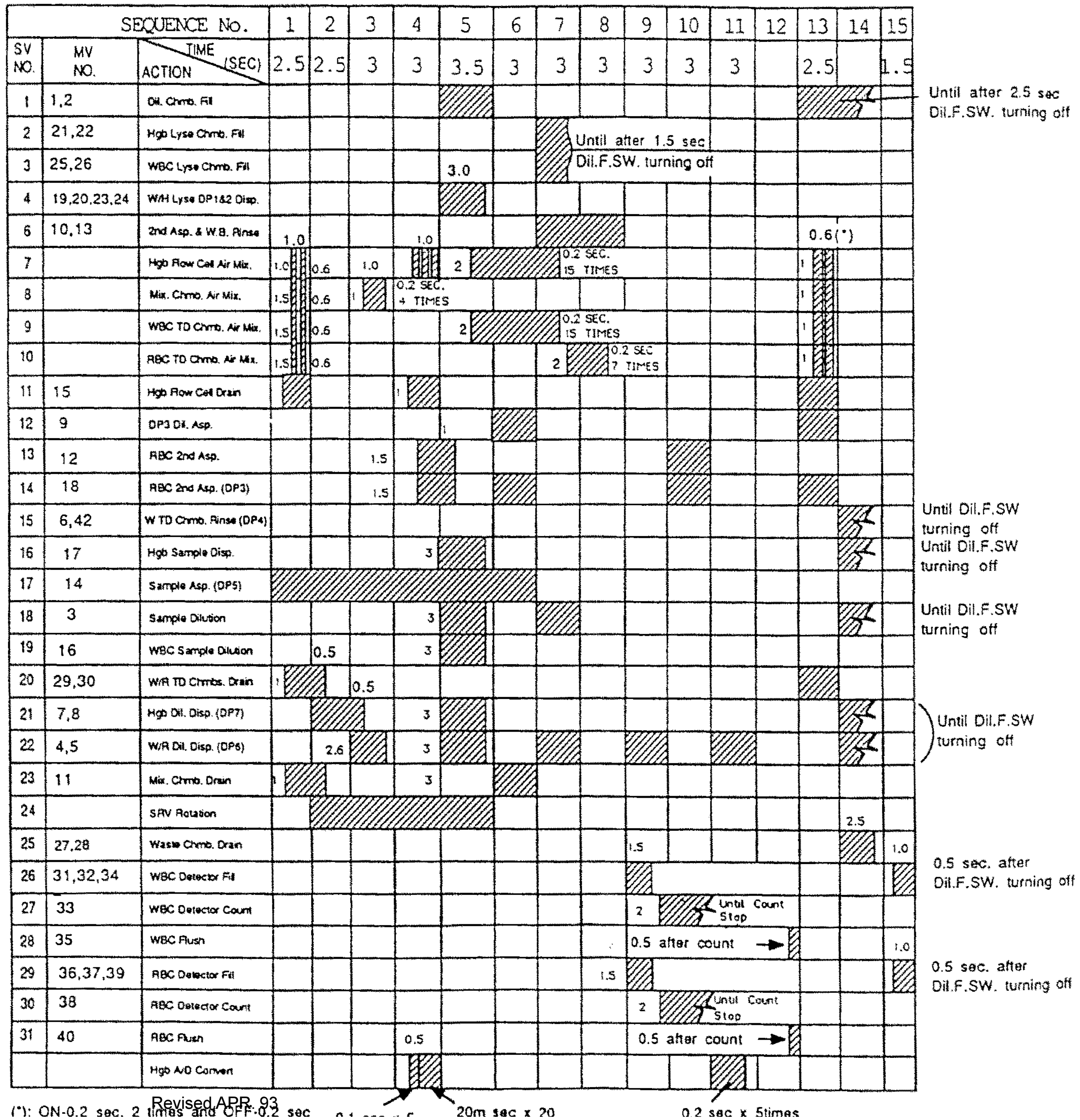
Schematics

Basic Operation Timing Chart

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R B C	Drain			2 nd ASP				N.P. Bubble Removal	COUNT				Drain	Rinse	Fill
W B C	Drain				Dilution	Air Bubble Mixing	N.P. Bubble Removal		COUNT				Drain	Rinse	Fill
H G B	Drain	Blank Dispense	(Blank Convert) →	Drain	Dilution	Air Bubble Mixing	N.P. Bubble removal				Sample Convert		Drain	Rinse	
M I X	Drain		Dilution			Drain			Rinse		Rinse				
S R V	Sample Aspiration	SRV arm goes to the Right					Aspiration Line Rinse						Diluent Priming into Dil. Chamber		

