シリア国国立計測標準研究所プロジェクト
計画打合せ調査団報告書

平成元(1989)年10月

国際協力事業団

6K. 1

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序　　文

シリア国政府は、科学研究調査センターの拡充・強化の一環として電子・電気分野の計測標準部門を設立し，もってシリア国内の産業発展に資するため、わが国に技術協力を要請してきた。

この要請を受けて、我が国は1987年９月、シリア側関係当局と本件実施に係る討議議事録（R／D）の署名・交換を行い、５年間にわたる技術協力を開始した。

現在，同国に長期専門家２名，短期専門家３名を派遣しており，技術協力は概ね順調に実施され、本格的実施段階に移行しつつある。

当事業団は、R／D署名から今日までの本プロジェクトの活動状況を調査し、かつ1989年度の本格的な技術移転に向けての具体的な協力内容をシリア側関係当局と協議することを目的として、1989年３月17日から同28日まで計画打合せ調査団をシリア・アラブ共和国に派遣した。

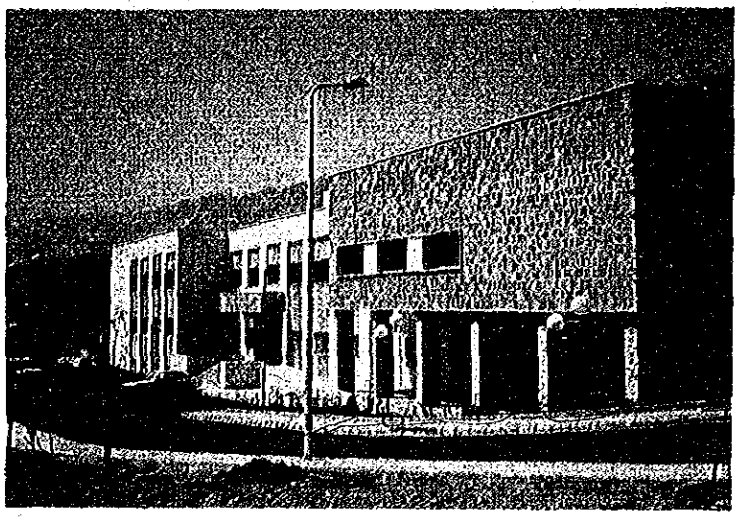
本報告書は、計画打合せ調査団の現地における調査及び協議事項をとりまとめたものである。

ここに、本調査団派遣に際し、御協力をいただいた関係各省ならびに、在シリア日本国大使館の各位に対し、深甚なる謝意を表する次第である。

平成元年10月

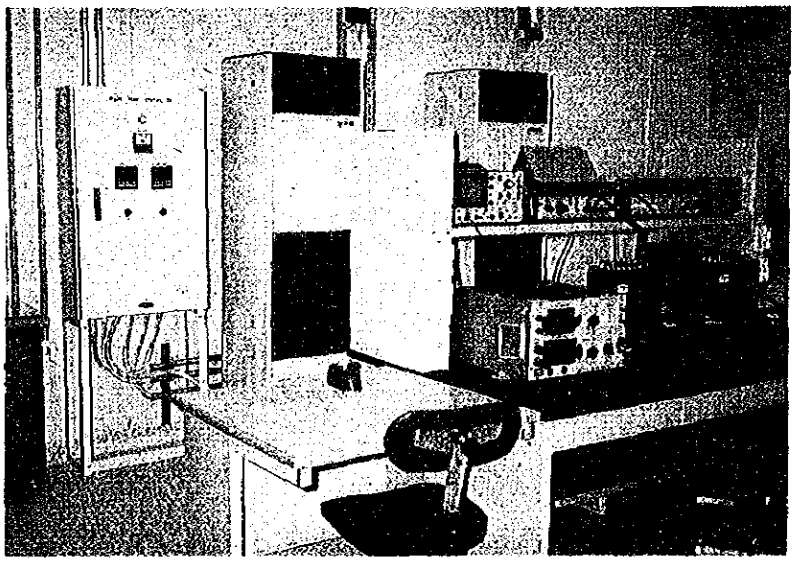
国際協力事業団
鉱工業開発協力部長
山崎宗重

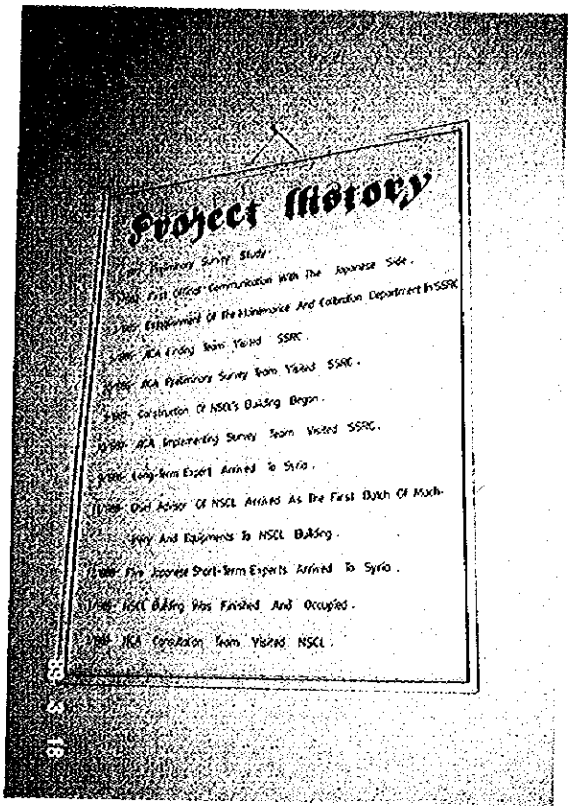
ＮＳＣＬ外観



ＮＳＣＬ開所式後、建物内部を見学する木幡大使、シャヒードＳＳＲＣ総裁

据付けられた供与機材





ＮＳＣＬの会議室に展示されている
Project History

討議議事録（Ｒ／Ｄ）の署名を終えて

目　　次

Ⅰ．計画的打合せ調査団派遣

1. 経緯と目的

1987年10月R／D署名以来、長期２名、短期５名計７名の専門家派遣、他方７名のカンウターパートの受入れ（1987年度４名，1988年度３名）の実施、シリア側の建屋建設も順調に進み、機材も88年末から一期分の据付・指導も開始され本格的な技術協力が始まるのに合わせて、詳細な技術移転計画並びに89年度年次計画の協議・策定を行い、協力の適正実施を図ることが第一の目的である。また本研究所建屋の完成と合わせてシリア側が本プロジェクトの公式な開所式を開催することとなったためそれに出席することが第二の目的である。

2. 日　　程

月　日	調　査　日　程	
3／17（金）	移動	東京 ―― （フランクフルト経由一泊）
18（土）		――→ダマスカス
19（日）	10:00～11:00	ＳＳＲＣ総裁表敬・打合せ
	11:00～14:00	調査団、専門家、ＪＩＣＡ事務所協議
	16:00～18:30	ＮＳＣＬ（第一回協議）
20（月）	9:00～10:30	〃　（第二回協議）
	11:00～12:00	本幡大使表敬（日本大使館）
	12:00～14:30	ＮＳＣＬ（第三回協議）
	16:00～18:00	ＮＳＣＬ開所式
		（本幡大使、経済企画大臣、ＳＳＲＣ総裁他出席）
21（火）	9:00～14:00	ＮＳＣＬ（第四回協議）
	16:00～	資料整理
	20:00～	ＳＳＲＣ総裁主催 Cocktail Party
22（水）	9:00～12:00	ＨＩＡＳＴ（ＳＳＲＣ研修施設）視察
	12:00～14:00	ＮＳＣＬ（第五回協議）
	14:00～16:00	本幡大使公邸
	16:00～18:00	ＮＳＣＬ（第六回協議）
23（木）	終日	団内打合せ・ミニッツ作成
24（金）	休日	資料整理
25（土）	9:00～16:00	ＮＳＣＬ（第七回協議）
	16:30	M／D署名交換
26（日）	移動	ダマスカス ―― （パリ経由一泊）
28（火）	〃	――→ 東京

3. 団員構成

(1)	総括・団長	坂田　武穂	国際協力事業団鉱工業開発協力部調査役
(2)	技術協力計画	長島　京子	通商産業省資源エネルギー庁公益事業部技術課海外調査班長
(3)	校正システム	加藤　敏男	横河電機㈱品管部門標準器室長
(4)	計測標準	池田　義雄	日本電気計器検定所標準研究部研究課長
(5)	業務調整	高橋　　悟	国際協力事業団鉱工業開発協力部開発技術課

4. 主要面談者

（ＳＳＲＣ側）

Dr. A. W. Chahid : Director General
Dr. A. H. Mansour : Vice Director General
Dr. M. Mrayati : Director of the Institute of Electronics
Dr. A. Armanazi : Deputy Director of the Institute of Electronics
Mr. S. Weiss : Director of Standards and Calibration Dept.
Dr. Z. Sulelman : Electronics Industry Branch
Dr. M. Aghbar : Director of Calibration Project
Mrs. M. Kallas : Scientific Cooperation Dept.

（日本側）

木幡昭七	日本大使館	特命全権大使
小平　功		参事官
堀沢英三		一等書記官
黒田孝伸		専門調査員
稲田武司	ＪＩＣＡ事務所	所長

Ⅱ. 協議概要

1. 1988年度活動の評価

(1) 日本側

① 長期専門家　　2名（チーフ・アドバイザー、計測標準）

② 短期専門家　　5名（機材据付・操作）

③ 研修員受入れ　　3名（信号発生機、オシロスコープ、周波数）

④ 4年計画第一年目の機材供与(295百万円)　1988年11月にプロジェクトサイトに到着

以上、全体としてシリア側は日本の協力実績を高く評価しており、特に専門家の資質の高さを評価した。

(2) シリア側

① 建物（ＮＳＣＬ研究棟）がほぼ予定通り完成。

② カウンターパートの確保、運営予算も順調に確保された。

以上、プロジェクト実施が極めて順調に進捗していることを、双方により確認した。

2. 1989年度年次計画の策定

(1) 専門家派遣

イ．長期　　2名（チーフ・アドバイザー、計測標準）

ロ．短期　　2名（高周波電力・減衰量、周波数及びオシロスコープ、信号発生器）

その他必要に応じて派遣する。

(2) 研修員受入れ

イ．一般　　3名（直流電圧・電流、抵抗・静電容量、交流電圧・電流）

ロ．シリア側はディジタル計器修理ベンチ分野1名を追加希望

ハ．シリア側は高級研修員を希望

ロ．及びハ．については検討の結果、後日回答することとした。

(3) 機材供与

4年計画の第二年度分　リスト提示

（実際は、88年度予算にて完了、89年5月現地着予定）

3. 暫定実施計画（ＴＳＩ）の変更

88年度において、機材供与分一部先取りを実施したため、全体計画が若干前だおしとなった。

4. 技術協力計画（ＴＣＰ）

・別添計画表（P19）をシリア側に提示、説明を行った。シリア側は、その内容についてよく理解した。

・その主な内容は、

標準校正部門の人員・機器を有機的に機能させるための適正な運営組織とルールを作るよう指導する。①組織ルール　②資産管理ルール　③精度管理ルール　④依頼試験ルール　⑤図書管理ルール等とし、校正手順書の作成も指導する。

・作成したルールに従って標準器の資産管理、精度管理等を実施し、一貫した校正試験が出来るよう指導する。

・今後はこの計画に沿ってプロジェクトの進捗をはかる。

Ⅲ. 協議内容

1. 1988年度技術移転結果のレビュー

(1) 専門家派遣

日本人専門家からカウンターパートへの技術移転状況については、極めて順調であることを双方確認した。

また、訓練を受けたカウンターパートによる“トレーナーズ・トレーニング”の概念は、幅広い人材の裾野を広げるための効果的なアプローチであることが確認された。専門家が技術指導する際のカリキュラムの内容については、今後とも専門家、カウンターパートの協力が必要であろう。特に技術力に応じたものであること、カウンターパートは英語力が必要であること等指摘があった。

1988年12月から５人の短期専門家が派遣されている。

① 美濃由専門家（空調システム）

１月末、機器の据付け・配管工事を終了し、以後24時間連続運転を行っている。３月、制御性を改善するため、冷凍機のオンオフ制御方式を一部変更した。各校正室の室温は、現在、当初の計画どおり23℃±１℃以内に制御されている。

空調システムに関する技術移転は、主に機器の設置工事、試運転を行う中で実施した。今後のメンテナンスは、ＳＳＲＣの担当者によって行われるが、担当者が意欲的に技術の吸収に取り組んだため、空調機を運転する上で問題はないものと思われる。

② 片山専門家（シールドルーム組立て）

１月末に設置を完了した。運用上の注意事項、今後のメンテナンスについての指導も終了した。実際の使用開始は、88年度分の機材が到着する1989年５月以降になる。

③ 大木専門家（直流、交流、抵抗）

１月中旬から約１ヵ月、各標準校正システムの据付け及び動作チェックを行った。２月中旬からはシステムの性能・特長、使用上注意点などをカウンターパートに説明し、さらに校正機器間のトレーサビリティ、標準器の校正方法、校正成績書の作成法などについての指導を行った。

④ 古川専門家（温度）

１月中旬から開始した標準校正システム（計測器、温度槽、コンピュータ、純水装置など）の設置、動作チェックに引き続き、カウンタパートに対して各機器の取扱い方法の説明を行った。更に標準器の精度確認方法を実習で体得させ、測定データの処理用に使用しているコ

ンピュータについても運用方法、プログラミング手法のトレーニングを行った。

⑤ 宮沢専門家（修理）

供与機材の設置・動作チェック・機能確認を行ったのち、各機材の取扱い方法を説明し実習を行った。

ディジタルマルチメータ・標準電圧発生器・レコーダについては、プリント板に人為的に不具合箇所を設け、その追求方法を実習を通して理解させた。

また、技術的に未熟なカウンターパートに対しては、電子回路の基礎や計測器の基本的事項について講義を行い、技術レベルの向上を図った。

1988年度の専門家の派遣実績は下表の内容である。

指導科目	氏名	所属	派遣期間
チーフ・アドバイザー	中村 久夫	電子技術総合研究所	1988. 11. 21～1989. 11. 20
計測標準	野口 佳彦	横河電機㈱	1988. 9. 12～1990. 9. 11
空調システム	美濃山貞敏	大倉冷機㈱	1988. 12. 6～1989. 2. 6
シールドルーム組立	片山 節男	㈱昌新	1988. 1. 6～1989. 2. 3
機材据付・操作（直流電圧・電流、抵抗・静電容量、交流電圧・電流の二次標準校正技術）	大木 喬夫	日本電気計器検定所	1989. 1. 6～1989. 4. 10
機材据付・操作（温度一次、二次標準校正技術）	古川 雅英	横河電機㈱	1989. 1. 13～1989. 4. 10
機材据付・操作（三次標準校正技術、計測器の修理技術）	宮沢 康弘	横河エンジニアリングサービス㈱	1989. 1. 6～1989. 4. 10

(2) 研修員受入れ

1988年度は、一般研修員3名の受入れを実施中であるが、順調に研修中であることを双方にて確認した。日本での研修の概念は、帰国後いかに現場に反映するかのアプローチ、つまり現場のエンジニアやアシスタントエンジニアに対していかに効率的に技術を移転するかということの重要性が認識された。

87、88年度の研修員受入れは下表のとおり。

氏名		期間	受入・協力先
Mustafa Aghbar	（計測標準）	1988. 3. 22～12. 14	日本電気計器検定所
Mhd Abdul-Salam Karouni	（直流、抵抗）	1988. 3. 22～1988. 6. 13	横河電機株式会社
Mazhar Zaawite	（交流、電力）		
Moufid Harb	（温度）		
Tatal Al-Hajji	（オシロスコープ）	1989. 1. 20～1989. 4. 23	日本電気計器検定所
Mahmoud Kashour	（信号発生器）		横河電機株式会社
Suleiman Hassan	（RF及び周波数標準）		機械電子検査検定協会

(3) 資機材供与及び利用状況

既給与機材及び次年度以降の計画については、下表のとおりである。供与機材はその利用・管理状況も良好であり、今後の機材の現地到着により、さらなる技術協力の展開が期待される。

NSCL 1987年度分供与機材利用状況

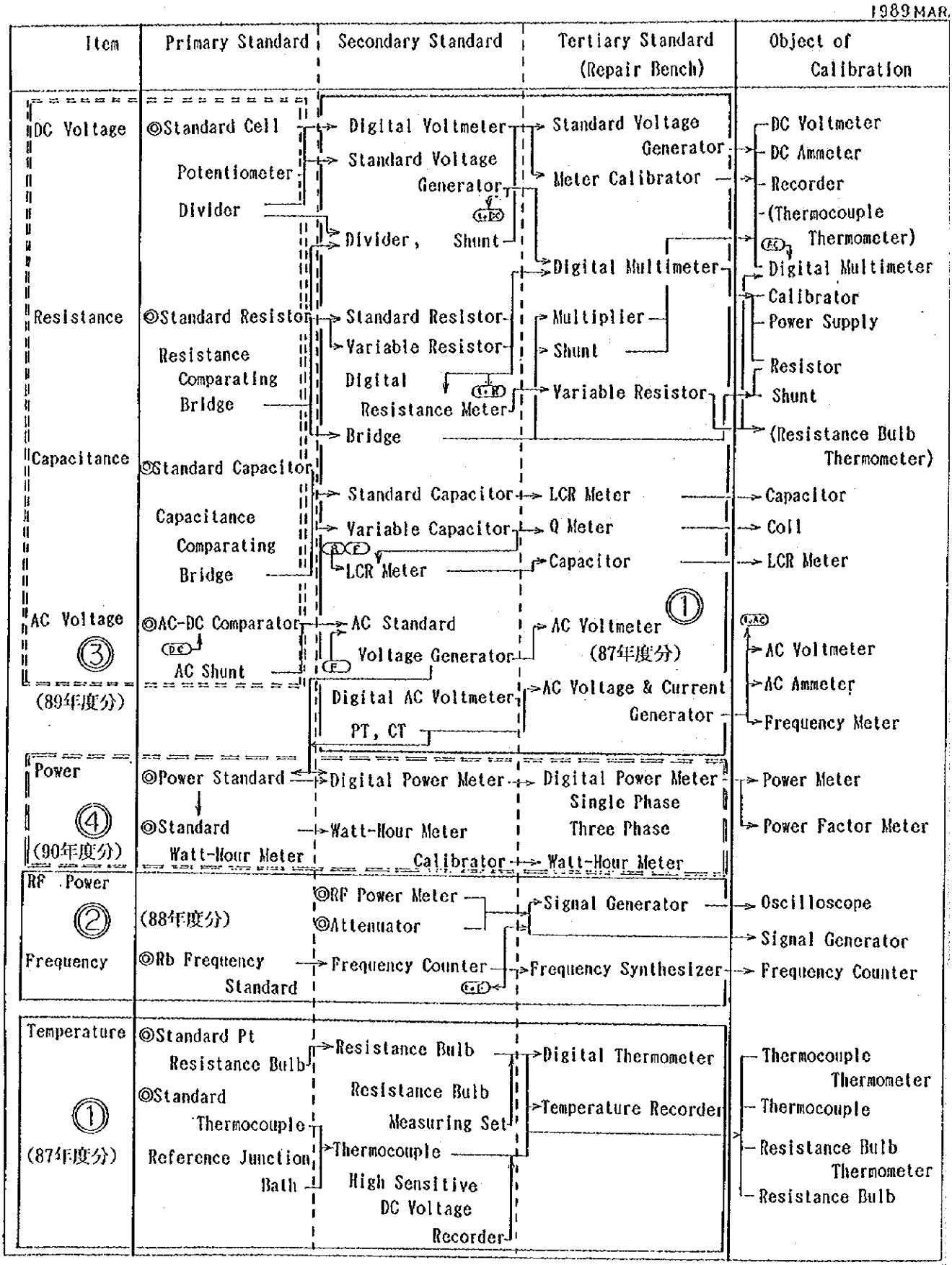
89年3月現在

項目	機材名	利用状況
I	直流電圧・電流二次標準校正システム 高精度ディジタルマルチメータ、分圧器 直流校正装置、標準抵抗器、分流器 交流安定化電源装置、無停電電源装置	校正方法の実習に利用中
II	抵抗・静電容量二次標準校正システム 標準抵抗器、精密級ダブルリッジ、 精密級ホイートストンブリッジ、Qメータ 標準コンデンサ、LCRメータ 交流安定化電源装置、無停電電源装置	同上
III	温度一次・二次標準校正システム 標準白金測温抵抗体、標準熱電対 ディジタル電圧計、ラインコンピュータ 油槽、硝石槽、比較的試験炉、純水装置	
IV	交流電圧・電流二次標準校正システム AC STANDARD, ディジタル電圧計 交流標準電圧発生装置 交流安定化電源装置、無停電電源装置	同上
VI	高周パワー及び減衰量標準校正システム （シールドルーム、電源トランス、空調器）	88年度納入機材待ちのため休止中
VII	マルチメータ及び記録計修理ベンチ （三次標準校正システム） 直流校正装置、交流標準電圧電流発生器 オシロスコープ、ディジタルマルチメータ ロジックアナライザ、標準抵抗器 純水装置、温湿度試験槽	修理法の実習に利用中
VIII	直流電源及び標準電圧発生器修理ベンチ （三次標準校正システム） ディジタルマルチメータ、直流校正装置 ディジタルLCRメータ、ダブルブリッジ 標準抵抗器、ディジタルACパワーメータ 電子負荷装置、耐電圧試験器	同上
IX	恒温空調設備 パッケージエアコン、扇風機、制御装置 温湿度センサ、監視盤	各校正室で24時間運転を実施中。 ただし、シールドルームを除く。

OVERVIEW OF THE MEASURING STANDARDS

& CALIBRATION SYSTEM

1989 MAR.

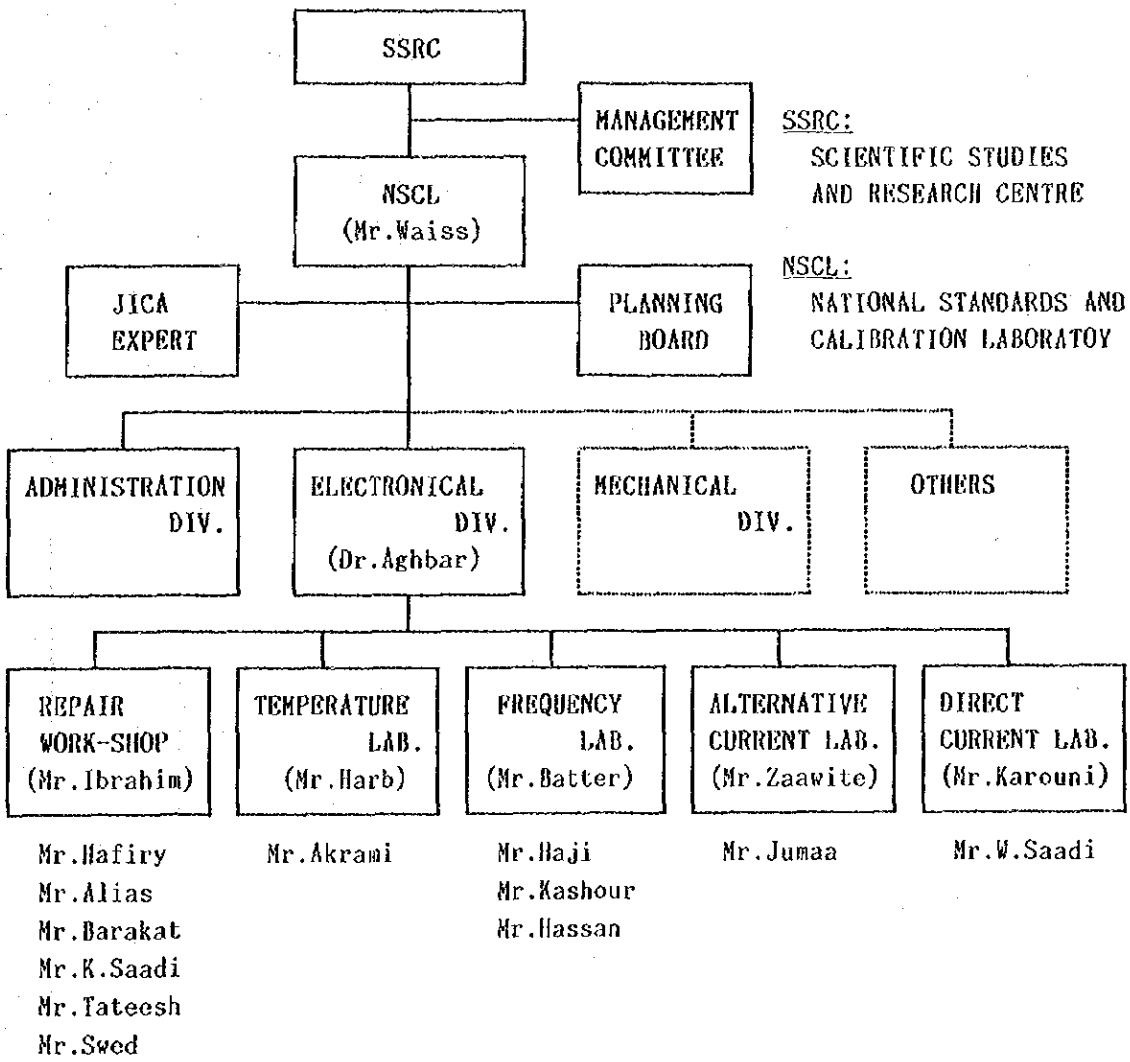


(4) 組織及びカウンターパートの配置

ＮＳＣＬには現在20名のカンウターパートが配属されているが、今後さらに優秀なカウンターパートを増員して行く方針である。

カウンターパートの氏名及び配置は次のとおり。

NSCL ORGANIZATION



National Standards and Calibration Laboratory

March,1989

Name	Age	Univ.or Inst.	Main Subject(Career)	Present Work	Trainee	Expert
Mr.S.Waiss	57	Damascus,Mosco	Math,Phys,Chem,Geo,Mech	Director	87.6-6	Nak.Nog.
Mr.M.Nokary	45	Belegrad Univ.	Electrical;Construct.Dep.	Vice director		
Dr.M.Aghbar	37	Canan Univ.	Metrology;Systems	Division chief	88.3-12	〃
Mr.N.Zaawite	35	Damascus,Cairo	Electronic;Calibration+QC	Sec.ch.(AC) ◈◈	88.3-6	Ohki
Mr.Z.Batter	34	Leningrad Univ	Electronic;QC+Maintenance	Sec.ch.(RF) ◈◈		
Mr.R.Ebrahim	32	Aleppo Univ.	Electronic;Test Equip.	Sec.ch(Rep.)◈◈		Miyazawa
Mr.M.Harb	29	Damascus Univ.	Electrical;Solar system	Sec.ch.(Temp.)◈	88.3-6	Furukawa
Mr.A.Karouni	38	Damascus Inst.	Electronic;Test& Calib.Dep	Sec.ch.(DC) ◈◈	88.3-6	Ohki
Mr.T.Haji	31	Damascus Inst.	Electronic; 〃	RF ◈◈	89.1-4	
Mr.M.Kashour	32	Damascus Inst.	Electronic; 〃	RF ◈◈	89.1-4	
Mr.S.Hassan	31	Damascus Inst.	Electronic; 〃	RF ◈◈	89.1-4	
Mr.W.Saadi	25	Damascus Inst.	Electronic; 〃	DC ◈◈		Ohki
Mr.M.Hafiry	23	Damascus Inst.	Electronic	Repair ◈◈		Miyazawa
Mr.M.Jumaa	28	Damascus Inst.	Electronic; 〃	AC ◈◈		Ohki
Mr.N.Alias	29	Damascus Inst.	Electronic; 〃	Repair ◈◈		〃
Mr.K.Barakat	23	Damascus Inst.	Electrical	Repair ◈◈		〃
Mr.S.Akrami	22	Damascus Inst.	Mechanical(Air-Condi.)	Temperature ◈		Furakawa
Mr.K.Saadi	23	Damascus Inst.	Electrical	Repair ◈◈		Miyazawa
Mr.S.Tateesh	24	Damascus Univ.	Electronic	Repair ◈◈		〃
Mr.M.Z.Swed	20	Damascus Inst.	Electronic	Repair ◈◈		〃

Notes:◈.DC voltage and current, ◈.Resistance and capacitance, ◈.Temperature, ◈.AC voltage and current, ◈.Electric power and energy, ◈.RF power and attenuation, ◈.Frequency, ◈.Mutimeters and recorders ◈.Power supplies, ◈.Oscilloscope. ◈.Signal generator

(5) 運営予算

本プロジェクトの運営予算についてＳＳＲＣ側によると、1987年LS 3,851,150(≒25百万円) 1988年LS 27,021,180 (≒177百万円)、1989年LS 6,675,950(≒44百万円) である。1988年度予算が突出しているのは、建屋の建設がシリア側負担でなされたものであり、建築工事、電機配線、暖房、排水設備等に費用がかかったためである。プロジェクトが健全に運営されている背景から満足のいく予算が確保されていると思料される。(Annex 5 参照)

BUDGET OF CALIBRATION & MAINTENANCE DEPARTMENT
(NSCL PROJECT)

Ref	Costs' Items (Budget's Payments)	Payment During			Total(S.P)
		1987	1988	1989	
1-	Project's design (drawings).	600000	-	-	600,000
2-	Gneral site Works	700000	1.500000	700000	2.900 000
3-	Skeleton Construction	2000000	6.100000	-	8.100.000
4-	Finishing Construction	-	8.400000	-	8.400.000
5-	Electrical Instulation Works	-	5.000000	1400000	6.400.000
6-	Central heating	-	2.500000	-	2.500.000
7-	drainage Systems		7.00000		
8-	Land reforming & Gardings	-	-	1.000000	1.000.000
9-	Fork lifting equipment Hydr.cranes(1.5T,2T)	100 500	-	-	100.500
10-	Administrative Furniture	-	763.130	-	763.130
11-	Technical furniture & equipment	-	894750	-	894.750
12-	Wages& Salaries(Staff)	238000	816000	1.152000	2.206.000
13-	Servecing & Transportation	212650	347300	423950 →	983.900
	TOTAL	3.851.150	27.021180	4.675950	35.548.280
1-	Building's Costs.	33300000	24.200000	3.100000	30.600000
2-	Administrative technical furniture's costs.	100 500	1.657880	-	1.758380
3-	Wages, Servicing& Tranportation costs	450 650	1.163300	1.575950	3.189.900
	TOTAL	3.851.150	27.021180	4.675950	35.548.280
(*) 4-	Budget Allocated for1989			2.000 000	2.000.000
					37.548 280

(6) 建　物

本プロジェクトは、National Standards and Calibration Laboratory（ＮＳＣＬ）の建物はシリア側で用意することが決定されており、1987年９月より、Science Studies and Research Centre（ＳＳＲＣ：ＮＳＣＬの上部機関）により建物の建設が開始された。1988年12月１日の時点では、全ての建物（周辺道路、庭園等を含む）は12月末に完成することが約束されていた。この計画に基づいて、機材の開梱、精密空調工事の開始を始めたが、実際には、建物の内部が完成して新しい建物に全員が移ったのは1989年２月であり、その間、廊下及び天井工事が行われている中で空調工事、機材の据え付けが行われた。現在、建物の内部は完全に終了している。しかし、道路、庭園等はまだ工事が行われており、エクステリアまで含めてＮＳＣＬビルディングが完全に完成するのはあと１ヶ月を要すると思われる。

次に建物の建築経過を述べる。

１９８７年９月	：	建物の建築開始
１９８８年１１月	：	一階の一部完成 （供与機材の搬入）
１９８８年１２月中旬	：	一階の建物の内、精密空調設置用の４部屋完成 （天井除く） 電源、水道、暖房供給済み （精密空調工事開始）
１９８９年１月初旬	：	４部屋分の天井工事完成 （空調取り付け完成）
１９８９年１月下旬	：	一階の全室完成 （旧ビルディングから引っ越し）
１９８９年２月中旬	：	建物の一、二階とも完成
１９８９年３月中旬	：	一、二階の補修工事実施 会議用机、絵画等備え付け終了

建物は地上二階、地下一階であり、計測標準研究所として十分な広さを持っており、また将来の拡張も見込める。一部、塗装、配管等に粗雑な面がみられるが、当面問題はないと思われる。一階は主として実験用機材、設備が置かれている。二階は事務室、居室に使われている。全ての部屋は集中暖房式が採用されている。だだし、冷房装置はない。当初かなり頻繁にあった停電も現在はほとんど無くなった。

建物完成は、上述のごとく当初予定では1988年12月末であったが、実施計画への影響はなく、技術移転は順調に進展しており、予算の獲得も含め、シリア側の努力は高く評価される。

(7) 技術移転の成果

① 各標準校正システムの取扱い方法・校正方法については、ほぼ技術移転を終了した。チーフカウンターパートは、今後独力で経験を積み重ねられるレベルにほぼ達したものと思われる。

② トレーサビリティについての考え方をカウンターパートに理解させることができた。

③ 各校正室のチーフカウンターパートが校正成績書の作成に着手できるまでに成長した。

④ ディジタルマルチメータ・標準電圧発生器・レコーダの一部の機種については、カウンターパート自身で調整ができるようになった。

⑤ 軽度の不具合であれば、理論的に不具合箇所を追求して、部品単位の修理が可能になった。

⑥ 各校正室のチーフカウンターパートが、他のカウンターパートに対して不十分ながら技術指導できるようになった。

(8) 問題点と今後の対応

① 供与機材を現地で調整するためのドキュメントが不十分である。

対応：可能なかぎり日本からフォローする。

② カウンターパートは、校正実務の経験に乏しく、応用力が不足している。

対応：今後の経験の積み重ねを待つ。

③ 校正依頼受付けの手順が未確定

対応：既にルール作りに着手した。

④ カウンターパート（特に若いアシスタントエンジニア）の技術レベルが低い。計測器を使用する上での基本的事項を理解していない者がいて、計測器を破損させる恐れがある。

対応：チーフカウンターパートにより内部教育を実施してレベルアップを図る。

⑤ 若いカウンターパートに、特に目的意識・積極性が欠如している。

対応：指導を継続する。

⑥ 英語が全く通じないカウンターパートがいる。

対応：ＳＳＲＣ内における語学教育の成果を待つ。

2. 1989年度年次計画の策定

(1) 専門家派遣

① 長期専門家については、チーフ・アドバイザーを含む２名で活動していくことで合意した。なお中村チーフ・アドバイザーについては任期が一年間であり、1989年11月に後任と交替する予定であることを確認した。

② 短期専門家については、シリア側より２名（高周波電力・減衰量、周波数１名、オシロスコープ、信号発生器１名）の要請があり、その他必要に応じて派遣するということで日本側は承諾した。

(2) 研修員受入れ

① 一般3名

なお、シリア側よりディジタル計器修理ベンチ分野で1名追加で受入れを実現してほしい旨の要望があった。

② また、シリア側よりさらにＳＳＲＣ役職者の日本への視察旅行について考慮してもらいたい旨申し入れがあった。本調査団としては即答することを避け、とりあえず議事録に留めることとした。なお、調査団が日本大使館を訪問して木幡大使に中間報告し、本件についても触れたところ、シリア側からそのような要請があるならば、日本大使館としても、ＳＳＲＣ役職者の研修員受入れを推す旨のコメントを得た。

③ ①及び②については検討の結果、日本側より後日回答することとした。（ただし、高級研修員受入れについては外務省Matter）

(3) 機材供与

4年計画の第二年度分リストを提示し、1989年5月現地着予定であることを確認した。また次年度供与機材として、直流電圧・電流、交流電圧・電流、抵抗・静電容量の一次標準システムを予定していることを告げ、シリア側もこれを了承した。

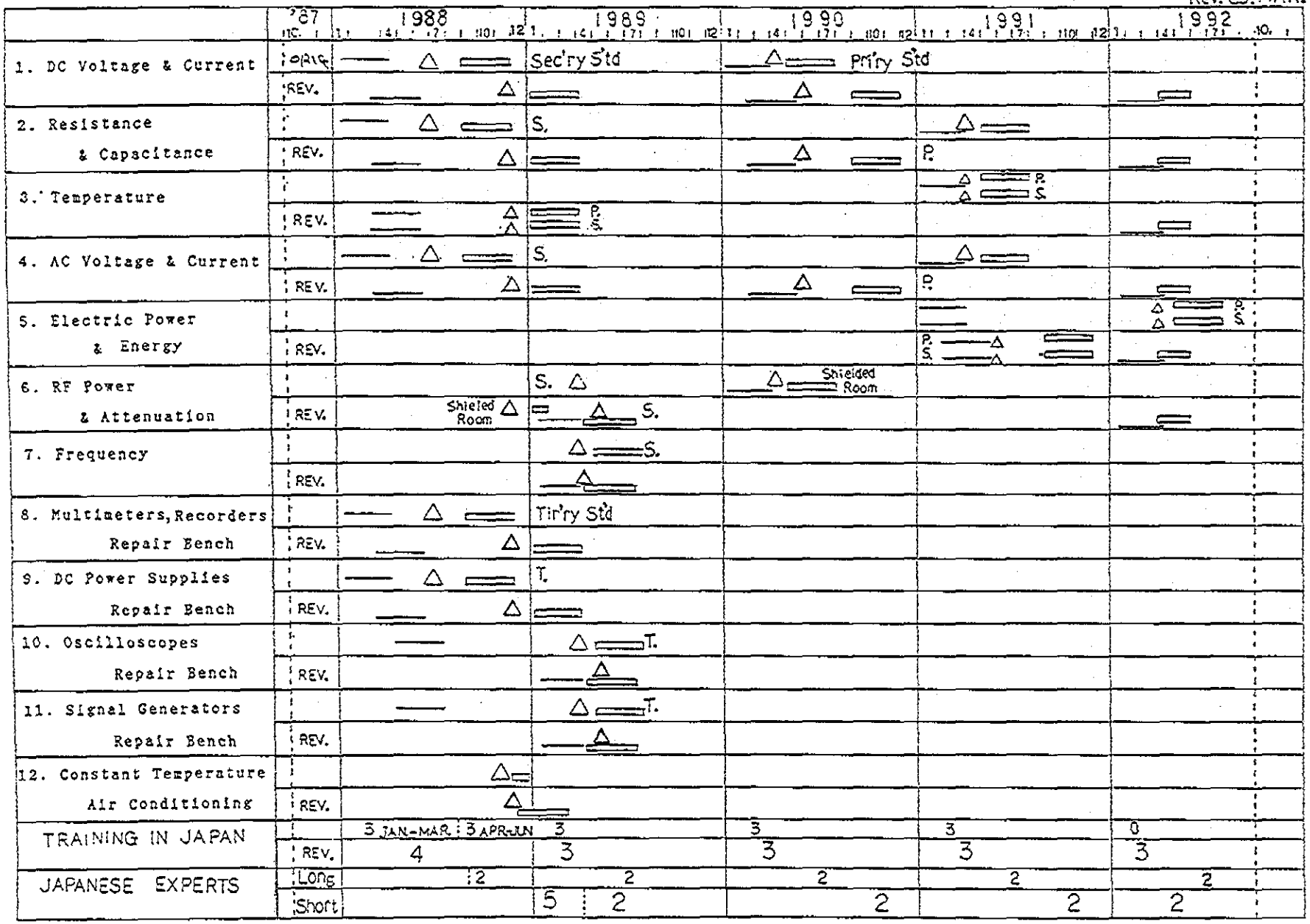
3. 暫定実施計画

当初機材供与計画のうち、早期購送した分に伴い、実施協議調査団派遣時に作成した暫定実施計画を修正した。

新たな暫定実施計画は別表のとおり。(Annex 2 参照)

TENTATIVE SCHEDULE OF IMPLEMENTATION

Rev.'69.MAR.



4. 技術協力の概要

日本側は本プロジェクトにおける技術協力のアウトラインを説明し、シリア側もこれをよく理解した。内容は以下のとおり。

- 標準校正部門の人員、機器を有機的に機能させるための適正な運営組織とルールを作るよう指導する。ルールは、①組織ルール　②資産管理ルール　③精度管理ルール　④依頼試験ルール　⑤図書管理ルール　等とし、校正手順書の作成も指導する。
- 作成したルールに従って、標準器の資産管理、精度管理等を実施し、一貫した校正試験ができるよう指導する。

5. 技術協力計画の策定

日・シ双方は、今後展開されてゆく本格的な技術移転に際し、本プロジェクトの一層の充実に資するため、以下の技術協力計画を策定した。(Annex 3 参照)

