THE ORACLE APPLICATIONS BASE OF SERVICE TO SIAM DAIKIN SALES CO., LTD.

by

Mr. Vittavat Apiromsene

A Final Report of the Three-Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
Assumption University

March, 2001

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Project Title	The Oracle Applications Base of Service to Siam Daikin Sales Co., Ltd.
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Academic Year	April 2001

The Graduate School of Assumption University has approved this final report of the three-credit course. CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

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ABSTRACT

This project examines the implementation and design of a new service system for Service Division of Siam Daikin Sales Co., Ltd., based on the Oracle Service System. The new system will replace the old system which is a tailor-made system and run on a mini-computer, NEC ASTRA 570. It is very obsolete. Implementing the Oracle Service for Service Division will facilitate the users to operate and accomplish their works well. In addition, it will provide information to the management in planning.

The problem from the old system will be identified and analyzed to find the causes. The existing systems should also be studied and analyzed to see what it provides the users, and how it works. IT Department has the direct aspect in the project. The IT manager will act as the project manager. He must setup an effective plan which describes all actions to be taken in order to accomplish the project. Users' requirements must be gathered and analyzed. It is necessary for the implementation team to understand what the Oracle Service will provide to fit the business. The new system will be designed based on the features and functionality of the Oracle Service. The newly designed system will describe the operations that the users have to follow in order to accomplish their tasks.

System evaluation and recommendations will be provided after the new system is in use for a period of time. They will explain the result of the implementation and system improvement to make the system meet the optimal performance.

ACKNOWLEDGEMENTS

I am indebted to the following people and organizations, without whose help, this project would not have been possible.

I wish to express my sincere gratitude to my advisor, Dr. Smith Tungkasmit. His patient assistance, guidance, and constant encouragement have led me to the research completion.

I would like to thank Mr. Punya Suwonkerd, Mr. Supakij Jiwarangsinee, and the staffs of Service Division of Siam Daikin Sales Co., Ltd.

Special appreciation is due to my family for their fervent and continuous encouragement. Above all, I am forever grateful to my parents, whose willingness to invest in my future has enabled me to achieve my educational goal.

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TABLE OF CONTENTS

Chapter	Page
ABSTRACT	i
ACKNOWLEDGEMENTS	ii
LIST OF FIGURES	v
I. INTRODUCTION	1
1.1 Location Decision	1
1.2 Company Profile	1
1.3 Project Objectives	6
II. SERVICE DIVISION'S STRUCTURE	9
2.1 Service Division's Organization	9
2.2 Types of Service	14
III. THE CURRENT SYSTEM	18
3.1 Existing Systems of Service Division	18
3.2 Existing Problems of the Current System	27
IV. SYSTEM IMPLEMENTATION	42
4.1 Implementation Plan	42
4.2 User's Requirements Analysis	42
4.3 Analysis of Oracle Service System	46
4.4 System Design	57
V. POST-IMPLEMENTATION'S EVALUATION	69
VI. POST-IMPLEMENTATION'S PROBLEMS	72
VII. RECOMMENDATIONS	74
VIII. CONCLUSIONS	77

Chapter			Page
APPENDIX	A	SAMPLE SCREENS OF THE CURRENT SYSTEM	79
APPENDIX	B	SAMPLE SCREENS OF THE ORACLE SERVICE	85
APPENDIX	C	SAMPLE REPORTS	107
BIBLIOGRAPHY			113

ASSUMPTION UNIVERSITY OF THAILAND
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มหาวิทยาลัยอัสสัมชัญ

LIST OF FIGURES

Figure		Page
2.1	Service Division's Organization	9
4.1	Flowchart of "Repair Jobs for Products with Warranty"	58
4.2	Flowchart of "Repair Jobs for Products out of Warranty"	59
4.3	Flowchart of "Job Completed: Known Serial Number"	60
4.4	Flowchart of "Job Completed: Unknown Serial Number"	61
4.5	Flowchart of "Job Completed: Invoicing"	62
4.6	Flowchart of "Service Maintenance Sales"	64
4.7	Flowchart of "Installation Service: Issuing Invoice"	65
4.8	Flowchart of "Installation Service: Non-Invoice"	67
4.9	Flowchart of "Entering Warranty"	68
A.1	Screen of Quotation Printing	80
A.2	Screen of Quotation Inquiry	80
A.3	Warranty Card Printing	81
A.4	Warranty Maintenance Screen	81
A.5	Warranty Inquiry Screen	82
A.6	Serial Number Inquiry Screen	82
A.7	Serial Number Inquiry by Document Screen	83
A.8	Customer Name Search's Parameter Input Screen	83
A.9	Customer Name Search's Inquiry Screen	84
A.10	Customer Master Maintenance Screen	84
B.1	Main Menu of Oracle Service System	86
B.2	Install Base Menu	86

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มหาวิทยาลัยอัสสัมชัญ

Figure		Page

B.3 Customer Product Summary Window 87

B.4 "Install/Billing" Region in Customer Product Window 87

B.5 "Product Attribute" Region in Customer Product 88

B.6 "Shipping" Region in Customer Product Window 88

B.7 "More" Region in Customer Product Window 89

B.8 "Support Services Summary" Window of "Service" Button 89

B.9 "System" Window 90

B.10 "Transfer Customer Products" Window 90

B.11 "Define Customer Products" Window 91

B.12 "Service Program" Main Menu 91

B.13 "Support Service Summary" Window 92

B.14 "Service Attribute" Region of "Open" Button 92

B.15 "Current Transaction" Region of "Open" Button 93

B.16 "Billing Information" Region of "Open" Button 93

B.17 "Service Coverage" Region of "Open" Button 94

B.18 "Service Product Attribute" Region of "Open" Button 94

B.19 "Order Service Programs" Window 95

B.20 "Renew Service Programs" Window 95

B.21 "Renew Service Programs: Customer Product" Window 96

B.22 "Terminate Service" Window 96

B.23 "Service Request Tracking" Main Menu 97

B.24 "Product, Services" Region of "Service Requests" Windows 97

B.25 "Problem Description" Region of "Service Requests" Window 98

B.26 "Problem Resolution" Region of "Service Requests" Window 98

Figure	Page

B.27 "Action" Window under "Service Requests" Window 99

B.28 "Address" Region of "Service Requests" Window 99

B.29 "Find Service Requests/Actions" Window 100

B.30 "Service Requests Summary" Window 100

B.31 "Depot Repairs" Main Menu 101

B.32 "Repairs" Window 101

B.33 "Estimate" Window 102

B.34 "Estimate Approval" Window 102

B.35 "Repair Jobs" Window 103

B.36 "Material Requirement" Window 103

B.37 "Repair Orders" Window 104

B.38 "Report Requests" Window 104

B.39 "Find On-Hand Quantities" Window 105

B.40 "Detailed On-Hand Quantities" Window 105

B.41 "Supply/Demand Detail" Window 106

B.42 "Planning" Main Menu 106

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

LIST OF FIGURES

Figure		Page
2.1	Service Division's Organization	9
4.1	Flowchart of "Repair Jobs for Products with Warranty"	58-59
4.2	Flowchart of "Repair Jobs for Products out of Warranty"	59-60
4.3	Flowchart of "Job Completed: Known Serial Number"	60-61
4.4	Flowchart of "Job Completed: Unknown Serial Number"	61-62
4.5	Flowchart of "Job Completed: Invoicing"	62-63
4.6	Flowchart of "Service Maintenance Sales"	64
4.7	Flowchart of "Installation Service: Issuing Invoice"	65-66
4.8	Flowchart of "Installation Service: Non-Invoice"	67-68
4.9	Flowchart of "Entering Warranty"	68
A.1	Screen of Quotation Printing	80
A.2	Screen of Quotation Inquiry	80
A.3	Warranty Card Printing	81
A.4	Warranty Maintenance Screen	81
A.5	Warranty Inquiry Screen	82
A.6	Serial Number Inquiry Screen	82
A.7	Serial Number Inquiry by Document Screen	83
A.8	Customer Name Search's Parameter Input Screen	83
A.9	Customer Name Search's Inquiry Screen	84
A.10	Customer Master Maintenance Screen	84
B.1	Main Menu of Oracle Service System	86
B.2	Install Base Menu	86

UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

Figure | Page

B.3 Customer Product Summary Window 87

B.4 "Install/Billing" Region in Customer Product Window 87

B.5 "Product Attribute" Region in Customer Product 88

B.6 "Shipping" Region in Customer Product Window 88

B.7 "More" Region in Customer Product Window 89

B.8 "Support Services Summary" Window of "Service" Button 89

B.9 "System" Window 90

B.10 "Transfer Customer Products" Window 90

B.11 "Define Customer Products" Window 91

B.12 "Service Program" Main Menu 91

B.13 "Support Service Summary" Window 92

B.14 "Service Attribute" Region of "Open" Button 92

B.15 "Current Transaction" Region of "Open" Button 93

B.16 "Billing Information" Region of "Open" Button 93

B.17 "Service Coverage" Region of "Open" Button 94

B.18 "Service Product Attribute" Region of "Open" Button 94

B.19 "Order Service Programs" Window 95

B.20 "Renew Service Programs" Window 95

B.21 "Renew Service Programs: Customer Product" Window 96

B.22 "Terminate Service" Window 96

B.23 "Service Request Tracking" Main Menu 97

B.24 "Product, Services" Region of "Service Requests" Windows 97

B.25 "Problem Description" Region of "Service Requests" Window 98

B.26 "Problem Resolution" Region of "Service Requests" Window 98

Figure	Page

B.27 "Action" Window under "Service Requests" Window 99

B.28 "Address" Region of "Service Requests" Window 99

B.29 "Find Service Requests/Actions" Window 100

B.30 "Service Requests Summary" Window 100

B.31 "Depot Repairs" Main Menu 101

B.32 "Repairs" Window 101

B.33 "Estimate" Window 102

B.34 "Estimate Approval" Window 102

B.35 "Repair Jobs" Window 103

B.36 "Material Requirement" Window 103

B.37 "Repair Orders" Window 104

B.38 "Report Requests" Window 104

B.39 "Find On-Hand Quantities" Window 105

B.40 "Detailed On-Hand Quantities" Window 105

B.41 "Supply/Demand Detail" Window 106

B.42 "Planning" Main Menu 106

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

LIST OF FIGURES

Figure		Page
2.1	Service Division's Organization	9
4.1	Flowchart of "Repair Jobs for Products with Warranty"	58
4.1	Flowchart of "Repair Jobs for Products with Warranty" (Continued)	59
4.2	Flowchart of "Repair Jobs for Products out of Warranty"	59
4.2	Flowchart of "Repair Jobs for Products out of Warranty" (Continued)	60
4.3	Flowchart of "Job Completed: Known Serial Number"	60
4.3	Flowchart of "Job Completed: Known Serial Number" (Continued)	61
4.4	Flowchart of "Job Completed: Unknown Serial Number"	61
4.4	Flowchart of "Job Completed: Unknown Serial Number" (Continued)	62
4.5	Flowchart of "Job Completed: Invoicing"	62
4.5	Flowchart of "Job Completed: Invoicing" (Continued)	63
4.6	Flowchart of "Service Maintenance Sales"	64
4.7	Flowchart of "Installation Service: Issuing Invoice"	65
4.7	Flowchart of "Installation Service: Issuing Invoice" (Continued)	66
4.8	Flowchart of "Installation Service: Non-Invoice"	67
4.8	Flowchart of "Installation Service: Non-Invoice" (Continued)	68
4.9	Flowchart of "Entering Warranty"	68
A.1	Screen of Quotation Printing	80
A.2	Screen of Quotation Inquiry	80
A.3	Warranty Card Printing	81
A.4	Warranty Maintenance Screen	81
A.5	Warranty Inquiry Screen	82

Figure | Page

A.6 Serial Number Inquiry Screen 82

A.7 Serial Number Inquiry by Document Screen 83

A.8 Customer Name Search's Parameter Input Screen 83

A.9 Customer Name Search's Inquiry Screen 84

A.10 Customer Master Maintenance Screen 84

B.1 Main Menu of Oracle Service System 86

B.2 Install Base Menu 86

B.3 Customer Product Summary Window 87

B.4 "Install/Billing" Region in Customer Product Window 87

B.5 "Product Attribute" Region in Customer Product 88

B.6 "Shipping" Region in Customer Product Window 88

B.7 "More" Region in Customer Product Window 89

B.8 "Support Services Summary" Window of "Service" Button 89

B.9 "System" Window 90

B.10 "Transfer Customer Products" Window 90

B.11 "Define Customer Products" Window 91

B.12 "Service Program" Main Menu 91

B.13 "Support Service Summary" Window 92

B.14 "Service Attribute" Region of "Open" Button 92

B.15 "Current Transaction" Region of "Open" Button 93

B.16 "Billing Information" Region of "Open" Button 93

B.17 "Service Coverage" Region of "Open" Button 94

B.18 "Service Product Attribute" Region of "Open" Button 94

B.19 "Order Service Programs" Window 95

Figure	Page

B.20 "Renew Service Programs" Window 95

B.21 "Renew Service Programs: Customer Product" Window 96

B.22 "Terminate Service" Window 96

B.23 "Service Request Tracking" Main Menu 97

B.24 "Product, Services" Region of "Service Requests" Windows 97

B.25 "Problem Description" Region of "Service Requests" Window 98

B.26 "Problem Resolution" Region of "Service Requests" Window 98

B.27 "Action" Window under "Service Requests" Window 99

B.28 "Address" Region of "Service Requests" Window 99

B.29 "Find Service Requests/Actions" Window 100

B.30 "Service Requests Summary" Window 100

B.31 "Depot Repairs" Main Menu 101

B.32 "Repairs" Window 101

B.33 "Estimate" Window 102

B.34 "Estimate Approval" Window 102

B.35 "Repair Jobs" Window 103

B.36 "Material Requirement" Window 103

B.37 "Repair Orders" Window 104

B.38 "Report Requests" Window 104

B.39 "Find On-Hand Quantities" Window 105

B.40 "Detailed On-Hand Quantities" Window 105

B.41 "Supply/Demand Detail" Window 106

B.42 "Planning" Main Menu 106

I. INTRODUCTION

1.1 Location Decision

To fulfil the course CE 6998 Project, Siam Daikin Sales Co., Ltd. is chosen for this project. Siam Daikin Sales Co., Ltd. is the company for which I have worked as a database administrator for 4 years. I have found that there are many problems in operations of all divisions/departments on the current computer system. At the end of 1998, IT department decided to replace the whole system with a new one. The Oracle Applications was chosen as the new system. This new software application includes all desired systems: financial, distributions, and manufacturing. Because of many modules in the Oracle Applications, this graduation project will focus on only one module, namely Oracle Service, which will be implemented to help Service division operate more efficiently. Service division has many critical problems. It has suffered for years because they have a few systems supporting employees' works. Most of their jobs are done manually. They have to work with difficulties. Having less computer systems, it is very critical. Oracle Service is the answer of which system Service division will have in order to get rid of their problems.

As an IT staff, I have to look after and administer all systems of the Oracle Applications including Oracle Service. My responsibility for service system is that I have to analyze, design, and enhance the new service system based on the feature and functionality of Oracle Service. It is a very challenging task, therefore, I would like to take this opportunity to use this assignment as my graduation project.

1.2 Company Profile

Siam Daikin Sales Co., Ltd., an affiliate of Siam Motors Co., Ltd., was initially located at Phornprapa Building. It began its business as a distributor and importer of

Japanese airconditioners. With a long vision towards a brilliant future for the air-conditioning industry in the Kingdom, Dr. Thaworn Phornprapha, the founder of Siam Motors Co., Ltd., established Siam Daikin Co., Ltd. (abbreviated as SDC), a joint venture company between Siam Motors Co., Ltd. and Daikin Industries Co., Ltd. on December 9, 1975. The company's main activities were to produce and distribute "Daikin" airconditioners. Directed by Mr. Phornthep Phornprapha, SDC was then renamed Daikin Air-conditioning (Thailand) Ltd. In 1978, its first plant, located at Siam Motors Group Industrial Estate, Samut Prakan, was set up and commenced production of airconditioners and air handling units for houses, offices, commercial and industrial buildings. On March 28, 1982, Siam Daikin Sales Co., Ltd. was established to market "Daikin" airconditioners.

Since then, Siam Daikin Sales Co., Ltd. has been the strong marketing arm for Daikin Air-conditioning (Thailand) Ltd. with a clearly defined goal to boost the sales of Daikin products. The company is proud to partake in the marketing of such high quality products as Daikin, since the production of all products are closely supervised by Japanese technicians and monitored by a computerized system considered the most advanced in the industry. With great emphasis on providing efficient sales and after-sales services, Siam Daikin Sales Co., Ltd. serves as the solid marketing base for Daikin Air-conditioning (Thailand) Ltd., thus putting it in an enviable position in the air-conditioning market of the Kingdom. Throughout the years, the company has grown rapidly, with the sales being expanded steadily and significantly. This is because demand for high quality airconditioners has risen remarkably along with the country's economic development. Today, the company is coming on in leaps and bounds to further enhance its operation, while improving its before- and after-sales services to achieve its ultimate goal – customer satisfaction.

(1) "Daikin" Products

Through Daikin's cutting-edge technology, Daikin airconditioners have been meticulously designed and engineered to answer the demands of different enterprises and individuals. All products are manufactured under strict quality control measures to ensure that only the superb quality products reach the customers. Daikin has never failed to improve its product quality and efficiency, together with its before- and after-sales services that are considered of great importance to customers who can rest assured that the services provided by Siam Daikin Sales Co., Ltd. are second to none. An extensive range of quality airconditioners marketed by Siam Daikin Sales Co., Ltd. include:

(a) Room Airconditioners:

(1) Split wall type

(2) Split floor type

(b) Airconditioners for residences and commercial buildings - Sky Air series:

(1) Ceiling-mounted cassette type

(2) Ceiling-mounted cassette corner type

(3) Ceiling-mounted built-in type

(4) Ceiling-suspended type

(5) Split wall type

(6) Floor standing type

(c) Split Air-Cooled Packaged Airconditioners for offices and industries:

(1) Floor-mounted type

(2) Duct connection type

(d) Convertible Airconditioners:

(1) Floor/Ceiling type

(e) Concealed Type Airconditioners for projects

(f) VRV system (Variable Refrigerant Volume)

(g) Additional products:

(1) Multi-System room airconditioners

(2) Packaged airconditioners for computer room

(3) Water-cooled packaged airconditioners

(4) Air handling units and fan coil units

Several large construction projects have extensively benefited from Daikin's high quality products. These include hotels, hospitals, state enterprises, shopping centers, government offices, entertainment complexes, and residences. Not only does this reflect the trust that customers put on the company but it also indicates that Daikin airconditioners are of utmost quality and reliability.

(2) Services

Siam Daikin Sales Co., Ltd. is fully aware that apart from high quality products, service is also of great importance. The company has been continually pursuing the goal of excellence in services and marketing which is a corporate drive to keep customers competitively ahead. It has long adhered to ceaselessly improve its operation in every aspect, especially service quality and promptness in order to build up a good product image while promoting product sales. The company places the most emphasis on the operation of all divisions that have laid a pivotal role in contributing to

the advancement and success of the company. There are 7 divisions which have worked closely to each other bringing only the best to its customers, while promoting teamwork within the organization. These include the Sales division, Dealer Sales division, Marketing Development division, Accounting and Financial division, Office division, Engineering division, Service and Spare Parts division. With its unswerving adherence to provide highly value-added customer services, Siam Daikin Sales has continuously provided comprehensive training programs, both in-house and abroad, for its staff, technicians and engineers not only to keep them abreast of new technology and services but also to further enhance their efficiency. In addition, training programs on products, unit installation and maintenance are also provided for its staffs, and technicians to its customers and dealers on a regular basis.

(3) ISO 9001-9002

With its dedication to quality, Daikin Industries Japan and Daikin Industries Thailand were awarded the ISO 9001 and 9002 Certification respectively from the Japan Quality Assurance Organization (JQA) for the production of home airconditioners and compressors. The ISO 9001 and 9002 are quality assurance certifications for quality management systems that cover development production, installation, and service activities. Attaining this certification is a significant step in line with the company's policy of providing the highest quality products for the benefit and satisfaction of customers. Apart from this certification, Daikin products produced in Thailand have also been approved by other institutes, including Japanese Industrial Standard (JIS), the Chinese Standard, and the Japanese

Safety Mark. Customers can be confident in the knowledge that Daikin airconditioners are produced under strict quality measures that comply with strict standards. As the air-conditioning market expands, the need of high quality products increases. And Daikin airconditioners are among the top quality products that have gained recognition and popularity around the country, with its sales spanning across every region through the dealer system. It is also evident that Daikin products now enjoy a lion's share of the market. This helps strengthen the company's position in the local market, enriching Thailand's industrial environment.

1.3 Project Objectives

This project will focus on Oracle Service, a module included in the Oracle Applications software package implemented at Siam Daikin Sales Co., Ltd. The purposes of the project are:

(1) Problems of Service division must be identified. All problems must be analyzed to find out the cause of those problems, which areas are effected, and how those problems effect Service division's operation.

(2) The current operation and business process must be studied. It is necessary to learn the nature of Service division's works before doing anything on the new system. The process flow from one section to other related sections must be clearly understood. The work relationship among Service division's sections must be explained. The existing service system which is currently being used must also be analyzed and studied to see its functionality, and how it serves Service division. Information of this stage is important in analyzing and designing the new service system. It is 'system mapping' against Oracle Service. This stage also provides further

information and problems which may be overlooked in the problem identification stage.

(3) Users' requirements and expectations will be identified in order to check what users need and expect from the new system to facilitate their work. Users' requirements are very important because the new system must be designed based on those requirements which the users think that they will help them work more efficiently. The feature and functionality of the new system will be applied to satisfy those needs.

(4) It is the stage of describing the feature and functionality of the new service system, Oracle Service. It will be explained how Oracle Service works, what kind of data it will keep in the system and be processed, what it will provides for Service division, how it will facilitate the operation of Service division, improve efficiency, and increase productivity.

(5) The new system based on Oracle Service will be designed according to users' requirements and operation. This stage will describe how the operation and process flow of Service division will look like, what the users have to operate on the new system, which systems will be integrated to each other, and what division or department will be concerned in the new service system. This is the implementation stage.

(6) Besides proposing a new effective service system, the deliverables of this project are to analyze and find out what problems will occur, and what the drawback is, what will have to be improved or enhanced after implementation. After the system is started up, it cannot be ignored to follow up and review new business process and operation based on the new Service system. The causes of the problems must be identified and fixed in

order to meet the optimal level of operation because they may be overlooked during implementation period. It does not mean that the system will be most efficient after the implementation is done. In contrast, it is very important and necessary to trace and observe whether there are any critical processes, what have to be changed, improved, and enhanced to ensure that the users have the most efficient system to facilitate them to work effectively and productively. In addition, if the system misses any feature, additional programs or applications can be provided to support missing function.

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II. SERVICE DIVISION'S STRUCTURE

2.1 Service Division's Organization

The structure of Service Division is organized in accordance to the nature of works or types of service. Figure 2.1 illustrates the organization of Service Division.

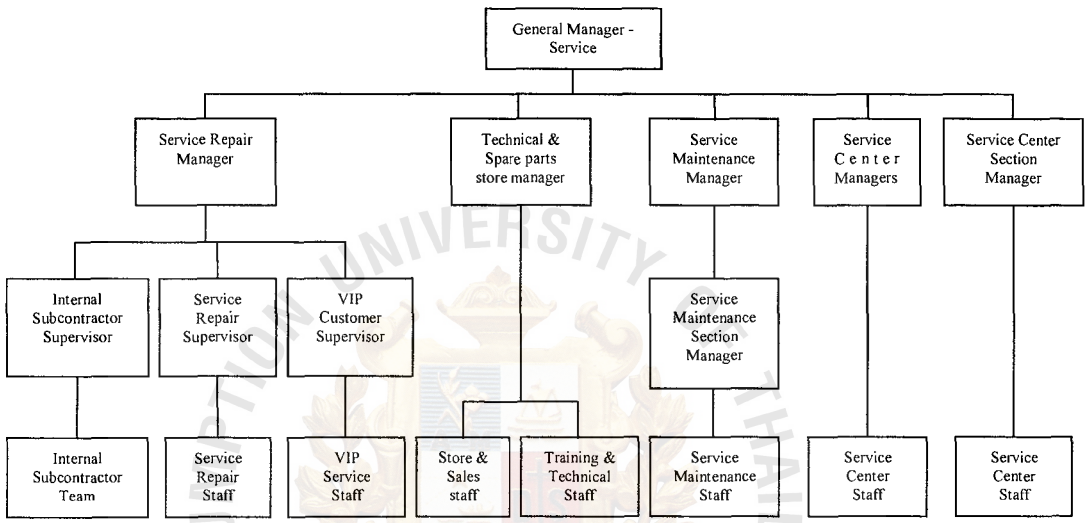

Figure 2.1. Service Division's Organization

The head of Service Division is Service General Manager who manages and controls the whole Service Division directly. Service Division is divided into 4 departments: Service Repair Department, Technical and Spare Parts Store Department, Service Maintenance Department, and Service Centers Department. These departments are managed by their own department manager. Some departments may have a section manager or supervisor. The lowest level is staff and technicians. The types of service are separated apparently to clarify works and manage more effectively. Those departments can be described as follows:

(1) Service Repair Department – Head Office

Service Repair Department is responsible to look after and handle all service repair jobs. If a customer calls in to request a service repair, this job will be forwarded to this department (depending on the location). Service Repair Department Manager manages and controls this department. There are 4 supervisors under the department manager. Each supervisor has his own team of technicians. Two teams of them are called "Internal Subcontractors". These internal subcontractors are like temporary employees. Indeed, these internal subcontractors were the company's permanent employees. Because of economics crisis, the management had to reduce salary expenditure. Many of these employees were laid off. Having many service jobs, Service Division needs these technicians. Therefore, these employees are hired job by job.

Organization of Service Repair Department at the head office is mainly structured into regions or areas. Those 4 teams are responsible for a different area. They handle all types of product, except chiller type, which is a large scale of airconditioner and needs more specialization.

(a) Internal Subcontractor Team A

This team will handle all jobs in Bangkok and some areas of East zone i.e. Bangkok, Thornburi, Paknum, and Rayong.

(b) Internal Subcontractor Team B

Bangna, Chonburi, and some areas of East zone will be looked after by this team.

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(c) Permanent Technicians

The areas around Thornburi, Yannawa, and Nakorn Pathom are handled by permanent employees.

(d) VIP Team

All VIP customers will be looked after by VIP team regardless of region. This team also has to travel around Thailand to service VIP customers. VIP team has a special and higher skill than other teams. They have to service this type of customers. Besides repairing, this team also does maintenance service jobs for VIP customers.

(2) Technical and Spare Parts Store Department

Technical and Spare Parts Store Department has 4 sections. All sections are under the control and management of the department manager. There is no supervisor or section manager. Those 4 sections are:

(a) Training Section

Training Section is responsible to provide training and technical knowledge to employees, existing or new ones, in order that they can work more efficiently, productively, and correctly. If there is a new model launched, this section will study with the engineers and forward the knowledge of the new model to the technicians.

