

V-9- The part number digits refer to the type and technical specification of the device.

V-10- The main group number /91/ is designated for passive components , such as : Resistors, etc...

V-11- The group digits refer to the class of passive devices such as :

91-00 to 21-xx-xxxx for resistors.

91-25 to 29-xx-xxxx for capacitors.

91-30 to 35-xx-xxxx for fuses and fuse holders.

91-36 to 39-xx-xxxx for switches.

V-12- The sub-group digits refer to the kind "materials, technology and some technical specifications" such as :

91-01-02-xxxx High stab. carbon film resistors , 0.5w, + 5%

91-02-04-xxxx Metal film resistors, 0.125w, + 1%

91-08-13-xxxx Ceramic wire wound resistors, 1w, +10%

91-25-30-xxxx Electrolytic capacitors, Wire indeed axial, 100v

91-27-00-xxxx Solid tantalum capacitors, 6.3 V, lead type

91-28-20-xxxx Metallic polyester film capacitors encapsulated,

axial leads 250V,

91-29-22-xxxx Disc ceramic capacitors , 25 V

V-13- The part number digits refer to the value , power rating voltage and tolerance.

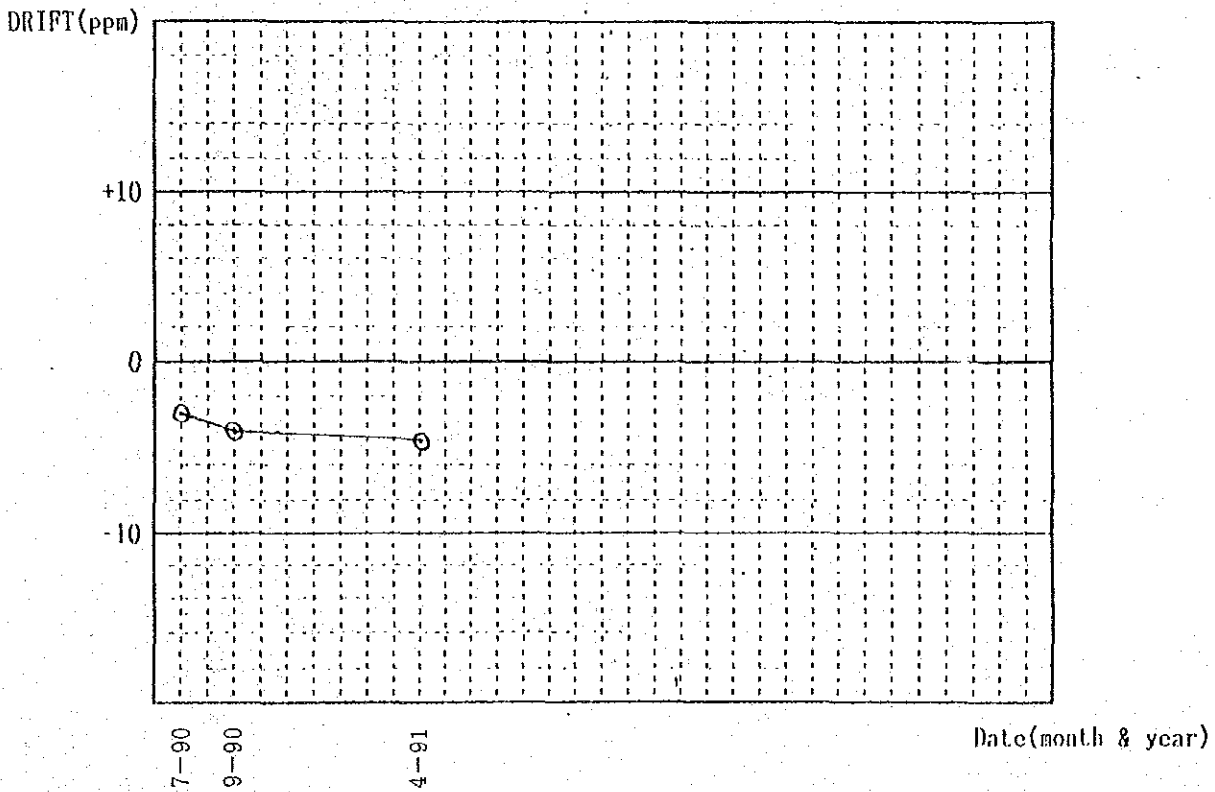
Attachment (2) : Historical Cards

DC & RC LAB

HISTORICAL CARD FOR

INSTRUMENT :standard resistor Type: 2794 S/No 59FU1002
 REG No:0004 LEVEL:Secondary Std
 REMARK:The intercomparison of this resistor was done by using DCCP 9975

