シリア国国立計測標準研究所プロジェクト
事前調査団報告書

１９８６年１２月

国際協力事業団

シリア国国立計測標準研究所プロジェクト

事前調査団報告書

１９８６年１２月

国際協力事業団

序　　文

シリア国政府は、科学研究調査センター（SCIENTIFIC STUDIES AND RESEARCH CENTER＝SSRC）を拡充強化することを計画し、電子電気分野の計測標準部門の新設により産業発展に資すためわが国に対し技術協力を要請してきた。

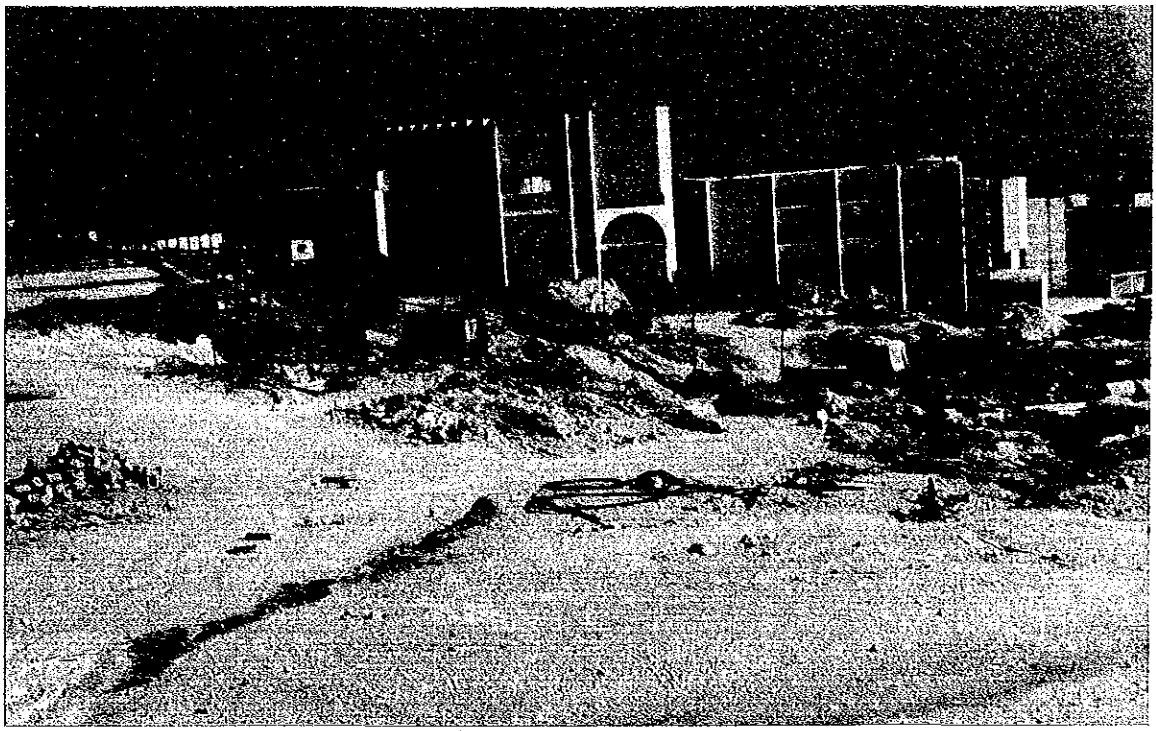
この要請をうけてわが国は、１９８６年１０月プロジェクト方式技術協力の可能性を確認するため事前調査団を派遣し要請の背景、協力分野の現状、要請内容、実施体制等について調査及び協議を行なった。

本報告書は、この調査結果をまとめたものである。

ここに調査団派遣に際し、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関係各位に対し、深甚なる感謝の意を表する次第である。

昭和６１年１２月

国際協力事業団
鉱工業開発協力部長
北　村　俊　男



建設中の科学研究調査センター（SIENTIFIC STUDIES AND RESEARCH CENTER＝SSRC）

SSRC における協議

目　　次

（参 考 資 料）

1. 事前調査団派遣

1－1 調査団派遣の経緯と目的

(1) 要請の経緯

１９８５年３月、シャラ・シリア外相が来日し、科学研究調査センター（Scientific Studies and Reserch Center＝SSRC）の拡充、強化に係る７つのプロジェクト（①通信衛星用アンテナ、②工業用自動制御、③視聴覚教育、④音声学、⑤小規模ＩＣ、⑥光学レンズ、⑦計測標準）の要請を行った。

その要請の内容及び優先順位も明確でないため、昭和６０年５月に外務省を団長とするプロジェクトファインディングチームを国際協力事業団派遣事業部より派遣し、シリア側と協議した。

その結果、とりわけ計測標準は、国民の日常生活上（生産、消費、取引、通信、医療、安全等）不可欠のものであるが、現在シリアにおいては、計測標準を供給する機関はなくこれらの標準は外国の輸入製品又は、計測器に付加されたものを、そのまま使用しているのが現状であることから、上記七項目中最優先の分野として、本件に対しプロジェクト方式技術協力の要請を行って来たものである。

(2) 調査目的

シリア国政府より要請のあった電気計測器に対する国立計測標準研究所（National Standards and Calibration Laboratory＝NSCL）設立に関し、我が国のプロジェクト方式技術協力システムを説明の上、要請目的、内容、実施体制、専門家の支援体制及びシリア側履行事項等について協議及び調査を実施し、日本側の協力の可能性を検討する。

1－2 調査団員の構成

	氏　名	職　名
団長	村田隆一	国際協力事業団鉱工業開発協力部鉱工業開発技術課課長代理
団員	安澤時雄	通商産業省資源エネルギー庁公益事業部技術課電気工作物検査官
団員	池田義雄	日本電気計器検定所標準研究部研究課長
団員	加藤敏男	横河電機株式会社品質企画部二グループ　専任課長
団員	江藤健夫	株式会社横河建築設計事務所　海外業務室長

１－３　調査日程

日程			調査内容等
1	10/19	日	東京～　　（移動）
2	20	月	～フランクフルト～（移動）
3	21	火	～ダマスカス　　（移動）
4	22	水	ＳＳＲＣ総裁表敬訪問
			シリア側とスケジュールの打合せ
			プロジェクト方式技術協力について説明
			質問書提出及び補足説明
5	23	木	資料整理
6	24	金	資料整理
7	25	土	シリア側要請の説明
	6		質問書に対する回答書の説明及び質疑
8	26	日	回答書の説明及び質疑
			ITRC（Industrial Testing Research Center）見学
			シリア側計測器等の装置リスト案の説明及び質疑
9	27	月	電気部門と建設部門に別れて見学
			SASMO（Syrian Arab Organization of Standardization and Metorology）
			電力量計（WHM）キャリブレイション・ラボ
			プロジェクトのスケジュールについて質疑
			プロジェクト協力範囲（部門別）の優先順位についてシリア側から説明
10	28	火	議事録の確認作業及び署名
11	29	水	ダマスカル～アムステルダム　（移動）
12	30	木	アムステルダム～　　（移動）
13	31	金	～東京　　（移動）

1－4　主要面談者

ＳＳＲＣ

Dr.W.C.Abdalah	: General Director of SSRC.
Dr.M.MRAYATI	: Director of electronics research institute.
Dr.A.HOUSARI	: Scientific cooperation department.
Mrs.M.KALLAS	: 〃
Dr.Z.S.SOULEIMAN	: Electronics research institute.
Dr.H.JARMOUKLI	: 〃
A.Eng.A.S.KAROUNY	: 〃
Eng.S.WAISS	: Calibration department.
Dr.M.AGHBAR	: 〃
Eng.M.KHATIB	: Architectural affairs department.
Eng.R.TARBADAR	: 〃
Mrs.A.Mallah	: General Director of SUSMO.
Eng.M.H.Charafle	: 〃 of ITRC.

2. SSRC関係者との協議要旨

日本側より今回訪問の目的は、要請の内容等を正確に把握し、収集した情報を日本に持ち帰り、プロジェクト協力の可能性を検討するための訪問であり、今回何らかのコミットメントを行う立場にない旨、協議の冒頭に説明し協議に入った。

先づ日本側より、シリアにおいてはプロジェクト方式技術協力の先例がない事もあり、プロジェクト方式技術協力のシステムにつき説明を行った。

プロジェクト方式技術協力は、専門家派遣、研修員受入及び機材供与事業より構成されており、これら三要素を有機的に組み合わせることにより、プロジェクトを効果的に運用しようとするものである。これらの要素のいづれかが欠けてもプロジェクトは成立しないとした説明についてシリア側は異存のない旨表明した。

次いで日本国内において検討を行ったシリア側の要請背景、内容等に関する疑問点を質問書として先方に提示し、シリア側がそれに回答するという形式により協議を進めた。本協議を通じ、シリア側の計測標準の現状は、機械的計測器に対する校正はごく一部実施されているものの、電気・電子計測器の校正はほとんど実施されていない。

このため本要請は、経験による要請書作成ではなく主として欧米諸国より得た情報を基に参考資料として作成したものであるとの説明があった。

また、シリアの建設事情は、建設技術面では問題はないが、資材面では空調関係といくつかの資材が入手困難である事が判明した。なお、本プロジェクトの研究室のような特殊設計条件を、シリア側では設定できないので、日本側に条件提示を求められた。

今回の協議は、休日をはさみ５日間実施され、１０月２８日協議結果として日本側及びシリア側双方が議事録に署名交換した。

3. 要請の背景

3－1 工業化推移

シリアにおける産業は、１９６０年代から１９７０年代にわたり、主要企業の国有化が図られ、企業の再編成が行われた結果、食料品、精糖、繊維、セメント、化学、エンジニアリングの６分野の公営企業体にまとめられた。政府の方針として主要基幹産業すなわち、精糖、セメント、製糸、肥料及びその他一部製造業の経営形態は公営企業体によるものとし、これらの分野は、公営企業が独占的に生産を行っており、私企業は、一般消費者が手にする最終製品の生産に集中している。また、私企業の規模は小さく、この分野で公営企業と共存しているが、労働者の数でみると公営企業の１／３程度となっている。

主要企業の国有化が図られて以来、政府による投資は急増した。

１９７０年代からのGross Fixed Investment 額の推移を表－１に示す。

表－１ ＧＦＩ

年 代	金 額
1971～1975	2,031百万シリアポンド（約200万米ドル）
1976～1980	5,122百万シリアポンド（約512万米ドル）
1981～1982	4,985百万シリアポンド（約499万米ドル）

投資は１９７０年代半ばに急増し、その後は安定的に行われている。この期間での投資の伸びで最大となった業種は、石油精製であり、次いで化学産業（肥料、タイヤ、製紙、ガラス、製革等）、セメントの順に伸びている。また、１９８１年からは、第五次５ヶ年計画が開始された。

１９８０年代の電気製品の生産量の推移を表－２に示す。

表－２　電気製品の生産量

製品名（単位）	１９８０	８１	８２	８３	８４
洗濯機（　台）	26,203	43,900	53,786	43,575	52,219
冷蔵庫（　台）	138,504	146,451	147,734	140,711	111,443
変圧器（　台）	941,979	765,044	551,457	622,833	896,549
モータ（　台）	65,444	84,751	88,842	90,718	202,325
Ｔ．Ｖ（　台）	72,058	47,189	59,418	48,766	31,366
乾電池（千個）	38,542	28,411	21,060	17,767	8,725
蓄電池（　個）	157,482	133,226	172,270	225,798	224,799
電　線（トン）	9,115	10,466	12,712	13,813	11,201
電力量計（個）	153,490	68,100	47,650	30,000	106,600
水道メータ（　個）	110,000	106,000	114,000	100,000	87,800
電　話（　台）	46,990	47,579	88,549	56,345	79,990

３－２　電力需給の推移

１９７４年からの発電電力量及び需要電力量等の推移を表－３に示す。

表－３　発電電力量と需要電力量の推移

（単位：１０億ｋＷｈ）

項　目		1974	82	83	84	85	86	90	2000	83/74	2000/83
発電電力量		1.0	5.4	6.3	7.2	7.8	10.2	18.0	40.5	22.7	11.6
輸　出		－	0.1	0.1	0.1	－	－	－	－	－	－
輸　入		0.1	－	－	－	0.2	－	－	－	－	－
供給停止		－	－	0.1	0.4	0.6	－	－	－	－	－
需要	電　灯	0.4	1.8	2.1	－	－	－	6.1	14.0	20.0	11.8
	工業・農業	0.5	1.9	2.3	－	－	－	7.9	19.2	18.5	13.3
	自家消費	－	0.2	0.3	－	－	－	1.1	2.4	－	13.0
	損　失	0.2	1.4	1.6	－	－	－	2.9	4.9	26.0	6.8
	計	1.1	5.3	6.3	－	－	－	18.0	40.5	21.4	11.6

表－３に見られるとおり、１９７４年～１９８３年までの電力需要の実績は、年平均２１％の伸び率となっているが、今後１９８３年～２０００年までの１７年間は、電灯需要では１２％程度、工業・農業用では１３％程度と想定している。しかし、発電電力量に不足を生じる場合には、供給停止（第一に電灯用を制限、第二に工業・農業用を制限）及び電力輸入で対応するが、一方では、ありとあらゆる分野で生産を減少することなく電力消費を節約するという息の長い努力が必要とされる。

なお、供給力不足が生じる原因としては、①ユーフラテス川の水位低下等による水力発電所の発電電力量の不安定性、②これを補うべき火力発電所の設備が十分でない、③需要の増大等が主な原因である。

現在シリアにおける電力需給は、非常に逼迫しており、日に４～５時間の計画停電を実施しているうえに、日に数回の短時間停電も生じているのが現状である。

このため、多数の企業では、自家用発電機を所有し、その停電に対応しているが、中には、使用電力量、全量を自家用発電機で賄っている企業さえ存在する。

このような電力供給不足は、自家用発電設備のような二重の投資と運営経費がかさむ原因となっている。

4. 協力分野の現状と問題点

4－1　計測標準の現状

発展途上国においては、産業振興が国の基盤を形成するためには重要な課題である。そのためには、計測標準を確立し製品の信頼性を高めることが極めて重要な問題である。

シリアにおける計測標準体系は、いまだ整備されておらず、本プロジェクトによる協力分野の電気標準についてみれば、国家標準はなく、電気計測器の校正を行う機関もない。長さ、質量等の度量衡については、試験機関としてＩＴＲＣがあるが、所有する標準レベルは低く、また、実際の校正作業は行われていない模様である。

シリアにおける標準化は、ＳＡＳＭＯが担当しているが、電気に関する規格は数件程度作成されているにすぎない。

以上のように計測標準が整備されていないことにより、各機関が所有する電気計測器は、特別の場合を除き（シリア航空等）無校正で使用されている。また、電気、水道メータ等一般消費者の生活に直接かかわりのある法定計量器の検査・検定も行われていないのが実態である。

このような現状からシリアにおいても産業立国の基盤として計測標準の確立を図ることが急務となっている。そのために、シリアにおける最高レベルの教育・研究センターであるＳＳＲＣは、ＮＳＣＬを設立しＳＡＳＭＯ、ＩＴＲＣと協力してシリアにおける国家計測標準体系の整備を計画している。

ＮＳＣＬは、シリアにおける国家標準を所有する計測標準センターとして位置ずけられている。第一段階として、本件プロジェクトにより電気標準と関連分野の整備を行い、産業界を含めた電気標準体系の整備を技術的、経済的な援助を含め強力に推進する方針である。

4－2　電気計測器使用状況

シリアにおける電気計測器の製造は、電力量計を除いては行われておらず、すべて輸入に頼っている。外国製計測器を扱うディーラは、修理部門を持たず、また、それらを使用する諸機関においても修理部門が整備されていない。このため一度、電気計測器が故障するとその修復が困難となり工場においては生産が停止する事態となる。この現状を加善するためにＳＳＲＣは、本件プロジェクトにより設立するＮＳＣＬの一部門として、修理部門を設けそれをモデル修理部門として電気計測器を所有する諸機関にコピーさせることを計画している。

シリアにおける電気計測器の輸入実績データは無いが、以下の機関には、校正が必要と思われる数千台のディジタル電圧計、オシロスコープ等が設備されていると推定される。

(1) 教育機関・研究機関

① ＨＩＡＳＴ（Higher Institute of Applied Sciences and Technology）：１

② 大学：４

③ 電気・通信工業関係研究所：２２

(2) 主な電気・電子工業

①配電盤工業　②ＴＶ　③変圧器、電線工業　④螢光燈・電球等

5. 要請の内容

ＮＳＣＬ設立に関する本件プロジェクトに関して、シリア側の計画及び要請の内容は以下のとおりである。

5－1 要請内容の詳細

シリア側の要請は、大別すると本設備を収容する建物の建設に関する助言、機材供与、研修の実施である。

(1) 建物の建設に関する助言

ＮＳＣＬを適切に運営するためには、必要とされる環境条件（建物の構造、電気設備等も含む）を満たすべく建設上で特別の配慮が要求される。これらの環境条件については、シリア側において決定することが出来ないため、日本側にその条件提供を要請し建設上の助言を求めている。助言を求めている事項は以下のとおりである。

① シリアの建設計画

② 一次、二次標準室の温湿度条件（シリア側は２３℃±0.６℃、湿度４５％±１０％）

③ 空調（シリア側は、セントラル方式で計画しており、必要な空調機材の供与を要望している。）

④ シールドの必要性

⑤ 静電気防止対策とその工法（シリア側は、材料の供与についても要望している。）

(2) 供与機材

シリア側が要望した機材の内容は以下のとおりであるが、要請機材は絶対的なものではなく、参考例として作成した。また、①、②の機材総額を３００万米ドルと見積もっているが、これは各製品についてメーカに見積依頼した結果の額であるとの説明があった。

① 計測標準室用機材

Ａ．一次標準

ａ）標準電池

ｂ）標準抵抗、標準コンデンサー

ｃ）周波数標準器

ｄ）温度標準については、日本側の提案を要望

Ｂ．二次標準

ａ）電圧、電流：直流及び交流電圧（１０００Ｖまで）及び電流の校正システム

ｂ）抵抗、インダクタンス、コンデンサ：ＬＣＲメータ

ｃ）高周波：カウンタ、アッテネイタ、電力測定器（２６.５ＧＨｚまでの通信機器管理

のための校正設備が必要であるとの強力な要請があった。）

C．三次標準

以下の測定器類の校正を行うための機材

a）ファンクション・ジェネレータ及びシグナル・ジェネレータ（オーディオ～RF帯まで）

b）オシロスコープ、スペクトラム・アナライザ

c）電源：DC、160V、20A

AC、380V、60A、45～400Hz

d）ディジタル・マルチメータ、LCRメータ

② 修理部門用機材

以下の測定器類の修理を行うためのそれぞれの修理ベンチ

A．オーディオ・ビデオ周波数帯の計測器

B．カウンタ

C．ディジタル・マルチメータ

D．電源

E．ファンクション・ジェネレータ

F．オシロスコープ

G．X－Yレコーダ

③ 特殊空調機器、無停電電源、電源安定化装置

特殊空調機器は、計測標準室の一次及び二次標準室を恒温に保つための空調機器である。

また、無停電電源、電源安定化装置は、停電があった場合にも中断することなく、標準器類に安定した電源を供給する装置である。

計測標準は、現実にはあるハードウエア（例えば、標準電池、標準抵抗等）で実現されるので、計測標準に対する要求精度は、それを用いて校正される計測器よりも十分高い精度が要求される。例えば、直流電圧の場合には、少なくとも10万分の1のオーダであり、このような高精度標準の実現には、変化の少ない一定の室内環境の下においてのみ可能である。なぜならば、標準器であるハードウエアを構成する多くの物質の特性は、温度変化等に影響されるからである。

従って、一次及び二次標準を恒温室内に設置することにより初めて必要とされる精度の実現が可能となる。このため高度の温度制御装置を持つ特殊空調機器が必要とされる。また、同様の問題が電源の安定性にもあり、例えば、わずかな時間の停電が動作をくるわせ、校正作業の大きなさまたげになる。これらの対策として無停電電源、電源安定化装置の設置が必要となる。

このように、本機材はＮＳＣＬ設立に必要不可欠なものであるにもかかわらず、シリア国内における調達は困難であるとして、強力な要請がなされた。

6. 日本の他の協力との関連

我が国のシリアに対するプロジェクト方式技術協力は、現在までいかなる分野においても実施の実績はない。また、シリアにおける電気・電子部門の計測標準分野に対する他の方式の技術協力の実績もないため、日本の他の協力との関連性はない。

7. 相手国のプロジェクト実施体制

7－1　実施機関の組織及び事業概要

本件プロジェクトは、大統領府直属の教育研究機関であるＳＳＲＣにおいて実施される。ＳＳＲＣは、シリア国の産業発展に資するため、科学分野における研究を国家レベルで行うことを目的に１９６９年に設立された。

現在の組織は、図－１に示す通りであり、年間予算は、約３００万米ドル、スタッフ２５０名程度で以下の事業を行っている。

Ａ．国家レベルの研究

Ｂ．ＨＩＡＳＴの運営

Ｃ．電子工業分野の研究

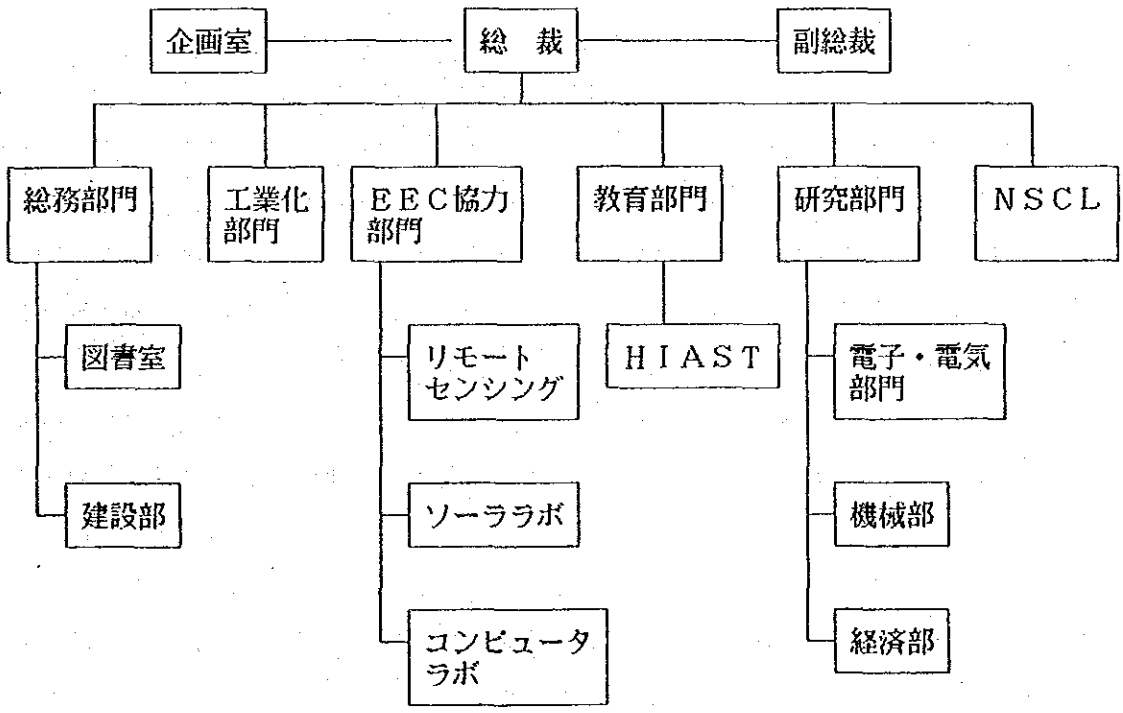
Ｄ．諸外国との技術交流

今回調査を行ったＳＳＲＣの教育・研究機関は、次の通りである。

① ＨＩＡＳＴの電子工学実験室

フランス製及びフィリップス社製電子計算機を有し、アナログ、デジタル回路の実験ベンチが設備されている。

図－１　ＳＳＲＣ組織図



② コンピュータ研究室

コンピュータは、Bull社のＳＤ－７、７４ＭＢのハードディスク付で７台の端末機が設備されている。ＯＳは、ＵＮＩＸを使用している。

③ リモートセンシング研究所

ランドサット衛星の情報処理を行う。ユーフラテス川の水利研究に利用している。

④ 太陽エネルギー研究室

集熱器、太陽電池（フランス製）を研究している。

⑤ 石油、潤滑油研究室

ガスクロマトグラフ、原子吸光分光器、走査型電子顕微鏡等各種分析計を所有している。なお、潤滑油試験装置は自国製であった。

７－２ ＮＳＣＬの組織と任務

ＮＳＣＬは、ＳＳＲＣの一部門として設立され、スタッフ数４０名程度で４部門から構成される。それぞれの任務は以下のとおりである。

(1) 計測標準部門

シリアにおける国家標準機関となるもので、そのために、一次、二次、三次レベルの電気標準を確立・維持する。所有する一次標準は、ＰＴＢ（西独）、ＥＴＬ（日本）等の国家標準機関へ校正依頼する。本部門では、ＳＳＲＣ及び他機関の所有する電気計測器を校正するが、主に二次レベルの測定器を対象とし、三次レベル測定器については、それを所有する各機関自からが校正が行えるような体制に強力に指導する方針である。

なお、機械量、物理量の計測標準部門は将来に設立を計画している。

(2) ドキュメンティション部門

本部門には、図書室を設け、電気標準及び校正試験に関する技術資料、規格書及び雑誌等を所有する。

さらにＮＳＣＬ及び他機関の技術者を対象とした技術研修を実施する。（統計も含む。）

(3) 修理部門

ＳＳＲＣが所有する計測器の修理を担当する部門であり、測定器の種類別の修理ベンチ（１０～２０種類）を設備し、モデル的修理機能に育成して他の機関にそれを見習うよう指導する。

(4) 運営管理部門

一般窓口業務に加え、校正依頼窓口業務を行う。校正スケジュールの管理、測定結果に保存に付いては、コンピュータ化を行う計画である。

7－3　プロジェクトの予算措置

ＳＳＲＣと調査団との議事録にもある通り、ＳＳＲＣは、建設工事（整地工事を含む）を2,０００万シリアポンド（約２００万米ドル）と概算し、その内の７０％に相当する1,４００万シリアポンドを、１９８７年度の予算に計上している。建設費以外の費用については、まだ予算措置されていない。

7－4　建築、施設等の計画

本プロジェクトの事前調査に当たって、シリア側からの要請書を入念に検討し、日本国内の類似施設の見学とヒヤリングを行い、本プロジェクトのためにシリア側が建設すべき建物についての特殊性や要求項目の概略を把握した上で、建築、構造、設備及び電気計測に影響を及ぼすシリアの状況やＮＳＣＬの活動計画等についての質問書を用意した。

