Service Manual

autohumalyzer 900 S Plus

RANDOM ACCESS ANALYZER

Cat.-No.: 17800/3

CE

INDEX

7A	18810/7	X-Y-Z INTERFACE
	*	EB0088.01.SCH
	*	A00506.03.PM
7B	18810/11	Z-AXIS CONTROL BOARD
	*	EB0145.01.SCH
	*	EB0145.01.OPM
8	HY0021.01	HIDRAULIC LAYOUT DIAGRAM
	*	HY0021.01
9	18810/10	TWO SPEEDS STEP MOTOR DRIVE
	*	EB0121.01.SCH
	*	EB0121.01.APM
10	18810/12	PUMPS & ALARM BOARD
	*	A01077.03.SCH
	*	A01077.02.APM
11	17840/3	DILUTER
	*	EB0068.01.SCH
	*	EB0068.01.PM
12	17810/50	I/O PORTS
	*	EB0078.12.SCH
	*	EB0078.22.SCH
	*	EB0078.32.SCH
	*	EB0078.42.SCH
	*	A00512.02.PM
13	*	MAINTENANCE AND ADJUSTMENTS
14	*	TROUBLESHOOTING GUIDE
15	*	SPARE PARTS AND ACCESSORIES LIST

LEGEND: SCH = SCHEMATICAL DIAGRAM PM/APM/OPM = LAYOUT

1. Built-in Service Test Programs

NOTE: The service test programs allow the operator to check the performances of the analyzer while for technician constitute a valid help in the maintenance and troubleshooting operations.
Each test will be described in detail and further documented with schematically and assembly drawings as well as testing procedures.

In order to access the SERVICE TEST PROGRAM proceed as follows:

-Starting from the main menu, at the same time press the keys **"Shift", "Ctrl", "Alt", "D".**

At first is carried out the mechanical reset and the following errors message* will be displayed:

General Reset of the Instrument
At end of initialisation :
params.simulate = 0
params.dilerror = 0
params.xyerror = 0
params.zerror = 0
Press any key to continue

Pressing any key the list of available tests will be displayed.

Available Tests:
1 Photometer and Filters Test
2 Probes and Level Sensor Test
3 Reset Instrument and General Homing
4 Temperature Test
5 Physical Axis Positions
6 Pump Tests
7 Diluter Test
8 Move Arms Test
0 Quit
Select Test (0... .8) ?

- For the explanation of the message see the chapter 1.3

1.1- Photometer and Filters Test

This test allows the operator to check the lamp, the filters, the flow-cell and the stability of all photometric system.

-Select Test (0...8) ? digit the number **"1"**
the probes move into the sample area over the position 45 and the below menu will be displayed

---

Test Photometer and Filters 13/5/1996

Select Filter (0 1 2 3 4 5 6 7 8)
340 405 492 510 535 546 578 620 NUL

(ESC=quit; R=random; D=down probe; U=up probe)

N. of Measures (340nm) = 6..7..8 *

First value = ...**

Mean value = ...***

- To select a new filter, digit a number between 0 and 7

- To lower or to raise the probes, press the keys "D" or "U"

- To carry out measurements with filters selected in random way, press the key "R"

- Press "Esc" to exit. It will be carried out the mechanical reset and displayed the errors message.

* Number of measurements carried out from the analyzer
** Value of the first measurement in milliabsorbance
*** Mean value in milliabsorbance calculated on the base of the measurements carried out.

1.2 - Probes and Level Sensor Test

This program allows the operator to check:
1) The up-down movement of Z-axis in every position of sample, reagent and reaction well area.
2) The up-down movement of Mixer and its mixing action.
3) The Sensor Level function.

TEST PROCEDURE

Select Test (0...8) ? digit the number **"2"**
After the mechanical reset the following menu will be displayed

---

Probes in Wash Position

Sampling Probe
Speed = 15 Step = 0

```
Command : ' 0 '          := 0 step
          ' 1 '          := +1 step
          ' 2 '          := -1 step
          ' 3 '          := +10 steps
          ' 4 '          := -10 steps
          ' <space>'     := go to End
          ' L '          := go to Level
          ' S '          := status
          ' H '          := home probes
          ' D '          := set sampling probe
          ' M '          := set mixing probe
          ' V '          := set speed of probe
        'Esc'            := quit
```

From the previous menu choose one of the following procedure:

1. Press "Esc" once to move the probes into the Wash Position

2. Press "Esc" twice and digit any number between 1 and 27 to move the probes into the reagent area.

3. Press "Esc" twice and "Space Bar" once then digit any number between 1 and 60 to move the probes into the sample area.

4. Press "Esc" and "Space Bar" twice then digit any number between 1 and 120 to move the probes into the reaction well area.

5. Press "Esc" three times to exit. It will be carried out the mechanical reset and displayed the errors message .

1.3 - Reset Instrument and General Homing

This test carries out a mechanical Reset of the analyzer. It includes the check of Dilutor, of X-Y axes and Z axis. The reset is carried out moving each mechanical assembly outside own homing position and going back at once to the original position. The check of the control signals will determine the errors message. The "0" number means that the mechanical movement is regular; a number greater than zero means that one or more misalignments happened during the check.

TEST PROCEDURE

Select Test (0....8) ? digit the number **"3"**
After the mechanical reset the errors message will be displayed

---

At end of Initialisation:
params. simulate = 0
params. dilerror = 0
params. xyerror = 0
params. zerror = 0
Press any Key to Continue

1.4 - Temperature Test

This test allows the operator to change the operating temperature of the analyzer. The selected temperature will change both in the flow-cell that in the reaction well.

TEST PROCEDURE

Select Test (0...8) ? digit the number **"4"**
the below menu will be displayed

Temperature Selection :
1 25 centigrade degrees
2 30 centigrade degrees
3 37 centigrade degrees

Select (1..3)

- digit the number correspondent to the temperature to select and the following writing will be displayed:

Selected temperature at ... degrees centigrade

after that will be carry out the mechanical reset and the errors message will be displayed.

1.5 - Physical Axis Positions

This test allows the operator to check if the probes are perfectly centred over the positions that they have to enter. If misaligned it will be possible to align the probes and to save the new positions.

TEST PROCEDURE

-Select Test (0...8)? digit the number **"5"**
After the mechanical reset the errors message will be displayed. Press any key to display the below menu.

Setting Waste Position.

	Co-ordinates		Old	
	x	y	x	y
Commands:' 8 ' := y-1 (rear 1 step)	0	0	0	0
' k ' := y+1 (forward 1 step)				
' u ' := x-1 (left 1 step)				
' o ' := x+1 (right 1 step)				
<shift> key := *10 (10 steps)				
' S ' := Save New Position				
' O ' := Restore Original Position				
' H ' := Homing & RePosition				
' p ' := test Probe Up/Down				
'Esc' := skip Position (no Save)				
' Q ' := quit Setting Positions.				

-after entering new co-ordinates, press 'S' to save then 'Esc' to skip to the next position. When the alignment is over and all the positions have been saved, press 'Q' to quit.

the below message will be displayed

do you want to Save Positions ? (y / n)

if yes then: **Writing..OK!**

next question:

Do you want to recover Original Installation Positions ? (y/n)

if yes then: **rewriting original positions.** (this will erase the positions you just entered).

if no then: **current** (new) **settings are retained.**

NOTE: be sure to save, the new position before next position.

The above procedure is repeated for the following positions:

WASH POSITION
REAGENT 1 POSITION
REAGENT 10 POSITION
REAGENT 18 POSITION
SAMPLE 1 POSITION
SAMPLE 16 POSITION
SAMPLE 31 POSITION
SAMPLE 46 POSITION
SAMPLE 60 POSITION

REACTION CHAMBER POSITION 1 OF RACK 1
REACTION CHAMBER POSITION 1 OF RACK 2
REACTION CHAMBER POSITION 1 OF RACK 3
REACTION CHAMBER POSITION 1 OF RACK 4
REACTION CHAMBER POSITION 30 OF RACK 4

1.6 - Pump Test

This test allows the operator to check the peristaltic pumps of the analyzer.

TEST PROCEDURE

-Select Test (0..8) ? digit the number **"6"**
the below menu will be displayed

Pump Selection:

1 Cuvette's Pump
2 Diluter's Probe Wash Pump
3 Water Pump
4 Drain Pump
Select (1..4)

-When "1" is entered the below writing will be displayed:

Cuvette's Peristaltic Pump Test :
Insert microliters to move (0 to exit ; 15000 max)

-Digit a number between 1 and 15000, press <Enter> and the following writing will be displayed:

volume:.....microliters
ESC=quit; D=down probe; U=up probe; any other key=start pump.

-when "2" is entered the following writing will be displayed:

Diluter's Probe Peristaltic Pump Test:
Insert milliseconds to activate (0 to exit; 15000 max)

-Type a number between 1 and 15000 <Enter>
-When "3" or "4" are entered Water pump or Drain pump will be selected.

1.7 - Diluter Test

This test allows the operator to check the Diluter module.

TEST PROCEDURE

Select Test (0...8) ? digit the number **"7"**
After the mechanical reset, the below menu will be displayed

Instrument Test

------- Diluter Test rel.4.0 13/05/1998 -------

leg. 1) Homing 4) Manual Start
2) Run Test 5) Quit
3) Random

Select ? _

---

1) Homing if the syringe is not in own start position (home), it will be automatically brought back to that position

2) Run Test ask for a volume* and then will move up and down. Press <Enter> to stop the movement.

3) Random enables the diluter to move up and down aspirating casual volumes in order to check and reproduce a real working condition.

4) Manual Start ask for a volume* and will move up and down upon pressing any key.

5) Quit carry out the mechanical reset and the errors message will be displayed.

* With the syringe N.4 the maximum volume to select is 550 µl

1.8. Move Arm Test X-Y-Z Axes

This program allows the operator to check the X-Y-Z axes.

TEST PROCEDURE

Select Test (0...8) ? digit the number **"8"**
After the mechanical reset the below menu will be displayed

Instrument Test

----------Test xyz Axis rel.4.0 13/05/1998 ----------

leg. 1) Homing Axis 4) Automatic Position Test
2) Run Test Axis 5) Exit
3) Random Axis
Select ? _

---

1) Homing axis automatically bring the probes to the homing position over the washing well.

2) Run test axis the below menu is displayed and will be possible to select different kinds of test.

Run Test Select :
1) Run Test X Axis
2) Run Test Y Axis
3) Run Test X and Y Axis : ' rectangle '
4) Run Test X and Y Axis : ' diagonal '
5) Run Test X and Y Axis : ' mixed '
6) Exit
Select Run Test ?

3) Random Axis Carries out casual movements of X-Y axes.

4) Automatic position test moves and lowers the probes in any position of reagent and reaction well area.

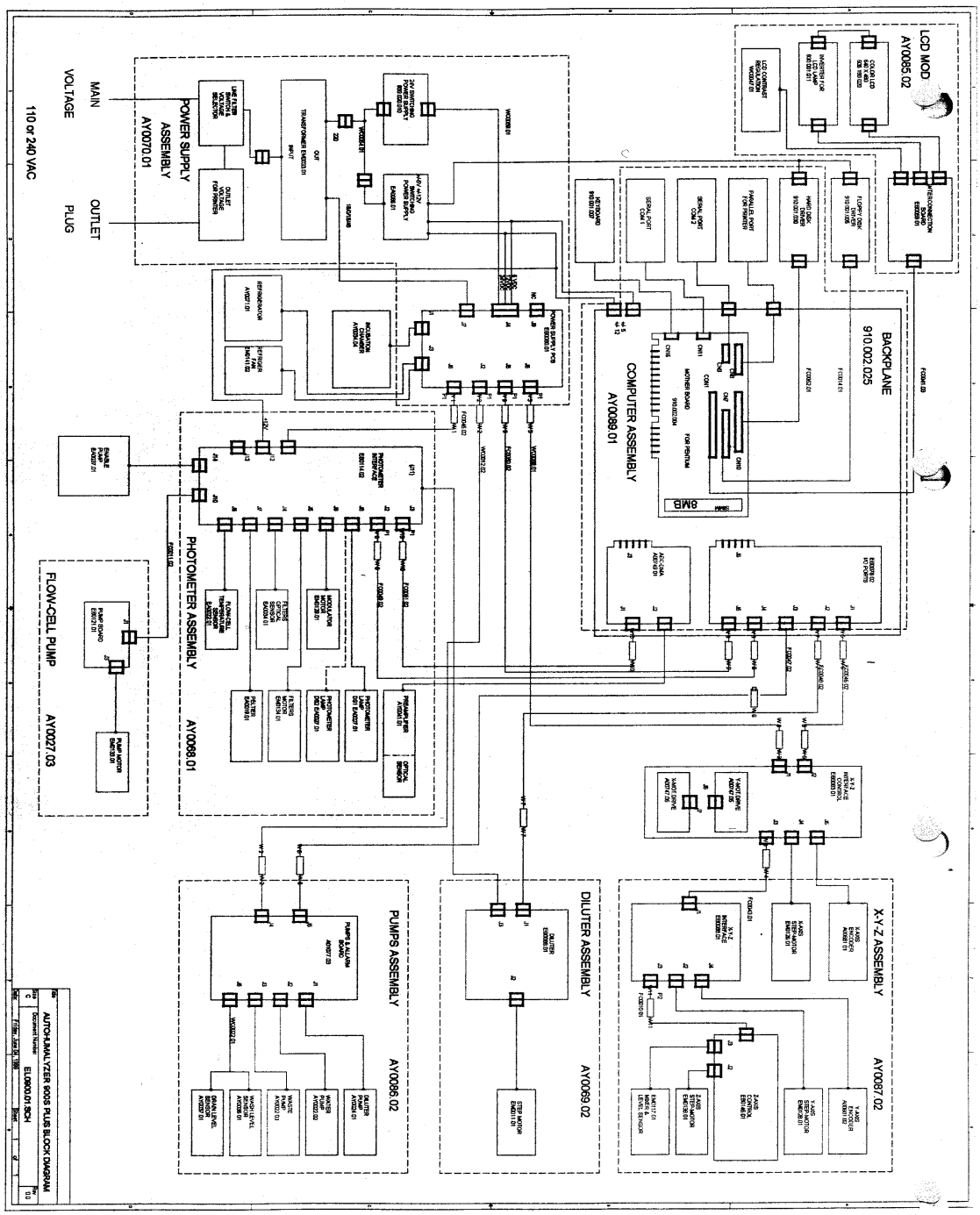
5) Exit carry out the mechanical reset and the errors message will be displayed

2. OVERALL BLOCK DIAGRAM

Diagram EL0900.01.SCH

2.1. TECHNICAL DESCRIPTION

The BLOCK DIAGRAM of the analyzer is basic for any information necessary on any part of the system. It includes all the interconnections between the various modules and PC boards that are indicated graphically in this layout.



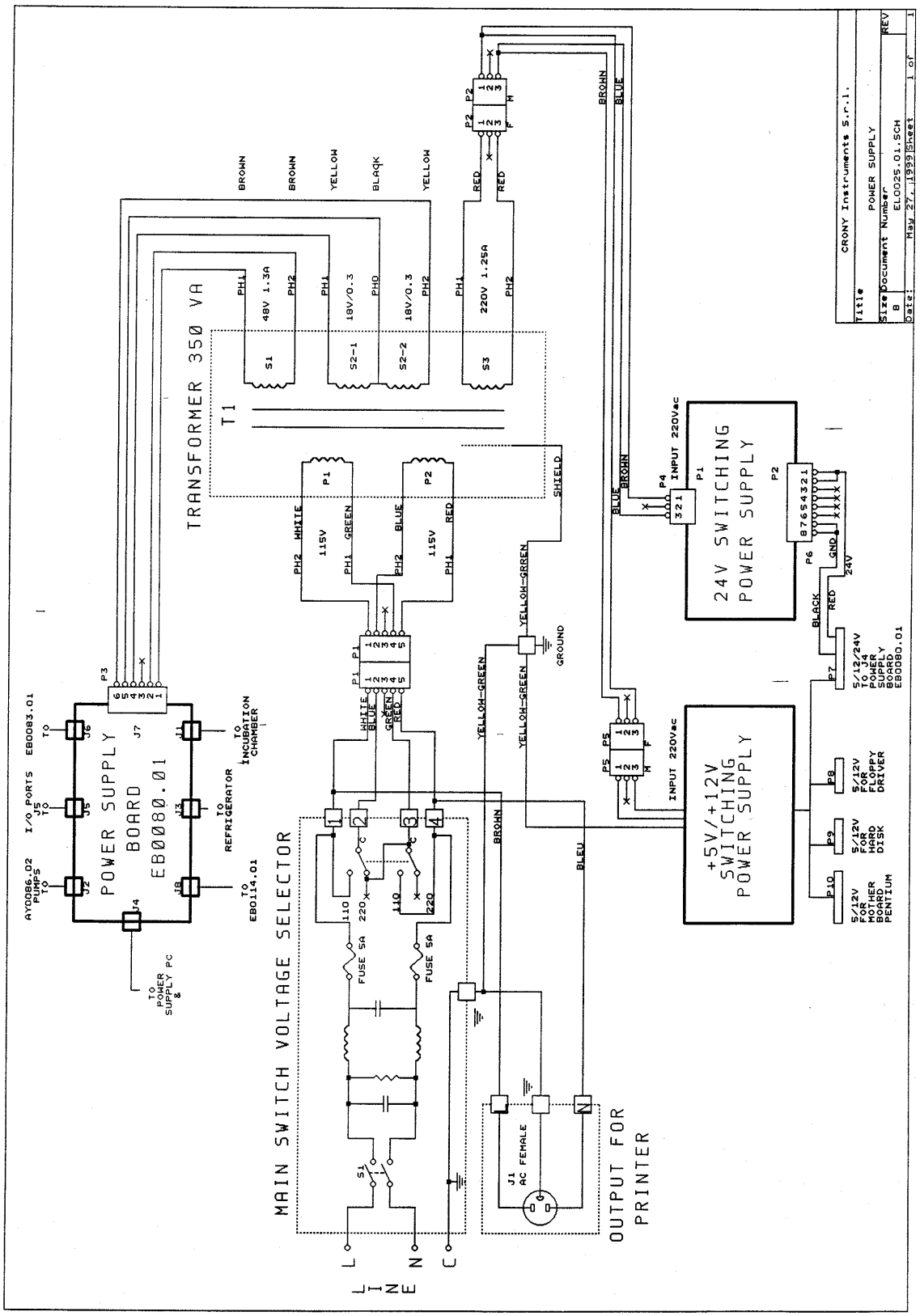
3A. POWER SUPPLY 17810/12

Schematical diagram EL0025.01.SCH

3A.1. TECHNICAL DESCRIPTION

This circuit shows the interconnections between the different modules inside the power supply assembly.

17820/2	24V/65 W Power Supply
17810/9	5V/12V Power Supply
17810/11	Transformer 350 VA
17810/10	Power Supply Board

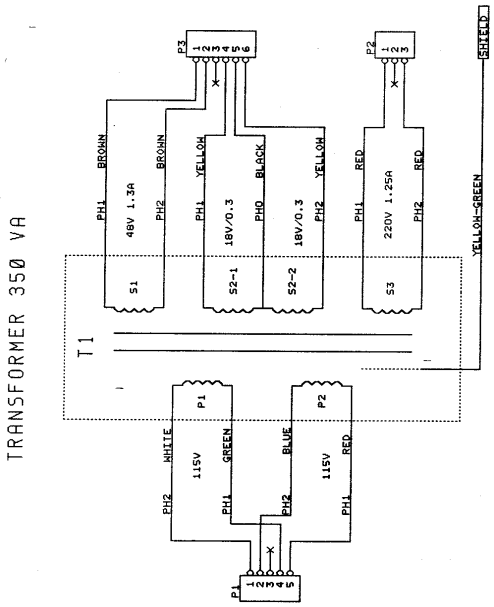

CRONY Instruments S.r.l.
Title
POWER SUPPLY
Size
B
Document Number
EL0025.01.SCH
REV
Date:
May 27, 1999
Sheet
1 of
TRANSFORMER 350 VA
T1
S1
48V 1.3A
S2-1
18V/0.3
S2-2
18V/0.3
S3
220V 1.25A
BROWN
YELLOW
BLACK
RED
WHITE
GREEN
BLUE
SHIELD
YELLOW-GREEN
GROUND
BLEU
INPUT 220Vac
24V SWITCHING POWER SUPPLY
+5V/+12V SWITCHING POWER SUPPLY
MAIN SWITCH VOLTAGE SELECTOR
FUSE 5A
OUTPUT FOR PRINTER
AC FEMALE
POWER SUPPLY BOARD EB0080.01
I/O PORTS EB0083.01
AY0086.02 PUMPS
TO INCUBATION CHAMBER
TO REFRIGERATOR
TO EB0114.01
TO POWER SUPPLY PC
5/12V FOR MOTHER BOARD PENTIUM
5/12V FOR HARD DISK
5/12V FOR FLOPPY DRIVER
5/12/24V TO J4 POWER SUPPLY BOARD EB0080.01
24V
GND
LINE
L
N
C

3B. TRANSFORMER 17810/11

Schematical diagram EM0033.01.SCH

3B.1. TECHNICAL DESCRIPTION

This diagram shows the AC voltages generated from the secondary coils of the transformer.



3C POWER SUPPLY BOARD 17810/10

Schematicals diagrams EB0080.11-21-31.SCH

3C.1. TECHNICAL DESCRIPTION

THE FUNCTION OF THIS PC BOARD IS :
-to transform the AC voltages of the transformer T1 into DC voltages, filtered and/or stabilised, necessary to power the electronic and electromechanical circuits of the analyzer.

-to control the temperature selection and stability of the flow -cell as well as the incubation chamber and the refrigerator module.

-to generate a very stable voltage to power the halogen lamp.

THIS PC BOARD SUPPLIES:
+15 VDC/-15 VDC stabilised voltages to feed the analogical circuitry and to control the temperatures both in the flow-cell as well as the incubation chamber.

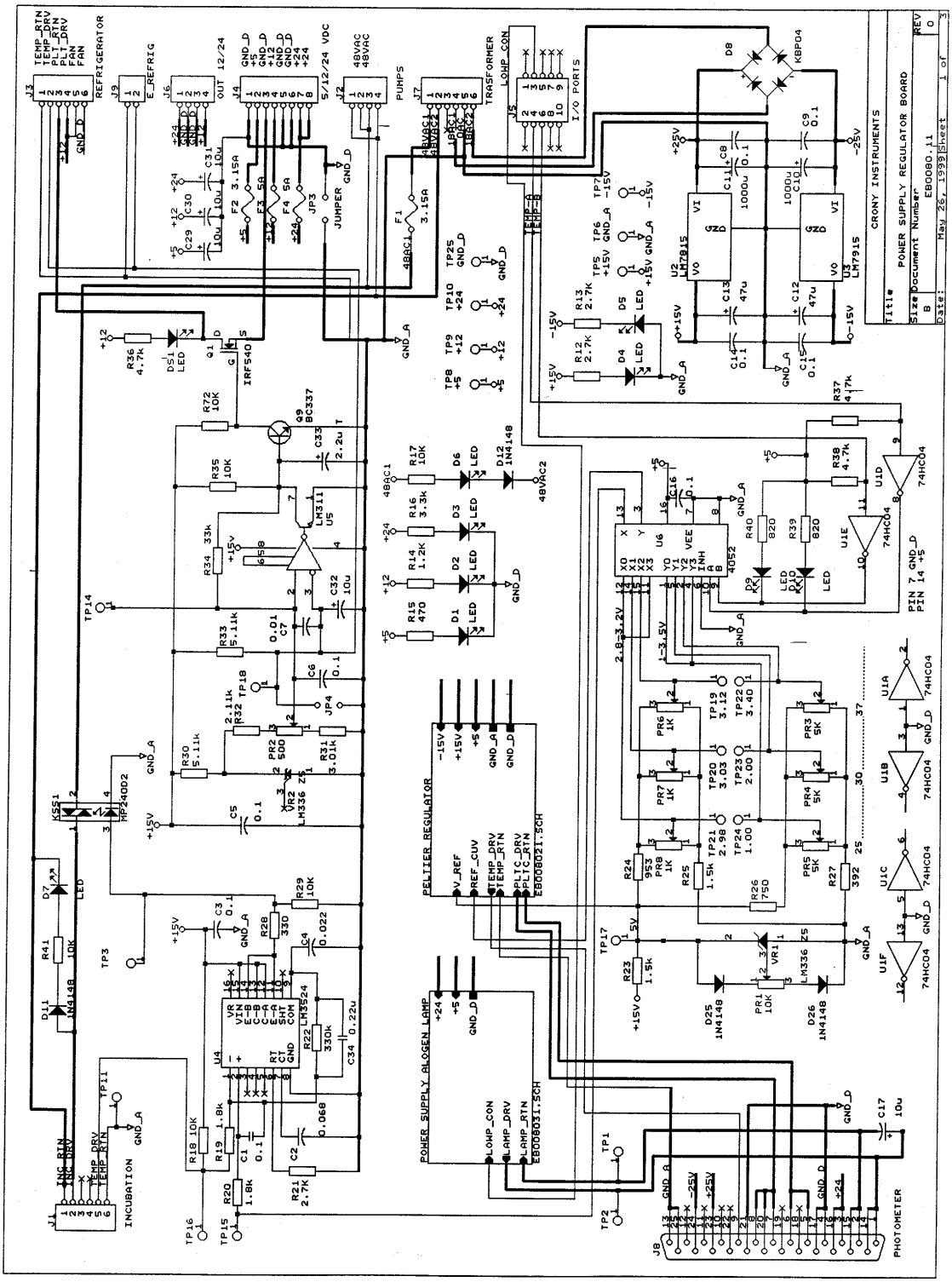
+25 VDC/-25 VDC non stabilised voltages to generate the necessary +15VDC and -15VDC for the analogical circuits of ADC-DMA and PREAMPLIFIER PC boards

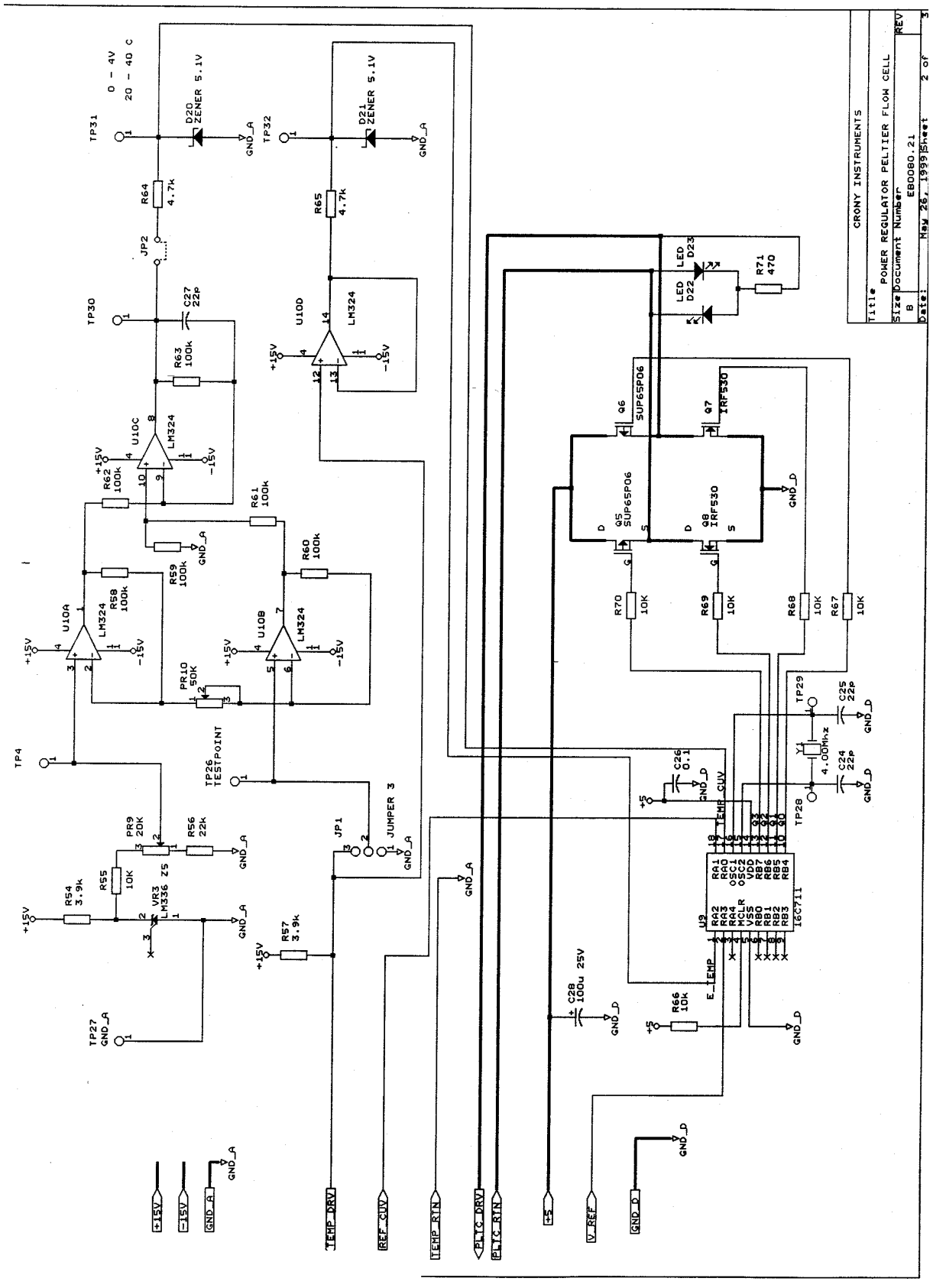
+5.9 VDC stabilised voltage for the photometer lamp.