技術協力計画

＜二次標準校正システム＞

(1) 二次標準器の資産台帳、分類番号ラベル等の作成

二次標準器を分類し、ラベル表示、資産台帳を作成、標準器の管理を行うよう指導する。

(2) 二次標準器及び下位標準器の校正手順書作成

二次標準器と三次標準器を校正する際に必要な校正手順書を作成する。手順書は、使用機器のリスト、接続図、試験の手順、注意事項などを記載する。

(3) 試験成績書、標準器履歴簿等の様式作成

校正記録、試験成績書、標準器履歴簿などの様式作成。

(4) システム構成機器の相互精度確認

システムの基準となる標準器をもとにして、各機器を校正し、それぞれの精度が仕様通りであることを確認する。

(5) 下位標準器の校正試験

二次システムで下位標準器を校正し、精度管理を行う。

＜一次標準校正システム＞

(6) 一次標準器の資産台帳、分類番号ラベル等の作成

一次標準器と分類し、ラベル表示、資産台帳を作成し、標準器の管理を行うよう指導する。

(7) 一次標準器の校正手順書作成

一次標準器用の校正手順書を作成する。

(8) システム構成機器の相互精度確認

システムの基準となる標準器をもとにして、各機器を校正し、それぞれの精度が仕様通りであることを確認する。

(9) 一次標準校正システムによる二次標準器の校正試験

一次システムを使用して二次標準器を校正、精度管理する。

(10) 外部機関からの依頼による校正試験実務技術

各システムを使用し、ＳＳＲＣ所有の各種計測器を校正し、校正試験の実務技術を習熟させる。

(11) システム精度評価（一次標準器の日本側による再校正試験）

日本から運んだ標準器で一次標準器を再校正し、ＮＳＣＬにおける校正試験精度を評価する。

(12) 各標準校正システム機器の定期校正試験

精度管理ルールに従って各標準器の定期校正を実施する。

＜三次標準校正システム（修理ベンチ）＞

(1) 三次標準器の資産台帳、分類番号ラベル等の作成

三次標準器を分類し、ラベル表示、資産台帳を作成、標準器の管理を行うよう指導する。

(2) 上位標準器による定期校正

上位標準器を使用して三次標準器を校正、精度管理する。

(3) 故障診断技術

具体的な個々の計測器について故障診断の技術指導を行う。

(4) 調整・校正技術

具体的な個々の計測器について調整及び校正を実施する。

(5) 修理報告書の作成

三次標準器の修理をした際に、修理報告書を作成する。報告書は故障箇所及び修理作業の詳細、取り換え部品、執務時間等を記載する。

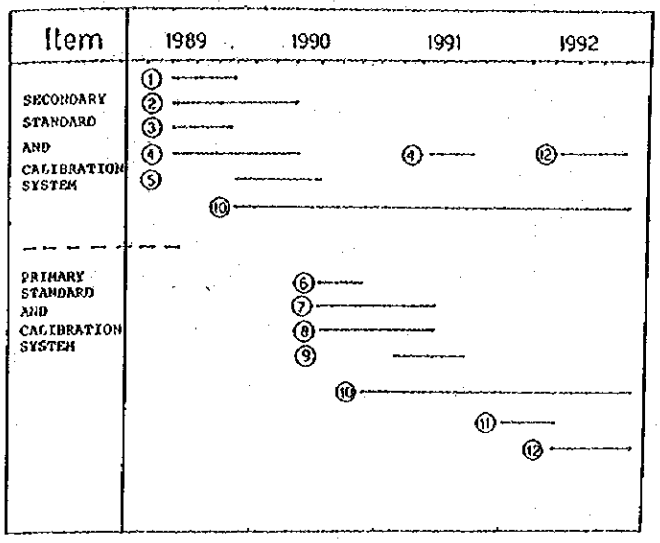
(6) サービスマニュアルの管理

計測器の適正な保管、保守、点検のためにサービスマニュアルの管理を行う。

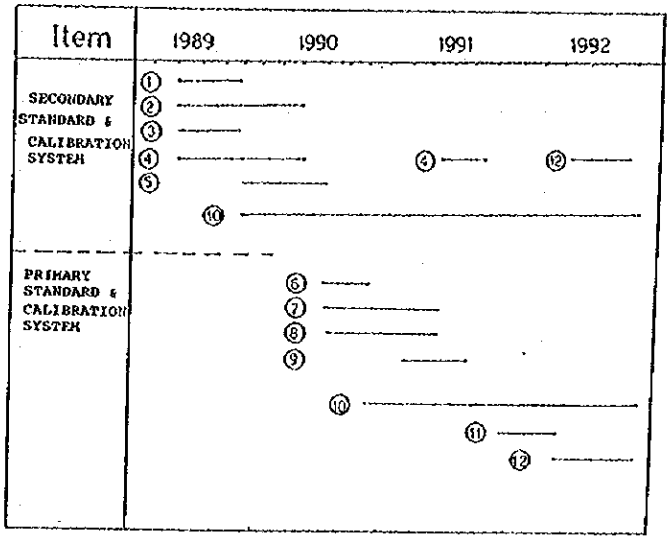
(7) 附属設備、治工具の保守規定作成及び点検の実施

附属設備、治工具の保守規定を作成し、その規定に従って数量、設置場所を定期点検する。

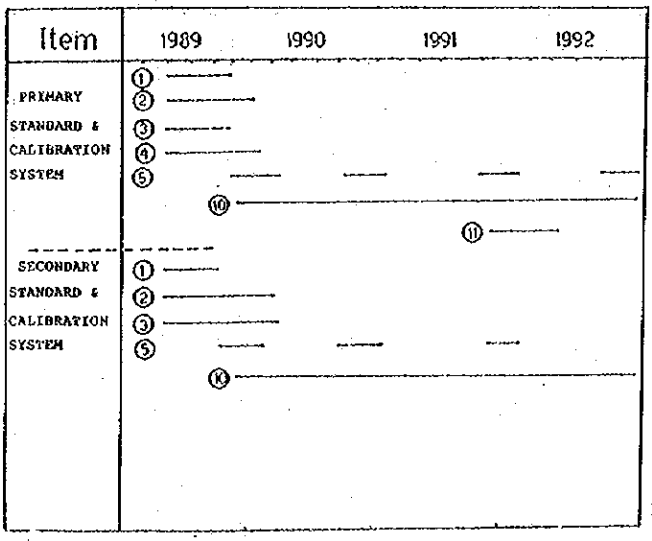
1,DC.VOLTAGE AND CURRENT STANDARD AND CALIBRATION SYSTEM



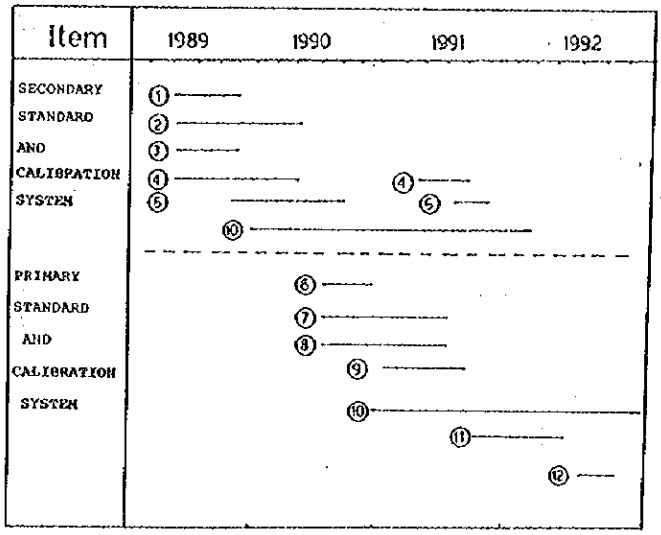
2,REGISTANCE AND CAPACITANCE STANDARD AND CALIBRATION SYSTEM



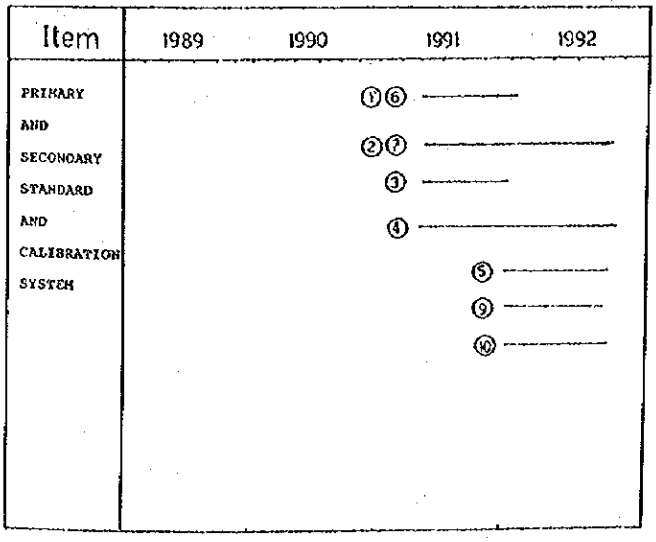
3,TEMPERATURE STANDARD AND CALIBRATION SYSTEM



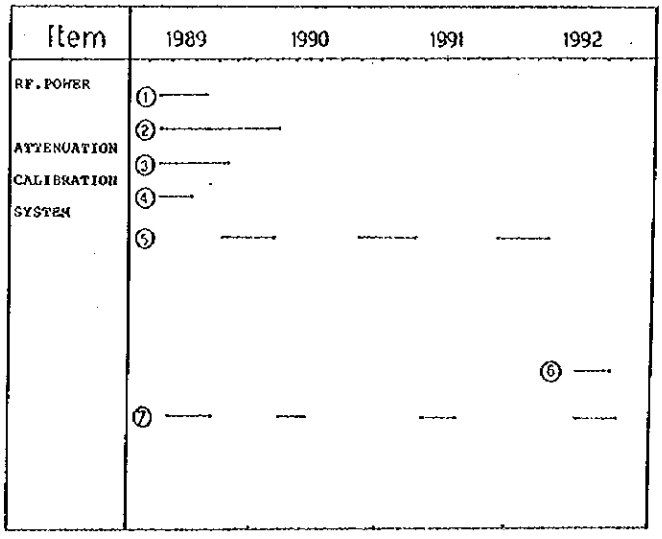
4,AC.VOLTAGE & CURRENT



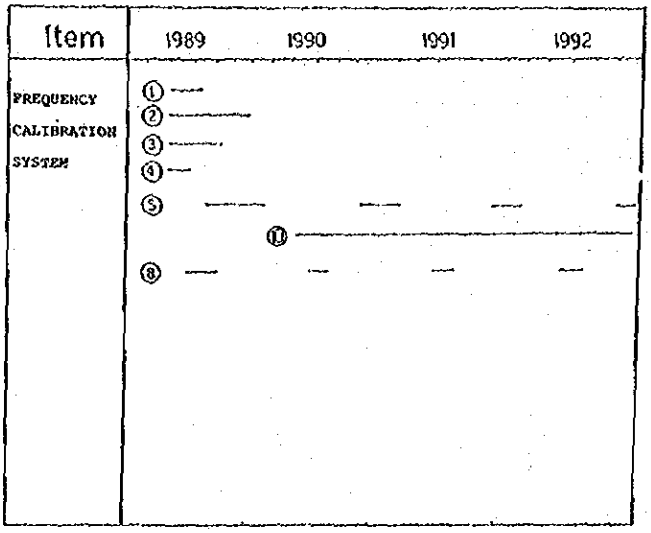
5,ELECTRIC POWER & ENERGY



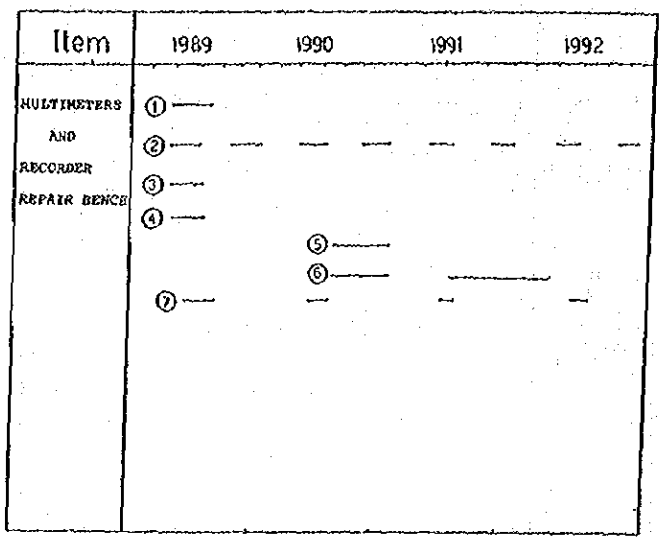
6,RF.POWER & ATTENUATION



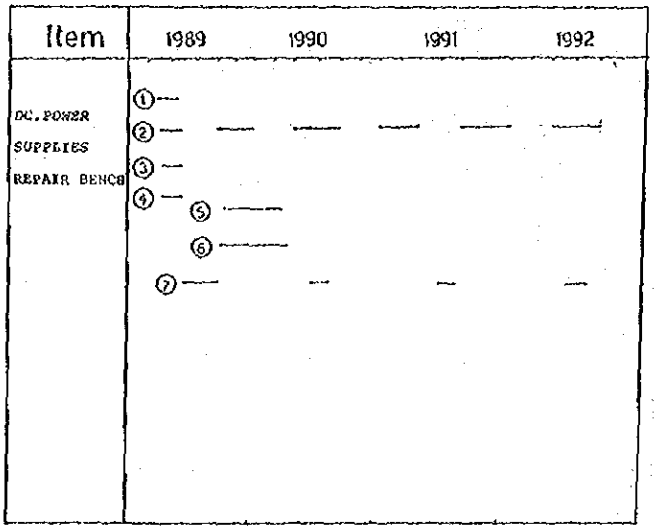
7,FREQUENCY



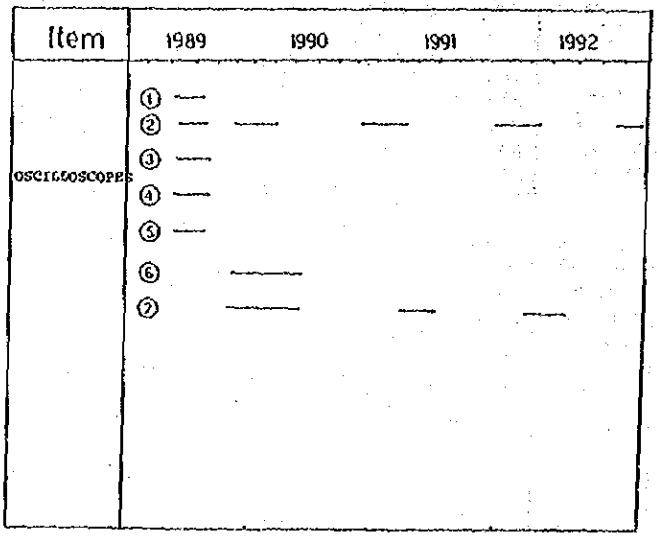
8,MULTIMETERS AND RECORDERS



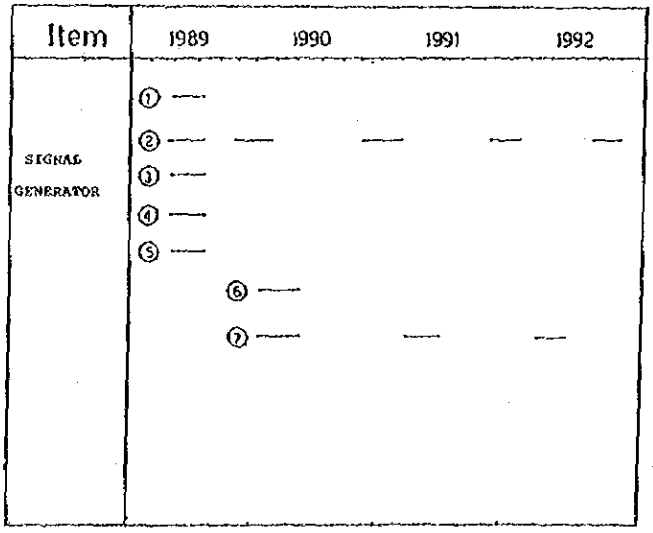
9,DC.POWER SUPPLIES



10,OSCILLOSCOPES



11,SIGNAL GENERATOR



6. 計測器の校正需要調査

ＮＳＣＬへ校正依頼されるであろう計測器の台数調査を日本側から要求した。この調査は今後のＮＳＣＬの活動方針を確立する際に非常に重要であり、団長からも、各研究所や機関を訪問し調査して欲しい旨申し入れた。シリア側からはＳＳＲＣとＨＩＡＳＴの機材リストが提出された。これ以外についてはＮＳＣＬがサービスするであろう機関の要求を１ヶ月以内に調査するとの回答を得た。ＳＳＲＣとＨＩＡＳＴの機器リストから校正対象となる計測器は 541台ある。その概要は下記の如くであり、これらを一通り校正するだけでもＮＳＣＬの現有能力ではかなりの負荷（工数）である。

＜校正対象台数＞

マルチメータ（ボルト、オームメータ）	２５６台
オシロスコープ	１２２台
シグナルゼネレータ、オッジレータ類	９２台
周波数カウンタ	１８台
スペクトラム・アナライザ	１６台
高周波電圧計、パワメータ類	２１台
その他（キャリブレータ、ＬＣＲメータ等）	１６台
合計	５４１台

今後、上記の調査と平行してＮＳＣＬの存在の広報と使用者教育を根気良く、機会ある毎に継続させるよう指導、支援していく必要があろう。

7. ドキュメンテーション

日・シ双方で策定した技術協力計画に基づき、校正機器の精度管理、機能管理、保守・修理等の活動を行っていくためには、シリア側は多くのコードやマニュアルを作成しなければならず、これらの作成について能力的に心配があるため、日本側に協力を求めた。専門家による指導とすでに提供されている機器の校正・調整に関するドキュメントだけでなく、さらに強力なサポートと詳細なドキュメントを提供して欲しいとの要望であった。

現在、ＮＳＣＬが入手した日本製の機材の中には、修理用のマニュアルや部品表が部分的に不足している機器があり、その追加をリストアップして要求された。その必要理由は上記の各種手順書を作成するためとのことである。

日本側は、ＮＳＣＬが要求している機材の回路図、部品表等の不足分の提供を検討することを約束した。

教育用資料、部品のカタログ規格表類については、来日した研修生に渡されたものも多いが、これらは個人で保有されてしまうようである。これら共用技術資料の管理も指導していく必要

がある。

8. スペアパーツ等修理ベンチ関連

・ シリア側から、供与された機器が故障したときにそれを修復するための部品の要求が出された。

これに対して日本側は、各機器のＮＳＣＬでの運用状況をみた上で、機器メーカーの推選スペアパーツから選定し、当該機材の供与より後の年度に供与する、また、それまでに緊急に必要とする修理部品は、個別に日本側から供与する旨回答した。

・ もうひとつのスペアパーツの問題は、修理ベンチを運営するための汎用電子部品、特に半導体部品の供与の要求である。これは非常に多品種の部品の要求でもあり、その必要となる確率も低いと思われる。また、輸出手続の問題もあるので日本側からの供給は困難である旨断った。

・ ＪＩＣＡ専門家を通して数点の修理要請があった。保証期間内であるものは日本へ送られれば保証対象範囲については無償で修理される。今回の修理品で現地修理可能なものは修理部品を送ることとし、現地修理不能の品は日本へ返送することとした。

・ 修理ベンチに関連して小型の工作機械、器具を供与して欲しいとの要求があった。主に機構部品の修理、又は修理用部品製作のためのものである。これについては日本側は検討を約した。同時に、工作機械の使用、高電圧・高温度の利用時の作業者の安全確保と教育についてもシリア側へ注意を喚起した。

・ 修理ベンチの範囲拡大についてもシリア側より要求が出された。これは、オーディオとビデオ機器の修理ベンチ及びディジタル機器（マイクロコンピュータ応用機器）のトラブル利用機器についてである。

これらについては、本プロジェクトの範囲外であることを日本側は説明したが、シリア側から強い要請があったため、本件につきミニッツに要請があったことを記載することとした。

前者は現有品の保守を目的としているのでその範囲は調査すれば明確となるが、後者はマイクロコンピュータ又はディジタル機器の基本設計システムと関係するので、シリア側の考えるように汎用又は現有のほとんどの機器を対象とした範囲を決めるのは困難である。前回調査団派遣時にも同様な提案があり、汎用性の高いロジックアナライザの供与で了承されている。

9. 本プロジェクトへの追加希望

(1) ＳＳＲＣ側より専門図書類の贈送依頼があった。(Annex 4)

これについて、日本側は調達可能な図書については、供与する方向で検討する旨回答した。

(2) 日本の大学への留学

シリア側から、さらに進んだ学位取得のために、カウンターパートを日本の大学へ留学させたいとの希望があった。これに対し、日本側は文部省奨学金による留学制度等一連の手続きを説明し、ＪＩＣＡ事務所、日本大使館を通して要請するよう提言した。

(3) 現プロジェクトの拡張

シリア側は現プロジェクトの拡張を希望し、機械工学及び光学の計測標準分野についても現プロジェクトに含めてほしい旨要請してきた。一方、日本側はプロジェクト拡張についての検討は、本調査団の目的ではないこと、まず現プロジェクトを円滑に実施し、成功裡に完遂することが優先されるべきであることを強調した。

10. セミナー及び域内研修の実施

日本側から、本プロジェクトの研修成果、ＮＳＣＬの活動状況を発表・ＰＲするためにセミナーを開催していくことが提案された。また、1991年に域内研修を実施すべく、その実現可能性を探っていくことで双方合意した。

11. その他のプロジェクト・プロポーザル

シリア側より、既提出済みのプロジェクト要請書を含む本プロジェクト以外の要請書の提示があった。これに対し、坂田団長から、各国からＪＩＣＡに来るリクエストの数はぼう大なものであり、その中からシリアのプロジェクトを選択することは困難であること、さらに本プロジェクトはまだ初期の段階にあり、プロジェクトの成功がほぼ確認された段階で次のプロジェクトの実行を検討すべきであることを強調した。

シリア側もこれに対し、今年、来年のことではなく、これらの要請（Annex 8）が取上げられるのには時間もかかることであり、それを見越して提示するものであること、また他の中近東諸国で行われている援助の件数に比して、シリアにおける件数が少ないことを主張した。

結局、プロポーザルをとりあえず Minutesに別添することで合意した。ちなみにシリア側のプロジェクトの要望は大別して① Technology ②Communications ③Automation and Robotics ④Energy and Environment の四つのカテゴリーに分類される。

12. その他の事項

(1) 西側からシリアへの協力の紹介

シリア側は1987年～1989年の西側諸国からの協力実績を紹介した。(M/D Annex 9)

(2) 定期会議の開催

日本側は、プロジェクトの問題点の解明、業務のスムーズな進行を図るため、専門家とカウンターパートとの定期会議の開催を提案し、シリア側も了解した。

(3) ネームプレートの取付け

日本とシリアの技術協力の証として、ＮＳＣＬの建物の玄関にネームプレートを取付けることが合意された。

(4) エアコンの取付け

日本側は、専門家居室にエアコン取付けの申し入れをし、シリア側の了解を得た。

Ⅳ. ＮＳＣＬ開所式

計画打合せ調査団の来シリアに合わせて、３月20日、ＮＳＣＬの開所式が行われた。これは、本年１月頃、種々の状況を考え開所式を催すことが重要であると専門家が判断したためである。一部には、まだ一次標準をはじめ全機材がそろっていないので、開所式は早すぎるという意見もあったが、専門家の強い申し入れによって決定した。開所式を開く理由は、ＮＳＣＬはもともとＳＳＲＣの Calibration Department が名前を変えたものであり、ＳＳＲＣの職員はＮＳＣＬという言葉を使っておらず、それを認めていない風潮がある。しかし、本プロジェクトはＮＳＣＬの設立という名前で一年半前から始められており、日本の技術援助が全く表面にでない恐れがあった。少しでも日本の技術援助をシリアの人に知らせる必要があった。また、ＮＳＣＬ建物、機構、予算についても何か区切りをつけないといつまでも整備されない恐れがあった。結果的にみて、ある程度急速にこれらのことが整備されたので成功であったといえる。

この開所式を行うことに対して、ＮＳＣＬの職員は全く未経験で、式次第の決定、パンフレットの製作、パネルの製作等細かい点にわたって指導した。彼らはビデオによる紹介を行いたいと申し出たので了承した。このビデオ製作設備はＪＩＣＡの個別供与によって提供された物である。パンフレットの製作に手間取り（途中アラビア語の説明を追加する）、印刷が間に合わず、専門家が打ったタイプを写真印刷したものを使用した。専門家とＪＩＣＡシリア事務所とで協力して日本大使の招待、大使の挨拶等を依頼した。

以下に開所式の内容を示す。

日本側14名（調査団５名、専門家５名、大使館３名、ＪＩＣＡ事務所１名）、シリア側19名の合計33名であった。シリア側はＳＳＲＣの職員に限られていた。これは外部の人を招へいすると、多くの校正・修理要請がきて現在の人員ではまかないきれないというＳＳＲＣ総裁の判断によるものであった。

開所式は次の順序で行われた。

(1) ＮＳＣＬ所長による全体の説明（ビデオを含む）　Mr. Weiss
(2) ＪＩＣＡ代表の挨拶　坂田団長
(3) ＳＳＲＣ総裁挨拶　Dr. Chahid
(4) 日本大使挨拶　木幡日本大使
(5) 木幡大使、ＳＳＲＣ総裁によるテープカット
(6) 各研究室の見学
(7) 軽食

特にビデオを用いた説明は好評をはくした。

本開所式において、ＳＳＲＣシャヒード総裁は、坂田団長に要請したと同様、木幡大使に対しても計測標準研究所以外のＳＳＲＣへの追加援助を要請した。

大使は、①我が国のシリアへの援助をＳＳＲＣだけに集中するわけにはいかないこと　②ＳＳ

ＲＣの他の部門は準軍事的研究にも従事しているといわれており、既に協力中の同研究所における研究協力は軍事的色彩を持ち込まないよう慎重な対応が必要であることを考慮されつつ、開所式の挨拶の中で、わが方の経済技術協力は、非軍事的な面での協力に限られることを強調した。

今後ともシリア側は、断られても繰り返し同じ要請を出してくることが考えられ、日本側は当分慎重な対応をすることが望ましいと思われる。

MINUTES OF DISCUSSIONS

MINUTES OF DISCUSSIONS BETWEEN THE JAPANESE CONSULTATION TEAM AND THE SCIENTIFIC STUDIES AND RESEARCH CENTRE TEAM ON THE JAPANESE TECHNICAL COOPERATION FOR THE ESTABLISHMENT OF NATIONAL STANDARDS AND CALIBRATION LABORATORY

The Japanese Consultation Team (hereinafter referred to as "the JICA Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Takeho Sakata , Special Assistant to the Director , Mining and Industrial Development Cooperation Department , JICA , visited the Syrian Arab Republic from March 18 to 26 , 1989 for the purpose of reviewing the activities of the project for the establishment of National Standards and Calibration Laboratory (NSCL) of the Scientific Studies and Research Center (hereinafter referred to as "the Project") and working out the Annual Work Plan for the further promotion of the Project .

During its stay , in accordance with the Record of the Discussions signed on October 3, 1987 in Damascus , the JICA Team had a series of discussions and exchanged views with the Director General of SSRC and the SSRC Team over the matters for the successful implementation of the Project . It also assisted in the official inauguration of NSCL .

As a result of the discussions , both parties mutually agreed upon the matters referred to in the documents attached hereto , the first an executive summary , and the second a detailed record of meetings . All relevant annexes have also been attached .

Damascus , March 25, 1989

Mr. Takeho Sakata
Leader
Japanese Consultation Team,
Japan International
Cooperation Agency
Japan

Dr. A.W. Chahid
Director General,
Scientific Studies and
Research Center
The Syrian Arab Republic

EXECUTIVE SUMMARY

I . GENERAL REVIEW

This project started on October 3, 1987 as a five-year project , and is now in the implementation stage of the basic training in the fields of
(1) Electrical Standards and Calibration Laboratories
(2) Electrical Repair Workshop
(3) Environmental Conditioning for the laboratories

in accordance with the Tentative Schedule of Implementation of the Project signed October 3, 1987 by both parties .

Regarding the project activity in 1988 , JICA has dispatched 2 long-term experts and 5 short-term experts to the Scientific Studies and Research Centre (hereinafter referred to as "SSRC") and has accepted 7 Syrian counterpart personnel for training in Japan .

In addition , JICA has taken suitable measures to provide the equipment necessary for the Project . In this regard , it is highly appreciated that the Japanese side has implemented the earlier provision of some of the equipment scheduled in the first two years .

On the other hand , it is highly appreciated that the construction work of the building by the Syrian side was completed nearly on schedule and all the equipment provided installed .

SSRC has ensured the budgetary allocation and number of Syrian counterpart personnel required for the smooth implementation of the Project .

These activities taken by both sides have been regarded as steady progress of the Project .

Thus , based on the common recognition of the present state of the Project as stated above , both sides confirmed the continuous cooperation between the Japanese and Syrian governments for further progress of the Project .

II . ANNUAL WORK PLAN

The Japanese side and the Syrian side have jointly formulated the Annual Work Plan for the period as given in ANNEX 1 according to the present state of progress and the other conditions of the Project .
Its outline is as follows :

1. Syrian side
   (1) Maintenance of the facilities and equipment

(2) Securing the budgetary allocation in order to set up the machinery provided by JICA
(3) Provision of Syrian counterpart personnel in accordance with the implementation of the Project
(4) Submission of official request forms for Japanese experts , training of Syrian counterparts in Japan and provision of equipment and documents

2. Japanese side
(1) Dispatch of experts
1- Long-term experts
a. Chief Advisor
b. Measurement Standards
(Above 2 experts have been already dispatched.)

2- Short-term experts
a. RF Power, Attenuation, and Frequency
b. Oscilloscope and Signal Generator
(Other experts will be dispatched, if necessary)

(2) Acceptance of Syrian counterpart personnel in Japan
a) 3 Syrian counterpart personnel will be accepted in Japan for training in the field of DC, RC and AC primary standards .

b) The SSRC Team proposed consideration of an additional Syrian counterpart training for the repair workshop in digital measuring instruments .

c) The SSRC Team proposed consideration of an observation trip to Japan for officials of SSRC .

(3) Provision of Equipment and Machinery
Necessary equipment and machinery for implementation of the Project will be continuously provided within the range of the Japanese budget .

III. TENTATIVE SCHEDULE OF IMPLEMENTATION

According to the present condition of the Project , both sides agreed to modify the Tentative Schedule of Implementation which had been formulated on October 3, 1987, as shown in ANNEX 2 .

IV . OUTLINE OF TECHNICAL COOPERATION

The JICA Team explained the Japanese technical cooperation as outlined hereunder . It was well understood by the SSRC Team and several relevant points were clarified and

agreed upon in the detailed record of meetings .

The Japanese side provides technical cooperation on establishing and maintaining the measuring standards and calibration system in electrical and electronic fields .

Details for technical cooperation are as follows :

To guide Syrian counterpart (c/p) personnel to make a systematic rule and management style of the organization , the staff allocation , the training course and a series of seminars , the property , the accuracy of the measuring instruments , the calibration service and the data-storing .

To guide Syrian c/p personnel to prepare the manual or the textbook of calibration procedures in accordance with the rule established above .

To guide Syrian c/p personnel to conduct the calibration practice on various measuring instruments .

The goal of this cooperation is to establish and maintain the primary level measuring standards in Syria , and to supply the calibration service for the secondary level measuring standards used in the laboratories of universities and industrial organizations in contributing to establish traceability system in Syria .

V . TECHNICAL COOPERATION PLAN

The Japanese side and the Syrian side have jointly formulated the Technical Cooperation Plan in each field of "Electrical Standards and Calibration Laboratories" and "Electrical Repair Workshop" as given in ANNEX 3 according to the present state of progress and the other conditions of the Project .

VI . OTHER MATTERS DISCUSSED

The record of meetings includes further details on discussions and agreements related to the following topics :

. NSCL and its customer base .
. Additional items requested by the SSRC team for NSCL .
. Extensions to the NSCL project and the TV lab .
. Future projects .
. Scholarships for obtaining advanced degrees in Japanese universities .

. Seminar and regional training session on subject of standards and calibration .
. Specific additional recommendations to further promote success of NSCL .
. Presentation of cooperation agreements between SSRC and Western countries .

VII. THE COMPOSITION OF THE JICA TEAM AND THE SSRC TEAM

ANNEX 10 lists the composition of the JICA Team and the SSRC Team .

DETAILED RECORD OF MEETINGS

During the period 18-26/3/1989, the Japanese Consultation Team organized by JICA (hereinafter referred to as "The JICA Team") and headed by Mr. Takeho Sakata visited SSRC to review and evaluate the progress of the Project and to work out the Annual Work Plan of 1989 as well as to attend the official inauguration of the National Standards and Calibration Laboratory (NSCL).

The composition of the JICA Team as well as that of the Syrian counterpart team (hereinafter referred to as the SSRC Team) is indicated in ANNEX 10.

Dr. A. W. Chahid Director General of SSRC welcomed the visiting delegation in a preliminary meeting during which he expressed great satisfaction at the progress of cooperation between JICA and SSRC as expressed in the implementation of NSCL and earlier, the TV Lab. He also elaborated future axes of cooperation and associated specialized laboratories that SSRC wishes to submit for consideration for future cooperation agreements between SSRC and JICA or other Japanese organizations.

A record of the meetings and related discussions and actions agreed upon is presented in what follows. The program of the inauguration ceremony held on 20/3/1989 is included in ANNEX 11. The ceremony was attended by the Ambassador of Japan in Syria and members of his staff, in addition to the JICA Team, the Director General of SSRC and his Deputy, the SSRC Team, NSCL staff, and guests from SSRC, the State Planning Commission and other Syrian institutions.

A) Review of results of technology transfer in the project and proposals for further improvement

* Both sides agreed that technology transfer activities have proceeded very satisfactorily, based on the achievements, as well as the opinions of the visiting experts and the staff of NSCL.

* It was also agreed that training of counterparts has proceeded satisfactorily and that the concept of "training of trainers" was an effective approach in seeking to build a broad local infrastructure of trained manpower. The need was thus emphasized for Syrian counterparts trained in Japan to pass their knowledge and experience to local staff of engineers and assistant engingers. It was further agreed that local Japanese experts (long and short term) will assist in drawing a curriculum for local training to be performed by Syrian counterparts.
  The SSRC Team emphasized the need for appropriate documentation based partly on that made available and provided to Syrian counterparts as well as new documentation to be generated.

* The JICA Team indicated that training programs are being modified and upgraded based on experiences with earlier training programs in order to further improve their effectiveness. The need to improve English language proficiency of trainees prior to training was also emphasized. The SSRC Team indicated that steps are being taken in this regard.

* It was agreed that an effective training scheme should always seek to create a match between the selection of the trainees, the training program and the role of the trainee upon his return to NSCL. Thus the latent demand should be used as the basis for the overall training program and schedule. In this regard it was emphasized that while many trainees are selected for a practical role, and are trained accordingly, there is a definite need for providing training to individuals targeted for technical management roles.

* The SSRC Team acknowledged its awareness of this dual need and indicated that there is other high level staff that will be allocated to NSCL, in addition to the staff of 20 presently allocated.

8) Review of technical cooperation plans for 1989-1990 and long-term plans extending to 1992

* A review and discussion took place of the technical cooperation to be provided by the Japanese side for establishing and maintaining the measuring standards and calibration system in the electrical and electronics fields. A set of documents prepared by the Japanese side was distributed and used as the basis for discussions. These documents are included in ANNEXES 1,2,3 and relate both to the annual workplan of 1989-1990 as well as to the long term program extending to 1992. The programs and schedules essentially relate to training of Syrian counterparts in Japan, the dispatching of Japanese experts, and the provision of equipment and machinery.

* The documents presented also listed the tasks that need to be performed and the detailed procedures that need to be developed by NSCL staff. These would constitute the operational code for the various NSCL specialized facilities .
The SSRC Team expressed some reservation regarding the ability of the NSCL staff to draw up the detailed procedures, particularly those related to adjustment,for all the facilities. In principle the procedures for calibration and measurement can be drawn up by NSCL staff for the various equipments with support of Japanese experts, and after the provision of more comprehensive documentation from Japan, particularly those related to adjustments, calibration performance and basic service. This

has been already achieved for most standards and calibration instruments delivered . However much stronger technical support and knowhow, as well as documentation, needs to be provided by the Japanese side for the tasks of adjustment of NSCL equipment. The JICA Team agreed to give further detailed consideration to this matter .

* The JICA Team also pointed out that the schedules proposed for implementation of the technical cooperation plan and the completion of the tasks and procedures for NSCL system of operation may be modified. These schedules were subsequently confirmed (ANNEX 3) .

C) Review and evaluation of the status of the NSCL facility, its organization, staff, budget and services provided

* A review of the status of the building and equipment thus far delivered, installed and commissioned, confirmed that progress overall has been very satisfactory according to plan. A floor plan of the facility was provided and it was agreed to provide a larger plan showing the site (ANNEX 5).

* The JICA Team presented the list of instruments to be delivered in 1989 and some corresponding traceability charts.
After considering the list of instruments belonging to SSRC (ANNEX 6) which are to be calibrated at NSCL, the JICA Team indicated that it would take the necessary action to assure compatibility between the standard and calibration systems provided and the measuring instruments to be calibrated.

* A few equipments had been found faulty during commissioning. In principle responsibility is assured by the Japanese side.

* The SSRC Team emphasized that for the proper execution of equipment maintenance there is a need for much more comprehensive technical documentation to be provided with the Standards and Calibration equipment of Japanese origin. The documentation, in English, should contain detailed service manuals that would include detailed circuit descriptions, troubleshooting guides, and parts lists. The JICA Team undertook to give the matter consideration.

* Concerning spare parts two aspects were considered. The first relates to spare parts for equipments that are associated with the NSCL facility. It was agreed that a plan for provision of spare parts for these equipments will be drawn up based on a closer analysis of needs and as a result of experience accumulated early in the operation of the NSCL facility. In the interim any emergency need for spare parts will be handled directly via JICA.

The second aspect of spare parts relates to general spare parts that will be used in the repair workshop for repairing faulty equipment brought for this purpose to NSCL from Syrian institutions. The SSRC Team indicated that a one-time preliminary stock for such parts would allow NSCL to gain much needed early credibility with its customers based on a rapid response to their needs. A proposed list of such general spare parts is included in ANNEX 4 . After this one-time preliminary stock the Syrian side assures the full provision of the general spare parts.

* The JICA Team requested and was provided with information about the NSCL budget. The purpose was to assure that NSCL has the means for operation and maintenance of its facilities and provision of services to its customers. The SSRC Team confirmed that NSCL is provided with a separate budget within SSRC to allow it to operate in an efficient and financially secure manner . This budget is detailed in ANNEX 5. For reference purposes, SSRC budget has also been provided in ANNEX 5. This does not however include the NSCL facilities budget which is allocated separately from that of SSRC proper.

D) NSCL and its customer base

* A preliminary list of potential NSCL customers in Syria was presented and an earlier list in 1986 was also recalled (ANNEX 6). It was agreed that a survey will be made within a month of the needs at such institutions for NSCL services. The JICA Team emphasized the need to obtain accurate inputs from these institutions based on questionnaires and visits to these institutions. Such information is important for effective planning and execution of the tasks which NSCL has been established to achieve. It is also important for drawing up the technical transfer program for 1989.
  The SSRC Team indicated that it has delayed its active interaction with the Syrian customer base (outside SSRC and HIAST) until now to assure for its own credibility that a satisfactory operational status had been achieved at NSCL before it projects its services to Syrian institutions. A list of equipment at SSRC and HIAST that has been allocated for servicing at NSCL is included in ANNEX 6.

* The list of current NSCL staff is presented in ANNEX 5, which also includes the organigram of NSCL and the various management and operational positions of the NSCL staff.

E) Additional Items requested by the SSRC Team for NSCL

The SSRC Team discussed the following additional items,

included as documents in the annexes

* A modified list of books and reference materials based on a detailed review of needs and the elimination of books already at hand. (ANNEX 4) . The JICA Team indicated it shall study this final list with a view to providing what can be made available. The list should be sent with an official request form A4.

* The SSRC team presented a list of ancillary equipment it considered necessary that NSCL be provided with. This list (ANNEX 4) includes:
  - Audio and video repair bench: The justification for this equipment derives from the fact that much of the electronic equipment used in several Syrian institutions includes various audio/video systems/subsystems. (e.g. Syrian radio and TV broadcasting facilities).
    The JICA Team indicated it will convey this request although it considers such equipment to be in principle outside the scope of the project.

  - Additional equipment for the digital measuring equipment repair bench: The JICA Team indicated it will convey this request.

  - A small mechanical workshop: The SSRC Team indicated such a workshop is an important complement to NSCL since electronic equipment contains mechanical hardware parts (knobs, fasteners, screws and nuts,...) which often are causes of simple malfunction that can be readily repaired at NSCL if such a small mechanical workshop were set up.
    The JICA Team indicated it would study the matter.

  * A list of office computers, audio-visual and other materials to be used within NSCL for computerized storage and retrieval of information and data, as well as for education and training.
    The JICA Team indicated it would study the list. However before acting on this request the JICA Team needs to check the budget for 1989.

F) Extensions to the NSCL project and the TV Lab

The SSRC Team proposed two extensions (ANNEX 7) to the current project to include mechanical and optical standards and calibration facilities. The JICA Team agreed to convey this request but stated that its present mission aims at reviewing the activities of the NSCL project and work out the Annual Work Plan. Furthermore, there is a need to accomplish the current Project successfully before considering an extension of this Project. The SSRC Team responded by noting that preparing for this new phase

takes time in any case, and it is further hoped that JICA will consider raising the level of cooperation with Syria to make it comparable to that existing with similar countries.

G) Further projects

The SSRC Team presented a list of outstanding projects previously submitted for consideration by JICA and on which no action has yet been taken. A list of additional new projects being submitted for consideration was also presented . Both lists are included in ANNEX 8 where copies of the preliminary proposals for these projects are also included. (The proposals for the materials testing laboratory is under preparation and will subsequently be submitted for consideration). The projects are seen to fall in the following four broad categories: technology, communications, automation and robotics, and energy and the environment.

The JICA Team indicated that it will convey the lists of these projects to JICA.

H) Scholarships for obtaining advanced degrees in Japanese universities

The JICA Team clarified the mechanism for submitting such requests through the JICA office in Damascus. In applying for these scholarships, the value of such education should be emphasized in relation to the projects being implemented .

I) Seminar and regional training program on subject of standards and calibration

The JICA Team stated that it is desirable to hold a seminar on the topic this year. Propositions for such a seminar and a program for internal courses in standards and calibration shall be submitted shortly by the Syrian side to the Japanese side for consideration. It was also agreed to study the feasibility of holding the regional training program in 1991 on the topic of standards and calibration.

J) Specific additional recommendations to further promote success of NSCL

The leader of the JICA Team identified the following important points of action to further promote success of NSCL:

* Setting up of regular meetings between Japanese experts and NSCL counterparts.

* The implementation of the technology transfer program (Japanese experts and counterparts) according to schedule, and its periodic review by both sides.

* The need to install a main board at the NSCL building entrance indicating that the project is a result of an SSRC - JICA cooperation.

* The need to set up a special purchasing committee for NSCL with authority to expedite and follow up local purchases (e.g. for stationery).

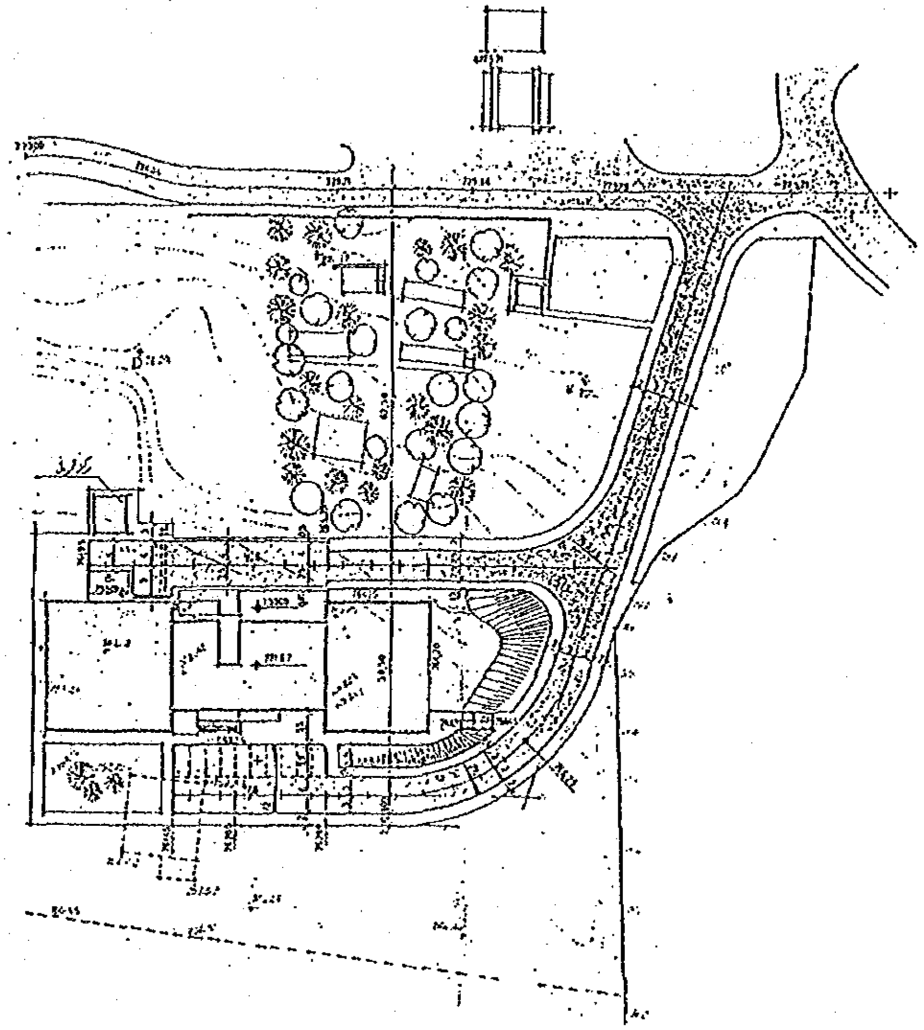
* The need for setting up and implementing suitable industrial safety procedures including a system of audit and monitoring. The JICA Team further requested special attention be paid to the health, safety and insurance of the Japanese experts as well as the Syrian counterparts. Air conditioning of their offices particularly needs to be provided. The SSRC Team provided assurance of its firm commitment to this task.

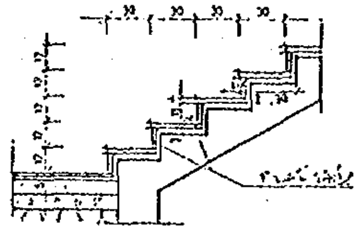
K) Presentation of cooperation agreements between SSRC and Western countries.

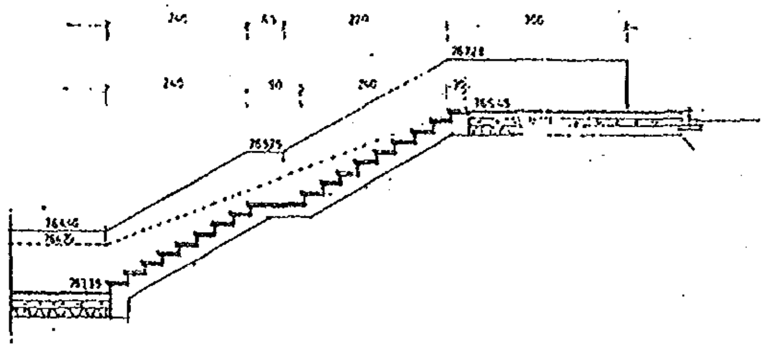
The SSRC presented a list of such agreements including French programs being implemented (ANNEX 9).

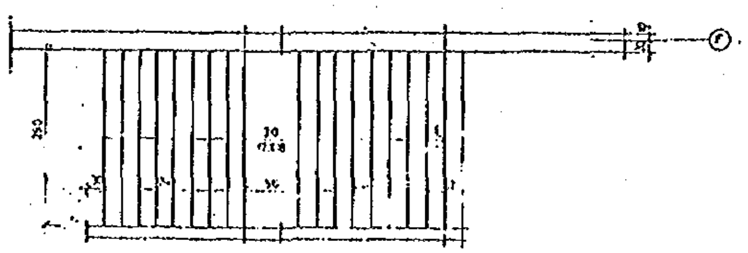
MINUTES OF DISCUSSIONS BETWEEN THE JICA TEAM AND THE SSRC TEAM DAMASCUS, SYRIA, March 18-26 , 1989

LIST OF ANNEXES









ملاحظة :

منسوب الصفر المعماري (البلاط الأرضي) : 763,35

رقم اللوحة 1	الجمهورية العربية السورية مركز الدراسات والبحوث العلمية	
المقياس 1/500 SC 1:500	STANDARDS&CAL PROJECT	إدارة الشؤون العمرانية
	اسم المخطط : SITE PLAN	
الدراسة المعمارية ARCH	تصميم :	إشراف :
	رسم :	رقيب :	التاريخ

ANNEX 1 : Annual Work Plan

ANNUAL WORK PLAN (FROM APRIL 1989 TO MARCH 1990)

CALENDED YEAR	1989									1990												
JAPANESE FISICAL YEAR	1989																		1990			
ITEM	4			½		6	7		2/4	9	10			½	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 Pacilities																							
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.							——																
5- Preparation of A4 Forms for Provision of Equipment.				——																			

ANNUAL WORK PLAN (FROM APRIL 1989 TO 1990)

CALENDER YEAR	1989												1990											
JAPANESE FISICAL YEAR	1989															1990								
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																								
2- Measurment Standards																								
b) Short-Term Experts																								
1- RF.Power,Attenuation and Frequency																								
2- Oscilloscope and signal Generator.																								
2. Acceptance of Syrian Counterpart Personnel in Japan.																								
1- DC.Voltage and Current.																								
2- Resistance and Capacitance.																								
3- Ac.Voltage and Current																								
3. Provision of Equipment & Machinary.																								
1- RF. power & Attenuation																								
2- Frequency																								
3- Oscilloscopes repair Bench.																								
4- Signal Generators Repair Bench.																								
5- Others .																								

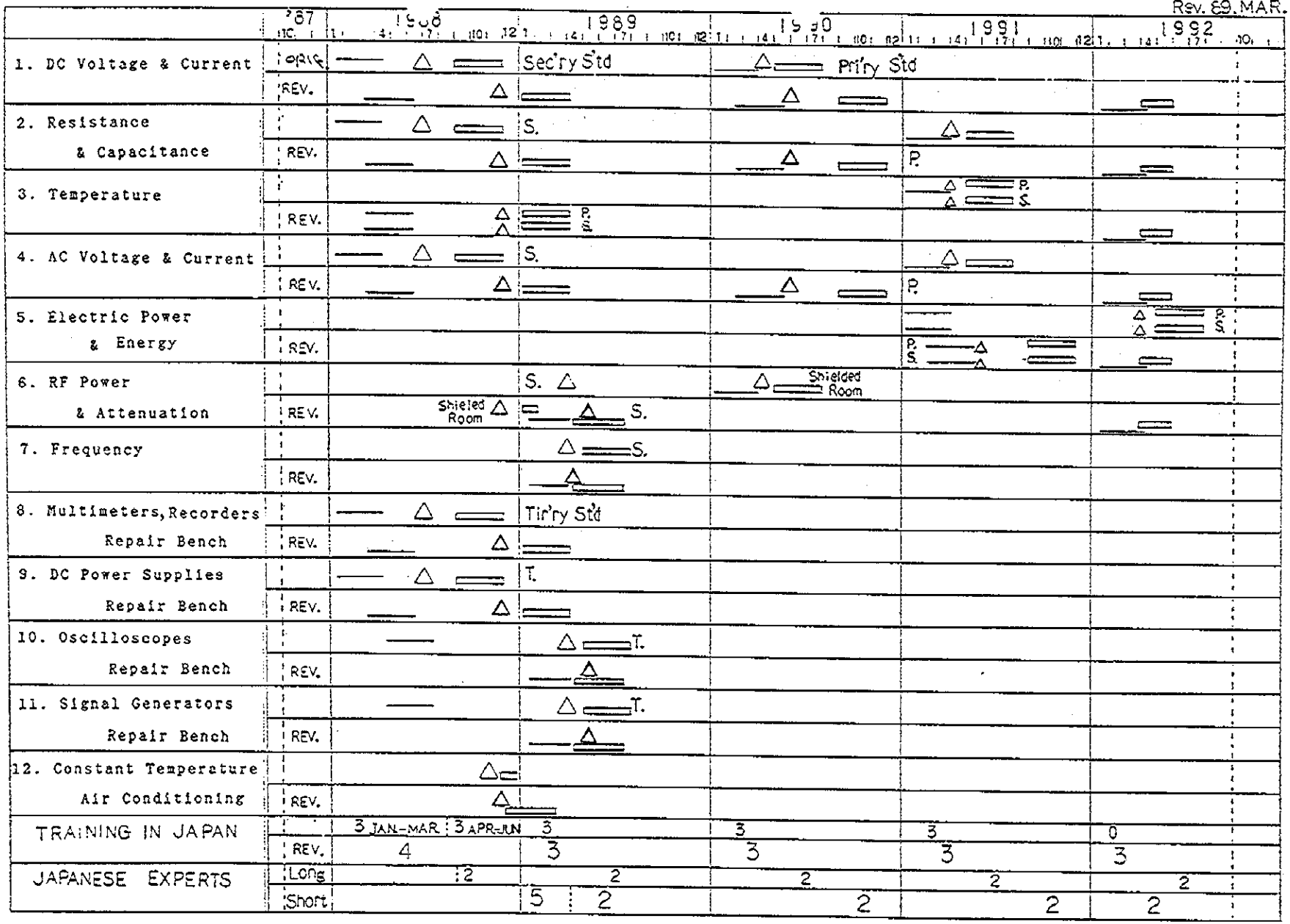
(Repplacement or Extention)

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.