NOTE : N.P. : No Operation

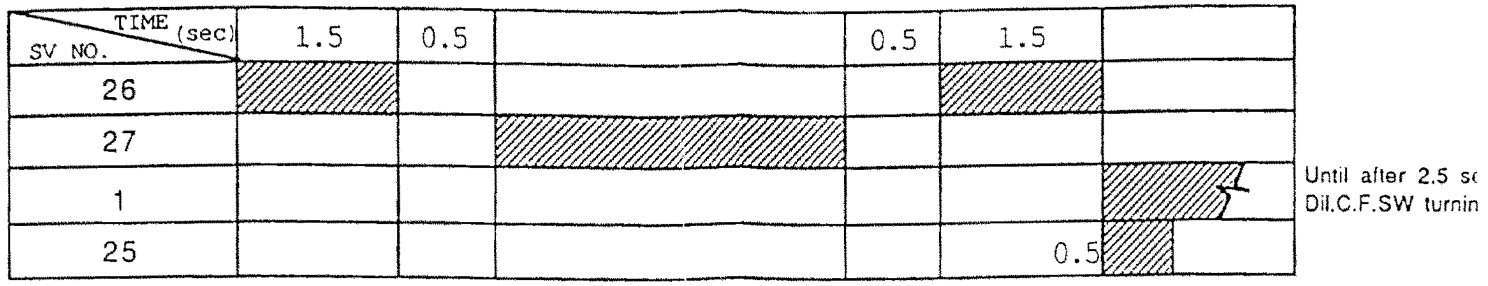
K-1000 Timing Chart

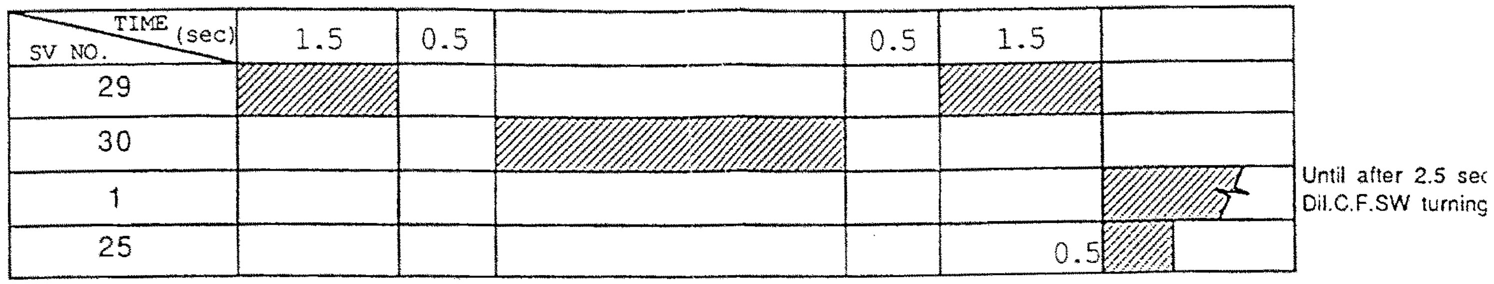


(*): ON-0.2 sec. 2 times and OFF-0.2 sec

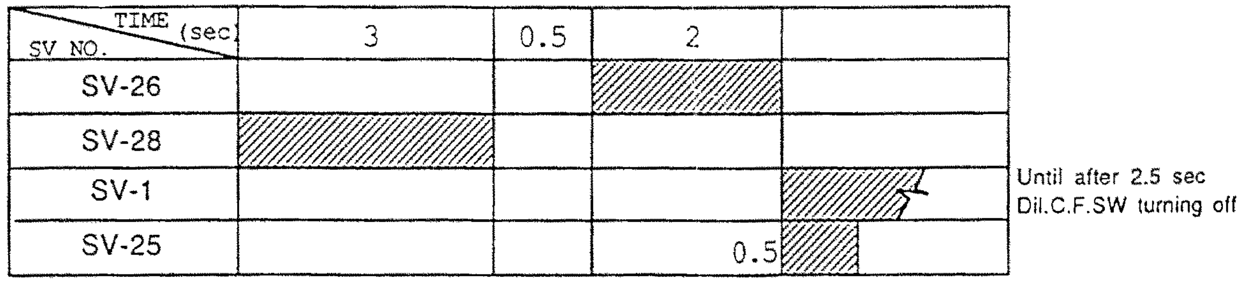
Revised APR. 93

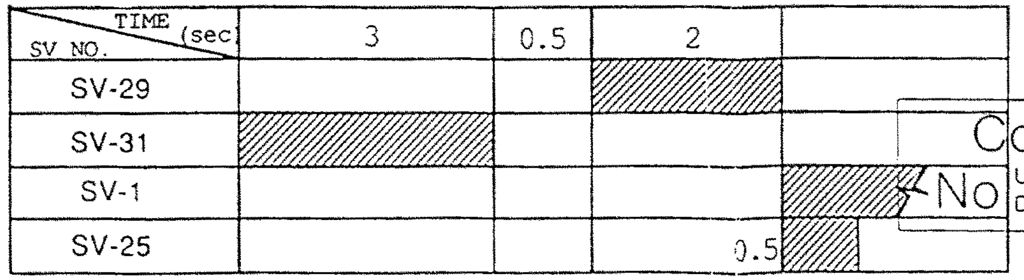
"COUNT SEQ. MODE" Timing Chart

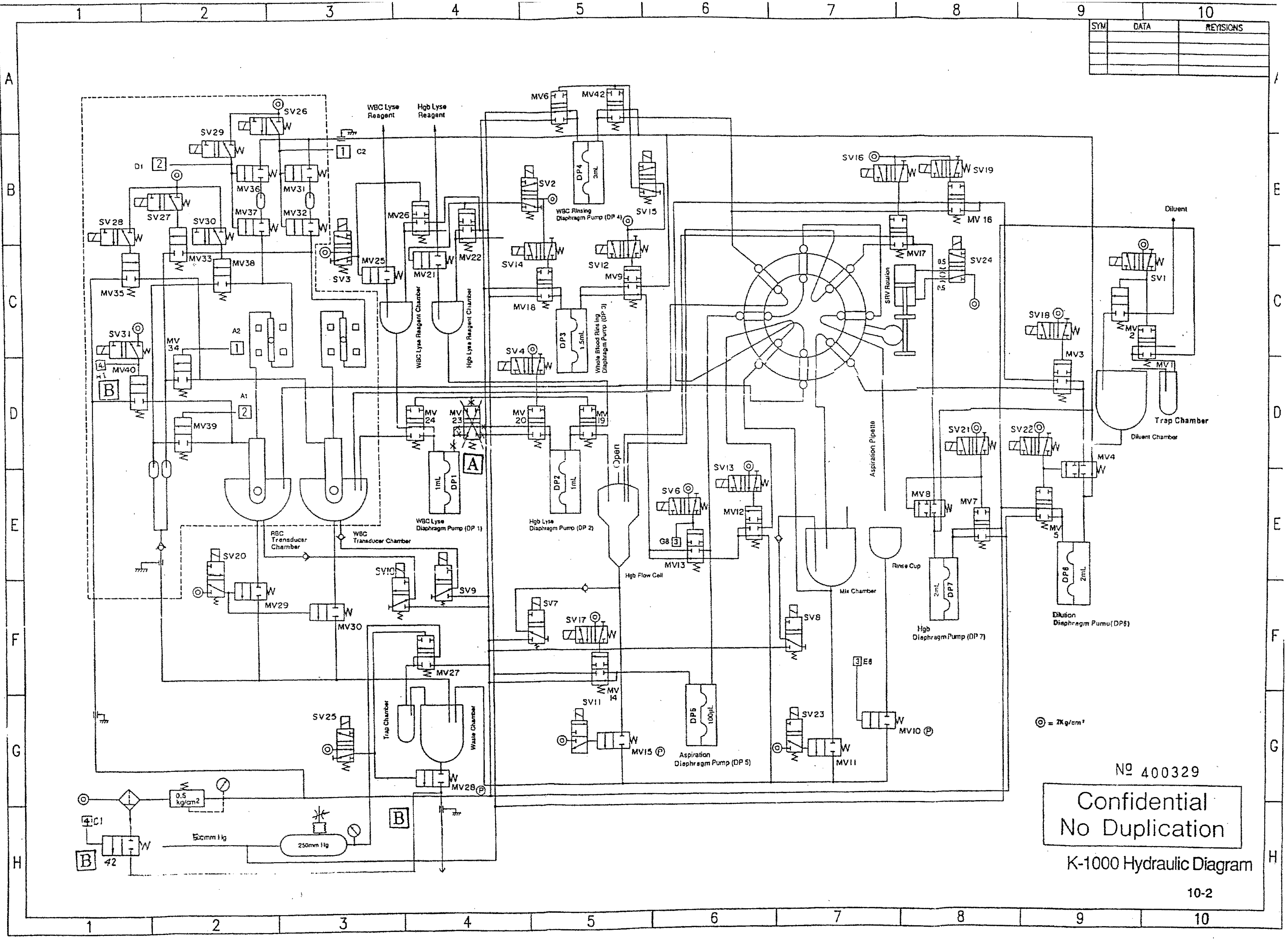




"FLUSH/FILL" Timing Chart







SYM	DATA	REVISIONS

№ 400329

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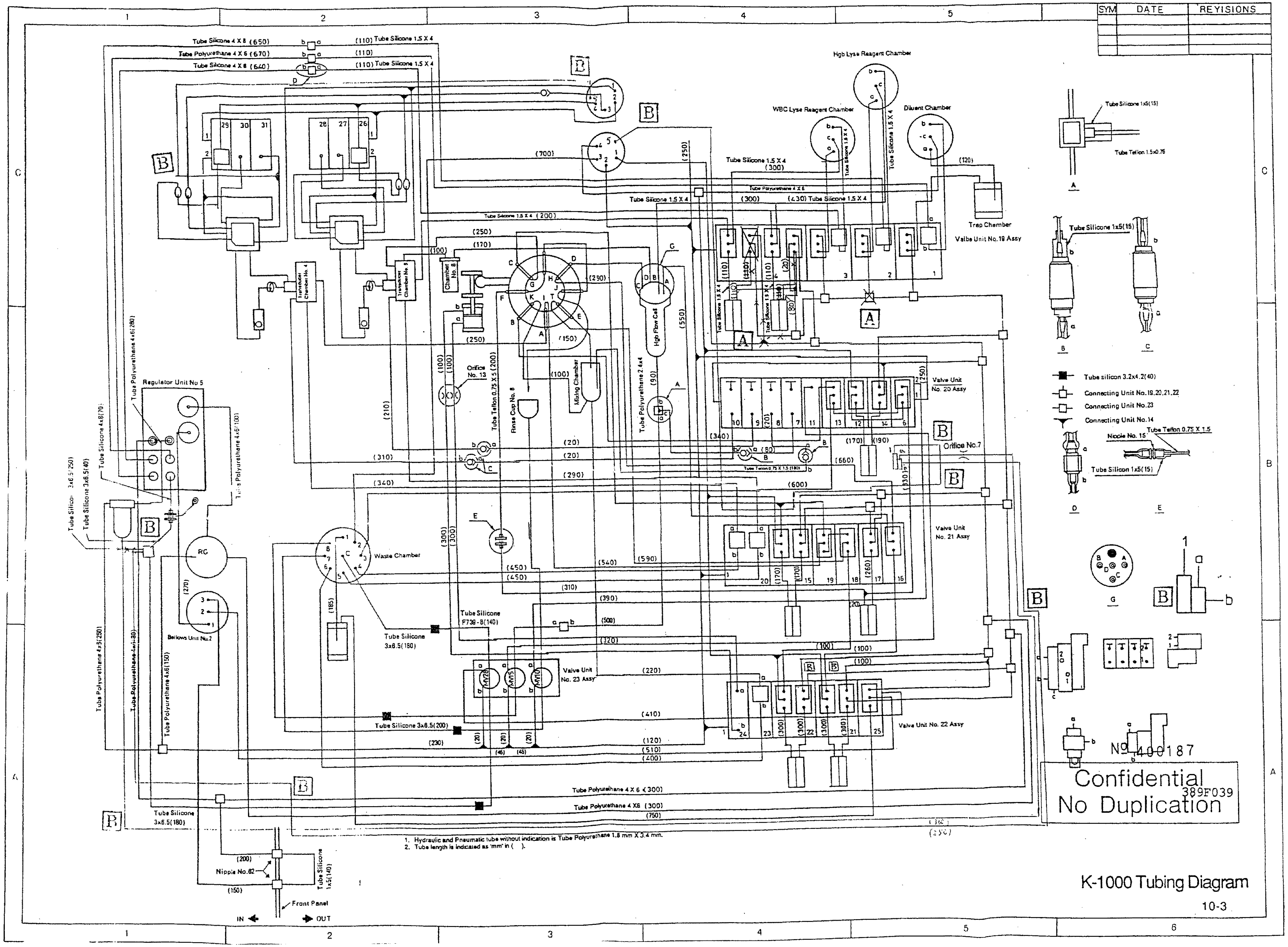
K-1000 Hydraulic Diagram

10-2

SYM	ECR NO.	K-1000 SERIAL NO.	K-800 SERIAL NO.
A	396G045	B6903-	A2332-
B	397F072	B7143-	A2757-
C			
D			
E			

Revised Jun.98



1. Hydraulic and Pneumatic tube without indication is Tube Polyurethane 1.8 mm X 3.4 mm.
2. Tube length is indicated as 'mm' in (   ).

SYM	ECR NO.	K-1000 SERIAL NO.	K-800 SERIAL NO.
A	396G045	B6903-	A2332-
B	397F072	B7143-	A2757-
C			
D			
E			

Nº 400187

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389F039
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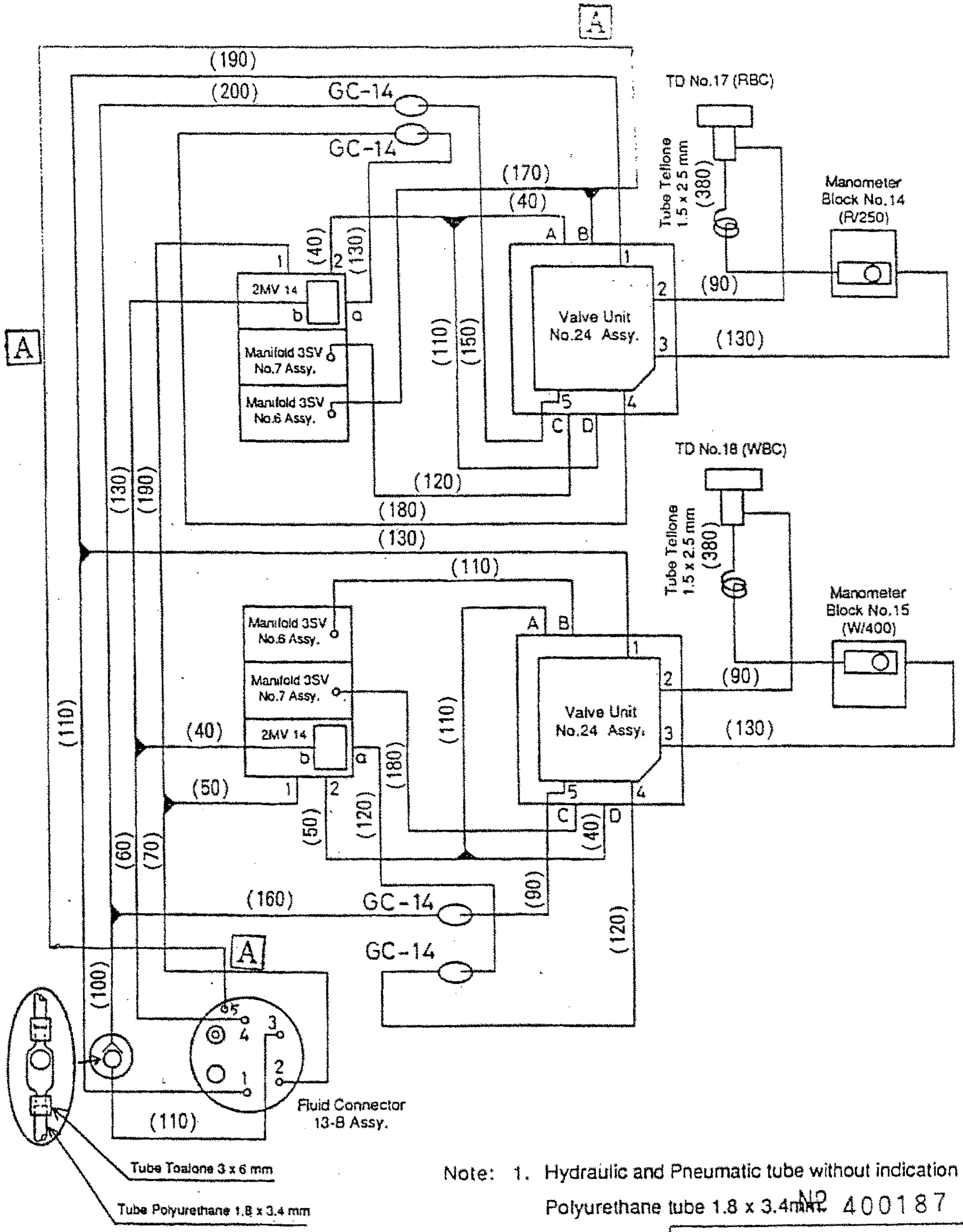
K-1000 Tubing Diagram



Note: 1. Hydraulic and Pneumatic tube without indication is Polyurethane tube 1.8 x 3.4mm.

2. Tube length is indicated as "mm" in ( ).

№ 400187

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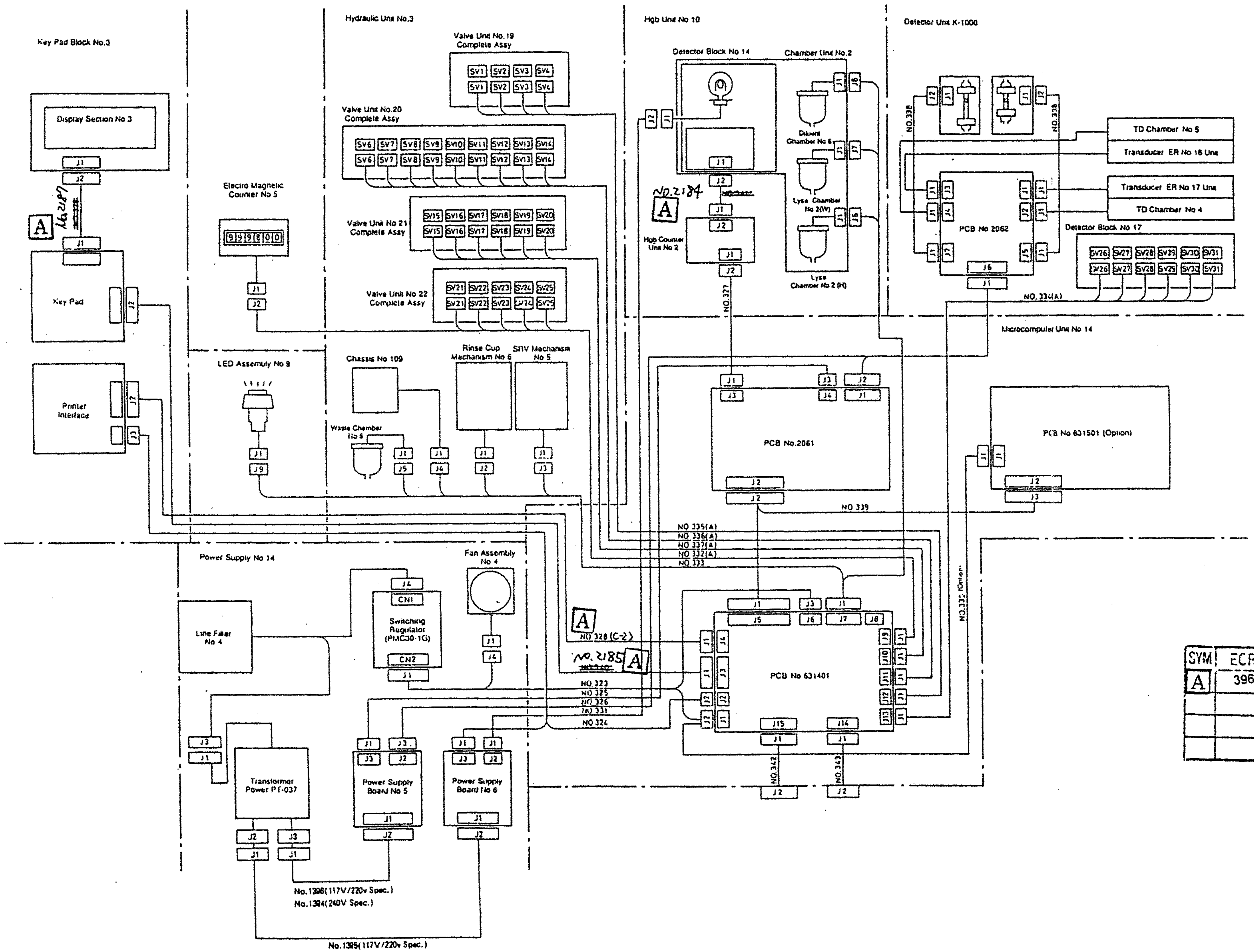
SYM	ECR NO.	SERIAL NO.
A	397F072	K1 B7143-, K8 A2757-