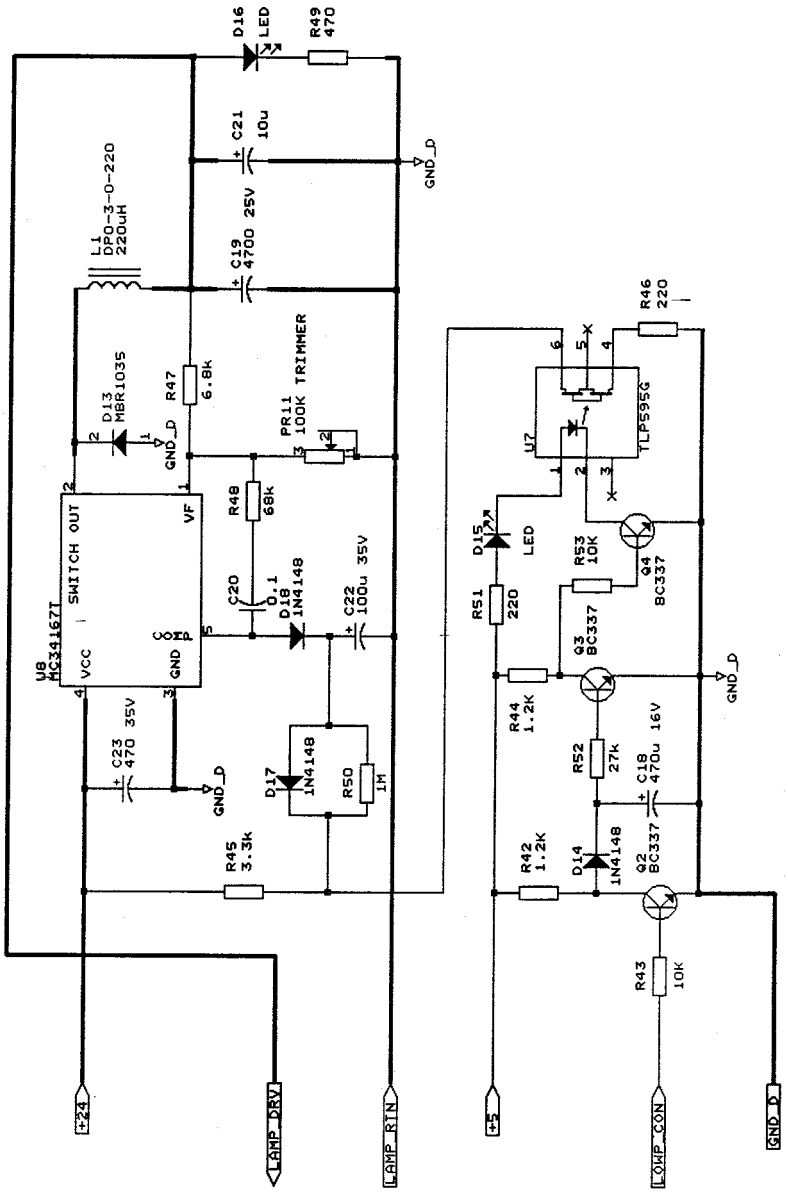
+24 VDC stabilised voltage to feed the following:
- -step motor to drive the X-axis
- -step motor to drive the Y-axis
- -step motor to drive the Diluter

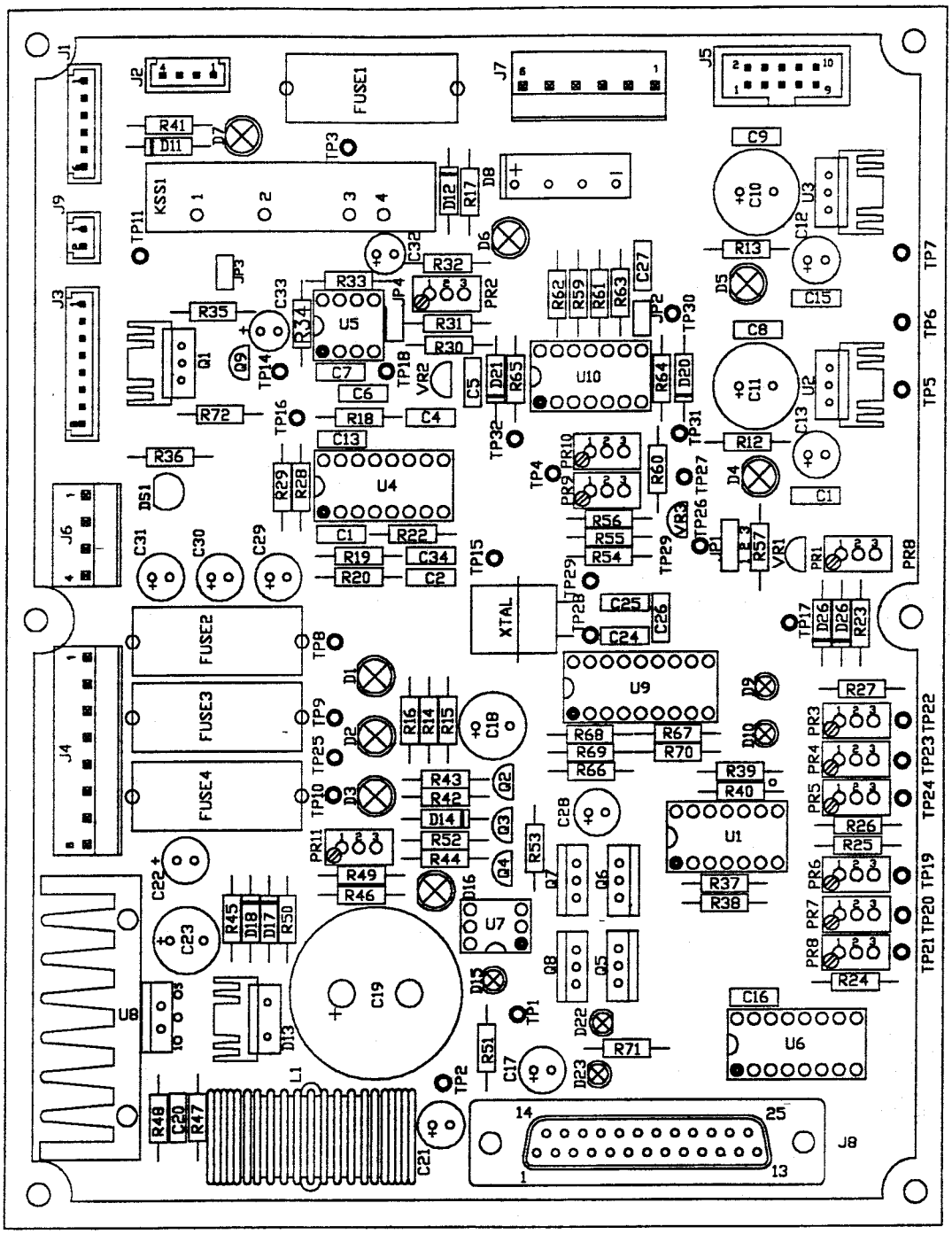
48 Vac Alternate voltage to feed :
- -the synchronous motors of the Pumps assembly
- -the incubation chamber heater

The circuitry also includes **+5 Vdc, +12Vdc and +24Vdc** taken from two switching power supplies.




CRONY INSTRUMENTS
Title
POWER REGULATOR PELTIER FLOW CELL
Size B
Document Number EB0080.21
REV
Date: May 26, 1999 Sheet 2 of 3
TP31
0 - 4V
20 - 40 C
D20 ZENER 5.1V
D21 ZENER 5.1V
TP32
R64 4.7k
R65 4.7k
JP2
TP30
C27 22p
R63 100k
U10D LM324
U10C LM324
R62 100k
R61 100k
R60 100k
R59 100k
R58 100k
U10A LM324
U10B LM324
PR10 50K
TP4
TP26 TESTPOINT
JUMPER 3
JP1
PR9 20K
R56 22k
R54 3.9k
R55 10K
VR3 LM336 Z5
R57 3.9k
TP27
LED D22
LED D23
R71 470
Q6 SUP65P06
Q7 IRF530
Q5 SUP65P06
Q8 IRF530
R70 10K
R69 10K
R68 10K
R67 10K
TP29
C25 22p
Y1 4.00MHz
C24 22p
TP28
C26 0.1
U9 16C711
C28 100u 25V
R66 10K
E_TEMP
+15V
-15V
GND_A
GND_D
+5
TEMP_DRV
REF_CUV
TEMP_RIN
PLTC_DRV
PLTC_RIN
V_REF


D16
LED
R49
470
C21
10u
GND_D
L1
DP0-3-0-220
220uH
C19
470u 25V
R46
220
D13
MBR1035
R47
6.8k
GND_D
PR11
100K TRIMMER
U7
TLP595G
U8
HC34167T
SWITCH OUT
VCC
GND
VF
R48
68k
C20
0.1
D18
1N4148
C22
100u 35V
D15
LED
R53
10K
Q4
BC337
R51
220
Q3
BC337
GND_D
C23
470 35V
GND_D
D17
1N4148
R50
1M
R44
1.2K
R52
27K
C18
470u 16V
R45
3.3K
R42
1.2K
D14
1N4148
Q2
BC337
R43
10K
+24
LAMP_DRV
LAMP_RTN
+5
LAMP_CON
GND_D


J1
J2
FUSE1
J7
J5
R41
D11
D7
TP3
C9
C10
U3
KSS1
TP11
J9
D12
R17
D8
C12
C32
D6
R13
C15
JP3
R33
R32
JP4
PR2
R62
R59
R61
R63
C27
D5
J3
R35
C33
R34
U5
R31
JP2
TP30
C8
Q1
Q9
TP14
R30
C7
TP18
VR2
U10
R64
D20
C11
U2
C5
D21
R65
C6
R72
TP16
R18
C4
TP32
C13
TP31
R12
R36
TP4
PR10
R60
D4
C1
R29
R28
U4
PR9
TP27
DS1
R56
VR3
J6
R55
TP26
R22
TP29
R57
VR1
PR1
PR8
C31
C30
C29
R19
C34
TP15
R54
R20
C2
XTAL
C25
TP28
C26
TP17
D26
D26
R23
TP8
FUSE2
D1
U9
D9
R27
TP9
R16
R14
R15
C18
R68
R67
PR3
FUSE3
D2
R69
R70
D10
TP25
PR4
J4
R43
Q2
R66
R39
TP10
D3
R42
R40
PR5
FUSE4
D14
Q3
C28
U1
R26
R52
R53
R25
PR11
R44
Q4
Q7
Q6
R37
PR6
C22
R49
D16
R38
R46
U7
PR7
R45
D18
D17
R50
Q8
Q5
PR8
C23
C19
U8
D13
TP1
C16
R24
D22
R71
U6
TP21 TP20 TP19
TP2
R51
C17
D23
L1
14
25
R48
C20
R47
C21
J8
1
13
TP7
TP6
TP5
TP24 TP23 TP22

3D. INCUBATION CHAMBER 18840/2

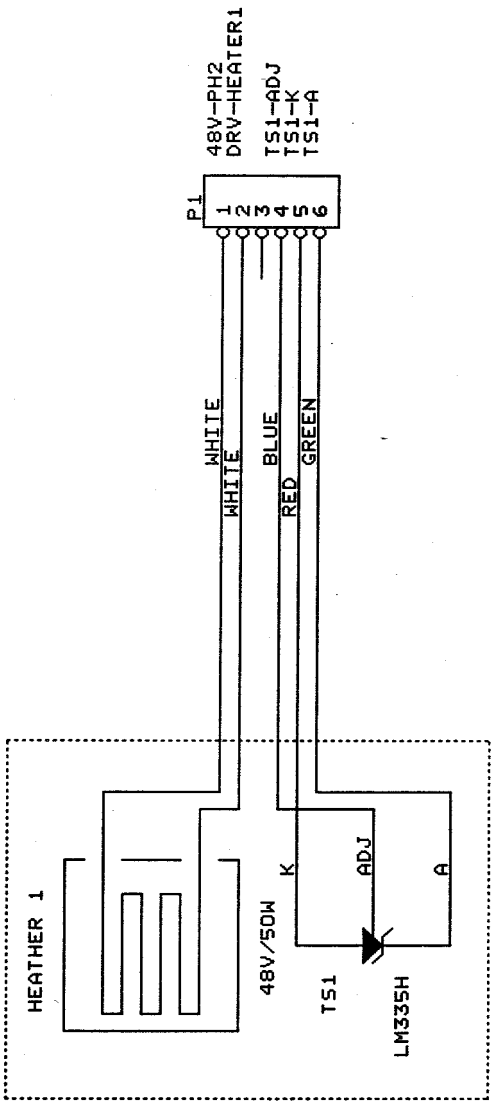
Schematical diagram A00505.01.SCH

3D.1. TECHNICAL DESCRIPTION

The function of this circuit is:

-To warm the incubation chamber by means an electrical heater

-To provide a voltage level proportional to the incubation chamber temperature



3E. REAGENT REFRIGERATOR **17840/5 complete modul**
17840/6 thermometer and peltier

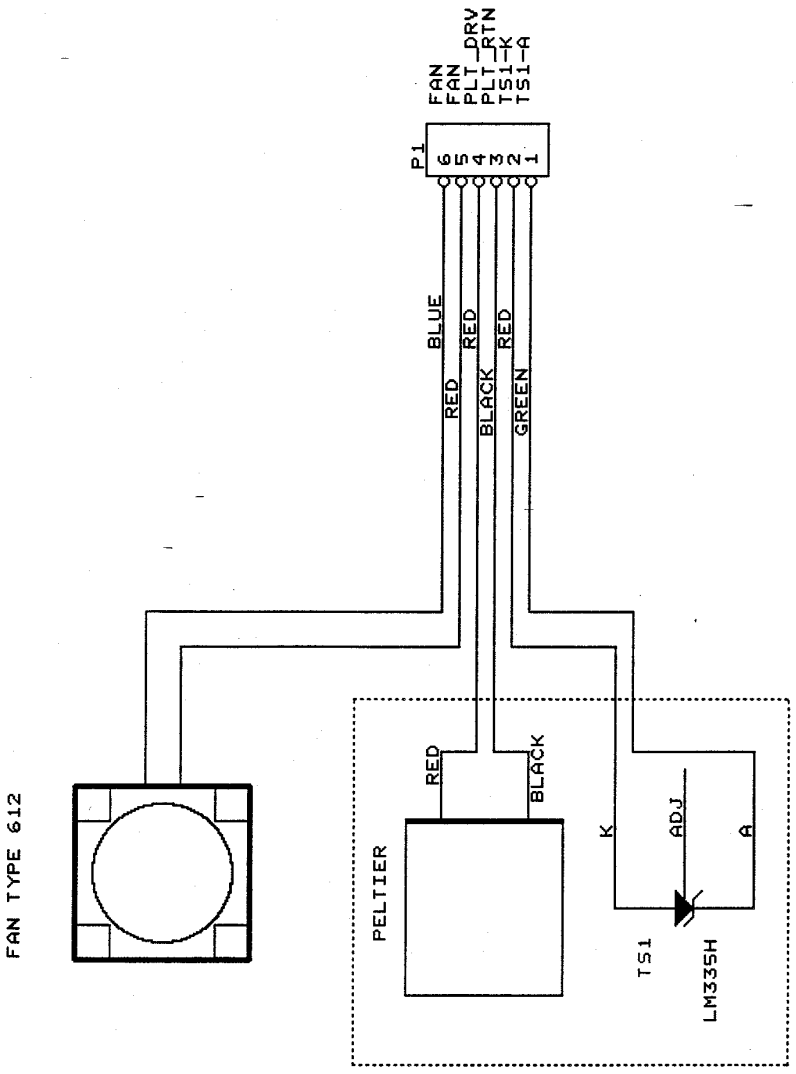
Schematical diagram EA0059.01

3E.1. TECHNICAL DESCRIPTION

The function of this circuit is:

- to cool the refrigerator module by means a Peltier device.

- to provide a voltage level proportional to the refrigerator module temperature.



4A. PHOTOMETER INTERFACE 18810/9

Schematical diagram EB0114.02.SCH

4A.1. TECHNICAL DESCRIPTION

The function of this P.C. Board is:

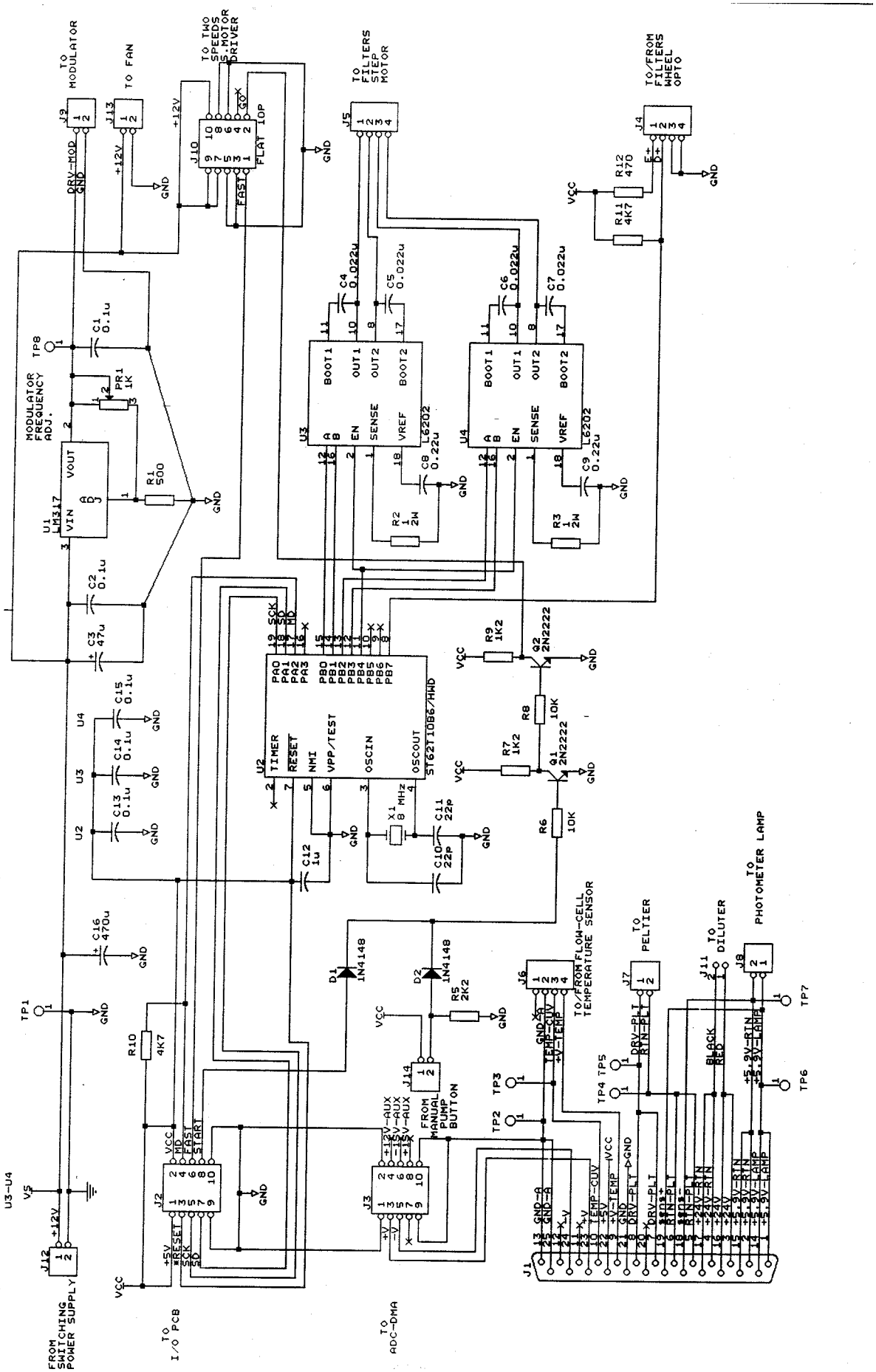
-To control the interference filters selection

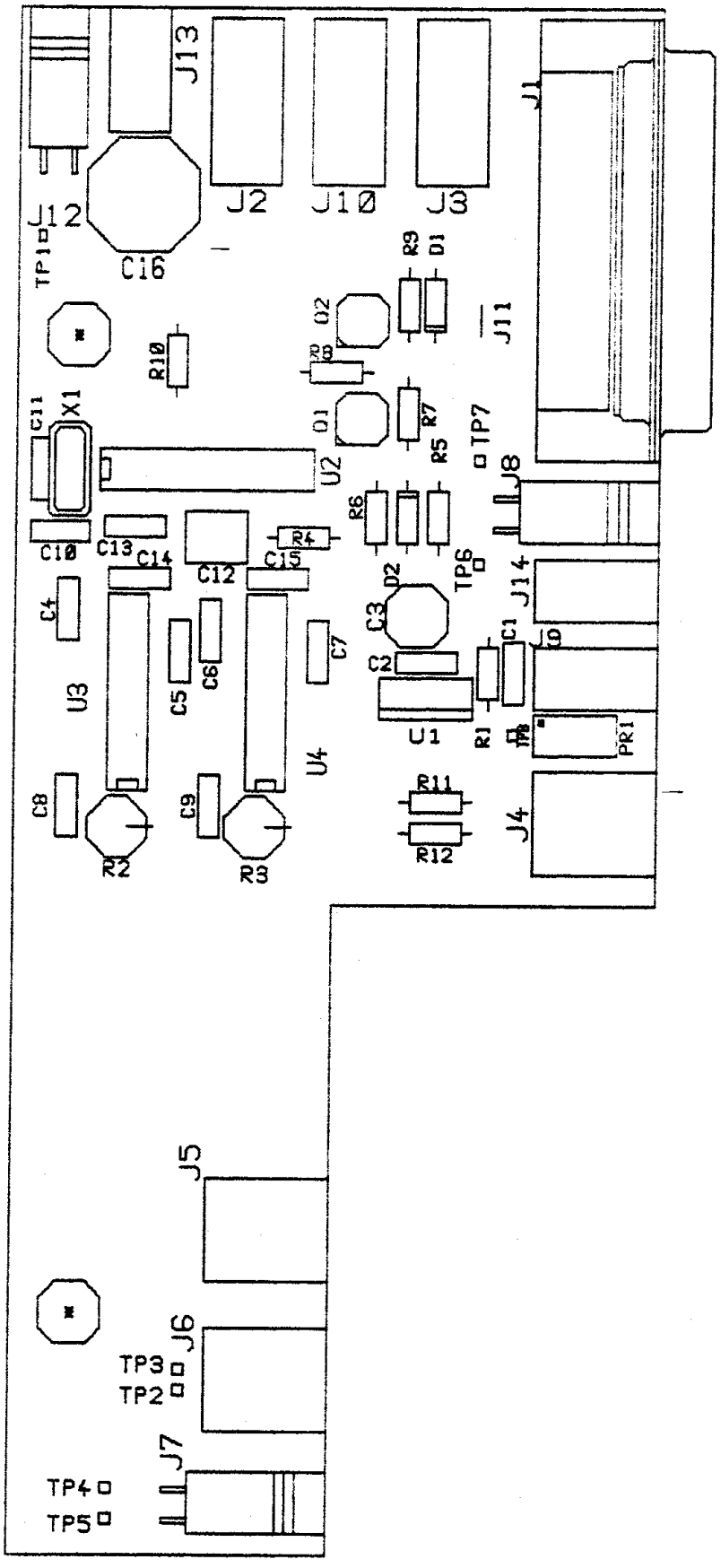
-To interface the photometer lamp

-To interface the flow-cell peristaltic pump

-To regulate the speed of the chopper wheel

-To supply the power to the analogical circuits of the ADC-DMA PC board


TO MODULATOR
TO FAN
TO TWO SPEEDS S.MOTOR DRIVER
TO FILTERS STEP MOTOR
TO/FROM FILTERS WHEEL OPTO
MODULATOR FREQUENCY ADJ.
TO PELTIER
TO DILUTER
TO PHOTOMETER LAMP
TO/FROM FLOW-CELL TEMPERATURE SENSOR
FROM MANUAL PUMP BUTTON
FROM SWITCHING POWER SUPPLY
TO I/O PCB
TO ADC-DMA
L6202
ST62T10B6/HWD
1N4148
2N2222
LM317

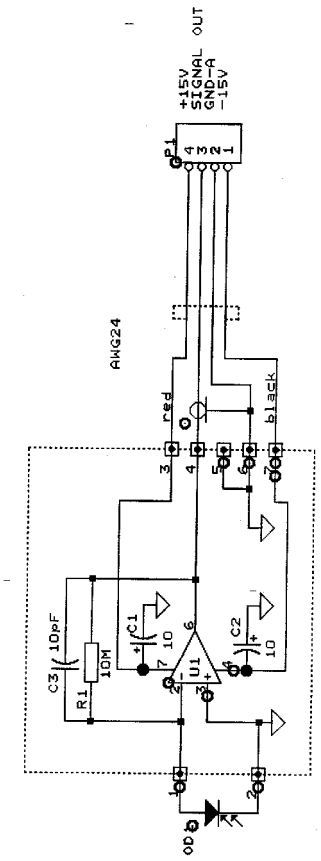

J13
J1
J2
J10
J3
J12
TP1
C16
R9
D1
D2
R10
R8
J11
X1
C11
D1
R7
TP7
U2
R5
J8
R6
C10
C13
C14
C12
C15
R4
TP6
J14
C4
D2
C3
C1
J9
C5
C6
C7
C2
U3
U1
R1
PR1
U4
C8
C9
R11
R12
J4
R2
R3
J5
J6
TP3
TP2
J7
TP4
TP5

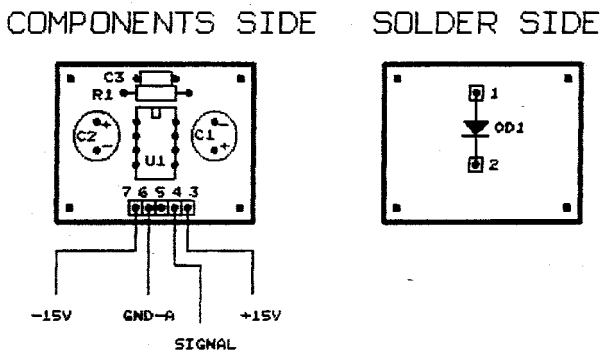
4B PREAMPLIFIER 18720/29

Schematical diagram A00513.01.SCH

4B.1. TECHNICAL DESCRIPTION

The function of this P.C. Board is to convert the current generated by the photodiode, proportional to the light intensity, into a sinusoidal waveform of variable amplitude.





Schematicals diagrams A00749.11-21.SCH

5.1. TECHNICAL DESCRIPTION

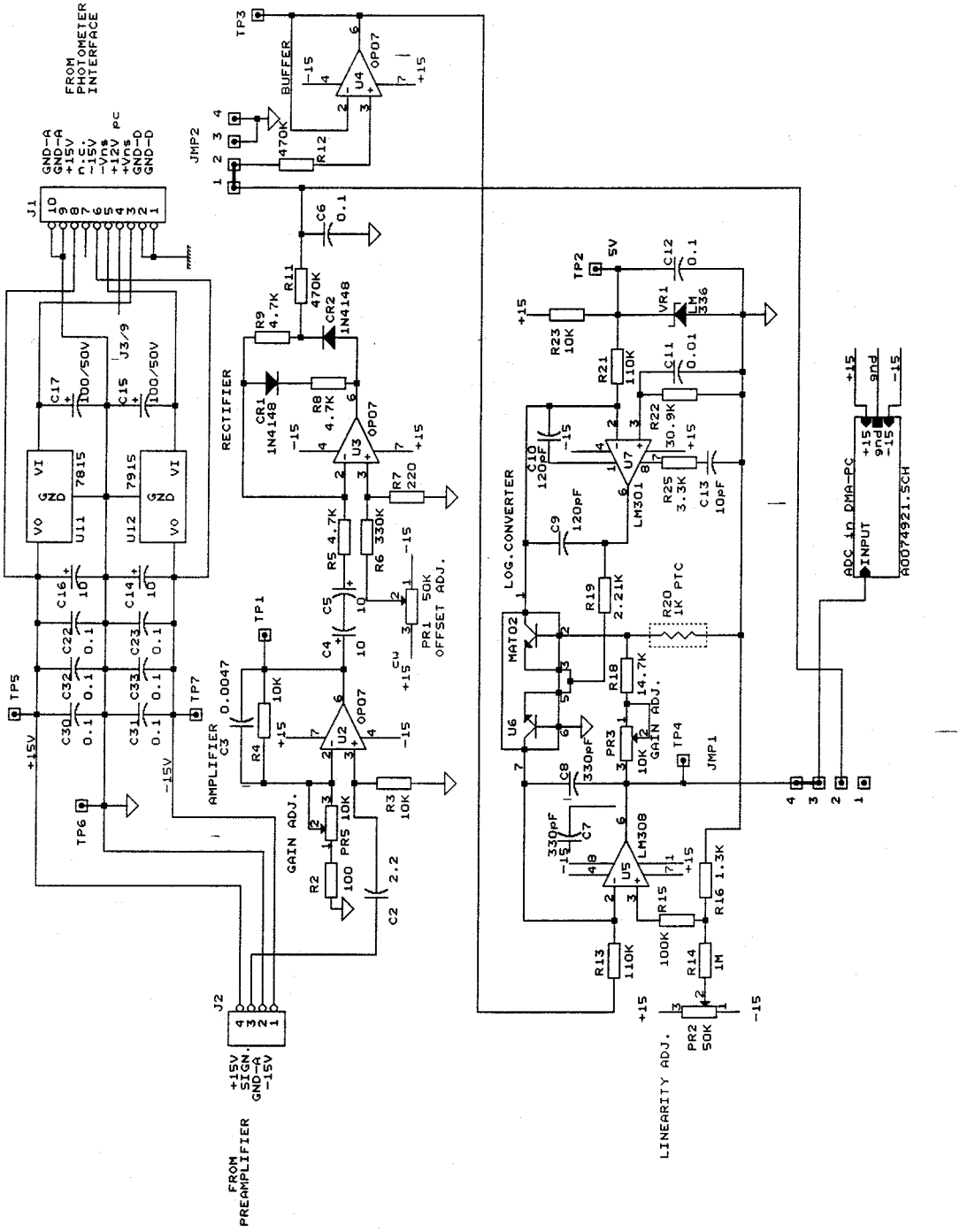
The function of this PC board is:

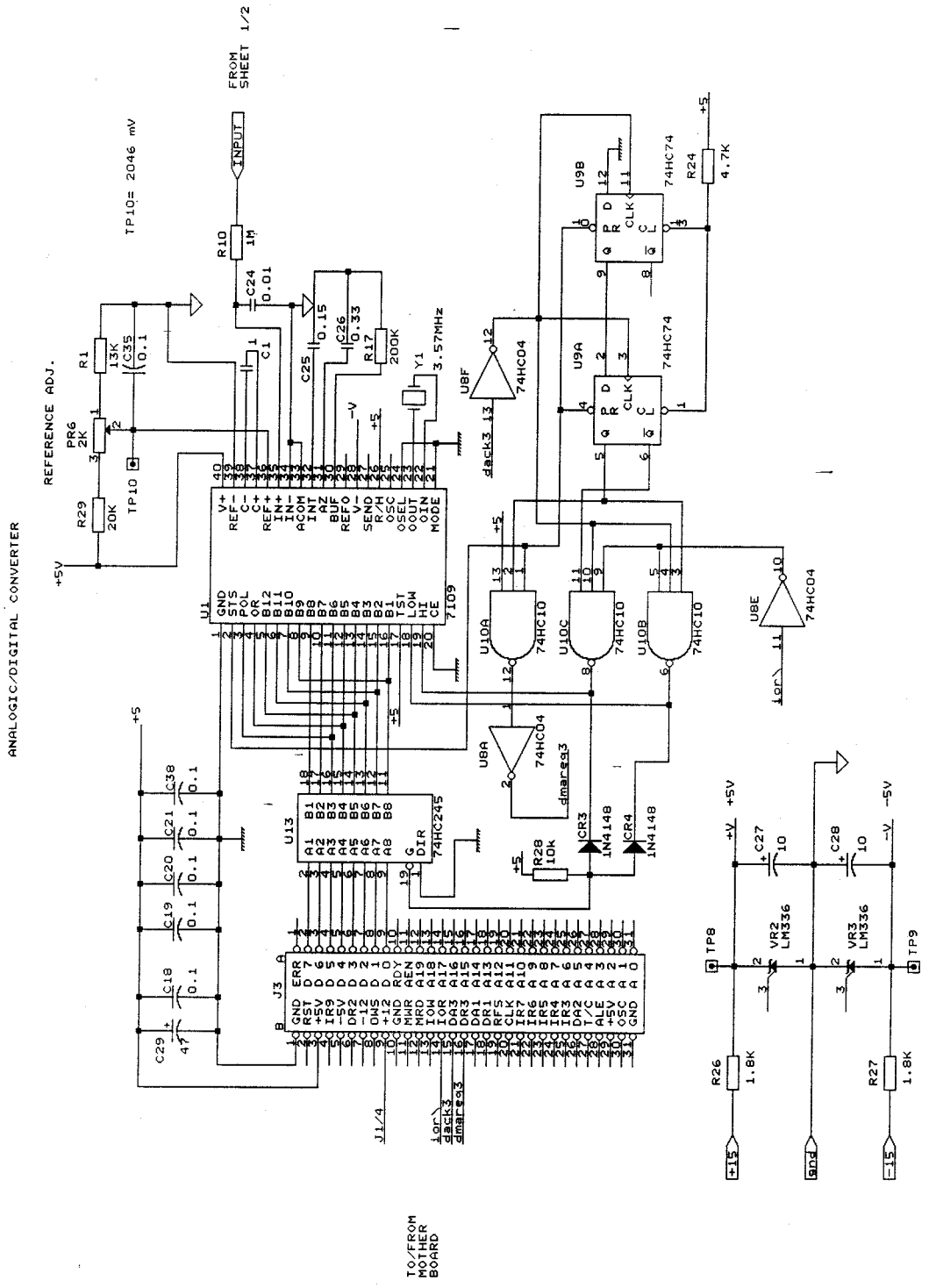
-To amplify the sinusoidal signal coming from the preamplifier