ANNEX 2 : Modified Schedule of Implementation

TENTATIVE SCHEDULE OF IMPLEMENTATION

Rev.'89.MAR.



ANNEX 3 : Technical Cooperation Plan

TECHNICAL COOPERATION PLAN *
Secondary Standard and Calibration System

(1) NSCL Property Control

The measuring instruments which compose the Secondary Standard and Calibration System must be classified , coded and labeled .

The individual instruments will be registered to inventory property documents under the systematic control .

(2) Preparation of Calibration Procedures

Calibration procedures should be documented for providing technical guidance in accomplishing calibration tasks on the measuring instruments of the Secondary Standard and Calibration System , and lower level measuring instruments .

This documentation will contain sufficient instruction and information for the calibration of measuring instruments , and include the following information :

List of instruments required , Connection diagram , Calibration process , Notes , etc .

The Syrian side will not be able to repair or adjust the instruments which do not have full complete technical documentation as listed in ANNEX 4 . Such documentation therefore needs to be provided by the Japanese side .

(3) Preparation of Record Formats

Calibration records must be maintained for the instruments that will be calibrated . Calibration record formats will be determined , in which information such as the following will be included :
Calibration data sheet , Calibration certificate , Calibration history , etc .

(4) Accuracy Checking of Measuring Instruments

To test the accuracy of the Standard and Calibration System , individual measuring instruments of the system must be calibrated in terms of the system's reference measuring instrument .

To conduct the calibration works , it will be assured that the measuring instrument is within the specified accuracy .

(5) Calibration of Lower Level Measuring Instruments

The calibration works will be conducted on tertiary measuring instruments in comparison with the Secondary Standard and Calibration System .

* SEE DETAILED SCHEDULES ATTACHED

Primary Standard and Calibration System

(6) NSCL Property Control

The measuring instruments which compose the Primary Standard and Calibration System must be classified , coded and labeled .

The individual instruments will be registered to inventory property documents under the systematic control .

(7) Preparation of Calibration Procedures

Calibration procedures should be documented for the measuring instruments of the Primary Standard and Calibration System .

This documentation will contain sufficient instruction and information for the calibration of measuring instruments , and include the following information :
List of instruments required , Connection diagram , Calibration process , Notes , etc .

The Syrian Side will not be able to repair the instruments which do not have complete technical documentation as listed in ANNEX 4 . Such documentation therefore needs to be provided by the Japanese side .

(8) Accuracy Checking of Measuring Instruments

To test the accuracy of the Primary Standard and Calibration System , individual measuring instruments of the system must be calibrated in terms of the system's reference measuring instrument .

To conduct the calibration works , it will be assured that the measuring instrument is within specified accuracy .

(9) Calibration of Lower Level Measuring Instruments

The calibration works will be conducted on secondary measuring instruments in comparison with the Primary Standard and Calibration System .

(10) Practice of Calibration Service

The calibration practice will be conducted on various measuring instruments installed in SSRC for mastering the calibration technique .

(11) Evaluation of Primary Standard

To evaluate the accuracy of standard and calibration systems maintained in NSCL , the Japanese side will give an opportunity to

calibrate the primary level measuring instruments of NSCL in comparison with Japanese standard measuring instruments which are traceable to Japanese national standards .

(12) Periodic Calibration

The measuring instruments of standard and calibration systems must be subject to periodic calibration to verify the accuracy within its specified limit .

The periodic calibration should be operated on the individual measuring instruments in conformity with the rule established .

Tertiary Standard and Calibration System

(Repair Bench)

(1) NSCL Property Control

The measuring instruments which compose the repair bench must be classified , coded and labeled .

The individual instruments will be registered to inventory property documents under the systematic control .

(2) Calibration by Upper Level Measuring Instrument and Periodic Calibration

The measuring instruments of the repair benches must be subject to periodic calibration to verify the accuracy within its specified limit .

The periodic calibration should be operated on the individual measuring instruments in conformity with the rule established .

(3) Practice of Trouble-Shooting

The trouble-shooting practice will be conducted on the specific measuring instrument .

(4) Practice of Adjustment and Calibration

The adjustment practice will be conducted on the specific measuring instrument . When a measuring instrument is repaired and adjusted , it must be calibrated .

(5) Preparation of Repair Report

When a measuring instrument is repaired , a repair report must be submitted .

This report will include the items such as :
Details of failure and repair work , replaced parts and working hours , etc .

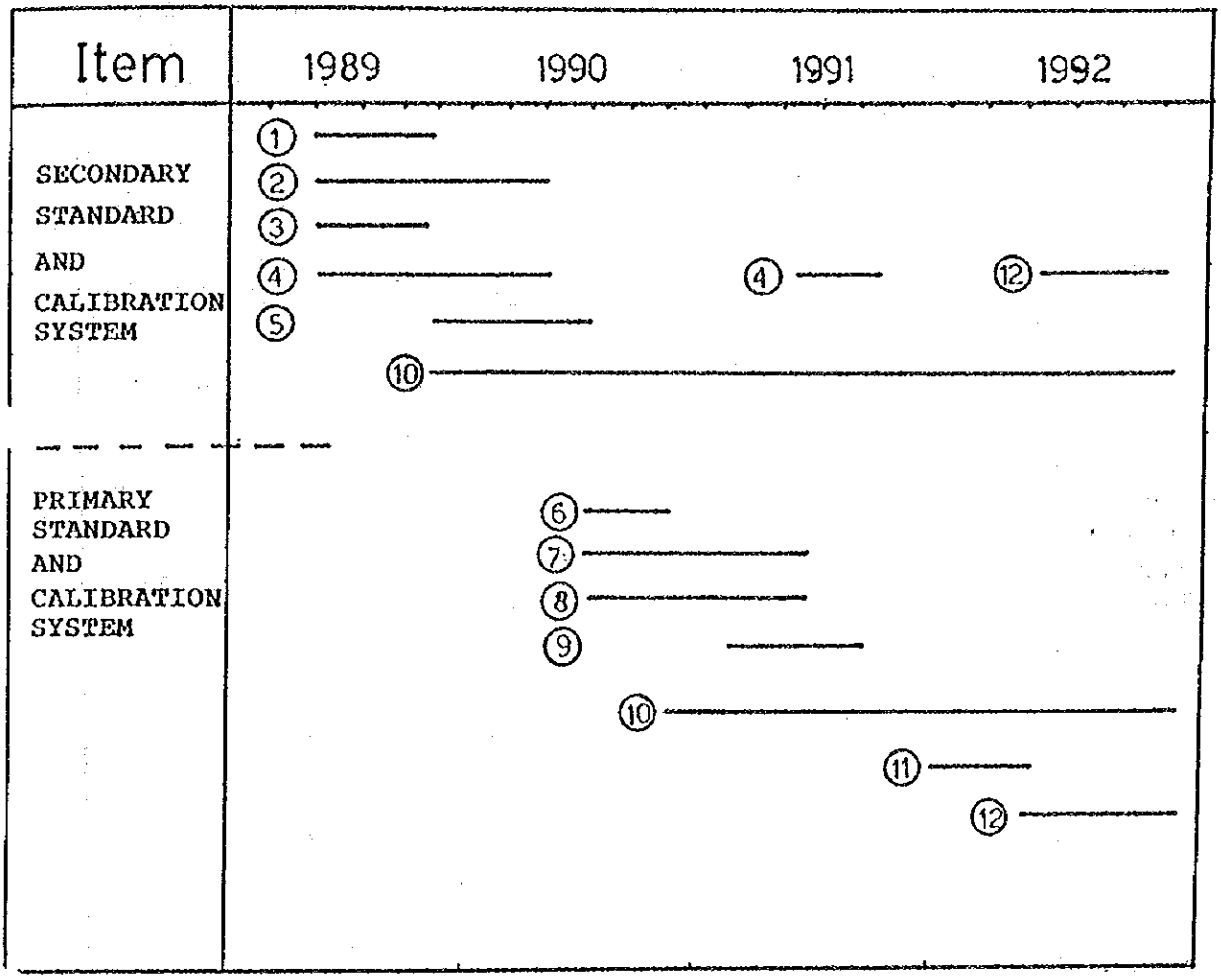
(6) Service Manual Control

The service manuals for the measuring instruments must be stored when not in use and maintained properly . Service manual controls will be conducted for providing technical guides to all personnel concerned .

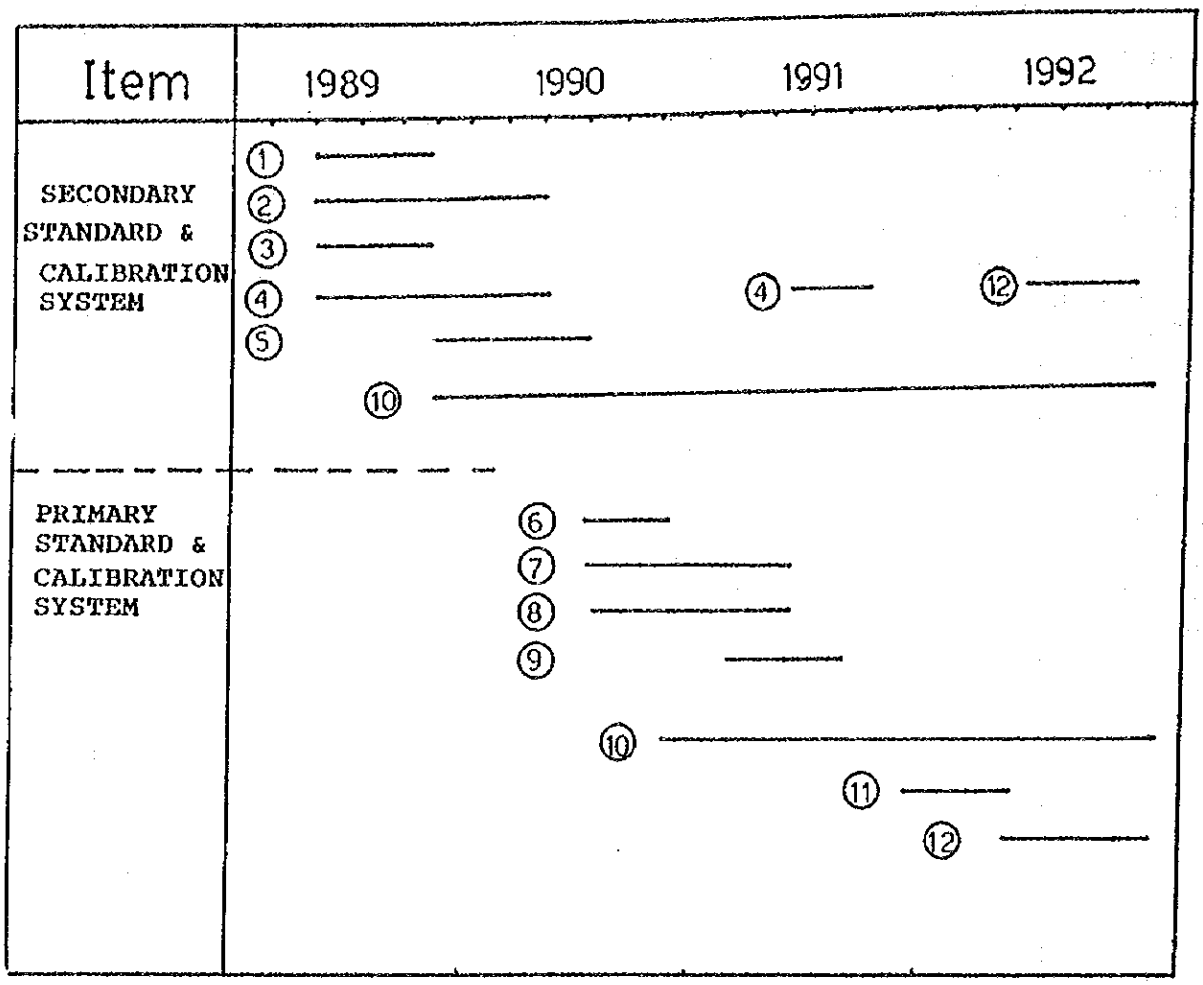
(7) Maintenance Rule for Tools and Auxiliary Equipment , Periodic Check

Tools and auxiliary equipments for the repair bench must be maintained properly . Their numbers and location will be checked periodically according to the maintenance rule .

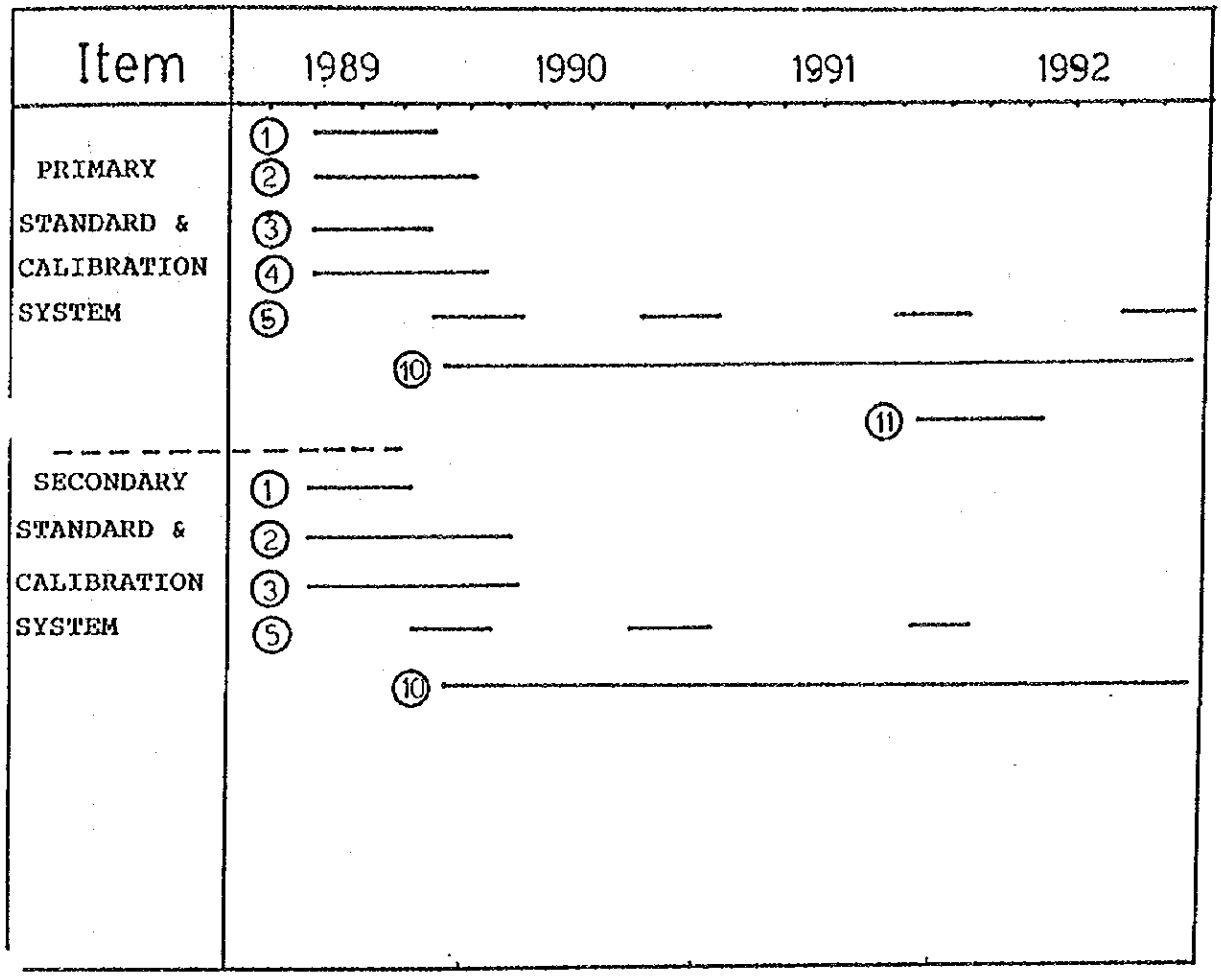
1,DC.VOLTAGE AND CURRENT STANDARD AND CALIBRATION SYSTEM



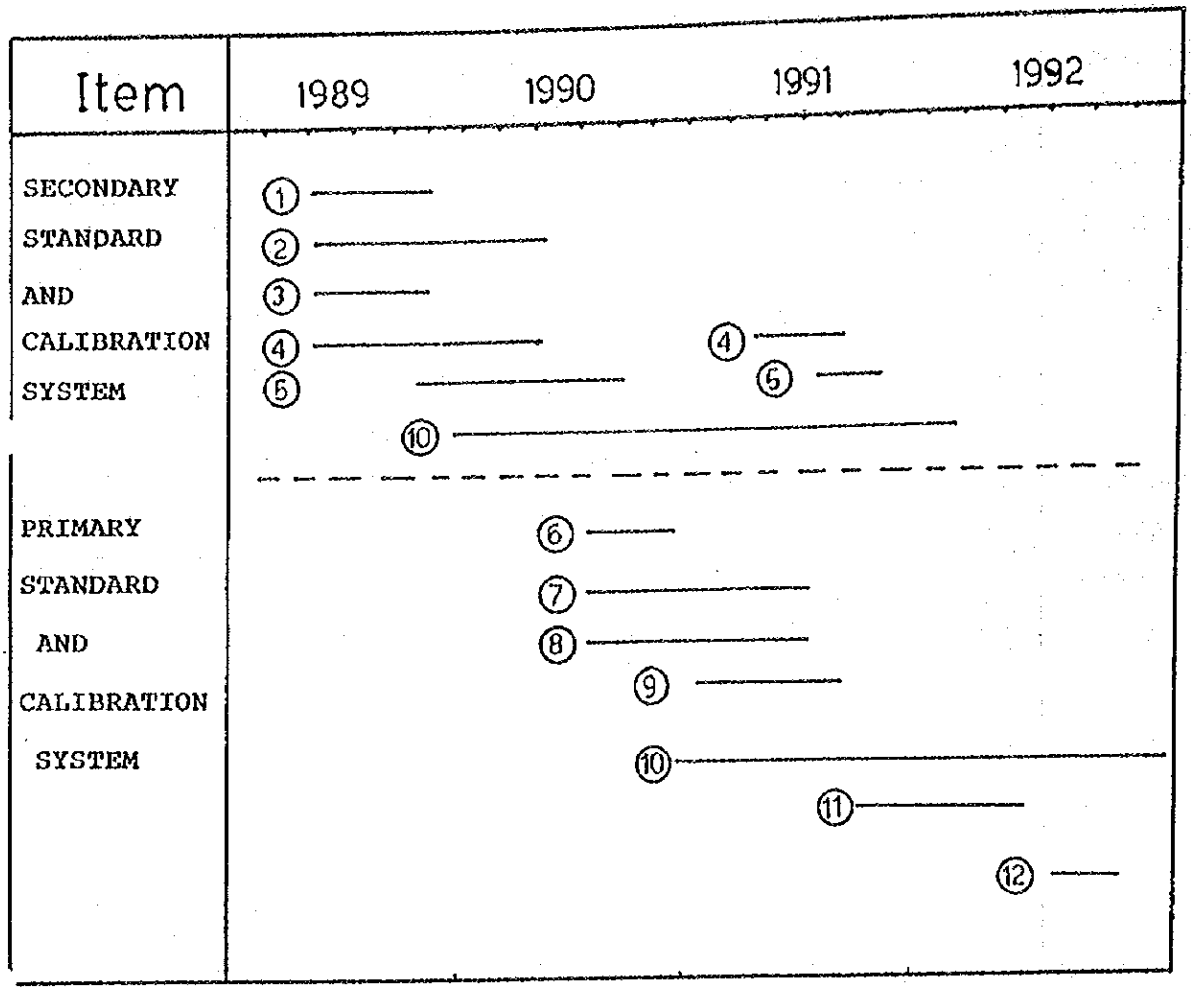
2,REGESTANCE AND CAPACITANCE STANDARD AND CALIBRATION SYSTEM



3, TEMPERATURE STANDARD AND CALIBRATION SYSTEM

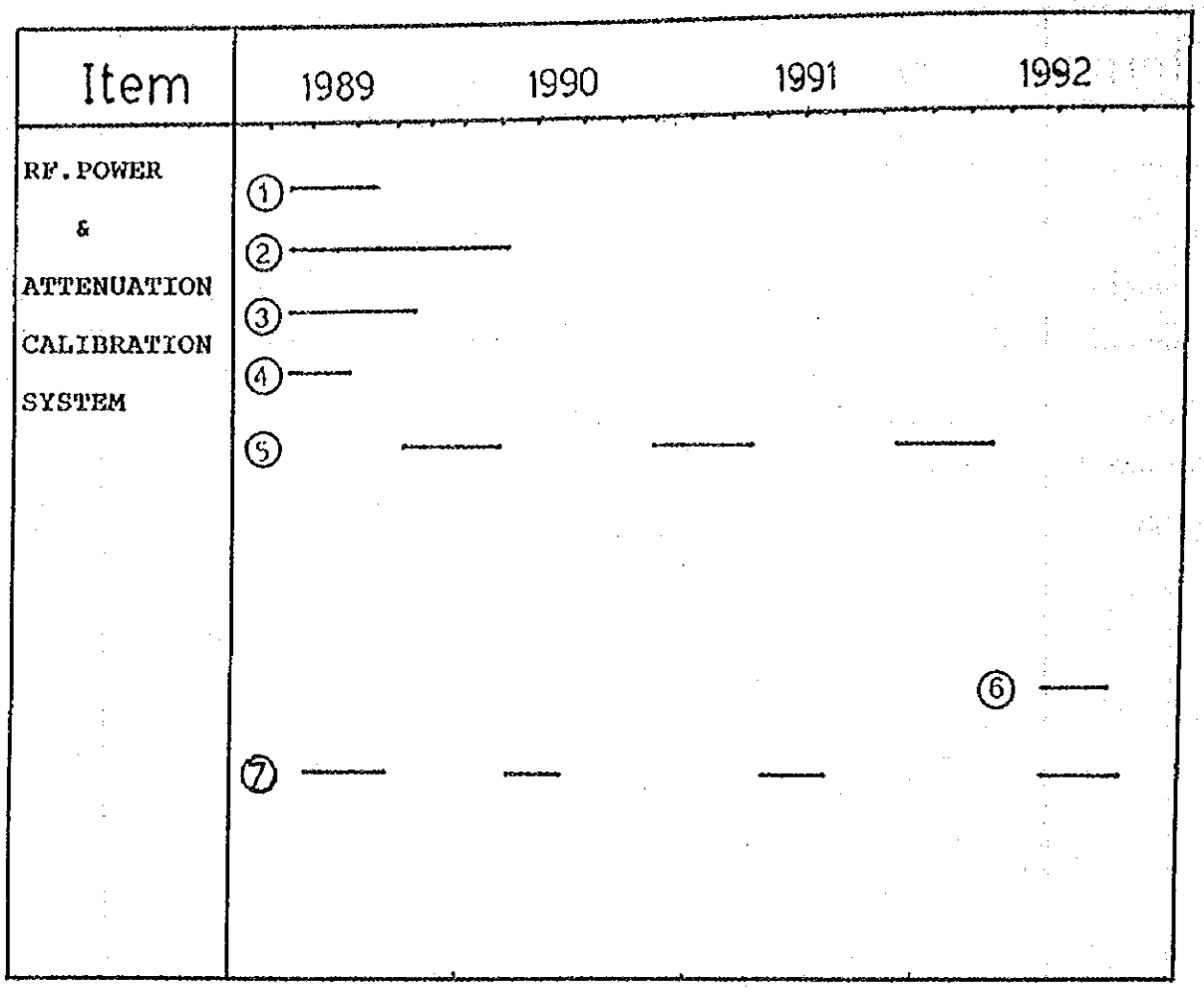


4, AC. VOLTAGE & CURRENT



Item	1989	1990	1991	1992
PRIMARY AND SECONDARY STANDARD AND CALIBRATION SYSTEM			①⑥ ———	
			②⑦ ———	
			③ ———	
			④ ———	
			⑤ ———	
			⑨ ———	
			⑩ ———	

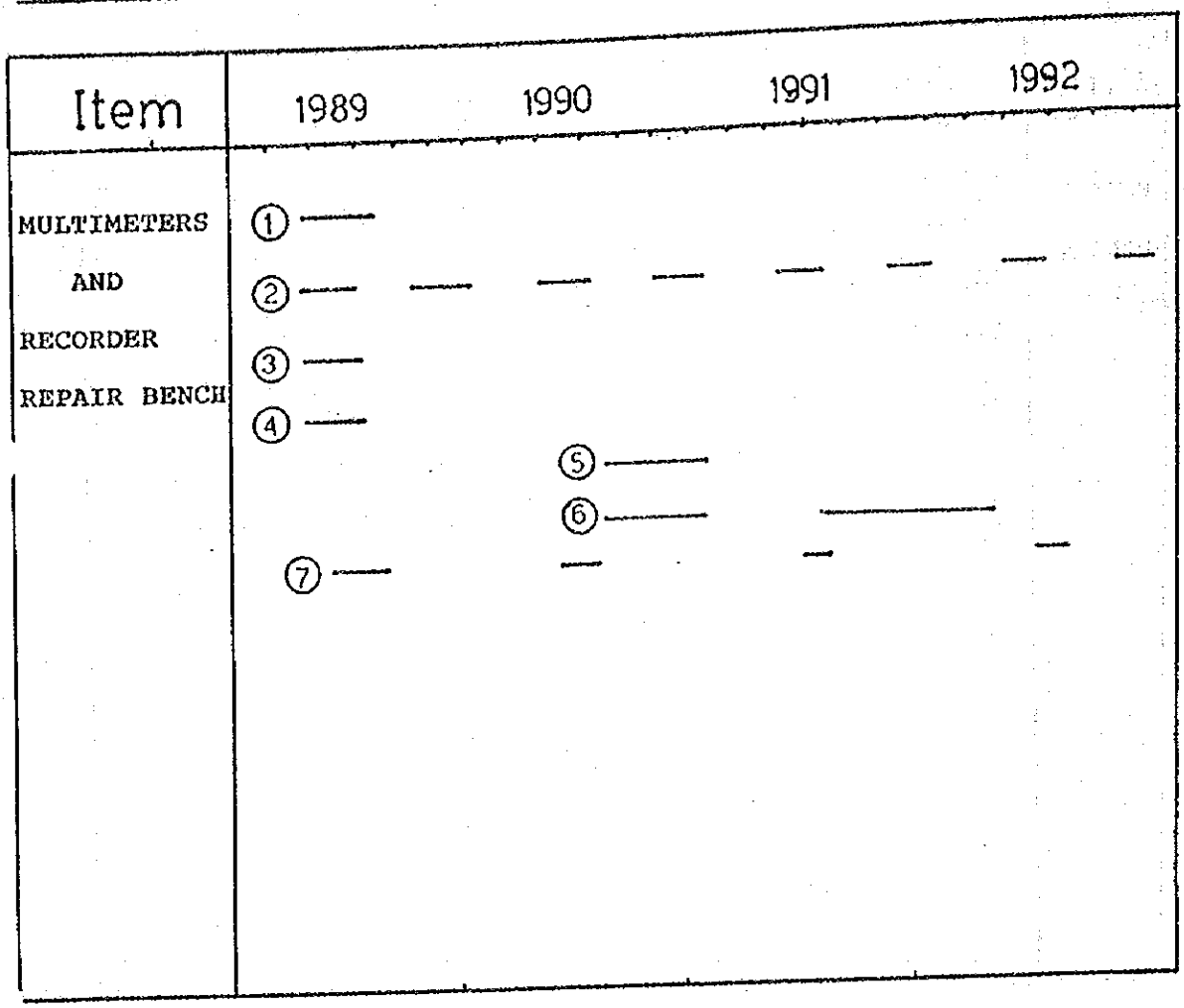
6,RF.POWER & ATTENUATION



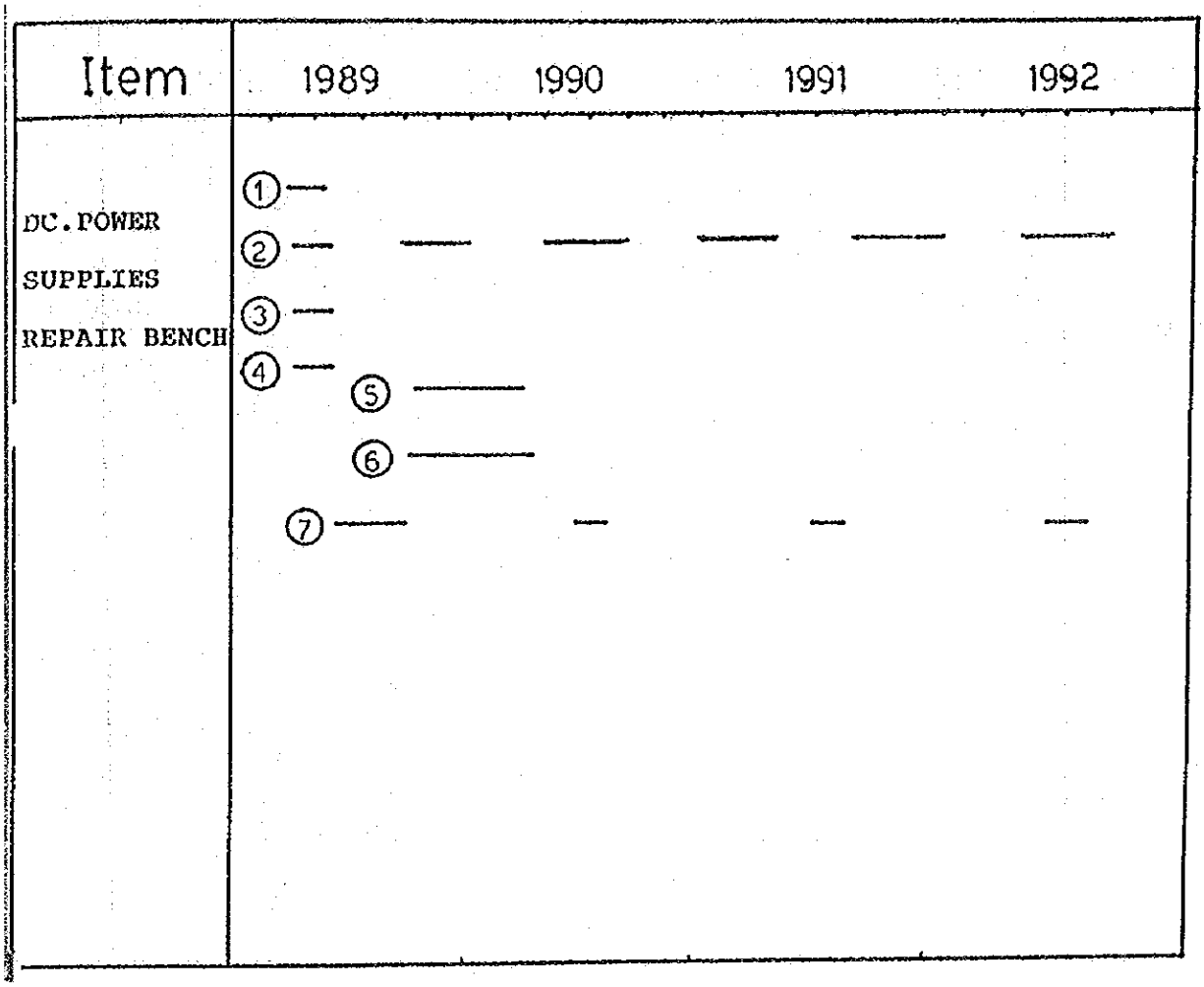
7, FREQUENCY

Item	1989	1990	1991	1992
FREQUENCY CALIBRATION SYSTEM	① ② ③ ④ ⑤ ⑩ ⑧			

8, MULTIMETERS AND RECORDERS



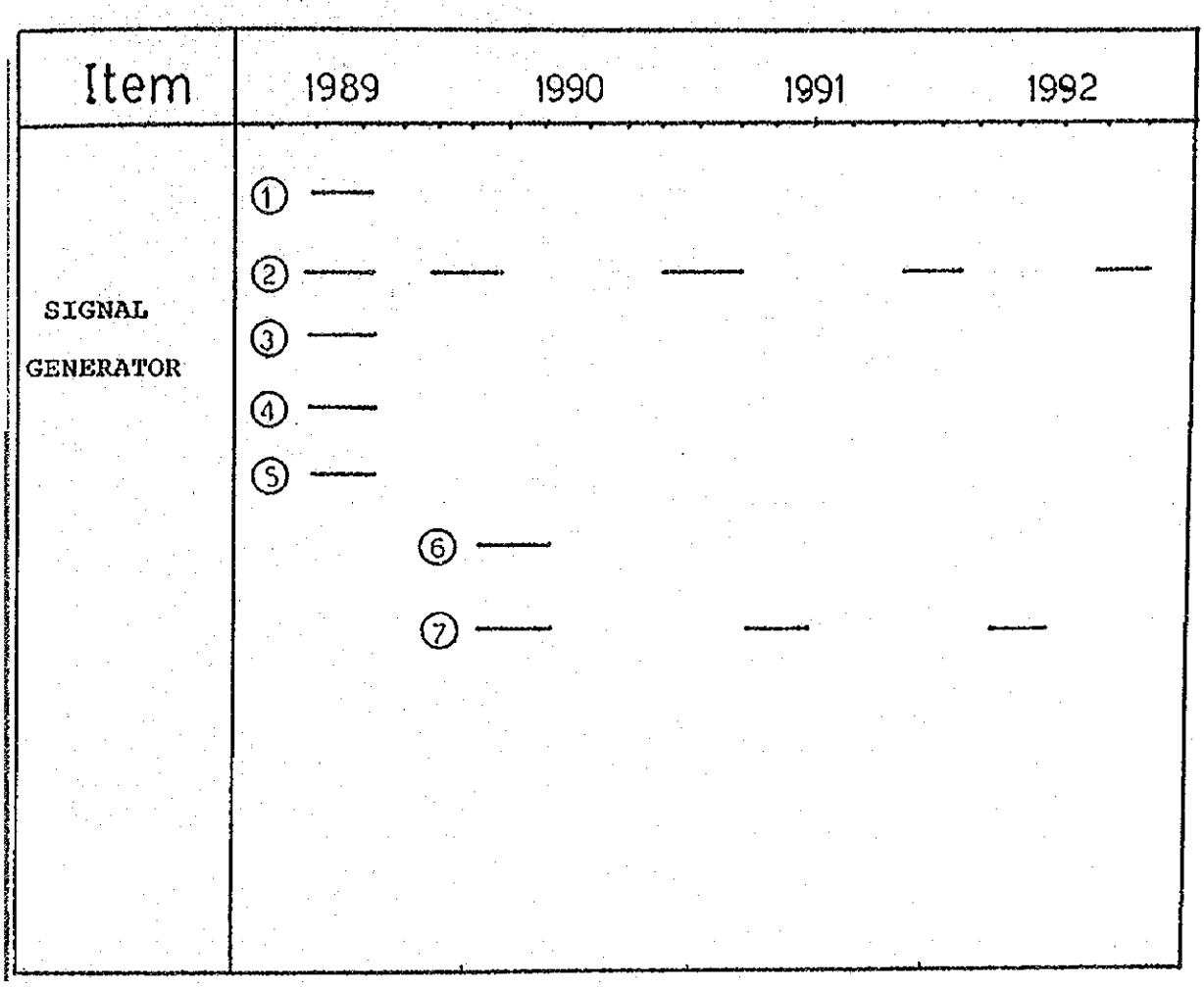
9, DC. POWER SUPPLIES



10, OSCILLOSCOPES

Item	1989	1990	1991	1992
OSCILLOSCOPES	① ——			
	② ——	——	——	——
	③ ——			
	④ ——			
	⑤ ——			
	⑥	——		
	⑦	——	——	——

11, SIGNAL GENERATOR



ANNEX 4 : Complementary Materials and Documents for NSCL

REFERENCE BOOKS

Reference Books

* Integrated-Circuit Operational Amplifier
Robert G. Meyer, University of California
ISBN-0-87942-116-9.

* Low-Noise Microwave Transistors & Amplifiers
Hatsuaki Fukvi, Bell Laboratories.

* Being the Boss
The Craft of Managing People
L. Kent Lineback, New England Business, Inc. 1987.
ISBN 0-879 42-212-2

* Teaching Engineering: A Beginner's Guide
Madhu S. Gupta, University of Illinois at Chicago
ISBN 0-87942-234-3

* Frequency Stability: Fundamentals & Measurement
Vencesiav F. Kroupa, Czechoslovak Academy of Science. 1983
ISBN-0-87942-171-1

* Electrostatic Discharge and Electronic Equipment: A Practical Guide for Designing to prevent ESD Problems
Warren Boxleiter, Koytek Instrument Corporation. 1988.

* 1988 Conference on Precision Electromagnetic Measurement (CPEM)

* 1988 IEEE Instrumentation and Measurement Technology Conference 5th IEEE.

* NBS Special Publication 300 Vol. 3. Precision Measurement and Calibration,
U.S. Department of Commerce/National Bureau of Standards 1968.

* F.B. Silsbee. Suggested Practices for Electrical Standardizing Laboratories.
J. L. Thomas. Precision Resistors and Their Measurement.
W. J. Hamer. Standard Cells, Their Construction, Maintenance and Characteristics.

* NBS Monograph 140. Time and Frequency: Theory and Fundamentals:
U.S. Department of Commerce / National Bureau of Standards 1974.
Byron E. Blair. Time and Frequency Dissemination: an Overview of principals and Techniques.

* B.F. Field and V. W. Hesterman. The Josephson Junction Based Voltage Standard:
Reprint Courtesy U.S. Department of Commerce/National Bureau of Standards.

* The Rise of the Calculable Capacitor:
Copyright 1975, Reprint Courtesy NBS/Dimension's Vol. 59, No. 12, Dec. 1975.

* Paul P.B Brooks NBS Monograph 39. Calibration Procedures for Direct-Current Resistance Apparatus:
U.S. Department of Commerce/National Bureau of Standard 1962.

* Frank A. Laws, S.B. Electrical Measurements:
Copy right 1938, Mc Graw-Hill, Inc.

* Rolf B.F. Schumacher. Control Chart for Saturated Standard Cells: copyright 1966 IEEE, Reprint courtesy IEEE/Transactions Vol. IM-15, No. 1-2 March-June 1966.

* H. W. Carlson. Philosophy of Calibration; Intercomparison of Standard Cells: Reprint Coutesy John Fluke Mfg. Co; Inc.

* Jan Slijper. Advanced DC Calibration Techniques:
Reprint Courtesy John Fluke Mfg. Co., Inc.

* Industrial Electricity-Principles and Practices,
Adams, J. E., and G. Rockmaker.

* Electricity, Principles and Applications,
Fowler, R. F.

* Instruments and Measurements,
Gilmore, C. M.

* Advanced Industrial Electronics,
Morris

* Direct and Alternating Currents,
Oppenheimer, Heus and Borchers

* Electric Circuits,
Ridsdale, R. E.

* Basic Electricity,
Abar, P.B.

* Introduction to Microprocessors,
Gilmore, C. M.

* Logic Circuits,
Morris

* Microprocessors and Microcomputers for Electronics Technicians,
Pasahow, E.

* Digital Electronics,
Tokheim, R. L.

* McGraw-Hill Encyclopedia of Electronics and Computers

* Introduction to Radar Systems (2nd Ed.),
Skolnik, M.

* Engineering Electromagnetics (3rd Ed.),
Hayt, Jr., Wm.

* Electricity, Electronics and Electromagnetics,
Boylestad, R., and Nashelsky

* Electrical Fundamentals,
DeFrance, J. J.

* Computer Circuit Analysis-Theory and Applications,
Hardi, F.

* Microprocessor and Digital Computer Technology,
Oleksy, J. E. and G. B. Rutkowski

* Electronics Math,
Deem, W.

* Contemporary Mathematics for Electronics
Gothman, W.

* Illustrated Handbook of Electronic Tables, Symbols, Measurements and Values,
Ludwig,R. H.

* Mechanics of Materials (2nd Ed.),
Popov, E.

* Illustrated Encyclopedic Dictionary of Electronics
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* RC-Active Circuits: Theory and Design,
Bruton. P.

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Van Valkenburg, M. E.

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* Electrical Engineering Fundamentals (2nd Ed.),

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* Electronic Servicing Data and Procedures. A Complete Manual and Guide,
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* Semiconductor Electronic Design,
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* Solid State Electronic Devices (2nd Ed.),
Streetman, B.

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Buchsbaum, W.

* Integrated Circuits: Materials, Devices and Fabrication,
Till, W. and J. Luxon

* Electronic Waves and Radiating Systems (2nd Ed.),
Jordan, E. and K. Balmain

* Introduction to Microwave Fields and Circuits,
Thomassen, K.

* Communication by Satellite,
Spilker, J.

* Digital Communications, Satellite/Earth Stations Enginnering,
Feher, K.

* Digital Electronics: A Workbench Guide to Circuits, Experiments and applications,
Genn, R. C.

* An Introduction to Computer Logic,
Troy, H. Nagle Jr., D. Irwin, and C. Irwin

* Advanced Computer Design,
Iliffe, J.

* Computer Network and Distributed Processing : Software Techniques and Architecture,
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* The Complete Microcomputer Handbook with tested BASIC Programs,
Genn, R. C. and Genn, E. L.

* Cobol: A Vehicle for Information Systems,
Grauer, R.

* Better BASIC for the IBM PC,
Hume, J. and R. Holt

* Basic Programming for the IBM Personal Computer with Technical Applications,
Kascab, V.

* Business Programming in Fortran VI and ANSI Fortran 77: A Structured Approach,
Khailany, A.

* Control of Electric Machines,
Kosow, K.

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Kuo, B.

* Automatic Control System Technology,
Santo, D.

* Drafting and Manual Programming for Numerical Control,
Chambers, H. and C. Chacey

* Numerical Methods,
Daulquist, G. and A. Bjorck

* Matrix Theory,
Franklin, J. N.

* A Table of Series and Products,
Hanson, E. R.

* Elementary Technical Mathematics with Calculus (2nd Ed.),
Juszli, F., et al.

* Elementary Technical Mathematics (3rd Ed.),
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* The Wiley Engineer's Desk Reference,
Heisler, S. I.

* Handbook of Engineering Fundamentals (3rd Ed.),

* Essential Formulae for Electrical Engineers,
Morris, N. M.

* A Basic Guide to Power Electronics,
  Klaas, A.

* Circuits and Signals. An Introduction to Linear and Interface Circuits,
  Thomas, R. and A. Rosa

* Electrical Network Theory and Analysis,
  Choma, J.

* Analog and Digital Electronics for Scientists (3rd Ed.),
  Vaasas, B.

* Optimization of Wire Antennas,
  Landstorfer, F. and R. Sacher

* Pinciples of Antenna Theory,
  Lee, K.

* Moment Methods in Electromagnetics Techniques and Applications,
  Moore, J. and R. Pizer

* Theory of Waveguides,
  Lewin, L.

* Reference Manual for Telecommunications Engineering,
  Freeman, R.

* Satellite Broadcasting Systems, Planning and Design,
  Slater, J. and L. Trinogga

* Telecommunication Transmission Handbook (2nd Ed.),
  Freeman, R. L.

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* Linked Local Area Networks (2nd Ed.),
  Mayne, A. J.

* Documenting an Organization's Computer Requirements,
  Smith, J. M. and N. M. Kokotovich

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  Turner, R.

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  Pinson, L.

* White-light Optical Signal Processing,
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* Handbook of Industrial Robotics,
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* Integrated Circuits Application Handbook,
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* Servomechanisms: Devices and Fundamentals,
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Richardson, D.

* Introduction to Microcomputers,
Chattergy, R. and V. Pooch

* Ac-to-dc Converter Chips

* The Complete MAP Solution BR329

* The Current Comparator,
W. J. M. Moore and P. N. Miljanic

* Microwave Measurement ,
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R. N. G. Burbridge

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* Electrical Craft Principles, Vol.2

* Management of Engineering Projects
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Editions Hermes-51 Rue R Rennequin-75017 Paris 1988

* La Vision par Ordinateur dans l'Industrie
Editions Hermes-51 Rue Rennequin 75017 Paris

* A Combined Evaluation & Simulation System of the Channel
Fifth International Conference on Antennas & Propagation ICAP 87
Y. M. Le Roux
York, England 30 March-2 April 87 London: IEE 87 1987

* HF Groundwave & Skywave Propagation
Agard-R- 744, Jevnakree, Norway 13-14 Oct. 86

Periodicals

- IEEE Transaction on Instrumentation and Measurement
- Applied Physics Letters (U.S.A)
- Measurement Techniques (U.S.A)
- Test & Measurement World (U.S.A)
- Metrologia
- IEE Proceedings, Physical Science Measurement and Instrumentation
  (U.K)
- Electronics Test, (U.S.A)
- Techno Japan
- Jemima
- JEE
- Practical Digital Electronics, HP
- Measurement Techniques
  Plenum Publishing Corp., 233 Spring St., New York
- Special Publications Issued from NBS in the Electrical Metrology and Traceability
- JEI-the Journal of the Electronics Industry
- AEU-the Journal of the Asia Electronics Union
- JEE-the Journal of Electronic Engineering

Special Course on Interaction of Propagation and D.T.T.
L. J. Hortenbech
France, Agard 1986

* Digital Propagation Simulators
Second International Conference on Simulators
W. Matley & P. Howser
London, England : IEE 86 Comentry, England 7-11 Sep. 1986

* Managing New Product Innovations
W. E. Souder
Lexington Books 1987

* Engineering Design for Producibility and Reliability
J. Priest
Lavoisier 1988

* Effectiveness of Product Development Methods
W. E. Sonder
Industrial Marketing Management 1978

* Application of New Technologies to Small Scale Activities
International Labor Organization (ILO), Geneva JAN. 1985

* Metrology (High technology Ser). (Illus) 474p 1984. pap. text ed. 33.00 (ISBN 1-55502-116-6) Ctr Res & Dev.

* Hewitt, Paul L. Modern Techniques in Metrology. 360p. 1984 40.00x (ISBN 9971-966-45-X, Pub. by World Sci Singapore); pap. 21.00x (ISBN 9971-966-46-8, Pub. by World Sci Singapore). Taylor & Francis.

