ASSUMPTION UNIVERSITY

SALES AND MARKETING MANAGEMENT SYSTEM

by

RONALD THOMAS SARGEANT

Final Report of the Three - Credit Course
CS 6998 System Development Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer Information Systems
Assumption University

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PROJECT TITLE	COMPUTER INFORMATION SYSTEM FOR SALES AND MARKETING MANAGEMENT.
NAME	RON SARGEANT
PROJECT ADVISOR	ASSOCIATE PROFESSOR DR. KANCHIT MALAIVONGS
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The Graduate School of Assumption University had approved this final report of the three-credit course, CS 6998 System development Project, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer Information Systems.

Approval Committee:

(Assoc. Prof. Dr. Kanchit Malaivongs)
Advisor

(Prof. Dr. Srisakdi Charmonman)
Member

(Dr. Buranawong Sowaprux)
Member

(Dr. Sudhiporn Patumtaewapibal)
Member

(Assoc.Prof.Somchai Thayarnyong)
Member

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PART 1. EXECUTIVE SUMMARY.

1. SYSTEM OVERVIEW.

The system developed provides management with an effective and efficient means of monitoring (and controlling) the sales activities in a typical high technology project oriented sales environment.

In particular, the system has been developed to meet the needs of the IBM compatible equipment distributors in the mainframe and midrange market. Vendors of such equipment include Memorex Telex, Storage Technology, McData, Amdahl, Hitachi Data Systems, Genicom and EMC to name a few of the larger and better known companies.

By and large, this market is very competitive, and often the users are looking for a solution to a problem, not just another piece of hardware, at a less expensive price. Accordingly, any sales plan is to consider the existing configuration, system software in use and nature of the problem.

The system itself has its roots in the early manual sales forecasting system of 1980 in Memorex (Australia) Pty. Ltd. Since that time little has changed and the manual system has been implemented throughout the Asia Pacific operations of the now Memorex Telex Corp.as well as its distributors.

While the system hasn't changed, the competition has. Newcomers have entered the market and IBM now has a more aggressive pricing policy.

The system provides management and indeed the entire sales organization with the following functionality via an interactive terminal :

1. Access to full customer configuration details.
2. Access to details of each customer call by a sales person.
3. Access to forecasts from the time of initial forecast to becoming an order.

From the above, and in conjunction with the product information, the following information may be deduced :

1. Achievement by sales person against target.
2. Achievement of company against target by product group.
3. Exception reporting on non-standard price sales.
4. Sales forecast.
5. Revenue forecasts.

2. BENEFITS

The major tangible benefit is the savings of time spent by the various personnel involved in the sales and marketing function. The time saved results from automating the information access, manipulation, summarization and reporting of sales related information.

Currently all information is maintained manually on sheets of paper.

However, apart from this tangible benefit, estimated to be Baht 131,712 per month, the real benefits are intangible. These intangible benefits, include those derived from tight control of the sales activities of each prospective customer and the strategic direction of the sales organization. The strategic direction is elaborated upon in Section 3, Future Expansion.

Probably of less strategic importance, but nevertheless worthy of mention, are the benefits to users outside the area of the sales organization, namely Finance and Logistics. The availability of the sales forecast information to these business units facilitate more efficient and effective planning.

It is expected that quite apart form the core issues of efficiency and effectiveness, the real immediate benefit will be increased sales.

3. FUTURE EXPANSION

The areas of future expansion include :

- Automated links to the corporate financial model.
- An Expert System to provide configuration assistance to the sales people.

This latter topic will assist the sales people in configuring and proposing various alternatives. The benefit of this will be to ultimately allow sales representatives to configure sophisticated solutions in the prospects' office without the need for an experienced System Engineer to be on hand. Thus, better resource utilization of System Engineers time and a more through knowledge of the prospects problems will result. This will alleviate the constant pressure to recruit and hire senior technical staff and at the same time allow the prospect to experiment with alternative configurations in an interactive environment.

PART 2 TECHNICAL DESCRIPTION.

1. INTRODUCTION.

1.1 BACKGROUND.

The system has its origin in Memorex (Australia) Pty. Ltd. company some eight (8) years ago. A manual system was implemented with the local sales force and the two distributors namely, Western Australia and New Zealand being coaxed to follow the same "Sales Reporting Procedures". Since that time the two (2) above mentioned distributors have become fully owned subsidiaries along with subsidiaries in Singapore, Hong Kong and Taiwan. Distributors operate in Indonesia, Malaysia, Thailand, Philippines, Korea and India. The South East Asian distributors report to the Far East Operations headquarters in Singapore. The "Sales Reporting Procedures" of eight years ago were implemented in each of the above subsidiaries and distributors. This was partly because the initial staff came from the Australian Operations and because the Asia-Pacific headquarters are based in Sydney. The "Sales Reporting Procedures" never really changed. The only computerisation has been to use Lotus 123 for data manipulation, database management and reporting.

Over the years Memorex has undergone many changes as indeed has the marketplace in which it operates. Memorex merged with Telex Corporation which was a strong competitor. Thus Memorex Telex Corporation is now a much larger company with revenues well over two billion dollars US. The emphasis of the company has also changed from a manufacturing organisation to a trading/sales organisation. Apart from IBM compatible cluster controllers and terminals, all products are OEM manufactured and badged "MEMOREX TELEX".

With the change in emphasis and general growth and competitiveness, a much more sophisticated system is required. One which will not only fit the in house needs, but also the needs of the distributor network.

1.2 SYSTEM OVERVIEW.

The Marketing & Sales System provides the management with a tool to monitor the sales staff's activities and performance. Part and parcel of this system are facilities to project sales revenue and monitor customers' computerisation activities. The system embraces a user friendly menu driven approach and facilitates both on-line interactive processing as well as batch mode reporting production. In essence the system is a tool for management by providing supporting information on various decision making activities.

It is anticipated that a future module will embrace an Expert System to provide competitive upgrade proposals. This current system supports the future A.I. module by providing the necessary data base of customer information. As an example, consider the following:

Customer "A" has a 4381 running VSE and requires more DASD. On investigation (from a prepared checklist) the salesperson discovers that the customer is also experiencing response problems and the cpu is paging at a rate of 160 pages/sec. The A.I. module might therefore suggest a Solid State Disk. This would overcome the performance degradation due to the paging and at the same time release 3380 DASD for conventional data sets.

Security of the system is considered having regard to the detailed coverage of the kinds of Security Breaches on page 3 of Ref.4.

1.3 OVERVIEW OF DESIGN PHILOSOPHY.

The overall design philosophy of the system is based on the principles of "Structured Analysis and Design" following a development life cycle which includes prototyping.

The system has been segmented into a set of functionally cohesive modules with interfaces kept as narrow as possible. As an aid to accomplishing this, IBM's Business System Planning Model was used where it was found to be applicable and practical.

The programming language used is VS Cobol II. The actual compiler used for initial program development is Microsoft Cobol V2.2. The language extensions implemented in MS Cobol 2.2 and features outside of the ANSI standard have been avoided where possible. This is to facilitate ease of implementation under MVS on an Amdahl mainframe.

The use of Cobol 2.2 provides an easy to use, though verbose, means of handling screen input and output and at the same time permits chaining back to the immediate chain program link. Although the compiler is not an optimising compiler, it provides a very suitable platform for prototyping. (Note 1)

The user friendly interface is facilitated by menu driven selection of facilities. Computer generated prompts guide the user through the screen.

The file Management System employed is one made up of sequential, ISAM and inverted ISAM files. Although a data management package or database management package has not been used, there has nevertheless been an attempt to resolve the problems associated with implementation of such a package by :

1. Each file containing only one record type. That is all records on any given file have the same format

2. All records within any given file are of a fixed record length.

3. Repeating groups have been eliminated.

System controls include mechanisms to protect against un-authorized access and audit trails are provided by way of a simple form of checksum on all files. These safeguards protect the system from all but skilled technical personnel.

Note 1 Ref.7 "Information Processing Today with Application Update on page 264 discusses the justification for COBOL in an article on Programming Languages.

2. SCOPE.

The scope of the system embraces Sales Prospectin g, Forecasting and Proposal Production System for a distr ibutor of IBM compatible mainframe peripheral equipment such as the operations of a Memorex Telex and/or Amdahl subsidiary or dis tributor.

Salespeople are responsible for calling on prospects on a regular basis to ascertain needs and wants and other sales information such as:

1. Pending new equipment acquisition
2. Equipment replacement plans
3. Equipment upgrade plans
4. Budgets
5. Timing for (1-3) above
6. Support requirements
7. Establish company and product differentiation
8. Conduct presentations
9. Prepare and present proposals

The system includes modules to cater for the following business functions:

1. Monitor customer calls in terms of frequency of calls and objective for calls
2. Monitor salesmen's achievement against target.
3. Monitor customer configuration changes.
4. Forecast orders and revenue.
5. Monitor proposal pricing.

3. OBJECTIVE.

The objective of the system is to:

Eliminate the weaknesses and lack of compliance controls in the manual system.

Examine the informational needs of sales and marketing management and the sales team by providing :

1. Guidance to the salesman where to call based on date of last call and activity in the particular account.

2. Provide configuration assistance and pricing for the range of products and services being offered.

3. Prepare sales forecasts.

4. Prepare company sales plans (budgets).

5. Automate the time consuming, redundant and error-prone process of manually reviewing and summarising sales activity information.

4. SYSTEM REQUIREMENTS.

4.1 GENERAL.

The system is required to maintain and provide on an ad-hoc basis by both on-line interactive access and batch style reporting, information in the following areas.

- Customer Details.
- Product Information.
- Forecast and Order Information.
- Sales Staff Information.
- Sales Activity details.

Within each of the above areas, the information required to be maintained along with any constraints is discussed below. (Note 2).

Note 2. Refer to Appendix A. Interview Notes.

4.2 CUSTOMER DETAILS

Processing of customer details is to include the following facilities:

1 Print Customer Listing including configuration.
(either whole file between range list of customers)

2 Display customer information on screen.

3 Create new customer details.

4 Modify existing customer detail.

5 Delete customer.

For each customer, the following information is required:

- Any customer identification should convey meaning and not be a meaningless numeric identifier which is used only for the sake of computer programming.
- Customer Name. The name, although usually alphabetic in nature may in fact contain numeric characters and even some special characters. Examples are "3M Company" and "Pearl & Dean". The maximum size to be catered for is to be thirty-two (32) characters.
- Customer Address. The address is to be split into three (3) lines. Each line may contain alpha numeric information along with such special characters as "/". The first and second lines are to cater for twenty-four (24) characters. The third line is to cater for sixteen (16) characters.
- Post Code is a five (5) digit numeric field.
- Telephone number is a seven (7) digit numeric field.
- Fax number is a seven (7) digit numeric field.
- Key Employee details for which there may be only a few or many, depending on the company should contain employee name of thirty-two (32) characters (alplabetic), position within the company which will contain sixteen (16) characters (alpha) and direct phone number.

Configuration details refers to the list of installed equipment. The equipment is to be listed under the following categories:

- Central Processing Unit (CPU).
- Operating System (OS).
- Disk Controllers and Drives (DASD).
- Magnetic Tapes and Tape Cartridges and associated Controllers.
- System Line Printers (LP).
- Communications Equipment including Front End Processors, Cluster Controllers, Terminals, Terminal Printers and other devices such as LANs.

4.3 PRODUCT INFORMATION.

Processing of the product information is to facilitate the following:

1 Print product information.
2 Display product information.
3 Add new products.
4 Modify existing product information.
5 Delete product.

For each product, whether it be hardware, software or service, the following information is required.

- Vendor. The vendor identification may be the name or initials where the initials are unambiguous. This field is to cater for eight (8) alpha/numeric characters.

- Product number. The product number may include a mixture of alphabetic and numeric characters and may be up to ten (10) characters in length.

- Product description is an alpha numeric field which may be up to sixteen character in length.

- Cost. This field contains the distributor's or subsidiary's cost price (into stock) from the vendor or the manufacturing facility as the case may be.

- List Price (in Baht). This field is the list price of the product. This is the base price of all sales before any discount is applied.

- Warranty in months. The warranty period, expressed in months, is the period free of maintenance charges for which the product is fully covered for all parts and labour.

- Monthly Maintenance charges for prime shift (8 am to 6 pm). Any additional coverage over the "prime shift" has an uplift applied. A full 24 hour 7 days per week has an uplift of thirty-nine (39%) percent applied.

4.4 FORECAST & ORDER INFORMATION.

Processing of forecast and order information is to facilitate the following:

1 Print Forecast & Orders by period by salesman (mth. to mth)
2 Display Forecast & Orders by period by salesman (mth.to mth)
3 Print Forecast & Orders by product group by period.
4 Display Forecast & Orders by product group by period.
5 Create a new Forecast.
6 Delete a Forecast.
7 Modify a Forecast.
8 Change Forecast to Order.

Notes.
a) Sales - installed orders.
b) Backlog - signed but not installed (billed)
c) Forecast - expected orders (have probability)
d) Revenue Gap - (target - (a+b+c))

The information require to be held and displayed or printed includes the following:

- Salesman's Name.
- Date of Submission.
- Name of Reviewing Manager.
- Date of review.
- Customer Name.
- Product Number.
- Unit Price of product.
- Quantity of product forecast or ordered.
- Total Price.
- Sign Month.
- Install Month.
- Probability of prospect being an order, expressed as a percentage.
- Comments.

4.5 SALESMEN INFORMATION.

The processing of the salesmen's information is to include the following:

1. Print Salesmen's details.
2. Display Salesmen's details.
3. Create New Salesman data.
4. Modify Salesman Target, Name, Prod. group & Customer Name (correct spelling).
5. Delete Salesman data.

Addition to a new salesman is effected by the following steps :

1. On the main menu, select Salesmen Information.
2. On the secondary menu select the appropriate process required which may be one of :

   2.1 Print Salesman's details
   2.2 Display Salesman's details
   2.3 Create New Salesman
   2.4 Modify details

3. Printing may be actioned by selecting either :
   A single saleman number
   or
   A range of salesman numbers.
4. Display in actioned by entering a single saleman's number
5. In creating a new saleman record, the system is to generate a saleman's ID or number.
6. The information held on the file includes :
   - Name
   - Target
   - Product group
   - Customer group

4.6 SALES ACTIVITY & CUSTOMER INFORMATION.

The Sales Activtity and Customer Information process pertains to maintenance of a call report file, and the generation of action plans.

The call reports are in fact blocks of text which are input to the system from the salesmen's notes. As well as blocks of text, there is a requirement to keep action play information. This information is to include an action plan indicator and date by which the action must be performed.

Information must be capable of being recalled and either printed or displayed. Selective recall is to be provided for on the basis of any of the following :

1. Date of call or group of dates.
2. Customer or group of customers for date or group of dates
3. Salesman or group of salemen for a date or group of dates.

The following information is required to be maintained.

- Date of call
  Salesman idendification
  Customer number
- Text of meeting
- Action plan status
- Date of which action is to be completed.
-
-

5. BENEFIT ANALYSIS.

5.1 TANGIBLE BENEFITS.

The more obvious tangible benefits include time and consequently cost savings of all personnel concerned in the sales review and reporting system from the Executive Management down. The obviously related opportunity costs are ignored as these in part if not in full are to some extent subjective. They are however considered under the next section titled "Intangible Benefits".

The time save and the resulting costs saved by having automated analysis and reporting of sales activities may be categorised under the following major headings.

1 Sales Reviews with Sales Executives.
2 Customer Profile/Opportunity Identification.
3 Action Plan Formulation.
4 Management Review.
5 Order Forecasting.
6 Proposal Exception Reporting.
7 Revenue Forecasts.
8 Other.

For each of the above activities, savings are calculated for the following categories of personnel.

1 Executive Management.
2 Sales and Marketing Manager.
3 Account Manager.
4 Sales Executive.
5 Secretarial.

Monthly time and Related Cost Savings of Automated System.

5.1.1 Sales reviews with Sales Executives.

	TIME	RATE	DIR. COSTS	O/HEADS	TOTAL
EXECUTIVE DIRECTOR		1,000	0	0	0
SALES MANAGER	16	625	10,000	1,000	11,000
ACCOUNT MANAGER	24	450	10,800	1,080	11,880
SALES EXECUTIVE	8	312	2,496	250	2,746
SECRETARY	40	187	7,480	748	8,228

5.1.2 Customer Profile/Opportunity Identification.

	TIME	RATE	DIR.COSTS	O/HEADS	TOTAL
EXECUTIVE DIRECTOR	4	1,000	4,000	400	4,400
SALES MANAGER	8	625	5,000	500	5,500
ACCOUNT MANAGER	16	450	7,200	720	7,920
SALES EXECUTIVE		312	0	0	0
SECRETARY	8	187	1,496	150	1,646

5.1.3 Action Plan Formulation.

	TIME	RATE	DIR.COSTS	O/HEADS	TOTAL
EXECUTIVE DIRECTOR	2	1,000	2,000	200	2,200
SALES MANAGER	4	625	2,500	250	2,750
ACCOUNT MANAGER	8	450	3,600	360	3,960
SALES EXECUTIVE	4	312	1,248	125	1,373
SECRETARY	8	187	1,496	150	1,646

5.1.4 Management Review.

	TIME	RATE	DIR.COSTS	O/HEADS	TOTAL
EXECUTIVE DIRECTOR	4	1,000	4,000	400	4,400
SALES MANAGER	8	625	5,000	500	5,500
ACCOUNT MANAGER	8	450	3,600	360	3,960
SALES EXECUTIVE		312	0	0	0
SECRETARY	8	187	1,496	150	1,646

5.1.5 Order Forecasting.

	TIME	RATE	DIR.COSTS	O/HEADS	TOTAL
EXECUTIVE DIRECTOR	2	1,000	2,000	200	2,200
SALES MANAGER	4	625	2,500	250	2,750
ACCOUNT MANAGER	4	450	1,800	180	1,980
SALES EXECUTIVE		312	0	0	0
SECRETARY	8	187	1,496	150	1,646

5.1.6 Proposal Exception Reporting.

	TIME	RATE	DIR.COSTS	O/HEADS	TOTAL
EXECUTIVE DIRECTOR	8	1,000	8,000	800	8,800
SALES MANAGER	4	625	2,500	250	2,750
ACCOUNT MANAGER	4	450	1,800	180	1,980
SALES EXECUTIVE	2	312	624	62	686
SECRETARY	4	187	748	75	823

5.1.7 Revenue Forecasts.

	TIME	RATE	DIR.COSTS	O/HEADS	TOTAL
EXECUTIVE DIRECTOR	2	1,000	2,000	200	2,200
SALES MANAGER	4	625	2,500	250	2,750
ACCOUNT MANAGER	2	450	900	90	990
SALES EXECUTIVE		312	0	0	0
SECRETARY	20	187	3,740	374	4,114

5.1.8 Other.

	TIME	RATE	DIR. COSTS	O/HEADS	TOTAL
EXECUTIVE DIRECTOR	4	1,000	4,000	400	4,400
SALES MANAGER	8	625	5,000	500	5,500
ACCOUNT MANAGER	8	450	3,600	360	3,960
SALES EXECUTIVE	4	312	1,248	125	1,373
SECRETARY	10	187	1,870	187	2,057

5.1.9 Consolidated Summary.

	TIME	RATE	DIR. COSTS	O/HEADS	TOTAL
EXECUTIVE DIRECTOR	26	1,000	26,000	2,600	28,600
SALES MANAGER	56	625	35,000	3,500	38,500
ACCOUNT MANAGER	74	450	33,300	3,330	36,630
SALES EXECUTIVE	18	312	5,616	562	6,178
SECRETARY	106	187	19,822	1,982	21,804

TOTAL MONTHLY TIME RELATED COST SAVINGS _____ 131,712

Note 3. The above information was obtained from the interviewees. While this is their "best estimate", they felt, if anything, it was conservative.