-To convert the sinusoidal signal into DC signal

-To calculate analogically the logarithm of the DC value

-To convert the analogical signal into digital


FROM PHOTOMETER INTERFACE
GND-A
GND-A
+15V
n.c.
-15V
-Vns
+12V
+Vns
GND-D
GND-D
J1
JMP2
TP3
BUFFER
U4
OP07
470K
R12
C6
0.1
R11
470K
R9
4.7K
CR2
1N4148
CR1
1N4148
RECTIFIER
R8
4.7K
U3
OP07
R7
220
R5
4.7K
R6
330K
C5
10
PR1
50K
OFFSET ADJ.
TP1
C4
10
U2
OP07
R4
10K
C3
0.0047
AMPLIFIER
GAIN ADJ.
PR5
10K
R2
100
C2
2.2
R3
10K
TP5
TP6
TP7
+15V
-15V
C30
0.1
C31
0.1
C32
0.1
C33
0.1
C22
0.1
C23
0.1
C16
10
C14
10
C17
100/50V
C15
100/50V
J3/9
U11
7815
U12
7915
J2
+15V
SIG.
GND-A
-15V
FROM PREAMPLIFIER
TP2
5V
C12
0.1
VR1
LM 336
R23
10K
R21
110K
C11
0.01
R22
30.9K
C10
120pF
U7
LM301
R25
3.3K
C13
10pF
C9
120pF
LOG.CONVERTER
MAT02
R19
2.21K
R20
1K PTC
U6
R18
14.7K
PR3
10K
GAIN ADJ.
TP4
JMP1
C8
330pF
C7
330pF
U5
LM308
R15
100K
R16
1.3K
R13
110K
R14
1M
PR2
50K
LINEARITY ADJ.
ADC in DMA-PC
INPUT
A0074921.SCH


ANALOGIC/DIGITAL CONVERTER
REFERENCE ADJ.
TP10= 2046 mV
FROM SHEET 1/2
INPUT
TO/FROM MOTHER BOARD

6A. X-Y-Z INTERFACE CONTROL BOARD 18810/6

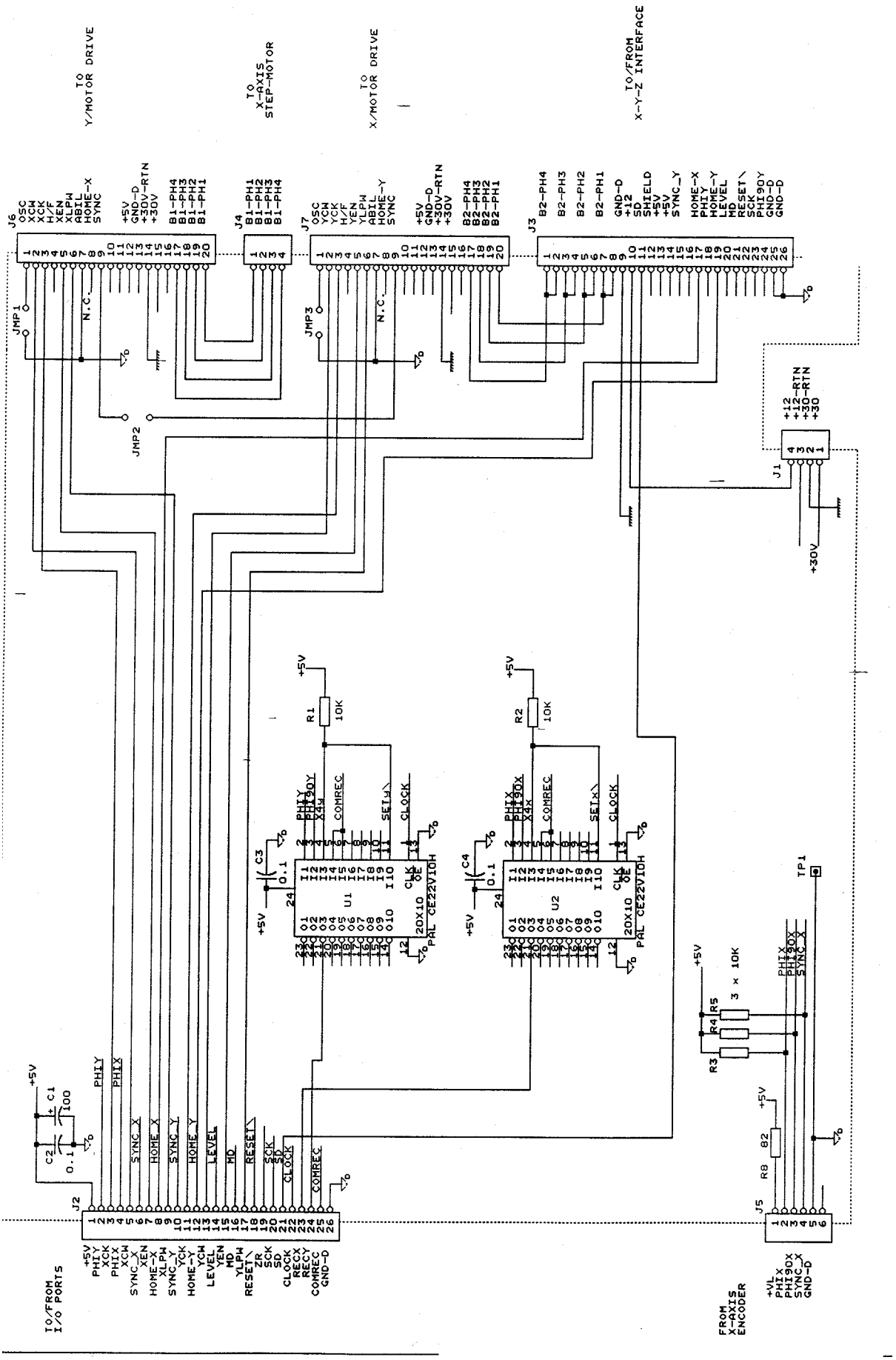
Schematical diagram EB0083.01.SCH

6A.1. TECHNICAL DESCRIPTION

The function of this PC board is:

-To interface the X-Y-Z axes movement with the I/O PC board

-To inform the computer that something has prevented
the regular X-Y axes movement


TO Y/MOTOR DRIVE
TO X-AXIS STEP-MOTOR
TO X/MOTOR DRIVE
TO/FROM X-Y-Z INTERFACE
J6
J4
J7
J3
JMP1
JMP2
JMP3
N.C.
J1
+12-RTN
+30-RTN
+30V
R1
R2
10K
C3
C4
0.1
U1
U2
PAL CE22V10H
20X10
CLOCK
R3
R4
R5
3 x 10K
TP1
R8
82
C1
100
C2
J2
J5
TO/FROM I/O PORTS
FROM X-AXIS ENCODER

6B. X-Y AXES STEP MOTOR DRIVE 18720/9

Schematical diagram A00747.05.SCH

6B.1. TECHNICAL DESCRIPTION

The function of this PCB is:

-To drive a step motor

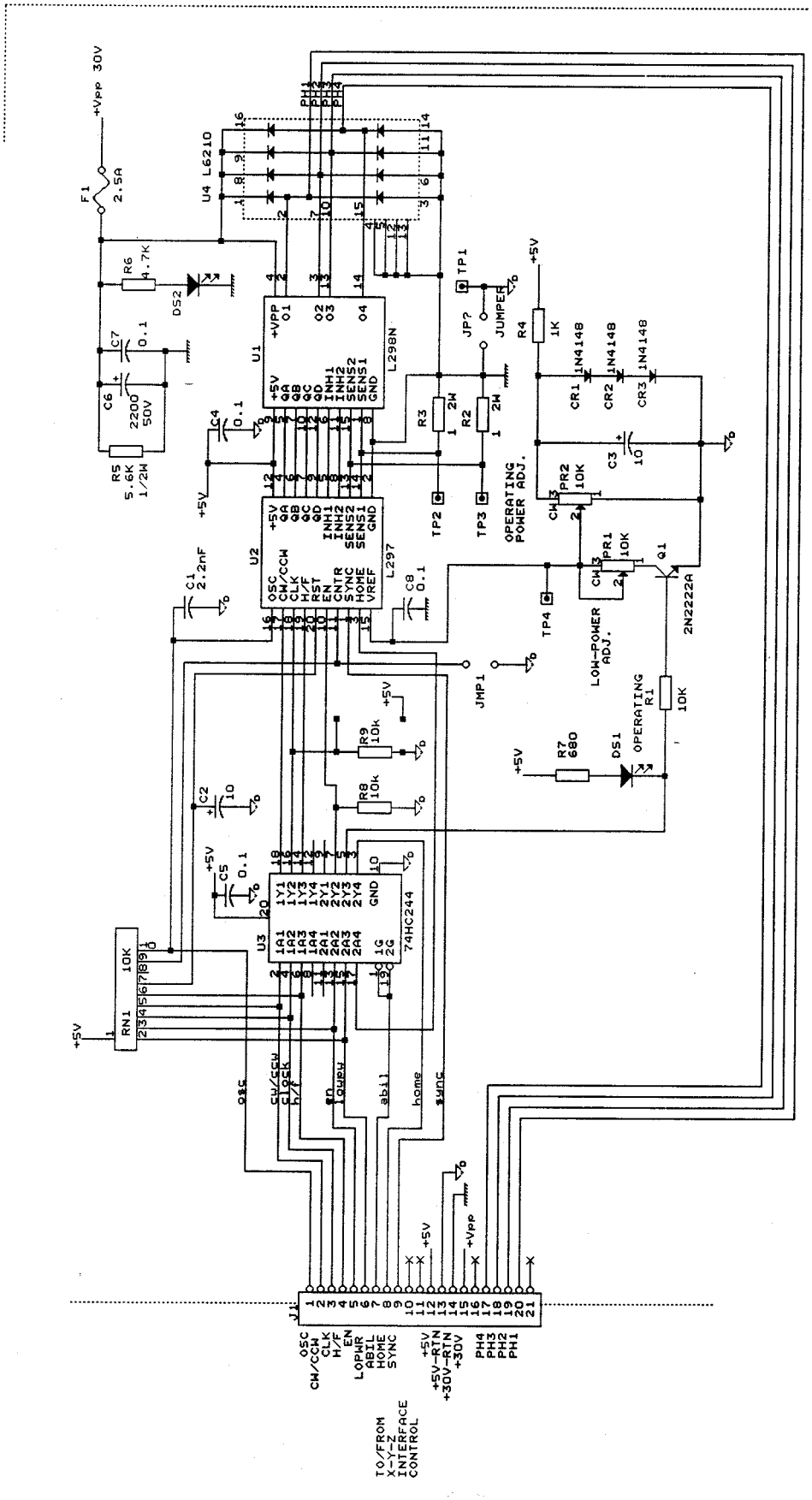
-To maintain the motor restrained during stand still

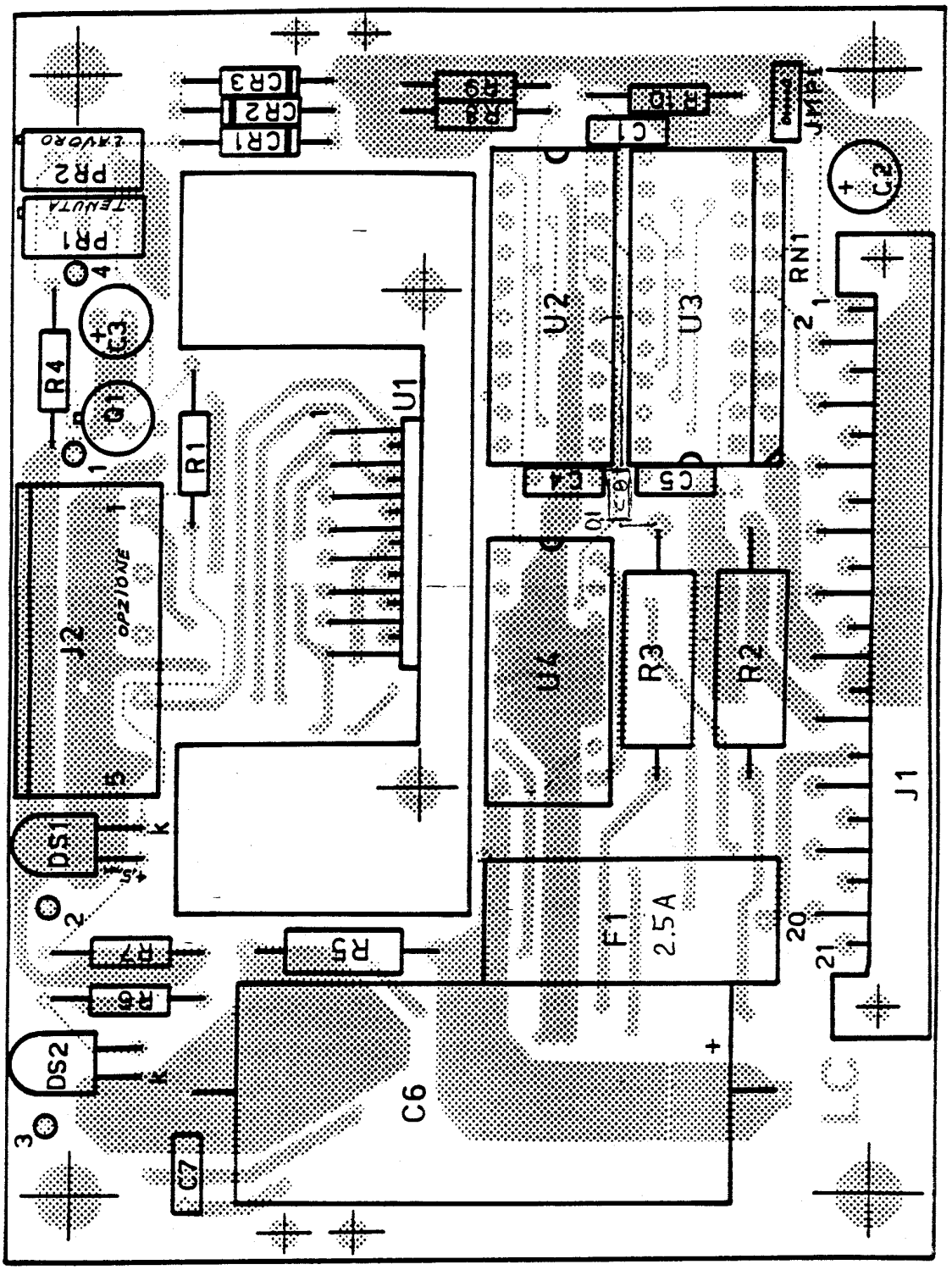
-To change the sense of rotation

-To move the motor in:

1) Whole step

2) Half step


+VPP 30V
F1
2.5A
U4 L6210
R6
4.7K
DS2
C7
0.1
C6
2200
50V
R5
5.6K
1/2W
U1
L298N
+VPP
+5V
QA
QB
QC
QD
INH1
INH2
SENS2
SENS1
GND
C4
0.1
+5V
U2
L297
OSC
CW/CCW
CLK
H/F
RST
EN
CNTR
SYNC
HOME
VREF
C1
2.2nF
C8
0.1
TP1
JP?
JUMPER
R4
1K
+5V
CR1
1N4148
CR2
1N4148
CR3
1N4148
C3
10
R3
1 2W
R2
1 2W
TP2
TP3
OPERATING
POWER ADJ.
PR2
10K
PR1
10K
Q1
2N2222A
TP4
LOW-POWER
ADJ.
JMP1
R1
10K
OPERATING
DS1
R7
680
R9
10k
R8
10k
C2
10
C5
0.1
U3
74HC244
1A1
1A2
1A3
1A4
2A1
2A2
2A3
2A4
1G
2G
1Y1
1Y2
1Y3
1Y4
2Y1
2Y2
2Y3
2Y4
GND
RN1
10K
CW/CCW
Clock
H/F
EN
LOPWR
ABIL
HOME
SYNC
+5V
+VPP
J1
OSC
CW/CCW
CLK
H/F
EN
LOPWR
ABIL
HOME
SYNC
+5V
+5V-RTN
+30V-RTN
+30V
PH4
PH3
PH2
PH1
TO/FROM
X-Y-Z
INTERFACE
CONTROL


CR3
CR2
CR1
R9
R8
C1
R10
JMP1
C2
PR2
TENSIONE
PR1
TENSIONE
R4
C3
Q1
R1
U1
U2
U3
RN1
C4
C5
Q2
U4
R3
R2
J2
OPZIONE
J1
DS1
R7
R6
R5
F1
2.5A
DS2
C6
C7

6C. X-Y AXES ENCODER PC BOARDS 18720/13

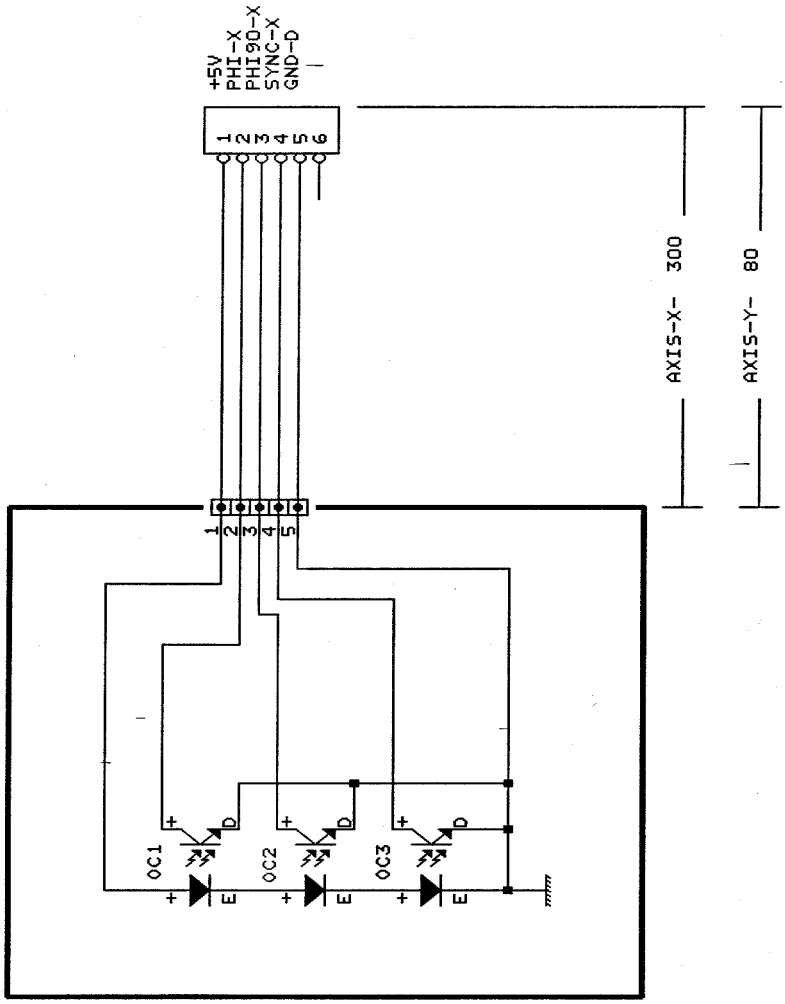
Schematical diagram A00681.01/02.SCH

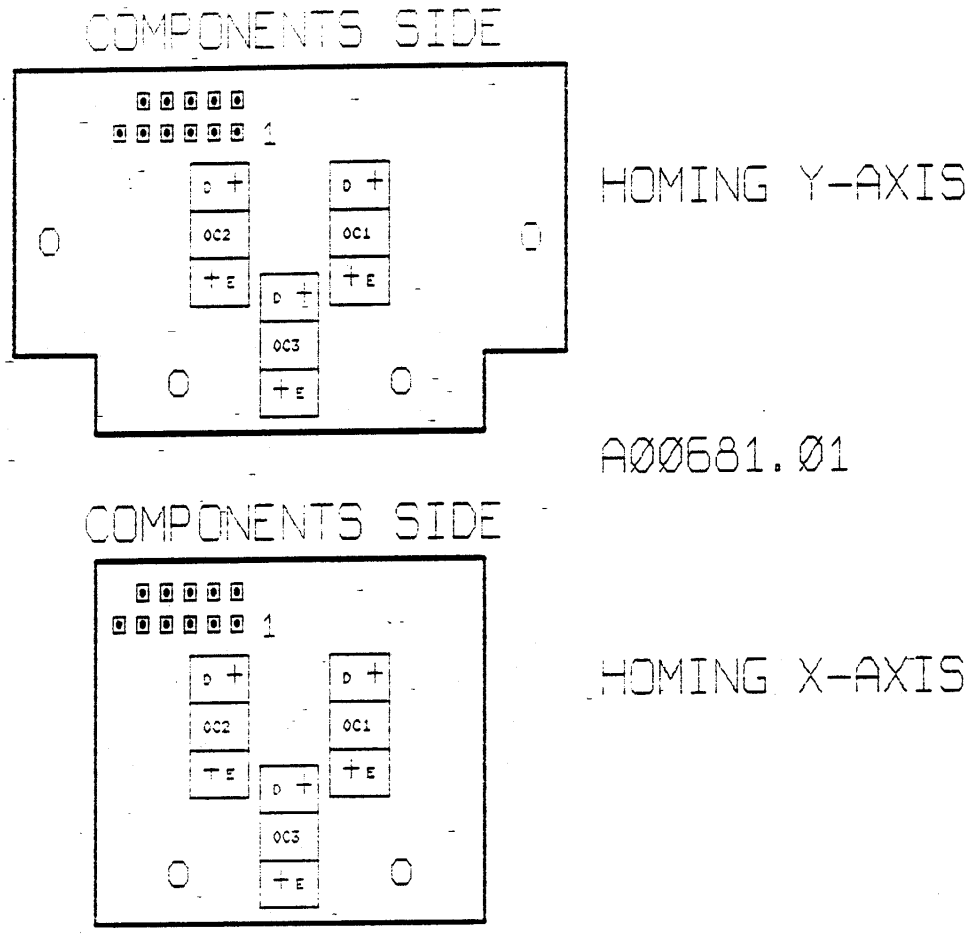
6C.1. TECHNICAL DESCRIPTION

The function of these PC boards is:

-To generate a synchronisation impulse at every turn of the step motor. The coincidence with the signal "HOMING" determines the mechanical zero of the X and the Y axes.

-To generate two square waves, out of phase between them by 90 degrees, consisting of 10 impulses for each turn of the step motor. These are needed to inform the computer if there has been and in which conditions a lost of steps.





7A. X-Y-Z INTERFACE **18810/7**

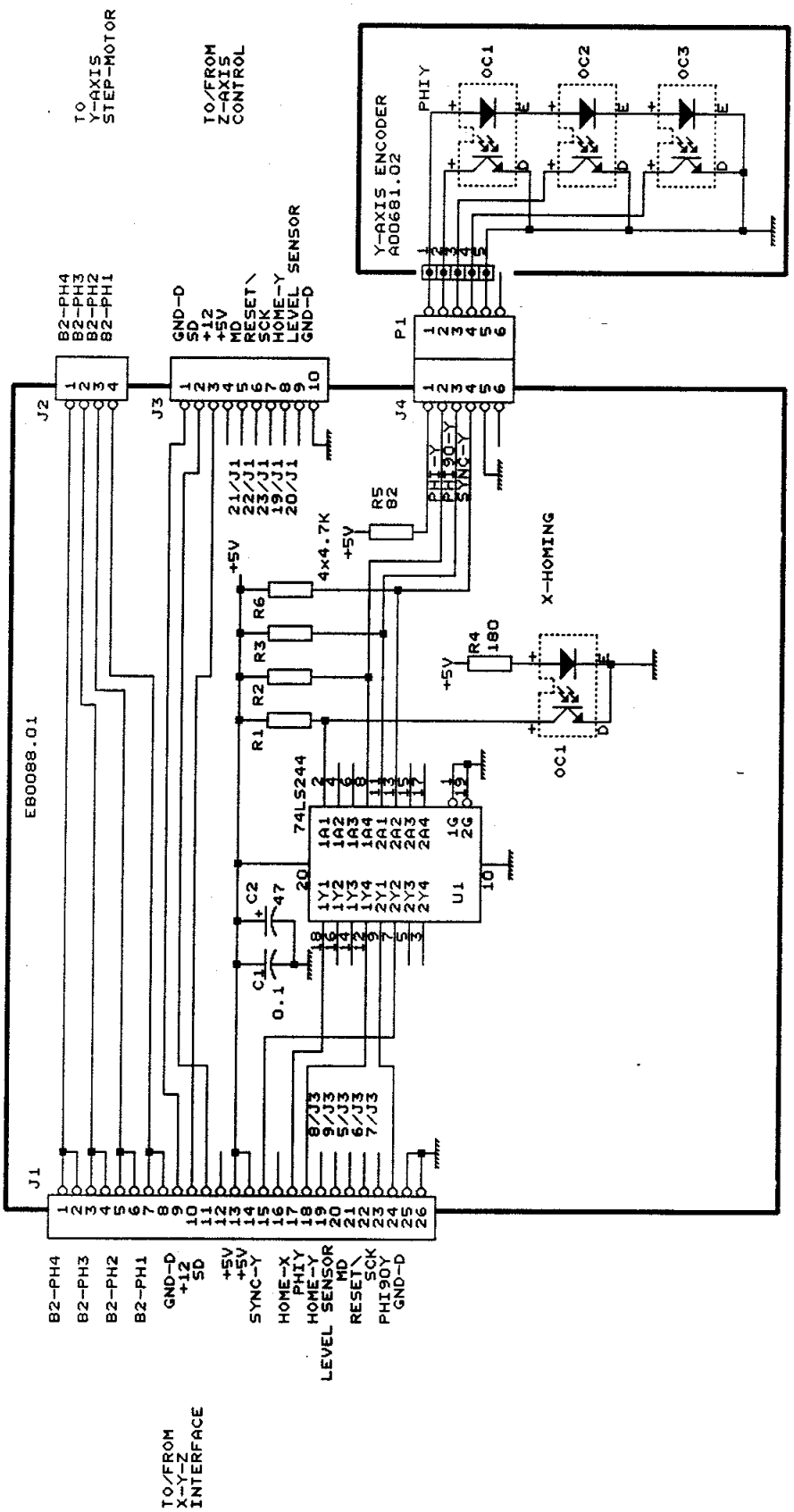
Schematical diagram EB0088.01.SCH

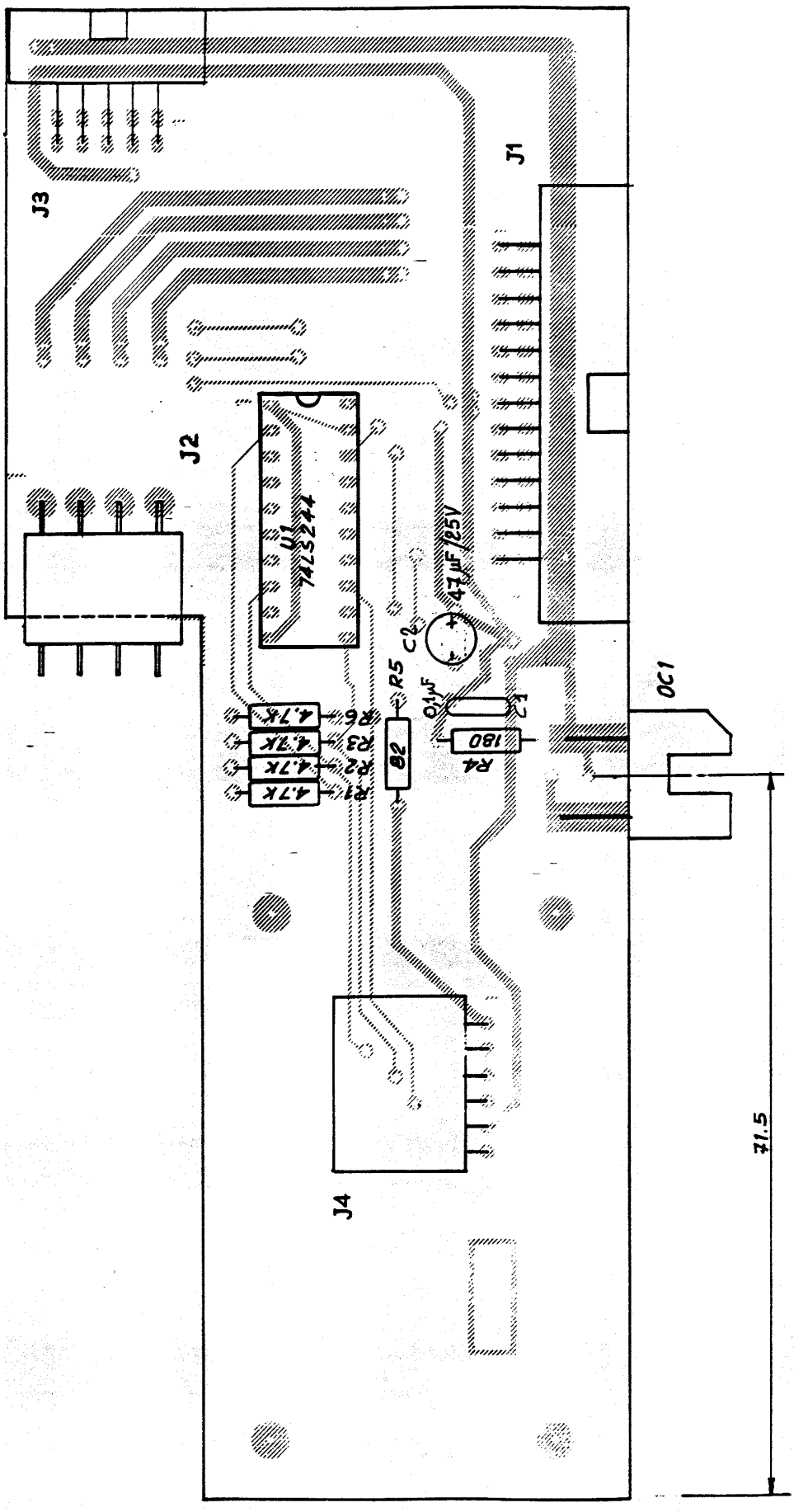
7A.1. TECHNICAL DESCRIPTION

The function of this PC board is:

-To interface the X-Y-Z movement with the PC board EB0083.01

-To generate the x-axis homing signal


TO
Y-AXIS
STEP-MOTOR
TO/FROM
Z-AXIS
CONTROL
Y-AXIS ENCODER
A00681.02
PHIY
OC1
OC2
OC3
B2-PH4
B2-PH3
B2-PH2
B2-PH1
GND-D
SD
+12
+5V
MD
RESET\
SCK
HOME-Y
LEVEL SENSOR
GND-D
P1
J2
J3
J4
J1
EB0088.01
R5
B2
4x4.7K
+5V
R6
R3
R2
R1
R4
180
X-HOMING
74LS244
U1
C2
47
C1
0.1
TO/FROM
X-Y-Z
INTERFACE
HOME-X
PHIY
SYNC-Y
PHI90Y


J1
J2
J3
J4
U1
74LS244
47µF/25V
C2
0.1µF
C1
R5
82
R6 4.7K
R3 4.7K
R2 4.7K
R1 4.7K
R4
180
OC1
71.5

7B. Z-AXIS CONTROL BOARD 18810/11

Schematical diagram EB0145.01.SCH

7B.1. TECHNICAL DESCRIPTION

The function of this PC board is :

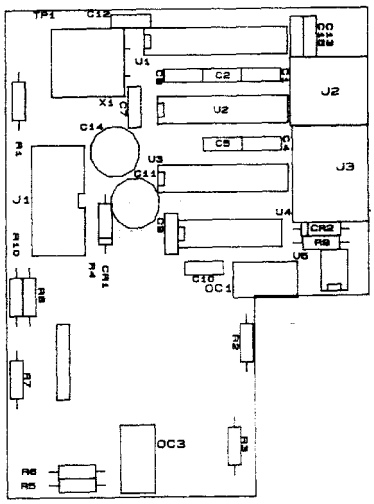
-To drive the mixer motor

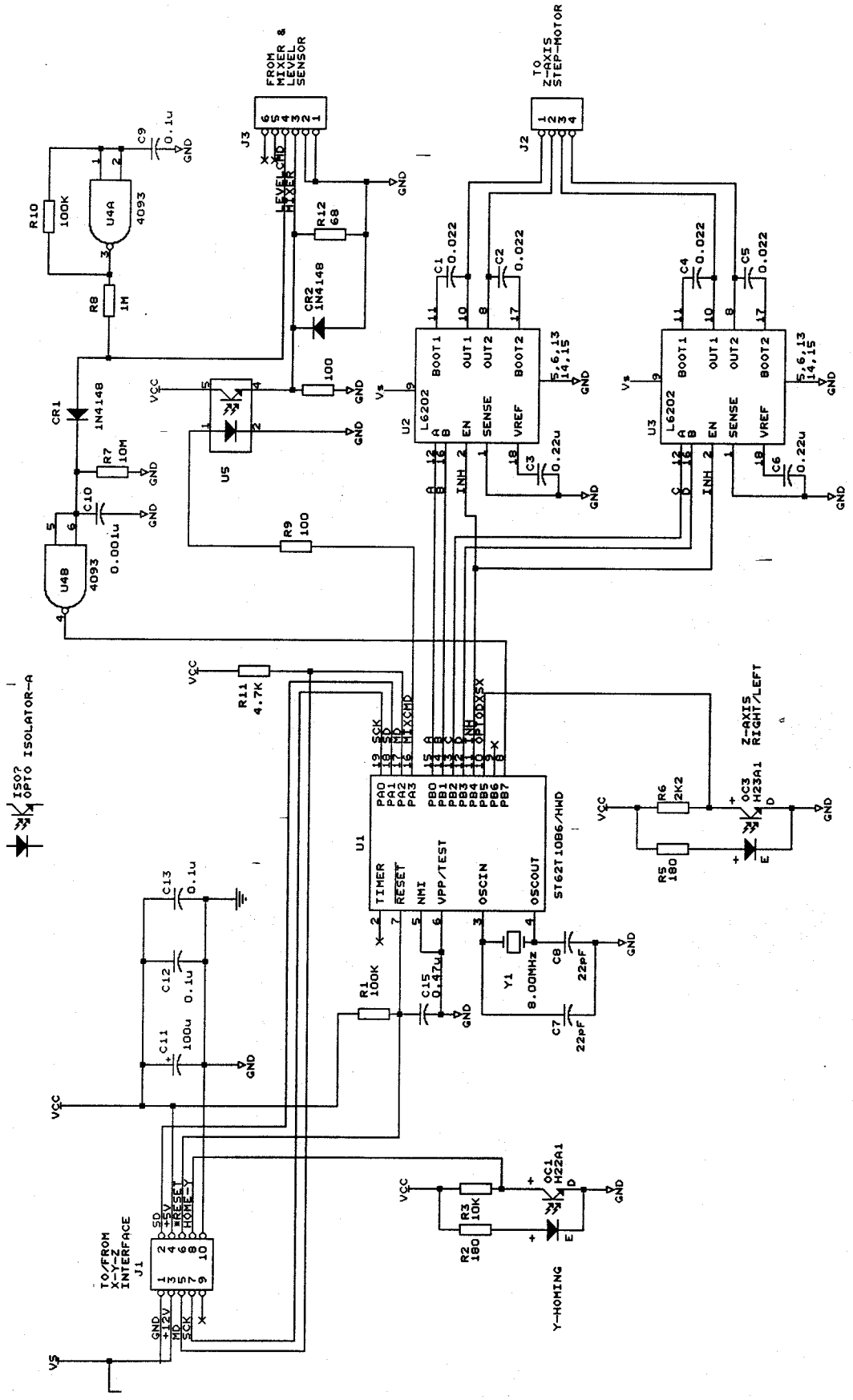
-To generate the probes position signal

-To generate the Y-axis HOMING signal

-To drive the Z-axis step motor

-To generate the level sensor signal



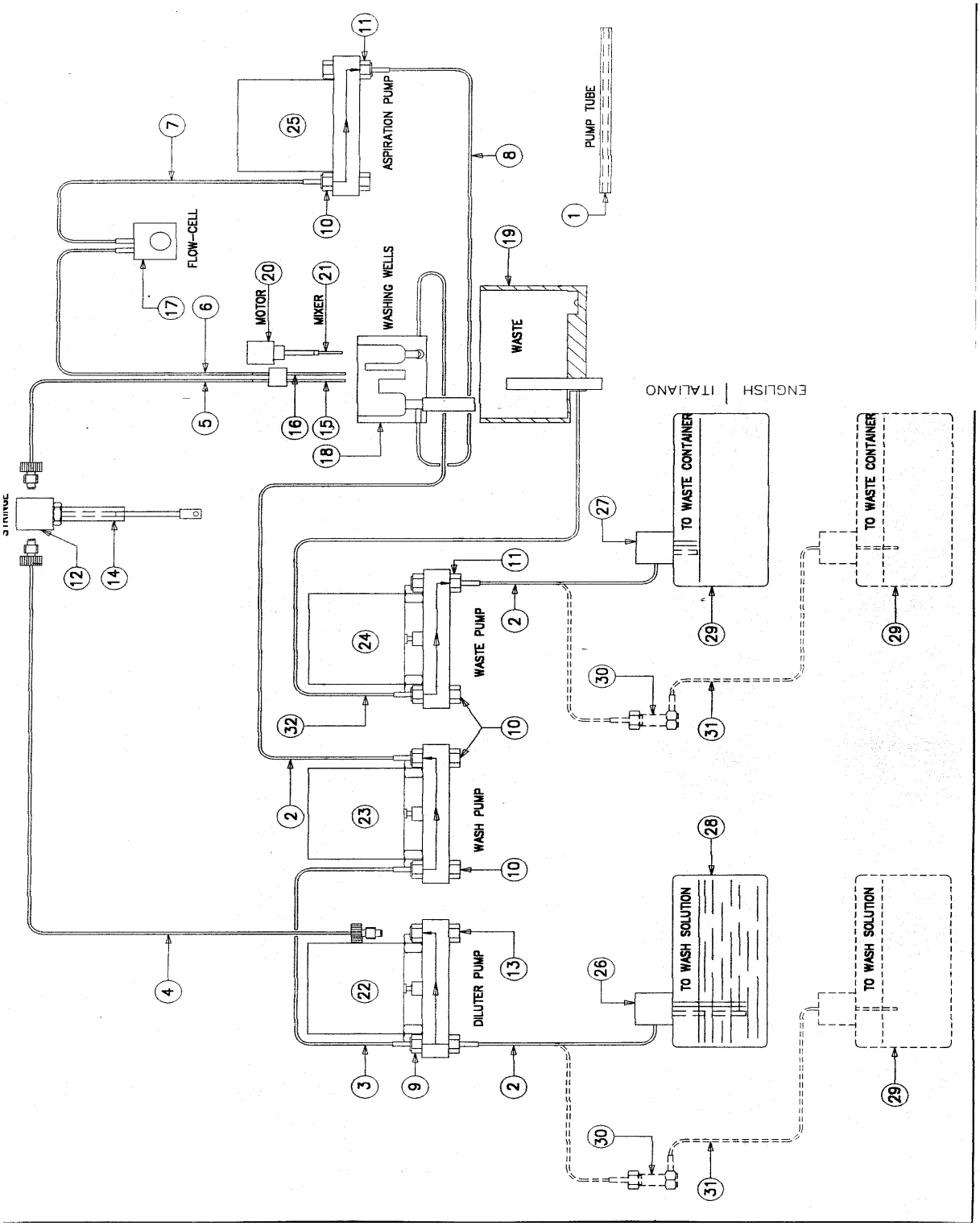

FROM MIXER & LEVEL SENSOR
TO Z-AXIS STEP-MOTOR
J3
J2
LEVEL GND
MIXER
R10 100K
U4A 4093
C9 0.1u
R8 1M
R12 68
CR2 1N4148
CR1 1N4148
R7 10M
C10 0.001u
U4B 4093
U5
100
R9 100
U2 L6202
U3 L6202
C1 0.022
C2 0.022
C4 0.022
C5 0.022
C3 0.22u
C6 0.22u
INH
R11 4.7K
ISO? OPTO ISOLATOR-A
U1 ST62T10B6/HWD
TIMER
RESET
NMI
VPP/TEST
OSCIN
OSCOUT
R1 100K
C15 0.47u
Y1 8.00MHz
C8 22pF
C7 22pF
R6 2K2
R5 180
OC3 H23A1
Z-AXIS RIGHT/LEFT
C13 0.1u
C12 0.1u
C11 100u
TO/FROM X-Y-Z INTERFACE J1
SD
+5V
*RESET
HOME-Y
GND
+12V
MD
SCK
R3 10K
R2 180
OC1 H22A1
Y-HOMING
VCC
GND
V5

8. HIDRAULIC LAYOUT DIAGRAM

Diagram HY0021.01

8.1. DESCRIPTION

This diagram shows the hydraulic system present in the analyzer



9. TWO SPEEDS STEP MOTOR DRIVER 18810/10

Schematical diagram EB0121.01.SCH

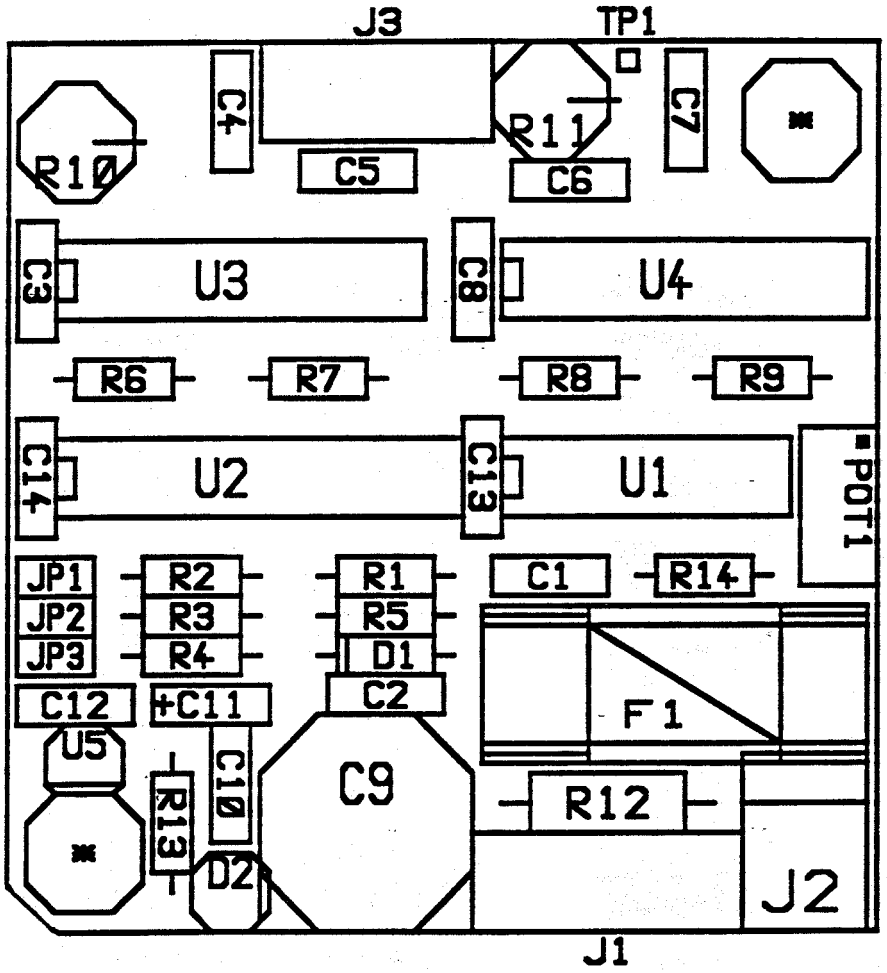
9.1. TECHNICAL DESCRIPTION

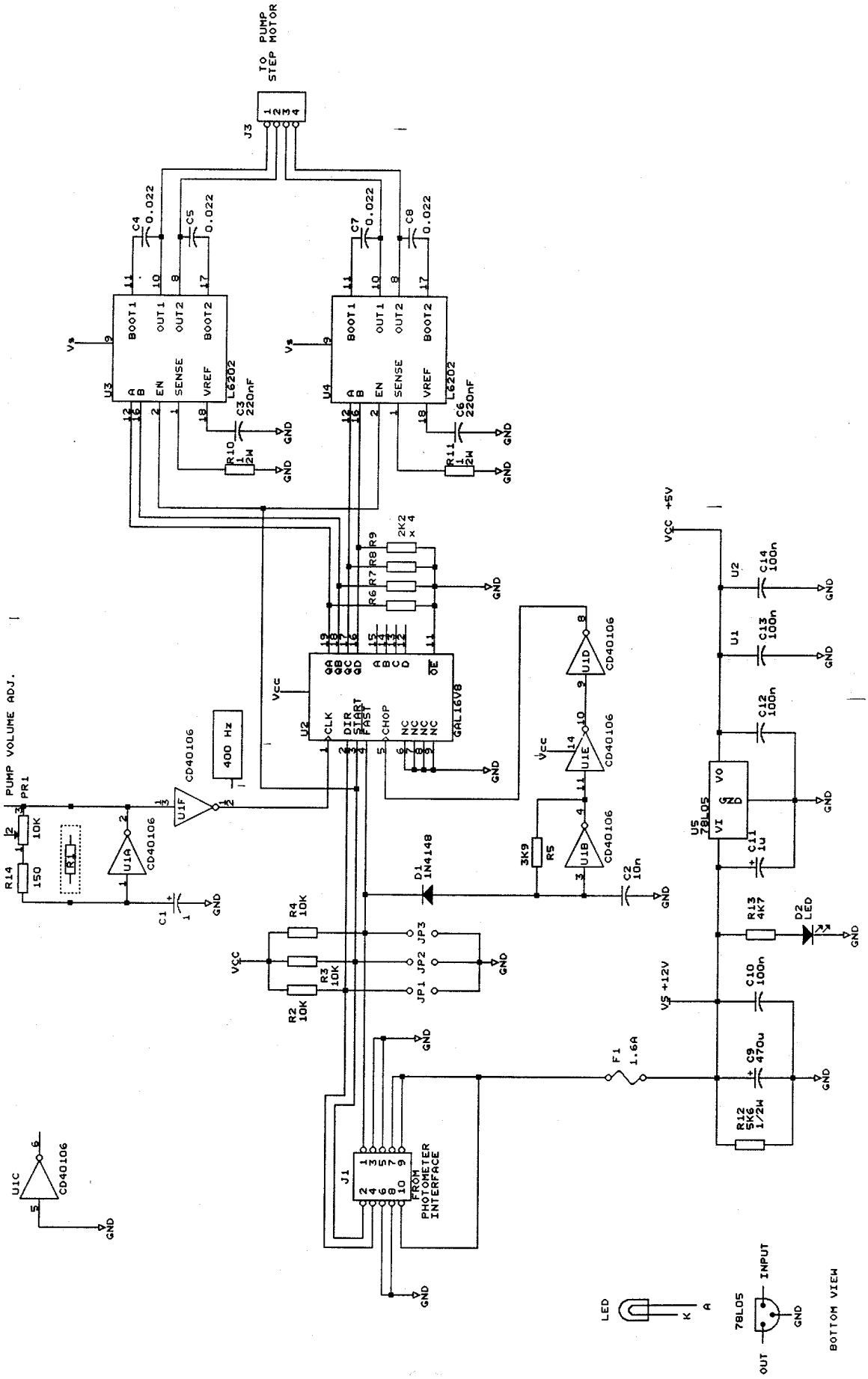
The function of this PC board is :

-To drive a step motor

-To change the sense of rotation

-To select the double speed




TO PUMP STEP MOTOR
J3
L6202
U3
U4
C4 0.022
C5 0.022
C7 0.022
C8 0.022
C3 220nF
C6 220nF
R10 1/2W
R11 1/2W
2K2 x 4
R6 R7 R8 R9
GAL16V8
U2
CD40106
U1A
U1C
U1D
U1E
U1F
400 Hz
PUMP VOLUME ADJ.
PR1
R14 150
10K
R1
C1
R4 10K
R3 10K
R2 10K
JP1 JP2 JP3
D1 1N4148
3K9 R5
C2 10n
J1
FROM PHOTOMETER INTERFACE
F1 1.6A
VCC +5V
VS +12V
78L05
U5
C14 100n
C13 100n
C12 100n
C11 1u
C10 100n
C9 470u
R13 4K7
D2 LED
R12 5K6 1/2W
LED
K
A
78L05
INPUT
GND
OUT
BOTTOM VIEW

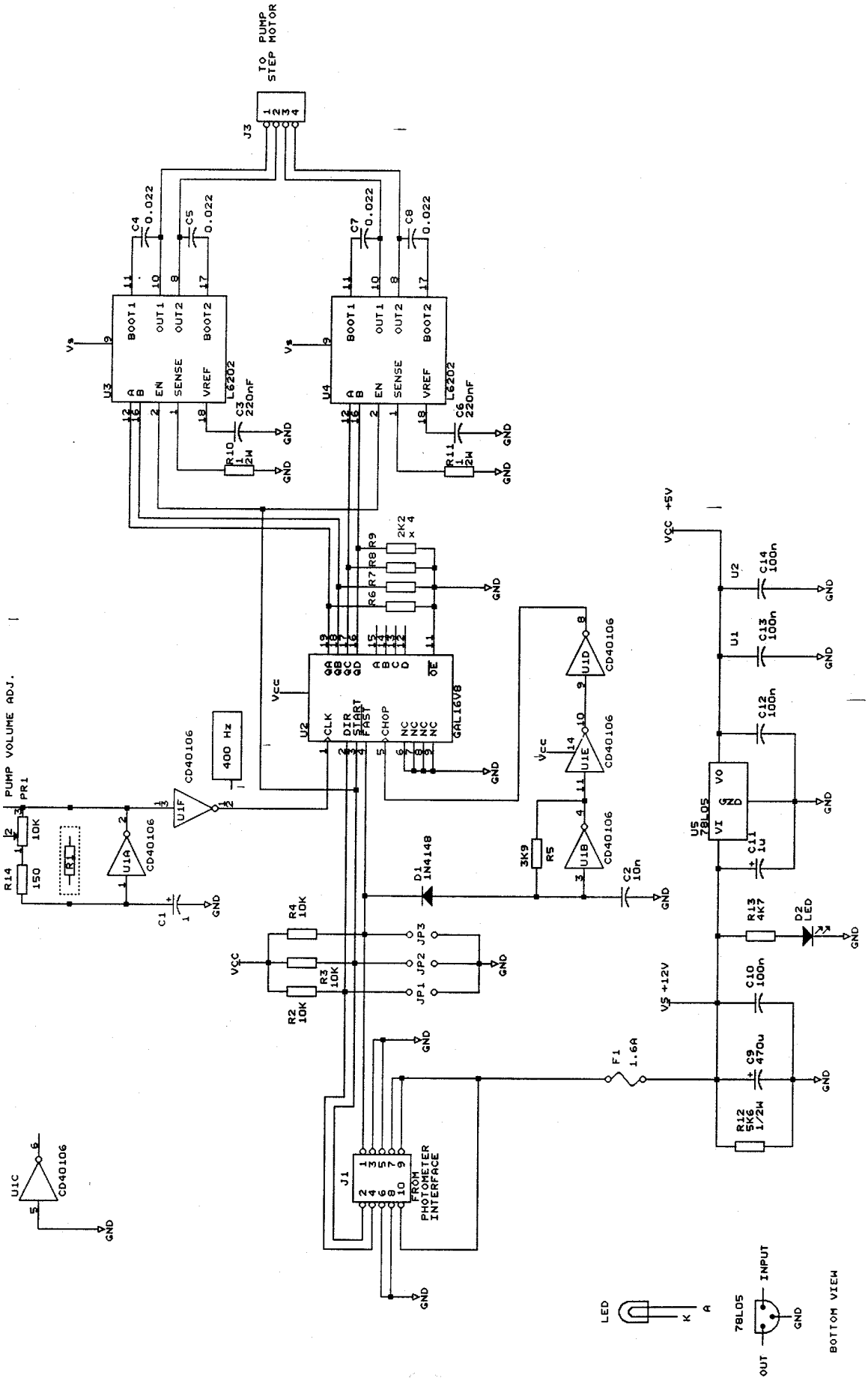
10. PUMPS & ALARM BOARD 18810/12

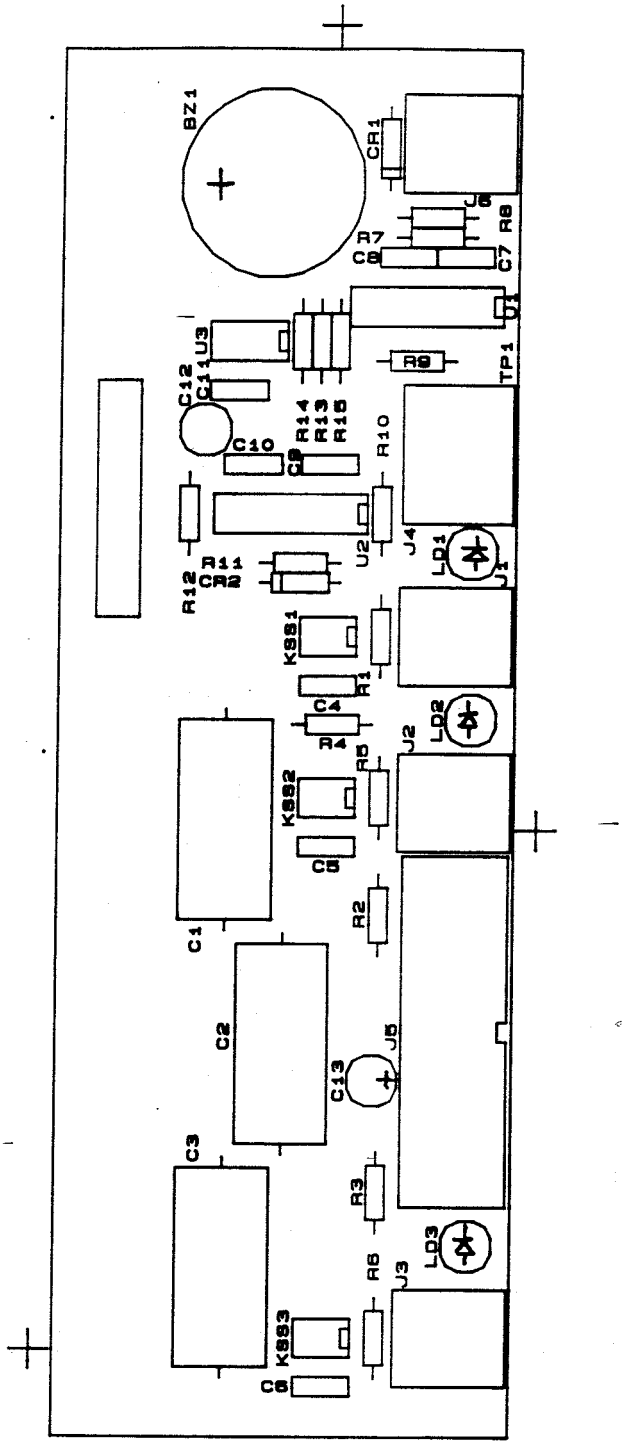
Schematical diagram AO1077.03.SCH

10.1. TECHNICAL DESCRIPTION

The function of this PC board is:

- -To drive the peristaltic pumps motors
- -To generate an acoustic signal when the wash solution volume is at its minimum.
- -To generate an acoustic signal when the waste bottle is full.


TO PUMP STEP MOTOR
J3
C4 0.022
C5 0.022
C7 0.022
C8 0.022
U3 L6202
U4 L6202
C3 220nF
C6 220nF
R10 1/2W
R11 1/2W
GND
Vs
2K2 x 4
R6 R7 R8 R9
U2 GAL16V8
CLK DIR START FAST CHOP
OE
Vcc
400 Hz
PUMP VOLUME ADJ.
PR1
R14 150
R1
U1A CD40106
U1F CD40106
C1
U1D CD40106
U1E CD40106
U1B CD40106
3K9 R5
D1 1N4148
C2 10n
R4 10K
R3 10K
R2 10K
JP1 JP2 JP3
J1
FROM PHOTOMETER INTERFACE
U1C CD40106
F1 1.6A
VCC +5V
VS +12V
U5 78L05
VI VO GND
C11 1u
C14 100n
C13 100n
C12 100n
C10 100n
C9 470u
R13 4K7
D2 LED
R12 5K6 1/2W
LED
K A
78L05
INPUT
OUT GND
BOTTOM VIEW


BZ1
CR1
J6
R8
R7
C8
C7
U3
C12
C11
R9
TP1
R14
R13
R15
C10
C9
R10
U2
J4
LD1
J1
R11
R12
CR2
KBS1
R1
C4
R4
LD2
J2
R5
KBS2
C5
R2
C1
C2
J5
C13
C3
R3
LD3
R6
J3
KBS3
C6

11. DILUTER **17840/3 complete modul**
17830/6 motor

Schematical diagram EB0068.01.SCH

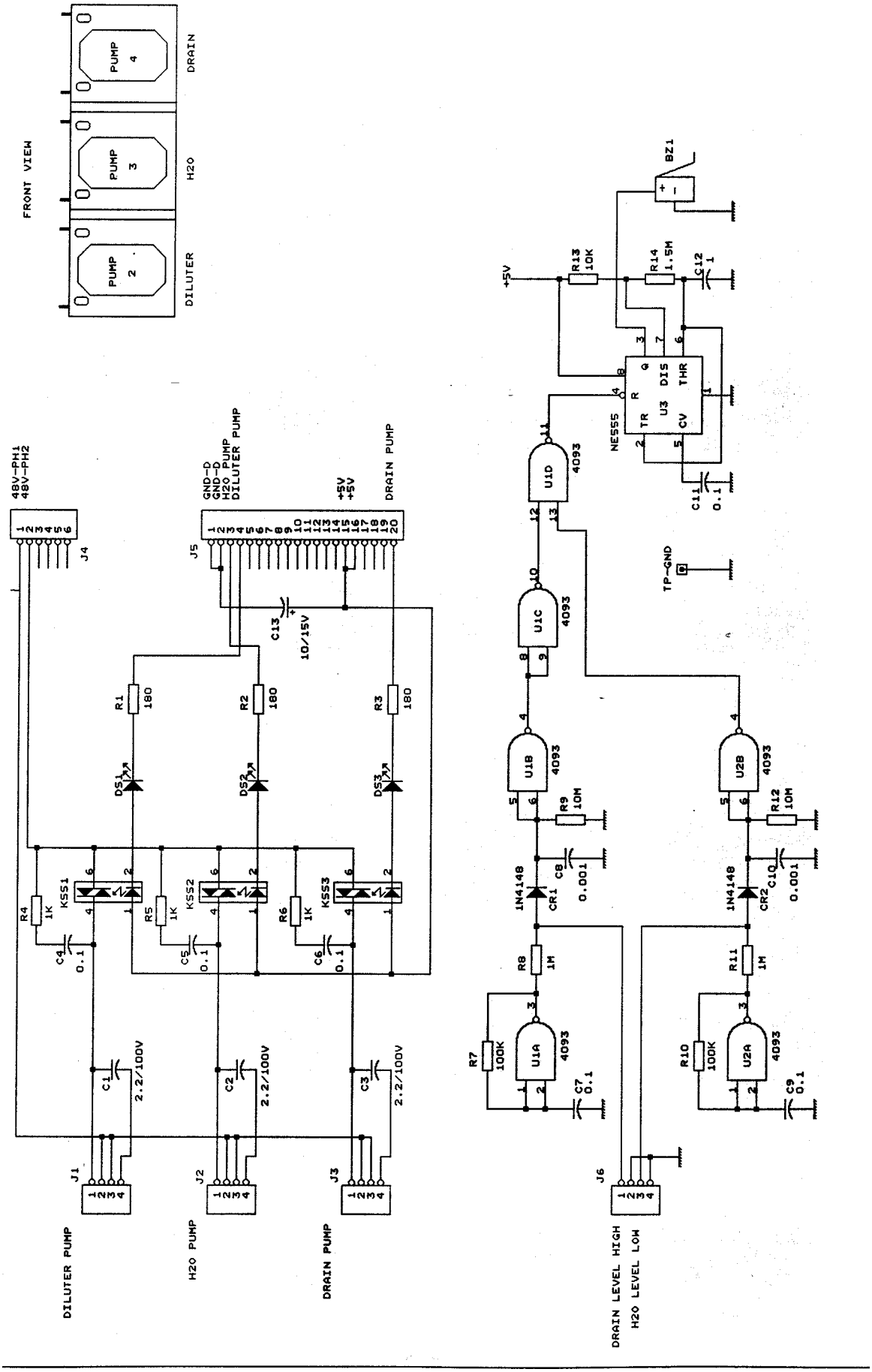
11.1. TECHNICAL DESCRIPTION

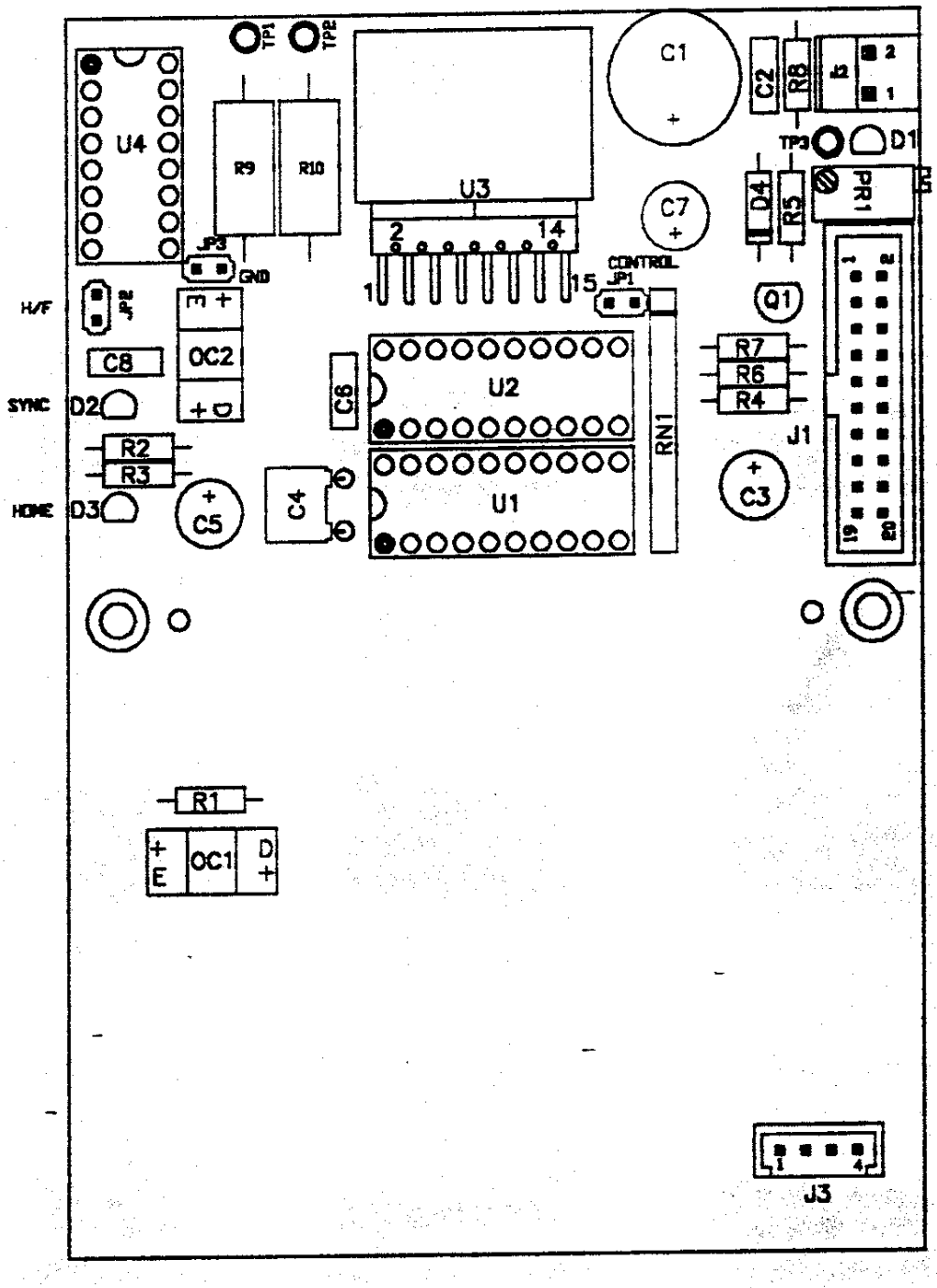
The function of this PC board is :

-To drive a step motor to move the syringe of the diluter.

