ASSUMPTION UNIVERSITY

AN INFORMATION SYSTEM FOR A REAL ESTATE COMPANY

by

Mr. Boolsak Luangaram

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

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

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The Graduate School of Assumption University has approved this final report of the three credit course, CS6998 System Development Project, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer Information System

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ABSTRACT

Peak Tower Company is the company in Real Estate Business. The company has many projects and the managing director wants to have the system to control all several projects of the company.

The company builds the condominiums and villages. It wants to have the application system to control all projects . In the past the company used the manual system to control the reservation ,making the contract with the customer, receiving the installment and transferring to the Bank and so on. The company can support only one or two project(s) at the same time. But now, the real estate business is growing up and the company also grows up , then the company has many project to handle. The documenting system is more complexed and very difficult to maintenance. He wants to keep all documents within the computer system and it is very easy to find and record and it can reduce the paper work in the processing And the company can support more customers at the same time.

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An Thanks for his friends for the time they spent in their encouragement and assistance throughout the project

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1. INTRODUCTION

1.1 PROJECT BACKGROUND

Peak Tower Co., Ltd. is the real estate business. There are many projects in Bangkok. The product are Condominium , Town House, and so on. The company was established in 1990. The major tasks of the company are as follows.

1). Constructing the Condominium, Town House and so on.
2). Purchasing the land and raw material to construct the product
3). Open the reservation , contract of each unit.

The rate of expanding of real estate business is very high. In the past, there is a little customer and little unit on each project. The company can run the business by using the manual or keep more documents. And in the past there is less competitor, less competition. The company does not compete with any one. Then the company can use the old method. But now there are more competitors in the field. So, the company must develop the operation to be suitable with the environment. And the company has to construct all units by himself. The task of the company can be classified into 2 main tasks.

1. Construction the unit
2. Office work (Reservation, making the contract)

In the past, the company has to keep more documents to record on the customer's payment. If the filing system is not good, it will be very difficult to find and record. And it will be very easily to make mistake.

Now the expansion of the business is more, then the management team wants to increase the capacity of the business , increase the efficiency of the operation and shift to the computer technology. Because they know that the computer can do many things and it can support all works. And the cost of computer is not high , then it is worth to invest. Many company in this field are also used the computer to help your works.

To maximize the capacity of the system, the company should use Local Area Network (LAN) to support their job. There may be many customers come to reserve the unit and make the contract at the same period of time. If there is only one computer to support , it is not enough. Then it need LAN (many computer in the same system to use the same database (Shared Database) to support the all customers. LAN is very useful and more efficient. The Accounting Department can also know the sales volume of each month, and who does not pay the installment in this period.

The customer can come to reserve the unit but the employee and officer may not remember all product description or product details, and which one is available. If the company use the computer , the company will know which one is available. And the system can issue (print) the receipt to customers.

1.2 PROJECT OBJECTIVE

The benefit of the project is to reduce the response time. If the company uses the new system, the company can support more customers and spends less time for each customer. And the company can give the better service to the customers. The company can control many projects at the same time. There will be less papers work in the operation. The time for creating the report for the management will take few minutes.

The objective of the project on an information system of Real Estate of Peak Tower Co., Ltd. are as follows.

1. To analyze the existing system.
2. To analyze and design of application for Real Estate business.
3. To implement and test of the application of Real Estate business.
4. To design the model of the LAN system within the limited budget.
5. To increase the efficiency of the business (operation of the business)

1.3 SCOPE OF THE PROJECT

The project will cover major part of the information system of Real Estate which include as follows.

1. Issuing the customer payment (receipt)
    - indicate the customer name
    - amount of money that customer paid.
2. Update the status of the unit (Reservation ,Contract, Installment, etc.)
3. Create the customer list of each project
4. Create the list of unit and the status of each unit
5. Create the list of unit which is available
6. Create the list of customer who does not make the contract within the specific period.
7. Create the list of customer who does not make the installment payment in specific period.

1.4 ACTIVITIES OF THE PROJECT

The activities for the project or the Real Estate of Peak Tower Co., Ltd. are as follows.