5.2 INTANGIBLE BENEFITS.

The major of the intangible benefits is "Opportunity Time". This is really an over-generalisation as the opportunity time, that is the time saved is put to many and varied uses depending on the level of the staff position at which the time is saved. At the fundamental sales level, that is the position of the Sales Executive, more time is spent with the customer, at the Account Manager level more time is spent with the customer and developing tactical plans with the Sales Manager. At the level of the Sales Manager more effective time is spent developing strategic sales initiatives and high level customer contact. At the Executive Director level, more effective time is available for understanding the internal problems, associating these with the outside influences and developing corporate strategies that will produce a competitive advantage.

More effective time is available to devote to the more important and productive aspects of job responsibility and accountability. There are less errors made as a result of manual processing and less "forgotten" agendas. As well, increased productivity is a natural by-product of the computerised monitoring and reporting system.

Finally, management have a tool which provides timely and accurate information on which to base decisions in the sales and marketing environment.

5.3 COST OF IMPLEMENTING THE AUTOMATED SYSTEM.

The cost of implementing the system is made up of three components, namely, hardware, software and operating costs. These three forementioned costs are dependent upon the hardware selected and the volume of data to be processed. In the case of this development project, the system is developed on an AT compatible. However, the first implementation will be on an Amdahl 5890 running MVS operating system. The second implementation at this stage is likely to be on an AS/400. Thus the costs associated may and probably will vary quite dramatically. Performance is also likely to vary quite dramatically as will security and integrity facilities.

6. STRUCTURED DESIGN.

6.1 MODULE DETERMINATION PHILOSOPHY.

The rationale of the structured design of the modularisation is that of the least significant entity or operational module. Basically this is a process whereby the system is subdivided into "Operational Processes" (Level 0 Data Flow Diagram) (Note 4), and then each process is further broken down into non-divisible units or entity components (Level 1 Data Flow Diagram) (Note 4). A non-divisible component is defined as one which itself cannot be further sub-divided without loosing its self-contained functional operational capacity. While this methodology gives rise to redundant code within like functional modules, it nevertheless provides a platform for ease of "Prototyping". In transferring such a prototype to a production system "re-entrancy" techniques may be employed. These techniques provide similar logical code modules to share common code and concentrate on segregating the users private data areas. Thus the common logic code is implemented as re-entrant code segments controlling the various data areas. Such a methodology approaches "Object Oriented" techniques. A significant reason for adopting this approach is to facilitate the prototyping necessity of ease of change. Thus the basic prototype which lays the ground for the future implementation of an expert system module is firmly established.

The process of determining the modularisation is to take the Level 0 Data Flow Diagram (Note 4) and construct a menu which provides the user with a means of entering the domains of a specifically defined process. Within each process, the user is presented with a function menu. The function menu presents the user with a choice as to which function provided by the process, he or she would like to invoke. Thus what would normally have constituted a program in the era prior to structured techniques for example, a master file update program might well have contained sections to insert new master records, modify existing master records an delete master records becomes three (3) distinct programs. The advantages of this approach are many, the more significant of which are:

1. Tight Cohesiveness.
2. Narrow Coupling.
3. Ease to write, debug and implement.
4. Ease of maintenance.
5. Removal of system wide global variables.

Note 4. See Reference 1 - Data Flow Diagrams.

While the disadvantage of verbosity in programming prevails, the code within any given common function module is duplicated and thus there is a standard logic within the system. As mentioned previously, this common code could be made re-entrant obviating the redundancy.

This foregoing theory is implemented in the following manner. A hierarchy of menus (Note 5) gives rise to a set of screens which in turn each control an indivisible function. The first level of menu is called the "Main Menu" and comprises one program. The purpose of this program is to:

1. Provide by screen selection, a choice which will allow the user to access all available processes.

2. Provide a means of exiting the program suite.

3. Provide a mechanism to detect and notify invalid user selections/actions.

4. Maintain a user friendly interface.

The second level of menus is the level under which the set of functions of a given actual process are collected.

This level provides the following facilities:

1 Provide, by screen selection a choice which will enable the user to access all available functions of a process.

2 Provide a means of exiting the program suite by backtracking to the main menu.

3 Provide a mechanism to detect and notify invalid user selections/actions.

4 Maintain a user friendly interface.

The third level is the screen input, which control the operational functions of the program. These three levels are shown in Appendices J thru L.4

Each menu program "chains" to a program which takes the user one step nearer to a very specific programmable action. These programmable actions or functions are defined below:

Note 5. See Appendix J. Menu Hierarchial Tree Structure.

6.2 MODULE SPECIFICATION.

6.2.1 PROCESS : PROCESS CUSTOMER INFORMATION.

6.2.1.1 FUNCTION : ADD A NEW CUSTOMER.

This function performs its processing by following the procedure outlined below (Note 6).

1. Request the customer number from the user.

2. On receipt of the customer number, check if the customer number is already on file.
   If the customer number is already on file, display the customer details with the message, " Customer Number Already On File ".
   If the customer number is not on file, request further input from the user.

3. Information or customer details to be input include:

   Company Details Section.
   - Name
   - Address (3 lines)
   - Post Code
   - Phone and Fax Numbers.

   Executive Personnel Details Section.
   - Name
   - Position (Title)
   - Direct Phone Number.

   Configuration Details Section.
   - CPU
   - Operating System
   - DASD
   - Tapes
   - Line Printers
   - Communications Equipment.

Each field is format edited on input. An input field is terminated by pressing the "Enter" key. At the end of each of the above sections, the user presses the "F1" key. At this stage the message "Do you wish to change any of the above Y/N" will be displayed on the screen. The user may elect to change the entered data by pressing the "Y" or "y" key. Pressing the "N" or "n" key will instruct the program to accept the data. At the end of each line of input for both the executive personnel and configurations sections , the message "Any more ? Y/N" will be displayed.

Note 6. See Appendix K 2.1 Add New Customer Screen.

6.2.1.2 FUNCTION : MODIFY EXISTING CUSTOMER DETAILS.

This function follows the procedure below (Note 7).

1. Request the customer number from the user.

2. On receipt of the customer number, check if the customer number is no file.

   If the customer number is not on file, display the message "CUSTOMER NOT ON FILE, TRY AGAIN". The user may then enter the customer number or exit by backtracking thru the hierarchy of menus.

   If the customer number is on file, the company details corresponding to that customer number are displayed on the screen with the message "CORRECT CUSTOMER Y/N ?".

   If the user enters either "N" or "n" the program will backtrack to the customer menu by. Then the user may either enter another customer number and repeat the above or exit backtrack thru the main menu and exit the program.

   If the user enters either "Y" or "y", the program will display the message "DO YOU WISH TO CHANGE :

```
COMPANY DETAILS.....C
PERSONNEL DETAILS.....P
CONFIGURATION.....F
BACK TO THE CUSTOMER MENU.....B
```

The appropriate details are displayed on the screen. That is either the company details, the personnel details or the configuration details, with the message "DO YOU WANT TO CHANGE ANY OF THE ABOVE Y/N". The user may elect to change the data by pressing either the "Y" or "y" key. Pressing the "N" or "n" key will instruct the program to accept the data, and go back to the menu which displays "DO YOU WISH TO CHANGE :

```
COMPANY DETAILS.....C
PERSONNEL DETAILS.....P
CONFIGURATION.....F
BACK TO THE CUSTOMER MENU.....B
```

Note 7. See Appendix K2.2 Modify Existing Customer Data Screen.

6.2.1.3 FUNCTION : DELETE A CUSTOMER'S DETAILS.

The delete function is performed by the following procedure (Note 8).

1. Request the customer number from the user.

2. On receipt of the customer number, check if it is on file.

   If the customer number is not on file, display the message "CUSTOMER NUMBER NOT ON FILE, TRY AGAIN". The user may then enter the customer number, or exit by backtracking thru the hierarchy of menus.

   If the customer number is on file, the company details are displayed with the message "CORRECT CUSTOMER Y/N ?"

   If the user enters either "N" or "n", the program will display the message "ENTER CUSTOMER NUMBER OR EXIT". Then, the user may either enter another customer number and repeat the above or backtrack to the previous the menu.

   If the user enters either "Y" or "y", the message "CUSTOMER DELETED" is displayed and the customer detail records for that particular customer number are deleted from the system.

   The program then backtracks to the previous menu which requests the user to enter the customer number or exit.

Note 8. See Appendix K 2.3 Delete Customer Screen.

6.2.1.4 FUNCTION DISPLAY A CUSTOMER'S DETAILS.

The function to display customers details is performed by the following procedure (Note 9).

1. Request the customer number from the user.

2. On receipt of the customer number, check if the customer number is on file.

   If the customer number is not on file, display the message "CUSTOMER NOT ON FILE, TRY AGAIN". The user may then enter the customer number or exit by backtracking thru the menus.

   If the customer number is non file, the customer details are displayed together with the message "ANY MORE Y/N". If the user enters either "N" or "n", the program backtracks to the pervious menu.

   If the user enters either "Y" or "y", the next customer on file will be displayed.

Note 9. See Appendix K 2.4 Display Customer Details Screen.

6.2.1.5 FUNCTION : PRINT CUSTOMER LISTING.

The user may print a Customer Listing by the following procedure (Note 10).

1. Request start and finish customer numbers.

2. Print any records which are on file and within the range. See appendix L 1 for sample print report.

   If there are no records present on file, the message "NO CUSTOMER RECORDS ON FILE FOR RANGE x.....x to x.....x. "TRY AGAIN" is displayed. At this stage, the user may enter a range of customer numbers or backtrack to the previous menu.

   At the end of the report printing, the message "REPORT PRINTING COMPLETED" is displayed and the program backtracks to the previous menu.

Note 10. See Appendix L 1. Customer Details Report

6.2.2 PROCESS : PROCESS PRODUCT INFORMATION.

6.2.2.1 FUNCTION : ADD A NEW PRODUCT.

This function performs its processing by following the procedure outlined below (Note 11).

1. Request the customer number from the user.

2. On receipt of the customer number, check if the customer number is already on file.
   If the customer number is already on file, display the customer details with the message, " Customer Number Already On File ".
   If the customer number is not on file, request further input from the user.

3. Information or customer details to be input include:

   Company Details Section.
   - Name
   - Address (3 lines)
   - Post Code
   - Phone and Fax Numbers.

   Executive Personnel Details Section.
   - Name
   - Position (Title)
   - Direct Phone Number.

   Configuration Details Section.
   - CPU
   - Operating System
   - DASD
   - Tapes
   - Line Printers
   - Communications Equipment.

Each field is format edited on input. An input field is terminated by pressing the "Enter" key. At the end of each of the above sections, the user presses the "F1" key. At this stage the message "Do you wish to change any of the above Y/N" will be displayed on the screen. The user may elect to change the entered data by pressing the "Y" or "y" key. Pressing the "N" or "n" key will instruct the program to accept the data. At the end of each line of input for both the executive personnel and configurations sections , the message "Any more ? Y/N" will be displayed.

Note 11. See Appendix K 3.1 Add New Product Screen

6.2.2.2 FUNCTION : MODIFY EXISTING PRODUCT DETAILS.

This function follows the procedure below (Note 12).

1. Request the customer number from the user.

2. On receipt of the product number, check if that product number is on file.

   If the product number is not on file, display the message "PRODUCT NOT ON FILE, TRY AGAIN". The user may then enter the product number or backtrack to the previous menu.

   If the product number is on file, the company details corresponding to that product number are displayed on the screen with the message "CORRECT PRODUCT Y/N ?".

   If the user enters either "N" or "n" the program will backtrack to the product menu. Then the user may either enter another product number and repeat the above or backtrack to the previous menu.

   If the user enters either "Y" or "y", the appropriate details are displayed on the screen, with the message "DO YOU WANT TO CHANGE ANY OF THE ABOVE Y/N". The user may elect to change the data by pressing either the "Y" or "y" key. Pressing the "N" or "n" key will instruct the program to accept the data, and go back to the previous menu.

Note 12. See Appendix K 3.2. Modify Existing Product Data Screen.

6.2.2.3 FUNCTION : DELETE A PRODUCT'S DETAILS.

The delete function is performed by the following procedure (Note 13).

1. Request the product number from the user.

2. On receipt of the product number, check if it is on file.

   If the product number is not on file, display the message "PRODUCT NUMBER NOT ON FILE, TRY AGAIN". The user may then enter the product number, or exit by backtracking thru the hierarchy of menus.

   If the product number is on file, the product details are displayed with the message "CORRECT PRODUCT Y/N ?"

   If the user enters either "N" or "n", the program will display the previous menu where the user may enter a product number or backtrack to the main menu where the program may be exited.

   If the user enters either "Y" or "y", the message "PRODUCT DELETED" is displayed and the product detail record for that particular product number are deleted from the system.

   The program then backtracks to the previous menu.

Note 13. See Appendix K 3.3. Delete Product Screen.

6.2.2.4 FUNCTION : DISPLAY A PRODUCT'S DETAILS.

The function to display customers details is performed by the following procedure (Note 14).

1. Request the product number from the user.

2. On receipt of the product number, check if that product number is on file.

   If the product number is not on file, display the message "PRODUCT NOT ON FILE, TRY AGAIN". The user may then enter the product number or backtrack to the previous menu.

   If the product number is non file, the product details are displayed together with the message "ANY MORE Y/N". If the user enters either "N" or "n", the program backtracks to the pervioùs menu.

   If the user enters either "Y" or "y", the next product on file will be displayed.

Note 14. See Appendix K 3.4. Display Product Details Screen.

6.2.2.5 FUNCTION : PRINT PRODUCT LISTING.

The user may print a Product Listing by the following procedure (Note 15).

1. Request start and finish product numbers.

2. Print any records which are on file and within the range. See appendix L 2 for sample print report.

   If there are no records present on file, the message "NO PRODUCT RECORDS ON FILE FOR RANGE x. ...x to x.....x. "TRY AGAIN" is displayed. At this stage, the user may enter a range of product numbers or backtrack to the previous menu.

   At the end of the report printing, the message "REPORT PRINTING COMPLETED" is displayed and the program backtracks to the previous menu.

Note 15. See Appendix L2. Product Listing.

6.2.3 PROCESS : PROCESS ORDER FORECAST PRODUCT INFORMATION.

6.2.3.1 FUNCTION : ADD A NEW ORDER OR FORECAST.

This function performs its processing by following the procedure outlined below (Note 16).

1. Request the forecast number from the user.

2. On receipt of the forecast number, check if that forecast number is already on file.

   If the forecast number is already on file, display the forecast details with the message, " Forecast Number Already On File ".

   If the forecast number is not on file, request further input from the user.

3. Information on forecast details to be input include:

   Company Name.
   Product #.
   Unit Price.
   Quantity.
   Expected Sign Month.
   Expected Install Month.
   Probability of receiving the order.

Each field is format edited on input. An input field is terminated by pressing the "Enter" key. At the end of each line of the forecast, the user presses the "F1" key. At this stage the message "Do you wish to change any of the above Y/N" will be displayed on the screen. The user may elect to change the entered data by pressing the "Y" or "y" key. Pressing the "N" or "n" key will instruct the program to accept the data. Then, the message "Any more ? Y/N" will be displayed.

Note 16. See Appendix K 4.1. Add New Order Forecast Screen.

6.2.3.2 FUNCTION : MODIFY EXISTING FORECAST DETAILS.

This function is performed by the following procedure (Note 17).

1. Request the forecast number from the user.

2. On receipt of the forecast number, check if that forecast number is on file.

   If the forecast number is not on file, display the message "FORECAST NOT ON FILE, TRY AGAIN". The user may then enter the forecast number or backtrack to the previous menu.

   If the forecast number is on file, the company details corresponding to that forecast number are displayed on the screen with the message "CORRECT FORECAST PRODUCT Y/N ?".

   If the user enters either "N" or "n" the program will backtrack to the product menu. Then the user may either enter another forecast number and repeat the above or backtrack to the previous menu.

   If the user enters either "Y" or "y", the appropriate details are displayed on the screen, with the message "DO YOU WANT TO CHANGE ANY OF THE ABOVE Y/N". The user may elect to change the data by pressing either the "Y" or "y" key. Pressing the "N" or "n" key will instruct the program to accept the data, and go back to the previous menu.

Note 17. See Appendix K 4.2. Modify Existing Order Forecast.

6.2.3.3 FUNCTION : DELETE AN ORDER FORECAST.

The delete function is performed by the following procedure. (Note 18).

1. Request the forecast number from the user.

2. On receipt of the forecast number, check if it is on file.

   If the forecast number is not on file, display the message "FORECAST NUMBER NOT ON FILE, TRY AGAIN". The user may then enter the forecast number, or exit by backtracking thru the hierarchy of menus.

   If the forecast number is on file, the forecast details are displayed with the message "CORRECT FORECAST Y/N ?"

   If the user enters either "N" or "n", the program will display the previous menu where the user may enter a forecast number or backtrack to the main menu where the program may be exited.

   If the user enters either "Y" or "y", the message "FORECAST DELETED" is displayed and the forecast detail record for that particular product number is deleted from the system.

   The program then backtracks to the previous menu.

Note 18. See Appendix K 4.3. Delete Order Forecast

6.2.3.4 FUNCTION : DISPLAY AN ORDER FORECAST.

The function to display forecast details is performed by the following procedure (Note 19).

1. Request the forecast number from the user.

2. On receipt of the forecast number, check if that forecast number is on file.

   If the forecast number is not on file, display the message "FORECAST NOT ON FILE, TRY AGAIN". The user may then enter the forecast number or backtrack to the previous menu.

   If the forecast number is non file, the forecast details are displayed together with the message "ANY MORE Y/N". If the user enters either "N" or "n", the program backtracks to the pervious menu.

   If the user enters either "Y" or "y", the next forecast on file will be displayed.

Note 19. See Appendix K 4.4. Display Order Forecast.

6.2.3.5 FUNCTION : PRINT FORECAST LISTING.

The user may print a Forecast Listing by the following procedure (Note 20).

1. Request start and finish sign or install dates.

2. Print any records which are on file and within the range. See appendix L 3 for sample print report.

   If there are no records present on file, the message "NO FORECASTS ON FILE FOR RANGE x.....x to x.....x. "TRY AGAIN" is displayed. At this stage, the user may enter a range of expected sign or expected install dates numbers or backtrack to the previous menu.

   At the end of the report printing, the message "REPORT PRINTING COMPLETED" is displayed and the program backtracks to the previous menu.

Note 20. See Appendix L 3. Forecast Report.

6.2.4 PROCESS : PROCESS SALESMAN INFORMATION.

6.2.4.1 FUNCTION : ADD A NEW SALESMAN.

This function performs its processing by following the procedure outlined below (Note 21).

1. Request the salesman number from the user.

2. On receipt of the salesman number, check if the salesman number is already on file.

   If the salesman number is already on file, display the salesman details with the message, " Salesman Number Already On File ".
   If the salesman number is not on file, request further input from the user.

3. Information on salesman details to be input include:

   Salesman Number.
   Salesman Name.
   Target.

Each field is format edited on input. An input field is terminated by pressing the "Enter" key. At the end of each line of input, the user presses the "F1" key. At this stage the message "Do you wish to change any of the above Y/N" will be displayed on the screen. The user may elect to change the entered data by pressing the "Y" or "y" key. Pressing the "N" or "n" key will instruct the program to accept the data. Then, the message "Any more ? Y/N" will be displayed.