初回の協議の席でシリア側へ手渡し、３日後に回答を得て、その内容の確認も行った。また、建物建設のための技術上及び資材調達上の問題を把握するための調査も行った。

その結果、建設技術面は問題ないが、資材面では空調関係といくつかの建築材料は入手が困難と思われる。ただし、本プロジェクトの研究室の様な特殊条件をシリア側で設定できないので、日本側にその条件の提供を求めている。

シリア側は、本プロジェクトの早期実現に対する意欲は非常に強く、建設予定地（整地工事を要する。）は既に決定されており、要請書に添付されていた建築の計画図を日本側が了承すれば、直ちに建設準備に着手したい旨の発言があった。しかし、本プロジェクトへの日本側の協力も正式決定されておらず、建築への与条件も確定していない段階であるので、建築計画や工法についてアドバイスしたり、意見交換を行うにとどめた。

要請の中に、「建築の設計」と「電力供給システムの設計及び施行」を日本側に要求しているように解釈できる箇所があるので、その意図を確認した結果、「建築設計のための与条件」と、「電力安定供給装置の設計とその機材供与」であることが分かった。

(1)　建築計画について

ＳＳＲＣが用意していた平面、断面、立面図を、ＮＳＣＬの暫定的組織と活動計画を基に検討して、機能や経済の観点から、建物の形、必要部屋数、部屋の配置及び建物階高等についてアドバイスを行った。

(2)　空気調和設備について

一次や二次標準のように高精度の機器の精度を維持するには、変化の少ない室内環境が不可欠であり、非常に厳格な空調の制御を必要とする。この空調設備が、ＮＳＣＬ建築上の最重要事項である。

シリア側は、ＮＳＣＬの空調をセントラルエアコンで計画し、その空調機器の供与を第一

優先で日本側に要求して来た。供与の可否に関しては触れずに、技術的、経済的観点及び危険負担の面から見ても、この規模ではセントラルエアコンよりもパッケイジタイプの個別空調の方が良いとアドバイスをしたが、シリア側は合意していない。表－４に示す三種類の空調システムの比較表でも明らかなように、セントラル方式では、故障やメンテナンスに備えて予備機器を持つのが常識であり、サプライとリターン両方の長いダクトが必要となり、設備・熱損失ともに大きく、また、大きな階高と専用の空調機室を必要とする等の不経済要素がある。個別式パッケージタイプならば、それらの欠点が無くなる。

要請書は、研究室の温度は２３℃±０.６℃、湿度は４５％±１０％の記述があるが、シリア側はこの数値には固執せず、日本側より適当な値をアドバイスして欲しいと述べている。また、ダマスカスの気候より判断すると、年間を通じて相対湿度がかなり低いため、静電気の発生を予防するために、加湿装置も必要となる。一次と二次標準の研究室は、一年中、昼夜を問わず一定の温度を保つことが不可欠であり、特別の空調制御システムを用意しなければならず室の壁面、天井に対する断熱工事等の、省エネルギーに対する配慮も必要となる。

表－４　空調システムの比較

	空冷直接式 セントラルタイプ	空冷直接式 パッケージタイプ	水冷間接式 パッケージタイプ
クーリングタワー （含むポンプ）	不　要	不　要	要
屋　外　機	要	要	不　要
ダ　ク　ト	要	不　要	不　要
冷媒配管	要	要	不　要
新鮮空気管	不　要	要	要
専用機械室	要	不　要	不　要
必要階高	高	低	低
代　替　機	要	不　要	不　要

(3) シリアの建設事情

最近の都市部の建物は、鉄筋コンクリート造の柱・梁と床（内部に中空コンクリートブロックを埋め込んだものもある。）に仕上げ材は、床がテラゾータイルかモルタル塗（高級なものは、大理石。）、壁及び天井はモルタル塗りにペイント仕上げ、サッシは木又はアルミ製、屋内ドアーはベニヤフラッシュであった。

ダマスカスやホムスでは、多くの建設途中の建物が見かけられたが、一部の物は躯体工事終了の段階で中断している物もある。その中断の理由は、民間の工事で資金不足に陥ったもの及び仕上げ材の調達不可による物の他に、躯体の状態で売出し、買主の要求に応じて仕上げを行うため、買手を待っている物もあるということであった。

資材調達面から見ると、シリアは鉄・アルミ・プラスチックや木材等を輸入に頼っているので、それらを使用した製品も入手し難いものがある。床用ビニール・タイル、壁と天井に使用すべき石膏ボードの類が入手不可、また、鉄筋・鉄材と天井材が入手困難である。設備資材では空調関連機材がウィンドウタイプの物を除いては入手できない。現在のところ、設備配管用の鋼管は入手できるが、硬質ビニールパイプは非常に入手困難である。電気設備関係では、一般的なケーブル以外のケーブルと火災検知器は入手できない。火災報知機も入手困難である。

建設労働者の供給状況は、熟練労働者は十分過ぎる程いるが、未熟練労働者の方が少なく、これが建設費を高める結果を招いている。

7－5 カウンターパートの配置計画

ＳＳＲＣは、ＮＳＣＬの暫定的組織図を作成したが、それに対する人員配置計画までは行っていない。しかし、ＮＳＣＬ全体で３５～４０名程度となるであろうと考えている。その中で、一次と二次標準の校正に３～４名、三次には１０名強となろう。その他に、修理・保守のためのテクニシャンも１０名以上となることが予想される。

7－6 政府関係機関の支援体制

ＮＳＣＬの母体であるＳＳＲＣは、「道徳的人格と経済的自治」を持った大統領直属の機関で、人材的にも財政的にも非常に恵まれていることが感じられた。組織上、ＮＳＣＬはＳＳＲＣの総裁に直属しているが、職員は、ＳＳＲＣから選抜されるであろうし、また、その他の面でもＳＳＲＣ全体と関係を持つであろう。その他には、工業省所管のＩＴＲＣが物理量校正の面で、ＳＡＳＭＯとは、種々の規格その他校正関連文書の面での協力が予定される。

8. プロジェクト協力の基本計画

8－1 協力の方針

本プロジェクトの目的は、ＳＳＲＣが建設中の電気・電子計測を中心とするＮＳＣＬの設立に関する基本的な部分につき、技術及び設備面から協力し、ＮＳＣＬの活動が学術、産業等の分野に基本的な貢献を果たすようにすることにある。

具体的な目標は下記の項目である。

① 基本電気量の国内での最上位の計測標準を実現。（国家標準の確立）

② 実用段階での各種の高精度標準を導くための計測技術、精度管理技術等の修得

③ 実用計測標準の電子計測器の校正・修理への利用

④ 高精度計測を行うための必要な環境条件（恒温、安定電源、電磁遮蔽等）の実現

これらの目標は、計測標準の体系が階層的な構造を持つため互いに関係があるので、系統的かつ段階的に進めて行くことが、重要である。

8－2 協力の範囲と内容

ＳＳＲＣからの要望と建物建設の工程を基に考慮して、協力の範囲と内容を、計測標準の確立、計測器の修理及び環境条件の確保に大区分する。

(1) 計測標準の確立

計測標準に関する協力範囲は、その種類とレベルにより下記のごとく区分した。

区分と主な機器については、別表－２を参照。

① 計測標準の種類

Ａ．直流電圧、電流

Ｂ．抵抗、キャパシタンス（静電容量）

Ｃ．電気式温度計（０～1,000℃）

Ｄ．交流電圧、電流（～１００kHz）

Ｅ．電力、電力量（５０Hz）

Ｆ．高周波電力、減衰量（～1,０００MHz）

Ｇ．周波数

② 標準のレベル

各レベルは、標準器及び関連する計測器と補助機器を用いて実現される。

Ａ．一次標準

国家標準となる基本的な量の最高精度の標準。国際度量衡局又は先進工業国の国家標準と輸送用標準器を介して校正される。

B．二次標準

一次標準を基に範囲を拡大又は誘導した高精度の標準。実用される最高の精度の計測器である。

C．三次標準

計測器の校正、調整に使用される標準。その精度は目的により異なるが、通常二次標準により校正される。本プロジェクトでは、修理ベンチで修理された計測器の調整と校正にも使用する。

上記①のF高周波及びC.電気式温度計測は、一次標準を省略するが、その他の各計測標準は全てのレベルを持つ。この省略の理由はＮＳＣＬ発展の第二フェーズの将来において協力するのが、適切と判断されるからである。

高周波の標準は、その国家標準の必要の前に、現在各所で使用されている計測器の保守のための標準が必要とされている。従って修理ベンチの機能に適合する計測量を対象とする。

温度計測器の校正は、直流電圧と抵抗の校正の応用であり、マルチメータの機能の一つとなっている計測器も多く、校正の必要性も高いので取り上げた。

(2) 計測器の修理

修理する計測器により下記のベンチを設け、修理作業に必要な整備をする。調整、校正には三次標準の設備、場合によっては二次標準の設備を利用する。

① 電圧、電流、抵抗計（マルチメータ）、電気式温度計

② 上記①の記録計、Ｘ－Ｙ記録計

③ 直流安定化電源、標準電圧発生器

④ オシロスコープ

⑤ 信号発生器、発振器、ファンクション・ジェネレータ

修理ベンチの共用付帯設備として温湿度試験槽及び小規模な機械工作設備、工具と測定工具を置く。

修理技術の教育訓練は、技術者の研修を受け入れることにより行うが、研修の時期は、修理ベンチを使用して経験を積み、修理についての問題点を持つようになった時期が適当であろう。

(3) 環境条件の確保

ＳＳＲＣ側が建設計画中の建物の構造、付帯設備等につき、標準研究所特有の条件について日本側のアドバイスが求められている。その調査の中で、高精度の標準維持と計測に必要な条件である恒温室を作るための空調機器がシリア国内では入手できないことが明らかとなった。この機材を供給し恒温条件を実現することが本プロジェクトに必要な前提条件となる。

同じく、計測器に供給する電力の品質の確保を行わなくては、計測結果であるデータに信

頼が置けなくなるので、電源安定化装置が必要である。特にディジタル信号を扱う機器や計測器制御用コンピュータの電源には、瞬時停電対策のため、無停電電源装置（ＵＰＳ）を付属させる必要がある。

これら空調機器と電源安定化装置の設計、試運転調整、保守整備及び技術指導は本プロジェクトにとって不可欠な重要なテーマである。

８－３　専門家派遣

ＳＳＲＣ側研究員のレベルから見て、日本側から派遣する専門家は、以下のごとく分類される。

(1)　計側標準と計測器の管理技術者

１名を長期派遣

(2)　専門分野毎の計測技術と計測器校正の技術者

８－２(1)での区分を用いると、

Ａ．直流電圧、電流

Ｂ．抵抗、キャパシタンス（静電容量）

Ｃ．電気式温度計（０～1,０００℃）

上記分野にて延べ２名を２回にわけ各３箇月程度派遣

Ｄ．交流電圧、電流（～１００kHz）

Ｅ．電力、電力量（５０Hz）

上記分野にて延べ２名を２回にわけて３箇月程度派遣

Ｆ．高周波電力、減衰量（～1,０００MHz）

Ｇ．周波数

上記分野にて延べ３名を３回にわけて各３箇月程度派遣

(3)　恒温空調設備技術者

設備の試運転調整時に１名を２箇月程度派遣

(4)　修理技術者

直流、低周波用計測器の修理技術者を１名、高周波用計測器の修理技術者を１名、各２箇月程度にわたりシリア側修理技術者の研修終了数箇月後に派遣及び、最終年度に機材の整備点検の目的を兼ねて、同じく２名を各２箇月派遣

８－４　研修員受入計画

計測標準及び校正技術に関する研修員の受入は、派遣する専門家に相当する人数の２倍程度の人員を、日本において校正設備のシステムアップを行い完了した時から、計測管理に関する

研修を行うことが望ましい。

修理技術者の研修は、ＮＳＣＬにおける修理業務をある程度経験し、疑問をいだいた技術者に対し行う。研修のかなりの部分は実際の修理作業を経験させることが必要である。

８－５　機材供与計画

(1)　計測器、標準器

各分野別に、ＮＳＣＬにおける部屋の配分も考慮にいれて、可能な限りシステム化して使用する標準供給範囲又は校正範囲を明確にするよう機材を構成して供給する。

各分野別の主な計測器と標準器を別表－１に示す。具体的な機種選定は今後の課題であるが、使用条件から考え精度より信頼性を優先して選定すると共に、日本電気計器検定所における検査を行うよう準備しておくことが望ましい。

計測及び校正のための資料とマニアルの用意も本プロジェクトの対象に含めるべきである。

修理ベンチを含む年次計画を別表－２に示す。基礎から応用へ、低精度から高精度への原則により順次実施する。しかるに初年度に修理ベンチをあげたのは、ＮＳＣＬの建物が完成するまでの間、緊急度が高く高精度の恒温室を必要としない修理業務と関係する三次（必要な場合は二次も）標準から、プロジェクトを開始したいとのＳＳＲＣ側の要請に答えるためである。

(2)　恒温空調機器、電源安定化装置

ＮＳＣＬの建物の建設スケジュールに合わせて供与する必要がある。これらが設置されてから一次及び二次標準が使用可能となる。このため、これらの機器は現地の気象条件と電源事情等に適した性能を持つだけではなく、運転実績があり、信頼度が高く、かつ保守の行い易いものでなければならない。

別表－1

A．直流電圧、電流

一次標準		二次標準	三次標準
標準器	測定器等		
標準電池群 （恒温空気槽に収納） 〔国家標準〕 ＊標準電池群 （恒温空気槽に収納） 〔輸送用〕	電位差計 システム 分圧器 標準電圧 発生器 補助機器類	直流電圧 標準器 直流標準電圧 電流発生器 （精密級） 分圧器 デジタル 電圧計 （精密級） 直流標準電流 発生器 分流器 補助機器類	直流標準電圧 電流発生器 （普通級） デジタル電圧計 （普通級） 直流電圧記録計 直流電流計 分流器 補助機器類

＊印は、外国の校正を依頼するもの。以下同じ。

B．抵抗、静電容量

一次標準		二次標準	三次標準
標準器	測定器等		
＊標準抵抗器群 （恒温油槽中に保管） 〔国家標準〕	抵抗測定システム	標準抵抗器	抵抗器
		可変抵抗器 （精密級）	可変抵抗器
		抵抗測定用ブリッジ	デジタル抵抗計 （マルチメータ抵抗レンジ）
積み重ね抵抗器 〔抵抗比標準器〕			
＊標準コンデンサー 〔国家標準〕	容量測定システム	標準コンデンサー	可変コンデンサー
		標準インダクタ	ＬＣＲメータ（低周波用）
		デジタルＬＣＲメータ	ＬＣＲメータ（高周波用）
	補助機器類	補助機器類	補助機器類 絶縁抵抗計 オシロコープ

C．温度（電気式温度計）

一次標準		二次標準	三次標準
標準器	測定器等		
＊標準白金 測温抵抗体	各種温度槽 及び高温炉	測温抵抗体 各種熱電対	二次標準器による
	基準接点槽	温度記録計	
＊標準熱電対		基準接点槽	
	デジタル 電圧計		
	標準抵抗器	デュアー瓶	
	直流 定電流源		
	ペンレコーダ		
	補助機器類 消耗品類	補助機器類→ 消耗品類 ↓ 油脂、溶剤 補償導線	純水製造装置 小型製氷機 溶接機 ろう付け設備 排気ファン及び ダクト

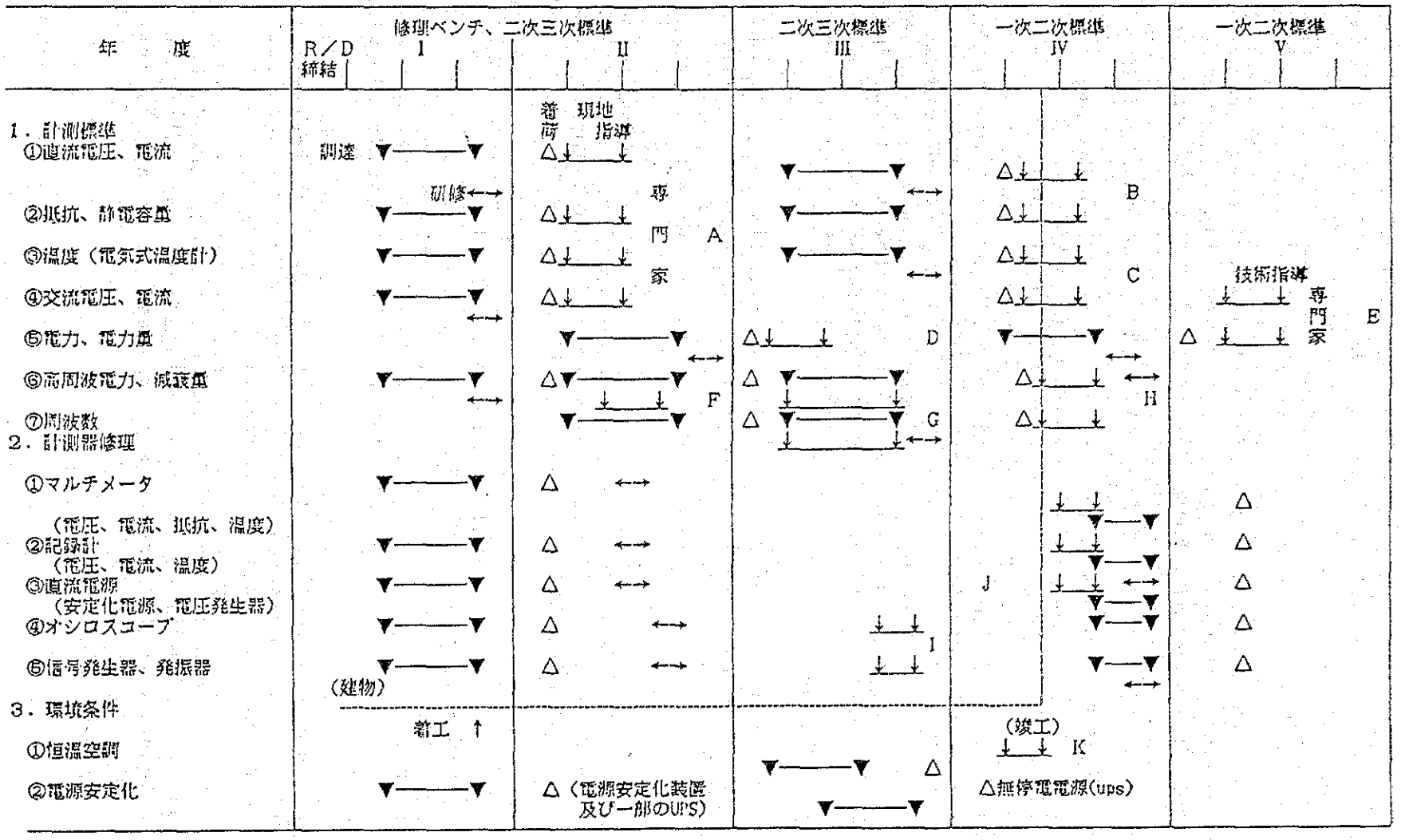
D．交流電圧、電流

一次標準		二次標準	三次標準
標準器	測定器等		
＊交流比較器 〔国家標準〕	直流定電圧源	デジタル交流 実効値電圧計	交流電圧計
	直流定電流源		交流電流計
	交流定電圧源	交流電流計	
	交流定電流源	計器用変圧器 変流器	交流標準電圧 電流発生器
		誘導分圧器	
		校正用電源装置	
	補助機器類	補助機器類	補助機器類 記録計 デジタル マルチメータ オシロスコープ 歪率計 絶縁抵抗計 耐電圧試験器

E．電力、電力量（５０Ｈｚ）

一次標準		二次標準	三次標準
標準器	測定器等		
＊標準電力変換器		標準電力計 電力量計用 電源装置 時間計 デジタル 電力計 計器用変成器 変流器 交流電圧計 交流電流計	デジタル電力計 単相電力計 校正装置 補助機器類 デジタル マルチメータ オシロスコープ 記録計 絶縁抵抗計 耐電圧試験器 温度計 等

別表－２　ＮＳＣＬ設立　技術協力プロジェクト



注．長期専門家派遣については現在検討中

REPORT

During the period 21/10 - 29/10/86 several meetings were held between Japanese delegation and SSRC delegation concerning National Standards and Calibration Laboratory project (NSCL).

The meetings were attended from Japanese side by:

- Mr. R. MURATA : Deputy head of mining & industry development cooperation department (JICA).
- Mr. T. ANZAWA : Inspector of electric equipment and material Agency of Natura/ Resources and Energy (MITI).
- Mr. Y. IKEDA : Manager of research section technical research laboratory (JEMIC).
- Mr. T. KATOH : Manager of quality planning department (YOKOGAWA Electric Corporation).
- Mr. T. ETOH : Manager of overseas department office (YOKOGAWA Architects and Engineers INC).

and from SSRC, by:

- Dr. M. MRAYATI : Director of electronics research institute.
- Dr. A. HOUSARI)
- Mrs. M. KALLAS) Scientific cooperation department.

- Dr. Z. S. SOULEIMAN)
- Dr. H. JARMOUKLI) Electronics research institute.
- A. eng. A. S. KAROUNY)

- Eng. S. WAISS)
- Dr. M. AGHBAR) Calibration department.

- Eng. M. KHATIB)
- Eng. R. Tarbadar) Architectural affairs department

Meetings were partly attended by Mr. HAYASHI (commercial attachee at Japanese embassy) and Mr. YOSHIMURA (resident representative of Japan international cooperation agency).

Dr. A. W. Chahid, General Director of SSRC, opened the preliminary meeting by wellcoming the delegation and stressing upon SSRC willingness to cooperate with Japanese side and to exert all

possible efforts in order to reach successful results in cooperation projects, similar to those already attained with the previous Japanese mission concerning T.V. lab. Japanese side thanked Dr. CHAHID for his wellcome and explained JICA's role in scientific cooperation and mentioned that the mission aim is to act as a preliminary servey team for this project.

Syrian side gave a description of the NSCL project: its aims and purposes, its policies and strategies and explained the tentative organization of NSCL. He also emphasized the extreme necessity of NSCL in Syria, and the need to reduce the time allocated to the realization of the project.

The project was first studied in 1983 and handed to the Japanese embassy in that year. An advanced study was given to a Japanese mission in Damascus in April 1985 and to the Japanese Foreign Minister in the summer of 1985. A copy of the study was also given to JICA team who came to Damascus on 27/7/1986 for the television laboratory project.
Nevertheless, Syrian side considers the NSCL project as a flexible proposal open to necessary modification and appropriate advice suggested by Japanese delegation in order to improve specifications and to ensure its successful results.

It was agreed to discuss the following points:
a - Project scope and aims.
b - Questionnaire presented by Japanese delegation.
c - Tentative equipment list presented by Syrian side.
d - Time schedule for the project implementation .
e - Training.
f - Building requirements.
g - JICA cooperation programme and financing procedures.
h - List of priorities.
i - Next phase of the project

a - Project scope and aims:

There is no NSCL in Syria now for electrical and electronic equipment. Calibration electronic instruments are not applied. The need for the NSCL is urgent. NSCL will cooperate and coordinate with SASMO and ITRC (see attached answers in annex 2).

NSCL will have primary, secondary and tertiary levels. It will have a repair facility for electronic instruments using the inventory of electronic components available at SSRC. This repair facility is necessary because foreign companies do not have usually maintenance and repair workshops in Syria. NSCL will promote the creation of such facilities gradually in the large electronic

companies and centers in Syria. NSCL will hold seminars and training courses on maintenance and tertiary calibration for technicians in syrian electrical and electronic centers and companies.

b - Technical questions about the project:

Japanese side handed a questionnaire list (see Annex 1) about Syrian research centers relating to calibration matters, industrial evolution in Syria, electrical energy in addition to specific and detailed questions concerning the NSCL . After discussion, Syrian delegation provided the appropriate answers, (see Annex 2).

c - Tentative equipment list:

Syrian delegation presented a list including some of the required equipment. The list contents were discussed and necessary clarifications were given. It was mentioned that it is a tentative list including examples of equipment, intended to cover some of the planned future activities. So, it should not be considered as a definitive list (see Annex 3).

d - Proposed time table of project realization:

Syrian side proposed a time schedule for the project implementation. According to the phases shown in Annex 4, the cooperation project would start in parallel with beginning of construction work conforming to the technical specifications that the Syrian side would like to be provided with by Japanese side. Then, supply of conditioning , electricity regulators and UPS will follow , side by side with the pursuing of construction work.

e - Training:

As for training, it was proposed that it will be executed according to JICA's training programmes and will undertake the formation of appropriate numbers during the period of cooperation. The Syrian delegation estimates the number to be about 15 persons.

f - Building requirements:

The two sides discussed building requirements and necessary specifications - appropriate plans were submitted to Japanese side - discussions included matters as: lab. insulation ,conditioning, aeration , floors number , vibration , etc ...
Syrian side gave an approximate estimation of the building financial requirement as follows:

4500 S.P. x 4000 m = 18.000.000 S.P.
With the site preparation it becomes around 20.000.000 S.P., this sum will be partly allocated (2/3) during year 1987 . It should be mentioned that temporary laboratory spaces exist and can be used for accomodating tertiary as well as repair and maintenance work stations . Two alternatives were presented to the Japanese side.

g - JICA cooperation programs

Japanese delegation explained the JICA cooperation programmes and procedures and means of finance adopted by JICA. Syrian side requested a financial assistance of approximately (3) million U$ allocated tentatively as shown in annex (5). Japanese side will examine the allocation of the requested financing over (4-5) years in order to cover the project requirements.

h - List of priorities:

Syrian side defined following list of financial priorities:
1 - Central air conditioning.
2 - Uninterrupted power supply.
3 -Instruments needed for secondary level.
4 - Instruments needed for tertiary level.
5 - Instruments needed for primary level.
6 - Instruments needed for maintenance and repair.
7 - AC power supply: 400 HZ/2 KVA.

i - Next phase of the project:

Japanese side declared that the objective of the present mission is to collect and gather information which will be submitted to concerned japanese authorities. After examination, these authorities will decide either to dispatch surveyors team, or to designate the implementation mission which will finalize the plan for the project realization.
It is expected that equipment will be supplied according to the following time schedule:
1 - Tertiary level calibration equipment.
2 - Repair and maintenance equipment.
3 - Documentation.
4 - Secondary level equipment.
5 - Primary level equipment.

Experts will be dispatched according to the programme agreed by both sides when necessary.