CAL DATA	TEMP	SETTING RANGE	DRIFT (ppm)	UNCERTAINTY OF MEAS	ALLOWABLE LIMITS(± δ)
7-90	23	1Ω	-3 ppm	± 5 ppm	± 20 ppm
7-90	23		-4 ppm	± 5 ppm	
7-91	23		-4.4 ppm	± 5 ppm	



Attachment (3) : NSCL's Transfer Standards

N. S. C. L ' s TRANSFER STANDARDS

NO	TYPE	DESCRIPTION	Manufacturer	Qt	Sec
1	732A	DC Reference standard	Fluke	1	DC
2	2781 /1 Ω	Double-wall Standard Resistor	YCW	3	DC
3	1404A/1000PF	DRY-Nitrogen Standard Capacitor	G.R.	2	DC
4	540 B	AC-DC Transfer Standard	Fluk	1	AC
5		Current Shunt(1mA)	Fluke	1	AC
6	DT72	AC Voltage Divider, Decade Transformer	E.S.I.	1	AC
7	R800-1 RTD (PT-25)	Standard Temperature Sensor	Chino	2	TEM
8	C800-15	Thermocouple type "S"	Chino	2	TEM
9	Rb-1008C	Rubidium Frequency Standard	N.E.C	1	RF
10	ML8403A	Power Meter	Anritsu	1	RF
11	MA4601A	Power Sensor	Anritsu	2	RF
12	MA4702A	Power Sensor	Anritsu	2	RF
13	MP721A	3dB Attenuators	Anritsu	3	RF
14	MP721B	6dB Attenuators	Anritsu	3	RF
15	MP721C	10dB Attenuators	Anritsu	3	RF
16	MP721D	20dB Attenuators	Anritsu	3	RF
17	MP752A	Termination	Wiltron	3	RF
18	MP752B	Termination	Wiltron	3	RF
19	CG 5001	Programmable Calibration Generator	Tektronix	1	REP

**PS AC Power&Energy Transfer Standards are to be determined later.

**Attachment (4) : NSCL's Requirement for Mechanical &
Optical Standards.**

NSCL'S REQUIREMENTS
FOR
MECHANICAL & OPTICAL STANDARDS

SCIENTIFIC STUDIES & RESEARCH CENTER (SSRC)

NATIONAL STANDARDS & CALIBRATION LABORATORY (NSCL)

7-1991

I - Dimensional Laboratory

This laboratory will keep the National reference of length and will conduct precise measurements related to this quantity.

Environmental conditions:

Temperature	$20^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$
Humidity	$40\% \pm 10\%$
Cleanliness	particles which have $\phi = 0.5 \mu\text{m}$ or more are less than 1.3×10^6 per cubic meter
Light <illuminance >	800 lm/m ²
Pressure	Not controlled but measured

The equipment needed to fulfill those tasks are as shown in diagram -1- :