(b) Technical Section

Technical Section is responsible in investigating and checking returned products which have a problem in operation. The technicians of Technical Section will check the cause of the problem, and which part works abnormally or is damaged, and they will report it to the department manager for further action such as parts replacement, etc.

(c) Spare Parts Sales Section

This section will sell spare parts to customers. There is no salesperson for this section to go out and sell spare parts like other airconditioners sales divisions. The responsibility of the staffs is to process sales order and issue an invoice. However, other sales divisions can ask this section to process an order and issue an invoice. After that, the salespersons will deliver the goods to their customers themselves. Usually, customers will come to the company and purchase spare parts themselves.

(d) Spare Parts Store Section

This section will control, handle, and plan the store. Storekeepers will issue requested parts according to the approved picking list. One of them has responsibility in planning. She will inform stock status to the department manager. Spare Parts Store Section supports both Spare Parts Sales Section and Service Division.

(3) Service Center Sections

There is no department managing and controlling this section. Service Center Sections will report directly to Service General Manager. However, there is one Service Center Section manager working at the head office in coordinating with other Service Center Section managers. Each service center has its own Service Center Section manager.

There are now 3 service centers opening to service customers. The management will gradually open more service centers in the future in other regions to service customers efficiently and quickly. Those 3 service

centers are looking after the regions other than the head quarter's (4 teams), and they are:

(a) Ransit Service Center

This service center is located near several Industrial Estates such as Bangpa-in Industrial Estate. Ransit service center handles product types of room airconditioners, package airconditioners, and especially chiller type. For chiller type, Ransit center will be responsible to repair this type of product for any region because chiller type needs highly-specialized technicians, and all these technicians work at Rangsit center.

(b) Nongkhaem Service Center

This site is a newly established service center. It began operation last year. This service center handles general service jobs. They look after all types of product. The customers around or near Nongkhaem can request for a service from this center.

(c) Lampoon Service Center

The management wanted to expand service center not only around Bangkok area, but also to other provinces. Lampoon province was selected as the first center opening to service local customers and customers near Lampoon. It was chosen as the best location because it is located in the center among provinces where most customers are. This site handles all types of product.

(4) Service Maintenance Department

Airconditioners need to be maintained regularly to have a long life usage. Service Maintenance Department is responsible to handle this type

of service. It is managed by the Service Maintenance Department manager. Under the control of the department manager, there is one section manager who controls the staff, technicians, and service maintenance salespersons. Its salespersons have to sell service contract to customers who use Daikin's products. Usually, service maintenance request is made in a contract. Service Maintenance Department will schedule to service customers periodically.

2.2 Types of Service

Siam Daikin Sales Co., Ltd. provides 2 types of service to the company's customers. The first type is Service Repair, and the other one is Service Maintenance.

(1) Service Repair

Usually, sales of service repair is one-time or per-call service. A customer will call in to request a service when his/her airconditioner has a problem in operation. Service Division will assign a technician to fix the problem and charge the customer for the requested service job. After a job is done, the company offers a 3 month- service guarantee. If the problem reoccurs during guarantee coverage, the company will go to fix the problem with no charge. There is no service repair contract to repair customers' airconditioner without charge for a period of time. Some types of business provide this kind of contract. The company will invoice job by job.

However, the company provides some benefit to customers who have a service maintenance contract with the company. The benefits are 10% discount for spare parts, 10% discount for transportation and travelling price.

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(2) Service Maintenance

Besides repairing, service maintenance is another kind of service provided to the company's customers. Although Daikin's products are manufactured with quality assurance and high quality materials, they need to be maintained for a long life usage. There are 2 types of service maintenance for the customers to choose depending on their preference. The first one is one-time or per-call maintenance, the other one is service maintenance contract.

(a) One-time or Per-Call Maintenance

This type of service maintenance is that a customer will call in to request for service maintenance with Service Division. The department manager will determine the price based on the type and size of product. If the customer accepts the price, the manager will assign a team to service the customer and charge the customer for that service job immediately.

(b) Service Maintenance Contract

Usually, the customers prefer to choose this type of maintenance because an average price of the job is cheaper than the price of one-time maintenance. In addition, the customers are not to be worried and need not to remember when their airconditioner should be maintained and cleaned. Making a contract with the company, the customers pay once the total amount of contract, and maintenance will be delivered periodically according to the agreement in the contract. The Service Maintenance Department manager will establish a certain schedule to service the customers. To satisfy customers' need, the

company offers a few packages of contract to the customers to choose. Those packages are:

(1) 12 times a year maintenance

This package is suitable for airconditioners with heavy use. Airconditioners which are used so often should be checked and maintained frequently at least once a month. The manager will assign a team to service the customers once a month to clean their airconditioner. The customers who prefer to choose this type of contract are hotels, office buildings, etc. because their airconditioners must operate almost the whole day.

(2) 6 times a year maintenance

This type of contract is cheaper than the previous one. The frequency of maintenance is 2 month a time. The technician will go to maintain the customers' airconditioner every 2 months.

The price of individual packages also varies in themselves. The first package has several prices depending on the size and type of product. The second package also has the same criteria in determining the price because each type of product needs a different method of maintenance and materials.

(3) Warranty

Warranty is a factor to assure customers that the airconditioner they have bought are high quality product. If there is something wrong with it during warranty coverage, the company will change the damaged part without charge. One set of airconditioner has 2 warranties, and each one

has different duration of coverage. One warranty is for fancoil unit, and the other one is for condensing unit. The duration of warranty coverage for fancoil is 1 year, and 5-year coverage is for condensing unit. The reason why condensing unit has a longer duration of coverage is that Daikin is very proud of its compressor which is the main component of condensing unit. Daikin has researched and designed a high quality compressor which has a long life usage. Relying on the compress's operation, Daikin dare to offer a long duration of warranty coverage.

During warranty coverage, the company will change the damaged part immediately without charge after it is investigated and confirmed by the engineer of the Technical Section. It is rarely found that compressor of condensing unit has a problem in operation. However, if it is damaged during the warranty coverage, the whole one will be replaced with a new one.

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III. THE CURRENT SYSTEM

3.1 Existing systems of Service Division

This section will drill down into details of what systems Service Division has in operation, how those systems works, what they facilitate employees to carry on their works, and what the limitation of individual systems is. Most of those systems were tailor-made systems and developed by a software house. All applications run on the computer NEC ASTRA 570. They were coded with COBOL language. They were tailor-made systems and developed by a software house according to requirements of users, but they were the requirements in the past. A few additional features were added, but it did not support Service Division's operation much because there were many changes such as policy changes, organization change, etc. IT Department had tried to study the service system, but modification could not be made much because of lack of source code. It was quite risky to modify without source code. IT Department asked a software vendor, Datamat Co., Ltd., to analyze and evaluate a new service system 5 years ago. The proposal indicated that the cost was very high comparing with the new features proposed by Datamat. IT manager intended to develop the new system with IT Department's own staff. Because of less IT staff, the plan was pended. It can be said that the features and functionality of the current system are not different from the past much. It is very obsolete. Therefore, the employees have to work manually. The current systems will be explained as follows:

(1) Quotation System

Before opening a service job, a quotation must be issued and proposed to the calling customer whether customer accepts the price and items used in the job. After the technician comes back to the company and informs the

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symptom, solution and items used to the manager, the Service manager will evaluate the case and issue a rough quotation to the clerk. That clerk will enter details into the quotation system and print out an official quotation submitted to the customer.

The Quotation system is a transaction entry system. All transactions are entered into the system and kept in a data file. All records of quotation have to be kept because they can be accessed for later reference. The Service managers need to trace quotation history to check what service package is offered to the customer, the price of service, parts used in the job. Although there is a copy of quotation, it is faster to access a particular quotation in the system by referring its number than finding it in a file. If any item in the quotation needs to be changed, its record can be retrieved and edited and printed out without reentering and issuing a new quotation. It helps the manager or salespersons revise a quotation and provide quick response to the customers.

The Quotation system has several features supporting Service Division. Those features are as follows:

(a) Quotation Printing

Quotation Printing functions as a transaction entry application and printing quotation. This feature is used to issue a quotation for service repair job or per all maintenance jobs. The user will key in the details along with the pre-quotation made by the manager and print out as an official quotation proposed to the customer. All records of quotation are kept in the system regardless of quotation validity e.g.

cancelled quotation. They are kept for a period of time for the purpose of analysis.

(1) Limitation

The application of Quotation Printing was designed and developed to use only for repair jobs and per call maintenance jobs. It cannot support requirement of service contract because details and information of contract differ from other types of service job, and service contract needs many additional features such as contract transaction entry, maintenance scheduling, etc. Nowadays, all tasks and transactions related to service contract are done manually and kept in a file.

In addition, there is not any field to specify the status and validity of individual quotations. It affects querying data. The users cannot scope the query criteria for analysis. For example, if a user wants to analyze all quotations with the status of "refused", he cannot do that. The system will generate or display all records of quotation regardless of the status.

The application does not allow any user to edit the existing quotation. If quotation revision is made, the user has to key in for a new quotation.

(b) Quotation Purge

As mentioned in Quotation Printing, all records of quotation will be kept for a period of time. Invalid or mistaken quotations are not deleted out of the system. It means that the more the number of quotation is, the more the resources will be consumed. The resources

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refer to hard disk space, capacity of hardware to process transactions. If the resources reach their capacity limit, additional investment will be needed to increase computer capacity. Therefore, in order to avoid unnecessary investment, there should be a policy in keeping transactions and data in the computer system. The policy of keeping quotation is that the data between the current period through the past 3 months will still be kept, and the data earlier than this will be deleted or purged out to free up space and increase performance. Quotation Purge policy is carried out in monthly basis.

(c) Quotation Inquiry

Quotation Inquiry provides some information of individual quotations. Mostly, It is used by management level to retrieve information and analyze the data. The data provided are quotation number, customer's name, quotation's subject, and total price of quotation.

(1) Limitation

The Quotation Inquiry provides a few valuable data. It lacks of many important data: related service job, status of quotation whether it is cancelled, issued, or rejected. If this application is modified and improved, it will be a powerful "Customer Call and Quotation Analysis" system.

(d) Report Printing

In the Quotation system, there are 3 available reports provided to the users and managers.

(1) Quotation Listing

This report is a daily-basis report. It lists all quotations of a particular day specified in the parameter before running the report.

(2) Monthly Quotation Report by Customer

This report will be printed at the end of each month. It lists quotations entered during the month. The transactions are sorted by customer's number.

(3) Monthly Quotation Report by Quotation Number

This report is a monthly-basis report. The data are the same as of "Monthly Quotation Report by Customer", but the data of the report are sorted by quotation number.

These 3 reports are usually used by management level to analyze quotation issued to customers. However, it gives no much detail for effective analysis.

(2) Warranty System

It is very necessary for Service Division to have a warranty system to control warranty status of each product sold to customers. Without this system, the company may face the problem of loss. The information given by the system is useful to Service Division to track and check which serial number is expired or nearly expired. Warranty system is a transaction-entry system. It does not interface to Sales Order system or other related system to retrieve warranty-related data into the system automatically. Therefore, the users have to enter data into the system themselves based on the warranty request form returned from the customers. Customers will receive

a warranty request form when they buy a product. They must fill in the form and return it to the company. After receiving the form, the company will mail an official warranty card to them.

There are several features available to Service Division. Most of them are transaction entry, inquiry, and generating reports. They can serve Service Division's tasks at a level, especially tracing warranty status. Those features are:

(a) Warranty Card Print

When warranty request form is returned from the customers, the users will key in the data and print an official warranty card to send to the customers. Without this card, the customers cannot request for any claim, if their airconditioner has a problem.

(1) Limitation

Most of the problems of warranty are from the policy and cooperation of customers and dealers. Warranty record can miss in the system,if the customers do not return warranty request form. Service Division has faced this kind of problem, unreturned forms. They cannot trace or check warranty validity of unreturned forms. It is found that there is a drawback of warranty request form. There are 2 separate forms. The first one is for fancoil unit, and the other one is for condensing unit. If either one is lost, warranty coverage of that form cannot be validated. The customer will lose warranty benefits. Furthermore, it is not a good practice to issue 2 warranty cards separately for a set of airconditioner i.e. warranty card of fancoil

unit and condensing unit. There should be only one warranty card issued for a set of product.

(b) Warranty Maintenance

It is necessary to edit or update entered warranty record. Warranty Maintenance application provides this kind of operation. It allows users to retrieve existing records for updating, if there is any change such as customer's address is changed, location of product installed is changed, etc. The screen of Warranty Maintenance has the same look of Warranty Card Printing.

(c) Warranty Inquiry

Users can check warranty status by querying data via the Warranty Inquiry application to check whether it is expired. The screen of this application has the same look as of Warranty Card Printing. Users can only retrieve data, but they cannot edit or update the record.

(d) Serial Number Inquiry by Serial Number

Besides warranty inquiry, Serial Number Inquiry is an alternative in checking warrant status. It will not inform the status directly, but the data given can be used to calculate for expiration date. This feature is suitable for the case of missing warranty record in the Warranty system, if the customer does not return the warranty request form, or if the warranty request form is lost. It helps Service Division avoid argument with the customers when there is no warranty record in the system. It is an effective application facilitating Service Division to check the status indirectly. The data given are serial

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number issued or sold, invoice number, invoice date, receiving number, receiving date. This application is applicable only when the users know a certain serial number. They will use the serial number to trace invoice date of the suspect product and calculate for the expiration date.

(e) Serial Number Inquiry by Document Number

If the users know only invoice number instead of serial number, they can also check warranty status in Serial Number Inquiry by Document Number application. The desired data retrieved from this application are serial number, invoice date. They will check further whether a particular serial number retrieved from the system corresponds to the one attached to the product located at the customer's site. If information is correct, warranty status will be considered.

(f) Reports

There are a few reports concerning warranty provided in the system to facilitate the users to work with warranty card. Those reports are in both daily basis and monthly basis. These reports are:

(1) Daily warranty issuance listing

This report will list all warranty cards issued each day.

(2) Monthly warranty issued report

All warranty cards issued within each month will be shown in this report.

(3) Customer System

Customer system is shared with other divisions and departments. All divisions will be able to access data of the company's customers via this system. The users can add, update, inquiry, or edit customers' record in the system. Because Customer System is used by several divisions, some divisions may have the same customers. Duplication of records may occur. The users of each division may add a record of a customer which may exist in the system without knowing its existence. Duplicated record of a customer is a serious matter. It affects several areas of work and divisions such as debt status of the customers, etc. Therefore, customers' number is used to clarify and identify the customers. The first digit of customer's number is used to identify the division owning the record. Therefore, a customer may have several customer numbers. Customer System consists of 2 features:

(a) Customer Name Search

The users can retrieve the name of a customer via this application. The user just enters the division number, and the application will display all customer's name in the database and customer's number of that division.

This program is a simple program. It displays only customer's number and name. The purpose of this program is to retrieve a few columns of customer's record. The users may not want to see more data. It will list a long list of customer's record at a time. There is another program for the users to retrieve customer's record, but it

displays a record at a time. The users are inconvenient to press a button several times to search only name or number.

(b) Maintenance Customer Master

Customer's record can be edited, updated, and even queried via Maintenance Customer Master program. There are several important data of a customer needed to be input because they will be used with other system and for analysis. Furthermore, in case of inquiry, there are 2 important fields provided for Credit Control Department to be used for analysis. These 2 fields are A/R Balance and B/R Balance. The Credit Control Department will check balance of debt which the customers have with the company and consider whether the company should sell products to a particular customer.

3.2 Existing Problems of the Current System

Service Division is one part of the company which plays an important role in making Daikin's products gain a well acceptance from customers and prospectives. Not only selling and distributing high quality airconditioners to the market, but Siam Daikin Sales Co., Ltd. also provides services to its customers such as repairing, maintenance, etc. in order that all customers can rely on and be confident that their conditioner will not be left unusable when it has a problem. Siam Daikin Sales Co., Ltd. realizes the importance of providing services because it has an effect on whether or not products can be sold. After-sales-service is a factor which prospectives will use in considering which brand is worth buying. Therefore, the management emphasizes that services must be efficient in order to gain customers' satisfaction. In satisfying the policy, the organization's operations and standard operating procedure must be also effective. Nowadays, computer system is such a very important tool that all organizations use it to

facilitate their business to work more efficiently. Siam Daikin Sales Co., Ltd. also has a computer system in the company to help all divisions and departments operate their works. Unfortunately, Service Division has less system supporting their operation (discussed in later topic). Most of the functions of the current service system are to keep transaction, and there are a few functions for transaction processing. Most of the operations of Service Division are done manually. Because of less supporting systems, the employees have to work with difficulties, and their work performance is not satisfactory to the management.

The problem of Service Division can be categorized as follows:

(1) Service Sales Analysis

Since all income of Service Division comes from service sales, it is very necessary for its management to analyze how the sales volume varies period by period, so that strategic and effective plans can be developed in order to increase sales figures. Sales analysis is an important tool that can provide valuable and useful information about the sales performance. It tells the strength and weakness of individual types of service provided (installation, maintenance, repair, etc.) In case of decrease in sales volume, the cause of the problem must be identified immediately, and solutions should be found to fix the problem. Sales analysis also implies the performance of technicians because it affects customer satisfaction. If any technician provides unsatisfied service for customers, of course, those customers will not request Service Division for any service again. Even worse, they may not buy Daikin's products again. It means Loss of customer.

The current sales analysis is in the form of report. There are 4 reports provided from the system: Daily Sales Report, Daily Sales Analysis, Monthly Sales Analysis, and Monthly Sales Analysis by products. Those reports can satisfy information needs at a certainly level. If the General Manager of Service Division wants to have a report other than the current format and data, these reports will be used as raw data and processed with other documents (such as invoices) manually by the clerk to produce the desired format. Data in the current report are quite summarized. Those reports do not support requirements, if users want to drill down into details. For example, in the Monthly Sales Analysis by product, it shows a sales figures of installation service, but it does not show the details of what kind of installation are (e.g. factory or ordinary house, etc.). There are several types of installation service provided for customers.

Furthermore, all types of business have to meet changes in organization and business structure along with business growth. For years, Service Division has grown up with increasing rate, and there are many changes in its organization structure including sales structure. Its sales channels and segments have been expanded. The top management announced a policy to expand service center to main territories in order to support customers more efficiently, and increase service center more in the future. There are 4 service centers opened now: Onnuch center (Head Office), Rangsit center, Nonkhaem center, and Lumpoon center. It is a business strategy that will gain more customers' acceptance and ensure customers to rely on Daikin's products. Unfortunately, while the organization and structure are changing, the current computer system has no

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improvement to revise its life cycle along with those changes. The current software has a life cycle. It was developed in the past 8 years with the requirements at that time. It is quite obsolete. Because of obsolescence of the current computer system, sales analysis is done inefficiently and inaccurately.

(2) Job Status and Work Performance

Customers will call in to Service Division to request for service, if their airconditioner has a problem or works abnormally. The service-call recipient will open a "Service Job", and that service job will be assigned to an appropriate technician. All service jobs have to be recorded and processed, so that the manager or supervisor can check the progress of each job. The manager and supervisor will check individual jobs daily to see whether there is any job having any problem and progressing slowly. If there is any job having problem, a solution can be found out on time to fix the problem. It is not good to service customers with a long period of time. It leads to customer's unsatisfaction. Usually, Service Division has a standard work time for each kind of job or symptom. The job status will be compared against this standard time or work performance. Not only checking the job status, but also time spent on service jobs are used to evaluate work performance of each technician. Work performance provides information how efficient and productive all transactions are. If there is something wrong with any employee, an action can be taken immediately such as providing training to improve skillfulness, etc.

Currently, all service jobs are recorded manually in paper sheet, called "work report". The details of the jobs are kept in this form. It is difficult

for the manager and supervisor to process, analyze, and check job status. Its clerks have to collect those work reports and process manually to produce a summarized job status report. Such kind of activity is time consuming. Job evaluation might be carried out ineffectively and inaccurately. There is no system currently supporting this kind of work.

(3) Inventory

Spare parts is another factor which customers will consider when they purchase. There is no product being able to survive in the market without spare parts supported. Siam Daikin Sales Co., Ltd. also keeps stock of spare parts. The company invests in spare parts inventory for several million baht a year in order to satisfy customers' need. All parts are available for both sales and service jobs. There is no policy to allocate stock separately to sales and service. Therefore inventory must be controlled not to let the stock be surplus or shortage because inventory is costly. The cost of stock investment will be either high or low, depending on how effective inventory plan is.

There are about more than 3,000 types of spare part kept at the store. The current stock does not only have parts for the latest models, but also for the old models. Nowadays, the inventory planner has to work with difficulties in controlling the level of stock. The plans are not effective and accurate enough. The cost of inventory is now quite high and uncontrollable. The planner needs a powerful tool to help her manager and control inventory. There is also an inventory system supporting inventory-planning task, but it lacks of many important features and functionality. It can support inventory tasks at a level. Its main function is to process

receiving and issuance, updating stock status, and generating a few reports for further planning. There are several problems effecting inventory control and planning.

The problems of inventory have existed for years. They have affected many divisions and departments involving inventory including Service Division, Spare parts sales Department, etc. (this project will focus on the effects against Service Division only.) The problems can be identified as follows:

(a) Insufficient stock available for service jobs

As mentioned earlier, spare parts in the stock are available for both sales and service jobs. There is no apparent stock allocation and priority of issuance. The earliest part request will be given high priority. Mostly, parts requests for sales are acknowledged before service jobs. Therefore issuance priority for sales will be higher. If parts request for service jobs is informed later than sales while the stock is going shortage, unavailability of parts is possible. The current system is not designed to have a function of reservation. Furthermore, Service Division does not have inventory status query system to check the availability of stock. They do not know a certain status whether spare parts will be available for them to pick. If they know that they have to pick a particular part, they will go to the store and ask if the stock of that part will be available. The other way is that they can know the stock status when they directly go to store and request for that item. Although the technicians ask the availability of an item 1 hour in advance, it may not be in the stock when they come back with

a picking slip and request for that item. This event occurs because customers come directly to the store and buy a part. Then the storekeeper must give high priority to sales. If that part is going shortage, it will not be available for any technician.

Indeed, the current Inventory system has a program for inventory query, but the displayed information is not accurate and up-to-date. The problem comes from obsolete pattern of file processing of the current system. All systems in the current computer system also use the same method of file processing. The type of file processing used at the company is "Batch Processing". During the business day, all transactions will be kept in a temporary file. They are not processed and updated immediately. At 4.00 p.m. of each day, all operations on the computer will be stopped. Transactions later than this time will not be allowed to be input because IT Department have to start process and update transactions starting from that time. The time spent for processing is about 2 hours. The computer system will process and update data of individual systems. The most updated data and reports will be available on the next business day. The drawbacks of Batch processing method are that employees have to waste time during processing for 1 hour with less productivity (4.00 – 5.00), and information during the business day is unreliable. Therefore the inventory query system provides rough and inaccurate information. The only one source which can provide the most up-to-date stock status is "Stock Card". Each item in the stock has its own stock card. The storekeeper uses this stock card to record every

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transaction of receiving in and issuing out of the store. Having more than 3,000 types of spare parts, the number of stock is equal to the number of those items. If the stock card of an item is lost, the storekeeper has to recount the stock manually to find out the actual quantity, and check against the Daily Stock Status report or other documents. Every weekday morning, the storekeepers must ensure that the real quantity in the stock is consistent to the figure in the stock card by regularly reconciling the daily report received from IT Department against the stock cards and other documents.

Service Division once asked IT Department to modify the system to let the user be able to reserve or allocate stock, but it is very difficult to modify the program because it is developed by outsource (software house) and IT Department has no source code of the inventory system. In addition, it is not a good idea to develop a new inventory system because it may affect other related systems. It may cause unpredictable problem.

If the spare part store has no item available to Service Division, the ultimate solution is that Service Division needs to pull out the desired part from an airconditioner to service the job. That airconditioner cannot be sold until the drawn part is attached back.

(b) Inventory Planning

Since there are many types of spare part, it requires an effective inventory planning and control. Currently, the company's inventory is quite difficult to handle. Inventory planning is not accurate and effective. The cost of inventory for several items is very high. At the

same time, several items are frequently not available to support customers. Some high-value items have been left in the store without sales for years, and they are worn out ,get rusted, and are sold as scrap. Nowadays inventory planning is done manually by collecting and processing data in the reports received from IT Department. The planner will calculate and determine supply and demand of each item herself and use her own assumption in planning. It is hard work to plan all items in the store. The planner will plan for the items which have frequent movement.

Without an inventory planning system in the current system, the current planning mechanism is quite poor. The most effective mechanism for inventory planning in the current system is to process daily transactions at the end of day and generate daily, weekly, and monthly reports. Reports is the only one tool supporting planning tasks. The data in the reports will be used for further processing in Microsoft Excel or Lotus spreadsheet.

(4) Warranty

Warranty is other strategic tool that makes customers rely on and be confident in Daikin's products. Customers can be assured that the product bought is of high quality and has a long life usage. All materials and components are manufactured with quality assurance. If any part of the product works abnormally or is damaged during normal usage, the customers can claim for it without paying money while the product is in warranty coverage period. All products under the brandname of "Daikin" are high quality products. They are attached with warranty. However,

warranty can generate cost. Warranty needs to be controlled and managed in order that the cost will not be high.

Siam Daikin Sales Co., Ltd. has faced problems concerning warranty for years. There have been many policies being established to get rid of those problems. The company has lost money to service customers for untrusted and uncheckable warranty coverage. It is found that there are several cases in which customers and dealers are cheating the company about warranty coverage. For example, the company sold a set of airconditioner consisting of fancoil unit with serial number "0001" and condensing unit with serial number of "0002" to a dealer on January 01, 1999. The warranty agreement given is that fancoil unit has a 1 year warranty and 5 years warranty for condensing unit starting from the date of purchase. However, the company understands that it must take time to let the dealer sell the product. The company has an internal policy to expand the warranty to 1 and a half year of warranty coverage. The dealer has half a year to release the product. The dealer makes a trick by telling a customer not to specify the purchase date and send the form back yet until the airconditioner has a problem. It means that that customer will write down the purchase date beyond the truth. According to the agreement, the warranty will be expired on December 31, 1999 plus half a year. The extended expiration date will be June 30, 2000. If the customer specifies the purchase date on the form as March 1, 2000. Then the warranty will cover to August 31, 2001. It is beyond the real expiration date.

Another example is that many dealers order a lot of airconditioners and keep them in their stock for a long time. Many products are kept in

stock until their warranty status is expired. Often, Service Division receives complaints from customers who bought a warranty-expired airconditioner. A good warranty system should be able to generate a report showing the serial numbers which are still at the dealer's site. If they have been at the dealers for a long period of time, an action will be taken such as informing the dealer about the status of those products, etc.