Detector Unit Tubing Diagram

10-4

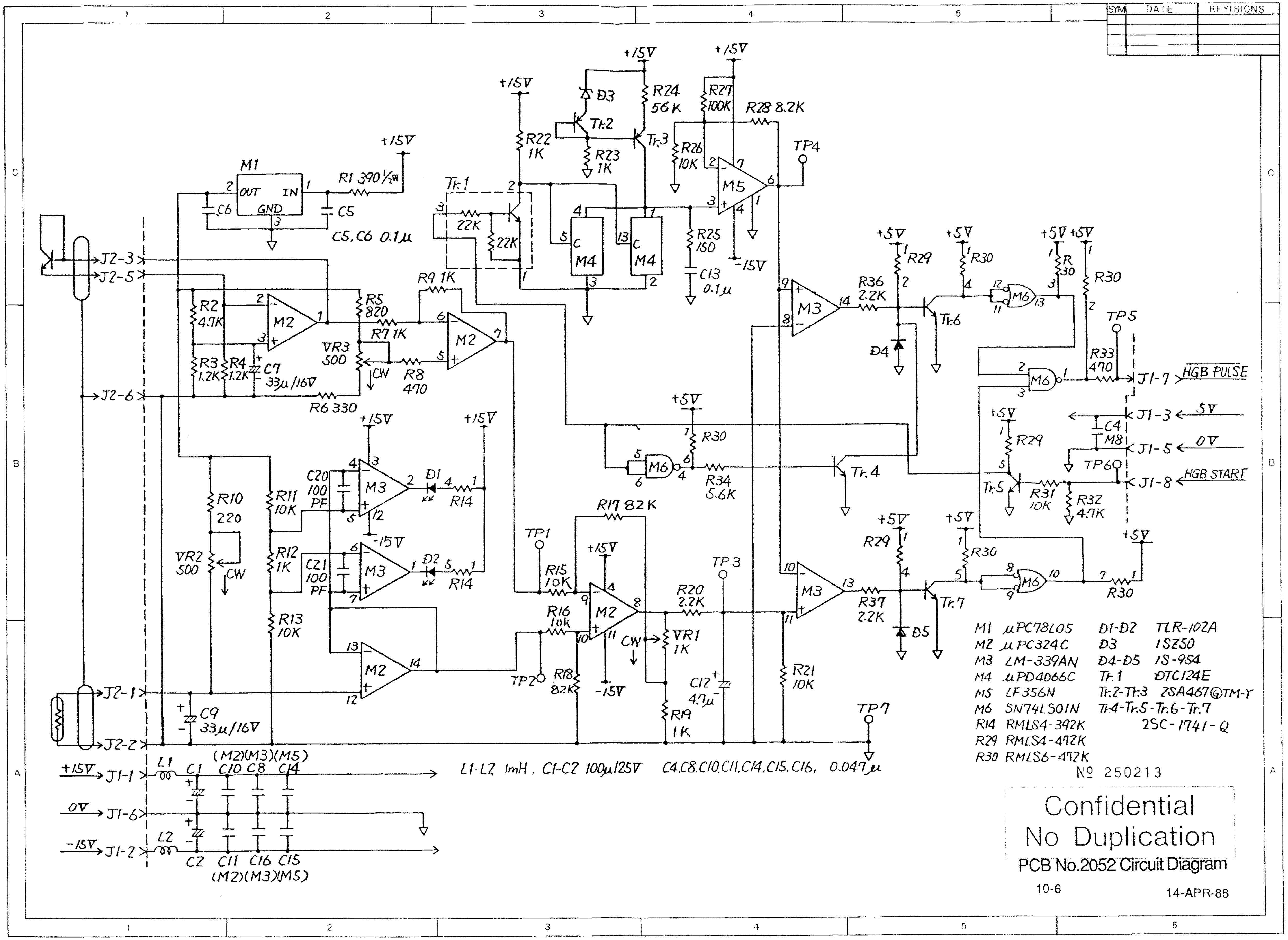
SYM	DATE	REVISIONS



SYM	ECR NO.	SERIAL N.
A	396E051	K1 B6858- K8 A2272-

K-1000 Wiring Diagram

Revised AUG.97



M1	μPC78L05	D1-D2	TLR-102A
M2	μPC324C	D3	1SZ50
M3	LM-339AN	D4-D5	1S-954
M4	μPD4066C	Tr.1	DTC124E
M5	LF356N	Tr.2-Tr.3	2SA467Ⓖ TM-Y
M6	SN74LS01N	Tr.4-Tr.5-Tr.6-Tr.7	
R14	RMLS4-392K		2SC-1741-Q
R29	RMLS4-472K		
R30	RMLS6-472K		

№ 250213

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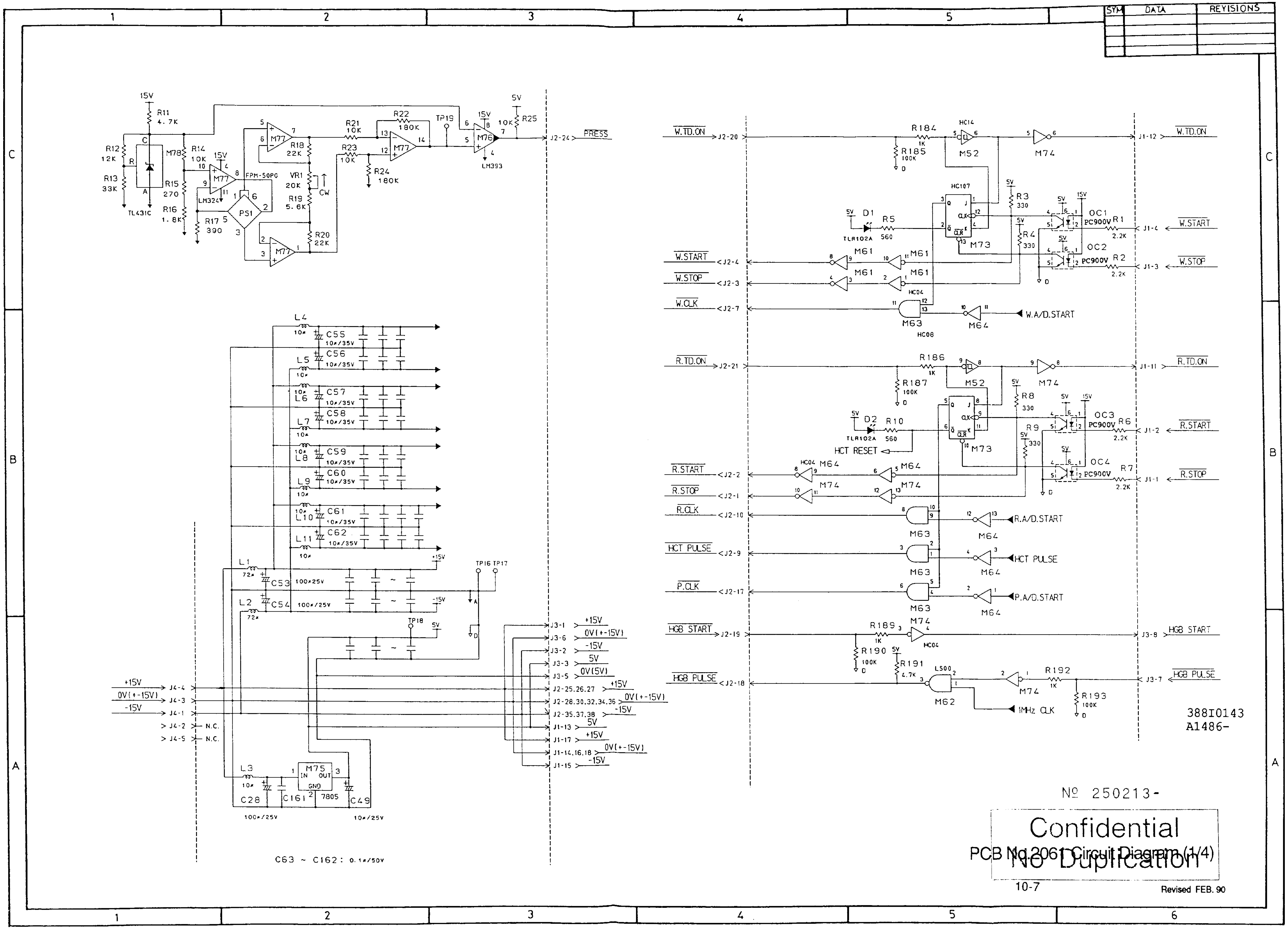
PCB No.2052 Circuit Diagram

10-6

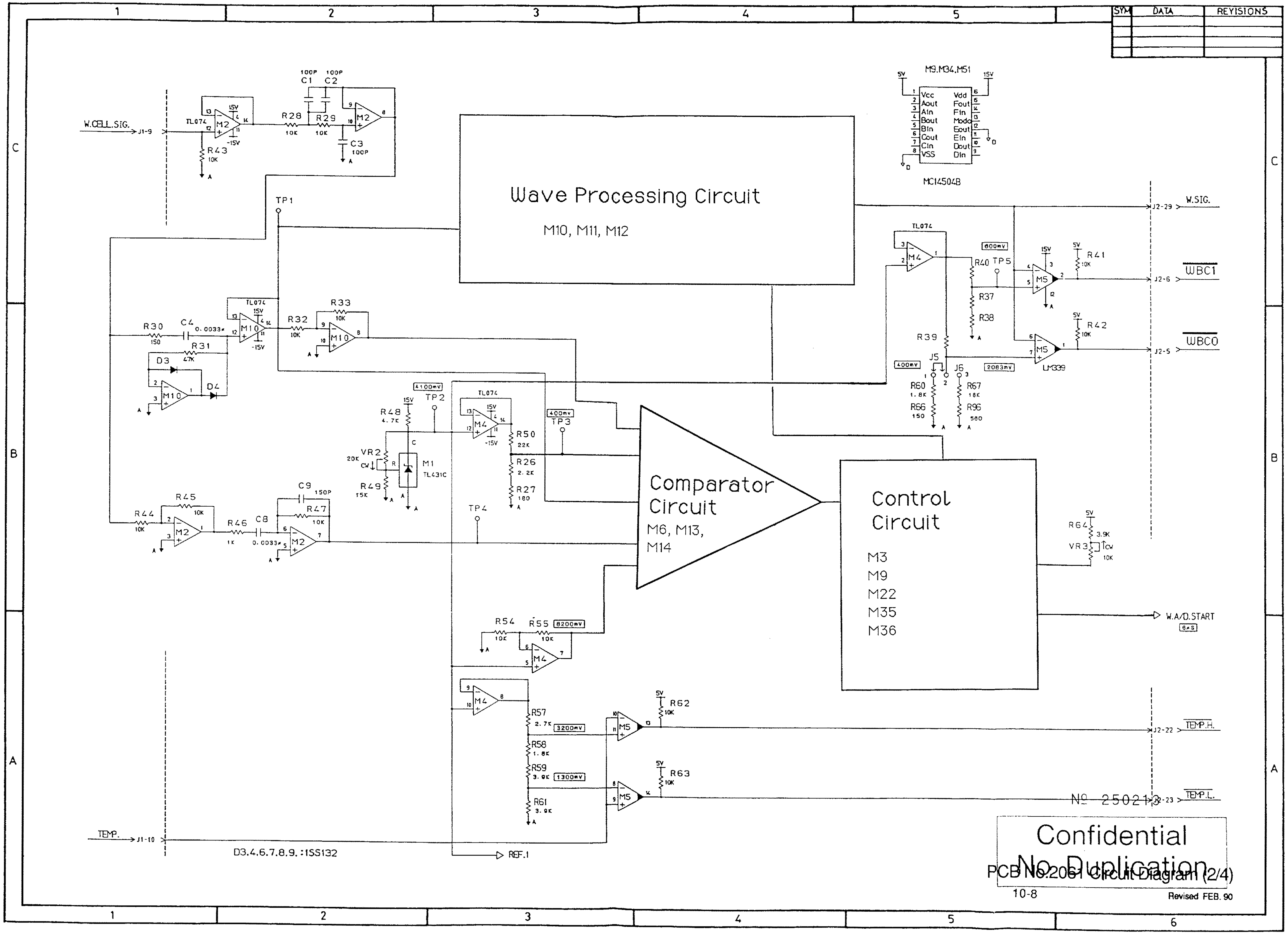
14-APR-88



Nº 250213-

PCB No.2061 Circuit Diagram (1/4)

Revised FEB. 90



Nº 250213

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PCB No.2061 Circuit Diagram (2/4)

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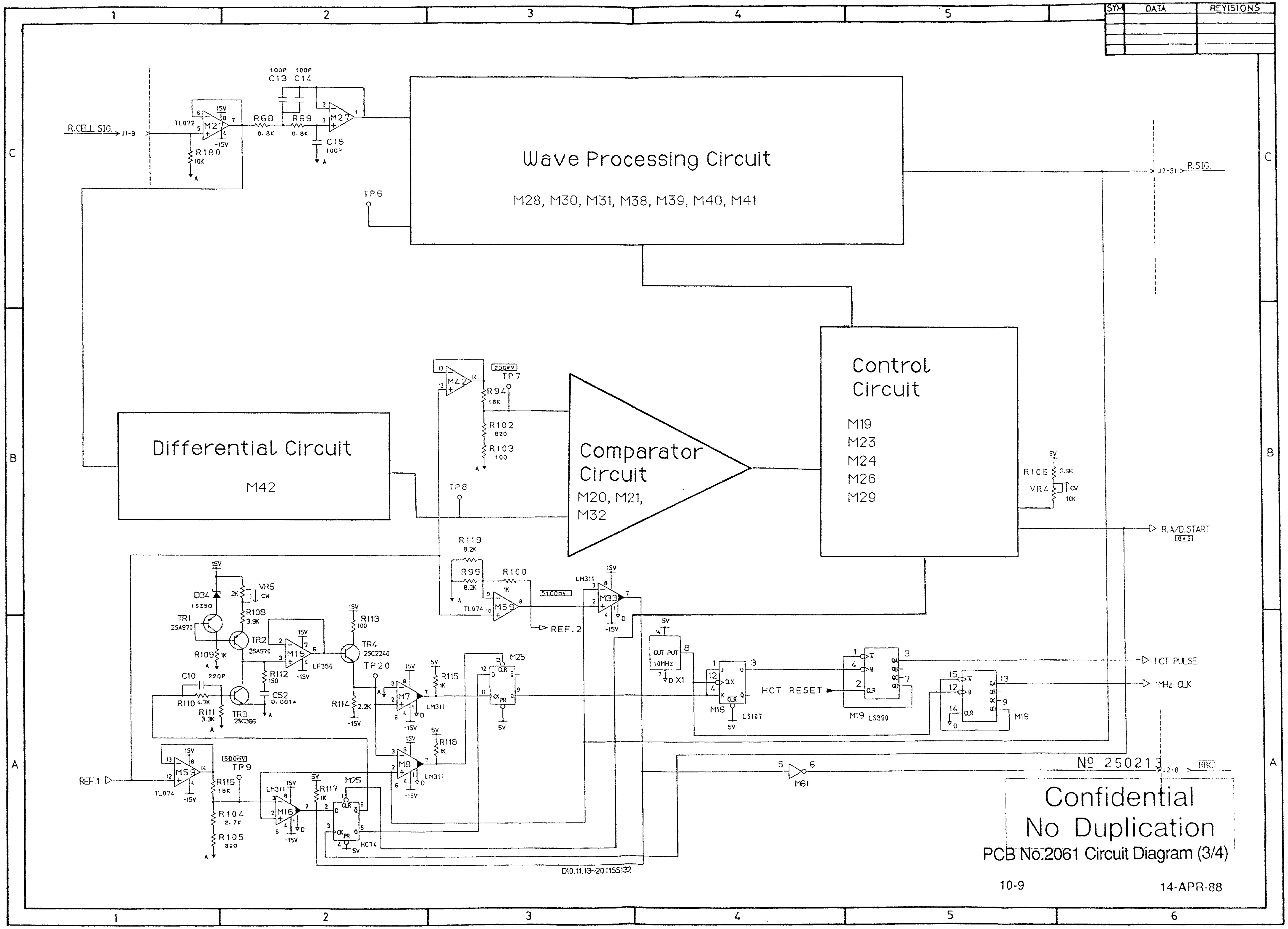
Revised FEB. 90



