A N N E X - 1 -

MEMBER LIST

Technical Guidance Team
on the Japanese Technical Cooperation
for the Establishment of National Standards and Calibration
Laboratory of the Scientific Studies and Research Centre

1. Team Leader	Muneshige Yamazaki	Managing Director, Mining and Industrial Development Cooperation Department, Japan International Cooperation Agency (JICA)
2. Technical Cooperation Planning	Hideo Tachibana	Senior Inspector for Electric Articles, Electric Power Technology Division, Agency of Natural Resources and Energy, Ministry of International Trade and Industry (MITI)
3. Calibration System	Toshio Kato	General Manager, Standards Laboratory, Corporate Quality Control Division, Yokogawa Electric Corporation
4. Measurement Standards	Yoshio Ikeda	Manager, Technical Management Section, Technical Division, Japan Electric Meters Inspection Corporation (JEMIC)
5. Project Coordinator	Satoru Takahashi	Staff, Technical Cooperation Division, Mining and Industrial Development Cooperation Department, Japan International Cooperation Agency (JICA)

SCIENTIFIC STUDIES AND RESEARCH CENTER
Meetings with JICA Delegation
9/2-17/2/1990

PARTICIPANTS

1) From JICA :

- Mr. YAMAZAKI	Head of Delegation
- Mr. TACHIBANA	(MITI)
- Mr. KATO	(YOKOGAWA)
- Mr. IKEDA	(JEMIC)
- Mr. TAKAHASHI	
- Mr. NOGUCHI	JICA EXPERT IN NSCL
- Mr. NAKASE	JICA EXPERT IN NSCL.

2) From SSRC:

- Dr. MRAYATI	Head of Electronic Institute
- Dr. AGHBAR	Director Of NSCL
- Dr. KUBEITARI	Assistant-Director of NSCL
- Dr. ABOU-SAMRA	Environmental LAb.
- Mrs. KALLAS	Scientific Cooperation Dept.

Note :

The following members could be called to meeting when discussing topics related to previous discussions and according to their specialization.

- Dr. ARMANAZI	Electronic Dept. SSRC
- ENG. M. ZAAWEET	NSCL.
- ASSIST ENG. A.KAROUNI	NSCL.

A N N E X - 2 -

ANNUAL WORK PLAN (FROM APRIL 1990 TO MARCH 1991)

CALENDED YEAR	1990			1991	
JAPANESE FISICAL YEAR	1990				1991
ITEM	4 ½ 6	7 2/4 9	10 ¾ 12	1 4/4 3	4 ½ 7
(Transfer of Technology)					
1. Operation of Calibration System					
2. Maintenance of Measuring Standards.					
3. Repair of Measuring Instruments.					
4. Control Of Measuring Instruments					
(Transfer Of Technology)					
Syrian side					
1. Maintenance of Facilities					
2. Allocation of Counterpart Personnel					
3. Preparation of A1 Forms for Dispatch of Japanese Experts.	—				
4. Preparation of A2-3 Forms for training Counterpart Personnel in Japan.		—			

ANNUAL WORK PLAN (FROM APRIL 1990 TO 1991)

CALENDER YEAR	1990												1991						
JAPANESE FISICAL YEAR	1990												1991						
ITEM	4	½	7	7		2/4	9	10	½	12	1	4/4	3	4	½	7			
Japanese side																			
1. Dispatch of Japanese Experts																			
a) Long-Term Experts.																			
1- Chief Adviser									(Rep lacement or Extention)										
2- Measurment Standards							*												
b) Short-Term Experts																			
1- DC. RC																			
2- AC. Repair																			
2. Acceptance of Syrian Counterpart Personnel in Japan.																			
1- Electric Power & Energy																			
2- Repair																			
3- RF																			
3. Provision of Equipment & Machinary.																			
1- DC (Primary)	△																		
2- RC (Primary)	△																		
3- AC (Primary)	△																		

Note : This plan is subject to condition that necessary budget will be acquired for the implementation of the project.
This plan is subject to change with in the scope of the record of discussions.

A N N E X - 3 -

M A I N N S C L A C H I E V E M E N T S

A N D A C T I V I T I E S D U R I N G 1 9 8 9.

Feb. 1990

C O N T E N T S

I - I N T R O D U C T I O N

This report is to describe the result of the implementation and transfer of Japanese technology through the NSCL project.

Japan International Co-operation Agency (JICA) decided in 1987 to implement this project which includes:

- Training of Syrian staff
- Required technical equipment and measuring instruments .
- Dispatch of Japanese experts.

Now after two and half years what happened?

The answer is very precise , 60 % of the total implementation schedule has been realized.

How the Syrian side is appreciating and profiting of this realization ?

What is the actual organization of NSCL ?

What are our future plans ?

Those questions as well as others will be raised and briefly dealed with through this report .

Doing so , we hope succeeding in clearing up our situation , in order to give birth to the invalauble advices of the Japanese JICA Guidance mission team .

II - NSCL ORGANIZATION & MANAGEMENT

NSCL organization is shown in figure -1-.The general director of SSRC and / or his deputy are directly involved in supervising the management commitee of NSCL .

This commitee is composed of the director of NSCL as a chairman and the membership of some representants of SSRC and NSCL .

In the other hand , the planning board is composed of the Japanese experts(team leader and long term expert) , the director of NSCL and the section chiefs.

Actually, NSCL has only one division (Electronic Div) composed of five sections:direct - current , alternative-current, Radio - frequency, Temperature and repair work-shop sections.

The list of NSCL staff is given here after.

Dr. Mansour (deputy general director) meets monthly and when needed) the Japanese experts with NSCL responsibles .

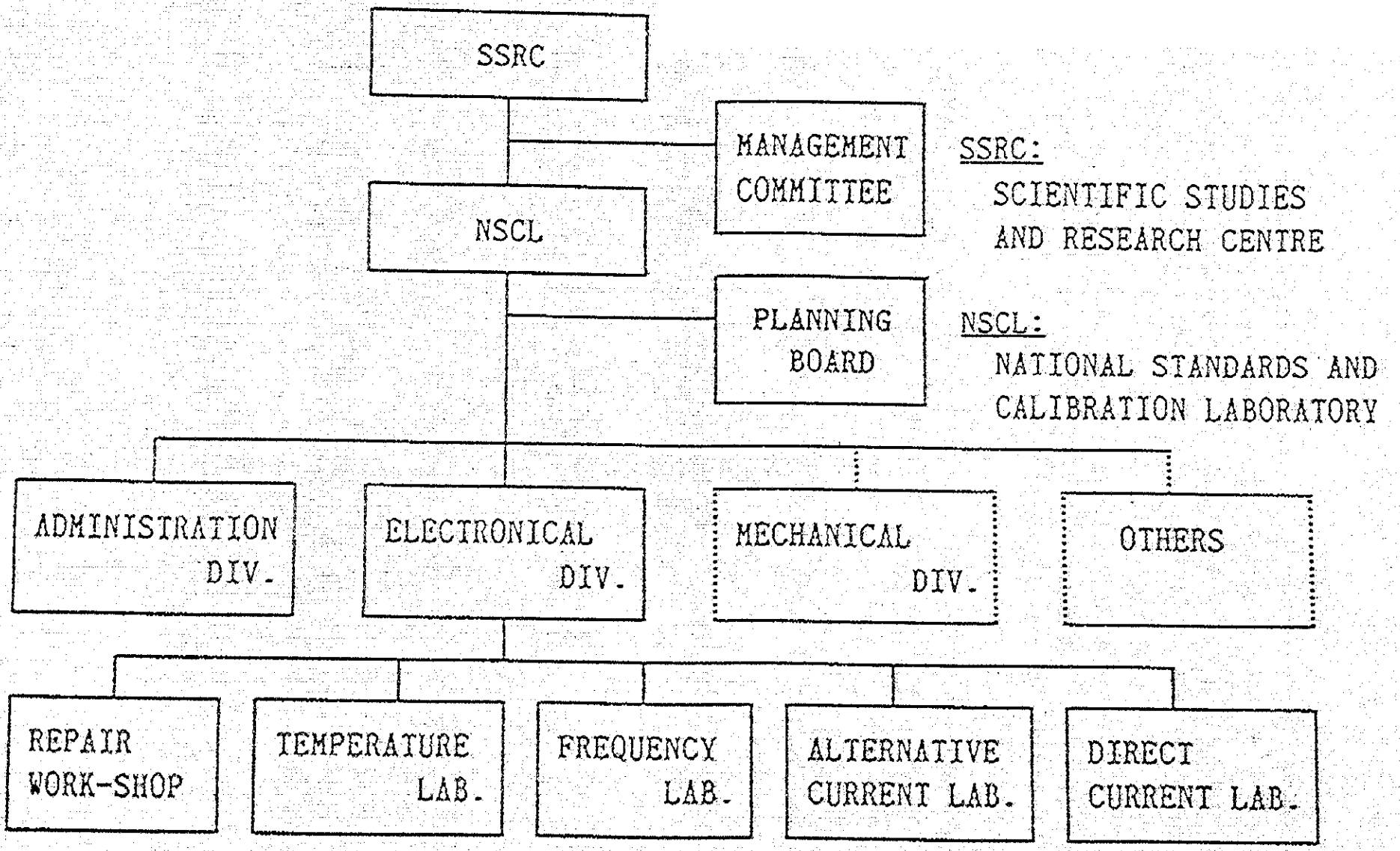


FIG. 1 NSCL ORGANIZATION

LIST OF NSCL PERSONNEL

Mr. M. Aghbar	Director
Mr. M. Kubeitari	Electronical div. manager
Mr. M. Haj Ibrahim	RF section chief
Mr. S. Hassan	RF section
Mr. M. Kashour	RF section
Mr. M.Z.Swed	RF section
Mr. M. Zaawite	AC section chief
Mr. M. Jumaa	AC section
Mr. K. Barakat	AC section
Mr. R. Ibrahim	Repair work-shop section chief
Mr. T. Haji	Repair work-shop section
Mr. N. Elias	Repair work-shop section
Mr. H. Khattab	Repair work-shop section
Mr. S. Amro	Repair work-shop section
Mr. M. Sharani	Repair work-shop section
Mr. K. Saadi	Repair work-shop section
Mr. A. Karouni	DC section chief
Mr. E. Salhani	DC section
Mr. W. Saadi	DC section
Mr. M. Hafiri	DC section
Mr. M. Harb	Tem. section chief
Mr. S. Akrami	Tem. section
Mr. A. Saada	Tem. section & store keeper
Mr. S. Mawlawi	Chief of adminstration
Mr. A. Zaitoun	Registration
Mrs. S. Shalati	Secretary
Miss.R. Safadi	Library
Mr. M. Sabeck	Store
Mr. B. Abou shanab	Driver
Mr. A. Amin	
Mr. A. Kaskus	

W E E K S C H E D U L E F O R . . . . L A B

d a t e / / 1990

L A S T W E E K FROM . .1990 TO . .1990						T H I S W E E K FROM . .1990 TO . .1990					
INSTRUMENT	TYPE	R	C	Q	LOC	INSTRUMENT	TYPE	R	C	Q	LOC
OTHERS WORKS						REQUEST					

Table -1- Week Schedule

RC - Laboratory

PROPERTY CONTROL NO.	Reg. No.	DESCRIPTION	MANUFACTURER	TYPE	S./ No.	Reg. DATE	WASTE DATE	REMARKS
8800120000	0010	1m ohm std resistor	Yokogawa	2792	28FS1041			
8800120001	0011	10m ohm = =	=	=	28FS2045			
8800120002	0012	100m = = =	=	=	28FS3048			
8800120003	0013	1 ohm = =	=	=	28FS4117			
8800120004	0014	10 ohm = =	=	=	28FS5049			
8800120005	0015	100 = = =	=	=	28FS6091			
8800120006	0016	1K ohm = =	=	=	28FS7043			
8800120007	0017	10K ohm = =	=	=	28FS8029			
8800130000	0018	100K ohm = =	=	=	28FS9020			
8800150000	0019	1M ohm = =	=	=	28FS0014			
8800150001	0020	10M ohm = =	=	=	28FS1401			
8804040001	0021	Decade resistance box =		2793-01	58FT0524			
8804040001	0022	= = =	=	2793-01	58FT0525			
8804040003	0023	= =	Portland Oregon	DB 62	2020688006 2D			
8804040003	0024	=	=	DB 62	2030688006 2D			
8804040002	0025	=	Yokogawa	2793-03	28FT1142			
8804040002	0026	=	=	2793-03	28FT1143			

Table -2- Property control

The planning board holds weekly meetings, during those meetings the work is assigned to working groups and the week schedule, table -1-, of each laboratory is examined.

III - INTERNAL REGULATION

NSCL adminstrative regulation is the same as applied in SSRC. But NSCL has some peculiarities such as management of standards.

Thus , our internal regulation will describe the methods and rules to do and to control NSCL internal job.

A such document is indispensable to garantee the certificate NSCL issuing.

We have prepared the first draft of this internal regulation which contains :

I - Introduction
II- Definitions
III- Organization
IV- Classification of NSCL's standards
V- Traceability
VI- Maintaining NSCL's standards
VII- Requirement for NSCL's standards
VIII-Request of standards

of course , more detailed discussion and practice are necessary before deciding a such important document.

IV - NSCL PROPERTY CONTROL

All NSCL assets (instruments, furniture, etc..) are submitted to control .IT is assumed periodically by SSRC staff according to the regulation in force . This regulation differs between technical and non technical equipment.

Technical equipment are classified and coded as shown in table -2- (which is only an example). Our technical instrumentation , whatever the level they have , are 10 % coded for property control.

As a matter of fact, every instrument must enter to the store (store keeper is responsible in front of our regulation) . Then it is placed to availability of users (laboratories).

V - D O C U M E N T S

Calibration works are carried according to specified procedures. The measured values are filled in certain processing sheet(table-3- shows an example) which facilitates the calculation of the final results. Those results are given in result sheets (table -4- shows an example) .

The certificate (table -5- shows an example) , when requested by our customers , contains also the appropriate result sheets.

NSCL began preparation of those documents (processing sheet , result sheet , adjustment procedure , and calibration procedure).

This work should be done for every measuring instrument.But , it is very important to finish our internal need before going towards our customers . Our actual situation is figured in table -6-.

VI - ACCURACY CHECKING OF MEASURING INSTRUMENTS

To test the accuracy of standards and calibration systems , individual measuring instruments of those systems are to be calibrated periodically.

Those instruments are classified to primary std, secondary std, tertiary std , measuring instruments and auxiliary . in order to easily distinguish them , colored ribon was sticked on every instrument.