Visit of some laboratories

During the above period, Japanese delegation visited some labs at SSRC such as: Solar energy lab, Remote sensing lab, Oil and lubricants lab, HIAST buildings and labs, some buildings under construction. In addition, the delegation effected the following visits:

* ITRC : Industrial testing and research center.
* SASMO: Syrian Arab standards and meterology organization.
* Watt-hour meters calibration station (ministry of electricity).

The attached documents (Annexes 1 - 2 - 3 - 4 - 5) were handed to the Japanese delegation who presented in his turn a set of technical documents and brochures.

for "SSRC"
Mr. MRAYATI

for Preliminary Survey Team
Mr. MURATA

Annex 1

1. Are there any laws regulating the measuring instruments?
If any, what kinds of measuring instruments are regulated by them?

In Japan, Measurement Law prescribes the accuracy classes of legal measuring instruments (watthour meter, measure, etc) and organizations who perform the pattern approval and verification.

2. According to your proposal, you have not a calibration and measurement laboratory. How are the electronic instruments used in Syria calibrated or tested?

In Japan, the units of electrical quantities have been established and maintained by Electrotechnical Laboratory in the Agency of Industrial Science and Technology.
Based on the national standards established by ETL, the service for suppling and extending the electrical standards required by the industry have been performed by public intermediate calibration organization.

3. What grade of accuracy class measuring instruments (e.g. length, time, mass, etc) are used and how the maintenance of reference standards (if any) and the calibration are carried out in Syria?

4. Needs for Establishment of a Calibration and Measurement Laboratory

(1) How many research institutes (not only the national but also the private) or educational organizations relating to the electric field do you have in Syria?

What kinds of measuring instruments and what grade of accuracy class measuring instruments are used in such organizations, relating to the ones requiring the calibration?

How many and what kind of measuring instruments are estimated to be calibrated in the future?

(2) What kind of activities will the Calibration and Measurement Laboratory perform for the research institutes, industry, etc? Do the activities include the function of verification in the future?

How do you intend to maintain and controll the standards and how do you train your staff members for improving their technical level in your laboratory in the future?

(3) How is the GNP in Syria these five or ten years and how is the GNP estimated in the future?

(4) How is the present and future states of industrialization in Syria?

(5) How is the scale of the electricity generation and the consumed enegy these five or ten years in Syria?

(6) What percentages of energy are used for the household and the industrial respectively?

(7) How are the household electrical applinaces (refrigerator, TV, etc) widely used at present in Syria and how is estimated in the future?

5. How are the budgets and staff menbers of the Calibration and Measurement Laboratory maintained from now on?

6. Objective of Calibration
In order to establish the calibration facilities, it is important for us to know what sort of Measuring Instruments and Equipment, you have in your mind, should be calibrated.

1) What "Industrial organization and the research center in Syria" described in "1. Introduction" means?
What is the principal research of these research organizations mentioned in the above?

2) Who will take care of inspection, repairment, calibration and maintenance for:
(1) The Measuring Instruments in possession of these organizations, either internal department or instrument manufactures including local representatives or other organizations.
Is NSCL performing calibration of the above instruments ? *1)

*1) NSCL : National Standards and calibration Laboratory.

(2) The Measuring Instruments for maintenace in communication field such as Telephone, Radio, TV and so on.

(3) The Measuring Instruments in electrical power field such as Power Generation, Transmission, Distribution and so on.

(4) The Industrial Process Instruments such as Pressure, Temperature, Flow Measurement and Control Instruments and so on, which have been used in metal and chemical industries etc.

7. Measuring Instruments for Calibration
What kinds of physical quantities can the Instruments measure, which may be used for calibration at SSRC ? *2)

*2) SSRC: Scientific Studies and Research Center.

8. Organization of NSCL and its activities planned.

1) Please explain the following items.

(a) Calibration and Repair Division (eleven laboratories)

(b) Maintenance and Repair Division (six benches)

(c) Documentation Center

2) What is planned number of research people and engineers at the termination of the project?

3) What is the relationship between SSRC and NSCL?

4) Who is taking the responsibility in proceeding this project and to which organization does he belong?

5) How do you intend to proceed the preparation before NSCL starts?

9. Organization and Activities of NSCL in Detail

1) Please submit the organization chart of SSRC.

2) Please submit the organization chart of NSCL and state the personnel appointment schedule of NSCL.

3) Please state the functions and activities of NSCL.
How about training, lecture, seminar or other activities which are not specified in the proposal?

10. Environmental Conditions of NSCL

1) Please fill in the attached questionnaire as to meteorological conditions in Damascus.

2) Please submit the site layout of SSRC.

3) Please submit the soil investigation data of the SSRC grounds.

4) Please state the conditions of power to be supplied by the power distribution system, such as power failure, voltage regulation, frequency fluctuation,etc. which are needed to investigate the requirements of electric power supply.

5) Are measurements of length, mass, pressure and optical measurements considered in the future? If so, even outside of the proposed area, provisions for vibration-proof need be considered.

6) What are the reasons of adoption of laboratory temperature 23°C ±0.6°C, and relative humidity 45%±10%?

7) How will the cooling water for the chiller unit for air conditioning be supplied, from city water or well water?

8) Others

Please specify the following in detail.

(1) Capacity of 400Hz power source (KVA)

(2) Earthing work (underground water level)

(3) Necessity of separate power source for the computer system

(4) Lighting (incandescent or fluorescent)

(5) Possibility of high electromagnetic field stregth and electromagnetic interference

(6) Water quality, dust, cleaning method

(7) Packing and transportation of calibrated instruments

(8) Telephone and speaker system

(9) Electrostatic discharge control during repairs and replacement of electronic instruments

11. Construction Situations in Syria

1) Please state the average cost per unit area of the buildings of similar size and construction to the planned NSCL building.

with air conditioning

without air conditioning

2) Please state average construction periods of 2-storey, 3-storey and 4-storey buildings of reinforced concrete construction respectively.

3) Please state in detail the manufacturers, locations of manufacturing, type and capacity, etc. of air conditioners available in Damascus.

4) Please fill in the questions in the attached sheat.

12. Others

You are kindly requested to introduce an architect or let him join our counterpart urgently, as we would like to ask general construction situations in Syria.

Annex 2

National Standarization and Calibration Center

Answers to questionaire

1. Yes, there are laws regulating some of the measuring instruments; (e.g. Watthour meters, water flow meters, weights,..)> The verification is performed by authorised departments in the ministries they belong to. But, there are no such laws concerning electronic measuring instruments.

2. There are limited low end facilities for local calibrating of electronic measuring instruments. The syrian Arab Standardization and Metrological Organization (SASMO) is the authority in Syria, that issues standards for import and verification. SASMO, cooperate with SSRC when establishing some of its standards. SASMO has no laboratories yet. On the other hand, the Industrial Testing and Research center (I.T.R.C.) is the organization responsible of testing of materials especially in the field of mechanics, and chemistry, and it is responsible of verification of such materials. A brief description of these two organizations follows

Industrial Testing and Research Center (ITRC)

ITRC was set up by legistlative decree no. 71 in 1965 as an autonomous body attached to the Ministry of Industry. A board of directors, headed by the Minister of Industry directs and administers the activities of the center. Its real activities began some 10 years later when it received assistance from UNDP and UNIDO, furnishing technical assistance, equipment and fellowships. This assistance was discontinued in 1982.

The center is serving especially public manufacturing companies. Services are free of charge and consist especially of following elements:

- testing and analysis of materials,
- research into optimum utilization of local materials,
- consulting services to enterprises,
- industrial information and documentation services,
- organization of training courses.

The organization of ITRC corresponds to these functions. There are 2 technical departments, one for chemistry and textiles and one for engineering, each with own laboratories and workshops. Furthermore, there is an information department, disposing of a modern auditorium with a seating capacity of 200, a metrology department and, finally, a department for technical and economic studies.

In order to carry out these functions, the center has on its roll some 150 men and women,70 of whom have university training. The center is housed in specially designed buildings with 3000 m2 surface and an important extension is under way. These buildings contain well-equipped laboratories, a workshop, a library and a documentation center. Moreover, ITRC owns of a pilot plant.

As to current acivities, the center is carrying out research on pozzolane cement, silica cement and the desalting process for crude oil. Public manufacturing enterprises make little use of the services of ITRC. For this reason most of its staff and equipment are actually underutilized.

Syrian Arab Standardization and Metrology Organization (SASMO)

This organization was created in October 1969 by legislative decree no. 248 and is part of the Minisitry of Industry. However, during a long time SASMO had no real existance, the work being done by a department of the Industrial Testing and Research Center (see preceding section). Only in June 1982 did SASMO receive its own budget and could appoint its own staff. Even then, SASMO had no proper facilities and the work continued to be done by the Industrial Testing and Research Center. In July 1983, SASMO got its own premises which were opened on world standards day (14/10/83). These premises consist of offices, 3 laboratories and a documentation center. Offices and documentation center are very nicely arranged and the laboratories are being equiped in a modern way. SASMO employs a staff of 50 persons, half of which university graduates, the other half being of the intermediate level. SASMO is a member of to all international and arab organizations working in the fields of standardization and metrology.

There are now about 300 syrian standards, which are either generally mandatory or only mandatory in foreign trade. SASMO is not quite sure to what extent there standards are observed by manufacturing industry and has sent out a questionnaire in the beginning of 1984 in order to know what is going on. The questionaire is addressed to public and private companies alike.

The annual working program of SASMO is established as follows. In October of each year a circular letter is addressed to all interested parties in order to ask them for suggestions for relevant topics. These suggestions are discussed in committee meetings and as a result of these discussions the program for following year is drawn up. The General Organizations are part of those that are invited to give suggestions but only half of them replied to the circular letter for 1984. It is true that some of these GO are represented in the committee, debating the suggestions.

As a result of these committee deliberations, the work load for 1984 consists of about 100 items, distributed over sectors as follows:

- 26 subjects in chemical industries,
- 17 subjects in textiles,
- 34 subjects in food industries,
- 18 subjects in engineering industries,
- 13 subjects in metrology.

SASMO's staff feels somewhat sceptical about the practical possibility to carry out such a program. Fixing standards for each subject requires meetings in which participate representatives from industry and others, like university people. Or, these meetings are badly attended: Industries do not yet see the interest of standards and outside people do not like to come as attendance is not paid for.

Manufacturing industries do not like to be bothered about standardization of their products as, firstly, this is not required for selling in the protected home market, and as, secondly, quality of exported products is not fundamental to the execution of trade agreements with east-european countries. In the long run, such an attitude on the part of captains of industry does not seem correct.

As to the internal market, it is certainly true that legal imports of products, locally manufactured, are severely restricted. However, smuggling plays an important role and, even now, the consumer often has the choice between products of local and of foreign origin. Or, one is struck by the strong preference that syrian consumers give to imported products. This attitude is certainly bad for development of manufacture in Syria and has to change. One of the ways to do away with this preference for imported good on the part of the syrian consumer is to guarantee the quality of products of syrian manufacturing industry. Or, up to March 1984, SASMO's quality mark was not yet given to any product of local manufacture.

As to exports, quality guarantees are absolutely needed in most foreign markets. Syria created huge capacities for many products and their utilization requires exports. Moreover, the foreign exchange situation is tight and an export drive is needed to bring relieve. For these reasons, SASMO's activities need to be sustained as one of the conditions required for future growth of the Syrian economy.

3. Different accuracy classes of measuring instruments are used in different places according to there use, and they may vary from low standard up to secondary level of accuracy (e.g. SSRC). There are no approved reference standards in Syria, and low level calibration is done locally in some industrial firms (e.g. Watthour meter, Water flow meter,).

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

4.1

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.

4.2 In addition to calibration of measuring instruments, it will perform the following:
- Repair and maintenance
- Training staff members for working in other local low-end calibration facilities.
- Developing calibration and testing procedures when necessary.

The intention of maintaining and controlling the standard is by traceability to an international primary standard; such as ETL., NPL., GNPL. and to be indopendent as much as possible.

In cooperation with SASMO & IIRC, NSCL will carry out the function of verification of electronic imported and locally manufactured measuring instruments (if any).

Improving the technical level of laboratory staff is performed by courses (locally and abroad) and visiting experts.

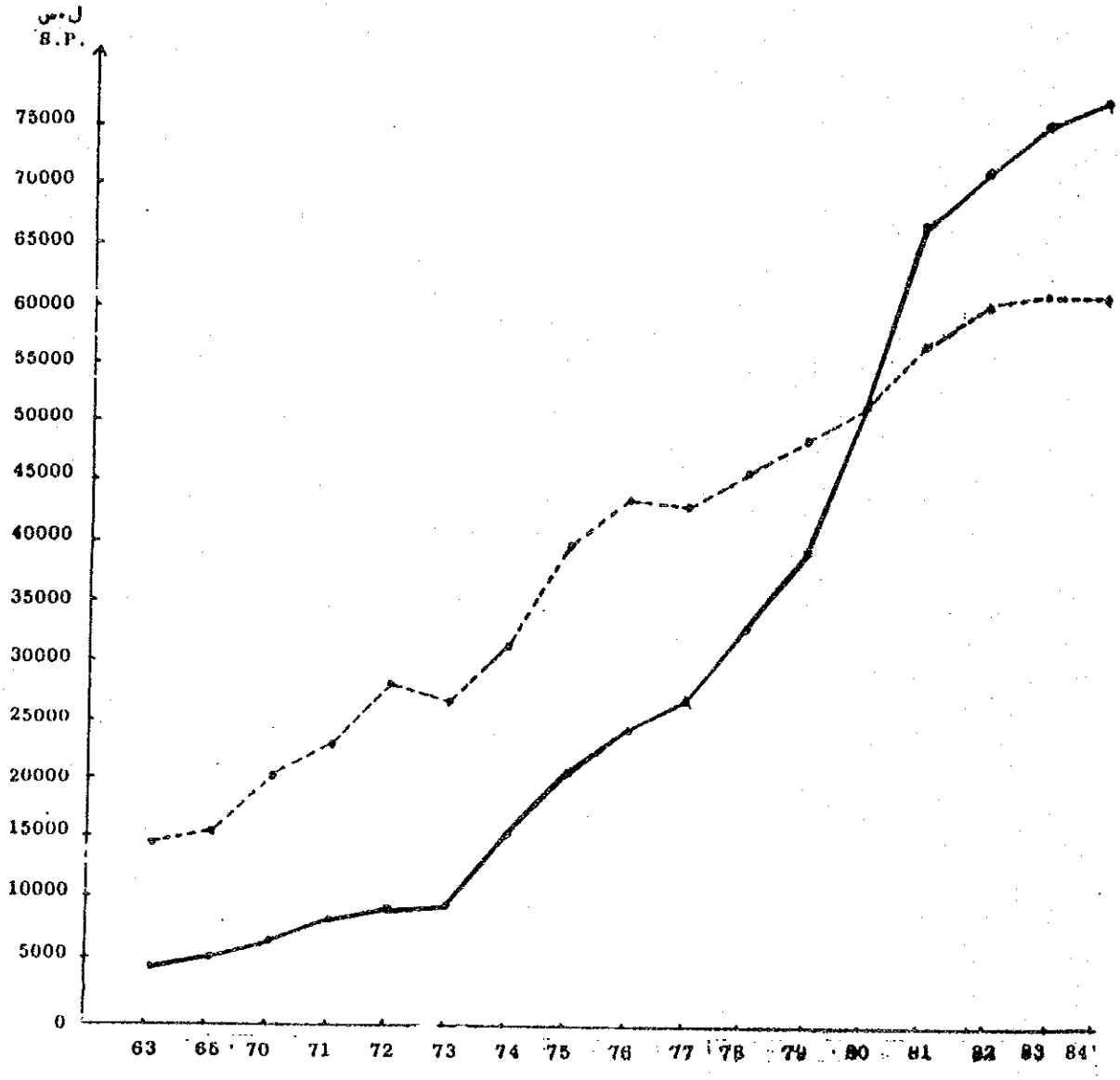
4 (3)

- Gross Domestic Product
- Per Capita Domestic Product

الناتج المحلي الاجمالي بسعر السوق ١٩٦٣ ، ١٩٦٥ ، ١٩٧٠ - ١٩٨٤ (بالاسعار الشابتة والجارية)

GROSS DOMESTIC PRODUCT AT MARKET PRICES 1963,1965 1970-1984

(AT CURRENT PRICES - AT CONSTANT PRICES)



— Gross Domestic Product:At current prices. الناتج المحلي الاجمالي:بالاسعار الجارية

... Gross Domestic product:At constant prices. الناتج المحلي الاجمالي:بالاسعار الشابتة

GROSS DOMESTIC PRODUCT AT MARKET PRICES BY SECTORS, 1963,1970-1984

(At constant prices of 1980, in million Syrian Pounds)

TABLE 9/16

SECTORS \ YEARS	* 1984	1983	1982	1981	1980	1979	1978
Agriculture	9480	10458	10545	10820	10383	7423	8698
Mining & manufacturing	8690	9190	9771	9283	9006	8845	9830
Building & construction	4447	4067	4092	3703	3555	3796	2894
Wholesale & retail trade	13963	15211	15470	15336	12700	11017	11134
Transport & communications	4638	4469	4234	4188	3557	3379	3056
Finance & insurance	3418	3370	3649	3586	3267	3142	2792
Social & personal services	1476	1239	1187	992	928	987	906
Government services	11278	10857	9969	9162	8369	8574	6894
Private non-profit services	48	44	40	37	34	30	28
Total	57447	58705	58957	57107	51799	47793	46232

STRUCTURE OF GROSS DOMESTIC PRODUCT AT MARKET PRICES BY SECTORS,

1963,1970-1984

(At constant prices of 1980)

TABLE 10/16

SECTORS \ YEARS	* 1984	1983	1982	1981	1980	1979	1978
Agriculture	16	18	18	19	20	16	19
Mining & manufacturing	15	16	17	16	17	19	21
Building & construction	8	7	7	7	7	8	6
Wholesale & retail trade	24	26	26	27	25	24	24
Transport & communications	8	7	7	7	7	7	7
Finance & insurance	6	6	6	6	6	6	6
Social & personal services	3	2	2	2	2	2	2
Government services	20	18	17	16	16	18	15
Private non-profit services	0	0	0	0	0	0	0
Total	100	100	100	100	100	100	100

* Provisionel

STRUCTURE OF GROSS OUTPUT BY SECTORS, 1963, 1970-1984

(At constant prices of 1 80)

TABLE 5/16

SECTORS \ YEARS	* 1984	1983	1982	1981	1980	1979	1978
Agriculture	12	14	14	15	15	13	15
Mining & manufacturing	32	31	29	29	29	29	32
Building & construction	12	11	12	11	12	12	10
Wholesale & retail trade	16	17	18	19	17	17	18
Transport & communications	7	7	7	7	7	7	7
Finance & insurance	4	4	4	4	4	4	4
Social & personal services	2	2	2	1	2	2	1
Government services	15	14	14	14	14	16	13
Private non-profit services	0	0	0	0	0	0	0
Total	100	100	100	100	100	100	100

INDICES OF GROSS OUTPUT BY SECTORS, 1963, 1970-1984

(At constant prices of 1980, 1980 = 100)

TABLE 6/16

SECTORS \ YEARS	* 1984	1983	1982	1981	1980	1979	1978
Agriculture	95	105	105	107	100	75	83
Mining & manufacturing	136	130	119	114	100	91	94
Building & construction	125	114	117	104	100	03	72
Wholesale & retail trade	110	119	120	120	100	92	87
Transport & communications	130	125	119	118	100	93	85
Finance & insurance	106	104	112	109	100	97	86
Social & personal services	164	139	130	109	100	101	84
Government services	121	116	111	105	100	99	79
Private non-profit services	143	130	117	107	100	89	83
Total	120	119	115	112	100	91	85

* Provisional

PER CAPITA DOMESTIC PRODUCT, 1963, 1970-1984

(At constant prices of 1980)

TABLE 21/16

ITEMS \ YEARS	* 1984	1983	1982	1981	1980	1979	1978
Population at mid year (1000 persons)	9934	9611	9298	8996	8704	8421	8148
G.D.P at market prices (Million S.P)	57447	58705	58957	57107	51799	47793	46232
Per capita G.D.P.at market prices (S.P.)	5783	6108	6341	6348	5951	5675	5674
G.D.P at factor cost (million S.P.)	54587	56112	56222	55483	50491	47166	43601
Per capita G.D.P at factor cost (S.P)	5495	5838	6047	6168	5801	5601	5351
N.D.P. at market prices (million S.P)	55669	56910	57236	55483	50356	46484	45031
Per capita N.D.P. at market prices (S.P.)	5604	5921	6156	6168	5785	5520	5527
N.D.P. at factor cost (million S.P.)	52809	54317	54501	53859	49048	45857	42400
Per capita N.D.P.at factor cost (S.P.)	5316	5652	5862	5987	5635	5446	5204

* *Provisional*

Syrian Industry

Historical Background

&

Development

. Background Information 1)

.1 History

.1.1 General Description.

The manufacturing sector in Syria before 1950 was composed mainly of small workshops; modern, relatively large scale plants were few. Several textile mills, a cement plant and a sugar mill. The 1950s witnessed the growth of modern industry in the spinning and weaving of cotton and in the production of cement, vegetable oils, sugar, soaps, matches and glass. However, except for textiles and cement, modern manufacturing industry continued to be carried on only on a modest scale throughout the 1950s. The contribution of the government to Syria's manufacturing development during this phase of industrialization was confined essentially to encouraging private initiative by providing bank credit guarantees and protecting from import competition.

This initial period came to an end during 1957, when negotiations were begun with Egypt to form the United Arab Republic (UAR,1958-1961). Planning was introduced and the first Five Year Plan (FYP) drawn up for the period 1961-1965. When nationalization measures were taken in Egypt in 1961, Syria's large private businesses were also nationalized. However, they were denationalized a few months later after the dissolution of the UAR. During the nonsocialist interregnum of 1961-1963 not much was done on the first FYP, but it remained a legal document and the idea of planning was not abandoned.

The Ba'ath party came to power in 1963 and decided anew in favor of socialism; the Supreme Planning Council and other planning machinery were established. The years 1963-1965 have been described as essentially years of contemplation, spent on deciding what model of socialism to follow and how much of a mixed economy to develop. By 1965 the choice was made in favor of the East European model. As a consequence, the government accelerated the process of nationalizing manufacturing enterprises without, however, abolishing the private industrial sector.

As a matter of fact, the first nationalization decrees were already promulgated in April 1964, when the government took over 8 industrial companies. Other decrees in May 1964, gave the government a 25 % participation in 15 other companies. At the

---

1. This chapter draws heavily on related sections in the 1980 World Bank report : Syrian Arab Rebublic, Development; Prospect and Policies; Report of a 1977 World Bank Mission.

beginning of 1965, new decrees totally nationalized 22 companies, including the 15 companies in which the State had already taken a 25 % participation in 1964. In addition, the State nationalized 30 companies by taking a 90 % participation and 63 other companies through a participation of 75 %. Upon this wave of nationalization of manufacturing industries followed an exodus of managerial and technical skill as well as of private capital from the country. In the remaining years of the 1960s Syria suffered particularly from this drain.

The nationalized enterprises were first put under the umbrella of a newly-formed General Organization of the Public Industrial Sector, which, in 1968, was replaced by 3 unions for, firstly, food processing, socondly, textiles and, thirdly, engineering and chemicals. Secondly, as part of the reorganization, designed to improve managerial control and to enhance efficiency, mergers of companies were introduced, reducing the number of public companies to about one half. Thirdly, in 1975 the Unions replaced by six General Organizations covering (1) food processing, (2) sugar, (3) textiles, (4) cement, (5) chemicals and (6) engineering. The General Organizations are attached to the Ministry of Industry. Some other public companies in the manufacturing field remained with other ministries. This structure, that remained valid up till now, will be described in chapter 3.2

Even though no nationalizations took place during the seventies and the eighties, there is still, among private entrepreneurs, a fear for 'socialization', as it is called. Such fear might explain why, in general, private manufacturing enterprises are of modest size. This does not take away the existence of a number of modern, medium-sized, private factories.

3.1.2 Growth of Value Added in Manufacturing.

Real Annual Growth Rate in Manufacturing Industries.

Periods	Growth rates %	Sources
1956-1960	10	United Nations: Industrial Development in the Arab Countries (New York, GOII. B.23, 1967), p.132. Cited in World Bank op. cit., vol. II, p.251.
1961-1965	5	World Bank, op. cit. vol IV, table 2A1: 'Government estimates GDP by industrial origin'.
1966-1970	6	Idem
1971-1975	9	Idem
1976-1982	8	Statistical Abstracts of different years. Table: Index numbers for industrial production.

The preceding table shows high growth rates in the fifties and in the seventies and slow growth in the sixties. It is a well-known statistical phenomenon that growth rates slacken when the basic volume, with which the increment is compared, becomes more important. Thus high growth rates are more easily obtained in the early stages of the industrialization process than in later ones and it is therefore well understandable that growth rates in the late seventies were somewhat below the ones in the fifties. Apart from this, the growth pattern seems to fit rather well with the historical description given in the preceding section: Growth has been rapid in periods with stable structures and slow in periods of change.

4.1.3 Gross Fixed Investment in Industry

In Syria, series of gross fixed investment are given for total industry, including manufacturing, mining, electricity and water. Thus it is not possible to disaggregate manufacturing from the other components of industry. Nevertheless, the former accounts for the principal share.

Average Annual Amount of Gross Fixed Investment in Industry.
(in mn SP, in constant 1980 prices)

1956-1960	not available
1961-1965	679
1966-1970	1.156
1971-1975	2.031
1976-1980	5.122
1981-1982	4.985

Source: Statistical Abstracts of different years.

This table makes it clear that the period of nationalization was followed by a really astonishing acceleration of the investment effort in industry. The biggest change in the investment level took place in the years 1973 to 1976 when the fixed investment volume in manufacturing was, in a period of 3 years, multiplied by 5, that is from 1104 mn SP in 1973 to 4.991 mn SP in 1976 (both figures in 1980 prices). Thereafter the investment volume remained stable. Even for the period of the 5th Five Year Plan, covering the years 1981 to 1985, the planned level of annual industrial investment, 5,4 bn SP, remains close to what has already been attained. It goes nearly without saying that this very big investment effort was mainly carried by the public sector. Statistics, pertaining to public manufacturing companies, permit to look into the sector distribution of fixed investment.