The causes of the problem are, firstly, Service Division cannot trace all warranty status because the company does not have record of all warranty cards. Before issuing warranty, the customers have to return the warranty request form back to the company. This form is attached to all products. When Service Division receives the returned form, it will record it into the system and print out a warranty card which will be sent to customers. In reality, many customers do not return it to the company. The warranty record of those customers is certainly missed and untraceable. Several times, the company argued with them about the warranty coverage. They feel unsatisfied with this event. It is not a good practice to argue with any customer, but it is also not good to let the company lose. It is found that there are several issues which cause the problem such as warranty policy, documents used, and process flow, etc. An appropriate solution to the problem is that all serial numbers and warranty cards should be recorded automatically at the time of invoicing before products are delivered to customers or dealers. There is a system available to the user to handle warranty. It is "Warranty System". However, it has no features to fulfill the users' requirements. It was developed with the requirements in the past. It

is quite obsolete. It works as transaction recording and querying. It does not provide valuable warranty information.

(5) Service History

Every service job will have a work report attached to it. This work report contains information such as model of airconditioner, serial number, symptom, solution and part used, etc. Especially, symptom and solution are very necessary for service history. It is like a knowledge base. Service Division established a set of symptom code and recorded them in work report. Service Division dreamed to have a system or database to record those symptom codes and their associated solution and related information valuable to its technicians searching before going out to service customers. This system will help them fix the problem quickly, if the problem corresponds to the one in the database. If there is a new symptom, the technician who solves and fixes the problem will record the details of the problem and solution into the database for future reference. Indirectly, it can help technicians improve performance, reduce service time, and increase productivity. Service Division wants to have such kind of system implemented. It can minimize cost and maximize profit. Because of limitation, IT Department once requested a software company to survey and analyze. However, the software company cost a lot of money. So this project has been pended since then. Without supporting system, all symptoms and solutions are recorded in the work report. Nobody searches them in the file when he is assigned a service job. It is impossible to search a particular work report in a bulk of file. The manager, supervisor, and even technicians use their own experience to consider a solution for each

symptom before the first visit. They will take some parts which they may fix the problem. If the parts taken cannot fix the problem, they have to come back and pick another part and go to the customer's site again. This activity causes travelling and gasoline costs. It would be better to know which part can fix the problem correctly before the first visit. In addition, if a particular symptom happens so often to a particular model of product, it is a sign informing that something is wrong with that model. This information will be forwarded to engineer to search for the cause and improve the product immediately. Furthermore, all records of symptom and solutions will be useful to improve other new models to assure the market that Daikin's products are high quality products.

(6) Service Contract

Besides service repair jobs, Siam Daikin Sales Co., Ltd. also provides maintenance service. There are several types of service maintenance provided for the market. The type that is facing a problem is "Service Maintenance Contract". All service contracts must be kept carefully. They are now being kept by filing. There are currently thousands of customers having service contract with Service Division. It is difficult to handle those contracts. There is no Service Contract System available to Service Division to manage customers' contracts effectively. It is necessary to trace individual contracts if they are near expiration date. If any contract is nearly expired, a service salesperson will immediately contact the customer for contract renewal. Because of having no supporting system, its employees cannot check the status of all contracts rapidly. Many contracts are missed from processing and checking. For the worst case, the company lost several

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customers because of missing in checking. It is also necessary to check and analyze unrenewed contracts in order that the management can find the cause of the problem, why those customers refuse to renew their contract, so that some actions will be taken to fix the lost.

(7) Work Scheduling and Assignment

Everyday customers call in for service request. It is not good to let those customers wait for a technician several days to service them. Then work scheduling and assignment must be effective, otherwise customers may be unsatisfied and turn to other vendors instead. It is the responsibility of Service manager and supervisor to schedule and assign work to each technician based on skill, type of service, symptom or nature of problem, etc. Scheduling and assignment functions were not included in the current computer system when Service System was developed in the past. Work scheduling has been done manually in a document. Their filing system is not systematic and controllable. They sometimes plan the schedule for a technician to service 2 customers at the same scheduling time. For example, technician A is assigned to service a customer on March 1, 2000. Later the supervisor assigns other job to this technician on March 1, 2000, too. It is schedule overlapping. They want to have a system to help them plan their work schedule more efficiently. Work scheduling also affects response time against service request. Response time measures the level of customer's satisfaction. Certainly, no customer wants to wait for a long time. It is the responsibility of Service Division to service customers quickly. Receiving many service requests everyday, it is difficult to answer the calling customers accurately about the certain time when they will get service.

(8) System Integration

A good computer system should have a feature of system integration. System integration means all modules or sub-systems in the computer system should be able to transfer related data to each other automatically without reentering transactions. For example, some data of a transaction an order entered into Service system should be automatically transferred to Accounts Receivable system. The user enters the transaction once in the Service System, and that transaction will be transferred to Accounts Receivable to issue an invoice automatically after pressing "Save" button. This function will help Accounting Division not to enter the transaction again the Accounts Receivable system. Such kind of feature gives several advantages i.e. unnecessary processes will be reduced, data correctness can be reliable, productivity increases, cost decreases. Without system integration, a bulk of document is utilized, employees have to walk around the building to flow the documents. It causes unproductivity.

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IV. SYSTEM IMPLEMENTATION

4.1 Implementation Plan

Implementing a software package, it requires an effective plan to ensure that the new system will serve the company's business and fulfill users' requirements, and it should help the users operate at the optimal level. IT Department has a direct aspect to develop a plan explaining what action will be taken during the implementation period, objectives of the project, and concerned parties. Project appraisal must also be taken to assure that each action is carried out along with the plan, the results of each are accomplished, and solutions are provided to fix the problems. The actions which will be done in the plan are as follows:

(1) Set up an implementation team consisting of key users.

(2) Gathering and analyzing users' requirements.

(3) An Overview Training of the Oracle Service system.

(4) Designing a new system based on the Oracle Service.

(5) System Testing.

(6) Evaluation and correction.

It is the rule of thumb that system development must follow all of these actions. Detailed explanation of each action will be discussed in the following sections.

4.2 User's Requirements Analysis

One step of system development life cycle (SDLC) which is very necessary before designing and developing a system is "users' requirement gathering and analysis". It needs to know what the users expect and require from the new system. Information about their requirements must be gathered completely in order that the required features from the new system will not miss during system designing stage. Users' requirements

are gathered by interviewing the users directly. Those requirements and expectation of users can be detailed as follows:

(1) Service Job System

It is the first request from Service General Manager that Service Division requires a Service Job System to handle and manage all jobs opened to service customers. The requested system should be able to provide important, a valuable information such as job's status, responsible technician, serial number of product, progress of job, cost, revenue from job, and so forth. They assure that having this system will help them work more efficiently and productively. Furthermore, they expect that the Service Job System will generate a Job Status Report by Service Center.

(2) Work Assignment and Job Scheduling System

Either for repair or maintenance job, the department managers or supervisors need to schedule and assign work to technicians. They expect that they can enter the schedule and work assignment into the system, and it should be able to automatically print out a Work Report everyday. The users only start the program and press a button, the system will process to find out which job will be serviced on that day and print out Work Reports. Nowadays the managers or supervisors will assign work and specify the technician in advance. They have to note the schedule in a book. If there is such system, it will help them manage and control service jobs. Besides scheduling and work assignment, this system will be used to appraise the technicians' performance such as, how long they take to fix the problem.

(3) Sales Volume Analysis

On the current system, it can process and generate only 4 reports of sales analysis. It is not enough for the management to analyze their sales figures. They expect that the new system should be able to provide them with more reports than the current one. The reports for which they request are:

(a) Sales Analysis Report by Service Center and by Product

The company has opened several service centers to other territories to service its customers. Those service centers have brought revenue into the company, but the current system cannot process data to identify how much each service center can make revenue from service jobs. They want the report to show sales figure of each center and each product apparently.

(b) Sales Analysis Report by Capacity

Capacity of airconditioner can be measured in BTU and HP (horsepower). Rates of service charge which Service Division mainly uses in invoicing are based on capacity of HP. The management of Service Division wants to analyze sales according to the capacity of product.

(c) Revenue from Hidden Sales

Besides selling services directly by Service Division, there are some revenue hidden in sales of product. For example, Dealer Sales Division occasionally sells products with free installation or free 1-year maintenance. The price in the invoice is showed as the price of product, but, indeed, the price of that free installation or 1 year

maintenance is implicitly included. This price is the revenue of Service Division.

(4) Job Cost Report

It is necessary to determine the exact cost of individual jobs. The cost of a job will be compared against the sales amount to find out the net income. This report will be analyzed to consider price adjustment. It is also necessary to analyze cost of jobs under warranty coverage, although those jobs have no revenue.

(5) Service Contract System

Service Maintenance Department wants to have a tool in managing their service contracts. They expect that the system should help them keep, monitor, and track status of contracts. It should alert or print out a report informing which contract is nearly expired, so that salespersons will immediately contact their customers to renew their contracts. It should provide a report of unrenewed contracts for analysis.

(6) Aging or Invoice Status Report

Service Division needs a report showing the status of invoices issued whether there is any invoice not being billed or being overdue, so that an action will be taken.

(7) Stock Status Inquiry

Service Repair Department expects to be able to check the status of spare parts stock whenever they want. The level of stock affects their work schedule. If there is not enough spare part for a job, the manager cannot assign any work to the technician. If they can find out in advance that a required part is out of stock, the Store Section manager will immediately

issue a purchase order to support service job. The information in the report must be the most updated data.

(8) Stock Reservation

Service Division expects that the new system will allow them to reserve required parts because nowadays they have the problem of stock shortage when they go to the store to request parts for service jobs.

(9) Inventory Planning

Service General Manager wants to have a system supporting the planner to plan and control more effectively and efficiently. He wants the new system to alert the planner which part is going to be shortage and suggest open a purchase order. It should also inform which part has no movement for a long time.

(10) Warranty Control System

Service Division has had the problem of warranty for a long time. They cannot control it to minimize losses. They expect to have a system to control warranty of products sold. They require that it should provide information about warranty's status, real owner and location of the product, etc. It should also be able to print warranty card when a product is sold out, so that warranty record will not be missing in the system. If any serial number is still residing in the stock, the system should also inform the users.

4.3 Analysis of Oracle Service System

After gathering users' requirements, there comes the step of studying and analyzing what the Oracle Service Application will provide, and how it works. It is necessary to get insight of the application because the key users and IT staff will be involved in designing and developing the new system. They will be able to think how

to adapt and apply the features of the application in their operation. Without knowledge of the application, it seems like they are blind men walking on the road.

The features of the Oracle Service are divided into functionalities or types of work. Each functionality is categorized into menus, and each menu also has submenus. They can be described as follows:

(1) Install Base

The purpose of Install Base function is to handle records of products sold to customers. All products sold will be kept in the system via Install Base. It helps Service Division manage and control serial number and warranty more effectively. The users can rely on that and they can retrieve and check whatever they want to know about the products sold such as checking warranty status, owner of product, location, etc. Install Base will interface with Order Entry System i.e. when a product is sold, service-related data including serial number and warranty will be transferred to Order Entry System. Install Base consists of 4 functions which can be described as follows:

(a) Customer Products

Customer Products function directly interfaces with Order Entry System. When a product is sold to a customer or a dealer, service-related data from Order Entry will be transferred to Customer Products. The users can update or maintain the records as appropriate. Service Division can be confident that there will not be any record of products sold to the customers missing from the system. It enables the users to be able to check products' information, serial number, owner, warranty status and coverage, sales order of the products, etc. In case

of warranty, this function can fulfil the users' requirements mostly. It will display apparently whether or not the inquired product has a warranty, and how long the warranty has covered. In addition, if the customer has a service contract, service repair job, or any type of service, it will inform in 'Coverage' column. Sometimes a customer buys a set of airconditioner, but that customer wants the product to be installed at other location than his own address. Customer Products also support a multi-address feature. It display 2 addresses at a time by identifying the purpose of each location or address i.e. Bill-To location and Install-TO location. Indeed, Oracle Applications allows a customer to state more than 2 addresses. This feature resides in Oracle Receivables System.

If a customer has more than 2 sets of airconditioner, Customer Products will display all of those sets. The users can select to view information of individual units. Data of each unit are separated from each other because each unit has different attributes. The users can enter customer's product via this feature.

(b) Systems

Usually, a customer may have several sets of airconditioner and different model of products. Service Division can arrange those products into group, called 'Systems' in Oracle Service. The purpose of "Systems" is that Service Division can group customers' products according to service types, service management, or distribution of responsibility. For example, Service Division divides technician teams according to the types of product. 9,000 BTU type is called

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"System 9000", and 13,000 BTU type is called "System 13000". The manager assign all products under System 9000 handled by Team A, and products under System 13000 handled by Team B. When a customer calls in to request a service, the user will refer to these Systems to assign work to the correct team. This feature is appropriate for customers who have many sets and models of product such as hotels, buildings, etc. This feature helps the technicians in managing their work by grouping products via "Systems" feature.

(c) Transfer Customer Products

After the company sold products to dealers, the owners displayed in "Customer Products" are those dealers. Later, it is found that the real owner is not the same one in "Customer Products", and the user can update the record via 'Transfer Customer Products'. Instead of updating directly in "Customer Products", 'Transfer Customer Products' will transfer all attributes to the new owner. Direct updating is not a good practice because some important attributes may be lost or incorrect, and it is time-consuming. Therefore, this feature facilitates the users in transferring product to a new customer without error. In addition, it also displays the previous owner, if the user wants to know the dealer who sold this product. "Transfer Customer Products" ensures the users that all records of product sold will be matched to the correct customers.

(d) Define Customer Products

As mentioned earlier, "Customer Products" interfaces with Oracle Order Entry in transferring data of products sold. Sometimes

products may not be sold via Oracle Order Entry. They are entered directly in Oracle Receivables system. Especially system migration, data from the old system is also entered directly into Accounts Receivable system. Therefore, there is no service data transferred from Order Entry system to Service system. However, Oracle Service provides a feature to handle this kind of problem. The users can enter Customer Products record directly via "Define Customer Products" function. Usually, the users will use this feature for the products which are not interfaced to the Oracle Service.

(2) Service Programs

Service Program is a tool designed to handle service contract and warranty. This function corresponds to users' requirements. All contracts will be recorded and processed here, "Service Programs". Products under warranty coverage will be displayed in "Service Programs". There are 4 functions arranged in the menu which the users can use to control and manage service contract transactions. The users can ensure that all contracts can be handled effectively with this tool.

(a) Customer Product Services

The users can track or check details of individual contracts in "Customer Product Services". It will show the start and end date of warranty or contract, type of service. If the users can track service sales, they can do so. It informs service order, amount, and even status of order and invoice. With this information, they can track invoice data in Oracle Receivable by referring sales order. This

feature helps the management control all services provided to the customers and revenue from services.

(b) Order Service

When a customer orders a service contract, the users can create a service contract by using "Order Service" function. "Order Service" interfaces with Oracle Order Entry. The users key in details about service contract i.e. type of contract, start date of contract, duration, product, serial number, and so forth. "Order Service" is quite flexible in allowing the customers to have a contract with any duration. The users just enter the start date, it will automatically calculate the end date. The users can choose either to create a new service order or to add to an existing order. 'Order Service' will then transfer sales data to Oracle Order Entry to process a service order, and the order is transferred to the Oracle Receivable in issuing an invoice.

(c) Renew Service

If it is found that any contract is nearly expired, the salesperson will immediately contract the customer to renew the contract. If the customer desires to renew his contract, the user will retrieve the old contract and renew it. 'Renew Service' is provided in the Oracle Service to handle contract renewal. Issuing a sales order, the user can either add the service renewal order to an existing order or create a new one. The system allows to extend the contract by specifying a certain date or a range of time, and desired unit of product from the old contract. The user just selects the desired ones to renew the contract. The application will automatically determine the new end

date for each unit of airconditioner. The renewal order will be displayed in "Renew Service" when the users inquiry the record. The salesperson can track contract's status.

(d) Terminate Service

Only a few customers cancel or terminate their contract before the expiration date. However, if a customer desires to do so, 'Terminate Service' is a function available to terminate the contract. The users can select any product in the list to terminate. Specifying terminate date, "Terminate Service" will automatically calculate the remaining amount of undelivered service. For example, a customer made a 12 times a year service contract. The price is 1,200 Baht. The service has been delivered for 10 times. The customer wants to cancel the other 2 times of undelivered service. The application will display 200 Baht returned to the customer. This feature is rarely used because there is no any customer terminating the contract.

(3) Service Request Tracking

The purpose of "Service Request Tracking" is to handle service requests from the customers. The progress of each job can also be checked here. The function helps the users ensure that sll service requests are fullfiled.

(a) Enter Service Requests

When a customer calls in to request for a service, the call recipient will ask some information about the customer and his product. The information will then be entered into the system to issue a service request. In the Oracle Service, the word "Service Request"

is used interchangeably with "Service Job". However, "Service Job" is till being used in the Oracle Service, but the "Service Job" function will use the Oracle Work In Process to issue service jobs. The data of a service request will be transferred to the Oracle Work In Process. In the Oracle Work In Process system, it mostly handles about cost, materials or parts used in the jobs. It does not provide much information about service. Most service jobs' data resides in "Service Request Tracking" instead. Therefore data of service jobs are managed in "Service Request Tracking".

Controlling and monitoring service jobs can be done in "Service Request Tracking". It has as many features as the users can handle service jobs. It will describe the owner, the customer's data, product's data, problem description, problem resolution, and so forth. The users can monitor the progress and status of service jobs via this function. They can update the progress of the jobs. All activities against a job can also be tracked. "Service Request Tracking" can be used as performance appraisal because it provides the time spent on a job. Furthermore, it can be used as knowledge base of problem resolution. The technicians or users will update what they have done in fixing the problem. If a similar problem occurs, other technicians can search the resolution referring to the problem code. Whenver a customer calls for a service, his request will be recorded via this feature.

(b) View Service Requests

After a service request is accepted, the managers or supervisors can monitor the progress and status of the jobs. "View Service

Requests" will enable the managers and supervisors to control service jobs more effectively. They just refer to the request number, the system will immediately display everything about the job. "View Service Request" provides an overview of individual service jobs, but they can drill down into details by pressing "Open" button. The screen will look the same as "Enter Service Requests". "View Service Requests" is an effective tool. The users can retrieve data according to searching criteria. They can search all jobs during a particular month, by status, and so forth. The application provides many parameters for searching. This feature is an effect tool which helps the manager keep track of all requests.

(4) Depot Repair

"Depot Repair" will interface with "Service Request Tracking" in handling service repair jobs or per-call maintenance jobs. After a request is issued, the user will release a service job via "Depot Repair". "Depot Repair" will process a request and interface with the Oracle Work In Process System to release a job. After a job is transferred to the Oracle Work In Process, the user will enter parts used, labor cost, and other costs of the service job. After a job was closed, that job will be transferred to the Oracle Order Entry to issue a service order and an invoice. The status of service jobs can be checked whether they are closed. If not, the user can check the progress in "Service Requests Tracking" to find out the reason why the jobs have not been closed. There are 3 functions handling service repair jobs.

(a) Repairs

"Repairs" function is available to the authorized users only to open a service job and issue an order. This function should be controlled with security because it can process a job to pick spare parts and issue an invoice. The user will key in what will be charged in the "Estimate" in which the users will enter what will be charged for a service job. The data in "Estimate" will be transferred to the Oracle Order Entry. The manager or supervisor can use "Repairs" function to track and monitor the status of repair jobs, and they can track information of service jobs in the Oracle Work In Process by referring the job number shown in the "Repairs".

(b) Repair Jobs

After the manager has approved a service repair job in "Repairs", the user can then process the repair job in "Repair Jobs" to open a job by interfacing with the Oracle Work In Process. Indeed, the Oracle Work In Process is a system used in manufacturing, but it can be applied to work with the Oracle Service to handle service jobs. The user need to transfer data from "Repair Jobs" to the Oracle Work In Process to specify which part will be used in the job, costs of each job.

(c) Repair Orders

When a repair job is completed and closed, it must be transferred to issuing a service order and an invoice. The user will select which job will be transferred to the Oracle Order Entry system and press "Submit Order" button. The application will transfer items specified

in the "Estimate" to the Oracle Order Entry. The user needs not to reenter data.

(5) Other

"Other" provides reports concerning services available to the users. The users can select which report they want to submit. There are several reports provided in the Oracle Service.

(6) On-Hand Quantities

The users can check the status of a particular item in the stock by querying data in the 'On-Hand Quantities" function which is a function in the Oracle Inventory system. 'On-Hand Quantities" can support this kind of work. The users just specify the item and parameters into the application, and it will display the on-hand quantity in the stock. The users can retrieve a rough information, or they can drill down into detail which shows all warehouses and their status. However, the on-hand quantity shown includes the reserved quantity, but it does not specify which order reserves the item. If the users want to inquiry only available quantity, they can check the status in "Item Supply/Demand" function. "Item Supply/Demand" will inform only available quantity. In addition, it will display all sales orders, purchase order, etc. This function is quite powerful. The users will get more accurate status of the stock. If the stock has no enough quantity, the users can check when the new lot of an item will arrive.

(7) Planning

According to one of the users' requirements, the users expect that the new system should include Inventory Planning system. The Oracle Inventory system certainly has this function. There are 3 main planning

St. Gabriel Library, Au

tools available to the users to select to plan: Min-Max Planning, Reorder-Point Planning, and Safety Stocks. In addition, it also provides a few effective tools for inventory analysis. The users enter particular data in the "Setup" program such as lead time, minimum stock, maximum quantity ordered, etc. These programs will use these data processing planning and generate a suggestion report, or the users can choose the programs to generate a purchase requisition automatically. There are several planning tools which facilitate the users' planning tasks.

4.4 System Design

Whenever "System Design" is mentioned, everyone will think of developing and programming an application to support users' operation. For this project, it refers to designing and developing business processes and standard operation procedure based on the features and functionality of the Oracle Service system. Even though the Oracle Service is a software package developed by Oracle Co., Ltd., it does not mean that the users can use the application by just learning how to use the software from the user's manual. Since the Oracle Service is not developed by the company's IT staff, the users, IT Staff, and involved persons must attend an overview training to learn the Oracle Service's features and functions to have some idea before designing the new system. Knowing how the application works, the implementation team will adapt and apply the software to fit users' requirements and operation. System mapping and prototype is the steps in designing the new standard operation procedure. The implementation team will discuss together to determine which function in the application will be implemented in the operation.

This section will describe the system flow and processes of each operation via the diagrams given. The diagrams are like a map with which the users have to follow.

They depict what the users have to operate on the system to accomplish their work. Those diagrams are shown as follows:

(1) Repair Jobs for Products with 1-Year Warranty Coverage

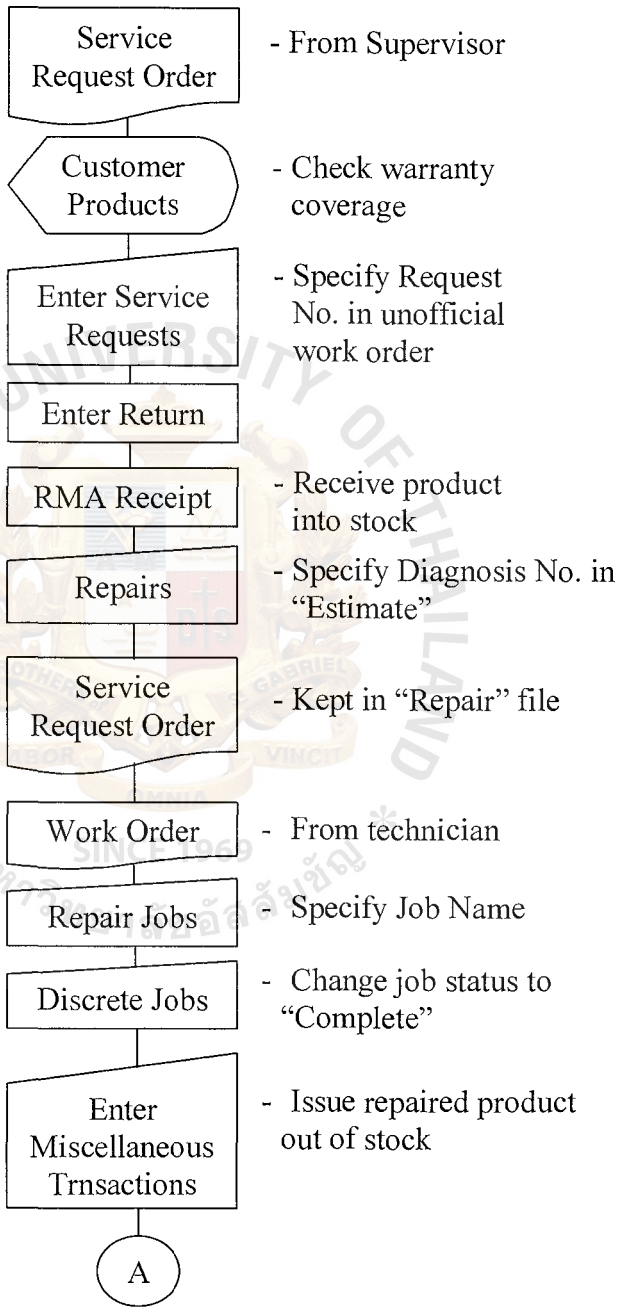

Figure 4.1. Flowchart of "Repair Jobs for Products with Warranty".

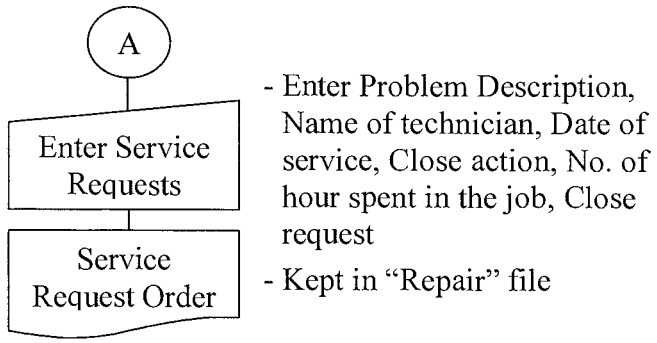

Figure 4.1. Flowchart of "Repair Jobs for Products with Warranty". (Continued)

(2) Repair Jobs for Products out of Warranty

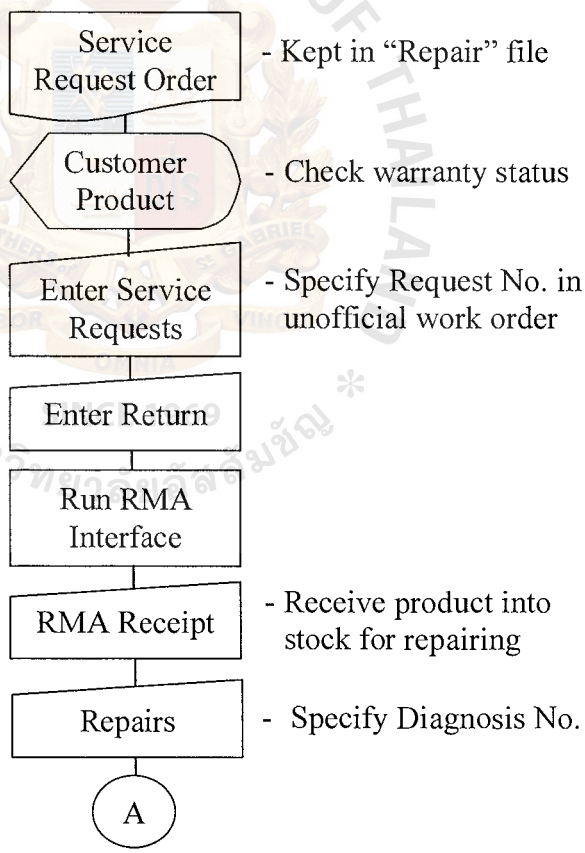

Figure 4.2. Flowchart of "Repair Jobs for Products out of Warranty".