Those instruments are also registred(coded) according to the following rules :

Registration number	Laboratory
From 1 to 300	DC
301 to 600	AC
601 to 900	Tem
901 to 1200	RF
1201 to 1600	Repair work-shop
1601 to 2000	Reserve

According to those information and some others obtained from manufacturer catalogues (calibration interval etc.) , every laboratory (DC,AC,Tem, Repair , RF) makes its special annual plan (table -7- is an example).

Those annual plans facilitate the management of each laboratory and determine exactly the due date of each instrument , regardless to which lab. it belongs.

Scientific Studies & Research Center
National Standard & Calibration Laboratory

Sheet ..1..of...3...
Issue No.:...1.....
Certificate No.:....

DC

PROCESSING RESULT SHEET

Description : Digital Multimeter
Manufacturer: YOKOGAWA
Type : 2501 A

Reg. No.:.0150.....
Serial No.:.48AA0066
Customer:.DC.lab....

1 - DC- Voltage

Range	Indicated Value	Reading DC-Voltage	ERROR 2552	ERROR 2745	ERROR residual voltage	ERROR total	Calculated Value	Actual Value
1000V	1000.000 V	1000.070	-20mV	0	+3mV	-17mV	1000.08	1000.087
DC-V	000.000	0.003mV						
100 V	100.0000	99.9996	-1.2mV	0	+0.3	-0.9mV	100.0005	100.0005
DC-V	00.0000	0.0003						
10 V	11.0000	11.00067	+30µV	0	+30µV	+60µV	11.00061	11.00061
DC V	10.0000	10.00064	+0µV	0	+30µV	+30µv	10.00061	10.00061
	9.00000	9.00061	-30µV	0	+30µV	0 µv	9.00061	9.00061
	8.00000	8.00057	-50µV	0	+30µV	-20µv	8.00059	8.00059
	7.00000	7.00000	-70µv	0	+30µv	-40µv	7.00057	7.00057
	6.00000	6.00048	-80µv	0	+30µv	-50µv	6.00053	6.00053
	5.00000	5.00042	-90µv	0	+30µv	-60µv	5.00048	5.00048
	4.00000	4.00035	-90µv	0	+30µv	-60µv	4.00041	4.00041
	3.00000	3.00028	-80	0	+30µv	-50µv	3.00033	3.00033
	2.00000	2.00018	-50	0	+30µv	-20µv	2.00020	2.00020
	1.00000	1.00007	-10µv	+30µv	+30µv	10µv	1.00006	1.00006
	0.90000	0.90008	-30µv	+20µv	0.00	-10µv	0.90009	0.90009
	0.80000	0.80007	-50µv	+20µv	0.00	-30µv	0.80010	0.80010
	0.70000	0.70007	-70µv	+20µv	0.00	-50µv	0.70012	0.70012
	0,60000	0.60006	-80µv	+20µv	0.00	-60µv	0.60012	0.60012
	0.50000	0.50005	-90µv	+20µv	0.00	-70µv	0.50012	0.50012
	0.40000	0.40004	-90µv	+20µv	0.00	-70µv	0.40011	0.40011
	0.30000	0.30003	-80µv	+20µv	0.00	-60µv	0.30009	0.30009
	0.20000	0.20002	-50µv	+20µv	0.00	-30µv	0.20005	0.20005
	0.10000	0.10001	-10µv	+20µv	0.00	+10µv	0.10000	0.10000
	0.09000	0.09001	-30µv	+70µv	0.00	+40µv	0.08997	0.08997
	0.08000	0.08001	-50µv	+70µv	0.00	+20µv	0.07999	0.07999
	0.07000	0.07001	-70µv	+70µv	0.00	0µv	0.07001	0.07001

Table-3-:Processing result sheet

Continuation of processing result sheet sheet 2 of 3

For Digital Multimeter type 2501 A Req. No.:

Range	Indicated Value	Reading DC-voltage Standard	Error 2552	Error 2746	Error residual voltage	Error Total	Calculated Value	Actual Value
	0.06000	+0.06001	-80µv	+70µv	0.00	-10µv	0.06002	0.06002
	0.05000	0.05001	-90µv	+70µv	0.00	-20µv	0.05003	0.05003
	0.04000	0.04001	-90µv	+70µv	0.00	-20µv	0.04003	0.04003
	0.03000	0.03001	-80µv	+70µv	0.00	-10µv	0.03002	0.03002
	0.02000	0.02001	-50µv	+70µv	0.00	+20µv	0.01999	0.01999
10 V	0.01000	0.01001	-10µv	+70µv	0.00	+60µv	0.00995	0.00995
DC	0.00900	0.00901	-30µv	-80µv	0.00	-110µv	0.00912	0.00912
	0.00500	0.00501	-90µv	-80µv	0.00	-170µv	0.00518	0.00518
	0.00100	0.00100	-10µv	-80µv	0.00	-90µv	0.00109	0.00109
	0.00090	0.00090	+2µv	-80µv	0.00	-78µv	0.000978	0.00098
	0.00050	0.00050	+2µv	-80µv	0.00	-78µv	0.000578	0.00058
	0.00010	0.00010	+2µv	-80µv	0.00	-78µv	0.000178	0.00018
0.	0.00009	0.00009	+2µv	-80µv	0.00	-78µv	0.000168	0.00017
10 V	0.00005	0.00005	+2 µv	-80µv	0.00	-78µv	0.000128	0.00013
DC-V	0.00001	0.00002	+2µv	-80µv	0.00	-78µv	0.000088	0.00009
	0.00000	0.00003						
10 V	10.00000	10.00065	0µv	0	+30µv	+30µv	10.00062	10.00062
DC-mV	0.00000	0.000031		0				
1 V	1000.000	1000.075	+2µv	0	+29µv	+31µv	1000.044	1000.04
DC-mV	000.000	000.029						
1 V	1000.000	1000.083	+2µv	0	+20µv	+22µv	1000.061	1000.06
DC-mV	000.000	000.020						
100mV	100.0000	100.0060	0µv	+20µv	+2.9µv	+22.9µv	99.9831	99.9831
DC-V	00.0000	0.0029						
10mV	10.0000	9.9930	0 µv	+20µv	+126µv	+146µv	9.847	9.8470
DCmV	0.0000	0.0126						

Note: The actual values do not include the value of the residual Voltage

Residual voltage: The voltage which is applied to the Input terminal. of the UUT to get Zero indication .

Cont. table -3-

Continuation of result sheet processing — sheet 3 of 3

Result sheet of Digital Multimeter Type 2501 A — Reg. No.

2 - Resistance :

Range	Indicated Value	Reading of 2501A	Nominal value std Resistor	Error			Calculated Value	Actual Value
				Std. Res.	residual	Total		
100M OHM	100.000M	99.9190	100M ohm	-70K	+0.0044	-0.0656	99.9846	99.985
	00.000	0.0044						
10 M OHM	10.0000M	9.99662	10 M ohm	+180ohm	+0.00043	+0.00061	9.99601	9.99601
	0.0000	0.000430						
1 M OHM	1000.00K	999.946	1 M ohm	0.043	+0.043	+0.043 9	99.903	999.903
	000.00	0.043						
100K OHM	100.000K	99.9976	100K ohm	+1.5ohm	0.0000	+0.0015	99.9961	99.9961
	00.000	0.0000						
10 K OHM	10.0000K	10.00012	10Kohm	+20mohm	0.00000	+0.0000	10.0001	10.0001
	0.0000	0.00000						
1 K OHM	1000.00	999.9928	1 Kohm	+2mohm	0.002	+0.004	999.9888	999.989
	000.00	0.002						
100 M	100.000	99.9928	100ohm	+ 1mohm	0.0017	+0.0027	99.9901	99.9901
	00.000	0.0017						

1

AC-power supply (220V +10%,50Hz+ 1Hz)

Date:..... Ambient:Temp.& Humid.:.....°C.....%

Inspector:..... Technical Manager :.....

Cont. Table -3-3

NATIONAL STANDARD & CALIBRATION LABORATORY

Sheet..1....Of...3....
Issue No.:.....1.....
Certificate No.:.....

R E S U L T S H E E T

Description : Precision Digital Multimeter
Manufacturer: YOKOKAWA
Type : 2501 A

Reg. No.:....0150.....
Serial No.:.48 AA 0066
Customer : .DC Lab.....

Calibration

1 - DC Voltage: Table -4- Result Sheet

Range	Indicated Value	Allowable Limits	Actual Value	
			Before	After
1000 V	1000.000 V	± 51 mV	1000 087	
100 V	100.0000 V	± 5.1 mV	100.0005	
10 V	11.00000	± 560 µV	11.00061	
(DC V)	10.00000	± 510 µV	10.00061	
	9.00000	± 460 µV	9.00061	
	8.00000	± 410 µV	8.00059	
	7.00000	± 360 µV	7.00057	
	6.00000	± 310 µV	6.00053	
	5.00000	± 260 µV	5.00048	
	4.00000	± 210 µV	4.00041	
	3.00000	± 160 µV	3.00033	
	2.00000	± 110 µV	2.00020	
	1.00000	± 60 µV	1.00006	
	0.90000	± 60 µV	0.90009	
	0.80000	± 50 µV	0.80010	
	0.70000	± 50 µV	0.70012	
	0.60000	± 40 µV	0.60012	
	0.50000	± 40 µV	0.50012	
	0.40000	± 30 µV	0.40011	
	0.30000	± 20 µV	0.30009	
	0.20000	± 20 µV	0.20005	
	0.10000	± 20 µV	0.10000	
	0.09000	± 15 µV	0.08997	
	0.08000	± 15 µV	0.07999	
	0.07000	± 14 µV	0.07001	
	0.06000	± 13 µV	0.06002	
	0.05000	± 13 µV	0.05003	
	0.04000	± 12 µV	0.04003	
	0.03000	± 11 µV	0.03002	
	0.02000	± 11 µV	0.01999	
	0.01000	± 10 µV	0.00995	
	0.00900	± 10 µV	0.00912	

Range	Indicated Value	Allowable Limits	Actual Value	
			Before	After
	0.00500	± 10 μV	0.00518	
	0.00100	± 10 μV	0.00109	
	0.00090	± 10 μV	0.00098	
	0.00050	± 10 μV	0.00058	
	0.00010	± 10 μV	0.00018	
	0.00009	± 10 μV	0.00017	
	0.00005	± 10 μV	0.00013	
	0.00001	± 10 μV	0.00009	
10 V (DCmV)	10.00000	± 510 μV	10.00062	
1 V (DC V)	1000.000 mV	± 51 μV	1000.045	
1 V (DC mV)	1000.000 mV	± 51 μV	1000.061	
100 mV (DC V)	100.000 mV	± 4 μV	99.9831	
10 mV (DC mV)	10.0000 mV	± 0.4 μV	9.8470	

Residual Voltage ;

" The voltage which is applied to the input terminals of the U.U.T to get zero indication".

1000 V Range----------

100 V Range----------

10V(DC.V) Range----------

10V(DC.mV) Range----------

1V(DC.V) Range----------

1 V(DC.MV) Range----------

100mV(DC V) Range----------

100mV(DC.mV)Range----------

10mV(DC.mV) Range----------

Note: The actual values do not include the value of the residual voltage.

Continuation of result sheet for sheet 3 of 3

Digital Multimeter type 2501 A Reg. No.:

2- Resistance:

Range	Indicated Value	Allowable Limits	Actual Value	
			Before	After
100 M	100.000 M	± 101 K OHM	99.985	
10 M	10.0000 M	± 1.1 K OHM	9.99601	
1 M	1000.00 K	± 0.04 K OHM	999.903	
100 K	100.000 K	± 3 OHM	99.9961	
10 K	10.0000 K	± 0.3 OHM	10.0001	
1 K	1 000.00	± 0.03 OHM	999.989	
100	100.000	± 0.005 OHM	99.9901	

Note: The actual values include the value of residual resistance.

Date:..... AC.power supply(220V±10%,50Hz±1Hz)

Ambient:Temp.&Humid.:...°C.....%

Inspector:..... Technical Manager :.....

Cont. Table -4-

National Standard
&
Calibration Lab

No _____

CALIBRATION CERTIFIGATE

for

Description _____ Manufactuer _____

Type _____ Serial Number _____

Requested by: _____

_____

_____

Results of calibration are given in attached result sheet

Date of issue _____

Certified by _____

N.S.C.L

This certificate include _____ pages.

NUMBER OF TECHNICAL DOCUMENTS TO BE DONE OR ALREADY DONE AS BY .07-02-1990

DOCUMENTS TO BE DONE												
LAB	AC		DC		TEM		RF		REP		OSC	
CAL/ADJ PROCEDURE	a	b	a	b	a	b	a	b	a	b	a	b
	2	-	8	14	-	1	33	-	2	-	-	-
FORMAT OF RESULT SHEET	2	-	7	10	-	1	-	1	-	-	-	-

DOCUMENTS ALREADY DONE																		
LAB	AC			DC			TEM			RF			REP			OSC		
CAL/ADJ PROCEDURE	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c
	7	2	3	14	3	1	9	-	2	12	5	10	6	-	15	2	-	-
RESULT SHEET	8	6	26	17	7	54	10	-	3	149	6	20	13	-	53	2	-	-

a- Number of technical documents for the instruments belonging to each mentioned labs in NSCL.

b- Number of technical document for the instruments concerning the other labs in NSCL.

c- Number of technical documents for the instruments belonging to the other company

Table (6) Technical documents

INSTRUMENTS		CALIBRATION INTERVAL	Reg. No.	1989												R E
TYPE	DESCRIPTION			1	2	3	4	5	6	7	8	9	10	11	12	
DATRON 4200 A	Autocal AC. Standard	3 months	0301													AC
Datron1281	Self Cal. Digital Multi-meter.	3 months	0302													AC
YEW 2792	Standard Resistor	6 months	0303													DC
YEW 2558	AC.Voltage Current Stand.	6 months.	0311													AC
YEW 2503	Digital AC Power meter	6 months	0312													AC
YEW 2243	Portable Current Transfor-mer.	3 Years	0313													AC
YEW 2243	Portable Current Transfor-met.	3 Years	0314													AC
YEW 2261	Portable Potential Trans-former.	3 Years	0315													AC
YEW 2262	Portable Potential Trans-former.	3 Years	0316													AC
YEW 2388	Frequency Transducer	6 months	0340													AC
YEW 2383	AC.Ampere Transducer 5A	6 months	0341													AC
YEW 2383	AC.Ampere Transducer 1A	6 months	0342													AC
YEW 2383	AC.Voltage Transducer 300 V	6 months	0343													AC
YEW 2383	AC.Voltage Transducer 150 V	6 months	0344													AC
KEITHLN CCU-1000	Single Phase Current Regulator.	1 Year	0325													AC
H.P 5316 B	Universal Counter	6 months	0324													RF
H.P 339 A	Distortion Measurements Set.	6 months	0326													AC.+RF.
YEW 3056	Pen Recorder	1Year	0328													DC
YEW 3664	Oscilloscope	6 months	0327													AC
YUTAKA 2510V-B-3	U.P.S.	1 Year	0332													AC
Yutaka SA 25005	AC Voltage Re Regulator	1 Year	0331													

After accomplishing the calibration of any instrument a calibration record is filled and filed in the appropriate laboratory.