-To generate the homing and sink signals used to control the diluter movement.

-To interface the diluter movement with I/O PC board.


FRONT VIEW
PUMP 2
PUMP 3
PUMP 4
DILUTER
H2O
DRAIN
48V-PH1
48V-PH2
J4
GND-D
GND-D
H2O PUMP
DILUTER PUMP
+5V
+5V
DRAIN PUMP
J5
C13
10/15V
R1 180
R2 180
R3 180
DS1
DS2
DS3
KSS1
KSS2
KSS3
R4 1K
R5 1K
R6 1K
C4 0.1
C5 0.1
C6 0.1
C1 2.2/100V
C2 2.2/100V
C3 2.2/100V
J1
J2
J3
DILUTER PUMP
H2O PUMP
DRAIN PUMP
+5V
R13 10K
R14 1.5M
C12 1
BZ1
NE555
U3
TR
R
Q
DIS
THR
CV
C11 0.1
TP-GND
U1D 4093
U1C 4093
U1B 4093
U2B 4093
U1A 4093
U2A 4093
R9 10M
R12 10M
R8 1M
R11 1M
R7 100K
R10 100K
1N4148
CR1
CR2
C8 0.001
C10 0.001
C7 0.1
C9 0.1
J6
DRAIN LEVEL HIGH
H2O LEVEL LOW


TP1
TP2
U4
R9
R10
U3
C1
C2
R8
J2
2
1
TP3
D1
D4
R5
PR1
C7
JP3
GND
2
14
1
15
CONTROL
JP1
H/F
JP2
Q1
C8
OC2
C6
U2
R7
R6
R4
J1
SYNC
D2
R2
R3
RN1
C3
HOME
D3
C5
C4
U1
R1
OC1
J3

12. I/O PORTS 17810/50

Schematicals diagrams EB0078.12-22-32-42.SCH

12.1. TECHNICAL DESCRIPTION

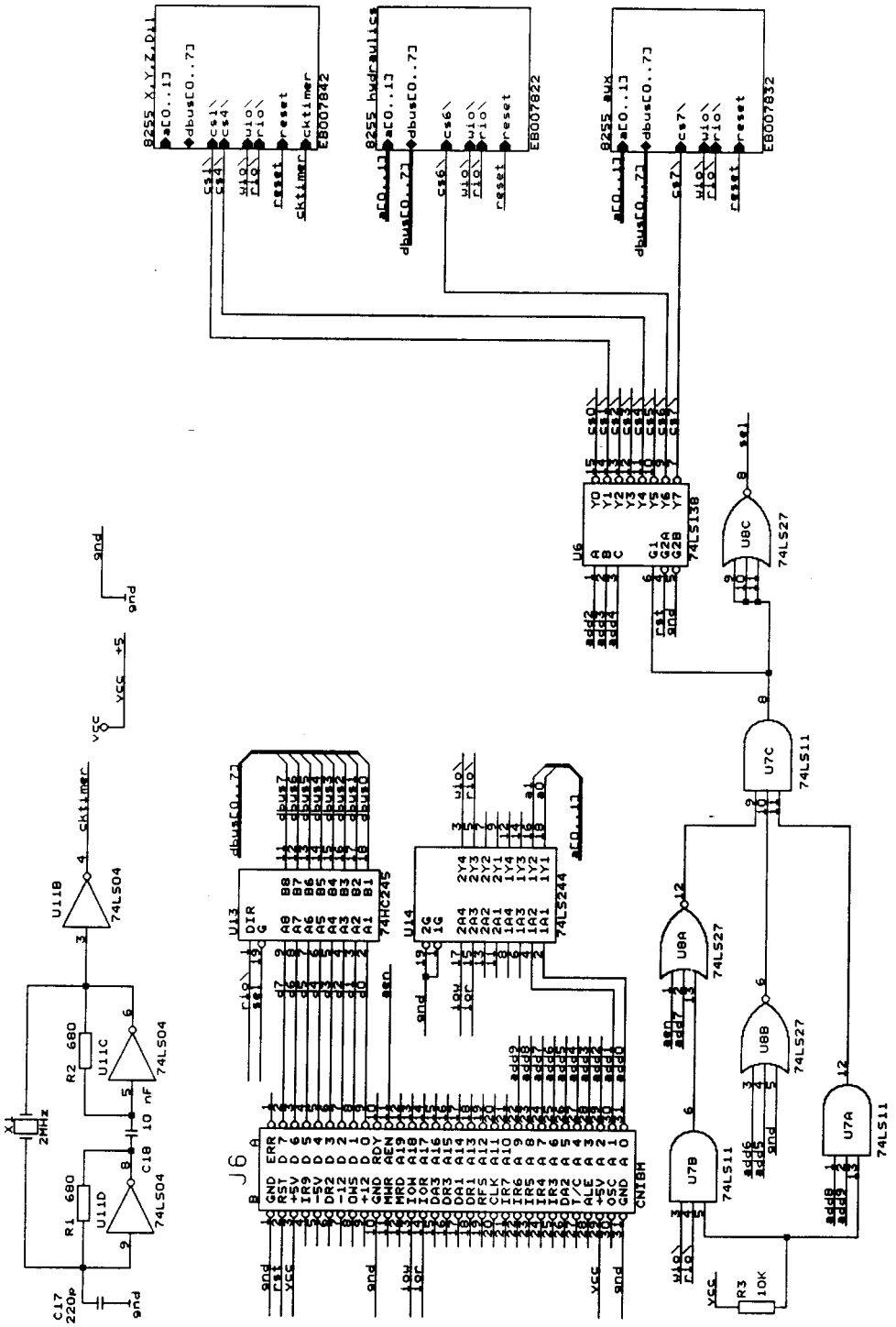
The function of this board is to interface the computer with the following modules:

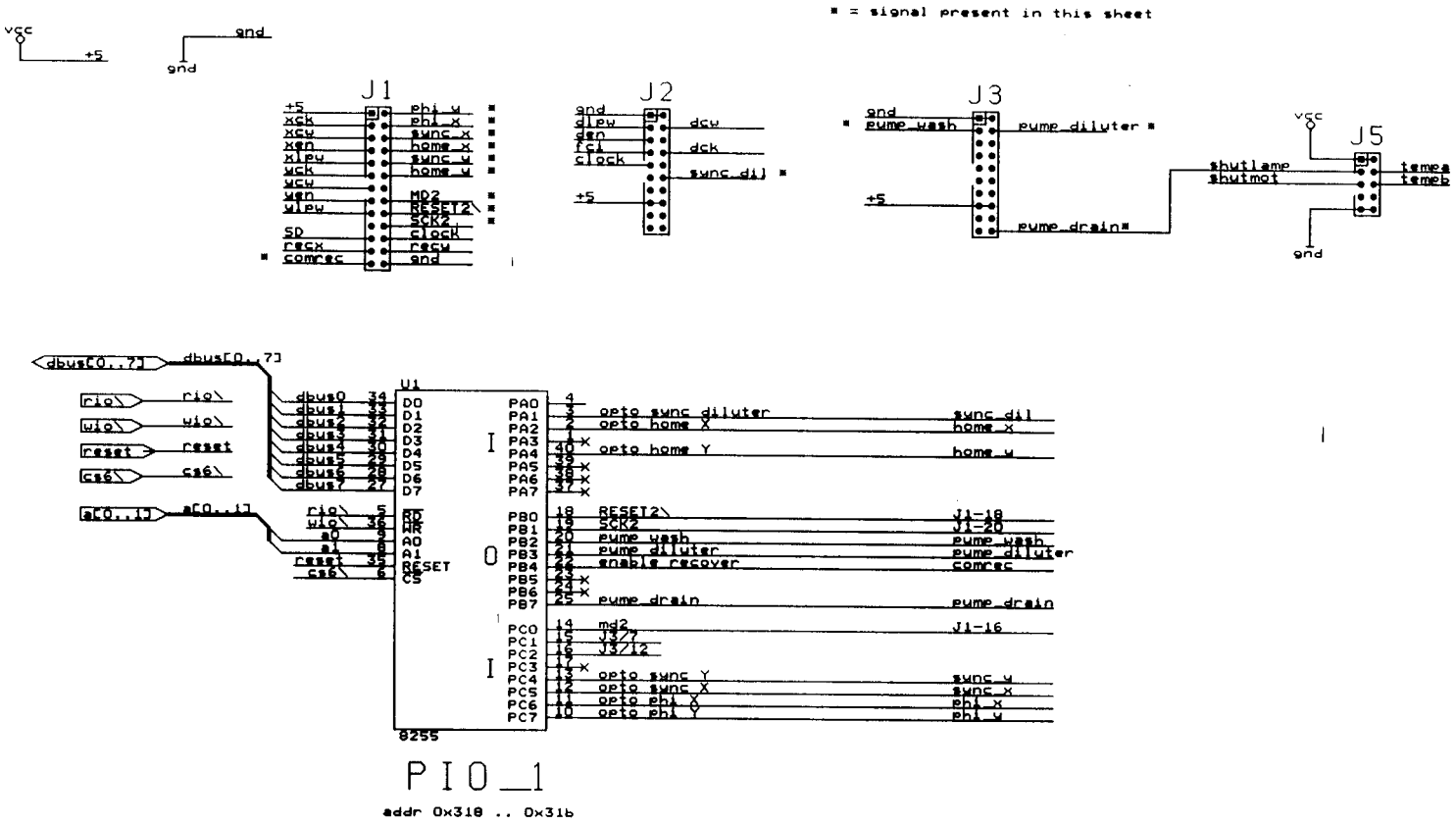
X-Y-Z assembly AY0087.02

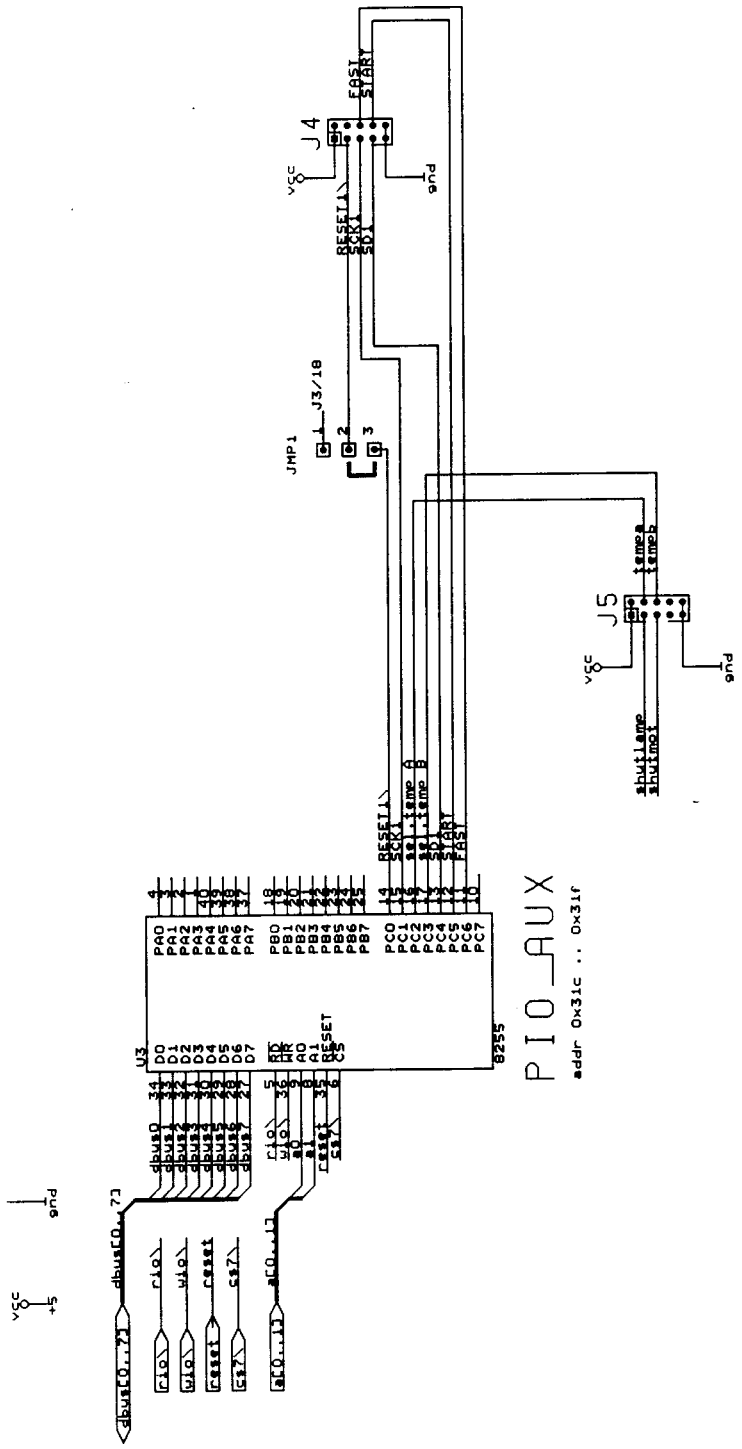
Diluter assembly AY0069.02

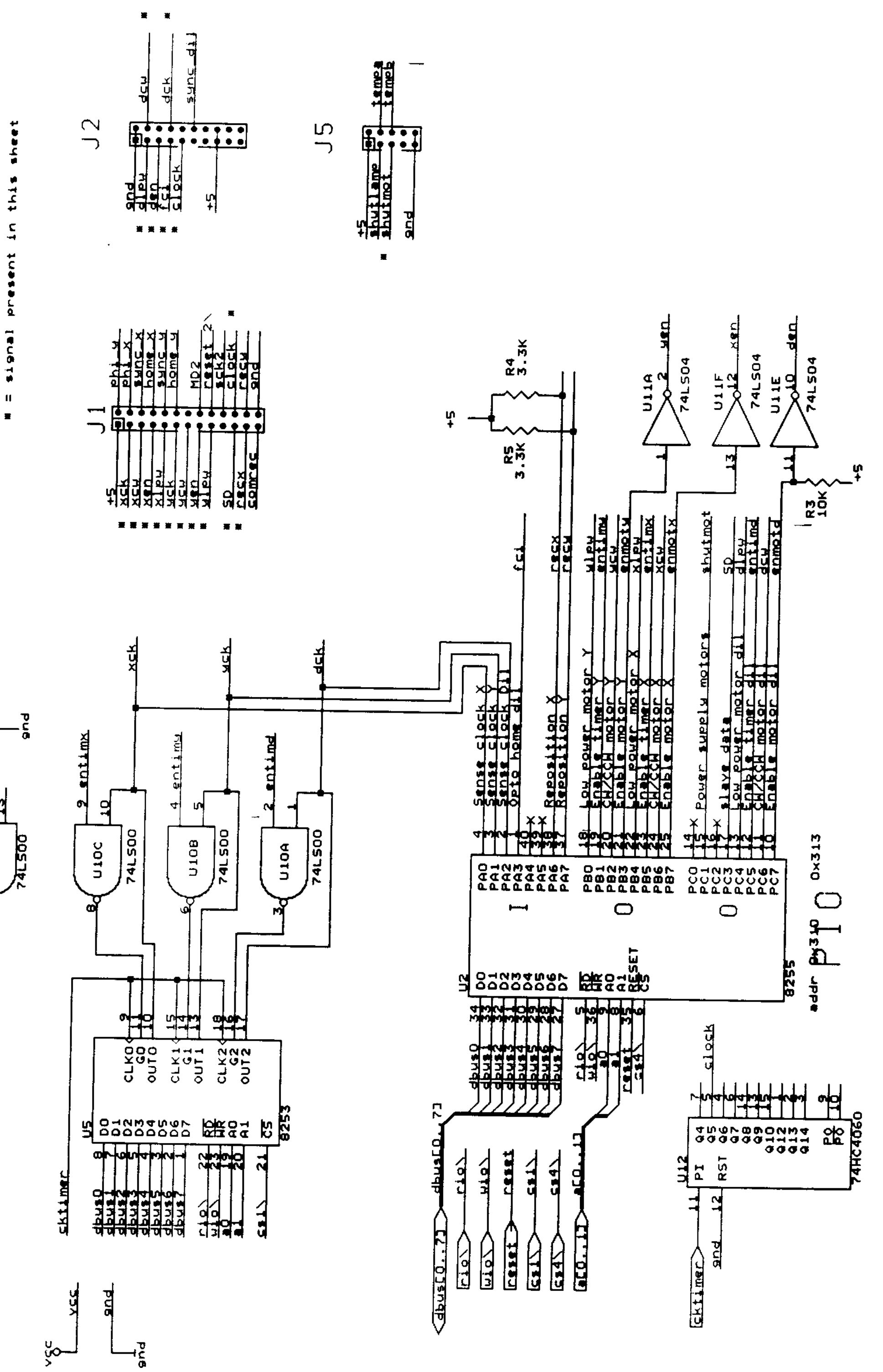
Photometer assembly AY0068.01

Pumps assembly AY0086.02




* = signal present in this sheet
vcc
+5
gnd
gnd
J1
+5
xck
xcw
xen
xlpw
wck
wcw
wen
wlpw
SD
recx
comrec
phi_w
phi_x
sync_x
home_x
sync_w
home_w
MD2
RESET2\
SCK2
clock
recw
gnd
J2
gnd
dlpw
den
fc1
clock
+5
dcw
dck
sync_dil
J3
gnd
pump_wash
+5
pump_diluter
pump_drain
vcc
J5
shutlamp
shutmot
gnd
temea
temeb
dbus[0..7]
rio\
wio\
reset
cs6\
a[0..1]
U1
dbus0
dbus1
dbus2
dbus3
dbus4
dbus5
dbus6
dbus7
rio\
wio\
a0
a1
reset
cs6\
D0
D1
D2
D3
D4
D5
D6
D7
RD
WR
A0
A1
RESET
CS
8255
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
opto sync diluter
opto home X
opto home Y
RESET2\
SCK2
pump wash
pump diluter
enable recover
pump drain
md2
opto sync Y
opto sync X
opto phi X
opto phi Y
sync dil
home x
home w
J1-18
J1-20
pump wash
pump diluter
comrec
pump drain
J1-16
sync w
sync x
phi x
phi w
PIO_1
addr 0x310 .. 0x31b


PIO_AUX
addr 0x31c .. 0x31f
8255
U3
J4
J5
JMP1
J3/18
vcc
gnd
RESET\
SCK\
SDA\
FAST
START
time A
time B
timea
timeb
shuttime
shutmot
dbus[0..7]
adr[0..1]
cs7\
cs1\
rd\
wr\
reset


* = signal present in this sheet
J1
J2
J5
8253
8255
74LS00
74LS04
74HC4060
PIO

13. MAINTENANCE AND ADJUSTMENTS

13.1. - TAKING OFF THE CASING COVER (see figure 13.1)

Procedure:
- Disconnect the power cord of the analyzer and the possible printer interconnection cable

- Loosen the screws (1) and remove the casing cover. To open the maintenance door (2) remove only the screws (10).

13.2. - FLOW-CELL 17830

The quartz-steel flow-cell (a patent) has been designed to heat quickly and to maintain with a high degree of precision thermic equilibrium inside the cell.
The temperature is electronically controlled by a Peltier effect.
A solid state thermometer is incorporated inside the flow-cell, allowing the measurement of its temperature.

FLOW-CELL FEATURES

- volume: 50 µl
- optical path length: 10 mm
- optical axis (Z): 7.5 mm
- weight: 10 g

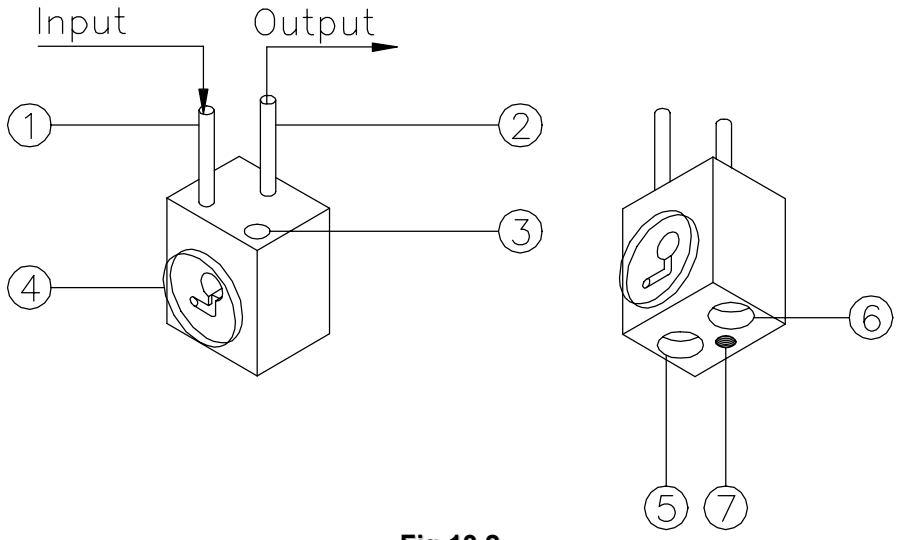


Fig.13.2

1 flow-cell inlet
2 flow-cell outlet
3 thermometer probe
4 quartz window
5/6 temperature sensor 18720/22
7 clamping screw

13.2.1 - CLEANING OF THE FLOW-CELL

At the end of a work-cycle, the flow-cell is automatically washed. To avoid the formation of bacterial growth inside the flow-cell, it is advisable to wash the flow-cell at least once a week using a good laboratory glassware detergent.

PROCEDURE
-Switch-on the instrument and dip the aspiration probe into the liquid detergent.
-Press the MANUAL PUMP pushbutton for at least 10 seconds and leave the solution in the flow-cell with distilled water for at least 15-20 minutes in order to remove any residues from the washing solution.

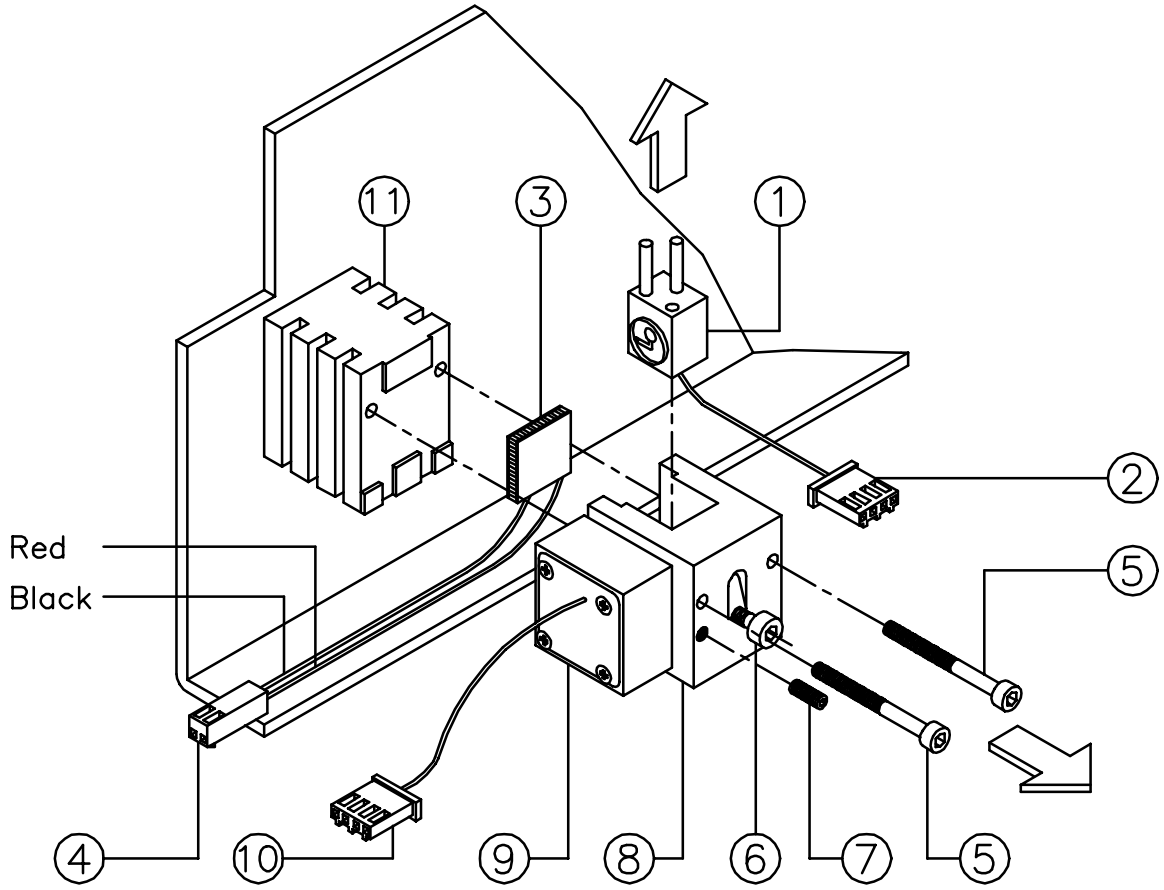
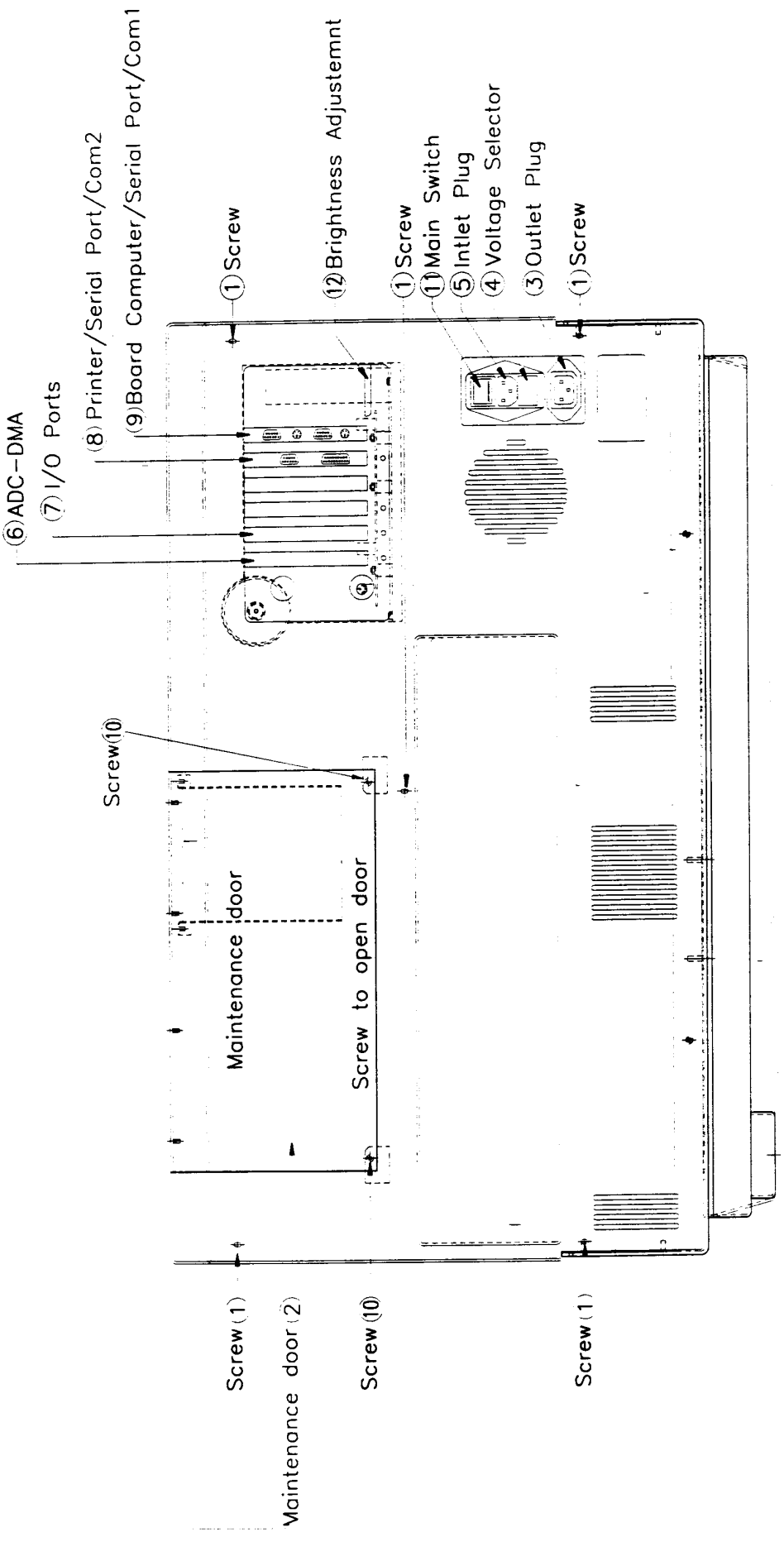


Fig. 13.3

1 flow-cell 17830
2 temperature sensor connector 18720/22
3 Peltier 17820/20
4 Peltier connector
5 mounting screw
6 flow-cell clamping
7 stop pin
8 mounting block
9 preamplifier 18720/29
10 preamplifier connector
11 heat sink


(6) ADC-DMA
(7) I/O Ports
(8) Printer/Serial Port/Com2
(9) Board Computer/Serial Port/Com1
(1) Screw
(12) Brightness Adjustemnt
(1) Screw
(1) Main Switch
(5) Intlet Plug
(4) Voltage Selector
(3) Outlet Plug
(1) Screw
Screw (10)
Maintenance door
Screw to open door
Screw (1)
Maintenance door (2)
Screw (10)
Screw (1)

13.2.2 - FLOW-CELL REPLACEMENT (see figure 13.3)

Procedure:
- Turn-off the analyzer and open the maintenance door (see par. 13.1)

- Remove the inlet and outlet tubes from the flow-cell.