* Jungjohann, Kathy & Schenck, Becky R. How to Use Measurements. (Math for Independence Ser.). (Illus.) 64p. (Orig.). 1986. pap. text ed. 4.25 (ISBN-0-88120-988-0, 1064). C C Pubns.

* Khrgian, A. Kh. Metrology: An Historical Survey. 396p. 1971. text ed. 79.00x (ISBN 0-7065-1068). Coronet Bks.

* Market Research Company Staff. Personal Computers Impact on the Test & Measurement Industry. 125p. 1985. pap. text ed. 895.00 (ISBN 0-317-19566-2) Market Res Co.

* Noltingk, E., ed. Jones' Instrument Technology: Electrical & Radiation Measurements, Vol. 3. 4th ed. 272p. 1987. pap. text ed. 29.95 (ISBN-0-408-01233-1) Butterworth.

* Japan Electronics Almanac

* EBG-the Japan Electronics Buyers Guide

,Discontinued Devices e ed.

* Linear ICs 2 eds.
struments and Components

D.A.T.A. Series
M/S B77
9889 Willow Creek Road
P.O. Box 26875
San Diego, CA 92126

Which include the following items:

Integrated Circuits

* Audio/Video ICs 1 ed.

* Digital ICs 2 eds.

* Digital & Audio/Video Discontinued Devices 1 ed.

* Interface ICs 2 eds.

* Interface Discountinued Devices 1ed.

* Linear ICs 2 eds.

* Linear Discontinued Devices 1 ed.

* Memory ICs 2 eds.

* Memory Discontinued Devices 1ed.

* Microprocessor ICs 2eds.

* Modules/Hybrids 1ed.

Discrete Semiconductors

* Diode 1ed.

* Diode Discontinued Devices 1ed.

* Power Semiconductor 1ed.

* Thyristor 1ed.

* Thyristor Discoutinued Devices 1ed.

* Transistor 1ed.

* Transistor Discontinued Devices 1ed.

Special Publications

* Application Notes Reference 1ed.
* Capacitors 1ed.
* Engineering Application Software 1ed.
* Microcomputer Systems 1ed.
* Microwave 1ed.
* Microwave Discontinued Devices 1ed.
* Military Electronic Devices Guide 4eds.
* Optoelectronics 1ed.
* Optoelectronics Discontinued Devices 1ed.
* Power Supplies 1ed.

Alternate Source/Replacement Guides

* IC Replacement & Ulternate Source Guide 2eds.
* IC Generic Source Guide 2eds.
* SAVE S Purchase Both IC Guides.
* Diode Replacement & Ulternate Source Guide 2eds.
* Thyristor Replacement & Ulternate Source Guide 2eds.
* Transistor Replacement & Ulternate Source Guide 2eds.
* SAVE S Purchase Diode, Thyristor & Transistor Guides.
* IC Functional Equivalence Guide 1ed.
* International Directory of ICs & Discrete Semiconductor 1ed.
* International Directory of Discontinued ICs & Discrete Semiconductor 1ed.

Connectors

* PC Board Connectors 1ed.
* Rack & Panel Connectors 1ed.

Materials

* Additives for Plastics 1ed.

* Adhesives led.
* Composites & Laminates led.
* Plastics-Thermoplastics & Thermosets led.

OFFICE EQUIPMENT

Office Equipment

1 - Overhead projector.

2 - Vedio projector.

3 - Slide projector.

4 - Word processor:
IBM compatible; Data-base, Personnel-Graphics CAD raughting.

5 - Computer
IBM compatible; inventory of NSCL, inventory of customers,..etc,

6 - Kardex system

NECESSARY INSTRUMENTS FOR NSCL

Necessary Instruments

1 - Instrument Needed for AC Laboratory:
- AC Shunt Resistor Set 100mA-100A
- Decade Inductive Voltage Divider

2 - Video and Audio Repair Bench:
- Color TV Pattern Generator
- Stereo Generator
- Versatile Instrument
- Flutter Meter

3 - Digital Equipment Repair Bench:
- Signature Analyzer
- Micro-System Troubleshooter
- Curve Tracer
- Logic Lab
- Programmer

4 - Small Mechanical Worshop:
- Centre Laeth Turning with Milling Head and Accessories Needed.
- Drilling Machine
- Grinding Wheel Machine
- Recommended Mechanical Tools Needed

5 - Calibration Service Car.

DOCUMENTATION AVAILABLE AND REQUIRED TO BE PROVIDED FOR SERVICE MANUALS

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						
AC.Digital Power meter 2503-Yew						
Universal Counter 3516B-h.p	yes	yes	yes	yes	yes	yes
Distortion measurment set-339A-h.p	yes	yes	simple	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			yes
Current Transformer 2243	—	—	—			
Voltage Transfor 2261	—	—	—			
Standard Resistor	—	—	—	—	—	—
U.P.S. 2510VB			yes			
AC.Power Supply Stabilezer	—		yes			

SERVICE MANUAL (DC.LAB.)

Name& Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circuit Diagram
Precision DMM 1501A23	O N	O N				O N
DC.Cal. Set255001 GPIB Convertor 346611	O N / NO	O N / NO	O N / NO	O N / NO	O N / NO	NO
DC.Ref. Standard 731B	yes	yes	yes	yes	yes	yes
Electronic Golvanometer 270900			yes	O N	O N	O N
Pen recored 3056	O R	O R	O R	O R	O R	O R
Standard Volt-Radio Box2746	yes	yes	yes			yes

Name& Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layout of Component	Circuit Diagram
Multi-frequency LCR Meter 4274A	yes	yes	yes	yes	yes	yes
Q.Meter 4342A	yes	yes	yes	yes	yes	yes
Decade Capacitor 4440B	yes	yes	yes	yes	yes	yes
High resistance meter 4329A	yes	yes	yes	yes	yes	yes
Double Bridge 2752	yes		yes	yes	yes	yes
Wheotstone Bridge 2768			yes	yes	yes	yes
Elictric Golvanometer 27009 -			yes	○N	○N	○N
DC.power Supply PAD850L	yes	yes	yes			yes
DC.Precision Current . supply 2854			yes			yes
High Impedance voltmeter Nulldetector 845AB	yes	yes	yes	yes	yes	yes

SERVICE MANUAL

Rep

Name& Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Componet List	Layout of Component	Circuit Diagram
Dc-Vol STA-Type2552	Yes		Yes	Yes	Yes	Yes
Current Unit Type2561		Yes	Yes	Yes	Yes	Yes
Res-Box Type2793-01 03		Yes	Yes	Yes	Yes	Yes
Ac.AMMETER &Voltmeter 2013		Yes	Yes	Yes	Yes	Yes
Digital LCR Meter 4261 A						
ELECTRONIC LOAD PLZ-720			Yes			
Dc-Power Supply PAB25-ITR	Yes					
With Std. Volt&Insu. tester Model871			Yes			
ELECTRONIC LOAD PLZ-152W	Yes	Yes	Yes			Yes
DC power Supply PAR80A	Yes					
DC Vol/Current Standard Type2553	Yes	Yes	Yes	Yes	Yes	Yes
Digital HYGROMETER 2577	Yes		Yes			
Standard Resistor 2792	Yes					
Double Bridge 2769	Yes		Yes	Yes		Yes
Digital Thermometer 2583	Yes					
Decade Resis-Box 2786				Yes		Yes
Vertical pen Recorder 3056		Yes	Yes	Yes	Yes	Yes

Name& Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component list	Layout of Component	Circuit Diagram
2502A.	Yes	Yes	Yes	Yes	Yes	Yes
Digital.AC powermeter 2503	NO					
OSC. Ds-6411						
Logic. Analyzer SL-4121						
HYBRID Recorder 3081	YES	Yes	Yes	Yes	Yes	Yes
M Res-Box 3947						
Function Generator 3314	Yes					
MICRO Recorder 4156	Yes	Yes	Yes	Yes	Yes	Yes
Deka Box Resistor DB62						
MILLIOMMETER 4328A	Yes	Yes	Yes	Yes	Yes	Yes
OSC 3664						
GP-IB Converter 3466						
Ac Voltage Current-STA	Yes	Yes	Yes	Yes	Yes	Yes
Insulation Tester Type2403						
Circuit tester 3201						
CURRENT TESTER 3226						
BRIDGE 2755			Yes	Yes		Yes

SERVICE MANUAL

Rep

Name& Model	Caliration Procedure	Adjustment Procedure	Block diagram	Componet List	Layout of Component	Circuit Diagram
Selector Switch· 2745						
Voltmeters Standard 2012			Yes	Yes	Yes	Yes
%ero- Con						
Ac Voltage Transducer 2383						
Volt BATIO Box Type2744						

SERVICE MANUAL

TEMPARATURE

Name& Model	Calibration Procedure	Adjustment Procedure	Block Diagram	Component List	Layoutof Component	Circuit Diagram
Pen recorder 3056		○R	○R	○R	○R	○R
HYBRID Recorder 3081	yes	yes	yes	yes	yes	yes
Digital Resistance Thermometer 2804	yes	yes	yes			
Dc.Precisign Current Supply	yes		yes			yes
Dc.Reference Standard 731B	yes	yes	yes	yes	yes	yes
DMM1281 Datron	yes	yes				
DMM 2501a	yes	yes				
Computer Yemac50						
Ploter Pl.2000						
Printer M3413A						
Oil Bath Control Tpv-0-21			yes			
Nitor path Control Tpv-N-21			yes			
Tpv-Sc-22						

SAMPLE OF ELECTRONIC COMPONENTS AND SPARE PARTS FOR REPAIR WORKSHOP

Sample of Electronic Components and Spare Parts

Type	Function
LM301	Operational Amplifiers, Single, Dual and Quad
MC7805	Voltage Regulators
LM317	Adjustable Voltage Regulators
LM385	Voltage Reference
MC6880A	Bus Interface, (A-D/D-A) Convertor, Clock Generator
MCM10144	RAMS, ECL
MCM1024X1	
MCM93L422	RAMS, TTL
MCM10149	ECL-PROMS
MCM7641	TTL-PROMS
	Logic Circuit
	MECL 10,000 Series
74ALS00	ALS TTL/74ALS00 Series
MC14000	CMOS Logic Circuits MC14000 Series
	Power Transistors
2N6542	High Voltage Switching Transistors>600V
MJE13003	" " " " <600V
BU522A/	" " " Darlingtons
MJ10006	
BD680	General Purpose Darlingtons (PNP and NPN)
	General Purpose Transistors > 10Amps (PNP and NPN)
	General Purpose Transistors < 10Amps.(PNP and NPN)
	High FT Drivers and Switching Transistors
	High Voltage Switching Transistor
	TMOS Power FETS
	Silicon Control Rectifier, Thyristors,Triacs
	General-Purpose Rectifiers
	Fast Recovery Rectifiers
	Zener Diodes
	Small-Signal Transistors (PNP and NPN)
	Field Effect Transistor (FETS), (P and N Channels)
	Radio Frequency Transistors

INSTRUMENTS TO BE REPAIRED UNDER WARRANTY

INSTRUMENT TO BE REPAIRED

- R.T.D.	(PT25)	temperature
- R.T.D.	(PT100)	temperature
- Thermocouple	(Type [S])	=
- Regulator DC power supply	PAB 18-2-5DU	Repair
- Fluke 845		DC

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ANNEX 5 : Information about Syrian Institutions

SCIENTIFIC STUDIES AND RESEARCH CENTER
AN INTRODUCTION

The Scientific Studies and Research Center (SSRC) is a public autonomous institution, sponsored by the President of the Syrian Arab Republic. It was founded in 1969 and started operations in Damascus in 1972.

SSRC is devoted to the development of a national R&D capability and to the rationalization of scientific research and development related to applied sciences and technology. It is managed by a Board consisting of SSRC departmental heads and of independent distinguished scientists and engineers. The Chairman of the Board is the General Director, appointed by presidential decree.

SSRC has currently the following subdivisions:

(1) Scientific research institutes and departments:

- Institute for Electronics & Applied Physics Research
- Institute for Mechanical Research
- Institute for Chemical & Biological Research
- Institute for Aerodynamics & Avionics Research
- Department of Informatics Research
- Department of Economics Research

(2) An educational arm:

- Higher Institut for Applied Sciences & Technology

(3) Industrialization section:

- Electronics Industries Branch
- Project take-off structures

(4) Administrative services:

- Financial services
- Social services
- Technical support services
- Scientific cooperation & international relations
- Administrative services

The current staffing of SSRC is about 1000 permanent members. The annual budget is about 120 million Syrian pounds. The existence of an educational arm providing high caliber graduates in modern technology not (or not sufficiently) covered by Syrian Universities, and of a manufacturing arm enabling the transformation of major designs from a prototype to a full product, is rather unique for an R&D institution.

The mandate of SSRC includes among others the transfer, adaptation and further development of modern key technologies in the fields described above. Generally the approach is to acquire sufficient expertise and know-how in a certain field and then inject this expertise into the corresponding sector through pilot projects. Special attention is given to the autonomous continuation and development of the pilot projects in the concerned sector.

SSRC has achieved with this methodology several large projects with significant success:

-Salination study on the Euphrate region using remote sensing technology.

-Design of a telecommunication system for the entire Euphrate region.

-Development of anti-corrosive paints for the public sector industries.

-Implementation of the first computer network in Syria.

-Automation of large public sector corporations.

SCIENTIFIC STUDIES AND RESEARCH CENTER
SSRC
DAMASCUS - SYRIA

1.1 DEFINITION:

The Scientific Studies and Research Center "SSRC" is a public institution endowed with the "Moral personality and financial autonomy" and sponsored by the President of the Syrian Arab Republic. The Scientific Studies and Research Center has been founded in 1969 in Damascus but secondary branch could be created in the provinces

1.2 AIMS:

The Scientific Studies and Research Center has the general task of developing and rationalizing the scientific research related to applied sciences and technology aiming to serve the development of the country. Therefore it is also charged of organizing , rationalizing and transferring the appropriate technologies, including the accomplishment of feasibility studies and "technological assessment" of the industrial projects employing advanced techniques.

To reach this aim, the Scientific Studies and Research Center must form purposely prepared scientific staff able to assume a pioneer and vanguard role in leading and developing the scientific research and in exploiting the potentials of modern technology.

1.3 STRUCTURE AND ORGANISATION :

The Scientific Studies and Research Center is managed by the department directors and a few independent prominent scientific personalities. The President of the Board is the General Director appointed by a presidential decree. The Scientific Studies and Research Center is subdivided to:

1- Scientific research department covering actually the following fields: Chemistry, Physics, Applied Mathematics, Electronics, Mechanics, Informatics and Economcis

   Other department would be erected in the opportune moment as judged so by the administration board.

2- Industrializing sections and projects take-off structures.

3- The Higher Institute for Applied Sciences and Technology.

The current staffing of SSRC is about 1000 permanent members. The annual budget is about 120 million Syrian pounds.

1.4 A SURVEY OF THE SCIENTIFIC STUDIES AND RESEARCH CENTER ACTIVITIES:

1.4.1 SOME NATIONAL LEVEL ACTIVITIES

1- The realization of the researches and studies solicited by industries and governmental organizations regarding specific projects of which we shall enumerate nonexhaustive examples:

*In the field of the remote sensing: two studies for the benefit of the Euphrate's Dam, University and Oil Ministry.

*The conception of a telecommunication system for the benefit of the Euphrate's Dam ministry, aiming to facilitate the revalorisation of arable lands.

*The introduction of electronics data processing in several organizations such as the Finance Ministry, banks, the Syrian Arab Airlines and so on...

*The implementation of the spare parts industrialization technology, and the techniques of titration, amelioration and regeneration of engine and machine oil.

*Data automation in distribution circuits to the benefit of the Ministry of Internal Trade.

2- Staff formation in the research fields pertinent to the reponsabilities of the Scientific Studies and Research Center.

3- The implementation of specialized laboratories and their equipment with adequate installation.

4- The foundation of the Higher Institute for Applied Sciences and Technology, to habilitate the elite of engineers in the following fields:

- Applied Physics
- Informatics
- Automatics
- Micro electronics
- Remote Sensing
- Energetics and specially solar energy
- Management

5- The Scientific Studies and Research Center is monitoring the implementation and the take-off of some factories on behalf of the government and the public sector.

1.4.2 SOME INTERNATIONAL LEVEL ACTIVITIES

1- The Scientific Studies and Research Center organizes the siminar sessions of the Arab School for Sciences and Technology held annually, with the participation of sevral scientific arab and international organizations.

2- The Scientific Studies and Research Center has concluded co-oparative conventions with the National Organization for Scientific Research of Algeria to organize the exchange of researchers and foster common research in linguistics and informatics to begin with.

3- The Scientific Studies and Research Center is realizing a co-operation project with "European Economic Community" concerning advanced technology transfer in some fields and the development of technologies adequate to the Syrian framework in other fields.

4- The Scientific Studies and Research Center is realizing cooperative conventions with the GEFIE, (the pool of the French Schools teaching foreign engineers), in the fields of the formation of engineers and their training. The Research Center has concluded similar conventions with the French National Foundation for the teaching of Management (FNEGE) and the French Association for the professional formation of adults (AFPA) and other French "Grandes-Ecoles".

5- Important projects have been initiated in cooperation with JAPAN (JICA), Canada (ACCC) and UNDP (UNIDO).

INFORMATION ON THE HIGHER INSTITUTE OF APPLIED SCIENCES & TECHNOLOGY

The Higher Institute of Applied Sciences and Technology (HIAST) is an institution for education and research of advanced university level in the fields of Science and Technology.

Studies at HIAST extends to five years after the Syrian Baccalaureat (equivalent to grade 13) and produces high calibre engineers in some selected fields such as Computing, Automation and Control, Microelectronics, and Management.

A relatively small number (currently 40) of carefully selected applicants enter the first year and follow a three year program (first cycle) studying the basic sciences (Mathematics, Physics, Chemistry) Computer programming, Electronics and foreign languages (French and English). At the end of this first cycle of studies, students may pursue their studies in one of the available fields of specialization at the Institute or in other fields available in French Engineering Schools (Grandes Ecoles).

The second cycle of specialization consists of two years (fourth and fifth) and is carried out within a department. In each of the two years, a set of specific courses has to be completed as well as a project.

A third cycle to award a Ph.D. degree is planned for the near future.

Research and development are carried out by the professors and teaching/research assistants individually or in teams in the fields of specialization of each department or on interdepartmental basis.

The department of Computer Engineering currently offers the following courses:

* For third year students: Introduction to Computing and Programming.

* For fourth year students: Computer Organization, Digital Networks, Computer Architecture, Algorithmics and Data Structures, Formal Languages and Automata, Scientific Programming, Assembly Programming.

* For fifth year students: Micro-computers and Micro-processors, Data Communications and Computer Networks, Graphics, CAD/CAM Systems, Operating Systems, Compilers, Data Bases, Software Tools and Methodologies, Semantics and Verification, Complexity of Computing, Computability and Decidability.

Students in the Computer Engineering program should take courses offered by other departments, such as:

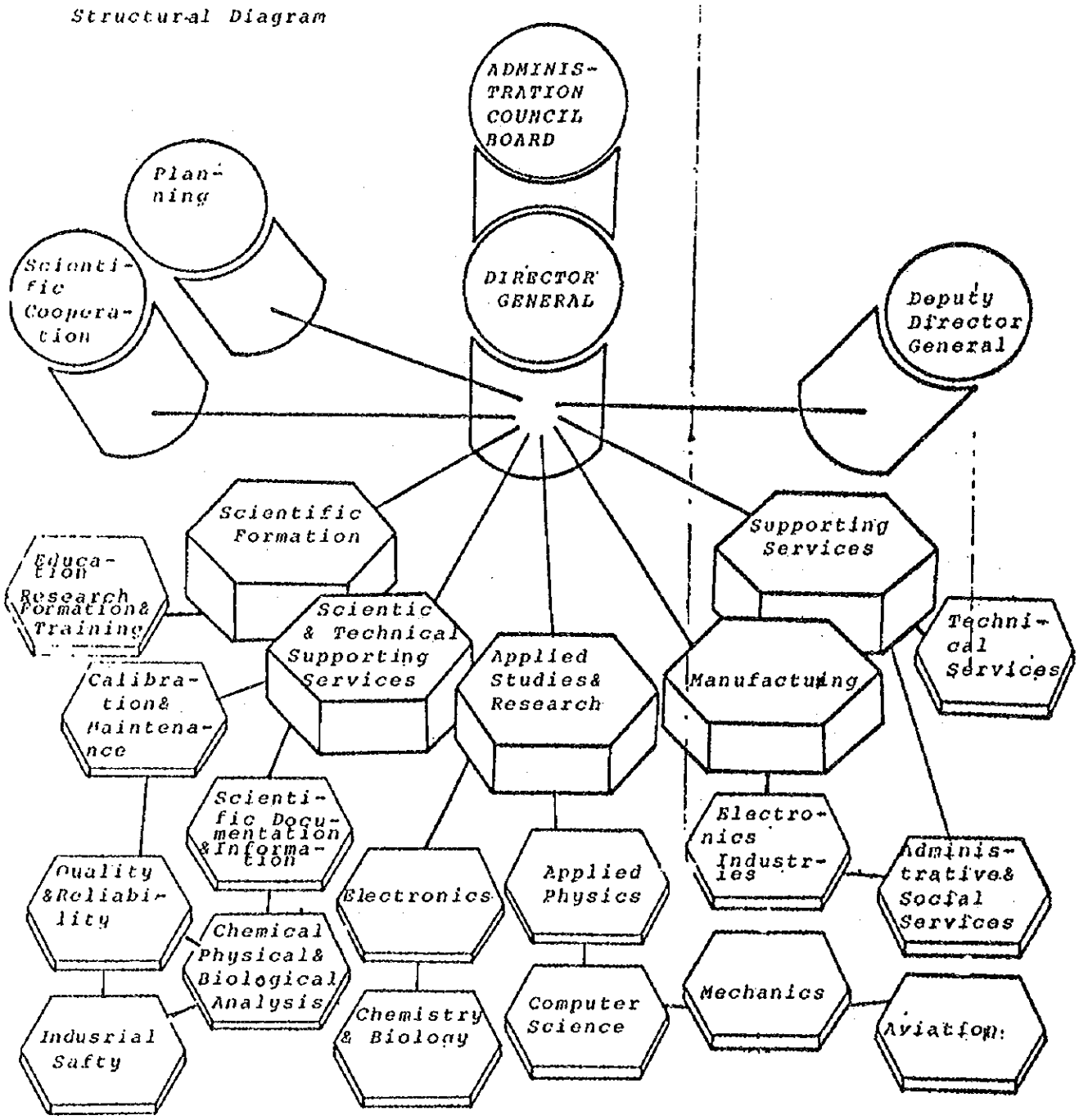
* Fourth year students: Electric Circuits, Electronics, Logic, Graph Theory, Numerical Analysis, Probability, Statistics, Stochastic Processes, Economics.

* Fifth year students: Acquisition, Control, Singal Processing, Operations Research, Management and Computing Applications.

الهيكل التنظيمي

Scientific Studies & Research Center

Structural Diagram



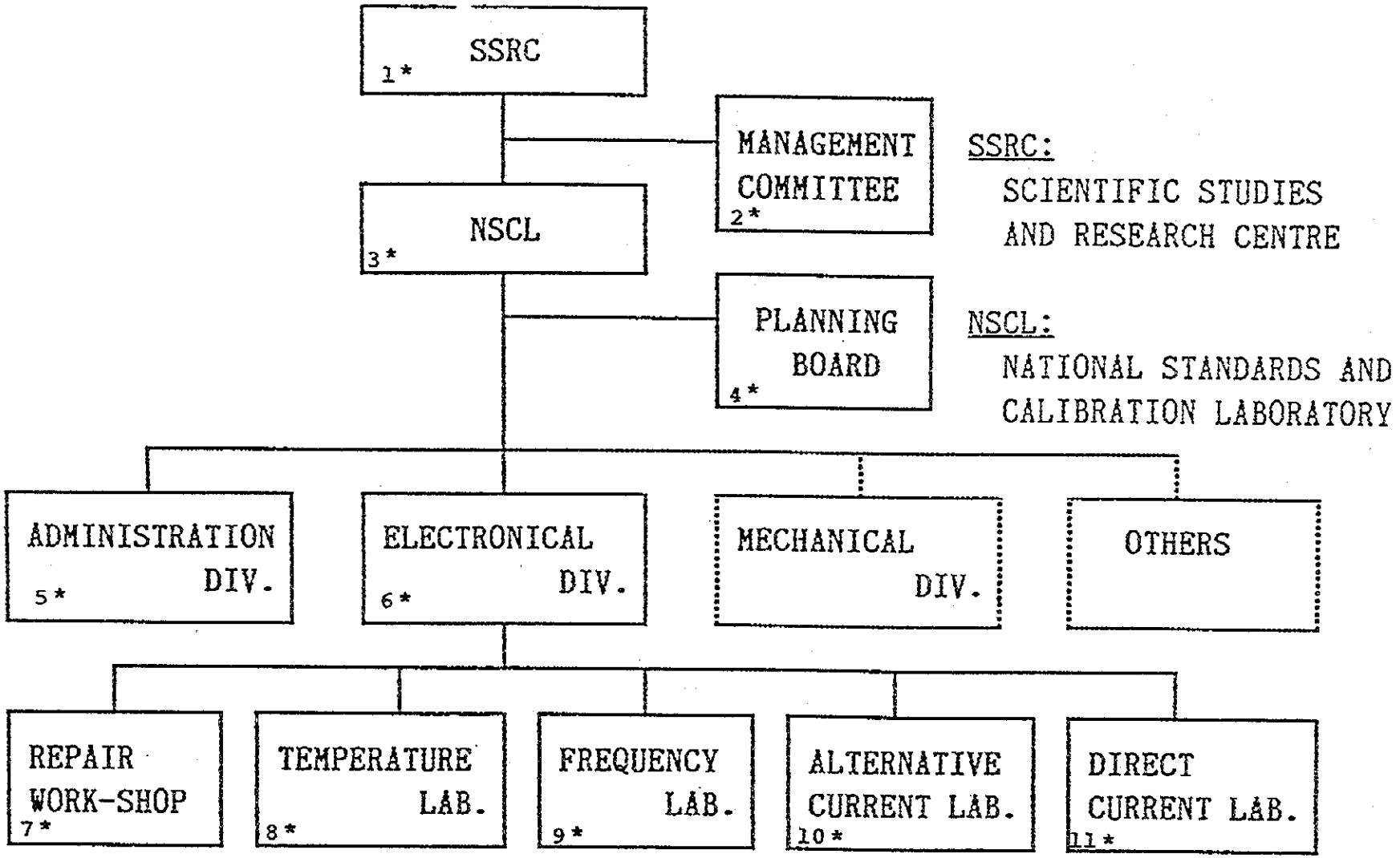


FIG.4 NSCL ORGANIZATION

1* DIRECTOR GENERAL: DR.A.W.CHAHID

2* INTERIM MANAGMENT COMMITTEE - DEPUTY DIRECTOR GENERAL: A.H.MANSOUR.

- ENG.S.WAISS
- DR.Z.S.SULAIMAN
- DR.H.JARMOUKLY
- DR.M.AGHBAR
- ENG.Z.BATTER
- ENG.M.ZAWITE

3* ENG.S.WAISS

4* DR.M.AGHBAR

- ENG.Z.BATTER
- ENG.M.ZAWITE
- ENG.R.IBRAHIM
- ENG.M.HARB
- A. ENG.A.S.KAROUNI

5* ENG.M.NOUKARI

- MRS.S.CHALATI
- MR.M.SABEK
- MISS.R.SAFADI
- MR.A.ZAITOUN

6* DR.M.AGHBAR

7* ENG.R.IBRAHIM

- ENG.S.TATEESH
- A.ENG.N.ALIAS
- A.ENG.M.HAFIRI
- A.ENG.K.SADDI
- A.ENG.K.BARAKAT
- A.ENG.M.Z.SWED

8* ENG.M.HARB

- A.ENG.S.AKRAMI

9* ENG.Z.BATTER

- A.ENG.T.HAJI
- A.ENG.M.KASHOUR

10* ENG.M.ZAWITE

- A.ENG.M.JUMMA

11* A.ENG.A.S.KAROUNI

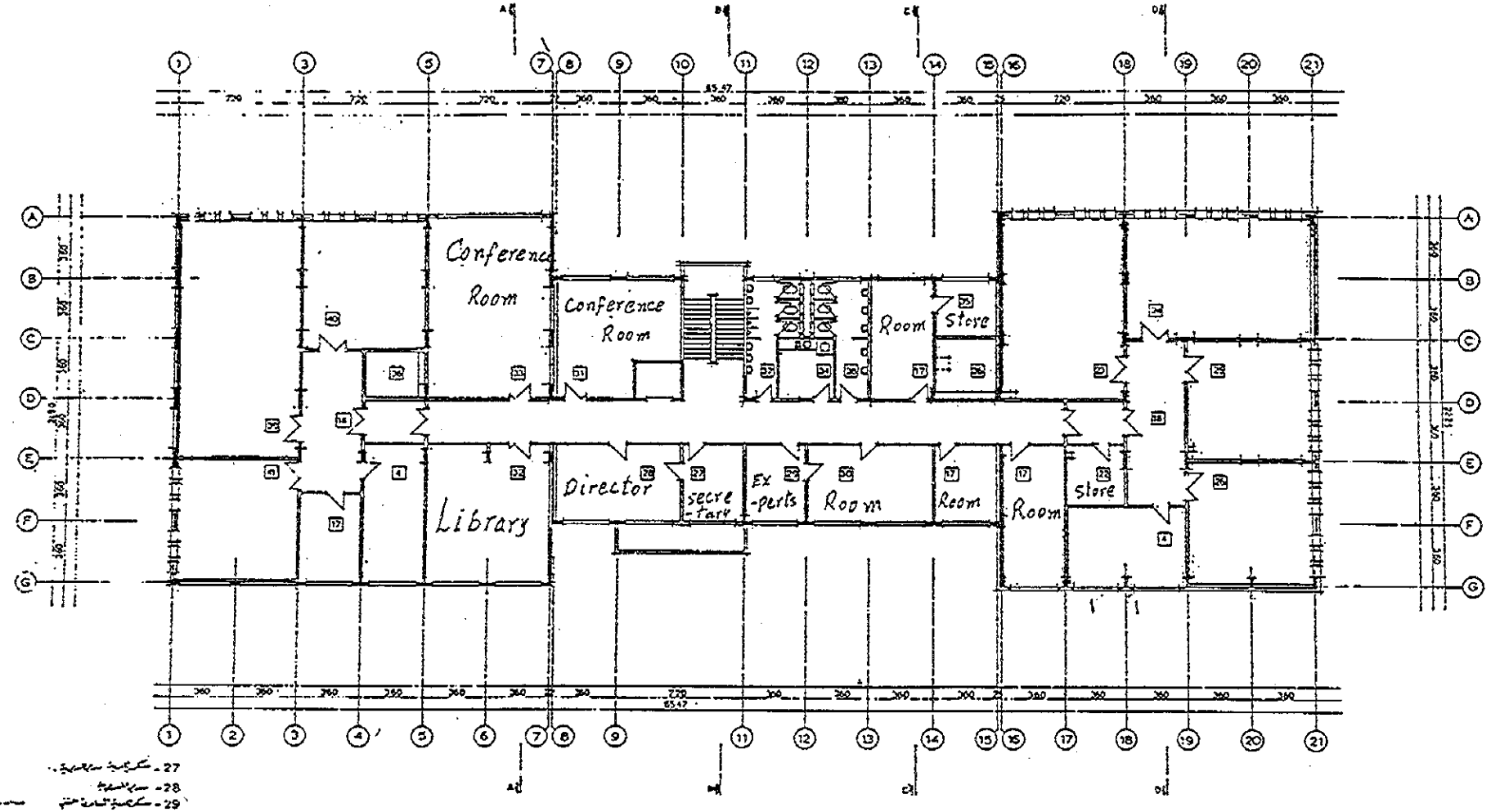
- A.ENG.M.SADDI

THERE ARE OTHER EMPLOYEE TO BE ADDED IN NEAR FUTURE

BUDGET OF CALIBRATION & MAINTENANCE DEPARTMENT (NSCL PROJECT)

Ref	Costs Items (Budget,s Payments)	Payment During			Total(S.P)
		1987	1988	1989	
1-	Project,s design (drawings).	600000	-	-	600,000
2-	Gneral.site Works	700000	1.500000	700000	2.900 000
3-	Skeleton Construction	2000000	6.100000	-	8.100.000
4-	Finishing Construction	-	8.400000	-	8.400.000
5-	Electrical Instulation Works	-	5.000000	1.400000	6.400.000
6-	Central heating	-	2.500000	-	2.500.000
7-	drainage Systems		7.00000		
8-	Land reforming & Gardings	-	-	1.000000	1.000.000
9-	Fork lifting equipment Hydr.cranes(1.5T,2T)	100 500	-	-	100.500
10-	Administrative Furniture	-	763.130	-	763.130
11-	Technical furniture & equipment	-	894750	-	894.750
12-	Wages& Salaries(Staff)	238000	816000	1.152000	2.206.000
13-	Servecing & Transportation	212650	347300	423950 →	983,900
	TOTAL	3.851.150	27.021180	4,675950	35.548.280
1-	Building's Costs.	33300000	24.200000	3.100000	30.600000
2-	Administrative technical furniture's costs.	100 500	1,657880	-	1.758380
3-	Wages, Servicing& Tranportation costs	450 650	1.163300	1.575950	3.189.900
	TOTAL	3.851.150	27.021180	4,675950	35.548.280
(*) 4-	Budget Allcated for1989			2.000 000	2.000.000
					37.548 280

Ground Floor


Conference Room
Conference Room
Room
Store
Library
Director
secre tary
Ex -perts
Room
Room
Room
store
floor

ANNEX 6 : First List of Instruments to be Calibrated (SSRC and HIAST Instruments) and a List of Potential Customer Institutions and Survey Form

DC Power Supplies (SSRC)

Type	Manufacture	Description	Quantity
NGT20	Rohde & Schwarze	2x20V/1A,1x6V/5A	15
NGMD35	= = =	35V/1A	3
NGM35-1	= = =	35V/1A	5
NGRU35/10	= = =	35V/10A	8
NGAS32	= = =	32V	2
Hera 2000	Hera Lab	2x30V/1A,1x5V/3A	20
EL750B	Acdc	Electronic Load	1
PAC35V/5A	Kikusu	35V/5A	2
	Rohde & Schwarze	30V/50A	7
	Farnel	30V/100A	6
	Roband	30V/10A,60V/1A	10
1389		Alimentation Stability	3
TE10		Pulse Generator	8
TE18		= =	2
		Universal Measurement Amplifier	2
		Temp-Plotter	1

DC Power Supplies (HIAST)

Type	Manufacture	Description	Quantity
ORB1700		U.P.S. 1700 V.A	2
A120		U.P.S. 15 K.V.A	1
52231		Power Supply	8
52235		Power Supply	2
		Power Supply	2
AX822		Power Supply	8
52230		Power Supply	10
57432		Power Supply	1
6203		Power Supply	28
		Power Supply	11
6268		Power Supply	10
AX105M		Power Supply	3
57431		Power Supply	1

Analogue and Digital Multimeters (SSRC)

Type	Manufacture	Description	Quantity
PM2517E	Philips	D.M.M.	20
MX202	Matrix	Analogue M.M	30
MX225A	Matrix	Analogue M.M	5
177	Keithly	D.M.M.	3
TF2604	Marconi	Electronic Voltmeter	4
9301A	Racal-Dana	R.F.millivoltmeter	10
D4025	Norma	D.M.M.	1
3435A	H.P.	D.M.M.	1
3400A	H.P.	RMS Voltmeter	2
3455A	H.P.	D.M.M.	1
4003	Racal-Dana	D.M.M.	8
AV08	AVO	Analogue Multimeter	15
6900	Racal-Dana	Multimeter	1
4261A	H.P.	LCR Meter	2
4342A	H.P.	Q Meter	1
RD7	aoip	Resistance Decade Box	2
CD4E1	aoip	Capacitance Decade Box	2
6400	Comark	Digital Thermometer	8
760A	Fluke	Meter Calibrator	1
		Frequency programmable	1
MX202	Metrix	Multimeter	10
410C	H.P.	Volt Meter	2
419A	"	DC Null Voltmeter	2
3406A	"	Broadband Sampling	2
		Voltmeter	2

Analogue and Digital Multimeters (HIAST)

Type	Manufacture	Desoription	Quantity
577		Storage Guire	1
CEI 27101		Interface System	1
2610		Frequency Meter	2
2400		Phase Meter	1
5000		Phase Meter	1
1394		Volt Meter	4
MX30		Volt Meter	12
2625		Volt Meter	4
MX482		Volt Meter	10
		Volt Meter	5
		Micro Ampere Meter	4
MX309		= = =	10
		= = =	4
1395		Milli-Ampere Meter	4
2630		Ampere Meter	4
		Ampere Meter (1mA-3A)	4
		Micro Volt Meter	2
MX575		Digital Multimeter	19
MX202		Multimeter	36
MX550		=	2
7045		=	15
8024B	Fluke	Digital Multimeter	1
MX550	Metrix	= =	1
7045	Solartron-Schlumberger	= =	1

Oscillascopes (SSRC)

Type	Manufacture	Description	Quantity
2215	Tektronix	60MHZ Dual Trace Oscilloscope	15
2235	Tektronix	100MHZ Dual Trace Oscilloscope	8
468	Tektronix	Digital Storage Oscilloscope	7
465B	Tektronix	Oscillascope	6
466	Tektronix	Digital Storage Oscilloscope	5
OS4020	Gould	Digital Storage Oscilloscope	8
OS4020	Gould	Digital Storage, Oscilloscope with Data Option	2
OS4000	Gould	Digital Storage Oscilloscope	2
OS4040	Gould	Digital Storage Oscilloscope	2
183A	H.P	4 Channel Oscilloscope	2
1707A	H.P	200MHZ Dual Trace Oscilloscope	2
PM3200	Philips	Dual Trace Oscilloscope	2
1470A/1471A	H.P	Oscilloscope	10
D83	Telequipment	Oscilloscope	2
TM504	Tektronix	Oscilloscope Calibrator	1
1727A	H.P.	Oscilloscope	
2215A	=	=	2
5027	Enertec-Schluberger	=	2

Oscillascopes (HIAST)

Type	Manufacture	Description	Quantity
		Digital Storage Scope	1
		Table Tracante XY	1
		Machine Adessiner Format	1
		Plotter XY	1
		Table XX	1
		Plotter XY	1
		Table T2Y	1
IF1502		Plotter XV	1
IF3802		Plotter XV	1
IF2510		= =	1
7475A		Graphics Plotter	1
5022		500KHZ Oscilloscope	5
5013		15MHZ Oscilloscope	5
5012		Modulation Unit	5
		Oscilloscope	2
5072		12 MHZ Oscilloscope	2
57520		Oscilloscope	12
5025		25MHZ Oscilloscope	8
0X734		Oscilloscope	5
HM812-2		Storage Oscilloscope	1
5276		50MHZ Oscilloscope	2
5224		100MHZ Oscilloscope	1

R.F Generators and Measuring Instruments (SSRC)

Type	Manufacture	Description	Quantity
9008	Racal-Dana	Modulation Meter	8
9104	Racal-Dana	R.F. Power Meter	3
2065	DYMAR	Distortion Factor Meter	6
6155	Bird	R.F. Power Meter	2
2081	Farnel	R.F. Power Meter	5
4815A	H.P	Vector Impedance Meter	1
TF2370	Marconi	100HZ-110MHZ Spectrum Analyzer	8
3582A	H.P	Audio Spectrum Analyzer	1
9082	Racal-Dana	R.F. Signal Generator	15
9083	Racal-Dana	2 Tone Signal Generator	12
	Wave Tek	Function Generator	4
9901	Racal-Dana	Counter	10
9903			
9906			
9912			
9915			
9916			
9917A			
143	Wavetek	20MHZ Function Generator	4
802	Wavetek	50MHZ Pulse Generator	2
18	Wavetek	5MHZ Sweep Generator	1
CG5001	Tektronix	Programmable Calibration Generator	1
141T,8554B and 8552B	H.P	100KHZ to 1250MHZ Spectrum analyzer	3
141T	H.P	10MHZ to 40GHZ, Spectrum analyzer	1
8568A	H.P	100KHZ to 1500MHZ, Spectrum analyzer	1
3325A	H.P	21MHZ, Synthesized function generator	1
8662A	H.P	10K-1280MHZ Synthesized Signal Generator	1
8660C	H.P	1MHZ to 2600MHZ Synthesized Signal Generator	1
3314A	H.P	Function Generator	1
3312A	H.P	Function Generator	3
3311A	H.P	Function Generator	2

TF2015	Marconi	R.F Signal Generator	1
8672A	H.P	2-18GHZ Synthesized Signal Generator	1
8640A	H.P	0.5 to 1024MHZ, Signal Generator	1
5315A	H.P	0-100MHZ Electronic Counter	2
740A	ADRET	U.H.F. Generator	1
8903A	H.P	Audio Analyzer	1
8901A	H.P	Modulation Analyzer	1
435B	H.P	Power Meter	1
DC5010	Tektronix	Prog Universal Counter	1
5315A	H.P.	Universal Counter	
2615	Enertec-Schlumberger	= =	2
2618	= =	= =	1
NAUS4	Rhode & Schwarz	R. F. Power Meter	1
PF810	Trio	Function Power Meter	1
	B & K	Spectrum Analyzer	
	B & K	F.F.T.	
	B & K	Single Channel	
M262E	Anritsu	Field Strength Meter	1
MS62B	Anritsu	Spectrum Analyzer	1
MS611A	Anritsu	20 HZ to 2GHZ, Spectrum Analyzer	1

R.F Generators and Measuring Instruments (HIAST)

Type	Manufacture	Description	Quantity
MP51		Generator	4
5144		Signal Generator	24
TE7700MX		Functions Generator	2
1176093		= =	4
6080		= =	4
GX933MX		Generator Stereo 50	1
GX933MX		= = 75	1
HP8018A		Word Generator	1
HP8070A		Logic =	15
604		Generator Variable	1
6070		= =	2

Please make a quantitative survey of electrical and electronic measuring instrument calibration requests in Syria.

The data from this survey will be useful to estimate the calibration workload at NSCL, and to make our cooperation plan of this project.

< Please refer REPORT(Oct. 1986) on meeting concerning NSCL, Annex 2, Answers to questionare 4 >

Organization / Instruments	SSRC	HIAST	ITRC	PTT	Syrian ARAB Airline	Electric Power Company
(1)Digital Voltmeter						
(2)Electrical Indicator < V,A,W meter >						
(3)Meter Calibrator < DC, AC >						
(4)Recording Thermometer & Digital Thermometer						
(5)Standard Resistor & Resistance Box						
(6)Oscilloscope						
(7)Frequency Counter						
(8)Audio Frequency Signal Generator						
(9)Radio Frequency Signal Generator						
(10)W.H Meter for 2nd'ry Standard						

Instruments,(1) to (5) & (10), have accuracy class 0.5% or better.

The need for establishing a calibration laboratory is urgent for the following organizations:

a. Scientific Research Sectors.
- SSRC
- Atomic Energy Committee
- Remote Sensing Commission
- Nuclear Medicine Center
- ITRC (Industrial Testing and Research Center)
- ICARDA (International Center for Agriculture Research in the Dry Areas
- ACSAZ (Arab Center for the Study of Arid Zones).

b. Educational Sector.
- 4 Universities
- HIAST (Higher Institute of Applied Sciences and Technology).
- 22 Technical institutes
- high school laboratories
- The technical institutes, which belong to the following ministries:
  * Ministry of Electricity
  * Ministry of Communication
  * Ministry of Industry

c. Industrial Sector.
- Syrcotel factory (switch boards).
- Syronics factory (T.V.)
- Ugarit factory (tranformers and motors)
- Barrada factory (cables)
- Electronic industry branch (part of SSRC)
- Shahba factory (light, lamps...).
- Different private electrical and electronic enterprises

d. Medical Sector.
- Medical equipments in ; Hospitals, Laboratories and private clinics.

e. Others.

Electronic equipments in different ministries and public companies such as:
- Laboratories of Ministry of Oil
- Meteorological Institute
- Syrian Arab Airlines
- P.T.T.
- .
- .
- etc

There is no accurate statistical data yet. But more than 1000 Oscilloscopes is estimated in the above mentioned sectors and several thousand of multimeters too.

ANNEX 7 : Syrian Proposals for New Phase of NSCL snd TV Lab

NSCL Requirements for Mechanical & Optical Standards and Calibration Systems

SSRC-Damascus

3 - 1989

I - Dimensional Laboratory

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

Environmental conditions:

Temperature	20°C - 0.5°C
Humidity	50% - 10%
Cleaness	particules which have = 0.5 m or more are less than 1.3 . 10 per cubic meter
Light (illuminance)	800 lm/m²
Pressure	Not controlled but measured

The equipment needed to fulfil those tasks are as shown in block diagram -1- . Here are some more specifications:

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 comparaison of 5 points of the block gauge under test and standard, with reading less than 0.1 μ m; with thermometer to mesure between 15 °C to 25 °C with an accuracy of 0.1 °C.

L6 : Optical glass to verify the planity of block gauges, diameter 60 mm, planity better than 0.1 frange of interference with monochromatic lamp to facilitate the observation of franges.

L7 : Universal measuring machine to compare block gauges by substitution; sensibility minimal 0.1 μm. This machine may be combined with an internal standard tape ot 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 1m. This tape must be divided every mm and calibrated for every cm.

L10: Standard tape, length 200 mm divided every mm.