NSCL's primary standards are actually calibrated in Japan , but checked in our laboratory to confirm their stability,the result are projected in a historical card (figure -2- is an example) .

VII - PRACTICE OF TROUBLE-SHOOTING, ADJUSTMENT AND CALIBRATION

NSCL staff began work after installation and know-how transfer realized by the Japanese short term experts.

The number of monthly repaired instruments is shown in figure -3-. The total number up to 31.01.1990 is 239 ; 5 belonging to NSCL 140 belonging to SSRC ; 94 belonging to other ministries or organizations.

The list (here-after) mentions the main type of instruments or devices already repaired.

In general 80% of the applied instruments for repair were repaired The most important reasons we failed in repairing those 20% are:

Lack of spare parts
Lack of service manuals
Lack of extention boards

This general result convinced us that we have , at least for NSCL instruments, to try to do our best in repairing before sending the instrument for repair in foreign country.

In order to improve the capability of our staff we need:

- Text books
- Data books
- More training in Japan
- Facility to obtain spare parts
- Some more instruments

Repair work-shop is accepting actually , for repair , very few medical or scientific instruments , because the instrumentation we have is fitted mainly for repairing electronic measuring instruments. So, it could be very useful if you could extend this capability for scientific instruments and Audio-visual.

National standard & calibration laboratory
DC, and RC, laboratory

HISTORICL CARD FOR

INSTRUMENT.....2552 DC Voltage standard.....
REG N° .....0161.... LEVEL.secondary...REMARK.....
.....

CAL DATE month	TEMP °C	SETTING RANGE	D R I F T (P.P.M)	UNCERTAINTY OF MEAS	ALLOWABLE LIMITS(± δ) PPM
89/4	23	10 V	- 32.15	11.74 PPM	55
89/5			- 34.78	11.84	
89/8			- 40.8	11.73	
89/9			- 42.33	11.75	
89/10			- 45.42	11.66	
89.11			- 47.94	11.81	
89/12			- 47.61	11.63	

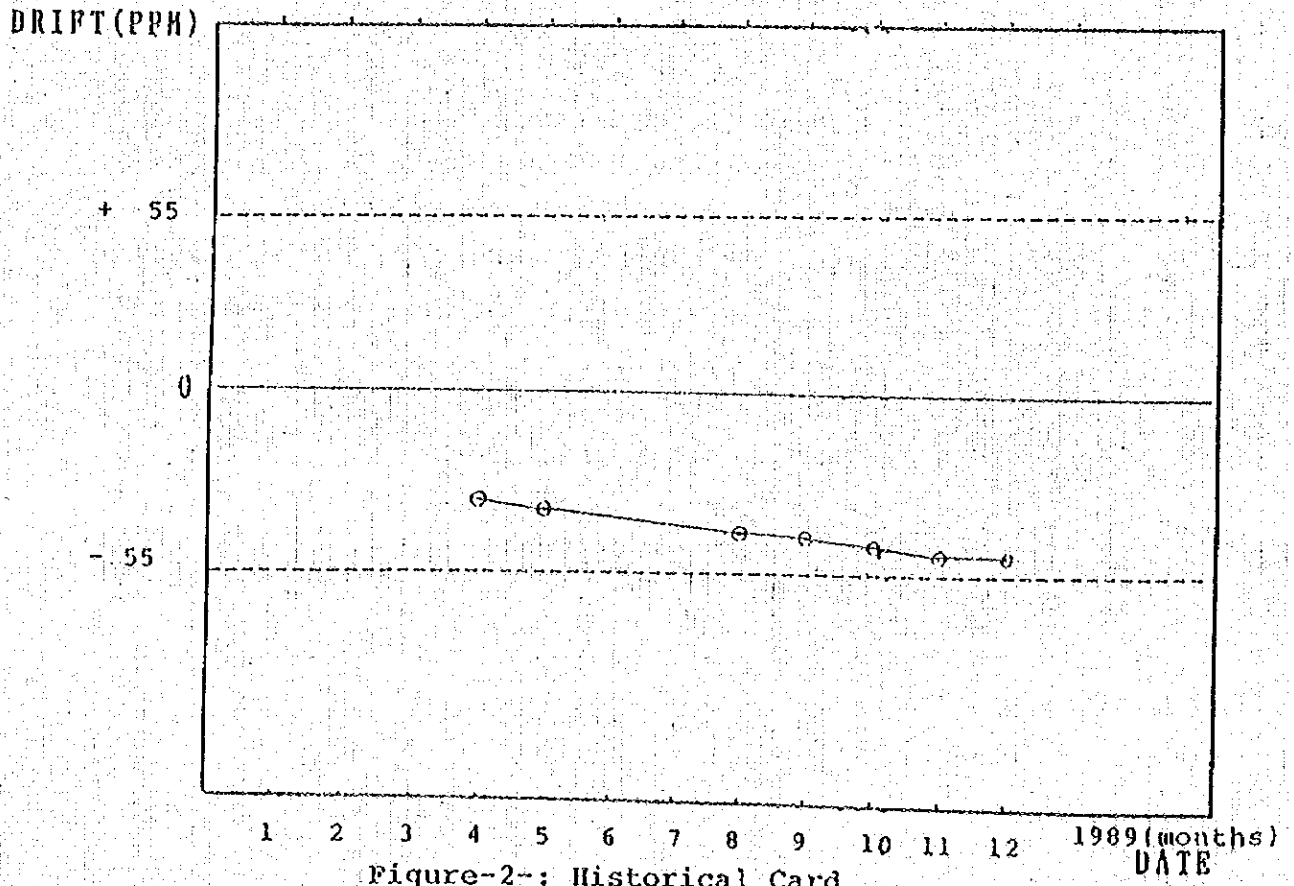


Figure-2-: Historical Card

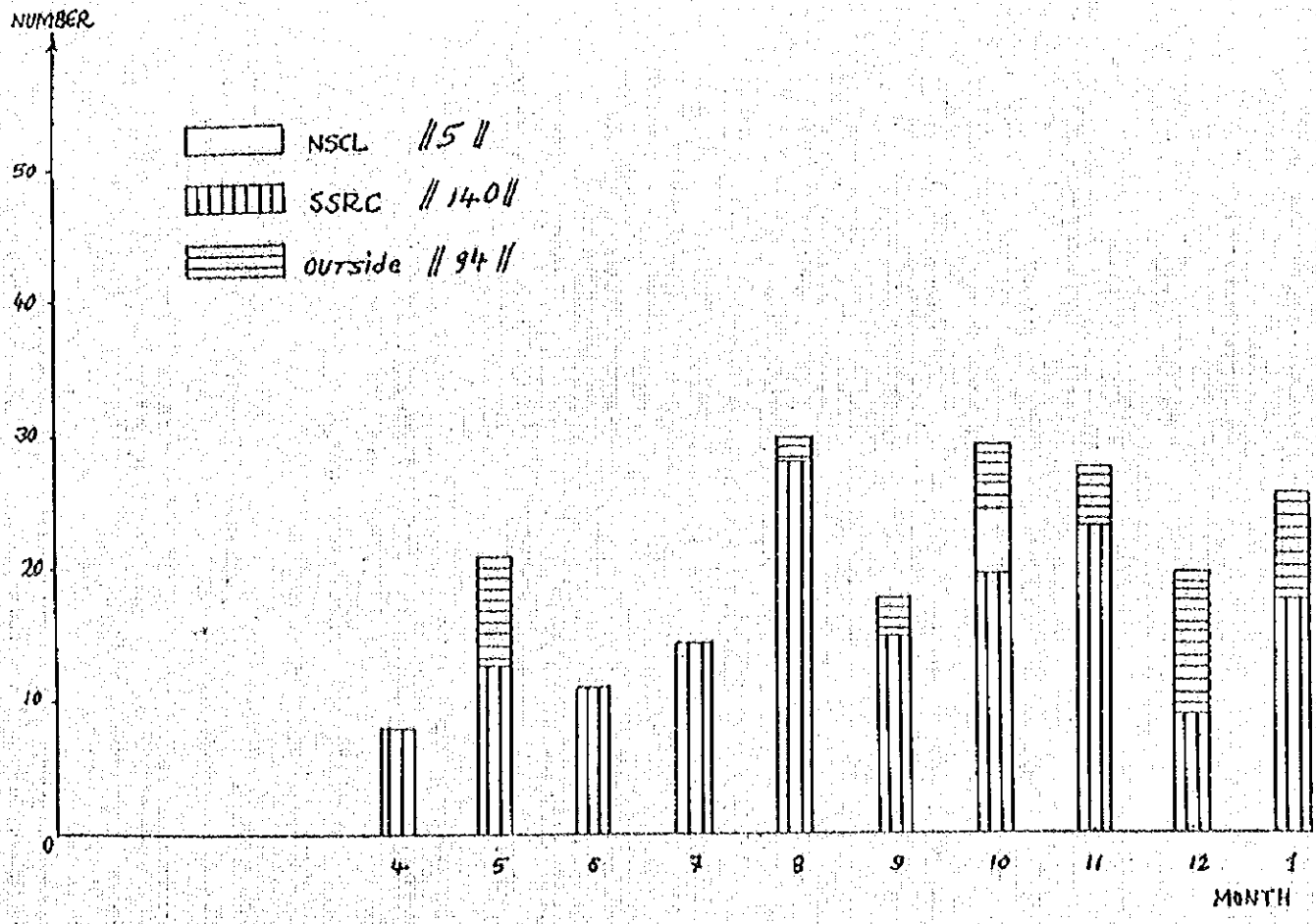


Figure 3.1 NUMBER OF REPAIRED INSTRUMENTS

KINDS OF SCIENTIC INSTRUMENTS REPAIRED IN NSCL UP TO 31/1/1990

1 - Spectro photometer
2 - Absorbance monitor
3 - Pulse amplifier
4 - X.Y Recorder
5 - Gas chromatograph
6 - Electronic balance meter
7 - Hydraulic dynamo-meter
8 - Photo meter
9 - Ultrasonic meter
10- Timer clock recorder
11- Electronic oil Heater
12- Stirer water bath
13- Computer monitor
- Disc driver
14- Ultracentrifuge
15- PH - meter
16- Data control console
17- Printer
18- Compressor

Figure -4- shows the number of monthly calibrated instruments.

The total number up to 31.01.1990 is 1042 ; 536 belonging to NSCL ; 394 belonging to SSRC ; 112 belonging to outside.

The list (here-after) includes the main types of instruments already calibrated. More than 50% of calibrated instruments have been adjusted (excluding NSCL instruments).

In the begining of NSCL works we chose to carry on our works mainly on NSCL and SSRC instruments , to insure that we went beyond apprenticeship. So the number of calibrated instruments belonging to outside is increasing .

VIII - OTHERS ACTIVITIES

As a matter of fact , NSCL still needs to make advertising.

To accomplish this duty we are trying several ways :

1- Almost all foreign mission visiting SSRC are guided to NSCL.

2- Personnel contacts ,

Every one from NSCL or SSRC is summerizing-personally to his colleagues from others institutions or private companies , the role of NSCL.

3- Open house

From 5-8/11/1989NSCL opened the house to visitors , after official invitation to some tens of public organizations.

The total number of visitors was around three hundred.

Thanks to a special questionaire we could know the opinion of the visitors which was very favourable.

4- General lecture:up to now several SSRC staff made up general lectures entitled (Annex 14) :

1 - Frequency measurement & traceability in Japan.
2 - IPTS - 68 & Practical temperature measurement.
3 - Precise measurements using superconductivity.
4 - Temperature lab. (measurement & SI).
5 - The maintenance and comparison of standard cells
6 - Calibration philosophy and explanation of some terms.
7 - NSCL

5- As a part of international propoganda we hope holding, in 1992, a seminar about metrology.

6- A TV. film on NSCL was produced.

