
PA-1-1-7-636

PA-1-1-7-636

Arab Republic of Egypt, Ministry of Social Insurance

**Automated Egyptian Social
Insurance System
(AESIS)**

**Functional Requirements and
Conceptual Design**

October 1984

**International Business Services, Inc.
GENASYS Corporation**

TABLE OF CONTENTS

	<u>PAGE</u>
1. INTRODUCTION.....	1-1
1.1 Summary.....	1-1
1.2 General Information.....	1-3
2. OVERVIEW OF THE EXISTING SYSTEM.....	2-1
2.1 Background.....	2-1
2.2 Objectives of AESIS.....	2-8
2.3 Existing Methods and Procedures.....	2-8
2.3.1 SIO Existing Methods and Procedures.....	2-10
2.3.2 PIO Existing Methods and Procedures.....	2-19
2.4 Problems with the Current System.....	2-28
3. MSI REQUIREMENTS FOR AESIS.....	3-1
3.1 System Environment Requirements.....	3-1
3.2 Data and Process Flow Requirements.....	3-2
3.3 Data Handling and Control Requirements.....	3-4
3.4 Operational Requirements and Standards.....	3-5
3.5 System-Wide Functional Information Requirements..	3-6
3.5.1 Application Requirements.....	3-6
3.5.2 Eligibility and Processing Requirements...	3-7
3.5.3 Operational and Security Requirements.....	3-9
3.5.4 Reporting and Inquiry Requirements.....	3-11

TABLE OF CONTENTS (Continued)

	<u>PAGE</u>
4. MSI OPERATING ENVIRONMENT.....	4-1
4.1 Equipment.....	4-1
4.2 Operating System and System Software.....	4-1
4.3 Interfaces.....	4-1
5. OVERVIEW OF THE PROPOSED AUTOMATED SYSTEM.....	5-1
5.1 AESIS System Network.....	5-1
5.2 Features of AESIS.....	5-1
5.3 Benefits of AESIS.....	5-6
6. AESIS SYSTEM CONCEPTUAL DESIGN.....	6-1
6.1 The Registration System.....	6-3
6.2 The Coverage System.....	6-8
6.3 The Benefits System.....	6-22
6.4 The Accounting System.....	6-22
6.5 The Management Reporting System.....	6-33
6.6 Data Base Structure.....	6-33

TABLE OF CONTENTS (Continued)

	<u>PAGE</u>
7. DATA BASE PHYSICAL AND CONCEPTUAL DESIGN.....	7-1
7.1 Introduction.....	7-1
7.2 Terms and Abbreviations.....	7-2
7.3 Identification of Databases.....	7-3
7.4 AESIS Software Components.....	7-4
7.5 Naming Conventions.....	7-6
7.6 Support Software.....	7-6
7.8 Logical Characteristics.....	7-8

INDEX OF EXHIBITS

<u>EXHIBITS</u>	<u>PAGE</u>
2-1	SIO Organization Structure..... 2-2
2-2	PIO Organization Structure..... 2-5
2-3	Current System Overview..... 2-9
2-4	Summary of the Egyptian Social Insurance Laws.... 2-12
2-5	Automated and Manual Procedures of Current PIO System..... 2-21
2-6	Types of Benefit Payments (PIO)..... 2-24
4-1	SIO Hardware Configuration Chart..... 4-2
4-2	PIO Hardware Configuration Chart..... 4-5
4-3	SIO and PIO Operating System and System Software List..... 4-8
5-1	Overview of the Proposed AESIS Environment..... 5-2
5-2	AESIS Data Base Structure Overview..... 5-3
5-3	Features of AESIS Reporting..... 5-4
6-1	The AESIS System Composition..... 6-2
6-2	The Registration System..... 6-4
6-3	Individual Registration Subsystem..... 6-5
6-4	The Coverage System..... 6-9
6-5	AESIS Main Menus..... 6-10
6-6	Law 50 Coverage Subsystem Functional Chart..... 6-14

INDEX OF EXHIBITS (Continued)

<u>EXHIBITS</u>	<u>PAGE</u>
6-7	Law 79 (Government Workers) Coverage Subsystem Functional Chart..... 6-15
6-8	Law 79 (Public Workers) Coverage Subsystem Functional Chart..... 6-16
6-9	Law 79 (Private-Salaried Workers) Subsystem Functional Chart..... 6-1
6-10	Law 79 (Private Sector - Construction Workers) Functional Chart..... 6-18
6-11	Law 79 (Private Sector - Transportation Workers) Subsystem Functional Chart..... 6-19
6-12	Law 108 - Coverage Subsystem Functional Chart.... 6-20
6-13	Law 112 - Coverage Subsystem Structure Chart..... 6-21
6-14	The Benefits System..... 6-23
6-15	Benefit System Menu Screens..... 6-24
6-17	Law 50 - Benefit Subsystem Functional Chart..... 6-25
6-18	Law 79 - (Government Workers) Subsystem Functional Chart..... 6-26
6-19	Law 79 - (Public Workers) Benefit Subsystem Functional Chart..... 6-27
6-20	Law 79 - (Private-Salaried Workers) Benefit Subsystem Functional Chart..... 6-28
6-21	Law 79 - (Private-Construction Workers) Benefit Subsystem Functional Chart..... 6-29
6-22	Law 79 - (Private-Transportation Workers) Benefit Subsystem Functional Chart..... 6-30
6-23	Law 108 - Benefit Subsystem Functional Chart..... 6-31
6-24	Law 112 - Benefit Subsystem Functional Chart..... 6-32

1. INTRODUCTION

1.1 SUMMARY

This document describes the functional requirements and the Conceptual design for the Automated Egyptian Social Insurance System (AESIS) to be developed for the Arab Republic of Egypt (ARE), Ministry of Social Insurance (MSI). The component organizations of MSI are the Social Insurance Organization (SIO), and the Pension Insurance Organization (PIO), which provide social and pension insurance services to ARE non-government and government workers respectively. The information contained within this document will serve as a basis for the detailed design and development of AESIS.

The requirements and conceptual design for the system were developed based on the results of several distinct activities:

- o Review of available studies performed by previous contractors concerning the development of this automated social insurance system,
- o Examination of legal requirements for the administration of social insurance programs in Egypt, and
- o Requirements analysis and general systems design with management and operational personnel representing both SIO and PIO while in Cairo, Egypt during the months of May and June, 1984.

AESIS is envisioned to support MSI operations for both SIO and PIO at the Ministry, headquarters, regional, local office and unit levels. The system will maintain a repository of data which describes the insured and otherwise covered population of the ARE. For the current effort, the pilot system will be configured such that it will operate simultaneously and in parallel at SIO and PIO on separate IBM 4341 mainframes. Thus the application software will be duplicated at each headquarters level.

A separate database will be established for SIO and PIO, however Ministry-wide reporting requirements will exist. Access of data will initially be accomplished via terminals located at both SIO and PIO headquarters. For national implementation of the system throughout Egypt, upgraded or additional mainframes will be acquired and separate databases may be developed.

The software necessary to support AESIS will include:

- o Registration programs to establish individuals and businesses on the databases and issue national social insurance identification cards, and certificates,

- o Coverage activity programs to calculate, monitor and record collections from both individuals and employers,
- o Benefit calculation programs to calculate insurance benefits payments and disbursements,
- o Accounting and management reporting programs to provide detail and summary operational monitoring information for policy decision making,
- o Programs to assist in the conversion of existing data,
- o Internal operations programs, to be defined at a future date, to provide information on certain internal functions such as payroll, inventory control, purchasing, etc.

To facilitate the use of this document the contents of each of the chapters contained herein are summarized below:

- o Chapter 1 - General Information - summarizes the general nature of the software needed and identifies the environment in which AESIS will operate
- o Chapter 2 - Overview - contains the background and objectives of AESIS, a description of current SIO and PIO operations, and problems concerning those operations
- o Chapter 3 - MSI Requirements for AESIS - outlines the functional requirements which must be met by AESIS
- o Chapter 4 - SIO/PIO Operating Environment - describes the AESIS hardware and system software environment and presently interfaces with external environments
- o Chapter 5 - Overview of the Proposed Automated System - describes the AESIS System Network, the features of AESIS and the benefits of the target system
- o Chapter 6 - AESIS System Conceptual Design - describes each of the five AESIS systems and the associated subsystems and the physical and logical structure of the database.

1.2 GENERAL INFORMATION

- o Project Sponsors - U.S. Agency for International Development (USAID), Washington, D.C. and Cairo, Egypt.
- o Developers - International Business Services, Inc. of Washington, D.C., and GENASYS Corporation of Rockville, Maryland
- o Users - Arab Republic of Egypt, Ministry of Social Insurance, Social Insurance Organization (SIO) and Pension Insurance Organization (PIO), Cairo, Egypt.
- o Computer Centers - SIO and PIO Headquarters Data Centers, Cairo, Egypt.
- o Project Request - Contract Number: NEB-0042-C-00-4031-00, May 4, 1984.

2. Overview of the Existing System

2. OVERVIEW

2.1 BACKGROUND

Social Insurance in Egypt predates that of the United States and most other countries. In late 1854, laws and legislation were passed which dealt with pensions for civil servants, employees and workers. Through the years, these original laws were greatly expanded and amended until today. The Ministry of Social Insurance attempts to provide for the financial security of all Egyptian workers and their families during retirement years and in the event of the death or disability of wage earners. The Ministry is charged with collecting contributions from workers and employers, paying benefits to pensioners and dependents, and managing the resulting pension and insurance funds.

The Ministry is divided into two major organizations: The Social Insurance Organization (SIO) and the Pension Insurance Organization (PIO). SIO currently serves approximately 2.5 million pensioners and 10 million insured persons in the public and private sectors; plus construction, transportation, bakery and casual workers and Egyptian workers abroad. PIO serves approximately one million pensioners and 2.5 million insured persons who are government workers. Services provided by these organizations are mandated by four separate laws: law 79 of 1975, law 108 of 1974, law 50 of 1978 and law 112 of 1980, all as amended.

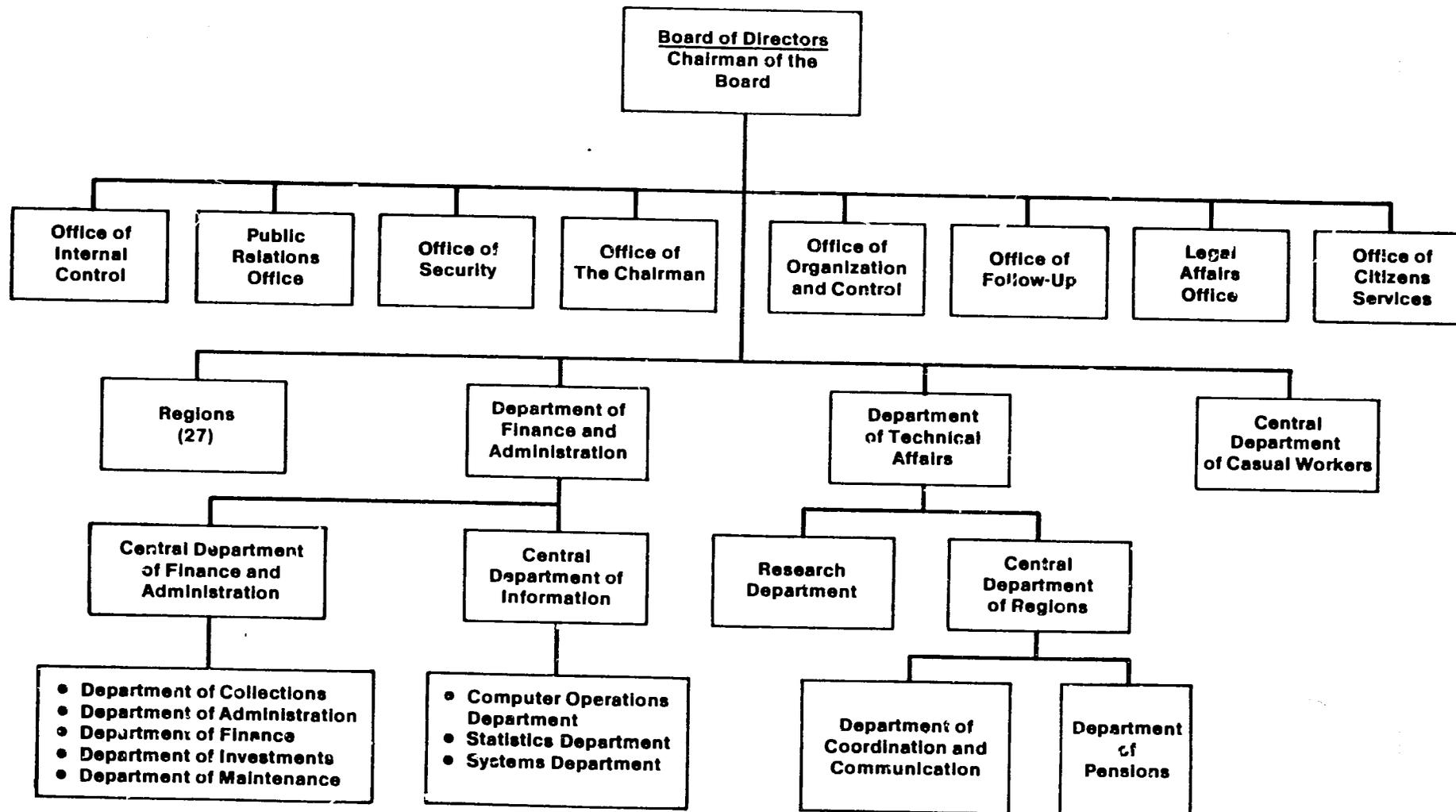
Currently SIO maintains an organization of 27 regional offices and 360 district (local) offices. The local offices establish and maintain records of individuals and employers in the private, transportation, construction, casual-work and work-abroad areas and are concerned with the collection of funds and distribution of benefits in those areas. However, in the public sector area (government-owned or -sponsored business) SIO relies on the administrative offices of each business to keep records of individual workers. They are not informed of the existence of an individual public sector worker until he or she becomes a pensioner.

PIO also maintains 27 regional offices in the same governmental areas, but not the same physical locations as SIO. As with SIO's public sector group, PIO relies on the administrative offices of each government ministry to keep records on individual government workers.

Operations in both organizations are now basically manual, although each organization maintains its own separate batch-oriented computer system for recordkeeping purposes. Exhibits 2-1 and 2-2, following this page, present the current organizational structures for both SIO and PIO.

EXHIBIT 2-1

ARE, MINISTRY OF SOCIAL INSURANCE
 SOCIAL INSURANCE ORGANIZATION
 ORGANIZATION STRUCTURE
 (HEADQUARTERS)



2-2

EXHIBIT 2-1 (Continued)
SOCIAL INSURANCE ORGANIZATION
REGIONAL OFFICE
(ZONE)
TYPICAL ORGANIZATIONAL STRUCTURE

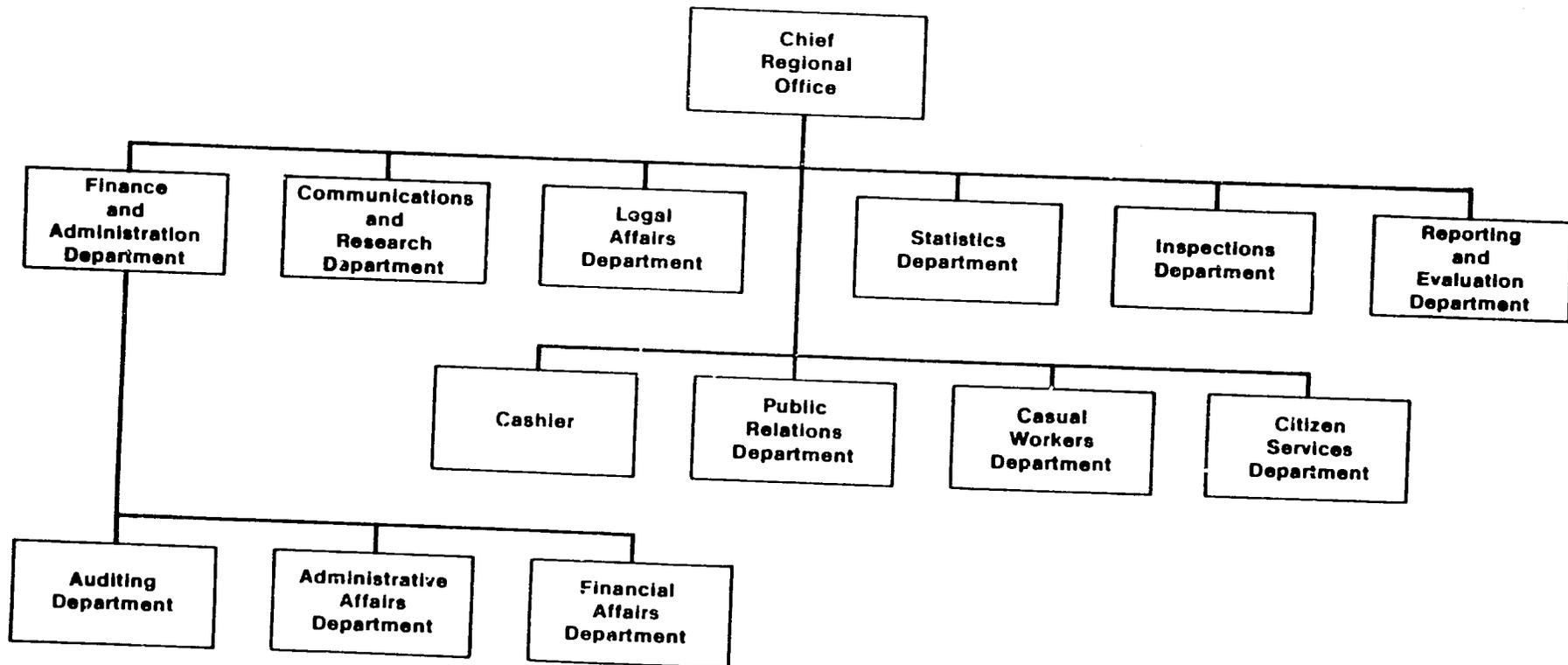
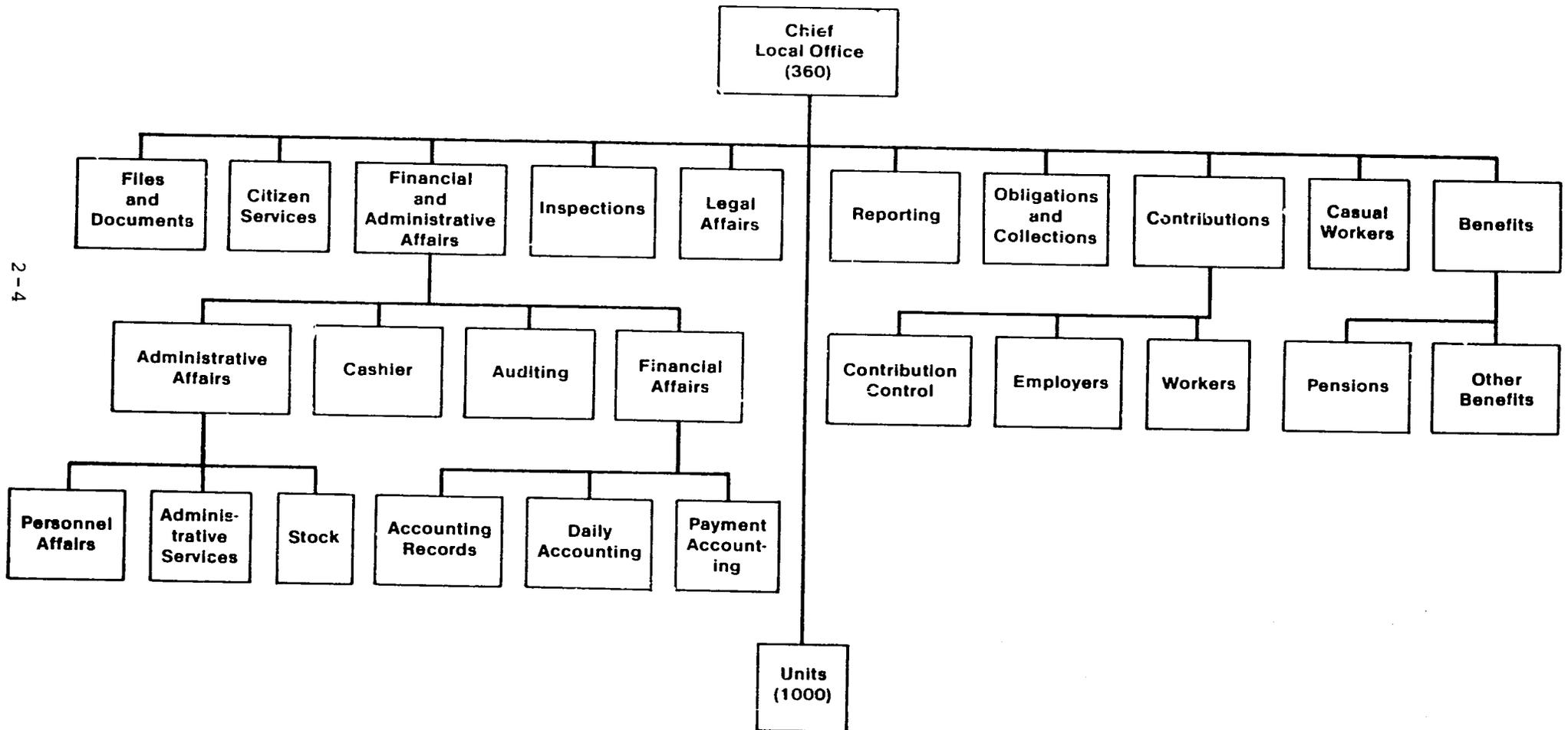


EXHIBIT 2-1 (Continued)

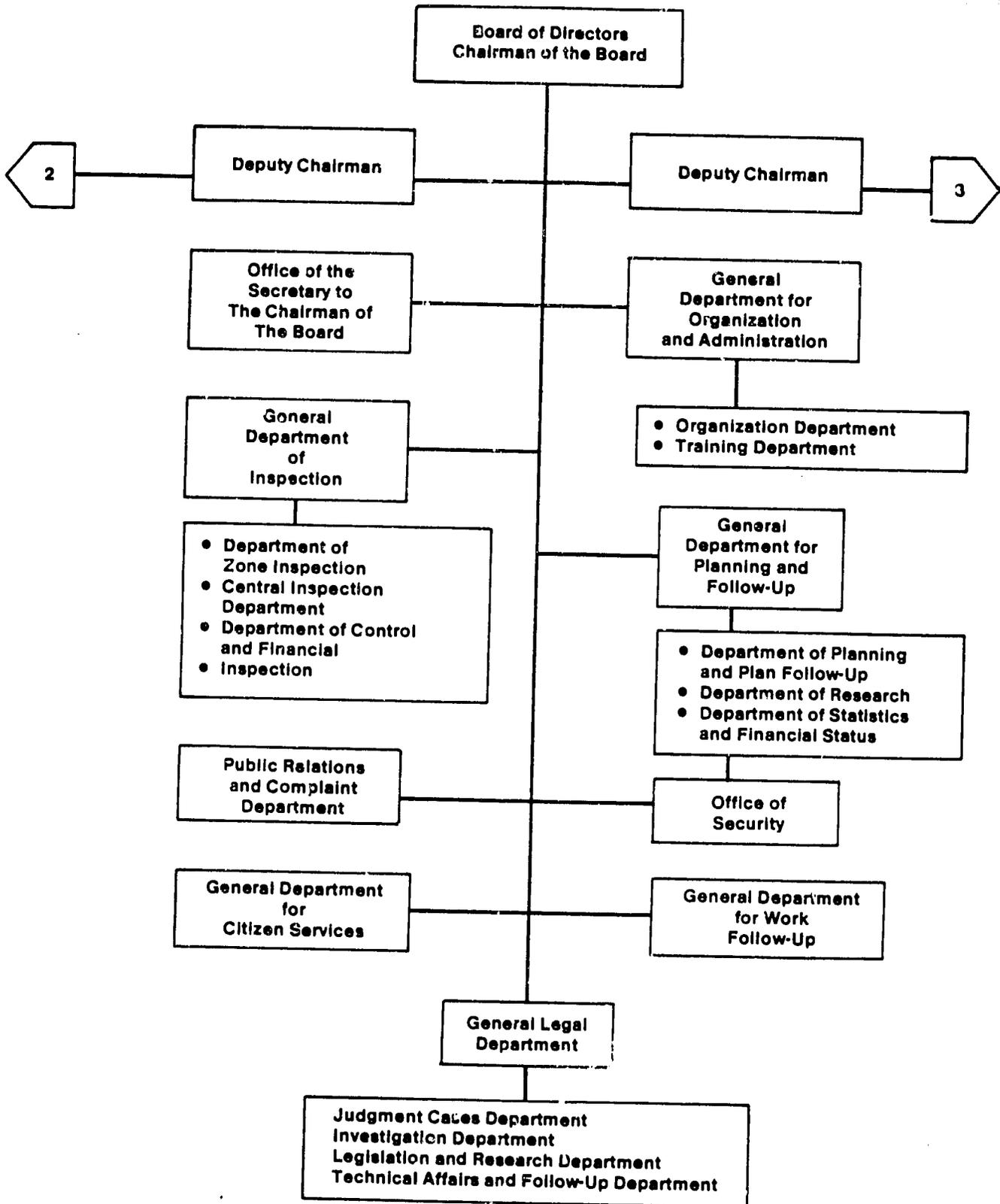
SOCIAL INSURANCE ORGANIZATION
LOCAL OFFICE
(DISTRICT)
TYPICAL ORGANIZATION STRUCTURE



2-4

EXHIBIT 2-2

**ARE, MINISTRY OF SOCIAL INSURANCE
PENSION INSURANCE ORGANIZATION
STRUCTURE CHART**



A

EXHIBIT 2-2 (Continued)

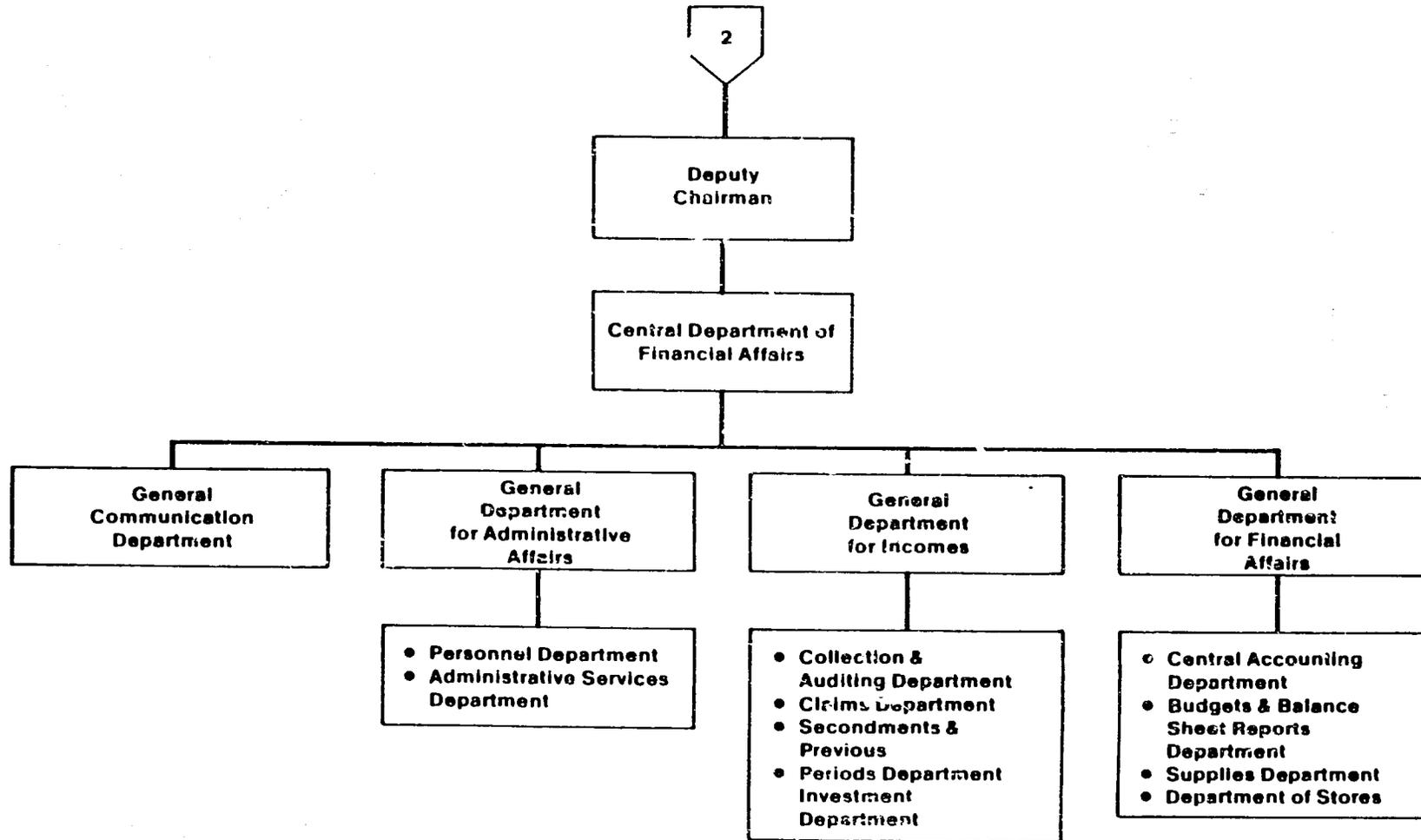
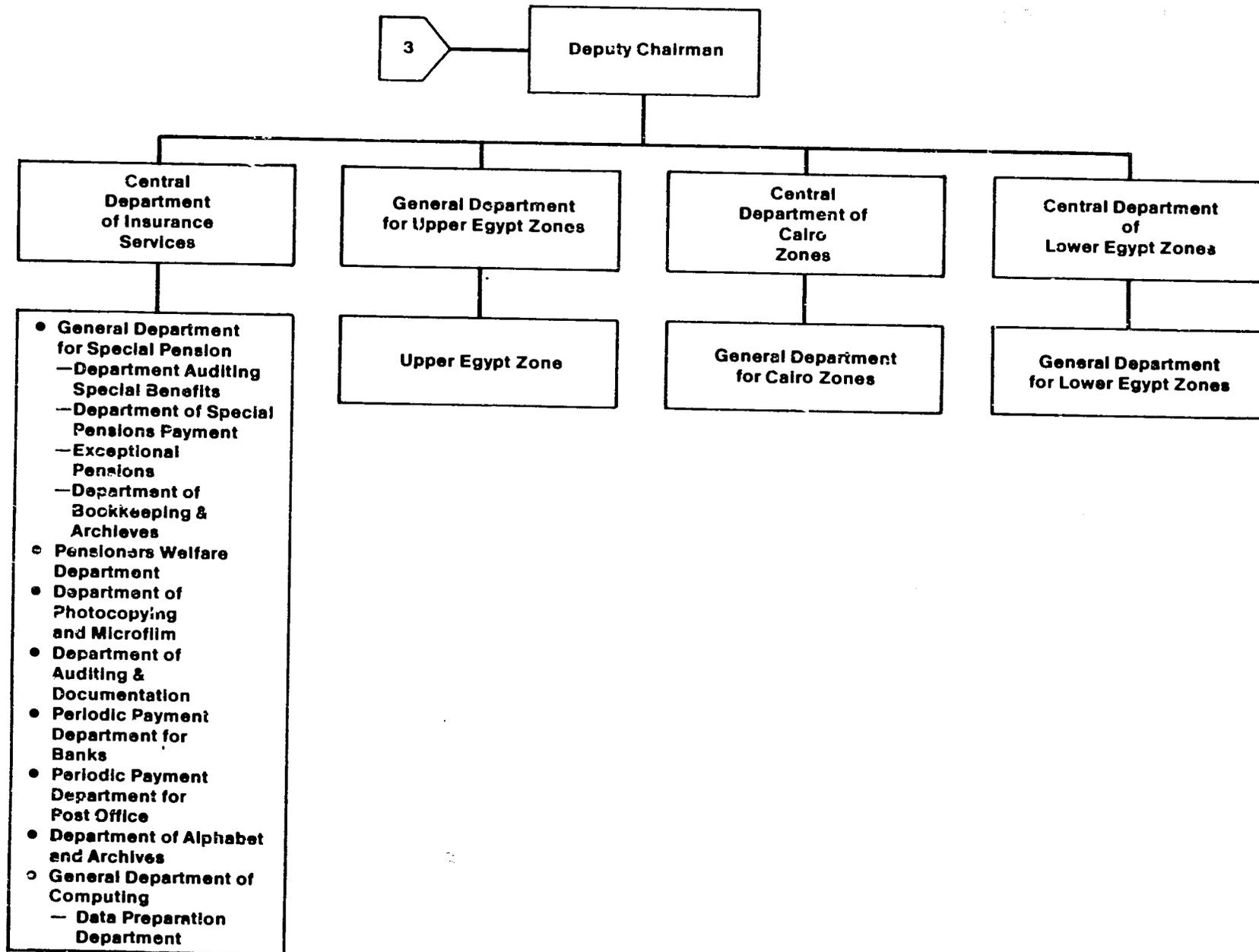


EXHIBIT 2-2 (Continued)



2.2 OBJECTIVES OF AESIS

The primary objective of the AESIS System is to aid the Ministry and its two major organizations in attaining their goal of an efficient, well-run organization that complies with the laws and delivers services as intended. AESIS will meet this objective by providing integrated data systems which enable SIO and PIO to meet the following sub-objectives:

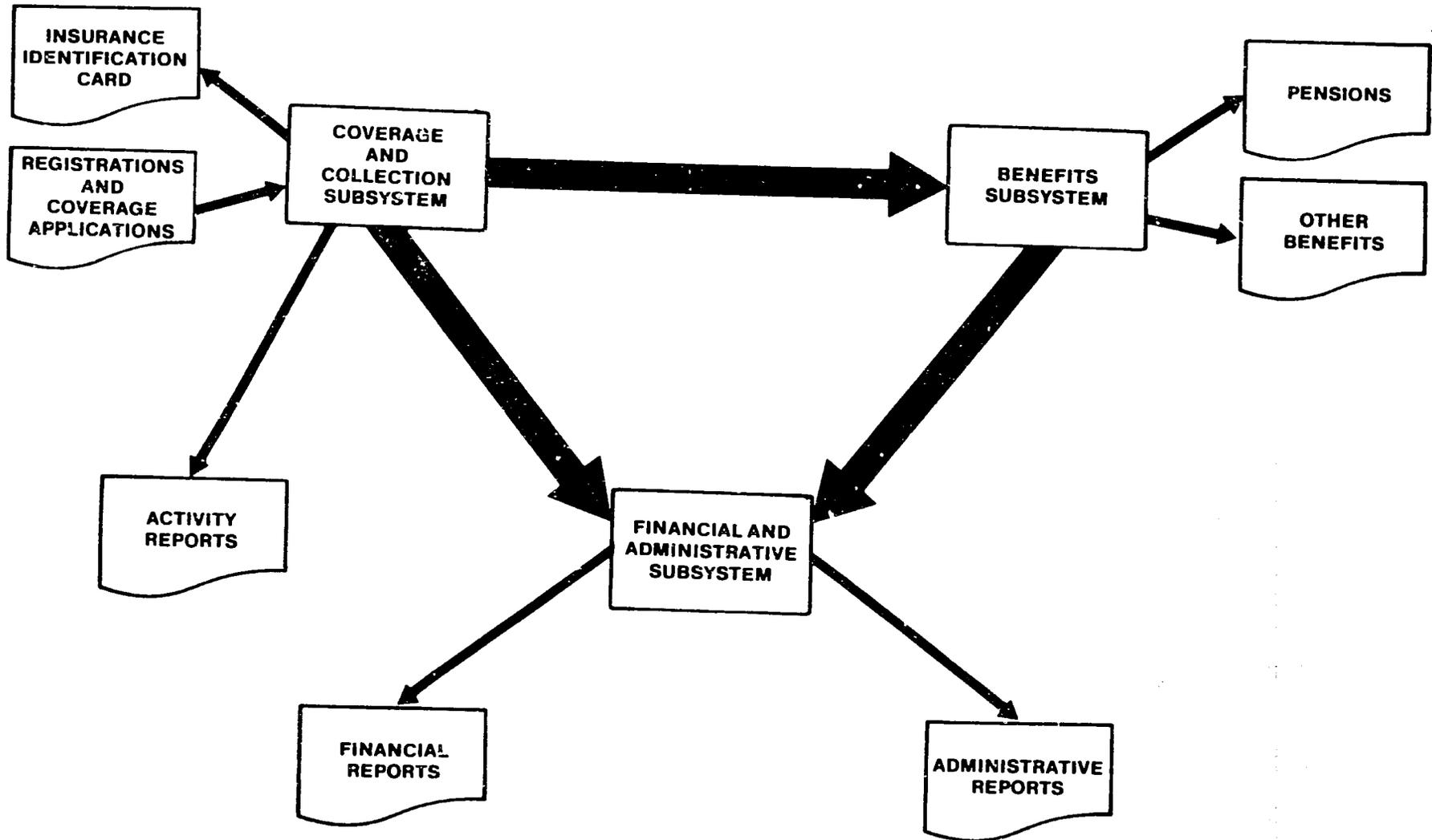
- o Record and track pensioners, insured workers and contributing employers on an individual basis
- o Calculate and track monthly contributions on an individual basis
- o Provide benefits and funds disbursement registers on an individual basis
- o Obtain greater control over contributions, and thus, investments
- o Eliminate duplication of effort between local, regional and central offices, and also between SIO and PIO
- o Eliminate massive paperwork and filing problems within local offices
- o Provide administrative, actuarial and management tools and reports
- o Minimize errors and maximize services while providing security, confidentiality, and auditability.