- Loosen the screw (6) and pull the cuvette upwards taking care not damage the thermometer wires.

- Loosen the clamping screw (7) and remove the thermometer (do it gently).

- Before inserting the new flow-cell, spread a bit of thermal grease into the thermometer housing and secure it (make sure that the thermometer fits perfectly in its housing).

- Spread a bit of thermal grease on the side of the flow-cell that touches the Peltier device.

- Before re-inserting the flow-cell, make sure that it is perfectly clean inside, as well as the quartz windows on the outside.

- Pull the screw (6) and re-insert the flow-cell (if correctly inserted the upper edge of the flow-cell is about at the same height of the Peltier).

- Reconnect the tubes with their sleeves onto the flow-cell .

- Check the alignment by 'PHOTOMETER AND FILTER TEST' diagnostic program.

13.3 - PHOTOMETER LAMPS REPLACEMENT AND ALIGNMENT 17820/32

(see figure 13.4)

Procedure:
- Turn-off the analyzer and open the maintenance door (see par. 13.1)

- Disconnect the lamp from the Photometer Interface PCB and loosen the clamping screw (5).

- Turn the vertical alignment screw (3) and remove the lamp (be careful not loose the spring).

- Carry out the same procedure to remove the second lamp.

- Insert the new lamps and the vertical alignment screws without tightening them (**beware do not touch the glass part with your fingers**, use the plastic envelope to hold the glass part of the lamps). Reconnect one lamp to the Photometer Interface PCB.

- Turn-on the analyzer, set the service program and select the "Photometer and filters test".

- By means the manual pump fill the flow-cell with distilled water (make sure the flow-cell is free of air bubble).

- Select the filter 340nM (filter N° 0) and wait until the photometer starts measuring. It will show continuously the mean absorbance between 7-8 readings.

- The monitor will be displaying continuously a number in mABS which must be minimised (the lamp must be aligned both horizontally and vertically). Turn the screws for the horizontal (4) and vertical (3) alignment until the absorbance reaches the minimum value then tighten the clamping screw (5)

- Repeat the same procedure to align the second lamp.

- Select the lamp with the greater absorbance and adjust PR5 on A00749.01 board (ADC-DMA) to read an absorbance around 130-150 mABS.

- Select the other filters, their absorbance must be between 100 and 300 mABS.

- Select the lamp with the smaller absorbance and turn the horizontal screw (4) to obtain the same value given from the lamp previous aligned.

- Close the maintenance door.

13.3.1 - FILTERS EQUALIZATION (see figure 13.4)

NOTE: before to equalise the interference filters carry out the following maintenance operations
- cleaning of the optical system (lens, filters, quartz windows)
- check of the flow through the flow-cell
- replacement of the lamps
- alignment of the lamps

Procedure:
- Fill the flow-cell with distilled water (make sure the flow-cell is free of air bubble).

- Adjust the 340 nm filter absorbance around 130-150 mABS (turn PR5 on ADC-DMA PCB).

- Select the other filters and note their absorbance. If one or more filters are outside the specified range it is necessary to equalise them.

- Turn-off the analyzer and remove the cover panel (see par.3.1)

- Remove the screw (10) and take the panel whit the chopper motor off.

- Loosen (half turn) the two Allen screws holding the filter wheel to the motor shaft and remove the filter wheel.

- One at a time remove those filters were the absorbance is outside the specified range (take care don't loose the attenuators diskettes 17850/10).

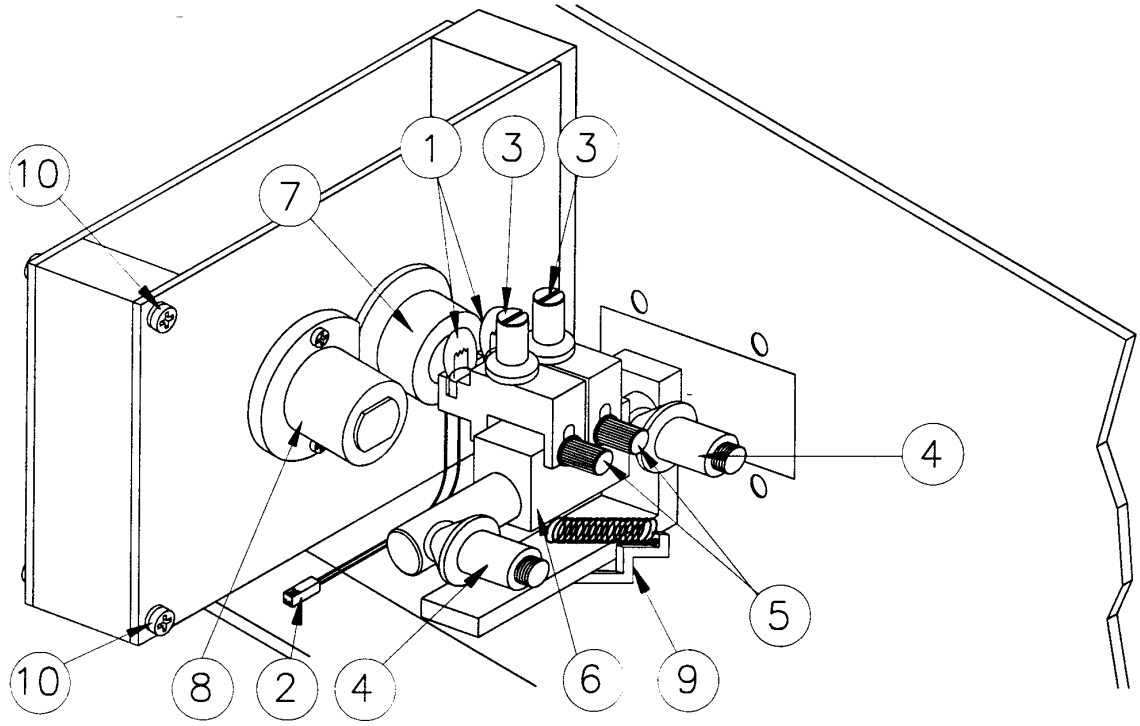
- If the absorbance of the removed filter is below 100 mABS add one or more absorbance diskettes, if it is above 300 mABS subtract so many diskettes as necessary.

NOTE: HUMAN provides attenuators diskettes of 60,100 and 350 mABS. Take account that the real value of the diskette change with the filter wavelength. For this reason a 100 mABS diskette added at the 405 nm filter will increase the absorbance about 100 mABS while if added at the 620 nm filter will increase the absorbance about 50 mABS.

- Re-assembly the filter wheel and the chopper panel then switch-on the analyzer.

- Check the absorbance of each filter and if the test does not meet the specification repeat the procedure as many times as necessary.

- Switch-off the analyzer and replace the cover panel.



13.4. - PERISTALTIC PUMPS TUBE 18820/5 REPLACEMENT AND ADJUSTMENT

13.4.1. - FLOW-CELL PERISTALTIC PUMP (see figure 13.5)

Procedure:
- Turn-off the analyzer and open the maintenance door (see par.13.1)

- Remove the screws (4) and the tube holder (5).

- Replace the tube (3) with the new one having the same size and diameter (see note below).

- Replace the tube holder (5) and tighten the two screws (4) (take care don't pinch the tube)

- Turn-on the analyzer, set the service program and select the "Pump Test" Diagnostic Program (see par.1.6).

- Press key "1" to select the flow-cell peristaltic pump.

- Disconnect the aspiration tubing from the aspiration probe.

- Fill a graduate tube with 10ml of distilled water.

- Dip the photometer tubing into the graduate tube.

- Digit 10000 µl and press Enter twice.

- The pump has to aspirate10ml of water in about 40 seconds. If the test does not meet the specification, adjust the volume

ADJUSTMENT: Insert a small flat screwdriver into the housing of the trimmer volume adjustment (6), turn it cw to increase the volume. After the adjustment check the volume again.

- Reconnect the photometer tubing to the aspiration probe and close the maintenance door.

13.4.2. - WASH SYSTEM PERISTALTIC PUMPS 18840/6

For these three peristaltic pumps used to draw in wash solution and waste, the procedure is identical to the previous one. The three pumps are located under the keyboard. No adjustment is required.

NOTE: THE SILICON TUBING USED IN THE PERISTALTIC PUMPS HAS TO BE OF THE PARTICULAR TYPE, SUPPLIED BY CRONY. OTHER TUBING COULD ALTER VOLUMES ASPIRATED AND WILL CAUSE INCONVENIENCES IN THE PHOTOMETRIC MEASUREMENT.

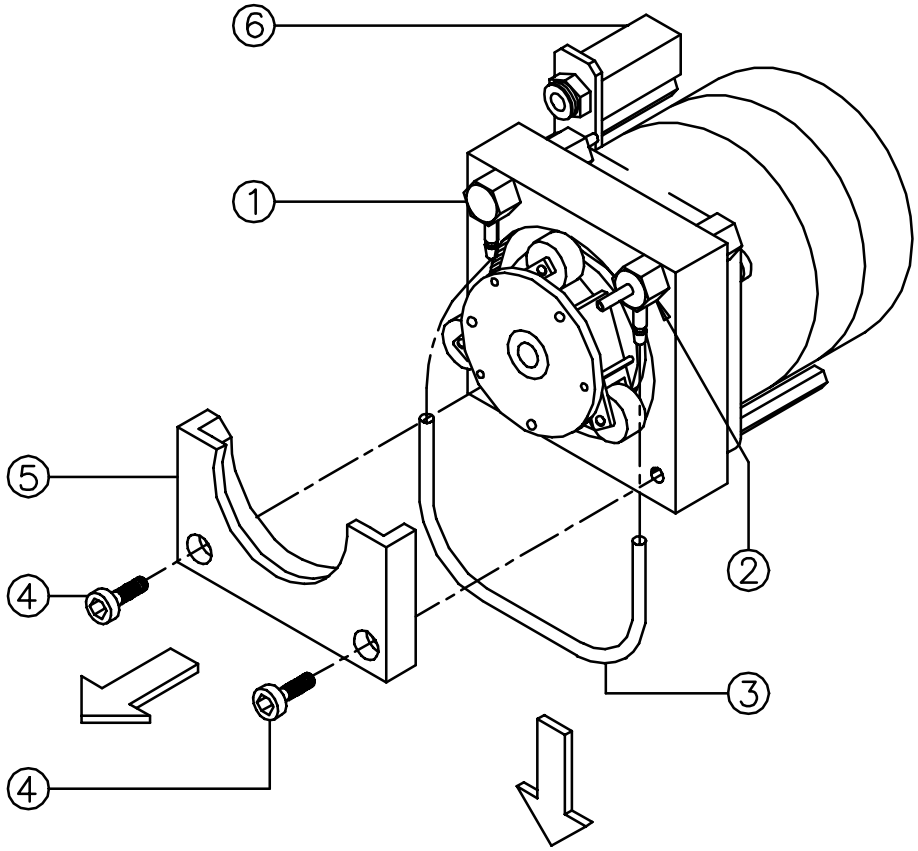


Fig. 13.5

1	input	4	screw
2	output	5	tubing holder
3	pump tube	6	trimmer speed adjustment

13.5 - DILUTER 17840/3

13.5.1. - SYRINGE REPLACEMENT (See fig.13.6)

Procedure:
- Loosen the syringe mounting screws (4) and (5).

- Remove the syringe from the diluter panel and separate it (2) from the holder (6).

- Reconnect the new syringe and piston to the diluter panel (Make sure to fit the o'ring (3).

- Tighten the screws (4) and (5).

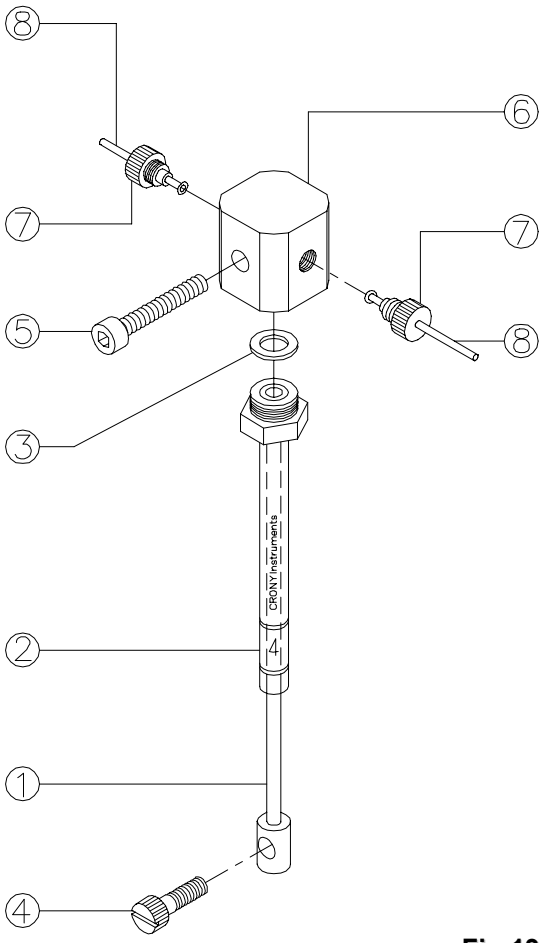


Fig.13.6

1	piston	5	syringe holder mounting screw
2	syringe body	6	syringe holder
3	o'ring	7	tube fitting
4	syringe mounting screw	8	tubing

13.5.2 - BELT REPLACEMENT AND ADJUSTMENT (see fig. 13.7)

PROCEDURE:
- Open the maintenance door (see par. 13.1).

- Disconnect the tubes and remove the syringe.

- Remove the four screws that fix the assembly to the chassis.

- Loosen the Allen screw (22) and remove the encoder disk (14).

- Take the belt (13) off and place the new one.

- Replace the encoder disk (14).

- Tighten partially one of the two screws that hold the syringe in the upper hole.

- By means the diagnostic program carry out the homing of the diluter.

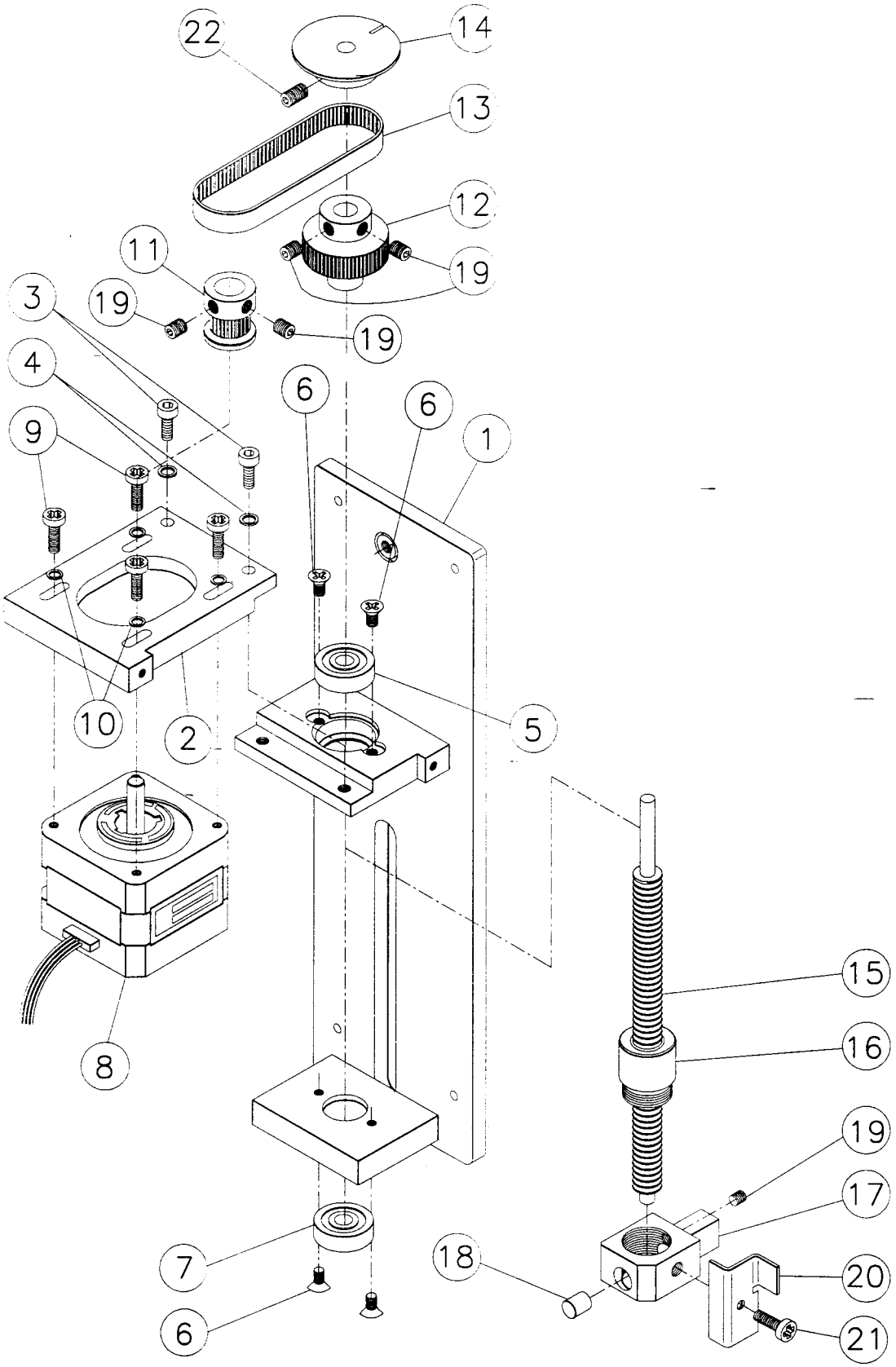
- By means a calliper check the distance between the screw and the mechanical part (17). The requirement is 106.5 mm +/- 0.1mm.
If the check does not meet the specification, loosen the Allen screw (22) and turn the encoder disk (14) cw to increase the distance or ccw to reduce it then tight the screw (22).

- Re-assembly the syringe, connect the tubes and fix the module to the chassis.

- Close the maintenance door.

13.5.3. - DILUTER MAINTENANCE

Every 5 or 6 months place a bit of lubricating grease on the mechanical screw of the diluter. Have it done by your service engineer during the periodic visits.


22
14
13
12
19
11
19
19
3
4
9
6
6
1
10
2
5
15
16
19
17
18
20
21
8
7
6

13.6 - WASHING WELL 17820/7 CLEANING

Clean the washing well periodically (once a month) with a diluted bleach solution 1:5, by pouring some of that bleach solution into the well. Leave the bleach solution inside for 15 to 20 minutes. Wash well thereafter.

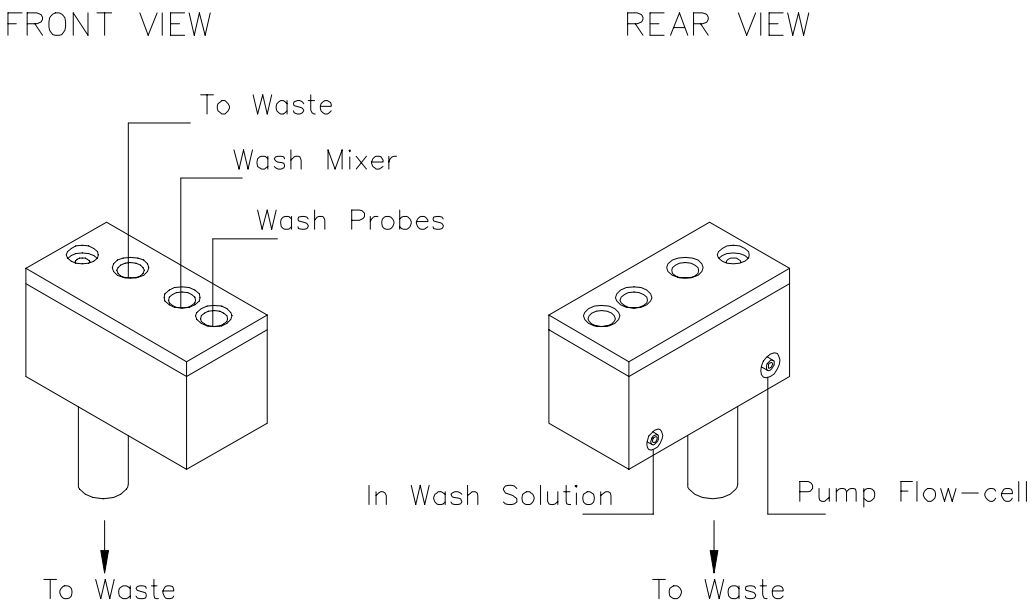


Fig. 13.8

13.7 - X - Y - Z AXES (see fig.13.9)

NOTE: When there is not the right timing between the homing and the sync signals, a mechanical position error takes place. This event may be caused following a hardware failure (motor, optical sensor, rubber belt, PC board) or a mechanical misalignment. In any case it is necessary to carry out this adjustment to restore the regular operating conditions.

13.7.1 - PROBES CENTERING

Procedure:
- Turn-off the analyzer and remove the casing cover (see par.13.1)

- Remove the reagent and sample racks.

- Disconnect the two tubings from the liquid sensors.

- Remove the work plane of the analyzer.

- Loosen the Allen screw (1) holding the rubber belt (2) in order to unclamp the x-axis movement.

- Loosen the Allen screw (3) holding the rubber belt (4) in order to unclamp the y-axis movement.

- Manually move z-axis assembly (6) outside its standby position.

- Turn-on the analyzer; when the x-y stepper motors begin to run move the z-axis assembly (6) toward the standby position. If the action is successful, the coincidence of the two signals Homing and Sync stops immediately the stepper motors in the standby position.

- Tighten the Allen screws (1) and (3) Without moving the z-axis assembly.

- Make a mechanical reset of the analyzer and check the probes centring. Repeat the adjustment if necessary.

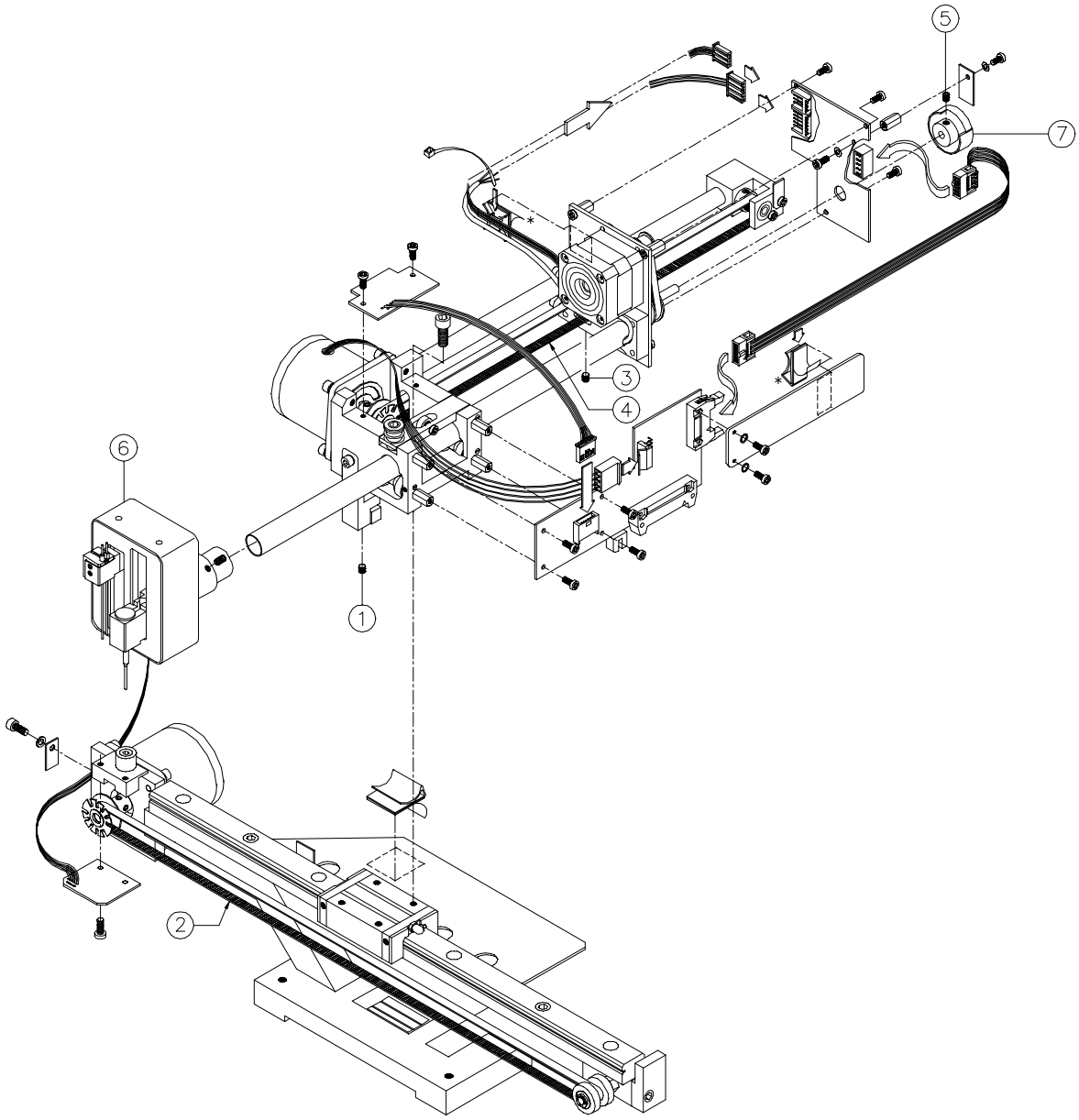


Fig.13.9

1 x-axis set screw
2 x-axis rubber belt
3 y-axis set screw
4 y-axis rubber belt
5 z-axis set screw
6 z-axis assembly
7 encoder wheel

13.7.2 - Z AXIS ALIGNMENT (See fig.13.9)

NOTE: When the z-axis motor or the rubber belt or the EB0091.01 PC Board are replaced and every time the wheel (7) is removed it is necessary to carry out this adjustment.

Procedure:
- Turn-off the analyzer and remove the casing cover (see par.13.1).

- Turn-on the analyzer and set the service program.

- check the crank (1) of the z-axis assembly (see fig 13.11),in standby condition it must be perpendicular respect to the analyzer baseplane, if it is not , loosen the Allen set screw (5) half turn.

- If the crank is moved toward the mixer probe, turn the wheel (7) slightly ccw. Instead if the shaft is moved toward the sampling and aspiration probes turn the wheel slightly cw.

- Tighten the Allen set screw (5) then check the Z-axis assembly by means the diagnostic program (perform a mechanical reset of the instrument).

- If the check is not satisfactory repeat the alignment.

- Turn-off the analyzer and re-assembly the casing cover.

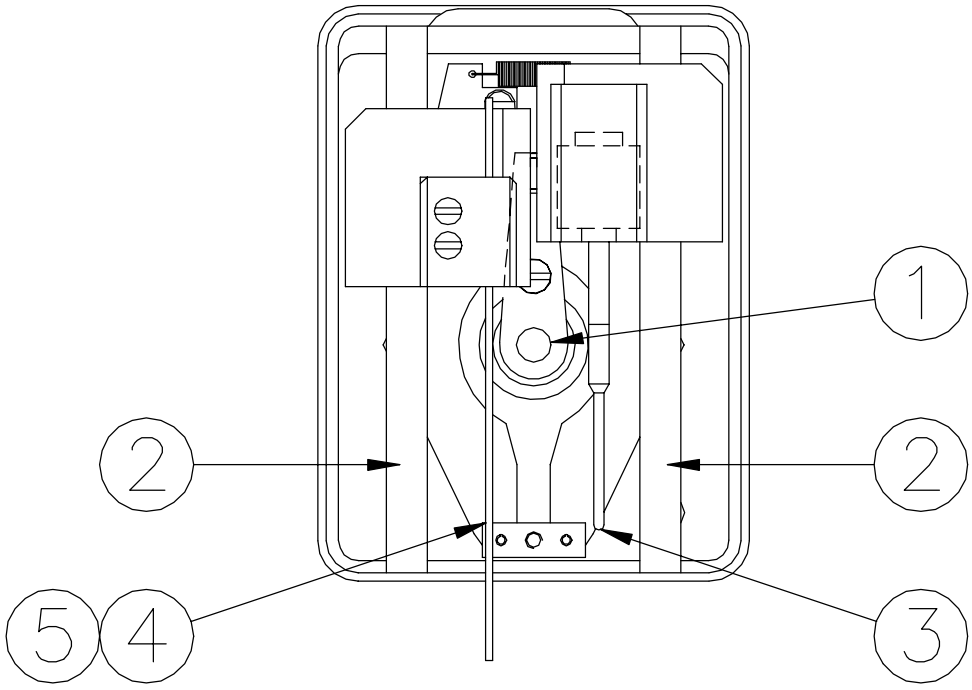


Fig.13.10

1 crank
2 probe slide
3 mixer 18820/10 mixer blade, 18820/30 mixer motor
4 sampling probe 18820/4
5 reading probe 18820/3

13.8 - TEMPERATURE CONTROL AND ADJUSTMENT

13.8.1 - INCUBATION CHAMBER

- Turn-off the analyzer and remove the casing cover.