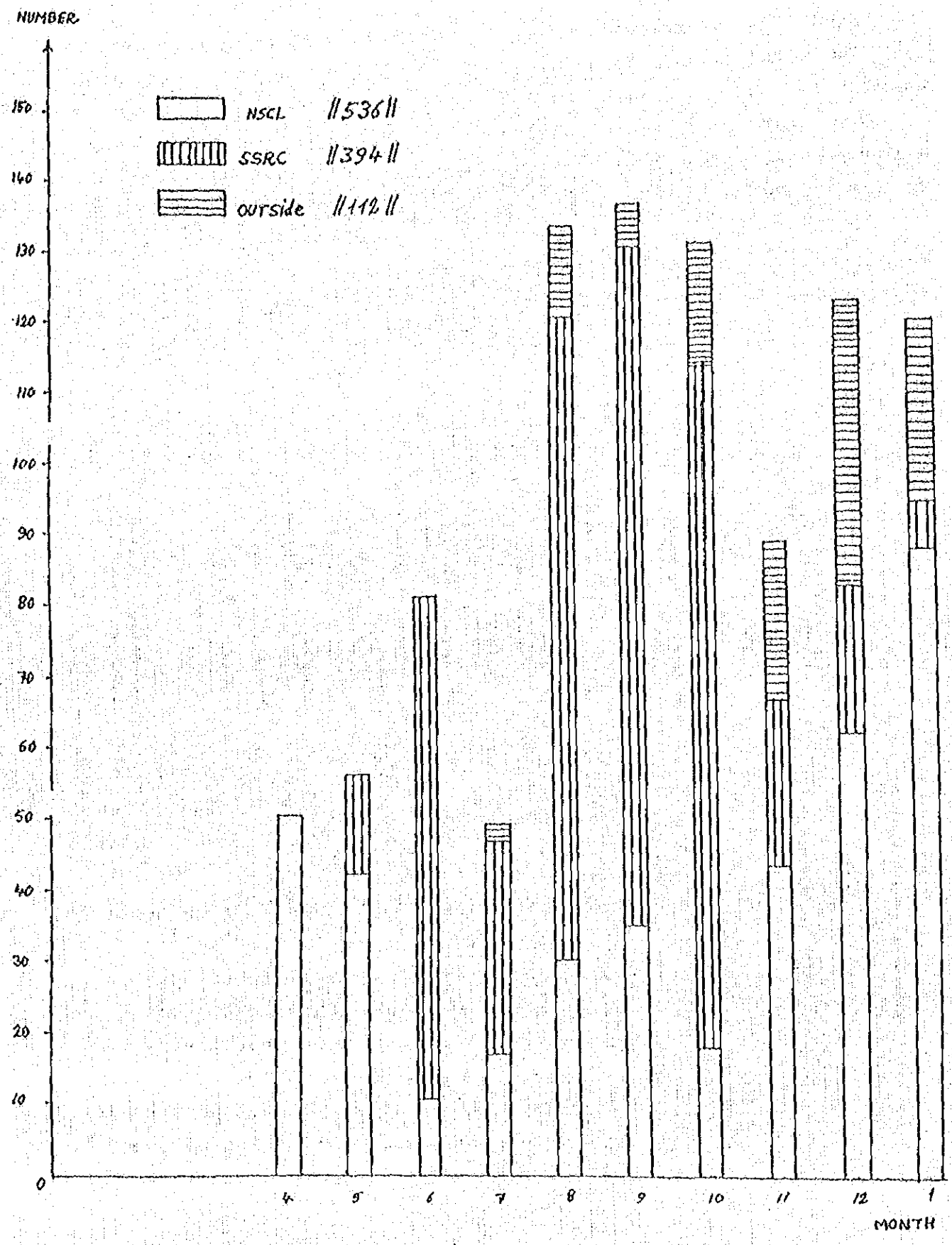


Figure-4-: NUMBER OF CALIBRATED INSTRUMENTS

KINDS OF MEASURING INSTRUMENTS CALIBRATED IN NSCL UP TO 31/1/1990

1- Digital thermometer
2- Digital Multimeter
3- Power supply
4- L_C_R Bridge
5- Insulation Tester
6- R-C meter
7- Q meter
8- Voltmeter
9- Ampermeter
10-Avo universal bridge
11-Megaohm meter
12-Galvano meter
13-Decade capacites Box
14-Decade resistance box
15-X_Y recorder
16-V_A meter
17-mV MA meter
18-mA meter
19-W meter
20-μA meter
21-Oscilloscope
22-Frequency counter
23-Selector 6 wires with sensor
24-Sensor of temperature
25-Spectrum analyzer
26-Frequency synthesizer
27-Signal generator
28-Function generator
29-Pulse genarator
30-Phase generator
31-Decade inductance
32-Standard resistance
33-Thermo couple
34-Inductor
35-Wheatstone bridge

36- Thomson bridge
37- Pulse parameters
38- Current chock
39- Fault locater
40- Frequency standard
41- Impedance meter
42- Spectro meter
43- Ultrasonic detector

LIST OF OUR MAIN CUSTOMERS

- SSRC
- Atomic Energy Commission
- General Co. for cable Industry
- Industrial Testing and Research Center
- Syrian Society of Production and Commercialization of telecommunication Equipments.
- Ministry of Petrolium
- Syrian Arab Radio and Television Organization
- Damascus University Faculty of Science.
- D mascus University Faculty of Electrical & Mechanical Engineering
- Damascus University Faculty of Civil Engineering
- Techrin Power Station.

IX - TECHNICAL CO-OPERATION PLAN

The record of discussion signed on March 1989 contains a technical co-operation plan . It schedules the main duties of each laboratory (DC. AC. RF. TM. Repair) up to 1992 .

Annex (5) : shows the planed , to be continued and realized duties . Every number in those tables corresponds to a special duty :

(1) NSCL property control
for all levels
(secondary , tertiary and repair systems)

(2) Preparation of calibration procedures
(secondary)

Or

Calibration by upper level
measuring instruments and
periodic calibration
(Tertiary + repair benches).

(3) Preparation of record formats
(secondary).

Or

Practice of trouble-shooting
(tertiary & repair systems))

(4) Accuracy checking of measuring
instruments (secondary).

Or

Practice of adjustment and calibratio
calibration (tertiary).

(5) Calibration of lower level
measuring instruments
(primary, secondary).

Or

Preparation repair report
(repair benches)

(6) Property control (primary)

Or

Service manual control(general)

(7) Preparation of calibration procedure (Primary)

Or

Maintenance rule for tools and auxiliary equipment, periodic check (tertiary + repair).

(8) Accuracy checking of measuring instrumets (primary)

(9) Calibration of lower level measuring instruments (primary).

(10) Practic of calibration service (primary).

(11) Evalution of primary standards.

Those tables show that almost all planed duties are realized except : property control (general) and some calibration procedures.

Indeed , the lists of NSCL belongings are ready. Table -2- shows an example; but some of them still are not coded. This work will be done up to June 1990.

X - JAPANESE EXPERTS & TRAINING IN JAPAN

It is an opportune occasion to say that this project could not achieve the level it has, without the invaluable help of the Japanese experts whose name are:

Mr. Yoshihiko Noguchi	12/9/1988 to 11/9/1990
Mr.Hisao Nakamoura	2/11/1988 to 20/11/1989
Mr. Sdatoshi Minoyama	7/12/1988 to 5/2/1989
Mr. Setsuo Katayama	7/1/1989 to 2/2/1989
Mr. Takao Ooki	7/1/1989 to 9/4/1989

Masahide Furukawa	14/1/1989 to 9/4/1989
Yasuhiro Myazawa	7/1/1989 to 9/4/1989
Hideo Susuda	13/5/1989 to 29/7/1989
Shigeaki Hatakeyama	21/9/1989 to 21/12/1989
Hitohiro Kato	23/11/1989to 7/12/1989
Takahiro Nakase	8/11/1989 to 7/11/1990

The level of experts we had up to now is very much appreciated. On the other hand the period they have spent in NSCL were somewhat short, specially for RF laboratory and repair work-shop.

If we consider the schedule of implementations(figure5) we find no more experts are expected to come in RF and repair fields.

However ; it would push considerably the level of our staff if we had one more expert for each field.

The Syrian staff belonging to NSCL who were trained in JApan are:

Mr. S. Waiss
Mr. M. Aghbar
Mr. M. Zaawite
Mr. A. Karouni
Mr. M. HArb
Mr. S. HAssan
Mr. T. Haji
Mr. M. Kashour
Mr. M. Juma
Mr. A. Salhani
Mr. W. Saadi
Mr. N. Elias

The level of training has been very convenient . It was generally held in several Japanese companies and organizations .

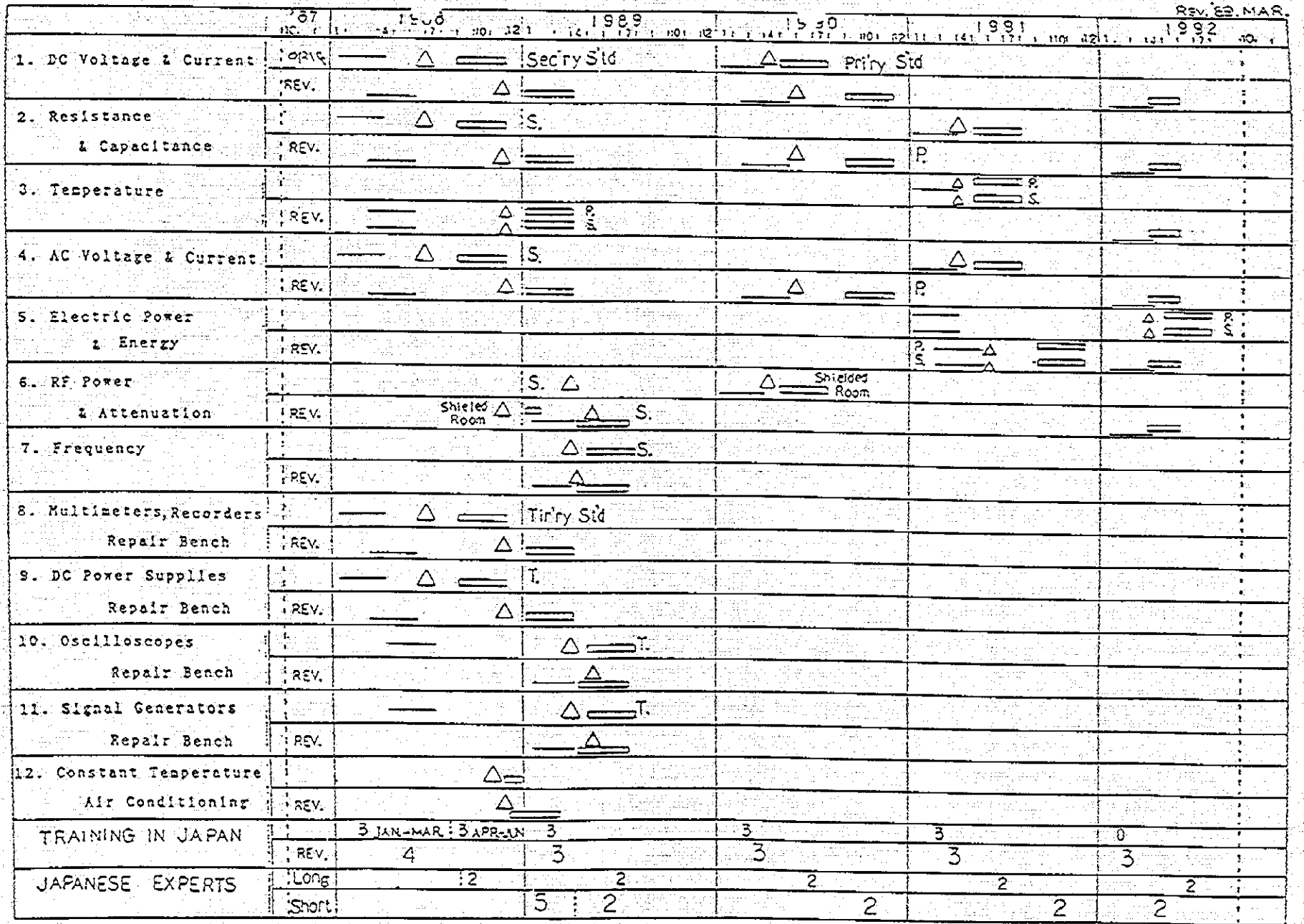
In the actual stage of NSCL project we will appreciate very much more specialized training.

Also , it could be very much fruitful if some of our staff passed half of their professional training in laboratories as electrotechnical laboratory , national research laboratory or communication research laboratory.

In addition to training planned in the schedule of implementation figure -5-, we will appreciate very much the possibility of extending the number to include one in RF field and an other for repair work-shop .

TENTATIVE SCHEDULE OF IMPLEMENTATION

Rev. '83. MAR.



Because we still feel that those two laboartories need to enlarge their knowledge about the applied techniques.

XI - NSCL FUTURE PLANS

We can say that NSCL is passing successfully the first stage. The transfer of technology , including know- how is done very smoothly up to now . Thus , we deeply wish that JICA considere our present need :

1- To overcome some general difficulties : the daily work showed that there are some indispensable requirements such as :

- Transportation

  A lot of our customers find difficulty to bring their instruments to NSCL thus, it could be wise to have a transportation car assuring the link between NSCL and the customers.

- Spare parts

  We could distinguish between two categorie of instruments those belonging to NSCL : we have to try to repair them even before the expiration of guarantee period. thus we need:

  Service manuals

  Spare parts kits

  Extention boards

  Concerning the customers instruments need ;

  General purpose spare parts

  Mecanical Tools

2- Equipment for actual laboratories

The actual laboratories (AC,DC,TM.RF,Repair)
are facing some technical difficulties when accomplishing their daily job . Indeed , measuring instruments were registred for calibration but
the actual calibration system did not cover all the functions needed to calibrate some customers, electronic measuring instruments
Thus the laboratories recorded the instruments, they could need : (including those required for keeping time standards) the lists are given in annex - -

3- Documentation ;

Our library is lacking very much , not only the specialized books or journals but also the general ones .
Those documents (annex - -) are very important to level up our staff and to help in preparation of general lectures or special training.

4- Office equipment

In order to issue certificates (including result sheets) to keep calibration (results) cards, to make inventory of customers , we need a word processor.

5- Service calibration car

The Syrian organizations and companies have all over the country their own small calibration laboratories . But in the present situation , there is no central calibartion services in the Syrian cities . So , a calibration service car Annex - -,is very much needed to calibrate the instruments of those small laboratories.

6- Research works,

The instrumentation , JICA provided us , is of very high level. It can be used to conduct research with a view to :

- improve the local capability of manufacturing measuring instruments
- Participate internationaly in developing new standards.
- Realize (in the future) absolute measurements

As Japan is one of the best countries in conducting such research , we suggest some cases which could be realized jointly between ETL , JEMIC , JMI or YEW and NSCL.
Those possibilities are ;

- Production of standard cells
- Studying and developing a solide state voltage reference
- prototype for production of decade resistance
- thin film multijunction thermal converter
- Precission fixed ratio transformer bridge.

Some of those cases could be the main subject for obtaining a " PH.D" . Indeed , SSRC is commonly practicing with Europe(mainly France , England, Irland) the joint preparation of " PH.D" .

The theoritical part is covered in Europe and the practical mainly in Syria.

Those research works are very important for NSCL, because they level up our knowledge and encourage us to study more hardly.

Thus, we will appreciate very much the approbation of dispatching a Japanese expert mainly to advise us in those works.

Equally , our researchers will highly appreciate the possibility of staying in ETL, JEMIC for a short period(four months).

7- Future extension

The Syrian government adapted , in 1981, by (ministerial decree) , the international system of units (SI).

NSCL is the official organization to conserve and maintaine the national standards.

We have actually : the national standard of electric unit(A).

The national standard of temperature unit (K).