Meeting these sub-objectives will be a challenging effort; however, with a dedicated resolve in the design, development and implementation, the success of AESIS will upgrade current operations to a more effective and efficient level.

2.3 EXISTING METHODS AND PROCEDURES

The current Egyptian Social Insurance System is a combination of manual and automated processes. There are however, great similarities between automated functions at SIO and PIO. The basic automated system employed by each MSI element consists of three functional subsystems. Exhibit 2-3, following this page, depicts these subsystems and their interrelation. Below, each subsystem is identified and briefly described as to functional responsibilities:

**EXHIBIT 2-3
EGYPTIAN SOCIAL INSURANCE SYSTEM
CURRENT SYSTEM OVERVIEW**



2-9

12

- o Coverage and Collection Subsystem - establishes initial enrollment, eligibility and coverage of the pensioners and beneficiaries, and determination of contribution amounts
- o Benefits Subsystem - applies benefit payment criteria, determines benefits, and issues benefit payments
- o Financial and Administrative Subsystem - provides automated accounting and reporting functions for some MSI activities.

Each of these subsystems is addressed separately in the following paragraphs. The perspective for review of existing methods and procedures has been necessarily critical, in order to identify much-needed system requirements presented in Chapter 3 of this document.

2.3.1 SIO EXISTING METHODS AND PROCEDURES

2.3.1.1 Coverage and Collection Subsystem

The current SIO Coverage and Collections "Subsystem" is partially automated on IBM 370/158 hardware running under DOS. Mostly, the system runs procedures that are intended to create the master file of insured persons and employers and record and follow-up the contributions of both. Major functions include:

- o Establishing and maintaining master files
- o Recording and following-up contributions
- o Calculating monthly contributions
- o Printing monthly reports of new insureds and those removed from the records
- o Printing various reports concerning collections and insureds.

Unfortunately, it has been difficult for SIO to automate most of the subsystem, because of differences in the procedures for collections of contributions from various types of insured persons. For example:

- o Public Sector: Contributions are collected from the various companies on the basis of actual wages paid each month. There is no record maintained of individual insureds and no record of changes on a monthly basis.

- o Private Sector: Contributions are collected on a monthly basis from employers, based on their January payroll. The employers deduct the insured person's contribution and pay on a monthly basis. They are supposed to report additions and deletions each month. A record of individual insureds and employers is produced.
- o Construction Workers: Contributions are collected from workers through the purchase of stamps. Each worker is issued a card which is good for one year's worth of stamps. Upon filling the card, each worker returns it to the local office and receives another blank card. Employers are required to contribute on the basis of the value of each construction site, when completed. In some cases they may request the privilege of paying in installments. Currently, reports to SIO concerning these construction sites are not tied to issuance of building permits.
- o Transportation Workers: Drivers pay by purchasing stamps. They are issued a card good for a two year period, which is equivalent to the period of their drivers license renewal. Vehicle owners pay a yearly amount based on the value of cars they own.
- o Casual Workers: They purchase stamps on a three-year basis. Employers pay according to a formula for their industry, i.e., farmers, fisherman, etc. When a worker's card is full, he must return to his original local office to receive another card.
- o Bakery Workers: They do not pay, although they must register with a local office to be eligible for a pension. Owners pay on the basis of the number of flour packets purchased from the Ministry of Supply each day. On a regular basis, the Ministry of Supply pays SIO a total sum to cover such workers.

At present, only casual workers' and drivers' collections are handled on an automated basis. Standard regulations encompassing all categories must be applied before the collections mechanism will be reliable.

Exhibit 2-4 on the following pages is a summary table presenting the various types of insured persons, the applicable social insurance laws they fall under, and eligibility and calculation criteria for each of the laws.

2.3.1.2 Benefits Subsystem

The SIO Benefits Subsystem is a combination of manual and automated activities through which SIO attempts to store historical records for pensioners and beneficiaries, process amendments to current records, record periodic payments to pen-

Type of Benefits	<ul style="list-style-type: none"> - Old-age, disability and death insurance - Labour injuries insurance - Health Insurance - Unemployment insurance - Pensioners social Services 	<ul style="list-style-type: none"> - Old-age, disability and death insurance 	<ul style="list-style-type: none"> - Old-age, disability and death pension of Labour injuries in case of end of service because of total invalidity or death. 	<ul style="list-style-type: none"> - Old-age, disability and death insurance
Persons Covered	<ol style="list-style-type: none"> 1) Civil workers in the administrative departments of the state 2) Workers in the general organizations 3) Workers in public sector 4) Workers either in private sector or co-operative sector 	<ol style="list-style-type: none"> 1) Persons who for their own account, practice a commercial or industrial or agricultural activity and artisans. 2) Partners in personal companies of joint liability 3) Workers in liberal professions 4) Productive members in productive co-operative societies who work for their own account 5) Owners of cultivated lands whose area is at least 10 feddans 6) Proprietors of cultivated lands whose area is at least 10 feddans, whether they rent or collaborate or both 7) Proprietors whose annual income is at least L.E. 250 of the rental value of building 8) Owners of means of transport for person and goods 9) Officials authorised to perform civil marriages, and notaries other than monks 0) Men-of-letters and artists 1) Mayors and chief of villages 	<p>Egyptian workers abroad who are not covered with social insurance Law and they are:</p> <ol style="list-style-type: none"> 1) Personal contract 2) Working abroad for himself 	<ol style="list-style-type: none"> 1) Temporary agricultural (casual) workers on farms, parks, gardens or reclaimed land, who raise cattle, poultry, sheep, or other animals as an enterprise. 2) Proprietors of cultivated lands of less than 10 feddans 3) Land owners (not proprietors) of less than 10 feddans 4) Proprietors whose annual income is less than L.E. 250 of the value of buildings 5) Employed Workers in fishing in private sector 6) Migrant workers 7) Small wandering sellers, workers such as car guards in parking stations, newspapers sellers and the like, and small artisans in cities or villages if they have no permanent work location and have no employees

NOTIFICATION

Law No. 79/75

EXHIBIT 2-4 (CONTINUED)

Law No. 108/76

Law No. 50/78

Law No. 112/80

		<p>12) Guides and touristic guides</p> <p>13) Commercial agents</p> <p>14) Owners of environment housing and family industries and owners of sailboats used in fishing or aquatic transport, and self-employed workers who employ workers.</p> <p>15) Monastic corps</p> <p>16) Partners of joint liabilities in simple companies</p>		<p>8) Domestic servants</p> <p>9) Sailboat owners in the fishing or the river-industries if they have no employees and owners of light transportation means who have no employees</p> <p>10) Trainees at vocational training facilities for lepers.</p> <p>11) Choristers, curators and others serving at churches who are not covered by social insurance system for employers.</p> <p>12) Pesons who recovered from T.B. disease who are trainees at vocational training facilities centers of the societies for defense against T.B. disease.</p>
<p>Organization responsible of insurance</p>	<p>Pension Insurance Organization for the workers in administrative departments of the state. Social Insurance Organization for the workers in public, private and cooperative sectors.</p> <p>Health Insurance organization for health insurance.</p>	<p>Social Insurance Organization</p>	<p>Social Insurance Organization</p>	<p>Social Insurance Organization</p>

EXHIBIT 2-4 (CONTINUED)

NOTIFICATION

Law No. 79/75

Law No. 108/76

Law No. 50/78

Law No. 112/80

Obligation	Obligatory	Obligatory	Optional	Obligatory												
Estimate of persons entitled according to the total number of the population in 1975	4.5 Million	2.9 Million	0.5 Million	4.2 Million												
Age at the beginning of contribution	The insured has no specific age to reach, if he is a worker in the state or in the public sector. He has to reach the age of 18 if he is a worker in private sector, but labor injury insurance which covers the trainees less than 18 years	21 Years	18 Years	18 Years												
The pension age	The age of retirement provided for the employment regulations or the age of sixty for the insured persons subject to the labour code (private sector workers)	65 Years	60 Years	65 Years												
Monthly contribution percentage	<p><u>Employer/Insured/Treasury/Total old-age, disability and death insurance</u></p> <table border="1"> <tr> <td>%</td> <td>%</td> <td>%</td> <td>%</td> </tr> <tr> <td>15</td> <td>10</td> <td>1</td> <td>26</td> </tr> </table> <p><u>Labour injuries insurance: -</u> x For the workers in the administrative departments of the state and general Organizations</p> <table border="1"> <tr> <td>1</td> <td>00</td> <td>00</td> <td>1</td> </tr> </table>	%	%	%	%	15	10	1	26	1	00	00	1	15% of the category of income chosen by the insured person from the table of income categories annexed to the Law containing 18 categories from L.E. 40 up to L.E. 600 monthly	The insured person has the option to pay 22.5% of the income category from among the 17 categories listed in a table annexed to the law range from L.E. 50 to L.E. 600 per month in order to obtain the maximum limit of pension i.e., L.E.480 Monthly	<p>30 L.E. Monthly contribution by social insurance stamps put on the insured's card by himself.</p> <p>The resource of financing depends on the indirect financing resources i.e.</p> <ol style="list-style-type: none"> 1) The amounts allocated in the budget of the state. 2) The amounts allocated in the budget of Nasir bank. 3) A share of contribution collected under Law 79/75, not more than 2%
%	%	%	%													
15	10	1	26													
1	00	00	1													

2-14

2

NOTIFICATION

Law No. 79/75

EXHIBIT 2-4 (CONTINUED)

Law No. 108/76

Law No. 50/78

Law No. 112/80

	<p><u>*For the workers in the public sector</u></p> <p>% % % % 2 00 00 2</p> <p><u>*For the workers in the private sector</u></p> <p>3 00 00 3</p> <p><u>Health insurance: -</u> <u>For the workers in the administrative departments of the state and general organizations</u></p> <p>3 1 00 4</p> <p><u>For the workers in the private sector</u></p> <p>4 1 00 5</p> <p><u>Unemployment insurance</u></p> <p>2 00 00 2</p>			
<p>Period required for entitlement old-age pension</p>	<p>At least 120 Months</p>	<p>120 Months</p>	<p>180 Months</p>	<p>At least 12 Months. For those who did not supplement this period at the time of promulgation of Law No. 112/75 it had to be reduced by the period between 31/12/85 and the age of 65.</p>

* These employers are obliged by the Law to pay wage compensation and travelling expenses.

2-15

14

EXHIBIT 2-4 (CONTINUED)

NOTIFICATION

Law No. 79/75

Law No. 108/76

Law No. 50/78

Law No. 112/80

Minimum period for entitlement to pension of total invalidity, partial disability causing end of work, or death	No requirement for workers in the administrative department, general organizations, public sector or those who are covered by employment laws or regulations. Private or cooperative sector the insured person should have a contribution period not less than 3 consecutive months or 6 intermittent months.	3 consecutive Months or 6 intermittent months.	3 consecutive Months	6 Months reduced to 3 Months for those who died before 1/7/1980
Minimum of Monthly payment	L.E. 20 + L.E. 4 by law 116/82 + 5 by law 98/83 = L.E. 29	L.E. 20 + 4 by law 116/82 + 5 by law	L.E. 20 + 4 + 5 = L.E. 29	L.E. 12
Minimum of Monthly payment	L.E. 200 + 4 by law 116/82 + 5 by law 98/83 = L.E. 209	L.E. 480	L.E. 480	L.E. 12
Calculation of old-age pension	1/45 of the average monthly wage during the last two years	The same as Law No. 79/75	The same as law No. 79/75	A Flat rate of L.E. 12

Notice: ELSADAT pension is eligible by law 112/80 for those who reached 65 years, total invalidity or dead before 1/7/80 and ineligible for payment due to any of social insurance Laws and not receive any payment equal to or more than L.E. 10.

sioners and beneficiaries, and account for returned pensions. There are four major functional areas contained in the subsystem:

- o Calculations
- o Benefit amendments
- o Periodic payments
- o Returned pensions.

The automated portion of the subsystem contains 154 programs, 79 of which are included in the periodic payment area.

The major objectives of the benefits subsystem are to:

- o Maintain pensioner and beneficiary information
- o Prepare lists of periodic payments to be made
- o Process changes to pensioner and beneficiary records
- o Follow-up returned pensions
- o Check for duplication of insurance; and
- o Check calculation of benefits by local offices.

Unfortunately, this subsystem fails in meeting these objectives for two reasons:

- o The modules of the subsystem are not integrated.
- o The subsystem is manually bound, i.e., nearly all processes are performed manually and subsequently re-checked by the computer. There is little or no attention paid to the computer verification process. For example, upon notification to begin benefits, a lump sum benefit representing the first three periodic payments is calculated by the local office (or company agent in the public sector category) and paid to the beneficiary by the local office accounting department. This lump sum payment is not reported to, or recorded on the automated system. In addition, when benefits begin, the local office prepares two separate forms for input. One is processed through the calculations module and one through the periodic payment module. The calculations module re-calculates the local office calculation and returns lists of correct and incorrect (or insufficient data) calculations. The periodic payment module accepts the local office calculation and sets-up the permanent payment record. There is no interface between these modules. Subsequently, the local office is supposed to resubmit

incorrect calculations in the form of amendments to the periodic payment module. There is no control as to whether this is ever done. In addition, although returned pensions are reported to the system, stop payments are not usually performed. Therefore, there is no system control over these amounts.

2.3.1.3 Financial and Administrative Subsystem

The current financial system is completely manual, although there is a trial automated system in operation in the Alexandria region. The automated F & A subsystem is an attempt to produce journal ledgers monthly based on inputs from the local offices. These offices submit a variety of inputs including:

- o Expense orders
- o Journal entries
- o Cash journal entries
- o Compensation journals
- o Subscription journals.

This information is keyed and various output reports are produced. However, because there is no interface with other subsystems, this SIO subsystem provides inadequate data, and results in extra manual workload.

Another part of the SIO F & A subsystem which is currently being redesigned is the payroll. This system gathers data and statistics on MSI employees, including:

- o Salary
- o Pensions
- o Incentives and bonus
- o Periodic and annual raises.

This system is also not interfaced with any other and, therefore, causes extra manual effort.

2.3.1.4 Actuarial System

Currently, the SIO actuarial system is completely manual. Extensive data is required concerning active insured persons, pensioners, beneficiaries, and the families of each group. The data is currently gathered by sending questionnaires to various companies and employers in the public and private sectors. The return rate is approximately 30%.

The actuarial valuations are made every five years by using the data returned in the questionnaires to produce voluminous reports by various categories, such as:

- o Amendments to the files between valuations:
 - Number of pensioners
 - Amount of pension
 - Number of deaths (by age)
 - Number of disabilities (by age)
 - Number of ill-health pensioners

- o Comparisons by age (by category):
 - Total salaries
 - Average salaries
 - Average period of service
 - Average added period of service
 - Number of insureds
 - Number married
 - Percent married
 - Average age of wife

- o Many others.

The data required is as of June 30 of the valuation year. The next needed information will be as of June 30, 1987. The Ministry has recently completed the cycle for June 1977 and is currently gathering data for the June 1982 period. The current system keeps a large staff busy at SIO at all times, and also imposes extra work and recordkeeping activity on employers.

2.3.2 PIO EXISTING METHODS AND PROCEDURES

Data processing at PIO occurs in both manual and automated modes. Manual processing of data occurs primarily at the governmental department and regional office level, while all automated data processing devolves to the central office. The manual processing consists primarily of pension application completion, three month lump sum pension calculations, forms auditing and report preparation. Additionally, most administrative and accounting data processing functions (with the exception of overtime) are manual. Automated processing is primarily confined to rechecking manual amendment calculations (made at the regional and government department level), generating on-going periodic benefit payments, and collections activities.

PIO operates three basic subsystems, specifically:

- o Collections Subsystem
- o Benefits Subsystem
- o Financial and Administrative Subsystem.

Each of these subsystems consists of a series of manual and automated procedures that address the various requirements under the pension-related provisions of the Egyptian Social Insurance Law. Exhibit 2-5 provides a listing of these automated and manual processing modules by type of subsystem.

The automated processing activities of PIO are supported by International Computers, Ltd., equipment of the following specifications:

- o ICL key edit 16 minicomputer stations
- o ICL 1902 T Computer (64K memory, 1 word = 24 bits) supported by:
 - 2 ICL 2815 disc drive units (60M characters each)
 - 8 ICL 2900 tape drive units (9 tracks)
 - 1 ICL 2101 card reader (1,000 cards/minute)
 - 1 Estrex teletype supervisor
 - 2 ICL 2430 high speed chain printers (160 cpl, 1500 LPM)
 - 1 ICL 71 keypunch machine.

PIO has approximately 50 people working in the data processing department: 20 persons in data entry and editing, 15 in systems analysis and programming, and 8 operators. Facilities are operated an average of 18 hours/day, six days/week. The following is a summary of a typical monthly systems schedule:

<u>Operation</u>	<u>Volume</u>	<u>Hrs/Operation</u>
Periodic Pension Payments	500,000	75
Adjustments, Live Pensioners	12,000	50
Adjustments, Inheritance Pensioners	10,000	50
Payment of Special Premiums	136,000	25
Other Payment Cheques	125,000	32
Alimony Debits	2,000	10
Lending	8,000	16
Income	14,500	56
Sudanese Pensions	3,000	10
Other (System Maintenance, Program Development, etc.)		60
		384

General Organization for
Insurance and Pensions
 PIO

AUTOMATED & MANUAL PROCEDURES
OF CURRENT SYSTEM

PROCEDURE NAME	TYPE	SUBSYSTEM
1. Adjustment of Living Pensioner's Pensions	Automated	Benefits
2. Adjustment of Inheritance Pensions	Automated	Benefits
3. Periodic Payment	Automated	Benefits
4. Revenue Procedures		
. collection (checks)	Automated	Collections
. collection (post orders)	Automated	Collections
. in-country secondment	Automated	Collections
. foreign secondment	Automated	Collections
. previous periods	Automated	Collections
. special premiums	Manual	Collections
. claims	Manual	Collections
5. Alimony Payment	Automated	Benefits
6. Returned Pensions	Manual	Benefits
7. Special Pensions	Automated	Benefits
8. Pension Updating (Amendments)	Manual	Benefits
9. Accounting Procedures		
. uncleared checks	Manual	F & A
	Automated	F & A
10. Personnel & Payroll Procedures		
. bonus process	Manual	F & A
	Automated	F & A
11. Inventory	Manual	F & A
12. Commutation	Manual	Benefits
13. Investment Activities	Manual	F & A
14. Financial Status	Automated	F & A
15. Statistics for Final Accounts	Automated	F & A

2.3.2.1 Collections Subsystem

The Collections Subsystem consists of a series of manual and automated processes designed to collect, track, calculate, and control pension-related receipts. The subsystem is designed so that it can receive only two types of payments, checks and post office money orders. Checks and money orders may be received from individuals, however, the Government issues only checks.

o Individuals and Government Departments

The government department is responsible for submitting summary payroll and individual pension related deductions information along with a check for monthly payment of the premium. These collections are segregated according to whether they are periodic monthly payments or non-periodic (one-time) payments. Similarly, an individual may submit a pension-related payment. This may be submitted either through the government department or directly to PIO Regional or Central Offices. If these payments are made through the government office, the government office has the option of submitting these payments by utilizing Form No. 3 - Other, supported by the forms submitted by the individual or without Form No. 3 - Other, utilizing only the individual's forms.

o Regional Office

The regional office receives checks and forms from the individual or government department, reviews them for completeness and sends these files to the central office for processing. The regional office does not perform any calculations.

The regional office is responsible for some inspection and follow-up activities based on payment exceptions listings received from the central office in addition to its routine inspection activities.

o Central Office

Premium collections and contributions do not formally enter the collection subsystem in an organized and controlled fashion until they are received at the central office. It is at this point that documents are formally logged in and processed in a controlled fashion (batching). Before being entered into the automated processing cycle the payment files received from the government departments, regions and individuals, are reviewed for completeness and manually checked for gross errors and exceptions (e.g., discrepancies between check and form gross totals, incomplete forms, unsigned or

illegible check signatures, etc.). Exceptions are returned to the government departments and individuals for correction. The remaining data is processed through the collections system.

Two collections modules are used to receive and process payments. One module is used for postal money orders and the other for checks. Both of these modules are used to produce automated analytical and control reports.

The calculation modules, with the exception of claims processing, calculate (audit) the amounts due based on the input data and generate exceptions listings and penalty payments used for establishing, and processing adjudications. Additionally, analytical and control reports are produced.

Exceptions are followed up on the basis of error listings produced by the computer with the assistance of central and regional office inspections office personnel.

2.3.2.2 Benefit Payment Subsystem

The Benefit Payment Subsystem calculates and controls pension payments for eligible pensioners. The types of benefit payments which are possible in this system are listed in Exhibit 2-6 following this page. Additionally, there are three types of lump sum payments which can occur, specifically:

- o Three-month lump sum payment, which the government department is responsible for issuing at the time of an employee's retirement
- o Differential lump sum payment, which provides for the difference between the date of pensioner retirement and the first delivery of a periodic pension payment, if such time exceeds the original three-month period, or there is a discrepancy in the level of the benefit amount calculated for the three-month period
- o A lump sum payment for a pensioner who requests or by law is due a lump sum payment in lieu of a monthly pension.

With the exception of the Cairo and Alexandria Regional Offices, all lump sum payments must be determined and issued by the Central Office.

- o Government Department

With the exception of Special Decrees, the processing of government pension data begins at this

TYPES OF BENEFIT PAYMENTS

- A. Living Pensioner and Beneficiary Benefits
1. Retirement Benefit
 2. Temporary Injury Benefit
 3. Wage Compensation
 4. Additional occupation-related benefit payments under:
 - o The Law of Judges
 - o The Law of Public Intelligence
 - o The Law of Policemen
 - o The Law of Administrative Managers
 - o The Law of Central Agency for Accountancy
 - o The Law of University Professors
 5. Additional Benefit payment increases by Decree:
 - o Pension Law 7, '77
 - o Pension Law 44, '78
 - o Pension Law 62, '80
 - o Pension Law 93, '80
 - o Pension Law 137, '80
 - o Pension Law 61, '81
 6. Compensation benefits for workers with over 36 years of public employment
 7. Exceptional case benefit payments
 8. Death and permanent disability benefits
- B. Savings Benefit Payment
- C. Benefit payment for workers with less than 19 years of service
1. 15% lump sum payment
 2. Saving payment

28

level where the government representative and employee complete the pension application and submit it with the employee's service data to the regional office for processing. To allow for the processing time between the application submission and the first reimbursement from PIO, a pension payment based on a "rough" estimate is made by the government department covering three months and is provided to the pensioner. The resulting file is then submitted to the regional office for subsequent processing.

o Regional Offices

The regional office is the first PIO-controlled organization in which the pensioner's information is received. The regional office is responsible for:

- Reviewing the file for completeness
- Auditing the calculations made by the government representative
- Calculating and issuing lump sum payments
- Issuing file numbers (except in Cairo and Alexandria where the Central Office issues file numbers)
- Retaining and maintaining pensioner files including query and update transactions
- Conducting site inspections of government departments
- Administrative activities such as report preparation, operations scheduling, etc.

o Central Office

The Central Office receives and processes all new pension applications of PIO as well as all periodic payments. Additionally, the Central Office provides administrative support to the regional offices. It is the only level at which automated data processing occurs in the PIO organization. Benefit Subsystem activities of the Central Office include:

- Application validation and file number control and issuance
- Data preparation and entry for automated processing activities

- Automated calculation of exceptional case and regular pensions
 - Automated auditing of various lump sum amendments including differential lump sum payments
 - Automated generation of award notices and payment orders and other control reports
 - Automated deductions from pension checks (i.e., loan, health insurance, etc.)
 - Manual issuance of consolidated pension and deduction payment checks (to banks and post offices) and related deductions
 - Automated billing of governmental agencies for amounts due by pensioner
 - Archive files maintenance; and
 - Inquiry and update processing.
- o Post Office and Bank

The post office and banks are responsible for disbursing funds to pensioners and beneficiaries on the basis of automated listings and manually prepared checks received from the Central Office. Additionally, the post offices and banks coordinate with the regional offices in resolving unclaimed pension funds. Deductions may be made against an individual account for health insurance, bank loans and other government services and are controlled by reimbursement summaries and checks provided to the banks and ministries on an as required basis by the Central Office.

2.3.2.3 Financial and Administrative

The Financial and Administrative Subsystem consists of several components addressing the diverse needs of management and financial control and reporting. These components consist primarily of:

- o Financial Accounting
- o Actuarial Analysis
- o Operating Statistics
- o Administrative Reporting

o Financial Accounting

There are two types of financial accounting performed by PIO; administrative accounting and pension accounting. Administrative accounting includes the revenue and expense accounting used for controlling administrative and operational expenses of operating the PIO system. The financial accounting system consists of the classic functions of such systems including a general ledger with the related subsidiary ledgers such as payroll, a form of accounts payable, subsidiary expense ledgers and receipts ledgers.

Pension accounting involves tracking pension fund inflows and outflows as well as non-pension fund related revenues and expenses (payments) for the military pensions and the old pensioners (before 1956) pensions. PIO pension fund accounting entails tracking the receipts and payments generated from the collections and benefits subsystems as well as the performance of the pension fund itself. Military and old pensioners pension require estimating, collecting and disbursing funds received from the Ministry of Treasury by PIO paid to the Ministry of War and other government agencies by PIO.

With the exception of bonus (overtime) payments and pension fund activities all administrative accounting activities are manual. Only the portions of the pension fund subsystem previously described are automated.

o Actuarial System

The Actuarial System is a five year cycle system which collects demographic and economic data on the PIO insured and pensioner universe for the purpose of adjusting premium and payment levels of insured persons and pensioners. This system manually collects and edits data provided by the government agencies and performs tabulations through automated processing. The resulting data is used in the actuarial analysis performed to arrive at contribution and payment parameters.

o Operating Statistics

Operating statistics are provided on an as-needed basis to satisfy management requirements to evaluate organizational efficiency and production levels. At present there is no periodic or formalized

statistical system. Reports are prepared on an as-needed (ad hoc) basis using information gathered by survey or generated as a by-product of other organizational activities.

o Administrative System

The administrative system, consisting primarily of personnel and inventory, is manually operated. Files of each employee in PIO are maintained; such files contain information related to position description, salary, service data, and personal employee data. The inventory system is manually maintained and requires annual physical inventories (periodic inventory system) to be made to update the inventory records.

The inventory system is centrally maintained by the Central Office. A depreciation account is maintained for capitalized inventory.

2.4 PROBLEMS WITH THE CURRENT SYSTEMS

MSI has experienced a dramatic growth in the number of insureds it serves during the past seven years. Between 1975 and 1982, the number of insureds has increased from 3 million to approximately 12 million due to expanded coverage mandated by law. The problem of rising service demands is compounded by increasingly complex laws and regulations and constantly changing reporting requirements. Computer processing has long been recognized as an aid to reducing this type of burden. MSI has utilized computer processing to some extent; however, each benefit program uses different clerical and operational procedures. Thus, data collection, processing, file storage, and file maintenance functions often are duplicated. Under the current system, it is virtually impossible to ensure that an insured person or pensioner is eligible for the services he is receiving and that he is not receiving duplicate payments.

There are currently a variety of problems, both organizational and operational which plague MSI in their attempts to effect an efficient, smooth-running organization. These problems include:

- o Lack of control over input and reporting of data from the government and public sector areas
- o No audit trails, identification of duplicate insureds or analysis of potential fraud, other than actual field inspections
- o No common procedure for identification of insured persons, beneficiaries or employers, and no knowledge of workers in the government and private sector

- o No control over amounts to be collected in the various sectors until after the fact
- o Extensive duplication of effort in calculation and recalculation of contributions
- o No control of SIO local office collections on a daily basis
- o Extensive manual activity including payroll, accounting, finance accounts, yearly reports, etc.
- o Voluminous manual files at each local office, with no back-up in case of disaster
- o Little or no security and confidentiality of information.

3. MSI REQUIREMENTS FOR AESIS

The system-wide requirements presented herein will apply to both MSI components -- SIO and PIO. To avoid repetition of those functional requirements that apply to SIO and PIO alike, a single grouping was formulated and is presented first. However, on a functional level, they describe a requirement that applies to both organizations and therefore has been stated as system-wide. The remaining section presents requirements that are unique to the specific programmatic areas of each organization.

An overview of the system-wide requirements is provided from an automated perspective, grouped into the following categories, and presented in subsequent subsections:

- o System Environment Requirements
- o Data and Process Flow Requirements
- o Data Handling and Control Requirements
- o Operational Requirements and Standards.

These four subsections describe the type of requirements (inquiry, data management, etc.) which AESIS must satisfy. The final subsection presents comprehensive statements of the AESIS system-wide functional information requirements.

3.1 SYSTEM ENVIRONMENT REQUIREMENTS

System environment requirements include that class of requirements which have an impact on the type or placement of hardware and/or software components. For example, the need for information on insureds currently certified as eligible to fulfill screening requirements on new applicants, establishes a requirement for sharing and communicating information about eligible insureds. This functional requirement and others similar to it have an impact on the system environment of AESIS. In this section, an overview and examples of the system environment requirements will be presented, logically grouped by the following classifications:

- o Inquiry - Numerous needs were identified that require an on-demand response capability for specific information requests. For example, to support the applicant screening function, a need exists to scan the list of eligible insureds to identify those applicants who have information on file with MSI. These requirements imply information availability at multiple remote sites which can be readily accessed.

- o Ad Hoc Reporting - Requirements which specify the need for reports, which are produced based upon user specific parameters and required on a non-routine basis, are classified as ad hoc reporting requirements. For example, an ability to identify insureds having some combination of eligibility characteristics is needed for evaluating the impact of a proposed policy change. Neither the characteristics nor the frequency of such reporting can be adequately planned.
- o Real-Time System Interaction - This category of requirements includes functions where the ability to interact with AESIS during the actual performance of a task (e.g., insured interview or eligibility determination) is essential. Although no single task has been identified that can be satisfied only with real-time interaction, the combined requirements for timeliness and accuracy are most easily met by some real-time system interaction.
- o Batch - Numerous requirements were identified that demonstrate a need for processing large quantities of information in a short timeframe. An example of such a need is the requirement to provide benefit level information routinely to the benefit payment subsystem for all eligible insureds. This type of requirement can best be satisfied by a batch processing capability.
- o Interface - Communications between SIO and PIO as well as the Health Insurance Organization (HIO) are necessary system interface requirements that AESIS must meet.
- o Data Management - To accomplish a comprehensive screening of insureds, the ability to search individual's data comprehensively across programmatic areas with the option of using multiple factors (Social Insurance Number, name, etc.) has been identified as a requirement. Such requirements impact the capabilities provided by data management approaches.