№ 250213

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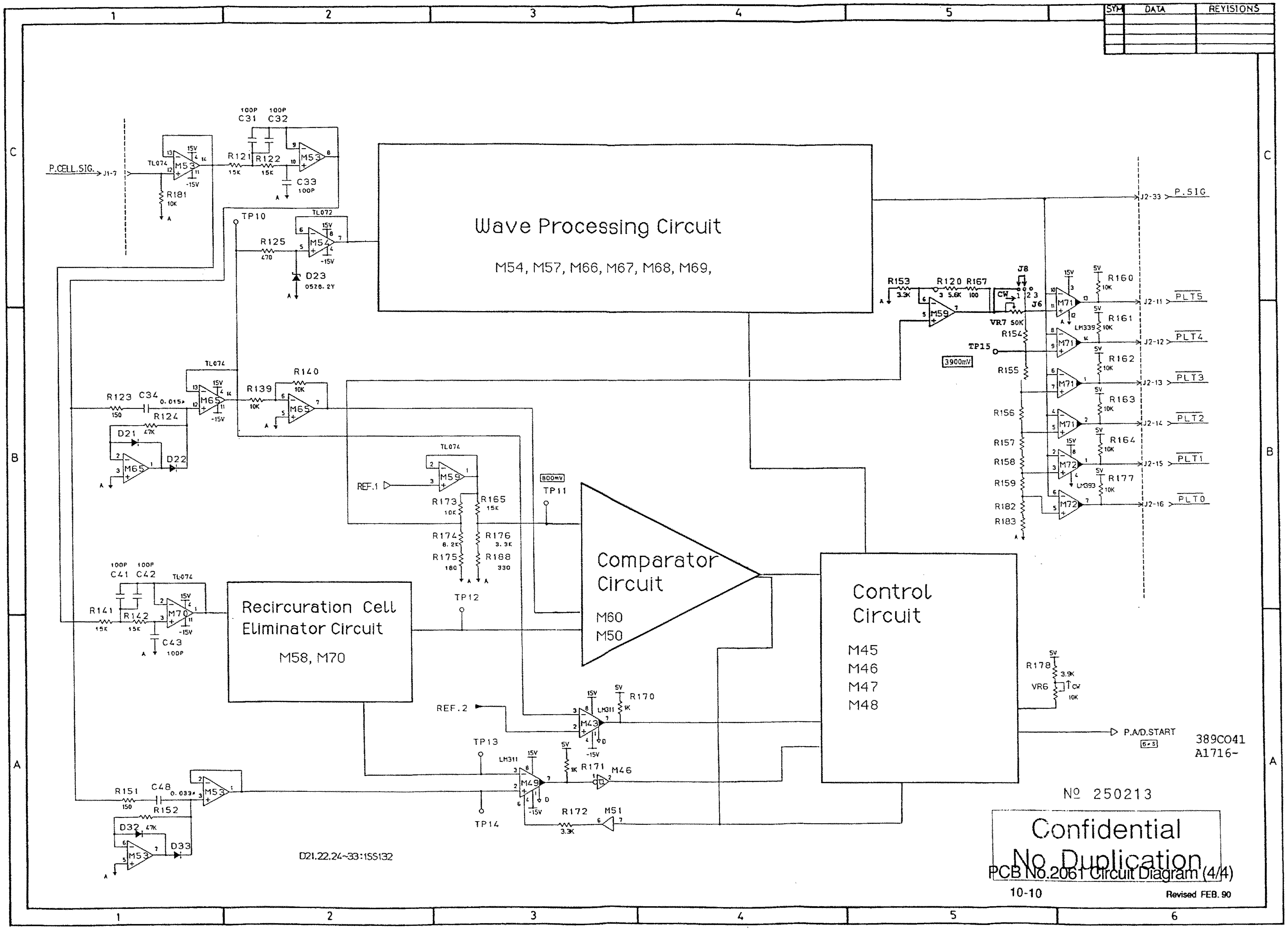
PCB No.2061 Circuit Diagram (3/4)

14-APR-88



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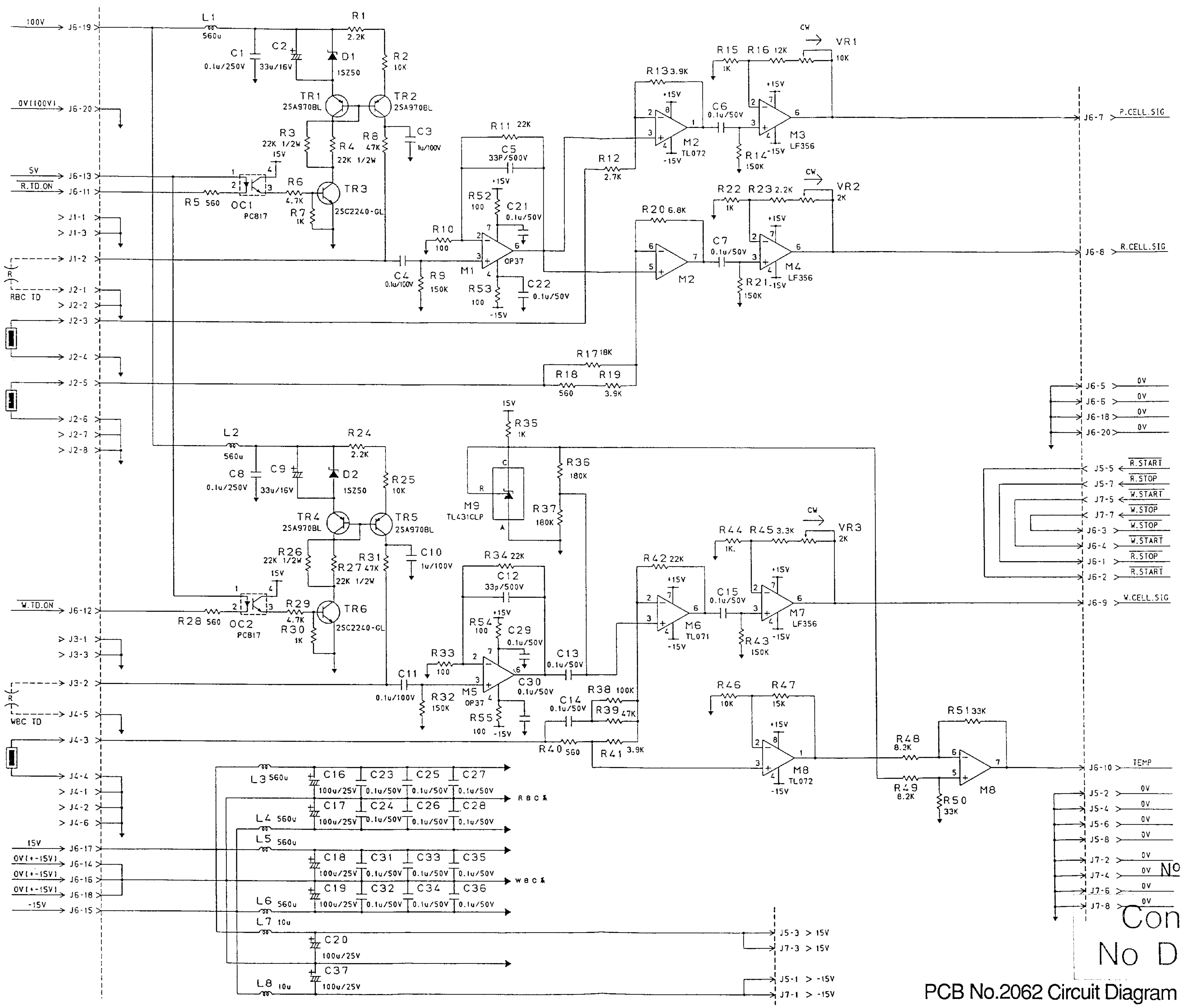
No Duplication

PCB No.2061 Circuit Diagram (4/4)

10-10

Revised FEB. 90

SYM	DATA	REVISIONS



Nº 250213

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No Duplication

PCB No.2062 Circuit Diagram

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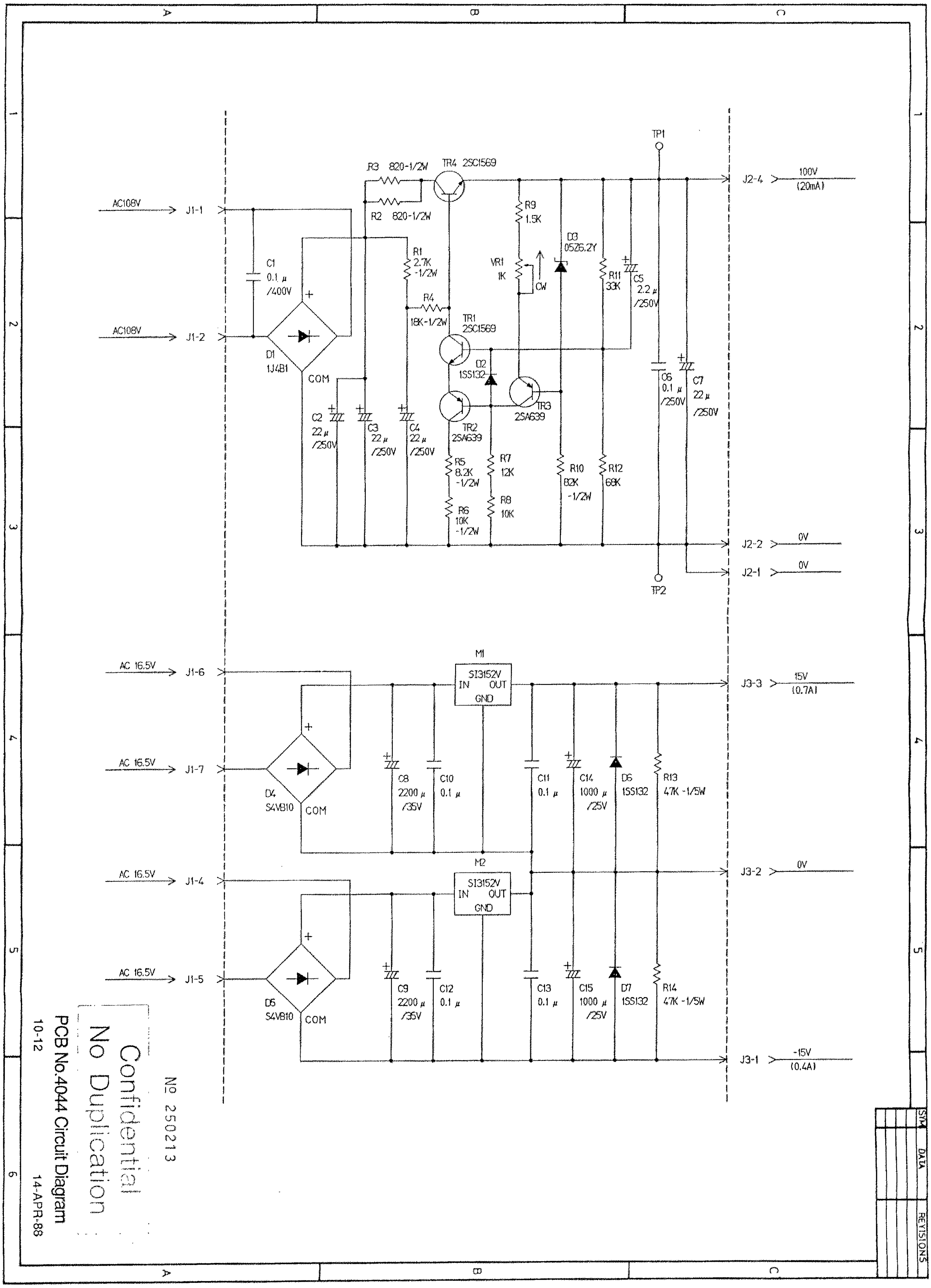