Accumulated Invested Capital in Public Manufacturing
(in mill. LE, current prices)

Sector	1970	1976	1982	Increase 1970-1982	In %
Food industries.	85,9	141,3	596,5	510,6	2,5
Sugar.	74,9	308,0	1.619,3	1.544,4	6,1
Textiles.	311,8	514,6	2.529,5	2.217,7	8,7
Engineering.	61,4	338,9	1.368,0	1.306,6	5,1
Chemicals.	118,9	287,8	5.013,9	4.895,0	19,3
Cement.	124,6	281,9	2.844,3	2.719,7	10,7
Tobacco.	83,4	252,4	887,0	803,6	3,2
Cotton ginning.	77,5	377,7	414,0	336,5	1,3
Oil production and refineries.	848,3	2.605,7	10.764,0	9.915,7	39,0
Milling and bakeries.	93,3	193,8	1.254,9	1.161,6	4,6
Total	1.880,0	5.302,9	27.291,4	25.411,4	100,0

Source: Statistical Abstracts of several years.

This table of accumulated investments is not completely in accordance with the investments stated by the different G.O., see chapter 5.1. The trend is of course the same, but the G.O. state somewhat lower investments, app. 25 %.

Crude oil production and refining absorbed the biggest share of public investment. Thereafter comes the investment in chemicals (fertilizers, tyres, paper, glass, tanneries) and cement. Other important sectors are sugar and textiles. It is clear that the investment effort touched a large number of sectors. In a certain way, the industrial survey, subject of this report, can be looked upon as an evaluation of this investment drive: After all this expenditure, what is now the state of affairs in manufacturing?

.2 Organization of Manufacturing Industries

2.1 Roles of Public and Private Sector.

As is clear from the preceding sections, government policy has been to reserve for itself certain basic or strategic manufacturing activities and permit private sector production elsewhere. Thus in a number of areas deemed "strategic", for instance sugar refining, cement production, cotton spinning, fertilizer manufacturing and certain engineering industries, public enterprises have a monopoly position. The private sector has concentrated on the production of final consumer goods. For some products, both public and private enterprises are engaged. The origin of the output is relatively evenly divided between the public and private sectors although the latter, which consists of primarily small-scale and artisan-type units, engages about three-quarters of the manufacturing labour force.

.2.2 Organization of the Public Sector

.2.2.1 General View

Public enterprises are organized under Legislative Decree no. 18. A public enterprise is an organization engaged in agricultural, industrial, commercial or financial activities as a financially and adminstratively independent unit. It is headed by a General Manager who is responsable to a General Organization (GO), a governmental holding company for a group of enterprises having similar purposes. The GO is also a legal entity, financially and administratively independent. In turn, each GO is attached to a ministry.

The industrial survey only deals with a limited number of ministries and GOs. These are shown in the following table:

Ministries and General Organizations 1)

Ministry	General Organization (GO)	Number of Companies	Number of Factories
1.Industry 1)	1. Food industry	22	30
	2. Sugar	8	13
	3. Textiles	23	31
	4. Chemical industries	13	33
	5. Engineering industries 2)	13	26
	6. Cement	9	13
	Total	88	146
2. Supply and Internal Trade	1. Mills	1	27
	2. Bakeries	2	109
	Total	3	136
3. Economy and Foreign Trade	1. Tobacco	1	4
	2. Cotton Ginning	1	18
	Total	2	22
4. Petroleum and Mineral Resources	1. Homs refinery	1	1
	2. Banyas refinery	1	1
	Total	2	2
5. Defence 3)	1. Medecine factories	3	3
	2. Military housing companies	6	63
	Total	9	66
Total	-	104	372

1) A list of all companies is given in Volume I Annex 1,
2) Inclusive Furat Tractor Company

The companies, listed above, are those covered by the industrial survey. The list is not complete to the extent that there are other public companies, engaged in manufacturing activities. This is notably important in three cases: First of all: Various ministries have under their authority printing workshops. For each of these workshops, the small questionnaire, as used in the enquiry with private manufacturing firms, has been completed. These are commented upon in section 4.2.4 (small). Secondly, questionnaires have not been completed for the organization of Defence Factories. However, some other source of information is available for these factories (see before cited section). Thirdly, a number of public organizations with main

activities outside manufacture, have nevertheless manufacturing activities as a side line. Two examples might be given: (a) GO for Fodder has some factories for the production of mixed fodder; (b) GO for Geology and Mineral Resources exploits 2 marble cutting factories and 1 factory for gypsum products.

Notwithstanding these shortcomings, the scope of the industrial enquiry is very large and this is so in particular as certain factories with the Ministry of Defence have been included. This was not foreseen in the terms of reference: Article A3 mentions that " ... the survey will cover all industrial manufacturing activities, except those of military and defence character...". Enterprises with the Ministry of Defence, included with the survey, have a purely civilian character. It still remains remarkable that it proved possible to include them in the survey. It shows that the Syrian authorities expect a great deal from the results of the industrial survey.

2.2.2 Ministries, General Organizations and Companies

GOs are crucial in the organization of public manufacturing companies with the Ministry of Industry. These GOs, sandwiched between ministry and companies, are peculiar to the organization of public manufacturing industries in Syria. On the one hand they can be considered, as already said, as holdings but, on the other hand, they may also be looked upon as small ministries. A special questionnaire was addressed to these GOs and this part of the industrial survey is reported upon in chapter 5.1. Here, just a few remarks will be given, necessary to understand the organizational structure in which industrial companies are operating.

As to its holding function, GOs have the supervision of the enterprises belonging to it. Company managers must refer any decision of significance to the GO's General Manager for approval. These submissions cover such operating aspects as financing, production, procurement, investment and personnel decisions. As to ministerial functions, the GO sets policies and objectives of production, exports, marketing, employment and pricing. In order to implement these objectives, the GO has to approve the annual plan of each company. Moreover, the GO prepares detailed plans to ensure development of production and it has to approve the annual investment budgets of companies, enforcing a strict control over the financial resources available to them. In fact, most of the time of the staff of the GOs is taken up by project preparation and execution.

The above discussion has made it clear that individual public companies only have a limited autonomy in decision-making. As so many decisions are made for them, General Managers of public enterprises cannot be held wholly responsible for the success or failure of their companies.

2.2.3. Wider Administrative Framework

GOs are responsable to the ministries to which they belong. The ministers chair the meetings of the board of the GOs, thus they know what is going on and have the possiblity to decide. Also the Ministry of Industry is supported by three staff organizations, discussed in chapter 6:

- Center for industrial tests, research and development,

- Syrian Arab standardization and metrology organization,

- Management and productivity center.

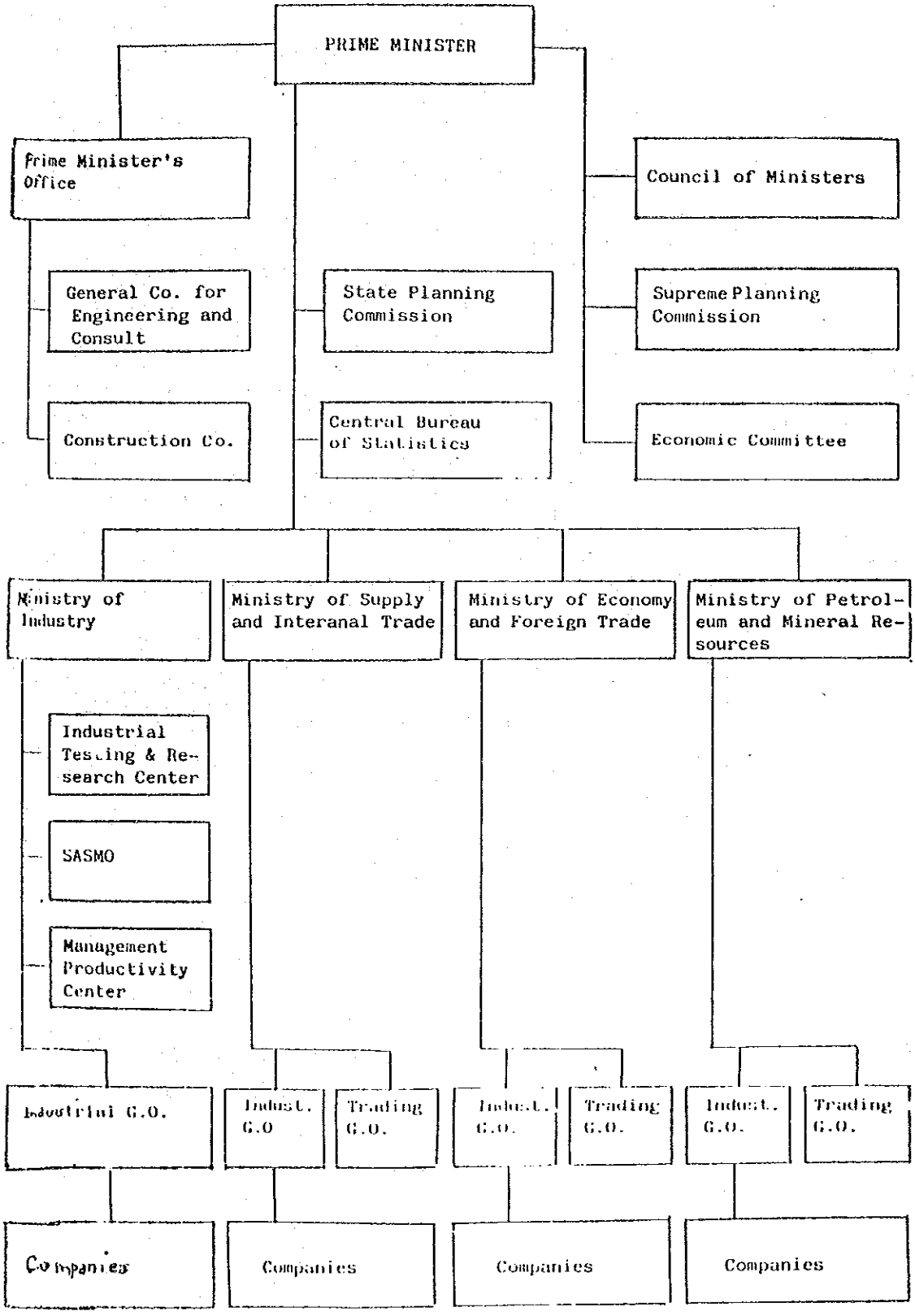
The role of the ministries is especially a coordinating one: they collect the budgets of the GOs and put them together into one document. On the other hand, they transmit the guidelines, coming from above to the GOs and see to it that these policies are translated into actions.

Policy formulation in the economic field comes essentially from the Supreme Planning Council, headed by the Prime Minister and composed of ministers and agency heads,holding portfolios which deal with economic matters. As the top policy-making body for economic development, the Supreme Planning Council formulates the economic and social goals of the nation, designs the institutions which will carry out these objectives, and allocates resources for their implementation . It supervises the execution of plans and evaluates their accomplishment, taking necessary action to design, finance, and execute development projects. Day-to-day decisions, required to implement the plans, are made by the Economic Committee, an interministerial subcommittee of the Council of Ministers.

The State Planning Commission (SPC), headed by the Minister of State for Planning Affaires is attached to the Prime Minister. It functions as the secretariat to the Supreme Planning Council, providing information-gathering and data-analysis services. The Central Bureau of Statistics is also attached to the Prime Minister Office. Finally, this office is supported by another staff organization, the General company for engineering and consultation (also discussed in chapter 6). Since 1963, the influence of the Ba'ath Party has been strongly felt at the highest decision-making levels. The objectives of each plan are identified by the party and communicated to the Supreme Planning Council through the Prime Minister.

The following diagram gives the part of the executive branch that is of particular relevance to public enterprises and that just has been described.

Executive Branch, Particularly Related to Public Enterprises



الارقام القياسية للانتاج الصناعي ١٩٨١ - ١٩٨٤

(١٠٠ = ١٩٨٠)

INDEX NUMBERS FOR INDUSTRIAL PRODUCTION, 1981-1984

(1980 = 100)

جدول ١/٥

TABLE 1/5

Industries	1984	1983	1982	1981	الصناعات
First : General index number	139	132	125	113	اولا : الرقم القياسي العام
Second : Mining & quarrying	103	102	98	103	ثانيا : الصناعات الاستخراجية
Third : Maunfacturing industries	163	151	138	117	ثالثا : الصناعات التحويلية
1) Manufacture of food, beverages & tobacco	184	180	164	105	١ - صناعة المواد الغذائية والمشروبات والتبغ
2) Manufacture of textiles, gunning & hides	151	134	110	101	٢ - صناعة الغزل والنسيج والجلود
3) Manufacture of wood & furniture	96	117	120	118	٣ - صناعة الخشب والورق والاثاث
4) Manufacture of paper, printing & binding	329	320	193	118	٤ - صناعة الورق والطباعة والتجليد
5) Manufacture of chemicals	170	153	153	137	٥ - الصناعات الكيميائية ومنتجاتها
6) Manufacture of non-mineral products (excluding petroleum & coal)	194	165	137	114	٦ - صناعة منتجات غير معدنية (عدا الفحم والبترول)
7) Main mineral industries	123	127	105	133	٧ - الصناعات المعدنية الاساسية
8) Manufacture of mineral products & equipment	87	108	117	105	٨ - صناعة المنتجات المعدنية المصنعة والمعدات
Fourth : Industry of electricity & water	226	208	139	116	رابعا : صناعة الماء والكهرباء
1) Production of electric power ...	248	227	141	117	١ - انتاج الطاقة الكهربائية
2) Water nets & distribution	133	119	114	115	٢ - شبكات الماء وتوزيعها

انتاج الصناعات التحويلية الرئيسية ١٩٨٠ - ١٩٨٤

PRODUCTION OF THE MAIN MANUFACTURING INDUSTRIES, 1980 - 1984

TABLE 2/5 — جدول ٢/٥

Types of industry	Unit	1984	1983	1982	1981	1980	الوحدة	نوع الصناعة
Pasteurized milk	Ton	9066	7576	6315	6032	5754	طن	حليب مبستر
Butter	Ton	1164	2283	1858	1322	1434	طن	زبدة
Yoghurt	Ton	21195	18163	15719	14846	14739	طن	لبن رائب
Canning	Ton.000	16	26	13	12	10	الف طن	كونسروة
Olive Oil	Ton.000	51	27	95	45	83	الف طن	زيت زيتون
Vegetable Oil	Ton.000	24	24	20	20	21	الف طن	زيت نباتي
Margarine	Ton.000	9	7	8	7	7	الف طن	سمن نباتي
Flour	Ton.000	1116	997	887	865	447	الف طن	دقيق
Biscuits	Ton.000	8	11	10	8	7	الف طن	بسكويت مشكل
Macaron	Ton.000	15	15	14	12	9	الف طن	معكرونة
Sugar	Ton.000	199	206	183	148	90	الف طن	سكر
Peanuts	Ton	3485	2943	1570	3626	3626	طن	فستق سوداني
Alcohol Liguids	Mil.Liters	17	15	57	17	14	مليون لتر	سوائل كحولية
Tobacco Tombac	Ton.000	13	13	11	10	9	الف طن	تبغ وتنباك
Cotton yarn	Ton.000	34	37	28	31	21	الف طن	غزول قطنية
Silk and cotton textiles	Ton.000	38	25	18	17	17	الف طن	أقمشة قطنية وحريرية
Wool yarn	Ton.000	2	2	1	2	2	الف طن	غزول صوفية
Woolen cloth	Ton	1583	1578	1049	1897	1129	طن	أقمشة صوفية
Nylon industrial threads	Ton	3576	2110	1382	1374	1337	طن	خيوط صناعية نايلون
Silk yarn	Ton.000	2	2.7	2.7	2	2	الف طن	غزول حريرية
Underwear	Dozen000	1569	1438	1689	1605	1393	الف دزينة	ألبسة داخلية
Stockings	Dozen000	1786	1623	1606	1499	1478	الف دزينة	جوارب
Wool carpets	M^2. 000	517	588	412	483	376	الف م٢	سجاد صوفي
Silk carpets	$M.^2$ 000	480	1586	707	682	651	الف م٢	سجاد حريري
Tanned hides box	F^2. 000	11153	10738	8504	3013	3598	الف قدم٢	جلود مدبوغة بوكس

انتاج الصناعات التحويلية الرئيسية ١٩٨٠ - ١٩٨٤

PRODUCTION OF THE MAIN MANUFACTURING INDUSTRIES 1980 - 1984

جدول ٢/٥ تابع

TABLE 2/5 (Cont'd)

Types of industry	Unit	1984	1983	1982	1981	1980	الوحدة	نوع الصناعة
Ginned Cotton	Ton 000	196	166	127	118	134	الف طن	قطن محلوج
Medical paper	Box.000	632	678	650	486	391	الصندوق	ورق صحي
Fertilizers Azotic	Ton.000	110	113	117	60	48	الف طن	سماد آزوتي
Paints	Ton.000	9	14	9	7	7	الف طن	دهانات
Medical products	S.P.000	126146	125114	112258	91213	43208	العبوة	منتجات طبية
Soap	Ton.000	47	52	48	46	37	الف طن	صابون
Detergents	Ton	23177	25825	16242	10410	7519	طن	منظفات كيميائية
Liguid gazes	M^3 000	1444	2006	1756	1383	1434	الف م٣	غازات سائلة
Matches	Gross.000	2970	4000	3110	3587	2772	الكرتون	كبريت
Rubber Shoes	P. 000	752	806	738	685	960	الفزوج	أحذية مطاطية
Plastic Shoes	P. 000	795	851	718	999	938	الفزوج	أحذية بلاستيكية
Glass & Pottery products	Ton.000	65	47	51	58	39	الف طن	زجاج وخزف
Cement	Ton.000	4279	3719	2850	2310	1995	الف طن	اسمنت
Iron Bars round	Ton	84033	84137	66741	102363	79968	طن	حديد مسروم
Metal pipes	M. 000	5976	7917	7551	6725	5620	المتر	أنابيب معدنية
Pressure Cookers	P	-	-	60923	80000	75622	قطعة	طناجر ضغط
Washing machines	P	52210	43575	53786	43900	26203	قطعة	غسالات
Refrigerators	P	111443	140711	147734	146451	138504	قطعة	براد ات
Electrical transformers	P	896549	622830	551457	765044	941979	قطعة	محولات كهربائية
Electrical engines	P	202325	90718	88942	84751	65444	قطعة	محركات كهربائية
T.V. Sets	P	31366	48766	59418	47189	172058	قطعة	أجهزة تلفزيونية
Dry batteries	piece 000	8725	17767	21060	28411	38542	القطعة	بطاريات جافة
Liguid batteries	P	224799	225798	172270	133226	157482	قطعة	بطاريات سائلة
Cables	Ton	11201	13813	12712	10466	9115	طن	كابلات

المنتجات الصناعية التحويلية الرئيسية للقطاع العـــام الصناعي ١٩٨٠- ١٩٨٤

MAIN MANUFACTURED INDUSTRIAL PRODUCTS OF THE PUBLIC INDUSTRIAL SECTOR, 1980 - 1984

TABLE 3/5 — جدول ٣/٥

Type of industry	Unit	1984	1983	1982	1981	1980	الوحدة	نوع الصناعة
Pasteurized milk	Ton	9066	7576	6315	6032	5754	طن	حليب مبستر
Butter	Ton	1164	2283	1858	1322	1434	طن	زبدة
Yoghurt	Ton	21195	18163	15719	14846	14739	طن	لبن رائب
Canning	Ton	14675	24634	11851	10341	8683	طن	تنكرة
Vegetable Oil	Ton	24127	24297	19672	20016	20648	طن	زيت نباتي
Margarine	Ton	8250	6379	6926	5822	6586	طن	سمن نباتي
Flour	Ton.000	1116	997	887	865	447	الف طن	دقيق
Biscuits	Ton	7558	8394	8197	7107	6852	طن	بسكويت مشكل
Macaroni	Ton	3463	3123	2250	1394	2707	طن	مكرونة
Sugar	Ton.000	199	206	183	148	00	الف طن	سكر
Peanuts	Ton	3485	2943	1570	3626	3626	طن	حب سوداني
Cotton cake	Ton.000	137	115	126	88	91	الف طن	كسبة
Wine	Ton	630	323	372	141	147	طن	نبيذ
Beer	L.000	8858	8089	8343	8899	7310	الف لتر	بيرة
Arak	Ton	2838	1340	1315	852	854	طن	عرق
Mineral water	P.000	25401	12456	18230	18961	11751	الف زجاجة	مياه معدنية
Manufactured tobacco	Ton	12736	13211	10880	9939	8985	طن	تبغ مصنوع
Cotton yarn	Ton	33616	37000	28237	31383	20455	طن	مغزول قطنية
Cotton and Mixed textiles	Ton	17631	18070	14734	14016	14032	طن	منسوجات قطنية ومزوجة
Mixed woolen yarn	Ton	1778	1949	1404	1618	1554	طن	مغزول صوفية
Woolen cloth	Ton	1583	1578	1049	1234	1131	طن	منسوجات صوفية
Synthetic threads	Ton	3576	2110	1382	3360	1848	طن	خيوط صنعية وتركيبية

المنتجات الصناعية التحويلية الرئيسية للقطاع العـــام الصناعي ١٩٨٠ - ١٩٨٤

MAIN MANUFACTURED INDUSTRIAL PRODUCTS OF THE PUBLIC INDUSTRIAL SECTOR, 1980 - 1984

جدول ٢/٥ (تابع)

TABLE 3/5 (cont'd)

Type of industry	Unit	1984	1983	1982	1981	1980	الوحده	نوع الصناعه
Underwear clothes	D.000	1374	1408	1504	1437	1239	الف دزينة	البسة داخلية
Stocking	D.000	266	258	233	224	206	الف دزينة	جـــوارب
Woolen blankets	P	15000	10000	21000	15600	-	قطعة	حرامات صوفية
Woolen carpets	M^2.000	517	588	412	483	376	الف م٢	سجاد صوفـــي
Silk carpets	M^2.000	255	350	540	551	523	الف م٢	سجاد حريـــري
Ginned Cotton	M^2.000	196	166	127	118	134	الف طن	قطن محلـــوج
Panolatteh wood	M^3	1581	2298	3106	3126	2661	م٣	خشب بانولاتيه
Plywood	M^3	6182	9382	9546	8707	7807	م٣	خشب معاكس
Compressed wood	M^3	6134	8445	7828	5656	7082	م٣	خشب مضغـــوط
Tanned Hides	F^2.000	7352	6980	4579	6452	5986	الف قدم٢	جلـــود مدبوغة
Tanned hides box	F^2.000	3801	3758	4015	3613	3598	الف قدم٢	جلـــود بوكس
Tanned hides Sole	Ton	244	203	135	325	229	طن	جلود نعـــل
Cardboard	Ton	5526	5356	5085	4791	4582	طن	كرتـــــون
Medical paper	Box.000	632	678	650	486	341	الف صندوق	ورق صحـــي
Alcohol	Ton	2357	2103	2057	2324	1942	طن	كحـــــول
Nitrogen'Fer.	Ton	110206	112682	116543	59607	48315	طن	سماد آزوتي
Phosphatic'Fer.	Ton	191176	115991	115746	68333	-	طن	سماد فوسفاتي
Liqued Ammonum	Ton	38230	56330	14760	15000	-	طن	آمونيا سائلة
Yuria Ammonum	Ton	164514	141776	70211	24079	-	طن	أمـونيا يوريـا
Paints	Ton	6779	8186	5135	3574	3268	طن	دهانـــــات
Medical Products	S.P.000	110947	105406	92738	79645	51116	الف ل.س	منتجات طبية
Detergents	Ton	14421	16049	11725	6893	2461	طن	منظفات كيميائية
Liguid gazes	M^3 000		1446	1195	1016	1142	الف م٣	غازات سائلـــة
Matches	G. 000	2965	3906	3106	3583	2769	الف كروز	كبريـــــت

المنتجات الصناعية التحويلية الرئيسية للقطاع العـــام الصناعـــي ١٩٨٠ - ١٩٨٤

MAIN MANUFACTURED INDUSTRIAL PRODUCTS OF THE PUBLIC INDUSTRIAL SECTOR 1980 - 1984

TABLE 3/5 (cont'd) — جدول ٣/٥ (تابع)

Type of industry	Unit	1984	1983	1982	1981	1980	الوحده	نوع الصناعة
Rubber Shoes	P.000	675	724	660	606	883	ألف زوج	أحذية مطاطية ورياضية
Plastic shoes	P.000	795	851	718	909	938	ألف زوج	حذية بلاستيكية
Class & pottiery products	Ton	55502	39701	44025	51515	39048	طن	نتجات زجاجية وخزفية
Porcelain	P.000	31816	22577	12920	16182	16350	ألف بلاطة	رســـــلان
Cement	Ton 000	4279	3719	2850	2310	1995	ألف طن	ســـــمنت
Ironbars round	Ton	84033	84139	66741	102363	79968	طن	يد مـــروم
Metal pipes	M.000	5976	7917	7551	6725	5620	ألف م طولي	نابيب معدنية
Shapes of Alumainium	Ton	3157	2635	1999	1376	1350	طن	قاطع الالمنيوم
Pressure cookers	Piece	-	-	60923	80000	75622	قطعة	نجر ضغـــط
Water meters	P	97800	100000	114000	106000	110000	قطعة	دادات مياه
Gas cookers and Oven	P	23822	35979	37366	30754	24866	قطعة	وتوفازات وأفران
Refrigerators	P	95341	119345	125219	125329	126155	قطعة	ـــــــرادات
Electrical meters	P	106600	30000	47650	68100	153490	قطعة	دادات كهرباء
Electrical transformers	P	896549	622830	551457	765044	941979	قطعة	حولات كهربائية
Electrical engines	P	202325	90718	88942	84751	71619	قطعة	حركات كهربائية
T.V Sets	P	31366	48766	59418	47189	72058	قطعة	جهزة تلفزيونية
Telephone Sets	P	79990	56345	88549	47579	46990	قطعة	جهزة هاتـــف
Dry batteries	P.000	8725	17767	21060	28411	38542	ألف قطعة	طاريات جافـــة
Liguid batteries	P.000	205	193	148	110	142	ألف قطعة	طاريات سائلة
Cables	Ton	11201	13813	12712	10466	9115	طن	نابلات
Pencils	G.000	275	324	196	213	184	ألف كروز	قلام رصـــاص