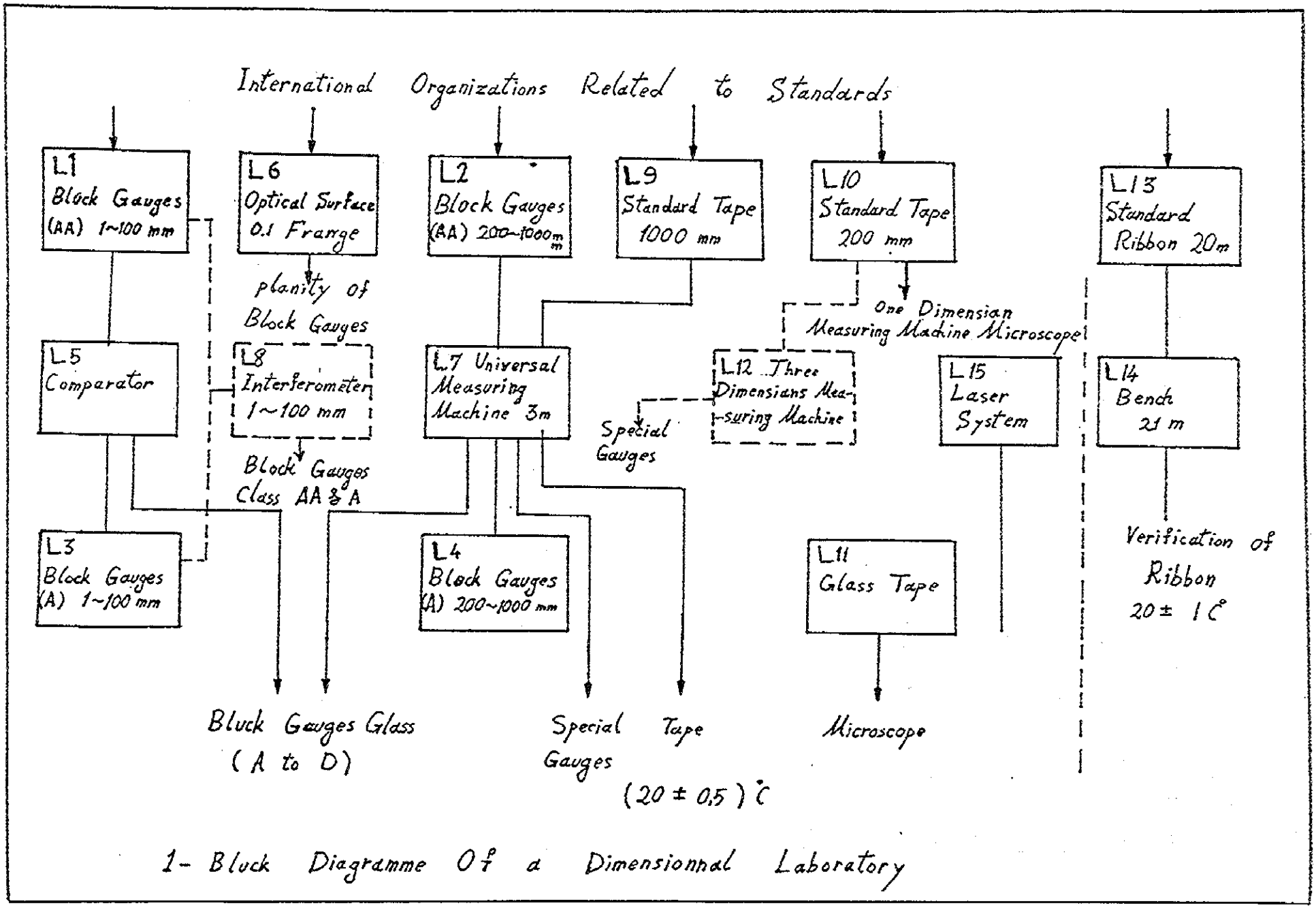
L11: Glass tape including one division of 2 mm divided every 0.1 mm.

L12: Three dimensional measuring machine.

L13: Three standard Rubon tape, length 20m, divided every cm.

L14: Special installation for the comparaison of rubon tapes.

L15: Laser system; like HP 5528 system to measure angle, speed and straightness.



1- Bluck Diagramme Of a Dimensionnal Laboratory

II - Mass Laboratory:

this laboratory will keep the National Standard of Mass and will conduct precision measurement related to this quantity.

Environmental conditions:

Temperature	(23±1) C
Humidity	(50-10) C
Cleaness	Particules which have =0.5 m or more are less than 1.3 10 particules per cubic meter
Light (illuminance)	800 lm/m

The block diagram 2 shows the equipment needed to calibrate weights and balances. Here are some more details discriping 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: Serie of mass for verifying analytical balances or others used in pharmacy industry and jewellery; from 10mg to 100g.

M5: Serie of mass; 10mg to 2x2 Kg to be used with M4.

M6: Mass to be used for verification.

M10: Balance for calibration, capacity 20Kg

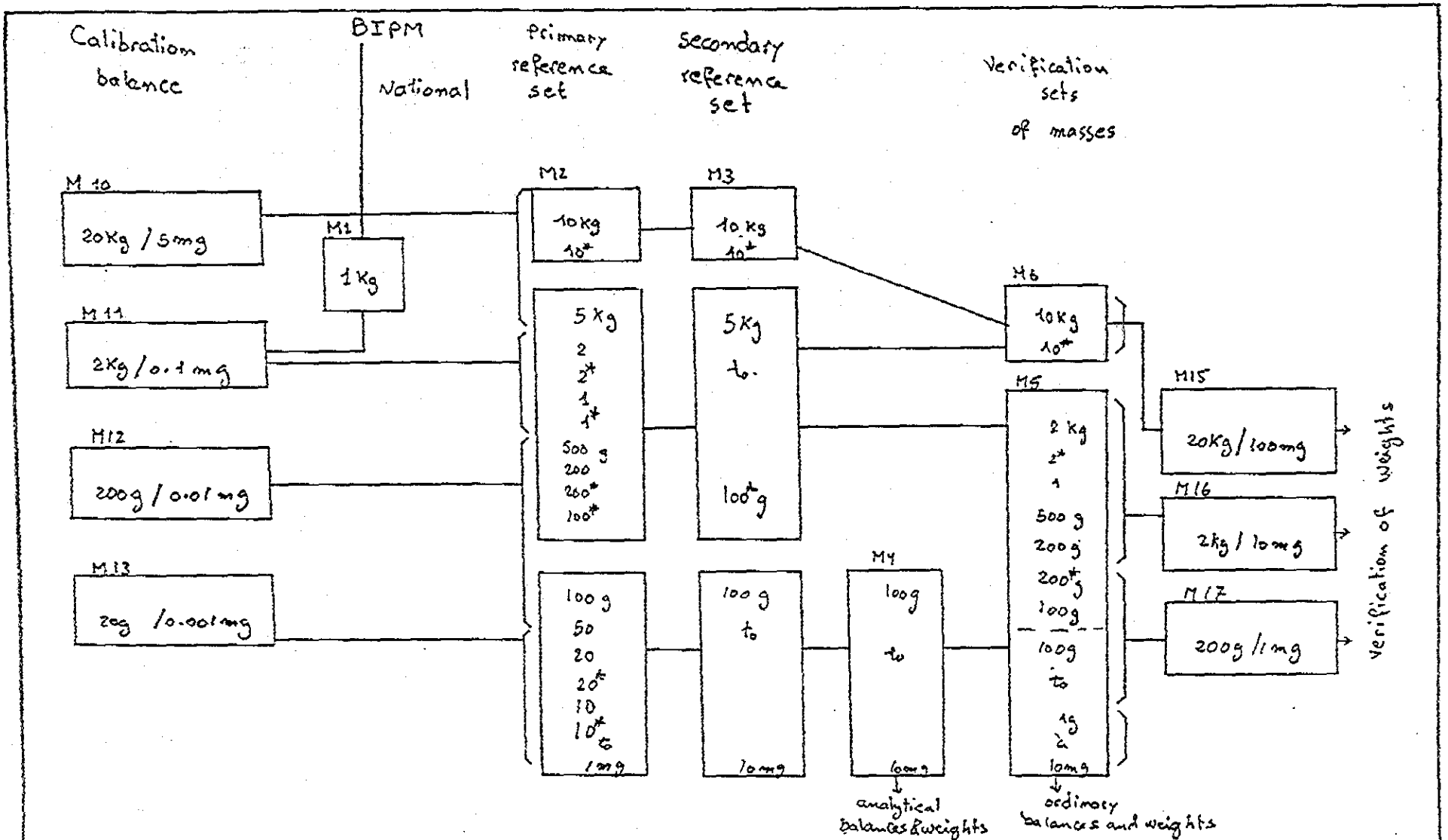
M11: Balance for calibration, capacity 2Kg

M12: Balance for calibration; typo analitic, capacity total with sensible weight (20,02g).

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

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

M17: Balance; capacity 200g; suitable for the verification and adjustement of weights by comparaison.



2 - Block diagram of equipment needed for the verification weights and balances

III - Optical Laboratory:

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

R1 : 10 standard lamps of luminous intensity filled with gaz, 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 50V); current maximal 30A; 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 resistors; colded by water; accuracy -0.01% ; nominal values:

0.001 Ω ; 50A
0.01 Ω ; 10A
0.1 Ω ; 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 gaz, electric power 200 W, 220V.

R10: 15 working standard lamps as R9.

R11: Lamps, 25 to 500W, chosen from general usage lamps.

R12: Sphere of integration (sphere of ulbricht) diameter 2.5 m, with accessories to support all type of lamps (incandescent, fluorescent).

R13: Digital photometer, with a set of fillers in order to obtain a spectral response corresponding to V established by the international comission 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: Colorimeter to evaluate the three components corresponding to specifications of (CIE).

In order to conduct radiometric calibration we need the following:

Radiance Measuring System

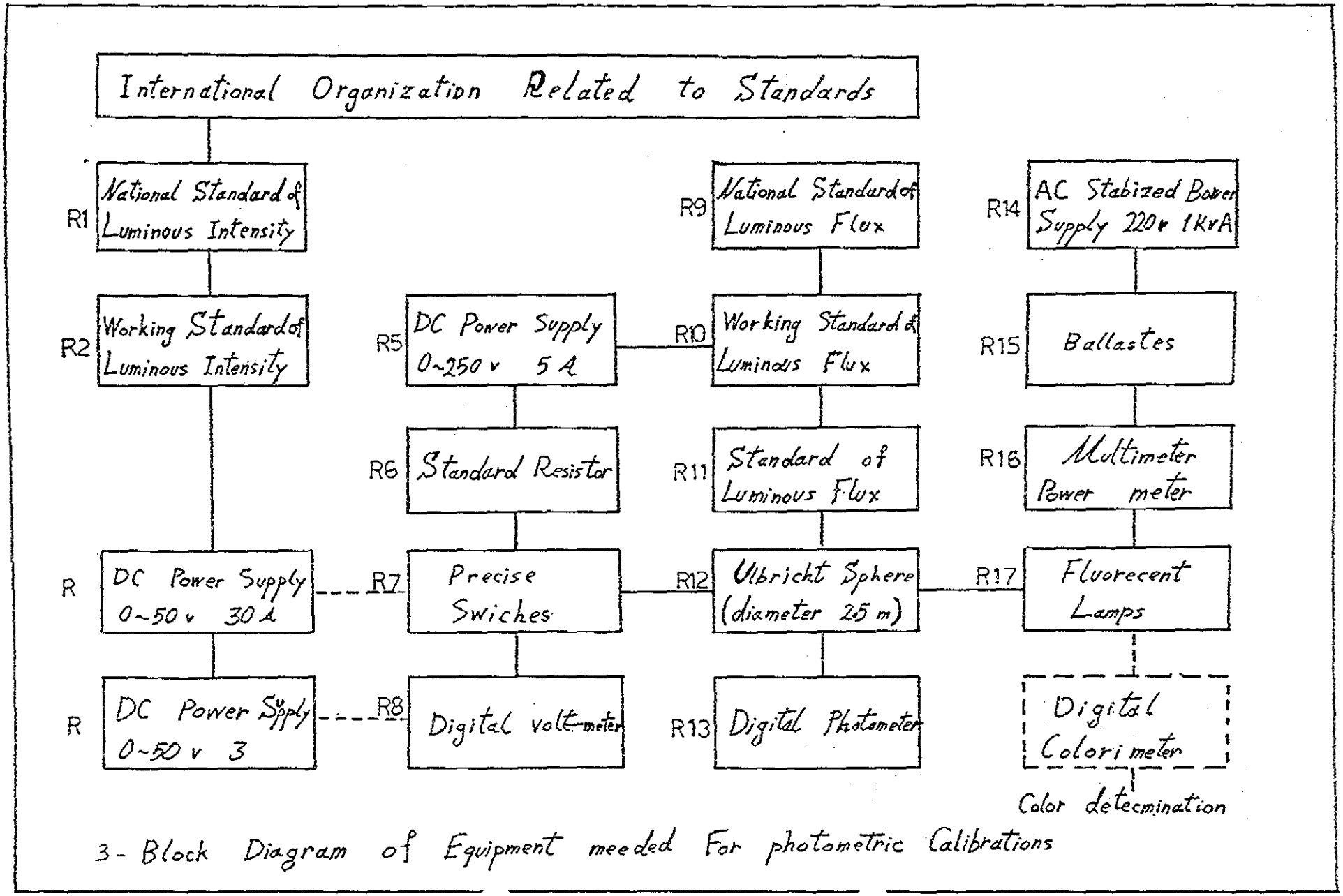
This system will permit to compare radiometric sources in order to calibrate the unknown. It will be composed of:
* Optical bench.
* Standard sources (UV, visible, IR).
* Grating spectrometer with different gratings.
* Bandpass filters.
* Optic (mirrors, lens).
* Photomultiplicator and adequate HT power supply.
* DMM.
* Stabilized power supplies.
* Microcontrol tables (to move sources).
* Personal Computor.
* Special optical system to compare radiance and irradiance.
* Others.

Transmission Measuring System

This system will be used to measure the transmission of filters. It will be composed of:
* Optical bench.
* Light sources.
* Grating spectrometer with different gratings.
* Optic.
* Bandpass filters.
* Photomultiplicator and adequate high tension power supply.
* Stabilized power supply.
* DMM.
* Personal computer.
* Others.

Sensibility Spectral Measuring System

This system will permit the measurement of the spectral response of photodiodes or others detectors. It will be composed of two subsystems: One to determine the relative spectral response and the other to fixe the absolute value.



3- Block Diagram of Equipment meeded For photometric Calibrations

Relative Measurement Subsystem

* Optical bench .
* Xenon arc.
* Optic.
* Grating spectrometer.
* Thermopilos.
* Filters.
* DMM.
* Microcontrol table.
* Personal computor.
* Others.

Absolute Measurement System

* Standard light source.
* Graduate optical bench.
* Bandpass filters.
* DMM.
* Stabilized power supply.
* Personal computor.
* Others.

IV - Others Facilities:

Others systems to measure quantities related to presure, force, hardness. In addition to a small workshop to enable us to make small precise pieces needed for mechanical and optical measuroments.

LIST OF COMPLEMENTARY EQUIPMENT

FOR TV LABORATORY

Item No	Description of Goods		Quantity
1	Equipment to improve our U-matic VTR editing system and to connect another VTR to our SONY SEG 2000 AP		
1.1	VO-5850P	U-matic VTR	1
1.2	PVM-1370QM	Colour Video monitor	1
1.3	BVT-800PS(P)	Digital TBC	1
2	Color system convertor to convert NTSC (4.43) color signal into Pal color signal		1
3	Equipment to record necessary TV programs		
3.1	PVM-2010QM	Color video monitor	1
3.2	TU-1110E/UB/CH/AS	TV tuner unit	1
3.3	SU-530	Mounitor stand	1
3.4	VO-5630	U-matic VTR	1
4	PVM-1371QM	Color Video monitor	2
5	TC-K444ES	Stereo cassette dock	1
6	UPS System with out put 5 KVA, signle phase, 220V ±1% , 50Hz ±0.5%		1
7	Kit of necessary spare parts for BVU 820 VTR ...		1
8	VT-323	Fluid head tripod	2
9	Video Recording Tapes		
9.1	KCS-20 HQ	U-matic Video recording tape	100
9.2	KCA-60 HQ	U-matic Video recording tape	100
9.3	E-30 HQ	VHS video recording tape ...	250
9.4	E-60 HQ	VHS video recording tape ...	250
10	UP-5000	Color video printer (Pal) ..	1

Item No		Description of Goods	Quantity
11	PSS-10/722	Suspension support for 1020 QM Projector	1
11.1	VPR-722	Remot control for 1020 QM Projector	1
12	CMA-8CE	Camera adaptar for DXC-3000P	2
13	Annex 1	List of necessary tools and devices for maintenence	1
14	J50X9.5B IE	Zoom Lens with special extander (2.0X) For DXC 3000 Camera	1
15	.....	Closed Circuit High Speed System	1

* All our TV equipment are SONY products .

ANNEX-I

LIST OF NECESSARY TOOLS AND DEVICES FOR MAINTENENCE

Item No	Part No	Description of Goods
1	J-6002-270-A	Roll table torque measurement tape
2	J-600 -830-A	Flatness plate
3	J-680 -013-A	Dihedral a djusting screw
4	J-6080-030-A	Spare Mirror
5	J-6130-010-A	Reel table Height check Base jig
6	J-6130-020-A	Reel table Height check jig
7	J-6152-450-A	Clearance check Gauge
8	Y-2031-001-0	Cleaning fluid
9	3-702-390-01	Eccentric screwdriver (4mm dia)
10	7-732-050-20	Tension scale (50g full scale)
11	2-034-697-00	Cleaning Piece
12	7-732-050-30	Tension scale (100g full scale)
13	7-732-050-50	Tension scale (500g full scale)
14	9-911-053-00	Thickness Gauge
15	J-6150-020-A	Pinch lever Adjustment jig
16	3-702-215-01	Torque Measurement tape (100mm dia)
17	3-702-216-01	Back tension adjustment jig
18	7-661-018-01	Sony Oil
19	Standard Products	Head Demagnetizer , HE-4
20	Audio	Audio Attenuator
21	J-6150-360-A	Reel motor shaft slantness check jig
22	3-702-215-01	Reel table torque measurement tape (100mm dia)
23	----------	Audio level Meter
24	----------	Distortion Meter
25	8-969-995-52	PAL alignment tape: KR5-2H
26	7-700-733-01	Alignment tool
27	----------	Frequency counter 5HZ-30MHZ, 7 digits display
28	J-6026-100-A	Resolution chart
29	J-6026-110-A	Multiburst chart
30	J-6026	130-A Grayscale shart
31	J-6020-680-A	PTB-220 Pattern Box
32	4-7513-383-A	Extension board EX-98
33	----------	Trigger, 7, 8KHZ (test signal generator)
34	----------	Reel table torque measurement jig (40mm dia)
35	----------	Frequency Counter (5HZ-30MHZ or more 7digits display or more)
36	----------	Signal Generator (color Bar, Dot Pattern, white pattern)
37	7-700-781-02	Degausser (for AC 220V)

Item No	Part No	Description of Goods
38	3-702-436-01	Anode Gap Remover
39	J-3030-690-A	EX-20 Extension Board (for SEG-2000 series)
40	J-6001-820-A	Drum Eccentricity Gauge (3)
41	J-6001-830-A	Drum Eccentricity Gauge (2)
42	J-6001-840-A	Drum Eccentricity Gauge (1)
43	J-6001-930-A	Drum Eccentricity Gauge (4)
44	J-6002-270-A	Torque Measurement Tape 40mm dia
45	J-6152-560-A	Tape Guide Slantness Check Tool
46	9-911-053-00	Thickness Gauge (for checking clearance)
47	----------	Discharger for NP-1A battery

ANNEX-II

LIST OF MAIN ITEMS BY PRIORITY

1) Item (1) Equipment to improve our U-matic VTR editing system .

2) Item (10) Video graphic printer .

3) Item (3) Equipment to record necessary TV programs .

4) Item (15) Closed Circuit High Speed system .

5) Item (7) Kit of necessary spare parts for BVU 820 VTR .

6) Item (6) UPS system .

7) Item (13) List of necessary tools and devices for maintenance .

8) Item (4) Color video monitor .

9) Item (8) Fluid head tripod .

10) Item (12) Suspension support for OM projector .

11) Item (5) Stereo cassette deck .

12) Item (10) Video recording tapes .

13) Item (12) Camera adaptor for DXC 3000P .

14) Item (2) Color system convertor .

15) Item (14) Zoom Lens for DXC 3000 Camera .

ANNEX 8 : Outstanding Projects and New Projects

Part I

Projects Submitted in 1985

- Seven projects submitted as follows :
  - . IC Lab
  - . Standards & Calibration Lab
  - Control Lab
  - TV Lab
  - Antenna Lab
  - Optics Lab
  - Acoustics Lab

- The proposals were appended to a letter from SSRC sent to Mr. Kaneko , Second Secretary of Embassy of Japan-Letter ref. no. 10159 dated Aug. 6, 1985 .

- The Japanese government subsequently supported the set up of the following labs which have been implemented at SSRC :
  - . Standards & Calibration Lab
  - . TV Lab

- An Optics Lab is being implemented via UNIDO with financial support of UNDP .
- An IC Lab is being set up through French government financial support .

Proposal for a Control Facility

1 - Objectives:

The main aim of the Control Systems Group (CSG) of S.S.R.C. is to develop into an educational and R & D facility by integrating the practical knowledge with necessary requirement of instrumentations. Hence, the main objectives of the Control Group can be classified as follows:

First: Creating a technical facility for the Control Systems Group necessary to undertake complete responsibility for industrial projects, and for educational and research purposes in automatic control. Computer aided analysis is often used in the design of the overall system. CSG needs this tool to be compatible with currently existing computers with S.S.R.C.

Second: Preparing well trained technical staff for the CSG is the other necessary objective. It is no less important than the first one, by which the point is reached when CSG is capable of developing ideas to meet commercial specifications.

2 - Future Directions:

The directions of activities intended to cover various aspects of the control system engineering spectrum are classified into five different mainstreams as follows:

a - Analogue and digital control techniques.
b - Stabilization and positioning.
c - Industrial automation and flexible manufacturing.
d - Simulation and identification.
e - Transducers.

These mainstream activities are discussed below:

a Analogue and Digital Control Techniques:

Many designs use analogue and digital techniques, frequently based on computers and increasingly using graphic video displays. These enable accurate determination of states, hence the system response characteristics can be optimized and controlled more closely. Applications of real time techniques range from algorithms of state estimation to algorithms for tracking any moving system.

b - Stabilization and positioning:

Any equipment which needs stabilization is required to be

isolated from external torques; for example the stabilization of a T.V. camera, which may constitute the payload of an agriculture airplane, and the stabilization of scientific equipment for research purposes.

Closed loop positionnal control could be used in various industrial projects.

The above discussion leads the Control Systems Group into the area of designing and developing stabilized platforms, so the Group aims to master the practical techniques applied to build up a stabilized platform.

c - Industrial Automation and Flexible Manufacturing:

CSG has been interested in the automation of some aspects of the assembly process. This leads the Group into robotic devices and flexible manufacturing fields.

It is supposed that some of its technical staff should master the various techniques in implementing and set-up of robots and flexible manufacturing systems.

In addition to this it is necessary to fully understand the following areas:

1 - Pattern recognition.
2 - Man machine communication.
3 - Vision sensors.
4 - Artificial intelligence.

d - Simulation and Identification:

The Control Group, to be capable of system design, should be backed up by computer simulation, identification and mathematical analysis which enables complete complex systems to be described. Such modelling allows optimum performance to be obtained in real environments and enables systems to be built to specification within maximum certainty.

e Transducers:

The transducers are an important part of any control system. Their selection and characteristics measurement should be given very careful consideration.

After the brief discussion above it is worth to mention that

some of the trends, although important, will remain ideas until well trained technical staff are prepared.

3 - Required Instrumentations:

In addition to the currently existing basic equipments and computers for the control facility, the following suggested instrumentations will be essential for setting up the control facility as discussed in the previous section.

a - Standard Electronic Equipment:

	Quantity
1 - Digital storage oscilloscope.	1
2 - Analogue storage oscilloscope.	1
3 - Pseudo random sequence generator.	1
4 - Pulse function generator.	2
5 - Frequency counter < 100 MHz > 10 MHz.	2
6 - Logic analyser equivalent to solartron 7611.	1
7 - White noise generator.	1
8 - Vibration instrument.	1
9 - Word generator.	1

b - Analogue and Digital Measuring with Analogue Computer Equipment and Software:

1 - Data logging system:
Containing ≃ 50 analogue channels
≃ 20 event / status channels
≃ 40 digital channels
≃ 5 channels counter / timer unit
RS 232 interface.

Capable of both high and low level analogue input and thermocouple input and cold junction compensation. Programmable with display, hard copy and local storage. Type solartron ORION-A or equivalent.

2 - Data acquisition system (analogue and digital) providing at least 10 KHz sampling rate (one channel) and analogue inputs and outputs and 16 digital inputs and outputs with necessary software packages. Type Keithley or equivalent.

3 Medium-scale analogue computer, with following configuration:

i - 12 Integrators
12 Summers

6 Summers with track / store
36 Coefficients manually and digitally set.
6 Free functions
6 Comparators
6 Flip-flops
6 Logic gates

ii - Hybrid computer expansion
- Analogue-digital converters.
- Digital-analogue converters.
- Control lines.
- Interrupt lines.

iii- Control station.

Type EAI-1000 or equivalent.

4 - Simulation packages.
Similar to ACSL.

5 - CAD package for control design (similar to CTRL-c) and system identification (similar to CAPTAIN).

The package is suggested to contain the following:

i - Signal processing (similar to ASYST)
ii - Plant identification.
iii- Controller design methods:
a - Frequency-domain design.
b - Time-domain design.
c - State-space design.
d - Sub-optimal design.
e - Adaptive control system design.
iv Validation of the overall design.

N.B. These packages should be suitable for use on VAX and IBM. P.C. computers.

c - Servo Systems Equipment:

1 - Stabilized platform:
Spec. : - 6 axis
- Load 10-15 Kg. Dimension $\simeq$ 40x40x40 cm
- Pitch $\pm$ 45°
- Roll $\pm$ 50
- YAW $\pm$ 40

max. Rate: - Pitch ± 20° / sec.
- Roll ± 20° / sec.
- YAW ± 15° / sec.

Power supply: 28 VDC ± 4V

Operating temp. range: - 20c° to + 80c°

2 - Rate table (3 axis gyro simulator)
Spec.: - Load ~ 25 Kg Dimension ~ 40x40x40 cm
- Range movement: YAW 360° x n
ROLL ± 90 ± 2'
Pitch ± 90 ± 2'
- Rate ranges: YAW 0.1 to 999°/ sec.
ROLL 0.1 to 100°/ sec.
Pitch 0.1 to 100°/ sec.
- Position feedback with digital O/P programming facility to set/change parameters display of 3 axis information simultaneously power input 220 + 20 VAC.

3 - Lab-type servo trainer similar to TecQuipment.

d - Automation Equipment:
1 - Advanced Robot.
Spec.: - 6 degrees of freedom robot including all necessary sensors to perform closed-loop control.
- Capable of assembly of small parts weight 2.5 Kg.
- Work area 1.5-2 meters diameter.
- Pressure sensors on grippers.
- Vision and speed sensors.
- To be connected to a digital computer.

e - Transducer Equipment:

1 - Precision balancing machine for small parts.
2 - Moment-of-inertia measuring system for small mechanical parts or assemblies.
3 - Synchro and resolver simulators.
4 - Gyro test-stand (Rate, free, vertical).
5 - Laser autocollimator or equivalent.

Spec.: - Resolution: 3 arc sec.
- Range: ± 50 arc minutes at 1 meter in both direction.

- Response: 1.5 MHz.

System has built in test facility, additional three axis are servo controlled for positioning.

4 - Required Buildings:

The S.S.R.C. provides all required buildings, with all necessary installations such as work tables, electrically stabilized power supplies, ventilation and air conditioning if necessary.

5 - Suggested Training Program:

The Control Systems Group is aware that these future directions would be successfully achieved if, and only if, the technical staff is well trained especially in the servo and the automation areas (sections (3-c) and (3-d)). It is preferred that the training program for sections (3-c) and (3-d) involves selected trainees in all design and development phases of the proposed items. The training program should cover all steps (theoretically and practically) from ideas to products.

From section (3) technical staff training may be envisaged as follows:

a - 1) One engineer for exploiting and maintenance of analogue computer and data measuring equipment.
2) One control engineer and a computer operator for the CAD & simulation packages.

b - Stabilized platform:
1) A two years training course for two well qualified engineers (one software and electronics and one mechanical engineer).
2) One engineer for exploiting and maintenance of rate table and servo trainer.

c - Robotics and automation:
- A two years training course for two well qualified engineers (one software and electronics and one mechanical engineer).

d - One engineer for exploiting and maintenance of transducers equipment.

6 - Estimated Time Schedule:

The Control Group planning to realize this proposal is as follows:

a - The standard electronic equipment by the end of 1989.
b - The analogue and digital measuring with analogue computer equipment and software by the end of 1989.
c - The servo systems equipment and well trained staff by the end of 1990.
d - The automation equipment and well trained staff by the end of 1991.
e - The transducers equipment by the end of 1989.

7 - Estimated Budget for the Facility:

The estimated budget is divided into two main parts as follows:

a - Estimated Instrumentations Budget:

The suggested equipment in this proposal is estimated to be $ 737,000.

b - Estimated Training Budget:

The suggested training program in this proposal is estimated to be $ 240,000 .

The approximate total cost is estimated to be $ 977,000 .

Notice:

Any positive and practical advice concerning this proposal will be appreciated.

Damascus 22 - 3 - 1988

REQUIRLMENTS FOR THE SET UP OF AN ANTENNA FACILITY IN SYRIA

1. OBJECTIVES:

The facility is intended to provide for education, applied research, design, development, test, and limited production of various types of antennas.

2. FUNCTIONAL PARTS OF THE PROJECT

The functional parts of the project are as follows:

- Antenna measurement laboratory consisting of :

  a) Outdoor test range measurements.
  b) Indoor test measurements.
  c) General laboratory equipments

- Design and CAD capability.
- Precision mechanics for limited production.

2-1 Antenna measuremenet laboratory.

This laboratory shall enable accurate measueremens of the following parameters in the frequency range from 30 MHZ to 18 GHZ:

1- Impedance.
2- Radiation pattern in azimuth and elevation(with side lobe level -35 db).
3- Polarization pattern and axial ratio.
4- Power gain and directivity.
5- Power handling.
6- Amplitude and phase

2-1-1 The outdoor test range measurements.

- The specifications of antennas under test (in the frequency range from 30 MHZ to 18 GHZ) are as follows :

Frequency (GHZ)	Weight (Kg)	Diameter (m)
.03-1	---	---
1-4	5000	4
4-8	2000	3
8-12	1000	2
12-18	---	1

- It should be accomodated in an area of 1 Km x .5 Km max.
- It is preferabele to have concrete test tower mounted on the building which contains the test equipments (built locally).

- It is preferable to have two remote fixed source towers.The first is at a distance of 500 meters and the second equipped with a vertical carriage travel (1m to 11m) is at distance of 100 meters from the test tower .
- All tower must handel maximum wind speed up to 120 Km/hour and must operate in average wind speed of 20 Km/hour.
- Azimuth over elevation over azimuth positioner should be provided.
- Source towers equipped with a polarization positioner in addition to an adjustable mounting fixture must be provided.
- A convenient boresight alignment system is to be provided. All the necessary equipments for outdoor range measurements and data collection must be contained in a central control building .

2-1-2 Indoor test measurements

- A small anechoic chamber should be designed to cover the frequency range from 2 to 18 GHZ.
- The quiet zone must be contained within a sphere of diameter suitable for the frequency range above
- the overall performance of the chamber must achieve minimum reflection performance of -30 db at 2 GHZ and -50db at 18 GHZ.
- It should be used to do far field measurements for small antenna diameters.
- The positioners should be controlled automatically by a desk top computer.
- Two test positioners must be supplied, the first is movable in azimuth over elevation over azimuth and the second is moveable in roll over azimuth over elevation for small antennas.
- Source positioners must be provided.
- A range of illuminating source antennas must be provided capable of supporting orthogonal,linear and circular polarization.
- Antenna analyzer and other test equipments must be contained in a separate room near the anechoic chamber.
- A range of standard gain antennas must be provided.
- A selection of absorbing materials is required to minimize reflection from objects associated with positioners, ...etc.

2-1-2.a Antenna accessories required:

1- Standard gain antennas from 0.1 to 18 GHZ (Qty: 2 of each est).
2- parabolic reflectors (Qty:2 of each set).
3- Broad band antennas 0.1 to 1 GHZ (Qty: 2 of each set).
4- Log periodic feeds 0.4 to 12GHZ (Qty : 2 of each set)
5- A set of coaxial to waveguide adapters 0.5 to 18.0 GHZ. (Qty: 2 of each)

2-1-3 General laboratory equipments

Measurement of impedance , V.S.W.R, return loss , isolation and power handling is to be provided by the following equipments:

1- Network analyzer with time domain option.
2- Frequency counter with the ability to measure pulse modulated signals.
3- A range of fixed and variable attenuators usable to 18 GHZ.
4- A range of fixed high power attenuators (waveguide or coaxial).
5- A kit of inter series of coaxial adapters including waveguide to coaxial transitions.
6- A comprehensive tool kit for on site construction and adaptation of antennas.
7- Other equipments, tools , accessories, and components necessary to do the measurements must be supplied.

2-2 Design and CAD capability

- Suitable software must be provided for the analysis and synthesis of antennas which permits the optimization of antenna design and the prediction of performance prior to manufacturing.
- This software must be compatible with a DEC VAX 11/780 computer and / or micro computer (IBM XT/AT or compatible) used to collect and analyse data on the measurement facility .

2-3 Precision mechanics for limited production

Precise machines and tools specialized for antenna manufacturing (small quantity and small size) must be provided .

3. THE CONSTITUENT PARTS OF THE PROJECT:

- Equipments and software.
- Manpower and training
- Facility.
- Expertise and technical support.
- Documentation.

3-1 Equipment and software

A list of equipments is suggested as follows:

a) Outdoor test range equipments:
- Azimith over elevation over azimuth positioner with necessary options.
- Polarization positioner plus mounting fixture.
- Antenna analyzer to cover frequency from 100 MHZ to 18 GHZ, with low frequency converter.

b) Indoor test equipments:
- Antenna analyzer
- Azimuth over elevation over azimuth positioner
- High accuracy antenna positioner
- Roll over azimuth positioner
- Polarization positioners with mounting fixture

c) General laboratory equipments
- Network analyzer
- Frequency counter
- Power amplifiers for power handling test
- Power meter

3-2 Manpower and training

Training programs for selected manpower (numbers, specializations, schedules, type of training and time frames) shall be specified.
Suitable university programs in antenna design shall also be recommended.

3-3 facility

It is required that :
1) An architectural design for all parts of the facility (indoor, outdoor range site) be provided.
2) Interfacing with and advising local civil engineering works contractor who will under-take building non-specialized parts of the facility and non-specialized secvices, be provided.
3) All necessary information for proper upkeep and maintenance of the facility and the application of necessary safety precautions and procedures be provided

3-4 Expertise and technical support

There shall be provisions for expert specialists to provide local know-how transfer according to a specified plan.
This will cover supervision of installation and commissioning, putting the facility into proper operation and making sure that local staff acquire the necessary technical and operating skill to effectively use the equipment provided.

3-5 Documentation

Offers shall include a detailed list and description of all the documentation packages that will be provided for the facility .

4. BUDGET:

The estimated cost of the facility is about $2.5Million.

22/3/1988

Facility of Phonetics Acoustics and Speech Processing

1 - Objectives of the Facility

Creating a Scientific and Technical facility capable of carrying out the necessary efforts required to follow up the modern developments in the fields of applied phonetics, acoustics, speech processing. And participating in the process of creating a modern Arabic Man-Machine communicating system , and- finally - enriching the Technical Institute, with practiced human skills, within the integrated educational process.

2 - Directions of Research and Activities

It is supposed that this lab should contain six different main-streams in order to cover the various aspects of speech-signal processing :

a - Coding of speech and audio signals for digital transmission and storage applications.

b - Speech recognition and machine-man communication.

c - Speech synthesis, implementing various techniques, as applied to Arabic.

d - Applied modern phonetics in Arabic language.

e - Measurement and calibration of acoustic and infra-acoustic sensors and transducers.

f - Measurements of noise levels, (especially within the industry) , its effects, and how to reduce it.

3 - Area required for installation

These equipments will be situated in suitably prepared labs at the S.S.R.C. The proposed area is: 2 x 60 m^2 (two large rooms with all necessary installations such as work tables, electrically stabilized power supplies, ventillation and air-conditionning if necessary and four smaller rooms with a total area of 40 m^2 are also reserved to this project. P.S. The S.S.R.C will provide all building requirements.

4 - Suggested training program

In principle, it is thought that the qualified staff required to operate such a lab should consist of :

a - Two software engineers plus linguist for the phonetics activities.

b - Two engineers plus one technician for the transducers, acoustics and audio-engineering activities.

c - Two engineers plus one technician for speech coding.

d - Two engineers plus one technician for speech recognition.

e - Two engineers plus one technician for speech synthesis.

Such a staff may require the following training program :

- A six months period training course for three technicians in the fields of operation and maintenance.
- A six months theoretical and practical training course for two qualified technicians in the fields of transducers and its calibration, vibration measurements, and general acoustics (noise effects and how to reduce it).

- A one year training course for one engineer and an MSC. dissertation for another - both - are to be concerned with the field of speech analysis - synthesis systems and/or speech recognition systems.
- A PHD thesis Concerning phonetics and speech modelling.

5 - Estimated laboratory's cost

The total cost of the proposed lab can be estimated as follows(excluding training and maintenance costs):

Equipment cost, materials and accessories *1.150.000. DM* currently existing facilities are :

- A 2 terminals VAX-11 access.
- An HP -25 Microcomputer.
- Professional tape-recorder.
- A digital spectro-graph .
- A fundamental frequency measuring instrument.

included is a list of the required instruments

Damascus 22.3.1988

Required Intrumentations for

Phonetics , Acoustics and Speech Porcessing Laboratory

NO	Designation	Instrumetation Type or equivalent	Manufacture	Qty
1	Signal processor with IEEE 488 intreface	1200	Solartron	1
2	Universal filter with adapter for IEEE 488	Un 2	Wandel & Goltermann	2
3	Programmable - dual filtre	PDF 3700 B PDF 3700 EU	DIFA DIFA	1 1
4	Digital storge oscilloscope	Gould OS/4040	Gould	3
5	X - Y Plotter	7046 - B or enuivalent	HP	1
6	High Speed recorder	Store horse	RACAL	1
7	Cassette Recorder high Quality with Ampli	GX - 7	AKAI	2
8	Transient Recorder	5180 A	HP	1
9	Silent Room		Audipho - Acquitique	1
10	Terminals	VT220	DEC	4
11	Acousticsmeasuring Set			
	- Audio test station	2116	Bruel & Kjaer	1
	- Sine generator	1023	=	1
	- Noise generator	1405	=	1
	- Piston phone	4220	=	1
	- Sound level meter	2218 + 1616	=	3
	- Unechoic chambre	4222	=	1
	- Reciprocity calibrator	4143 - A	=	1
12	Speech processing station	IBM PS-2	IBM	
	- IBM PS-2		=	2
	- Emulator cards for the following processor:(8085 - 8086 8051 -8088)		=	2

NO	Designation	Instrumetation Type or Equivalent	Manufacture	Qty
	- Universal EPROM Programmer: (EPROMS : 2716 27512) + monochip - 8051		IBM	2 2
	-I/O card " DADIO : TECMAR ": (Aquisition of analog signal)			2
	-Oki 6992 D.S.P Evaluation Board .			1
	- 32 bit digital Input/output Module .			1
	- Soft ware :			2
	- Operating system MS-DOS VER 3.3 or upgrade			2
	- ISIM 85			2
	- ISIM 86			
	- XASM dBuG for 8051,8088 8085 (from cybernetic micro systems			2
	- VTERM (Connection with VAX system Via RS 232 C			1
	- CARDS			
	- MPELP (multi-Pulse-exited linear predictive coder card)		NEC	1
	- LPC Vocoder card			1
13	Line printer , with Arabic character option , paper and ink	351	centronics	2
14	frequency counter	HP 5316 A	HP	1
15	Network Analyzer (gain/phase Meter 1 Hz to 13 MHz).	HP 3575 A		1
	-Option : - Panel meter	001	HP	1
	- dual readout	001	HP	1
16	Measurement plotting system	HP 7090 A		1

Part II

Projects Submitted in 1988

- The following projects were submitted :

A . "Project" proposals :

. Antenna Lab

. Control Lab

B . "Equipment Delivery" proposals :

. Mask-Making Equipment for IC Lab

. Device Packaging and Assembly Equipment for IC Lab

. Laboratory for Composite Materials

C . Equipment Delivery - Training Courses - Development Survey Missions :

. Study of Environmental Pollution in HOMS

. Center for Renewable Energies

. Flexible Manufacturing System

- Documents of above projects were sent by SSRC to the State Planning Commission as follows :

- Letter no. 1250/D dated 14/6/88 .

- Letter no. 13746/D dated 30/6/88 .

The documents and request for support of the provision and set up of the above capabilities were sent by the State Planning Commission to the Japanese Embassy in Damascus with letter ref. 1164/F/3534 dated 21/7/1988 .

Proposal for Establishing a Mask-Making Facility to Support the Microelectronics Center at the Higher Institute of Applied Sciences and Technology, Damascus, Syria

1 - Background and General Objectives:

A microelectronics center is currently being set up at HIAST, and the facilities that have so far been defined and are in the process of implementation essentially relate to a wafer fabrication laboratory including the associated clean room facilities, and IC design and test capabilities. The microelectronics center is intended to serve the multiple purposes of education, training and applied research.

The above equipment, capabilities, and facilities are being provided essentially through the support of the French Government. Two important aspects of the project are mask-making and device assembly and packaging which are not covered in the project presently being implemented.

We outline in what follows the requirements for establishing a mask-making facility as a necessary part of the microelectronics center at HIAST in the expectation that the Japanese Government will favorably support the setting up of said facility. We also outline in a separate "project proposal" the requirements for establishing a device packaging capability also as part of the microelectronics center at HIAST.

2 - Specific Project Objective:

The mask-making project essentially serves to a provide a rapid turnaround facility for generating the masks required for the wafer fabrication processes, starting from the output of the computer-aided-design (CAD) facilities presently being implemented. The facility may thus be considered an integrated component of the overall microelectronics center, allowing for rapid implementation of IC designs generated by the various educational and research activities in integrated circuits at HIAST.

It is also readily apparent that for logistics reasons, it is not feasible to depend on foreign sources for provision of masks required by such educational and research activities.

3 - General Description of the Mask-Making Facility:

a - The facility is intended to be of developmental nature and allowing for the generation of mask patterns down to 3 micron resolution compatible with essentially MOS IC processes.

b - The facility should allow for the generation of emulsion-coated as well as chrome-coated glass plate photomasks.

c - The facility should allow for testing and repair of the manufactured photomasks.

4 - Proposed Japanese Contributions:

It is proposed that the Japanese contributions to the project be the following:

a - Selection and provision of appropriate equipment, tools, and spare parts.

b - Selection and provision of raw materials and consumables for the start-up period.

c - Provision of the required process specifications and instructions.

d - Specification of the clean room required for the mask making (e.g. total area, class, etc.). It is to be noted that the clean room being implemented for wafer fabrication is of class 10,000 in the aisles and of class 100 in the working area. Specialized additional requirements are to be provided.

e - The organization and implementation of the training programs both in Japan and on-site for Syrian personnel involved with the management, operation and maintenance of the facility and its equipment.

f - The provision of local technical support through planned visits by Japanese experts for supervision of installation and commissioning of equipments as necessary, the provision of on-site training in the start-up phase, and overseeing the proper initial operation of the equipments.

5 - Proposed Syrian Contributions:

a - Providing all site preparations and construction work, and the associated services and furnishings, except the specialized aspects associated with the clean room and its related services which have not been envisaged in the clean room presently being implemented. All required support and labor for equipment installation will also be provided.

b - Providing the required technical, managerial, and administrative staff based on mutually agreed proposals and job specifications.

c - Providing full exponses for Syrian trainees in Japan.

6 - Estimated Financial support:

The total financial support associated with establishing and start up of the mask-making facility is estimated as follows:

a - Financial support by the Japanese Government: $1.5 million to cover items in sections 4a to 4f .

b - Financial support by the Syrian side: all expenses associated with section 5.

7 - Project Implementation Timescale:

It is expected that the microelectronics center can be completed by the end of 1989. It is thus proposed that the timescale for the completion of the mask-making workshop should be early 1990.

8 - Equipment List:

A tentative equipment list is provided in the attached appendix. Such a list is subject to modification as a result of mutual technical discussions and reviews with the Japanese experts, as well as to assure consistency with the financial support that can be provided.

APPENDIX

Tentative Equipment List for HIAST Mask-Making Facility

A. Pattern Generation:

We include under this category the equipment required for reticle production:

1 - Pattern generator.
2 - Reticle repair station.
3 - Contact printer.
4 - Measuring microscope.
5 - Low power microscope.
6 - Inspection tables.
7 - Reticle storage cabinet.
8 - Plate cleaner.
9 - Processing tools.
10- Spares.

B. Step and Repeat:

The list below includes the equipment required to produce master masks:

1 - Image repeater.
2 - Plate titler.
3 - Low power microscope.
4 - Inspection table.
5 - Wet bench.
6 - Processing tools.
7 - Spares.

C. Quality Control:

1 - Comparator.
2 - High power measuring microscope.
3 - Repair station.
4 - Wet bench.
5 - Inspection table.

D. Emulsion Reprints:

1 - Process bench.
2 - Inspection table.
3 - Processing tools.

E. Chrome Reprints:

1 - Process bench.

2 - Inspection table.
3 - Processing tools.
4 - Static control equipment.

F. Photolith Processing Unit:

This processing unit is expected to be a semiautomatic unit including spinner, IR oven, etc...).

G. Consumable Materials (Initial set):

1 - Emulsion plates.
2 - Chrome plates.
3 - Quartz plates.
4 - Photoresist materials.
5 - I.P.A. Acetone.

N.B.

1 - All equipments listed above are to be provided with necessary accessories and spare parts.

2 - The equipment list is subject to modification, deletion, and addition based on mutual discussions and recommendations of the Japanese experts to achieve better cost-effectiveness within the budget constraints.

Proposal for Establishing a an Assembly and Packaging Facility to Support the Microelectronics Center at the Higher Institute of Applied Sciences and Technology, Damascus, Syria

1 - Background and General Objectives:

A microelectronics center is currently being set up at HIAST, and the facilities that have so far been defined and are in the process of implementation essentially relate to a wafer fabrication laboratory including the associated clean room facilities, and IC design and test capabilities. The microelectronics center is intended to serve the multiple purposes of education, training and applied research.

The above equipment, capabilities, and facilities are being provided essentially through the support of the French Government. Two important aspects of the project are mask-making and device assembly and packaging which are not covered in the project presently being implemented.

We outline in what follows the requirements for establishing a device assembly and packaging facility as a necessary part of the microelectronics center at HIAST in the expectation that the Japanese Government will favorably support the setting up of said facility. We also outline in a separate "project proposal" the requirements for establishing a mask-making capability also as part of the microelectronics center at HIAST.

2 - Specific Project Objectives:

The device assembly and packaging facility is considered to be an integrated component of the overall microelectronics center. It is intended to serve the following specific objectives:

a - Support education and training in device assembly and packaging technologies, in order to highlight the growing impact of assembly and packaging on the dynamic characteristics of integrated circuits as well as the role of the package in providing chip protection.

b - Allowing the assembly and packaging of the chips being developed in the microelectronics center to permit chip handling, testing and evaluation, and subsequent assembly into prototype electronic circuits.