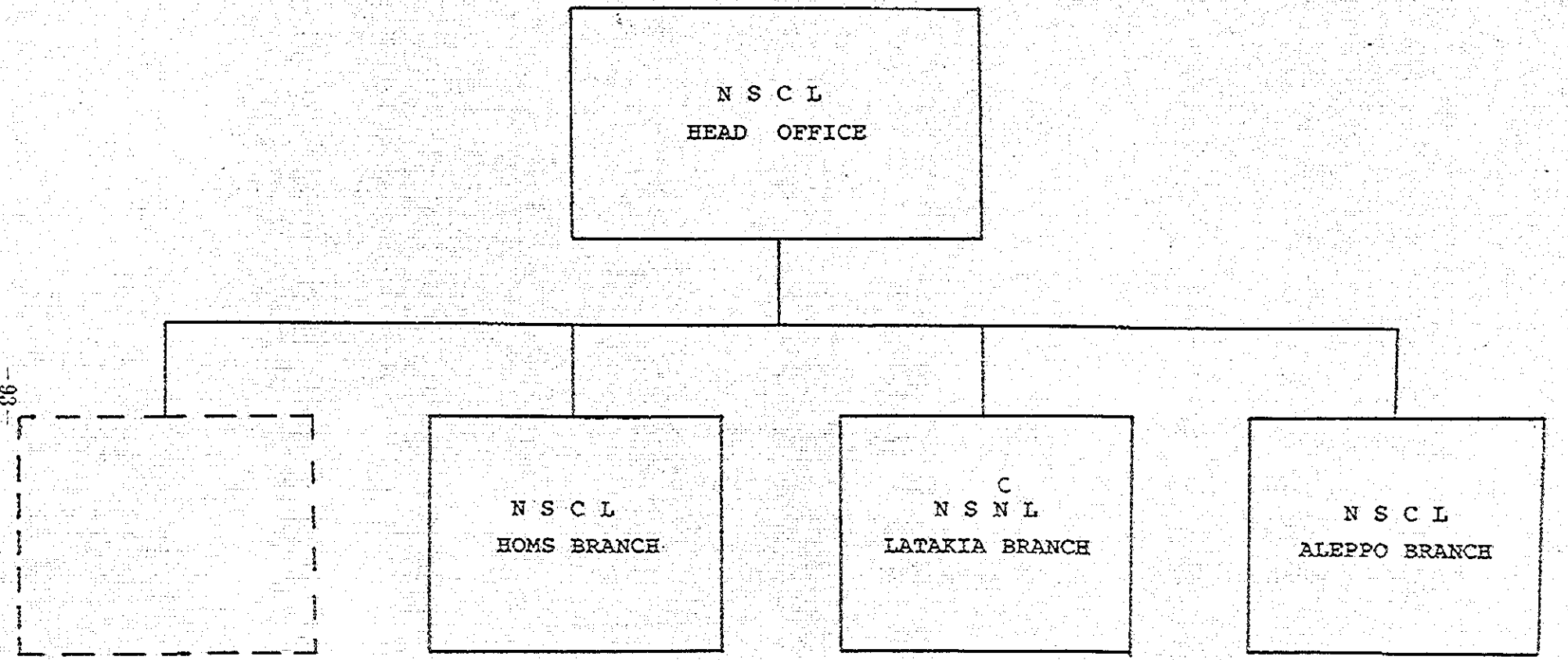
The national standards of some derived units as frequency(HZ), resistance(ohm), etc..

Concerning the others basic units (meter, Kilogram ,candela mole, second).

No Syrian organization has the national standard .Thus , it is urgent to conserve those national standards in NSCL.

The equipment suggested in Annex-2- is a proposal , basic foundation for the mechanical & optical divisions, to conserve and maintain the optical and mechanical standards and some related measurements.

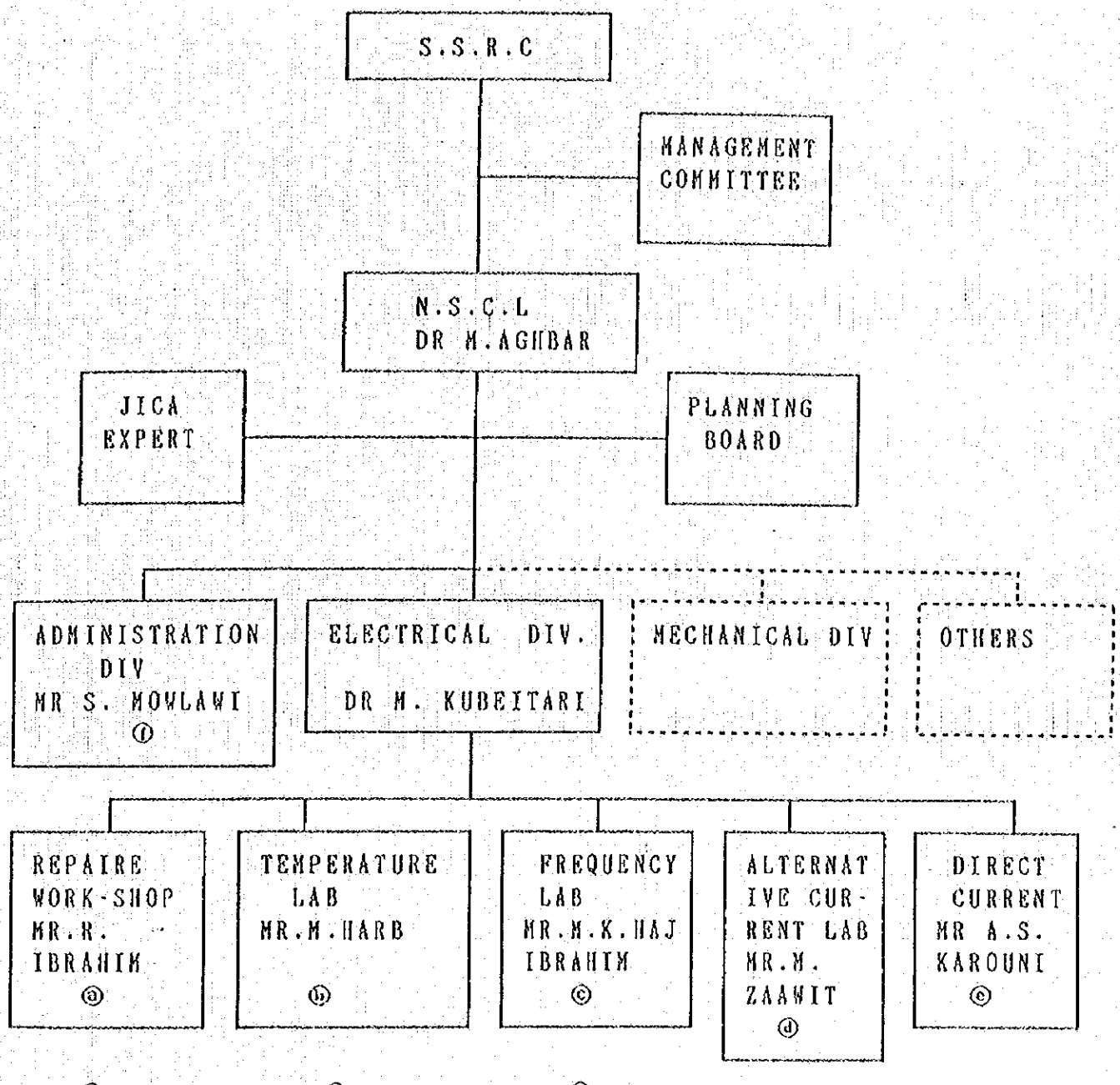
It is clear now that the Syrian cities (excluding Damascus) are lacking calibration centers. Thus , we are studying the possibility of opening NSCL branches in Aleppo, Lattakia and Homs. Those centers, figure-6-, could carry calibration of tertiary and , in some special cases , secondary levels , as well as repair of measuring instruments .



Fgure -6- : NSCL Extension

A N N E X - 4 -

N S C L O R G A N I Z A T I O N



ⓐ

MR T.Haji
MR N.Elias
MR H.Khattab
MR S.Amro
MR M.Sharani
MR K.Saadi

ⓑ

MR A.H.Saada
MR S.Akrami

ⓒ

MR S.Hassan
MR M.Kashour
MR H.Z.Swed

ⓓ

MR M.Juma
MR K.Barakat

ⓔ

MR E.Salhani
MR W.Saadi
MR M.Hafiri

ⓕ

MRS S.Shalati
MR S.Sabeck
MR M.Zaitoun
MR K.Safadi

A N N E X - 5 -

(1) NSCL property control

(secondary , tertiary and repair systems)

(2) Preparation of calibration procedures (secondary)

Or

Calibration by upper level measuring instruments and periodic calibration (Tertiary + repair benches).

(3) Preparation of record formats (secondary).

Or

Practice of trouble-shooting (tertiary & repair systems))

(4) Accuracy checking of measuring instruments (secondary).

Or

Practice of adjustment and calibratio calibration (tertiary).

(5) Calibration of lower level measuring instruments (primary, secondary).

Or

Preparation of repair report (tertiary & repair).

(6) NSCL property control (PrimarY)

(7) Preparation of calibration procedures (primary).

Or

Maintenance and Kule of tools and auxiliary equipment ,periodic check (tertiary and repair work-shop)

(8) Accuracy checking of measuring instruments (primary).

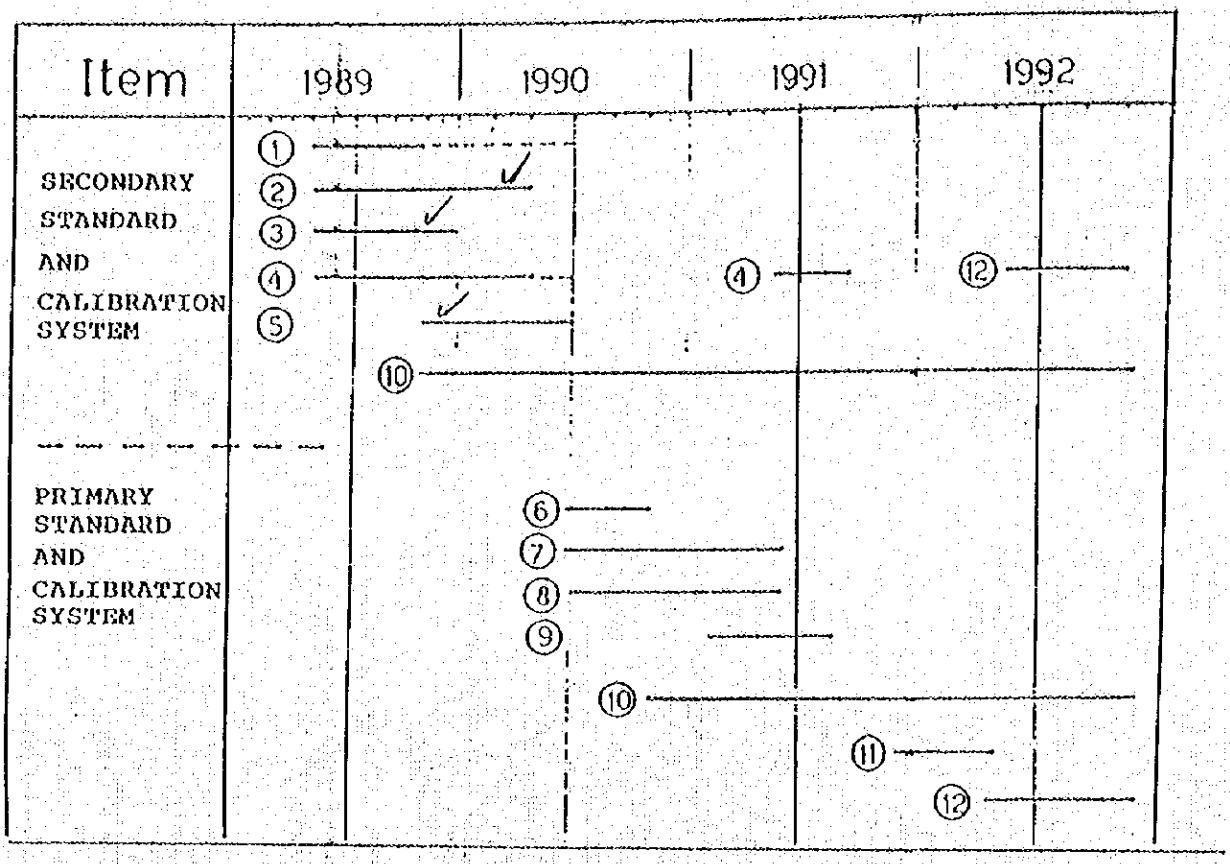
(9) Calibartion of lower level measuring instruments (primary).

(10) Practice of calibration service (primary).

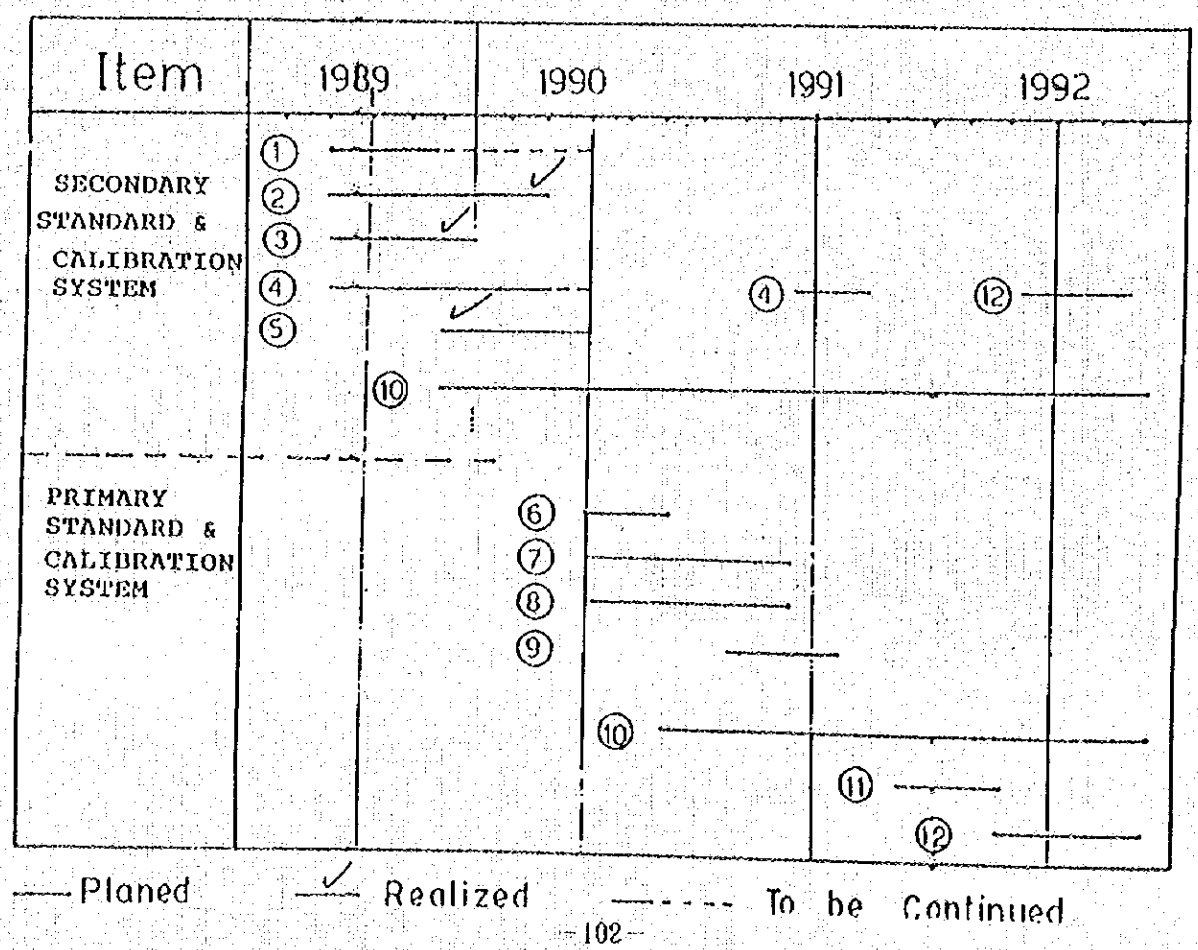
(11) Evalution of primary standards (primary).