3.2 DATA AND PROCESS FLOW REQUIREMENTS

This section presents an overview and examples of the types of data and process flow requirements that apply system-wide. These requirements are presented from an automated system perspective and are classified as information inquiry requirements, data entry requirements, data correction requirements, and reporting requirements.

- o Information Inquiry Requirements - Inquiry requirements have been identified at numerous points in the process of determining insured eligibility for either coverage or benefits. For example, in the screening process, data on an existing individual is needed to identify potential duplicate applications. Additionally, in the eligibility determination process, information is needed from other program areas to assist in verification of application data. In general, the following types of inquiry requirements exist system-wide:
 - Individual status: depicts the individual's status across insurance programs lines
 - Individual search: scans to locate the individual in the database
 - Individual data: provides detailed information on an individual in the database
 - Verification request: provides information used for verifying eligibility criteria or data.

- o Data Entry Requirements - Data entry capabilities are required to support several key processes during eligibility determination. For example, to automate the evaluation of all eligibility criteria requires that information of each factor be entered into the system. From a functional perspective, the types of data entry requirements are categorized as follows:
 - Registration data: information required to establish tracking of individuals
 - Application data: information required to determine eligibility
 - Change data: data on changes in individual's circumstances
 - Follow-up action requirements: entry of follow-up actions when the requirement for follow-up is identified.

- o Correction Requirement - Errors in data may be identified at any point in processing. The ability for corrections to be made and subsequently communicated to all data users is essential. For example, an erroneously spelled name identified by a worker processing a claim for benefits must be corrected. In such cases, AESIS must establish a control over the correction of the individual's data.

- o Reporting Requirements - Reporting exists at various levels of detail in AESIS. The following functional types of reporting requirements exist in support of AESIS work process:

- Detailed reporting: reports that provide information on an individual level. Examples include: periodical files review lists, overdue application list, follow-up action notices, inspection notices, and list of records that have been closed for a period sufficient to warrant archiving.
- Summary reporting: reports that provide summary totals of specified actions. Examples include: registration application statistics (number received, approved, denied, and pending), periodical statistics, eligible insured by category, and payments authorized by time period.
- Ad hoc reporting: user-required reports provided non-routinely based on specific information requests. Examples include: identification of insureds having certain characteristics, policy change impact analysis, and mailing labels.

Additional reporting requirements will be discussed in forthcoming subsections regarding data control and operational requirements.

3.3 DATA HANDLING AND CONTROL REQUIREMENTS

Data control is essential to the integrity of the AESIS system. Examples of the types of data handling and control requirements are:

- o Input Data Control - It is required that AESIS maintain control over input data from time of entry until processing has been completed. Such a requirement dictates a need for feedback reporting to the originator of input. In addition to entry/response level feedback, summary reporting is also required.
- o Output Control - AESIS must control the distribution of output reports to ensure timely receipt by the proper user. In addition, AESIS must produce and control the transmission of output data identifying individuals to be issued benefit checks. This includes physical control through formalized distribution procedures as well as summary control totals produced at a level appropriate for verification.

- o Security - Requirements exist to restrict the ability to browse through financial information, to restrict availability of data update capabilities, and to provide limited access to confidential data. This includes limiting access to the system in general, limiting user capabilities (inquiry/update), and limiting access to specific data items.
- o Archiving - Data that is deleted from the current source of insured case information is to be stored on archive media for subsequent audit purposes. To fulfill this requirement, data should be stored off-site on an automated medium.
- o Audit Trail - Requirements that dictate the need to trace the origin and status of actions on individual information are described as audit trail requirements. An example of this type of requirement is the need to identify the location or even the worker initiating an adverse case action.
- o Activity Statistics - AESIS is required to provide summary information on system activity. For example, summary reports are needed to show the number of actions (approvals, denials, payments, etc.) for each local office.
- o Error Correction - Input data found to be in error must be held in suspense for later correction. Error correction requirements of this type define the techniques utilized for correction and control of errors.

3.4 OPERATIONAL REQUIREMENTS AND STANDARDS

Operational requirements are those requirements which impact the operating schedule or timing standards as well as requirements for quality assurance, configuration management and training support. These requirements stem from the constraints on process requirements.

- o Schedule - The need for timely action expressed in numerous requirements established a requirement for AESIS capabilities to alter the operating hours if MSI operating hours change.
- o Timing Standards - Applications for benefits must be completely processed within an established timeframe (e.g., 30 days). During the AESIS design, this requirement has an impact on the timing standards of each action required to complete the processing of an application.

- o Configuration Management - MSI must have maximum access to the AESIS system. This requirement necessitates operational management of AESIS to establish a configuration management capability to assure that major equipment or software modifications are scheduled at times of low work volume and least risk to continued user service.
- o Training Support - To satisfy the requirement for accuracy, the need for ongoing support for training is essential. AESIS must be able to process actions for training workshops and to provide access for trainees during supervised sessions.
- o Quality Assurance - AESIS must assure the accurate use of system capabilities by identifying and summarizing error statistics which can be used to provide follow-up instruction to system users.
- o Back-up and Recovery - The ability to identify and reconstruct lost or destroyed data is crucial to the operating integrity of AESIS.

3.5 SYSTEM-WIDE FUNCTIONAL INFORMATION REQUIREMENTS

This subsection contains a statement of the system-wide or common AESIS functional requirements. The preceding subsections have offered an overview of identified requirements from four data-processing perspectives with statements of typical examples. The focus of this section is to present all major AESIS functional requirements that are coincidental across insurance programs boundaries, that is, common to the SIO and PIO environments, described from a functional or process-oriented perspective. Through further analysis, these defined requirements will be decomposed to identify design criteria, data element needs and implementation considerations necessary for completion of the detailed systems designs.

The system-wide requirements presented here are categorized into four functional groups:

- o Application Requirements
- o Eligibility and Processing Requirements
- o Operational and Security Requirements
- o Reporting and Inquiry Requirements.

3.5.1 APPLICATION REQUIREMENTS

- o AESIS must utilize comprehensive application programs to capture insured data identical to the originating source if possible.

39

- o AESIS must utilize extensive data editing criteria to test entered data and control erroneous or incomplete data. Error-free applications are to be permitted to initiate or update files; applications in error are to be suspended pending resolution and are available for corrective action.
- o AESIS must support the eligibility control processes such as screening, intake, application processes, by using key identifiers from the applicant for detecting possible duplication of entry in the single source of insured information. Information such as name, age, sex, place of birth, date of birth and social insurance number are to be used to match the applicant to other records on file. Matches are to be reported for follow-up and inspection.
- o The process of adding the individual's data or changing already existing participation data is to take advantage of the interrelationship of program data to individual data. Additionally, the most current version of all update activity is to be made available from the single source of the individual's information to authorized users.
- o AESIS is to prompt users to perform a re-evaluation of insured beneficiary eligibility upon receipt of changed information from the insured, beneficiary or another source.
- o Data entry actions are to cross check against current or previous participation. Insureds existing in the comprehensive data base will not be re-entered.

3.5.2 ELIGIBILITY AND PROCESSING REQUIREMENTS

- o AESIS must provide a flexible means of changing eligibility criteria. Policy and regulation manuals relating to eligibility criteria are to be tabular and modular in format. Analysis of regulatory change determines specific criteria to be changed. These criteria are then used to update the AESIS eligibility tables. A report is to be generated showing previous and new contents. Benefit calculations are to be modular in nature and easily accessible to program maintenance personnel. Control is established over all changes to these calculations. All changes are to be reported.
- o AESIS must possess a methodology for the transformation of policy and regulation into specific eligibility criteria for coverage and benefits. This methodology is to be used by the MSI policy organi-

zation in determining the specific criteria or benefit level by program which pending legislation can affect. These criteria or benefit levels then constitute broad parameters that enable automated scan techniques to determine potential impact.

- o AESIS is to provide clearly defined procedures to satisfy priority payment requests for insureds without disrupting or delaying on-going benefit payments. Application processing and eligibility determination must be expedited even though data may be subject to later verification.
- o AESIS must re-evaluate individual eligibility for benefits/pensions and recalculate the benefit level where appropriate, on the basis of verified changes in specified insured data. These changes may be provided through automated means. AESIS must notify the insureds and users concerned.
- o Eligibility criteria for each MSI program are to be organized in an explicit and convenient format that allows for accurate and practicable application. This document must be maintained as changes occur and is cross-referenced to the relevant policy manuals.
- o Eligibility reviews are to be conducted routinely on selected cases within specified time periods by programmatic area. Workers are notified of upcoming reviews to assist verification.
- o AESIS will re-evaluate continued eligibility when program participation criteria change due to revised policy or legislation.
- o AESIS will utilize a standard set of eligibility criteria for each program in the eligibility determination.
- o AESIS will make readily available to the user information identifying all eligibility criteria and supporting information required for benefit payment and program eligibility determinations.
- o AESIS will utilize standard policy manuals that present all programmatic policies applicable to insured eligibility and benefit determination.
- o AESIS must utilize standardized procedures during the identification and verification of insured eligibility information required for all benefit/pension payments.

- o For each program, AESIS will utilize insured information on file to calculate, with automated algorithms, the level of benefit to be provided.

3.5.3 OPERATIONAL AND SECURITY REQUIREMENTS

- o AESIS is to provide direct entry capability and eliminate the transcription of information from program source documents to data entry input forms wherever possible. The removal of this intermediate step will reduce the error rate and the resulting need for labor intensive correction procedure normally associated with data reduction techniques.
- c AESIS should protect the integrity of data entry processing by providing an alternative entry mode in case of an extended interruption of service of direct entry mode.
- o AESIS is to provide disposition of data entered via the data entry procedure. Errors in entry are to be clearly identified as well as the reason applicable to the error. After a defined number of attempts at correction, the newly entered data is to be suspended. This suspended record on a subsequent correction attempts is to appear with the same error indications as when it was suspended. When possible, the individual's record is to be updated to indicate the presence of additional data in suspense.
- o AESIS daily system initiation (start-up) is to be performed by one designated data control point at SIO and PIO. The direct data entry component cannot be opened for processing until a positive response is given by data control to the balances and activity statistics for the last processing cycle. This prevents processing to occur on insured information sources that are out of data or out of balance. AESIS system termination is to be controlled through this one central data control point.
- o AESIS will permit at specified locations varying degrees of query and/or update capability. For instance, users located in a local office inquiry location would possess the ability to only query certain case information. Update capability would be denied at this location. Additionally update capability is to be located in secured locations. The AESIS security table is searched upon transaction request and processing continues for a valid request. An invalid request would result in termination of the request.

- o On an unscheduled basis, security keys to AESIS are to be renewed through re-identification and re-assignment by the centralized data control/data security unit. Reassignment of these keys also necessitates recompilation of user-ID tables. Reports are to be generated on new/previous contents.
- o AESIS should support the maintenance of confidentiality guidelines applicable to insured eligibility data. These guidelines will establish the specific user groups which will be allowed to obtain confidential data.
- o All update activity is to be recorded by type of activity to a transaction activity file. Additionally, after update processing for a specified cycle, file balancing algorithms are to be used to balance activity against total file content. This balancing mechanism also will generate file balance/activity report for use by the data control unit.
- o AESIS will permit, through additional indices, flexible access to the single source of individual information. For instance, name or social insurance number (should it not be the primary key) are to be used as a secondary means of access for query or search purposes.
- o The single comprehensive source of active, pending and closed individual data is to provide the ability to relate eligibility information about a person across programmatic areas. Included in the relationship is the ability to logically relate data (both personal and demographic) to information dealing with eligibility determination, benefit/pension payments, and actions.
- o AESIS will assist in the detection of fluctuating input volumes. In addition, AESIS is to provide sufficient processing capacity capable of handling "peak loads" in the number of registrations or applications being processed.
- o AESIS will provide replies to queries pertaining to prior contact by applicants during application processing.
- o AESIS must provide central access to the single source of the individual's information through one common key identifier. All cases, regardless of program participation, are to possess this key identification element. AESIS will control the assignment of this identifier.

- o AESIS must categorize related case information to distinct data groups. This is to facilitate the identification of, and provide faster access to individual information that requires maintenance.
- o AESIS will automate selected manual processes to improve accuracy, data flow and processing time. For example:
 - Registration
 - Eligibility determination
 - Mathematical calculations
 - Tracking of insured data
 - Storage of individual's information
 - Retrieval of individual's information
 - Generation of standard reports or notices.

3.5.4 REPORTING AND INQUIRY REQUIREMENTS

- o Control reporting is to be provided to data control organizations after each cycle of processing. This reporting must provide before/after totals and summaries of all transactions activities against the file.
- o AESIS control reports are to include both detail line items and summary balances of detail activity reported. Additionally, report distribution is to be specified upon generation of AESIS reports.
- o In AESIS, all program participation data is to be logically related to the master individual record for use in identifying those who have been or are participating in more than one coverage or benefit program administered by MSI. Inquiry responses as well as profile reports are generated to assist users with interrelating program information about specific individuals.
- o AESIS will notify the insured of the result of an eligibility determination, and identifies and establishes control over those who appeal the decision when benefits must be provided during the appeal process.
- o AESIS is to provide for the presentation to users of follow-up notices that list incomplete and/or erroneous data to be corrected prior to further eligibility determination.

- o AESIS, upon demand, must generate a listing of programmatic eligibility criteria used in determining eligibility and payments. Additionally, a cross reference to applicable MSI policy manual sections may be available.
- o When an insured requests assistance, the worker is to query the system to identify previous benefits and services received. Query capabilities are to access the current sources of insured data through key identifiers and are to display current and/or previous information on the individual.
- o AESIS is to provide current insured participation interface data to other MSI elements to support verification procedures. This interface is to be provided on a regularly scheduled basis.
- o Individuals suspended for eligibility determination due to missing or incorrect information are to be reported regularly. These suspense reports are to contain identification of the individuals reason for suspension. Suspense aging reports are to be produced showing the length of time an insured has been suspended.

4. MSI OPERATING ENVIRONMENT

This section summarizes the overall environment for SIO and PIO in terms of equipment, support system software and interfaces with external sources.

4.1 EQUIPMENT

The IBM hardware configuration for both SIO and PIO is presented in Exhibits 4-1 and 4-2. This hardware is anticipated to be delivered and installed during the month of August, 1984.

In summary, the system proposed is IBM 4341 mainframes, with 4MB for SIO and 2MB for PIO.

4.2 OPERATING SYSTEM AND SYSTEM SOFTWARE

A list of proposed IBM operating system and system software is presented in Exhibit 4-3. In general, the system will operate under DOS/VSE, DL/I and CICS environment; all software will be developed in COBOL.

4.3 INTERFACES

The AESIS will not have interfaces with any other existing MSI systems, however, it is anticipated that the databases between SIO and PIO shall be periodically interfaced in order to produce consolidated reporting at the Ministry level. Additionally, an interface will exist between AESIS and the Health Insurance Organization (HIO).

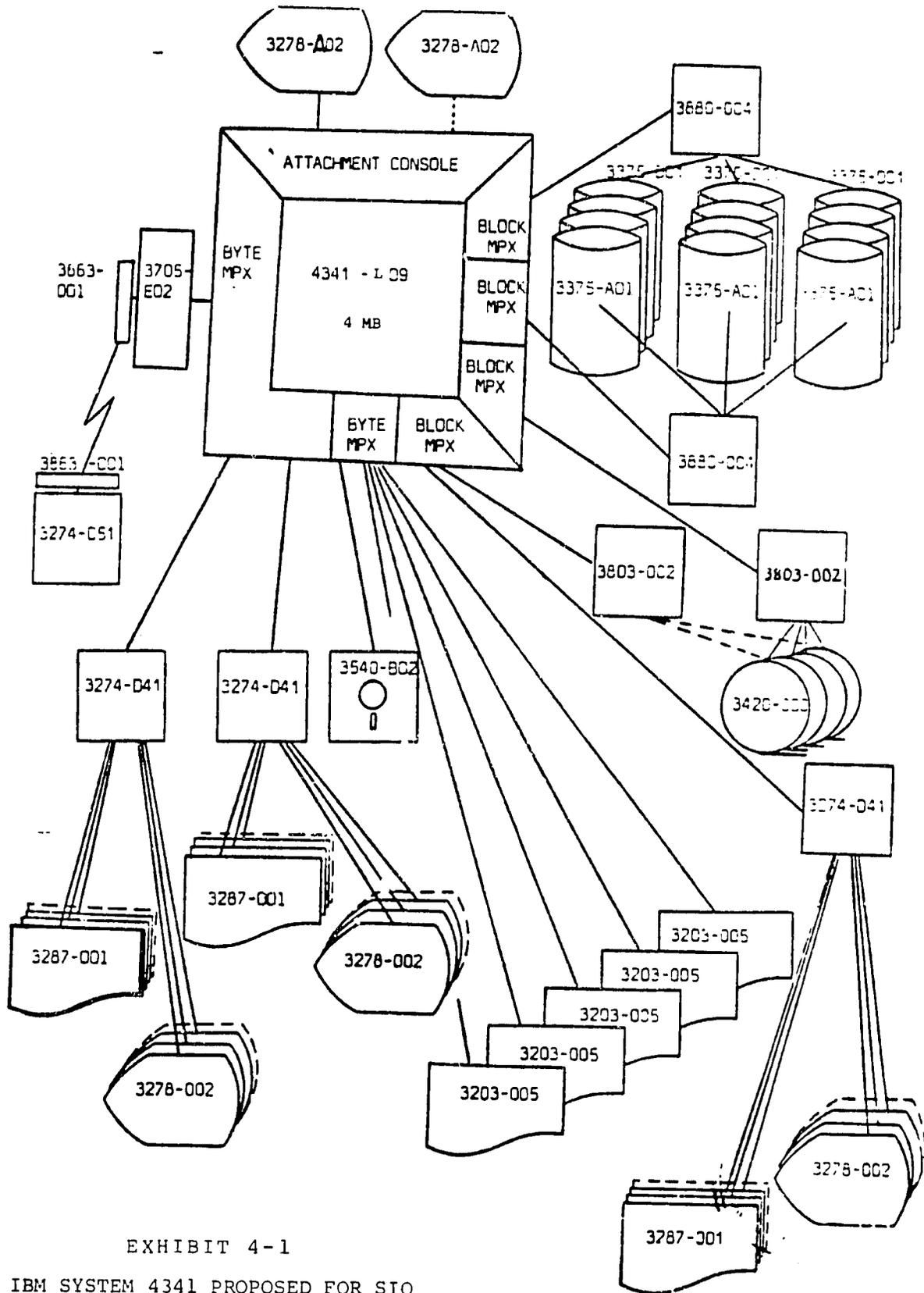


EXHIBIT 4-1
 IBM SYSTEM 4341 PROPOSED FOR SIO
 CONFIGURATION LAYOUT

EXHIBIT 4-1 (Continued)
 IBM SYSTEM 4341 FOR SIO
 LIST OF PROPOSED HARDWARE

Item	Machine Type	Machine Mod/Feat.	Qty	D e s c r i p t i o n
01	4341	L09	1	Processor with 4 MB
		1480	1	Book Rack and Cable Holder
		1550	1	Console Table
		1870	1	Block Multiplexer Channels Additional
02	3278	A02	2	Display Console
		4632	2	Console Keyboard
03	3274	D41	3	Control Unit
		7H0504	3	Arabic Control
04	3278	002	40	Display Station 1920 Characters
		4627	40	87-Key Typewriter Keyboard
		7H0300	40	Arabic Display Character Generator
		7H0508	40	Arabic Keyboard
05	3287	001	32	Printer 80 cps
		4110	32	Friction Feed
		4450	32	Forms Stand
		8331	32	3274 Attachment
		8700	32	Variable Width Forms Tractor
		7H0307	32	Arabic Character Generator
06	3840	004	2	Storage Control
07	3375	A01	3	Direct Access Storage & Control
		4951	3	Model 001 Attachment for Model A01
08	3375	B01	6	Direct Access Storage
		4952	6	Model D01 Attachment for Model B01
09	3375	D01	3	Direct Access Storage
10	3803	002	2	Tape Control
		1792	1	Tape Switching
11	3420	008	4	Magnetic Tape Unit
		6425	4	6250/1600 Density

96

EXHIBIT 4-1 (Continued)
 IBM SYSTEM 4341 FOR SIO
 LIST OF PROPOSED HARDWARE

Item	Machine Type	Machine Mod/Feat.	Qty	D e s c r i p t i o n
12	3203	005	5	Printer 1200 LPM
13	1416	001 Y91358	10 5	Interchangeable Train Arabic Character Set
14	3540	B02	1	Diskette Input/Output

PROPOSED HARDWARE FOR
 REMOTE COMMUNICATIONS

15	3705	E02	1	Communication Controller
		1302	1	Attachment Base Type 2
		1642	1	Communication Scanner Type 2
		1544	1	Channel Adapter Type 4
		8510	1	Unit Protection
		4701	1	Line Interface Base Type 1
		4714	1	Line Set Type 10
		4650	1	Business Machine Clock
16	3274	C51	1	Control Unit
		6302	1	Communication Adapter
		3701	1	CCITT Interface
		7H0504	1	Arabic Control
		1800	1	Extended Function Store
17	3863	001	2	Modem 2400 bps
		7930	2	Extended Diagnostic Card
		6240	2	Rack Mount Adapter

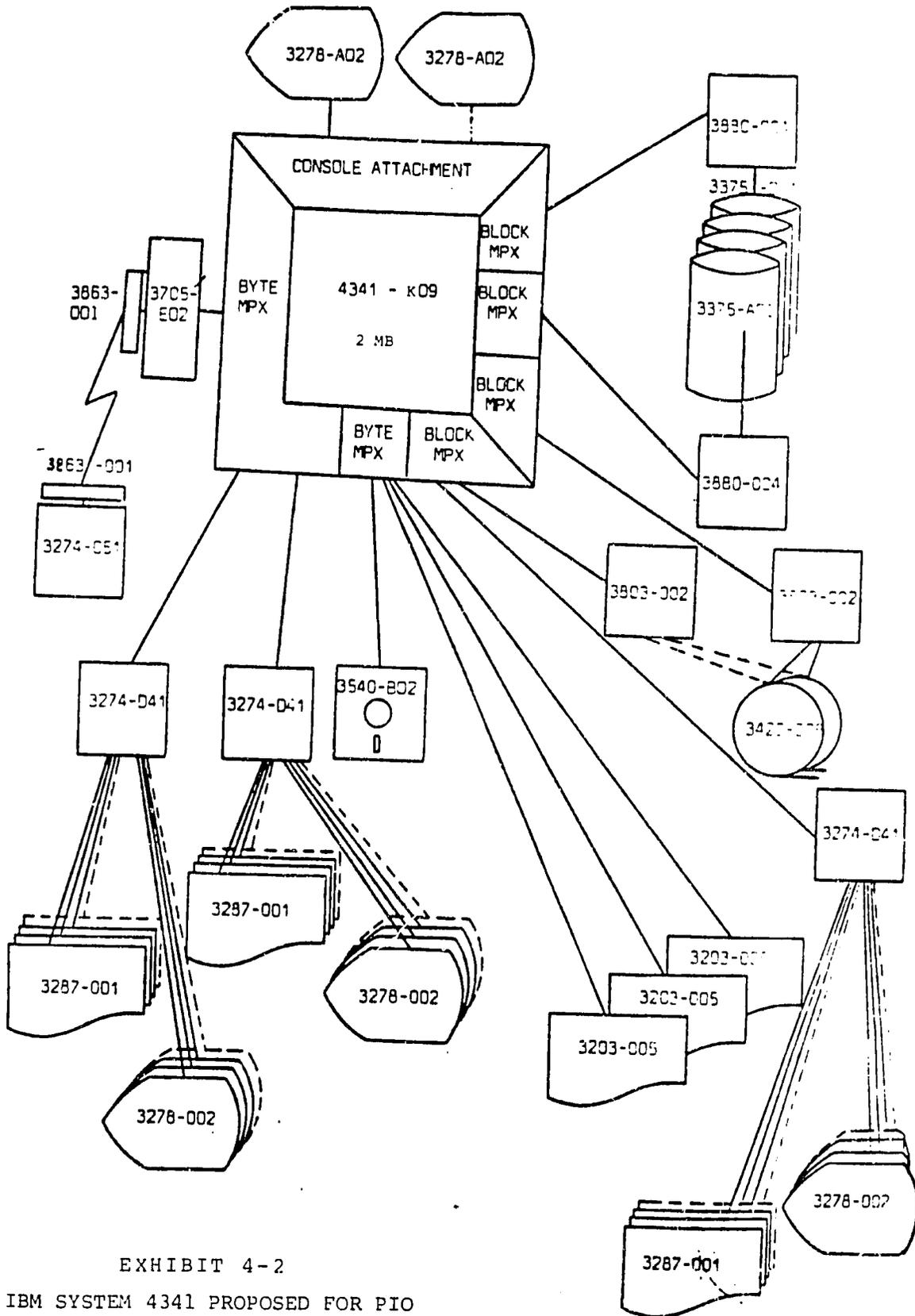


EXHIBIT 4-2
 IBM SYSTEM 4341 PROPOSED FOR PIO
 CONFIGURATION LAYOUT

50

EXHIBIT 4-2 (Continued)
 IBM SYSTEM 4341 FOR PIO
 LIST OF PROPOSED HARDWARE

Item	Machine Type	Machine Mod/Feat.	Qty	D e s c r i p t i o n
01	4341	K09	1	Processor with 4 MB
		1480	1	Book Rack and Cable Holder
		1550	1	Console Table
		1870	1	Block Multiplexer Channels Additional
02	3278	A02	2	Display Console
		4632	2	Console Keyboard
03	3274	D41	3	Control Unit
		7H0504	3	Arabic Control
04	3278	002	40	Display Station 1920 Characters
		4627	40	87-Key Typewriter Keyboard
		7H0300	40	Arabic Display Character Generator
		7H0508	40	Arabic Keyboard
05	3287	001	32	Printer 80 cps
		4110	32	Friction Feed
		4450	32	Forms Stand
		8331	32	3274 Attachment
		8700	32	Variable Width Forms Tractor
		7H0307	32	Arabic Character Generator
06	3880	004	2	Storage Control
07	3375	A01	1	Direct Access Storage & Control
		4951	1	Model 001 Attachment for Model A01
08	3375	B01	2	Direct Access Storage
		4952	2	Model D01 Attachment for Model B01
09	3375	D01	1	Direct Access Storage
10	3803	002	2	Tape Control
		1792	1	Tape Switching
11	3420	008	2	Magnetic Tape Unit
		6425	2	6250/1600 Density

EXHIBIT 4-2 (Continued)
 IBM SYSTEM 4341 FOR PIO
 LIST OF PROPOSED HARDWARE

Item	Machine Type	Machine Mod/Feat.	Qty	D e s c r i p t i o n
12	3203	005	3	Printer 1200 LPM
13	1416	001 Y91358	6 3	Interchangeable Train Arabic Character Set
14	3540	B02	1	Diskette Input/Output

PROPOSED HARDWARE FOR
 REMOTE COMMUNICATIONS

15	3705	E02	1	Communication Controller
		1302	1	Attachment Base Type 2
		1642	1	Communication Scanner Type 2
		1544	1	Channel Adapter Type 4
		8510	1	Unit Protection
		4701	1	Line Interface Base Type 1
		4714	1	Line Set Type 10
		4650	1	Business Machine Clock
16	3274	C51	1	Control Unit
		6302	1	Communication Adapter
		3701	1	CCITT Interface
		7H0504	1	Arabic Control
		1800	1	Extended Function Store
17	3863	001	2	Modem 2400 bps
		7930	2	Extended Diagnostic Card
		6240	2	Rack Mount Adapter

EXHIBIT 4-3

LIST OF PROPOSED SOFTWARE FOR SIO & PIO

ITEM NO.	PROGRAM NO.	DESCRIPTION	
01	5745-030	Disk Operating System/Virtual Storage Extended	"DOS/VSE"
02	5746-XE8	Virtual Storage Extended/Advanced Functions	"VSE/AF"
03	5746-SA1	Virtual Storage Extended/Interactive Problem Control System	"VSE/IPCS"
04	5746-XE3	Virtual Storage Extended/POWER	"VSE/POWER"
05	5746-AM2	Virtual Storage Extended/Virtual Storage Access Method	"VSE/VSAM"
	==6073	Back up restore	
	==6090	Space Management	
06	5746-TS1	Virtual Storage Extended/Interactive Computing and Control Facility	"VSE/ICCF"
07	5748-MSI	Interactive Productivity Facility	"IPF/VSE"
08	5746-XX3	Customer Information Control System	"CICS/DOS/VS"
09	5746-XX1	Data Language / I DOS/VS	"DLI/DOS"
10	5746-XXC	DB/DC Data Dictionary	"DB/DC"
11	5746-XXQ	Data Base Design Aid	"DBDA"
12	5746-RCS	Basic Telecommunication Access Method/Extended Support	"BTAM/ES"
13	5746-CG1	Basic Telecommunication Access Method/System Control Program	"BTAM/SCP"
14	5746-UT3	VSE/Data Interfile Transfer, Testing and Operations Utility	"VSE/DITTO"
15	5748-XXJ	Structured Query Language/Data System	"SQL/DS"
16	5746-SM2	SORT/MERGE	"S/M"

EXHIBIT 4-3

LIST OF PROPOSED SOFTWARE FOR SIO & PIO

ITEM NO.	PROGRAM NO.	DESCRIPTION	
17	5746-AM4	FAST COPY	
18	5746-CB1	DOS/VS COBOL Compiler and Library	"CB1"
19	5746-RG1	Report Program Generator	"RPG II"
20	5736-PL3	DOS PL/I Optimizing Compiler	"PL/I"
21	5798-CFP	Report Performance Analyzer	"CICS PA"
22	5796-PLQ	VSE Performance Tool	"VSE/PT"
23	5746-XX9	Planning, Control, and Decision Evaluation System/Interactive	"PLANCODE I"

PROPOSED SOFTWARE TO SUPPORT REMOTE COMMUNICATIONS

24	5747-CH1	Network Control Program	"NCP"
25	5746-RC3	Advanced Communication Function for VTAM	"ACF/VTAM"
26	5747-CF1	System Support Programs for ACF/VTAM	"ACF/VTAM SCP"
27	5735-XX8	Network Problem Determination Application	"NPDA"
28	5735-XX6	Network Communications Control Facility	"NCCF"
29	5735-XX1	Advanced Communication Function for NCP/VS	"ACF/NCP"
30	5735-XX3	System Support Programs for ACF/NCP/VS	"ACF/NCP SCP"

** Unless specific release is requested, IBM will deliver the last announced release.

54

5. OVERVIEW OF THE PROPOSED AUTOMATED SYSTEM

This Chapter describes the System Network, the features, and the benefits of the target automated system.

5.1 AESIS SYSTEM NETWORK

AESIS is envisioned to be ultimately a nationwide telecommunications network, as illustrated in Exhibit 5-1 following this page; it integrates all local and regional offices and all the social insurance program areas into a comprehensive management control system, for SIO and PIO. Data transmission lines, which will be installed at a future date when the national telecommunications network is established, will connect the remote terminals with the mainframe in a design that allows for two-way communication. Thus, a remote site can enter or retrieve information and make changes in AESIS information. Data entry is enhanced with uniform automated editing, eligibility determination, and coverage contribution and benefit calculation procedures.

The AESIS data resides in an integrated database, depicted in Exhibit 5-2, which is structured so that it relates all individuals with their associated data. In general, the data base allows the individual to enter the system by last name or social insurance number (SIN). Detailed conceptual design of this data base is presented in Chapter 6.

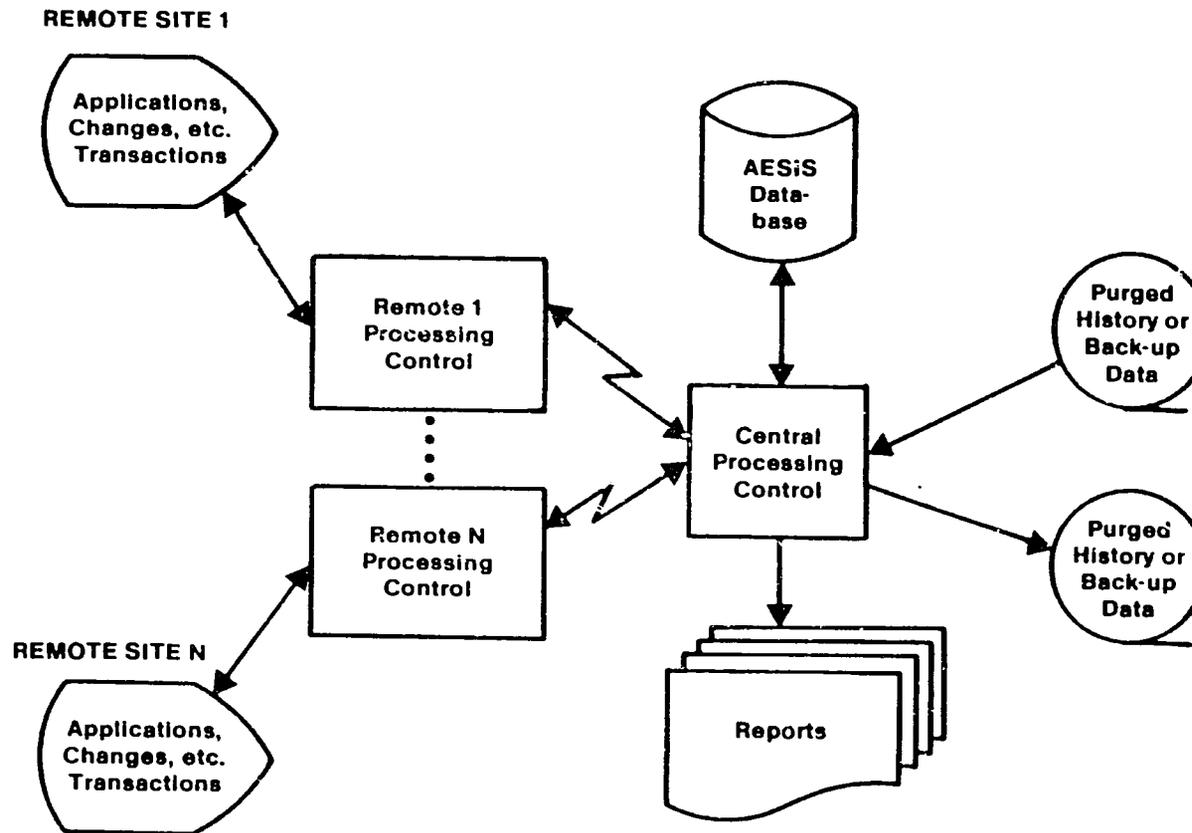
The system produces a diverse set of reports, shown in Exhibit 5-3, which are designed to fulfill the information needs of a variety of individuals and administrative offices, both internal and external to MSI. The reports reflect consolidated information concerning individuals, insureds and employers. Reports are generated on a scheduled or on-demand basis and present numerous categorical mixtures of statistical and management information.