3 - General Description of the Assembly and Packaging Facility:

a - The facility is intended to be of developmental nature essentially providing for various forms of ceramic packaging which is suitable for low volume developmental activity, as well as the assembly into pre-molded plastic packages.

b - The assembly technologies essentially involve epoxy die bonding and gold (or aluminium) wire bonding.

c - The facility also provides for achieving hermeticity in ceramic packaging and means of testing the level of hermeticity.

4 - Proposed Japanese Contributions:

It is proposed that the Japanese contributions to the project be the following:

a - Selection and provision of appropriate equipment, tools, and spare parts.

b - Selection and provision of raw materials and consumables for the start-up period.

c - Provision of the required process specifications and instructions.

d - The organization and implementation of the training programs both in Japan and on-site for Syrian personnel involved with the management, operation and maintenance of the facility and its equipment.

e - The provision of local technical support through planned visits by Japanese experts for supervision of installation and commissioning of equipments as necessary, the provision of on-site training in the start-up phase, and overseeing the proper initial operation of the equipments.

5 - Proposed Syrian Contributions:

a - Providing all site preparations and construction work, and the associated services and furnishings. All required support and labor for equipment installation will also be provided.

b - Providing the required technical, managerial, and administrative staff based on mutually agreed proposals and job specifications.

c - Providing full expenses for Syrian trainees in Japan.

6 - Estimated Financial support:

The total financial support associated with establishing and start up of the assembly and packaging facility is estimated as follows:

a - Financial support by the Japanese Government: $350,000 to cover items in sections 4a to 4e .

b - Financial support by the Syrian side: all expenses associated with section 5.

7 - Project Implementation Timescale:

It is expected that the microelectronics center can be completed by the end of 1989. It is thus proposed that the timescale for the completion of the assembly and packaging facility should be early 1990.

8 - Equipment List:

A tentative equipment list is provided in the attached appendix. Such a list is subject to modification as a result of mutual technical discussions and reviews with the Japanese experts, as well as to assure consistency with the financial support that can be provided.

APPENDIX

Tentative Equipment, Tools and Start-up Materials for HIAST Assembly and Packaging Facility

1 . Epoxy die bonder.
2 . Thermosonic wire bonder.
3 . Inert atmosphere glove box.
4 . Package sealing furnace.
5 . Cleaning plant.
6 . Gross leak detector.
7 . Fine leak detector.
8 . Device burn-in chamber.
9 . Baking oven.
10. Moisture meter.
11. Gluing jigs and clamps.
12. Prototype plastic injection molding machine.
13. Start-up kit of various packages and consumable materials.

1- Composite material laboratory

The aim of this laboratory is to provide the possibility of developing the technology of manufacturing compounds of composite material (fibre glass and fibre carbon) and of performance testing.

Required Equipment

- curing oven : diametre 1,5 m
  length 4 m
  pressure up to 15 bm
  temp up to 250° c

- filament winding machine :

  non linear
  dia. up to 50 cm
  length up to 6 m

2- Laboratory for the test of raw materials mechanical and physical properties

3- Laboratory for the test of mechanical properties of samples of manufactured parts

4- Training course on composite technology:

- 2 Engineers
- 5 Assistant Engineers

Preliminary Study of the Project:

" Air and Water Pollution Monitoring in Homs Area. "

The Sientific Studies and Research Centre

I - Introduction:

As one of the developing countries trying to catch-up with industrilization and in order to supply the everyday needs of its modern life; the Syrian government has worked very hard during relatively a short period and constructed many industries which were very essential for the development of the country. Nevertheless, rapid urbanization and improper location of industries will always produce serious environmental pollution problems. One good example of pollution problems in Syria is the case of air and water pollution in Homs area.

II- Nature of the problem:

Homs prefecture is located in the mid-west region of the country, and it occupies a very nice land which is considered as one of the best farming lands in the country. This city has always attracted many civilizations due to its location and mild weather. Nowadays, Homs is considered as the major industrial centre in Syria since it locates many industrial plants. These industries are as follows:

- Homs petroleum refinary and its newly constructed thermal power station.
- Ammonium fertilizer plant
- Phosphate fertilizer plant
- Kattinah thermal power station
- Vichels maintenance and galvanization centre.
- Homs sugar factory.
- Textiles and Dyeing factory

Fig.1 represents a schematic diagram of the location of these industries in accordance to the city.

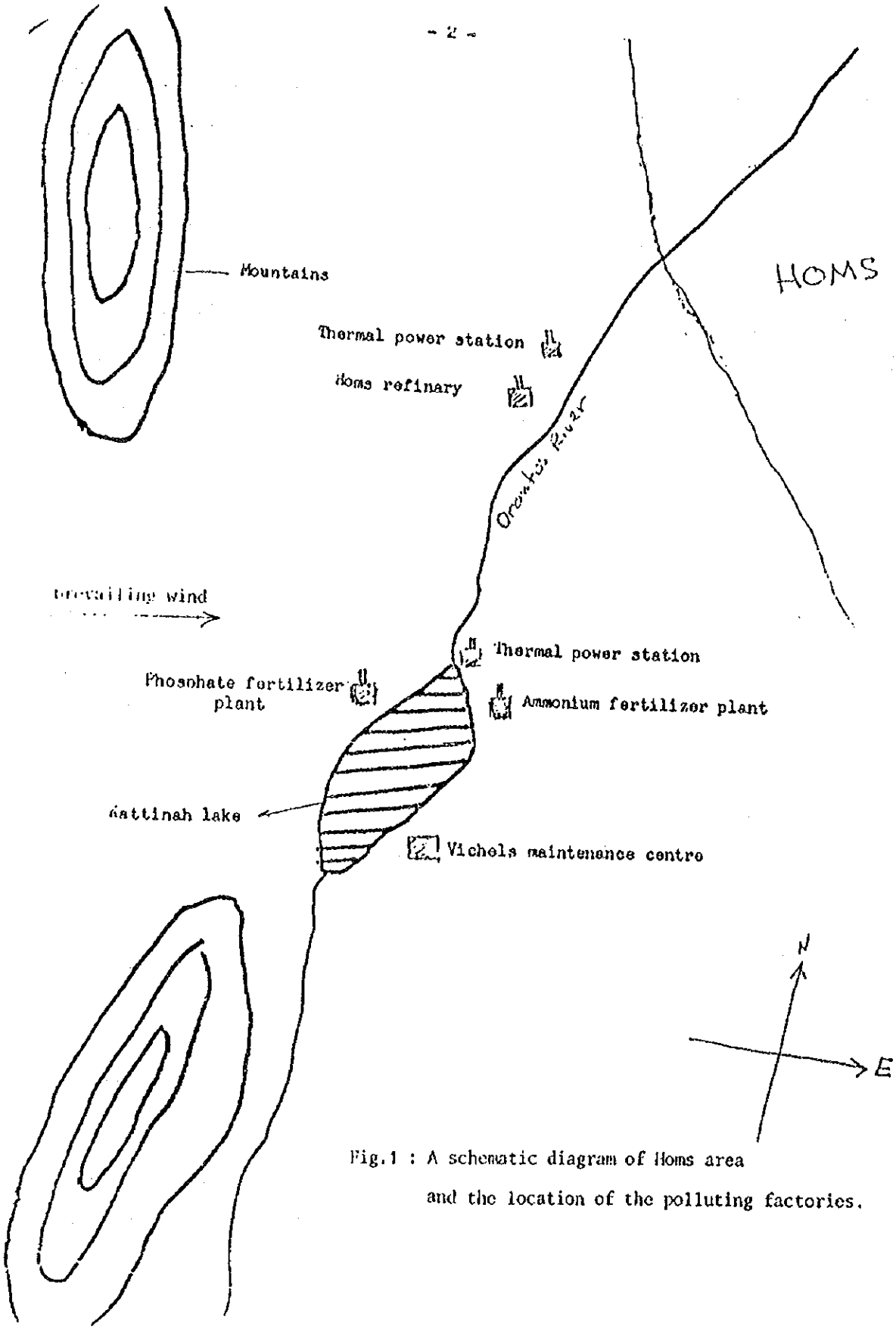


Fig.1 : A schematic diagram of Homs area and the location of the polluting factories.

Homs area has always been famous with its mild westerly prevailing winds, but after the construction of these factories west to the city, gaseous pollutants emitted from the factories are carried by the western winds toward the city and the smell of sulphur compounds can be detected veary easly by the olfactory system in many parts of the city.

Orontos river is considered as the major water source for irrigating a huge farmlands in the midlands. Therefore, the discharge of industrial waste into this river has become a great worrier and offensive matter to the farmers using this river.

III- Main objectives of the project:

1- To investigate the major pollution sources and to identify the types of its pollutants.
2- To evaluate, by monitoring, the extent of air and water pollution in Homs area.
3- To determine the types of pollutants whose ambient concentrations exceed the air and water quality standards.
4- To monitor the pollutants emission rate and consequantly, to establish the emission standards for each pollutant.
5- To determine the degree of treatment that should be applied at the major polluting sources.
6- To recommend the suitable pollution countermeasures and control systems.
7- To establish permanent air and water pollution monitoring stations.
8- To advise on the future expansion possibleties for urban and industrial zones in Homs area.

IV- Major components of the project:

1- Detailed survey of the social and living conditions in Homs area.
2- Preliminary survey of the visible or known effects of industrial pollution in Homs area.
3- Detailed survey of the topography and meteorological factors which enhance the formation of air pollution.
4- Review of the design and operating data of all industrial plants.
5- Identifying types of pollutants which will be monitored and giving time schedule for pollutants monitoring.
6- Choosing the proper location of the sampling sites.
7- Contineous monitoring of the major pollutants for a certain period of time(ex. one year).
8- Establishment of permanent pollution monitoring network with a central laboratory for data handling and processing.

V- Local activities and cooperation:

- All the necessary procedures to ease the continuation and completion of the project.
- Supply of the lands and buildings necessary for the construction of the ambient monitoring stations and the central laboratory.
- The Scientific studies and Research Centre had carried out several field measurments of the major gaseous pollutants in Homs area, and recently, the SSRC is giving this project great consideration and thorough studies, and is willing to share experience and to conduct some parts of this project.

VI- Cost estimate:

Preliminary estimation of the cost of equipments and instruments needed for, preliminary pollutants monitoring survey, ambient monitoring network and the central laboratory is around one million US dollar.

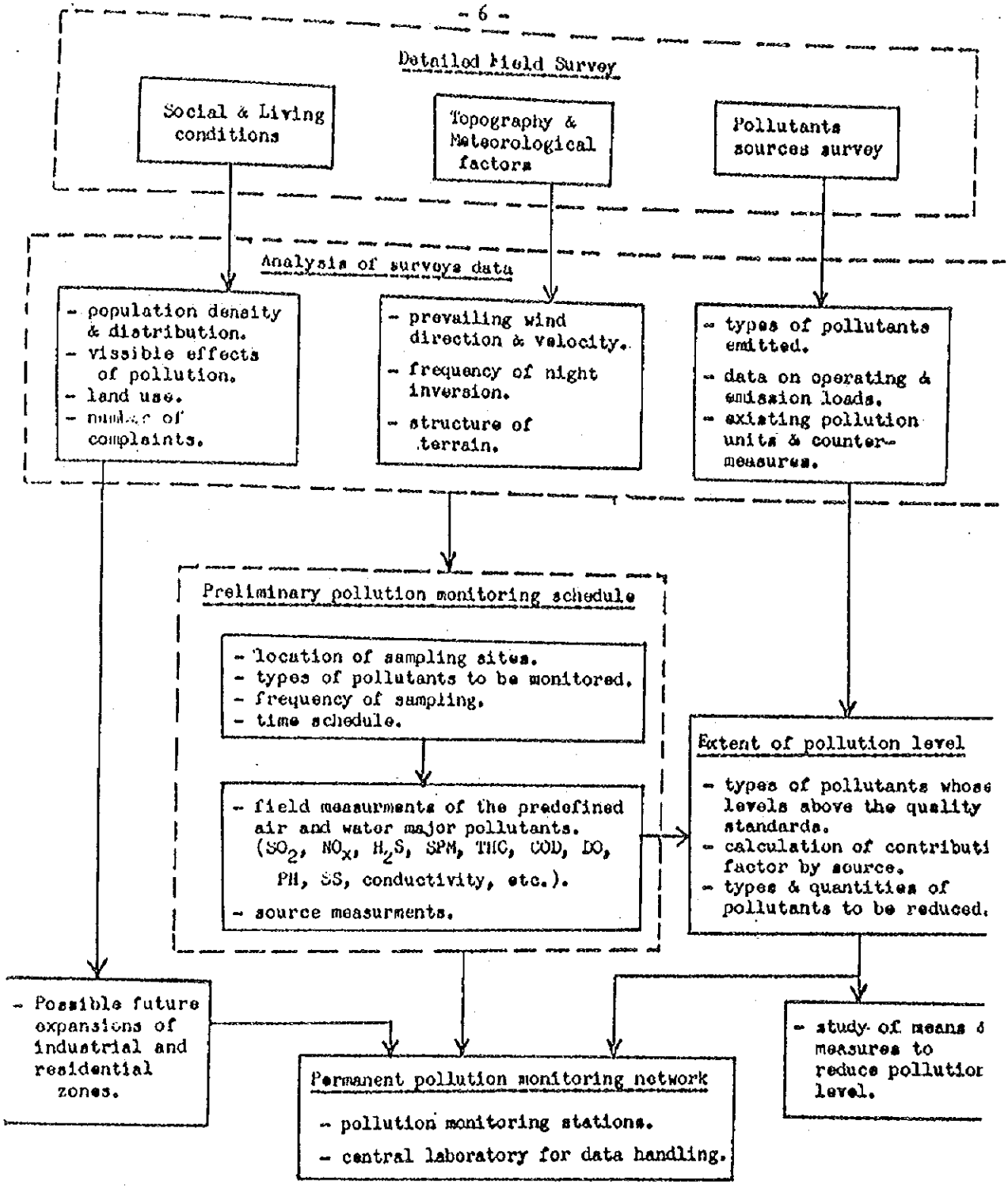
VII- Merits of the project:

The main purpose of this project is to protect man and nature from industrial pollution. Nevertheless, this project will be the first of its kind in Syria and therefore many advantages would be achieved such as:

1- The establishment of pollution monitoring network, where the data obtained from this network could be used in the following aspects:
   - Contineous measurments of the air and water quality.
   - If any pollution control units would be instaled in the future, the data obtained from this network will determine the effectiveness of this units.

2- Japan is very advanced in pollution control and monitoring, and throughout this project the Syrian adminstrative and technical personnel will gain great experience in this new field .

3- To strengthen the friendly relation and technical cooperation with Japan.



Annex A: Conceptual flow-chart of the project.

Annex B: List of Instruments & Equipments

I- Air pollution monitoring:

- SO_2 Analyzer (colourmetric or fluorescent.)
- H_2S Analyzer (" " " " " ")
- NO_x Analyzer (" " " " or chemiluminescent.)
- CO Analyzer (nondispersive InfraRed.)
- HC Analyzer (flame ionization detector.)
- Gas calibrator system (dynamic, zero air and span permeation cylinders
- Suspended particulate matters (high volume sampler.)
- Stack sampler for dust & gases (filteration and absorption bublers.)
- Mini data logger. (5-channels with RAM cartridges.)

II- Water pollution monitoring:

- 24 hr. automatic samplers.
- dissolved oxygen meter.
- PH & conductivity meter.
- total carbon

III- Central environmental laboratory:

- spectrophotometer.
- ion chromatograph. (for determination of anions & cations in water samples and high volume filter extracts.)
- atomic absorption spectrometer (for determination of metals in water samples and high volume filter extracts.)
- gas chromatograph.
- data processing computer system for environmental pollution measurments.

REPORT TO SUPPORT RENEWABLE ENERGY CENTER IN SYRIA

I - Introduction:

It is well known that the world energy sence is charatorised by a steadily increasing energy domand for many aplication and services . A rapidly depleting store of fossil fuels and increasing pollution hazards associated with excessive burning of these fossil fuels . However, nuclear energy has many disadvantages which are openly contradicted with the present state of the world . The main disadvantages of nuclear power are that nuclear power is centralised , capital-intensive and generates long-term health and safety hazard which so for have not been surmounted. In view of this unsatisfactory situation, a search is going on all over the world for an energy which is: renewable, inexhaustible and clean .

To meet these requirements in a country like Syria, solar and wind energy are the most popular choice in this regard.

Although scientists and senior politicians in Syria have become aware of the importance of renewable energy for quite some time, but the actual financial support have not been fully released. In spite of shortage in foreign exchange, there is some activities in solar energy in several places, but the relation between these institutions and laboratories is not clear enough to avoid unnecessary duplications.

However, the most active one is the solar energy group in the Higher Institute for Applied Sciences and Technology (HIAST).

II- Problems facing renewable energy in Syria:

There are many barriers and problems which have to be overcome such as:

- High Initial capital cost
- Undeveloped technology
- Sceptical attitudes
- Poor planing and insufficent international aid

- The high cost is due to the nature of the resources and the technology involved, and it is probably the most significant barrier facing the new system, nevertheless, this is not an excuse to stop it from seeing the light . A realistic examination of the nature of these costs and their relative position versus conventional energy systems is necessary.

- In Syria as well as in the other developing countries, there is not enough technical ways to improve performance and reliability of renewable energy system. In fact, the capabilities for efficient industrial work based on research and development is needed. Energy policy and training capability in the area of renewable energy are only weakly developed. Moreover repair and maintenance infrastructure are absent. Thus, it is hard to develop new technologies locally and initial expensive importation must be done.

- Solar and wind energy systems in the form of direct conversion are new to most people, especially the rural population. The introduction of a new technology will often be met with scepticism as to whether the system will actually perform or not, and if so, to what extent it is reliable and economical.

. These problems are not insuperable, if assisted with appropriate investment, research and development and international support and supervision, only then could the technical issues be overcome and low cost reliable systems can be developed.

III- Energy situation in Syria:

The Syrian Arab Republic has an area of 185.000 Km2, about half of it is considered arable. The population in Syria is about 11 million with a growth rate of 3% per annum. Nearly half of the population live in rural areas and other half in urbon areas gathered mainly in Damascus and Aleppo.

The major source of energy in the country is oil. Electrical energy consumption is increasing rapidly (for example it was 1353 Gwh in 1975 and about 7000 Gwh in 1986). The electrical energy produced in 1986 was as the following:

- 24 % hydro
- 64 % thermal
- 12 % gas turbine

During the last two decades the government of Syria has extended the natinoal grid, but the electrical energy production is not enough to supply the electrified towns and villages. In fact this problem has arised as a results of the expansion of industrial development, electrify some more villages, mass use of the electrical tools for better living conditions and increased of population. In order to continue the economic development, or even to maintain the actual conditions faced with an explosive population increase, energy consumption will of course have to increase remarkably in the future.

Figure (1) shows the evolution of the effective production of electric power from 1965 to 1986 curve (a), while curve (b) indicates the total energy demand. It is clear that, the energy demand increases exponentially, while the energy production in the present energy sources has nearly the same value for the coming three years. In order to match the value of energy demand in 2000, then the energy production has to be tripled, this of course can only be achieved if we increase largely our energy sources, otherwise there will be an energy disaster in the country in the very near future. If we are going to install fuel oil or gas power stations in order to increase our electrical energy production to meet the demand, then in 2000's Syria will became a net importer of oil products.

From what can be seen, it will be clear that any solution that allows a decrease in oil consumption or increase of energy production will be of great advantage to the country. In this regard solar energy is one of the most apt ways of achieving savings in oil and electricity consumption. (The consumption of oil products in 1985 was 6.8 million tons, and it is expected to increase over 15 million by the year 2000).
The average sunshine hours and the average daily solar radiation in Syria are high, for example the average solar radition in

Damascus is reported to be 5.3 Kwh/m2/day, and the average sunshine hours is about 9.2 hours. Wind energy in Syria is good in most parts of the country. However, information on wind energy resources is quoted in the Mission Report on Syrian Arab Republic by Mr. Derek Jovejoy (Interegional Adviser in renewable energy in DTCD) in 1985. It has to bear in mind that solar and / or renewable energy systems will not completely solve the energy balance problems of the country in a short or medium term, but they will allow a considerable energy saving for both the country and local consumers. For example, it is estimated that the consumption for heating domestic water by using solar collectors in the year 2000 could save about 765 Gwh of electricity and about 520.000 tons of gas oil stoves. This is only if we assumed that about 20% of the existing dwellings and 80% of the dwellings which will probably be built by the year of 2000 will make the use of solar collectors. It is clear that the country would benefit from the savings due to lower import of gasoil and to the possibility of switching the output of a 90 MW power station to a more productive use. It is therefore, possible to affirm that the widespread utilization of solar energy or in general renewable energy is of course in the interest of the country to meet our energy local demand .

A copy of an article tilted : Energy status in SYRIA & Solar energy, prepared by two specialists at HIAST, is included together with this report (Annexe 1).

From what has been stated, we are addressing the following project in order to gain enough support towards the support of the solar energy center in Syria.

IV - The project:

1- Development and research objective:

Contribute to the scientific and technological development of Syria, through the establishment of the center for solar energy development.

2- Duties:

Through the implementation of this project, it is intended to achieve the following objectives:

* Evaluation and approval of solar systems entitled to public subsidies.

* Testing of materials and components (liquid solar collectors, air solar collectors , storage tanks, solar cells, solar moduls etc).

* Testing of entire standard solar systems.

* Testing "in situ" of solar systems.

* Elaboration of test methods concerning norms and standards.

* Consultancy for public authorities.

* Consultancy for manufacturers, such as development work and testing of prototypes.

* Informative activities, transfer of know-how to manufacturers, consulting and projecting specialists.

* Providing basis for information of consumers.

3- Testing:

The tests carried out include to day:

* Testing of the thermal efficiency of liquid solar collectors.

* Testing of the thermal properties of storage tanks.

* Testing of I-V caracteristics of solar cells.

* Testing of I-V caracteristics of solar moduls.

* Testing of some materials properties.

The renewable energy centre could be include the following complementary testing:

* Testing of the thermal efficiency of air solar collectors.

* Testing of standard solar heating systems.

* Testing of reliability and accuracy of control systems.

* Testing of reliability mand durability of solar collectors (thermal and photovoltaic)

* Testing of all properties of materials utilized in solar and wind technology.

* Measurements " in situ " of plants already built.

To encourage and accelerate the introduction of renewable energy technologies. The program of the centre could be include organising small-scale pilot projects suitable for use and / or production in syria:

- drying
- desalination
- refrigeration
- space heating
- water pumping

for each demonstration plant a comprehensive modelling and measuring programme should be carry out.

4- Special considerations:

The project deserves special consideration as it can provide a good basis for students to do research and developments work, and can be considered as a good place for regional and inter-regional co-operation. Also experience of energy development can provide employment opportunities for young people.

5- Background and Justification:

The following presentation of the project background and justification was prepared to describe the proposed activities of the work and it was subdivided into:

5-1 Background:

a-Institutional aspect:

Higher Institute for Applied Science and Technology (HIAST).

b-Technical aspects:

* CISE , Final Report on Solar Energy Manufacturing Study in Syria,(1986).
* Mission Report on Syrian Arab Republic, by Mr Derek Lovejoy (Interregional Adviser in Renewable Energy in DTCD) (1985).

* Facilities available at HIAST.

* Solar energy staff at HIAST .

5-2 **Justification:**

5-2-1 **Higher Institute for Applied Sciences and Technology:**

The HIAST is one of the main divisions of the Scientific Studies and Research Center (SSRC) which is a public autonomous institution sponsored by the President of the Syrian Arab Republic.

In co-operation with French educational establishment, HIAST is running a five year regular degree level course in informatics with an annual intake of about 60 students. Upon completion of the common course for three years at HIAST studing the following courses: applied mathematics, fine mechanics, applied physics, and energetics with a special emphasis on solar energy, the qualified students are sponsored for remaining courses in France. There is also involvement with organisation of international co-operation activities such as, seminar sessions of the Arab School for Sciences and Technology, exchange of researchers with the National organisations for Scientific Research in Algeria and co-operation with European Economic Community in the areas of remote sensing, solar energy, computer & signal processing optics and lasers and lubricants. There is also a co-operation with French Organisations GEFIE, FNEGE and AFPA in the field of education.

A branch of HIAST was established at Aleppo which is located within the University campus. This branch is dealing with linguistics, English and French as foreigner language, there is also cources in avionics, electronics, mathematics, mechanics and informatics. In co-operation with Aleppo University, the HIAST Aleppo branch is running a diploma course in avionics and also two research groups have recently started to search in the field of photovoltaic solar cells in particular thin film devices and in microelectronics.

5-2-2 **Solar Energy Manufacturing Study in Syria:**

This study was financed by the European community from resources of the first protocol of the EEC/SYRIA cooperation Agreement,under project no SEM/01/608/027 .

The work have been undertaken by CISE-CENTRO INFORMAZIONI STUDI ESPERIENZE Spa. and carried out jointly with company PHOEBUS " Ricerche per l'Energia Solare " S.P.A, and with CUEIM team for the economic and financial aspects.

The report is divided into four volumes or seven chapter which are:

1- Summary of the report and its conclusion, economic and technical aspects.

2- General considerations on SYRIAN ENERGY SITUATION

3- State of the art of solar systems.

4- Socio - demographic examination and analysis of potential users of solar systems,

5- Survey of materials and components for solar systems available in SYRIA.

6- Potential market for solar systems in SYRIA.

7- Production strategy.

5-2-3-**Mission Report on Syrian Arab Republic (1985):**

In response to a request from the Syrian government to advise on a long range programme in solar and wind energy, a mission undertaken by Mr. Derek Lovejoy , Interregional Adviser in Renewable Energy in DTCD (Department of Technical Co-operation for Development). Mr. Lovejoy visited Syria in 1985 and made several field trips in different places. The mission report was based on an article prepared by Dr. A. Housari who is a senior member at HIAST. However Mr. Lovejoy has suggested the establishement of

renewable energy center in Syria and a copy of his mission report is included together with this report (Annexe II).

5-2-4 Facilities available at HIAST :

- Spectrosun solar simulator, Model XT-10 , and Electronic load, Model D-1550 (Spectro LAB)

- Computer H.P85, plotter H.P 7470A , Printer H.P 82905B and X-Y Recorder H.P 70358 (helwett Packard).

- Curve tracer , type 576 (Tektronix).

- Multipurpose recorder A3-X-Y , Model PM 8131 and Automatic Digital Multimeter , Model PM 2517E (Philips).

- Stereoscopic Zoom Microscope , Model SMZ-2 (NIKON)

- Direct Capacitance Bridge, Model 75D, 1MHZ (Boonton) .

- Tin melting pot, Model D-3548 (Arolsen).

- Flasher system for the power output measuring of photovoltaic modules in simulated sunlight (pulsed) (AEG).

- Solar liquid collector test loop (Industrial Contracting).

- One Vacuum coating unit (Edward 306).

- SEM (Scanning Electron Microscop).

- Electro-pneumatic Dispenser, FNR 06 (E.F.D U.S.A).

- Emissometer Model AE, (Devices & Services Co).

- Alphatometer model 1A with Digital voltmeter RD1 (Devices & Services Co).

- Pyranometer (KIPP & ZONEN).

- Automatic Meteorological station Enertic).

6 - Solar energy Staff at HIAST:

At the present time the solar energy group in HIAST has the following national staff members:

- 3 scientists (ph.D)
- 3 electrical and mechanical engineers.
- 2 physicist
- 3 technicians and other will be employed soon.

Most of the staff are qualified with advanced training in Solar conversion energy instrumentation and development from overseas. There are also a number of research students studing abroad in the field of renewable energy or related subjects and they are expected to complete their studies by 1990.

7 - Justification for the establishment of the center:

- It is well known that electricity is justified as one of the most important basic infrastructure of rural development. Some of the benefits of the rural electrification are:

  (a) autonomy or reduction of fuel consumption.

  (b) improving standards of living.

  (c) improving communication and educational facilities.

  (d) an increase in labour and student productivity.

  (e) improving the social life.

- In many villages in Syria, water pumping for drinking and irrigation is a problem. The UNDP and the world Bank sponsored a major global solar pump demonstration and evaluation programme in many countries in the third world. In fact water for irrigation is characterised by a large variation of demand from month to month. Therefore, a PV pump is sized to meet the peak demand is under utilized in other months. This has generally adverse effects on the cost of water supply, but not in the rural areas simply because the PV array in the system can be easily

adjusted to other systems for various application.

- It is hard to develop the technology of the direct conversion by means of the photovoltaic solar cells , there fore the aid of international commuinty is needed. At the present time, it is reasonable to establish a small unit to manufacture PV modules starting from imported PV cells, and the production line will include the following steps:

  (a) cell soldering and continuity test.
  (b) module assembly.
  (c) encapsulation and lamination.
  (d) framing and final test.

- This production line can indeed give the opportunity of developing a new technology. Furthermore, a future technological break through, reducing substancially the cost of PV cells, could be an important factor towards widespread use of PV systems.

- The project is in consonance with the recommendation by Mr. Derek lovejoy and CISE group. The establishment of renewable energy center in Syria is to serve as a focal point in the development and exploitation of the renewable energy opportunities to be used in the remote villages, small farms and rural area. The Syrian governments objectives in the area of energy development is to ensure sufficiently supplies to all pepole, but with special émphasis in the rural area whose development is still lagging for behind other sector.

8 -<u>Complementary equipments necessary to the center:</u>

j) Monitoring instrumentation for various purpose such as :

  - Simple integrating counters (energy meter, anemometer ...etc.).

  - Meters with chart recorder output or with integrating print-out.

  - Modern data loggers.

  - Field data loggers with storage.

- Meters for measuring solar reflectance and transmittance.

2) Wind mill test station.

3) Solar air collector test station.

4) Small-scale demonstration prototype of: drying, desalination , refrigeration , space heating and pumping by solar and wind energy.

5) Necessary equipments for cells soldering and encapsulating.

6) Solar materials to develop small-scale prototypes.

9 - Government Inputs:

The following inputs will be provided from the government:

9-1- Personnel:

a- A project co-ordinator for maintaining liaison with U.N and international agencies.

b- A project group leader who will be responsible for technical execution of the work programme in consultation with the international staff deployed on the project. The project leader will be also responsible for meeting the requirements of the technical parts needed in the project in accordance with the system design developed.

c- Senior staff members to serve as sectional project leaders.

d- Technical staff such as engineers, phsicists, chemists, technicians and other supporting as may be required for the effective project implementation such as secretary, driver, cleaners and so on .

e- The government will provide the required national staff for the project before the provision of the U.N inputs.

9-2- Premises:

a- Complete floor for laboratories with necessary modifications shall be made available for housing the different sections of the laboratory. (Annex III).

b- The international and national project personel will be provided with adequate office accommodation with the necessary office furniture, equipment and supplies as well as telephone communication, air conditioning and other utilities.

c- Adequate hall/conference room will be available when it is needed for conducting meetig or organising seminars.

d- Suitable residential furnished accommodation shall be provided free of charge to the experts and consultant.

e- Test field places with the necessary requirements.

f- HIAST shall arrange all the requirements needed and the completion of the requirement promises before the provision of U.N inputs.

9-3- Salaries and Travelling Expenses of the National Staff:

The government shall continue to pay the local salaries and appropriate allowances for all personnel involved in this project including the personnel sent on followships and study tour during their absence abroad.

Travel allowances for national project personnel will be paid from the regular operating budget of the government.

9-4- Miscellaneous:

Office facilities, supplies and stationary, operating and maintenance provisions for offices, utilities and office equipment will be provided from the regular operating budget of the government.

Outline project: project budget Covering UNDP Contribution:

Title: Salar and Wind Energy Demonstration

	Total		1989		1990
Project Personnel	m/m	$	m/m	$	m/m	$
Consultants	2	30,000	1	15,000	1	15,000
Mission costs		10,000		5,000		5,000
Component total		40,000		50,000		30,000
Training						
fellowships		40,000		20,000		20,000
study tour		15,000		15,000		-
Component total		55,000		35,000		20,000
Equipment						
non expendable		535,000		400,000		135,000
Component total		535,000		400,000		135,000
Miscellaneous						
sundry		10,000		8,000		2,000
Reporting costs		5,000		-		5,000
Component total		15,000		8,000		7,000
Grand total		645,000		483,000		162,000

PILOT PLANT
FOR CUTTING MACHINE TOOLS
USING
FLEXIBLE MANUFACTURING SYSTEM
F.M.S.

GENERAL :

Developing countries experience has proved that the development of manufacturing technology would undoubtedly meet the needs of these countries for equipment and machinery, and therefore, would stimulate the economic growth and save a considerable amount of hard currency .

In the Syrian Arab Republic these needs are increasing year after year as the demands for general purpose equipment and machinery are becoming more urgent, due to the quantitative and qualitative change occuring in technical education and in vocational training . Besides, this type of equipment could be used purposefully in the majority of workshops with job-type production .

Taking into consideration these economic, social and educational factors, and the prospective development of technology in the country, the " Scientific Studies and Research Center " intends to set up a "Pilot Plant" for cutting machine tools using the technique of flexible manufacturing system " F.M.S. " capable of meeting - partly at least - the urgent needs of the local market for machinery .

The intended plant, with its modern technical processes and its advanced production methods, would participate in transferring appropriate technologies in the field of machine tools manufacturing, and thus, would implant deep roots for subsequent development of machinery and equipment manufacturing in the country .

THE PILOT PLANT

I - JUSTIFICATIONS AND OBJECTIVES OF THE PLANT :

1 - EDUCATIONAL REASONS :

- The great change in educational policy and the special attention given by the State to educational development and vocational training represented by updated programs, deversified crafts, and specializations, and by the increased capacity of technical institutes which results in increasing demands for machinery and equipment,necessary for training . The increased capacity in Ministry of Education technical institutes is shown in fig.1, whereas there are many technical institutes depending on other Ministries as shown in the following table :

Technical Institute	Ministry	Location
- Industrial Intermediate Institute	Ministry of Higher Education	Damascus
- I.I. for Chemical Industries	Ministry of Industry	Damascus
- I.I. for Food Industries	Ministry of Industry	Damascus
- I.I. for Agricultural Machinery	Ministry of Industry	Aleppo
- I.I. for Chemical Industries	Ministry of Industry	Homs
- I.I. for Engineering & Metal Industry	Ministry of Industry	Damascus
- I.I. for Textile Industries	Ministry of Industry	Damascus
- I.I. for Petroleum & Mineral Resources	Ministry of Petroleum & Mineral Resources	Homs
- I.I. for Electricity & Mechanics	Ministry of Electricity	Damascus
- I.I. for Railways	Ministry of Transportation	Damascus
- I.I. for Sanitary Engineering .	Ministry of Higher Education	Aleppo

Other Ministries have projects aiming at covering the needs of the country for specializations and professions by starting new Intermediate Institutes or by adding specializations to the existing Institutes .

The student number in these institutes is also increasing espacially in Engineering and Industrial Institutes, consequently the needs for equipment and machinery .

The rate of increase in the number of graduates during the last five years 1977-1981 is 96% in Engineering, and 139% in Industrial fields .

It is well known that the technical education costs much higher than other types of education and ranges between 8 and 10 times .

The Flexible Manufacturing System could - undoubtedly - reduce these costs by providing machinery necessary for these institutes with reasonable prices .

- This project would help upgrading high trained personnel through production training . In this case the Higher Institute for Applied Sciences and Technology graduates in Damascus and Aleppo, as well as the students of secondary technical schools and technical institutes in the country would get the opportunity for training and working.

2 - ECONOMIC REASONS :

- The intended project aims at manufacturing cutting machine tools for general use, like drills, taking into consideration the possibilities of future increase in production capacity in a systematic way .
- The plant would cover - partly and within reasonable prices - the needs of the local market for equipment and machinery and thus, would save hard currency considering the low prices of the product on the one hand and its high quality in comparison with the production using traditional system on the other hand .
- The plant would participate in accelerating the implantation of machine tools manufacturing in the country and in establishing a solid industrial basis .

3 - SOCIAL REASONS :

- Meeting the needs of the population increase which is actually 12 millions , and satisfy their developing demands .
- Participating in the realization and the success of the State Social and Economical Development Plan .
- Taking part in the upgrading of high level technical personnel .

4 - TECHNOLOGICAL REASONS :

- Developing the industry by introducing modern methods of production .
- The project would be the nucleus for technology transfer and expansion in the country . In this plant " Flexible Manufacturing System " could be applied in the appropriate field and in suitable conditions .
- The pilot plant would be a good example to be followed by other sectors in adapting, training and renovating, using new technologies instead of the old ones without taking any risk in adopting the new systems .

II - THE CONTENT OF THE STUDY :

The study will be carried out into three phases :

1 - MARKET SURVEY :

In this phase, a survey should cover the different needs of institutes, schools and other technical and vocational establishments for equipment and machine tools . The study should take into account the following :

- The kind of equipment and machine tools needed and their specifications : capacity, size ....

- Quantity of machines needed from each kind and their utilization priorities, and the prospect of their increase in the future .
- Justification for setting up a pilot plant which would produce these " selected " machines .

Accordingly, the size of the plant would be determined as would be the possibility of future expansion . An over all production cost-benefit analysis in comparison with imported machine tools would be annexed .

2 - DETERMINATION OF THE PRODUCT TECHNICAL SPECIFICATIONS :

- Taking into account the result of the market survey, the local materials and technological abilities available, the technical specifications should be defined . These should include the following :
- The economical and technical study of the product to be manufactured .
- Detailed technical specifications of the " selected " product or its " family " .
- Detailed technical drawings of the " selected " product or its " family " .

3 - DETERMINATION OF TECHNICAL CONDITIONS OF THE PLANT :

This phase should consider the following :

- A general description of the required workshops .
- A list of the equipment needed and their technical specifications .
- A lay out for the intended plant .
- General conditions of the site and buildings necessary for the plant.
- The manpower needed, their number and technical qualifications .
- The cost determination of the plant .
- The time schedule for the setting up of the plant . (Enclosed a preliminary time schedule for the setting up of the plant, see fig.2)

RECOMMENDATION :

"The Scientific Studies and Research Center" could collaborate in the required study by designating a team of its engineers to assist the Consultants .

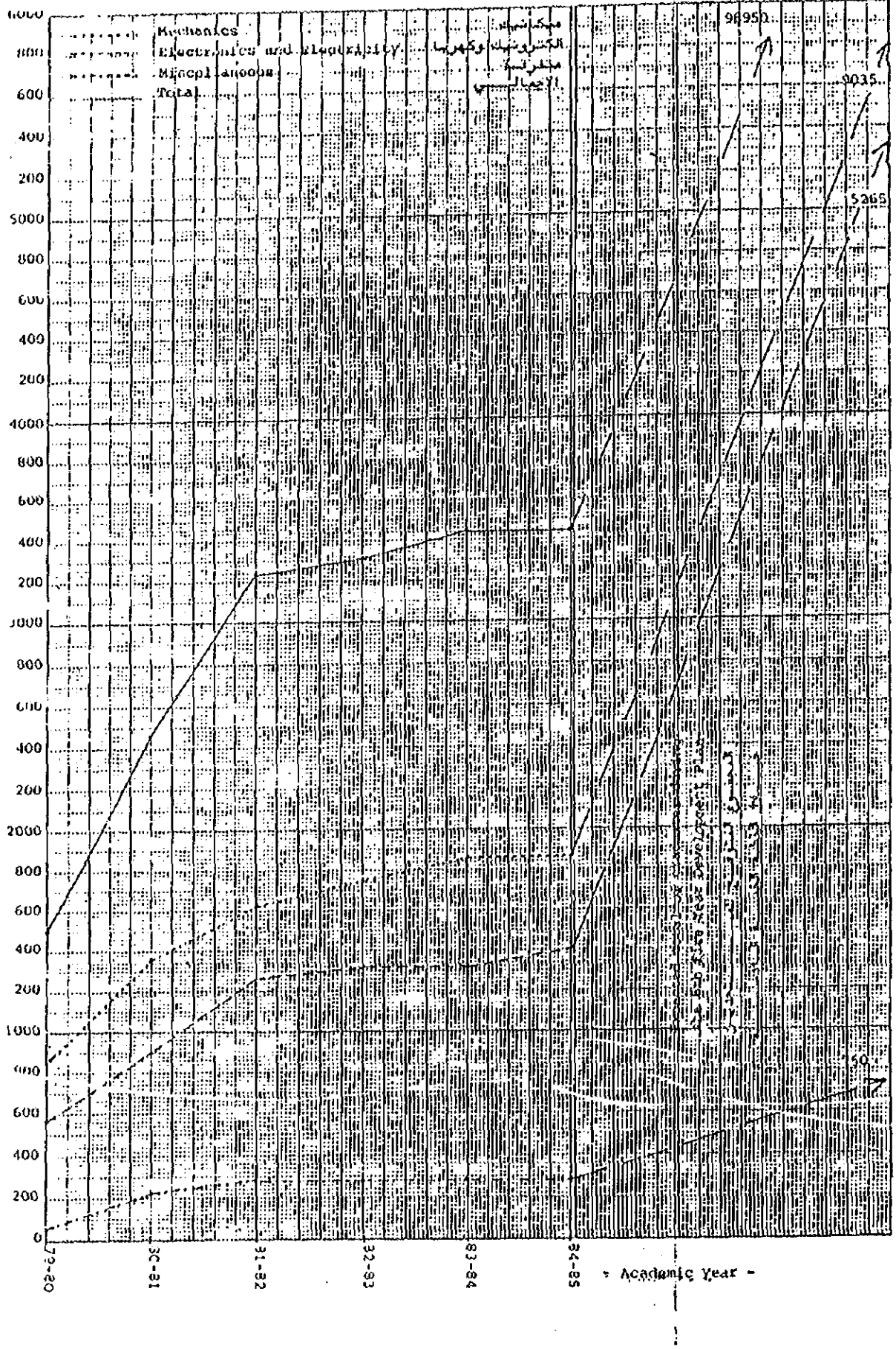
It would also be possible to provide free of charge transport for the Consultant's staff, convenient office and secretarial services, as well as all supporting activities , in order to achieve the required study .

From Ministry of Education Technical Institutes

احصائية المتخرجين من المعاهد الفنية التابعة لوزارة التربيـــــة

(Fig. 1)

(الشكل رقم ـ ١ ـ)



The schedule of the setting up نظام برنامج زمني لاقامة
of a flexible Manufacturing تصنيع مرن / ٥ سنوات
System / 5 years

Part III

Outstanding Projects and New Projects being Prepared for Submission

A . The outstanding projects from previous submissions for support by the Japanese Government and not presently supported from other sources are :

1. Control Lab
2. Antenna Lab
3. Acoustics Lab
4. Mask Making Equipment
5. Device Packaging and Assembly Equipment
6. Lab for Composite Materials
7. Study of Environmental Pollution in HOMS
8. Center for renewable Energies
9. Flexible Manufacturing System

B . New Projects being Prepared for Submission :

1. Precision Mechanics Workshop
2. Satellite Communication Facility
3. Fibre Optics Lab
4. Robotics Lab
5. Materials Testing Lab

Note :

Many of the above laboratories are being targeted for implementation within the Center for Technology Development (CTD) which is the R and D organ of the Higher Institute for Applied Science & Technology (HIAST) , associated with SSRC.

- A letter was also sent from the State Planning Commission to the Japanese Embassy in Damascus ref. 114/F/397 dated 19/1/1988 .

The letter contained documents relating to :

a) Control Lab b) Antenna Lab c) Acoustics Lab

Precision Mechanics Laboratory Project

Precision Mechanics Laboratory Project

Contenents:

I - The Report Prupose:

The purpose of this report is to give in brief a general idea about the scale of the required laboratory and its equipment; inorder to estimate the size of the investment needed to execute this project.

II- Preliminary Feasibility Study of the Project:

1- Introduction:

Machining technology is widely used in S.A.R. But most of the existing machines are not suitable for making precision parts or devices. This is due to a great extent to wear of moving parts or the lack of precision machines or measuring devices.

Precision mechanics activities are practically non existance. The need to create a modern laboratory in this field is increasing greatly, because it is becoming more and more important to improve the national industry,

It is recommended to cooperate with developed countries for technical and financial support.

2- Objectives:

- Setting-up a precision mechanics laboratory which contains both cutting and grinding machines and equiped with its own metrology facilities.
- The project will assist in training and qualifying engineers and technicians in the field of precision mechanics. This will be open to public and private sectors.
- The laboratory will help in making and producing precision parts and equipment such as:

Mechanisms.

Gear Boxes.

Tools.

Optical devices.

- Improving the potential af design and development of precision parts and devices in S.A.R.

3- Required Equipment For Precision Mechanics Laboratory:

Table No. 1 shows the laboratory equipments for machining and measuring:

Table 1

Item	Name & Description			Qt.	Remarks
I	High precision digital read-out lathes:				
	Height of Centres	Max. Dis. Between Centres			
1	70 mm	275 mm		1	
2	100 mm	400 mm		2	
3	150 mm	600 mm		3	
II	High precision digital read-out milling machines:				
	Longitudinal strock	Vertical strock	Transverse		
1	300 mm	475 mm	400 mm	2	
2	500 mm	600 mm	500 mm	3	
3	800 mm	1000 mm	800 mm	2	
III	High precision digital read-out grinding machines:				
1	Plan surface grinding machine				
	Max.grinding surface 520x230 mm			1	
2	Profile grinding machine				
	Max. Grinding surface 520x230 mm			1	
3	Internal and External grinding machines:				

../..

Item	Name & Descriptions	Qt.	Remarks
	Height of Centres / Dis. Between Centres / Grinding Diameter		
	160 mm / 100 mm / 0,1-20 mm	1	
	125 mm / 400 mm / 10-100 mm	1	
4	Visual grinding system for flat, axialform and radial form grinding:		
	Table size 200x400 mm	1	
5	Single lip cutter grinder with setting and measuring projector:		
	Longitudinal Traverse / Lateral Traverse		
	50 mm / 20 mm	1	
6	Universal tool and cutter grinding machine optoelectronic measuring system:		
	Max. Grinding Length / Grinding Diameter		
	150 mm / 2 - 150 mm	1	
IV	High precision and digital read-out Drilling machines:		
	Drilling Cap. / Spindle Travel / Table surface		
	0,5 - 6 mm / 50 mm / 200x200 mm	1	
	6 - 18 mm / 90 mm / 220x285 mm	1	
	Up 18 mm / 150 mm / 340x370 mm	1	
V	High precision universal broaching machine:		
	distance between centres 60 mm	1	
	High precision digital read-out broaches sharping machines:		
	Max. piece length 60 mm	1	
VI	Assembly equipments		
VII	Tools		
VIII	Miscellaneous equipments		

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Rquired Measuring Equipments

1 - Digital three-coordinate measuring machine.

2 - Measuring hard granit surface plates.

3 - Profile projector.

4 - Measuring and testing machines.

5 - Dial indicator - comparators.

6 - Measuring tools.

7 - Gear testing equipment.

8 - Gauges (Blocks-form side and out side serration - grinding).

9 - Levels.

10 - Optical bevel protractor.

11 - Optical dividers.

12 - Contraces

13 - Miscellaneous measuring instrument .