المنتجات الصناعية التحويلية الرئيسية في القطاع الخـــــاص ١٩٨٠ - ١٩٨٤

MAIN MANUFACTURED INDUSTRIAL PRODUCTS OF THE PRIVATE-SECTOR, 1980-1984

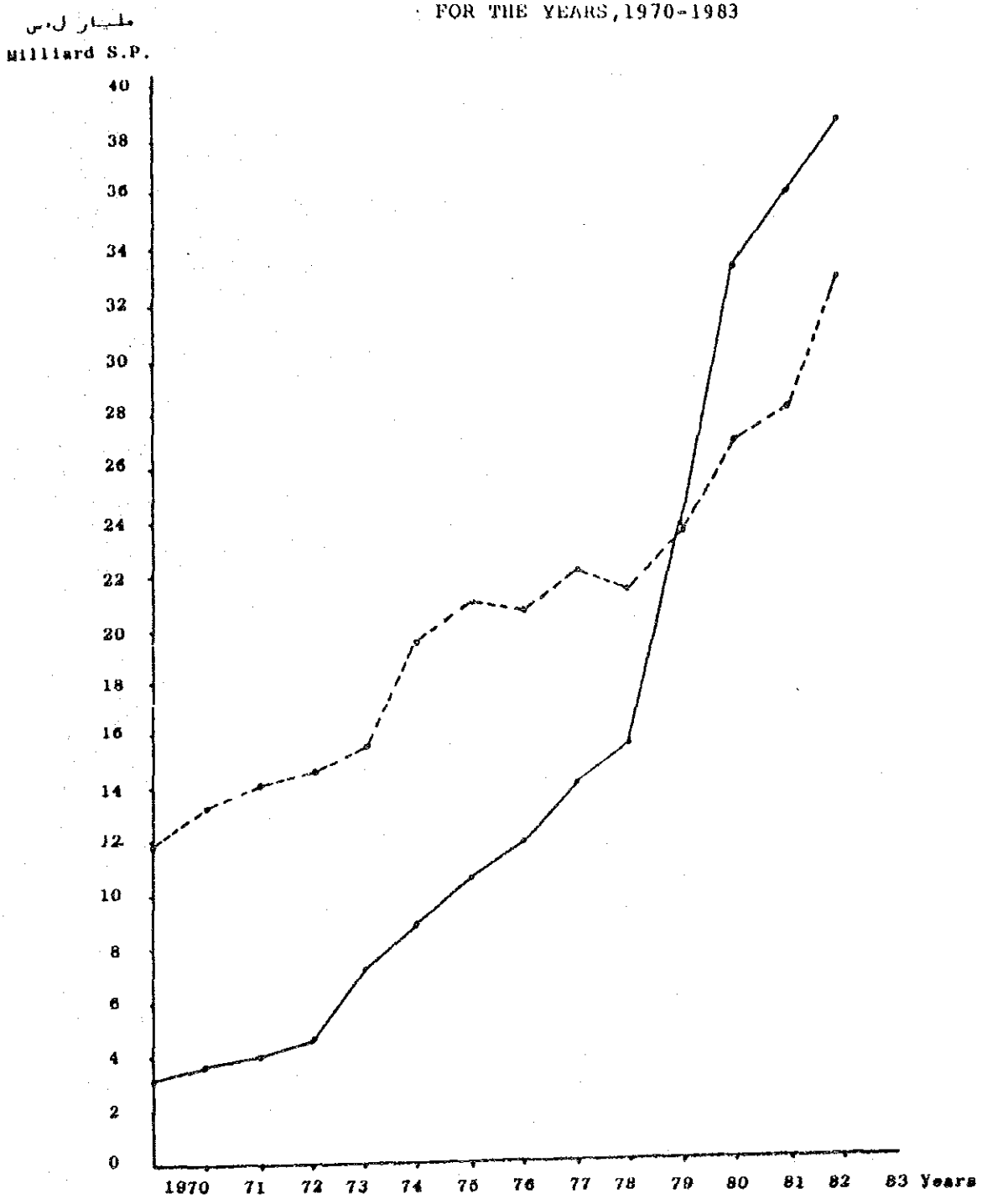
جدول ٤/٥

TABLE 4/5

Types of Industry	Unit	1984	1983	1982	1981	1980	الوحدة	نوع الصناعة
Canning	Ton	1480	1450	1415	1215	1112	طن	كونسروة
Sheeted Apricot	Ton	3415	5713	5056	1789	3666	طن	قمر الدين
Olive Oil	Ton	51034	27264	94838	44520	83385	طن	زيت زيتون
Margarine	Ton	650	891	698	693	688	طن	سمن نباتي
Biscuits	Ton	1387	2882	1434	792	335	طن	بسكويت
Macaroni	Ton	11229	12000	12204	11600	6554	طن	معكرونة وشعيرية
Chocolate	Ton	4111	5691	3605	3364	3228	طن	شوكولاتـــه
Grape Treacle	Ton	9151	11605	10049	10876	12198	طن	دبـــــس
Cotton textiels	M.000	7810	12280	3220	2960	2895	الف متر	منسوجات قطنية
Silk and cotton blanket	P.000	375	355	350	295	290	الف قطعة	حرامات قطنية وحريرية
Cotton and Silk bedsheet	P.000	2456	5141	5620	456	152	الف قطعة	شراشف قطنية وحريرية
Towels and Kuflas	P.000	3121	4753	4819	4752	4648	الف قطعة	مناشف وبشاكير
Nylon textiles	M.000	380	954	381	352	319	الف متر	أقمشة نايلون
Tergal and trevera textiles	M.000	357	610	354	342	339	الف متر	أقمشة تركبال وتريفيرا
Silk textiles	M.000	18231	20850	19811	18816	17875	الف متر	أقمشة حريرية
Tricot	P.000	2578	2390	2015	1875	1800	الف قطعة	تريكو مشغول
Silk under wear	P 000	2340	2139	2221	2020	1848	الف قطعة	البسة داخلية
Stockings	D.000	1520	1365	1373	1275	1272	الف دزينة	جوارب
Silk textiles	M.000	225	1236	167	131	128	الف م٢	سجاد حريري
Alcohol	Ton	436	259	250	253	240	طن	كحـــول
Paints	Ton	2274	5431	4361	3651	3563	طن	دهانـــات
Medical Products	S.P.000	15199	19708	19520	11568	9811	الف ل.س	منتجات طبية
Detergents	Ton	8756	9776	4517	3517	2597	طن	منظفات كيميائية
Soap	Ton	42912	43681	48225	42120	31214	طن	صابـــون
Liguid gas	M3.000	310	650	561	367	292	الف م٣	غازات سائلة
Matches	Gross	4557	4270	4011	3716	2800	كروز	كبريـــت
Rubber Shoes	P.000	77	82	78	79	77	الف زوج	أحذية مطاطية
Glass	Ton	7120	7115	7215	6712	6615	طن	زجـــاج
Gas coockers	P	22573	26200	26752	26558	25723	قطعة	بوتوغازات
Wasking machines	P	52219	43575	53786	43900	26203	قطعة	غســـالات
Refrigerators	P	16102	21366	22115	21122	11749	قطعة	ثلاجـــات
Liguid batteries	P	19300	32798	24270	23580	15337	قطعة	بطاريات سائلة

تطور قيمة الانتاج الصناعي للسنوات ١٩٧٠- ١٩٨٣

DEVELOPMENT OF THE VALUE OF INDUSTRIAL PRODUCTION
FOR THE YEARS, 1970-1983



Development of the value of Industrial Production at current Prices

.... Development of the value of Industrial Production at the fixed prices of 1980

تطور قيمة الانتاج الصناعي بالاسعار الجارية

تطور قيمة الانتاج الصناعي بالاسعار الثابتة لعام ١٩٨٠

4 (5) , 4 (6) , 4 (7)

Electrical Energy

in

SYRIA

Power Supply

.1 Introduction

Power supply has become a very important issue in Syria. During the industrial survey, many managers complained about power cuts, that interrupt production and, in a number of cases, destroy materials, that are in the machines. Therefore, quite a number of enterprises purchased generators as stand-by and even, for certain enterprises, as a permanent power source. This is very costly, both because of the necessary investments and of high running costs. Further development of the country requires that power will be available in sufficient quantities.

Given the importance of the issue, the Ministry of Electricity prepared, within the framework of the present industrial survey, a number of tables on power production and consumption. These tables are reproduced in the Annex These tables provide at the same time the necessary information for the past decade and projections up to the year 2000. This chapter will give some of the conclusions that can be drawn from this very rich material.

.2 Supply and Demand

Basic tables are nos 1 and 2 in the set of tables refered to before. The information, given there, can be summarized as follows:

Power Supply and Demand (1000 GWH)

Year	Power Generated	Domestic Power Demand	Balance		
			Export	Imports	Power Cuts
Actual figures 1974	1.0	1.1	-	0.1.	-
1982	5.4	5.3	0.1	-	-
1983	6.3	6.3	0.1	-	0.1
Projection 1984	7.2	7.5	0.1	-	0.4
1985	7.8	8.6	-	0.2	0.6
1986	10.4	10.4	-	-	-
1990	18.0	18.0	-	-	-
2000	40.5	40.5	-	-	-

Source: Ministry of Electricity

Domestic power demand is growing fast in Syria:

- 21 %, actual annual growth rate, 1974-1983,
- 12 %, projected annual growth rate, 1983-2000.

An annual increase of 21 % means that power demand is doubling every 3.6 years. The Ministry of Electricity expects that growth rates will become lower in the future. Still, an annual growth rate of 12 % would demand a doubling of production every 6 years.

Power supply was not able to follow demand and so demand outstripped ouput from 1983 onwards, necessitating power cuts and imports. According to the projection of the Ministry of Electricity, this disequilibiriums is a temporary situation and will be over in 1986. In the worst year, 1985, production will lag about 10 % behind consumption. The Ministry of Electricity thinks that from 1986 onwards, powercuts will have become a thing of the past if the projects scheduled will be realized. However, it would seem that this projection is rather optimistic. An alternative one will be considered in next section.

.3 Supply

Supply did not grow sufficiently, firstly, as production from Euphrates dam is unstable, secondly, as this unstability was not

sufficiently offset by an increase in production from thermal power stations and thirdly, because of the rate of increase of consumption.

The production from Euphrates dam increased steadily until 1982. In that year, hydro-power generation stood at 91% of its maximum capacity (3,260 GWH). The production fell in 1983 and this fall is expected to continue in 1984. For that year hydro-power generation should only stand at 52% of its maximum capacity. This means a reduction of nearly one half of hydro-electric power production. Supposing that, in 1984, production of this type of electric power would be as much as in 1982, no power cuts would be necessary.

Electricity production from the Euphrates will diminish due to the following facts:

1. Increase of irrigation in Turkey,

2. Increase of irrigation in Syria,

3. Construction of dams in Turkey,

4. Increased evaporation of the Euphrates waters, due to extended surfaces from the new dam-lakes, 4-5 % of the water.

It should also be remembered that the Euphrates dam was built without reaching beforehand a formal agreement about the division of water between all parties concerned. It seems advisable to reach as yet such an agreement. Otherwise new surprises concerning hydro-electric power production might occur.

The reduction in hydro-power generation was only partly offset by a rapid expansion of electricity production by thermal power plants. New units started operation in 1982 and in 1983. According to the projection of the Ministry of Electricity the expansion will be resumed in 1985 and, on the stength of this expansion, the gap between consumption and production will disappear.

The capacity expansion, foreseen in 1985 in thermal power plant, should come from a natural gas turbinal station of 150 MW in Sweedieh. This project has not yet been approved by the highest authorities in the country though approval seems likely. Also fuel fired power plants are planned up to 1987, totally 660 MW, as showed in the table on next page.

.3 (cont.)

During the coming years the Ministry of Electricity has planned the following extensions of the capacity:

Location	Scheduled Operation	Effect MW	Production Capacity 1000 GWH	Type of power Plant
Sweedieh	Sept. 1985	2 X 501	0,500	Natural gas-Turbine
Sweedieh	Jan. 1986	2 X 501	0,500	Natural gas-Turbine
Mehardeh	Sept. 1986	165	0.825	Fuel oil
Mehardeh	Jan. 1987	165	0.825	Fuel oil
Banias	Mar. 1987	165	0.825	Fuel oil
Banias	July. 1987	165	0.825	Fuel oil

The capacity is based on 5000 hours of yearly operation.

The extensions in Sweidiah and Banias has not yet obtained financing, whereas the extensions in Mehardeh already have approved financing. These considerations might change projection of power production in the following way.

New Projections of Power Produciton (1000 GWH)

year	Production with Installed Capacity 1)		Production New Capac. As Planned		Total Production		Demand	Difference Planned/Delay
			Gas	Fuel	Realized as Planned	with One Year's Delay of the planned Projects		
	Hydrs	Fuel						
1985	1.7	5.8	0.1	-	7.6	7.5	8.6	-1.1/-1.0
1986	1.8	5.8	0.9	0.2	8.7	7.6	10.4	-1.7/-2.8
1987	1.9	5.8	1.0	2.5	11.2	8.8	12.1	-0.9/-3.3
1988	1.8	5.8	1.0	3.3	11.9	11.1	13.9	-2.0/-2.8
1989	1.8	5.8	1.0	3.3	11.9	11.9	15.9	-4.0/-4.0

Capa.: Capacity
1) Ministry of Electricity

This projection is most alarming. Even if the planned projects are realized according to schedule, there will be an important gap between projected production and consumption. The gap will be app. 1.200 GWH to 2.500 GWH during the period up to 1987. This gap represents an extra installed effect of 300-500 MW and an investment of app. 1 bn SP. In 1988 the gap will become even bigger, app. 2,500 GWH, representing app. 20 % of total demand. Nothing can be done any more to avoid this shortfall. Moreover, it demands prompt decision-making concerning the power stations under consideration. Further power stations should be envisaged soon in order to avoid that the power cuts of 1988 will

1) In November 1984 this project is approved with 150 MW; In Nov. 1984, the implementation of this project has a delay of 3 months

.3 (cont.)

extend into 1989 and 1990.

For the nineties, new ways of generating electricity are foreseen, namely the utilization of petro coke, shale coal and nuclear energy. In 2000 these 3 new forms of energy should supply almost 40 % of total electricity production.

.4 Demand

Growth of domestic power demand can be broken down as follows:

Domestic Power Demand (1000 GWH)

Year	Lighting	Industrial, Agricultural	Self Consumption	Losses	Total
Actual figures					
1974	0.4	0.5	-	0.2	1.1
1982	1.8	1.9	0.2	1,4	5.3
1983	2.1	2.3	0.3	1.6	6.3
Projection					
1990	6.1	7.9	1.1	2.9	18.0
2000	14.0	19.2	2.4	4.9	40.5

Source: Ministry of Electricity.

Up to 1983, the demand for lighting and industrial power has grown more or less parallel. This is not surprising as electrification of villages took place in the period from 1974 to 1983: App. 3800 villages were supplied with electricity. In these years household demand increased by about 19 % per year whereas demand for electricity from public manufacturing only grew by 17 %. In Syria, electricity is cheap. Consquently, people tend to be careless about their electricity consumption. It would certainly seem advisable to provide more discipline by more realistic rates.

In the future, industrial demand should outstrip the demand for lighting: whereas industrial demand should grow by 13 % in the years up to 2000, demand for lighting would only increase by 12 % annually. Especially household demand should grow much slower after 1983,12 % per year instead of 19 % before. The projection of the Ministry of Electricity seems reasonable. However, in order that such a development will take place, it might be needed to raise rates.

From what has been said before, it is clear that the second half of the eighties will be a period where demand for electricity will exceed production. Therefore, it seems

.4 (cont.)

interesting to look somewhat more closely at the evolution of household demand in that period.

Annual Growth Rates of Household Demand (%)

Actual/ Projection	Periods	Growth Rate
Actual	1974-1977	20.4
	1977-1980	20.6
	1980-1983	16.7
Projection	1983-1989	18.0
	1986-1989	16.6
	1989-1992	13.7

Source: Ministry of Electricity

Growth of household demand is only slowing down after 1986. In order to narrow the gap between demand and production it might, indeed, be interesting to try to curb household demand already before 1987.

Lastly, the importance of non-metered production, called 'losses', increased from 13 % in 1974 to 27 % in 1983. This proportion is certainly too high and should diminish. It is, indeed, foreseen, that, by 2000, losses will only represent 12 % of total demand.

Public manufacturing employed in 1983 about 100.000 workers and used app. 1500 GWH according to the Ministry of Electricity. This Ministry is of the opinion that public enterprises would consume more than 10 times as much in the year 2000. Assuming a constant utilization of electricity per worker, this would mean a job creation in public manufacturing industries of about 1 mn positions in the year up till 2000. In total, 2.5 mn jobs need to be created (see section 9.2.2.). The contribution of public manufacturing, as implied in the demand projection, would seem fair.

.5 The Price of Electricity

Electricity tariffs for domestic and commercial uses, vary according to quantity bought. In mid 1984 they were as follows:

- 19 PT/KWh: 0-50 KWH/month,
- 24 PT/KWh: 51-100 KWH/month,
- 35 PT/KWh: more than 100 KWH/month.

Tariffs for industrial uses vary according to voltage: 1984

tariffs are the following:

- 10 PT/KWh for 220 KV: This voltage is only used by Hama steel works,
- 12 PT/KWH for 66KV: This voltage is in use, e.g., by cement factories and by fertilizer factories,
- 20 to 25 PT/KWh for 20 KV: These are the tariffs for most industrial uses. The tariff is 20 Pt when the connection is made before the transformer (20 KV) and 25 PT in case that the connection is made thereafter (380 V).

In order to calculate revenues form electricity sales, these tarifs may be applied to quantities sold in 1983. These are mentioned in the second one of the annexed tables from the Ministry of Electricity.

Revenue from Electricity and Subsidies in 1983

Users	Cons-ump-tion GWh	Revenue		Cost price		Subsidy mn SP
		Average tariff SP/KWh	Total mn SP	Per KWh	Total mn SP	
Lighting	2005	0.27	501.3	0.517	1036.6	535.3
Public Industry						
- 220 KV & 66 KV	1022	0.12	112.4	0.305	311.7	
- 20 KV & 380 V	681	0.23	153.2	0.399	271.7	
Total Public Industry	1703		265.6		583.4	317.8
Private Industry 20 KV & 380 V)	211	0.23	47.5	0.399	84.2	36.7
Irrigat.	356	0.23	80.1	0.399	142.0	61.9
Total	4275		894.5		1846.2	951.7

Irrigat.: Irrigation

As can be seen from this table, electricity consumption is subsidized by about 1 bn SP, representing more than half the cost of production. A large part of the subsidy, 318 mn SP, is benefitting public industry.

..6 Energy Saving

It appears from the preceeding chapters that Syria will pass difficult years in the near future with regard to electricity supply. The only way to smoothen the crisis is to limit the consumption first of all for lighting and secondly for the industrial use. Indeed it is important, that everybody tries to cut the consumption without decrease of the production.

Obviously the best way to obtain savings in the consumption on a voluntary basis is to rise the rates, so that these reflect the real production cost. However, as earlier mentioned in this report, it is also necessary to apply various methods for energy savings in the long run. In households and offices, where electric heating is quite common, it would diminish the consumption if the houses are better insulated, e.g., by double layer of window glasses and by insulation of walls. Also panels installation of solar heating will cut the consumption. In industries installation of heat exchangers and insulation of various installations will reduce electricity consumption as well as fuel consumption. In the irrigated areas wind mills for pumping will also diminish electricity consumption. It might be considered to elaborate rules for the construction work with regard to energy savings.

...es about Electricity (Source Ministry of Electricity)

TABLE No. 1

INSTALLED CAPACITIES ON THE NATIONAL NETWORK AND ENERGY GENERATION (1974-2000)

Year	Hydro		Oil fired		Gas fired		Petro Coke		Shale stone		Nuclear		Total	
	Inst. cap. MW a	Generation GWH	Inst. cap. MW a	Generation GWH	Inst. cap. MW a	Generation GWH	Inst. cap. MW a	Generation GWH	Inst. cap. MW a	Generation GWH	Inst. cap. MW a	Generation GWH	Inst. cap. MW a	Generation GWH
1974	324	339	273	694	—	—	—	—	—	—	—	—	597	1024
1975	324	758	435	896	—	—	—	—	—	—	—	—	759	1346
1976	524	1230	443	396	—	—	—	—	—	—	—	—	967	1626
1977	624	1760	489	284	—	—	—	—	—	—	—	—	1113	8052
1978	824	2134	657	358	—	—	—	—	—	—	—	—	1481	2492
1979	824	2353	829	824	—	—	—	—	—	—	—	—	1653	3275
1980	824	2556	883	1148	—	—	—	—	—	—	—	—	1707	3704
1981	824	2658	878	1767	—	—	—	—	—	—	—	—	1702	4425
1982	824	2959	1043	2470	—	—	—	—	—	—	—	—	1867	5429
1983	824	2169	1208	4143	—	—	—	—	—	—	—	—	2032	6312an
1984	824	1690	1208	5500	—	—	—	—	—	—	—	—	2032	7190an
1985	824	1650	1208	5800	200	300	—	—	—	—	—	—	2232	7750an
1986	874	3830	1408	3639	200	1000	—	—	—	—	—	—	2482	10449
1987	874	1870	1858	9251	200	1000	—	—	—	—	—	—	2932	12121
1988	874	1823	2258	11116	200	1000	—	—	—	—	—	—	3332	13939
1989	874	1776	2658	12864	200	1000	150	250	—	—	—	—	3882	15890
1990	874	1729	2658	13472	500	2000	150	750	—	—	—	—	4182	17956
1991	874	1682	2658	13579	800	3500	150	750	300	400	—	—	4782	20111
1992	1074	1835	2658	12730	800	4000	150	750	600	3000	—	—	5282	22323
1993	1284	2500	2658	12905	800	4500	150	750	600	2500	400	400	5892	24555
1994	1294	3035	2658	11480	1100	5000	350	750	600	3500	800	2000	6502	26765
1995	1304	3000	2658	11610	1400	6546	150	750	600	3000	800	4000	6912	28906
1996	1314	3150	2658	11610	1400	6420	150	750	1200	5000	800	4000	7522	30930
1997	1324	3250	2658	11610	1700	7485	150	750	1200	6000	800	4000	7832	33095
1998	1334	3350	2658	11610	2000	9201	150	750	1500	6500	800	4000	8442	35411
1999	1344	3425	2658	11610	2000	9405	150	750	1800	7500	1200	5000	9152	37890
2000	1354	3500	2658	11610	2000	9582	150	750	3300	8000	1600	8000	9562	40542

a This field represents nominal installed capacity, the real one is less.
as the generation is less than the consumption, the difference will be imported or discontinuing the supply.

TABLE No. 2

CONSUMPTION OF ELECTRICITY IN SYRIA DURING 1974-2000

(GWH)

Year	Lighting			Power					Self Consumption of P.S.	Total Consumption	Losses	Ready for Consumption	Import	Export
	Domestic Commercial	Government services	Total	Government Industry	Private Industry	Mill	Irrigation	Total						
1974	352	75	427	350	60	41	57	508	46	981	151	1132	108	---
1975	442	99	541	356	67	65	78	566	46	1153	200	1353	7	--
1976	541	110	651	396	77	80	100	653	46	1348	280	1628	2	--
1977	615	135	750	476	89	141	122	828	40	1618	391	2009	--	43
1978	745	176	921	518	101	129	145	893	49	1863	574	2437	--	55
1979	955	230	1185	746	115	191	188	1240	69	2514	585	3099	--	176
1980	1078	236	1314	892	132	182	218	1425	106	2847	750	3637	--	67
1981	1233	282	1515	1032	150	174	252	1608	160	3281	1097	4378	--	47
1982	1473	331	1804	1252	176	200	310	1938	176	3918	1382	5300	---	129
1983	1313	392	2105 (2005)	1487	211	216	356	2314 (2270)	250	4565	1653	6218	--	84
1984	2018	477	2495 (2195)	1898	271	238	432	2932 (2239)	332	5266	1774	7040	--	50
1985	2385	557	2942 (2542)	2222	333	261	508	3530 (3312)	387	6245	1705	7950	200	8
1986	2815	648	3463	2938	397	287	580	4202	575	8240	2209	10449	--	--
1987	3397	736	4093	3564	463	316	660	5003	727	9773	2348	12121	--	--
1988	3859	824	4683	4953	532	348	740	5811	836	13430	2509	15939	--	--
1989	4467	915	5382	5045	606	383	828	6854	953	13189	2701	15890	--	--
1990	5175	1006	6131	5869	685	421	800	7875	1077	15083	2873	17956	--	--
1991	5824	1097	6921	6751	767	463	986	8966	1207	17094	3017	20111	--	--
1992	6580	1185	7745	7686	851	509	1070	10116	1338	19188	3135	22322	--	--
1993	7312	1268	8580	8659	936	560	1155	11310	1473	23363	3192	24555	--	--
1994	8078	1346	9414	9647	1030	616	1240	12533	1606	23553	3212	26765	--	--
1995	8795	1424	10219	10348	1133	678	1325	13485	1776	25437	3469	28906	--	--
1996	9499	1518	11009	10947	1248	746	1415	14354	1856	27219	3711	30930	--	--
1997	10164	1600	11764	11678	1371	820	1505	15374	1986	29326	3971	33095	--	--
1998	10774	1697	12471	12561	1508	902	1595	16566	2125	31162	4249	35411	--	--
1999	11420	1798	13218	13535	1659	992	1685	17852	2273	33343	4547	37890	--	--
2000	12106	1906	14012	14561	1825	1092	1775	19233	2432	35677	4865	40542	--	--

ables about Electricity (cont.)