Note 21. See Appendix K 5.1. Add New Salesman Screen.

6.2.4.2 FUNCTION : MODIFY EXISTING SALESMAN DETAILS.

This function is performed by the following procedure (Note 22).

1. Request the salesman number from the user.

2. On receipt of the salesman number, check if that salesman number is on file.

   If the salesman number is not on file, display the message "SALESMAN NOT ON FILE, TRY AGAIN". The user may then enter the salesman number or backtrack to the previous menu.

   If the salesman number is on file, the company details corresponding to that salesman number are displayed on the screen with the message "CORRECT SALESMAN Y/N ?".

   If the user enters either "N" or "n" the program will backtrack to the Salesman Function Menu. Then the user may either enter another salesman number and repeat the above or backtrack to the previous menu.

   If the user enters either "Y" or "y", the appropriate details are displayed on the screen, with the message "DO YOU WANT TO CHANGE ANY OF THE ABOVE Y/N". The user may elect to change the data by pressing either the "Y" or "y" key. Pressing the "N" or "n" key will instruct the program to accept the data, and go back to the previous menu.

Note 22. See Appendix K 5.2. Modify Existing Salesman Data Screen

6.2.4.3 FUNCTION : DELETE A SALESMAN'S DETAILS.

The delete function is performed by the following procedure (Note 23).

1. Request the salesman number from the user.

2. On receipt of the salesman number, check if it is on file.

   If the salesman number is not on file, display the message "SALESMAN PRODUCT NUMBER NOT ON FILE, TRY AGAIN". The user may then enter the salesman number, or exit by backtracking thru the hierarchy of menus.

   If the salesman number is on file, the product details are displayed with the message "CORRECT SALESMAN Y/N ?"

   If the user enters either "N" or "n", the program will display the previous menu where the user may enter a salesman number or backtrack to the main menu where the program may be exited.

   If the user enters either "Y" or "y", the message "SALESMAN DELETED" is displayed and the salesman record for that particular salesman number is deleted from the system.

   The program then backtracks to the previous menu.

Note 23. See Appendix K 5.3. Delete Salesman Detail Screen.

6.2.4.4 FUNCTION : DISPLAY A SALESMAN'S DETAILS.

The function to display salesman's details is performed by the following procedure (Note 24).

1. Request the salesman number from the user.

2. On receipt of the salesman number, check if that salesman number is on file.

   If the salesman number is not on file, display the message "SALESMAN NOT ON FILE, TRY AGAIN". The user may then enter the salesman number or backtrack to the previous menu.

   If the salesman number is non file, the salesman details are displayed together with the message "ANY MORE Y/N". If the user enters either "N" or "n", the program backtracks to the pervious menu.

If the user enters either "Y" or "y", the details of the next salesman on file will be displayed.

Note 24. See Appendix K 5.4. Display Salesman Details Screen.

6.2.4.5 FUNCTION : PRINT SALESMAN LISTING.

The user may print a Salesman Listing by the following procedure (Note 25).

1. Request start and finish salesman numbers.

2. Print any records which are on file and within the range. See appendix L 4 for sample print report.

   If there are no records present on file, the message "NO SALESMAN RECORDS ON FILE FOR RANGE x.....x to x.....x. "TRY AGAIN" is displayed. At this stage, the user may enter a range of salesman numbers or backtrack to the previous menu.

   At the end of the report printing, the message "REPORT PRINTING COMPLETED" is displayed and the program backtracks to the previous menu.

Note 25. See Appendix L 4. Saleman Details Report.

6.2.5 PROCESS : PROCESS CALL REPORTS.

6.2.5.1 FUNCTION : ADD NEW CALL DETAILS.

This function performs its processing by following the procedure outlined below (Note 26).

1. Request the call number (concatenated date & customer #) from the user.

2. On receipt of the call number, check if the call number is already on file.

   If the call number is already on file, display the call details with the message, " Call Number Already On File".

   If the call number is not on file, request further input from the user.

3. Information on call report details to be input include:

   Action indicator.
   Date action must be completed.
   Date action was completed.
   Any text up to 128 Characters.

Each field is format edited on input. An input field is terminated by pressing the "Enter" key. At the end of each line of input, the user presses the "F1" key. At this stage the message "Do you wish to change any of the above Y/N" will be displayed on the screen. The user may elect to change the entered data by pressing the "Y" or "y" key. Pressing the "N" or "n" key will instruct the program to accept the data. Then, the message "Any more ? Y/N" will be displayed.

Note 26. See Appendix K 6.1. Add New Call Information Screen.

6.2.5.2 FUNCTION : MODIFY EXISTING CALL DETAILS.

This function is performed by the procedure below (Note 27).

1. Request the call number from the user.

2. On receipt of the call number, check if that call number is on file.

   If the call number is not on file, display the message "CALL NUMBER NOT ON FILE, TRY AGAIN". The user may then enter the call number or backtrack to the previous menu.

   If the call number is on file, the company details corresponding to that call number are displayed on the screen with the message "CORRECT CALL Y/N ?".

   If the user enters either "N" or "n" the program will backtrack to the Call Report Function Menu. Then the user may either enter another call number and repeat the above or backtrack to the previous menu.

   If the user enters either "Y" or "y", the appropriate details are displayed on the screen, with the message "DO YOU WANT TO CHANGE ANY OF THE ABOVE Y/N". The user may elect to change the data by pressing either the "Y" or "y" key. Pressing the "N" or "n" key will instruct the program to accept the data, and go back to the previous menu.

Note 27. See Appendix K 6.2. Modify Existing Call Information.

6.2.5.3 FUNCTION : DELETE A CALL REPORT.

The delete function is performed by the following procedure. (Note 28).

1. Request the call number from the user.

2. On receipt of the call number, check if it is on file.

   If the call number is not on file, display the message "CALL NUMBER NOT ON FILE, TRY AGAIN". The user may then enter the call number, or exit by backtracking thru the hierarchy of menus.

   If the call number is on file, the product details are displayed with the message "CORRECT CALL Y/N ?"

   If the user enters either "N" or "n", the program will display the previous menu where the user may enter a salesman number or backtrack to the main menu where the program may be exited.

   If the user enters either "Y" or "y", the message "CALL DELETED" is displayed and the call report record for that particular call number is deleted from the system.

   The program then backtracks to the previous menu.

Note 28. See Appendix K 6.3. Delete Call Information Screen.

6.2.5.4 FUNCTION : DISPLAY A CALL REPORT.

The function to display a call report is performed by the following procedure (Note 29).

1. Request the call number from the user.

2. On receipt of the call number, check if that call number is on file.

   If the call number is not on file, display the message "CALL NOT ON FILE, TRY AGAIN". The user may then enter the call number or backtrack to the previous menu.

   If the call number is non file, the call report are displayed together with the message "ANY MORE Y/N". If the user enters either "N" or "n", the program backtracks to the pervious menu.

   If the user enters either "Y" or "y", the details of the next call on file will be displayed.

Note 29. See Appendix K 6.4. Display Call Information Screen.

6.2.5.5 FUNCTION : PRINT CALL REPORT.

The user may print a Call Report by the following procedure (Note 30).

1. Request start and finish call report numbers.

2. Print any records which are on file and within the range. See appendix L 5 for sample print report.

   If there are no records present on file, the message "NO CALL REPORT RECORDS ON FILE FOR RANGE x.....x to x.....x. "TRY AGAIN" is displayed. At this stage, the user may enter a range of call report numbers or backtrack to the previous menu.

   At the end of the report printing, the message "REPORT PRINTING COMPLETED" is displayed and the program backtracks to the previous menu.

Note 30. See Appendix L5. Call Report.

7. SYSTEM CONTROLS.

The system controls built into the system should preferably avoid, but failing that, detect, report and correct if possible, failures and mischievous activities. While in a large systems environment, there are many controls built into the systems software, the micro computer is relatively void of such fineries. Thus, the control procedures are determined in the manner fundamentally as discussed in "The Fundamentals of Systems Analysis" (Reference 1). Ignored in the reference is the on-going maintenance of the system in the SDLC. This has been incorporated as a final stage. Prior to the final stage are the "Build and Refine Prototype" and "Transfer to Production" modules. The the SDLC has been adapted rather than using the Data Driven SDLC as postulated in Meilir Page-Jones' text (Reference 2). Adopting the six (6) steps methodology a set of mechanisms evolve as described below. (Note 31).

Control Review Step 1, concerns the identification of threats. These are those activities which are undesired and warrant effort expended to control against the consequences of their occurrence. In identifying the various threats, the most likely source of the violation is suggested in an effort to assist with determining the most appropriate Control.

- Errors in Data Capture. These are the human errors due to transcription, transposing and misreading for whatever reason.

- Omission in Data Capture. These are the errors generated by skipping a field or indeed an entire document at the time of data capture.

- Misplaced Documents. Errors due to misplaced documents arise due to sloppy clerical procedures or non-compliance to the clerical procedures. Simply, the document or set of documents are not available at the time of data capture. In fact they may never be available in the worst case.

- Unauthorised Access. Unauthorised access is a security breach whereby an unauthorised person or persons has access to the data. Such is the situation with the hacker. In this regard the system is most vulnerable to unauthorised access by the technical staff.

Note 31. See Reference 1 Page 376 "The Need For Controls".

- Breach of Privacy. In this regard, information is leaked. The access to the information may well have been by authorised personnel. However the information or data has had access control removed in some way for some period of time. A common occurrence of a breach of privacy arises from printed reports being left unattended or without the proper security. (Note 32).

- Corrupted Data Files. This usually results from hardware or media malfunction. In more rare cases corruption may result from a software malfunction or a logic bomb.

- Hardware Failure. Hardware failure may be caused wilfully, by an out of specification environment, by lack of proper maintenance procedures or by normal wear and tear.

- Software Malfunction. There are numerous possible causes of software malfunction. Some of these causes are unique to a particular type of software, e.g. Systems Software, In-house written Utilities or more likely, Applications Programs. The actual causes range from pre-meditated mischievous to program bugs to operator error.

- Disaster Recovery. This threat relates to the situation where the computer installation is rendered unserviceable, usually for a prolonged time or at least an anticipated long time.

The above table of threats is contained in Appendix H and are deemed those which are mandatory to control against in any size system environment.

Having identified and briefly described each threat, Control review Step 1 is completed.

Note 32. "Security In Computing", Reference 4, Page 3, gives a detailed coverage of security breaches.

Control Review Step 2 now considers the various control procedures available and these are contained in Appendix I. In this section, a brief description accompanies each control.(Note 33).

1. Randomly check data against the originating source.

2. Review data in the computer for consistency. (Sales Reviews with sales staff).

3. Cross check numeric totals against set standards. Analyse any variances.

4. Cross check Order/Forecast information against the Product File for price discrepancies.

5. Produce Audit trails on the numeric data.

6. Maintain a register for (5) above.

7. Maintain a simple checksum of records held on file in each file. Hold the checksum in encrypted format. Thus only updates by the proper application module will update the check sum.

8. Implement frequent backup procedures.

9. Log the on-line transaction and time stamp the log.

10. Implement a password having regard for access to a particular process or function or a particular data item.

11. Ensure that backup hardware is readily available.

12. Ensure that on-call software support is readily available.

13. Ensure adequate hardware maintenance in terms of both qualitative and quantitative issues.

14. Use key locks on equipment.

15. Implement adequate office procedures in handling documents.

16. Maintain a register of system malfunctions for thorough investigation.

17. Implement careful forms design procedures.

Note 33. Reference 1, Page 384.

Control Review Step 3 is concerned with with placing the appropriate control number in the cell of the Component/Threat matrix. The Component/Threat matrix is shown in Appendix G.(Note 34).

Control Review Step 4 is concerned with reviewing the appropriateness of each of the selections in step 3 above. The criteria for determining the level of appropriateness is to consider whether that control is adequate to prevent, detect and correct any occurrence of the threat in relation to the component. In the case of the component/threat matrix shown in Appendix G it is considered that the controls as selected are appropriate.

Control Review Step 5 is concerned with presenting the controls to such personnel as auditors for their acceptance as adequate in terms of statutory requirements and accounting standards. In this project, this step is omitted. the controls are presented as being part and parcel of the system itself.

Control Review Step 6 is concerned with testing the system. In this regard testing has two constituents, namely; testing and verification. To test a control means to test that the control is working as it is supposed to work. Verifying a control means to verify by means of a test that the control actually exists.

The Components to which the Threats relate as shown in Appendix G are those process bubbles on the Level 0 Data Flow Diagram. There is no reason other than avoiding unnecessary verbosity to relating the Threats to each of the functions of each of the processes. The functions are the bubbles in the Level 1 Data Flow Diagram.

Note 34. References 1, Pages 386 - 392.

8. LANGUAGE & FILE MANAGEMENT SYSTEM.

8.1 PROGRAMMING LANGUAGE.

The programming language is VS COBOL II and the actual compiler is Microsoft COBOL Version 3.0 (Note 35). The rationale of this choice is based on the desire to produce a system which is transportable across a wide range of Operating Systems without any major re-development effort. Thus the file system is a mix of straight forward Sequential, ISAM and INVERTED ISAM file structures. Implementation specific features are where possible ignored. Where it is advantageous to use extended features or where the ANSI standard is lacking notes and references are supplied. As much as possible these areas are to be modularised. Thus, the task of conversion is much reduced.

Scope Terminators and Pseudo Scope Terminators are used.

Naming conventions of field names follows the structure of containing the first four characters of the originating file or area name. For example, the NAME field in the CUSTOMER file definition is named "CUST_NAME".

Structured programming techniques are used with modules being restricted to containing functionally cohesive code.

Programs accept arguments as data from the screen. No arguments are passed by the terminal user (operator) at the time of invocation.

The system is transportable across a range of Operating Systems such as to:

MSDOS/PCDOS
OS/2
UNIX
OS/400
VM/VSE/MVS.

Note 35. References 12 & 13 various. Also see Reference 9 and 10 for detailed discussion on structured programming techniques using COBOL.

8.2 MAPPING TO THE PHYSICAL DATA DICTIONARIES.

Consideration has been given to taking advantage of a more sophisticated File Management Package, or indeed a Data Base Management System. The file structures have had to varying extents the Normalisation process applied to them. All files are in at least First Normal Form by having any repeating groups removed. In most cases this process has been effected to third normal form. Each of the following sub-sections now details the "normalisation" process as applied to each of the files.)Note 36).

8.2.1 CUSTOMER FILE.

CUST_#, CUST_NAME, CUST_ADD1, CUST_ADDR2, CUST_ADDR3, CUST_POST_CODE, CUST_PHONE, CUST_FAX,
{CUST_EMP_POSITION, CUST_EMP_NAME, CUST_EMP_PHONE},
{CUST_CPU, CUST_OS, CUST_DASD, CUST_TAPES, CUST_LP, CUST_COMMS},

Remove the repeating groups by creating new data sets for each set. A computer generated line number is concatenated with the customer number (CUST_#) to form the key in each case. Thus the resultant data set are :

CUSTOMER_N&A.

CUST_#, CUST_NAME, CUST_ADD1, CUST_ADDR2, CUST_ADDR3, CUST_POST_CODE, CUST_PHONE, CUST_FAX,

CUSTOMER_EMPLOYEE.

CUST_#, CUST_LINE#, CUST_EMP_POSITION, CUST_EMP_NAME, CUST_EMP_PHONE,

CUSTOMER_CONFIGURATION.

CUST_#, CUST_LINE_#, CUST_CPU, CUST_OS, CUST_DASD, CUST_TAPES, CUST_LP, CUST_COMMS,

8.2.2 PRODUCT.

VENDOR_#, PRODUCT_#, DESCRIPTION, COST, COST_TYPE, LIST_PRICE, WARRANTY, MAINT_CHARGE.

There are no repeating groups in this record. Thus this record structure is mapped to the physical data dictionary unchanged.

Note 36. Reference 1, Page 93. Also see Reference 8 for discussions on the Normalisation process for the Relational model.

PRODUCT.

VENDOR_#, PRODUCT_#, DESCRIPTION, COST, COST_TYPE, LIST_PRICE,
WARRANTY, MAINT_CHARGE.

8.2.3 FORECAST_ORDER.

SALESMAN_#, DATE_OF_PREP, FOR_PERIOD,
{CUST_#, PRODUCT_#, UNIT_PRICE, QUANTITY, EXP_SIGN_MONTH,ACT_SIGN_MONTH,
EXP_INSTALL_MONTH, ACT_INSTALL_MONTH, PROBABILITY, INVOICE_DATE,
PAYMENT_DATE}.

8.2.4 SALESMAN.

SALESMAN_#, SALESMAN_NAME, TARGET.

8.2.5 CALL_REPORT

CALL_REPT_DATE, CALL_REPT_SALESMAN_#, CALL_REPT_CUST_#
{CALL_REPT_TEXT}

Removing the repeating group "CALL_REPT_TEXT", by inserting a text line number between the customer number and the text which is used as part of the unique key.

CALL_REPT_REPORT

CALL_REPT_DATE, CALL_REPT_SALESMAN_#, CALL_REPT_CUST_#,
CALL_REPT_LINE#, CALL_REPT_TEXT

8.3 FILE HANDLING.

The file handling for the Customer Process involves creating one logical data set from three physical data sets. The three physical data sets are :

1. Customer_N&A_File see Appendix E1.
2. Customer_Employee_File see Appendix E2.
3. Customer_Config_File see Appendix E3.

The one logical data set created is "customer" which is shown in appendix D1, as the contents of Data Store D1.

The idiosyncrasies of this processing are:

1. A form of ensuring referential integrity is required unless it is permissable to have NULL field values in one or even two of the three physical files.

   In the case of the implemented prototype, NULL field values are acceptable. This will greatly assist in a phased building of the customer details file. This situation may continue thru to the final production system.

2. If it is indeed the customer name which is NULL because of say unknown correct spelling, then the customer number cannot be allocated, as it is made up of the first four characters of the customer name plus following numerics.

Note See Reference 8 for discussion on the many aspects of Security and Integrity.

9. HARDWARE & OPERATING SYSTEM PLATFORM.

Hardware on which this version is developed by means of the "prototype" approach is an IBM PC AT compatible. Artificial speed enhancement. There is no use of RAMDRIVES or the like. The DASD is as 16 bit AT bus type and monochrome monitor. Thus the suite of programs are capable or running on a very modest hardware configuration. The programs have also been loaded on an Amdahl 5860 driven system running MVS Operating System.

The hardware platform on which the system is capable of being run is dependent upon the support of COBOL and related functions such as file systems and screen I/O systems.

10. SINGLE/MULTI-USER CONSIDERATIONS.

While the system is developed on a single user platform, it is to be capable of supporting a multi-user environment. The operating environments to be specifically considered are single user DOS and multi-user MVS. Thus this section primarily concerns the MVS environment. Within the MVS environment, the TSO and CICS options are considered.

So far as the TSO option is concerned running the system as multi-user is not a problem as each user has his own operating environment. File security and integrity may easily be taken care of by opening with LOCK and the systems software provides the necessary features.

In the CICS environment, where each user will have his own data areas and share a common area of code, the programs are to be "Quasi Re-entrant". This is facilitated by clearly segregrating the the static data and the dynamic data into separate areas. Then on invoking the system, the initialisation module will copy the dynamic data area of WORKING STORAGE to the users private data area.

Note 37. See References 9 & 10 various.