4- Staff Training:

Project staff have to be trained abroad in developed countries. Part of the training will be given by the company from which the equipment is purchased, the other part, will be given by training institutions or universities. The training period varies from 3 - 12 months. The cost of staff training is about 500.000 D.M.

5- Estimated Cost:

The cost estimated here includes: machine tools, metrological equipment and instruments, tools, assembling equipment, staff training and miscellanceous equipment. Table 2 shows the cost of each item. The total cost of the project is appoximately 5.700.000 D.M.

Table 2

Item	Name & Descriptions	Total Est. Price D.M.	Qt.	Remarks
1	Lathes	1.000.000	6	
2	Milling machines	900.000	7	
3	Grinding machines, different types	1.200.000	"	
4	Drilling Boring and Broaching machines	350.000	5	
5	Metrological equipment	1.000.000		
6	Assembly equipment	250.000		
7	Tools	350.000		
8	Miscellaneous equipment	150.000		
9	Staff training	500.000		
	TOTAL	5.700.000		

../..

The Syrian party will take in its own charge the execution of building and furniture including the heating conditioning and ventellation. The Japanis party will provide the final study, the required equipment for precision mechanics laboratory including special furnishings, training the staff and supervision of installation and commissioning.

6- Project Time Execution and Time Scheduling:

It is estimated that this project will be executed in 24 months, starting from the date of approval and allocating its financial requirements .

This time includes:

- Final technical study 2 months.
- Issuance of tenders 2 months.
- Bidding 4 months.
- Evaluation and award 2 months.
- L/C and delivery of equipment 8 months.
- Installation and Commissioning 6 months.
- Staff training 3-12 months.

7- Recommendations:

It was shown in this report very briefly, the scale of the project and the investment involved, as well as its objectives and importnace.

It is strongely recommended to approve and execute this project as soon as possible. It is also recommended to cooperate with developed countries for technical and financial support.

We stress that this is a preliminary study, and we strongly recommend that this study is further developed by some other party from a developed country in order to get their expertise and Knowledge in this field .

Satellite communication facility

1 . Objectives:

The rapid increase in communication traffic demand and variety of users has required the introduction of large capacity communications satellites and also raised a requirement of utilizing the communication bandwidth and power more efficiently.

The Scientific Studies and Research Center in Syria intends to establish a satellite communication facility with the aim of carrying out studies and research in applications of Satellite communication systems as well as analysis of interference problems in such systems.

2 . Areas of Activities:

Work in this facility would deal with the following topics:
- Propagation aspects including interference and co-ordination
- Group delay and linearity distortions
- Modulation techniques
- Studies of regional and domestic satellite systems potential
- Analysis of received information
- Tests in analogue and data transmission
- T.V. reception techniques

3 . Staff:

Qualified staff is required to run this facility apart from researchers who carry out studies in various areas. This staff could include:

- Two engineers and three technicians for operation, maintenance and observation of reception systems.
- Two engineers and a technician to work in analogue and data transmission in communication systems.
- Two software engineers for information analysis and programming.

Most of the staff require training programs of up to six months in:
- Operation and maintenance
- Test equipment and developing aids.

4 . Budget:

The total cost of this facility is estimated to be some DM 1.750.000.

5 . Proposed Equipments:

Equipments of this facility would include:

- Sophisticated receiving station with facilities for auto - tracking, computer data logging, and polarisation tracking.

- Central processing unit
- Transportable small earth station with its antenna control systems.
- Analogue and digital modems.
- Measuring equipment such as: selective level measuring and radio link measuring devises.
- White noise generator
- synthesiser generators & frequency counters
- Group delay measuring instruments
- Telex machine and facsimile machine.

Damascus 22.03.88

Fiber Optic Laboratory Construction Proposal

at HIAST (SSRC)

Primary Study

1 . Project objectives :

a. Preparing personnels qualified in the Optical fiber field .

b. Scientific support to all companies and corporations in Syria .

c. Consulting and study services where they are necessary .

d. Developping of Fiber optic systems and subsystems in optical communications , TV & data transmissions , sensors , ... etc .

2 . Work fields :

All Fiber optic fields, and especially :

a. Communications and data transmissions (telephone, computers, TV, ... etc) .

b. Sensors (temperature, strain, gyroscopes, pressure, ... etc) .

c. Fiber Optic caracterisation and instrumentation .

3 . Equipement :

a. Attenuation measurments

- White light source
- Stabilized power supply
- Monochromator
- Light chopper
- Lock-in amplifier
- Launch optics
- Microscopes
- Fusion splicers
- Cleaving tools
- End angle measurements
- Tables
- Stripper
- UV gun
- UV curing epoxy

- Optical spectrum analyser
- Insertion loss meter
- Optical power meters
- Lasers, LED's and Detectors
- Electronic thermometers
- He-Ne Lasers

b. Dispersion measurements

- YAG Lasers
- Monochromator
- Storage oscilloscope
- Digital delay generator
- Oscilloscope
- Counters
- Various lenses, holders, micro-positionners
- Photodiodes
- Chart recorder
- Fiber profiler
- Chromatic dispersion measurements
- ESI/cut-off frequency measurements
- Micro-positionners with piezo electric
- Translation stages
- Electronic micrometer
- Optical Fiber time-domain reflectometer

c. Other requirements

- Fibers (single and multimode) different lengths
- Fiber branching (Y junctions, optical power dividers)
- Fabry-Perot etalon
- Electro-optic shutters
- Beam expanders
- Auto-collimators
- telescope/microscope for beam forming
- Brag cells and Electro-optical modulator

4 . Personnel requirements :

At suggested total of 15 people engaged in this laboratory we would envisage :

1 or 2	Ph D.
6	Graduates (Electronic & opto-electronic)
6	Technicians
1	Mechanical engineer

5) Budget :

We estimate the total cost of requirements and training courses to half a million $.

6 . Time table :

At suggested total of one year we would envisage :

a. Primary study involving equipement lists and training courses preparations (two months) .

b. Invitation to tender for project requirements (four months in which involved building preparations) .

c. Personnel training courses (four months) .

d. Installation and investement of the equipements (two months) .

Proposal for the construction of Robotics Lab in the HIAST

1 . Objectives :

The main goals of this project are :

- Educational : aimes at the application of control theoreys and methodes in simulation and comand for the realization of a task and determined frejectory .
  Under graduate students will benefit reom this project to get a B.Sc. degree in Robatics and post graduts will be able to do research in this area .

- Limited production : the ability to produce a limited prototypes of a stationary Robot and limited to a certain degrees of freedom, i.e. the Japanese SCARA/Robot to be used in some of the assembly and manufacturing processes .

2 . Areas of activities :

a. Industrial applications

Constructions of flexible cell contains the following :
- Five degrees of freedo-Robot
- C.N.C. numerical machine
- Conveyer bett
- Computer for controlling the flexible cell, and the posibility to use the CAM Techniques
- Modeling and simulation
- 2D and 3D Graphices

b. Medical applications

c. Sensors

Differant typer of sensors wich include : force, touch, lazer, ultra sonic, IR CCD cameras .

d. Vission

- Image treatment
- Pattern recognition
- Tracking

e. Expert Systems

3 . Staff :

a. The staff needed to achive the objectives consist of the following experts :
   - 3 in control
   - 3 in informatics
   - 2 in mechanics
   - 2 in electronics
   - 2 in vission

b. Five engineers

c. Five technitions

4 . Equipments :

- 4 IBM-PC-AT
- 1 PDP11 or Micro vaxII + 4 terminals
- 1 CNC Machine
- Software for IBM-PC :
  * 3D Portable graphics system
  * CAD, CAM, CAD (drafting)
- 8 bit, 16 bit up emulators
- 5 degree of freedo-Robot SCARA type
- Sensors :
  * Proximity
  * Touch
  * CCD camera
  * Absolute encoders 12 bit
  * Incremental encoders
- Computer system for image recognition and treatment
- DC Motors
- Torque Motors
- VME buss
- Monitor
- Electronic equipments for hardware designe

5 . Budgeting :

The estimated cost of this project is 750.000 US$ for the lab construction, in addition to 200.000 US$ for training .

6 . Time table :

- The HISAT will provide a suitable place for the lab .

- The Japanise part will provide the following :

  * Training of specalists in the fields of Control, Informatics, Mechanics Through a courses of 3-6 Months periods .

  * Providing the neccesary equipments and soft ware for operating the project .

  - The expected time for starting the operation of this project is one year after reciving of the above mentioned items .

ANNEX 9 : Recent SSRC Cooperation Programs with Western Countries

SSRC TECHNICAL AND SCIENTIFIC
COOPERATION PROGRAM WITH WESTERN COUNTRIES
FOR YEARS
87 - 88 - 89

(UNDER IMPLEMENTATION)

DONOR COUNTRY	EXECUTING AGENCY	PROJECT NAME	ASSISTANCE/ CREDIT AMOUNT
France:			
Third Financial Protocol between France and Syria (Loan)	HIAST + INPG (Grenoble): Technical assistance	Integrated Circuits lab (Education, research project)	25.M.FF
EEC:			
2nd Protocol between EEC and Syria (Grant)	HIAST+EEC consultants	Establishement of HIAST Labs (2nd cycle): (Education + research project) -Computer Center -Computer Engineering -Microelectronics -Applied Physics -Automatics -Management Eng.	8,25 M ECUs
UNDP:			
Development agreement between UNDP and Syria (Grant)	SSRC+UNIDO consultants	Optics Technology Pilot Project (Prototype production plant)	1,5 M. US$
UNESCO			
-Cultural and Scientific agreement between UNESCO and Syria	SSRC+UNESCO consultants	Computer Technician program (equipment)	400,000 US$

-Cultural and Scientific agreements between UNESCO and Syria	SSRC	Documentation and Information Training Center (equipment)	5.000 US$
Canada			
Development agreement between IDRC and Syria (Grant)	SSRC	Syrian Networking and Information Development	170.000 US$
Direct agreement (Technical assistance)	HIAST+ACCC consultants	Computer Technician Program (Technical assitance)	140.000 US$

ANNEX10 : Composition of the JICA Team and the SSRC Team

Member List

Consultation 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	Takeho Sakata	Special Assistant to the Director, Mining and Industrial Development Cooperation Department, Japan International Cooperation Agency (JICA)
2. Technical Cooperation Planning	Kyoko Nagashima	Deputy Director, 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 Research Laboratory, Japan Electric Meters Inspection Corporation (JEMIC)
5. Coordinator	Satoru Takahashi	Staff, Technical Cooperation Division, Mining and Industrial Development Cooperation Department, Japan International Cooperation Agency (JICA)
6.	H. Nakamura	Chief Adviser (ETL)
7.	Y. Noguchi	JICA Expert on measurement standards and calibration (YOKOGAWA)

PARTICIPANTS FROM THE SCIENTIFIC STUDIES
AND RESEARCH CENTRE (SSRC)
IN
THE DISCUSSIONS WITH THE JAPANESE CONSULTATION TEAM
DURING THE PERIOD 18-25/3/1989

"THE SSRC TEAM"

Dr. M. Mrayati : Director of the Institute of Electronics .

Dr. A. Armanazi : Deputy Director of the Institute of Electronics.

Mr. S. Weiss : Director of Standards and Calibration Dept .

Dr. Z. Suleiman : Electronics Industry Branch .

Dr. M. Aghbar : Director of Calibration Project .

Mrs. M. Kallas : Scientific Cooperation Dept .

Note :

Several members of NSCL staff participated in the discussions as required .

ANNEXII : The NSCL Inauguration Ceremony

NSCL INAUGURATION CEREMONY

MARCH 20 , 1989

HOSTED BY

DR. A.M. CHAHID

SYRIAN ARAB REPUBLIC

SCIENTIFIC STUDIES AND RESEARCH CENTER

Opening Ceremony

Monday 20.3.1989 h: 16,00

16,00 : - Reception

16,10 : - Welcoming the attendance

- The word of the Project Manager, a tecnical review to the Project, (film projection)

16,25 : - The word of the Japanese head of Delegation

16,35 : - The speech of the SSRC General Director

16,45 : - The speech of His Excellency the Ambassador of Japan

16,55 : - The Inauguration Ceremony

17,00 : - A visit t the NSCL labs.

18,00 : - Reception Party

Invited guests (the Japanese)

Name	Profession
His Excellency	Ambassador of Japan in Syria
Mr. Kodaira	Councilor, Embassy of Japan
Mr. Kuroda	Special Assistant, Embassy of Japan
Mr. Inada	Director, JICA Syria Office
Mr. Sakata	Special Assistant to the Director, Mining and Industrial Development Cooperation Dept., JICA
Miss Nagashima	Deputy Director, Electric Power Technology Division, Public Utilities Dept., MITI
Mr. Katoh	General Manager, Standards Laboratory, Corporate Quality Control Division, Yokogawa Electric Corp.
Mr. Ikeda	Manager, Research Section, Technical Research Laboratory, Japan Electric Meters Inspection Corp.
Mr. Takahashi	Technical Cooperation Division, Mining and Industrial Development Cooperation Dept., JICA
Mr. Nakamura	Expert (chief), JICA (Senior Researcher of Electrotechnical Laboratory, MITI)
Mr. Noguchi	Expert on Measurement Standards and Calibration, JICA (Manager, Corporate Quality Control Division, Yokogawa Electric Corp.)
Mr. Ohki	Expert on Measurement Standards and Calibration, JICA (Chief Engineer, Calibration Service Section, Japan Electric Meter Inspection Corp.)
Mr. Miyazawa	Expert on Calibration and Repair, JICA (Assistant Manager, Kashima Service Center, Yokogawa Engineering Service Corp.)
Mr. Furukawa	Expert on Measurement Standards and Calibration, JICA (Development & Engineering Dept., System Development & Engineering Division, Yokogawa Electric Corp.)

JICA : Japan International Cooperation Agency
MITI : the Ministry of International Trade and Industry

INVITED GUESTS (THE SYRIAN)

1- Dr. A.H.Mansour — Deputy of G.D. of SSRC

2- State Planing Commission:

- Dr. A. Subai
- Mr. M.Ghannam

3- The SSRC Team:

- Dr.M.Mrayati
- Mrs.M.Kallas
- Dr.A.Armanazi
- Eng.S.Waiss
- Dr. Z.S.Sulaiman
- Dr.M.Aghbar

4- The SSRC. Directorate of Constructicn

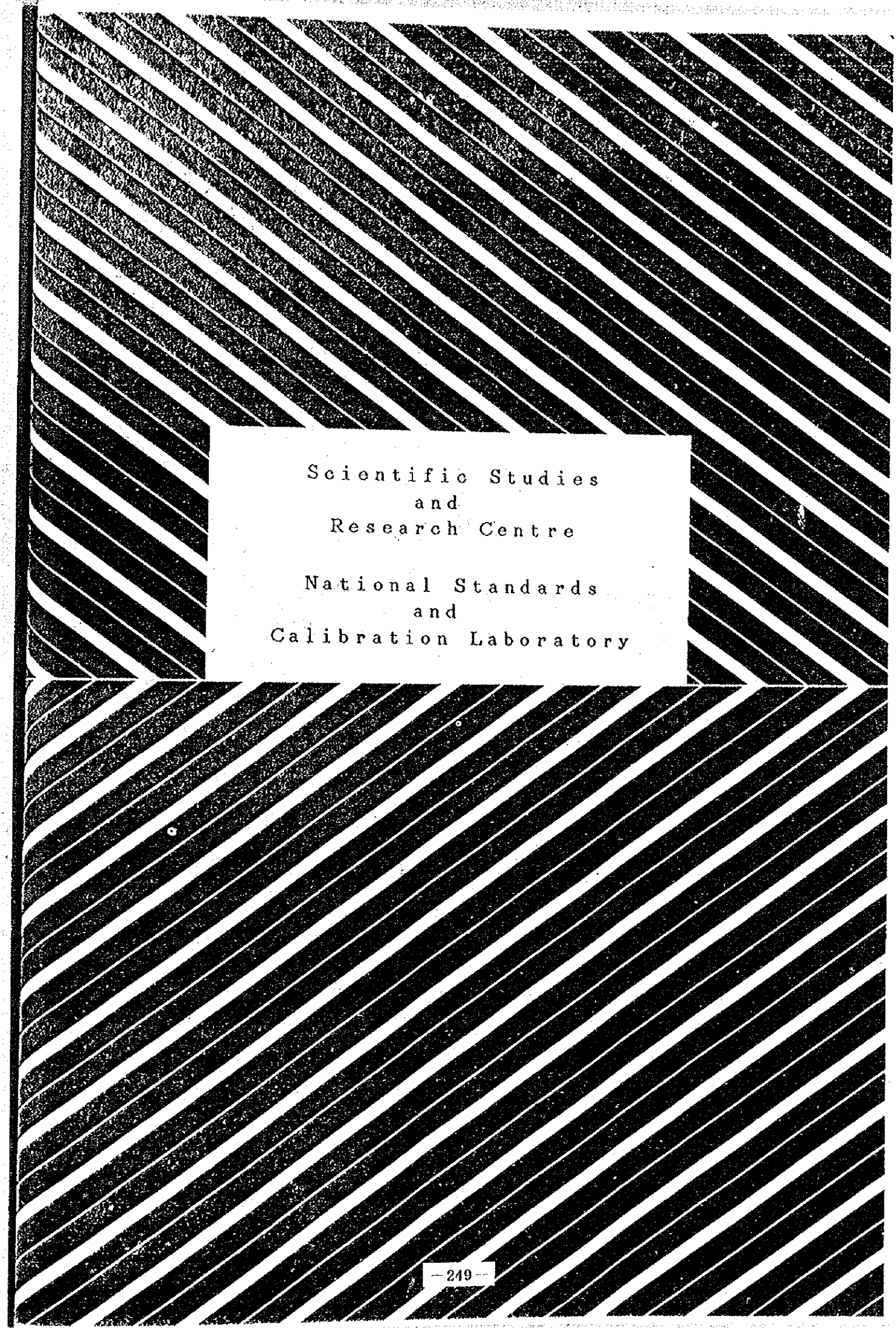
- Mr. M. Khatib
- Dr.M. Samara

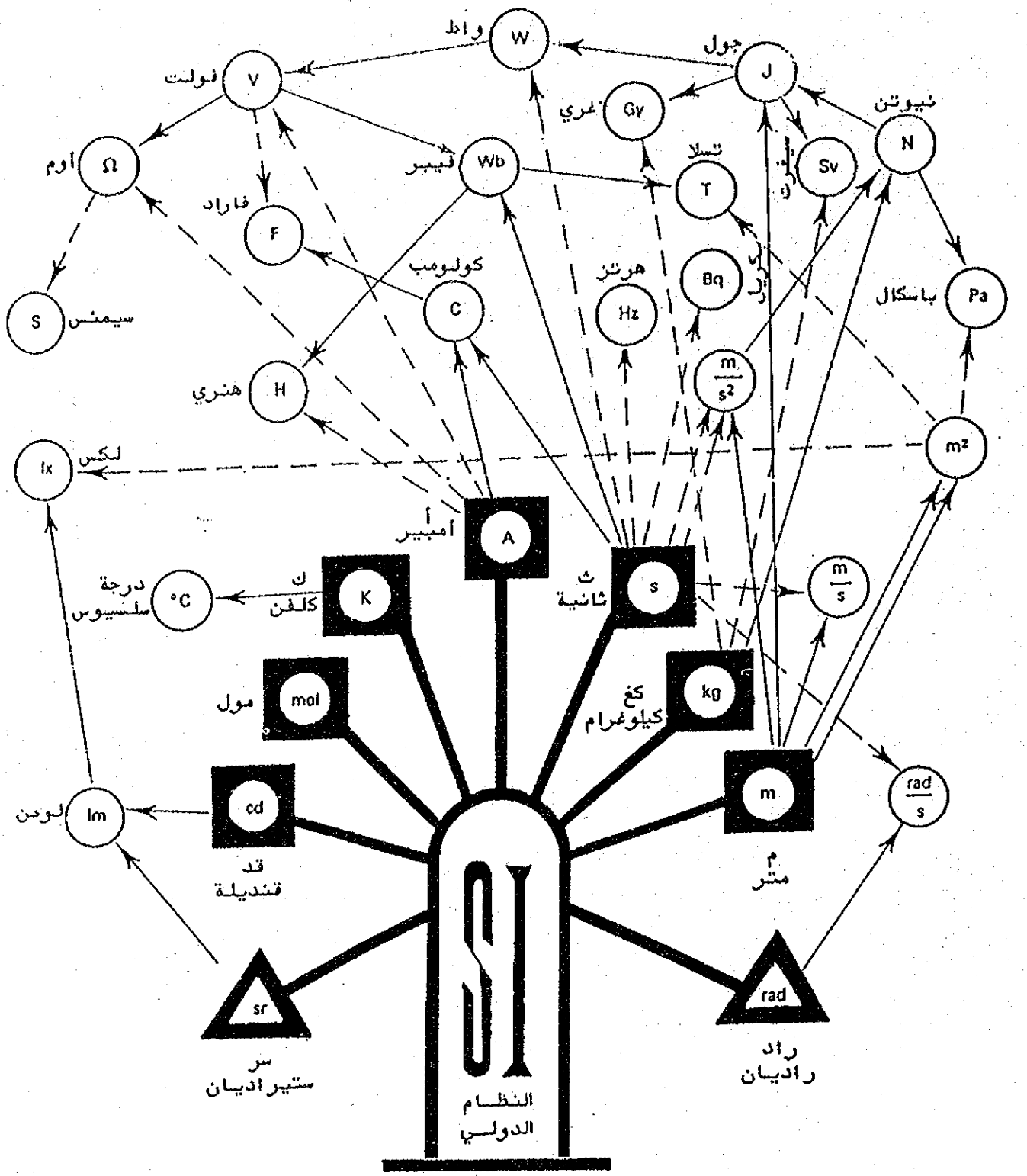
Eng.R. Tarbah dar

5- NSCL TEAM

- Eng.Z.Batter
- Eng.M.Zaaweete
- Eng.M.Harb
- Eng.R.Ibrahim
- ASSOC. Eng.Karouni

ＮＳＣＬパンフレット


Scientific Studies
and
Research Centre
National Standards
and
Calibration Laboratory



SYRIAN ARAB REPUBLIC
Scientific Studies and Research Centre
National Standards and Calibration Laboratory
Damascus, P.O.Box 4470
Tel: 772603/6 Telex: 411374SY

ARMANAZI

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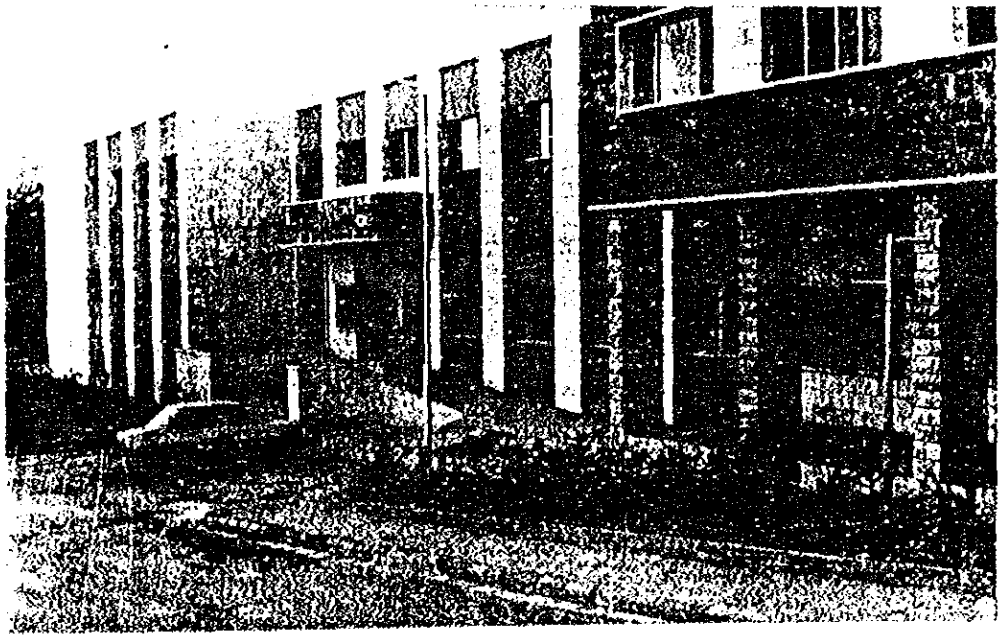


Fig. 1 NSCL Building

1. Preface

An effective metrological system forms one of the basic foundation of a nation. It is important for the developement and industrialization of a nation. Specially, reliable measurements based on precise standards induces the growth of social and industrial activities. Results produced by such standards have also been applied to various fields such as basic electronics, biological measurements, environment control and so on.

In Syrian Arab Republic, since adoption of the Internatinal System of Units (SI) in 1980, none of National Standards Laboratory related to electrical units has been establish. Therefore, the Scientific Studies and Reserch Centre (SSRC) decided to established a new department, the National Standards and Calibration Laboratory (NSCL), Fig.1, Fig.2, for keeping and maintaining the SI units' standards under the auspices of the Japanese Government.

A technical cooperation project between Japan and Syrian Arab Republic was then started in 1987 to establish NSCL. (Some important data are given in the project history). The project is implemented by Japan International Cooperation Agency(JICA). The Japanese side has been providing the following:

1-technical equipment and measuring instruments needed,
2-training of Syrian staff,
3-dispatch of Japanese experts.

The realization of this project, the estimated cost is 4M$, will be during five years. And the Syrian side provided the necessary building.

NSCL will have national(primary), working(secondary), and tertiary standards. It will have a repair facility for electric and electronic instruments. This repair facility is necessary because foreign companies do not have usually maintenance and repair workshop in Syria. NSCL will promote the creation of such facilities gradually in the large electronic companies and centres in Syria. NSCL will hold seminars and training courses on Metrology and Instrumentation to promote those fields in Syrian centres and companies.

2. Project History

Of cource, it is easy to imagine the enormous efforts needed from both Japanese and Syrian sides to achieve the actual stage of this extremely important project. To have more references, here is a brief chronological review of the events related to NSCL.

5/1979- Preliminary survey study to determine the need of Syrian organization for calibration facilities.

11/1979- Requested offers from foreign companies to cover our study.

1/1982- New revision to our study

2/1982- First official communication with the Japanese side concerning this project, through the State of Planning.

1/1983- Studies about NSCL were handed to the Japanese Embassy.

3/1983- Several required projects were handed to Japanese authorities by Syrian Foriegn Minister during his visit to Japan.

1/1984- New requested offers.

2/1985- The new revision were handed to Japanese side.

3/1985- Establishment of the Maintenance and Calibration Department in SSRC.

5/1985- A finding team from Japan Internatinal Cooperation Agency (JICA) visited SSRC.

6/1985- The new revision was handed to Japanese Foriegn Minister during his visit to Syria.

10/1986- JICA's preliminary survey team visited SSRC for NSCL project

9/1987- Construction of NSCL's building began.

10/1987- JICA's implementing survey team visited SSRC.

3/1988- Training of four Syrian staffs in Japan.

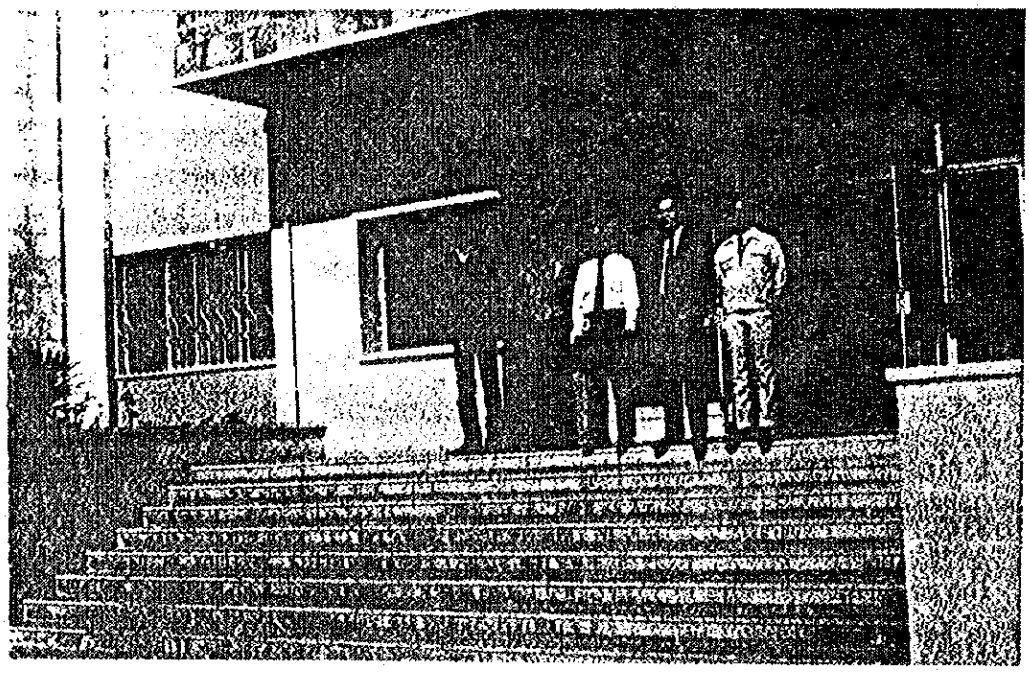
9/1988- Long-term expert arrived to Syria.

11/1988- Chief advisor of NSCL arrived as well as the first batch of machinery and equipments to NSCL building.

12/1988- Five Japanese short-term experts arrived to Syria.

1/1989- NSCL building was finished and occupied and training of three other Syrian staff in Japan.

3/1989- JICA's consultation team of the project visited NSCL.



3. Role of NSCL

The main goal of NSCL is to keep the Syrian National Statandards and to conduct every measurement necessary to maintain those standards or needed to conserve good traceability all over the country.

Of course, such tasks give NSCL right of representing Syria in Internatinal Meetings or Organizations concerning sceintific metrology.

In order to accomplish its tasks NSCL recognizes the need of implementing the standards flow chart presented in Fig.3. It is clear that any public organization (university, Ministry of Industry,etc.) or private company will have relation with SASMO ,ITRC and/or NSCL corresponding to its occupation (legal metrology, testing and/or scientific metrology).

4. Actual Facilities

NSCL is planning to have necessarry standards to cover SI (Internatinal System). The actual project is setting up facilities to permit maintaining the electrical unit(ampere), the unit of time(second), temperature unit(K) and related measurements.

Concerning the others fields (mechanical, optical,···), we are studying the posssibility of recruiting the necessary machinery and equipments, which were taken in consideration in the actual NSCL building. Therefore, the organization chart adopted, Fig.4, is adequate to promote new divisions as well as facilitate relation between them.

Table 1 summarizes the present activities giving the typical function, range and accuracy of instruments to be calibrated.

Indeed, five laboratories are functional. They are equiped to carry on very precise measurements.Such tasks require very special environmental conditions as follow:

Temperature (23±1)° C
Humidity (40±10)%

Environmental conditions of laboratories.

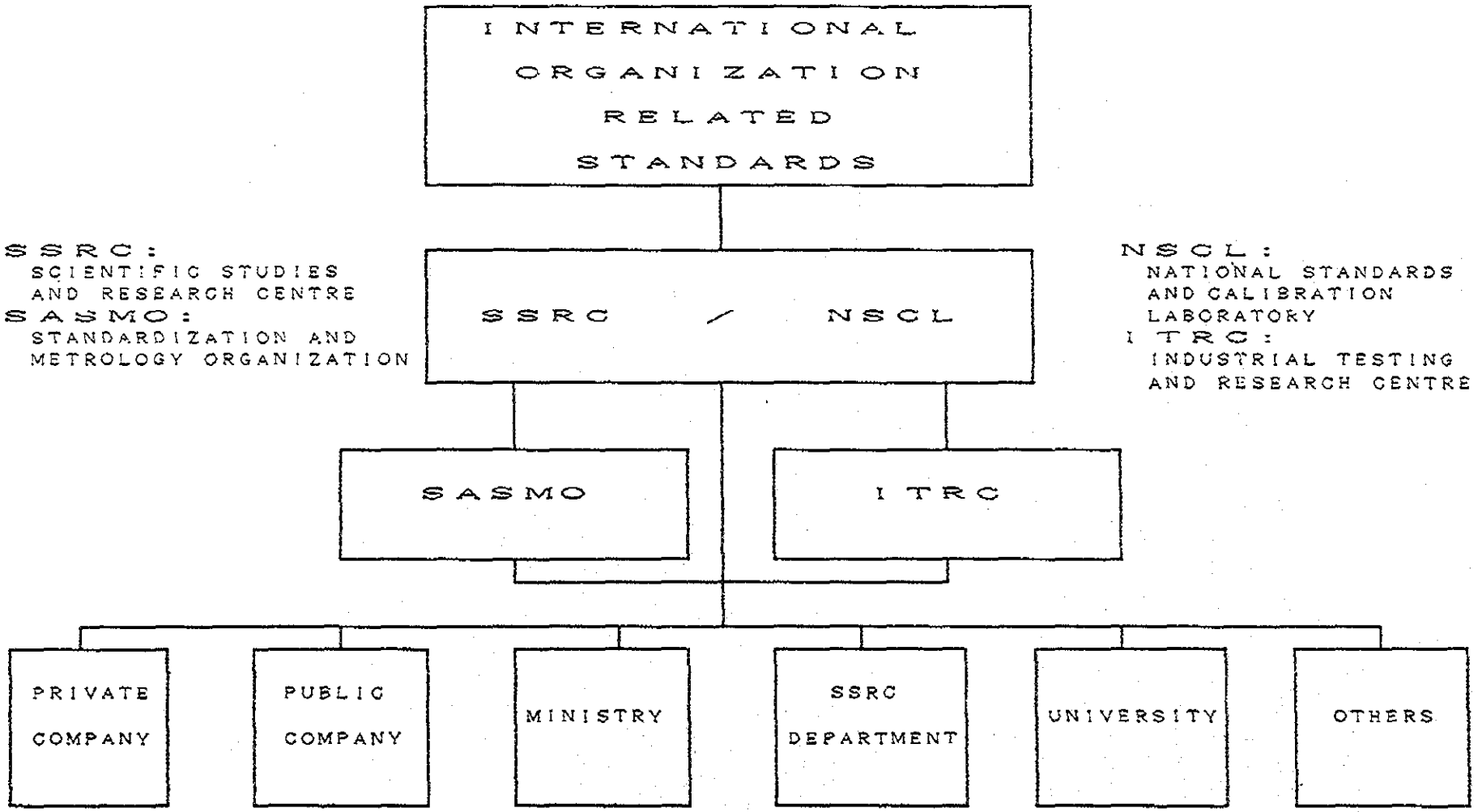


Fig. 3 TRACEABILITY OF STANDARDS IN SYRIA

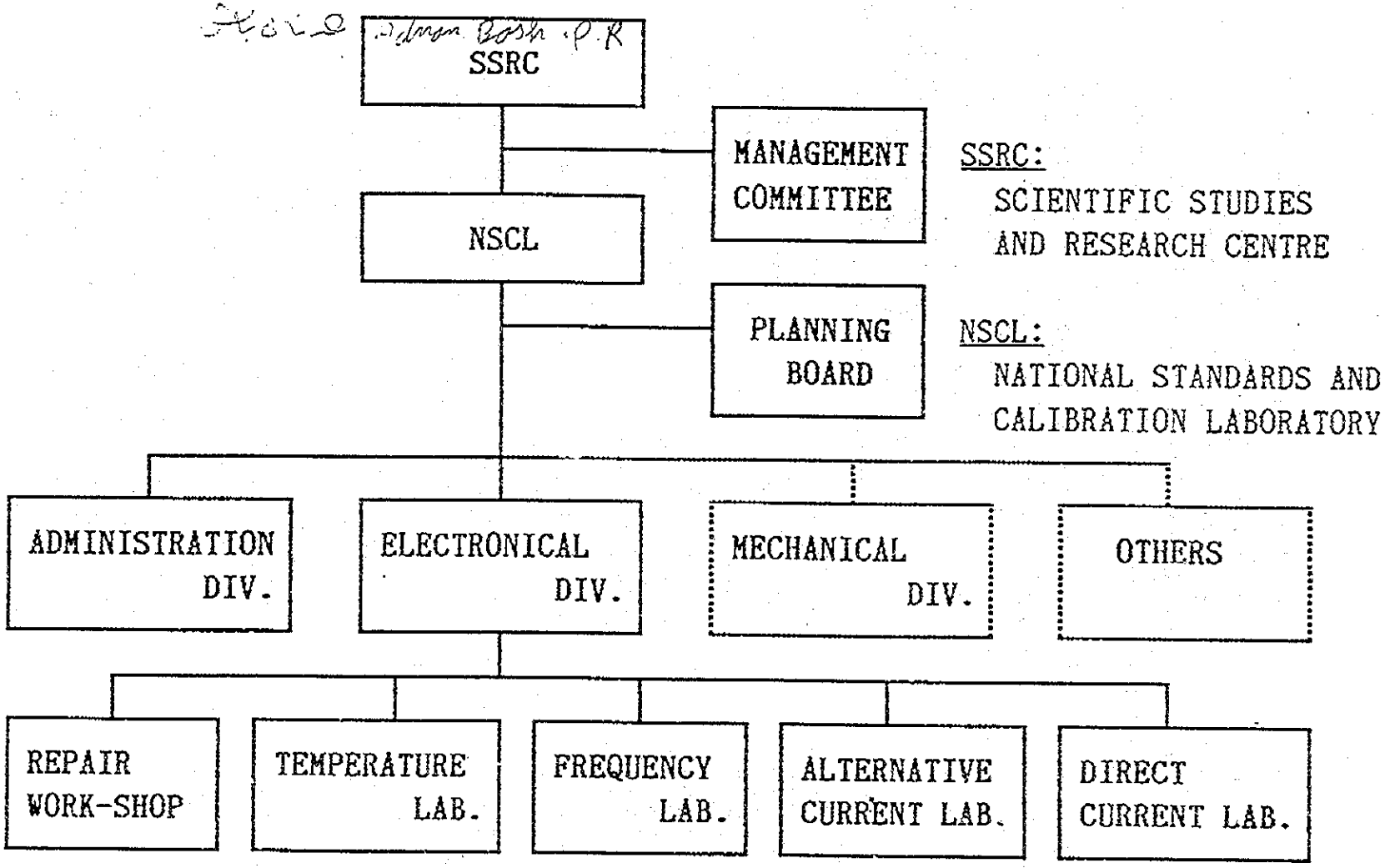


FIG.4 NSCL ORGANIZATION

41. DC and RC Laboratory

As its name indicates, this laboratory will keep and maintain the national references of voltage,resistance and capacitance and will conduct calibrations related to those standards. In big metrological laboratories (BIPM;international laboratory, ETL;national in Japan, LCIE;national in France, NIST;national in U.S.A.···), the electrical standards are established by means of very advanced technology.

In our laboratory we will maintain the national refernce standard of voltage by means of refernce group of five standard cells of accuracy ±2ppm.

The national reference standard of resistance will be maintained using a group of five resistors(Thomas type), value 1 Ω, accuracy ±2ppm.

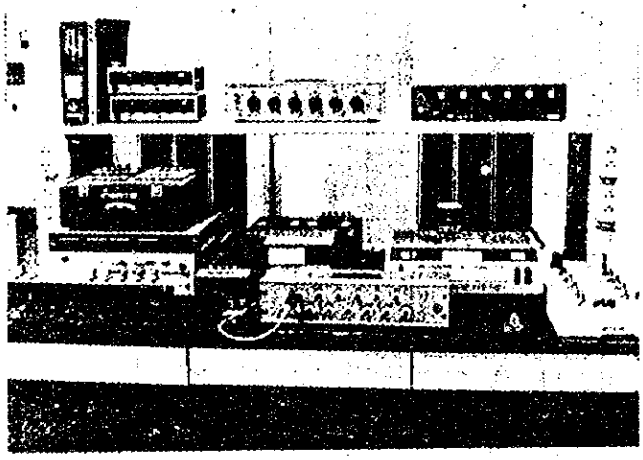


Fig.5 Capacitance Standard calibration system

Similarly, the national reference standard of capacitance will be maintained by using a reference group of five (2×10 pF and 3×100 pF) fused silica capacitors of accuracy ±10 ppm at 1 kHz

Those national standards and other instruments or equipments needed to conserve them in good environmental conditions will be provided next year. For time being, we are using actually three secondary standards systems which are: 1-DC voltage and current standard and calibration system, 2-resistance standard and calibration system, 3-capacitance standard and calibration systenm.

The representative accuracy as well as the calibration range of those systems are given in Table 1.

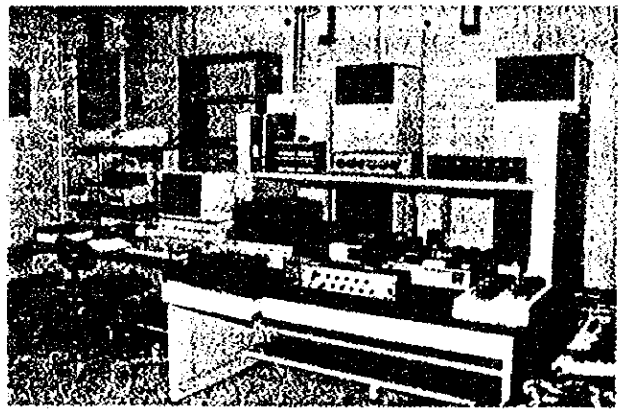
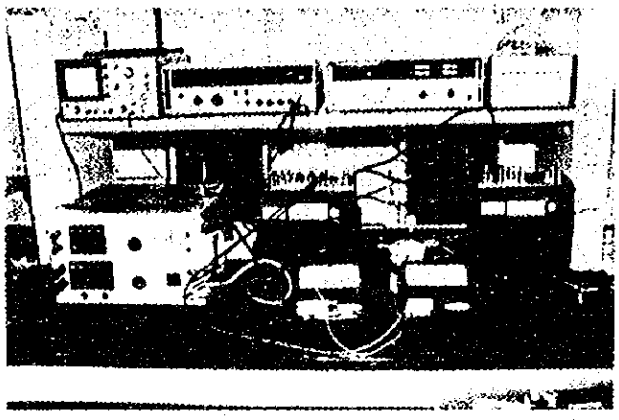


Fig.6 Automation facility of DC and RC laboratory

42 AC Labortory

This laboratory will conduct calibration related to AC voltage and current. The AC/DC thermal standard will play the role of national reference which is very used internationally for this purpose will be provided next year.



Waiting the complete system we are using actually the AC secondary calibration system which is shown in Fig.7. The calibration range and accuracy are listed in Table 1. An automation and acquisition of measuring data are accomplished using computor(YEWMAC).

Fig.7 AC secondary calibration system

43 Temperature laboratory

This laboratory keeps the national refernce standard of temperature(pt-25). Fig.8 shows some instruments used in our calibration systems. The calibrations are made by comparison method. The fixed temperature is held by an oil bath, salt bath or ice according to our need. Then, we compare the readings of our standard to that of the instrument under calibration.

Fig.8 Some equipment of temperature laboratory

44 Frequency laboratory

This laboratory will keep the national standard of frequency, and will calibrate radio frequency measuring instruments like (counters, signal generators,···). In order to accomplish such calibration, special controlled environment is required. Really, in addition to temperature, humidity controlling facilities, this laboratory has a shielded room, Fig. 9, to cut radio frequency noise corresponding to MIL-STD 285 which is one of the most strict standards in the world about this matter.

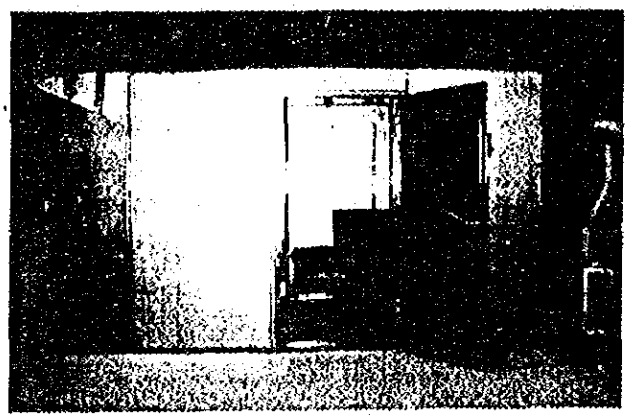


Fig.9 Shielded room

45 Repair workshop

Actually, we have two repair benches namely:

1- multimeter and recorder repair bench.

2- DC/AC power supplies repair bench.

Those benches are provided with both functions (repair and calibration). The instruments used in this laboratory will be periodically calibrated aginst NSCL standrds. This laboratory is also equiped to conduct temperature and humidity characteristics test.