(12) Periodic calibartion (primary).

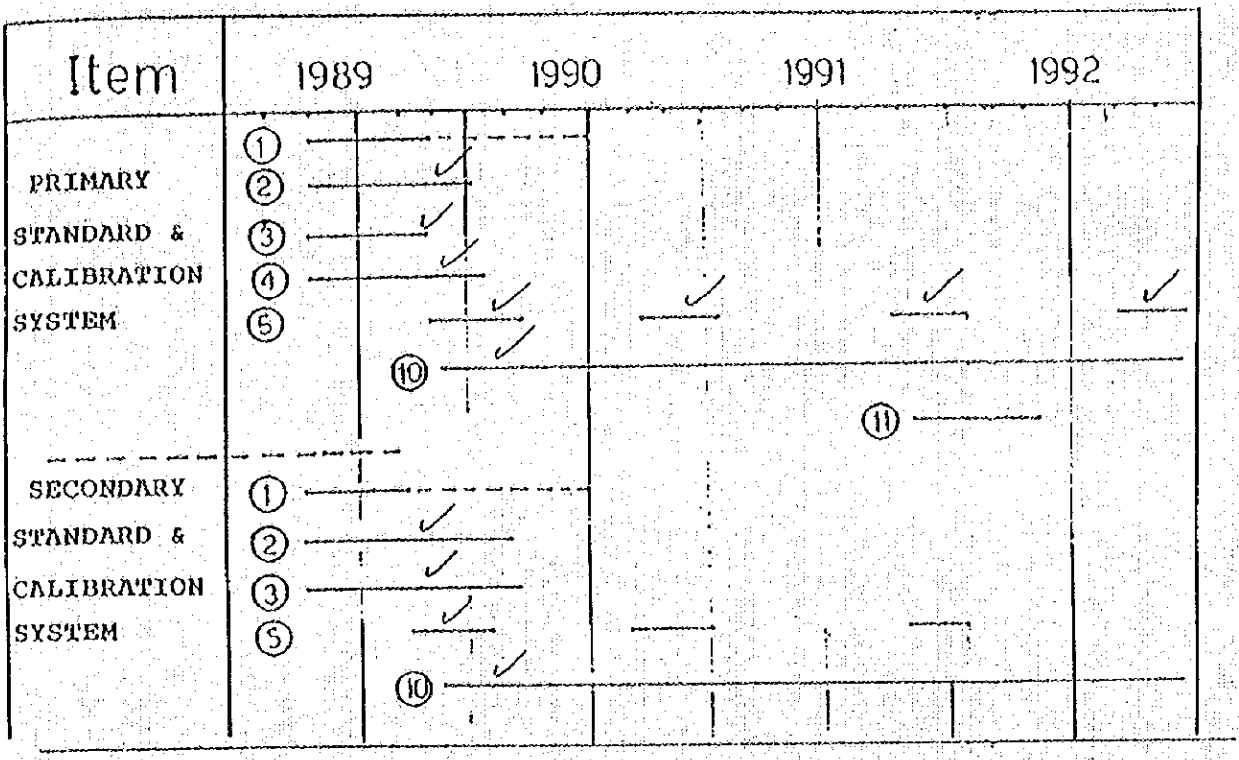
1, DC. VOLTAGE AND CURRENT STANDARD AND CALIBRATION SYSTEM



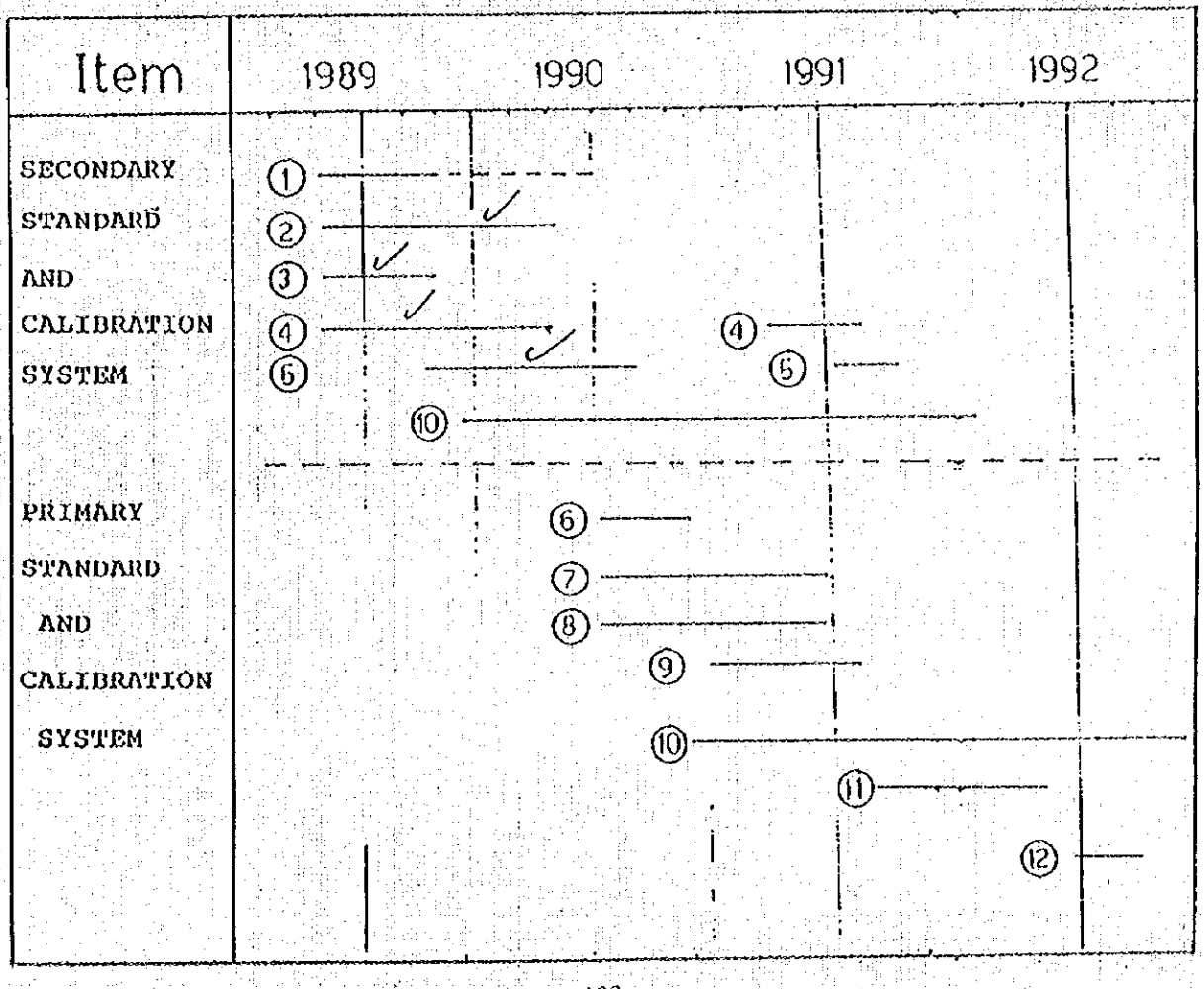
2, RESISTANCE AND CAPACITANCE STANDARD AND CALIBRATION SYSTEM



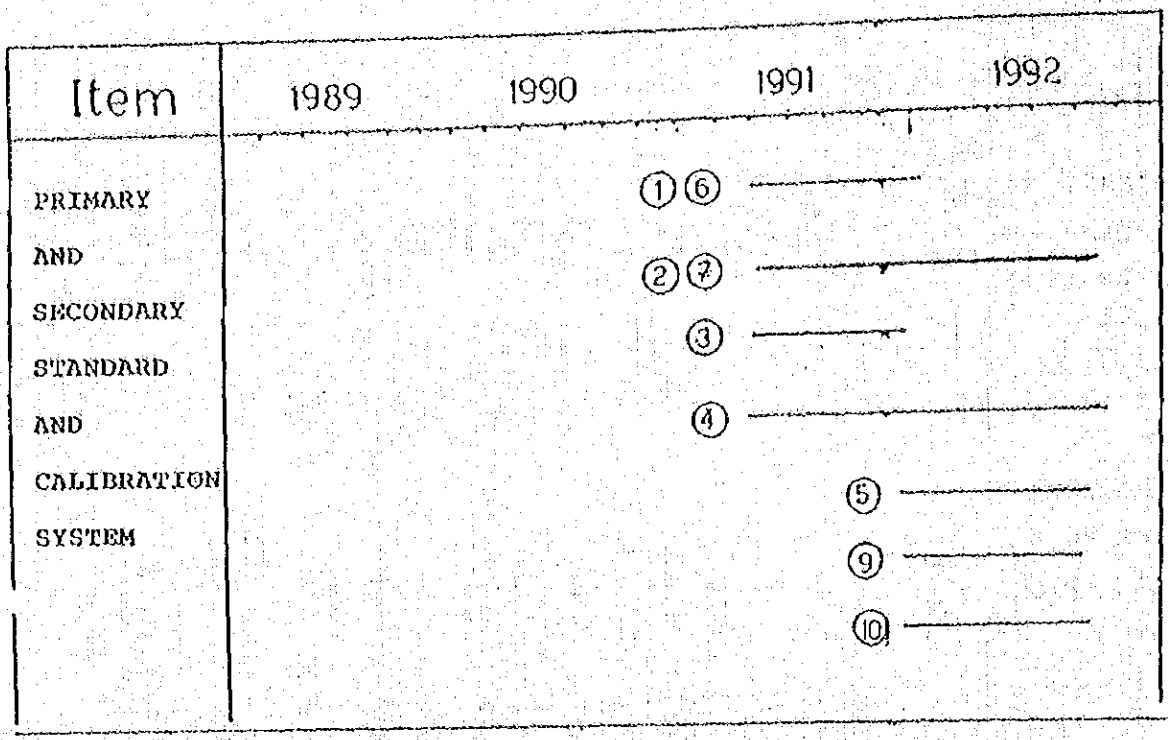
3, TEMPERATURE STANDARD AND CALIBRATION SYSTEM



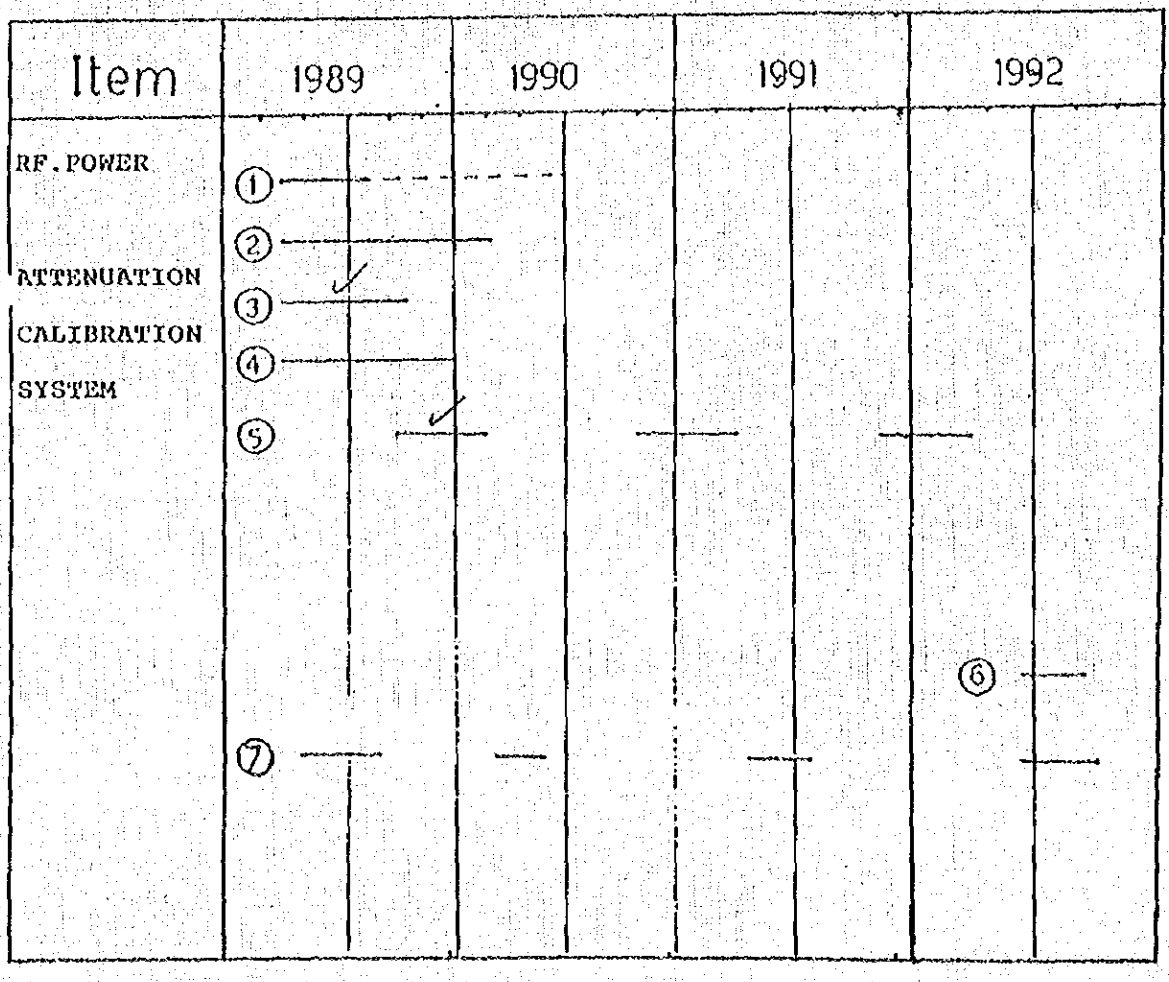
4, AC. VOLTAGE & CURRENT



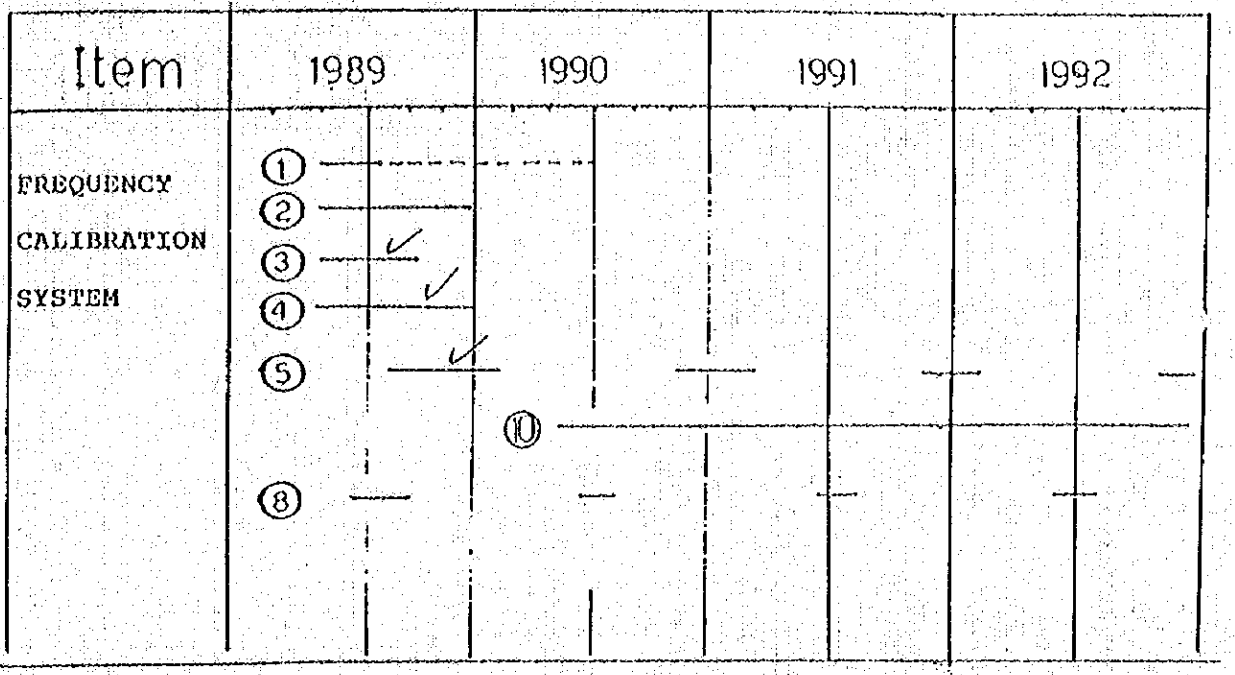
5, ELECTRIC POWER & ENERGY



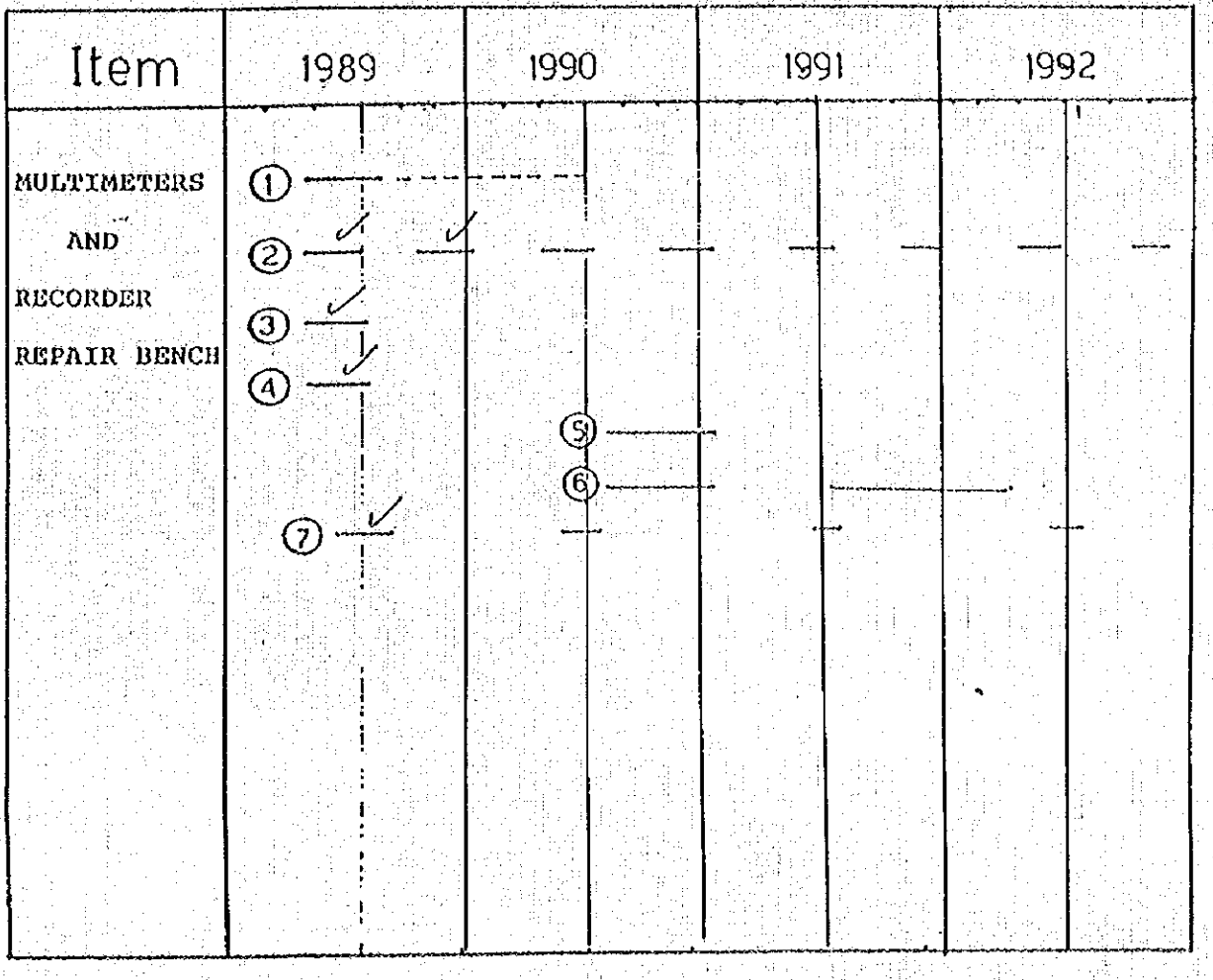
6, RF. POWER & ATTENUATION



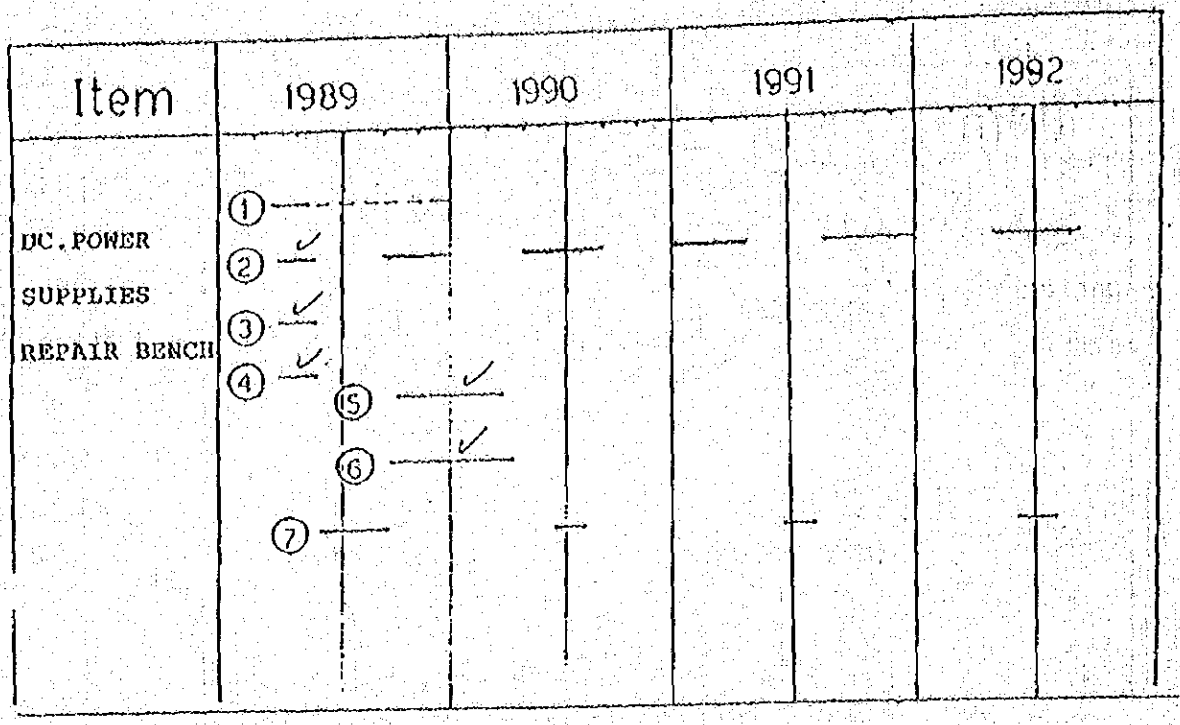
7, FREQUENCY



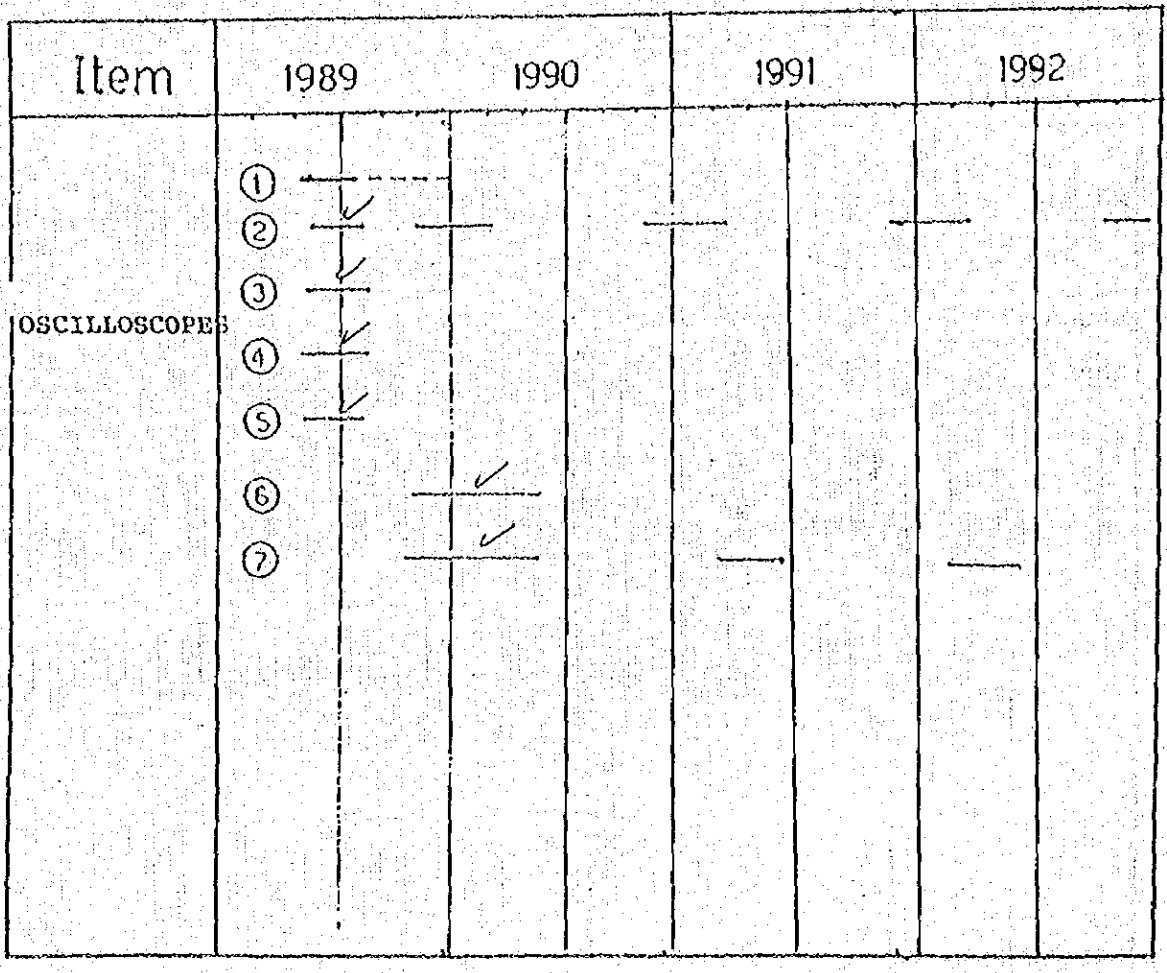
8, MULTIMETERS AND RECORDERS

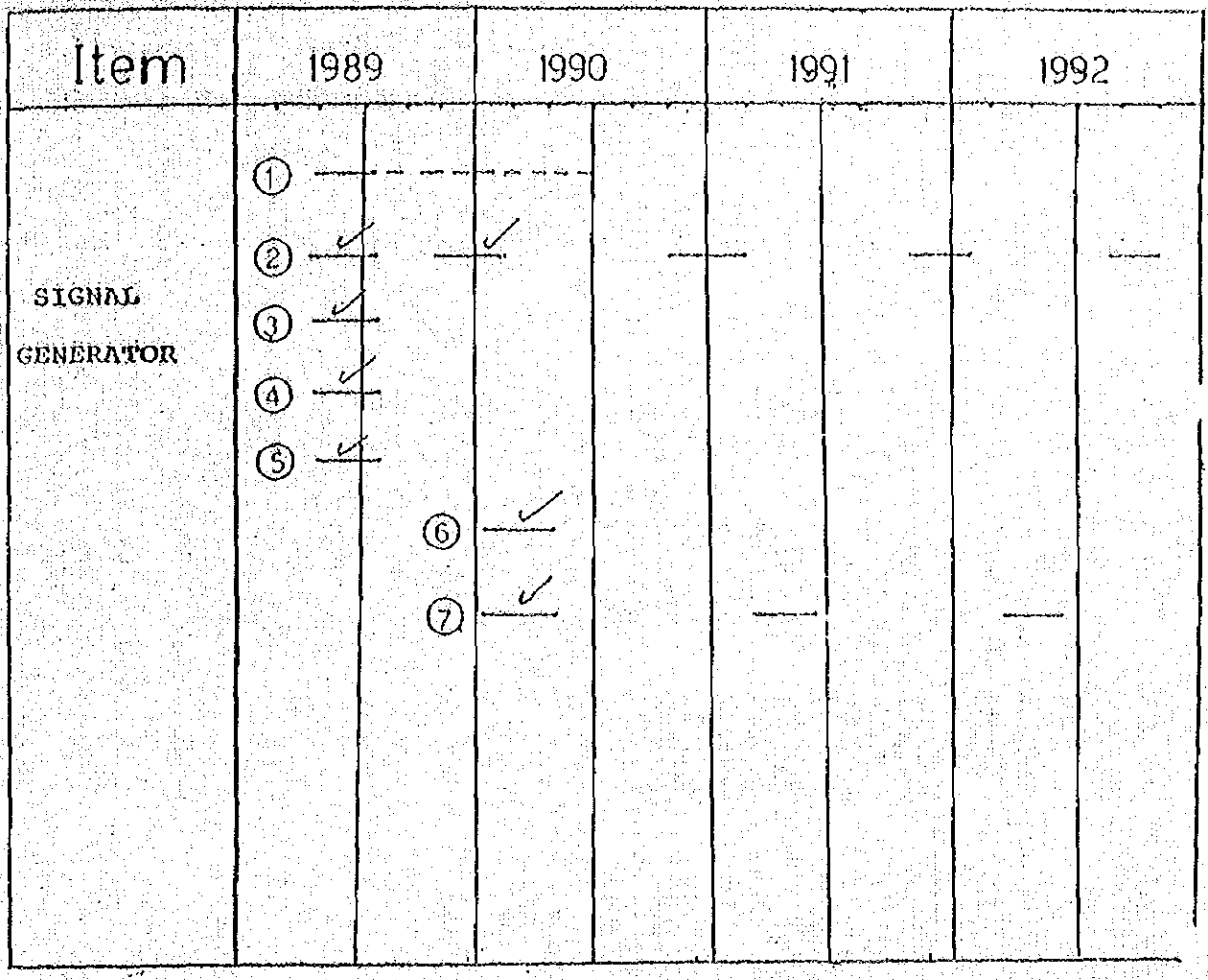


9, DC. POWER SUPPLIES



10, OSCILLOSCOPES




Item
1989
1990
1991
1992
SIGNAL GENERATOR
①
②
③
④
⑤
⑥
⑦

A N N E X - 6 -

DOCUMENTATION AVAILABLE AND REQUIRED TO BE PROVIDED FOR SERVICE MANUALS

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circuit diagram
Vertical pen-recorder 3056	Yes	Yes	Yes	Yes	Yes	Yse
Megohm resistance box Yew 3947-55	-	-	-	-	-	-
DC.precision current supply Yew 2854	-	-	Yes	-	-	Yes
Q meter H.P 4342 A	Yes	Yes	Yes	Yes	Yse	Yes
Regulated DC. power supply 50~L PAD -8- 5d	Yes	Yse	Yes	-	-	Yes
Decade resistance box Yew 2793-01-03	-	-	-	-	-	Yes
GP - IB Converter Ye 3466	-	-	-	-	-	-
Precision-wh Wheatstone bridge Yew 2768	-	-	-	-	-	Yes
DC CB 9975 (Guidline)	Self Calibration	-	Yes	Yes	Yes	Yes
Decade capacitor H.P 4440 B	Yes	Yes	-	Yes	Yes	Yes
High resistance meter H.P4329 A	Yes	Yes	Yes	Yes	Yes	Yes
Precision digital multimeter	Yes	Yes	Yes	Yes	Yes	Yes

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circuit diagram
Precision double bridge Yew 2752	-	-	-	Yes	Yes	Yes
Multi frequency LCR Meter H.P 4274 A	Yes	Yes	Yes	Yes	Yes	Yes
Decade resistance box YSI DB 62	Yes	-	Yes	Yes	-	Yes
High impedance volt meter null detector fluke 845 AB	Yes	-	Yes	Yes	Yse	Yes
Electronic Galvano meter Yew 2709	-	-	Yes	-	-	-
Oil- bath 9732 VT Guidline	-	-	-	-	Yes	Yes
Aself of inductor H.P 16474 A.						
0.07 µH to 130 mH H.P 16485 A						
U.P.S 1010 Yotaka U			Yes			
A.V.R SA 25005 Yutaka						

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circui diagra
Standard volt Rtio box 2746	Yes	-	Yes	Yes	-	Yes
Current unit Yew 2561	-	-	Yes	-	-	-
Digital LCR meter H 4261 A	Yes	Yes	Yes	Yes	Yes	Yes
DC calibration Sets Yew 2560	-	-	-	Yes	Yes	Yes
Portable Double bridge Yew 2769	-	-	-	Yes	Yes	Yes
Portable Wheatstone bridge Yew 2755	-	-	-	Yes	Yes	Yes
Circuit Tester Y 3201	-	-	-	Yew	Yes	Yes
SM 330 -D (Soshin)	-	-	-	No need	No need	-
SM 228 - c (SOSHIN)	-	-	-	No need	No need	-
H.P 16380 A/C standard air and mica capacitor	Yes	No need	Yes	No need	No need	-
DC.calibration sets 2550 Yew	Yes	Yes	Yes	-	-	-
DC.Referemce standard Fluke 731 B	Yes		Yes	Yes	Yes	Yes

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Componet List	Layout of Component	Circuit Diagram
AC.Std. 4200A Datron	Yes	Yes	Yes	Yes	Yes	Yes
DMM 1281-Datron		Yes	Yes			
AC.Voltage& Current Std. 2558Yew			Yes	Yes	Yes	Yes
AC.Digital Power meter 2503-Yew	Yes	Yes	Yes	Yes	Yes	Yes