1. An application is written in Database management system (DBMS) by 4GL (Plastic software 4GL). 4GL will help me develop the application easily and quickly.
2. Source Code that are generated by Plastic Software (4GL)
3. Screen Layout for use Interface.
4. User Manual of the application that generated by 4GL
5. Various hard copy layout
    - Customer list
    - Unit list
    - Group of unit list
    - The status of each unit list
    - The selling price of unit list
    - Unit that is available
    - The list of unpaid customer
    - The list of customer who does not make the contract within the specific period.
    - The list of customer who does not make the installment payment.
    - The list of customer who does not pay the installment payment in specific month.
    - The percentage of unit (reserved) report
    - The percentage of unit (contract) report
    - The percentage of unit (paying installment) report
    - The percentage of unit (complete the payment) report
    - The percentage of unit (transferred to bank) report

2.1 BACKGROUND

The Peak towner Company was established in 1990. The company is in the Real Estate Business. At first, the company construct only one project at that time and handle all activities manually. It can be done because the project is small and less customers come to pay the money at the same time. But when the Real Estate Business grows up. The company also grows up. The managing director wants to expand the business , then he joins with the foreign company in Hong Kong for expanding the business. And now the company has many projects to handle and each project is very large. There are condominium , town house, village , land and so on. The manual system can not support all company activities.