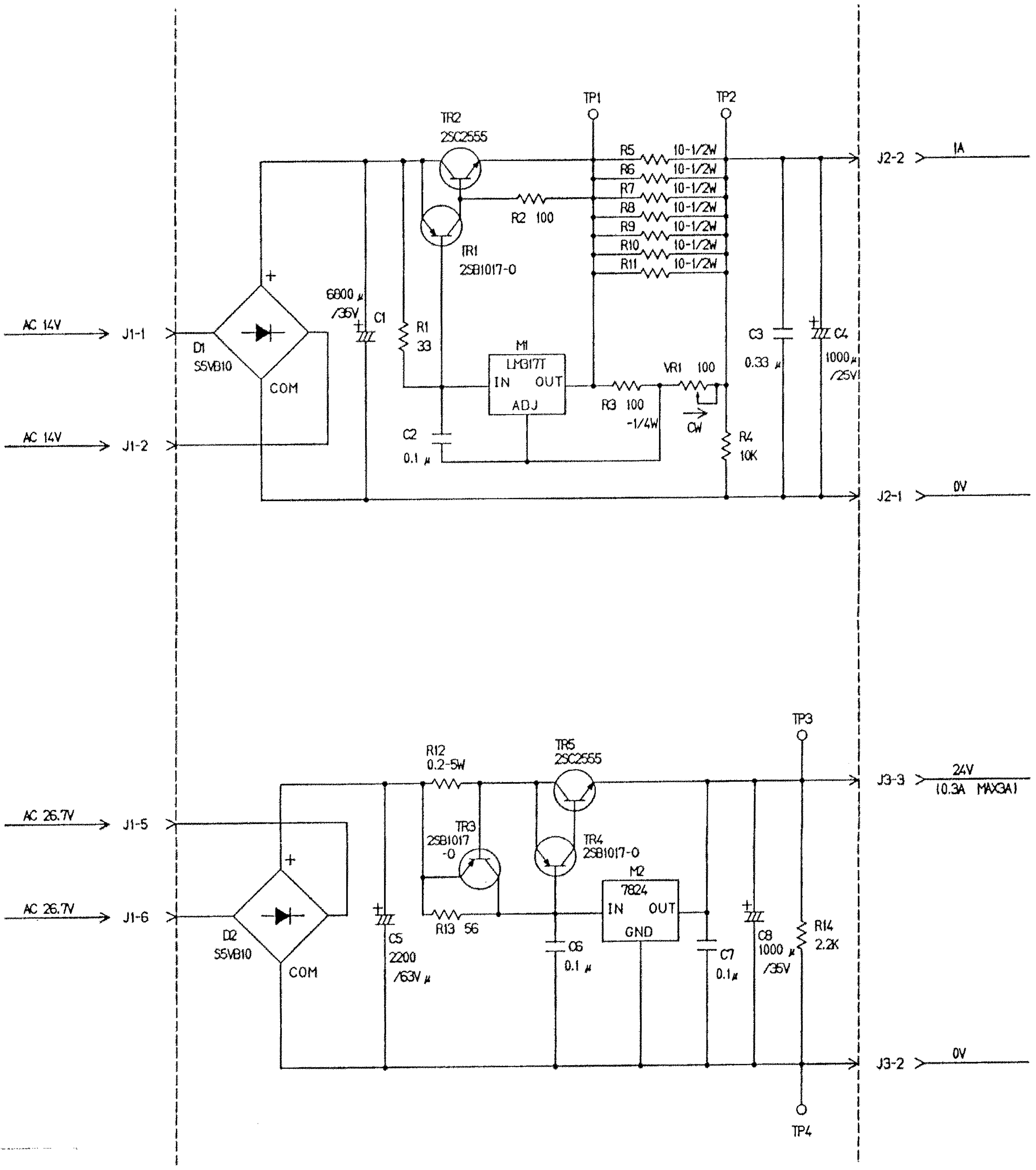
No 250213

Confidential
No Duplication

PCB No.4044 Circuit Diagram

10-12

14-APR-88



No 250213

Confidential
No Duplication

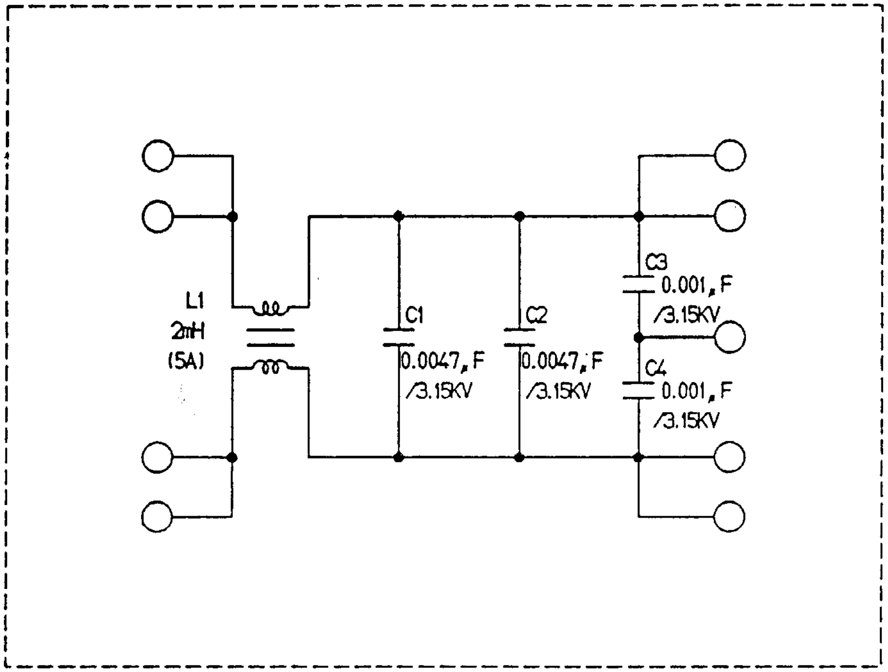
PCB No.4045 Circuit Diagram

10-13

14-APR-88

SYM
DATA
REVISIONS

SYM	DATE	REVISIONS

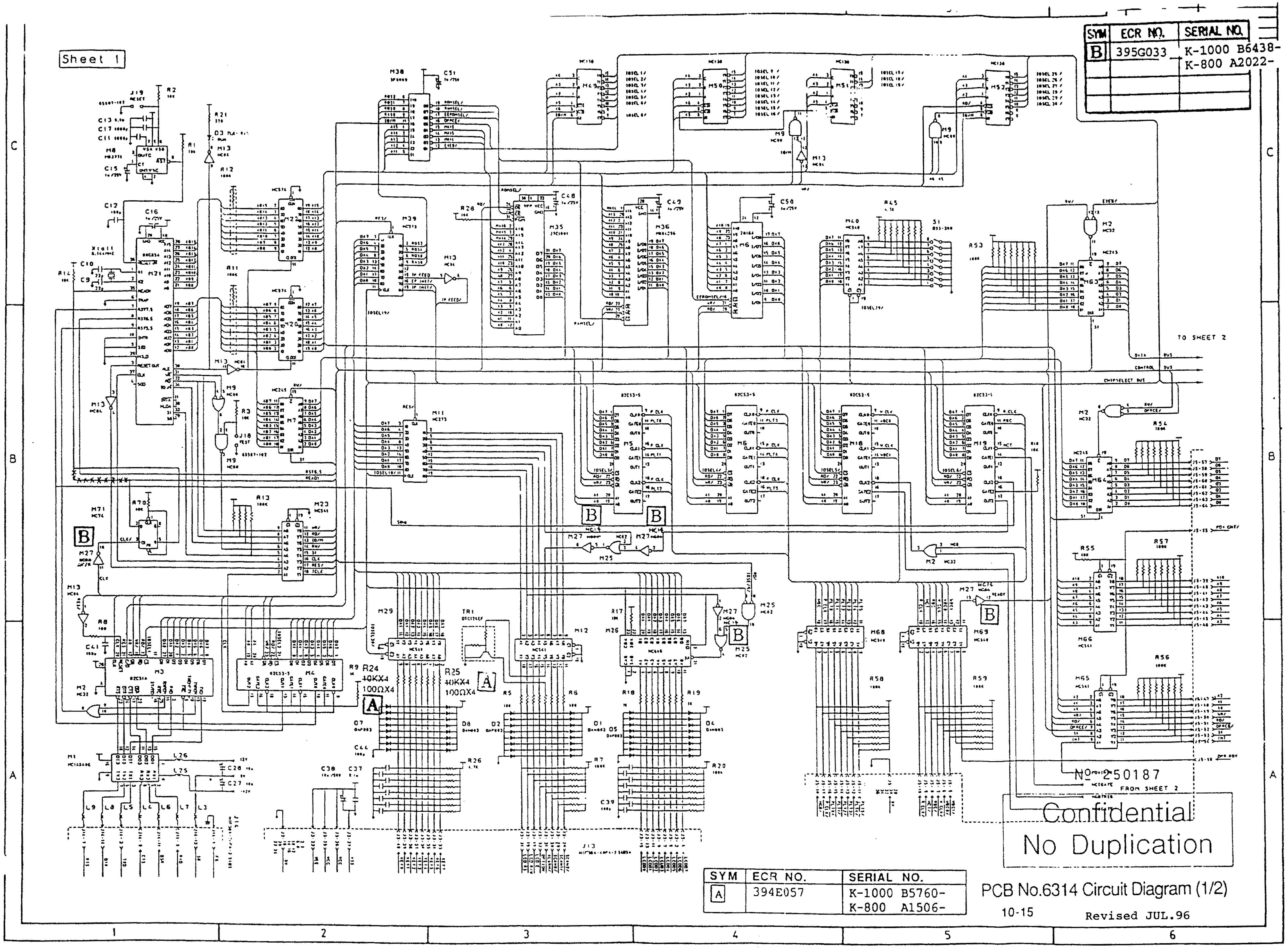


№ 250213

Confidential
No Duplication

PCB No.4046 Circuit Diagram

10-14 14-APR-88



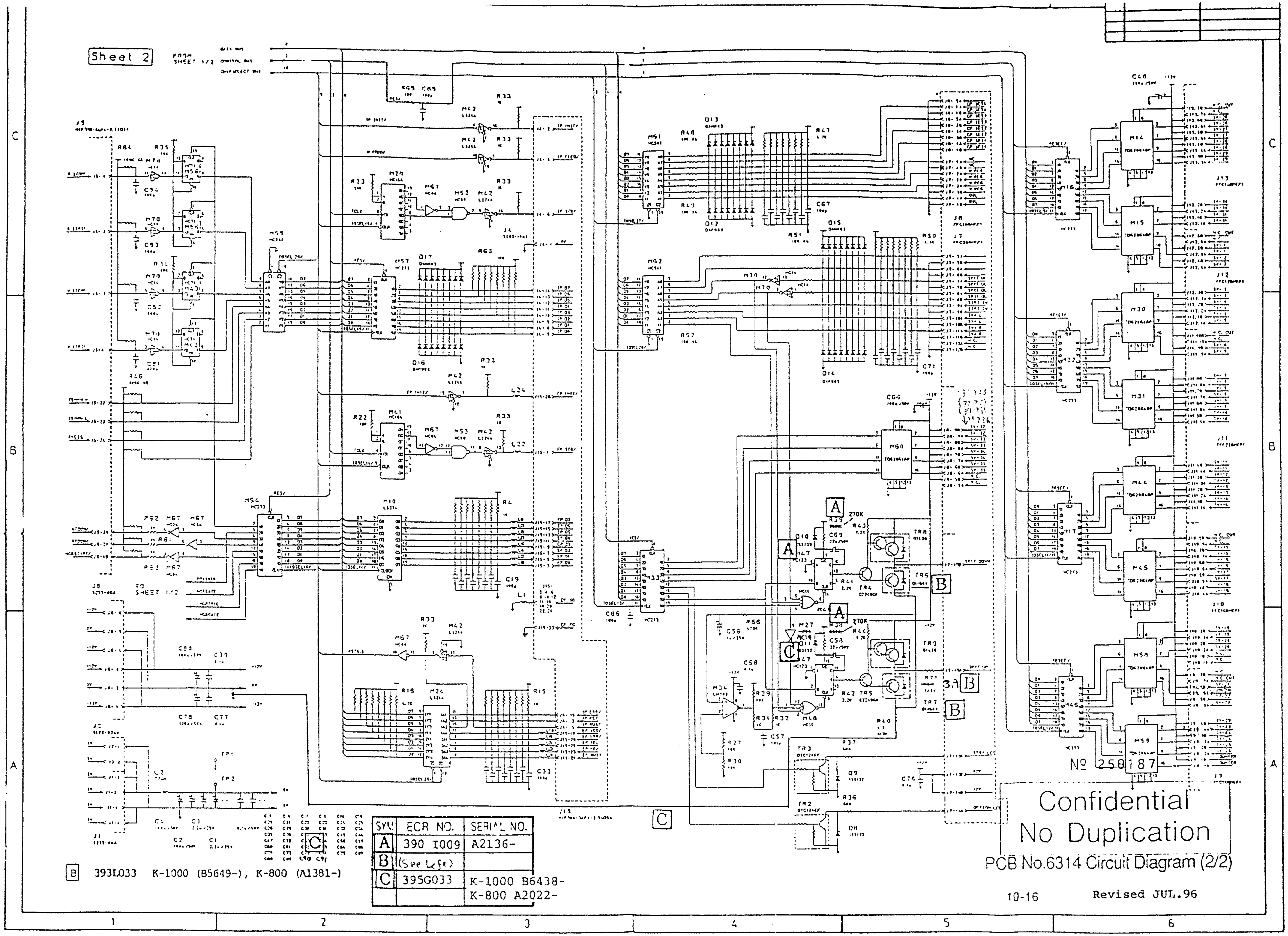
SYM	ECR NO.	SERIAL NO.
B	395G033	K-1000 B6438- K-800 A2022-

No 250187

SYM	ECR NO.	SERIAL NO.
A	394E057	K-1000 B5760- K-800 A1506-

PCB No.6314 Circuit Diagram (1/2)

Revised JUL.96



№ 250187

SYM	ECR NO.	SERIAL NO.
A	390 I009	A2136-
B	(See Left)	
C	395G033	K-1000 B6438- K-800 A2022-

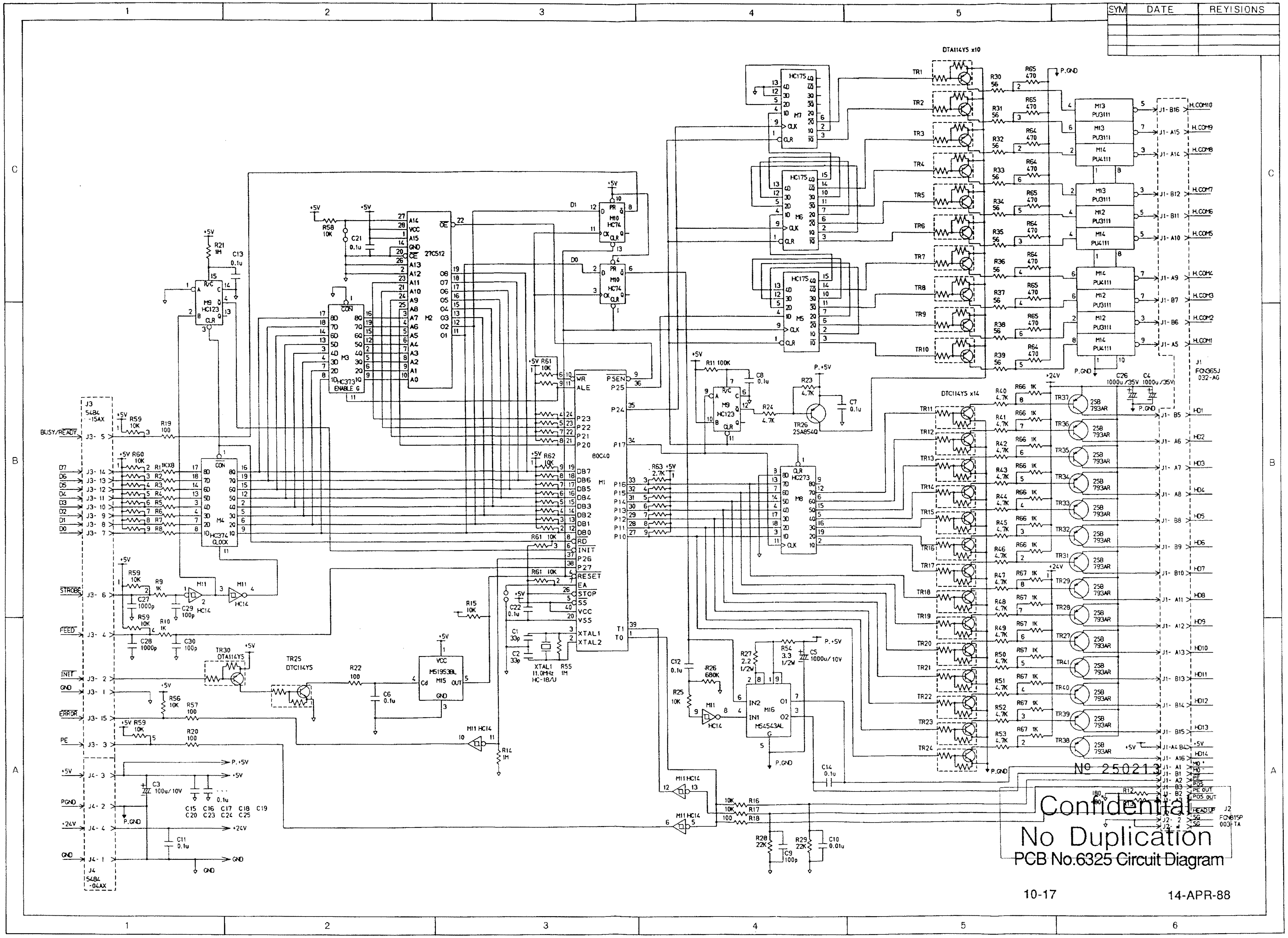
B 393L033 K-1000 (B5649-), K-800 (A1381-)