AESIS incorporates all necessary security and data integrity procedures that ensure a reliable and error-free tool for both the SIO/PIO worker and departmental administrators. In addition, the system design allows for adjustment and modification of data due to policy changes, and monitoring of financial conditions.

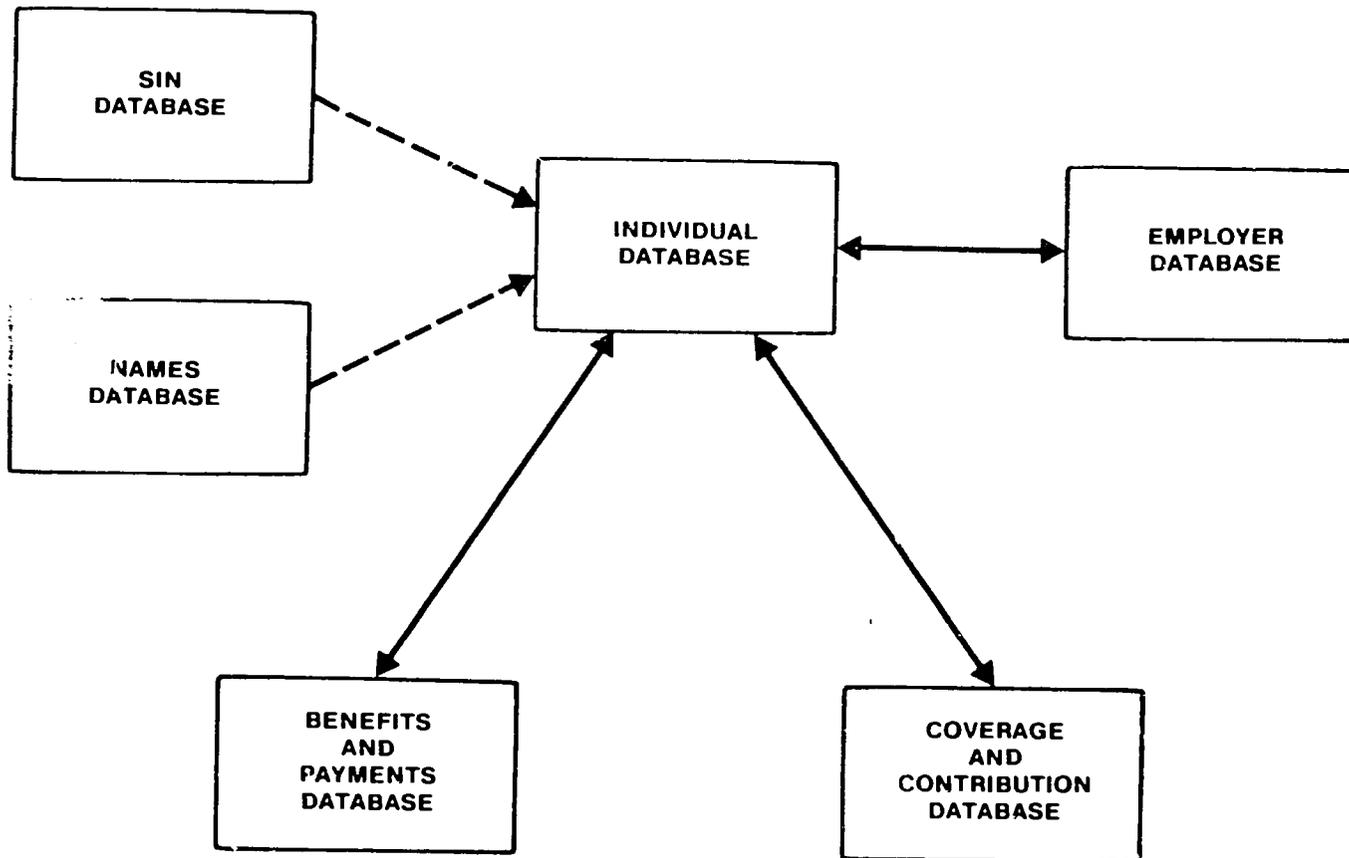
5.2 FEATURES OF AESIS

AESIS is designed to aid MSI in its efforts to provide insurance and pension benefits to eligible insured persons and beneficiaries. Toward that end, the design of AESIS has been conceptualized to include several interrelated features, which are highlighted below.

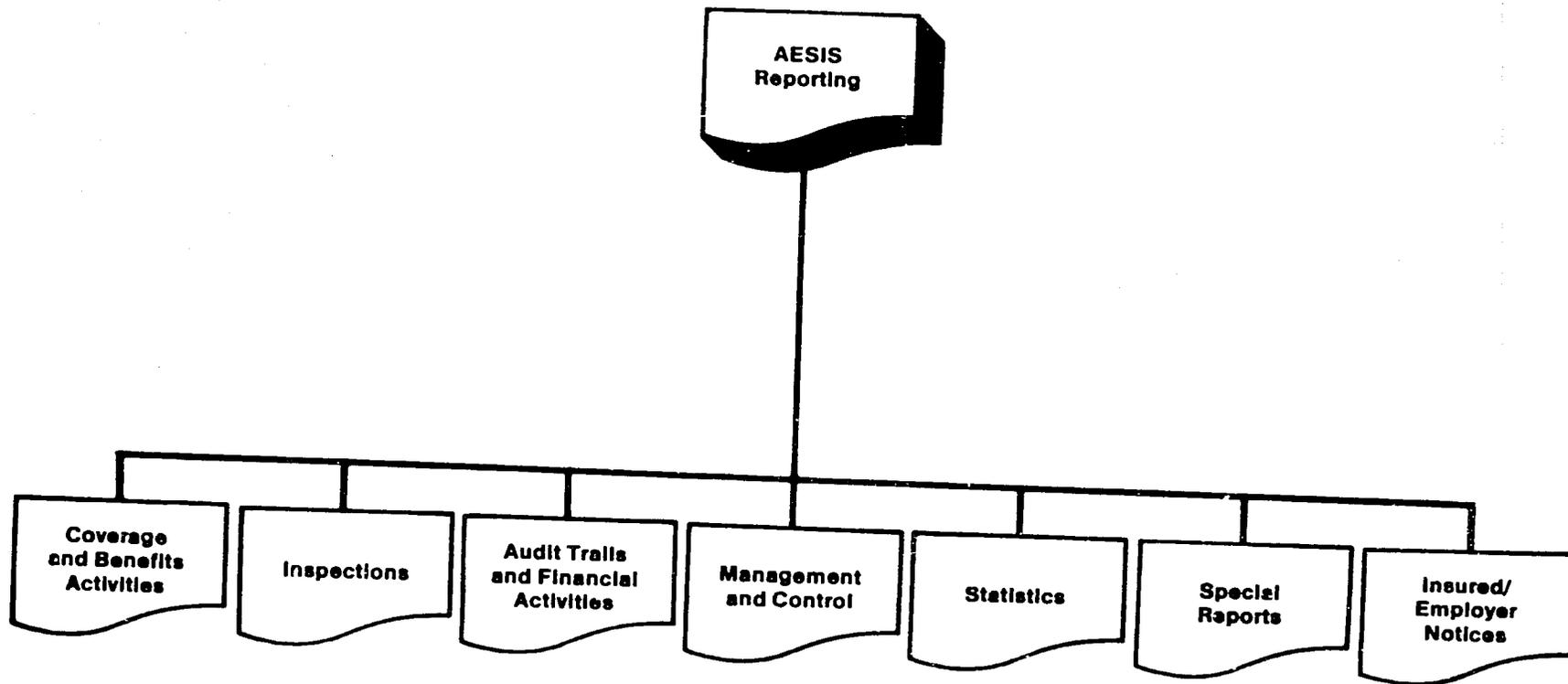
**EXHIBIT 5-1
OVERVIEW OF THE PROPOSED AESIS ENVIRONMENT**



**EXHIBIT 5-2
AESIS DATA BASE STRUCTURE OVERVIEW**



**EXHIBIT 5-3
FEATURES OF AESIS REPORTING**



o Integrated Database

AESIS maintains comprehensive data on all employers, individuals and families who are currently, or have previously, participated in any insurance program administered by MSI.

o Data Capture

AESIS will capture individuals and employers data through terminals. All data will be edited and verified. The "clean" data will update the database, the erroneous data being written to a pending file for later correction. Each transaction that updates the database will generate an audit trail for purposes of traceability.

o Registration

AESIS will record the registration of individuals and, after edit and verification of registration data, will generate a unique social insurance number (SIN), and a physical social insurance identification card, establishing an initial record of the person.

o Automatic Eligibility Determination

Using coverage policy tables, AESIS will automatically determine insured eligibility for the applicable social insurance law. Benefit computations will be performed for eligible insureds. Ineligible individuals will be notified of the reason(s) for denial.

o Data Inquiry

All authorized personnel will be able to inquire into case information in an automated mode. Insured or employer name and social insurance number will be the keys for such accesses.

o Records Management

AESIS will, on a regular basis, produce reports of individuals or employers records that require review according to MSI policy. Such records will be identified and appropriate notices will be produced.

o Benefit Delivery

As a result of application processing and eligibility determination, AESIS will internally authorize and generate and track benefit payments to individuals, banks, and post offices.

o Management Reporting

A variety of management reports will be produced for MSI management, in accordance with defined reporting requirements. These reports will be provided on a regular or ad-hoc basis as prescribed. Report types include:

- Records analysis by law
- Statistics for MSI-wide programs reporting
- On-demand requests
- Reports of insureds' characteristics (demographic case information)
- Quality control reports.

o Quality Control

Active records and actions will be selected according to the current needs. Summary information will be put on a temporary file, to be updated later with the results of the inspection.

o Interfaces

AESIS will provide for an interface between SIO and PIO systems for the purposes of verifying eligibility data and controlling information transfer.

o Security

An essential feature of AESIS is the security of all data. Only authorized personnel will be able to access the data base. Security features include:

- Sign-on procedures for using AESIS terminals
- Database lock-out of those personnel without a "need to know"
- Special rules for updating.

5.3 BENEFITS OF AESIS

Implementation of the AESIS system provides the following benefits:

- o More equitable and efficient treatment of individuals and employers
 - Registration of individuals on a nationally based scheme
 - Uniform and consistent application of eligibility, benefit, contribution and collection policy and regulations

- Timely and accurate authorization and payment of benefits
- Improved handling of application processing and information requests
- o Error reduction
 - Limited subjective judgments or manual calculations on the part of MSI workers
 - Accurate calculation of benefits
 - Identification of sources of errors as a basis for worker training
- o Improved management
 - Increased fraud-detection capability
 - Timely administration of reviews and pending applications
 - Accurate and efficient control of contributions and collections
- o Reduced administrative costs
 - Simplification of processing procedures and reduction of paperwork
 - Elimination of massive file storage facilities
 - Reduction of workload due to automated reporting
- o Improved flexibility and adaptability
 - Timely incorporation of new policy, policy changes, or other eligibility and payment criteria
 - Timely production of on-demand reports
 - Ability to expand and include new processes and/or interfaces
- o Improved reporting
 - Accurate, timely and consistent reporting
 - Ability to provide diverse types of reports
 - Comprehensive departmental statistics at all levels in SIO and PIO.

6. AESIS SYSTEM CONCEPTUAL DESIGN

The conceptual design of the AESIS system has been developed based on an analysis of stated objectives, system requirements, and extensive general and detailed analysis of the target system. The AESIS system consists of five (5) separate but interrelated systems. These systems, depicted in Exhibit 6-1 following this page, are identified below with a brief statement of purpose:

- o Registration System

Records the registration of individuals and, after extensive edit and duplication checks of the data, will generate a unique Social Insurance Number (SIN) and a physical social insurance card, and establish an initial record of the person. This system also assigns Business Insurance Numbers (BIN) and establishes initial records for the employers.

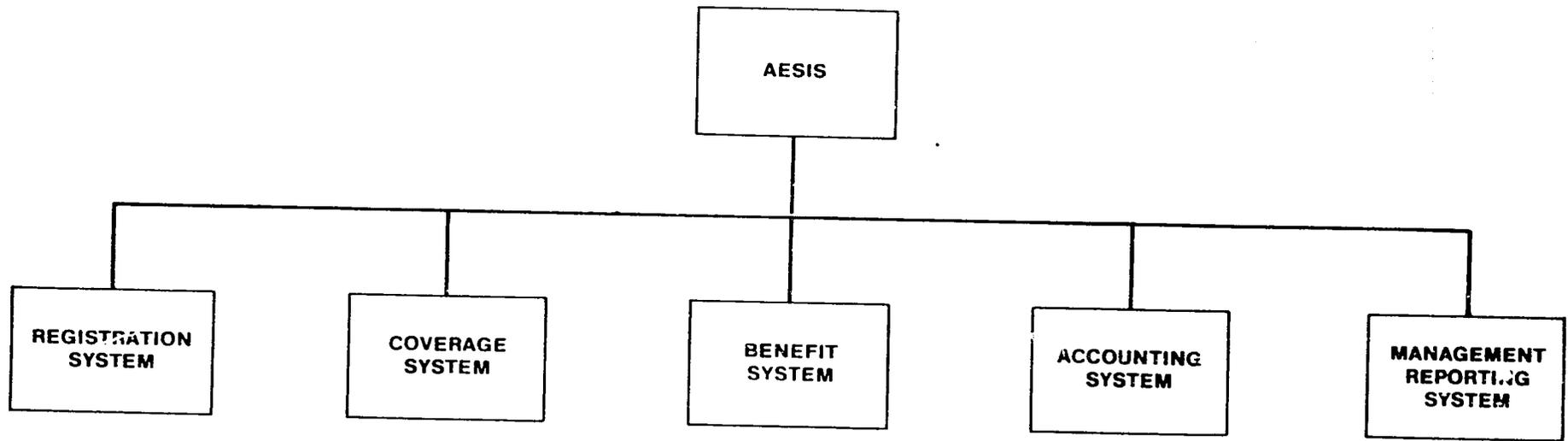
- o Coverage System

Uses eligibility criteria under the applicable law to establish new coverage records for registered individuals, and determines contribution amounts and periods. The coverage system also uses extensive edit and verification processes to validate all transactions before updating the data bases. Numerous inquiry screens and reports will be generated to provide MSI management personnel with detailed operational information concerning all activities of the insured individuals and the contribution of each under the applicable law.

- o Benefit System

Uses eligibility and edit criteria to check all benefit applications input data against the data base to determine duplications and invalid situations. As a result of these processes, the benefit system will generate or update the data base, then will internally determine amount of benefits, authorize, generate and track benefit payments to individuals, banks, and post offices. The system will also provide inquiry capabilities and will produce numerous operational reports of all activities of the benefits programs under each of the applicable laws.

**EXHIBIT 6-1
THE AESIS SYSTEM COMPOSITION**



6-2

16

- o Accounting_System

Initially, the accounting system will provide MSI management with summaries of all monetary transactions throughout the system, both for Coverage Contributions and Benefits Payments. At a later date, the accounting system will handle all accounting functions of MSI (i.e., expense orders, journal entries, payroll, investment activities, inventory, etc.).

The following sections present and describe the functions of each of the five AESIS systems, as well as identify and group the numerous subsystems, within each, that have been identified.

6.1 THE REGISTRATION SYSTEM

The Registration System, depicted in Exhibit 6-2, is made up of two distinct subsystems. The first is the Individual Registration Subsystem and the second is the Business Registration Subsystem. The following is a general description of each of these two subsystems.

6.1.1 INDIVIDUAL REGISTRATION SUBSYSTEM

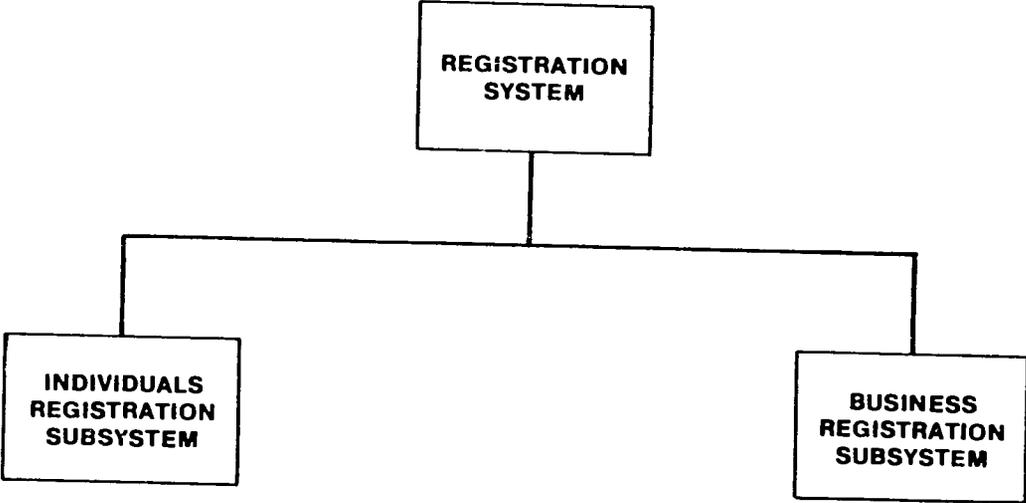
The main function of this subsystem is to assign national social insurance numbers (SIN) for all the individuals that will be affected by the AESIS system, produce SIN identification cards, and establish an initial record on the data base for each individual. Individuals who will apply for registration could be categorized as follows:

- o Insured individuals (working individuals)
- o Beneficiaries (to receive insurance benefits)
- o Dependents (of working individuals).

This subsystem is made up of the eight processing functions presented in Exhibit 6-3. These functions are as follows:

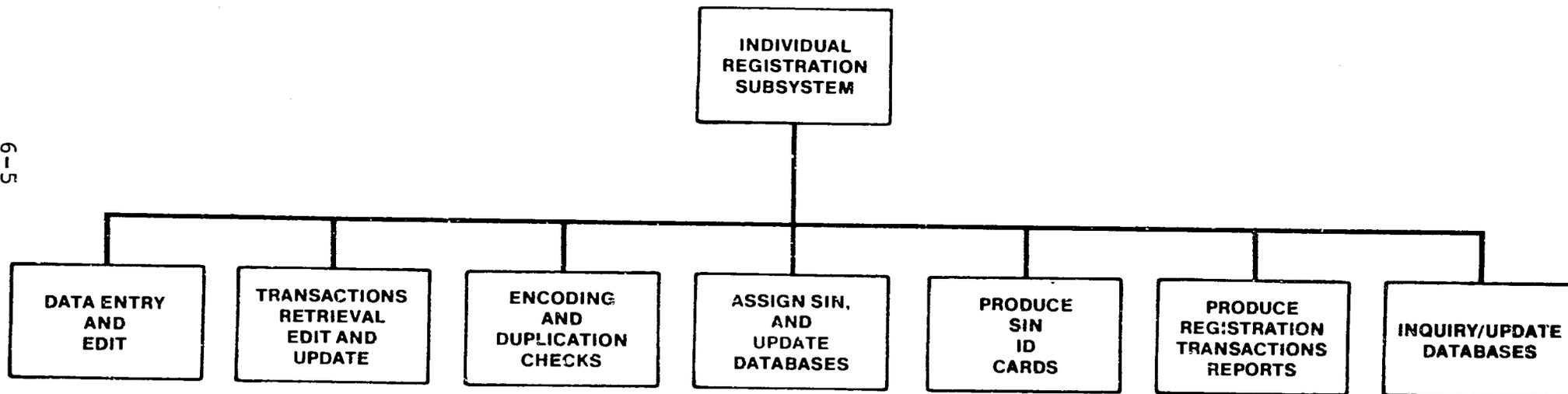
- o Data Entry and Edit -- Edits all input registration transactions for valid and complete applications and places only the valid transactions in the registration transactions files for later processing. Only very basic edits will be performed, such as editing the names, checking for blanks, checking for codes within limits or prespecified tables, etc. Items not passing such edits will be displayed for correction on re-entry.
- o Transactions Retrieval, Edit and Update -- Accepts and processes incoming records from the registration transaction file and validates such data against legal documents (i.e., birth certificates, police ID

**EXHIBIT 6-2
THE REGISTRATION SYSTEM**



9

**EXHIBIT 6-3
INDIVIDUALS REGISTRATION SUBSYSTEM FUNCTIONAL CHART**



6-5

6/6

cards, etc.). This function will be performed by supervisor personnel and is needed for further verification of the registration date.

- o Encoding and Duplication Check -- After the initial editing and supervisor verification, this process will check valid transactions against the data base to determine if there are any duplications. All duplicate individual records will be flagged on the registration transactions file for later inspection procedures.

Before a SIN is assigned to an individual, the encoding and duplication check process must take place. This process depends on certain data elements that must be gathered from every single individual and must be present on official documents such as birth certificates. These elements could be grouped as follows:

- Full Name - AESIS will use all names belonging to an individual up to a maximum of three names (e.g., first name, father's name, and grandfather's name).
- Sex Code - for male individuals we will use the code (1), and for female individuals we will use the code (2).
- Birth Date - this data element is broken down into the day, month, and the year of birth. If birth date is not available, especially for the very old generation, we will rely on a doctor certificate or assign 9999999 instead.
- Place of Birth - this is the two character code number of the Governorate which the individual was born. There are currently 27 Governorates in Egypt. Governorate is usually recorded on the birth certificate when individuals are first born. For individuals who are born outside of Egypt, we will use the foreign country code.
- Assign SIN and Update Data Bases - Transactions that passed all of the edit and duplication verification processes will be assigned an SIN and will be used to update the databases, thereby establishing an initial record on the data base for each individual.

The national SIN number will be unique for each individual and will be nine digits long (8 digits for the sequential number + 1 check digit). The first one to register on the system will have SIN 000-000-01N, and hypothetically, the last one to

register on the system will have SIN 999-999-99N, whereby (N) is the value of the check digit, which ranges from 0 to 9.

If an individual gets assigned a SIN and later on changes one of his/her basic data elements that was used in the encoding process to assign the SIN, the system will do the following:

- Change the data element.
 - Keep the SIN exactly the same.
 - Insert a character (flag) to indicate that such change has occurred (example: Blank = No change and C = Changed).
- o Produce SIN Identification Cards - This process will result in the issuance of National Social Insurance Identification cards to all individuals in Egypt. Such cards will be printed, in a batch mode, on imbossed plastic cards to insure durability and long lasting. This will cut down on the efforts spent in reissuing ID cards due to damage. It will also prevent individuals from changing information presented on the card, especially if preprinted cards with MSI's logo in the background are used.

The Social Insurance ID Cards will only include the following information on the front:

- The Social Insurance Number
- The individual's full name

The back of the card will include basic instructions to the individuals (i.e., what to do in case of loss of card).

- o Produce Registration Transactions Reports - All registration transactions whether processed or not processed will be organized and printed on daily activity reports to be used by management and supervision personnel.
- o Inquiry/Update Databases - This program will access the data base by the SIN key or name by to display inquiry data and update the individual data on the data bases.

6.1.2 BUSINESS REGISTRATION SUBSYSTEM

This subsystem functions in basically the same way as the individual registration subsystem, but it only deals with employers (i.e., Government Ministries or Agencies, Public Companies, Private Sector Companies, etc.). The subsystem

accepts business registration data, validates it, and establishes initial records for each employer on the employers data base. One of the essential outputs of this subsystem is the Business Insurance Number Certificates that will be used to monitor the activities of the employer, their employees and the amounts of Contribution for each.

6.2 THE COVERAGE SYSTEM

The Coverage System is made up of ten subsystems as shown in Exhibit 6-4, following this page. The breakdown of this system in such a fashion, was necessary to modularize the entire application according to the four distinct laws presented previously in Chapter 2.

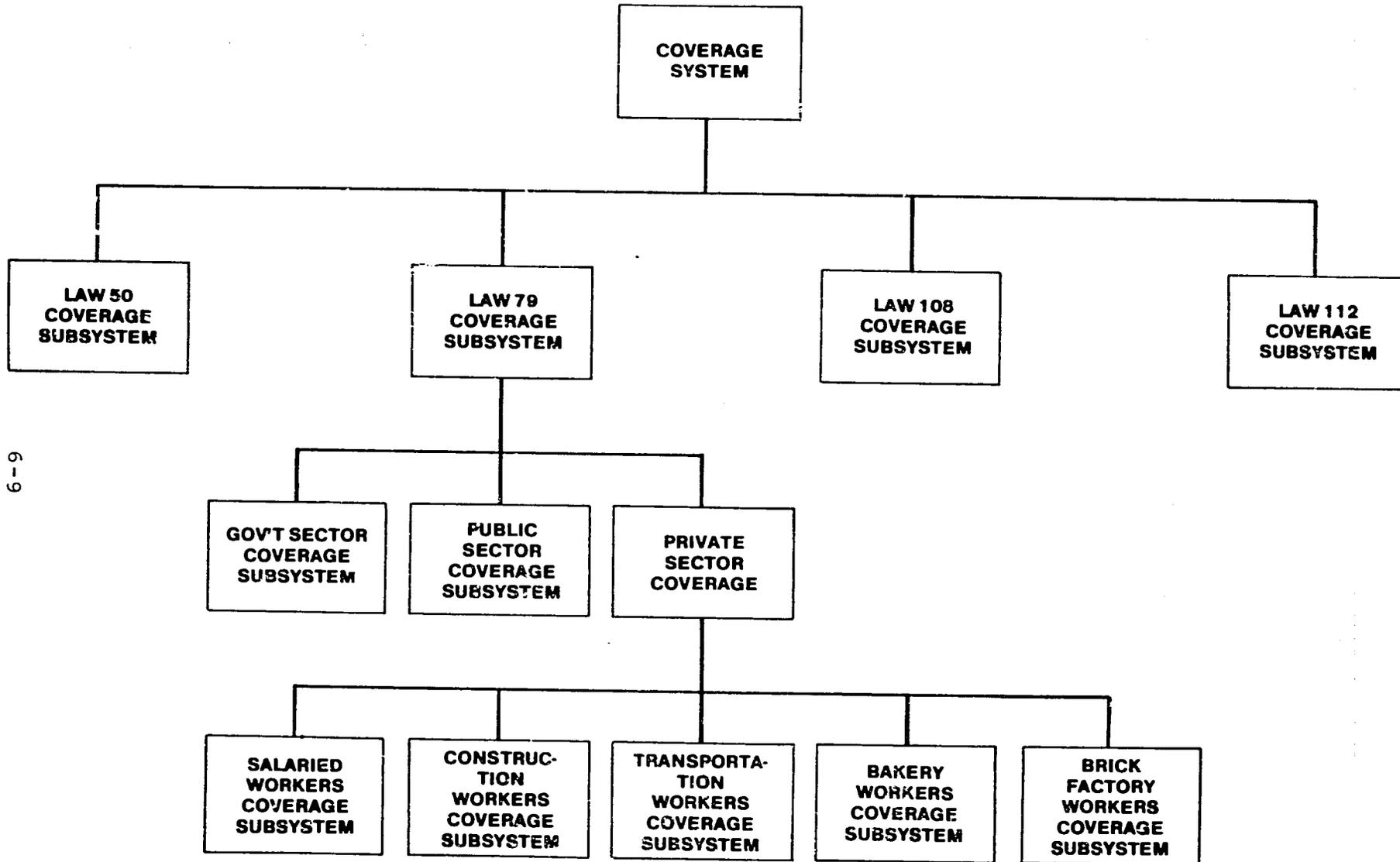
Each subsystem and its associated programs will not depend upon other subsystems, although they use the same data base; so, when there is a change in one, and only one law, only relevant programs will be modified without any effect on the rest of the programs that belong to the other laws.

Also, for the purpose of modularization and ease of system use on the part of the AESIS users, the system will be menu-driven so a single user will not have to understand and operate the entire system. Presentation charts for such menus are depicted in Exhibit 6-5.

There are some procedural and functional requirements for each of the subsystems, as follows:

- o Central to this approach must be timeliness of processing and the collection of accurate data. In addition, adequate back-up capability is critical to ensure that both manual and automated procedures can continue uninterrupted in the event of lost computer power.
- o The Coverage Application and Change Processes encompass all transactions that directly impact the AESIS database as a result of processing new applications and employment status changes. This includes functions necessary to accept transactions initiated from each remote terminal site, record coverage applications, process eligibility determinations, update the AESIS Coverage database at the central computer, and ultimately transmit the results back to the originating site.
- o All input transactions must be edited for valid and complete data; invalid or erroneous transactions must be placed on pending files.
- o After initial editing, inputs must be checked against the database to determine duplication of coverage, often invalid situations, etc.