Universal Counter 3516B-h.p	Yes	Yes	Yes	Yes	Yes	Yes
Distortion measurment set-339A-h.p	Yes	Yes	Yes	Yes	Yes	Yes
Oscilloscope 3664-Yew						
GP-IB-Conv. 3466-Yew						
Pen.recorded 3056 Yew			Yes	Yes	Yes	Yes
Tranducer Set Yew						
Current Generator Ccu-1000	-	-	Yes			Yse
Current Transformer 2243	-	-	-			
Voltage Transfor 2261	-	-	-			
Standard Resistor	-	-	-	-	-	-
U.P.S. 2510VB			Yes			
AC.Power Supply	-		YEs			

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circuit diagram
Rubidium freq. standard RB - 1008 C	Yes	Yes	Yes	Yes	Yes	Yes
Phase comparator XSRM - 23 278.9314.02	Yes	Yes	Yes	Yes	Yes	Yes
Phase recorder XKP 156.3541.02	Yes	Yes	Yes	Yes	Yes	Yes
5 MHz crystal Oscillator XSD2 283.6010.02	Yes	No	No	Yes	Yes	Yes
Freq.convertor XSRM - 2 238.0616.02	Yes	Yes	Yes	Yes	Yes	Yes
Digital clock CADM 299.6014.02	Yes	Yes	No	Yes	Yes	Yes
Power supply XSRM - 2 237.8013.02	Yes	Yes	Yes	Yes	Yes	Yes
Synthesiszed signal generator MF 655 A	Yes	Yes	Yes	Yes	Yes	Yes
Synthesizer/ level generator MG 443 B	Yes	Yes	Yes	Yes	Yes	Yes
Freq. counter MF 63 A	Yes	Yes	Yes	Yes	Yes	Yes
Network Analyzer MS 620 J	Yes	Yes	Yes	Yes	Yes	Yse
S-PArameter Test set MH 681 J	Yes	Yes	Yes	Yes	Yes	Yse
Power meter ML 4803 A	Yes	Yes	Yes	Yes	Yes	Yes

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circuit diagram
Power sensor MA 4601 A MA 4702 A	Yes	Yes	Yes	Yes	Not neet	Yes
Electronic Voltmeter ML 69 A	Yes	Yes	Yes	Yes	Yes	Yes
Signal generator MG 3601 A	Yes	Yse	Yes	Yes	Yes	Yes
?ectrum analyzer MS 611 A	Yes	Yes	Yes	Yes	Yes	Yes
Modulation analyzer MS 616 A	Yes	Yes	Yes	Yes	Yes	Yes
Selective level meter ML 422 A	Yes	Yes	Yes	Yes	Yes	Yes
Distortion Measurements set HP 339 A	Yes	Yes	Yes	Yes	Yes	Yes
Programble Attenuator V 63 A	No	No	No	No	No	No
Range calibrator MA 4001 A	Performance Test	Yes	No need	Yes	No	Yes
Pre.Amplifier MH 648 A	No	No	No	Yes	NO	Yes
Digital multimeter 2502	Yes	No	No	No	No	No
Oscilloscope 2235	No	No	No	No	No	No
AC.power supply EA - 2100	NO	No	for signal Phase	No	No	No

SERVICE MANUAL (RF)

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circuit diagram
Withstanding voltage insulation tester 871	No	No	Yes	No	No	No
AC variable transformer SST 2005	No	No	No	No	No	No
PAB 32-1.5DU regulator DC power supply	Yes	No	No	No	No	No
PAB 18 -2.5 DU regulator DC power supply	No	No	No	No	No	No
insulation Tester 2403	No	No	No	No	No	No
Universal leakage current tester 3226	Yes	No	Yes	No	No	No
Circuit tester 3201	No	No	No	Yes	No	Yes
Digital tester D - 110	No	No	No	No	No	No
Printer DPR 7713 B	No	No	Yes	No	Yes	Yes
X-Y Plotter MP 3200	No	No	No	No	No	No
BCD converter Mtt 037 A	No	No	Yes	Yes	Yes	Yes
Logic analyzer SL - 4121	No	No	No	No	No	No
Pulse circuit Trainer ITF - 03	Yes	No	No	Yes	No	Yes

SERVICE MANUAL (RF)

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circuit diagram
Osc/Modulator Trainer ITF - 011	Yes	No	No	Yes	No	Yes
AM - radio reciever trainer ITF-012	Yes	No	No	Yse	No	Yes
LF-Amplifier trainer ITF- 013	Yes	No	No	Yes	No	Yes
Rectifier .rcuit trainer ITF -014	Yes	No	No	Yes	No	Yes
Key board MC 3302 A	No	No	Yes	Yes	-	-