Confidential
No Duplication

PCB No.6314 Circuit Diagram (2/2)

10-16

Revised JUL.96



Confidential

No Duplication

PCB No.6325 Circuit Diagram

10-17

14-APR-88

Confidential
No Duplication

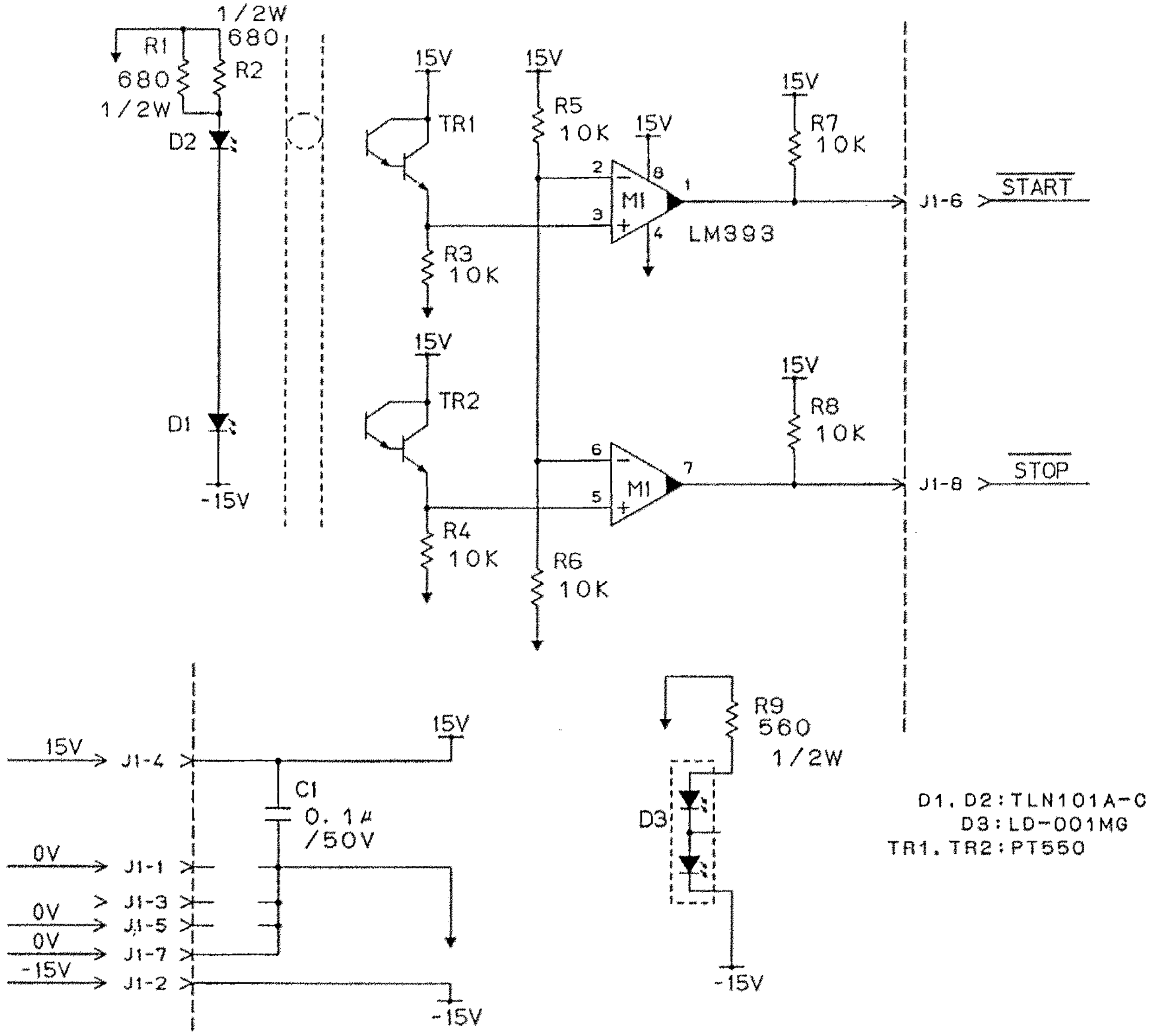
№ 250213

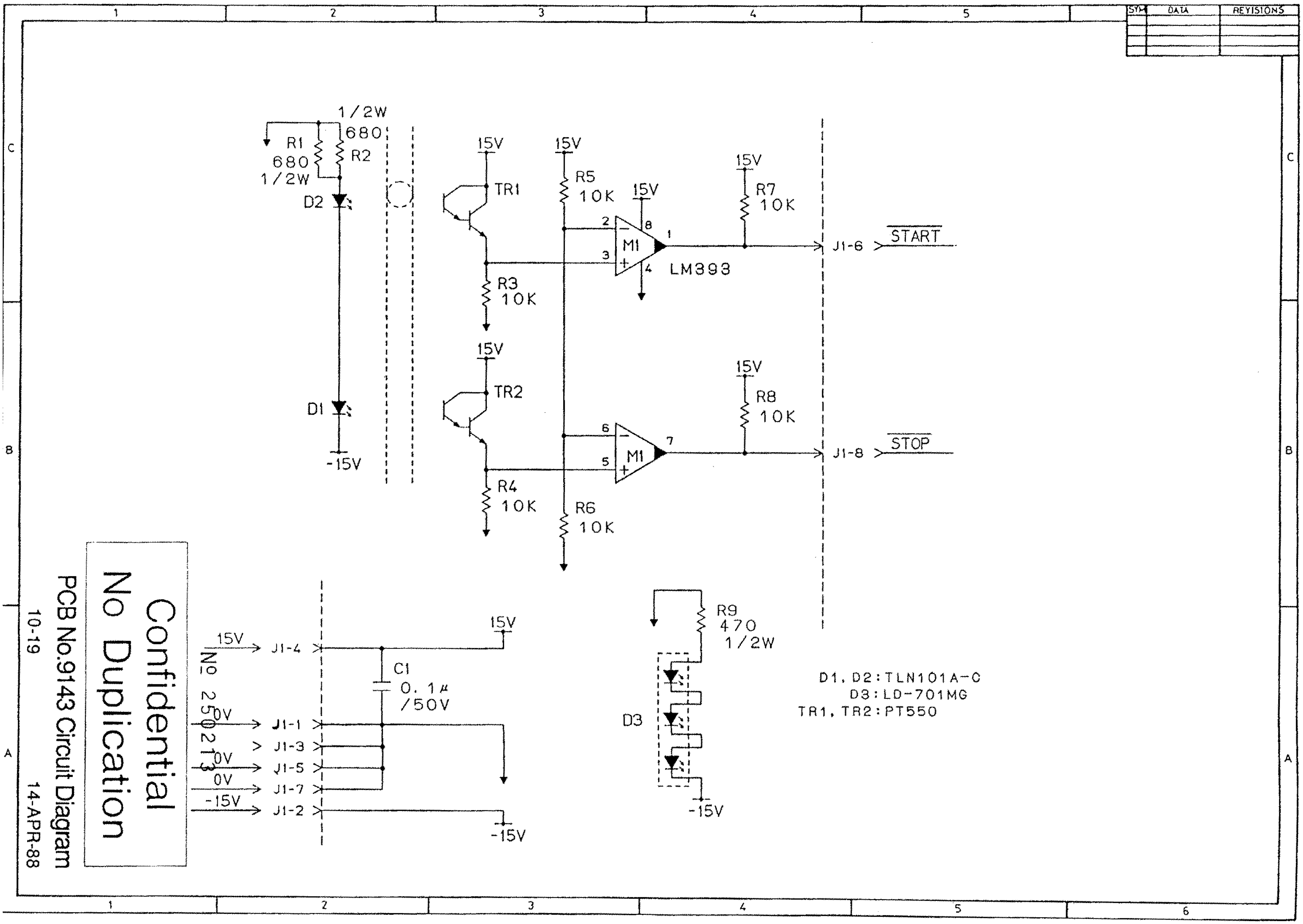
PCB No.9142 Circuit Diagram

10-18

14-APR-88

SYM	DATA	REVISIONS





D1, D2:TLN101A-C
D3:LD-701MG
TR1, TR2:PT550

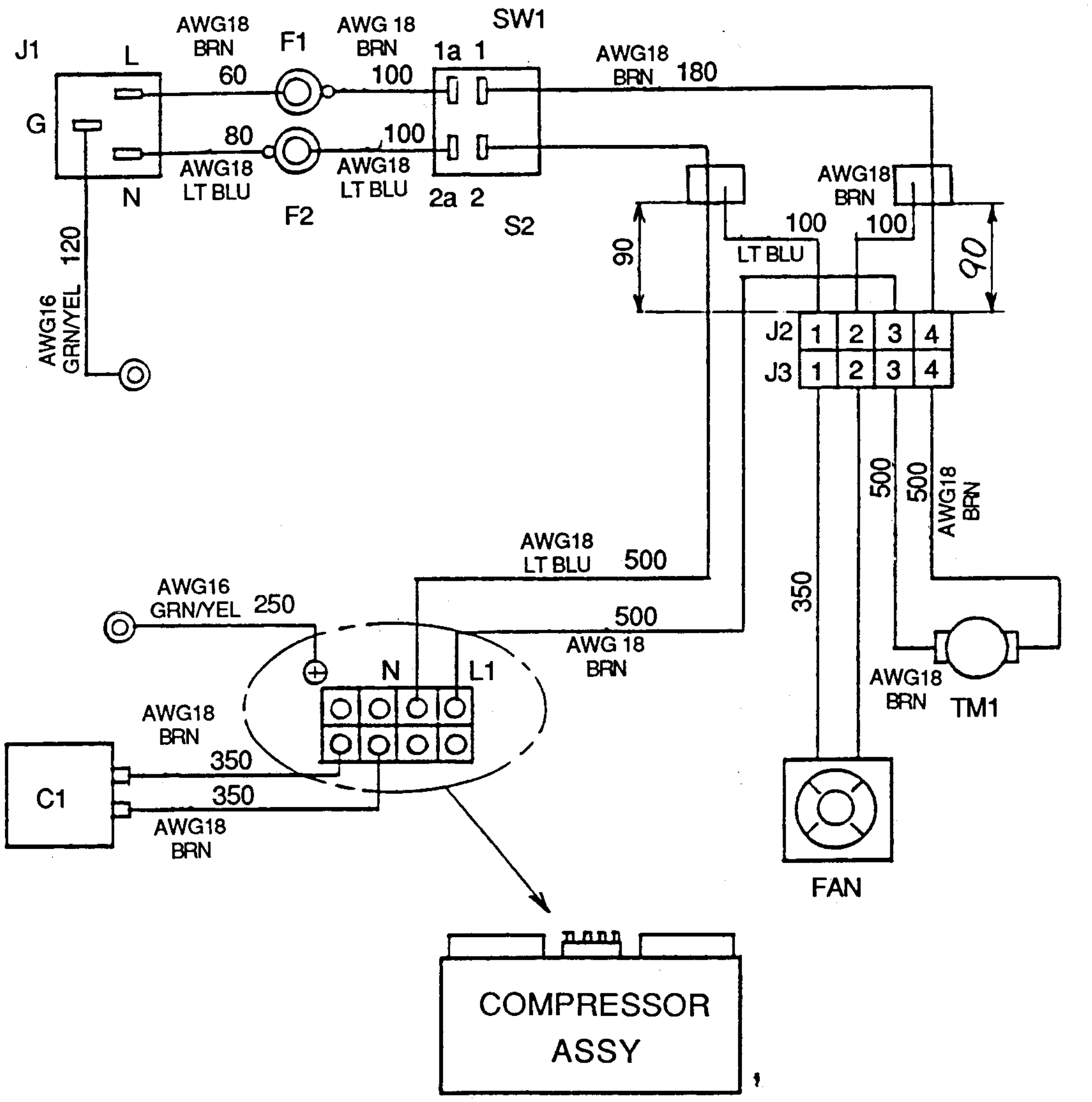
Confidential
No Duplication

PCB No.9143 Circuit Diagram

10-19

14-APR-88

No 250213



SYM	DATA	REVISIONS

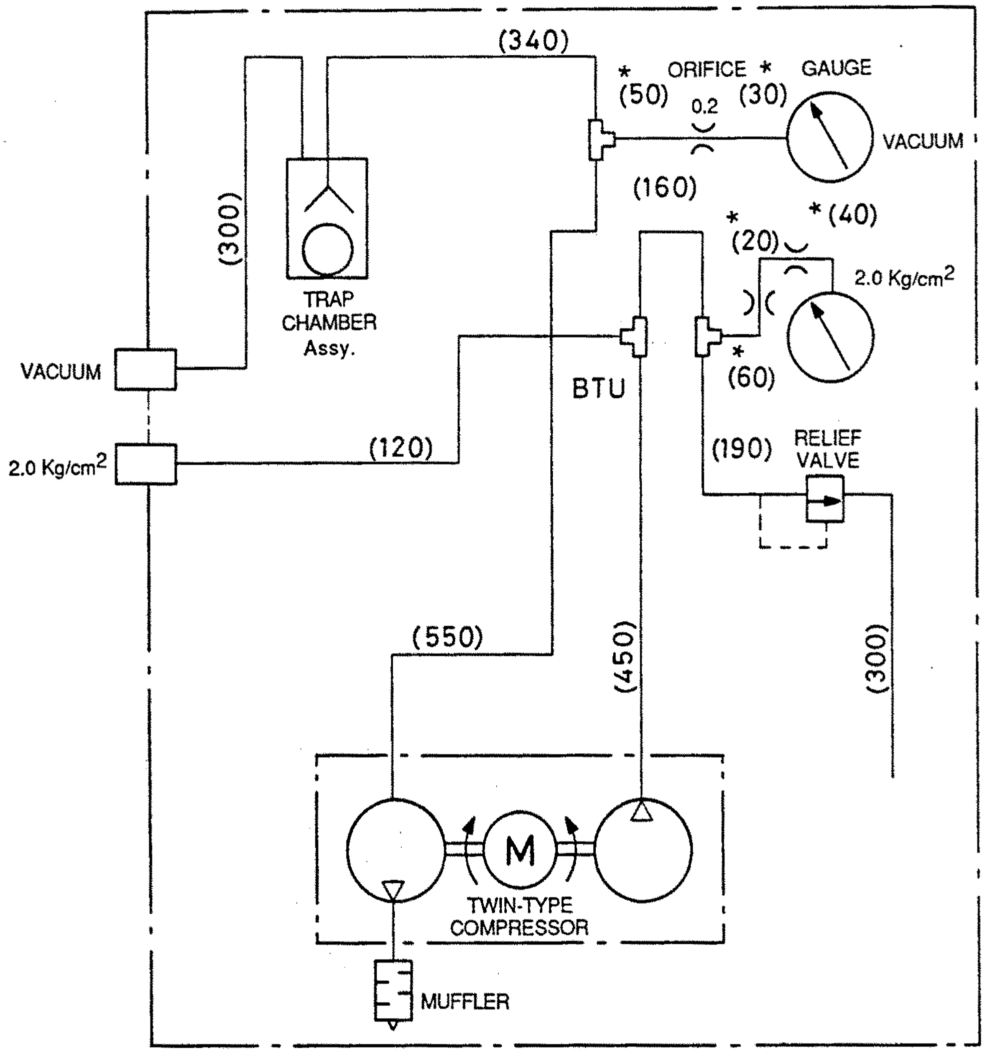
Confidential