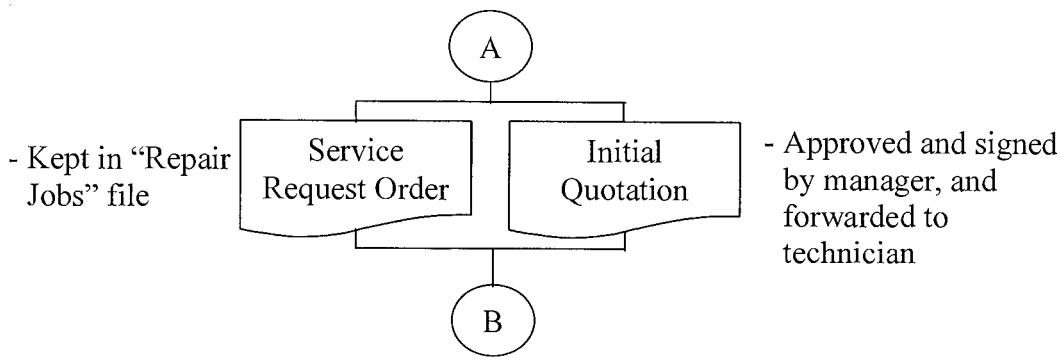

Figure 4.2. Flowchart of "Repair Jobs for Products out of Warranty". (Continued)

After the above process is finished, the next step can be either (a) or (b) depending on serial number acknowledgement.

(a) Process after a job is completed (if serial number is known)

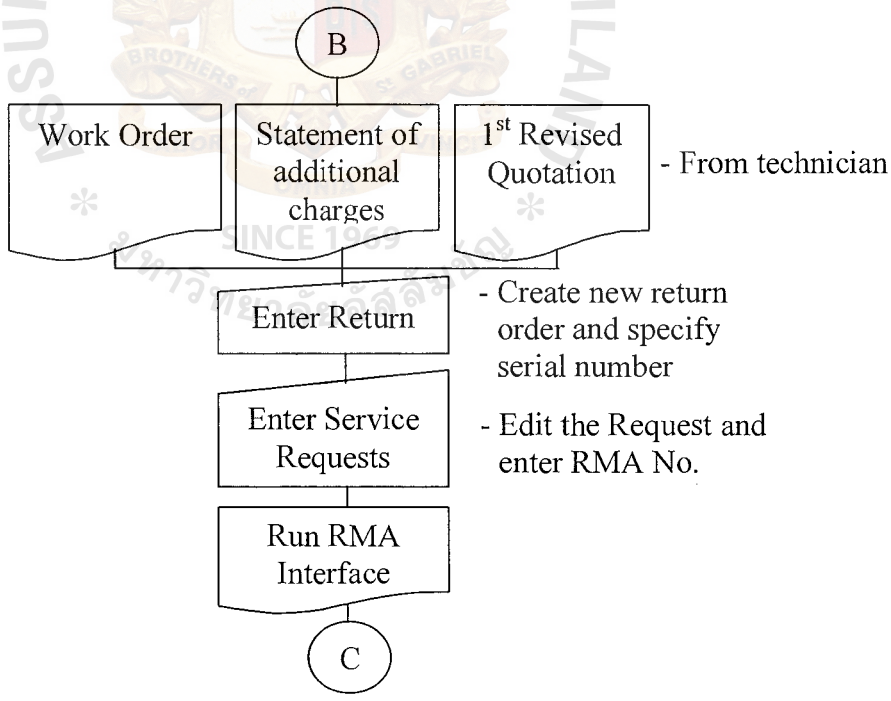

Figure 4.3. Flowchart of "Job Completed: Known Serial Number".

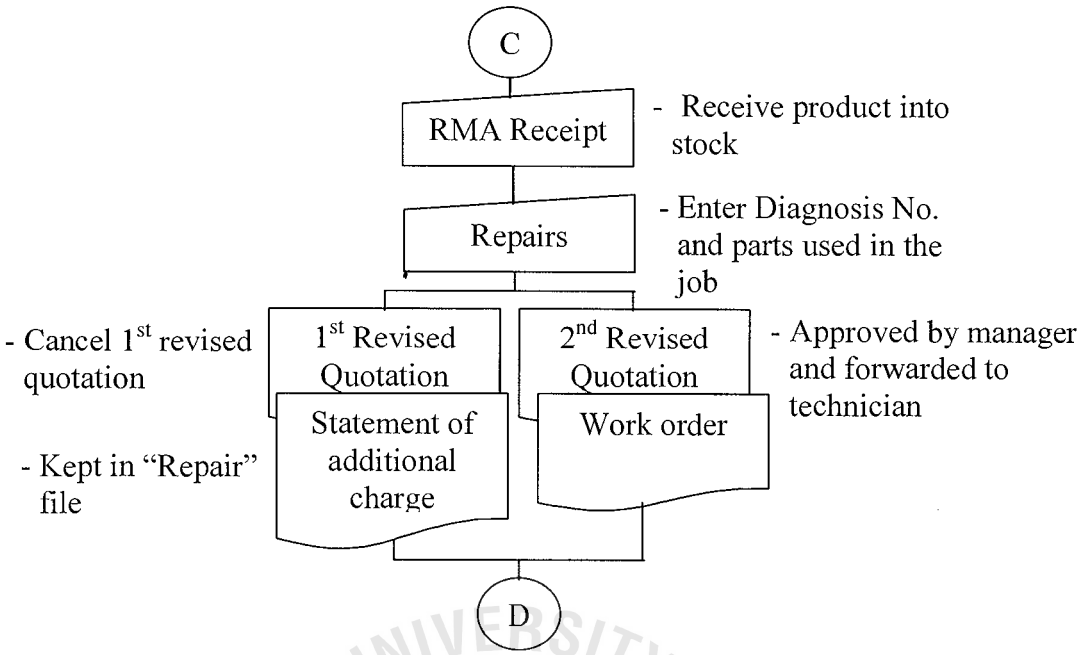

Figure 4.3. Flowchart of "Job Completed: Known Serial Number". (Continued)

(b) Process after a job is completed (if serial number is unknown)

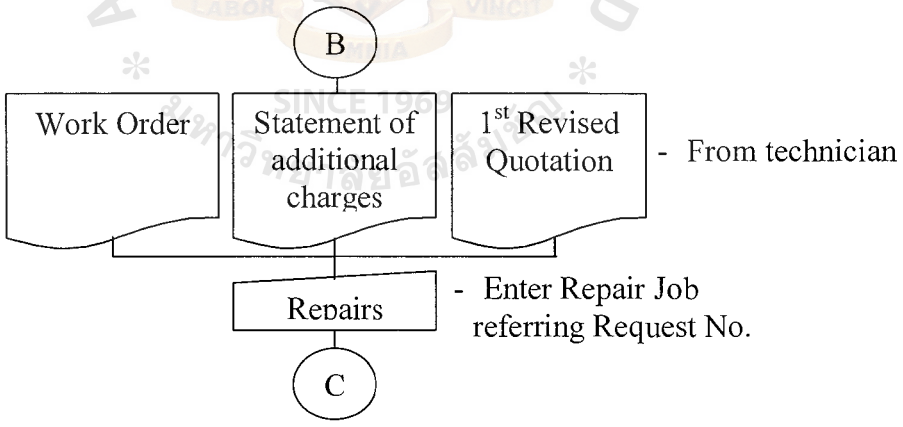

Figure 4.4. Flowchart of "Job Completed: Unknown Serial Number".

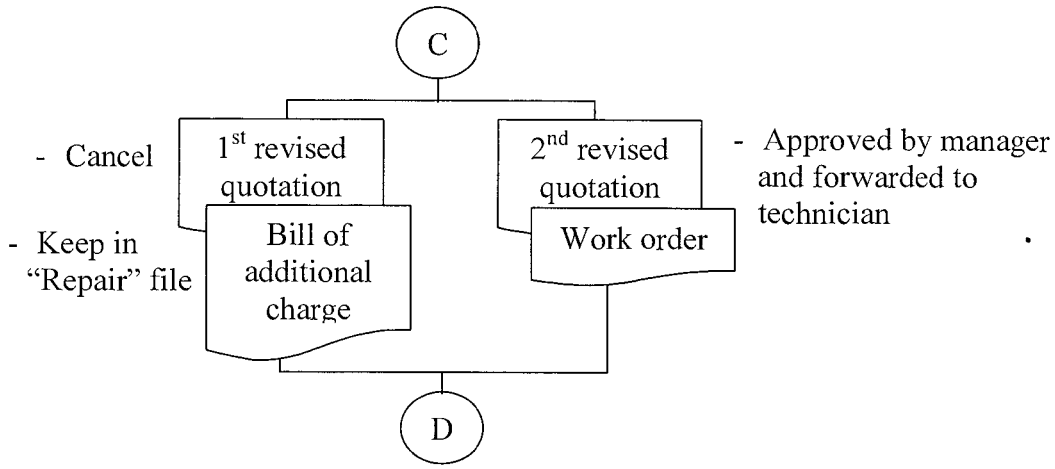

Figure 4.4. Flowchart of "Job Completed: Unknown Serial Number". (Continued)

(c) Process after the job of either (a) or (b) is completed.

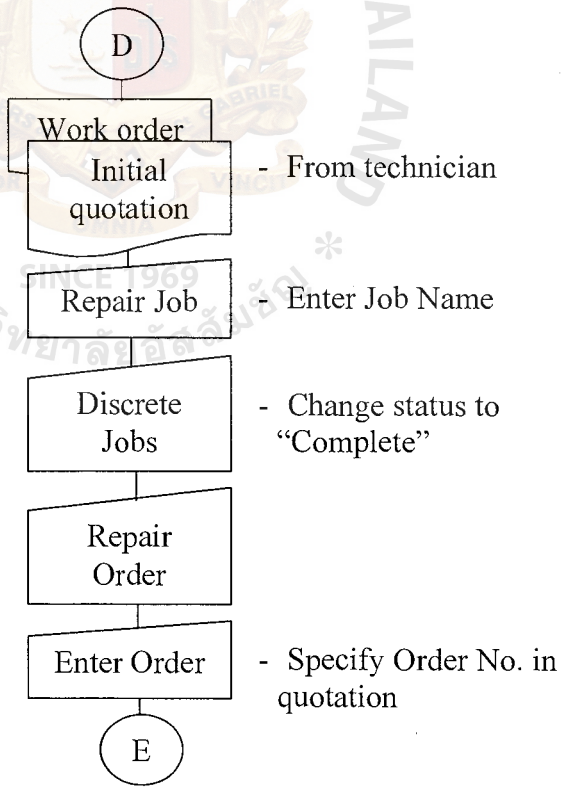

Figure 4.5. Flowchart of "Job Completed: Invoicing".

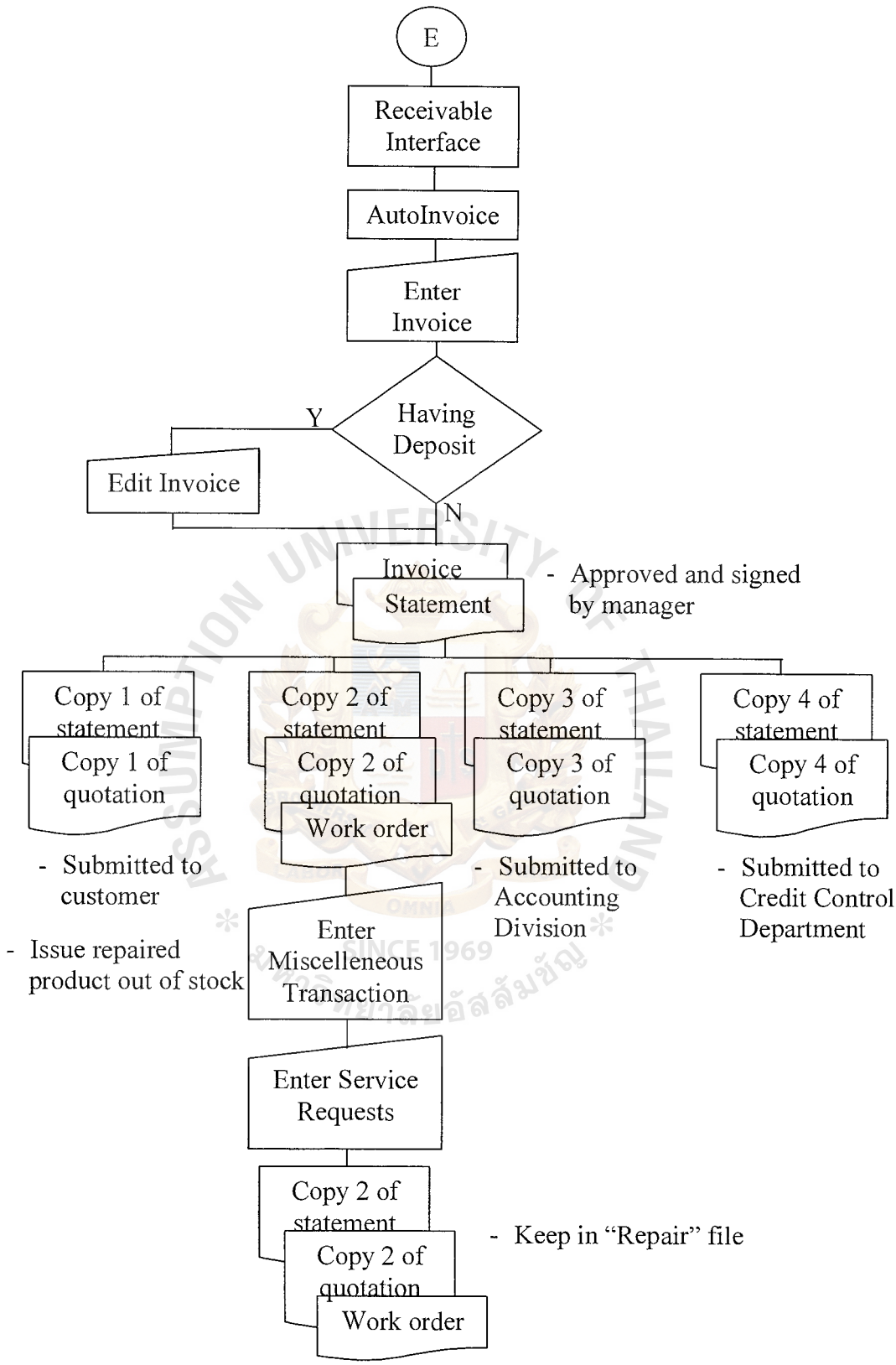

Figure 4.5. Flowchart of "Job Completed: Invoicing". (Continued)

(3) Service Maintenance Sales

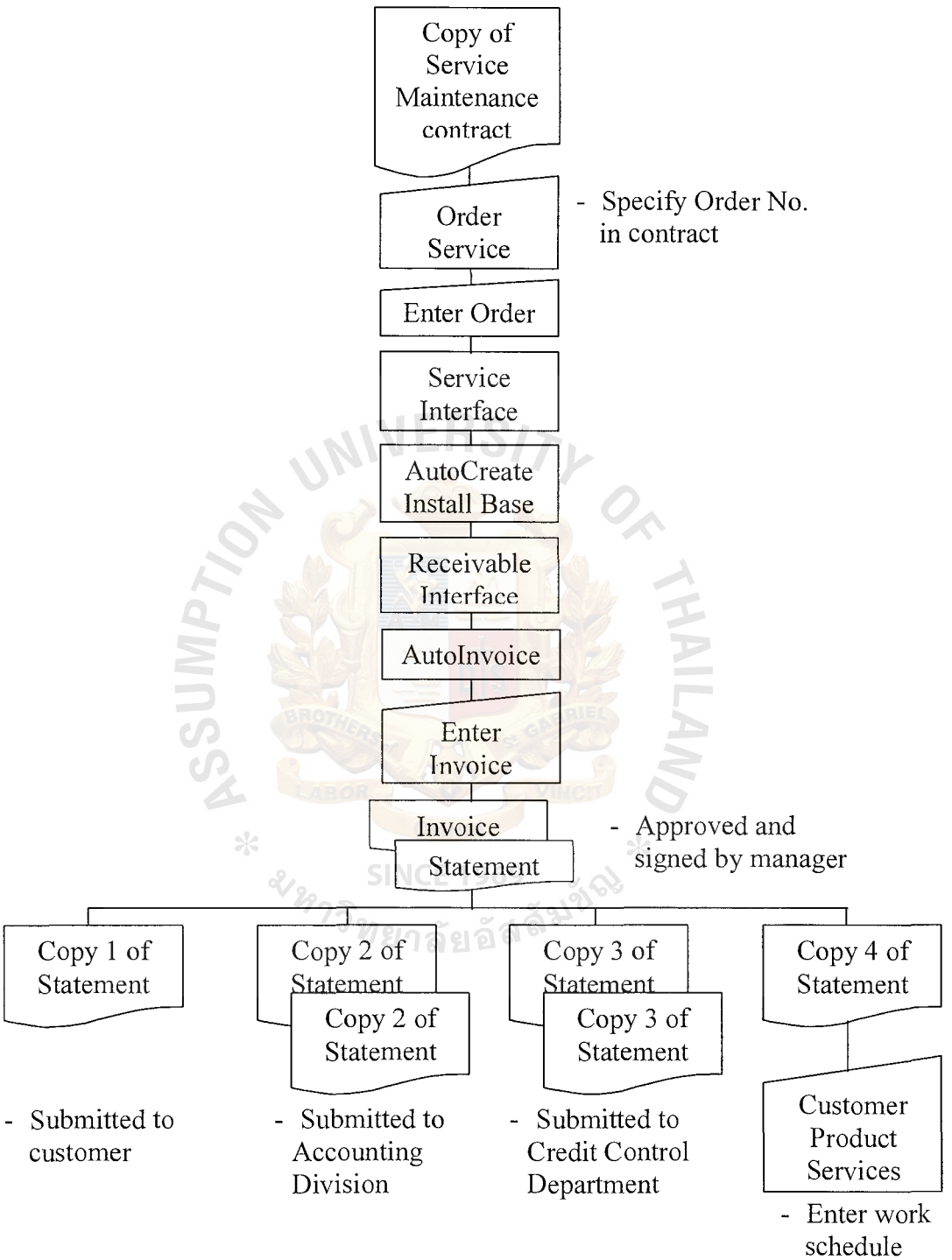

Figure 4.6. Flowchart of "Service Maintenance Sales".

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(4) Installation Service (issuing an invoice)

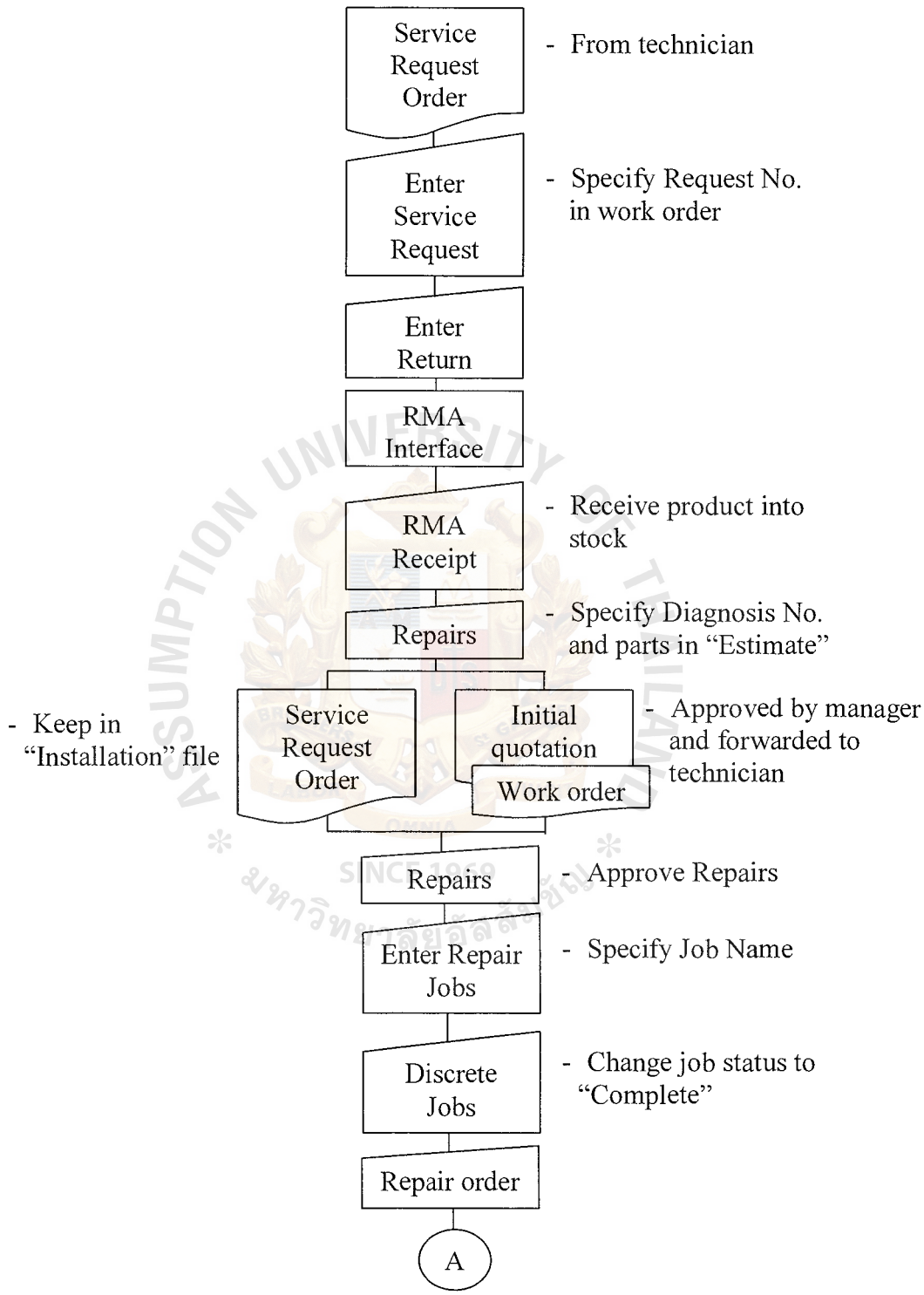

Figure 4.7. Flowchart of "Installation Service: Issuing Invoice".

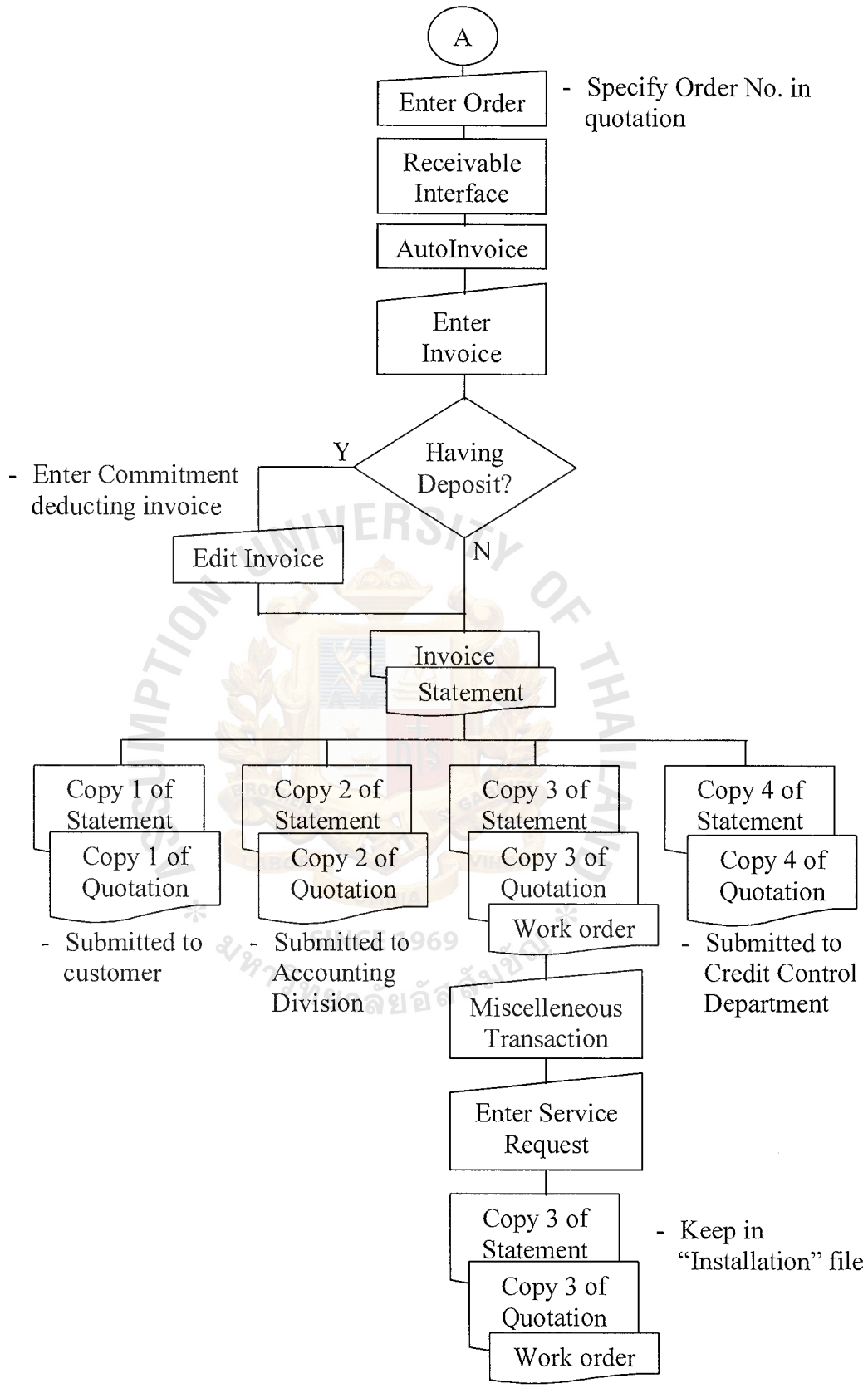

Figure 4.7. Flowchart of "Installation Service: Issuing Invoice". (Continued)

(5) Installation Service (without invoicing or hidden revenue)

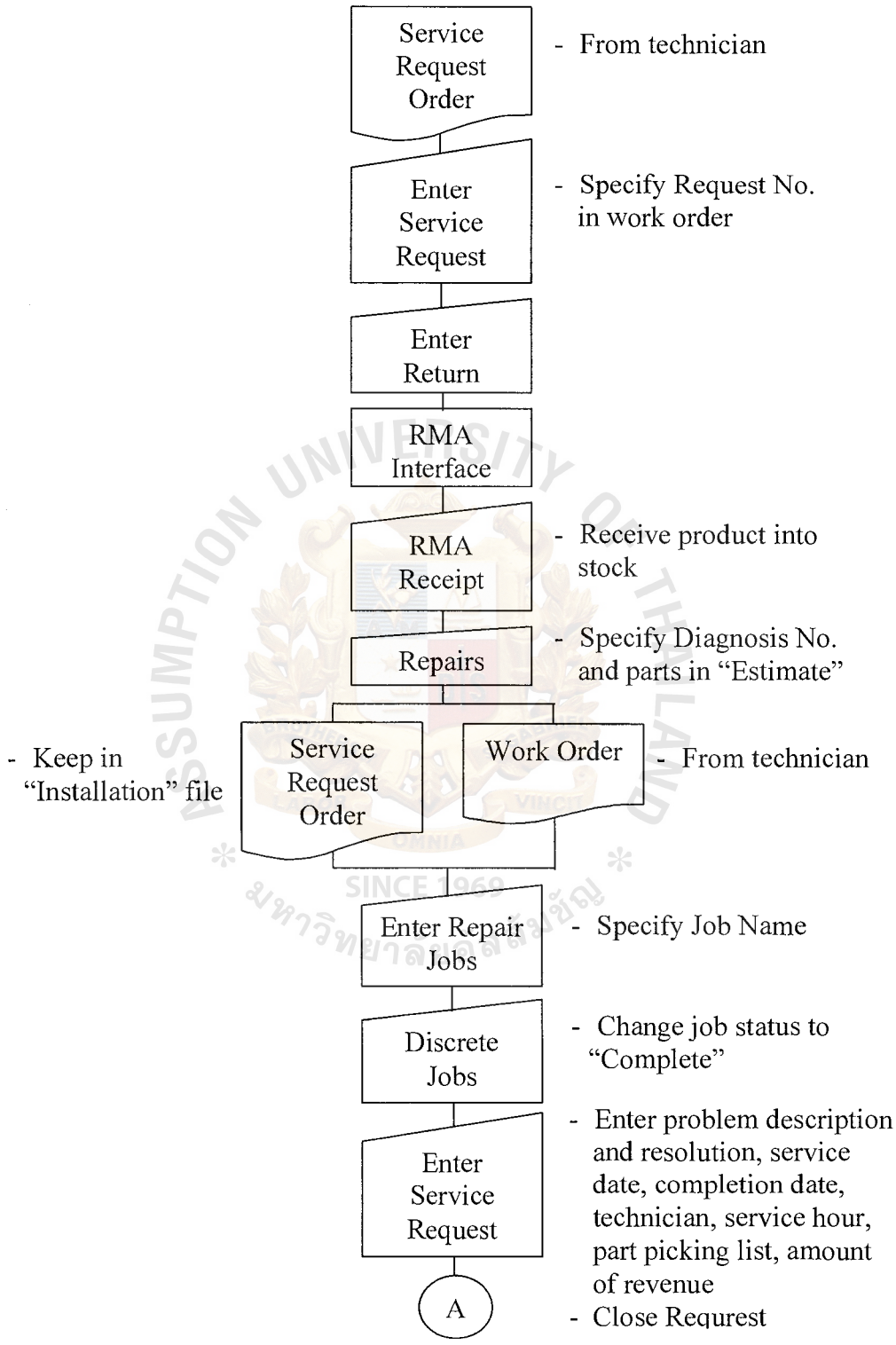

Figure 4.8. Flowchart of "Installation Service: Non-Invoice".