11. PROTOTYPE SPECIFICATION & BUILD.

The prototype specification is defined by the following rules:

- Each function of each process (each Level 1 DFD bubble) is to be a self contained set of data and program code.
- Selection of a function is to be by a hierarchial set of menus with each node of the tree structure being a self contained program.
- All screens are to contain only the information required for one decision. If there are two decisions required, then there are to be two screens.
- A change of any sort to any one module MUST NOT affect any other module.
- As much as possible, modules of similar functional logic are to contain identical code to facilitate re-entrantcy.
- All modules are to be written with simple screen handling code using DISPLAY and ACCEPT statements.
- Linking between the small self contained programs (functions and menus) is by "chaining".
- Each program is to chain back to the "chained from" program directly.
- No parameters are to be passed in a chaining operation.
- Each Process and subordinate functions must be capable of stand alone operation.
- Each function must be capable of stand alone operation.
- All Read and Write operations to Disk files are to be contained in the one procedure.
- There is to be only one open and close statement for any one function.
- Mixed language programming is to be avoided.
- The actual coding specifications or processing requirement of the various modules is detailed in Section 6 Structured design.

- The building of the prototype is to follow a top down procedure with each level being tested as a free standing module.

- Standard routines are to be used for reorganising ISAM files.

- Initial creation of files is to be facilitated by a free standing and separate utility program with no reliance on the system and vice versa.

12. TRANSFERRING THE PROTOTYPE TO PRODUCTION.

Transferring the prototype to production should be a single step operation. That is, if there is a change of platform from say, a micro to a mainframe, then the system should first be mounted as a prototype on the mainframe.

Similarly, if for some reason there is a requirement to use an optimising compiler or any compiler for that matter which provides different screen handling facilities, then the modules should be converted one by one and tested. This is to follow the same procedure as the original build. Transferring the actual programs should follow the simple procedure where only a re-compile is required. Converting the data is a different matter. The file must be recreated as the file system is actually outside the language and consequently not all systems are compatible at the physical file level.

In the case of this particular project the system will run on a micro for several months as a prototype. The reason for this is to try different type of screens, namely monochrome, colour and black & white. During this time the screen attributes will be changed and demonstrated. The actual layout of data on the screen as well as the method of terminating field input may be changed to demonstrate alternative operational procedures. During this time it is not envisaged that any files will be changed, though some screed displays and/or printed reports may be added.

There are two options for the system in a live production environment in the first instance. The first option is to run the system on an Amdahl mainframe. The second option is to run the system on a mini computer. The prototype as built is easily transported to either platforms.

In transferring the prototype to production on the mainframe, it will run under TSO initially, thereby obviating any logic changes to support a multi user environment.

13. REFERENCES.

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14. APPENDICES.

14. APPENDICES.

APPENDIX A. INTERVIEW NOTES.

NOTES OF INTERVIEW AND DISCUSSIONS WITH MEMOREX TELEX PROD. MGR.

The requirements of Memorex Telex of sales and marketing information from its distributors is not all that great. Validating the information received however is an awesome task. There are several reasons for this.

First, although MTX requests information in a particular format, for various reasons the information is received either incomplete or in a format that inhibits detailed analysis from one month to another.

Secondly, it is these sales forecasts that are used by the Far East Distributor Operations to order on the factory. The forecasts submitted to the next higher level of authority within the multi-national organisation become firm orders at the three month point. That is to say that if this month is August and we are submitting forecasts for September through February, then the November forecast will be taken as an order. Needless to say September and October have already been accepted as firm orders. Thus we require accurate sales forecast information which can be validated.

Each of the distributors have a target. While it is not enforced, the target is broken down by product group. The region comprises Korea, Philippines, India, Taiwan, Thailand, Malaysia and Indonesia.

Validation of the source data just isn't possible let alone practical. The prime reason for this is that all information on prospects with the possible exception of some multi-nationals is third hand. It is third hand because the local distributor's salesforce go to visit the prospect, both of whom may not speak english. Then the salesperson has a review with the sales manager who in turn modifies the forecast by some "management factor".

For any system to be successful, the information being received from each of the distributor countries must be in a common format and have consistency of format. There is one and only one form required. While some distributors have adopted this form others persist with submitting the information on forms from their own internal system.

Thus the information required from a distributor may be classified under the following headings:

- Sales Forecast.
- Reasons for variance from previous forecast.
- Competitive Issues.
- Areas of risk.
- Areas of opportunity.
- Vendor support required.
- Lost business report.

The information fed back to the distributor will include:

- Achievement (% of target).
- Pricing.
- New products.
- Global competitive issues.

The basic sales forecast information required from the distributors is detailed on the attached "Monthly Sales Forecast Form".

In order to perform the vendor function effectively, the information on the forms should be:

- Precise.
- Timely.
- Accurate.
- Complete.

It is accepted that from time to time on some prospects there will be gaps in the information. The vast majority of gaps could be avoided by the proper use of a standardised system. In any case the information required by this office surely overlaps to a very great extent with the information required in the distributor by senior management.

The attached Monthly Forecast form has been in use by Memorex Telex In all Pacific Basin and Far East Operations countries for the past ten years. The form requested from the distributors is in fact the same form as used internally by the sales force. The information required consists of:

- Submitted by is the name of the distributor.
- Date is the date of submission. The forecasts are required by the twentieth of each month for the following six months. The first and second months to appear should be firm.
- Reviewed by contains the Territory manager name.
- Customer contains the name of the prospective end user.
- Product contains the product identification number.

- Unit price contains the unit price at which the distributor will purchase the product from MTX. In most cases this will be list price. Some multi national companies and large local organisations enjoy a discount which is either partially or wholly funded by MTX. It may also be that the equipment is refurbished in which case it is priced under new list. Finally there may be a sales promotion on which for some period of time offers a discount.
- The Quantity column is the quantity of product.
- The Total Price column is merely the result of unit times quantity.
- The Sign Month is the month in which the order will be signed by the distributor.
- The Install Month is the month in which the end user requires installation.
- Comments contain any clarification on such items as non standard delivery lead times and non standard pricing.

  The % column contains the probability of closing the sale. The % is taken from the following table:

  100% Order in hand.

  80% Letter of intent received or end user agreed to purchase and is waiting on Logistics to issue the P.O.

  60% The end user has agreed to purchase but has not so obtained the budget.

  40% End user has need and will buy from someone. Proposal submitted.

  10% Early contact made.

For the want of a better method the above probability rating gives a good indication when taken with the particular distributors track record.

The above information is required in order for the MTX Far East Operations to make credible and reliable forecasts. There is also a "management factor" applied to the cumulative forecast submitted to the next level of authority in the MTX organisation. This "management factor" is based on the information received from the distributors together with the individual distributors track record and visits by the MTX Territory Manager.

INFORMATION REQUIREMENTS WITHIN A DISTRIBUTOR ORGANISATION.

Preamble.

The sales activity is driven by a heavy reliance on having the correct people in the various Marketing and Sales positions. While there is a differentiation of the marketing and sales functions they are nevertheless highly integrated. Possibly the most distinguishing factor is the basis of renumeration. Those in a direct sales role have the majority of their income at risk, that is the base salary is rather small, while the potential commission earnings are very substantial.

Sales meetings are regularly conducted and each salesperson is expected to give a presentation of the sales opportunities in his or her patch. These meetings follow a somewhat informal structure and for reasons of time and available resources, they are generally of short duration. Certainly the focus of the company is on the strategic plans which calls for establishing image and credibility in large accounts. That does not mean that the day to day sales of smaller products are ignored. Quite to the contrary. The company believes that the correct people are in the correct positions and these people, being professionally competent and possessing a "self starter" nature, return what is expected of them. However having said that, there is a feeling that we all could be more efficient if we had the benefit of tools to assist in the management of our sales and marketing activities.

In discussing this issue, I would prefer, not to talk of problems, but rather to address the issue of identifying "lost opportunities" before they are lost.

The information needs of management vary depending on the level of management. From the information emanating from the actual salespeople, the information permeates upwards in a process of summarisation. This is not always desirable. Some of the important basic issues should be brought to the attention of senior management. It could well be that senior management are privy to some information. In any case there are situations where they (senior management) are in a better position to deal with the particular issue, or at least be aware of the details of what is happening at the grass roots level. In order for senior management to assist in these situations information needs to be available in the form that is required. Unfortunately, in some instances, the salespeople are not aware of the details required by management or they keep the information in their head rather than on paper. This I hasten to add is quite the accepted norm as if all information was to be written on paper there would be precious little time for the selling activity. This now brings me to review the required information in terms of:

Content and Level of Detail.
Availability.
Timeliness.

We will assume that such aspects as correctness and relevance are taken for granted.

Content and Level of Detail.

Given that senior management may on some of the larger sales campaigns require very detailed backup information we'll first consider the detailed content which should be available. If the basic information is present, then summarisation for higher management reporting is a trivial issue.

The information may be categorized as:
- Customer Base information.
- Sales Activity information.
- Detailed Sales campaign information.
- Sales Forecasts.
- Revenue Forecasts.

Customer Base Information.

Currently installed hardware configuration.
Currently installed software.
Customer personnel - position & responsibilities.
Address, phone & fax contact numbers.

Sales Activity Information.
---

1. What calls have been made at what levels in what companies. Phone calls and actual visits are to be distinguished.

2. Frequency of calls at all levels.

3. Identify levels not being called upon.

4. Activities.

   4.1 Current plans.
   What products are being evaluated (not only hardware).
   Current upgrade plans (timing).
   Current plans for new systems (timing).

   4.2 Future plans.
   As above for 4.1.

Detailed Sales campaign information.

The information detailed below applies for both hardware and software for new acquisitions and upgrades.

- Basic product/s description.
- Budget approved.
- Who is the decision maker.
- Who is/are the recommender/s.
- Who's idea.
- Who is the sponsor.
- What is the timing.
- What, if any are the alternatives.
- What is the preferred solution & why.
- Who are the possible suppliers.
- Are there any existing reference accounts being contacted.
- What is the prospect's basis of decision. e.g.
    - Ease of implementation
    - Performance
    - Upgradeability
    - Support
    - Price
    - Proven product
- Who set the basis of decision; Us, the prospect by themselves or our competition.
- Needs & wants.
- Is it a component of a vertical market.
- Financial implications.
- Extension to existing product
- Mixed vendor implications.
- Satisfaction with existing supplier.
- Willingness to change.
- Will any products be rendered redundant by both our offering and competitors offering.
- Have we been there from the very beginning or are we a late starter.
- What stage of the sales profile are they at.
- Can we give a presentation - to all levels.
- Should we demonstrate our product.
- Is the prospect willing for us to demonstrate our product.
- Are we able to demonstrate our product.
- Do they currently have our product in this area.
- Do they have our products in other areas.
- What is their perception of our organisation.
- What is their perception of the proposed products.
- What is their perception of our sales force.
- What is their perception of our support.
- Are there any objections to buying from our company.

- What are the most pressing needs which are not being met, either because of available technology, cost/benefit, lack of budget or other reason. (document reason).
- What support is required to further the sale.
- Do we have the required support on staff and is it available.
- What is the timing of the required support.
- Identify the actual support required (technical, management or Vendor).
- Is a higher level of authority required for any aspect of furthering the sale than you have.
- Are there any outstanding actions, if so, why.
- What is the next action. When is the next call.
- What is the objective of the next call.
- What are the competition doing.
- Will the prospect talk about the competition.
- What are the personal relationships with the prospect like.

  Information Required.

- How does the prospect perceive:
  - Our Company.
  - Our Product
  - Our Supplier.
  - Our Sales force.
  - Our Support.

- What are the reasons which will stop us from getting the order.
- What are the reasons why the prospect will buy from us.

Sales Forecasts.

The basic information required is best shown by the Monthly Prospect Forecast Form shown as Attachment A.

Revenue Forecasts.

The Revenue Forecasts should comprise but not be limited to:

- Revenue by Salesperson by Month.
- Revenue by Customer by Month
- Revenue by Product by Month with Totals for Product Group (Supplier).
- Total Revenue by Month.
- Pricing Exception Report for all Sales which are forecast at other than List Price +/- say 10%, or a % which can be nominated.

Availability.

The information should be available by some form of on-line inquiry system. The system should be user friendly and menu driven. If any significant degree of computer expertise is required to operate the system, then it will fail. It will fail because of lack of use. Time is a senior manager's most precious commodity and anyone or anything that intrudes on that commodity must justify themself or itself. A system that is seen by senior managers to be clumsy, difficult or time consuming to use will be ignored in favour of his or her secretary.

Timeliness.

The information must be up-to-date. Critical or sensitive information which is stale is more of a hindrance than a help.

Concluding Comments.

The Sales function is not concerned wit margins. Their task is to sell. It is a management function and responsibility to determine the price based on market knowledge and feedback from the sales force.

Attachment A. Monthly Prospect Forecast Form.

MONTHLY PROSPECT FORECAST

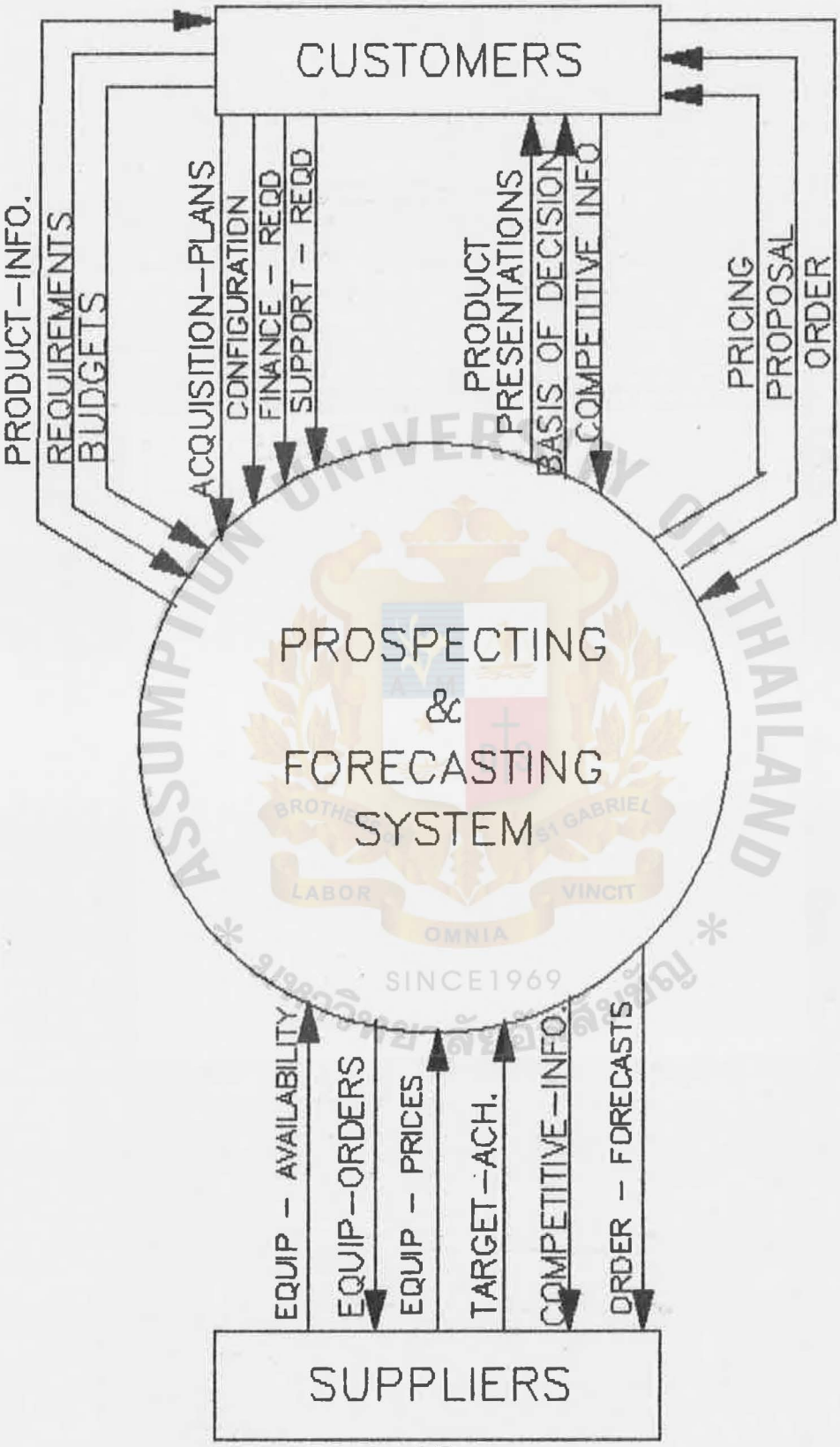
Submitted By..... Date / / For Month.....

Reviewed By..... Date / /

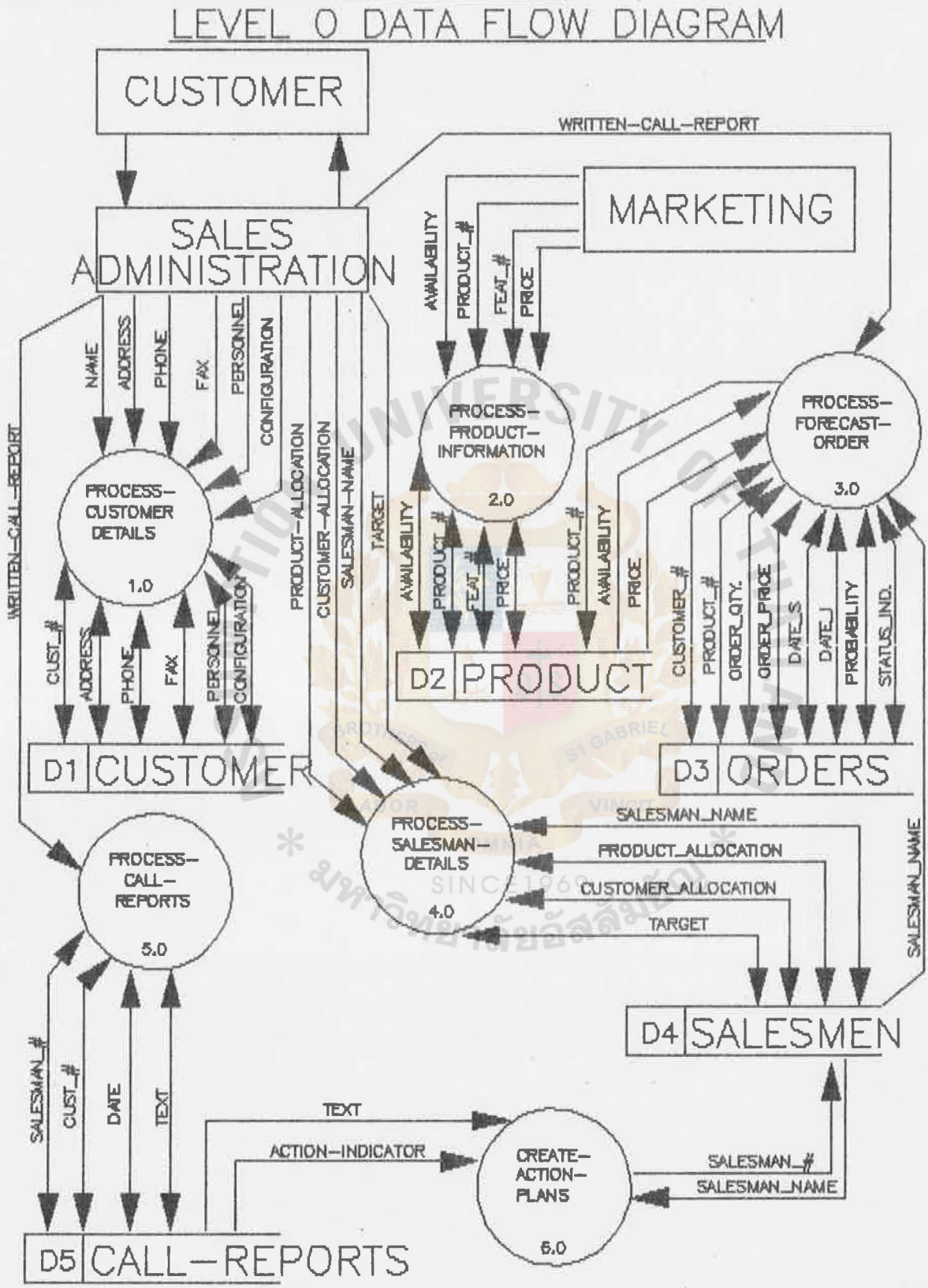
Customer	Product	Unit Price	Qty.	Total Price	Sign Month	Ins.Month	Comments	%

APPENDIX B.