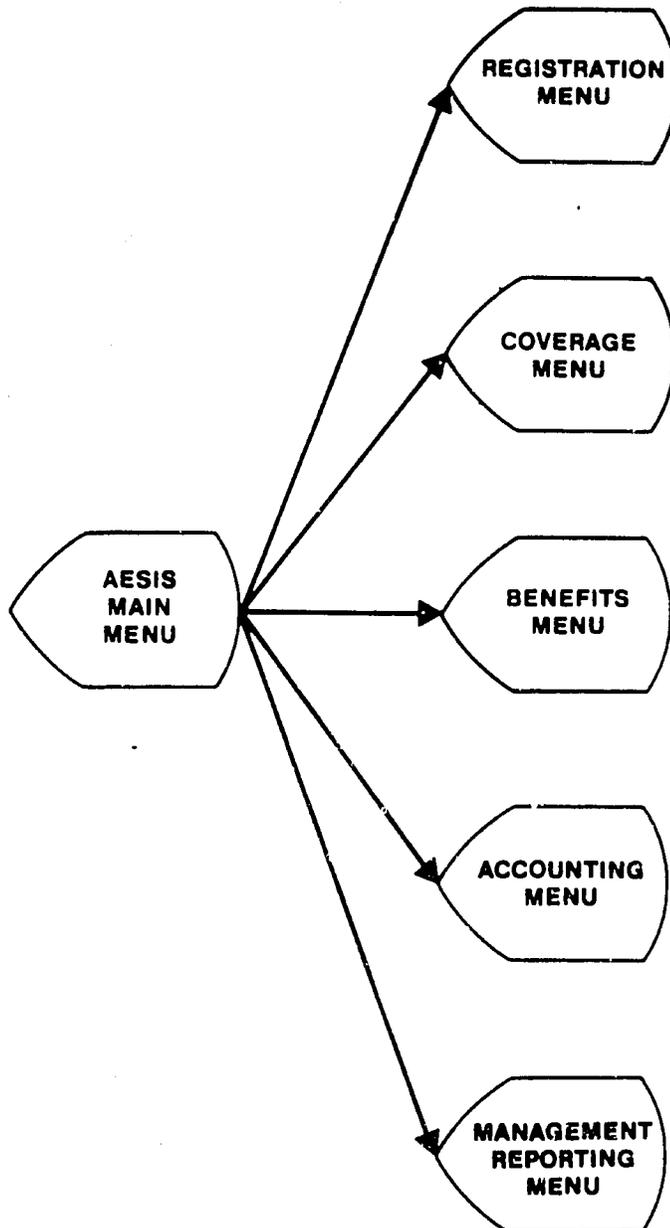
**EXHIBIT 6-4
THE COVERAGE SYSTEM**



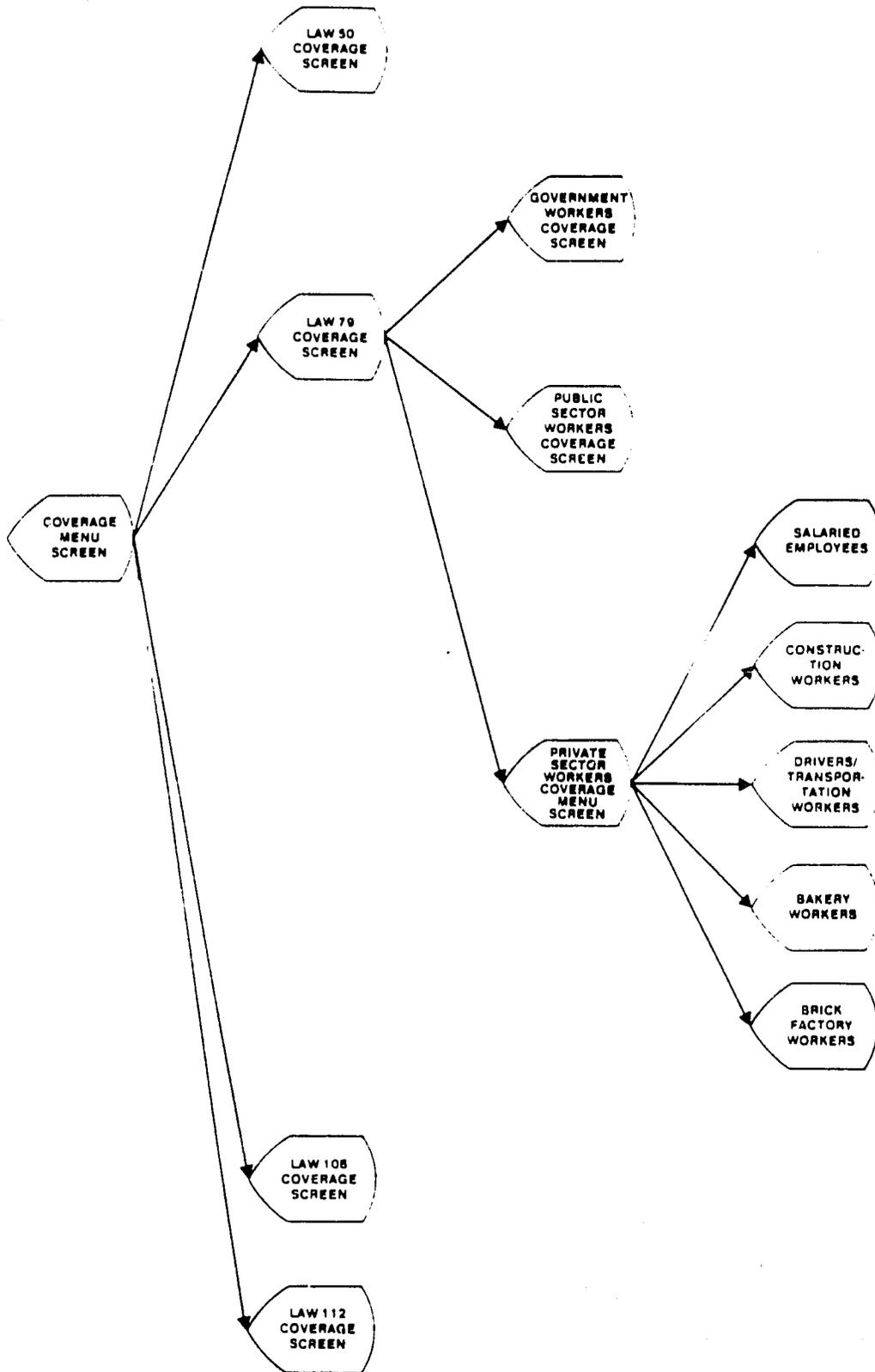
6-9

21

**EXHIBIT 8-5
AESIS MAIN MENUS**



**EXHIBIT 6-5 (CONT'D)
COVERAGE MENU SYSTEM SCREENS**

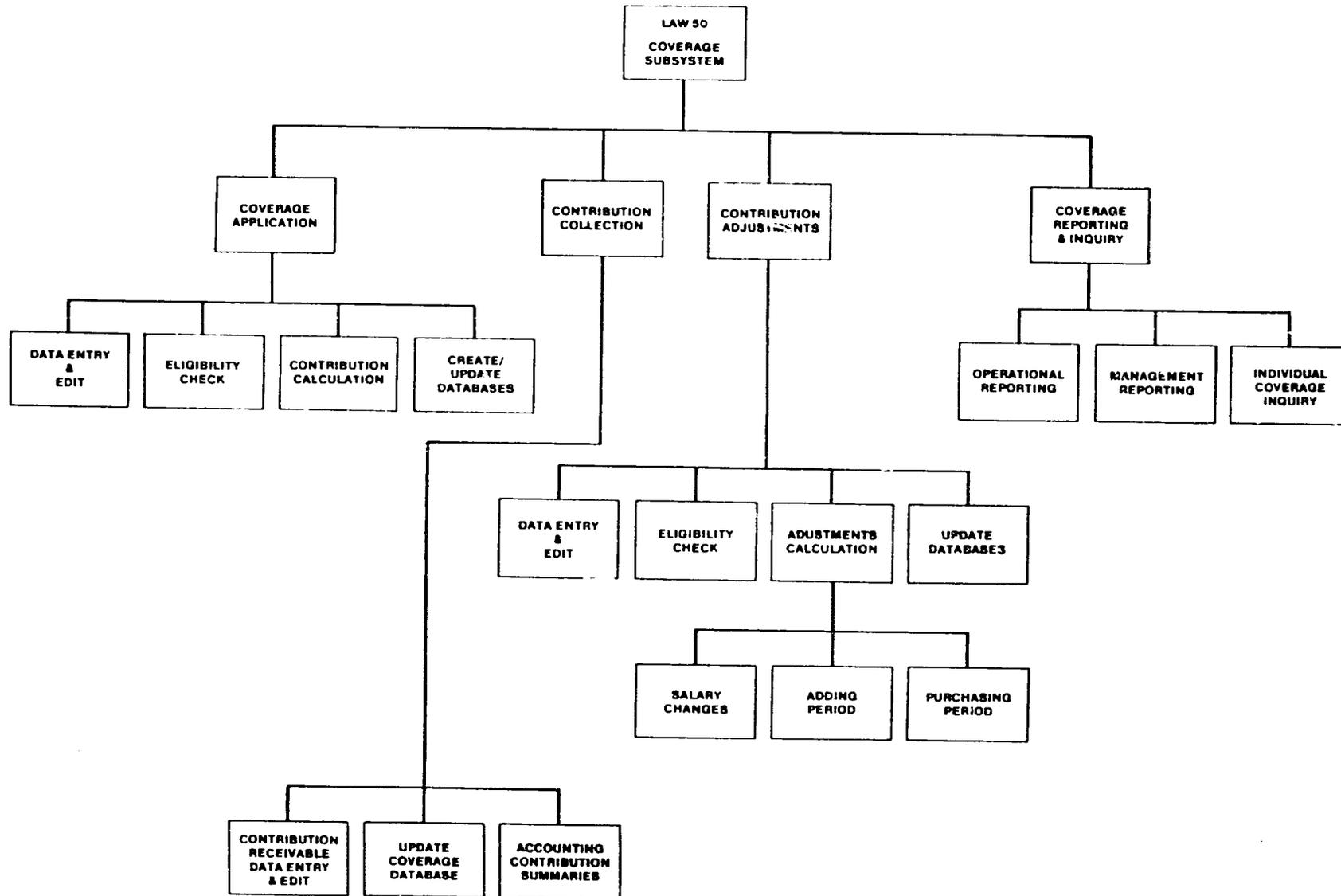


- o Use eligibility criteria to establish new records, determine amounts to be collected, contribution periods, etc.
- o Accept and process incoming corrections for "suspended" records.
- o Provide reporting files by type, of all inputs, plus internal calculations.
- o All coverage application and change transactions are entered at the central computer and the remote terminal locations.
- o Remote terminal control formats the data entry screens. These screens will be in a format similar to the application or change forms completed by the applicant or worker.
- o All transaction data is transmitted to the central site through the system teleprocessing monitor.
- o Transactions are received at the central site under telecommunications control, and are placed on input queue files based on type of transaction. Thus, data can be processed based on priority of transaction, i.e., pending applications have a higher priority than status changes.
- o Transaction data is initially checked for edit errors, with erroneous transactions automatically placed on a suspense file for later correction and processing.
- o Applications and employment status change data are checked for necessary verifications based on the program area requirements.
- o Data that has passed all edits and verification checks is processed through comprehensive eligibility determination checks, through the evaluation of the data against program policy rules; eligible individuals will have relevant contribution amounts computed.
- o The AESIS data base will be updated with the results of the application or status change as well as the eligibility determination results.
- o All edit, verification, and eligibility results are formatted onto output response messages that are placed on output queue files at the central site based on type of transaction.

- o The remote terminal sites can later request the results of eligibility processing and the output response messages are routed to the terminal under telecommunications control.

All functional charts for each of the ten subsystems are presented in Exhibits 6-6 through Exhibit 6-13 following this page. Each chart presents the major function that will be processed in order to track an individual from the moment he or she starts a working career, and the social insurance contribution that each must pay to MSI until the date he or she requests benefits from the system. The end result will be a completed worker/contribution history of every single insured individual in Egypt. Such history information will be used later on in determining how much and for how long the individual or his beneficiary will receive when applying for benefits.

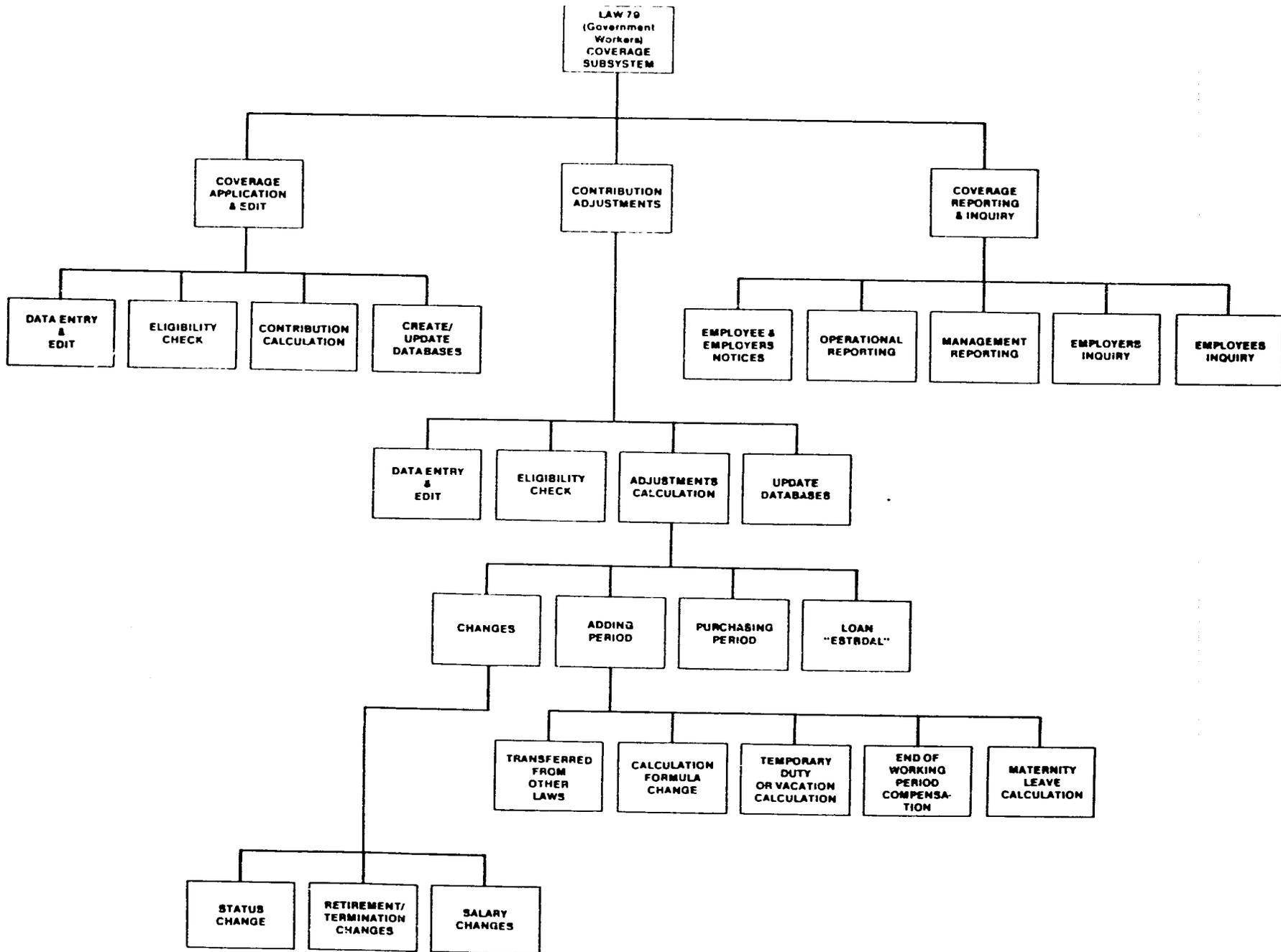
EXHIBIT 6-6 LAW 50 COVERAGE SUBSYSTEM FUNCTIONAL CHART



6-14

✓

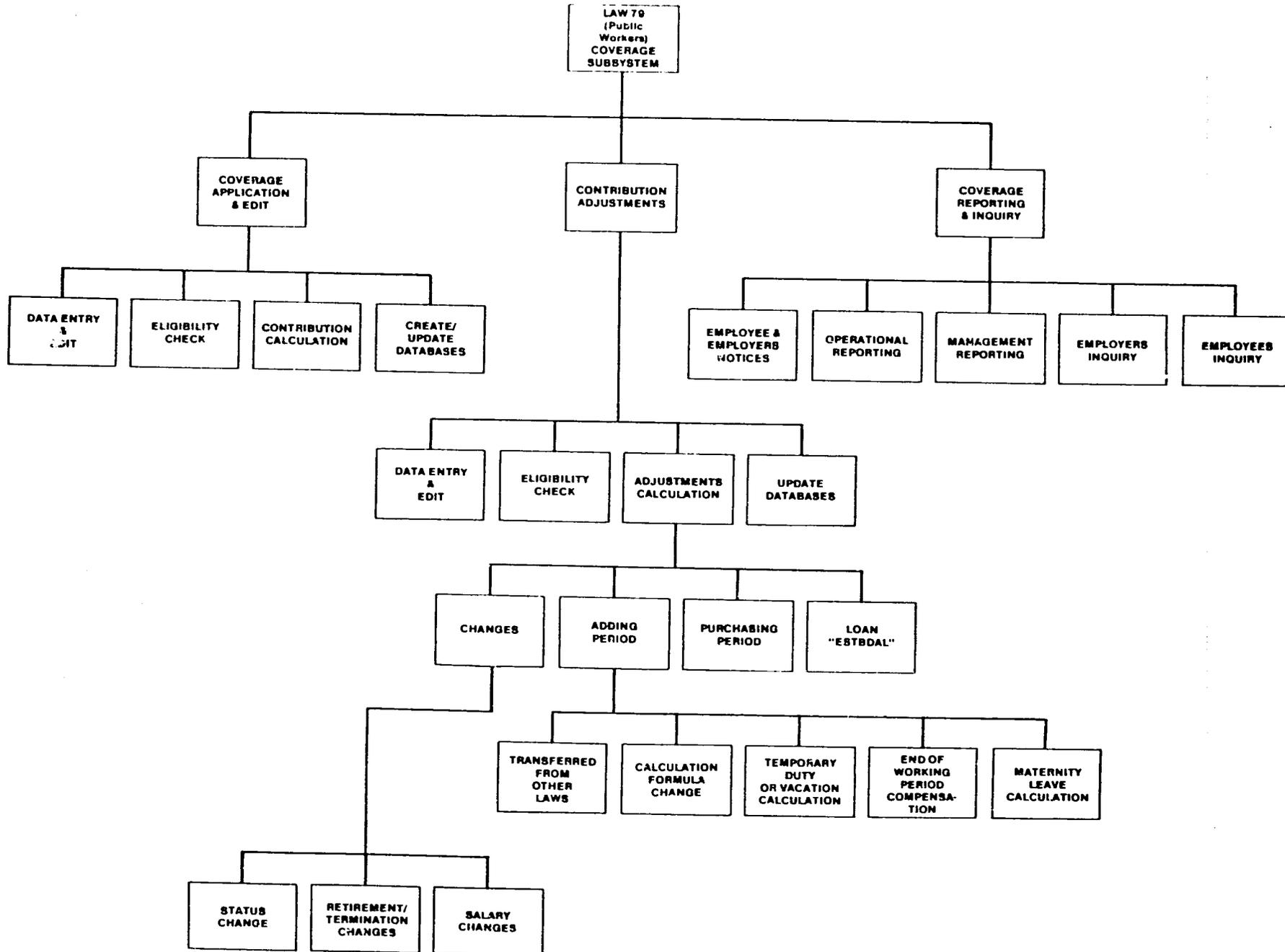
**EXHIBIT 6-7
LAW 79 (GOVERNMENT WORKERS)-COVERAGE SUBSYSTEM
FUNCTIONAL CHART**



6-15

76

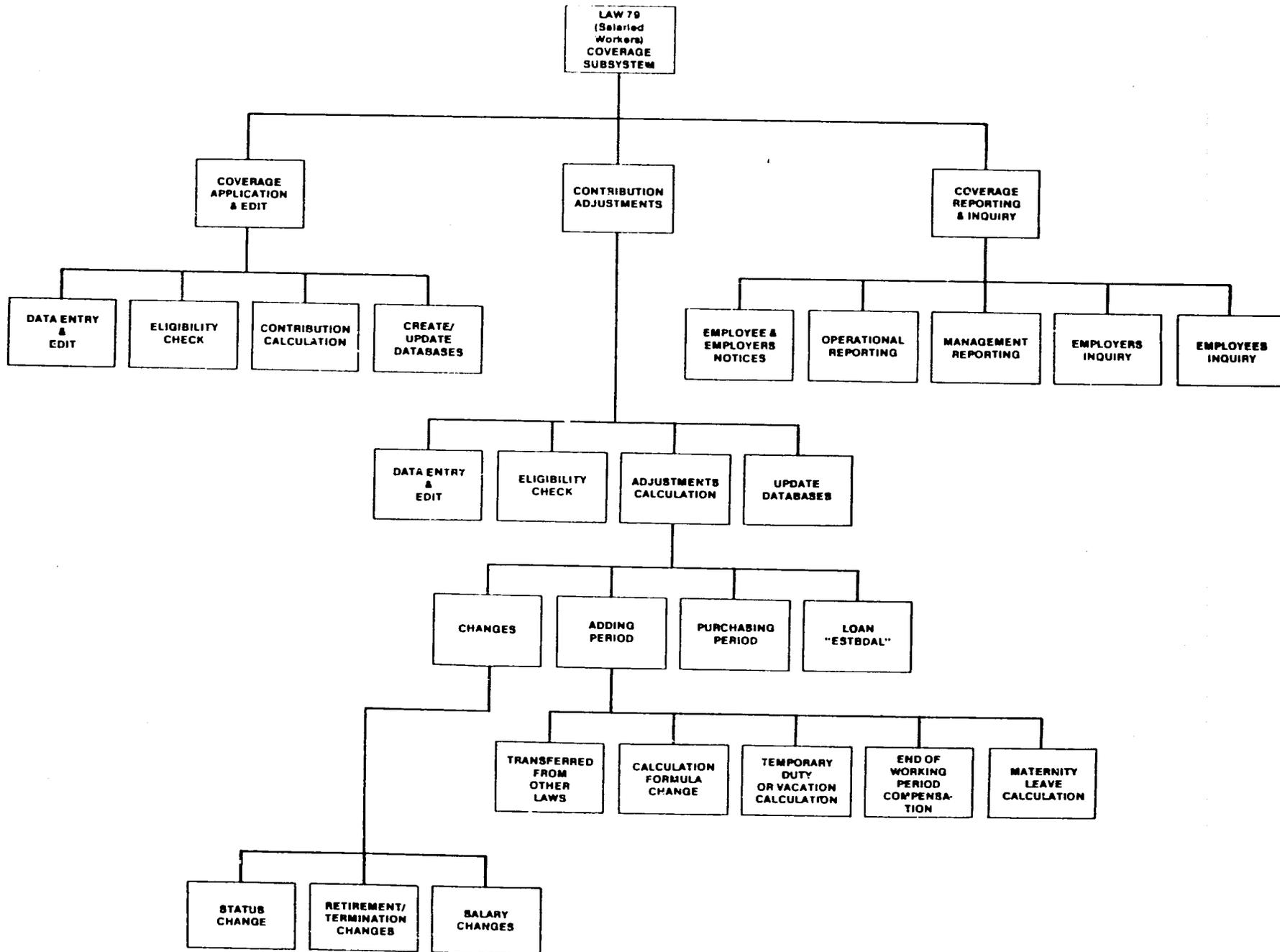
EXHIBIT 6-8 LAW 79 (PUBLIC WORKERS)-COVERAGE SUBSYSTEM FUNCTIONAL CHART



6-16

27

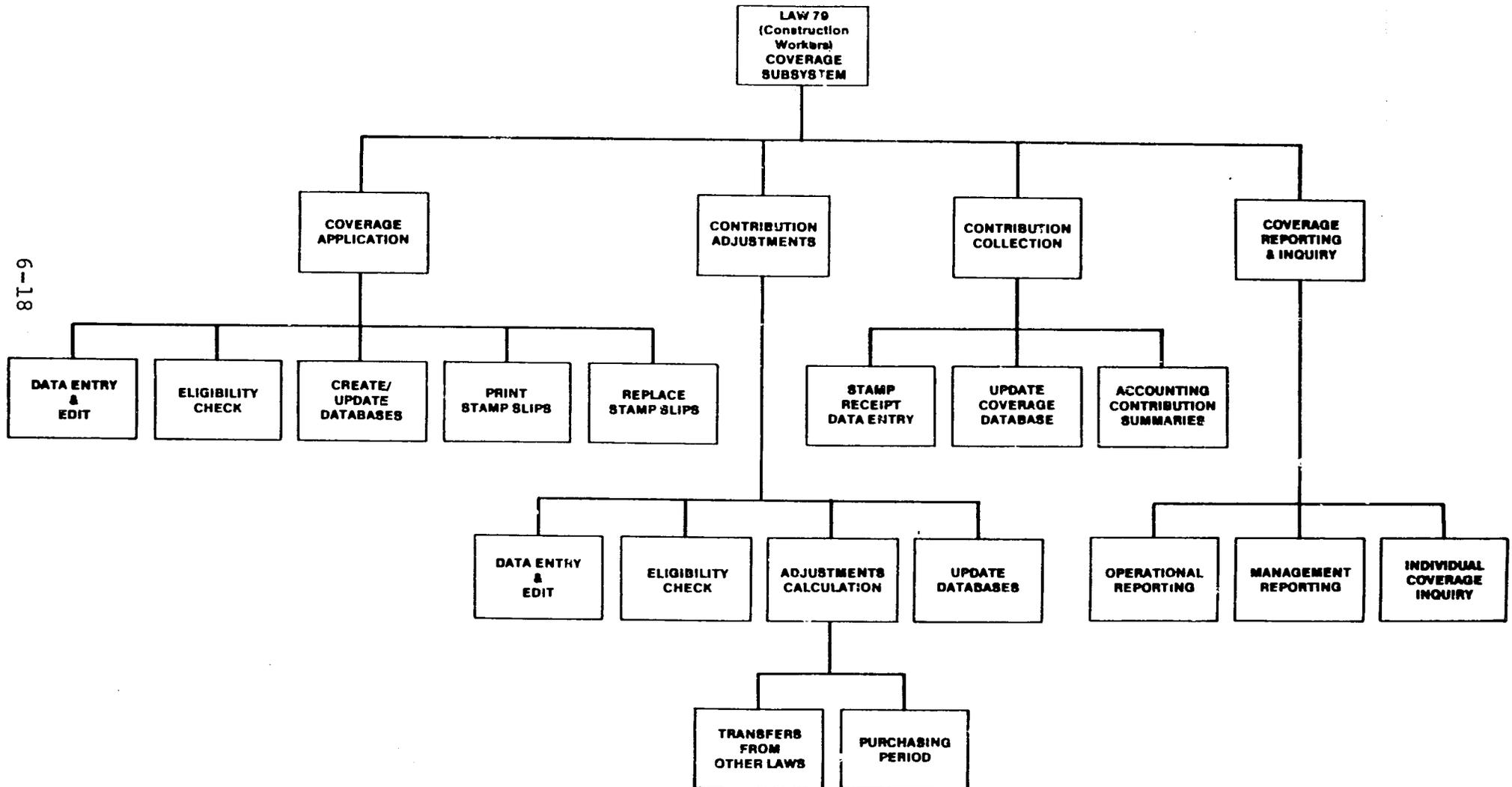
**EXHIBIT 6-9
LAW 79 (PRIVATE SECTOR-SALARIED WORKERS) COVERAGE
SUBSYSTEM FUNCTIONAL CHART**



6-17

AP

**EXHIBIT 6-10
LAW 79 (PRIVATE SECTOR-CONSTRUCTION WORKERS) COVERAGE
SUBSYSTEM FUNCTIONAL CHART**

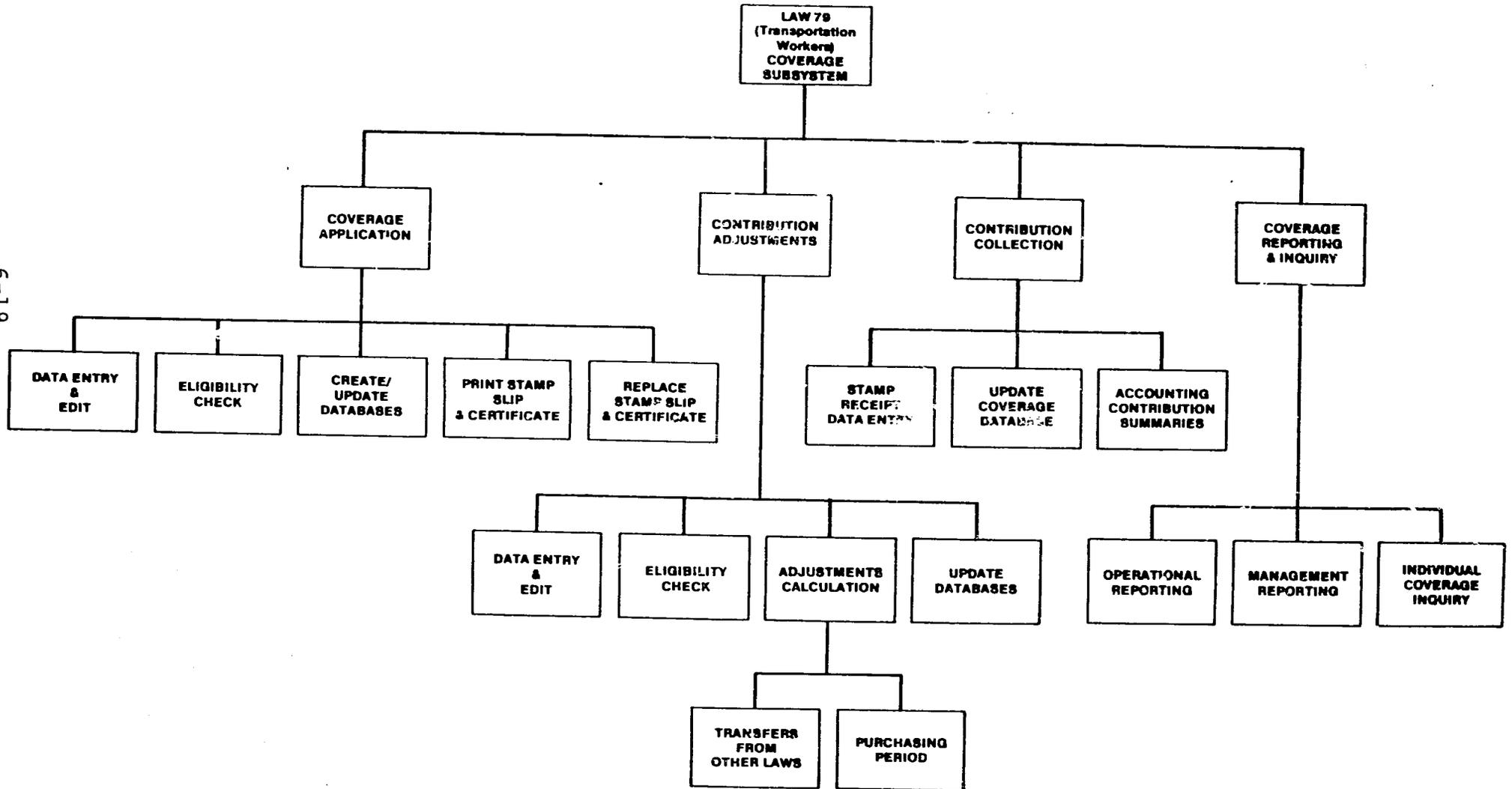


6-18

179

**EXHIBIT 6-11
LAW 79 (PRIVATE SECTOR-TRANSPORTATION WORKERS) COVERAGE
SUBSYSTEM FUNCTIONAL CHART**

6-19



10

**EXHIBIT 6-12
LAW 108 COVERAGE SUBSYSTEM FUNCTIONAL CHART**

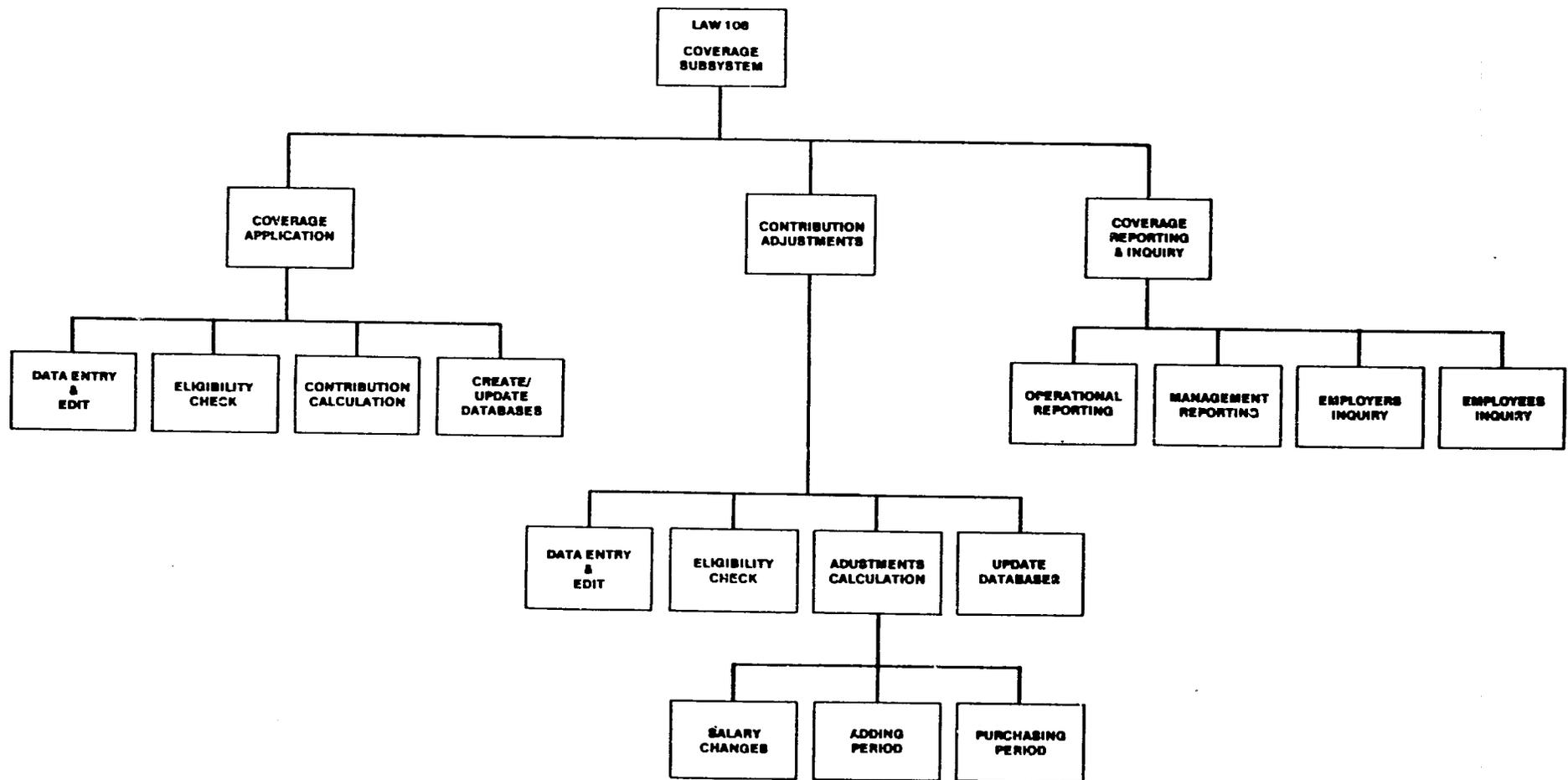
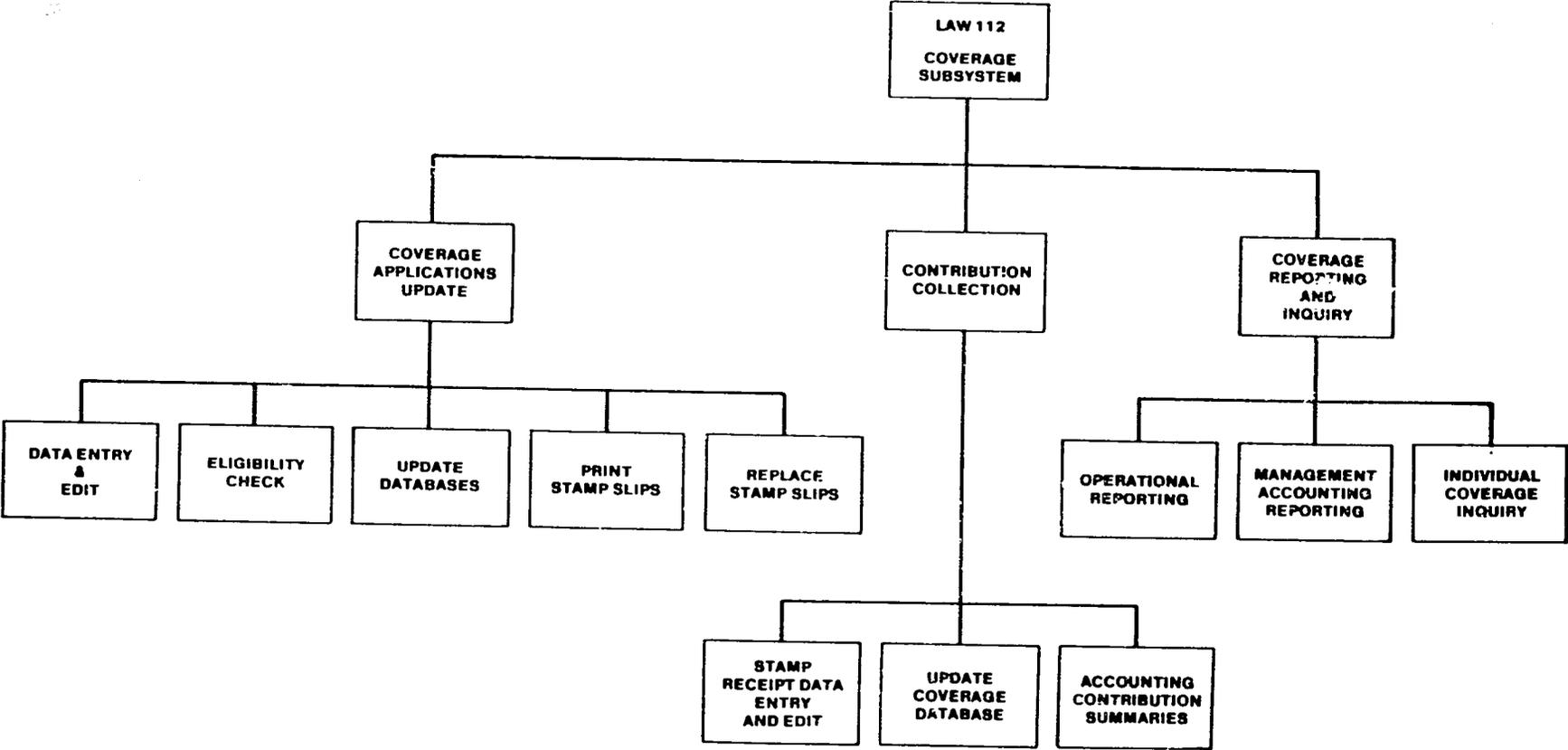


EXHIBIT 6-13
LAW 112-COVERAGE SUBSYSTEM FUNCTIONAL CHART



6-21

63V

6.3 THE BENEFITS SYSTEM

The benefits system is also made up of ten subsystems as shown in Exhibit 6-14, following this page. Using the same concept of the Coverage Subsystem, this system has been broken down in such a fashion to modularize the entire application according to the four distinct social insurance laws.