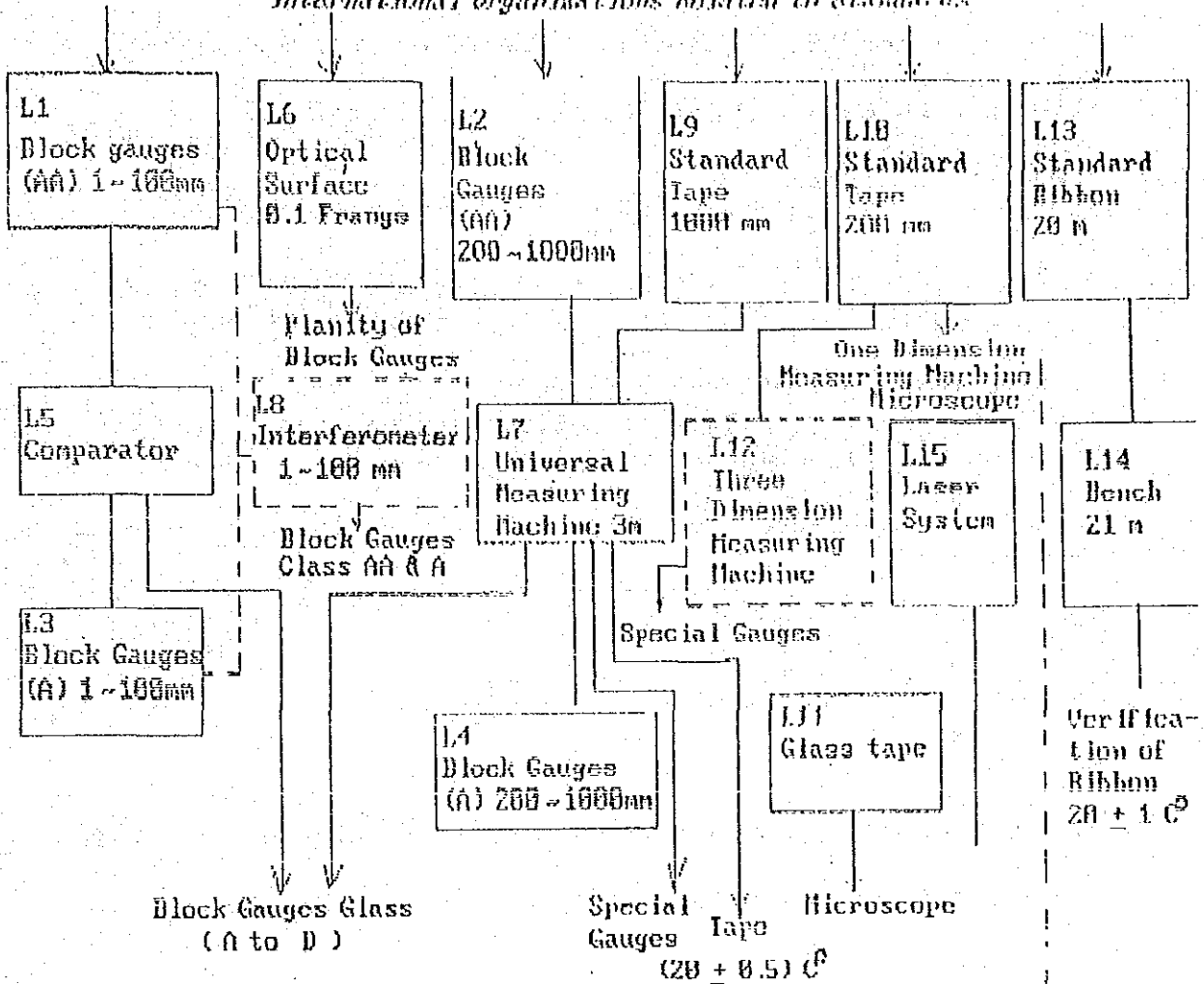
- L1 : A set of block gauges, class AA<00> , dimension <1 to 100 >mm to be used as reference < primary > standard.
- L2 : A set of block gauges / class AA , dimension <200,300,400,500>mm and 1000 mm < class A > to be used as reference < primary > standard.
- L3 : A set of block gauges, class A , dimension < 1 to 100 > mm; same composition of L1 . To be used as working < secondary > standard.
- L4 : A set of block gauges , class A , dimension <200,300,400,500,1000> mm. To be used as working < secondary > standard.
- L5 : Block gauges comparator, capacity maximal 100 mm, having a special mechanism to help the comparison of 5 points of the block gauge under test and standard

- ,with reading less than $0.1 \mu\text{m}$; with thermometer to measure between 15°C to 25°C with an accuracy of 0.1°C .
- L6 : Optical glass to verify the planarity of block gauges,diameter 60 mm , planarity better then 0.1 fringe of interference with monochromatic lamp to facilitate the observation of fringes.
- L7 : Universal measuring machine to compare block gauges by substitution; sensibility minimal $0.1 \mu\text{m}$. This machine may be combined with an internal standard tape at microscope of observation in order to use them in measuring tapes.
- L8 : Interferometer to control < calibrate > the standard block gauges < class AA>.
- L9 : National standard length 1 m. This tape must be divided every mm and calibrated for every cm.
- L10 :Standard tape , length 200 mm divided every mm.
- L11 :Glass tape including one division of 2 mm divided every 0.1 mm.
- L12 :Three dimensional measuring machine.
- L13 :Three standard Ribbon tape , length 20m ,divided every cm.
- L14: Special installation for the comparison of ribbon tapes.
- L15: Laser system ; like HP 5528 system to measure angle,speed and straightness.