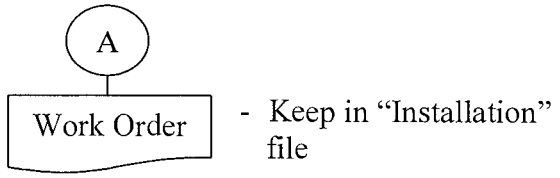

Figure 4.8. Flowchart of "Installation Service: Non-Invoice". (Continued)

(6) Entering Warranty

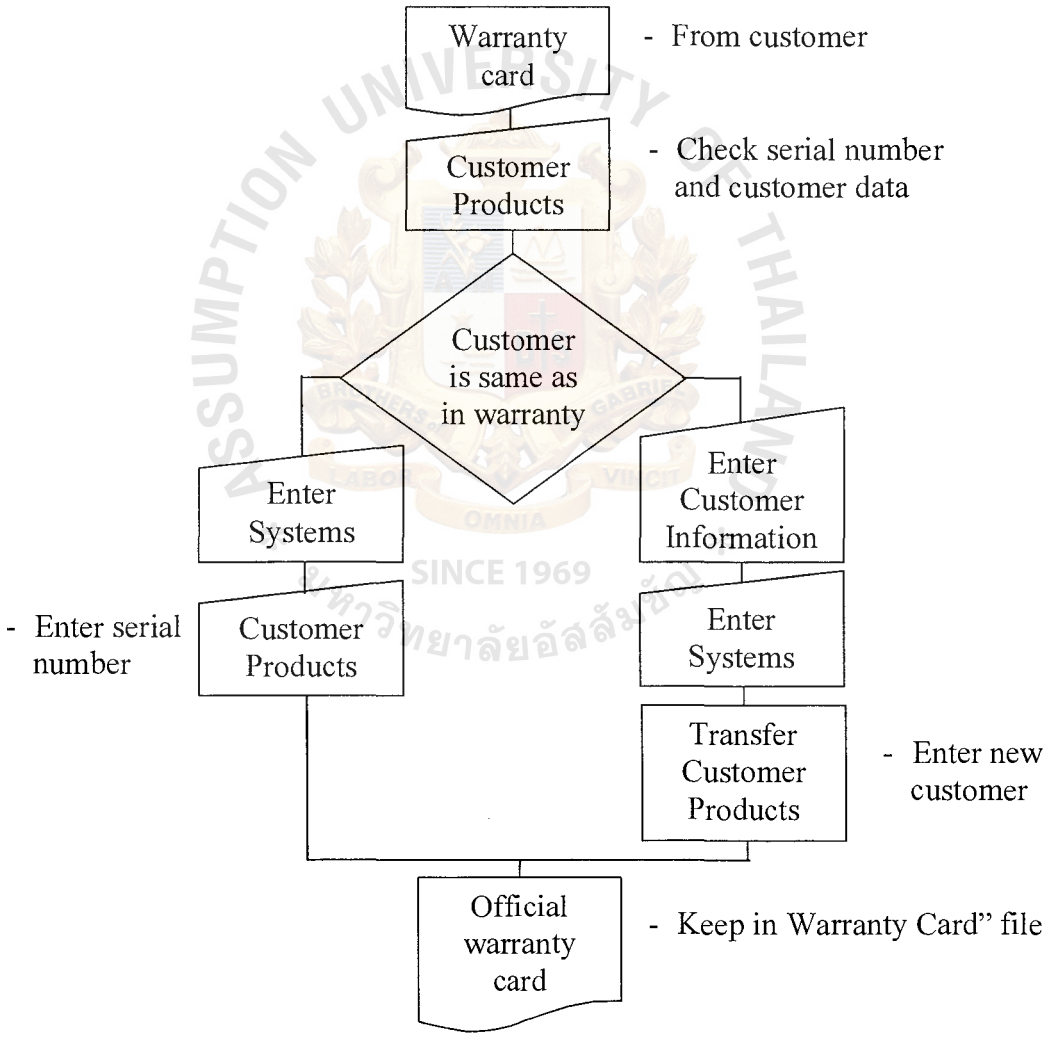

Figure 4.9. Flowchart of "Entering Warranty".

V. POST-IMPLEMENTATION'S EVALUATION

It is necessary to evaluate the newly designed system after it is implemented. It is the responsibility of IT Department to follow up the progress of system usage. The purpose of system evaluation is to check whether the system works smoothly, feedback from the users, operation on the system, and business processes. When the system is put in practice for the first time, it cannot be certain that it will work and facilitate the users perfectly. All problems, if any, must be identified. Productivity must be evaluated. Typically, the freshly implemented system needs to be modified in order to fit users' requirements as much as possible. The business processes or standard operation procedure must be revised and improved until it meets the optimal level. If modification must be taken place, it should be informed to the top management for decision making and approval. Evaluation will focus on the following areas:

(1) Application

Although the Oracle Service is developed by Oracle Co., Ltd., the second largest software company, it does not mean that its software works smoothly or has no errors or bugs. The application must be tested to find out errors, so that those errors will be informed to the Oracle (Thailand) Co., Ltd. to fix the bugs. Application testing should be done before it is put in practice, otherwise operation on the system may be interrupted and cannot be carried on. This problem will affect the business.

(2) Operation on the system

IT staff must keep close to the users while they are working on the system. Because the system is new to the users, they are not familiar with it yet. IT staff must support them when they have a problem. IT Department

is the ultimate place where the users can ask for help. IT staff must have an insight of the system. If problems occur, IT staff should discuss with the concerned parties to find out solutions. All solutions must be recorded as a knowledge base for future reference. IT staff should also train the users on the job because it needs time to be familiar with the system, though the users have already attended a training course. Operation Evaluation will also focus on the features of the application. A good application must be easy to use and be user-friendly. With this kind of evaluation, it will inform whether the application needs to be modified in order to fit users' requirements. All software packages in the market are horizontal software. They are developed to support as many types of business as possible. It is often found that several features are unusable, and at the same time many features are missing in the system. We can say that operation evaluation is a step of gathering additional users' requirements. If the application needs to be modified, the steering committee must discuss together to see if it is possible to modify or change business processes or standard operation procedure instead. Changing business processes is the cheapest way to modify the system. If system modification cannot be avoided, the top management must get involved to make decision because system modification means additional investment: money and time.

(3) New Business Processes or Standard Operation Procedure

Implementing a software package is a means of system development by designing a new standard operation procedure based on the features and functionality of the application. The Oracle Service has implicit business processes in itself. During designing the new system, those features are

applied and adapted to fit the company's business as much. After the newly designed standard operation procedure is put in use, the users have to follow it. IT Department has to join the users during operating on the system. They should discuss with other involved parties periodically about the business processes in order to check whether or not the new business processes should be improved, or the application should be modified to be compatible with the business processes because the application relates to them. Often, it is found that some processes are not designed and included in the system. The users will ask IT Department if the application has any feature supporting the missing operation. It is the responsibility of IT Department to check the system. If there is no the requested feature, IT Department must analyze the case and find out the best solution such as developing additional programs or reports, or applying other existing feature to fit the requirement, etc.

It is very important not to ignore system evaluation. Without evaluating the implemented system, the company will certainly be in trouble. The business will not be able to run smoothly. Confliction may occur within the organization. Individual divisions or departments will blame each other for the faults. Finally, system implementation project may fail. The management will think that the application is not suitable to the company's business. Thus they will turn to invest in other software package. It is crucial that IT Department has to handle the project effectively. The project manager has an important aspect to conduct the project.

VI. POST-IMPLEMENTATION'S PROBLEMS

With system evaluation, it will identify all problems after the system is in use. Those problems must be categorized apparently, and the steering committee must discuss together to analyze the problems and find out the best solution to fix them. After the system started up, IT Department observed the operation on the system. There are many problems. The users have some difficulties in operation. Those problems are:

(1) Too many steps to operate on the application

In the previous section describing the system flow or processes, the users have to operate along with those steps because it is the intention of specialist or development team of Oracle Co., Ltd. that service operation should be like the steps in the application. Having used the application, the users complained that there were too many steps to operate. They feel that it is inconvenient to follow all those steps. It takes too much time to finish one transaction. They insist that their work finish quickly, especially service jobs. The task which has this problem most is "Service Request Tracking". When a customer requests for a service, the users have to do transaction of request in "Service Request Tracking".

According to the processes shown in the previous section, to open a job requires 8 steps. They argue that it takes too much time to issue a work order. Time is a very important factor in servicing customers. It is unproductive to let the technician wait for a work order.

(2) Lack of Quotation function

Before a job can be released, a detail and price of a job must be informed to the customer. The manager will consider the symptom and

parts used in the job. Then the manager will determine the price and issue a quotation. In the Oracle Service, it is lack of Quotation function. In the newly designed system, the process of issuing a quotation is the same as opening a service job. The users must process a request through those 8 steps. The users just want to issue a quotation with a few lines in it. It seems to be inconvenient for the users to process a quotation like this manner. They want to have a program to handle the task of quotation.

(3) Lack of Required Reports

After the new system started up, there are several required reports, described in the section of "Users' Requirements and Expectation Gathering and Analysis", still missing in the system. Without these reports, the users are still working with difficulties. They cannot handle their works and operation on the system much. However, while making this report, some of them were being developed (shown in the Appendix A).

(4) Lack of Work Assignment and Schedule

The functions of work assignment and scheduling disappear in the Oracle Service. They are the requirements of Service Division to assign works in the system. Having the Oracle Service system, the users are still making scheduling in a book. If there is a tool facilitating the managers in managing work scheduling, it will help them reduce a lot of work. Everyday they have to open the book and tell the technicians about the schedule. They want IT Department to develop this program to be able to assign works in the system and print out a report and work orders.

VII. RECOMMENDATIONS

As the aspect of IT Section Manager, I am involved in the implementation project. I have to manage the project, administer the system, and support the users. I would like to propose some recommendations to the steering committee and the management to solve the problems. According to the problems described in the previous section, those problems should be fixed as soon as possible because they interrupt the operation of the user. They affect the business. My recommendations are as follows:

(1) Hiring more IT staff

Siam Daikin Sales Co., Ltd. decided to migrate the old system to the Oracle Applications consisting of 13 modules. It is a big system. Nowadays there are only 3 members in the IT department: one manager and 2 staff (including me). Most IT work, such as developing reports, are in bottleneck. This is the reason why many requested reports have not been developed yet. Most of their time is spent supporting users and analyze the implemented system. The top management must realize that it is very necessary to hire more IT staff, so that IT Department will be reorganized to delegate work. Otherwise, the company will have to invest in hiring a software company to customize those requested reports. However, hiring an outsource company is more expensive than hiring more employees. The outsource company will charge the company job by job. However, while this report was being made, some reports were developed (some examples are provided in the appendix).

(2) Application Customization

There is not any software package sold in the market fitting all types of business. There must be some customization of the software to suit the company's requirements. The Oracle Service is no exception. According to the features of "Enter Service Requests", the users complained about the steps in processing a transaction. I have analyzed and tested the application to find out if it is possible to reduce the operation steps and change the procedure. The result is that the application was designed with fixed operation. The users have to follow the designed procedure. They cannot bypass any step, otherwise the application will generate incomplete transaction, and worse, it will not allow the users to operate other tasks in the system. There are 2 functions falling into consideration for application customization.

(3) "Enter Service Requests" function

I agree with the users that "Enter Service Requests" function must be modified to fit the operation of Service Division. The steps of receiving product into stock, namely "RMA", should be cut out of the process. It needs not to receive the product into stock beforehand. Usually, the technicians go out to service customers. It should interface directly with "Repairs" and "Repair Orders". Without RMA processes, the operation will be faster.

(4) Quotation Function

I have checked the application for which feature in it can be applied to use as Quotation function. Analyzing the system, the Oracle Applications was designed to let the users have user-defined columns in the database,

called "Flexfield". Looking at the application, all forms (windows) have a square bracket. The users just enable the field via setup function, and assign the meaning of each field. I have tested those flexfields. I feel that it is still not suitable to be applied for quotation issuance. The task of quotation issuance needs a systematic application rather than those flexfields. Therefore, a Quotation function should be developed additionally to the Oracle Service. This requirement is urgent because, nowadays, the users have to use a word processing program such as Microsoft Word in issuing a quotation.

(5) Top Management Involvement

Implementing a new system means changes taking place in the company. Changes will affect all divisions and departments. There may be conflict among them. Then the implementation project needs a high involvement from the top management. They will join the project to make decision to solve the problems occurring during the implementation. In addition, they will have an important aspect in considering system modification, especially application customization. During the implementation period, they pay attention and involve the project quite less. There are many problems that cannot be solved among the steering committee. If there is much involvement from the top management, the project can be carried out and accomplished faster.

VIII. CONCLUSIONS

To survive in the furious market requires that a company must have a power tool to make its business more strategic and competitive over the competitors. We have come to the information age. Information is a valuable asset which the management must use for analysis and planning to gain competitive advantages over the competitors. Siam Daikin Sales Co., Ltd. has realized the importance of computer system and come to the direct way to invest in a new computer system. The old one is very obsolete. It has been used for almost a decade. Its life cycle is over. Changing to a new system will improve the business to carry on with more productivity and low cost.

Service Division is the division which has suffered from the old system most. They have a few systems supporting their works, and those systems cannot help them operate effectively. The users have had many problems and worked with difficulties. Most of their work is done manually. They have asked IT Department when they will have a new service system. "Oracle Service" is the answer. The Oracle Service is a module of the Oracle Applications implemented at Siam Daikin Sales Co., Ltd. as a new computer system. Analyzing its features and functionality, it seems to be a system corresponding to the users' expectation. It can facilitate the users operate more effectively and efficiently. The problems will be overcome by the new system. The former business processes or standard operation procedure must be changed in order to be compatible with the Oracle Service system.

It is a must for the implementation project having a plan describing what actions will be taken during implementation period. The project manager must control the involved parties to get along with the plan. To design a new system, the users must get insight of the new application beforehand, so that they can design the new business

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processes based on the application. The users have to follow the newly designed system. When the system is in use, it will certainly have problems. The implementation team and steering committee must discuss to find out the best solution. The improvement may be either modification of the new standard operation procedure or the application customization. It is a recommendation to the top management to reorganize IT Department by hiring more IT staff.

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APPENDIX A

SAMPLE SCREENS OF THE CURRENT SYSTEM

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APPENDIX A
SAMPLE SCREENS OF THE CURRENT SYSTEM

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```
Date   : 01 / 11 /00                    QUOTATION  PRINTING                    LANGUAGE    THAI
Time   : 15 : 49 : 36                                                          QUOTATION NO.   :
99 / 02970
                                                                               REFERANCE NO.   :
                                                                               QUOTATION  DATE :
01 / 11 / 00
ATTN   :    คุณสมชาย หาญกล้า
ADDRESS :  49 / 9 ถ.อ่อนนุช ประเวศ กรุงเทพฯ

SUBJECT   :   เสนอราคาซ่อมเครื่องปรับอากาศ
LACATE    :
MODEL     :   FT13GV1LS                    SERIAL  NO.     :    9900190
COMPLETION    :                            PROPOSER     :    นายธนพัน  ตระการไทย
PAYMENT   :   เมื่องานเสร็จแล้ว            MANAGER      :    นายธนพัน  ตระการไทย
```

Figure A.1. Screen of Quotation Printing.

```
<QNIN01>                                   QUOTATION  INQUIRY
                                      ENTER  START  QUOTATION  NO. :
NO.    QUOT. NO.          CUSTOMER                          SUBJECT
1      99/000957          192344 บริษัท สายไฟฟ้าไทย        เสนอราคาซ่อมรั่ว-เติมน้ำยา
2      99/000958          คุณประภาส  อำไพวิทย์              เสนอราคาเปลี่ยนอะหลั่ยเครื่อง
3      99/000960          1912156 บริษัท แสงเจริญ           เสนอราคาซ่อมรั่ว-เติมน้ำยา
4      99/000971          1945626 บริษัท บางกอกโคมัตสุ      เสนอราคาเปลี่ยนคอมเพรสเซอร์

                                                   SELECT NO. :
PF9=END                   PF1=OMIT
```

Figure A.2. Screen of Quotation Inquiry.

```
DATE : 01/11/00                    WARRANTY CARD PRINTING
Time : 15 : 28 : 34
                                                   REGIS – NO. B5-05883
BUYER
ADDRESS
ZIP                                                TEL
PURCHASE FROM
ADDRESS
ZIP                                                TEL
INSTALLED BY
ADDRESS
ZIP                        Installation Date    /  /Completion Date    /  /
FANCOIL        -> D/O :          ISSUE :   /  /   EFFEC :   /  /   EXP :   /  /
CONDENSING     -> D/O :          ISSUE :   /  /   EFFEC :   /  /   EXP :   /  /
```

Figure A.3. Warranty Card Printing.

```
DATE : 01/11/00                    WARRANTY MAINTENANCE
Time : 15 : 34 : 57
                                                   W/N – NO.
BUYER
ADDRESS
ZIP                                                TEL
PURCHASE FROM
ADDRESS
ZIP                                                TEL
INSTALLED BY
ADDRESS
                                   Installation Date    /  /      Completion Date    /  /
FANCOIL        -> D/O :          ISSUE :   /  /   EFFEC :   /  /   EXP :   /  /
CONDENSING     -> D/O :          ISSUE :   /  /   EFFEC :   /  /   EXP :   /  /

                                   PF9 - END
                                                                   A WNPRNT 01
```

Figure A.4. Warranty Maintenance Screen.

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```
DATE : 01/11/00                    WARRANTY INQUIRY
Time : 15 : 46 : 22
                                                                W/N – NO.
   Fancoil Model        Fancoil Mfg NO.        Condensing Modeel        Condensing Mfg NO.
BUYER
ADDRESS
ZIP                                                                          TEL
PURCHASE FROM
ADDRESS
ZIP                                                                          TEL
INSTALLED BY
ADDRESS
                                        Installation Date    / /      Completion Date    / /
FANCOIL        -> D/O :          ISSUE :   / /   EFFEC :   / /   EXP :   / /
CONDENSING     -> D/O :          ISSUE :   / /   EFFEC :   / /   EXP :   / /

PF9 - END
                                                                A WNPRNT 01
```

Figure A.5. Warranty Inquiry Screen.

```
Date : 01/11/ 00                SERIAL NUMBER SYSTEM
Time : 15 : 42 : 37             INQUIRY SERIAL NUMBER
     PRODUCT NO. : FT13GV1LS                                  SERIAL NO. : 9900120
      SERIAL      QUARANTEE                    RECEIVE                    ISSUE/RETURN
       NO.          NO.        DOC. NO.     DOC. DATE    DOC NO.        DOC. DATE
      9900120       MDC        9 / 4 / 42   09 / 04 / 99  SN91808       22 / 04 / 99
      9900121       MDC        9 / 4 / 42   09 / 04 / 99  SN91977       30 / 04 / 99
      9900122       MDC        9 / 4 / 42   09 / 04 / 99  SN91995       06 / 05 / 99
      9900123       MDC        9 / 4 / 42   09 / 04 / 99  SN91808       22 / 04 / 99
      9900124       MDC        9 / 4 / 42   09 / 04 / 99  SN91993       06 / 05 / 99
      9900125       MDC        9 / 4 / 42   09 / 04 / 99  SN91808       06 / 05 / 99
      9900126       MDC        9 / 4 / 42   09 / 04 / 99  SN91808       22 / 04 / 99
      9900127       MDC        9 / 4 / 42   09 / 04 / 99  SN91929       29 / 04 / 99
                                   SERIAL NO. ALREADY HAS ISSUED :      9
                                         UN – ISSUED SERIAL NO. :       1
                                                   TOTAL        :      10
PF9 – End , PF4 - Next Page , PF1 - Omit
                                                                A WNIPRD 01
```

Figure A.6. Seiral Number Inquiry Screen.

```
DATE      :                    SERIAL NUMBER SYSTEM
TIME      :                    INQUIRY BY DOCUMENT NUMBER

DESCRIPTION        :                                  CUST. NAME :
PRODUCT NO.        WH#          DOC. DATE             SERIAL NO.      W/N

PF9 = END                                             CONFIRM :
                                                      A WINDOC 08
```

Figure A.7. Seiral Number Inquiry by Document Screen.

```
DATE      : 01/11/00          CUSTOMER NAME SEARCH
CUST. NO. NAME (ENGLISH)                              TIME      :
16:00:09

                    ENTER SELECTION DIVISION :
                                                      1=DEALER      SALES
DIVISION
                                                      4=GENERAL     SALES
DIVISION
                                                      6=PROJECT     SALES
DIVISION
                                                      7=SSS
                                                      8=SERVICE DIVISION
```

Figure A.8. Customer Name Search's Parameter Input Screen.

```
DATE : 01/11/00                    CUSTOMER NAME SEARCH                    TIME : 17:34:02
CUST. NO.  NAME (ENGLISH)                  NAME (THAI)                     START : 100
1002000    J.S. AIR ENGINEERING CO., LTD.  บริษัท เจ.เอส. แอร์ เอ็นจิเนียริ่ง จำกัด
1003000    J.C. ELECTRIC                   บริษัท เจ.ซี. อีเลคทริค
1004000    JAOPROM AIR                     เจ้าพรหมแอร์
1005000    J.D.P TECHNOLOGY CO., LTD.      บริษัท เจ.ดี.พี. เทคโนโลยี จำกัด

ENTER=NEXT PAGE                PF9=END        BTAB=START-ID
                                                                        A    CUSSRH
01
```

Figure A.9. Customer Name Search's Inquiry Screen.

```
                                   MAINTENANCE CUSTOMER MASTER          DATE : 01/11/00
                                                                        TIME : 13:02:34
CUSTOMER # : 4005000
NAME (ENG)  : VIROJ  ATTAVEEWAN
NAME (THAI) : คุณวิโรจน์  อรรถวีวรรณ
GUARANTEE  :
ADDRESS #1  :

ADDRESS #2  :

ZIP-CODE
DIV.      DEPT      AREA      S/M      SHOP SIZE  TYPE      STATUS      INNER SHOPSTART      ACTIVE

CLASS     TERM      DISCOUNT            CREDIT LIMIT                   ADVANCE PAY
          SALES ORDER                   A/R BALANCE                    B/R BALANCE

                                                                        A SARM01 01
```

Figure A.10. Customer Master Maintenance Screen.

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APPENDIX B
SAMPLE SCREENS OF THE ORACLE SERVICE

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APPENDIX B

SAMPLE SCREENS OF THE ORACLE SERVICE

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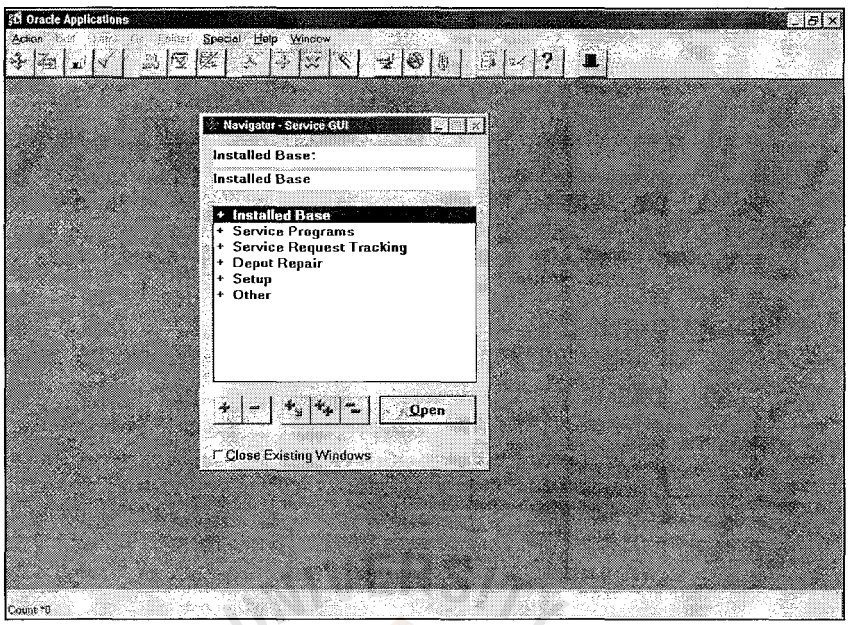

Figure B.1. Main Menu of Oracle Service System.