Each subsystem and its associated program will not depend upon other subsystems, although they will use the same data base; so, when there is a change in one law, only relevant programs will be modified, without any effect on the rest of the programs belonging to the other laws.

As was presented in the Coverage System, the benefits system is also menu-driven; this is presented in Exhibit 6-15. All procedural and functional requirements of the benefits subsystem are the same as what was presented previously in the Coverage System. Functional charts for each of these ten subsystems are presented in Exhibit 6-16 through Exhibit 6-24.

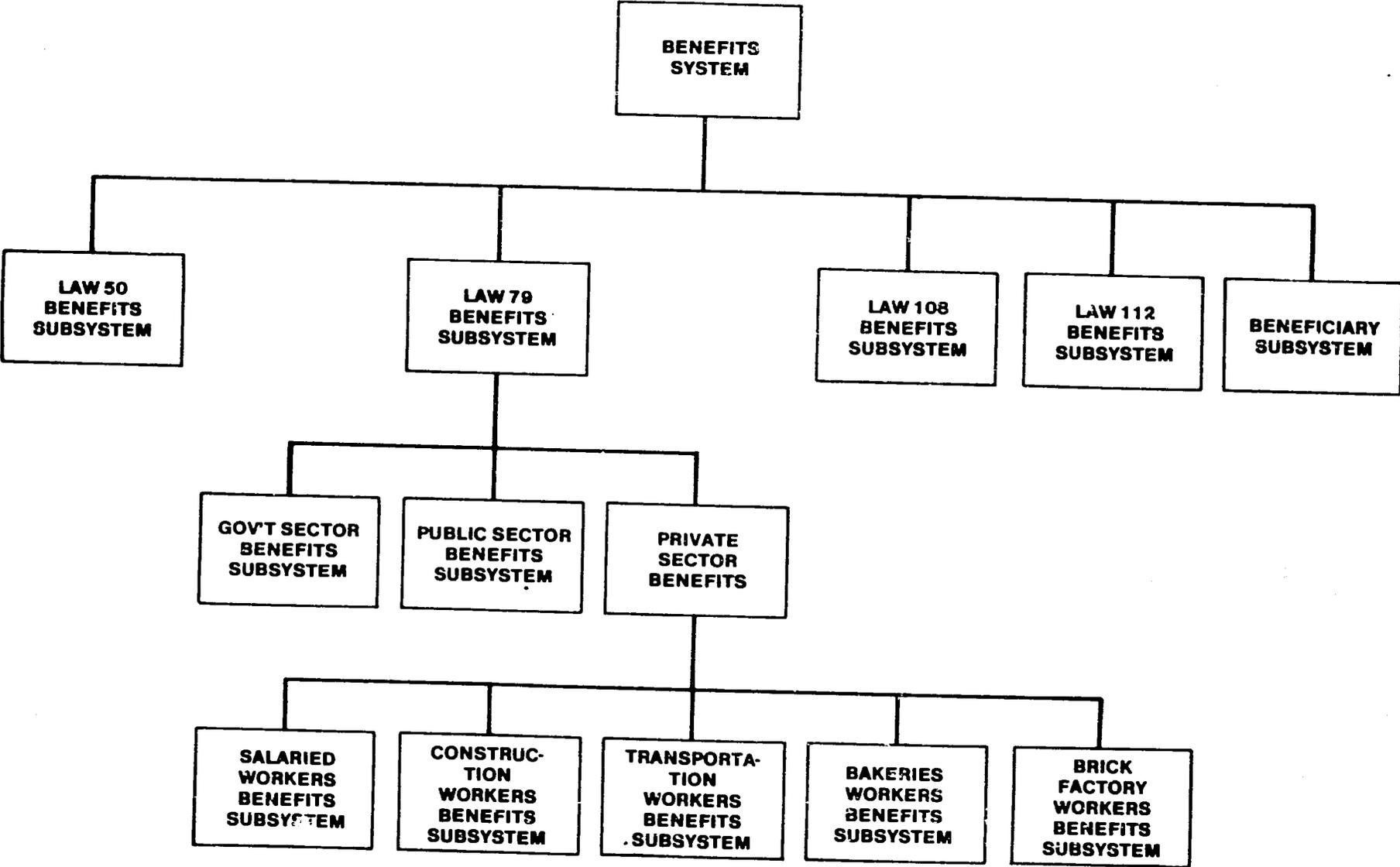
6.4 THE ACCOUNTING SYSTEM

The functional characteristics of the AESIS Accounting System are as follows:

- o Capture Payments to Individuals and Beneficiary
- o Capture Payments from Employers and Individuals
- o Track and Report, in detail and at summary levels, case history of individual payments and credits
- o Interface directly with the coverage and benefits subsystems by individual
- o Provide on-line review of case transaction history by individual
- o Provide modular interfaces for future capabilities.

The primary inputs to the AESIS Accounting System will be from the Coverage and Benefits subsystems. Upon acknowledgement of authorized coverage of an individual, a case record will be opened in the Accounting System. This case record can be viewed as a special general ledger account for a specific individual. All transactions, whether manual (adjustment) or automated from the Coverage and Benefits Systems, will be posted and detailed to the "General Ledger" account for the specific individual. This detailed ledger will provide a complete history of all financial transactions for an individual with a direct link to the individuals Coverage and Benefit Systems data bases.

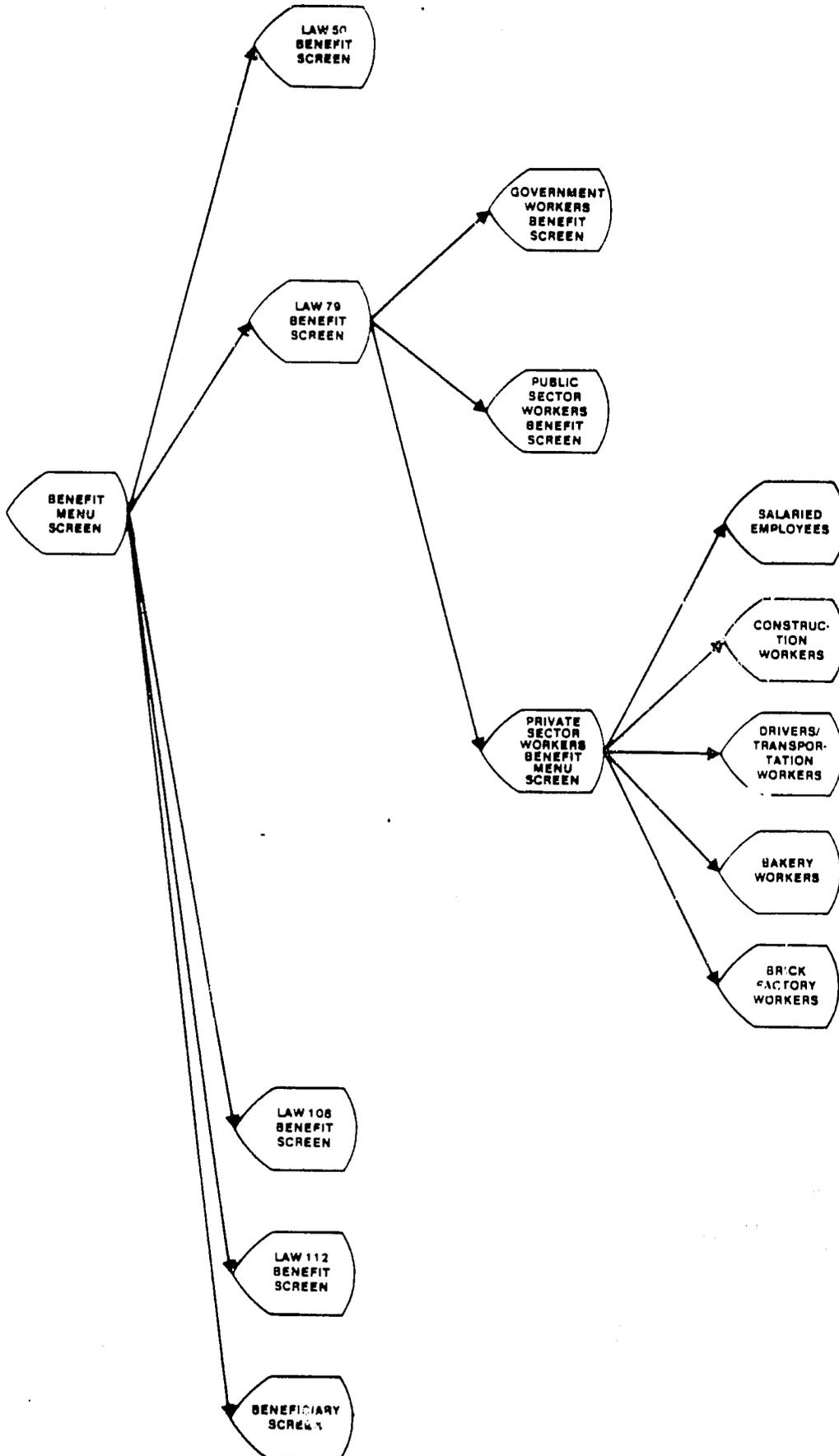
**EXHIBIT 6-14
THE BENEFITS SYSTEM**



6-23

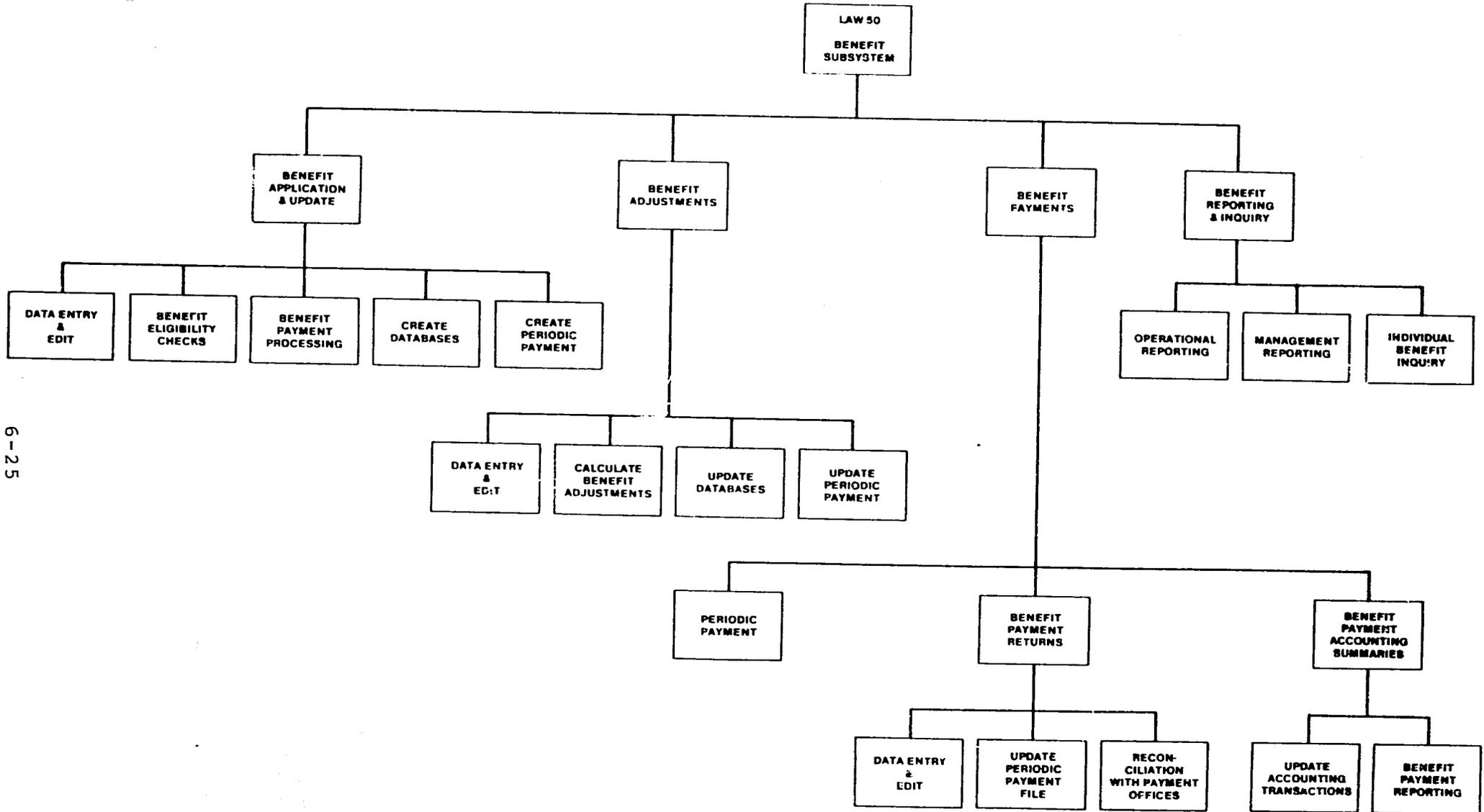
93

EXHIBIT 6-15 BENEFIT SYSTEM MENU SCREENS



25

EXHIBIT 6-17 LAW 50-BENEFIT SUBSYSTEM FUNCTIONAL CHART



6-25

99

EXHIBIT 6-18 LAW 79 (GOVERNMENT WORKERS) BENEFIT SUBSYSTEM FUNCTIONAL CHART

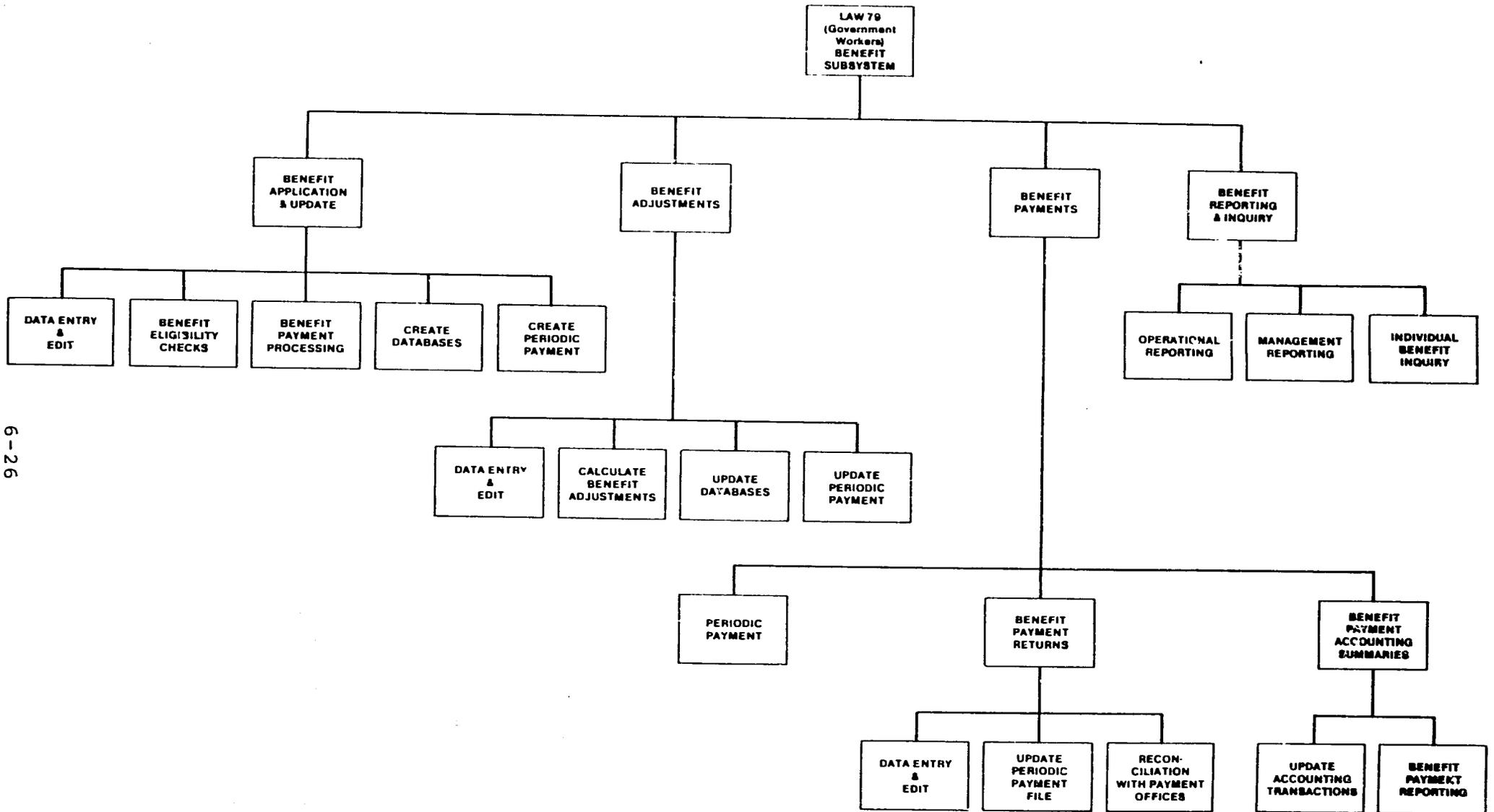
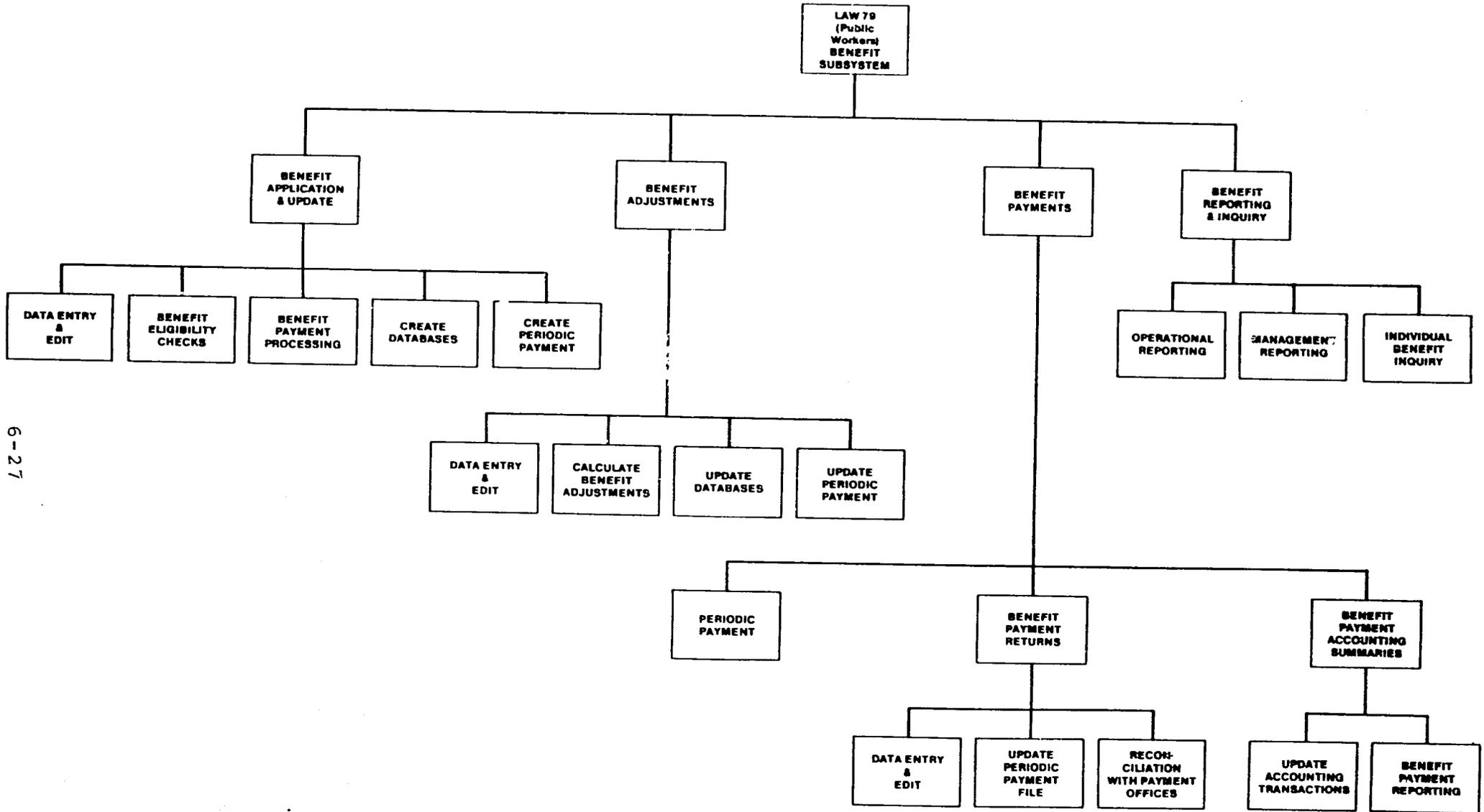


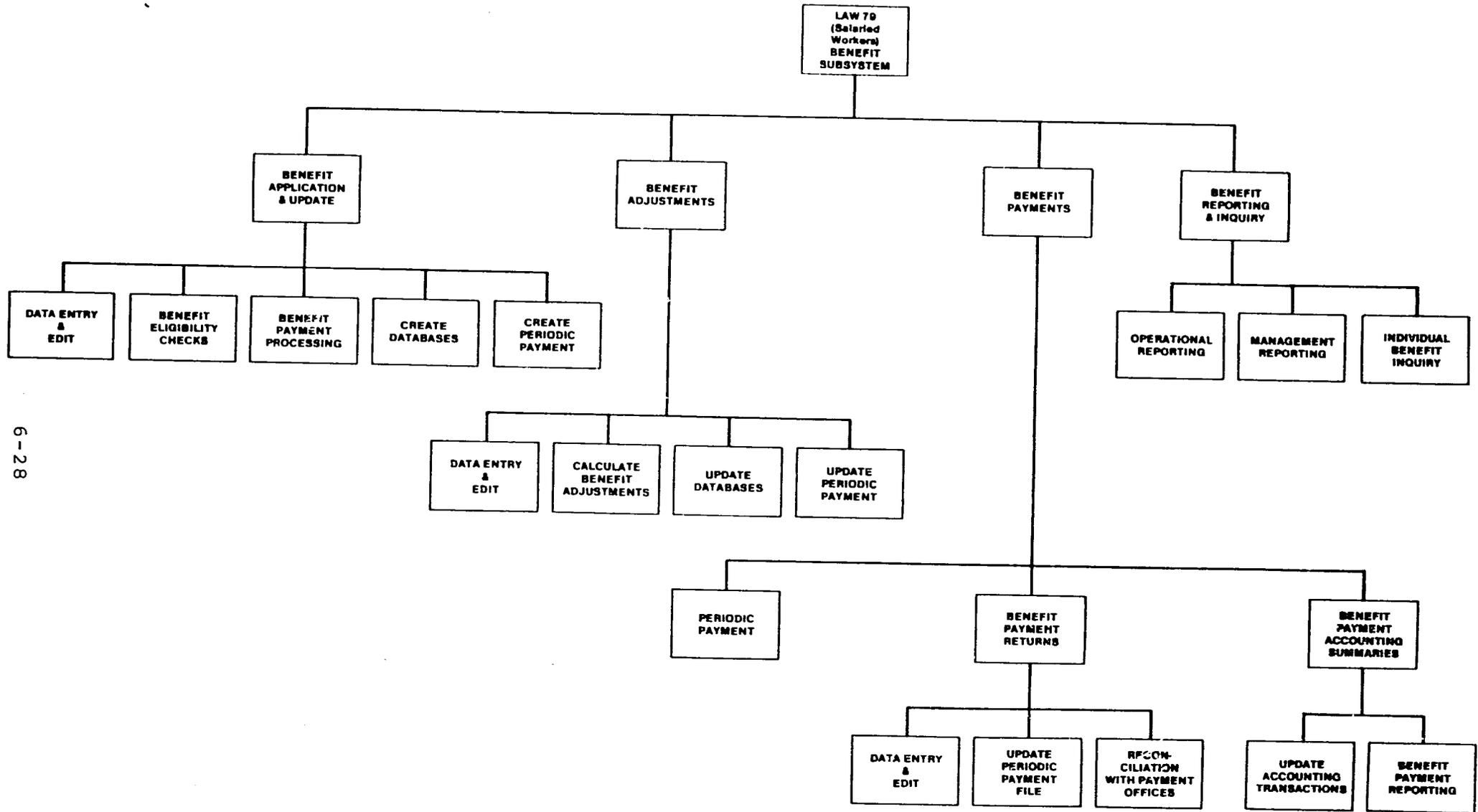
EXHIBIT 6-19 LAW 79 (PUBLIC WORKERS) BENEFIT SUBSYSTEM FUNCTIONAL CHART



6-27

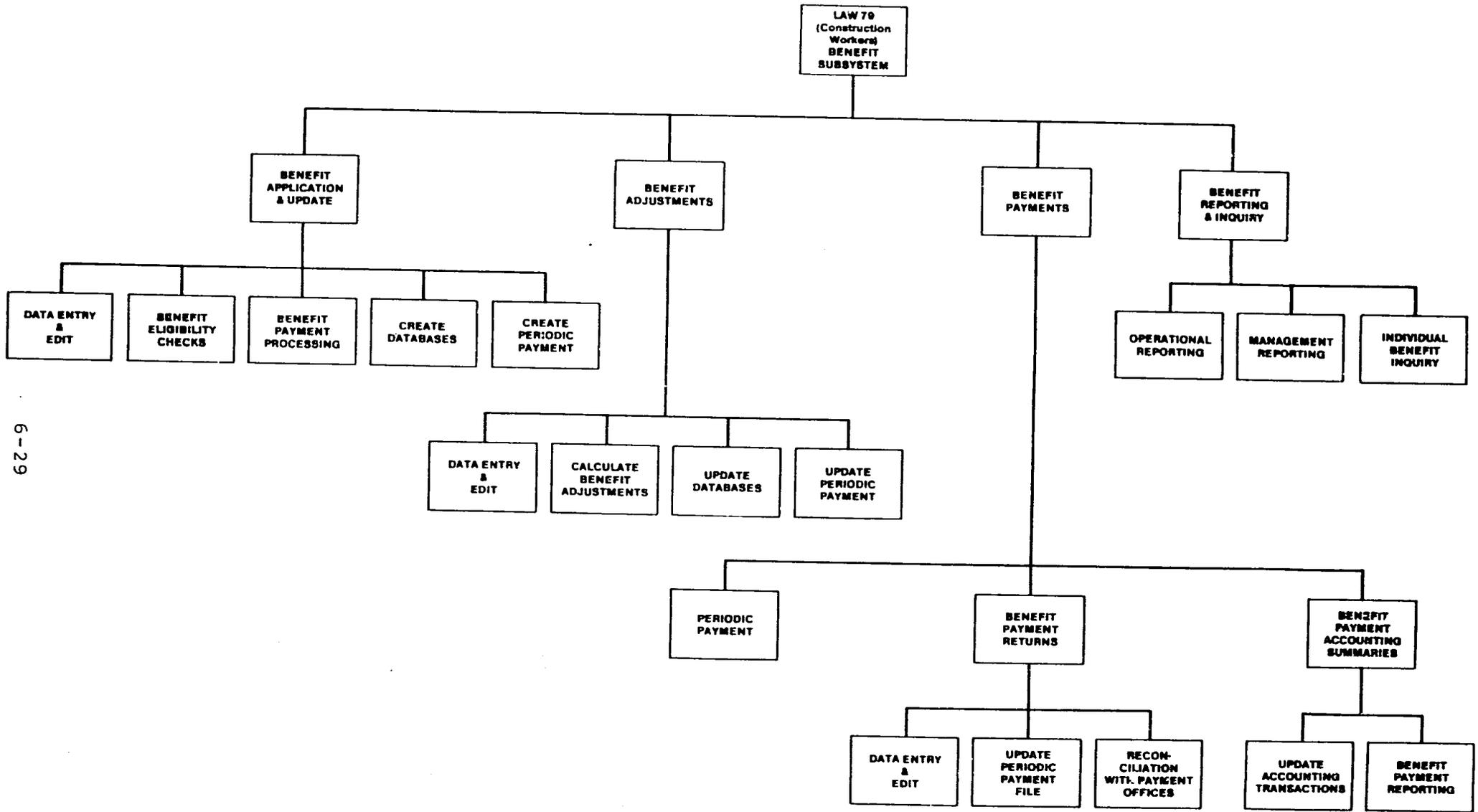


EXHIBIT 6-20 LAW 79 (PRIVATE-SALARIED WORKERS) BENEFIT SUBSYSTEM FUNCTIONAL CHART

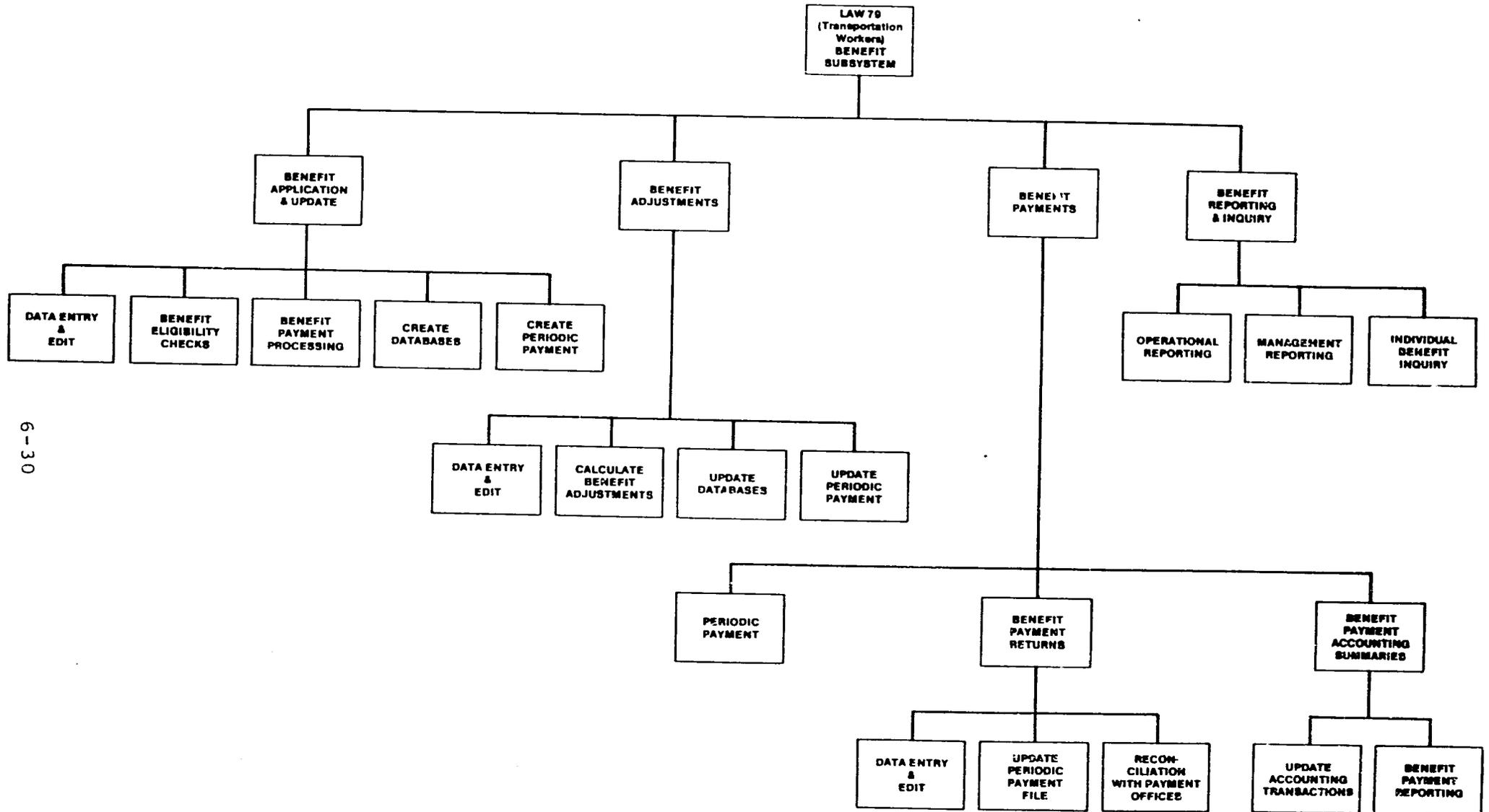


69

EXHIBIT 6-21 LAW 79 (PRIVATE-CONSTRUCTION WORKERS) BENEFIT SUBSYSTEM FUNCTIONAL CHART



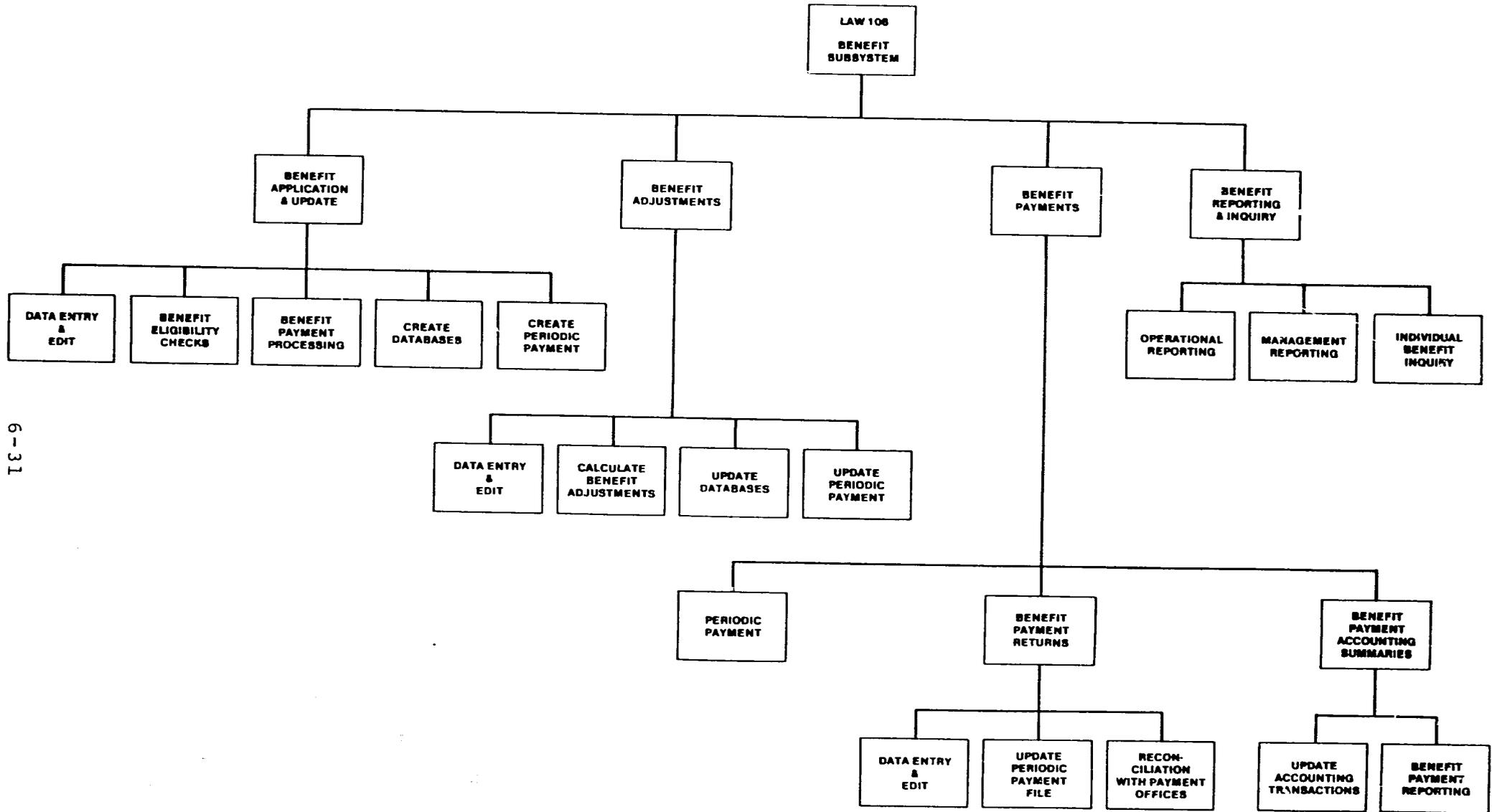
**EXHIBIT 6-22
LAW 79 (PRIVATE-TRANSPORTATION WORKERS) BENEFIT SUBSYSTEM
FUNCTIONAL CHART**