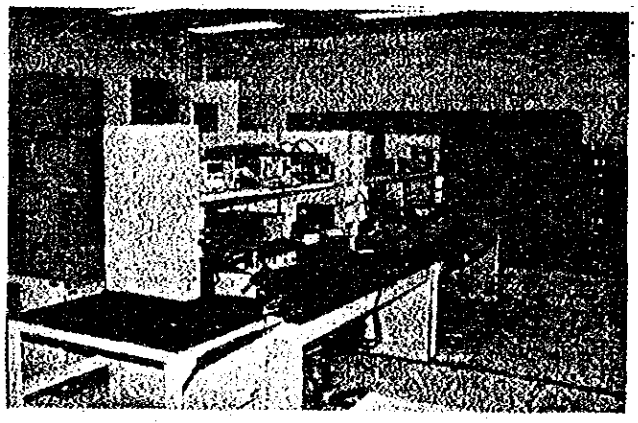
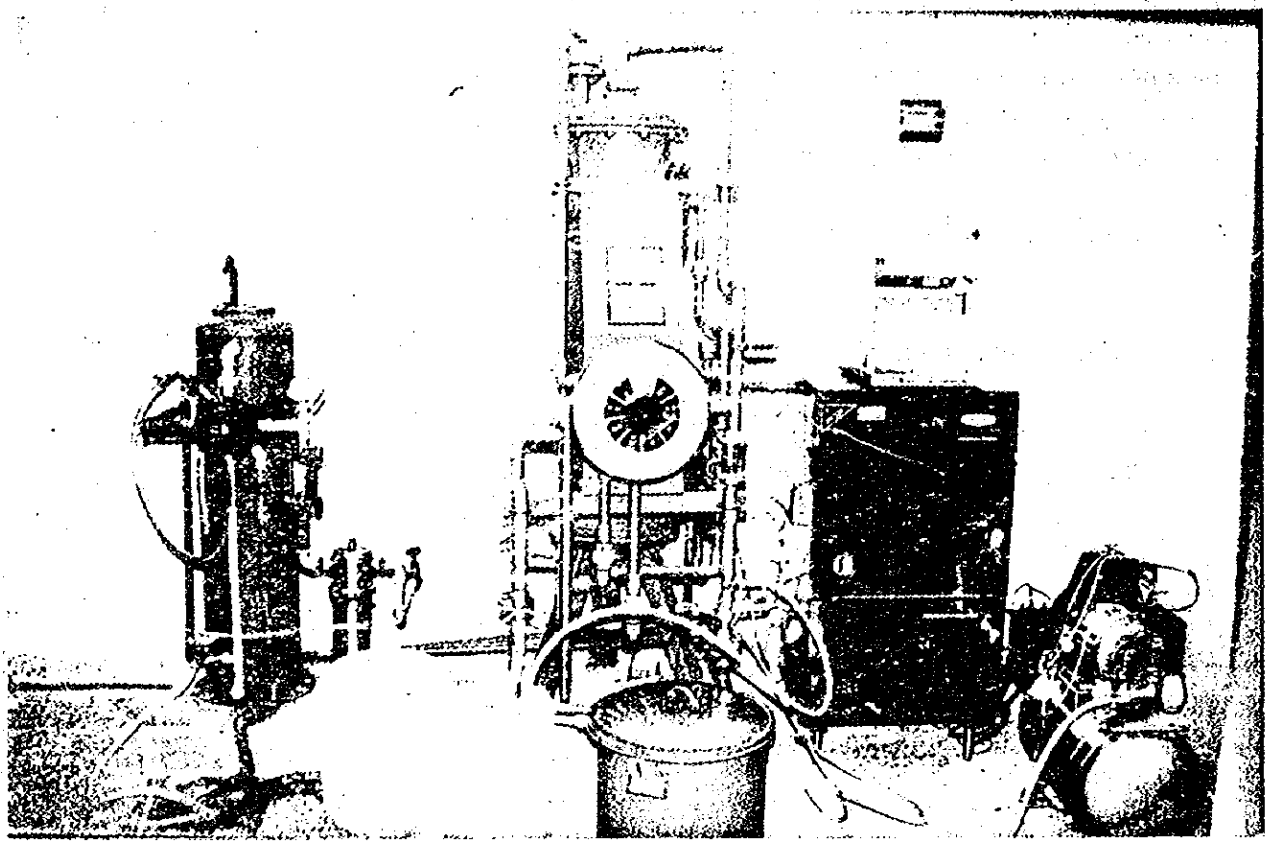


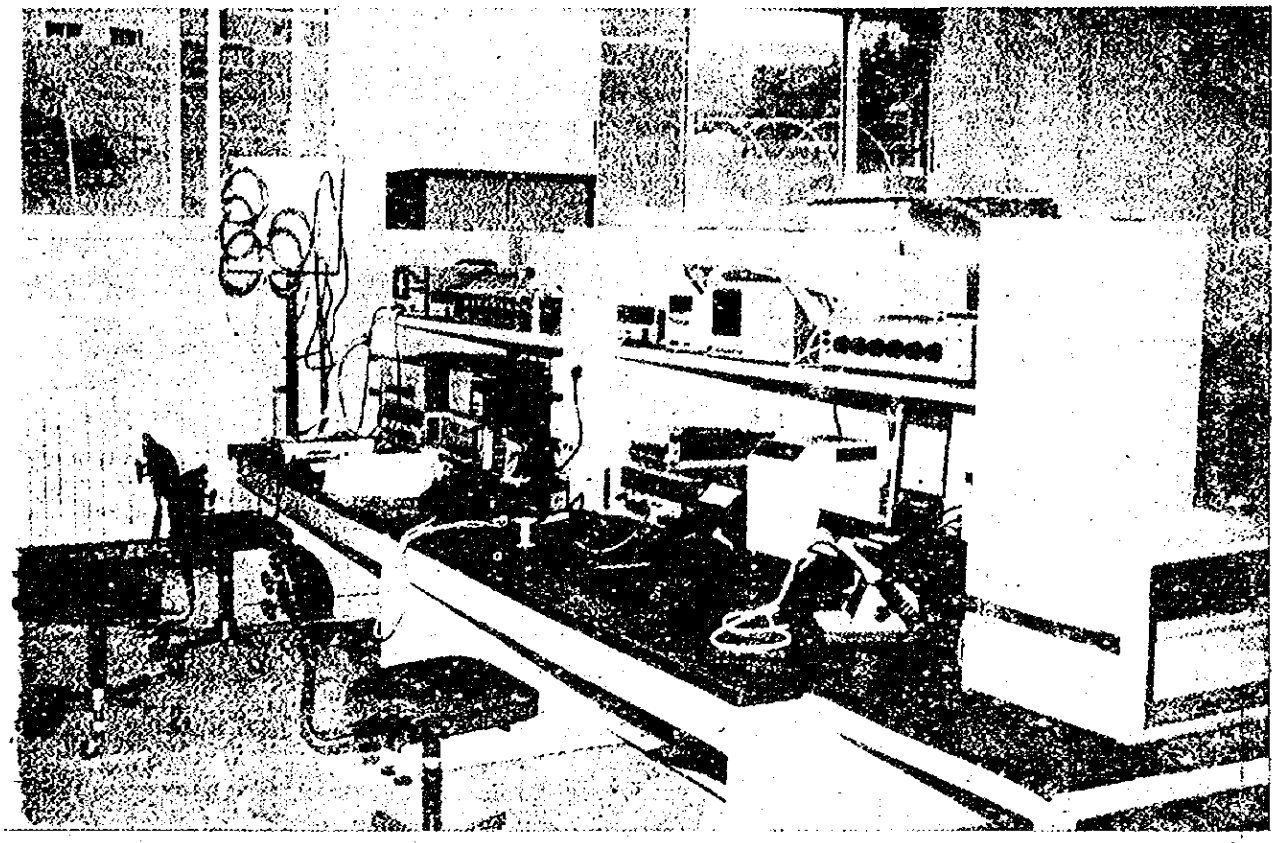
Fig.10 Repair workshop general view

FUNCTION	SPECIFICATION	
	RANGE	ACCURACY *
DC VOLTAGE MEASURING INSTRUMENTS	1mV TO 1000V	±(0.002% + 2μV)
DC VOLTAGE GENERATING INSTRUMENTS	1mV TO 1000V	±(0.005% + 10μV)
DC CURRENT MEASURING INSTRUMENTS	0.1mA TO 100A	±0.02%
DC CURRENT GENERATING INSTRUMENTS	0.1mA TO 30A	±(0.01 % + 10μA)
AC VOLTAGE MEASURING INSTRUMENTS	1mV TO 1100V 50Hz TO 10kHz	±0.01%
AC VOLTAGE GENERATING INSTRUMENTS	1mV TO 1100V 50Hz TO 10kHz	±0.01%
AC CURRENT MEASURING INSTRUMENTS	0.1A TO 100A 50Hz TO 400Hz	±0.1 %
AC CURRENT GENERATING INSTRUMENTS	0.1A TO 100A 50Hz TO 400Hz	±0.1 %
RESISTANCE MEASURING INSTRUMENTS	1 mΩ TO 100MΩ	±10ppm
RESISTORS	1 mΩ TO 100MΩ	±0.01%
CAPACITANCE MEASURING INSTRUMENTS	10pF TO 1μF	±100ppm
CAPACITORS	0.1pF TO 100 μF 1kHz	±0.01%
INDUCTORS	0.1mH TO 100H 1kHz;22kHz TO 70MHz	±0.2 %
TEMPERATURE MEASURING INSTRUMENTS	0℃ TO 1100℃	±0.05℃

* REPRESENTATIVE ACCURACY (BEST ACCURACY)

TABLE 1 CALIBRATION SERVICES





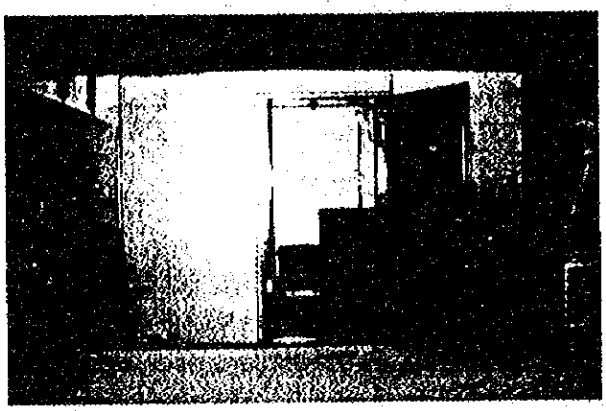
الأجهزة المراد معايرتها	المواصفات	
	المجال	الدقة
أجهزة قياس جهد التيار المستمر	١ ميللي فولت ـ ١٠٠٠ فولت	±(٠ر٠٠٢ / + ٢ميكروفولت)
منابع جهد التيار المستمر	١ ميللي فولت ـ ١٠٠٠ فولت	±(٠ر٠٠٥٪ + ١٠ميكروفولت)
أجهزة قياس التيار المستمر	١ر٠ميللي أمبير ـ ١٠٠ أمبير	± ٠ر٠٢ /
منابع التيار المستمر	١ر٠ميللي أمبير ـ ٣٠ أمبير	±(٠ر٠١ / + ١٠ميكرو أمبير)
أجهزة قياس جهد التيار المتناوب	١ميللي فولت ـ ١١٠٠ فولت ٥٠ هرتز ـ ١٠ كيلو هرتز	± ٠ر٠١ /
منابع جهد التيار المتناوب	١ ميللي فولت ـ ١١٠٠ فولت ٥٠ هرتز ـ ١٠ كيلو هرتز	± ٠ر٠١ /
أجهزة قياس التيار المتناوب	١ر٠ أمبير ـ ١٠٠ أمبير ٥٠ هرتز ـ ٤٠٠ هرتز	± ٠ر١ /
منابع التيار المتناوب	١ر٠ أمبير ـ ١٠٠ أمبير ٥٠ هرتز ـ ٤٠٠ هرتز	± ١ر٠ /
أجهزة قياس المقاومة	١ميللي أوم ـ ١٠٠ ميكا أوم	± ٠ر٠٠١ /
المقاومات	١ميللي أوم ـ ١٠٠ميكا أوم	± ٠ر٠١ /
أجهزة قياس السعة	١٠بيكوفاراد ـ ١ميكروفاراد	± ٠ر٠١ /
المكثفات	١ر٠بيكوفاراد ـ ١٠٠ ميكرو فاراد عند ١ كيلو هرتز	± ٠ر٠١ /
الملفات	١ر٠ميللي هنري ـ ١٠٠ هنري ١كهرتز، ٢٢كهرتز ـ ٧٠ميكاهرتز	± ٠ر٢ /
أجهزة قياس الحرارة	٥٠ م ـ ١١٠٠ م ـ ١١ ـ	± ٠ر٠٥ /

الجدول رقم (١) خدمات المعايرة

٠٤٤ مختبر التردد :

سيحتفظ هذا المختبر بالمعيار الوطني للتردد وسيعاير الاجهزة الراديوية مثل (العدادات ، مولدات الاشارة ، .... الخ) ، وستزود التجهيزات اللازمة لذلك خلال هذا العام .

أما المعدات اللازمة لتأمين الشروط المحيطية اللازمة فقد تم تركيبها وهي تضم غرفة محجبة لمنع الامواج الراديوية الدخيلة وذلك حسب المواصفات (MIL STD-285) التي تعتبر من أهم المواصفات العالمية في موضوع التحجيب .



الشكل رقم (٩) الغرفة المحجبة

٠٤٥ ورشة الاصلاح :

جهزت هذه الورشة لتقوم باصلاح عدة أنواع من أجهزة القياس الكهربائية والالكترونية ، حيث تم توزيعها على محطتين :

١- محطة اصلاح المقاييس المتعددة القياس والمسجلات البيانية .

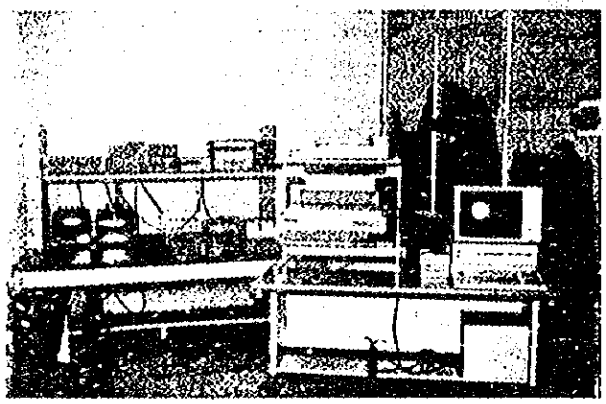
٢- محطة اصلاح وحدات التغذية للتيارات المستمرة والمتناوبة .

وهذا المختبر مجهز لاجراء اختبارات الحرارة والرطوبة وتعاير دوريا أجهزة القياس المستعملة في هذه الورشة بالمقارنة مع معايير المستوى الثاني

الشكل رقم (١٠) ورشة الاصلاح

٠٤٢ مختبر التيار المتناوب :

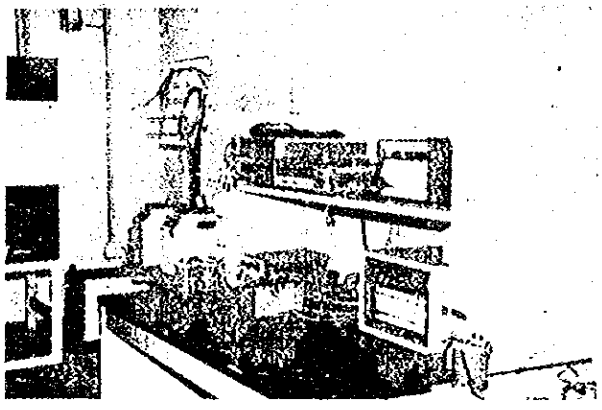
يقوم هذا المختبر بالمعايرات المتعلقة بالتيار المتناوب ، سيتم توريد المعاير المرجعي الوطني له خلال العام القادم ، وهو يعمل على مبدأ مقارنة الجهد المتناوب مع الجهد المستمر حسبما هو معتمد عالميا . يتم حاليا استثمار نظام معايرة الجهد والتيار المتناوب للمستوى الثاني الموضح على الشكل رقم (٧) الذي يبين أيضا الحاسب (YEMAC) المستخدم لاتمتة القياسات .



الشكل رقم (٧)

٠٤٣ مختبر الحرارة :

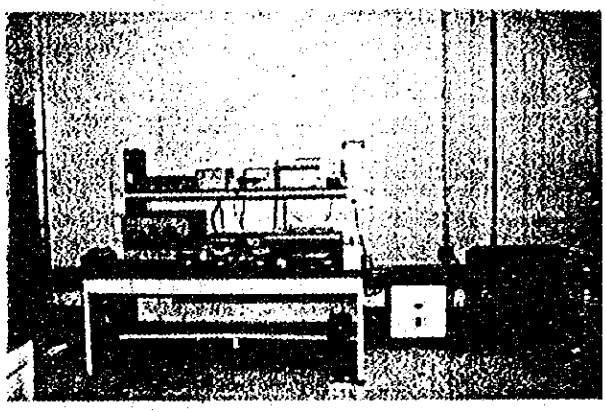
يقوم المختبر بالمحافظة على المعيار المرجعي للحرارة (Pt-25) المصنوع من البلاتين الصافي . يوضح الشكل رقم (٨) هذا المعيار وبعض أجهزة القياس اللازمة للمعايرات الحرارية . تتم المعايرة عن طريق المقارنة حيث تثبت درجة الحرارة بواسطة حوض من الزيت أو الملح أو الجليد حسب الحالة وتقارن قراءات المرجع المعياري والمقياس تحت الاختبار .



الشكل رقم (٨)

يتم اشتقاق معايير الواحدات الكهربائية باستخدام تقنيات متطورة جدا كما هو الحال في المكتب الدولي للاوزان والمقاييس ومخبر التكنولوجيا الكهربائية في اليابان والمخبر الوطني للصناعات الكهربائية في فرنسا والمعهد الوطني للمقاييس والتكنولوجيا في الولايات المتحدة .

أما في مخبرنا الوطني فسنبدأ بالاحتفاظ بمعيار الجهد بواسطة مجموعة مرجعية مؤلفة من خمس خلايا قياسية ، ذات دقة تبلغ جزئين من مليون جزء ($\pm 2 \times 10^{-6}$) .



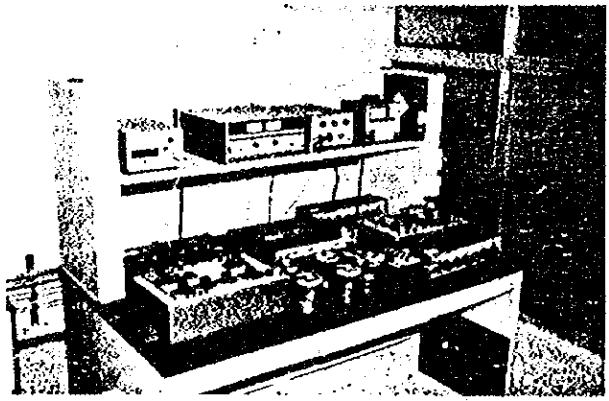
الشكل رقم (٥)

وسيزود الجانب الياباني المخبر بهذه الخلايا المعيارية وبالاجهزة اللازمة لاستخدامها وحفظها وذلك خلال العام القادم. تحقق التجهيزات الحالية نظام معايرة الجهد والتيار المستمر للمستوى الثاني حسب ما هو مبين على الشكل (٥).

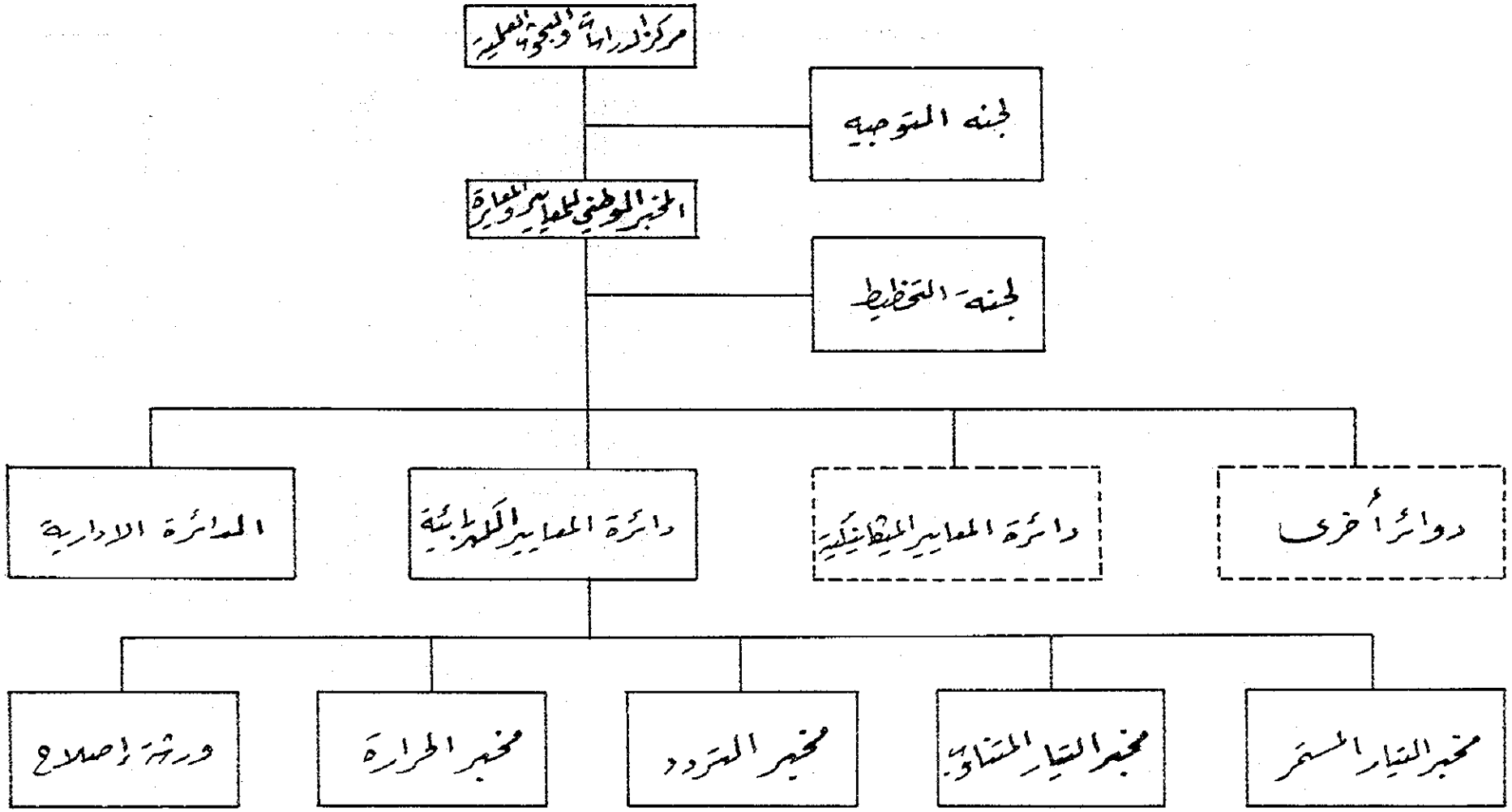
سيمثل المرجع السوري للمقاومة بمجموعة مرجعية مؤلفة من خمس مقاومات معيارية (نوع توماس) ذات قيمة اسمية مقدارها (١ أوم) وذات دقة جزئين من مليون جزء ($\pm 2 \times 10^{-6}$) . كما سيمثل المرجع السوري للسعة بمجموعة مرجعية مؤلفة من خمس مكثفات معيارية (نوع سيلكا مصهورة) ذات قيمة اسمية مقدارها (2×10 بيكوفاراد)و(٢×١٠٠ بيكوفاراد) وبدقة قدرها عشرة أجزاء من مليون جزء عند تردد واحد كيلو هرتز .

سيزود الجانب الياباني المخبر بهاتين المجموعتين وبالتجهيزات اللازمة لاستخدامها والحفاظ عليهما . تتم حاليا استثمار نظام قياس من المستوى الثاني لمعايرة المقاومات والمكثفات وأجهزة قياسها .

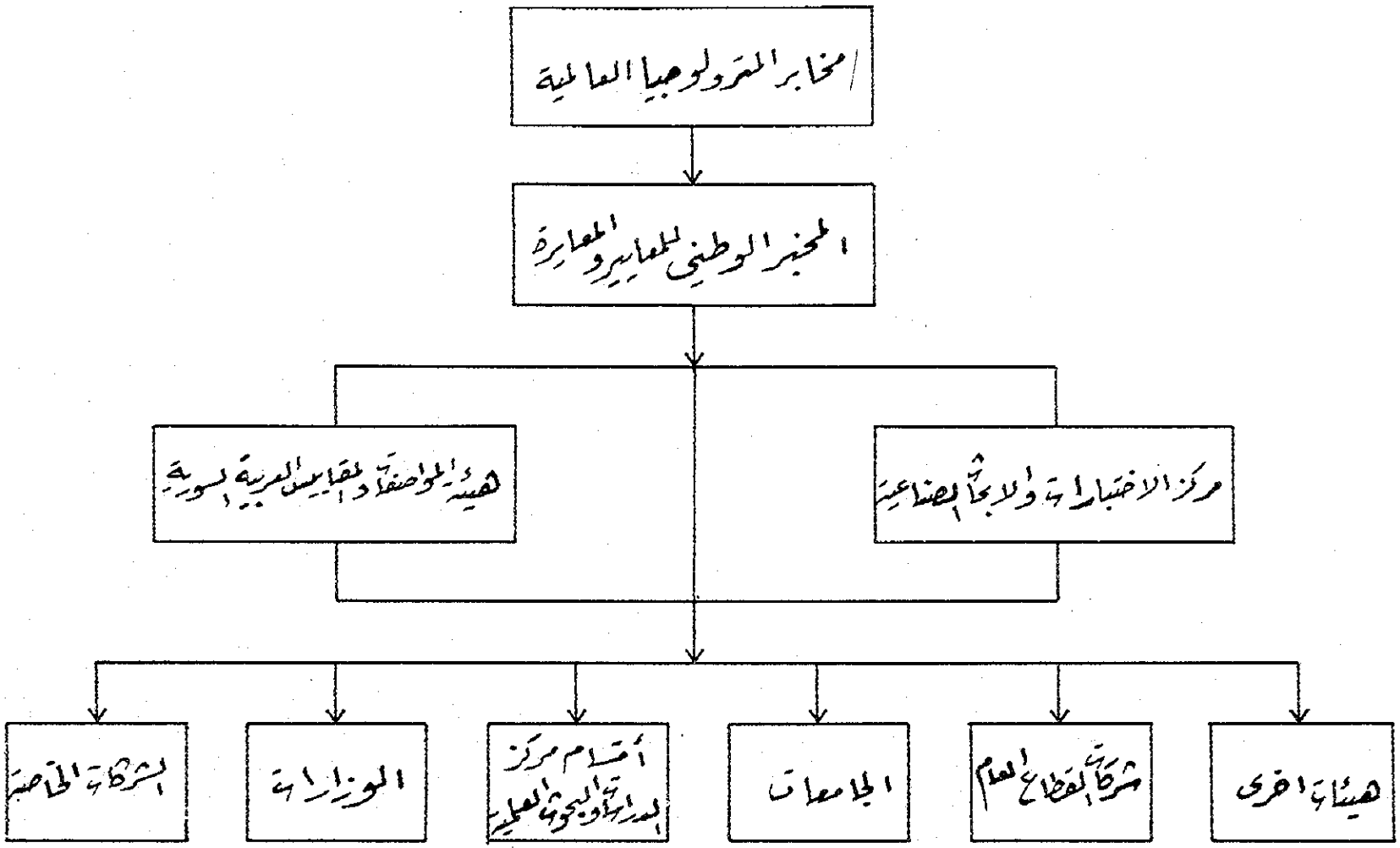
يبين الشكل رقم (٦) نظام معايرة المقاومات وأجهزة قياسها .



شكل رقم (٦)



الشكل «٤» : البنية التنظيمية للمخبر الوطني للمعايير والمعايرة



الشكل «٣» : التسلسل الهرمي للمعايير في الجمهورية العربية السورية

٣- الغاية من اقامة المخبر الوطني للمعاييير والمعايرة :

ان الهدف الاساسي للمخبر الوطني هو اقتناء المعاييير وحفظها والاستفادة منها في اجراء القياسات الضرورية بغية تحقيق تسلسل هرمي للمعايرة والقياس في سائر انحاء القطر ، مما يكسب هذا المخبر صفة تمثيل القطر في اللقاءات أو المنظمات الدولية التي تهتم بعلم القياس .

سيكون المخبر الوطني المرجع الرئيسي لسائر الجهات التي تهتم بامور القياس والمعايرة ، كما هو موضح على الشكل رقم (٣) ، حيث ترتبط المؤسسات الحكومية (الجامعات والوزارات والادارات) وبعض الشركات الخاصة ذات الاهتمام بمواضيع علم القياس ، بالهيئة العربية السورية للمواصفات والمقاييس أو بمركز الاختبارات والابحاث الصناعية أو بالمخبر الوطني للمعاييير والمعايرة وذلك حسب طبيعة أعمالها ونوعية تجهيزاتها .

٤- فعاليات المخبر :

يسعى المخبر الوطني للحصول على جميع المعاييير اللازمة لتغطية جملة الواحدات الدولية (SI) ، حيث يقدم المشروع الحالي الامكانيات الكفيلة بالمحافظة على واحدة الكهرباء وواحدة الزمن وواحدة الحرارة والقياسات المرتبطة بها .

ولايزال مركز الدراسات والبحوث العلمية يسعى لتامين المعدات والتجهيزات الخاصة بالمعاييير الاخرى مثل الميكانيك والضوء ..... الخ حيث الحظ المختبرات الخاصة بها في المبنى العام .

وسيكون الارتباط الاداري والفني لهذه الفعاليات كما هو موضح في المخطط التنظيمي للمخبر الوطني الشكل رقم (٤) .

يلخص الجدول (١) أنواع المعايرات الممكنة حاليا والتي تجري في خمسة مختبرات مجهزة للقيام بالقياسات الدقيقة اللازمة وضمن الشروط المحيطية التالية :

الحرارة (٢٣ ± ١)° مئوية

الرطوبة النسبية (٤٠ ± ١٠) ٪

٤١. مختبر التيار المستمر والمقاومات والسعات :

يضمن هذا المختبر المحافظة على المعاييير الوطنية للجهد المستمر (الفولت) وللمقاومة (الأوم) وللسعة (الفاراد) ؛ ويعمل على اجراء المعايرات اللازمة المتعلقة بهذه المعاييير .

١٠/ ١٩٨٦ – زيارة وفد ياباني دمشق لاجراء استطلاع تمهيدي حول حاجة المخبر الوطني الى اجهزة القياس للمعايير والمعايرة .

٩ / ١٩٨٧ – مباشرة المركز انشاء مبنى المعايرة .

١٠/ ١٩٨٧ – زيارة المركز من قبل وفد ياباني مفوض باعطاء موافقة الجانب الياباني على تقديم المعونة الفنية للمعايرة .

٣ / ١٩٨٨ – ايفاد / ٤ / متدربين من مخبر المعايرة الوطني الى اليابان لاتباع دورة تدريبية، تنفيذا لبرنامج المعونة اليابانية .

٩ / ١٩٨٨ – وصول خبير ياباني الى دمشق لمتابعة سير العمل في المخبر الوطني للمعايير والمعايرة ، تمتد اقامته فيها مدة سنتين .

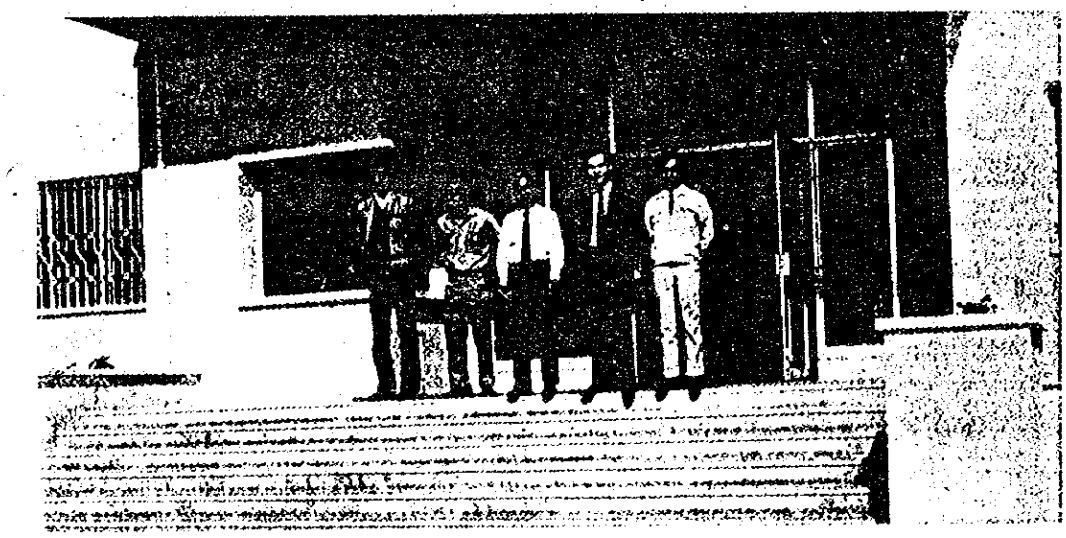
١١/ ١٩٨٨ – وصول كبير المستشارين اليابانيين الى القطر لمتابعة سير العمل لمدة سنة .

– وصول الدفعة الأولى من التجهيزات .

١٢/ ١٩٨٨ – وصول خمسة من الخبراء اليابانيين المختصين للمساعدة في تركيب وتشغيل التجهيزات .

١ / ١٩٨٩ – انتهاء مبنى المعايرة واستثماره كليا . وايفاد ثلاثة متدربين آخرين الى اليابان .

٣ / ١٩٨٩ – زيارة وفد استشاري ياباني المخبر الوطني للمعايير والمعايرة .



الشكل رقم (٢) مدخل المخبر الوطني

٢- مراحل تطور المشـــروع :

٥ / ١٩٧٩ - اعداد دراسة أولية عن حاجة القطر الى فعاليات معايرة والى التجهيزات اللازمة لانشاء هذه الفعالية .

١١ / ١٩٧٩ - طلب عروض من شركات متعددة لتقديم التجهيزات اللازمة لتلك الفعالية وفق الدراسة التي تم اعدادها .

١ / ١٩٨٢ - تطوير الدراسة الأولية لتاخذ بعين الاعتبار التطور الحاصـــل بالقطر خلال الفترة السابقة .

٢ / ١٩٨٢ - اجراء أول اتصال مع الجانب الياباني عن طريق هيئة تخطيـــط الدولـــة .

١ / ١٩٨٣ - تقديم نسخة عن الدراسة حول فعالية المعايرة الى الســـفارة اليابانية من قبل هيئة تخطيط الدولـــة .

٣ / ١٩٨٣ - تقديم مجموعة من المشاريع التي تهم القطر الى المسؤولين فـــي الحكومة اليابانية من قبل السيد وزير الخارجية السوري خـــلال زيارته لليابان .

١ / ١٩٨٤ - اعادة استدراج عروض للمتطلبات الاخيرة لتقديم التجهيـــزات اللازمة لفعالية المعايرة .

٢ / ١٩٨٥ - تقديم نسخة عن الدراسة الأخيرة الى المسؤولين في الحكومـــة اليابانيـــة .

٣ / ١٩٨٥ - صدور قرار باحداث مديرية المعايرة وصيانة واصلاح الاجهـــزة العلمية في مركز الدراسات والبحوث العلمية .

٥ / ١٩٨٥ - قيام وفد استطلاع ياباني من الوكالة اليابانية للتعاون الدولي بزيارة دمشـــق ، لسبر المعلومات حول مجموعة المشاريع التي تهم القطر والتي سبق أن قدمت الى الجانب الياباني .

٦ / ١٩٨٥ - تقديم دراسة أكثر تفصيلا الى السيد وزير الخارجية الياباني خلال زيارته الى القطر السوري .

١- مقدمـــــــة :

ان امتلاك نظام قياس فعال في بلد ما يشكل احدى دعائمه الاساسية ، وذلك لضرورته لدفع عجلة الصناعة والتطوير في ذلك البلد . كما أن القياسات الدقيقة تحرض تطوير الفعاليات الاجتماعية والصناعية ، وتدل على ذلك النتائج المتأتية من هذه المعايير وتطبيقاتها الفعلية في ميادين مختلفة مثـــل الالكترونيات والقياسات البيولوجية والتحكم بالبيئة وغيرها .

قامت الجمهورية العربية السورية في عام ١٩٨٠ باعتماد النظام الدولـي للواحدات وعلى الرغم من ذلك لم تقم أية جهة رسمية بانشاء مخبر وطنـي للمعايير الكهربائية . وبدأ مركز الدراسات والبحوث العلمية خطوات نحـو احداث فعالية لتباشر تدريجيا مهام المخبر الوطني للمعايير والمعايرة ، وذلك بالتعاون مع الحكومة اليابانية الممثلة بالوكالة اليابانية للتعاون الدولي .

وقد بدأ ذلك التعاون بين الجانبين السوري والياباني بتنفيذ مشـــروع المخبر الوطني في عام ١٩٨٧ . (انظر مراحل تطور المشروع الفقرة ٢) .

تتضمن المعونة الفنية اليابانية مايلي :

١- توريد أجهزة القياس والتجهيزات التكنولوجية اللازمة للمشروع .
٢- تدريب بعض الكوادر الفنية السورية في المخابر اليابانية المختصة .
٣- ايفاد الخبراء اليابانيين والمستشارين للاشراف على تركيب وتشغيـــل التجهيزات .

تقدر القيمة الاجمالية لهذه المعونة بما يعادل أربعة ملايين دولار أمريكيا ، يتم تقديمها على مدى خمس سنوات . وقد تم حتى الآن تنفيذ مايعادل ٤٠ ٪ منها .

قام مركز الدراسات والبحوث العلمية بتشييد البناء الخاص بهذا المشروع سيضم المخبر المعايير الوطنية (من المستوى الأول) ومعايير عمل (مـن المستوى الثاني) وأخرى استثمارية ، كما سيضم فعالية لاصلاح اجهـزة القياس الكهربائية والالكترونية .

سيشـجع المخبر الوطني تدريجيا على اقامة فعاليات اصلاح ومعايرة في المراكـز والشركات الصناعية المهتمة في مجالي الكهرباء والالكترونيات ، كما سيعقد ندوات علمية ودورات تدريبية في مجالات علم القياس .

المحتويـــــــــــات

١- مقدمـــــــــة .

٢- مراحل تطور المشـــــروع .

٣- الغاية من اقامة المخبر الوطني للمعايير والمعايرة .

٤- فعاليات المخبـــــر :

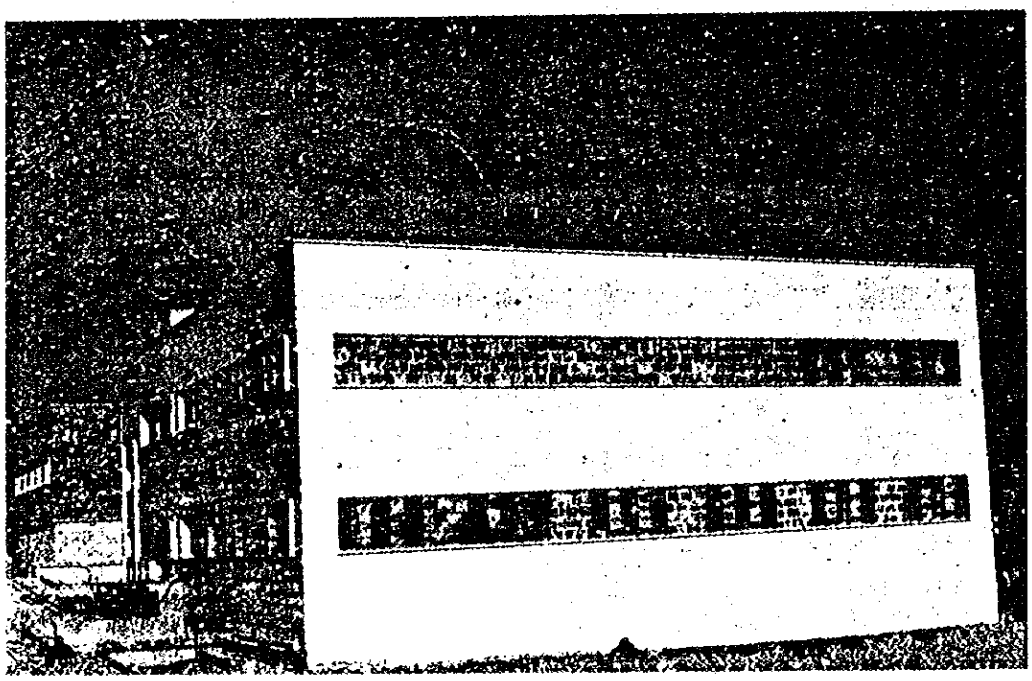
٠٤١ مختبـر التيار المستمر والمقاومات والسـعات .

٠٤٢ مختبـر التيـار المتنـاوب .

٠٤٣ مختبـر الحـــرارة .

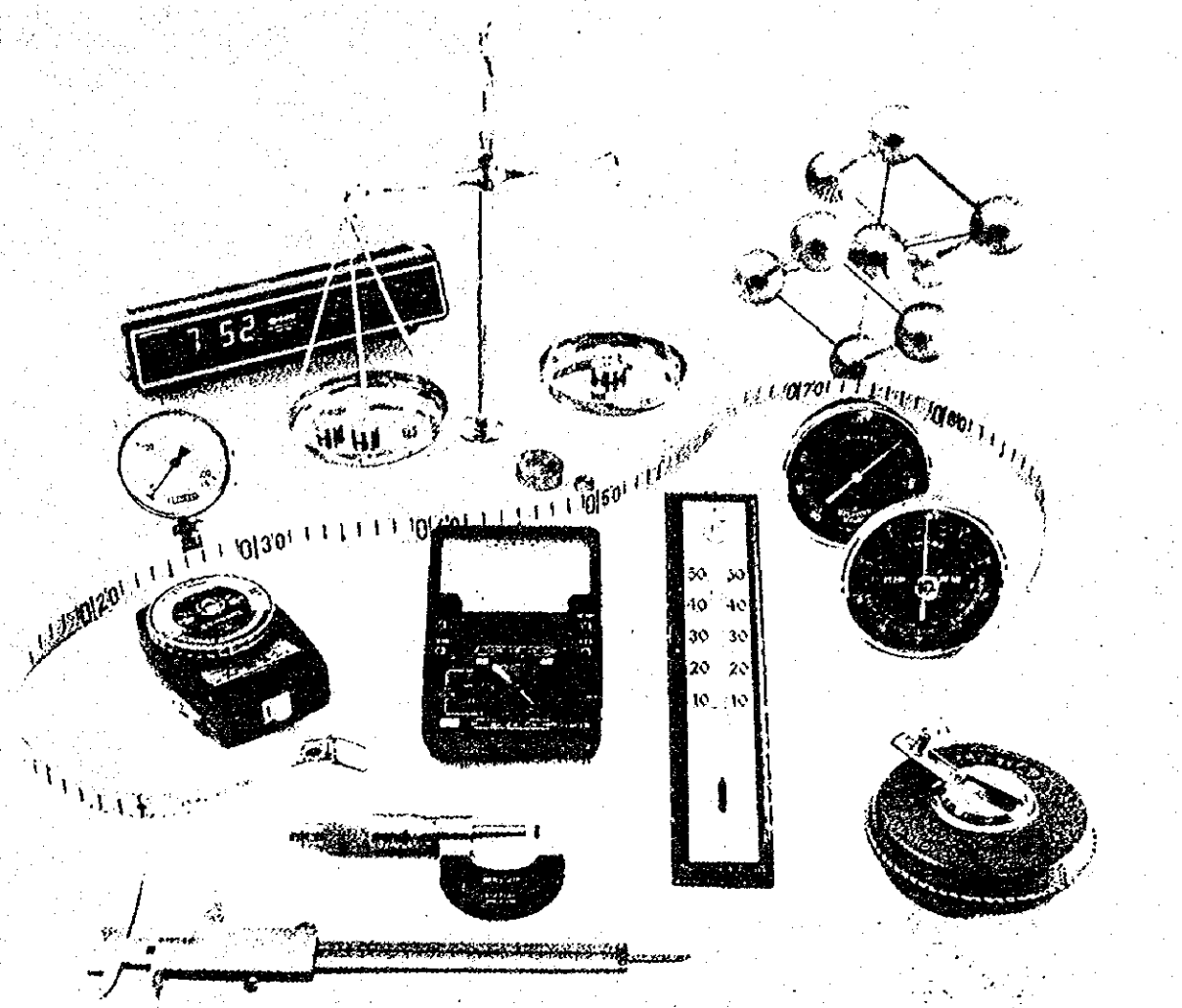
٠٤٤ مختبـر التـــردد .

٠٤٥ ورشـــة الاصـــلاح .



الشـــكل رقـــم (١)

مبنى المخبر الوطنـي للمعايير والمعايـرة



الجمهورية العربية السورية

مركز الدراسات والبحوث العلمية

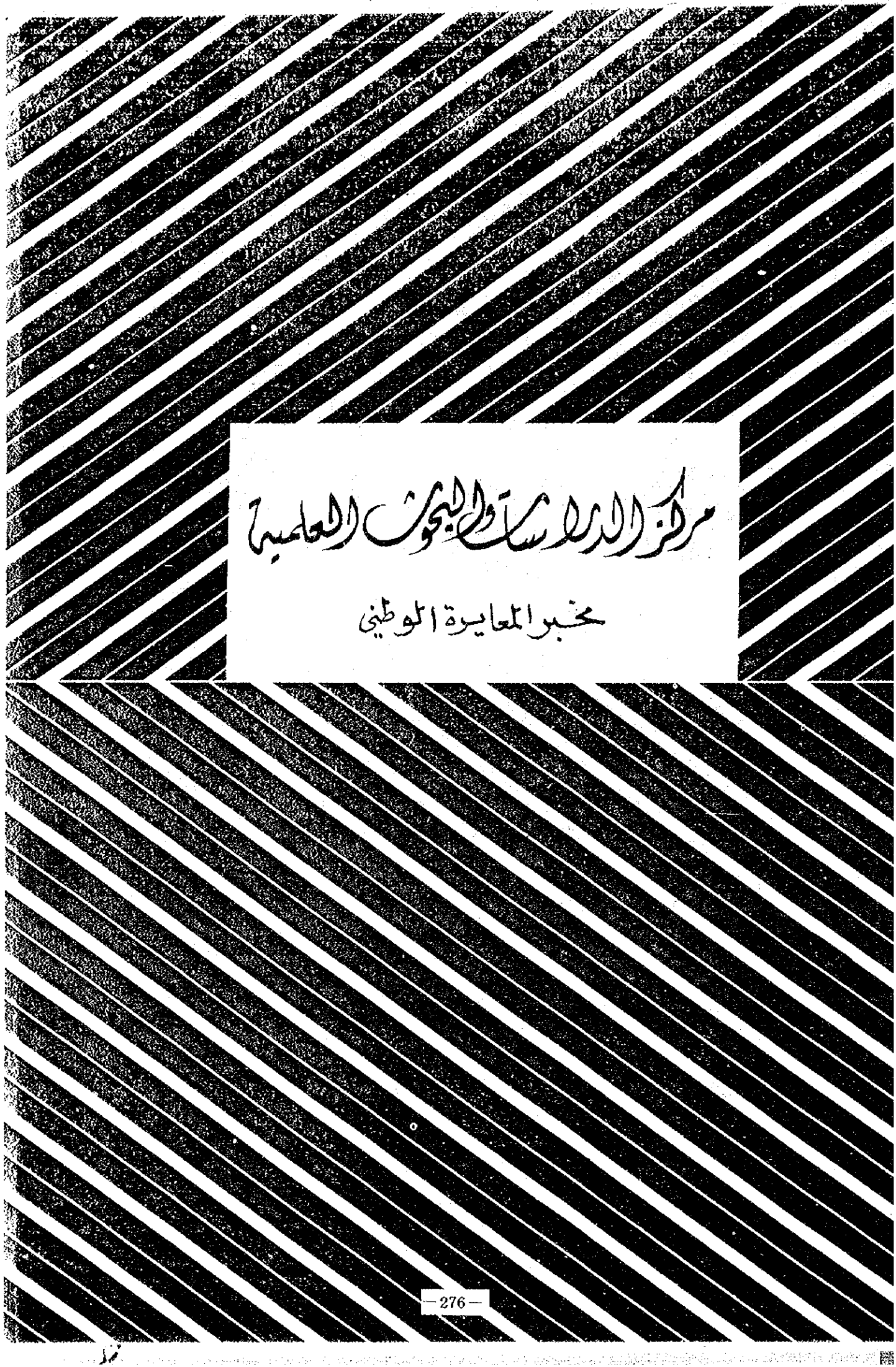
مخبر المعايرة الوطني

ص.ب: ٤٤٧٠

دمشق - هاتف ٧٧٢٦٠٣

تلكس - ٤١١٣٧٤

طباعة المؤسسة العامة للمساحة - دمشق


مركز الدراسات والبحوث العلمية
مخبر المعايرة الوطني