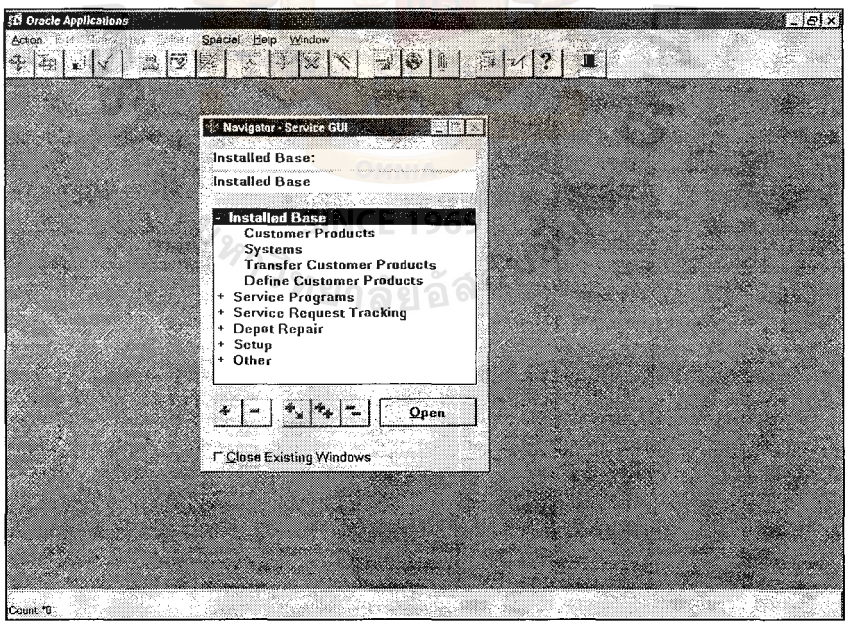

Figure B.2. Install Base Menu.

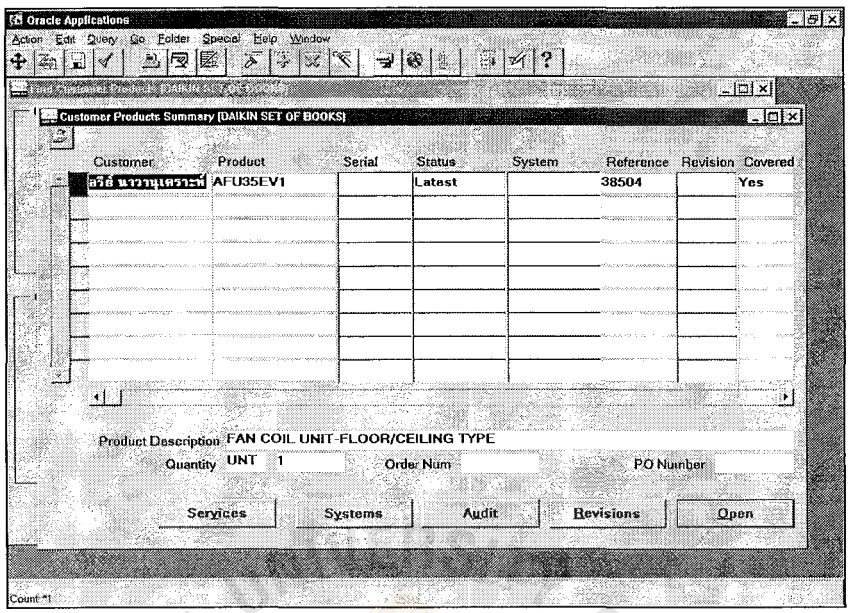

Figure B.3. Customer Product Summary Window.

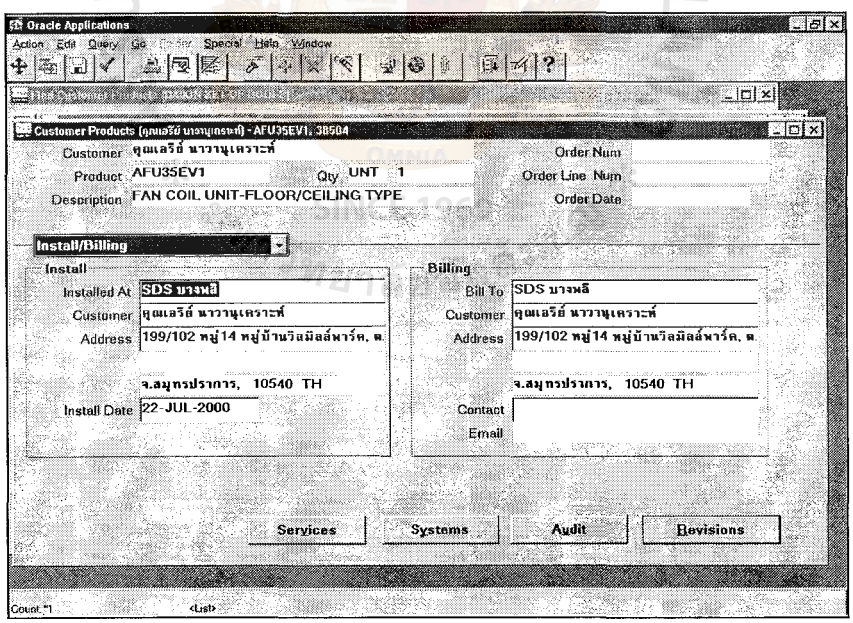

Figure B.4. "Install/Billing" Region in Customer Product Window.

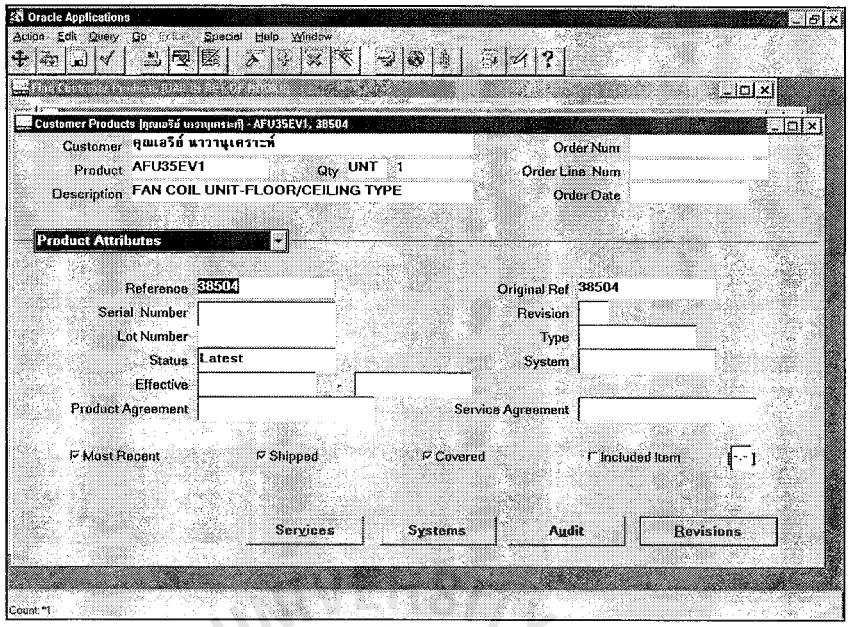

Figure B.5. "Product Attribute" Region in Customer Product.

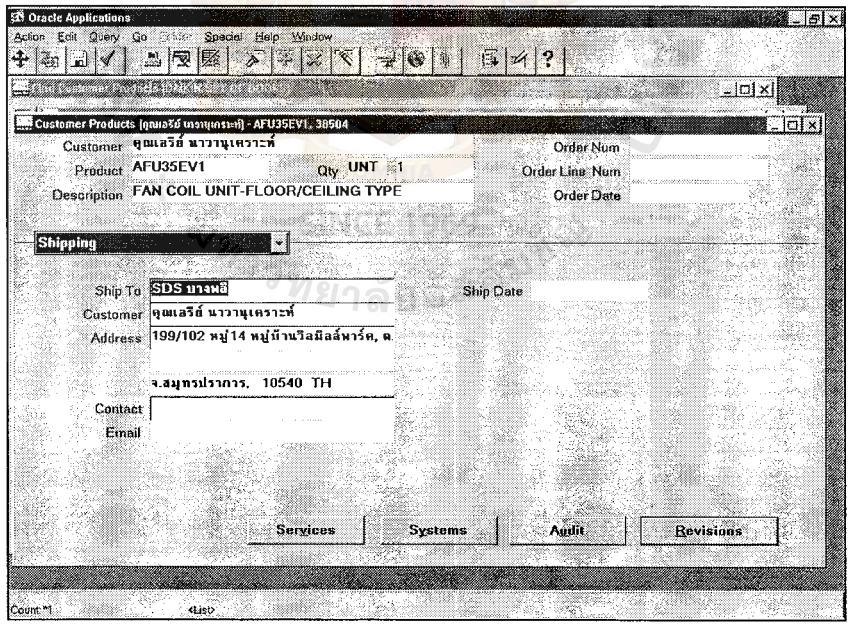

Figure B.6. "Shipping" Region in Customer Product Window.

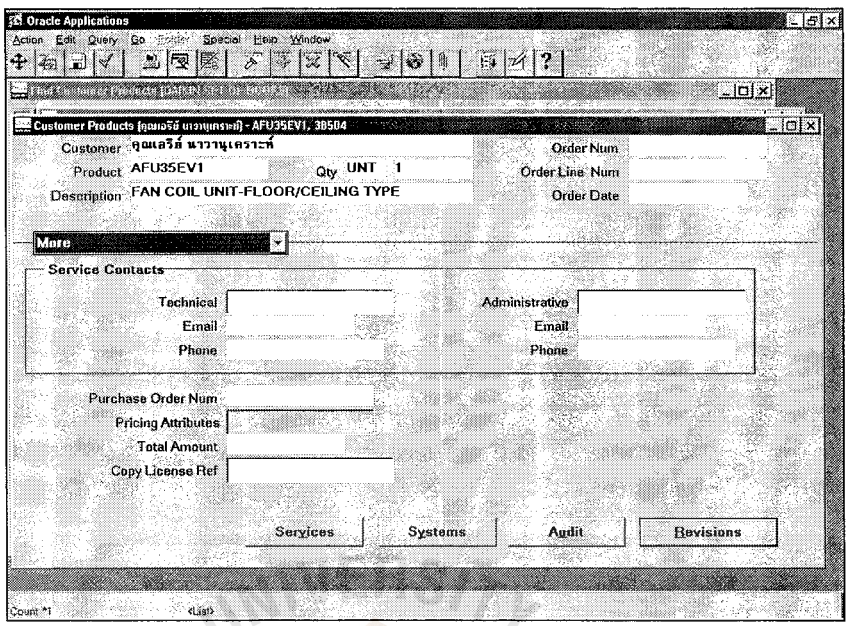

Figure B.7. "More" Region in Customer Product Window.

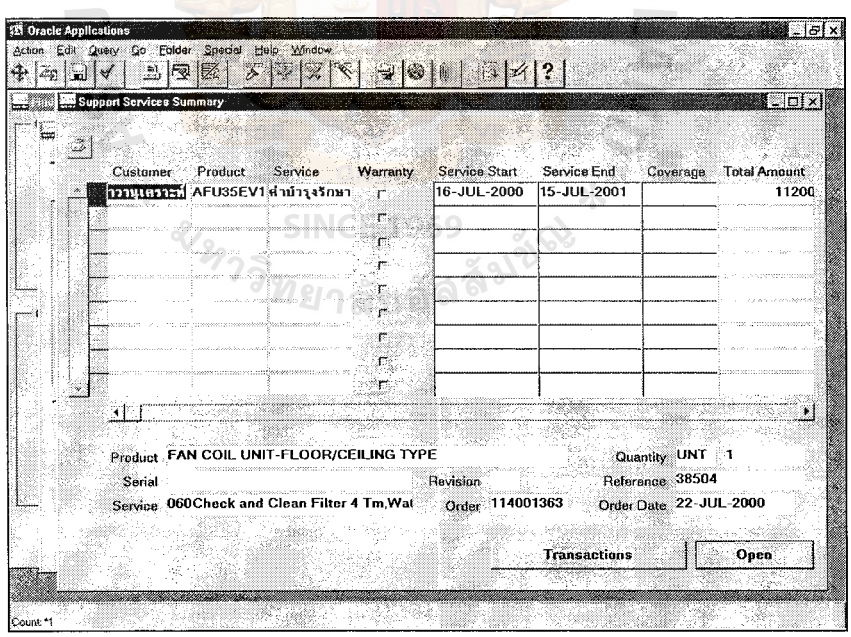

Figure B.8. "Support Services Summary" Window of "Service" Button.

St. Gabriel Library, Au

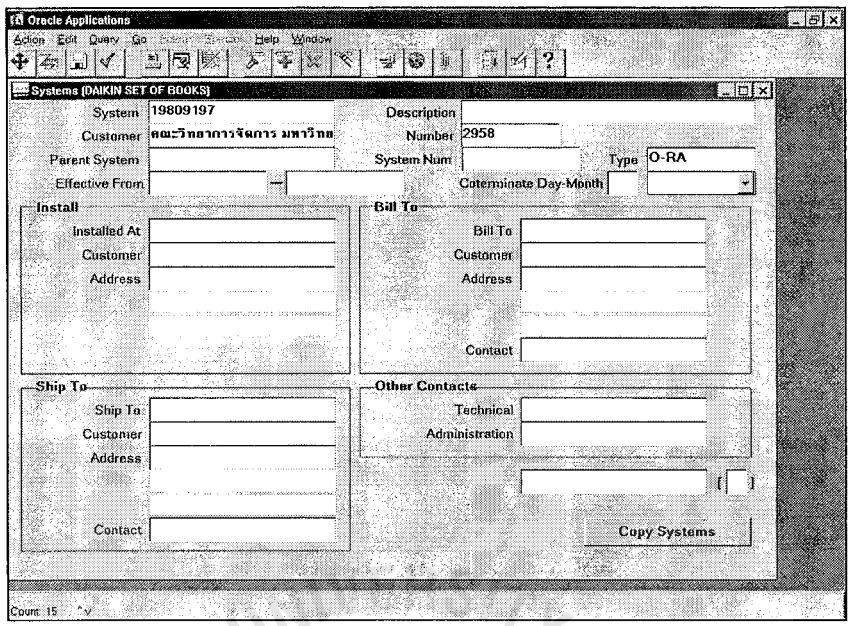

Figure B.9. "System" Window.

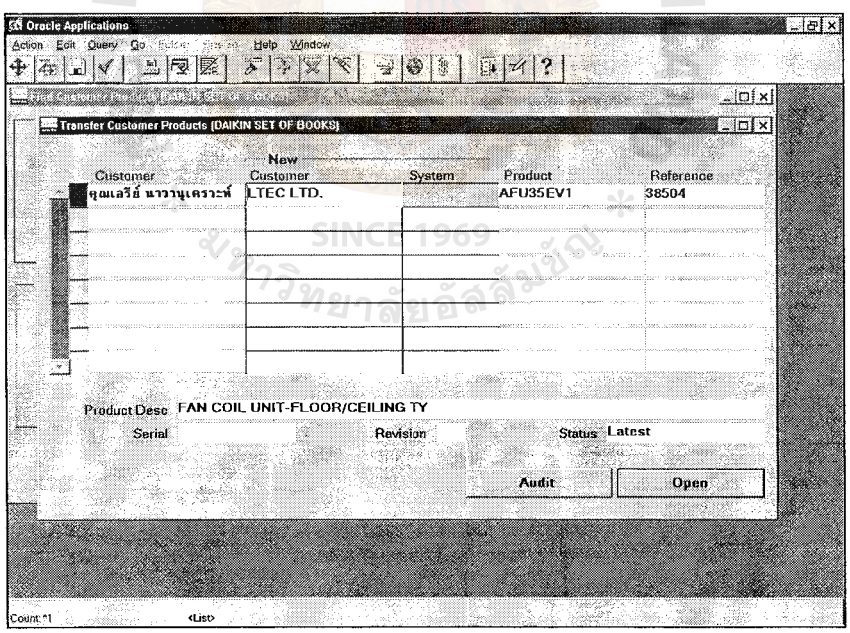

Figure B.10. "Transfer Customer Products" Window.

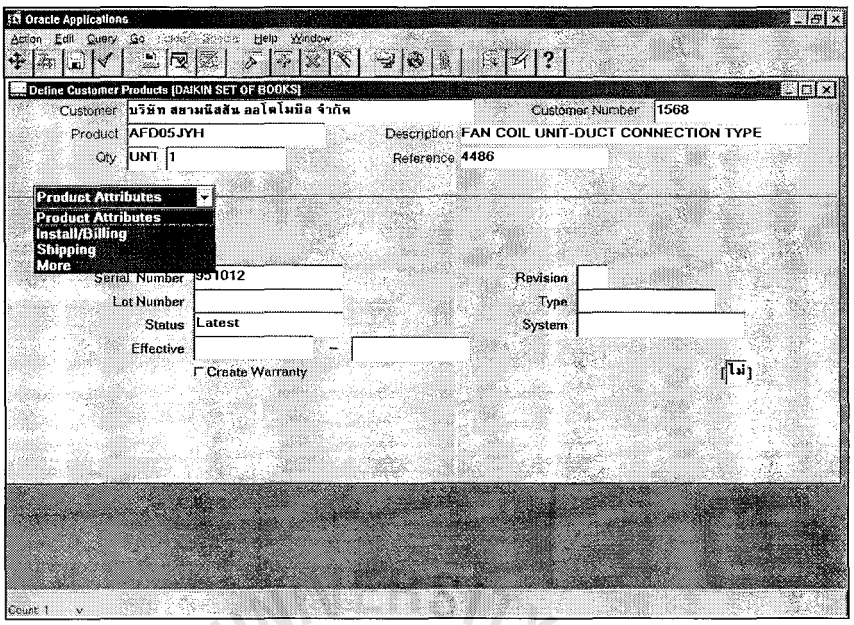

Figure B.11. "Define Customer Products" Window.

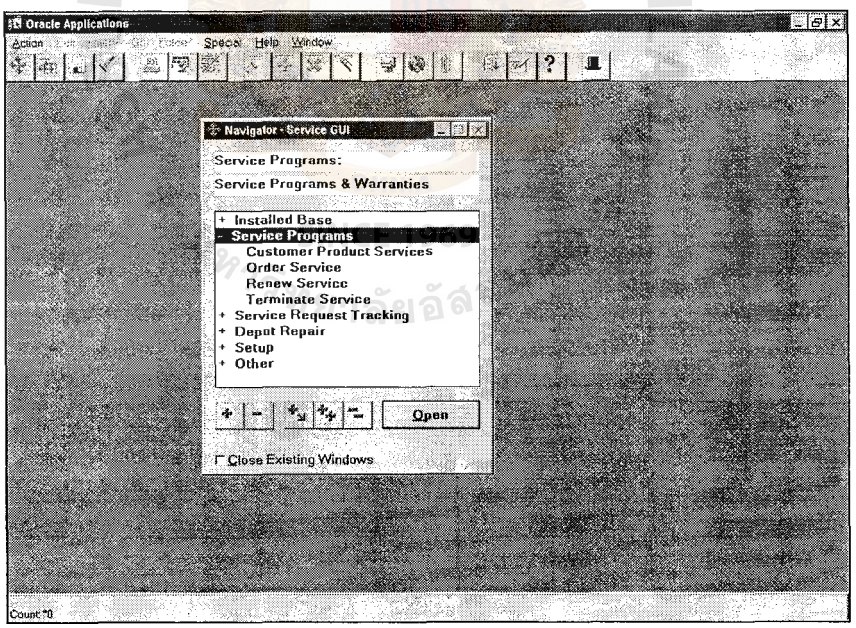

Figure B.12. "Service Program" Main Menu.

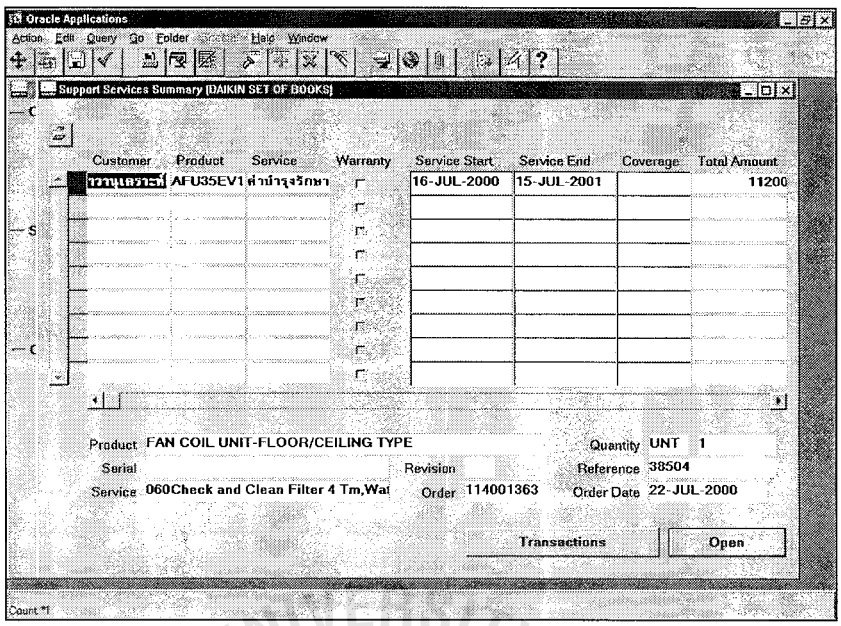

Figure B.13. "Support Service Summary" Window.

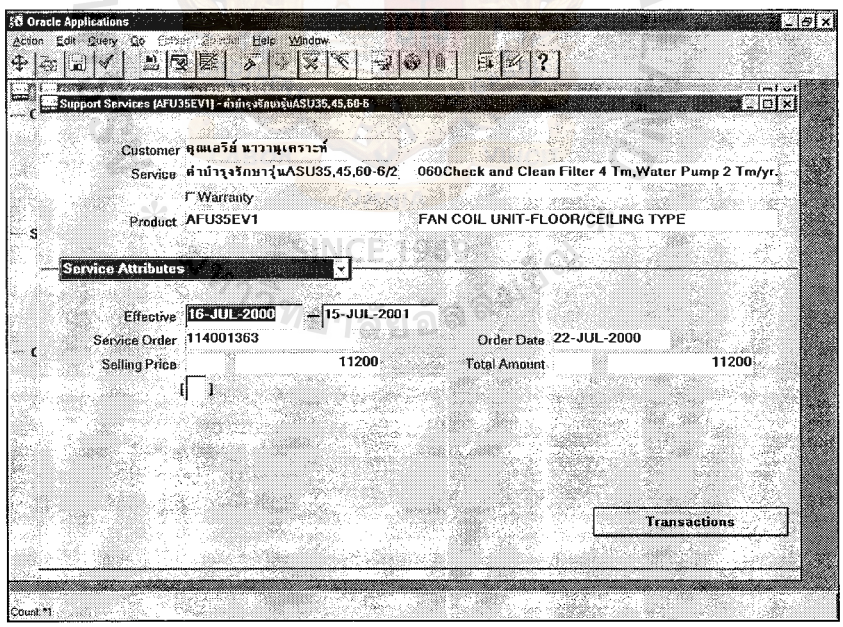

Figure B.14. "Service Attribute" Region of "Open" Button.

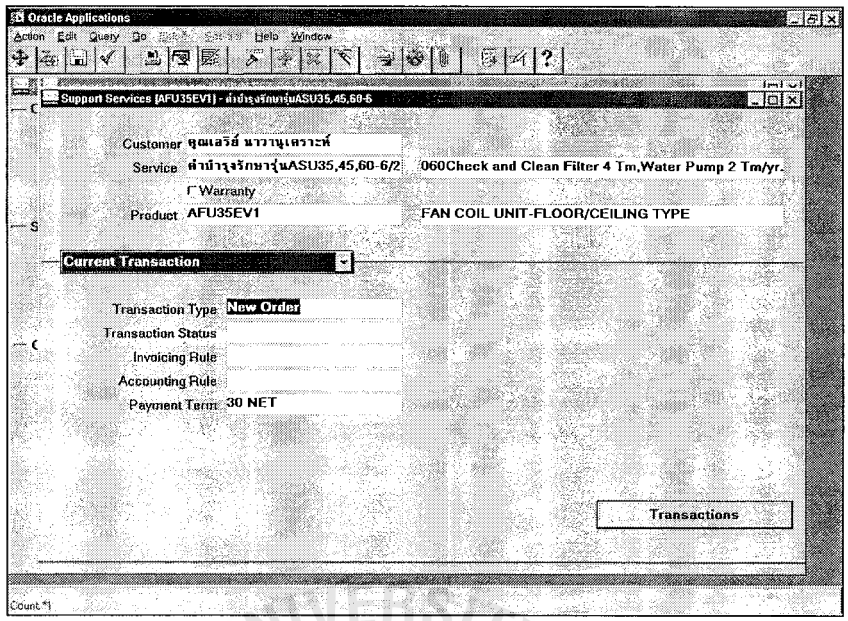

Figure B.15. "Current Transaction" Region of "Open" Button.

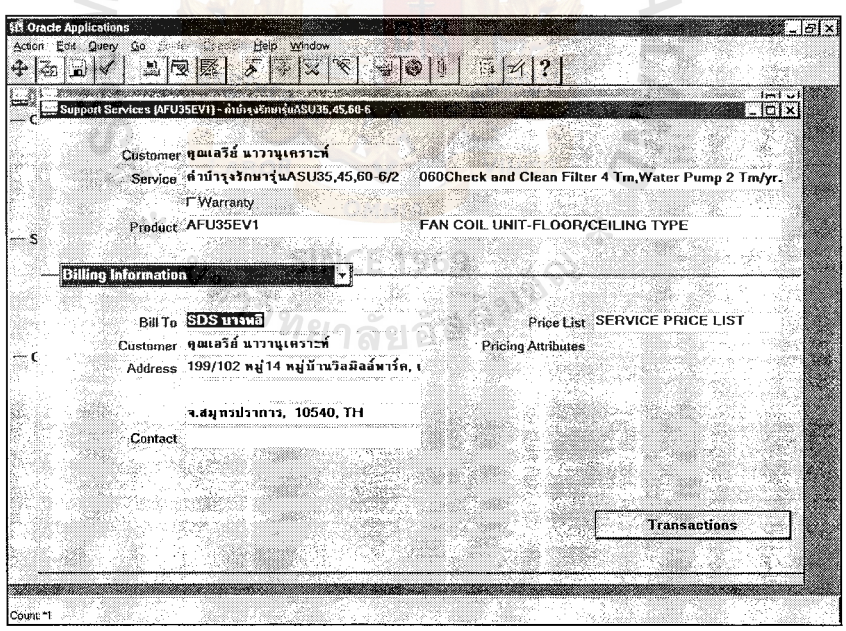

Figure B.16. "Billing Information" Region of "Open" Button.