6-30

91

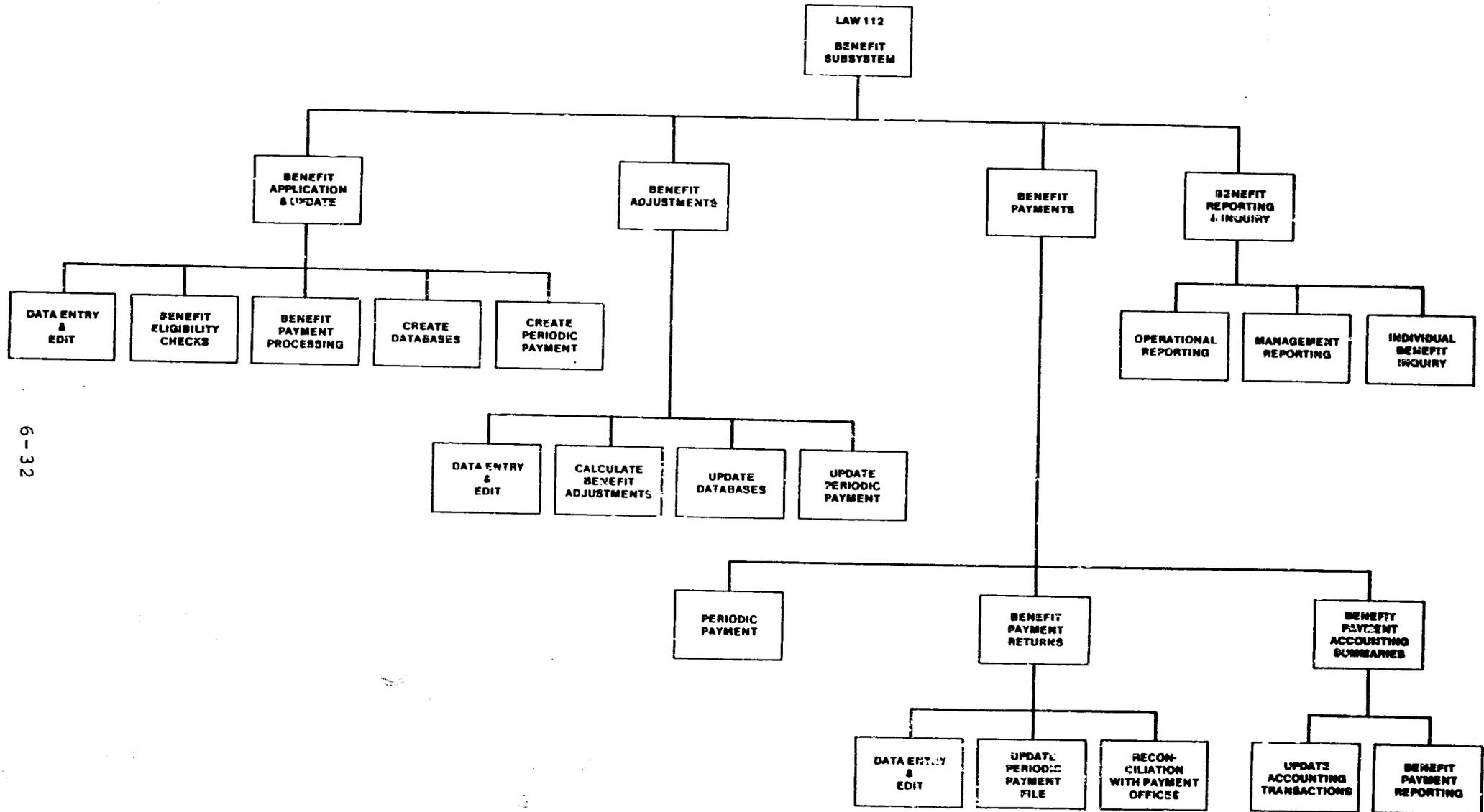
EXHIBIT 6-23 LAW 108-BENEFIT SUBSYSTEM FUNCTIONAL CHART



6-31

21

EXHIBIT 6-24 LAW 112-BENEFIT SUBSYSTEM FUNCTIONAL CHART



6-32

63

Additional capabilities which must be addressed in the near future are the following:

- o A full SIO and PIO Accounting System
- o Capital Equipment
- o Investments.

6.5 THE MANAGEMENT REPORTING SYSTEM

This is a batch system designed to access the AESIS data base sequentially and produce top management cyclical reports and interface files at the end of a processing period. One of the major reports to be produced by the system is the annual actuarial reports, which are currently done manually every five years. This system will also provide the capability to handle requests for special reports requiring access to AESIS data base. The use of special reporting features must be controlled so as to prevent the use of these capabilities for production of unnecessary or confidential reports.

6.6 THE DATA BASE STRUCTURE

AESIS requires access to a very large volume of data to accomplish all of the processes defined within the system. The primary database management system for AESIS is DL/I. The data structure defined to support AESIS takes into account the following items:

- o The required logical views of the data for each application function
- o The frequency of access and nature of access (on-line vs. batch) for each function
- o The large volumes of data required
- o The physical storage limitations for each database
- o Operational and maintenance considerations
- o Data security considerations
- o Database audit requirements.

The following section contains the physical and conceptual design of the AESIS data bases.

7. DATA BASE PHYSICAL AND CONCEPTUAL DESIGN

7.1 INTRODUCTION

This section describes the general and specific characteristics of the databases that support the Automated Egyptian Social Insurance System (AESIS). AESIS is being developed for the Ministry of Social Insurance (MSI) of the Arab Republic of Egypt. The two component organizations of MSI are the Social Insurance Organization (SIO) and the Pension Insurance Organization (PIO) which provide social and pension insurance services to government workers (PIO) and non-government workers (SIO).

AESIS is designed to directly support the daily operations of MSI with an initial implementation on two separate IBM 4300 class computers, one located at PIO and one located at SIO. The same database structure and the same software will be implemented at the two sites. In addition to the on-line operating sites, off-line local office microsystems will be used to directly support the daily activities of the SIO and PIO local offices located throughout Egypt.

The initial hardware environment is configured to support a small percentage of the total client base of SIO and PIO (on the order of 50,000 to 100,000 registered individuals compared to a design objective of 45,000,000 registered and 20,000,000 serviced

individuals). Future hardware enhancements will be required to fulfill the design potential of AESIS. These enhancements will be of the following type:

- o Upgrade in centralized processing capability.
- o Upgrade in telecommunication capability.
- o Additional distributed mainframe sites.
- o Additional microcomputer based distributed processing.

Even though the initial implementation of AESIS is targeted at a relatively small client base, the design objective of the AESIS database and the AESIS software is to be able to accommodate the fully loaded system, with suitable hardware upgrades.

7.2 TERMS AND ABBREVIATIONS

The following terms and abbreviations are used in this document to have specific meaning for the AESIS Project as defined below:

Registration - To formally be identified to the AESIS system. Registration is required for individuals and employers who participate in the social insurance system of Egypt.

Coverage - An individual is eligible for coverage, after registration, when he or she becomes employed in

one of the job sector categories applicable to one of the social insurance laws of Egypt. The term Coverage is used to refer to the AESIS function of administering the work history records for individuals within the social insurance system.

Benefits - A covered individual becomes eligible for designated benefits during active employment and after retirement according to the social insurance laws. Additionally, in certain cases individuals, covered or not, are due payments as the result of provisions of the laws such as a beneficiary of a deceased pensioner. The term Benefits is used to refer to the AESIS function of administering individual compensation from the social insurance system.

7.3 IDENTIFICATION OF DATABASES

The following eight key databases and two key files support AESIS:

- o National Individuals Database
- o National Individual Names Database
- o National Employers Database
- o National Employer Names Database
- o Social Insurance Database

- o Current Accounts Database
- o Recipient Accounts Payable Database
- o Current Accounting Transaction File
- o Detailed Transaction Journal File
- o General Ledger Database.

The following databases are used for temporary work files, code tables and global control parameters:

- o Subsystem Transaction Databases
- o ID Card Distribution Control Database
- o Tables Database
- o AESIS Control Database.

7.4 AESIS SOFTWARE COMPONENTS

AESIS application software contains the following systems and subsystems.

- o Registration System
 - Individuals Registration Subsystem
 - Employers Registration Subsystem
- o Coverage System
 - One subsystem for each law and job sector within a law
- o Benefits System
 - One subsystem for each law and job sector within a law.

- o Accounting System
- o Management Reporting System.

AESIS system support software includes:

- o Operating System, Basic Utilities, and Job Control:
 - DOS/VSE, VSE/Advanced Functions (AF), VSE/Interactive Problem Control System (IPCS), VSE/POWER, VSE/VSAM, VSE/Interactive Productivity Facility (IPF)
- o Terminal Control Language:
 - Customer Information Control System (CICS/DOS/VS, 1.6).
- o Data Base Management System
 - Data Language I (DLI/DOS/VS)
 - DB/DC Data Dictionary
 - Data Base Design Aid
- o Compiler
 - COBOL Compiler (CB1/DOS/VS)

7.5 NAMING_CONVENTIONS

- o Database Names

Format: ESIXXXX (7 characters max)

ESI stands for "Egyptian Social Insurance"
XXXX is a four character identifier of each
database.

- o Database Segment Names

1-8 characters - no format specified

- o Database Field Names

1-8 characters - no format specified

- o Program Specification Block Names

1-8 characters - no format specified

For additional naming conventions for Programs, Maps, Copy Library members etc. refer to the AESIS Technical Documentation Standards.

7.6 SUPPORT_SOFTWARE

- o Database Support Software

Refer to the DOS/VS/DLI Utilities Reference Manual
for a description of:

- Generation Utilities:
 - DBDGEN
 - PSBGEN
 - ACBGEN
 - ACTGEN

- Database Utilities:
 - Reorganization UNLOAD/RELOAD
 - Prereorganization
 - Scan
 - Prefix Resolution
 - Prefix Update
 - Image Copy
 - Change Accumulation
 - Recovery
 - Blackout
 - Utility Control Facility

- System Log Utilities
 - Log Recovery
 - Log Terminator
 - Statistical Analysis
 - Log Transaction Analysis
 - Log Tape Merge

o Data Communication Support Software

Refer to the CICS System Programmers' Reference Manuals for a description of:

- System Generation Software
- System Table Preparation Software

7.8 LOGICAL CHARACTERISTICS

The Database Overview Chart on the following page depicts the database structure for the seven key databases and two key files required to support AESIS. The chart presents each segment type in the database in a hierarchical manner. Secondary Indexes are depicted with arrows to their target segments.

Following the database chart, each of the key databases and files are defined in separate sections.

7.8.1 NATIONAL INDIVIDUALS DATABASE

OVERVIEW:

The National Individuals Database contains identifying and status information about each individual registered by SIO and PIO for all of Egypt. The database contains a single segment type, the key of which is the Social Insurance Number (SIN). The SIN uniquely identifies an individual within the system. The remainder of the data fields of the segment store characteristics of the individual that change very little over time.

SIO assigns the next available SIN to a new registrant within the system for both the SIO registered population and the PIO registered population. This assures that a single series of numbers is used to identify individuals for social insurance purposes within the Egyptian population. PIO will need to have a subset of the National Individuals Database available to support their processing for PIO covered individuals and PIO pensioners.

PURPOSE:

The National Individuals Database is referenced by multiple application functions, for which the SIN is already known, for one or more of the following reasons:

- o To verify that the SIN currently exists in the database.
- o To verify that the individual has the appropriate status for processing by the specific application.
- o To verify that the SIN provided is correct for processing by the application module based on the characteristics of the stored data for the SIN.
- o To retrieve for display/reporting the characteristic data for the individual.

PHYSICAL STORAGE CONSIDERATIONS:

The target population for design purposes is 45,000,000 registered individuals represented in the National Individuals Database (20,000,000 of those are serviced individuals). The stored data will be relatively static over time with little change in the data once an individual completes registration.

Almost every program that deals with individuals will need to access the National Individuals Database. The stored data will have a very high access rate for read only purposes. Only a few applications will be required to modify the stored data, and

those would only change status fields. There is the standard requirement for routine maintenance of the data for field maintenance and record deletion, however this will be an extremely low volume after initial registration. The deletion requirement is only to correct gross errors in assignment. The normal action is that if an individual is correctly registered then his/her records are retained on file for the life of the automated system.

In order to accommodate the large data volume required for the National Individuals Database, the total data storage will be partitioned into multiple separate physical databases. Each physical database will contain database records for a pre-defined range of SIN values. For example, if it is determined that each physical database can hold 1,000,000 individual database records in a manner that facilitates system operations and maintenance, then a simple calculation (division by 1,000,000) will be performed by application programs to determine the specific physical database to access for a particular SIN.

SEGMENT DEFINITION:

01 INDIVIDUAL-RECORD.

* SIZE = 170 BYTES

05 INDIVIDUAL-RECORD-KEY.

* SIZE = 4 BYTES

* ALL SINS STORED IN EXTERNAL FORM (W/ CHECK DIGIT) TO SAVE
 * RECACHECHECK DIGIT EN DISPLAYED

10 INDIVIDUAL-SIN PIC 9(09)
 COMP.

05 INDIVIDUAL-PART-I-DATA.

* SIZE = 45 BYTES

10 FULL-NAME PIC X(40).
 10 BIRTH-LOCATION-CODE PIC X(02).
 10 SEX-INDICATOR PIC X(01).
 10 DATE-OF-BIRTH PIC X(02).

05 INDIVIDUAL-PART-II-DATA.

* SIZE = 108 BYTES

10 FAMILY-NAME PIC X(12).
 10 MOTHERS-NAME PIC X(30).
 10 BIRTH-POLICE-STATION-CODE PIC 9(02).
 10 PLACE-REGISTERED.
 15 REGISTRATION-REGION-CODE PIC 9(02).
 15 REGISTRATION-LOCAL-OFFICE-CODE PIC 9(02).
 15 REGISTRATION-LOCAL-UNIT-CODE PIC 9(02).
 10 POLICE-ID-DATA.

* 1 = SINGLE PERSON

* 2 = MARRIED PERSON

* 3 = FOREIGN

15 POLICE-ID-TYPE PIC 9(01).
 15 POLICE-ID-GOVERNORATE-CODE PIC 9(02).
 15 POLICE-ID-STATION-CODE PIC 9(02).
 15 POLICE-ID-SERIAL-NUMBER PIC 9(06).
 10 FOREIGN-ID-DATA REDEFINES POLICE-ID-DATA.
 15 FOREIGN-ID-TYPE PIC 9(01).
 15 FOREIGN-NATIONALITY-CODE PIC 9(02).
 15 FOREIGN-PASSPORT-NUMBER PIC 9(08).
 10 CURRENT-ADDRESS-DATA.
 15 ADDRESS-BUILDING-NUMBER PIC X(04).
 15 ADDRESS-STREET-NAME PIC X(30).
 15 ADDRESS-POLICE-UNIT-CODE PIC 9(02).
 15 ADDRESS-POLICE-STATION-CODE PIC 9(02).
 15 ADDRESS-GOVERNORATE-CODE PIC 9(02).
 10 SENSITIVITY-INDICATOR PIC X(01).
 10 RECORD-STATUS-INDICATOR PIC X(01).
 10 NUMBER-OF-ID-CARDS-ISSUED PIC 9(01).

```

*      05 ORIGINAL-ENTRY-DATA.
      SIZE =      8 BYTES

          10 ORIGINAL-ENTRY-AUDIT-SIN          PIC 9(09)
              COMP.
          10 ORIGINAL-ENTRY-DATE-ADDED        PIC X(02).
          10 ORIGINAL-SOURCE-OF-DATA-CODE     PIC X(02).

*      05 LAST-MAINTENANCE-ACTION-DATA.
      SIZE =      3 BYTES

          10 DATE-LAST-ACTION                 PIC X(02).
          10 LAST-ACTION-TRANSACTION-TYPE     PIC X(01).

*      05 INDIVIDUAL-STATUS.
      SIZE =      4 BYTES

          10 COVERAGE-CODE                   PIC X(01).
*      1 = PENSIONER
*      2 = RECEIPIENT
*      3 =

          10 BENEFITS-CODE                   PIC X(01).
          10 CURRENT-REGION-CODE             PIC 9(02).
          10 CURRENT--LOCAL--OFFICE-CODE     PIC 9(02).

```

7.8.2 NATIONAL INDIVIDUAL NAMES DATABASE

OVERVIEW:

The National Individual Names Database provides for an "alternate index by name" into the National Individuals Database. If an application knows only the name of an individual that might be registered in the system, the National Individual Names Database will be used to attempt to locate the correct Social Insurance Number (SIN) for the individual.

The database record consists of a single segment type that contains the name field, additional qualifying data fields, and the SIN field to guarantee uniqueness of the key and to provide the reference into the National Individuals Database.

Listed below are some of the considerations for the database relating to characteristics of names of individuals in Egypt:

- o The primary (leftmost) portion of the key field will be the official full name of the individual. The full name of the individual is used since the concept of last name, first name, middle name does not exist for personal name usage in Egypt.

- o 40 characters are reserved for the full name field. If a full name is longer than 40 characters, the field is truncated to the right.
- o The full name will be stored with one blank character between each separate name within the full name.
- o Many individuals in Egypt have identical full names so there will be many repetitions of full names within the database. In such cases, additional investigation is required to identify a specific individual by checking the additional characteristic data stored in the National Individuals Database. A few fields will be provided in the National Individual Names Database (Birth Location Code, Birth Date, Sex Indicator) to assist the search in the case that additional information is known and required to separate duplicate names.
- o Some names are extremely popular in Egypt. These names when falling at the beginning of the full name will present a long, in some cases very long, string of similar names. For example, in a population of 20,000,000, more than 2,000,000 individuals can be expected to have a first name of Mohammed.

As in the case of the National Individuals Database, PIO will need to have a subset of the National Individual Names Database available to support their processing for PIO covered individuals and PIO pensioners.

PURPOSE:

The National Individual Names Database has the following main purposes within the system:

- o To assist in identifying an individual's SIN in the case that only the full name (or partial name) is known.

- o To assist in verifying that an individual is not already registered in the system for the registration processing application.

PHYSICAL STORAGE CONSIDERATIONS:

The target population for design purposes is 45,000,000 registered individuals, each of which will have a name registered on the National Individual Names Database. The stored data will be very static over time with almost no change in the stored data once an individual completes registration. The stored data will have a moderate access rate for read only purposes, primarily to support the registration process.

In order to accommodate the large data storage requirement for the National Individual Names Database, the total data storage will be partitioned into multiple separate physical databases. Each physical database will contain name references for all of the names that fall within pre-defined name limits. The detailed characteristics of name usage within the registered population can be studied during the initial implementation period in order to identify the correct partitioning needed to accommodate the target population. Maintenance procedures will provide for the respecification of the partitioning scheme in order to allow for adjustments over the life of the system. However, given a large volume of registered individuals, the maintenance procedures would be very lengthy involving the reorganization of the databases and possibly the recompilation of many application programs. The objective of the partitioning scheme will be the fairly even distribution of the registered population over a fixed number of databases.

For an application program that needs to access the correct database for a given name, a simple table lookup approach will be used with name ranges to provide the correct suffix for the physical database that would hold the name segment, if it exists.

SEGMENT DEFINITION:

01 INDIVIDUAL-NAME-RECORD.
* SIZE = 51 BYTES

05 INDIVIDUAL-NAME-RECORD-KEY.
* SIZE = 49 BYTES

10	FULL-NAME	PIC X(40).
10	BIRTH-LOCATION-CODE	PIC X(02).
10	DATE-OF-BIRTH	PIC X(02).
10	SEX-INDICATOR	PIC X(01).
10	INDIVIDUAL-SIN	PIC 9(09) COMP.

05	SENSITIVITY-INDICATOR	PIC X(01).
05	INDIVIDUAL-STATUS-INDICATOR	PIC X(01).

7.8.3 NATIONAL EMPLOYER DATABASE

OVERVIEW:

Within Egypt there are approximately one million Employers representing Government Agencies, Public Sector Companies, and Privately owned large, small, and owner/operator establishments. Each business is uniquely identified by an assigned Business Identification Number (BIN). The BIN is a nine digit number in the range of 900,000,000 to 999,999,999. The right most digit is a "check digit" so the number range can accommodate 10,000,000 employers. This database contains information concerning the owner, manager, type of business, address, the law/sector under which the business operates. SIO assigns the next available BIN to a new employer within the system for both the SIO registered employer base and the PIO registered employer base. This assures that a single series of numbers is used to identify employers for social insurance purposes within Egypt. PIO will need to have a subset of the National Employers Database available to support their processing.

PURPOSE:

The National Employer Database is designed to store the information about an employer from the time of business registration through business termination. The National Employer Database serves several functions:

- o Identifies the current and terminated businesses within Egypt

- o Identifies the Law/Sector under which a business operates

PHYSICAL STORAGE CONSIDERATIONS:

Approximately 1,000,000 employers will be registered for Social Insurance purposes. The stored data will be relatively static over time with little change once an employer completes registration.

SEGMENT DEFINITION:

```

01 EMPLOYER-RECORD.
*   SIZE = 134 BYTES
*   05 EMPLOYER-RECORD-KEY.
*     SIZE = 4 BYTES
*     10 BUSINESS-BIN PIC 9(09) COMP.
*   05 EMPLOYER-PART-I-DATA.
*     SIZE = 46 BYTES
*     10 BUSINESS-NAME PIC X(40).
*     10 ESTABLISH-LOCATION.
*       15 ESTABLISH-GOVERNORATE-CODE PIC 9(02).
*       15 ESTABLISH-POLICE-STATION-CODE PIC 9(02).
*     10 ESTABLISH-DATE PIC X(02).
*   05 EMPLOYER-PART-II-DATA.
*     SIZE = 73 BYTES
*     10 OWNER-SIN PIC 9(09) COMP.
*     10 MANAGER-SIN PIC 9(09) COMP.
*     10 PLACE-REGISTERED.
*       15 REGISTRATION-REGION-CODE PIC 9(02).
*       15 REGISTRATION-LOCAL-OFFICE-CODE PIX 9(02).
*       15 REGISTRATION-LOCAL-UNIT-CODE PIC 9(02).
*     10 TYPE-OF-BUSINESS.
*       1 - GOVERNMENT
*       2 - PUBLIC
*       3 - PRIVATE
*       4 - CONSTRUCTION
*       5 - TRANSPORTATION
*       6 - BAKERIES
*       7 - BRICK FACTORIES
*       8 - OTHER
*         15 SECTOR-CODE PIC X(01).
*         15 ACTIVITY-WITHIN-SECTOR-CODE PIC X(05).
*     10 CURRENT-ADDRESS-DATA.
*       15 ADDRESS-BUILDING-NUMBER PIC X(04).
*       15 ADDRESS-STREET-NAME PIC X(30).
*       15 ADDRESS-GOVERNORATE-CODE PIC 9(02).
*       15 ADDRESS-POLICE-STATION-CODE PIC 9(02).
*       15 ADDRESS-POLICE-UNIT-CODE PIC 9(02).
*     10 NATIONALITY-CODE PIC X(02).
*     10 SENSITIVITY-INDICATOR PIC X(01).
*     10 BUSINESS-TERMINATION-DATE PIC X(02).
*     10 HEALTH-INSURANCE.
*       15 HEALTH-INSURANCE-RATIO PIC 9(01).
*       15 HEALTH-INSURANCE-START-DATE PIC X(02).
*     10 NUMBER-OF-ID-CARDS-ISSUED PIC 9(01).
*   05 ORIGINAL-ENTRY-DATA.
*     SIZE = 8 BYTES
*     10 APPROVED-BY-SIN PIC 9(09) COMP.
*     10 DATE-ADDED PIC X(02).
*     10 ORIGINAL-SOURCE-OF-DATA-CODE PIC X(02).
*   05 LAST-MAINTENANCE-ACTION-DATA.

```

115

*

SIZE = 3 BYTES
10 DATE-LAST-ACTION
10 ACTION-TYPE-CODE

PIC X(02).
PIC X(01).

7.8.4 NATIONAL EMPLOYER NAMES DATABASE

OVERVIEW:

The National Employer Names Database provides for an "alternate index by name" into the National Employers Database. If an application knows only the name of an employer that might be registered in the system, the National Employer Names Database will be used to attempt to locate the correct Business Identification Number (BIN) for the employer.

The database record consists of a single segment type that contains the name field, additional qualifying data fields, and the BIN field to guarantee uniqueness of the key and to provide the reference into the National Employers Database.

Listed below are some of the considerations for the database relating to characteristics of names of employers or businesses in Egypt:

- o The primary (leftmost) portion of the key field will be the official business name of the business. The full name of the business is used since the concept of last name, first name, middle name does not exist for businesses operating under a personal name in Egypt.

- o 40 characters are reserved for the business name field. If a business name is longer than 40 characters, the field is truncated to the right.
- o The business name will be stored with one blank character between each separate name within the business name.
- o Some businesss in Egypt have similar business names so there will be some common business names within the database. In such cases, additional investigation is required to identify a specific business by checking the additional characteristic data stored in the National Employers Database. A few fields will be provided in the National Employer Names Database (Establish Location, Establish Date) to assist the search in the case that additional information is known and required to separate duplicate names.

As in the case of the National Employers Database, PIO will need to have a subset of the National Employer Names Database available to support their processing for PIO covered individuals and PIO pensioners.

PURPOSE:

The National Employers Names Database has the following main purposes within the system:

- o To assist in identifying an employer's BIN in the case that only the business name (or partial name) is known.

- o To assist in verifying that a business is not already registered in the system for the registration processing application.

PHYSICAL STORAGE CONSIDERATIONS:

The planned number of businesses that will be registered is 1,000,000, each of which will have a business name registered on the National Employer Names Database. The stored data will be very static over time with almost no change in the stored data once an business completes registration. The stored data will have a moderate access rate for read only purposes, primarily to support the registration process.

7.8.5 SOCIAL INSURANCE DATABASE

OVERVIEW:

The Social Insurance Database contains references to each individual covered for social insurance purposes for all of Egypt. For each individual referenced in the database, a summary of his/her entire work history is maintained as well as details on current work status. Also, control fields for Benefits processing are maintained.

Individuals can be covered under one of four national laws and there are different provisions within these laws depending on the type of employment of the individual (sector of the work force).

In order to be included in the Social Insurance Database, an individual must first exist on the National Individuals Database. Also, an individual is allowed to be referenced only one time within the Social Insurance Database. If an individual holds two jobs, even if they fall into two different employment sectors or are covered under different laws, there must be only one coverage reference for the individual in the database.

It is possible for an individual to change from one job category to another and therefore change coverage from one law/sector to another, but this doesn't happen very often within Egypt. However, the database approach must accommodate such a change.

PIO will maintain the portion of the Social Insurance Database that deals with government workers. SIO will maintain the remainder of the Social Insurance Database. A transfer into or out of government employment would result in coverage records being transferred between PIO and SIO.

PURPOSE:

The Social Insurance Database is designed to hold the coverage information for the twelve-million insured persons in Egypt, and the benefits information for four million individuals. This database will possibly consist of multiple separate physical databases with the same logical structure so that the information can be reasonably stored and processed by the Coverage, Benefits, and Accounting functions of AESIS.

The information stored in the Social Insurance Databases will provide an accurate reflection of the history of coverage for an individual, existing loans, period purchases or upgrades to coverage, and current salary information. In addition, the Social Insurance Database provides relations to the National

Employer Database, the Special Cases Secondary Index, and the Loan Pointer Secondary Index. This database also maintains detailed fields that support all temporary and permanent benefits of the individual.

The Social Insurance Database has the following main purposes within the system:

- o To maintain Employee to Employer relationships and sufficient current employment information to initiate accurate employer social insurance billing on a monthly basis for an individual current status.
- o To maintain law/sector specific information to support benefits computation for individuals covered by the law/sector. Employment history and current status data are generally required for benefits computation, but the requirements change from one law/sector to another.

PHYSICAL STORAGE CONSIDERATIONS:

The target population for design purposes is 12,000,000 covered individuals for all of Egypt. Each covered individual will have a database record in the Social Insurance Database with the number of segments and degree of detail required varying

depending on the applicable law/sector of employment and the amount of employment change activity. An additional four million individuals will be maintained for benefits payments purposes.

In order to accommodate the large volume of data required in the database, two methods of partitioning might be used:

- o First, separate databases or sets of databases will be used for each law/sector that requires essentially different record structures and segment types. This will provide flexibility in operations and maintenance by allowing changes to be applied only to the database structure affected by any adjustments in law/sector data storage requirements.

- o Second, within the law/sector database structure, when storage becomes too large based on the number of individuals participating in the law/sector coverage and the average size of the database record, a partition will be established based on Local Office range. The objective of the partitioning based on operational convenience, maintainability and data storage size is to produce multiple databases of approximately the same size to support a law/sector taking into account predictable growth patterns based on analysis of the current covered population and projections of future coverage requirements.

As a result of partitioning by law and work sector within a law, when an individual changes from one law/sector to another, his/her records need to be physically transferred from one database to another.

The PIO covered individuals all participate in one law/sector for coverage purposes. The databases supporting that law/sector would physically reside at PIO.

For application programs that need to access a specific covered individual, first the applicable law/sector for the individual needs to be determined from the status indicators of the individual's record on the National Individuals Database. The SIA is required for this access. Once the appropriate law/sector is determined, a table lookup on Local Office will determine the appropriate database suffix required for the access.