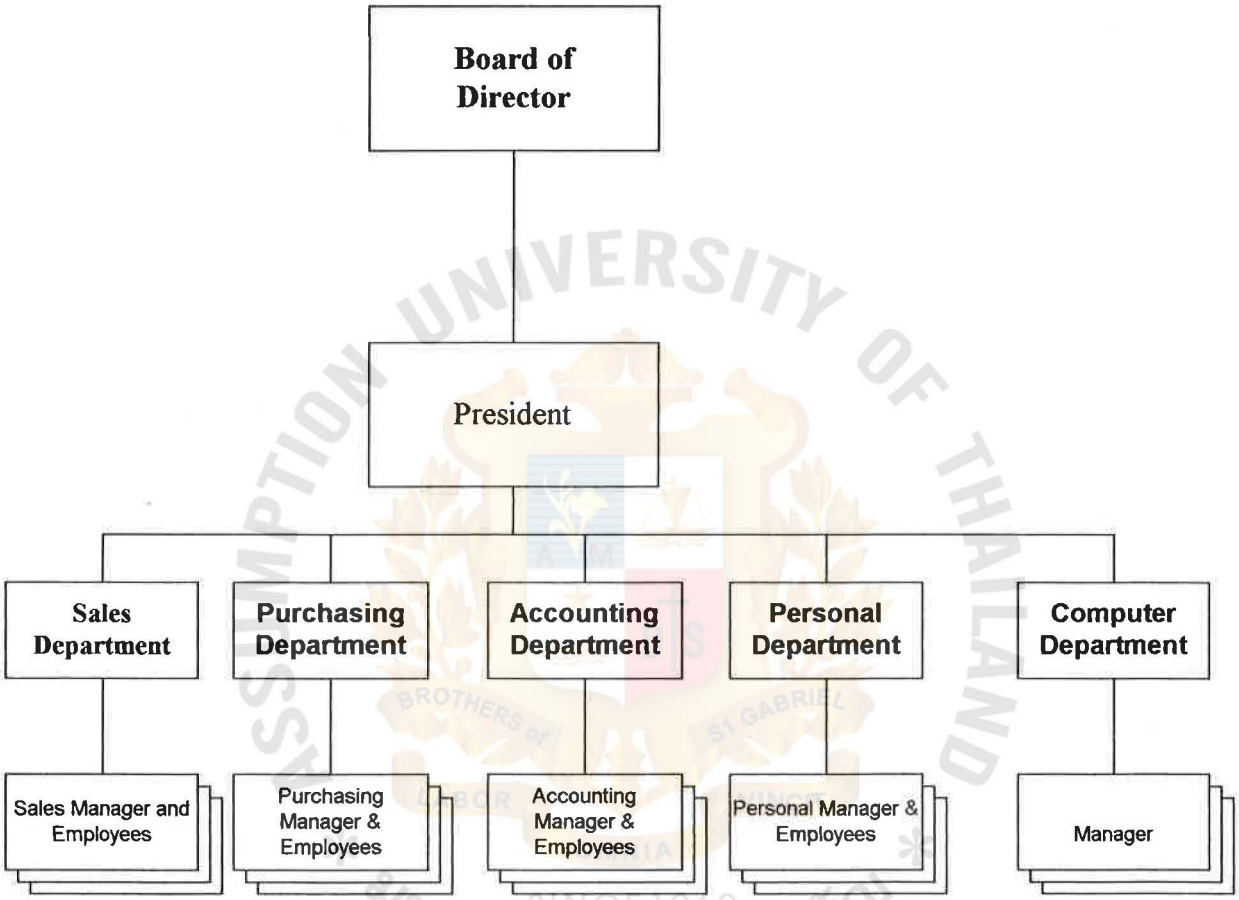

FIGURE 1-1 ORGANIZATION STRUCTURE OF PEAK TOWER CO.,LTD.

2.2 EXISTING SYSTEM FUNCTION

All existing system function are manual. And there are many documents in the processing.

- The first step, when the customers come to ask for the availabel unit for the project, the officer must look at the list of available unit. That is not easy because there are many units in the project and many projects.

- The second step, if the customer is interested in the unit and he wants to make the reservation for that unit. The officers must mark or change the status of unit to be reserved. And It must change all the list of all officers. And the officer in Accounting Department has authorization to issue the receipt to customers.

- The Third step, the customer come to make the contract or pay any installment, but customers forget the unit code (identification of unit) that he reserved. The officer must come to find from filing system and it is very difficult to find because there are more documents.

And the existing system, there must have more officer to support only one customer and spend more time, mean that the efficiency of the processing is less.

2.3 PROBLEM DEFINITION OF EXISTING SYSTEM

The Real Estate Business is growing up. The company is also growing up. The manual system can not support all processing . There are more projects to handle and if we use the manual system (existing system) , there are many papers work to handle and the customer must spend more time to make any activities with the company. Time for nowaday is very important, the customer will not satisfy when he has to pay 30 minutes to 1 hous for making any installments or reservation. And if there is not computerized system, the customer forget about the unit code, the officer must spend more time on finding the customer name from the unit file. and if the documents is demaged or lost. We will not know that who pay or who reserve that unit. The processing time of the officer that interfaces with the customer will be slow on manual system. Because there are many projects and units to be handled. The manager wants to reduce the processing time and he want to know the reserved unit and available unit and the percentage of the available unit and percentage of the sold unit. But in the manual system , any report will take more times to create.

Figure 1-2 The project plan is represented in Gantt Chart as follows.

PERIOD OF TIME	FEBRUARY				MARCH				APRIL				MAY			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ANALYSIS																
- Develop DFD	X															
- Context Diagram	X															
- Data Dictionary		X														
- Process Specification		X														
DESIGN																
- Structure Chart			X	X												
- Module Specification					X											
- User Interface						X	X									
- Screen Layout							X	X								
- Report Layout								X								
IMPLEMENTATION																
- Programming (Coding)									X	X	X	X				
- Testing											X	X	X	X		
- Training														X	X	
- Document														X	X	X

3.1 USER REQUIREMENT

REQUIREMENT SPECIFICATION FOR A REAL ESTATE BUSINESS

1. **Introduction**

1.1 **Purpose.** This document states the requirements of an Real Estate System for a medium sized business. The requirements stated serve as a basic for the acceptance procedure of this system. The document is also intended as a starting point for the design phase.

1.2 **Scope.** The purpose is to provide more effective service to the customer who purchase the unit, in particular through the online search facilities offered. More details of performance requirements are given in section 3.3 of this part. Once this system is installed, the incorporation of new title will go from an average of 20 minutes down to an average of 1 minute.

1.3 **Reference.** Appendix

1.4 **Overview.** Section 2 of this document give a general overview of the system. Section 3 gives more specific requirements for function offered to (external user) customer and officers respectively.