- Turn-on the analyzer and set the service program.

- Place a reaction plate on the reaction well and fill a cell with distilled water.

- Select 25°C temperature and dip the thermometer probe inside the cell.

- Wait for 15-20 minutes and check the thermometer: The read temperature must be 26°C +/- 0.1°C.

- If the check does not meet the specification adjust PR8 on Power Supply PC Board (turn ccw to increase the temperature).

- Check the temperature at 30°C and 37°C and adjust according to the below table.

TEMPERATURE	ADJUSTMENT	SPECIFICATION	
25°C	PR8	TP21 2.98 V	26°C +/- 1°C
30°C	PR7	TP20 3.03 V	31°C +/- 1°C
37°C	PR6	TP19 3.12 V	39°C +/- 1°C

13.8.2 - FLOW-CELL

- Insert the temperature probe inside the hole (3) (see figure 13.2)

- Select 25°C temperature and wait for 30 seconds.

- Check the thermometer: the read temperature must be 25°C +/- 0.1.

- If the check does not meet the specification adjust PR5 on Power Supply PC Board (turn ccw to increase the temperature).

- Check the temperature at 30°C and 37°C and adjust according to the below table.

TEMPERATURE	ADJUSTMENT	SPECIFICATION	
25°C	PR5	TP24 1.00 V	25°C +/- 0.1°C
30°C	PR4	TP23 2.00 V	30°C +/- 0.1°C
37°C	PR3	TP22 3.40 V	37°C +/- 0.1°C

- Turn-off the analyzer and re-assemble the casing cover.

13.8.3 - REFRIGERATOR (see figure 13.15)

NOTE: this check must be carried out at a room temperature not greater of 25 °. (maximum rating room temperature minus 15 °C)

- Fill a reagent container with distilled water and leave it in the refrigerator compartment for at least 20 minutes.

- Insert the temperature probe inside the container and wait for 1 minute.

- Check the thermometer: the required temperature must be between 10 and 15 °C.

- If the check does not meet the specification adjust PR2 on EB0080.01 PC Board.

13.9. - PREVENTIVE MAINTENANCE

It is recommended to schedule the preventive maintenance operations at least twice a year.

1.Fotometric system

- **Checks with analyzer turned-off**
  - ☐ Cleaning of the optical lens
  - ☐ Cleaning of the interference filters
  - ☐ Flow-cell check
    - -check of the flow
    - -cleaning of the quartz windows
  - ☐ Replacement of the lamps

- **Checks with analyzer turned-on**
  - ☐ Check the filters wheel homing signal(5V)
  - ☐ Check of the lamp voltage (5.9V)
  - ☐ Alignment of the lamps (340nM filter selected)
  - ☐ Check of the absorbance
  - ☐ Check of the flow-cell temperature

2.Hydraulic system

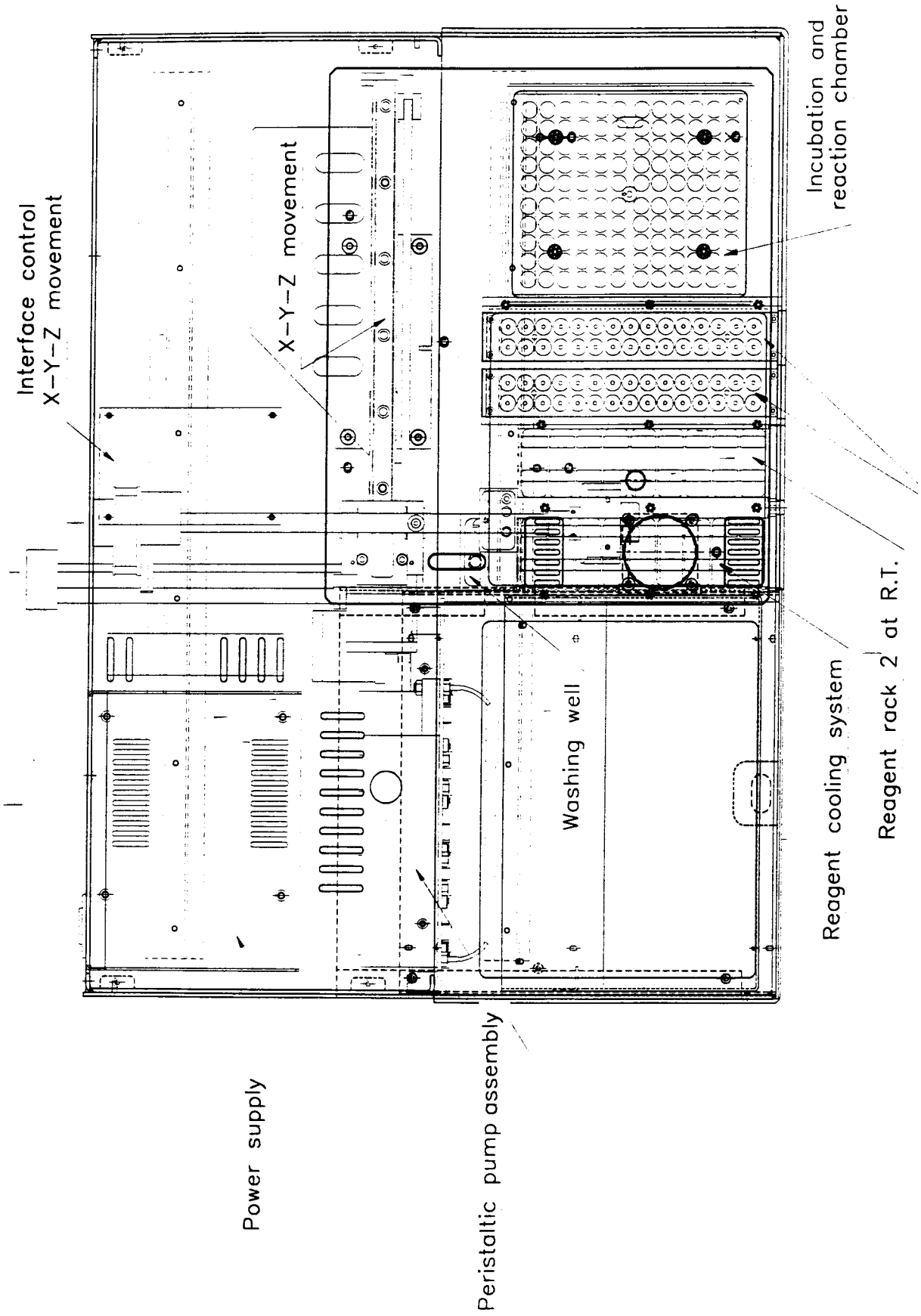
- ☐ Replacement of peristaltic pumps tube (once year)
- ☐ Full tubes replacement (every two years)
- ☐ Replacement of the syringe piston
- ☐ Cleaning of the washing and waste wells
- ☐ Check of the flow through the probes
- ☐ Check/adjustment of pump aspiration volume
- ☐ Check of liquid sensors (waste and wash)
- ☐ Check of the sensor level

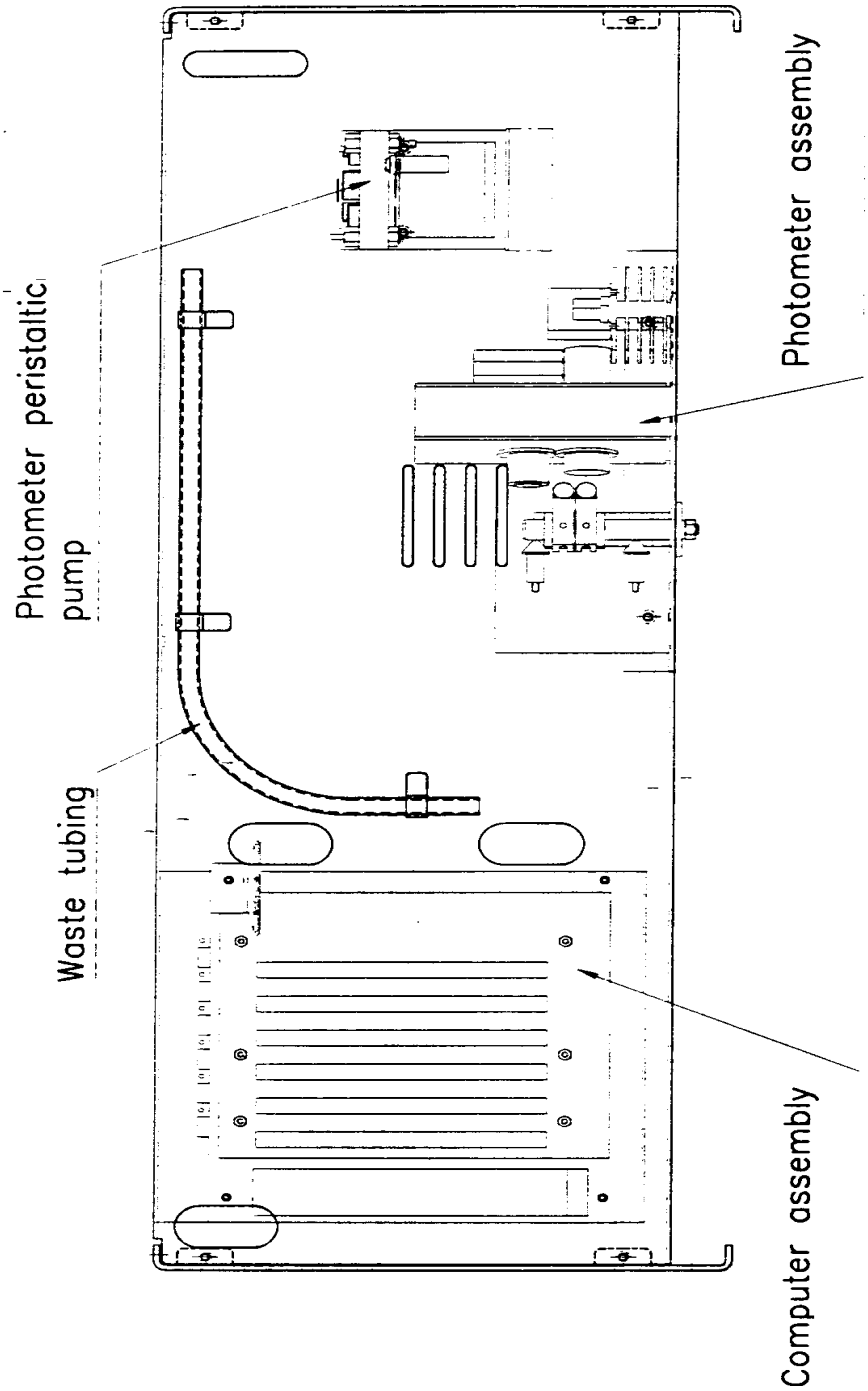
3. Mechanical system

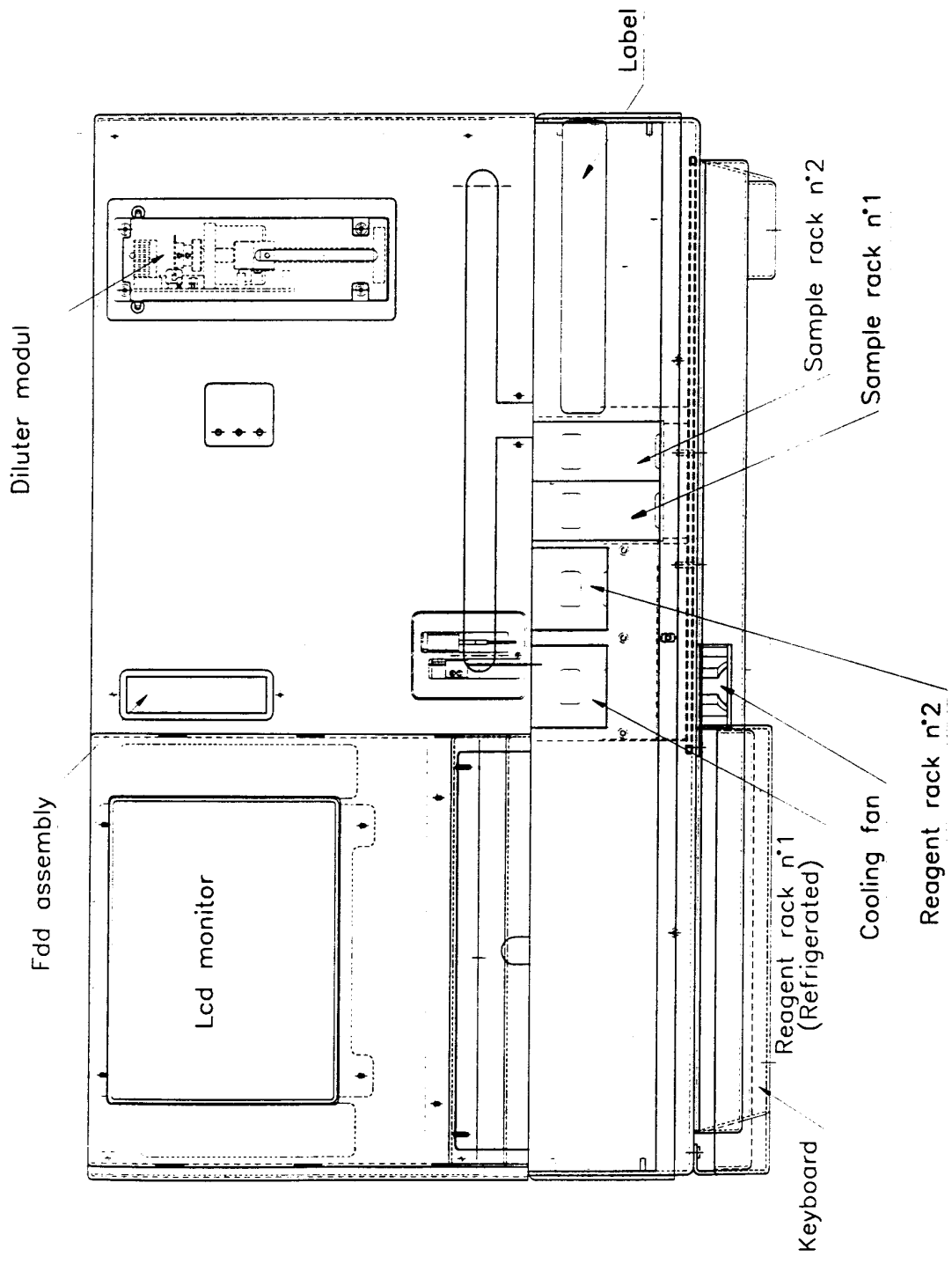
- ☐ Check and cleaning of Z axis mechanism
  - -cleaning of the two sliding axes
  - -cleaning of PC board
  - -cleaning of the two sliding contacts
- ☐ Check, cleaning and lubrication of Y axis mechanism
- ☐ Check and cleaning of X axis mechanism
- ☐ Check, cleaning and lubrication of dilutor screw
- ☐ Check of probes centring in the waste position
- ☐ Check of Z axis alignment
- ☐ Check of the probes positions in the reagent, sample and reaction area

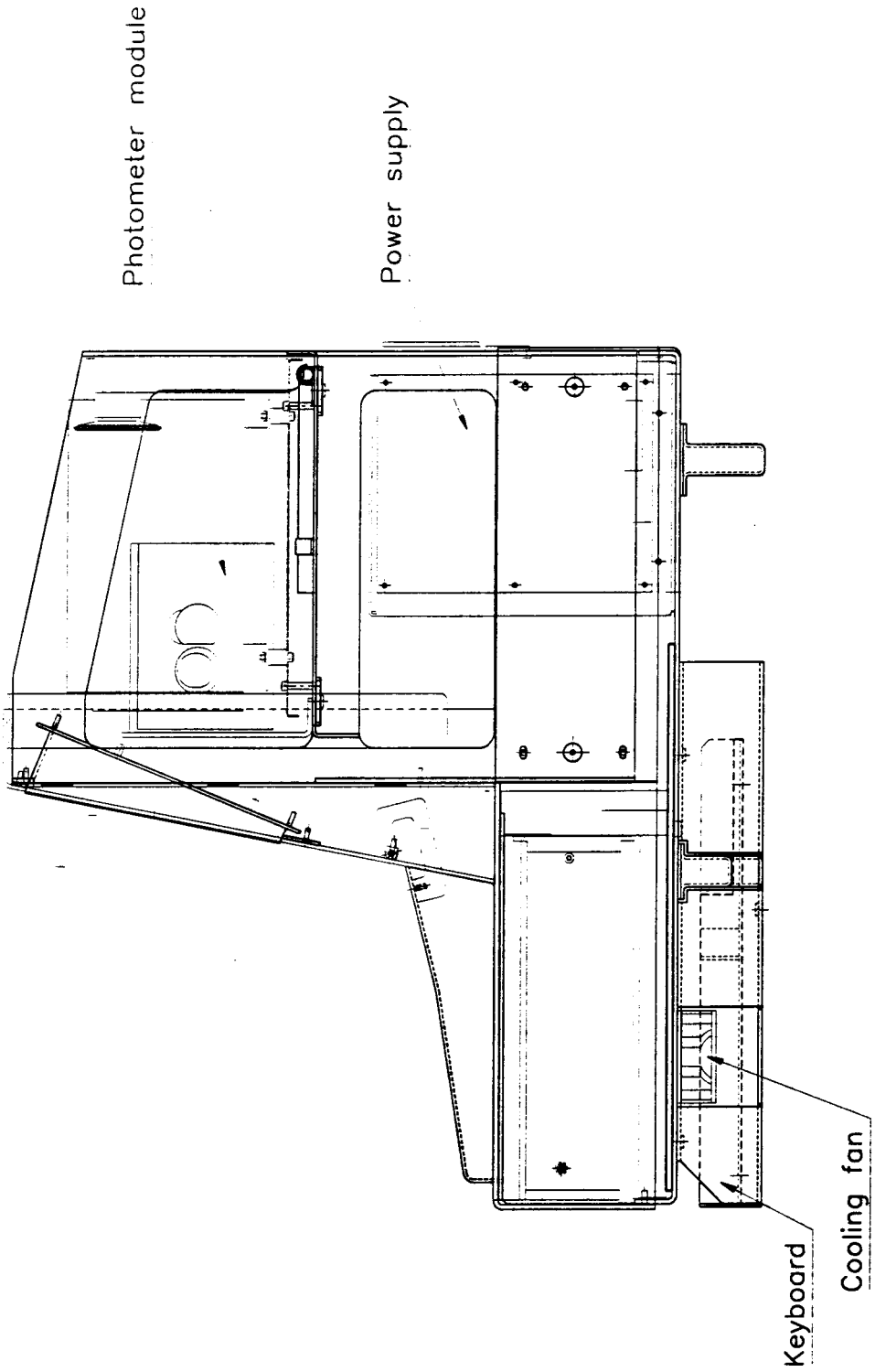
4. Control system

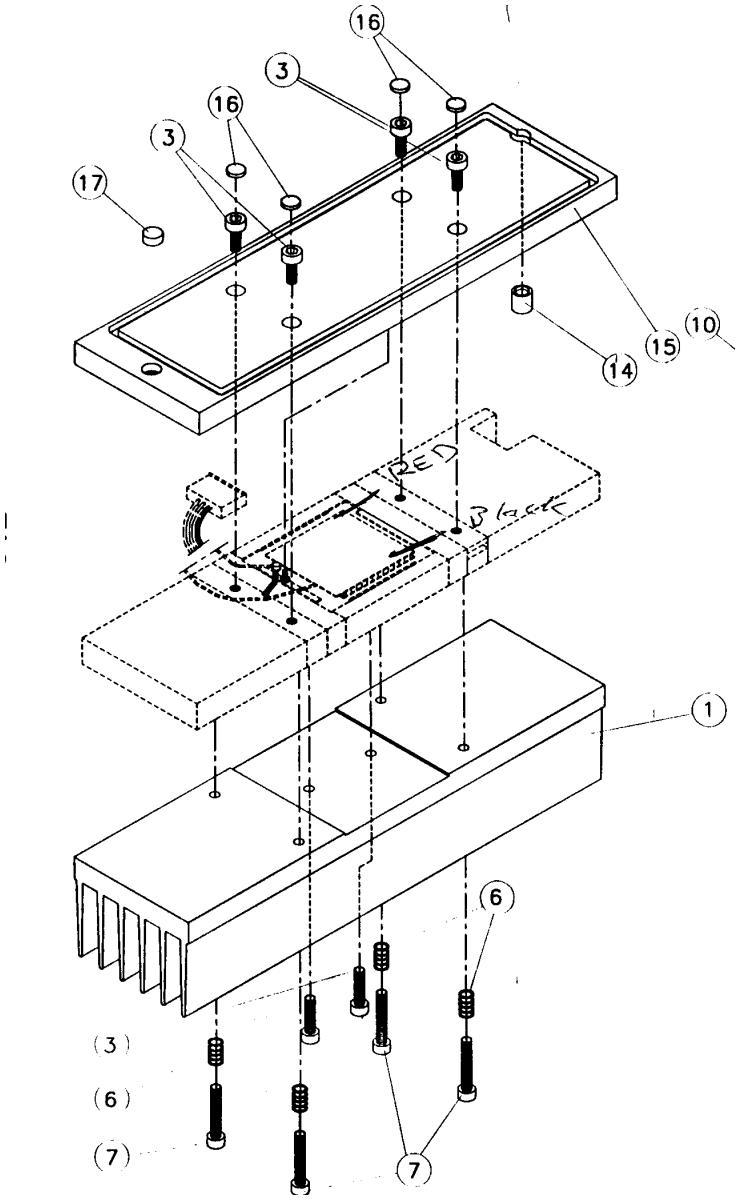
- ☐ Check of back-up battery voltage
- ☐ Check of CPU fan

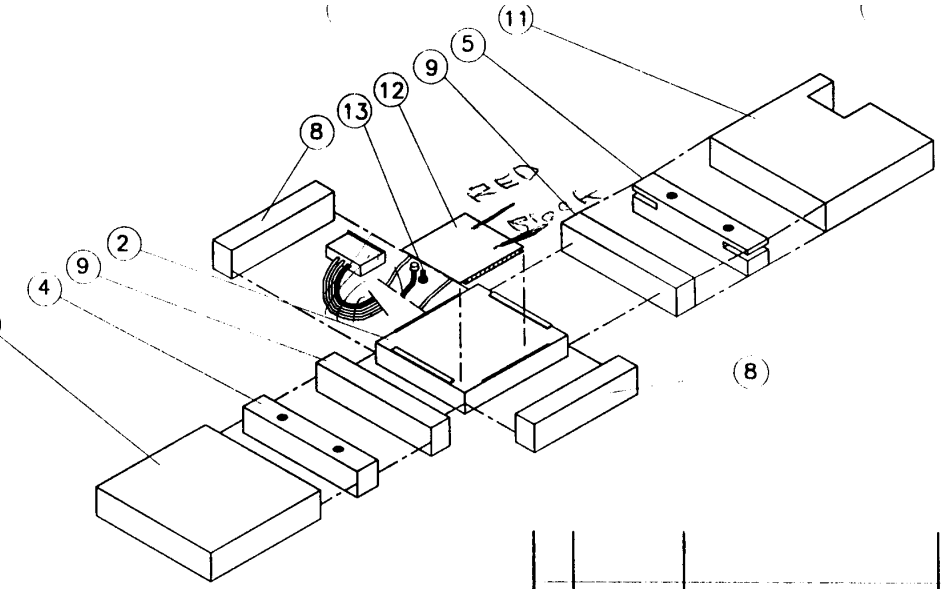

Interface control
X-Y-Z movement
X-Y-Z movement
Incubation and
reaction chamber
Reagent cooling system
Reagent rack 2 at R.T.
Washing well
Power supply
Peristaltic pump assembly


Photometer peristaltic pump
Photometer assembly
Waste tubing
Computer assembly

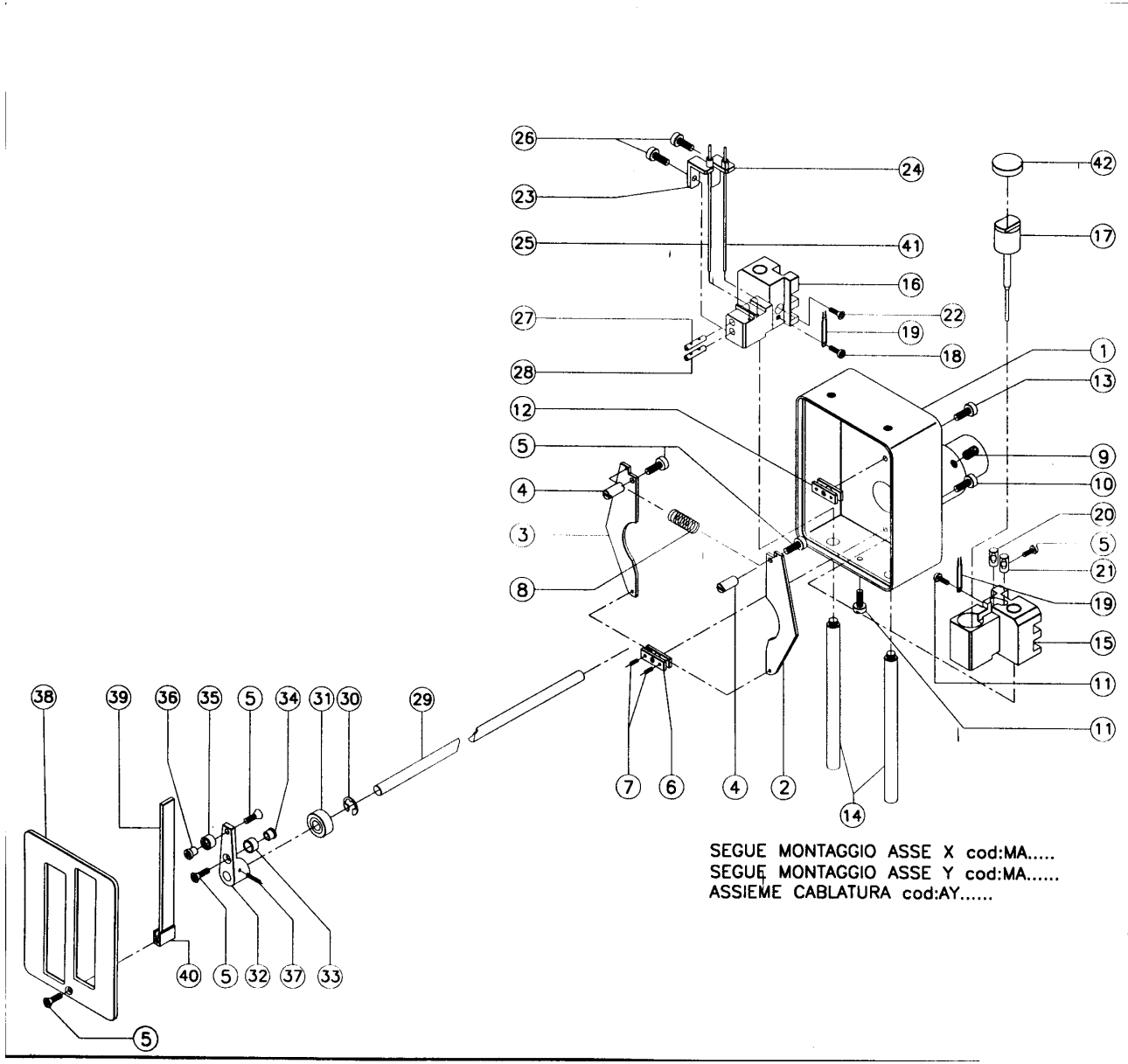

Label
Diluter modul
Sample rack n°2
Sample rack n°1
Fdd assembly
Lcd monitor
Reagent rack n°2
Cooling fan
Reagent rack n°1
(Refrigerated)
Keyboard


Photometer module
Power supply
Keyboard
Cooling fan

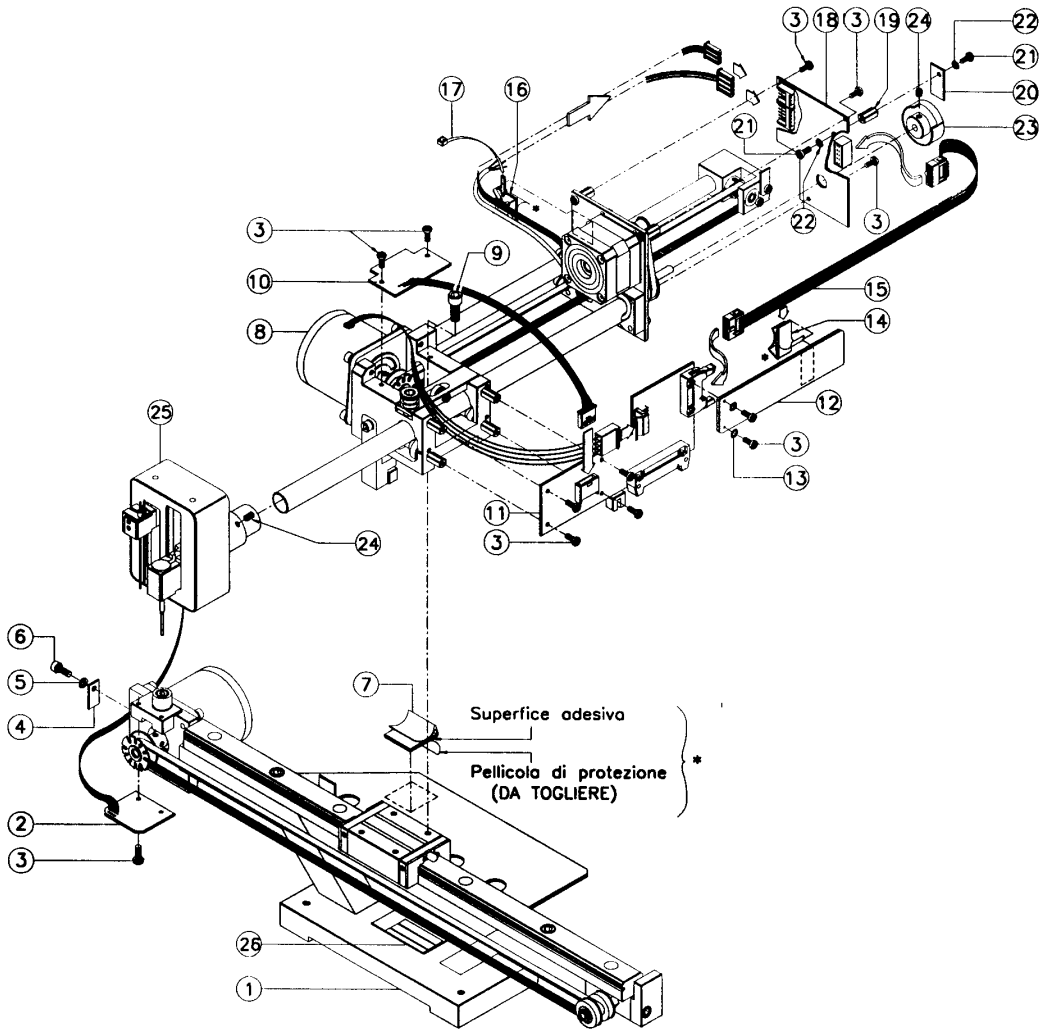




POS.	CODICE	DESCRIZIONE	Q.TA
17	282.009.030	CALAMITA ø8x3.6	1
16	MC0073.31	TAPPO PER VITI	4
15	MC0073.11	APPOGGIO RACK n°1	1
14	MC0073.21	SCARICO CONDENZA	1
13	230.313.154	VITE M2.5x4 TCC	1
12	EA0059.01	PELTIE'+SENSORE FRIGO	1
11	.....	COIBENT	1
10	.....	COIBENT	1
9	.....	COIBENT	2
8	.....	COIBENT	2
7	230.101.266	VITI M4x25 TCEI	4
6	A00361.01	MOLLA	4
5	MS0564.01	SUPP.FISS.DISSIPATORE ANT.	1
4	MS0565.01	SUPP.FISS.DISSIPATORE POST.	1
3	230.101.260	VITI M4x12 TCEI	6
2	MS0563.01	DISSIPATORE PELTIE' FRIGO	1
1	MS0562.01	DISSIPATORE	1