DATABASE VOLUME ESTIMATES:

CATEGORY	INSURED
PUBLIC SECTOR	2,000,000
GOVERNMENT	2,000,000
PRIVATE - SALARIED	2,000,000
CONSTRUCTION	700,000
TRANSPORTATION	200,000
BAKERIES	50,000
LAW 112 CASUAL WORKERS	4,000,000
LAW 50	50,000
LAW 108	1,000,000

APPROPRIATE TOTALS	12,000,000

124

AUTOMATED SOCIAL INSURANCE SYSTEM (AESIS)

SOCIAL INSURANCE DATABASE

```

01  SOCIAL-INSURANCE-ROOT.
*   SIZE = 13 BYTES
    05  SOCIAL-INSURANCE-ROOT-KEY.
        10  INDIVIDUAL-SIN                                PIC 9(09) COMP.
    05  COVERAGE-START-DATE                              PIC X(02).
    05  CUMULATIVE-COVERAGE-MONTHS                      PIC 9(03) COMP.
    05  LAST-ACTION-DATA.
        10  DATE-LAST-ACTION                            PIC X(02).
        10  LAST-ACTION-TRANSACTION-TYPE                PIC X(01).

01  COVERAGE-PERIODS.
*   SIZE = 20 BYTES
    05  COVERAGE-PERIODS-KEY.
        10  PERIOD-START-DATE                          PIC X(02).
    05  PERIOD-END-DATE                                  PIC X(02).
    05  EMPLOYER-BIN                                    PIC 9(09) COMP.
    05  OCCUPATION-CODE                                PIC 9(05) COMP.
    05  JOB-CATEGORY-CODE                              PIC 9(02).
    05  TYPE-OF-COVERAGE                               PIC 9(02).
    05  LAW-SECTOR-CODE                                PIC X(01).
    05  PERIOD-STATUS-CODE                             PIC X(02).
    05  TERMINATION-REASON-CODE                       PIC X(01).

01  COVERAGE-SALARY.
*   SIZE = 5 BYTES
    05  COVERAGE-SALARY-KEY.
        10  SALARY-START-DATE                          PIC X(02).
    05  MONTHLY-SALARY-AMT                             PIC 9(05) COMP-3.

01  COVERAGE-INCENTIVE.
*   SIZE = 5 BYTES
    05  COVERAGE-INCENTIVE-KEY.
        10  INCENTIVE-START-DATE                      PIC X(02).
    05  AVERAGE-MONTHLY-INCENTIVE-AMT                PIC 9(05) COMP-3.

01  COVERAGE-HISTORY.
*   SIZE = 17 BYTES
    05  COVERAGE-HISTORY-KEY.
        10  PERIOD-START-DATE                          PIC X(02).
    05  PERIOD-END-DATE                                PIC X(02).
    05  EMPLOYER-BIN                                    PIC 9(09) COMP.

```

AUTOMATED SOCIAL INSURANCE SYSTEM (AESIS)

SOCIAL INSURANCE DATABASE
(CONTINUED)

05	TYPE-OF-COVERAGE	PIC X(02).
05	LAW-SECTOR-CODE	PIC X(01).
05	AVERAGE-MONTHLY-SALARY-AMT	PIC 9(05) COMP-3.
05	AVERAGE-MONTHLY-INCENTIVE-AMT	PIC 9(05) COMP-3.
05	PERIOD-STATUS-CODE	PIC X(02).
01	WORK-EXTENSION.	
*	SIZE = 9 BYTES	
05	WORK-EXTENSION-KEY.	
10	WORK-EXTENSION-DECREE-DATE	PIC X(02).
05	WORK-EXTENSION-DECREE	PIC 9(05).
05	WORK-EXTENSION-MONTHS	PIC 9(02).
01	INSTALLMENT-PAYMENT.	
*	SIZE = 18 BYTES	
05	INSTALLMENT-PAYMENT-KEY.	
10	INSTALLMENT-START-DATE	PIC X(02).
05	ORIGINAL-AMOUNT	PIC S9(05)V99 COMP-3.
05	CURRENT-BALANCE-OF-PAYMENTS	PIC S9(05)V99 COMP-3.
05	MONTHLY-PAYMENT-AMOUNT	PIC S9(05)V99 COMP-3.
05	PAYMENT-PLAN-INDICATOR	PIC X(01).
05	TYPE-OF-INSTALLMENT	PIC X(01).
01	POSTPONED-PAYMENTS.	
*	SIZE = 4 BYTES	
05	POSTPONED-PAYMENTS-KEY.	
10	POSTPONMENT-START-DATE	PIC X(02).
05	POSTPONEMENT-END-DATE	PIC X(02).

AUTOMATED SOCIAL INSURANCE SYSTEM (AESIS)

SOCIAL INSURANCE DATABASE
(CONTINUED)

```

01 WAGE-COMPENSATION.
*   SIZE = 54 BYTES
05 WAGE-COMPENSATION-KEY.
    10 BENEFIT-BEGIN-DATE PIC X(02).
05 APPLICATION-DATE PIC X(02).
05 BENEFIT-END-DATE PIC X(02).
05 DISABILITY-PERCENTAGE PIC S9(03) COMP-3.
05 BENEFIT-AMOUNT PIC S9(03)V99 COMP-3.
05 MONTHLY-WAGE PIC S9(03)V99 COMP-3.
05 BENEFIT-TYPE PIC X(01).
05 TYPE-SPECIFIC-DATA PIC X(39).
05 UNEMPLOYMENT-DATA REDEFINES TYPE-SPECIFIC-DATA.
    10 LABOR-OFFICE-REG-DATE PIC X(02).
    10 LABOR-OFFICE-CODE PIC X(05).
    10 TOTAL-WEEKS-ELIGIBLE PIC 9(02).
    10 RELATIONSHIP-TO-EMPLOYER PIC X(01).
    10 WORK-CAPABILITY-CODE PIC X(01).
    10 WEEKS-PAID-TABLE OCCURS 28 TIMES.
        15 PAID-FLAG PIC X(01).
05 HEALTH-DATA REDEFINES TYPE-SPECIFIC-DATA.
    10 SICKNESS-TYPE-CODE PIC X(01).
    10 TRANSPORTATION-EXPENSE PIC S9(03)V99 COMP-3.
    10 TRANSPORTATION-EXPENSE-CODE PIC X(02).
    10 TRAVEL-EXPENSE PIC S9(03)V99 COMP-3.
    10 TRAVEL-EXPENSE-CODE PIC X(02).
    10 COMPANION-EXPENSE PIC S9(03)V99 COMP-3.
    10 COMPANION-EXPENSE-CODE PIC X(02).
    10 CORPSE-APPLIANCE-EXPENSE PIC S9(03)V99 COMP-3.
    10 CORPSE-APPLIANCE-EXPENSE-CODE PIC X(02).
    10 PREGNANCY-COUNT PIC 9(01).
    10 MEDICAL-TREATMENT-VISITS PIC 9(02).
    10 MEDICAL-TREATMENTS-MISSED PIC 9(02).
    10 FILLER PIC X(13).
05 LABOR-INJURY-DATA.
    10 NEGLIGENCE-FLAG PIC X(01).
    10 TRANSPORTATION-EXPENSE PIC S9(03)V99 COMP-3.
    10 TRANSPORTATION-EXPENSE-CODE PIC X(02).
    10 TRAVEL-EXPENSE PIC S9(03)V99 COMP-3.
    10 TRAVEL-EXPENSE-CODE PIC X(02).
    10 COMPANION-EXPENSE PIC S9(03)V99 COMP-3.
    10 COMPANION-EXPENSE-CODE PIC X(02).
    10 CORPSE-APPLIANCE-EXPENSE PIC S9(03)V99 COMP-3.
    10 CORPSE-APPLIANCE-EXPENSE-CODE PIC X(02).
    10 FILLER PIC X(18).

```

AUTOMATED SOCIAL INSURANCE SYSTEM (AESIS)

SOCIAL INSURANCE DATABASE
(CONTINUED)

01	BENEFICIARY--SOURCE--SIN--SEG.	
*	SIZE = 4 BYTES	
05	BENEFICIARY--SOURCE--SIN--KEY.	
05	BENEFICIARY--SOURCE--SIN	PIC 9(09) COMP.
01	PENSION--AND--LUMP--SUM.	
*	SIZE = 57 BYTES	
05	PENSION--AND--LUMP--SUM--KEY.	
10	BENEFIT--ELIGIBILITY--DATE	PIC X(02).
05	CATEGORY--CODE	PIC X(02).
05	RECIPIENT--SIN	PIC 9(09) COMP.
05	BENEFIT--TYPE--CODE	PIC X(01).
05	APPLICATION--DATE	PIC X(02).
05	RETIREMENT--DATE	PIC X(02).
05	DEATH--DATE	PIC X(02).
05	CONTRIBUTION--FACTOR--SUM	PIC S9(05)V99 COMP-3.
05	AVERAGE--MONTHLY--WAGE	PIC S9(05) COMP-3.
05	BONUS--AMOUNT	PIC S9(05)V99 COMP-3.
05	ELIGIBILITY--CODE	PIC X(03).
05	DISABILITY--PERCENTAGE	PIC S9(03) COMP-3.
05	FIFTH--COMMITTEE--DATE	PIC X(02).
05	BASE--BENEFIT--AMT	PIC S9(05)V99 COMP-3.
05	TOTAL--BENEFIT--AMT	PIC S9(05)V99 COMP-3.
05	AUDITOR--SIN	PIC S9(09) COMP.
05	UPDATE--COUNT	PIC S9(01).
05	DISABILITY--REASON--CODE	PIC X(01).
05	DEATH--REASON--CODE	PIC X(01).
05	PENSION--SUSPENSION--REASON	PIC X(01).
05	PENSION--SUSPENSION--DATE	PIC X(02).
05	INITIAL--BENEFICIARY--CASE.	
10	INITIAL--SPOUSE--COUNT	PIC 9(01).
10	INITIAL--CHILD--COUNT	PIC 9(02).
10	INITIAL--PARENT--COUNT	PIC 9(01).
10	INITIAL--SIBLING--COUNT	PIC 9(02).
01	SUPPLEMENT.	
*	SIZE = 11 BYTES	
05	SUPPLEMENT--KEY.	
10	SUPPLEMENT--EFFECTIVE--DATE	PIC X(02).
05	SUPPLEMENT--TYPE	PIC X(02).
05	SUPPLEMENT--AMT	PIC S9(05)V99 COMP-3.
05	SUPPLEMENT--CODE	PIC X(03).

AUTOMATED SOCIAL INSURANCE SYSTEM (AESIS)

SOCIAL INSURANCE DATABASE
(CONTINUED)

01 BENEFICIARY-AND-LEGAL-HEIR.
* SIZE = 40 BYTES
05 BENEFICIARY-LEGAL-HEIR-SIN PIC 9(09) COMP.
05 RELATIONSHIP PIC X(01).
05 RECIPIENT-SIN PIC 9(09) COMP.
05 PENSION-SHARE PIC S9(03)V99 COMP-3.
05 OTHER-INCOME-TYPE PIC X(01).
05 OTHER-INCOME-AMT PIC S9(03)V99 CPMP-3.
05 SUSPENDED-PENSION-SHARE-AMT PIC S9(03)V99 COMP-3.
05 SUSPENDED-SHARE-REASON PIC X(01).
05 MARRIAGE-DATE PIC X(02).
05 WIDOWED-DIVORCED-DATE PIC X(02).
05 PREGNANCY-CODE PIC X(01).
05 EDUCATION-END-DATE PIC X(02).
05 DISABILITY-CODE PIC X(03).
05 BENEFITS-AFTER-DEATH-FLAG PIC X(01).
05 INVOLITARY-DIVORCE-FLAG PIC X(01).
05 MARRIAGE-GRANT-AMT PIC X(01).
05 SUSPENSION-REPAY-AMT PIC S9(03)V99 COMP-3.
05 SUSPENSION-REPAY-REASON PIC X(01).
05 SUSPENSION-REPAY-DATE PIC X(02).
05 OTHER-PENSION-FLAG PIC X(01).

7.8.6 CURRENT ACCOUNTS DATABASE

OVERVIEW:

One of the major functions of AESIS is to collect revenue from individuals and employers that participate in the social insurance system. The Current Accounts Database is used to record and control accounts receivable activity.

Under each of the social insurance laws, provisions are made so that SIO and PIO can collect revenue to support the social insurance system. Generally, employers are responsible to directly pay social insurance contributions for their employees or deduct such payments from the employee's salary. Other law/sector situations require different collection methods.

Prior to being added to this database the employer or individual must be registered (reside on the National Employer or National Individual Database respectively).

PURPOSE:

The major purpose of the current Accounts Database within AESIS are:

- o To accurately record current social insurance contribution amounts required from employers or

individuals. Contribution payments are generally on a monthly basis with variations depending on law and sector.

- o To accurately record current payment events.
- o To otherwise record the current account status.
- o Provides data storage for installment payments.
- o To provide the cross reference to current employees for employers.
- o This database is a subsidiary ledger to the General Ledger.

PHYSICAL DATABASE CONSIDERATIONS:

The Current Accounts Database will be a dynamic database with regular posting events occurring throughout the monthly billing cycle. Rapid access to current account status is required to support client inquiries and on-line posting references. Approximately 1,000,000 employers and individuals will be referenced in this database.

AUTOMATED SOCIAL INSURANCE SYSTEM (AESIS)

CURRENT ACCOUNTS DATABASE

```

01 CURRENT-ACCOUNTS-ROOT.
*   SIZE = 4 BYTES
    05 CURRENT-ACCOUNTS-ROOT-KEY.
      10 BIN-OR-SIN
                                           PIC 9(09) COMP.

01 AR-ACCOUNT-STATUS.
*   SIZE = 25 BYTES
    05 AR-ACCOUNT-STATUS-KEY.
      10 START-OF-MONTH-DATE
                                           PIC X(02).
    05 NUMBER-OF-TRANSACTIONS
                                           PIC 9(05) COMP-3.
    05 PRIOR-BALANCE-AMT
                                           PIC S9(07)V99 COMP-3.
    05 TOTAL-MONTHLY-CONTRIBUTION-AMT
                                           PIC S9(07)V99 COMP-3.
    05 PAYMENTS-RECEIVED-AMT
                                           PIC S9(07)V99 COMP-3.
    05 CURRENT-MONTH-BALANCE-AMT
                                           PIC S9(07)V99 COMP-3.

01 AR-TRANSACTION-SUMMARY.
*   SIZE = 10 BYTES
    05 AR-TRANSACTION-SUMMARY-KEY.
      10 TRANSACTION-TYPE
                                           PIC X(01).
      10 TRANSACTION-CODE
                                           PIC 9(02).
    05 TOTAL-NET-EFFECT-AMT
                                           PIC S9(07)V99 COMP-3.
    05 STOP-DATE
                                           PIC X(02).

01 AR-INSTALLMENT-PAYMENT.
*   SIZE = 18 BYTES
    05 INSTALLMENT-PAYMENT-KEY.
      10 INSTALLMENT-START-DATE
                                           PIC X(02).
    07 ORIGINAL-AMOUNT
                                           PIC S9(07)V99 COMP-3.
    07 CURRENT-UNPAID-BALANCE
                                           PIC S9(07)V99 COMP-3.
    07 MONTHLY-PAYMENT-AMOUNT
                                           PIC S9(07)V99 COMP-3.
    05 INSTALLMENT-STATUS-FLAG
                                           PIC X(01).

01 EMPLOYEE-CROSS-REFERENCE.
*   SIZE = 4 BYTES
    05 EMPLOYEE-CROSS-REFERENCE-KEY.
      10 INDIVIDUAL-SIN
                                           PIC 9(09) COMP.

```

7.8.7 RECIPIENT ACCOUNTS PAYABLE DATABASE

OVERVIEW:

One of the major functions of AESIS is to accurately disburse benefit payments of the social insurance system to those individuals that are legally due those benefits. The person due the benefit is sometimes not able to directly collect the payment due to an infirmity, youth, inconvenience or some other authorized reason. In such cases, the person that collects the payment on behalf of the person due the payment is referred to as the "recipient." The Recipient Accounts Payable Database is used to record and control all benefit payment activity either directly to the individual due the payment or to the authorized recipient for the person due.

Prior to being referenced on this database as a recipient, an individual must be registered (on the National Individuals Database).

PURPOSE:

The main purposes of the Recipient Accounts Payable Database within AESIS are:

- o To record the current status of Accounts Payable to individuals due social insurance benefits.

- o To provide a summary of current month transactions that effect Accounts Payable.
- o To maintain the relationship between recipients and the individuals due the benefit payments.
- o This database is a subsidiary ledger to the General Ledger.

PHYSICAL STORAGE CONSIDERATIONS:

The data in the Recipient Accounts Payable Database will be dynamic with update activity being posted regularly by a batch Accounting Transaction Processing program. Approximately 4,000,000 payment events will be processed per month.

AUTOMATED SOCIAL INSURANCE SYSTEM (AESIS)

RECIPIENT ACCOUNTS PAYABLE DATABASE

01	RECIPIENT-AP-ROOT.		
*	SIZE = 4 BYTES		
05	RECIPIENT-AP-ROOT-KEY.		
	10 RECEIVER-SIN		PIC 9(09) COMP.
01	AP-ACCOUNT-STATUS.		
*	SIZE = 25 BYTES		
05	AP-ACCOUNT-STATUS-KEY.		
	10 START-OF-MONTH-DATE		PIC X(02).
05	NUMBER-OF-TRANSACTIONS		PIC 9(05) COMP-3.
05	PRIOR-BALANCE-AMT		PIC S9(05)V99 COMP-3.
05	TOTAL-MONTHLY-BENEFIT-AMT		PIC S9(05)V99 COMP-3.
05	PAYMENTS-MADE-AMT		PIC S9(05)V99 COMP-3.
05	CURRENT-MONTH-BALANCE-AMT		PIC S9(05)V99 COMP-3.
01	AP-TRANSACTION-SUMMARY.		
*	SIZE = 10 BYTES		
05	AP-TRANSACTION-SUMMARY-KEY.		
	10 TRANSACTION-TYPE		PIC X(01).
	10 TRANSACTION-CODE		PIC 9(02).
05	TOTAL-NET-EFFECT-AMT		PIC S9(05)V99 COMP-3.
05	STOP-DATE		PIC X(02).
01	RECIPIENT-SOURCE-SIN-SEG.		
*	SIZE = 4 BYTES		
05	RECIPIENT-SOURCE-SIN-KEY.		
	10 INDIVIDUAL-SIN		PIC 9(09) COMP.

7.8.8 CURRENT ACCOUNTING TRANSACTION FILE

OVERVIEW:

The Current Accounting Transaction File is the interface between the Accounting System and the other systems and subsystems of AESIS. When a program in an operational support subsystem processes a transaction that has an impact on the current accounting status, one or more Accounting Transactions are added to this file which will subsequently cause the accounting effect to be posted to the appropriate subsidiary ledgers and the General Ledgers.

PURPOSE:

The major purposes of the Current Accounting Transaction File within the system are:

- o To provide for a uniform interface to the Accounting System.
- o To allow the accounting effect of an on-line transaction to be posted in a batch manner.

PHYSICAL STORAGE CONSIDERATIONS:

The Current Accounting Transaction File will hold all of the detailed Accounting Transactions generated in a single processing day, or approximately 400,000 records. It must be on-line during the day for access by the on-line transaction.

AUTOMATED SOCIAL INSURANCE SYSTEM (AESIS)

CURRENT ACCOUNTING TRANSACTION FILE

01 CURRENT-ACCT-XACT-REC.
* SIZE = 42 BYTES
05 REGION-CODE PIC 9(02).
05 LOCAL-OFFICE-CODE PIC 9(02).
05 LAW-SECTOR-CODE PIC X(01).
05 TRANSACTION-CODE PIC 9(02).
05 APPROVAL-SIN PIC 9(09) COMP.
05 PROCESS-DATE PIC X(02).
05 GENERATING-PROGRAM-ID PIC X(08).
05 RESPONSIBLE-SIN-OR-BIN PIC 9(09) COMP.
05 REFERENCE-SIN PIC 9(09) COMP.
05 REFERENCE-DOCUMENT-CONTROL-NBR PIC 9(09) COMP.
05 REFERENCE-DOCUMENT-DATE PIC X(02).
05 EFFECTIVE-DATE PIC X(02).
05 TRANSACTION-NET-AMT PIC S9(07)V99 COMP-3.

7.8.9 DETAILED TRANSACTION JOURNAL FILE

OVERVIEW:

The Detailed Transaction Journal File is used to hold the accumulated Accounting Transaction Records.

PURPOSE:

The Detailed Transaction Journal File has the following main purposes within the system:

- o To support general audit activities by providing a detailed audit trail of all of the accounting events within the system.
- o To support statistical analysis of AESIS transaction load.

PHYSICAL STORAGE CONSIDERATIONS:

The Detailed Transaction Journal File is a sequential file that will most probably be stored on magnetic tape. With an estimate of 12,000,000 Accounting Transactions per month, a file that held an entire years worth of detailed transactions would have 144,000,000 records.

AUTOMATED SOCIAL INSURANCE SYSTEM (AESIS)

DETAIL TRANSACTION JOURNAL FILE

01 DETAIL-XACT-JOURNAL-REC.
* SIZE = 42 BYTES
05 REGION-CODE PIC 9(02).
05 LOCAL-OFFICE-CODE PIC 9(02).
05 LAW-SECTOR-CODE PIC X(01).
05 TRANSACTION-CODE PIC 9(02).
05 APPROVAL-SIN PIC 9(09) COMP.
05 PROCESS-DATE PIC X(02).
05 GENERATING-PROGRAM-ID PIC X(08).
05 RESPONSIBLE-SIN-OR-BIN PIC 9(09) COMP.
05 REFERENCE-SIN PIC 9(09) COMP.
05 REFERENCE-DOCUMENT-CONTROL-NBR PIC 9(09) COMP.
05 REFERENCE-DOCUMENT-DATE PIC X(02).
05 EFFECTIVE-DATE PIC X(02).
05 TRANSACTION-NET-AMT PIC S9(07)V99 COMP-3.
05 DB-ACCOUNT-NBR PIC 9(07) COMP.
05 CR-ACCOUNT-NBR PIC 9(07) COMP.

7.8.10 GENERAL LEDGER DATABASE

OVERVIEW:

The General Ledger Database is used to record accounting activity at the summary level for every Local Office in Egypt. The standard double entry T-account ledger approach is used so that the General Ledger will be self-balancing. There will also be consolidated accounts at the SIO and PIO headquarters levels.

Accounting activities are recorded in the General Ledger as a result of processing the Current Accounting Transaction File. As the subsidiary ledgers are updated to reflect the changes resulting from the transactions, the appropriate General Ledger accounts are posted. The Current Accounting Transactions are then appended to the Detailed Transaction Journal File.

PURPOSE:

The General Ledger Database has the following main purposes within the system:

- o To provide current summary status amounts by significant accounting categories.

- o To provide summary audit control amounts for the detailed amounts in the subsidiary ledgers (Current Accounts Database and Recipient Accounts Payable Database).
- o To support management reporting requirements with regard to the financial status of SIO and PIO, and their Local offices.

PHYSICAL STORAGE CONSIDERATIONS:

Accounts are maintained at the "Local Office" level where the term Local Office is defined as:

- o A local office of SIO
- o A Government Organization of PIO
- o SIO Headquarters administrative accounts
- o PIO Headquarters administrative accounts.

The term "Local Office" is used to refer to any discrete organizational unit for which independent accounting records need to be maintained in the centralized system. Consolidations are provided at the Regional and SIO/PIO headquarters levels.

Accounts will be maintained at the Local Office level by month with 12 months of data being stored on-line. The resulting record count can be approximated by:

**NUMBER OF
LOCAL OFFICES**

400

X

**NUMBER OF
ACCOUNTS**

200

X

**NUMBER OF
MONTHS**

12

TOTAL

960,000

AUTOMATED SOCIAL INSURANCE SYSTEM (AESIS)

GENERAL LEDGER DATABASE

```

01 GENERAL-LEDGER-ROOT.
*   SIZE = 42 BYTES
05 GENERAL-LEDGER-ROOT-KEY.
    10 REGION-CODE PIC 9(02).
    10 LOCAL-OFFICE-CODE PIC 9(02).
    10 GENERAL-LEDGER-ACCOUNT-NUMBER PIC 9(07) COMP.
    10 START-OF-MONTH-DATE PIC X(02).
05 BEGINNING-BALANCE.
    10 BEGINNING-BALANCE-DR PIC S9(13)V99 COMP-3.
    10 BEGINNING-BALANCE-CR PIC S9(13)V99 COMP-3.
05 ADJUSTMENTS.
    10 ADJUSTMENTS-NBR-OF-XACT PIC 9(07) COMP.
    10 ADJUSTMENTS-DR PIC S9(13)V99 COMP-3.
    10 ADJUSTMENTS-CR PIC S9(13)V99 COMP-3.
05 CURRENT-XACT.
    10 CURRENT-XACT-NBR-OF-XACT PIC 9(07) COMP.
    10 CURRENT-XACT-DR PIC S9(13)V99 COMP-3.
    10 CURRENT-XACT-CR PIC S9(13)V99 COMP-3.
05 ENDING-BALANCE.
    10 ENDING-BALANCE-DR PIC S9(13)V99 COMP-3.
    10 ENDING-BALANCE-CR PIC S9(13)V99 COMP-3.

```

7.9.1 DESIGN CONSIDERATIONS

SYSTEM ENVIRONMENT

The Automated Egyptian Social Insurance System (AESIS) is designed to directly support the operations of the Social Insurance Organization (SIO) and the Pension Insurance Organization (PIO). Listed below, are the general characteristics of the system environment.

- o Dual Processing Sites - SIO and PIO each have separate data processing centers for running their respective portions of AESIS. The interrelationships between the two major processing sites require that certain data be shared between the sites, without interfering with the autonomous nature of the two organizations.

- o Centralized Processing - Certain functions within AESIS require centralized processing, such as:
 - Registration Duplication Check
 - Accounting Audit Control
 - Management Reporting.

- o Off-line Local Processing - Where possible, and possibly as a temporary measure, it is desirable to have local offices of SIO and PIO conduct their day-

to-day business with their own local processing capability, without immediate access to the centralized systems. The interrelationship between the local office systems and the central sites require regular data transfer between local offices and headquarters and vice-versa.

- o Large_Volume - The total data storage requirement for SIO and PIO represents a very large volume of data. For design purposes, the following sizing data requirements have been used:

- Individuals Registered - 20,000,000
- Employers Registered - 1,000,000
- Individuals Covered - 12,000,000
- Individuals Receiving Benefits - 4,000,000
- Billing events per month - 1,000,000
- Billing transactions per month - 6,000,000
- Payments made per month - 4,000,000
- Cashiering Transactions per month - 2,000,000
- Accounting Transactions per month - 13,000,000

7.9.2 MAJOR PROCESSING REQUIREMENTS

Listed below are the major processing requirements of the centralized system which influence the design of the database:

- o The data base design must support required application processing.
- o The bulk of the data storage required to support AESIS may need to be partitioned into physical databases or data set groups of manageable sizes. Manageable sizes can be defined as:
 - Less than 200 MB - Static Data
 - Less than 100 MB - Semi-volatile Data
 - Less than 50 MB - Dynamic Data.
- o The stored data needs to accommodate routine database maintenance procedures.
- o The stored data needs to accommodate database redefinition and structural changes to the data storage approach based on law changes and management directives.
- o The database approach must accommodate database recovery.

Major application area requirements are listed below:

- o Registration
 - Support on-line registration of Individuals and Employers
 - Support of on-line duplication check by name
 - Support processing by Coverage, Benefits, and Accounting

- o Coverage
 - Support on-line Coverage processing
 - Support monthly billing of Employers and Individuals
 - Support benefits determination and calculation

- o Benefits
 - Support on-line benefits processing
 - Support Benefits payment activities

- o Accounting
 - Support all accounting functions
 - .. Accounts Receivable
 - .. Accounts Payable
 - .. General Ledger
 - .. Budget
 - .. Revenue/Expense Reporting
 - .. Balance Sheet Reporting

7.9.3 DATA STORAGE CONSIDERATIONS

The primary considerations for data storage for AESIS are presented below:

- o Size - the amount of data required to be on-line is extremely large
- o Volatility - data storage requirements have been divided into:
 - Static - Basically stable over time. Some on-line maintenance required but only on a relatively small percentage of the data at any one time.
 - Semi-Volatile - Data requiring regular maintenance but on a small to medium level.
 - Dynamic - Data requiring a high level of change on a continuing basis.

7.9.4 DATA BASE DESIGN APPROACH CONSIDERATIONS

The overall requirements of the data base design must include all functions performed for the AESIS as follows:

- o Initial Registration of Individuals and Employers once and only once - Registration Subsystems
- o Application, Calculation and maintenance of the individual insurance data and business and individual insurance contributions - Coverage Subsystems
- o Application, Calculation and maintenance of individual benefits and payments of benefits - Benefits Subsystems
- o Total administrative management and accounting for all transactions by Law, Sector, and local office - Accounting Subsystems.

To design a data base to provide the above functions, a logical view of the mission of the MSI must be viewed conceptually. This conceptual view can be logically presented, as in Exhibit I following this page.

EXHIBIT I

LAW/SECTOR

**EMPLOYERS
BIN**

**INDIVIDUALS
SIN**

INSURED DATA

**TEMPORARY
BENEFITS**

PENSION DATA

RECEIVERS

LOAN SEG COVERAGE SEG OTHER SEG

BENEFICIARIES

12/13

Several problems occur when one tries to apply the functions required by AESIS in this design. The most important of these problems is in the primary responsibility of issuing an Identification Card (SIN) to one individual only once. To ensure that one ID card is issued to one individual once, an entire scan of all individuals within all employers within all laws and sectors would be required and this is not acceptable.

The solution to this requires that the Law/Sector and Employer must be separated from the individual into a unique data base. It also requires a secondary key under DL/I of the name for the individual in order to perform the duplication check. Several advantages and disadvantages exist to using the DL/I secondary key but all advantages can be retained if a National Individual Names Data base is created in conjunction with the individuals data base. This will provide all the capabilities of a secondary key plus additional control information for the individual which will minimize impact on additional application programs. The logical view of this data base structure is presented in Exhibit II, following this page.

This structure represents a logical data base design which functionally meets the requirements of the IS system.

EXHIBIT II

LAW/SECTORS

EMPLOYER D.B.
(BIN)

NATIONAL
INDIVIDUALS
(SIN)

NATIONAL NAMES
D.B.
(NAME) SIN

CURRENT
ACCOUNTS

SIN CROSS
REF

INSURED DATA

TEMPORARY
BENEFITS

PENSION DATA

RECEIVERS

LOAN SEG

COVERAGE SEG

OTHER SEG

BENEFICIARIES

7.9.5 AESIS DATA BASE DESIGN TRADEOFFS

On the following pages, three examples of possible database approaches are presented in order to compare the features of different design concepts. The three segments used are simplifications of the actual storage structure required and the database sizing data are only indicative of the sizes involved, not actual size.

For the purposes of the AESIS database design, Case II provides the most flexible model for implementation, operations and maintenance with a very small loss in DBMS maintained relationships over and above the limitations that are required in order to have a feasible design.

CASE I: MONOLITHIC STRUCTURE

The structure presented below represents a single physical database that holds all data for all individuals participating in the social insurance system.

SIN

INDIVIDUAL DATA	20M X 170 bytes = 3,400M bytes
--------------------	-----------------------------------

5,360M bytes

COVERAGE DATA	BENEFIT DATA
12M X 130 bytes 1,560M bytes	4M X 100 bytes 400M bytes

1. Not feasible as a single database since it is too large. It would not be possible to reorganize and otherwise maintain the database in a timely fashion even though the data could be physically stored in one database.
2. However there are advantage of general structure:
 - DL/I maintains relationships between the three segment types.
 - Only one data structure to define and maintain.
3. Additional disadvantages of general structure:
 - Database resizing or structural change requires the reorganization of the entire database.
 - It does not make it easy to treat different segments of the insured population differently depending on their level of database activity.
 - It does not facilitate easy change to structure caused by Law changes.

CASE II: PARTITIONED STRUCTURE

The structure presented below represents multiple physical databases, all with the same logical structure.

1 LOGICAL DATA BASE
20 PHYSICAL DATA BASES

SIN

INDIVIDUAL
DATA

500K X 170 bytes
= 85M bytes

144M bytes
each

COVERAGE
DATA

BENEFIT
DATA

300K X 130 bytes
39M bytes

200K X 100 bytes
20M bytes

1. This approach would be feasible to implement since total data storage for each database is reasonable.
2. Advantages of structure:
 - DL/I maintains relationships between the three segment types.
 - Only one logical structure to define.
 - The impact of partitioning could be minimized for on-line programs that reference a single database record at a time.
 - Database resizing can be accomplished at the physical database level.
3. Disadvantages of the structure:
 - Somewhat limited utility remains for DL/I logical relationships and secondary indexes since the database is partitioned. However, each partitioned database may take advantage of the DL/I logical

relationships and secondary indexes with minimal additional application programming being required to treat the entire structure as a single database.

- The entire store of data would have to be reorganized to implement a data structure change, however this could be accomplished over a period of several days, by reorganizing a few databases each night.
- There would be a small additional application software burden to identify the correct databases to access.

CASE III: PARTITIONED_STRUCTURE/SEPARATE_SEGMENTS

The structure represented below is an extension of case II, with each major grouping of data divided into its own data structure.

SIN	SIN	SIN
INDIVIDUAL DATA	COVERAGE DATA	BENEFIT DATA
20 databases 1M X 170 bytes 170M bytes	12 databases 1M X 130 bytes 130M bytes	8 databases 1M X 100 bytes 100M bytes

1. This approach would be feasible to implement since total data storage for each database is reasonable.
2. Advantage of structure:
 - Each database type could be separately maintained without impact to other segment type databases.
 - Database resizing can be accomplished at the physical database level.
 - Easier to apply appropriate access technique to each database type.
 - Faster access to the data when only a subset is required.
 - Less contention for a single logical structure.
3. Disadvantages of structure:
 - Very little utility remains for DL/I logical relationships and secondary indexes.
 - Some additional application burden although minimal, to address correct physical database for a given SIN.
 - Additional application burden to maintain the relationship between the three segment types.