TABLE No. 3

Consumption over the year (by months) in GWH (1974-1983)

Year	January		February		March		April		May		June	
	S	D	S	D	S	D	S	D	S	D	S	D
1974	64,8	21,7	73,8	24,2	85,8	26,3	86,5	28,6	90,1	29,3	97,8	30,0
1975	129,7	45,9	123,8	41,6	132,9	42,4	123,3	41,1	127,6	42,4	132,7	45,4
1976	196,9	61,4	177,8	56,8	186,8	57,5	190,9	57,8	183,6	61,3	183,8	62,3
1980	300,8	101,8	265,8	93,8	287,9	97,0	269,0	91,6	274,0	91,0	282,0	97,0
1982	446,8	154,3	386,8	142,7	428,8	153,7	389,0	133,3	406,0	136,5	425,0	143,1
1983	557,8	186,7	493,8	147,9	537,0	167,9	466,8	135,3	488,0	138,6	514,0	147,8

Year	July		August		September		October		November		December		Total	
	S	D	S	D	S	D	S	D	S	D	S	D	S	D
1974	102,8	33,3	102,5	33,9	103,8	33,8	106,9	35,8	106,1	35,3	111,3	38,1	1132,4	365,9
1975	139,2	48,1	148,3	49,5	133,4	45,9	148,0	51,8	147,5	48,9	151,8	49,6	1627,7	552,1
1978	211,7	73,6	219,4	76,8	208,4	67,6	223,6	73,3	218,9	68,6	244,7	80,6	2436,7	784,8
1980	318,8	108,8	327,8	111,8	307,8	103,8	320,0	108,0	324,8	105,8	344,8	121,8	3634,0	1228,0
1982	468,8	148,3	473,8	155,7	446,0	147,7	450,0	148,3	467,8	154,4	516,0	167,9	5300,0	1766,9
1983	527,8	151,4	544,8	153,4	502,8	146,4	506,0	148,3	513,8	145,6	566,8	159,9	6218,8	1799,1

TABLE No. 4

Consumption of Damascus Mohafaza during (1974-2000) in GWH

Year	Lighting			Electro-motive	Self consumption of P.S	Total consumption of P.S.	Losses	Energy available
	Domestic Commercial	Government services	Total					
1974	136	32	208	86	3	306	89	366
1975	217	44	261	128	3	390	77	467
1976	263	50	313	146	2	461	91	552
1977	279	61	340	178	2	520	121	641
1978	333	83	416	212	7	635	160	795
1979	421	109	530	353	9	892	127	1019
1980	505	326	831	351	10	992	236	1228
1981	665	335	700	408	9	1117	359	1476
1982	605	248	753	550	16	1320	467	1787
1983	610	350	780 (850)	569 (639)	30	1349 (1509)	450 (491)	1799 (2000)
1984	695	188	875 (1000)	625 (735)	20	1520 (1755)	480 (545)	2000 (2300)
1985	820	218	1038 (1130)	790 (850)	20	1848 (2000)	552 (600)	2400 (2600)
1986	906	250	1156	977	20	2153	607	2760
1987	1071	280	1351	1114	20	2485	661	3146
1988	1246	320	1566	1258	20	2844	711	3555
1989	1381	365	1746	1410	70	3226	756	3982
1990	1582	410	1992	1565	100	3657	803	4460
1991	1825	460	2285	1721	140	4146	849	4995
1992	2108	515	2623	1876	200	4699	895	5594
1993	2440	580	3020	2026	280	5326	940	6266
1994	2883	650	3533	2168	280	5981	974	6955
1995	3325	720	4055	2370	280	6655	995	7650
1996	3746	820	4566	2483	280	7339	1000	8339
1997	4070	900	4990	2656	280	7926	1080	9006
1998	4368	950	5356	2842	280	8480	1156	9636
1999	4663	1090	5753	3041	280	9074	1237	10311
2000	4975	1200	6175	3254	280	9709	1324	11033

Tables about Electricity (cont.)

TABLE No. 8

Daily Total Production (GWH)

Week / Day	May 1983								September 1983							
	18 2-8		19 9-15		20 16-22		21 23-29		36 6-11		37 12-18		38 19-25		39 26-2 Octobre	
	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S
Monday	18,4	--	16,2	--	16,0	--	16,1	--	17,6	2,1	17,7	1,7	15,8*	--	16,8	1,1
Tuesday	16,1	--	16,3	--	16,0	--	16,0	--	17,8	2,2	17,8	--	13,7*	--	17,0	0,7
Wednesday	16,1	--	16,6	--	15,8	--	16,1	--	17,8	2,1	18,3	--	16,0	1,6	17,3	1,0
Thursday	16,5	--	16,8	--	15,8	--	16,1	--	17,8	2,1	18,4	--	16,1	1,8	17,6	0,6
Friday	14,3	--	13,5	--	14,0	--	14,2	--	16,0	--	17,6	--	14,9	1,4	16,5	--
Saturday	15,8	--	15,8	--	15,6	--	16,0	--	16,8	2,1	16,1*	--	16,2	1,5	16,9	0,7
Sunday	15,9	--	15,4	--	16,3	--	16,6	--	17,4	2,0	15,1*	--	15,6	3,0	16,8	0,4
Total :	110,1	--	110,6	--	109,5	--	111,3	--	121,3	12,6	120,1	1,7	109,9	9,3	110,0	4,4

Week / Day	January 1984							
	1 2-8		2 9-15		3 16 - 22		4 23 - 29	
	C	S	C	S	C	S	C	S
Monday	19,6	1,8	19,6	2,2	19,0	2,6	18,6	2,6
Tuesday	19,7	2,0	19,6	2,3	19,2	2,6	18,4	2,6
Wednesday	19,6	2,0	19,6	2,5	18,9	2,6	18,7	2,4
Thursday	20,0	2,3	19,4	2,3	19,0	2,4	19,1	2,8
Friday	18,1	1,4	17,8	2,0	17,4	2,8	16,7	2,8
Saturday	19,6	2,0	19,7	2,3	18,2	2,4	17,9	3,8
Sunday	19,7	2,1	19,3	2,4	18,5	2,4	18,4	3,6
Total :	136,3	13,4	134,9	16,0	130,2	17,0	127,8	20,7

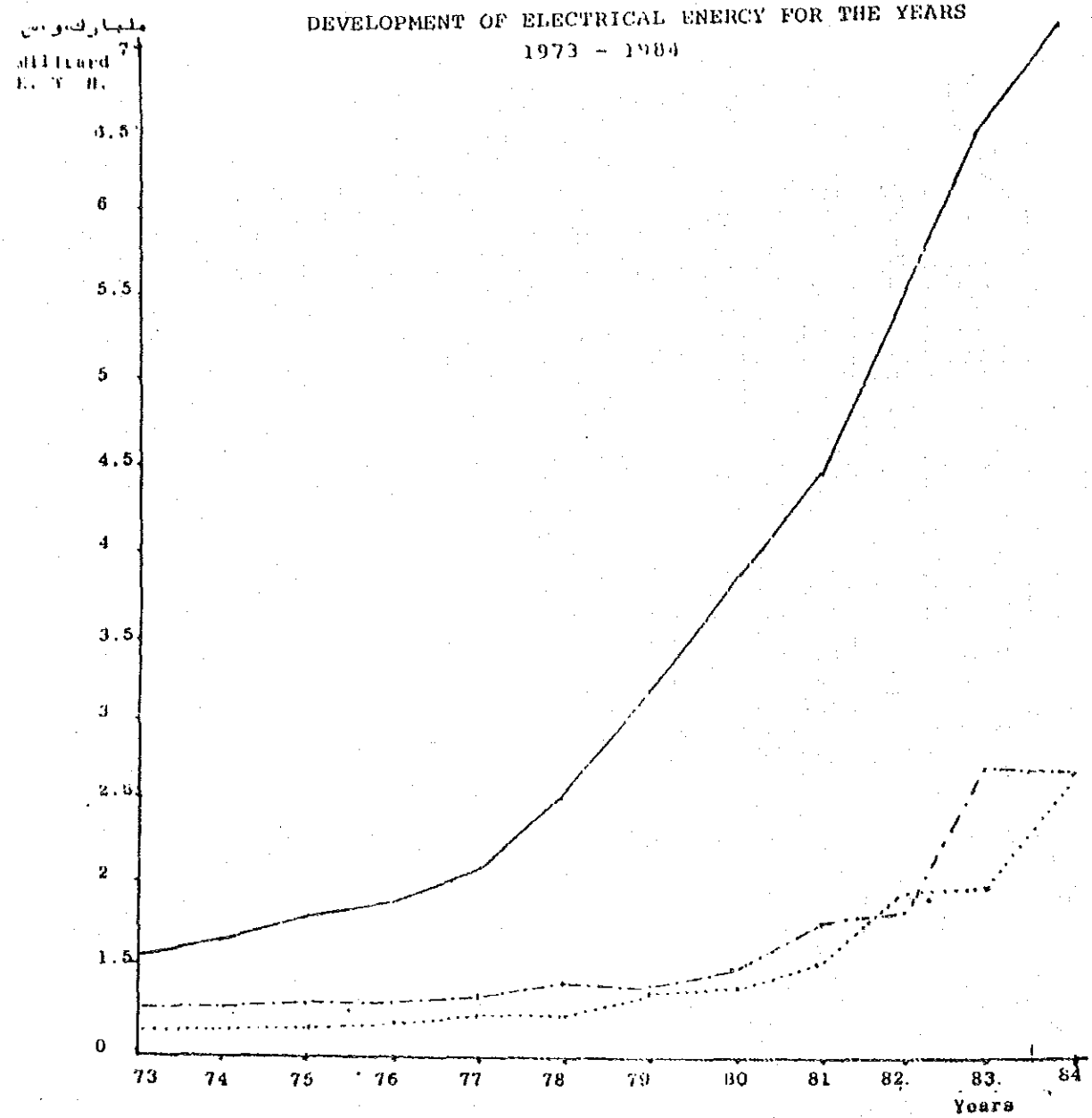
C is consumption as measured.

S is the approximate saving due to power cuts.

n.e. Holiday

تطور الطاقة الكهربائية للسنوات ١٩٧٣ - ١٩٨٤

DEVELOPMENT OF ELECTRICAL ENERCY FOR THE YEARS
1973 - 1984



—— The Produced electrical energy — الطاقة الكهربائية المنتجة

.... The electrical energy consumed in enlightenment .... الطاقة الكهربائية المستهلكة في الانارة

-.-.- The electrical energy consumed in Industry. -.-.- الطاقة الكهربائية المستهلكة في الصناعة

الطاقة الكهربائية المركبة والمنتجة والمستهلكة ١٩٨٤

ELECTRICAL ENERGY PRODUCED AND CONSUMED IN SYRIA,1984

TABLE 9/5

جدول ٩/٥

Classification	المجموع Total	المنشآت الصناعية * Industrial Establishments	المؤسسة العامة للكهرباء General organization for electricity	البيـــان
	أ ـ الطاقة المركبة بالميغاواط Actual Electrical Installed Capacity			
Water	820	-	820	مائـــي
Steam	853	48	805	بخاري
Gas	295	43	252	غـــازي
Diesel	866	866	...	ديـــزل
Total	2834	957	1877	المجموع
	ب ـ الطاقة المنتجة مليون ك و س Energy produced M.K.W.H			
Water	1928	-	1928	مـائـــي
Steam	4283	36	4247	بخـــاري
Gas & Diesel	1099	377	722	غازي وديزل
Total	7310	413	6897	المجموع
	ج ـ الطاقة المعدة للاستهلاك حسب أوجه الاستهلاك مليون ك و س Electrical Energy Consumed unit M.K.W.H			
For lighting	7310	95	2602	للانـــارة
For industry	2944	318	2626	قوة محركة
Total consumption	5641	413	5228	مجموع الاستهلاك.
Energy sold out-side the country	-	-	-	الطاقة المصدرة
Loss and self consumption	1669	-	1669	الفاقـد والاستهلاك الذاتـــي
Total	7810	413	6897	المجموع

* Estimated Figure.

* ارقام تقديرية .

5. The budgets and staff members of the calibration and measurement laboratory are maintained by (SSRC) Scientific Study & Research Center.

6. The sort of measuring instruments and equipment are as follows:

- Volt meters	DC	1	G.Hz
	0 V.	1100	V.
- Ampere meter	DC	1	G.Hz
	0 Amp.	20	Amp.
- Ohm meter	0	100	M
- LCR			
- Oscilloscopes	up to	200	MHz
- Signal generators	DC	26.5	G.Hz
- Power meter	up to	26.5	G.Hz
	&	100	mW.
- Power sensors	up to	25	W
- Attenuators	up to	120	dB & 26.5 G.Hz
- Spectrum analysers	DC	40	G.Hz
- Network analyser			
- Power supplies			
- SWR meter			
- Counters	up to	26.5	G.Hz
etc.....			

1. Industrial organization such I.V. factory Syronics). & Research Center such SSRC. Please refer to answer of question No 4 above.

2. General policy adapted by NSCL is the following:
   - Gradually assuming the responsibility of inspection & verification of electronic equipment in cooperation with SASMO & ITRC.
   - NSCL will start making a repair section with several specialised work stations for repairing certain types of measuring instruments & will try to transfer this experience to other institutes in Syria in order to improve the deteriorated situation of measuring instruments especially that most of foreign companies do not have repair work shops in the country.
   - NSCL, intends to have a primary, secondary, & tertiary level of calibration and will be the national center & it will practice the calibration on the national level.
     It worth mentioning that on the tertiary level, our policy is to encourage establishing low-end tertiary calibration facilities in sectors having relatively large number of measuring instruments.
     Finally concerning 3 & 4 of this question is not applicable for the moment, but it is planned for, in the next phase of this project.

7. There exist at SSRC some of the low-end tertiary calibration istruments which we intend to keep at SSRC and to encourge other large Syrian organizations to have such instruments when they have a lot of multimeters and power supplies . These instruments are the following:

I) <u>DC power supply calibration</u>

1) DMM 3.5 digit	DCV up 1000 V ACV up 500 V
2) Current Shunt	DCA UP TO 20 A
3) Electronic load	60 V/ 200 A
4) Oscilloscope	frq Band with up to 60 MHz.

II) <u>DMM and analogue meters calibration</u>

1) Meter calibrater	DCV/20 mV to 1100 V DCA(200 mA to 2A (frq up to 50 KHz) ACV/10mV to 1100 V ACA/200mA to 2A Resistance / 1 to 10m
2) RMS voltmeter	Voltage Rang up to 300 V frq: 10 Hz to 10 MHz

8. The tentative organization chart of NSCL is attached. NSCL is composed mainly of the following four blocks:
   a - Calibration labs for electrical and electronics

instruments. In the next phases of the project other labs are expected such as the physical and mechanical calibration labs.

b - Repair division having several fairly specialized workstations.

c - Documentation division

d - Managerial and finantial division.

We give below a brief explanation on each of the four blocks:

a - Calibration labs include the following three levels:
* Primary level is composed of 3 labs which are for:
  a. - DC measurements
  b. - AC measurements
  c. - Frequency and time

* Secondary level labs are composed of 3 labs., which are for:
  a. - DC measurements
  b. - AC & RF measurements
  c. - Wave

* Tertiary level labs are composed of 3 labs.

b - Maintenance & repair division, it is composed of several repair work-stations 6 of them are mentioned, others may be added also

c - Documentation division: as mentioned earlier it is a library containing mainly standard of measurements, criteria of calibration labs & procedures of calibration in addition to related books & periadicals.

d - Managerial & financial division: it is a classical managerial department but it worth mentioning that computerised management of instrument coming for repair & calibration is necessary.

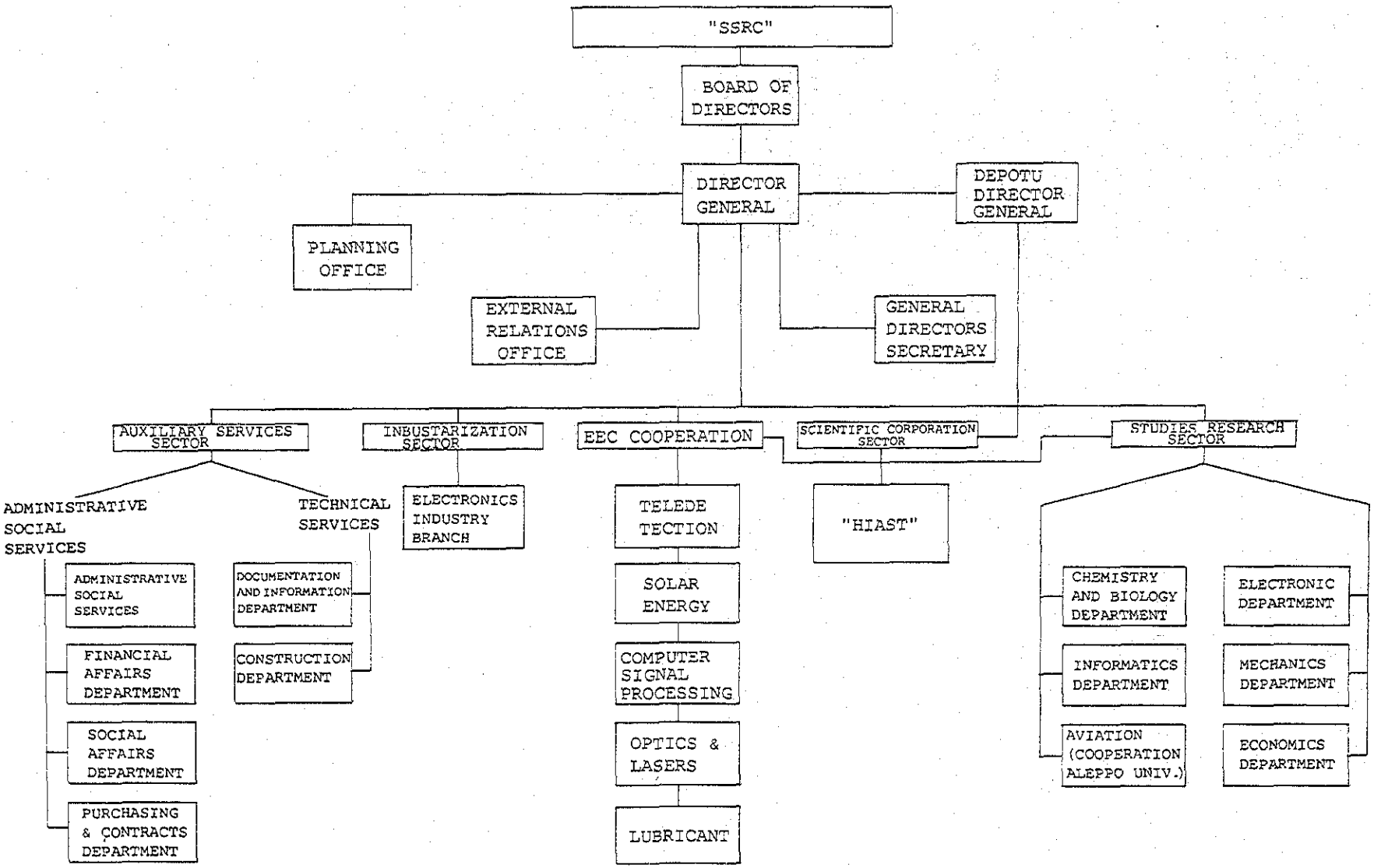
8 (5) - Many of public sectors are urging the creation of such a facility to meet their demands. Since NSCL is a part of the public sector, a wide scale propaganda is not needed. A letter through the related ministries will do the job.

9 (2) The organizational chart of NSCL is attached and the estimated number of people that will be working at NSCL (administrative and technical) is around 35 - 40 persons.

9 (3) The functions and activities of NSCL are stated above. Training of local technicians for other organization and companies will be carried out at NSCL periodically by NSCL staff. A class room for around 20 persons is to be used for this purpose. This room will be equiped by an overhead and slide projectors and a black board ....etc.

SSRC

Organisation Chart



* HIAS: HIGHER INSTITUTE OF APPLIED SCIENCES AND TECHNOLOGY

SCIENTIFIC STUDIES AND RESEARCH CENTRE

S S R C

DAMASCUS - SYRIA

1.1 DEFINITION:

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

1.2 AIMS:

The Scientific Studies and Research Centre 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 Centre 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 Centre 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 Centre is subdivided to:

1- Scientific research department covering actually the following fields: Chemistry, Physics, Applied Mathematics, Electronics, Mechanics, informatics and Economics.

   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 scientific and administrative staff of the Scientific Studies and Research Centre amounts to 250 permanent members, aided by an adequate number of technicians and laboratories personnel. The annual budget is actually about 30 millions of Syrian Pounds.

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

1.4.1 NATIONAL LEVEL ACTIVITIES:

1- the realization of the researches and studies solicited by ministries 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 teleccommunication system for the benefit of the Eurphrate's Dam ministry, aiming to facilitate the revalurisation of arable lands.
- . The introduction of electronic 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 responsabilities of the Scientific Studies and Research Centre.

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 Mathematics
- Informatics
- Fine mechanics
- Optoelectronics
- Remote Sensing
- Energetics and specially solar energy.

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

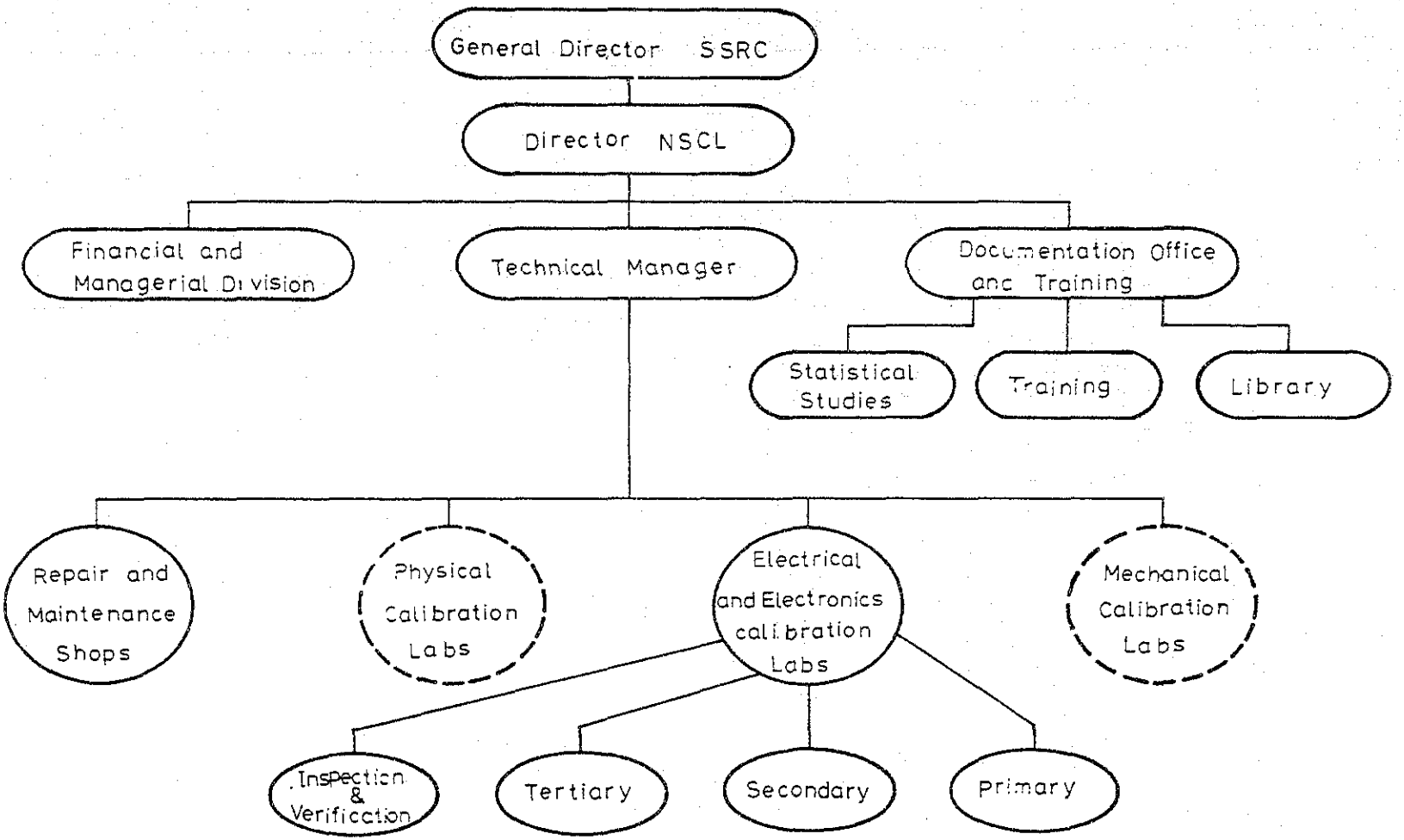
1.4.2 INTERNATIONAL LEVEL ACTIVITIES

1- The Scientific Studies and Research Centre organizes the seminar sessions of the Arab School for Sciences and Technology held annually, with the participation of several scientific Arab and international organizations.

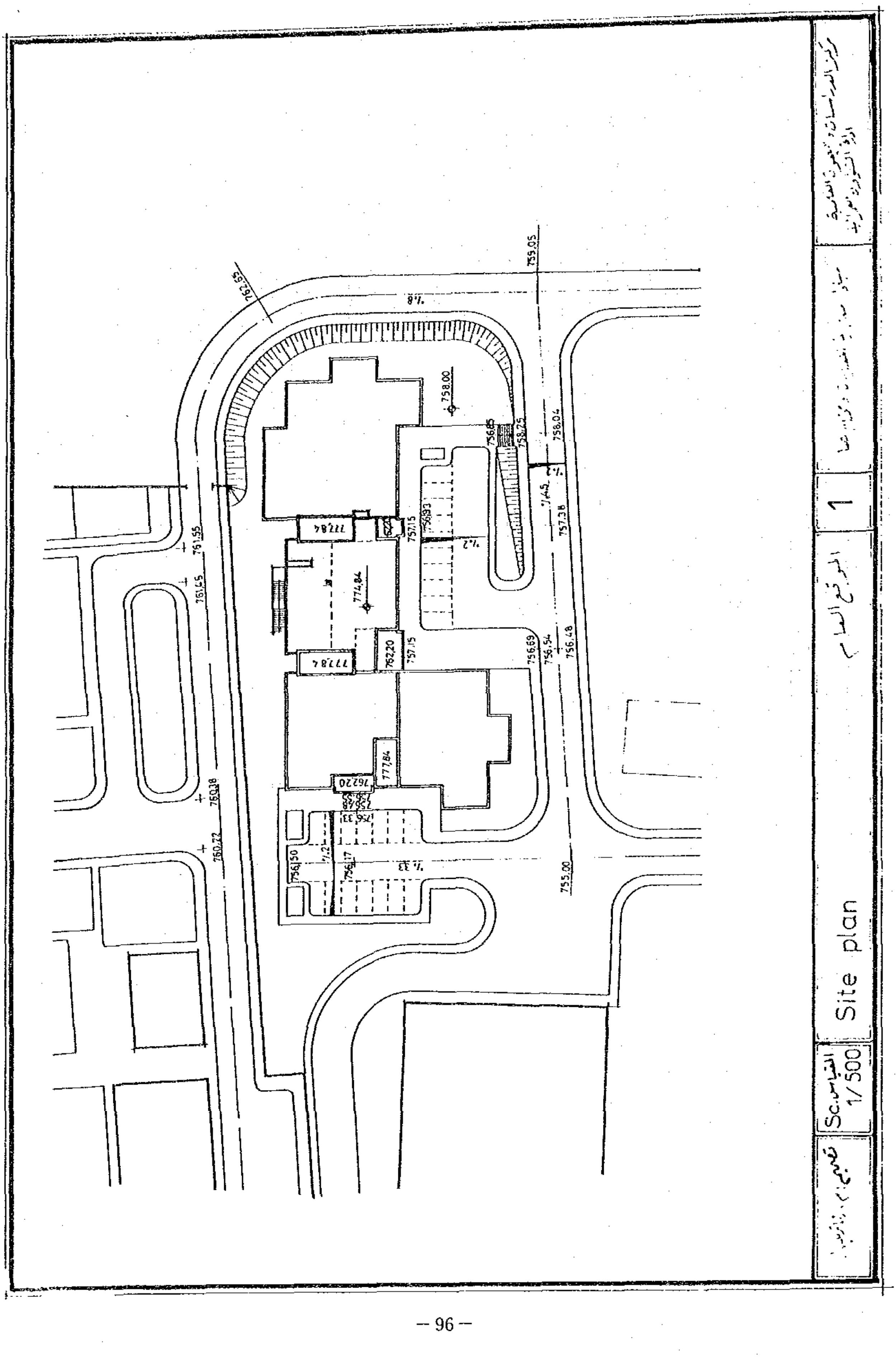
2- The Scientific Studies and Research Centre has concluded co-oparative conventions with the National Organization for Scientific Research of Algeria to organize the exchange of researchers and foster common researches in linguistics and informatics to begin with.