2. General description

2.1 **Product Perspective**: This system has a maximum capacity of 40 terminals. This system requires 2 Megabytes on Server. There are no interface to other system.

2.2 **Product Function** : This system provides many functions

- Creating new customer information
- Creating new group of unit
- Creating new unit of housing
- Reserving the available unit
- Searching the reserved unit by using customer name or unit code
- Making Contract with customer
- Recording the customer's payment
- Recording the installment
- Printed the receipt to customer

The officer of the system select one of the functions offered through the Main Menu

2.3 **General Constraints.** Each officer will has his own password, and each password has different authorization to perform the job. The officer can change the status of unit and create new customer information and can print the receipt. The manager can assign the officer's authorization.

3. Specific requirement

3.1 Functional Requirement

3.1.1 *Functional Requirement* 1: Select Feature.

3.1.1.1 *Introduction.* The main menu appears after the system is started. The user next selects one of the options from the main menu. Subsequent actions are described in section 3.1.2 - 3.1.10. If the option selected is contrainted to customer, the system asks for a Users' Identification and password before a switch to the feature selected is made.

3.1.1.2 *Input:* ...

3.1.1.3 *Processing* : ...

3.1.1.4 *Output* : ...

3.1.2 *Functional Requirment 2*: Create new customer information

3.1.2.1 *Introduction.* For the new customer, the company should keep all important information in the record, and each record or customer can represented by each customer code. And the customer code should be matched with the customer name and easily to remember.

3.1.2.2 *Input.* The input may contain the both upper and lower case letter special symbol is not allowed.

3.1.2.3 *Processing.* The lower case letter in the customer code are turned into upper case letters. The string thus obtained is used when quirying the data base. A data base entry matches the customer code given if the transformed input is a substring (customer code) of entry.

3.1.2.4 *Output.* List of the customer record that match that input is displayed. The user may tranverse the list of customer code found using the screen scrolling commands provided. A special warning is issued if no title matches the input given.

3.1.3 *Functional Requirement 3*: Create new group of unit

3.1.3.1 *Introduction*. For the new group of unit, the company should keep all important information in the record, and each record or group of unit can represented by each group code. And the group code should be matched with the group of unit and easily to remember.

3.1.3.2 *Input*. The input may contain the both upper and lower case letter special symbol is not allowed.

3.1.3.3 *Processing*. The lower case letter in the group code are turned into upper case letters. The string thus obtained is used when quirying the data base. A data base entry matches the group code given if the transformed input is a substring (group code) of entry.

3.1.3.4 *Output*. List of the group of unit record that match that input is displayed. The user may tranverse the list of group of unit found using the screen scrolling commands provided. A special warning is issued if no title matches the input given.

3.1.4 *Functional Requirement 4* : Create the New unit of housing

3.1.4.1 *Introduction.* For the new unit, the company should keep all important information in the record, and each record or unit can represented by each unit code. And the unit code should be matched with the unit and easily to remember.

3.1.4.2 *Input.* The input may contain the both upper and lower case letter special symbol is not allowed.

3.1.4.3 *Processing.* The lower case letter in the unit codes are turned into upper case letters. The string thus obtained is used when quirying the data base. A data base entry matches the unit code given if the transformed input is a substring (unit code) of entry.

3.1.4.4 *Output.* List of the unit record that match that input is displayed. The user may tranverse the list of unit found using the screen scrolling commands provided. A special warning is issued if no title matches the input given.

3.1.5 *Functional Requirement 5:* Reserved the unit by customer

3.1.5.1 *Introduction.* The customers want to reserve the specific unit of housing. The system should retrieve that specific unit and all related information and the status of the unit and if it is available, the customer can serve it. The system must change the status of this unit to be reserved, and also record the customer code and customer name that are used for searching the record.

3.1.5.2 *Input.* The customers may forget the unit code , the officer can use the customer name for searching the specific record.

3.1.5.3 *Processing.* In searching the specific unit can be searched by unit code or customer name

3.1.5.4 *Output.* List of the information of the unit and the customer code and customer name and also the status of the unit. The officer can know that status of this unit.