No Duplication

No 250213-

Pneumatic Unit PU-6 Wiring Diagram

10-20

14-APR-88



Note: 1.(*) indicates Polyurethane tube 1.8 x 3.4 mm, and other tubes are Polyurethane tube 4 x 6 mm.
2.Tube length is indicated as "mm" in ( ).

№ 250213

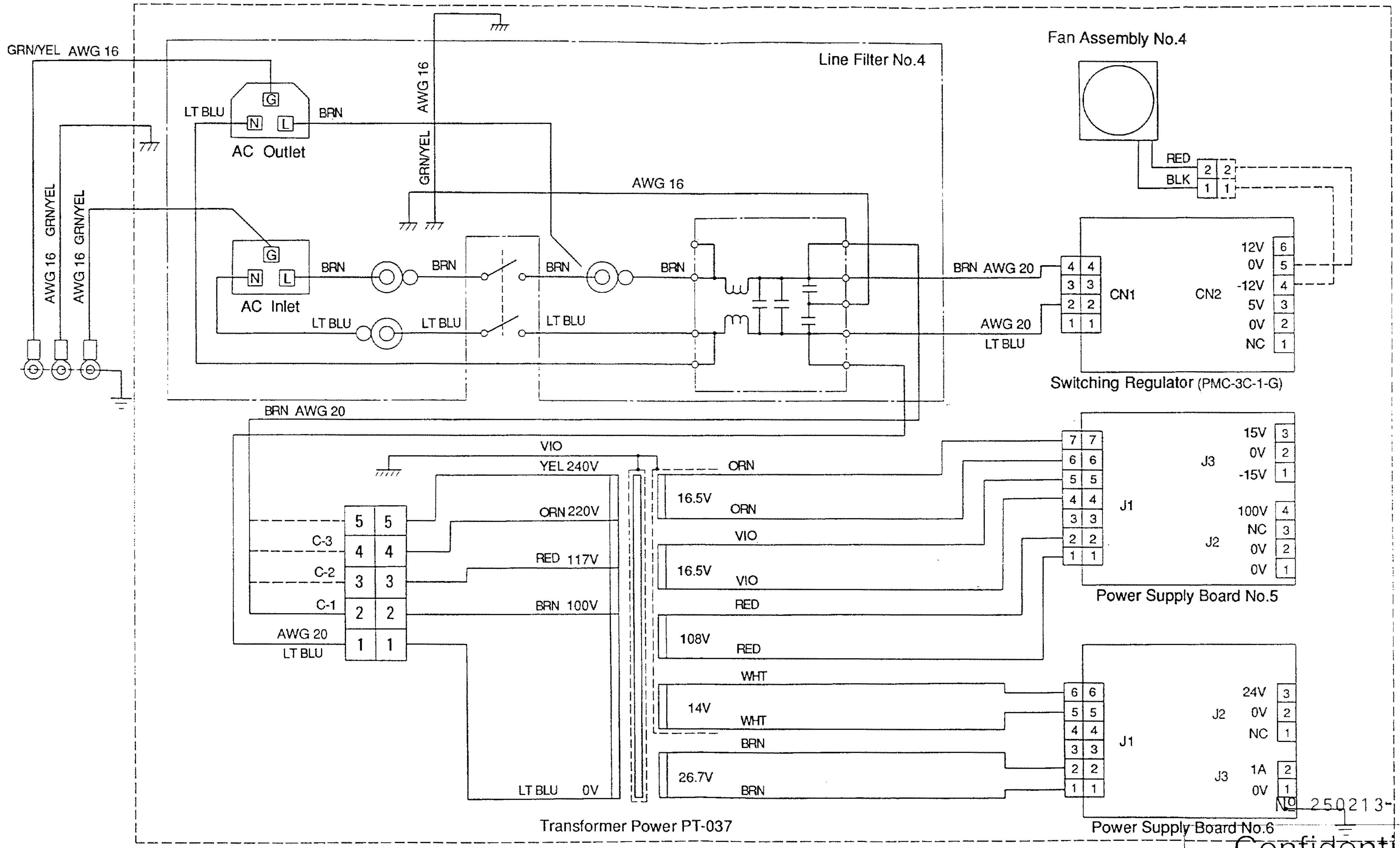
Confidential
No Duplication

Pneumatic Unit PU-6 Pneumatic Diagram

10-21

14-APR-88

SYM	DATA	REVISIONS



Note: Wiring Cable without indication is AWG 18.

Power Supply No.14 Circuit Diagram

14-APR-88

Sysmex

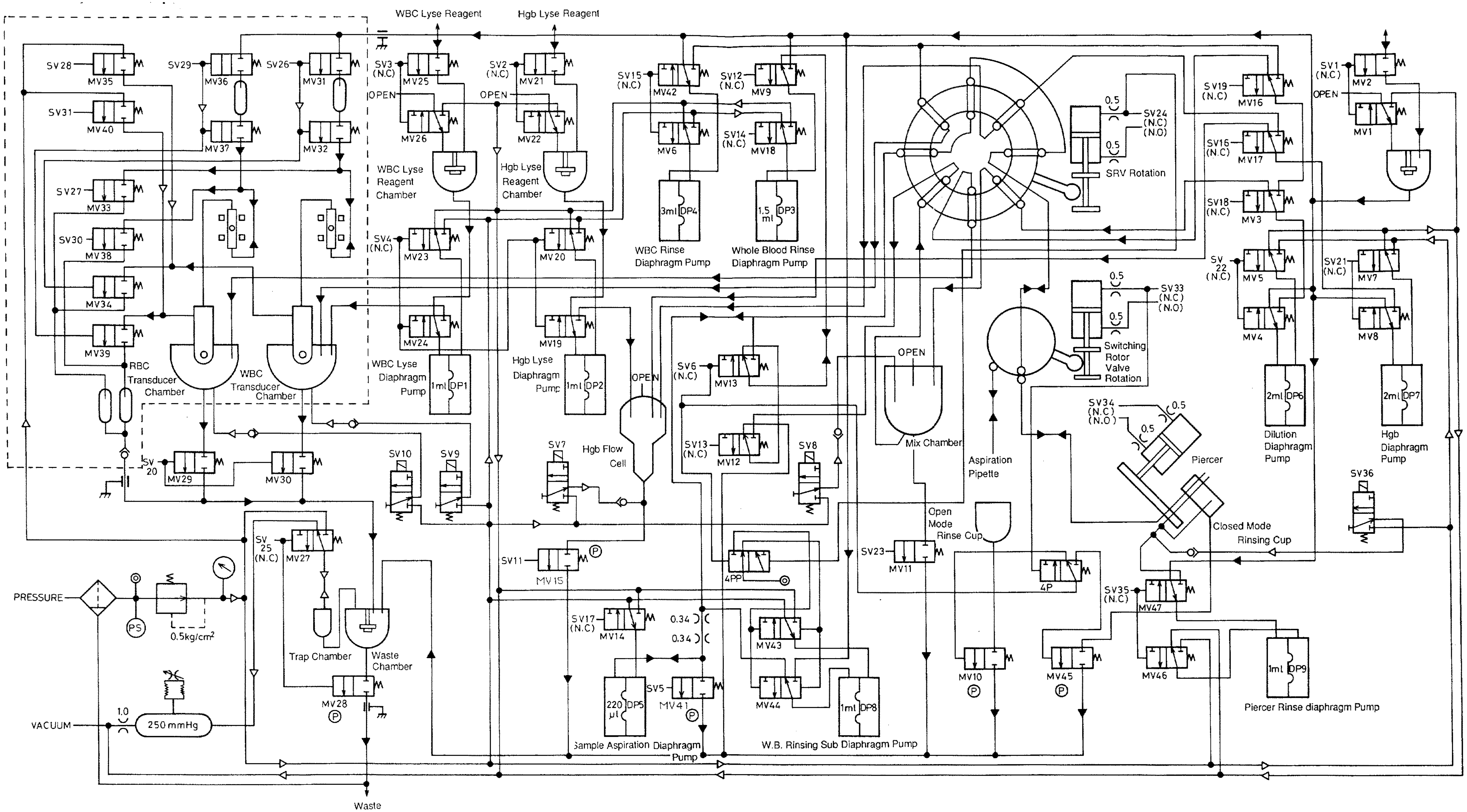
APPENDIX A.

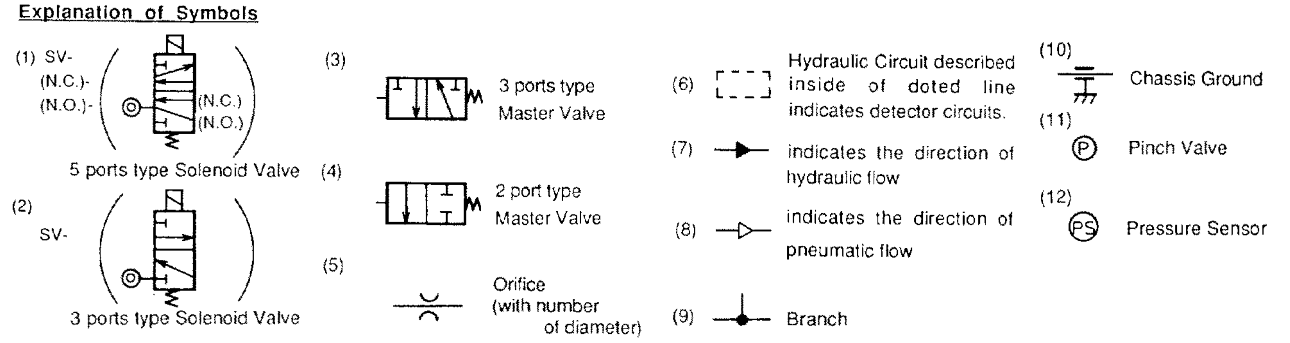
CAP PIERCING UNIT KCP-1
(OPTION)