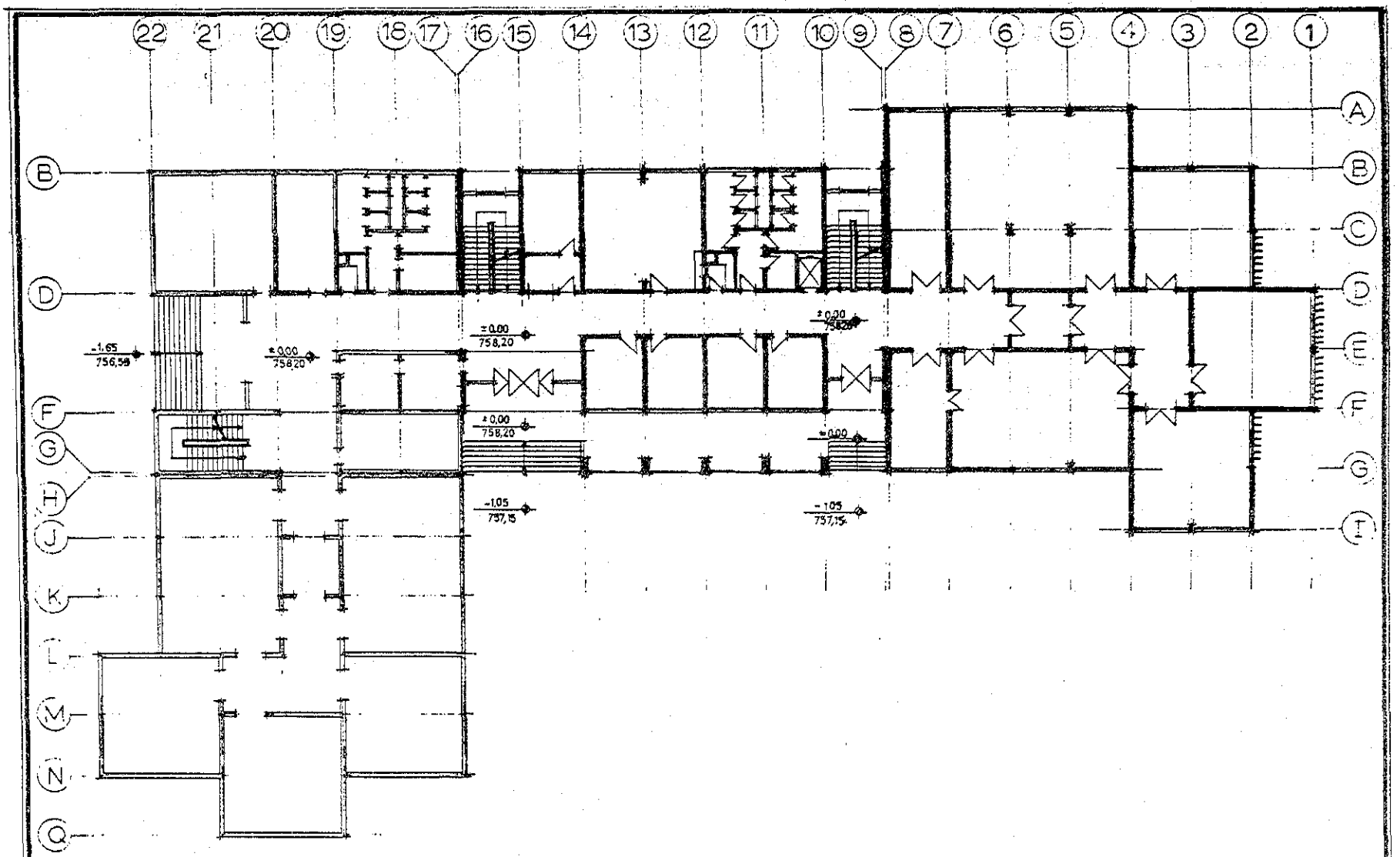
3- The Scientific Studies and Research Centre had realized negotiating a co-oparation project with "European Economic Community" concerning advanced technology transfer in some fields and the development of technologies adequate to the Syrian framework in other fields.

4- The Scientific Studies and Research Centre has realized a cooparative convention with the GEPIE, (the pool of the French Schools teaching foreign engineers), in the fields of the formation of engineers and their training. The Research Centre has concluded similar conventions whith the French National Foundation for the teaching of Management (FNEGE) and the French Association for the professional formation of adults (AFPA).

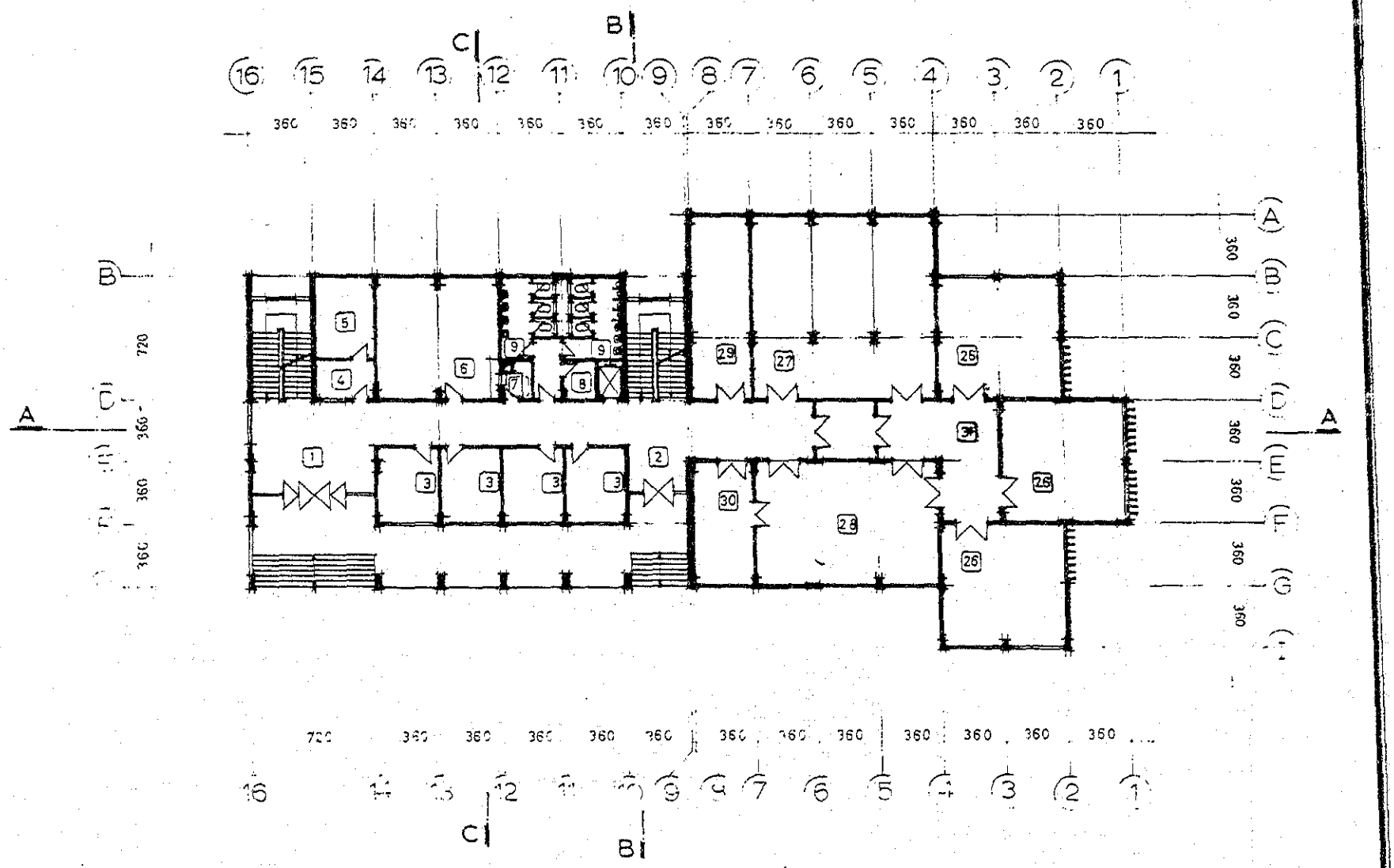


Tentative Organization Chart of NSCL

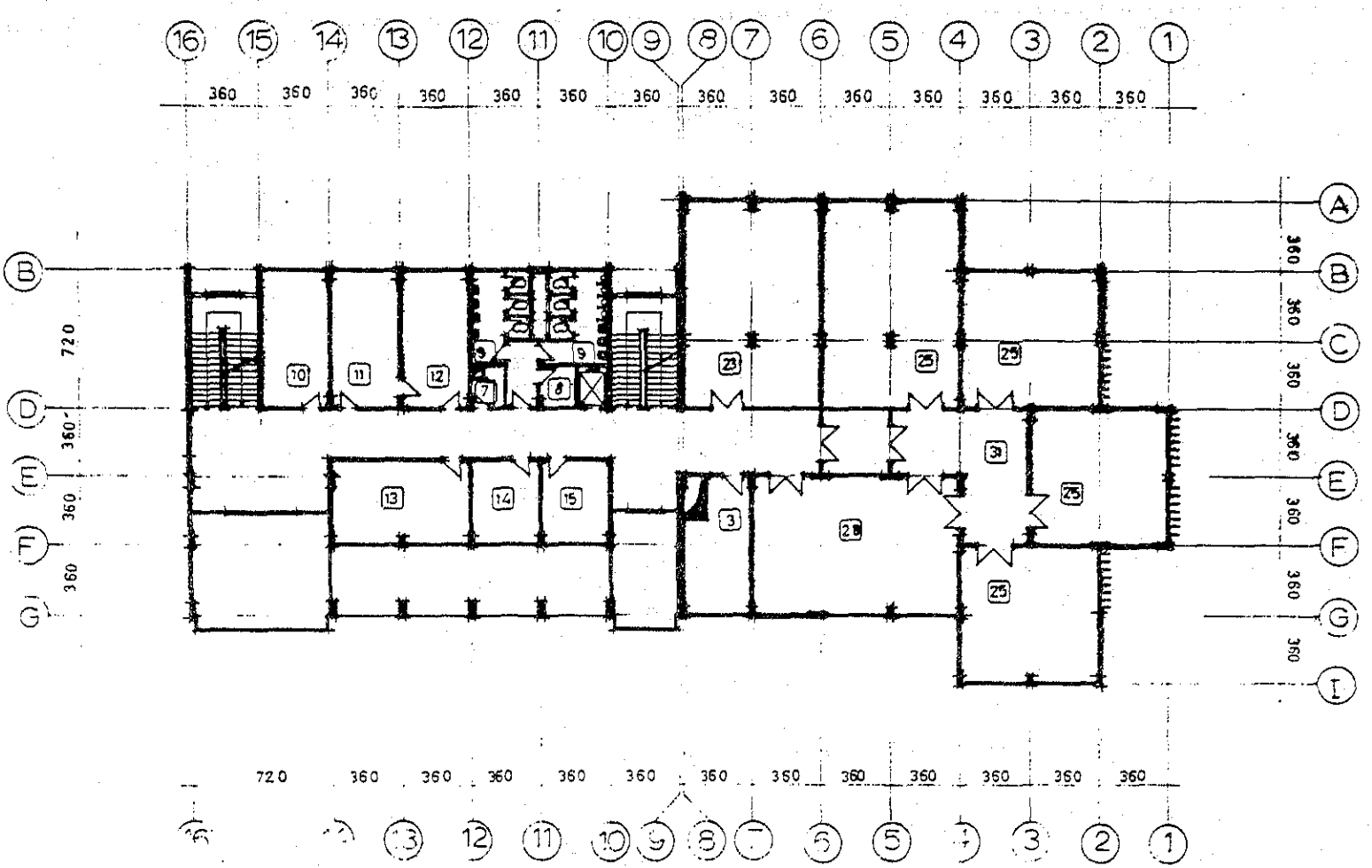

Site plan
Sc.
1/500
المقياس
الموقع العام
1
759.05
762.65
758.00
774.84
777.84
762.20
757.15
756.69
756.54
756.48
755.00
760.72
760.38
761.45
761.55
758.04
758.25
756.85
757.38



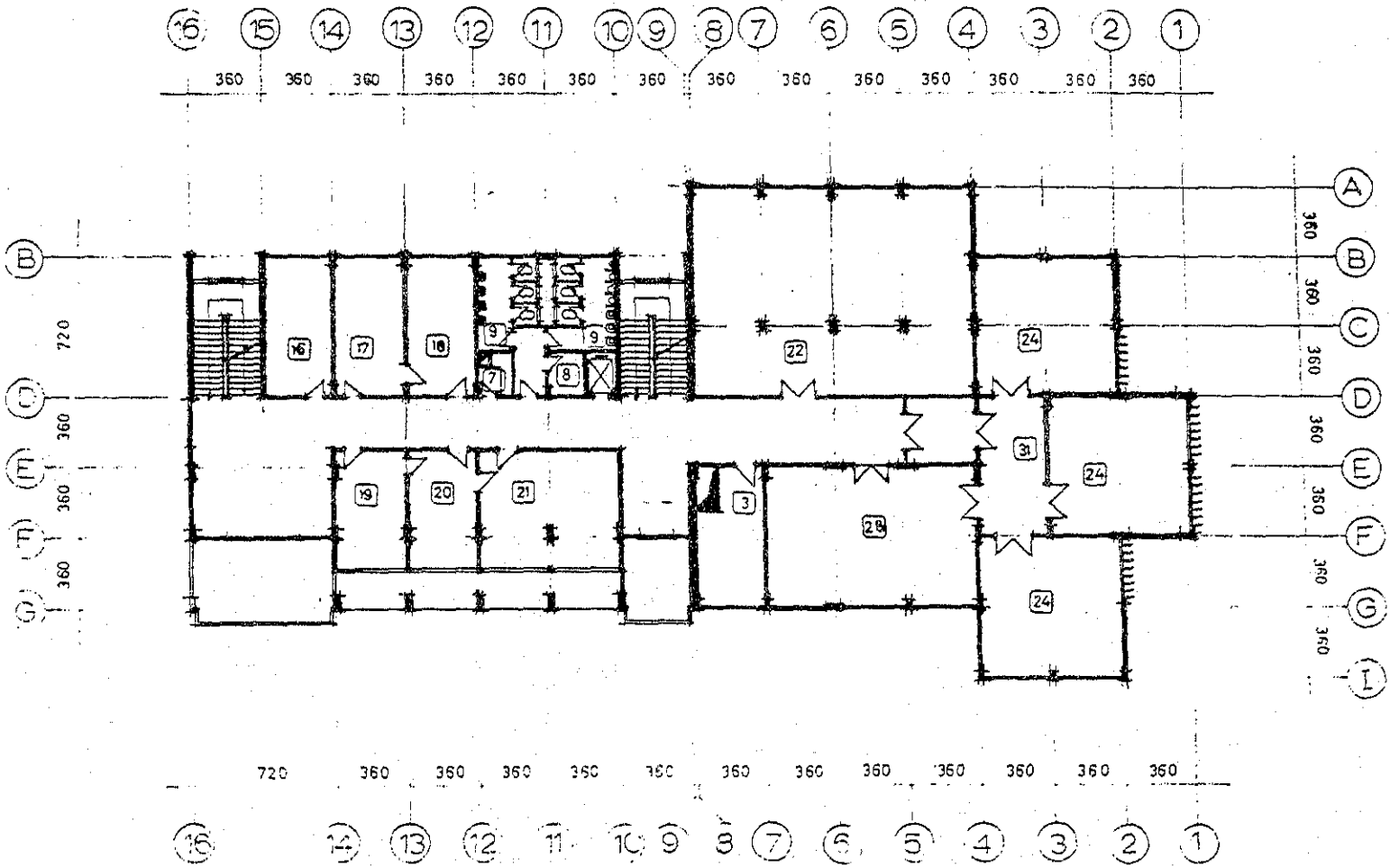
مركز الدراسات والبحوث العلمية لادارة التشوون العمرانية	مبنى صيدلية المطاعرة ومخابرها	2	مستوى الطابق الأرضي لكامل المبنى - الرئيسي والمقترح لتوسع مخابر المعايرة الميكانيكية - Ground floor with extension	القياس Sc.1/200	تصميم : م . زكا ترجمدار



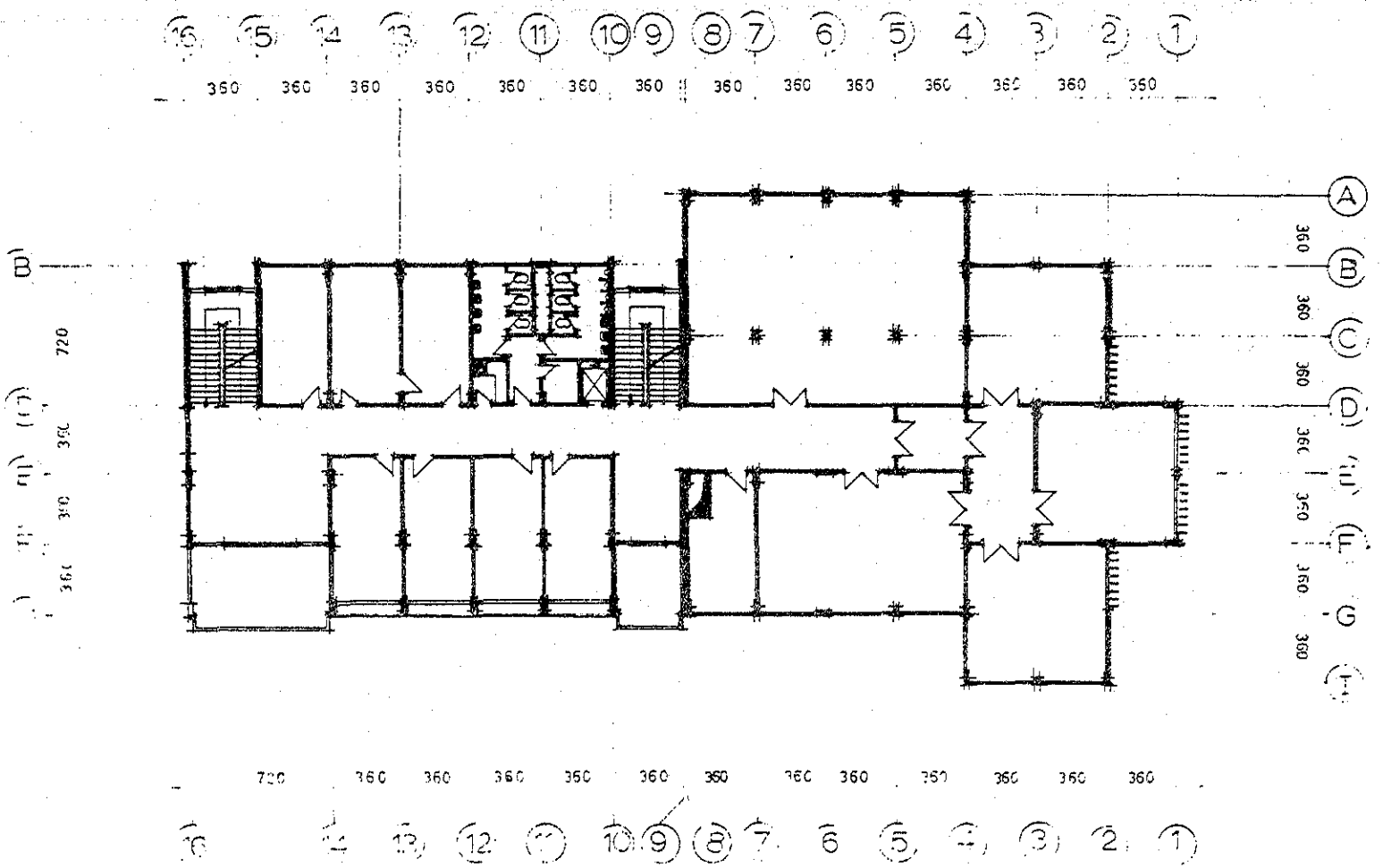
تصميم : رفائيل بيدار	المقياس : Sc.1/200	Ground floor -Tertiary level lab- مختبر المستوى الثالث - ورشة صيانة واصلاح — مسقط الطابق الأرضي	3	مبنى مديرية المعايرة ومخابرها	مركز الدراسات والبحوث العلمية ادارة الشؤون العمرانية



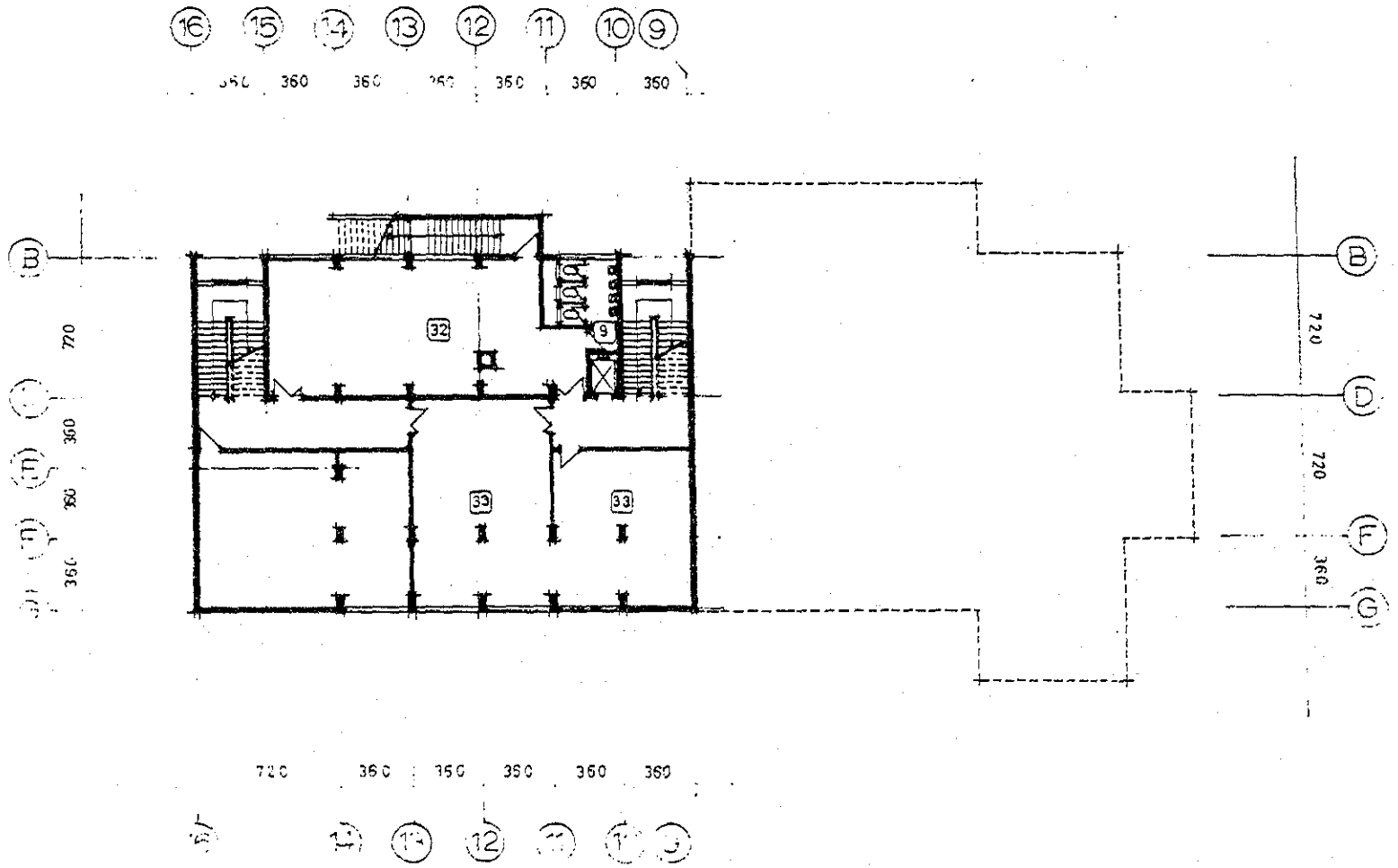
تصميم: م. رشا زريعدار	المقياس Sc.1/200	First floor Secondary level lab.	مسقط الطابق الأول، مختبر المستوى الثاني	4	مبنى مديرية العمارة ومختبرها	مركز الدراسات والبحوث الفنية، دائرة الشؤون العراقية