CONTEXT DIAGRAM

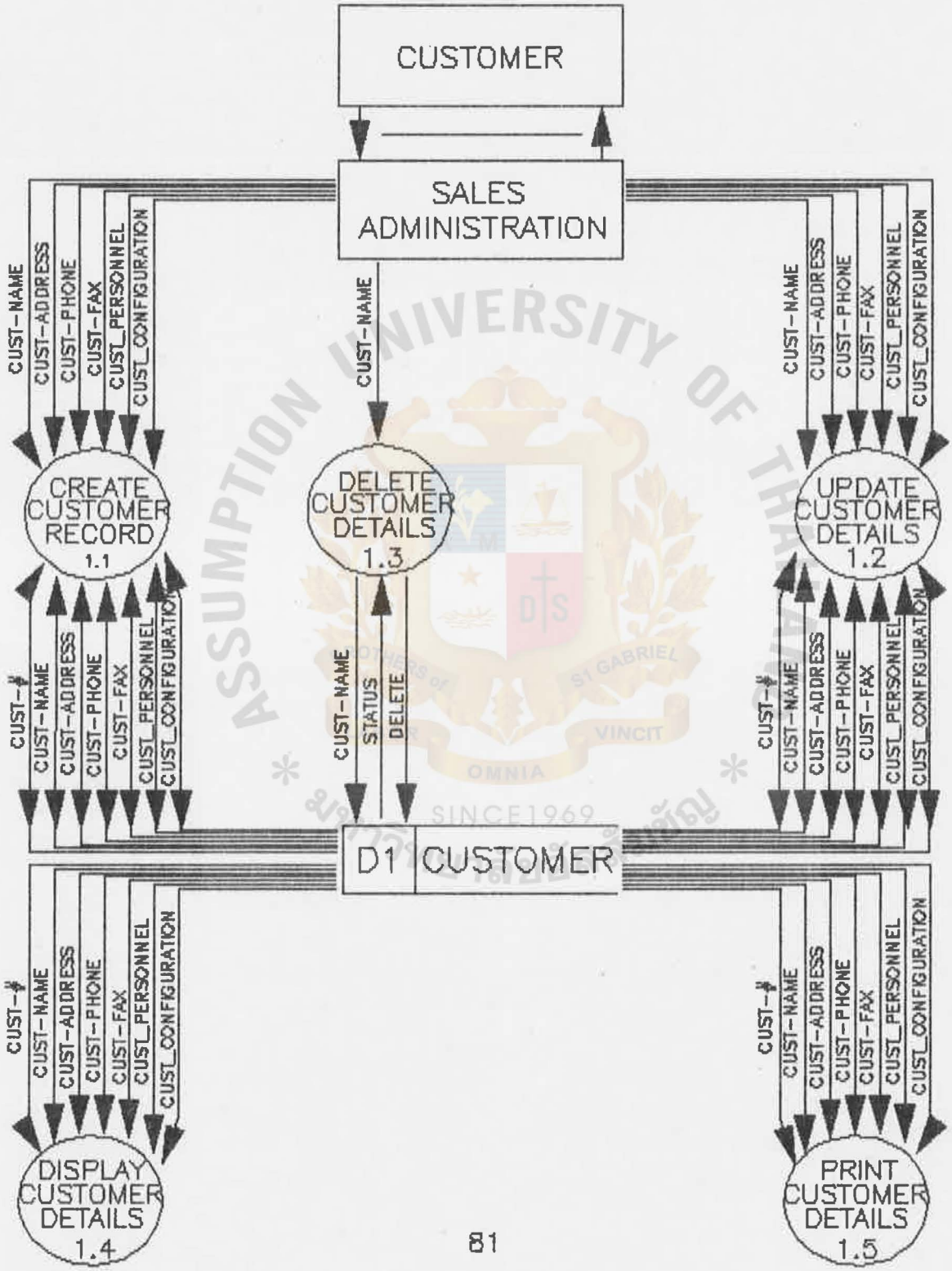


APPENDIX K. LEVEL 0 DATA FLOW DIAGRAM.

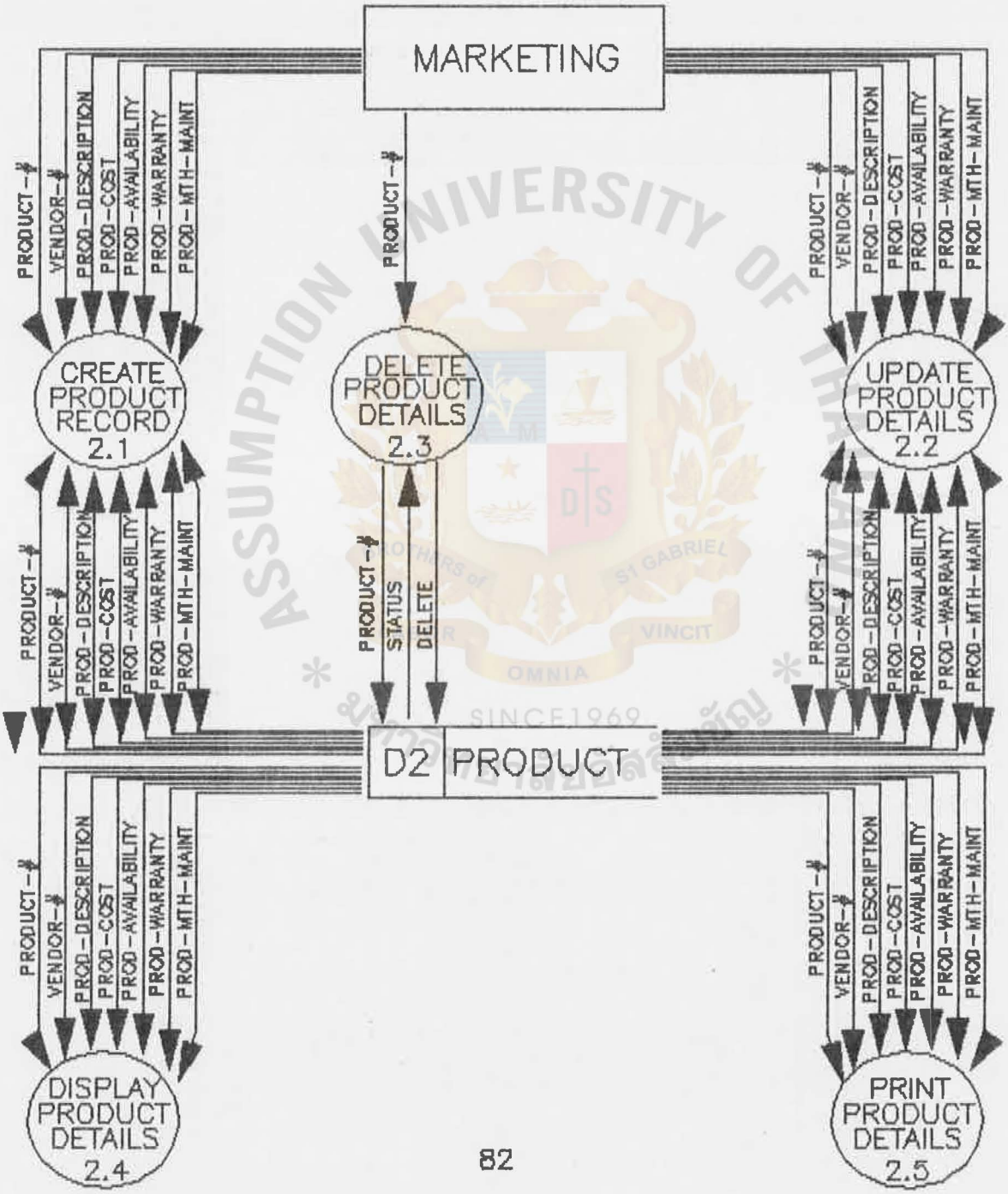


APPENDIX C2.

LEVEL 1 DATA FLOW DIAGRAM
PROCESS CUSTOMER DETAILS



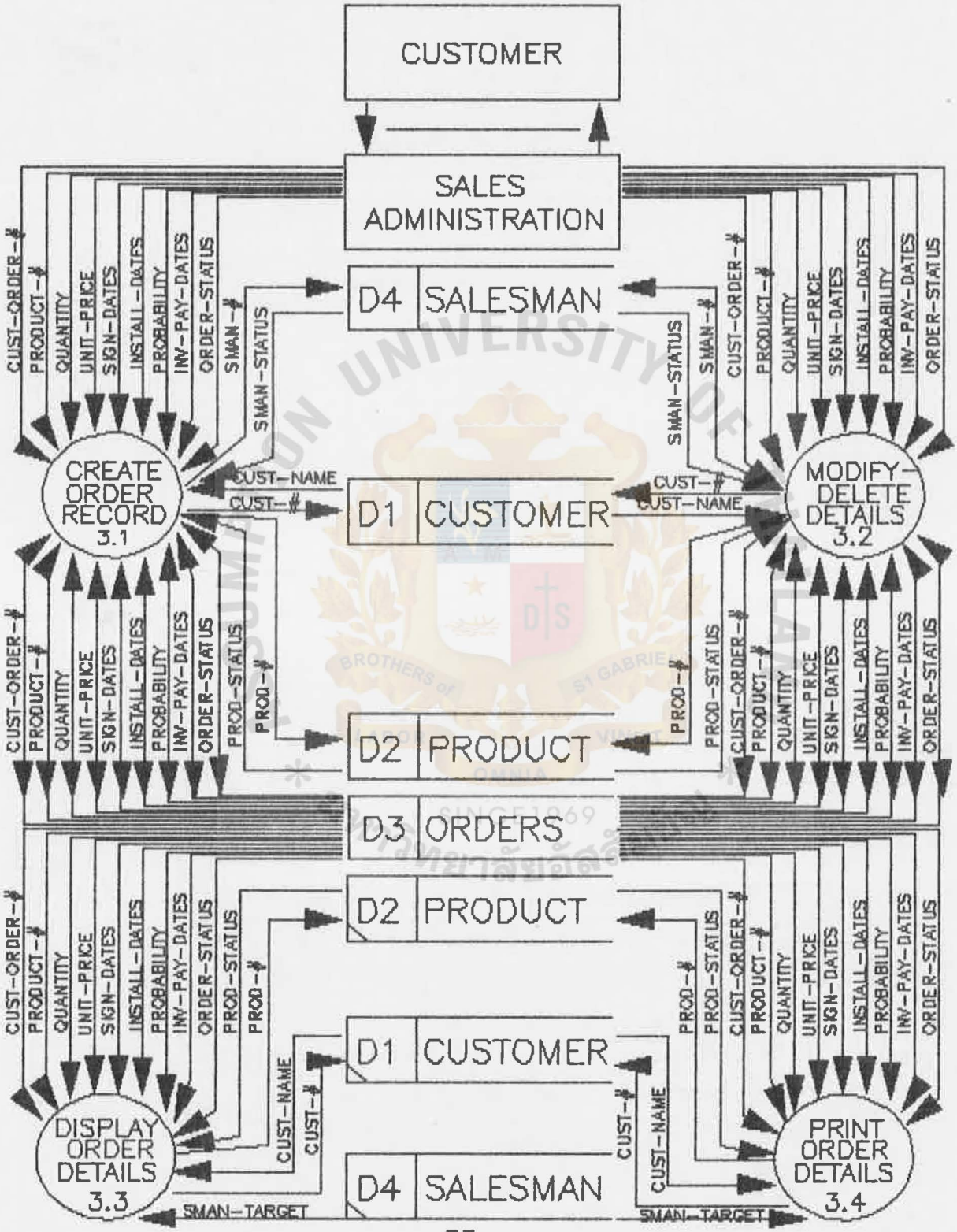
APPENDIX C3. LEVEL 1 DATA FLOW DIAGRAM
PROCESS PRODUCT INFORMATION



APPENDIX C4.

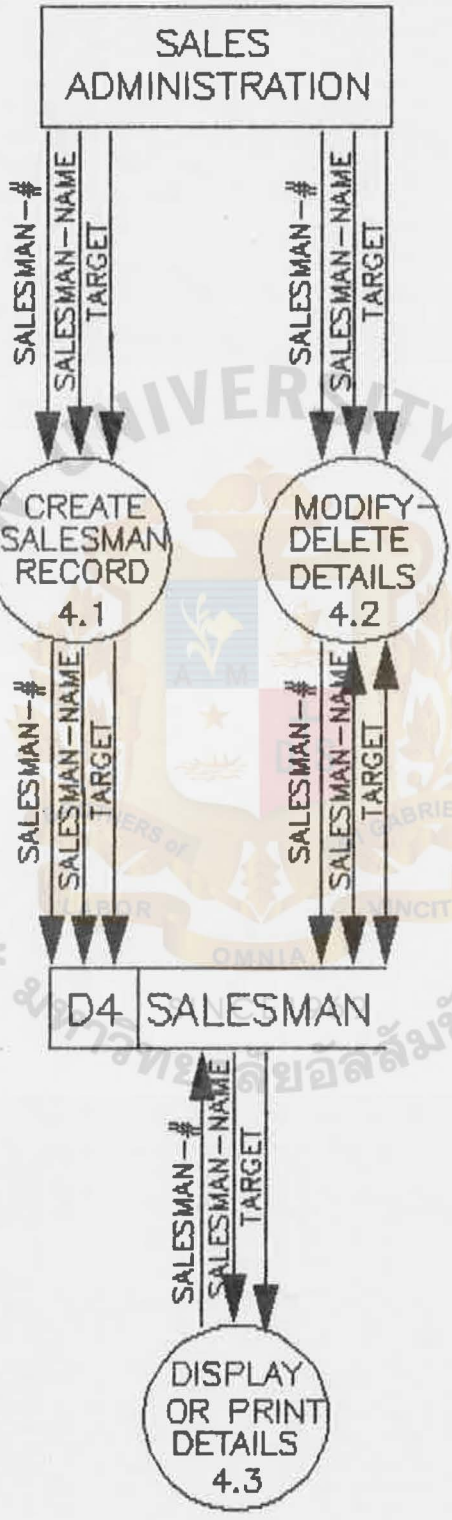
LEVEL 1 DATA FLOW DIAGRAM

PROCESS ORDER INFORMATION



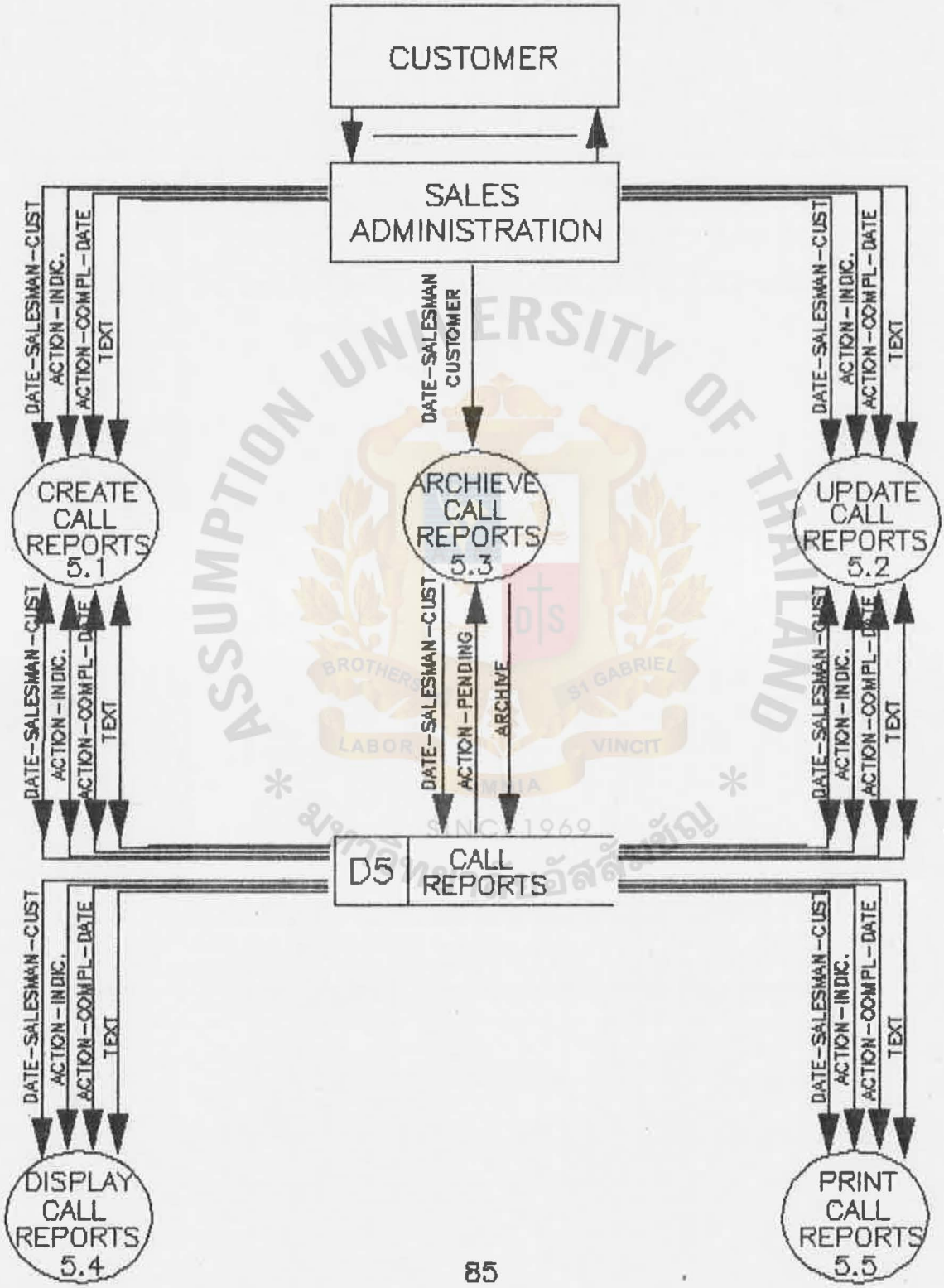
APPENDIX C5.

LEVEL 1 DATA FLOW DIAGRAM
PROCESS SALESMAN DETAILS



APPENDIX C6.

LEVEL 1 DATA FLOW DIAGRAM
PROCESS CALL REPORTS



APPENDIX D. LOGICAL DATA DICTIONARIES.

APPENDIX D1. DATA STORE D1 - CUSTOMER DATA STRUCTURE.

NAME OF DATA STORE : D1

NAME OF DATA STRUCTURE	NAME OF DATA ELEMENT
CUSTOMER	CUST_# CUST_NAME CUST_ADDR1 CUST_ADDR2 CUST_ADDR3 CUST_POST-CODE CUST_PHONE CUST_FAX CUST_EMP-POSITION CUST_EMP-NAME CUST_EMP-PHONE CUST_CPU CUST_OS CUST_DASD CUST_TAPE CUST_LP CUST_COMMS

NOTATIONS :

APPENDIX D. LOGICAL DATA DICTIONARIES.