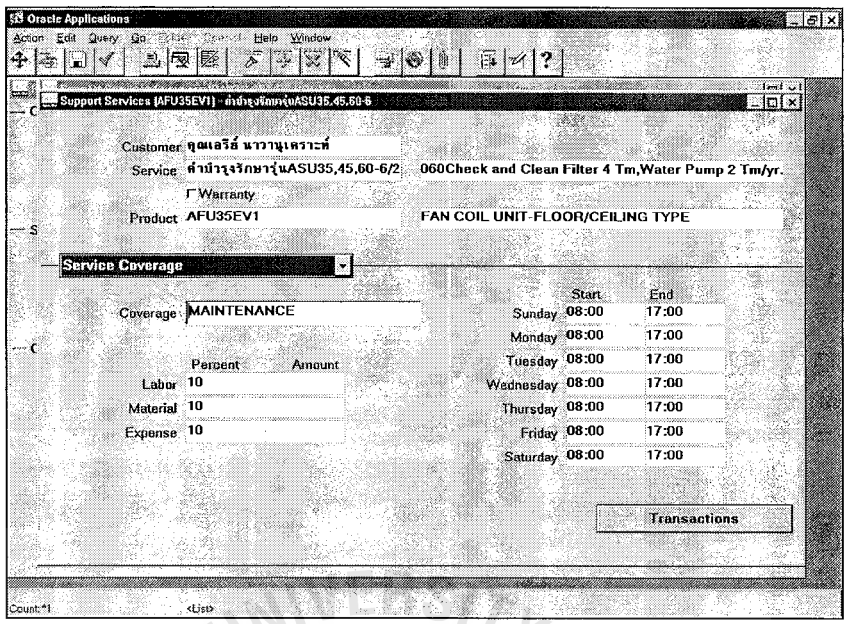

Figure B.17. "Service Coverage" Region of "Open" Button.

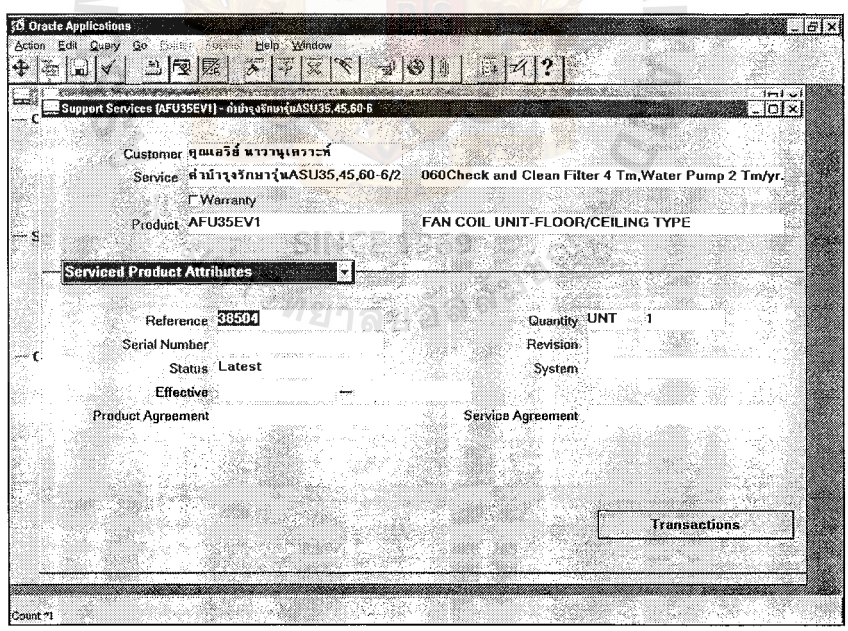

Figure B.18. "Service Product Attribute" Region of "Open" Button.

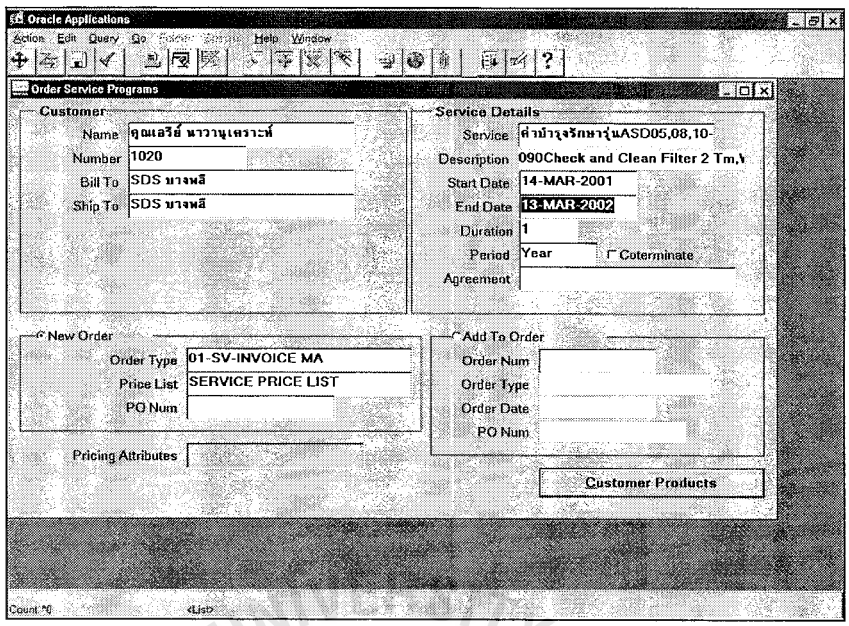

Figure B.19. "Order Service Programs" Window.

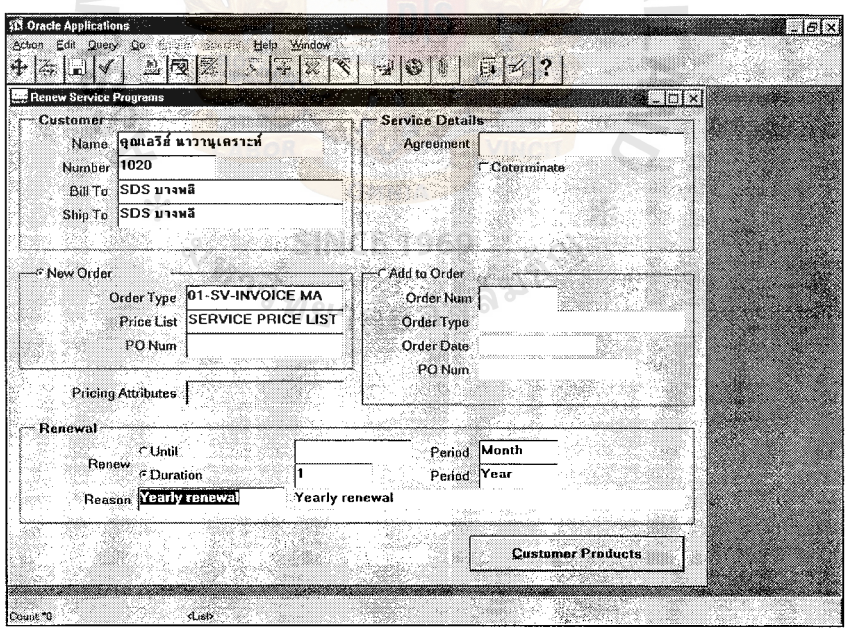

Figure B.20. "Renew Service Programs" Window.

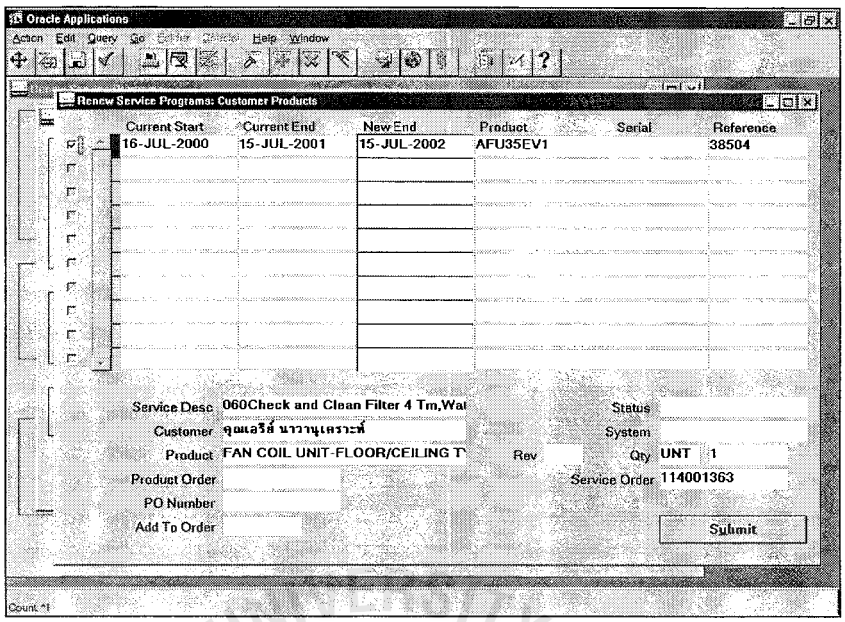

Figure B.21. "Renew Service Programs: Customer Product" Window.

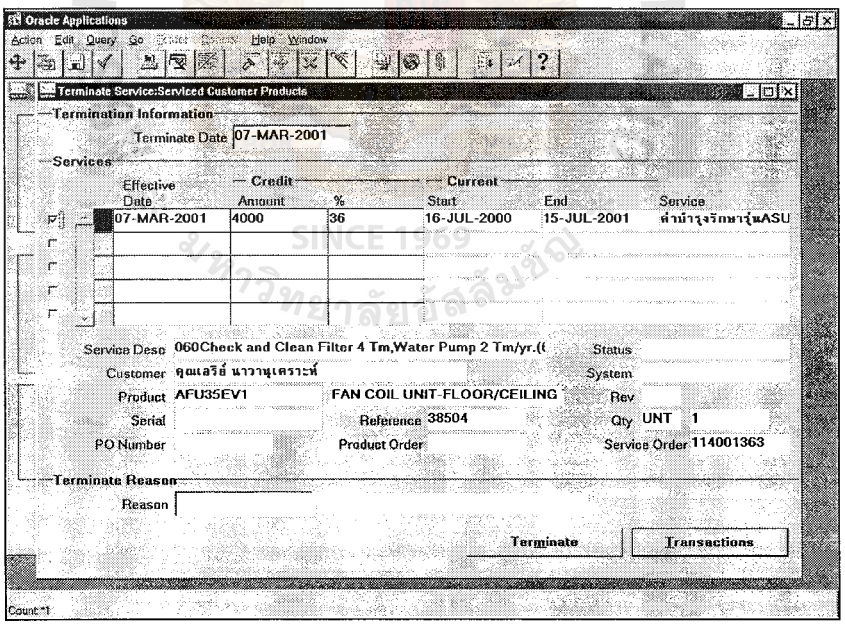

Figure B.22. "Terminate Service" Window.

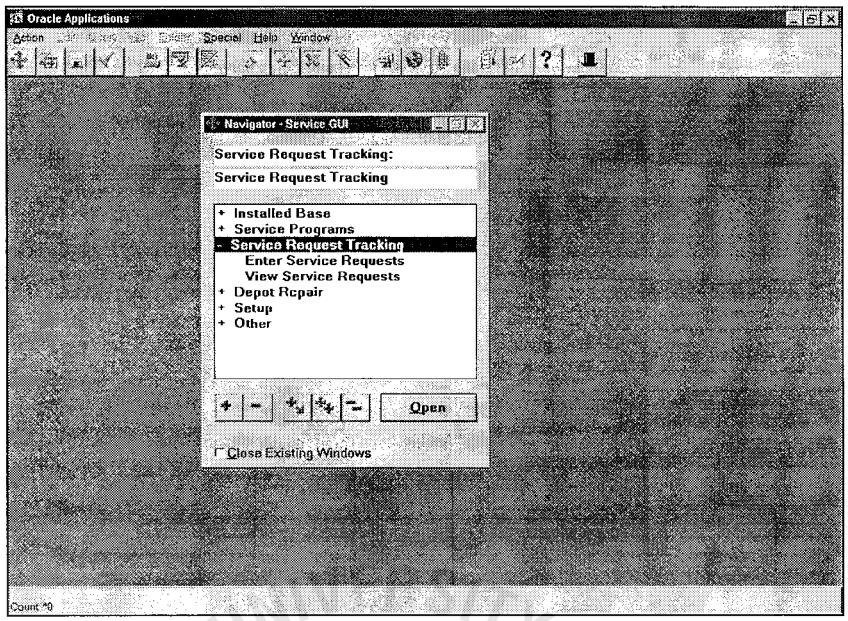

Figure B.23. "Service Request Tracking" Main Menu.

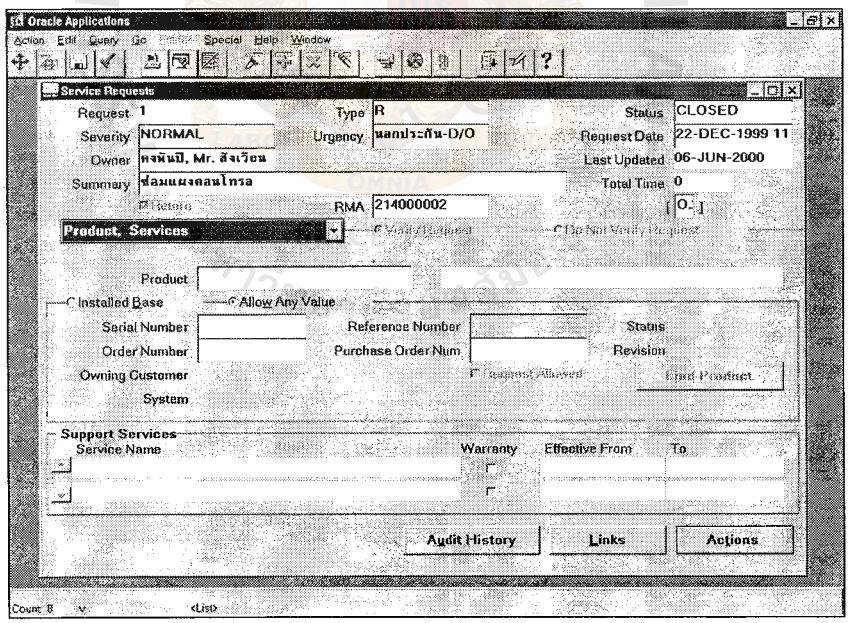

Figure B.24. "Product, Services" Region of "Service Requests" Windows.

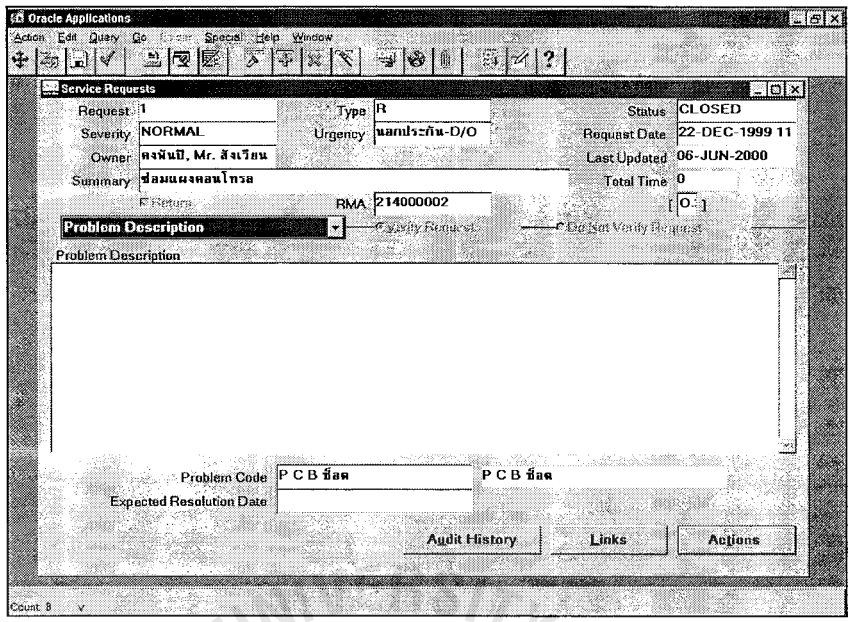

Figure B.25. "Problem Description" Region of "Service Requests" Window.

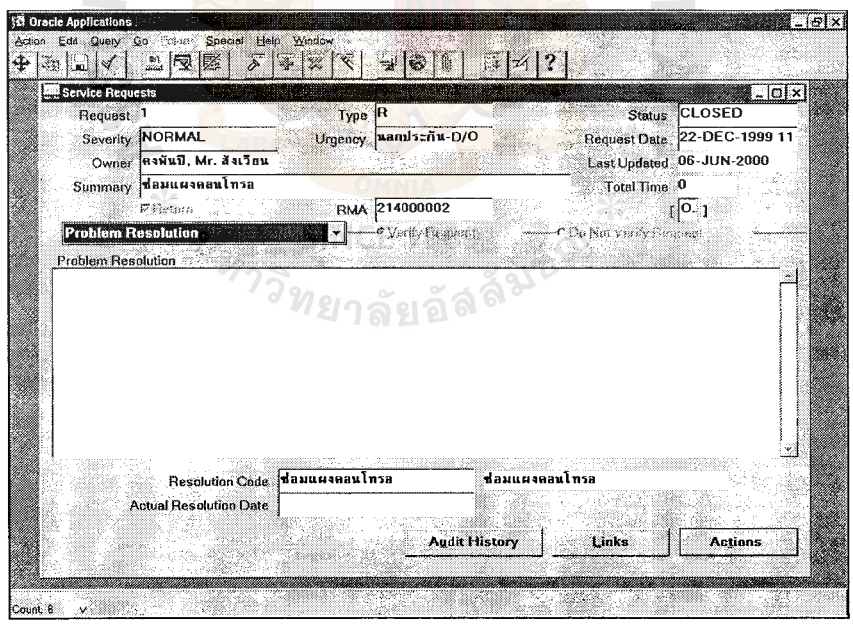

Figure B.26. "Problem Resolution" Region of "Service Requests" Window.

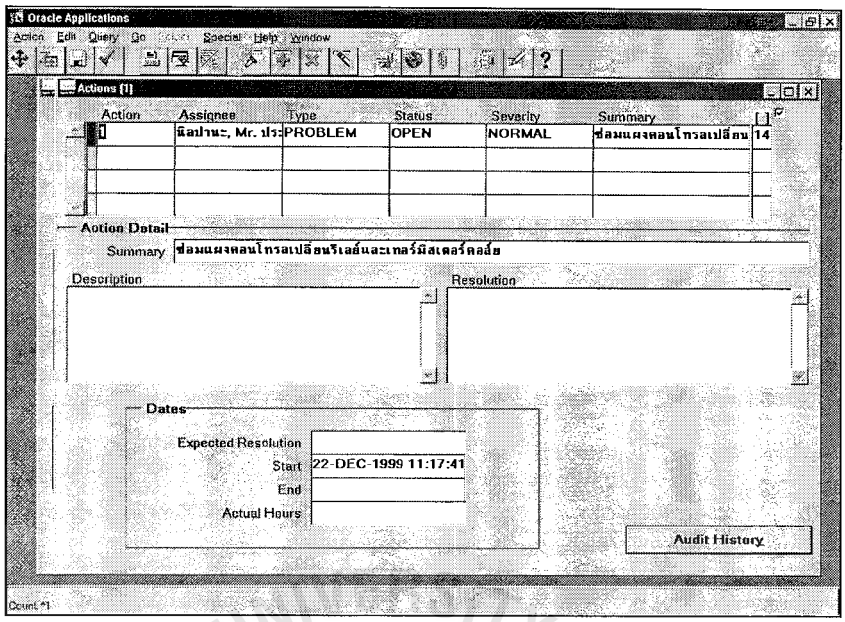

Figure B.27. "Action" Window under "Service Requests" Window.

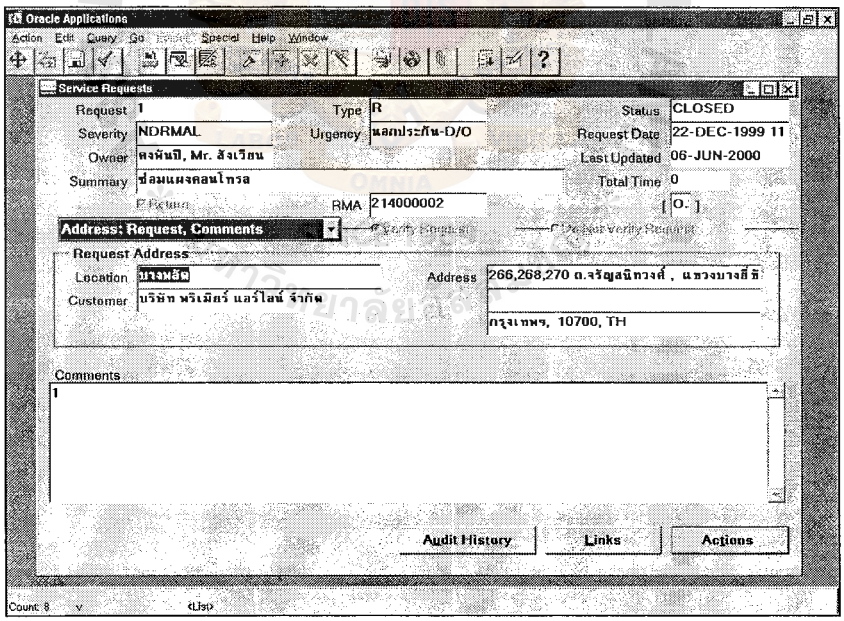

Figure B.28. "Address" Region of "Service Requests" Window.

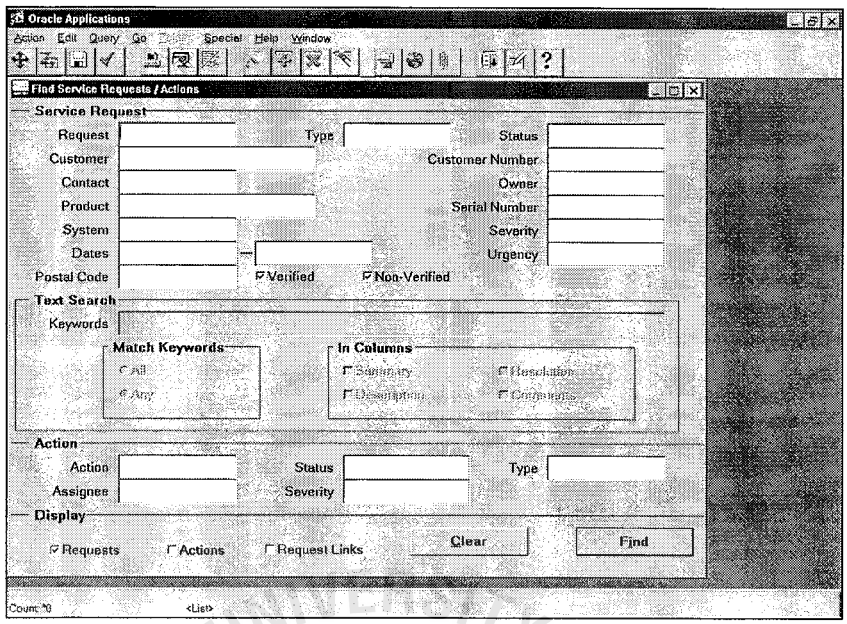

Figure B.29. "Find Service Requests/Actions" Window.

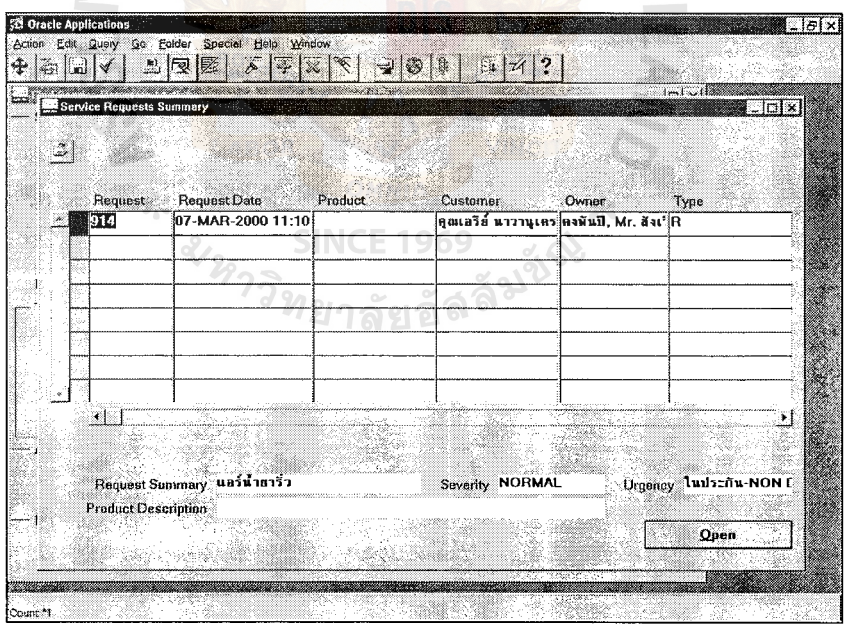

Figure B.30. "Service Requests Summary" Window.

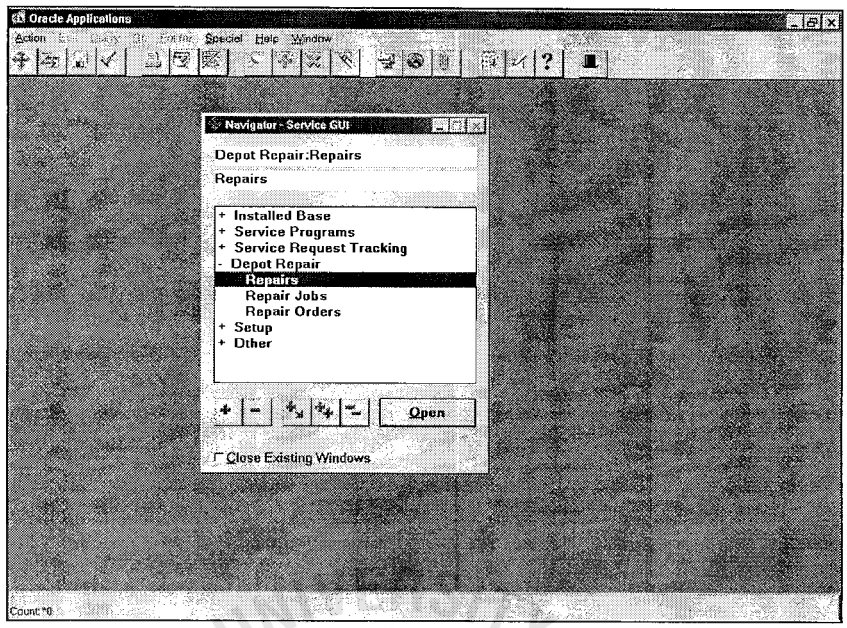

Figure B.31. "Depot Repairs" Main Menu.