In order to complete dimensional laboratory we propose the following measuring instruments and related devices.

- Set of gauge blocks , 100 to 200 mm , clas 00 and 0 .
- Sets of angle-gauge blocks , clas 00 and 0 .
- Sets of gauge pins .
- High precision setting ring gauges 1-400 mm.
- Control surface plates , class 00,0 and 1
- Surface roughness comparison standards
- High precision spirite levels.
- High precision height gauges and scribes.
- High precision surface roughness and form tester.
- High precision roundness and form measuring machine.
- Profile projector.
- Microscope and photomicrography.

International Organizations Related to Standards



1- Synoptic diagram of the equipment for a dimensional laboratory

II - Mass laboratory :

This laboratory will keep the standard of Mass and will conduct precision measurements related to this quantity.

Environmental conditions:

Temperature (23 ± 1) °C
Humidity (40-10) %
Cleanliness Particles which have $\phi = 0.5 \mu\text{m}$ or more are less than $1.3 \cdot 10^7$ particules per cubic meter
Light < illuminance > 800 lm/m²
pressure Not controlled but measured.

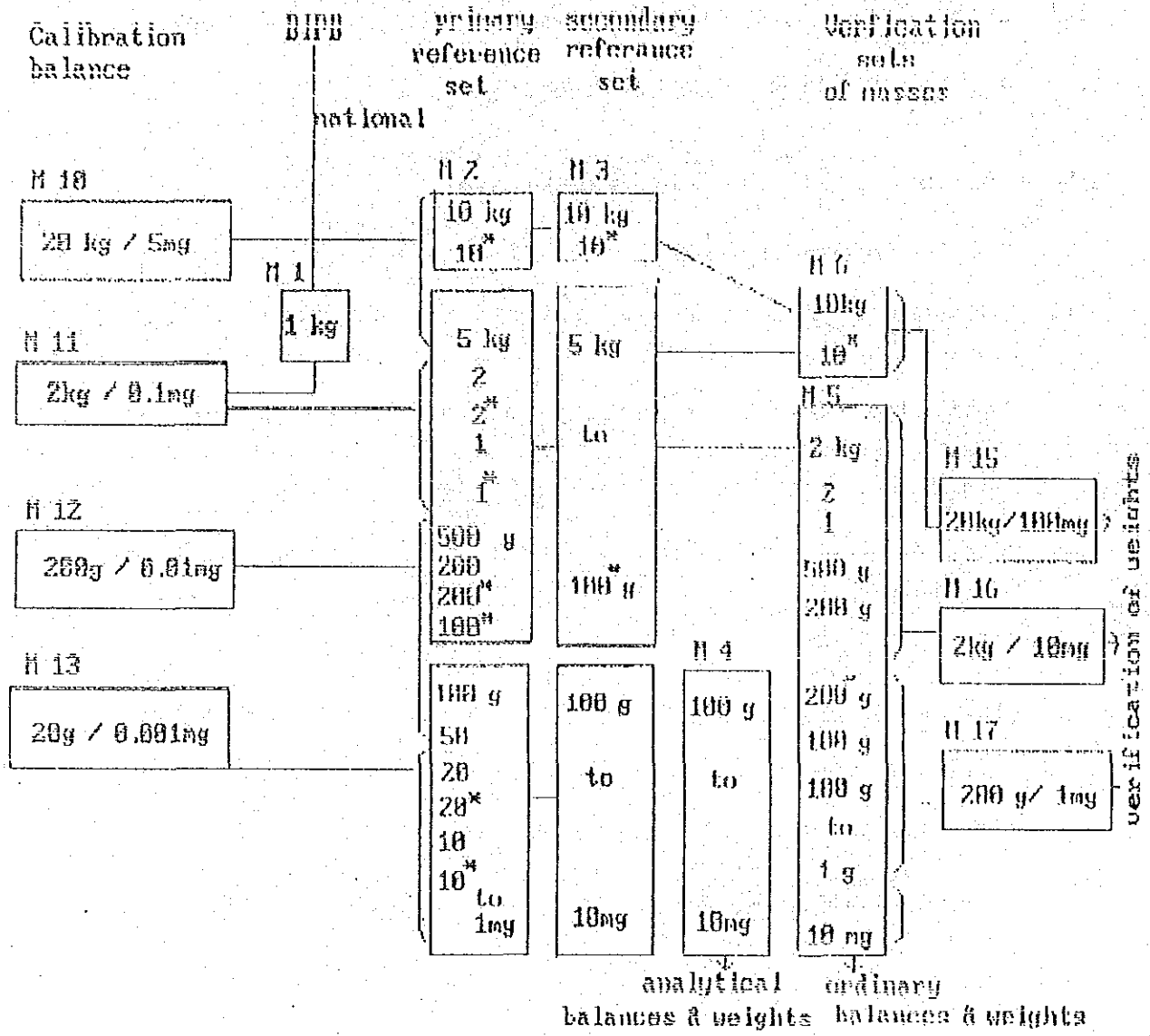
The diagram (2) shows the equipment needed to calibrate weights and balances. Here are some details describing those main instruments:

- M1 : National Standard ,1Kg.
- M2 : Reference < primary > set of mass from 1mg to 2x10Kg.
- M3 : Working < secondary > set of mass as M2.
- M4 : Set of mass for verifying analytical balances or others used in pharmacy industry and jewelry from 10mg to 100g.
- M5 : Set of mass ;10mg to 2x2 Kg to be used with M4.
- M6 : Mass to be used for verification.
- M10 : Balance for calibration ,capacity 20Kg
- M11 : Balance for calibration ;capacity 2Kg
- M12 : Balance for calibration ;type analytic,capacity total with sensible weight < 20,20g >.

M15 : Balance ; capacity 20Kg suitable for the verification
and adjustement of weights by comparison.

M16 : Balance ; capacity 2Kg suitable for the verification
and adjustment of weights by comparison.

M17 : Balance ; capacity 200Kg suitable for the verification
and adjustment of weights by comparison.



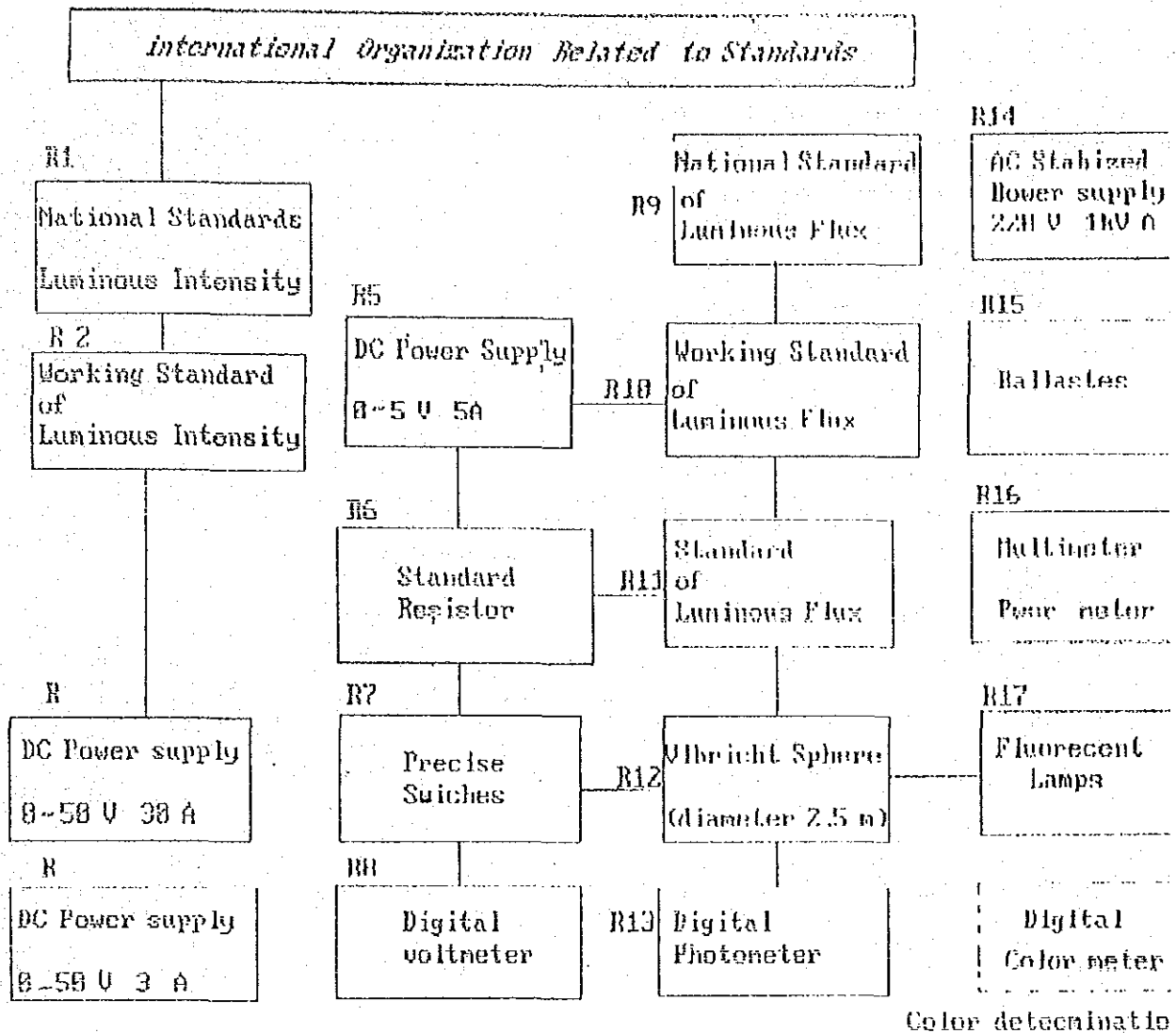
2- Synoptic diagram of the equipment needed for the calibration of weights and balances .

III - Optical laboratory :

This laboratory will keep the National Standards of Optical Quantities. It will conduct both photometric and radiometric measurements. The equipment needed for photometric calibrations are as given in diagram -3-. Here are some more specifications:

- R1 : 10 standard lamps of luminous intensity filled with gas, to be used at a color temperature around 2850 K. Five of them will constitute the national reference.
- R2 : Working standard lamps.
- R3 : Stabilized DC power supply < 0 to 50 V > ; current maximal 30 A; resolution 0.002V, stability better than 0.01% for one variation of 15% of the main AC.