APPENDIX D2. DATA STORE D2 - PRODUCT DATA STRUCTURE.

NAME OF DATA STORE : D2

NAME OF DATA STRUCTURE	NAME OF DATA ELEMENT
PRODUCT	PRODUCT_VENDOR_# PRODUCT_# PRODUCT_DESCRIPTION PRODUCT_COST PRODUCT_COST_TYPE PRODUCT_LIST_PRICE PRODUCT_WARRANTY PRODUCT_MAINT_CHARGE

NOTATIONS :

APPENDIX D. LOGICAL DATA DICTIONARIES.

APPENDIX D3. DATA STORE D3 - ORDERS DATA STRUCTURE.

NAME OF DATA STORE : D3

NAME OF DATA STRUCTURE	NAME OF DATA ELEMENT
ORDERS	ORDER_SALESMAN_# ORDER_DATE_OF_PREP ORDER_FOR_PERIOD ORDER_CUST_# ORDER_PRODUCT_# ORDER_UNIT_PRICE ORDER_QTY ORDER_EXP_SIGN_MONTH ORDER_ACT_SIGN_MONTH ORDER_EXP_INST_MONTH ORDER_ACT_INST_MONTH ORDER_PROBABILITY ORDER_INVOICE_DATE ORDER_PAYMENT_DATE

NOTATIONS :

APPENDIX . LOGICAL DATA DICTIONARIES.

APPENDIX D4. SALESMAN DATA STRUCTURE.

NAME OF DATA STORE : D4

NAME OF DATA STRUCTURE	NAME OF DATA ELEMENT
SALESMAN	SALESMAN_# SALESMAN_NAME SALESMAN_TARGET {SALESMAN_CUST_#} {SALESMAN_PRODUCT_#}

NOTATIONS :

APPENDIX D. LOGICAL DATA DICTIONARIES.

APPENDIX D5. CALL-REPORTS DATA STRUCTURE.

NAME OF DATA STORE : D5	
NAME OF DATA STRUCTURE	**NAME OF DATA ELEMENT**
CALL_REPORTS	CALL_REP_DATE CALL_REP_SALESMAN_# CALL_REP_CUST_# {CALL_REP_TEXT}
NOTATIONS :	

APPENDIX E. PHYSICAL DATA DICTIONARIES.

APPENDIX E1. PHYSICAL DATA DICTIONARY OF CUSTOMER_N&A FILE.

DATA ELEMENT NAME	APPROX SIZE	NARRATIVE DESCRIPTION	DATA STORE
CUST_#	4A/N+3N	CUSTOMER NUMBER IS MADE UP OF THE FIRST FOUR CHARACTERS OF THE CUSTOMER NAME AND PLUS THREE NUMERIC	D1
CUST_NAME	32A/N	COMPANY NAME	
CUST_ADDR1	24A/N	1ST LINE OF COMPANY ADDRESS	
CUST_ADDR2	24A/N	2ND LINE OF COMPANY ADDRESS	
CUST_ADDR3	16A/N	3RD LINE OF COMPANY ADDRESS	
CUST-POST-CODE	5N	POST CODE	
CUST_PHONE	7N	SWITCHBOARD OR MAIN TELEPHONE LINE NUMB.	
CUST_FAX	7N	FAX. NUMBER	
A = ALPHABETIC N = NUMERIC AN = ALPHABETIC & NUMERIC			

APPENDIX E2. PHYSICAL DATA DICTIONARIES.

APPENDIX . PHYSICAL DATA DICTIONARY OF CUSTOMER_EMPLOYEE FILE.

DATA ELEMENT NAME	APPROX SIZE	NARATIVE DESCRIPTION	DATA STORE
CUST_#	4A/N+3N	CUSTOMER NUMBER IS MADE UP OF THE FIRST FOUR CHARACTERS OF THE CUSTOMER NAME AND THREE NUMERIC DIGITS	D1,
CUST_EMP_LINE	3N	LINE NUMBER, COMPUTER GENERATED	
CUST_EMP_POS	16A	POSITION HELD BY THE EMPLOYEE	
CUST_EMP_NAME	32A	EMPLOYEE NAME	
CUST_EMP_PHONE	7N	EMPLOYEE DIRECT LINE	
A = ALPHABETIC N = NUMERIC AN = ALPHABETIC & NUMERIC			

APPENDIX E3. PHYSICAL DATA DICTIONARY OF CONFIGURATION FILE.

DATA ELEMENT NAME	APPROX SIZE	NARATIVE DESCRIPTION	DATA STORE
CUST_#	4A/N+3N	CUSTOMER NUMBER IS MADE UP OF THE FIRST FOUR CHARACTERS OF THE CUSTOMER NAME AND THREE NUMERIC DIGITS	D1
CUST_CONFIG_LINE	3N	COMPUTER GENERATED LINE NUMBER.	
CUST_CONFIG_CPU	10A/N	CPU MODEL NUMBER	
CUST_CONFIG_OS	10A/N	OPERATING SYSTEM TYPE AND VERSION IDENTIFICATION.	
CUST_CONFIG_DASD	10A/N	DASD MODEL NUMBER.	
CUST_CONFIG_TAPES	10A/N	TAPE MODEL NUMBER.	
CUST_CONFIG-COMMS	10A/N	COMMUNICATIONS EQUIP.	
A = ALPHABETIC N = NUMERIC AN = ALPHABETIC & NUMERIC			

APPENDIX E4. PHYSICAL DATA DICTIONARY OF PRODUCT FILE.

DATA ELEMENT NAME	APPROX SIZE	NARATIVE DESCRIPTION	DATA STORE
VENDOR_#			D2
PRODUCT_#			
DESCRIPTION			
COST	6N	VENDOR COST	
COST_TYPE	1A	FOB OR CIF & CURRENCY	
LIST_PRICE	8N	LIST PRICE IN BAHT	
WARRANTY	99N	WARRANTY PERIOD IN MONTHS	
MAINT_CHARGE	6N	MONTHLY MAINTENANCE CHARGE IN BAHT	
A = ALPHABETIC N = NUMERIC AN = ALPHABETIC & NUMERIC			

APPENDIX E5. PHYSICAL DATA DICTIONARY OF FORECAST_ORDER FILE.

DATA ELEMENT NAME	APPROX SIZE	NARATIVE DESCRIPTION	DATA STORE
SALESMAN_#			D3
DATE_OF-PREP.	YYMMDD		
FOR_PERIOD	YYMM - YYMM		
CUST_#	4A/N+3N	CUSTOMER NUMBER IS MADE UP OF THE FIRST FOUR CHARACTERS OF THE CUSTOMER NAME AND PLUS THREE NUMERIC	
PRODUCT_#	10A/N	PRODUCT NUMBER	
UNIT_PRICE	6N	UNIT PRICE OF PRODUCT OR FEATURE	
QTY.	4N	QUANTITY OF PRODUCT	
EXP_SIGN_MTH.	YYMM	MONTH EXPECT TO SIGN	
ACT_SIGN_MTH	YYMM	ACTUAL MONTH SIGN	
EXP_INSTALL_MTH	YYMM	MONTH EXPECT TO INSTL	
ACT_INSTALL_MTH	YYMM	ACTUAL MONTH TO INSTL	
PROBABILITY	3N	PROB. OF SIGN. ORDER	
INVOICE_DATE	YYMMDD	DATE OF INVOICE	
PAYMENT_DATE	YYMMDD	DATE RECV. PAYMENT	
A = ALPHABETIC N = NUMERIC AN = ALPHABETIC & NUMERIC			

APPENDIX E6. PHYSICAL DATA DICTIONARY OF SALESMAN_NAME_TARGET FILE.

DATA ELEMENT NAME	APPROX SIZE	NARATIVE DESCRIPTION	DATA STORE
SALESMAN_#			D4
SALESMAN_NAME			
SALESMAN_TARGET			
A = ALPHABETIC N = NUMERIC AN = ALPHABETIC & NUMERIC			

APPENDIX E7. PHYSICAL DATA DICTIONARY OF SALESMAN_PRODUCT FILE.

DATA ELEMENT NAME	APPROX SIZE	NARATIVE DESCRIPTION	DATA STORE
SALESMAN_#			D4
VENDOR_#			
PRODUCT_#	10A/N		
A = ALPHABETIC N = NUMERIC AN = ALPHABETIC & NUMERIC			

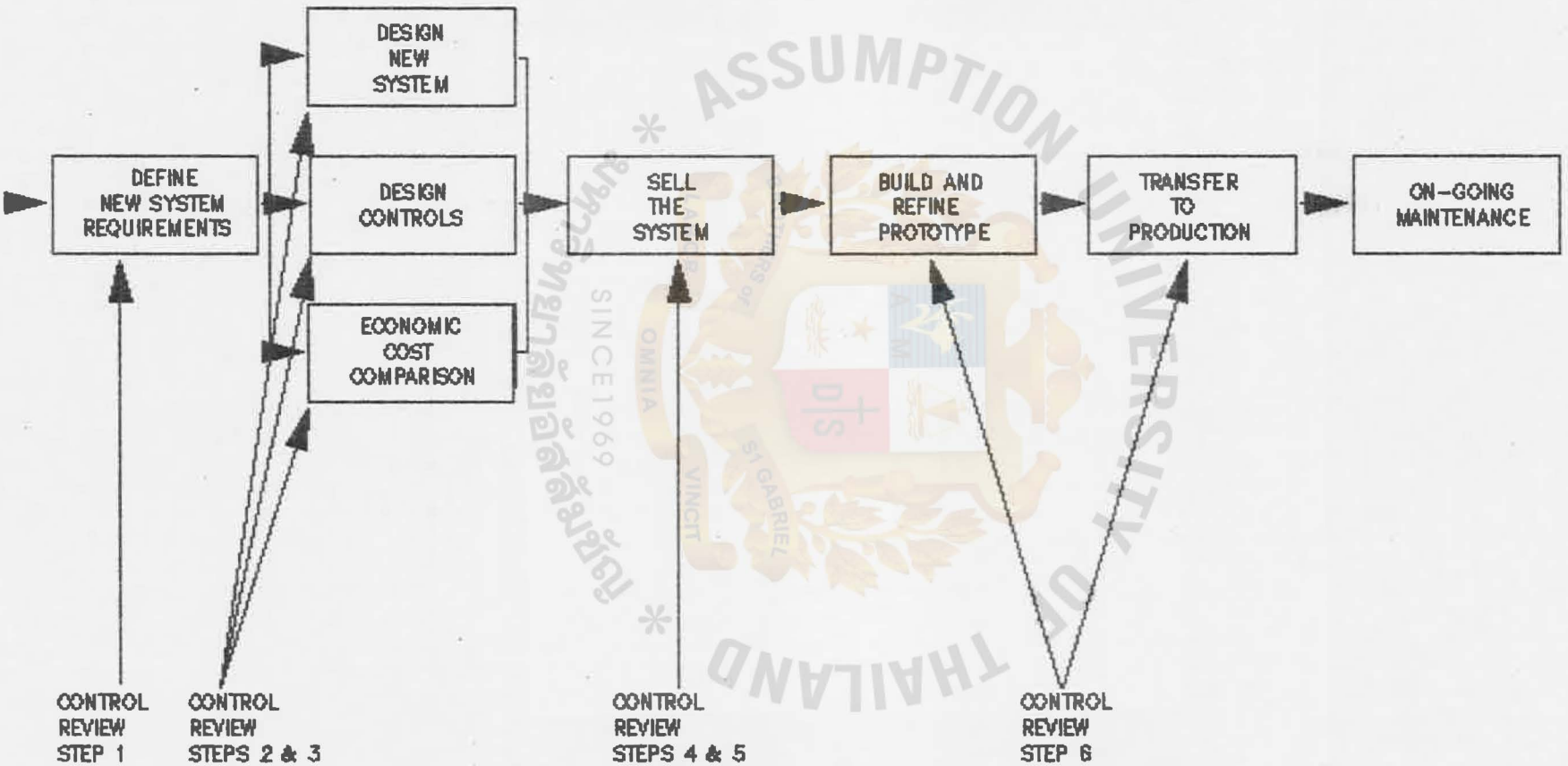
APPENDIX E8. PHYSICAL DATA DICTIONARY OF SALESMAN_COMPANY FILE.

DATA ELEMENT NAME	APPROX SIZE	NARATIVE DESCRIPTION	DATA STORE
SALESMAN_#			D4
CUST_#	4A/N+3N	CUSTOMER NUMBER IS MADE UP OF THE FIRST FOUR CHARACTERS OF THE CUSTOMER NAME AND PLUS THREE NUMERIC	
A = ALPHABETIC N = NUMERIC AN = ALPHABETIC & NUMERIC			

APPENDIX E9. PHYSICAL DATA DICTIONARY OF CALL_REPORT FILE.

DATA ELEMENT NAME	APPROX SIZE	NARATIVE DESCRIPTION	DATA STORE
CALL_REP_DATE			D5
CALL_REP_SALESMAN_#			
CALL_REP_CUST_#	4A/N+3N	CUSTOMER NUMBER IS MADE UP OF THE FIRST FOUR CHARACTERS OF THE CUSTOMER NAME AND PLUS THREE NUMERIC	
CALL_REP_LINE_#	3N	COMPUTER GENERATED LINE NUMBER.	
CALL_REP_TEXT	72A/N	BLOCK OF TEXT	
A = ALPHABETIC N = NUMERIC AN = ALPHABETIC & NUMERIC			

APPENDIX F. CONTROL REVIEW STEPS RELATED TO THE SDLC. (ADAPTED TO THE PROTOTYPE MODEL).



APPENDIX G. COMPONENT/THREAT MATRIX.

THREATS / COMPONENTS	ERRORS IN DATA CAPTURE	OMMISION IN DATA CAPTURE	MISPLACED DOCUMENTS	UNAUTH ACCESS	BREACH OF PRIVACY	CORRUPTED DATA FILES	H/W FAILURE	S/W MALFUNCTION	DISASTER RECOVERY
PROCESS-CUSTOMER DETAILS	1 2 3 4 5 6 17	1 2 4 17	1 2 15	7 9 10 14	9 10 14	7 8	7 8 13 16	7 8 12 16	8 9 11 12 13
PROCESS-PRODUCT-INFORMATION	1 2 3 4 5 6 17	1 2 4 17	1 2 15	7 9 10 14	9 10 14	7 8	7 8 13 16	7 8 12 16	8 9 11 12 13
PROCESS-ORDER-INFORMATION	1 2 3 4 5 6 17	1 2 4 17	1 2 15	7 9 10 14	9 10 14	7 8	7 8 13 16	7 8 12 16	8 9 11 12 13
PROCESS-SALESMAN-DETAILS	1 2 3 4 5 6 17	1 2 4 17	1 2 15	7 9 10 14	9 10 14	7 8	7 8 13 16	7 8 12 16	8 9 11 12 13
PROCESS-CALL-REPORTS	1 2 3 4 5 6 17	1 2 4 17	1 2 15	7 9 10 14	9 10 14	7 8	7 8 13 16	7 8 12 16	8 9 11 12 13
PROCESS-ACTION-REPORTS	1 2 3 4 5 6 17	1 2 4 17	1 2 15	7 9 10 14	9 10 14	7 8	7 8 13 16	7 8 12 16	8 9 11 12 13

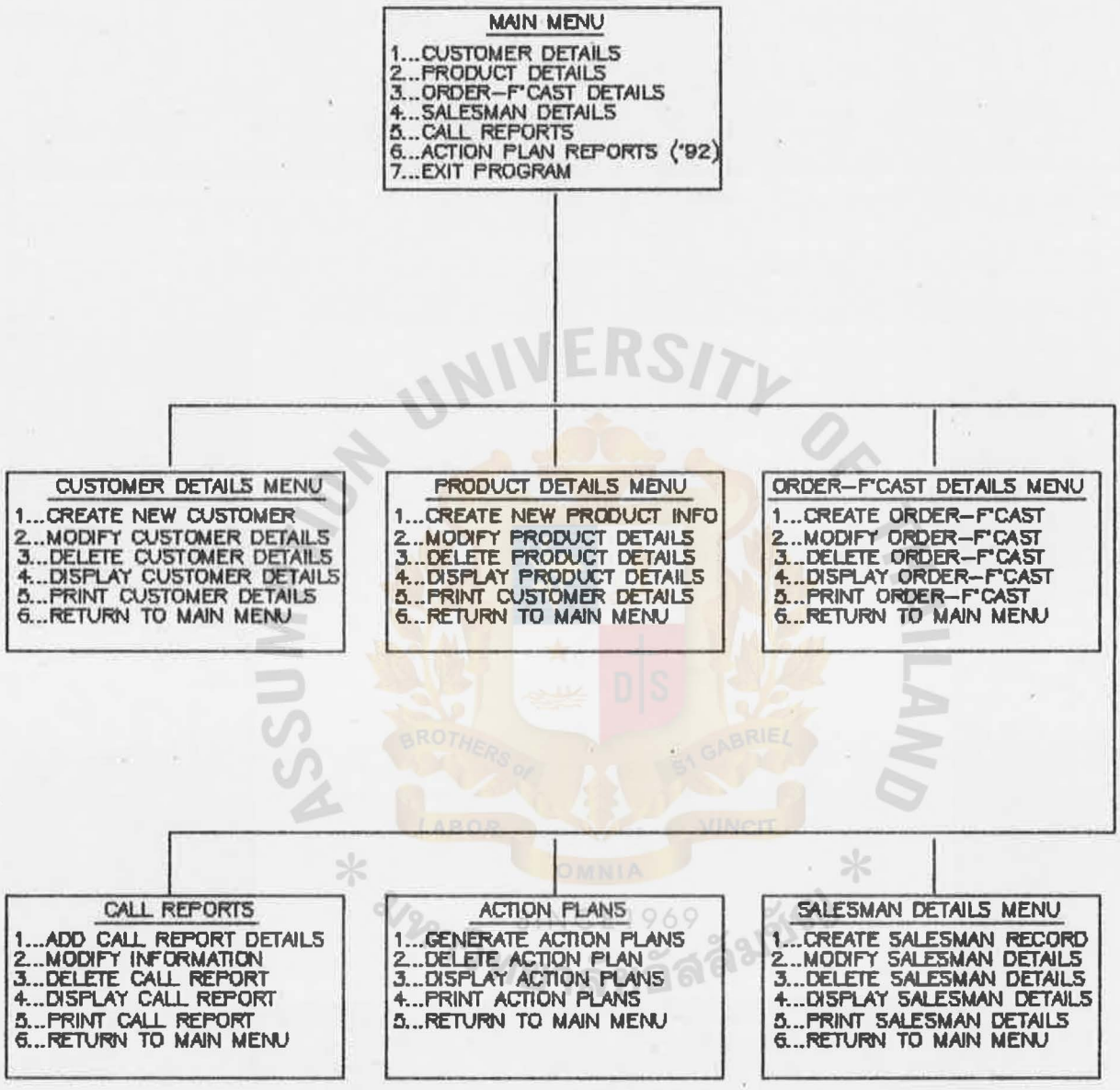
APPENDIX H. TABLE OF THREATS.

- Errors in Data Capture.
- Omission in Data Capture.
- Misplaced Documents.
- Unauthorised Access.
- Breach of Privacy.
- Corrupted Data Files.
- Hardware Failure.
- Software Malfunction.
- Disaster Recovery.

APPENDIX I. TABLE OF CONTROLS.