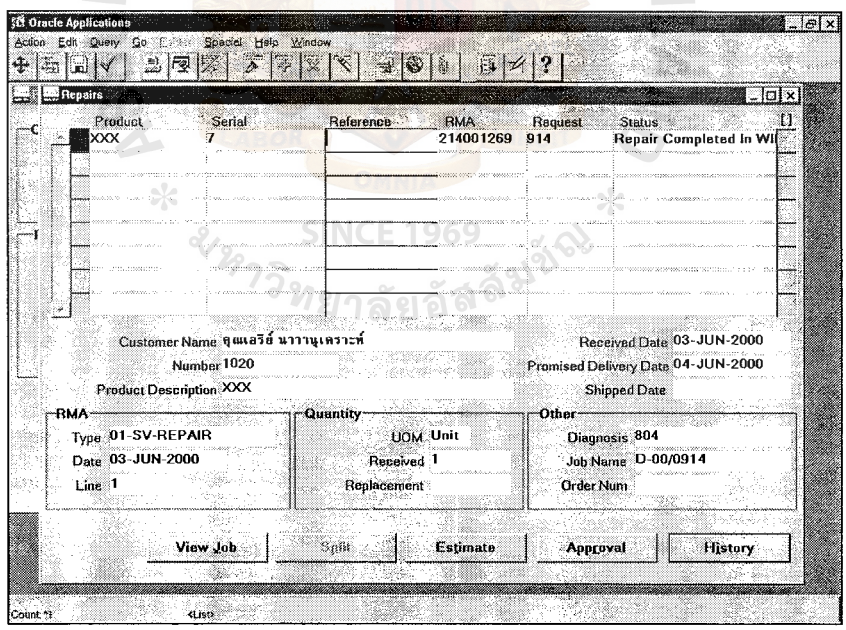

Figure B.32. "Repairs" Window.

Figure B.33. "Estimate" Window.

Figure B.34. "Estimate Approval" Window.

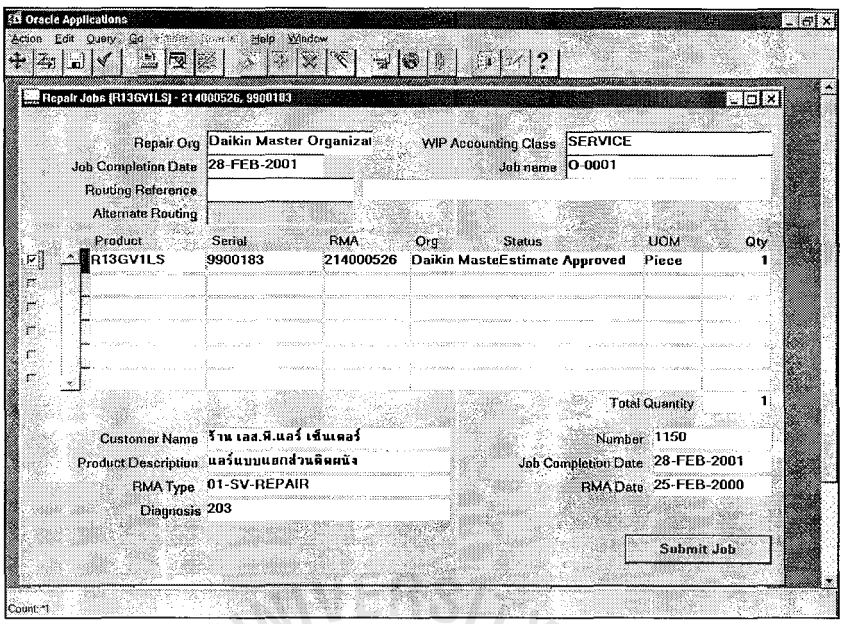

Figure B.35. "Repair Jobs" Window.

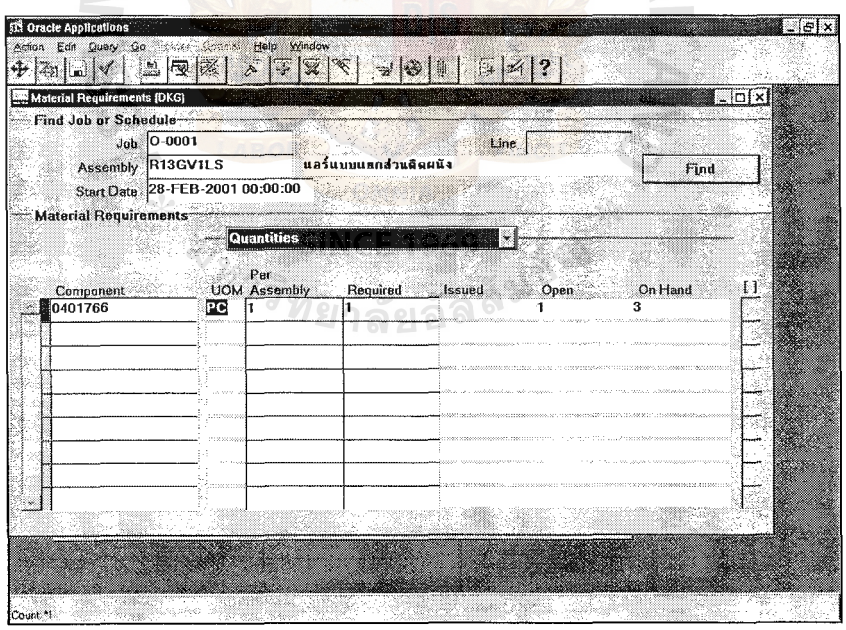

Figure B.36. "Material Requirement" Window.

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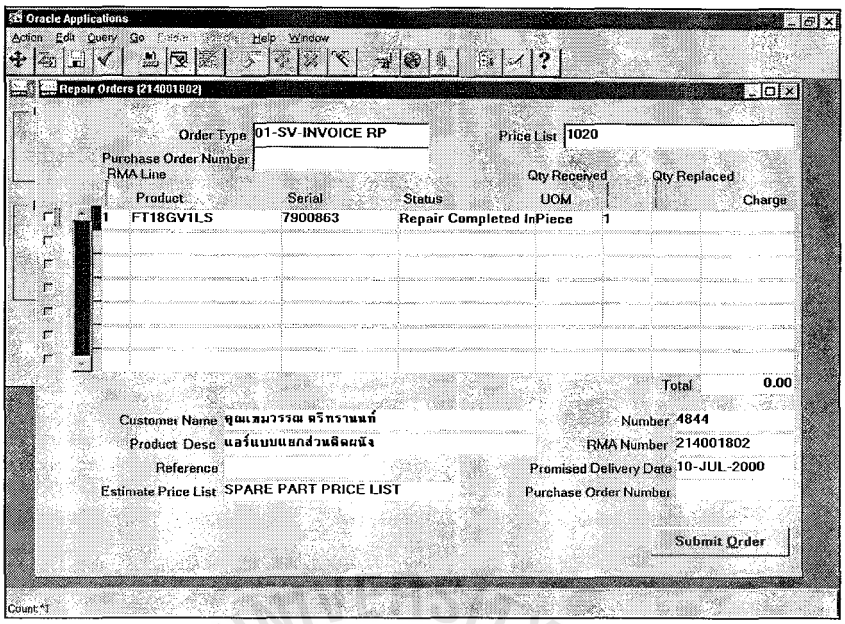

Figure B.37. "Repair Orders" Window.

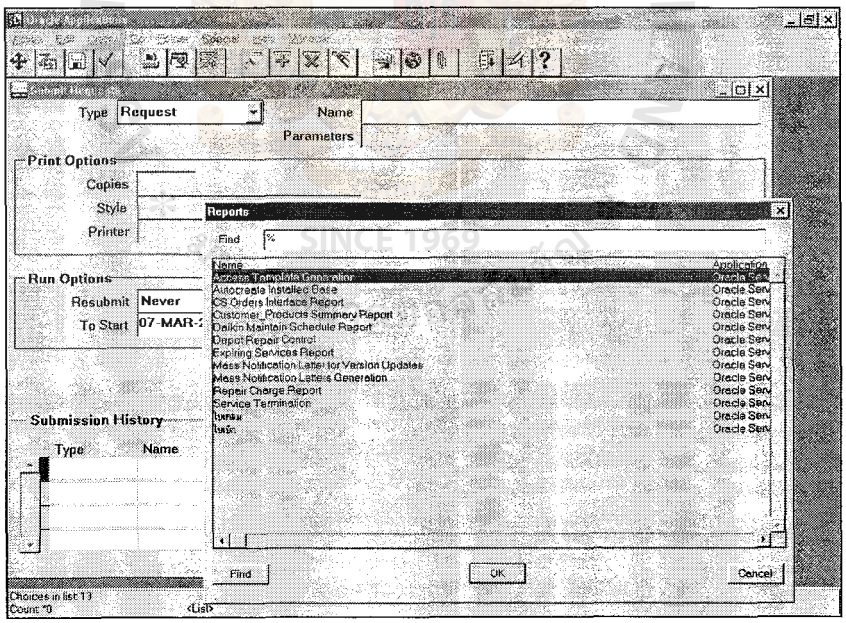

Figure B.38. "Report Requests" Window.

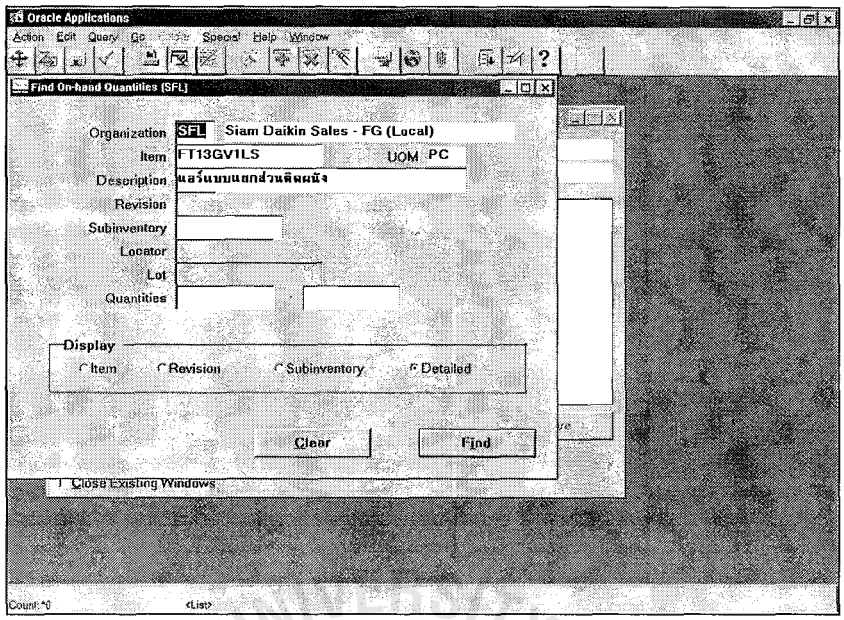

Figure B.39. "Find On-Hand Quantities" Window.

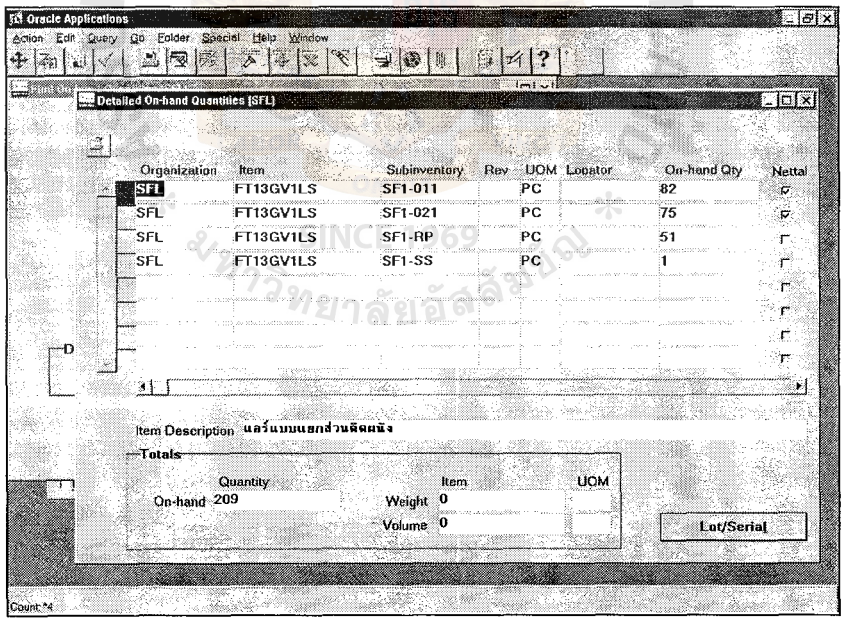

Figure B.40. "Detailed On-Hand Quantities" Window.

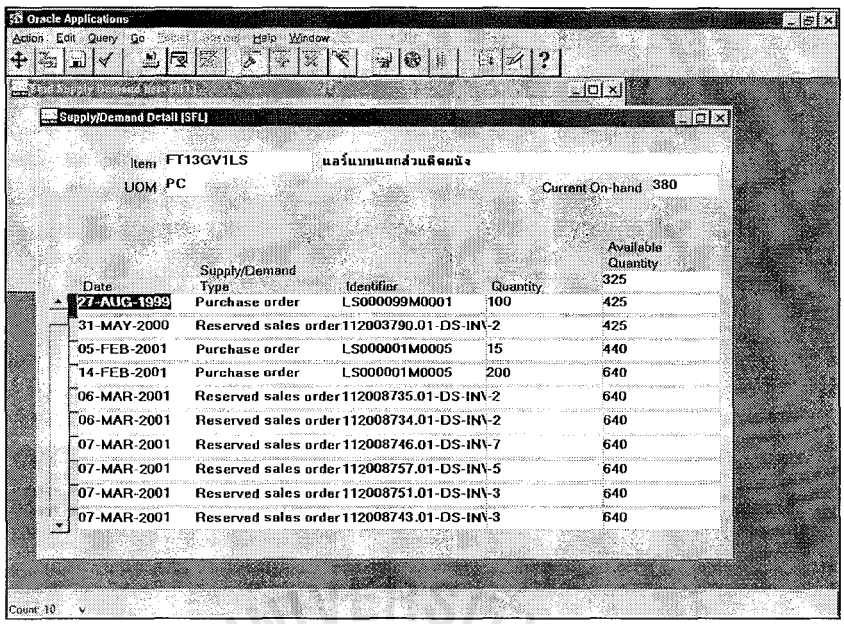

Figure B.41. "Supply/Demand Detail" Window.

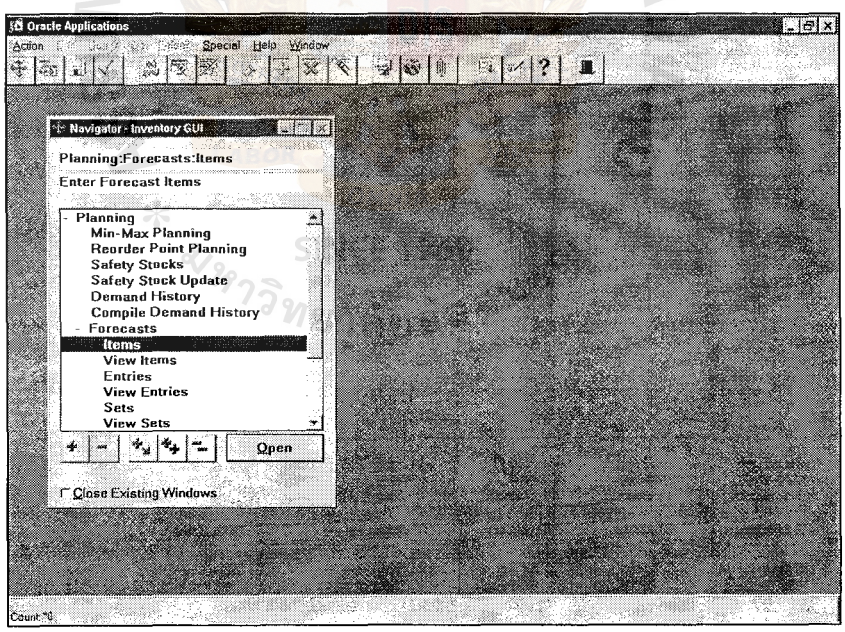

Figure B.42. "Planning" Main Menu.

APPENDIX C

SAMPLE REPORTS

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St. GABRIEL
LABOR OMNIA VINCIT
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

(SAR121)
SIAM DAIKIN SALES CO.,LTD.

MONTHLY SALES REPORT BY CUSTOMER
(FOR ACCOUNTING)
AS OF Jul-01

RUN DATE : 03-OCT-2001 10:14 AM
PAGE FROM : 1 TO 28

DIVISION : SERVICE DIVISION
DEPARTMENT : LUMPOON

DELIVERY DATE	DOC. NUMBER	CUSTOMER P/O NO.	INTERNAL P/O NUMBER	REF. NO.	SALESMAN CODE	DOC. TYPE	PRODUCT CODE	QTY.	UNIT PRICE	AMOUNT	COST	PROFIT (%)
CUSTOMER	2224	CHAINGMAI PLAZA HOTEL										
31-JUL-01	1016003163				SV-L-	D/O	GS331	1	9,720.00	9,720.00	.00	100.00
					CHILLER		245002	1	666.00	666.00	.00	100.00
					REPAIR		264311	1	1,116.90	1,116.90	.00	100.00
							233015	1	3,088.80	3,088.80	.00	100.00
							202506	1	1,083.60	1,083.60	.00	100.00
							202507	1	1,083.60	1,083.60	.00	100.00
							S03203	1	2,250.00	2,250.00	.00	100.00
							0589743	1	2,918.70	2,918.70	.00	100.00
							0589774	1	666.00	666.00	.00	100.00
							264208	1	463.50	463.50	.00	100.00
							* TOTAL BY DOCUMENT			23,057.10	.00	100.00
							* TOTAL BY CUSTOMER			23,057.10	.00	100.00
								(RETURN)		.00	.00	.00
CUSTOMER	3126	NUNTHAWAN CO.,LTD.										
23-JUL-01	1016003107				SV-L-	D/O	619488	1	5,730.00	5,730.00	.00	100.00
					CHILLER		* TOTAL BY DOCUMENT			5,730.00	.00	100.00
					REPAIR							
							* TOTAL BY CUSTOMER			5,730.00	.00	100.00
								(RETURN)		.00	.00	.00
							* TOTAL BY DEPARTMENT			28,787.10	.00	100.00
								(RETURN)		.00	.00	.00

Figure C.1. Sample Report of “Monthly Sales Report by Customer”.

(SAR151)
SIAM DAIKIN SALES CO.,LTD.

S A L E S S Y S T E M
ACCUMULATE SALES BY SALEMAN
FROM Jul-01 TO Jul-01

RUN DATE : 03-OCT-2001 10:15 AM
PAGE FROM : 1 TO 18

DIVISION SERVICE DIVISION
DEPARTMENT LUMPOON

SALESMAN / CUSTOMER NAME	TOTAL QTY. (X 1000)	JAN . QTY. (X 1000)	FEB . QTY. (X 1000)	MAR . QTY. (X 1000)	APR . QTY. (X 1000)	MAY. QTY. (X 1000)	JUNE QTY. (X 1000)	JULY QTY. (X 1000)	AUG. QTY. (X 1000)	SEP. QTY. (X 1000)	OCT. QTY. (X 1000)	NOV. QTY. (X 1000)	DEC. QTY. (X 1000)
CHILLER REPAIR													
- THAI TAKASAGO CO.,LTD.	570							570					
- CHAINGMAI PLAZA HOTEL	23							23					
- NUNTHAWAN CO.,LTD.	8							8					
*TOTAL BY CHILLER REPAIR	601							601					
MAINTENANCE													
- HOYA GLASSDISK (THAILAND) LTD.	70							70					
- FUJIKURA PRECISSION TECHNOLOGY LTD.	353							353					
*TOTAL BY MAINTENANCE	422							422					
**TOTAL BY LUMPOON	1,023							1,023					

Figure C.2. Sample Report of “Accumulate Sales by Salesman”.

(SAR161)
SIAM DAIKIN SALES CO.,LTD.

S A L E S S Y S T E M
DAILY SALE REPORT BY SALEMAN
FROM 01-JUL-01 TO 30-JUL-01

RUN DATE 03-OCT-2001 10:15 AM
PAGE FROM 1 TO 33

Division SERVICE DIVISION
Department LUMPOON

SALESMAN/CUSTOMER NAME	TYPE	D/O NO.	DEL.DATE	PRODUCT	DESCRIPTION	QTY.	UNIT PRICE	AMOUNT
CHILLER REPAIR								
-3126 NUNTHAWAN CO.,LTD.	AIR CONDITION	1016003107	23-JUL-01	MAGNETIC SWITCH		1	5,730.00	5,730.00
			23-JUL-01	□□□□□		1	1,770.00	1,770.00
				*TOTAL BY D/O		2		7,500.00
	**TOTAL BY TYPE							7,500.00
*TOTAL BY NUNTHAWAN CO.,LTD.								7,500.00
**TOTAL BY CHILLER REPAIR								7,500.00
**TOTAL BY SET								

SALESMAN/CUSTOMER NAME	TYPE	D/O NO.	DEL.DATE	PRODUCT	DESCRIPTION	QTY.	UNIT PRICE	AMOUNT
MAINTENANCE								
-6431 FUJIKURA PRECISSION TECHNOLOGY LTD.	AIR CONDITION	1018000763	25-JUL-01	030Check and Cle		1	352,500.00	352,500.00
	**TOTAL BY TYPE							352,500.00
*TOTAL BY FUJIKURA PRECISSION TECHNOLOGY LTD.								352,500.00
-4895 HOYA GLASSDISK (THAILAND) LTD.	AIR CONDITION	1018000760	18-JUL-01	030Check and Cle		1	69,800.00	69,800.00
	**TOTAL BY TYPE							69,800.00
*TOTAL BY HOYA GLASSDISK (THAILAND) LTD.								69,800.00
**TOTAL BY MAINTENANCE								422,300.00
**TOTAL BY SET								
***TOTAL BY LUMPOON								429,800.00
***TOTAL BY DEPARTMENT								

Figure C.3. Sample Report of "Daily Sales Report by Salesman".

(SAR191)
SIAM DAIKIN SALE CO.,LTD.

S A L E S S Y S T E M
MONTH SALES ANALYSIS BY PRODUCT
AS OF JAN-01

RUN DATE 03-OCT-2001 10:11 A
PAGE FROM 1/18

MID PRODUCT QTY AMT * 1000	MONTHLY SALES D/L	GEN.	VRV	SSS	SERVIC	TOTAL	ACCUMULATE SALES D/L	GEN.	VRV	SSS	SERVIC	TOTAL
AV AH38EA	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
	0.00	340.00	0.00	0.00	0.00	340.00	0.00	340.00	0.00	0.00	0.00	340.00
AH43EA	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
	0.00	403.60	0.00	0.00	0.00	403.60	0.00	403.60	0.00	0.00	0.00	403.60
AH95EA	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
	0.00	636.40	0.00	0.00	0.00	636.40	0.00	636.40	0.00	0.00	0.00	636.40
AHU10J	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
	0.00	60.00	0.00	0.00	0.00	60.00	0.00	60.00	0.00	0.00	0.00	60.00
FWHM66B-R*01	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
	0.00	21.00	0.00	0.00	0.00	21.00	0.00	21.00	0.00	0.00	0.00	21.00
UAH10J-R*01	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
	0.00	40.00	0.00	0.00	0.00	40.00	0.00	40.00	0.00	0.00	0.00	40.00
UAH8J-R*02	0.00	14.00	0.00	0.00	0.00	14.00	0.00	14.00	0.00	0.00	0.00	14.00
	0.00	412.00	0.00	0.00	0.00	412.00	0.00	412.00	0.00	0.00	0.00	412.00
UAV08J	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
	0.00	57.80	0.00	0.00	0.00	57.80	0.00	57.80	0.00	0.00	0.00	57.80
UAV08J-R*001	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
	0.00	60.80	0.00	0.00	0.00	60.80	0.00	60.80	0.00	0.00	0.00	60.80
UAV10J	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
	0.00	68.20	0.00	0.00	0.00	68.20	0.00	68.20	0.00	0.00	0.00	68.20
UAV15J-R*002	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
	0.00	83.60	0.00	0.00	0.00	83.60	0.00	83.60	0.00	0.00	0.00	83.60
UAV20J-R*001	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
	0.00	95.90	0.00	0.00	0.00	95.90	0.00	95.90	0.00	0.00	0.00	95.90
Total SET	0.00	25.00	0.00	0.00	0.00	25.00	0.00	25.00	0.00	0.00	0.00	25.00
	0.00	2,279.30	0.00	0.00	0.00	2,279.30	0.00	2,279.30	0.00	0.00	0.00	2,279.30
Total by AV	0.00	25.00	0.00	0.00	0.00	25.00	0.00	25.00	0.00	0.00	0.00	25.00
	0.00	2,279.30	0.00	0.00	0.00	2,279.30	0.00	2,279.30	0.00	0.00	0.00	2,279.30

Figure C.4. Sample Report of “Monthly Sales Analysis by Product”.

(SAR221)
SIAM DAIKIN SALES CO.,LTD.

MONTHLY SALES ANALYSIS BY PRODUCT
DATE FROM 01-JUL-01 TO 30-JUL-01

PAGE FROM : 19 TO 33
RUN DATE : 03-OCT-2001 10:14 AM

DIVISION : SERVICE DIVISION

MIDDLE CLASS	MINOR CLASS	PRODUCT CODE		QUANTITY	AVERAGED UNIT PRICE	AMOUNT (*1000B)	COST (*1000B)	GROSS PROFIT	PROFIT %
OP	SU	KPC20J	THIS PERIOD	0.00	0.00	0.00	0.00	0.00	0.00
			ACCUMULATED	3.00	13,500.00	40.50	18.00	22.50	55.56
	* TOTAL BY MINOR SU		THIS PERIOD	0.00		0.00	0.00	0.00	0.00
			ACCUMULATED	3.00		40.50	18.00	22.50	55.56
* TOTAL BY MIDDLE OP			THIS PERIOD	0.00		0.00	0.00	0.00	0.00
			ACCUMULATED	3.00		40.50	18.00	22.50	55.56
* TOTAL BY DIVISION SERVICE DIVISI			THIS PERIOD	0.00		0.00	0.00	0.00	0.00
			ACCUMULATED	3.00		40.50	18.00	22.50	55.56

Figure C.5. Sample Report of "Monthly Sales Analysis by Product".

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