POS.	CODICE	DESCRIZIONE	Q.TA'
42	MS0118.01	TAPPO MIXER	1
41	A01115.01	AGO DI LETTURA	1
40	A01021.01	SUPPORTO CIRCUITO	1
39	A01035.01	CIRCUITO STAMPATO	1
38	A01022.01	COPERCHIO PER CUST.TESTA	1
37	256.131.079	SPINA ELASTICA ø1.5x10	1
36	A01017.01	PERNO PER BOCCOLA (SUP.)	1
35	A01018.01	BOCCOLA (SUPER.)	1
34	MS0115.01	PERNO PER BOCCOLA (INF.)	1
33	A01020.01	BOCCOLA (INFER.)	1
32	A01019.01	BIELLA	1
31	219.115.120	CUSCINETTO 625-2Z	1
30	237.101.040	ANELLO ELAST.TIPO SEGER	1
29	A01233.01	ALBERO TRASMIS.ASSE Z	1
28	A01031.01	CONTATTO INFERIORE	1
27	A01030.01	CONTATTO SUPERIORE	1
26	230.311.158	VITE M2.5x8 TCC INOX	2
25	A01353.01	AGO DI CAMPIONAMENTO	1
24	A01032.01	STAFFETTA DESTRA	1
23	A01033.01	STAFFETTA SINISTRA	1
22	230.343.158	VITE M2.5x8 TPSC	1
21	A01026.01	CONTATTO PER BOCCOLA	1
20	A01025.01	CONTATTO PER MOLLA	1
19	MC0051.01	CONTATTO DI SFIORAMENTO	2
18	230.313.158	VITE M2.5x8 TCC	1
17	EM0117.01	MOTOR-MIXER	1
16	A01024.01	BLOCCHETTO SINISTRO	1
15	A01023.01	BLOCCHETTO DESTRO	1
14	A01038.01	ALBERO PER BLOCCHETTO	2
13	230.313.156	VITE M2.5x6 TCC	1
12	A01037.01	SUPPORTO CAMS SUPER.	1
11	230.313.155	VITE M2.5x5 TCC	2
10	230.313.159	VITE M2.5x10 TCC	1
9	230.372.256	GRANO M4x6 SENZA PUNTA	2
8	A00884.01	MOLLA	1
7	256.131.073	SPINE ELASTICHE ø1.5x5	2
6	A01036.01	SUPPORTO CAMS INFER.	1
5	230.343.156	VITE M2.5x6 TPSC	6
4	A01016.01	PERNO PER CAMS	2
3	A01014.01	CAMS SINISTRA	1
2	A01015.01	CAMS DESTRA	1
1	A01013.01	CUSTODIA PER TESTA CAMP.	1



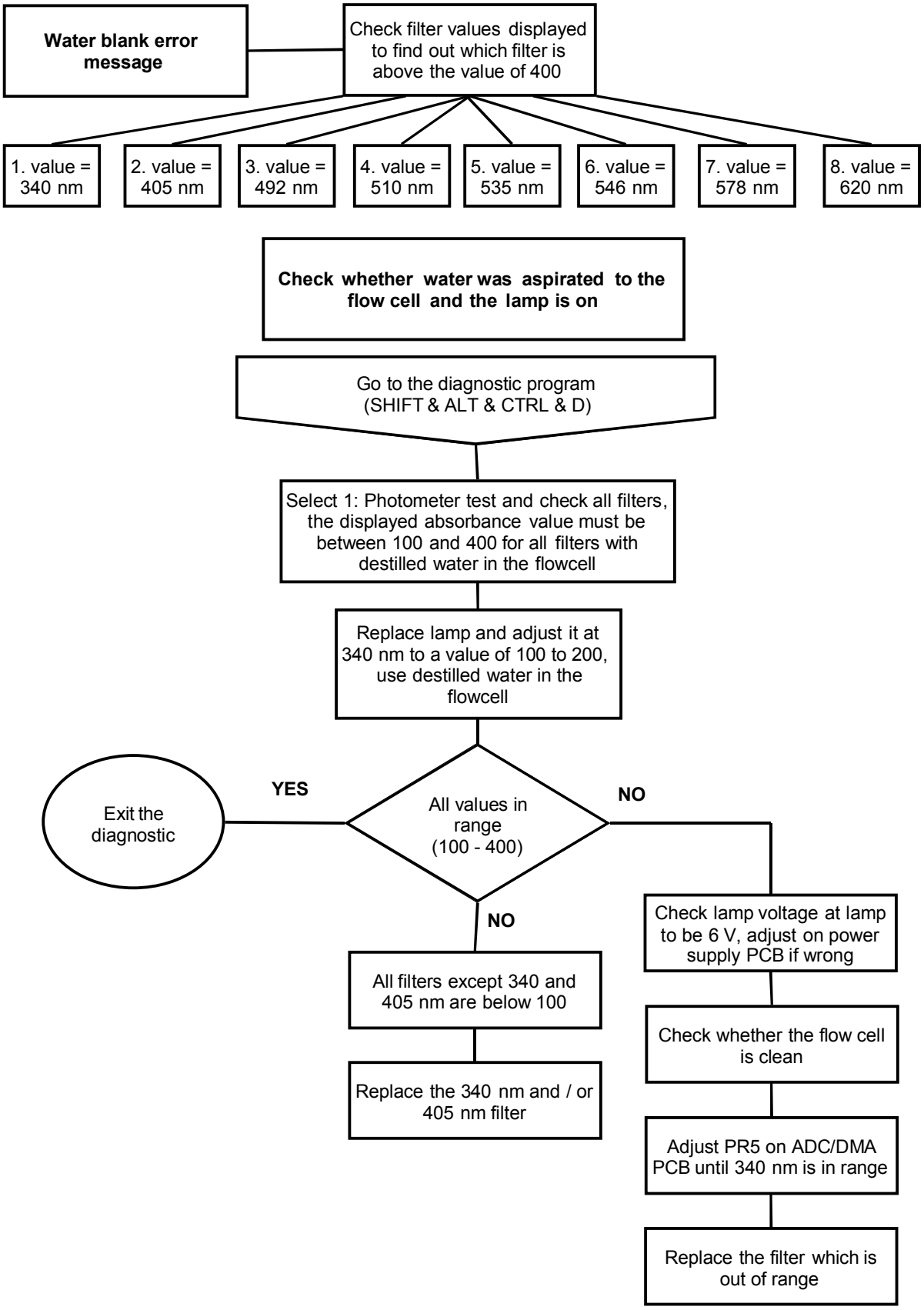
POS.	CODICE	DESCRIZIONE	Q.TA
26	PEL-15-Y1C-1	ETICHETTA 50x25	1
25	.....	ASSIEME ASSE Z	1
24	230.372.256	GRANO M4x6 SENZA PUNTA	3
23	A00628.01	RUOTA SYNC.	1
22	232.153.201	RONDELLA DENTATA ø3	2
21	230.313.208	VITE M3x8 TCC	2
20	MS0032.01	PIASTRINA FERMACAVO	1
19	A01236.01	DISTANZIALE H= 17,5	1
18	EB0145.01	SCHEDA CONTROLLO ASSE Z	1
17	276.010.010	FASCETTA	1
16	276.014.010	PIAZZOLA FERMACAVO	1
15	FC0010.01	CAVO FLAT ASSE Z	1
14	276.012.010	FERMACAVO (DIVISO IN 2pz)	1
13	232.104.201	RONDELLA PIANA ø3	2
12	MS0194.01	PROTEZIONE CAVO	1
11	EB0088.01	SCHEDA INTERFACCIA	1
10	A00681.02	SCHEDA RECUPERO OPTO	1
9	230.102.310	VITE M5x12 TCEI	4
8	.....	ASSIEME ASSE Y	1
7	276.016.012	FERMACAVO (INTERO)	1
6	230.102.258	VITE M4x8 TCEI	1
5	230.153.251	RONDELLA DENTATA ø4	1
4	MS0031.01	FERMACAVO	1
3	230.313.206	VITE M3x6 TCC	13
2	A00681.01	SCHEDA RECUPERO OPTO	1
1	.....	ASSIEME ASSE X	1

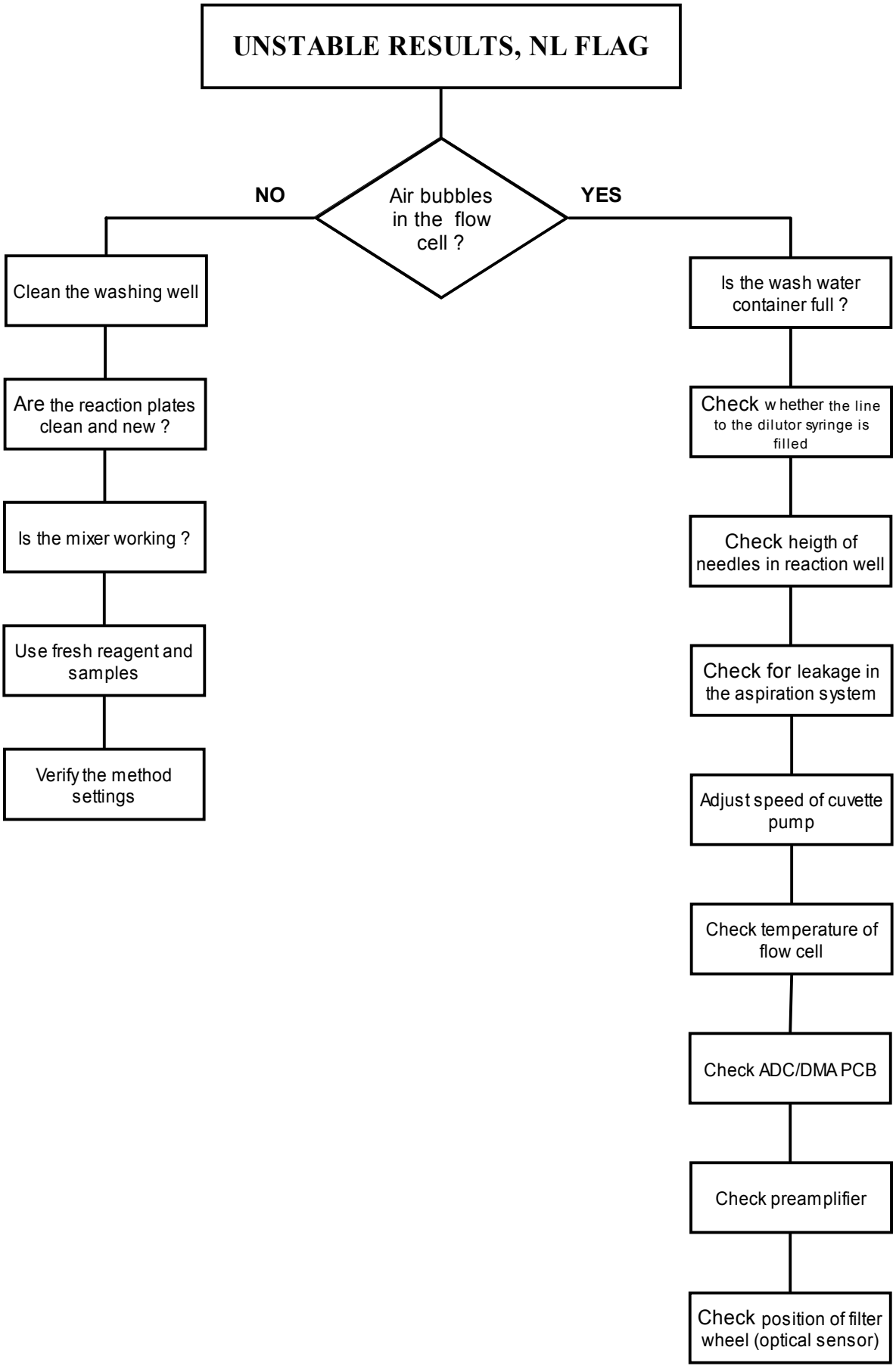
14. - TROUBLESHOOTING

14.1. - Troubleshooting guide

SYMPTOM	*CAUSES AND REMEDIES*
ANALYZER DOES NOT TURN-ON	-CHECK POWER SUPPLY CORD IF INSERTED -CHECK FUSES -CHECK FOR PROPER VOLTAGE
PHOTOMETER LAMP IS OFF	-CHECK POWER SUPPLY BEFORE CHANGING LAMP -IF COMPUTER AND INSTRUMENT ARE "ON" CHANGE LAMP
PROGRAM DOES NOT LOAD	-TURN.OFFTHE ANALYZER, WAIT FOR 10 SECONDS THEN TURN-ON AGAIN
PRINTER DOES NOT TURN-ON	-MAKE SURE THAT THE POWER CORD IS PLUGGED-IN -CHECK ON/OFF SWITCH -CHECK FUSES
PRINTER DOES NOT PRINT	-MAKE SURE IT IS SET "ON LINE"
WASHING WELL DOES NOT FILL	-MAKE SURE THERE IS WASHING SOLUTION IN THE CONTAINER -MAKE SURE THAT THE PERISTALTIC PUMP IS OPERATING PROPERLY -CHECK CONNECTING TUBING TO THE WELL
FLOW CELL DOES NOT FILL PROPERLY	-CHECK PERISTALTIC PUMP FOR PROPER OPERATION -CLEAN FLOW-CELL IT MAY BE DIRTY -CHANGE ASPIRATION TUBING IT MAY BE TORN -ASPIRATION TUBING TOO LONG OR TOO SHORT
PHOTOMETER DOES NOT READ	-CHECK IF THE PHOTOMETER LAMP IS ON -TRY TO READ ON ANOTHER WAWELENGTH -CHECK IF CHOPPER IS TURNING -CLEAN FLOW-CELL, IT MAY BE DIRTY
DILUTER MODULE STOPS	-TRY TO LUBRICATE THE SCREW WITH A BIT OF LUBRICATING GREASE -CLEAN SYRINGE WITH A GOOD LABORATORY DETERGENT -CHANGE SYRINGE
DILUTER DOES NOT ASPIRATE OR DISPENSE	-PINCHED OR TORN SYRINGE TUBING -LOOSE OR BADLY CONNECTED SAMPLING PROBE -BLOCKED SAMPLING PROBE; CLEAN OR REPLACE -CHECK WASH SOLUTION CONTAINER, FILL IF EMPTY -CHECK THE O'RING ON THE SYRINGE
SYRINGE HAS DIFFICULTY IN FILLING OR EMPTYING	-CHECK IF WASH SOLUTION IS ENOUGH -CHECK FOR LEAKING PISTON OR BLOCKED TUBING -REMOVE SYRINGE AND CLEAN IT
WATER BLANK HAS TOO HIGH ABSORBANCE	-AIR BUBBLE IN FLOW-CELL -REPLACE THE PHOTOMETER LAMP -CHECK PHOTOMETER LAMP ALIGNEMENT -CHECK WASH SOLUTION AND WASH FLOW-CELL -CHANGE WAWELENGTH AND TRY AGAIN; MAY BE A DIRTY FILTER -DIRTY OR OLD WASH SOLUTION; PREPARE FRESH

RESULT ARE NOT REPRODUCIBLE	-DIRTY REACTION PLATES; USE NEW ONES -SPORADIC AIR BUBBLES IN FLOW-CELL; CLEAN FLOW-CELL -CHECK ASPIRATION INTO THE FLOW-CELL, MAY BE TOO CRITICAL -USING TOO SMALL REAGENT VOLUME; INCREASE IT -CHANGE PHOTOMETER LAMP -DIRTY OR OLD WASH SOLUTION -BAD CONNECTION OR TORN ASPIRATION TUBE
APIRATION INTO FLOW-CELL IS NOT CONSTANT	-CHECK ASPIRATION PROBE FOR BLOCKAGE OR DIRT -CHECK PERISTALTIC PUMP TUBING; IT MAY NEED CHANGING -CHECK THAT THE BOTTOM OF THE REACTION PLATES IS PERFECT AND NOT DEFORMED
AIR BUBBLES ENTERING FLOW-CELL	-TORN OR IMPROPERLY CONNECTED TUBING BETWEEN ASPIRATION PROBE AND FLOW-CELL -ASPIRATION TUBING TOO LONG OR TOO SHORT FOR THE TOTAL VOLUME OF REAGENT USED IN THE TEST -MAKE SURE TO USE THE CORRECT CONNECTING TUBING
SERUM CONTROLS NOT WITHIN EXPECTED RANGE	-CHECK CONTROLS FOR EXPIRATION DATE -CHECK METHOD; IT MAY HAVE BEEN INADVERTENTLY REPROGAMMED -MAKE SURE THAT METHOD CONFORMS WITH REAGENT SUPPLIERS SPECIFICATION -RE-ASSAY BY AN ALTERNATE SYSTEM OR METHOD -CHECK TEMPERATURE BOTH INCUBATION AND ASPECIALLY FLOW-CELL; TRY ANOTHER REAGENT OR CONTROL
DILUTER SYRINGE DOES NOT MOVE UP AND DOWN REGULARLY	-PLACE A BIT OF LUBRICATING GREASE ON THE SCREW AND RESTART -DIRTY SYRINGE: CLEAN OR REPLACE -DIRTY PISTON: CLEAN OR REPLACE
SYRINGE LEAKS	-CHECK THE PISTON -CHECK THE O'RING ON THE SYRINGE -CHECK THE OUT-TUBING FOR BLOCKAGE -MAKE SURE SAMPLING PROBE IS NOT BLOCKED -CHANGE SYRINGE AND PISTON
THERE ARE BUBBLES INSIDE THE SYRINGE	-MAKE SURE THE PISTON IS TIGHT AND THERE ARE NO LEAKS -PUT SOME TWEEN 20 INTO THE WASH SOLUTION (ONE DROP PER 1 LITRE OF DISTILLED WATER) -MAKE SURE THAT THE INLET CONNECTION TO THE SYRINGE IS TIGHT -CHECK IF THE INLET TUBING IS TORN
SAMPLES ARE BEING CONTAMINATED	-SAMPLING PROBE IS LEAKING OR BADLY CONNECTED -CHANGE PROBE OR CLEAN IT PROPERLY -CLEAN WASHING WELL -MAKE SURE THAT THE WASTE IS PROPERLY ELIMINATED -MAKE SURE THAT THE WASH SOLUTION IS FRESHLY PREPARED AND NOT DIRTY -WASH FLOW-CELL WITH A DETERGENT SOLUTION
INCUBATION BLOCK IS NOT HEATING PROPERLY	-CHECK THE PROGRAMMED TEMPERATURE, IS IT ACTUALLY PROGRAMMED TO 37°C?


Water blank error message
Check filter values displayed to find out which filter is above the value of 400
1. value = 340 nm
2. value = 405 nm
3. value = 492 nm
4. value = 510 nm
5. value = 535 nm
6. value = 546 nm
7. value = 578 nm
8. value = 620 nm
Check whether water was aspirated to the flow cell and the lamp is on
Go to the diagnostic program (SHIFT & ALT & CTRL & D)
Select 1: Photometer test and check all filters, the displayed absorbance value must be between 100 and 400 for all filters with destilled water in the flowcell
Replace lamp and adjust it at 340 nm to a value of 100 to 200, use destilled water in the flowcell
All values in range (100 - 400)
YES
Exit the diagnostic
NO
NO
All filters except 340 and 405 nm are below 100
Replace the 340 nm and / or 405 nm filter
Check lamp voltage at lamp to be 6 V, adjust on power supply PCB if wrong
Check whether the flow cell is clean
Adjust PR5 on ADC/DMA PCB until 340 nm is in range
Replace the filter which is out of range


UNSTABLE RESULTS, NL FLAG
Air bubbles in the flow cell ?
NO
YES
Clean the washing well
Are the reaction plates clean and new ?
Is the mixer working ?
Use fresh reagent and samples
Verify the method settings
Is the wash water container full ?
Check whether the line to the dilutor syringe is filled
Check heigth of needles in reaction well
Check for leakage in the aspiration system
Adjust speed of cuvette pump
Check temperature of flow cell
Check ADC/DMA PCB
Check preamplifier
Check position of filter wheel (optical sensor)

14.2 - Hardware Errors

If during the analyzer working, a wrong position of the mechanical assembly takes place, on the screen will be showed one of the following error code. On end there is the list of more common error codes with their meaning.

Code	Message	Meaning
1024	ATTENTION: Positioning error X during motion.	Wrong positioning of X axis during the movement
1088	ATTENTION: Positioning error X during motion to home.	Wrong positioning of X axis when back home
2048	ATTENTION: Positioning error Y during motion	Wrong positioning of Y axis during the movement
2176	ATTENTION: Positioning error Y during motion to home	Wrong positioning of Y axis when back home
3264	ATTENTION: Positioning error X during motion to home, Y during motion to home.	Wrong positioning of X-Y axes when back home
4096	ATTENTION: Z status: 10	Transmission error between the CPU Pentium and the micro device of Z axis. This error is caused at 99% from the friction between the two probes and the sliding axes. With less probability, could be caused from the breaking of the flat cable FC0010.01
4097	ATTENTION: Z status: 10	Transmission error between the CPU Pentium and the micro device of Z axis.
4099	ATTENTION: Positioning error Z status NO response	Transmission error between the CPU Pentium and the micro device of Z axis. This error is caused from the software stop of Z axis micro device and very seldom from the breaking of the flat cable FC0010.01

15. SPARE PARTS AND ACCESSORIES

15.1. - ACCESSORIES HUMAN Cat.-No. 17800/1

HUMAN Cat.-No	Description
	SAMPLE CUPS (PKG OF 250 CUPS)
	REACTION PLATES (PKG OF 25 FOR 750 TESTS)
18720/50	CYLINDER & PISTON N°4
18720/17	REAGENT CONTAINER (32ML)
18270/3	ASPIRATION PROBE
18720/4	SAMPLING PROBE
18720/27	REAGENT CONTAINER (16ML)
17820/32	PHOTOMETER LAMP

15.2. - SPARE PARTS

HUMAN Cat.-No.	Description
17800/2	User Manual 900 S Plus
17800/3	Service Manual 900 S Plus
17800/4	Product Manual 900 S Plus
17810/10	VOLTAGE REGULATOR
17810/11	TRANSFORMER 350 VA
17810/12	POWERSUPPLY ASSEMBLY COMPLETE
17810/13	PLUGS AND BRAKER ASSEMBLY COMPLETE
17810/2	MICROPROCESSOR PENTIUM 100 Hz
17810/20	MONITOR LCD 640 x 480
17810/5	586 ISA BUS COMPUTER
17810/6	SIMM 4Mb
17810/7	6 SLOT ISA-BUS PASSIV BOARD
17810/8	INVERTER FOR LCD
17810/9	+5/+12V SWITCHING POWER SUPPLY
17820/1	MICRO FAN
17820/11	REAGENT SECTOR
17820/12	SAMPLE RACK 1-30
17820/13	SAMPLE RACK 31-60
17820/14	UNDERFLOW PLUG
17820/15	OVERFLOW PLUG
17820/16	WASTE WELL
17820/2	24V/65W SWITCHING POWER SUPPLY
17830	FLOW-CELL 50 UL
17840/3	DILUTER ASSEMBLY
17840/4	PHOTOMETRIC ASSEMBLY
17840/5	REFRIGERATOR MODULE
17840/6	PELTIER AND THERMOMETER FOR REFRIGERATOR
17850/10	ATTENUATORS DISKETTES SET
17850/13	POWER SUPPLY FILTER
17860	FLAT CABLE SET
1820/29	PREAMPLIFIER ASSEMBLY
HUMAN Cat.-No.	Description

18710/1	KEYBOARD
18710/10	PRINTER
18710/11	PRINTER CABLE
18710/12	PRINTER PAPER
18710/13	Printer Ribbon
18710/3	LOUDSPEAKER
18710/4	FLOPPY DISK DRIVER 1,44Mb 3,5"
18720/13	X-Y OPTORECOVER BOARD
18720/18	HEATING RESISTANCE 48V/50W
18720/20	PELTIER
18720/21	TEMPERATURE SENSOR TS1(incubator)
18720/22	TEMPERATURE SENSOR TS2 (flowcell)
18720/29	Preamplifier Assembly
18720/30	REACTION PLATE (100 pcs.)
18720/31	SAMPLE CUPS (2000 pcs.)
18720/50	Syringe & Piston for Dilutor
18720/62	Piston for Syringe
18720/7	ADC-DMA BOARD
18720/8	PREAMPLIFIER BOARD
18720/9	Driver & Control Stepper Motors
18730/1	QUARTZ LENS F=24
18730/3	Motor X - Axis
18730/4	Motor Y - Axis
18740/1	POWER SUPPLY CABLE
18740/2	Flat cable X-axis (W4)
18740/3	Flat cable Y-axis (W11)
18750/1	FILTER 340NM
18750/14	FUSE
18750/3	FILTER 405NM
18750/4	FILTER 492NM
18750/5	FILTER 510NM
18750/6	FILTER 535NM
18750/7	FILTER 546NM
18750/8	FILTER 578NM
18750/9	FILTER 620NM
18760/2	O-Ring for Syringe
17810/1	HARD DISK DRIVER 4.3 GB
18810/10	STEP MOTOR DRIVER BOARD
18810/11	Z-AXIS BOARD
18810/12	Peristaltic Pump Board
18810/4	Computer Power Supply
17810/50	I/O PORTS Version 2
18810/6	X-Y-Z AXES DRIVERS BOARD
18810/7	X-Y-Z INTERFACE BOARD
18810/8	Opto Dilutor Board
18810/9	PHOTOMETER INTERFACE BOARD
18820/10	Mixer Blade
18820/14	Tubing Kit complete
HUMAN Cat.-No.	Description
18820/15	WATER CONTAINER
18820/16	WASTE CONTAINER
18820/17	Reagent Container 32ml

18820/22	Sensor Wash Solution
18820/23	Sensor Waste Container
18820/27	Reagent Container 16ml
18820/3	Aspiration Probe
18820/30	Mixer Motor
18820/4	Sampling Probe
18820/5	Tubing Peristaltic Pump (4 pcs.)
18820/6	Adapter for Sample Cups
18820/7	WASHING WELL
18830/1	Mixer holder
18830/10	Mounting block for flowcell
18830/11	Spring loaded screw for flowcell
18830/2	Probes holder
18840/1	X-Y-Z ASSEMBLY
18840/10	Motor for Filterwheel
18840/11	PERISTALTIC PUMP FOR WASTE/WATER
18840/12	Motor Z - Axis
18840/2	INCUBATION CHAMBER ASSEMBLY
18840/4	Photometer Assembly
18840/6	PERISTALTIC PUMP FOR DILUTER
18840/6	Peristaltic Pump for Dilutor
18840/7	Chopper Motor
18840/8	PERISTALTIC PUMP FOR FLOW-CELL
18840/9	Motor for Peristaltic Pump Flow Cell
18850	Revolver with 8 filters
18850/1	Flat Cable Set
18850/2	Sensor Cable
18850/3	Extension cable probes to Z-Board
18850/4	Sliding contact for probes
18860/2	Hinges for Cover (2 pcs.)

List of micro-programmable devices

HUMAN Cat.-No.	Description	Device	Board	Layo. Ref.
17850/1	Photometer interface	ST62T10	EB0114.02	U2
17850/2	Z-axis control	ST62T10	EB0145.01	U1
17850/3	Power supply	16C711	EB0080.01	U9
17850/4	XYZ interface control	PALCE22V10H	EB0083.01	U1-U2
17850/5	Pump board	GAL16V8	EB0121.01	U2

AUTOHUMALYZER 900 S ^{Plus} Part Kits

HUMAN		
17802	**1**	**Maintenance Kit**
		2 X Photometer Lamp 1 X Aspiration Probe 1 X Sampling Probe 1 X O-Ring for Syringe 1 X Piston for Syringe 1 X Syringe with Piston 1 X Mixer Blade 1 X Tubing Kit complet 1 X Grease & Oil
17801	**1**	**Starter Spare Part Kit**
		1 X Service Manual 1 X User Manual 1 X Keyboard 1 X Peltier Element 1 X Temperature Sensor TS1 1 X Temperature Sensor TS2 1 X Flow Cell 1 X Fuse Box (10 pieces) 1 X Filter 340nm 1 X Filter 405nm 6 X Photometer Lamp 1 X Syringe with Piston 1 X Piston for Syringe 5 X O-Ring for Syringe 1 X Harddisk Drive with Software 1 X Peristaltic Pump Board 1 X Peristaltic Pump for Flow Cell 1 X Aspiration Probe 1 X Sampling Probe 5 X Mixer Blade 1 X Mixer Motor 1 X Sensor Wash Solution 1 X Sensor Waste Bottle 1 X Tubing Peristaltic Pump (4 pieces) 1 X Sensor Cable 1 X Flat Cable Set

Human
Gesellschaft für Biochemica
und Diagnostica mbH
Max-Planck-Ring 21 • D-65205 Wiesbaden
Germany
Telefon: +49 6122 9988 0
Telefax: +49 6122 9988 100

eMail: human@human.de
Internet: http://www.human.de

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