1. Randomly check data against the originating source.
2. Review data in the computer for consistency. (Sales Reviews with sales staff).
3. Cross check numeric totals against set standards. Analyse any variances.
4. Cross check Order/Forecast information against the Product File for price discrepancies.
5. Produce Audit trails on the numeric data.
6. Maintain a register for (5) above.
7. Maintain a simple checksum of records held on file in each file. Hold the checksum in encrypted format. Thus only updates by the proper application module will update the check sum.
8. Implement frequent backup procedures.
9. Log the on-line transaction and time stamp the log.
10. Implement a password having regard for access to a particular process or function or a particular data item.
11. Ensure that backup hardware is readily available.
12. Ensure that on-call software support is readily available.
13. Ensure adequate hardware maintenance in terms of both qualitative and quantitative issues.
14. Use key locks on equipment.
15. Implement adequate office procedures in handling documents.
16. Maintain a register of system malfunctions for thorough investigation.
17. Implement careful forms design procedures.

APPENDIX J. MENU HIERARCHIAL TREE STRUCTURE.



APPENDIX K. SCREEN FORMATS.

APPENDIX K1. MAIN MENU.

```
**********************************************************************************
*                          THAI COMPUTER SALES CO.                               *
*                            M A I N   M E N U                                   *
**********************************************************************************
*                                                                                *
*                        (1)  CUSTOMER INFORMATION                               *
*                                                                                *
*                        (2)  PRODUCT INFORMATION                                *
*                                                                                *
*                        (3)  ORDER-FORECASTS INFORMATION                        *
*                                                                                *
*                        (4)  SALESMAN DETAILS                                   *
*                                                                                *
*                        (5)  CALL REPORTS                                       *
*                                                                                *
*                        (E)  EXIT PROGRAM                                       *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                      ENTER SELECTION       >6                                  *
*                 *** INVALID CHARACTER - TRY AGAIN ***                          *
*                                                                                *
**********************************************************************************
```

APPENDIX K2. CUSTOMER INFORMATION FUNCTION MENU.

```
**********************************************************************************
*                          THAI COMPUTER SALES CO.                               *
*                     CUSTOMER INFORMATION FUNCTION MENU                         *
**********************************************************************************
*                                                                                *
*                          (1)  ADD A NEW CUSTOMER                               *
*                                                                                *
*                          (2)  CHANGE EXISTING DATA                             *
*                                                                                *
*                          (3)  DELETE A CUSTOMER                                *
*                                                                                *
*                          (4)  DISPLAY INFORMATION                              *
*                                                                                *
*                          (5)  PRINT REPORT                                     *
*                                                                                *
*                          (E)  BACK TO MAIN MENU                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                          ENTER SELECTION      >6                               *
*                    *** INVALID CHARACTER - TRY AGAIN ***                       *
*                                                                                *
**********************************************************************************
```

APPENDIX K2.1 ADD A NEW CUSTOMER.

```
*********************************************************************************
*                          THAI COMPUTER SALES CO.                              *
*                      A D D   A   N E W   C U S T O M E R                      *
*********************************************************************************
*                                                                               *
*     ENTER CUSTOMER #: AAAANNNN                                                *
*                                                                               *
*     ENTER NAME      : XXXXXXXXXXXXXXXXXXXXXXXX                                *
*                                                                               *
*     ENTER ADDRESS   : XXXXXXXXXXXXXXXXXXXXXXXX                                *
*                                                                               *
*                       XXXXXXXXXXXXXXXXXXXXXXXX                                *
*                                                                               *
*                       XXXXXXXXXXXXXXXXXXXXXXXX                                *
*                                                                               *
*     POST CODE       : NNNNN                                                   *
*                                                                               *
*     PHONE           : NNNNNNN NNNNNNN NNNNNNNN  FAX : NNNNNNN                 *
*                                                                               *
*                                                                               *
*                       DO YOU WISH TO CHANGE Y/N >U                            *
*                    *** INVALID CHARACTER - TRY AGAIN ***                      *
*                                                                               *
*********************************************************************************
```

APPENDIX K2.2 MODIFY EXISTING CUSTOMER DATA.

```
*****************************************************************************
*                          THAI COMPUTER SALES CO.                          *
*                     M O D I F Y   C U S T O M E R   D A T A               *
*****************************************************************************
*                                                                           *
*     ENTER CUSTOMER #: AAAANNNN                                            *
*                                                                           *
*     ENTER NAME      : XXXXXXXXXXXXXXXXXXXXXXX                             *
*                                                                           *
*     ENTER ADDRESS   : XXXXXXXXXXXXXXXXXXXXXXX                             *
*                                                                           *
*                       XXXXXXXXXXXXXXXXXXXXXXX                             *
*                                                                           *
*                       XXXXXXXXXXXXXXXXXXXXXXX                             *
*                                                                           *
*     POST CODE       : NNNNN                                               *
*                                                                           *
*     PHONE           : NNNNNNN NNNNNNN NNNNNNNN  FAX : NNNNNNN             *
*                                                                           *
*                                                                           *
*                       DO YOU WISH TO CHANGE Y/N >U                        *
*                    *** INVALID CHARACTER - TRY AGAIN ***                  *
*                                                                           *
*****************************************************************************
```

APPENDIX K2.3 DELETE A CUSTOMER.

```
*********************************************************************************
*                          THAI COMPUTER SALES CO.                              *
*                       D E L E T E   A   C U S T O M E R                       *
*********************************************************************************
*                                                                               *
*     ENTER CUSTOMER #: AAAANNNN                                                *
*                                                                               *
*     ENTER NAME      : XXXXXXXXXXXXXXXXXXXXXXXX                                *
*                                                                               *
*     ENTER ADDRESS   : XXXXXXXXXXXXXXXXXXXXXXXX                                *
*                                                                               *
*                       XXXXXXXXXXXXXXXXXXXXXXXX                                *
*                                                                               *
*                       XXXXXXXXXXXXXXXXXXXXXXXX                                *
*                                                                               *
*     POST CODE       : NNNNN                                                   *
*                                                                               *
*     PHONE           : NNNNNNN NNNNNNN NNNNNNNN  FAX : NNNNNNN                 *
*                                                                               *
*                                                                               *
*                         CORRECT CUSTOMER Y/N   >U                             *
*                     *** INVALID CHARACTER - TRY AGAIN ***                     *
*                                                                               *
*********************************************************************************
```

APPENDIX K2.4 DISPLAY CUSTOMER DETAILS.

```
*****************************************************************************
*                          THAI COMPUTER SALES CO.                          *
*                 D I S P L A Y   C U S T O M E R   D E T A I L S           *
*****************************************************************************
*                                                                           *
*     ENTER CUSTOMER #: AAAANNNN                                            *
*                                                                           *
*     ENTER NAME      : XXXXXXXXXXXXXXXXXXXXXXX                             *
*                                                                           *
*     ENTER ADDRESS   : XXXXXXXXXXXXXXXXXXXXXXX                             *
*                       XXXXXXXXXXXXXXXXXXXXXXX                             *
*                       XXXXXXXXXXXXXXXXXXXXXXX                             *
*                                                                           *
*     POST CODE       : NNNNN                                               *
*                                                                           *
*     PHONE           : NNNNNNN NNNNNNN NNNNNNNN  FAX : NNNNNNN             *
*                                                                           *
*                                                                           *
*                                   MORE Y/N   >U                           *
*                 *** INVALID CHARACTER - TRY AGAIN ***                     *
*                                                                           *
*****************************************************************************
```

APPENDIX K3. PRODUCT INFORMATION FUNCTION MENU.

```
**********************************************************************************
*                          THAI COMPUTER SALES CO.                               *
*                     PRODUCT INFORMATION FUNCTION MENU                          *
**********************************************************************************
*                                                                                *
*                          (1)  ADD A NEW PRODUCT                                *
*                                                                                *
*                          (2)  CHANGE EXISTING DATA                             *
*                                                                                *
*                          (3)  DELETE A PRODUCT                                 *
*                                                                                *
*                          (4)  DISPLAY INFORMATION                              *
*                                                                                *
*                          (5)  PRINT REPORT                                     *
*                                                                                *
*                          (E)  BACK TO MAIN MENU                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                          ENTER SELECTION       >6                              *
*                    *** INVALID CHARACTER - TRY AGAIN ***                       *
*                                                                                *
**********************************************************************************
```

APPENDIX K3.1 ADD A NEW PRODUCT.

```
*******************************************************************************
*                          THAI COMPUTER SALES CO.                            *
*                       A D D   A   N E W   P R O D U C T                     *
*******************************************************************************
*                                                                             *
*   PRODUCT #             : XXXXXXXXXX                                        *
*                                                                             *
*   PRODUCT DESCRIPTION   : XXXXXXXXXXXXXXXXXXXXXXX                           *
*                                                                             *
*   VENDOR                : XXXXXXXXXXXXXXX                                   *
*                                                                             *
*   COST                  : NNNNNNNNN                                         *
*                                                                             *
*   LIST PRICE            : NNNNNNNNN                                         *
*                                                                             *
*   MONTHLY MAINT         : NNNNNNNNN                                         *
*                                                                             *
*   WARRANTY PERIOD       : NN                                                *
*                                                                             *
*                                                                             *
*                     DO YOU WISH TO CHANGE Y/N >6                            *
*                   *** INVALID CHARACTER - TRY AGAIN ***                     *
*                                                                             *
*******************************************************************************
```

APPENDIX K3.2 MODIFY EXISTING PRODUCT DATA.

```
*****************************************************************************
*                          THAI COMPUTER SALES CO.                          *
*          M O D I F Y   E X I S T I N G   P R O D U C T   D A T A          *
*****************************************************************************
*                                                                           *
*   ENTER PRODUCT #      : XXXXXXXXXX                                       *
*                                                                           *
*   PRODUCT DESCRIPTION  : XXXXXXXXXXXXXXXXXXXXXXXX                        *
*                                                                           *
*   VENDOR               : XXXXXXXXXXXXXXXX                                 *
*                                                                           *
*   COST                 : NNNNNNNNN                                        *
*                                                                           *
*   LIST PRICE           : NNNNNNNNN                                        *
*                                                                           *
*   MONTHLY MAINT        : NNNNNNNNN                                        *
*                                                                           *
*   WARRANTY PERIOD      : NN                                               *
*                                                                           *
*                                                                           *
*                    DO YOU WISH TO CHANGE Y/N >6                           *
*                  *** INVALID CHARACTER - TRY AGAIN ***                    *
*                                                                           *
*****************************************************************************
```

APPENDIX K3.3 DELETE A PRODUCT.

```
*******************************************************************************
*                          THAI COMPUTER SALES CO.                            *
*                       D E L E T E   A   P R O D U C T                       *
*******************************************************************************
*                                                                             *
*   ENTER PRODUCT #      : XXXXXXXXXX                                         *
*                                                                             *
*   PRODUCT DESCRIPTION  : XXXXXXXXXXXXXXXXXXXXXXXX                          *
*                                                                             *
*   VENDOR               : XXXXXXXXXXXXXXXX                                   *
*                                                                             *
*   COST                 : NNNNNNNNN                                          *
*                                                                             *
*   LIST PRICE           : NNNNNNNNN                                          *
*                                                                             *
*   MONTHLY MAINT        : NNNNNNNNN                                          *
*                                                                             *
*   WARRANTY PERIOD      : NN                                                 *
*                                                                             *
*                                                                             *
*                          CORRECT PRODUCT Y/N >6                             *
*                  *** INVALID CHARACTER - TRY AGAIN ***                      *
*                                                                             *
*******************************************************************************
```

APPENDIX K3.4 DISPLAY A PRODUCT.

```
**************************************************************************
*                        THAI COMPUTER SALES CO.                         *
*                     D E L E T E   A   P R O D U C T                    *
**************************************************************************
*                                                                        *
*   ENTER PRODUCT #      : XXXXXXXXXX                                    *
*                                                                        *
*   PRODUCT DESCRIPTION  : XXXXXXXXXXXXXXXXXXXXXXXX                      *
*                                                                        *
*   VENDOR               : XXXXXXXXXXXXXXXX                              *
*                                                                        *
*   COST                 : NNNNNNNNN                                     *
*                                                                        *
*   LIST PRICE           : NNNNNNNNN                                     *
*                                                                        *
*   MONTHLY MAINT        : NNNNNNNNN                                     *
*                                                                        *
*   WARRANTY PERIOD      : NN                                            *
*                                                                        *
*                                                                        *
*                              ANY MORE   Y/N >6                         *
*                  *** INVALID CHARACTER - TRY AGAIN ***                 *
*                                                                        *
**************************************************************************
```

APPENDIX K4. ORDER - FORECAST FUNCTION MENU.

```
*********************************************************************************
*                          THAI COMPUTER SALES CO.                              *
*                     FORECAST & ORDER    FUNCTION MENU                         *
*********************************************************************************
*                                                                               *
*                          (1)  ADD A NEW FORECAST - ORDER                      *
*                                                                               *
*                          (2)  CHANGE EXISTING DATA                            *
*                                                                               *
*                          (3)  DELETE A FORECAST - ORDER                       *
*                                                                               *
*                          (4)  DISPLAY INFORMATION                             *
*                                                                               *
*                          (5)  PRINT REPORT                                    *
*                                                                               *
*                          (E)  BACK TO MAIN MENU                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                          ENTER SELECTION      >6                              *
*                   *** INVALID CHARACTER - TRY AGAIN ***                       *
*                                                                               *
*********************************************************************************
```

APPENDIX K4.1 ADD A NEW ORDER FORECAST.

```
*********************************************************************************
*                              THAI COMPUTER SALES CO.                          *
*                  A D D   A   N E W   O R D E R  -  F O R E C A S T            *
*********************************************************************************
*    ENTER FORECAST #                 : NNNN                                    *
*    ENTER CUSTOMER #                 : XXXXNNNN                                *
*    ENTER PRODUCT #                  : XXXXXXXXXX                              *
*    ENTER UNIT PRICE                 : NNNNNNNN                                *
*    ENTER QUANTITY                   : NNNN                                    *
*    ENTER EXPECTED SIGN MONTH        : NN                                      *
*    ENTER EXPECTED INSTALL MONTH     : NN                                      *
*    ENTER PROBABILITY                : NNN                                     *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                    DO YOU WISH TO CHANGE Y/N >6                               *
*                  *** INVALID CHARACTER - TRY AGAIN ***                        *
*                                                                               *
*********************************************************************************
```

APPENDIX K4.2 MODIFY AN EXISTING ORDER - FORECAST.

```
*****************************************************************************
*                          THAI COMPUTER SALES CO.                          *
*              M O D I F Y   A N   O R D E R  -  F O R E C A S T            *
*****************************************************************************
*    ENTER FORECAST #              : NNNN                                   *
*    CUSTOMER #                    : XXXXNNNN                               *
*    PRODUCT #                     : XXXXXXXXXX                             *
*    UNIT PRICE                    : NNNNNNNN                               *
*    QUANTITY                      : NNNN                                   *
*    EXPECTED SIGN MONTH           : NN                                     *
*    ACTUAL SIGN MONTH             : NN                                     *
*    EXPECTED INSTALL MONTH        : NN                                     *
*    ACTUAL SIGN MONTH             : NN                                     *
*    INVOICE DATE                  : DD/MM/YY                               *
*    PAYMENT DATE                  : DD/MM/YY                               *
*    PROBABILITY                   : NNN                                    *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                      DO YOU WISH TO CHANGE Y/N >6                         *
*                   *** INVALID CHARACTER - TRY AGAIN ***                   *
*                                                                           *
*****************************************************************************
```

APPENDIX K4.3 DELETE AN ORDER - FORECAST.

```
**************************************************************************
*                        THAI COMPUTER SALES CO.                         *
*            D E L E T E   A N   O R D E R  -  F O R E C A S T           *
**************************************************************************
*   ENTER FORECAST #              : NNNN                                 *
*   CUSTOMER #                    : XXXXNNNN                             *
*   PRODUCT #                     : XXXXXXXXXX                           *
*   UNIT PRICE                    : NNNNNNNN                             *
*   QUANTITY                      : NNNN                                 *
*   EXPECTED SIGN MONTH           : NN                                   *
*   ACTUAL SIGN MONTH             : NN                                   *
*   EXPECTED INSTALL MONTH        : NN                                   *
*   ACTUAL SIGN MONTH             : NN                                   *
*   INVOICE DATE                  : DD/MM/YY                             *
*   PAYMENT DATE                  : DD/MM/YY                             *
*   PROBABILITY                   : NNN                                  *
*                                                                        *
*                                                                        *
*                                                                        *
*                                                                        *
*                 CORRECT ORDER-FORECAST  Y/N >6                          *
*               *** INVALID CHARACTER - TRY AGAIN ***                    *
*                                                                        *
**************************************************************************
```

APPENDIX K4.4 DISPLAY AN ORDER - FORECAST.

```
*********************************************************************************
*                          THAI COMPUTER SALES CO.                              *
*          D I S P L A Y   A N   O R D E R  -  F O R E C A S T                  *
*********************************************************************************
*   ENTER FORECAST #              : NNNN                                        *
*   CUSTOMER #                    : XXXXNNNN                                    *
*   PRODUCT #                     : XXXXXXXXXX                                  *
*   UNIT PRICE                    : NNNNNNNN                                    *
*   QUANTITY                      : NNNN                                        *
*   EXPECTED SIGN MONTH           : NN                                          *
*   ACTUAL SIGN MONTH             : NN                                          *
*   EXPECTED INSTALL MONTH        : NN                                          *
*   ACTUAL SIGN MONTH             : NN                                          *
*   INVOICE DATE                  : DD/MM/YY                                    *
*   PAYMENT DATE                  : DD/MM/YY                                    *
*   PROBABILITY                   : NNN                                         *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                   MORE   Y/N >6                                *
*                *** INVALID CHARACTER - TRY AGAIN ***                          *
*                                                                               *
*********************************************************************************
```

APPENDIX K5. SALESMAN DETAILS FUNCTION MENU.

```
**********************************************************************************
*                          THAI COMPUTER SALES CO.                               *
*                     SALESMAN INFORMATION FUNCTION MENU                         *
**********************************************************************************
*                                                                                *
*                          (1)  ADD A NEW SALESMAN                               *
*                                                                                *
*                          (2)  CHANGE EXISTING DATA                             *
*                                                                                *
*                          (3)  DELETE A SALESMAN                                *
*                                                                                *
*                          (4)  DISPLAY INFORMATION                              *
*                                                                                *
*                          (5)  PRINT REPORT                                     *
*                                                                                *
*                          (E)  BACK TO MAIN MENU                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                       ENTER SELECTION      >6                                  *
*                  *** INVALID CHARACTER - TRY AGAIN ***                         *
*                                                                                *
**********************************************************************************
```

APPENDIX K5.1 ADD A NEW SALESMAN.

```
**********************************************************************************
*                          THAI COMPUTER SALES CO.                               *
*                    A D D   A . N E W   S A L E S M A N                         *
**********************************************************************************
*   ENTER SALESMAN #              : NNNN                                         *
*                                                                                *
*   ENTER SALESMAN NAME           : XXXXXXXXXXXXXXXX                             *
*                                                                                *
*   ENTER TARGET                  : NNNNNNNN                                     *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                 DO YOU WISH TO CHANGE Y/N >6                                   *
*               *** INVALID CHARACTER - TRY AGAIN ***                            *
*                                                                                *
**********************************************************************************
```

APPENDIX K5.2 MODIFY AN EXISTING'S SALESMAN DETAILS.

```
*****************************************************************************
*                          THAI COMPUTER SALES CO.                          *
*  M O D I F Y   A N   E X I S T I N G   S A L E S M A N' S   D E T A I L S  *
*****************************************************************************
*   ENTER SALESMAN #              : NNNN                                    *
*                                                                           *
*   SALESMAN'S NAME               : XXXXXXXXXXXXXXXX                        *
*                                                                           *
*   TARGET                        : NNNNNNNN                                *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                  DO YOU WISH TO CHANGE Y/N >6                             *
*                *** INVALID CHARACTER - TRY AGAIN ***                      *
*                                                                           *
*****************************************************************************
```