- Table of Contents -

Appendix A. Cap Piercing Unit KCP-1

A.1. Hydraulic Flow Chart





№ 150213

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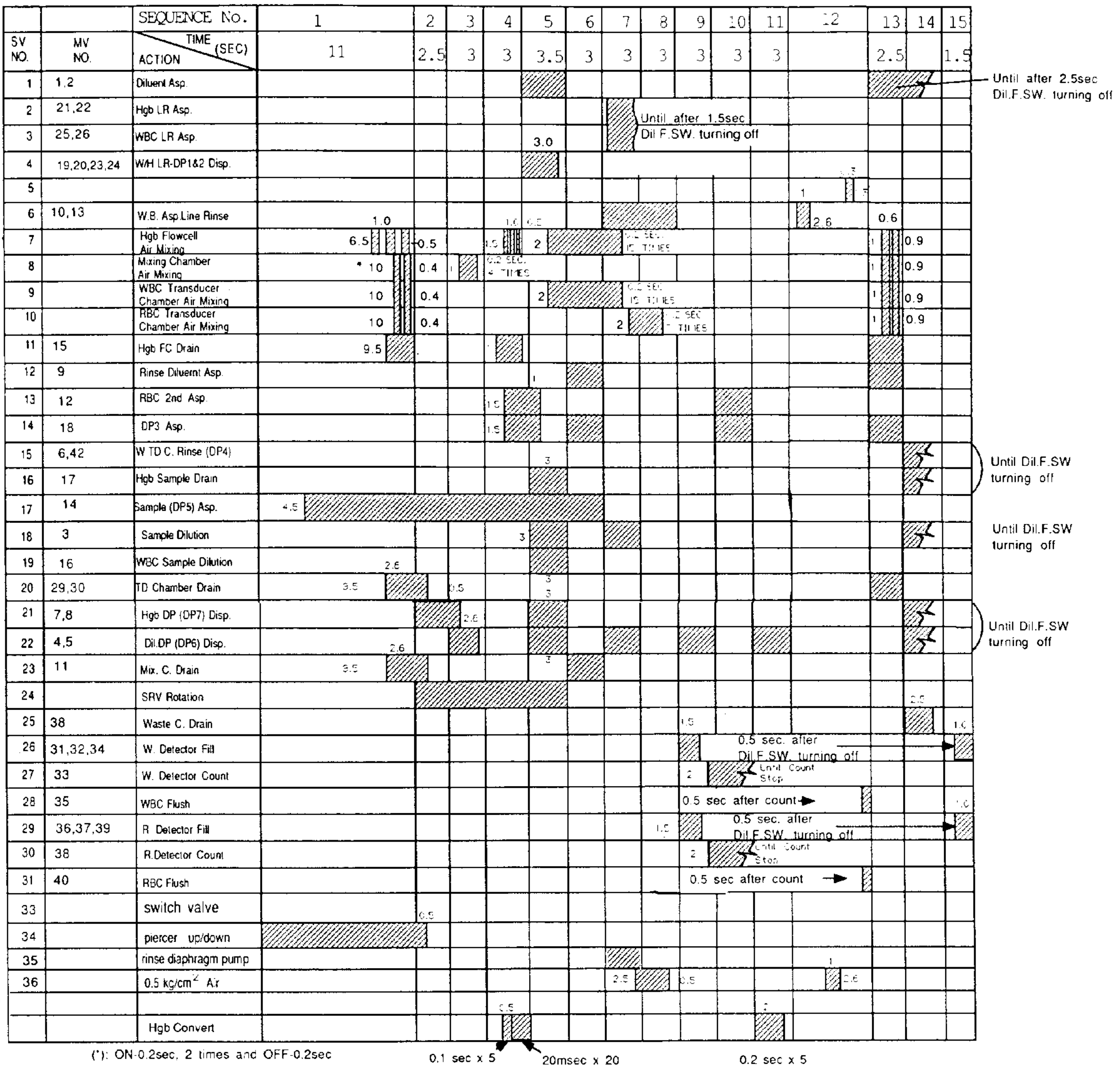
No Duplication

20-AUG-88

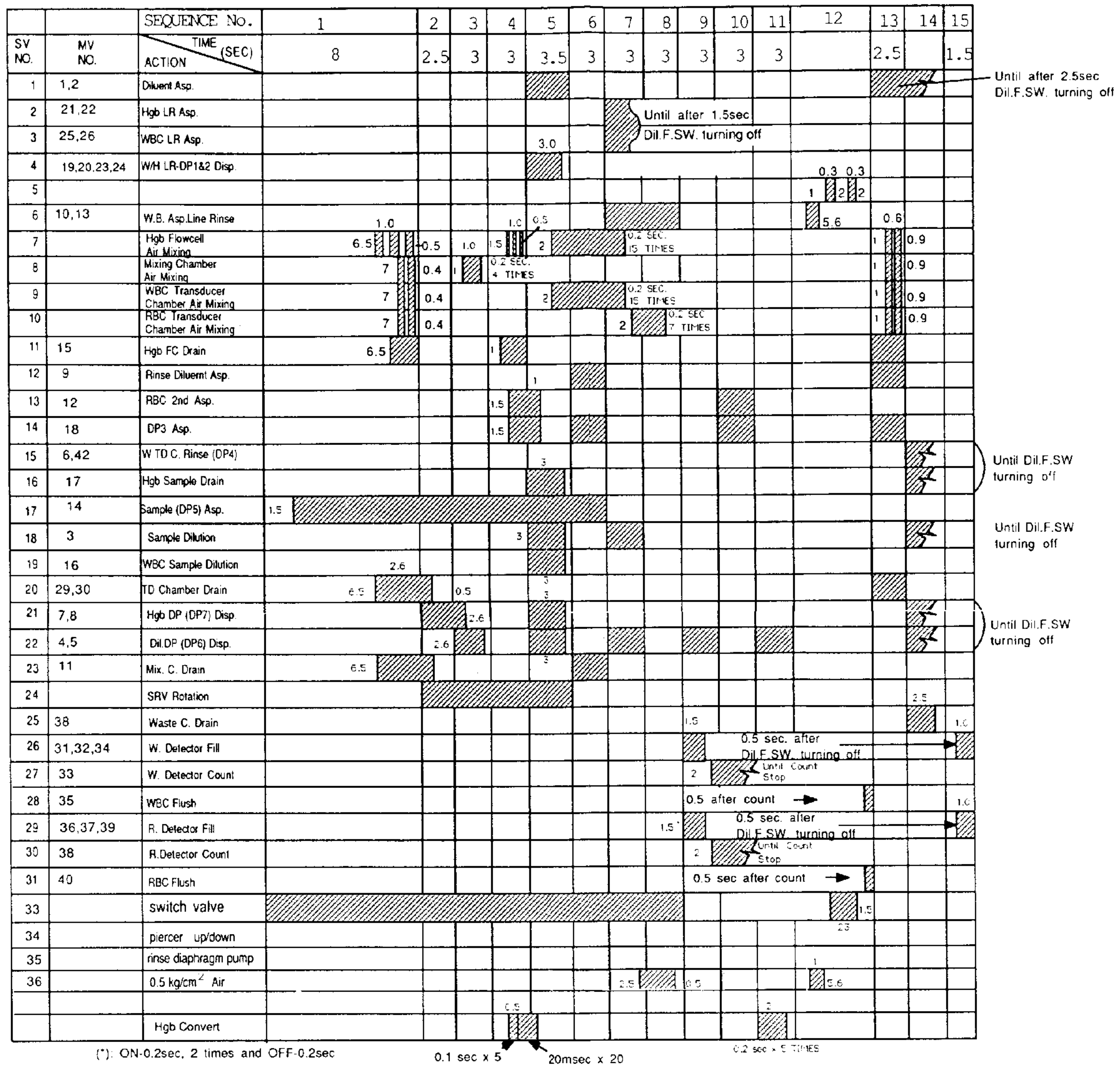
A.2. Timing Chart (Closed Mode / Open Mode)

CLOSED MODE TIMING CHART



(*): ON-0.2sec, 2 times and OFF-0.2sec

OPEN MODE TIMING CHART



(*): ON-0.2sec, 2 times and OFF-0.2sec

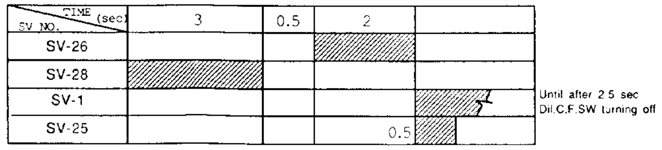
BASIC OPERATION TIMING CHART

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R B C	Drain			2 nd ASP				N.P. Bubble Removal	COUNT				Drain	Rinse	Fill
W B C	Drain				Dilution	Air Bubble Mixing	N.P. Bubble Removal		COUNT				Drain	Rinse	Fill
H G B	Drain	Blank Dispense	(Blank Convert)	Drain	Dilution	Air Bubble Mixing	N.P. Bubble removal				Sample Convert		Drain	Rinse	
M I X	Drain		Dilution			Drain			Rinse		Rinse				
S R V	Sample Aspiration	SRV arm goes to the Right					Aspiration Line Rinse						Diluent Priming into Dil. Chamber		

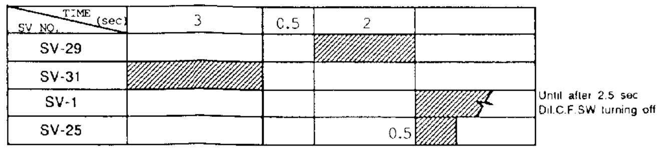
NOTE N.P. No Operation

FLUSH FILL TIMING CHART

WBC

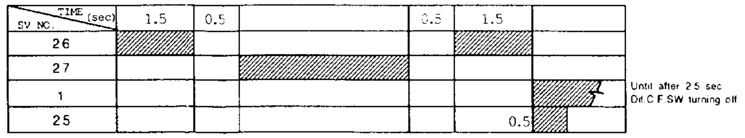


RBC

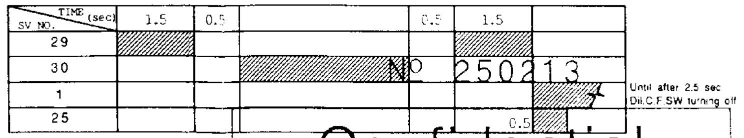


RECOUNT TIMING CHART

WBC



RBC



A.3. Switching Rotor Valve

A.3.1. Switching Rotor Valve Adjustment

This section contains procedure of the following adjustments the Switching Rotor Valve. Stop position of Switching Rotor Valve should be checked at least once a year. When installing a new Switching Rotor Valve, stop position adjustments should be performed before attempting to operate the instrument.

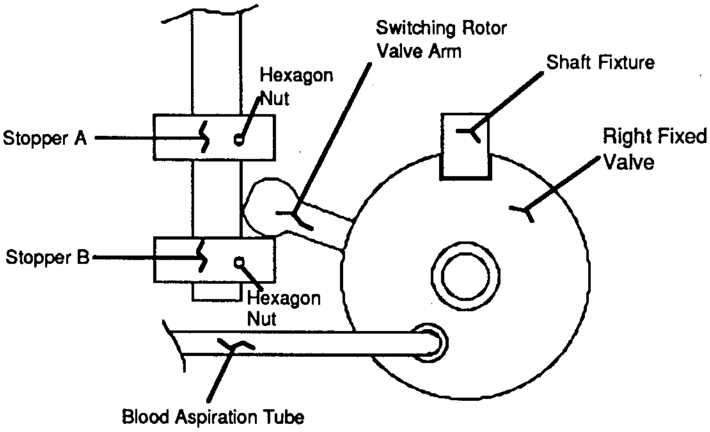


Figure A-1 Switching Rotor Valve

* Alignment tool required:

Code No.	Description
344-3708-1	Pin Parallel ø 2x25

Stop Position Adjustment Procedure:

A Turn the power off and wait at least one minute to release the vacuum and pressure accumulated inside the pneumatic line.

B Turn the knurled sample rotor valve fixing screw counterclockwise and remove it from the Switching Rotor Valve.

C Remove Aspiration tube from the fixed valve.

1) Uppermost stop position adjustment

A. Set the SRV Arm at uppermost position.
B. Insert the alignment pin into the hole (A).
C. Confirm that the alignment pin is inserted into the rotor valve through the fixed valve. If the alignment tool can not be inserted smoothly, adjustment is required:
E. Loosen the hexagon nut of the Upmost Stopper as shown in Figure A-2.
F. Adjust the uppermost stop position properly and tighten the hexagon nut.
G. After removing the pin, repeat the above procedure C to F for the confirmation.

CAUTION:

When performing this adjustment, pay attention to the following points.

- There should be no gap between the Rotor Valve and Fixed Valve.
- There should be no gap between the lever of Rotor Valve and each Stopper.

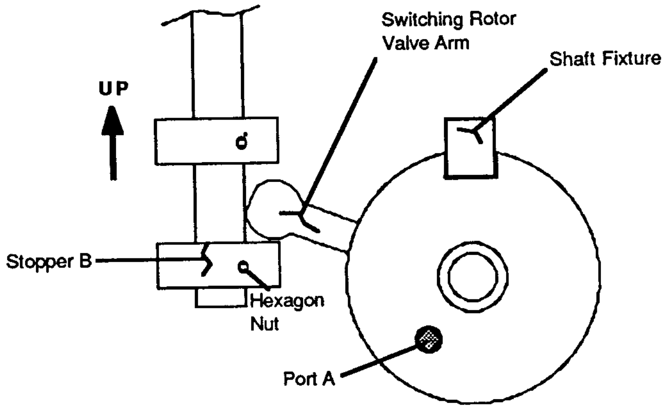


Figure A-2 Upmost Position of Switching Rotor Valve

2) Lowermost stop position adjustment

A. Set the SRV Arm at lowermost position.
B. Insert the alignment pin into the port A.
C. Confirm that the alignment pin is inserted into the SRV. If the alignment pin can not be inserted smoothly, adjustment is required:
E. Loosen the hexagon nut of the Rightmost Stopper.
F. Adjust the lowermost position properly and tighten the hexagon nut.
G. After removing the alignment pin, repeat the above C to F for the confirmation.

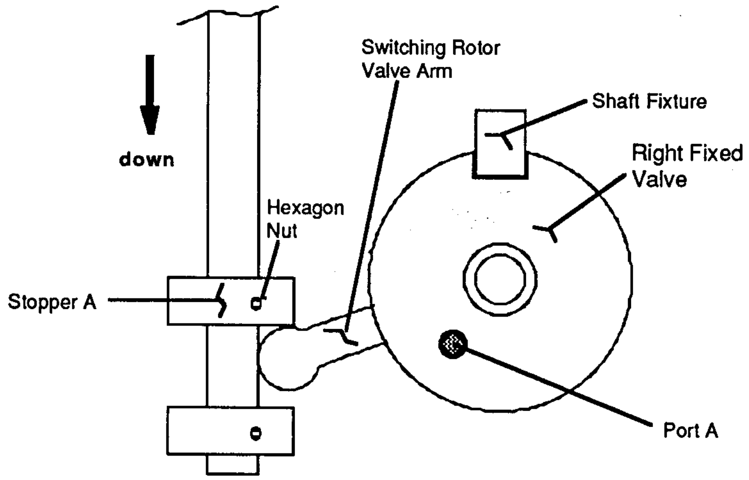


Figure A-3 Lowermost position of Switching Rotor Valve

CAUTION:

Do not activate the instrument while the alignment tool (pin parallel ø 2 x 25) is inserted in the Switching Rotor Valve. This could result in permanent damage to the SRV.