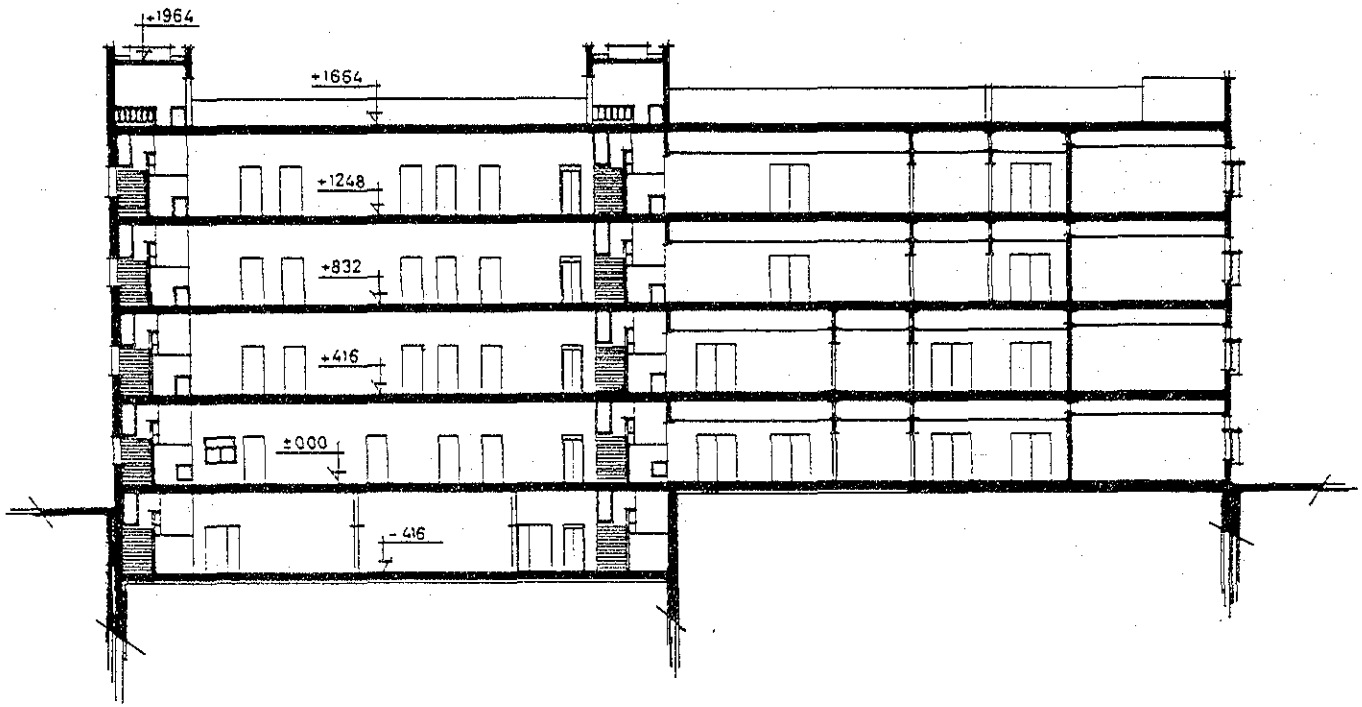
تصميم : م. رنا تريجوار	المقياس Sc.1/200	Second floor Primary level lab.	مسقط الطابق الثاني مخابر المستوى الأول	5	مبنى مديرية المعايرة ومخابرها	مركز الدراسات والبحوث العلمية الإدارة الشؤون العمرانية



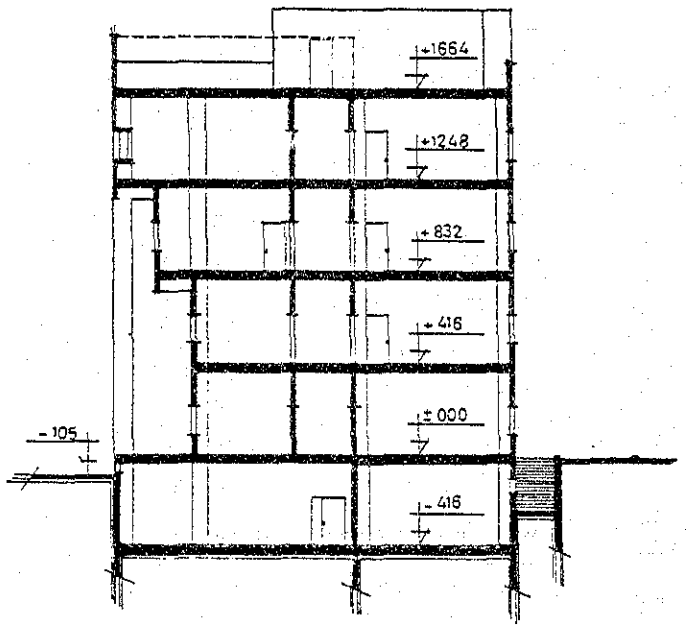
تصميم : م. بزاز بدار	المقياس Sc.1/200	Third floor _for extension_	مسقط الطابق الثالث - توسع -	6	مبنى مديرية المعايرة ومخابرها	مركز الدراسات والبحوث العلمية ادارة الشؤون الفرانية

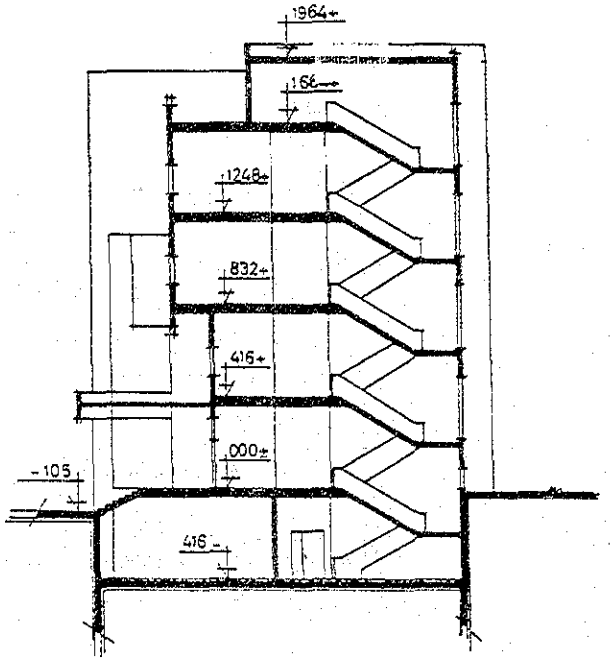


تصميم: م. مدانيه دار	المقياس Sc.1/200	Basement مسقط القبو	7	مبنى مديرية المعارف ومخابرها	مركز الدراسات والبحوث العلمية إدارة الشؤون العمرانية



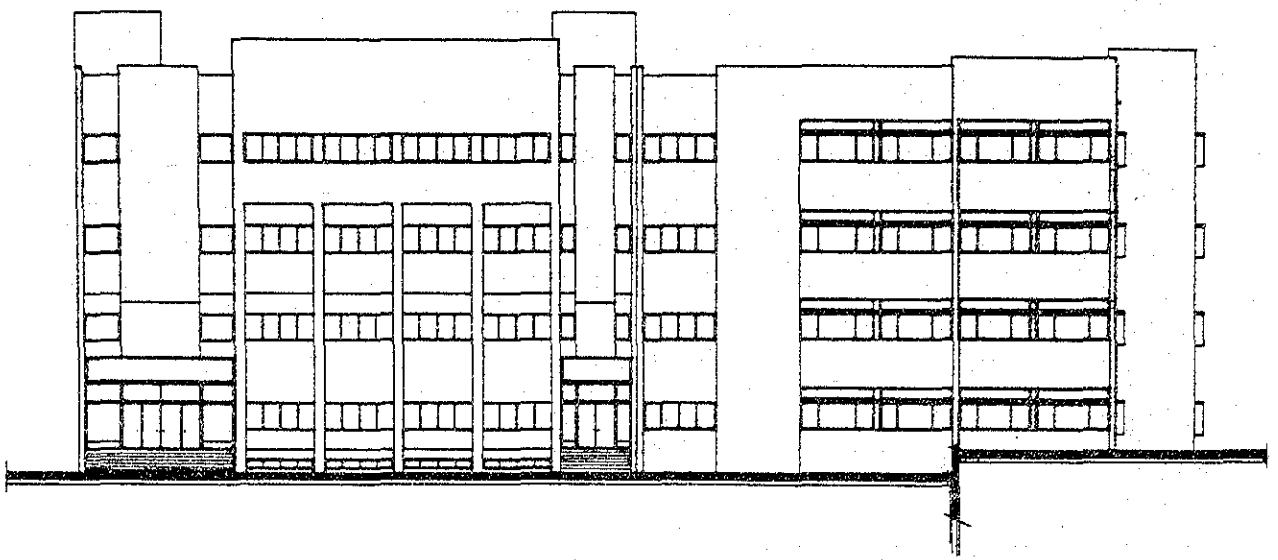
تصميم: م. بشار تربه دار	المقياس Sc1/200	Section A-A المقطع	8	مبنى مديرية المعايرة ومخابرها	مركز الدراسات والبحوث العلمية ادارة المؤسسات العامة



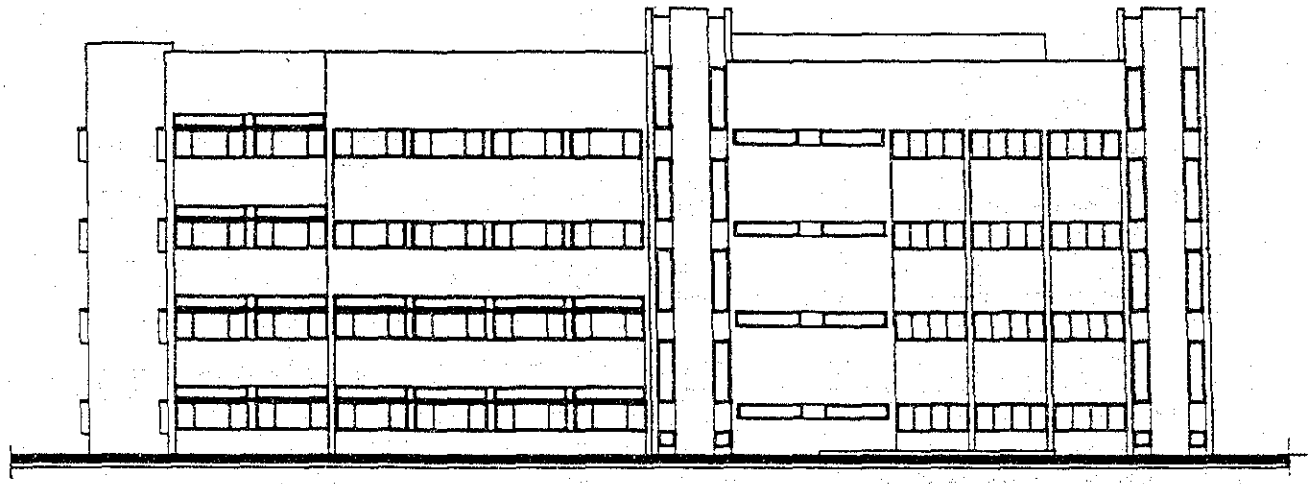


تصميم: م. رنا تريدار	المقياس Sc.1/200	Section C-C المقطع	Section B-B المقطع	9	مبنى مديرية المعابر ومخابرها

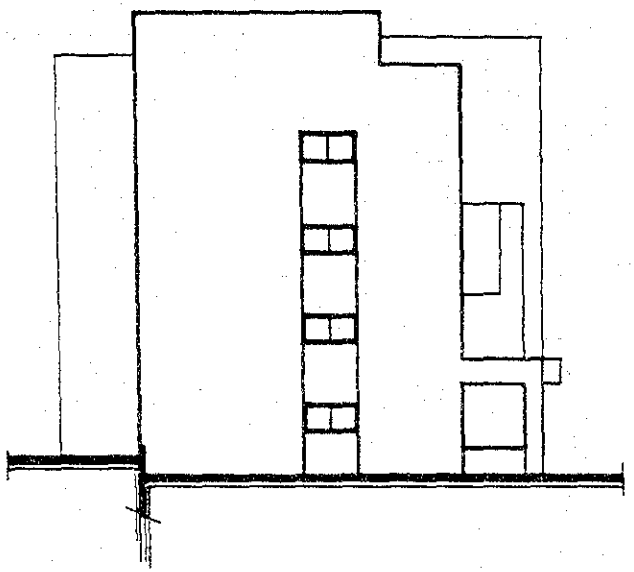
مركز الدراسات والبحوث العلمية
ادارة السكوبة العمرانية

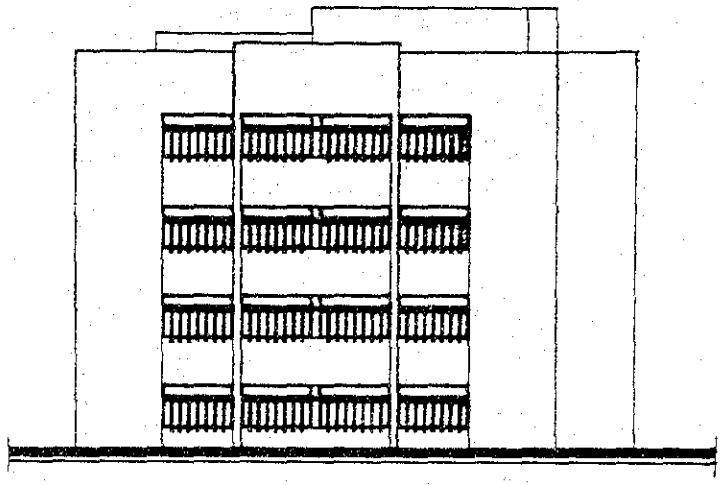


تصميم: م برنا تريصوار	المقياس Sc.1/200	South elevation الواجهة الجنوبية - الرئيسية -	10	مبنى مديرية العمارة ومخابرها	مركز الدراسات والبحوث العلمية ادارة الشؤون العمرانية



مركز الدراسات والبحوث العلمية ادارة الشؤون العمرانية	مبنى مديرية المعمارة ومكاتبها	11	الواجهة الشمالية	North elevation	المقياس Sc1/200	تصميم: م. رضا تربه دار



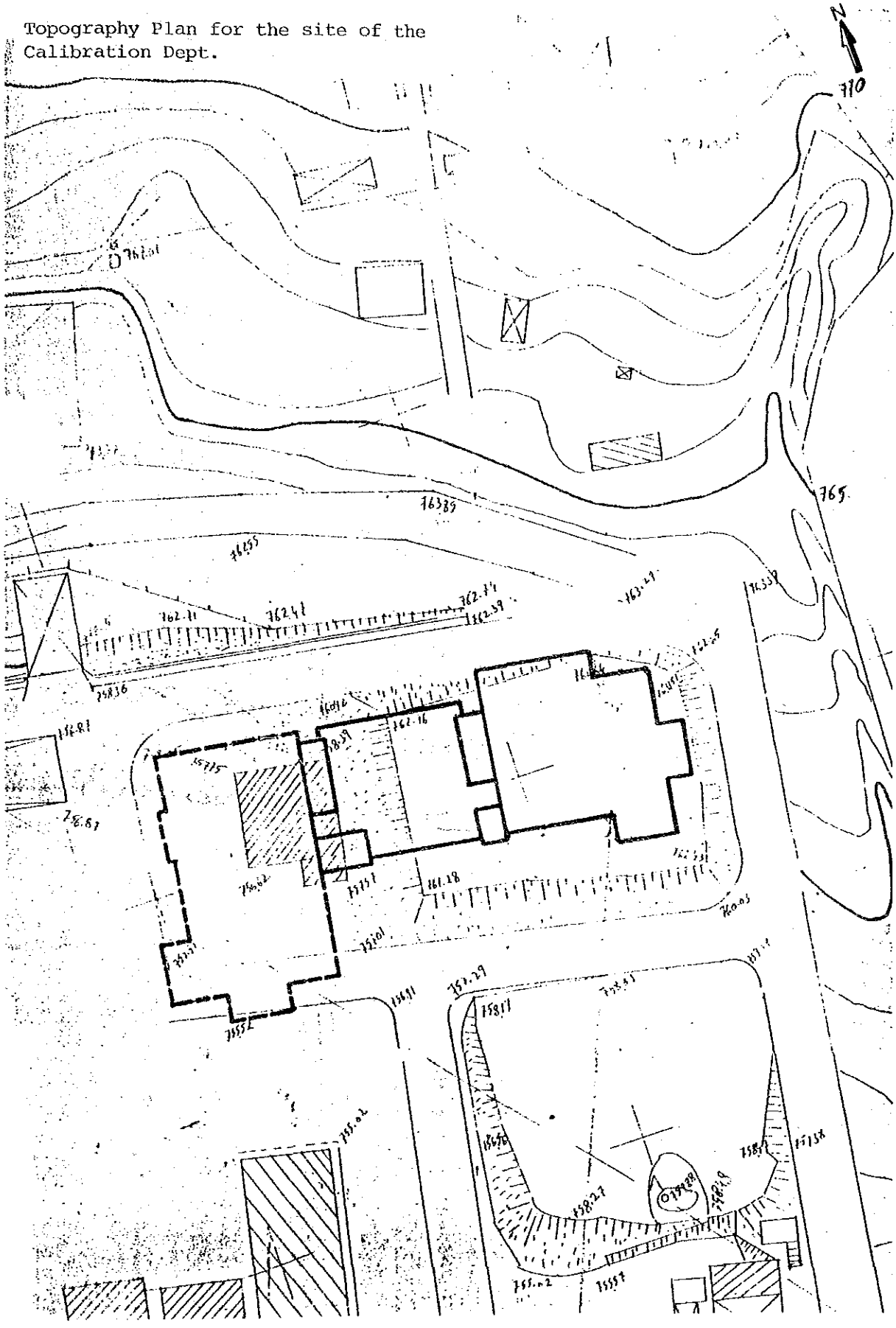


تصميم: زياد نزهدار	المقياس Sc.1/200	West elevation الواجهة الغربية	East elevation الواجهة الشرقية	12	مبنى صدرة المعايرة ومخابرها	مركز الدراسات والبحوث العلمية هادة الثورة العربية

Function	الوظيفة	N°	Function	الوظيفة	N°	Function	الوظيفة	N°
Conference	قاعة اجتماعات ومطالعة	23	Financial and adminstrative assistant	المعاون المالي والاداري	12	Main entrance	المدخل الرئيسي	1
Primary level laboratory	مخبر مستوى أول	24	Studies and documentation	رئيس مكتب الدراسات والتوثيق	13	Worker entrance	مدخل العاملين	2
Secondary level laboratory	مخبر مستوى ثان	25	Organization & statistics department	رئيس شعبة التنظيم والاحصاء	14	Office	مكتب	3
Tertiary level laboratory	مخبر مستوى ثالث	26	Technical training department	رئيس شعبة التدريب والتأهيل الفني	15	Reception	استعلامات	4
Maintenance & repair lab.	ورشة صيانة واصلاح	27	Electric & electronic calibration department	رئيس دائرة المعايرة الكهربائية والالكترونية	16	Drivers	سائقين	5
Mantling and dismantling + store	فك وتركيب + مستودع	28	Secretary	سكرتارية + انتظار	17	Canteen	ندوة	6
Receiving and delivery	استلام وتسليم	29	Technical assistant	المعاون الفني	18	Buffet	"بوفيه" ركن تحضير	7
Air vaccum cleaner	جهاز شفط الهواء	30	Secretary	سكرتارية + انتظار	19	Lockers	مشالح	8
Air lock & corridor	موزع محكم الاغلاق	31	Director	مدير المديرية	20	W.C	"تواليت" دورات مياه	9
Shelter	ملجأ	32	Meeting	قاعة اجتماعات	21	Storage department	شعبة التخزين والمستودعات	10
Store	مستودع	33	Library	مكتبة	22	Secretary	المعاون - قلم المديرية	11

تصميم د. زاتربه دار		Functions توزيع الوظائف	13	مبنى مديرية المعايرة ومخابرها	مركز الدراسات والبحوث العلمية ادارة الشؤون العمرانية

Topography Plan for the site of the Calibration Dept.



2. CLIMATE

(1) Temperature

① Monthly and Annual Average Temperature

Month / Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	7.7	9.1	11.9	16.6	21.4	25.1	27.2	27.6	24.4	20.6	13.5	8.7	

② Monthly Averages of Daily Max. & Min. Temperature

Month / Items	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Maximum													
Minimum													

③ Recorded Maximum & Minimum Temperature (past 10 (3) years)

Maximum 44 ℃ Date AUGUST 1957

Minimum − 8.3 ℃ Date JANUARY 1964

(2) Humidity

① Monthly & Annual Average Humidity

Month / Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	72	64	56	46	39	36	36	38	42	44	60	72	

② Monthly Averages of Daily Max. & Min. Humidity

Month / Items	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Maximum													
Minimum													

③ Recorded Maximum & Minimum Humidity (past 10 (3) years)

Maximum 100 % Date FEBRUARY 1976

Minimum 1 % Date MAY 1970

(3) Rainfall

① Monthly & Annual Average Rainfall & No. of Rainy Days

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (mm)	54	39	29	15	6	0	0	0	0	5	26	60	
Rainy Days													

② Recorded Maximum Rainfall (past 10 (3) years)

Maximum 72.3 mm/day Date 12 MARS 1959

? mm/hour Date

③ Rainy Season OCTOBER ~ MAY

Dry Season ~

② Recorded Maximum Wind Speed

40 m/sec. Date NOV. 1965

(5) Weather Catastrophe

① Storms

② Sandstorm

③ Thunderbolt

④ Earthquake

⑤ Flood

⑥ Landslide

⑦ Drought

⑧ Others

(6) Amount of Solar Radiation

Monthly & Annual Average Amount of Solar Radiation (kcal/m² hr)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
MJ／m^2	10	13.6	17.2	20.6	24.9	26.9	26.7	25.2	21.3	16.7	12.3	9.32	18.7
KWh／m^2	2.78	3.78	4.78	5.72	6.92	7.47	7.42	7	5.92	4.64	3.42	2.59	5,194
Kcal／m^2	2390	3250	4110	4920	5951	6424	6381	6020	5091	3990	2941	2227	4467

SYRIAN ARAB REPUBLIC

MINISTRY OF DEFENCE

METEOROLOGICAL DEPARTMENT

DAMASCUS

STATION : DAMASCUS (MEZZEH)

Latitude: 33° 29' 48" N Longitude: 36° 14' 23" E Elevation: 729 mts

Element	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	YEARLY	PERIOD
MEAN TEMPERATURE C	7.1	8.6	11.8	16.2	21.0	25.1	26.8	26.9	24.1	20.0	13.8	8.6	17.5	1951 - 1976
MEAN MAXIMUM TEMPERATURE C	12.1	14.1	17.8	22.8	28.5	33.2	35.5	35.7	32.4	27.1	19.8	13.7	24.4	1951 - 1977
MEAN MINIMUM TEMPERATURE C	2.4	3.3	5.4	8.8	12.4	15.9	17.2	17.3	15.3	12.2	7.6	3.6	10.1	1951 - 1977
ABSOLUTE MAXIMUM TEMPERATURE C	22.7	25.0	31.3	35.5	38.4	40.9	43.6	44.0	42.0	36.6	25.7	26.1	44.0	1951 - 1977
ABSOLUTE MINIMUM TEMPERATURE C	-8.3	-5.3	-3.7	-3.3	3.7	9.2	10.8	10.8	8.7	3.8	-4.4	-6.4	-8.3	1951 - 1977
MEAN RELATIVE HUMIDITY %	71	65	55	46	38	34	36	38	41	45	53	71	50	1951 - 1976
MEAN OF THE TOTAL PRECIPITATION MM	50.6	36.0	26.5	16.1	6.5	0.1	T	T	0.2	8.3	28.2	48.4	220.9	1950 - 1980
PREVAILING WIND DIRECTION	W	W	W	WNW	WNW	NW	WNW	WNW	WNW	E	E	W	WNW	1951 - 1979
MEAN WIND SPEED MTS/SEC	2.7	3.3	4.0	4.3	4.1	4.1	4.9	4.2	3.0	2.5	2.1	2.2	3.5	1956 - 1976
MAXIMUM WIND SPEED MTS/SEC	28	23	28	23	24	24	21	21	20	20	27	27	28	1951 - 1979
HIGHEST RELATIVE HUMIDITY %	100	100	100	100	99	94	98	98	97	100	100	100	100	1951 - 1977
LOWEST RELATIVE HUMIDITY %	4	10	5	2	1	1	1	2	1	3	10	5	1	1951 - 1977
DAILY AVERAGE EVAPORATION MM.	1.7	2.5	4.2	5.9	8.4	11.3	12.0	11.0	8.0	5.8	3.3	1.8	6.3	1956 - 1977
MAXIMUM FALL IN ONE DAY MM.	44.2	37.0	72.3	28.3	18.9	2.3	0.6	T	5.0	12.2	41.4	41.7	72.3	1956 - 1980
DAILY SUNSHINE IN HOURS	5.5	6.7	8.1	9.0	10.9	12.5	12.7	12.0	10.8	9.2	7.5	5.7	9.2	1958 - 1977

Syrian Arab Republic

Ministry of Defence

Meteorological Department

Damascus

Station Damascus (Inter National) Air Port

Latitude 33 25 N. Longitude 3631 E.Elevation 610 mts. above M.S.L.

42 52

Element	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Yearly
Mean Temperature C	6.1	8.1	11.3	15.7	20.2	24.5	26.2	25.9	22.9	18.2	11.8	7.4	16.5
Mean Maximum Temperature C	12.4	15.0	19.0	24.2	29.5	33.9	35.9	35.7	32.8	27.8	20.2	14.1	25.0
Mean Minimum Temperature C	0.4	1.6	3.7	7.3	10.3	14.1	16.5	16.0	12.5	8.4	3.8	1.4	8.0
Absolute Maximum Temperature C	22.6	25.6	32.4	37.2	38.2	41.2	45.5	43.7	9	36.8	31.5	23.5	45.5
Absolute Minimum Temperature C	-45.5	-7.2	-6.0	-3.9	0.5	5.0	8.3	8.4	1.0	-2.5	-8.8	-13.3	-13.5
Mean relative Himidity	76	68	59	53	47	42	46	50	51	50	61	74	36
Mean of the total precipitation IM.	27.0	23.7	15.2	10.2	3.1	0.1	0	0	0	8.1	22.7	27.2	137.3
Prevailing wind direction	SW	SW	SW	SW	W	SSW	SSW	SSW	SSW	SW	N	SW	SW
Mean wind speed MTS/SEC	3.2	3.7	4.0	4.4	4.0	4.6	5.4	4.9	3.5	2.8	2.7	3.3	3.9
Maximum wind speed mts/sec	16	20	16	20	16	20	16	13	16	16	16	16	20
Lighest relative humidity %	100	100	100	100	98	96	96	99	98	99	1001	100	100
Lowest relative humidity %	9	9	4	2	4	4	3	4	6	3	7	9	3
Daily average evaporation mm	1.9	2.9	4.2	5.8	8.6	11.3	12.3	10.5	7.9	5.6	3.3	1.8	6.3
Maximum fall in one day mm.	39.7	23.3	29.5	24.2	11.0	2.2	0,0	0.0	0.7	97.5	46.5	35.7	97.5
Daily sunshine in hours.	5.4	6.8	7.7	8.4	10.7	11.9	12.0	11.8	10.4	9.0	7.2	5.3	8.9

7. DESIGNING AND CONSTRUCTION WORK IN GENERAL

Please describe the following articles.

(1) Taboos and Characteristics

Are there any social or religious taboos on designing and constructing buildings?

There is no taboos of any kind.

Are there any characteristics on designging and constructing buildings?

A modern and scientific design should be taken into consideration, and some arabic features on the facades are preferable .

(4) Construction Contract

What are the most common construction contract and construction work tender system?

The most common type is constructing the project by one of the government contracting companies as a general contract.

① Construction contract form, etc.

General contractor.

② Construction work tender system

The contrat is negotiated with the gov. contracting companies.

(5) Construction Period

What are main factors that affect the construction period?

Please describe the reasons in detail.

The construction period depends on the existance of construct. materials.

Example:

During rainy season, can we cast concrete on site? *Yes.*

How about recruting situation and skill level of workers?

Skilled workers are always available.