APPENDIX K5.3 DELETE A SALESMAN.

```
**********************************************************************************
*                          THAI COMPUTER SALES CO.                               *
*                      D E L E T E   A   S A L E S M A N                         *
**********************************************************************************
*   ENTER SALESMAN #              : NNNN                                         *
*                                                                                *
*   SALESMAN'S NAME               : XXXXXXXXXXXXXXX                              *
*                                                                                *
*   TARGET                        : NNNNNNNN                                     *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                      CORRECT SALESMAN   Y/N >6                                 *
*                  *** INVALID CHARACTER - TRY AGAIN ***                         *
*                                                                                *
**********************************************************************************
```

APPENDIX K5.4 DISPLAY A SALESMAN'S DETAILS.

```
*********************************************************************************
*                          THAI COMPUTER SALES CO.                              *
*            D I S P L A Y   A   S A L E S M A N' S   D E T A I L S              *
*********************************************************************************
*   ENTER SALESMAN #              : NNNN                                        *
*                                                                               *
*   SALESMAN'S NAME               : XXXXXXXXXXXXXXXX                            *
*                                                                               *
*   TARGET                        : NNNNNNNN                                    *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                                                               *
*                                   MORE  Y/N >6                                *
*                 *** INVALID CHARACTER - TRY AGAIN ***                         *
*                                                                               *
*********************************************************************************
```

APPENDIX K6. CALL REPORT FUNCTION MENU.

```
**************************************************************************
*                          THAI COMPUTER SALES CO.                       *
*                       CALL  REPORT  FUNCTION  MENU                     *
**************************************************************************
*                                                                        *
*                          (1)  ADD NEW CALL DETAILS                     *
*                                                                        *
*                          (2)  CHANGE EXISTING DATA                     *
*                                                                        *
*                          (3)  DELETE CALL DETAILS                      *
*                                                                        *
*                          (4)  DISPLAY INFORMATION                      *
*                                                                        *
*                          (5)  PRINT REPORT                             *
*                                                                        *
*                          (E)  BACK TO MAIN MENU                        *
*                                                                        *
*                                                                        *
*                                                                        *
*                                                                        *
*                        ENTER SELECTION      >6                         *
*                  *** INVALID CHARACTER - TRY AGAIN ***                 *
*                                                                        *
**************************************************************************
```

APPENDIX K6.1 ADD NEW CALL INFORMATION.

```
**********************************************************************************
*                          THAI COMPUTER SALES CO.                               *
*              A D D  N E W  C A L L  I N F O R M A T I O N                       *
**********************************************************************************
*   ENTER CALL DATE              : NNNN                                          *
*                                                                                *
*   ENTER CUSTOMER NAME          : XXXXXXXXXXXXXXXX                              *
*                                                                                *
*   ENTER TEXT                   : XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX   *
*                                  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX   *
*                                  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX   *
*                                  XXXXXXXX                                      *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                                                                                *
*                  DO YOU WISH TO CHANGE Y/N >6                                  *
*                *** INVALID CHARACTER - TRY AGAIN ***                           *
*                                                                                *
**********************************************************************************
```

APPENDIX K6.2 MODIFY CALL INFORMATION.

```
**************************************************************************
*                        THAI COMPUTER SALES CO.                         *
*              M O D I F Y   C A L L   I N F O R M A T I O N             *
**************************************************************************
*   ENTER CALL DATE              : NNNN                                  *
*                                                                        *
*   ENTER CUSTOMER NAME          : XXXXXXXXXXXXXXXX                      *
*                                                                        *
*   TEXT                         : XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX *
*                                  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX *
*                                  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX *
*                                  XXXXXXXX                              *
*                                                                        *
*                                                                        *
*                                                                        *
*                                                                        *
*                                                                        *
*                                                                        *
*                                                                        *
*                                                                        *
*                  DO YOU WISH TO CHANGE Y/N >6                          *
*               *** INVALID CHARACTER - TRY AGAIN ***                    *
*                                                                        *
**************************************************************************
```

APPENDIX K6.3 DELETE CALL INFORMATION.

```
*************************************************************************
*                        THAI COMPUTER SALES CO.                        *
*              D E L E T E   C A L L   I N F O R M A T I O N            *
*************************************************************************
*   ENTER CALL DATE              : NNNN                                 *
*                                                                       *
*   ENTER CUSTOMER NAME          : XXXXXXXXXXXXXXXX                     *
*                                                                       *
*   TEXT                         : XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  *
*                                  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  *
*                                  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  *
*                                  XXXXXXXX                             *
*                                                                       *
*                                                                       *
*                                                                       *
*                                                                       *
*                                                                       *
*                                                                       *
*                                                                       *
*                                                                       *
*                    CORRECT CALL REPORT  >6                            *
*                *** INVALID CHARACTER - TRY AGAIN ***                  *
*                                                                       *
*************************************************************************
```

APPENDIX K6.4 DISPLAY CALL INFORMATION.

```
*****************************************************************************
*                          THAI COMPUTER SALES CO.                          *
*              D I S P L A Y   C A L L   I N F O R M A T I O N              *
*****************************************************************************
*   ENTER CALL DATE              : NNNN                                     *
*                                                                           *
*   ENTER CUSTOMER NAME          : XXXXXXXXXXXXXXXX                         *
*                                                                           *
*   TEXT                         : XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX   *
*                                  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX   *
*                                  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX   *
*                                  XXXXXXXX                                 *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                        CORRECT CALL REPORT  >6                            *
*                  *** INVALID CHARACTER - TRY AGAIN ***                    *
*                                                                           *
*****************************************************************************
```

APPENDIX L PRINT FORMATS.

APPENDIX L1 . CUSTOMER DETAILS REPORT.

Siam Computer Services & Consulting Co. Ltd.
181 Phaholyothin Road
Bangkok 10400

Tel: 2790010 ext. 7583
Fax: 2713790

Data Centre Manager: Khun Lert
Data Processing Operation Manager: Khun Kanika

CPU	O/S	DASD	TAPES	S/LP	COMMS
2x4381/R03 -32 MB	MVS	2x3880-3 2x3380-AE4 2x3380-AA4 2x3380-BE4	1x3281 4x3288	1x6262-014	1x3274-21D 1x3274-31D 2x3174-01L 2x3174-11L 1x3278-2A 1x3472 15x1040C 2x1040P
AS/400 35		9335-A01 B01x3 9331	9347	4590T	

APPENDIX L2. PRODUCT LISTING.

DATE 28/10/91 PRODUCT LISTING PAGE 1

VENDOR McDATA CORP.

PRODUCT #	DESCRIPTION	AVAILABILITY	COST	LIST PRICE	M.MAINT	WARRANTY
4174-10L	LOCAL CONTRL.	90 DAYS	250,000	350,000	1,750	3 MTHS
4174-20L	LOCAL CONTRL.	90 DAYS	150,000	250,000	1,250	3 MTHS
4199-2	8 PORT MUX	90 DAYS	20,000	33,000	200	36 MTHS

VENDOR GENICOM

1040P	400 CPS PRINTER	EX-STK	30,000	55,000	750	3 MTHS
4530	400 LPM PRINTER	90 DAYS	250,000	400,000	3,750	3 MTHS

APPENDIX L3. FORECAST REPORT.

MONTHLY PROSPECT FORECAST

Submitted By..... Date / / For Month.....

Reviewed By..... Date / /

Customer	Product	Unit Price	Qty.	Total Price	Sign Month	Ins.Month	Comments	%

APPENDIX L4. SALESMAN DETAILS REPORT.

DATE 28/10/91 SALESMAN DETAILS PAGE 1

SALESMAN #	SALESMAN NAME	TARGET
A0002	BANYONG SA-MART	16,000,000
A0004	PUNGAREE SIRIVANICH	25,000,000
B1234	SUNAN DAENGWIGIT	25,000,000
S2002	NOI SUKHAM	16,000,000

APPENDIX L5. CALL REPORT.

DATE 28/10/91 CALL REPORT PAGE 1

DATE OF	CUSTOMER	CONTACT	TEXT	S'MAN
21/10/91	THAI PANICH	Khun Lert	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	Pungaree
21/10/91	BETTER INSURANCE	Somsri	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	Pungaree

APPENDIX M. SAMPLE MAINMENU PROGRAM LISTING.

```
MAINMENU.COB                          Sun Oct 20 17:24:11 1991    Page   1
line number source line   Microsoft COBOL                          Version 2.20

  1         IDENTIFICATION DIVISION.
  2         PROGRAM-ID. MAINMENU.
  3        *
  4         ENVIRONMENT DIVISION.
  5         CONFIGURATION SECTION.
  6        *
  7         SPECIAL-NAMES.
  8             CONSOLE IS CRT.
  9        *
 10         SOURCE-COMPUTER. XXXXX.
 11         OBJECT-COMPUTER. XXXXX.
 12        *
 13         INPUT-OUTPUT SECTION.
 14         FILE-CONTROL.
 15        *
 16         DATA DIVISION.
 17         FILE SECTION.
 18        *
 19         WORKING-STORAGE SECTION.
 20         01  ERROR-MES                       PIC X(37)   VALUE
 21             "*** INVALID CHARACTER - TRY AGAIN ***".
 22         01  WIPE-ERROR                      PIC X(37)   VALUE
 23             "                                     ".
 24        ******************************************************************
 25         01  MAIN-SCRN.
 26             05  SCRN-0101                   PIC X       VALUE "*".
 27             05  SCRN-0102                   PIC X(78)   VALUE ALL "*".
 28             05  SCRN-0180                   PIC X       VALUE "*".
 29             05  SCRN-0201                   PIC X       VALUE "*".
 30             05  FILLER                      PIC X(26).
 31             05  SCRN-0228                   PIC X(24)   VALUE
 32                 " THAI COMPUTER SALES CO.".
 33             05  FILLER                      PIC X(28).
 34             05  SCRN-0280                   PIC X       VALUE "*".
 35             05  SCRN-0301                   PIC X       VALUE "*".
 36             05  SCRN-LINE-03                PIC X(78) .
 37             05  SCRN-0380                   PIC X       VALUE "*".
 38             05  SCRN-0401                   PIC X       VALUE "*".
 39             05  SCRN-LINE-04                PIC X(78)   VALUE ALL "*".
 40             05  SCRN-0480                   PIC X       VALUE "*".
 41             05  SCRN-0501                   PIC X       VALUE "*".
 42             05  SCRN-LINE-05                PIC X(78).
 43             05  SCRN-0580                   PIC X       VALUE "*".
 44             05  SCRN-0601                   PIC X       VALUE "*".
 45             05  SCRN-LINE-06                PIC X(78).
 46             05  SCRN-0680                   PIC X       VALUE "*".
 47             05  SCRN-0701                   PIC X       VALUE "*".
 48             05  SCRN-LINE-07                PIC X(78).
```

```
 49            05  SCRN-0780                  PIC X       VALUE "*".
 50            05  SCRN-0801                  PIC X       VALUE "*".
 51            05  SCRN-LINE-08               PIC X(78).
 52            05  SCRN-0880                  PIC X       VALUE "*".
 53            05  SCRN-0901                  PIC X       VALUE "*".
 54            05  SCRN-LINE-09               PIC X(78).
 55            05  SCRN-0980                  PIC X       VALUE "*".
 56            05  SCRN-1001                  PIC X       VALUE "*".
 57            05  SCRN-LINE-10               PIC X(78).
 58            05  SCRN-1080                  PIC X       VALUE "*".
 59            05  SCRN-1101                  PIC X       VALUE "*".
 60            05  SCRN-LINE-11               PIC X(78).
 61            05  SCRN-1180                  PIC X       VALUE "*".
 62            05  SCRN-1201                  PIC X       VALUE "*".
 63            05  SCRN-LINE-12               PIC X(78).
 64            05  SCRN-1280                  PIC X       VALUE "*".
 65            05  SCRN-1301                  PIC X       VALUE "*".
 66            05  SCRN-LINE-13               PIC X(78).
 67            05  SCRN-1380                  PIC X       VALUE "*".
 68            05  SCRN-1401                  PIC X       VALUE "*".
 69            05  SCRN-LINE-14               PIC X(78).
 70            05  SCRN-1480                  PIC X       VALUE "*".
 71            05  SCRN-1501                  PIC X       VALUE "*".
 72            05  SCRN-LINE-15               PIC X(78).
 73            05  SCRN-1580                  PIC X       VALUE "*".
 74            05  SCRN-1601                  PIC X       VALUE "*".
 75            05  SCRN-LINE-16               PIC X(78).
 76            05  SCRN-1680                  PIC X       VALUE "*".
 77            05  SCRN-1701                  PIC X       VALUE "*".
 78            05  SCRN-LINE-17               PIC X(78).
 79            05  SCRN-1780                  PIC X       VALUE "*".
 80            05  SCRN-1801                  PIC X       VALUE "*".
 81            05  SCRN-LINE-18               PIC X(78).
 82            05  SCRN-1880                  PIC X       VALUE "*".
 83            05  SCRN-1901                  PIC X       VALUE "*".
 84            05  SCRN-LINE-19               PIC X(78).
 85            05  SCRN-1980                  PIC X       VALUE "*".
 86            05  SCRN-2001                  PIC X       VALUE "*".
 87            05  SCRN-LINE-20               PIC X(78).
 88            05  SCRN-2080                  PIC X       VALUE "*".
 89            05  SCRN-2101                  PIC X       VALUE "*".
 90            05  SCRN-LINE-21.
 91                10  FILLER                 PIC X(27)   VALUE SPACES.
 92                10  FILLER                 PIC X(24)   VALUE
 93                    "ENTER SELECTION       > ".
 94                10  SCRN-2152              PIC X.
 95                10  FILLER                 PIC X(26)   VALUE SPACES.
 96            05  SCRN-2180                  PIC X       VALUE "*".
```

```
 97            05  SCRN-2201                      PIC X       VALUE "*".
 98            05  SCRN-LINE-22                   PIC X(78).
 99            05  SCRN-2280                      PIC X       VALUE "*".
100       *    05  SCRN-2301                      PIC X       VALUE "*".
101       *    05  SCRN-LINE-23                   PIC X(78).
102       *    05  SCRN-2380                      PIC X       VALUE "*".
103            05  SCRN-2401                      PIC X       VALUE "*".
104            05  SCRN-LINE-24                   PIC X(78)   VALUE ALL "*".
105            05  SCRN-2480                      PIC X       VALUE "*".
106       *
107       ****************************************************************
108        01  PROCESS-MENU.
109            05  PROCESS-MENU-LINE-01.
110                10  FILLER                     PIC X(27)   VALUE SPACES.
111                10  FILLER                     PIC X(24)   VALUE
112                    "   M A I N   M E N U    ".
113                10  FILLER                     PIC X(27)   VALUE SPACES.
114            05  PROCESS-MENU-LINE-02.
115                10  FILLER                     PIC X(27)   VALUE SPACES.
116                10  FILLER                     PIC X(24)   VALUE
117                    "(1) CUSTOMER INFORMATION".
118                10  FILLER                     PIC X(27)   VALUE SPACES.
119            05  PROCESS-MENU-LINE-03.
120                10  FILLER                     PIC X(27)   VALUE SPACES.
121                10  FILLER                     PIC X(24)   VALUE
122                    "(2) PRODUCT INFORMATION ".
123                10  FILLER                     PIC X(27)   VALUE SPACES.
124            05  PROCESS-MENU-LINE-04.
125                10  FILLER                     PIC X(27)   VALUE SPACES.
126                10  FILLER                     PIC X(34)   VALUE
127                    "(3) ORDER-FORECASTS INFORMATION   ".
128                10  FILLER                     PIC X(17)   VALUE SPACES.
129            05  PROCESS-MENU-LINE-05.
130                10  FILLER                     PIC X(27)   VALUE SPACES.
131                10  FILLER                     PIC X(24)   VALUE
132                    "(4) SALESMAN DETAILS    ".
133                10  FILLER                     PIC X(27)   VALUE SPACES.
134            05  PROCESS-MENU-LINE-06.
135                10  FILLER                     PIC X(27)   VALUE SPACES.
136                10  FILLER                     PIC X(24)   VALUE
137                    "(5) CALL REPORTS        ".
138                10  FILLER                     PIC X(27)   VALUE SPACES.
139            05  PROCESS-MENU-LINE-07.
140                10  FILLER                     PIC X(27)   VALUE SPACES.
141                10  FILLER                     PIC X(24)   VALUE
142                    "(E) EXIT PROGRAM        ".
143                10  FILLER                     PIC X(27)   VALUE SPACES.
144            05  PROCESS-MENU-LINE-08.
```

```
145                 10  FILLER                      PIC X(27)   VALUE SPACES.
146                 10  FILLER                      PIC X(24)   VALUE
147                     "ENTER SELECTION       > ".
148                 10  FILLER                      PIC X(27)   VALUE SPACES.
149         ****************************************************************
150          01  MENU-CHOICE                        PIC X.
151              88  VALID-CHOICE VALUES ARE "1", "2", "3", "4", "5", "E".
152              88  CUSTOMER     VALUE "1".
153              88  PRODUCT      VALUE "2".
154              88  FORECAST     VALUE "3".
155              88  SALESMAN     VALUE "4".
156              88  CALLREPT     VALUE "5".
157              88  EXIT-PROG    VALUE "E".
158         *
159
160          01  RESP                               PIC X.
161         *
162
163         ****************************************************************
164         *
165          PROCEDURE DIVISION.
166         *
167          MAIN-ROUTINE.
168              PERFORM   DISPLAY-PROC-MENU     THRU  DISPLAY-PROC-MENU-EXIT.
169          MAIN-ROUTINE-001.
170              ACCEPT    (21, 52) RESP.
171              DISPLAY   (22, 22) WIPE-ERROR.
172              MOVE  RESP                    TO   MENU-CHOICE.
173              IF NOT VALID-CHOICE
174                 DISPLAY (22, 22) ERROR-MES
175              GO TO MAIN-ROUTINE-001.
176              IF       RESP    = "1"
177                       CHAIN   "CUSTMENU".
178              IF       RESP    =   "2"
179                       CHAIN   "PRODMENU".
180              IF       RESP    =    "3"
181                       CHAIN   "FCSTMENU".
182              IF       RESP    =    "4"
183                       CHAIN   "SMANMENU".
184              IF       RESP    =    "5"
185                       CHAIN   "CRPTMENU".
186              STOP RUN.
187              EXIT.
188          DISPLAY-PROC-MENU.
189              MOVE  PROCESS-MENU-LINE-01   TO   SCRN-LINE-03.
190              MOVE  PROCESS-MENU-LINE-02   TO   SCRN-LINE-06.
191              MOVE  PROCESS-MENU-LINE-03   TO   SCRN-LINE-08.
192              MOVE  PROCESS-MENU-LINE-04   TO   SCRN-LINE-10.
```

```
193             MOVE  PROCESS-MENU-LINE-05   TO   SCRN-LINE-12.
194             MOVE  PROCESS-MENU-LINE-06   TO   SCRN-LINE-14.
195             MOVE  PROCESS-MENU-LINE-07   TO   SCRN-LINE-16.
196             DISPLAY (01, 01) ERASE.
197             DISPLAY MAIN-SCRN.
198         DISPLAY-PROC-MENU-EXIT.
199             EXIT.
200
201
202
203
204

  No errors or warnings

  Data area size =  2848
  Code area size =   328
```