- R4 : Optical bench with more than 3 holder of lamps, length 6m with a graduated tape. One holder must include x, y, z movement.
- R5 : Stabilized DC power supply < 0 to 250V > current maximal 5A, resolution 0.1 V; stability better than 0.01% for one variation of 15% of the main AC.
- R6 : A set of standard resistances; coldest by water; accuracy -0.01% ; nominal values:
- | | |
|-------|------|
| 0.001 | ;50A |
| 0.01 | ;10A |
| 0.1 | ;3 A |
- R7 : Switch selector ; 5 positions; isolation 1500 VDC.

- R8 : Digital voltmeter 6.5 digits; linearity better than 0.005%.
- R9 : 10 standard lamps of luminous flux; filled with gas, electric power 200 W 220 V.
- R10: 15 working standard lamps as R9.
- R11: Lamps, 25 to 500W chosen from general usage lamps.
- R12: Sphere of integration < sphere ulbricht > diameter 2.5 m, with accessories to support all type of lamps < incandescent, fluorescent >.
- R13: Digital photometer, with a set of filters in order to obtain a spectral response corresponding to V () established by the international commission on illumination < CIE >.
- R14 : Stabilized AC power supply, stability better than 0.01% for one variation of -10% of the main AC.
- R15 : Standard ballast to be used with fluorescent lamps.
- R16 : Voltmeter, Am meter and power meter.
- R17 : Fluorescent lamps.
- R18 : calorimeter to evaluate the three components corresponding to specifications of < CIE >.



3- Synoptic diagram of equipment needed for photometric calibration