Parallel input unit MH 038	No	No	Yes	No	Yes	No
Parallel output unit MH 039	No	No	Yes	No	Yes	No
MC 1202 A computer	No	No	Yes	Yes	Yes	Yes
color display MC 3602 A	Yes	No	Yes	Yes	Yes	No

Name& Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layoutof Component	Circuit Diagram
Pen recorder 3056	Yes	Yes	Yes	Yes	Yes	Yes
HYBRID Recorder 3081	Yes	Yes	Yse	Yes	Yes	Yes
Digital Resistance Thermometer 2804	Yes	Yes	Tes	Yes	Yes	Yes
Dc.Precisign Current Supply	Yes	No	Yes	No	No	Yes
Dc.Reference Standard 731B	Yes	Yes	Yes	Yes	Yes	Yes
DMM1281 Datron	Yes	Yes	No	No	No	No
DMM 2501a	Yes	Yes	Yes	Yes	Yes	Yes
Computer Yemac50	-	-	No	No	No	No
Ploter Pl.2000	-	-	No	No	No	No
Printer M3413A	-	-	No	No	No	No
Oil Bath Control Tpu-0-21	-	-	Yes	Yes	Yes	Yes
Nitor path Control Tpv-N-21	-	-	Yes	Yes	Yes	Yes
Tpu-Sc-22 Furnace	-	-	Yes	Yes	Yes	Yes

More drtailed information

about PID controller Okasaki

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circuit diagram
GP - IB Converter 3466						
AC-Voltage Current-sta 2558	Yes	Yes	Yes	Yes	Yes	Yes
Insulation Tester Type 2403						
Circuit Tester 3201						
Current Tester 3226						
Bridge 2755			Yes	Yes		Yes
DC- Volt ST Type 2552	Yes		Yes	Yes	Yes	Yes
Current Unit Type 2561		Yes	Yes	Yes	Yes	Yes
Res - BOX Type 2793-01 -03		Yes	Yes	Yes	Yes	Yes
AC-Ammeter & Voltmeter 2013		Yes	Yes	Yes	Yes	Yes

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circuit diagram
Digital Multimeter 2502 A	Yes	Yes	Yes	Yes	Yes	Yes
Digital Power meter 2503			Yes		Yes	Yes
Osc. D5 - 6411	Yes	Yes	Yes	Yes	Yes	Yes
Logic Analyzer SL - 4121	Yes	Yes	Yes	Yes	Yes	Yes
M OHM Res - Box 3947						
Function Generator 3314	Yes	Yes	Yes	Yes	Yes	Yse
Micro recorder 415e	Yes	Yes	Yes	Yse	Yes	Yes
Deka Box Resistor DB 62						
Milliohm meter 4328 A	Yes	Yes	Yes	Yes	Yse	Yes
Osc. 3664						

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circuit diagram
Digital thermometer 2583	Yes					
Decade Resist. Box 2786				Yes		Yes
Vertical pen Recorder 305		Yes	Yes	Yes	Yes	Yes
Selector Switch 2745						
voltmeter standard 2012			Yes	Yes	Yes	Yes
Zero - Con						
AC-Voltage Box Type 2744						

SERVICE MANUAL (OS.)

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circui diagra
Power supply PAB 18-2.5DU KIKUSUI						Yes
Tester 3201 YEW						
Digital Te'ter HOKAI DT-110						
B C D Convertor MH 037 A Anritsu			Yes	Yes	Yes	Yes
Withstanding voltage Insulation871 KIKUSUI						
Insulation Tester 2403 YOKOGAWA						
Hi Tester HI OKI						

Name & Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circuit diagram
CG 5001 programable Calibration generator	Yes	Yes	Yes	Yes	Yes	Yes
SG 503 level sine generator	Yes	Yes	Yes	Yes	Yes	Yes
SG 504 level sine ware generator	Yes	Yes	Yes	Yes	Yes	Yes
current prob Amplifier	Yes	Yes	Yes	Yes	Yes	Yes
Function generator 3314 A	Yes	Yes	Yes	Yes	Yes	Yes
Frequency Counter MF 63 A	Yes	Yse	Yes	Yes	Yes	Yes
Digital m`timeter 2502 A	Yes	Yes	Yes	Yes	Yes	Yes
Oscilloscope 2235 TEK	Yes					
Oscilloscope Tranare	Yes	Yes	Yes	Yes	Yes	Yes
Power supply PAB 32-1.5DU KIKUSUI						
SYNTHESIZER level genarator MG 443 B	Yes	Yes	Yes	Yes	Yes	Yes