3.1.6 *Functional Requirement 6*: Making Contract

3.1.6.1 *Introduction.* Customers want to make the contract after, they reserved the unit. The status of unit must be changed from "R" reserved to be "C" contract. and the customer must pay the amount of contract and issuing the receipt to the customer.

3.1.6.2 *Input.* The input should be the date of contract,Invoice number , date of payment, description and payment amount .

3.1.6.3 *Processing.* The process should record the date of contract.

3.1.6.4 *Output.* The output is to change the status of the unit,the receipt.

3.1.7 *Functional Requirement 7*: Paying the installment

3.1.7.1 *Introduction.* Customers want to pay the installment after, they make the contract. The status of unit must be changed from "C" contract to be "I" installment. and the customer must pay the amount of contract and issuing the receipt to the customer.

3.1.7.2 *Input.* The input should be Invoice number , date of payment, description and payment amount .

3.1.7.3 *Processing.* The process should record the status of unit.

3.1.7.4 *Output.* The output is to change the status of the unit,the receipt.

3.1.8 *Functional Requirement 8*: Completing the payment

3.1.8.1 *Introduction.* The status of unit should be changed from "I" installment to be "O" completed to present that this unit is paid completely.

3.1.8.2 *Input*. The code of unit.

3.1.8.3 *Processing*. The process should record the status of unit

3.1.8.4 *Output*. The output is to change the status of the unit

3.1.9. *Functional Requirement 9:* Transfering to Bank

3.1.9.1 *Introduction.* The status of unit should be changed from "O" completed to be "T" Transfer to present that this unit is paid completely.

3.1.9.2 *Input*. The code of unit.

3.1.9.3 *Processing*. The process should record the status of unit

3.1.9.4 *Output*. The output is to change the status of the unit

3.1.10 *Functional Requirement 10:* Seaching the Record by customer name

3.1.10.1 *Introduction*. Sometime the customer can not remember the unit code that they own, This application can search the record by using the customer name.

3.1.10.2 *Input*. The customer Name.

3.1.10.3 *Processing*. Searching the Unit of housing by using the customer name

3.1.10.4 *Output*. The output is the specific unit of housing that matches with the customer name.

3.2 SYSTEM DESIGN

System design is the process of planning a new business system or one to replace or complement an existing system. But before this planning can be done, we must thoroughly understand the old system and determine how computers can best be used (if at all) to make its operation more effective.

The system design also describes the data to be input, calculated, or stored. Individual data items and calculation procedures are written in detail. Designers select file structures and storage devices, such as magnetic disk, magnetic tape, or even paper files. The procedures they write tell how to process the data and produce the output.

The documents containing the design specification portray the design in many different ways - charts, tables, and special symbols. The detailed design information is passed on to the programming staff so that software development can begin.

Designers can responsible for providing programmers with complete and clearly outlined software specifications. As programming starts, designers are available to answer questions, clarify fuzzy areas, and handle problems that confront the programmers when using the design specification.

3.2.1 DATA FLOW

The logical data flow diagram can be completed using only four simple notations.

1. *Data Flow*: Data move in a specific direction from an origin to a destination in the form of document, letter, telephone call, or any other medium. The data flow is a 'packet' of the data.
2. *Process*: People, procedure, or devices that use or produce (transform) data.
3. *Source or Destination of data:* External sources or destination of data, which may be people, program organizations or other entities, interact with the system but are outside its boundary. The terms source and sink are interchangable with origin and destination.
4. *Data Store*: Data are stored or referenced by a process in the system. The data store may represent computerized or non computerized devices.

And the completed data flow diagrams of the new system are represented in Appendix C

3.2.2 STRUCTURE CHART

The technique that Structured Programming suggested for making a steady progression from overview to detail become known as top down design (or stepwise refinement). Top down design is an informal design strategy for breaking problem into smaller problems. The power of this top down technique is that we can develop and review the solution to a larger problem in managable pieces and can avoid the paralyzing shock of having to confront all of the detail at once.

Structure programming produced systems that were more smoothly developed and more reliable than systems ever had been before.

The structure charts of the new system are represented in Appendix D.

3.2.3 DATA DICTIONARY

The data dictionary is a specialized application of the kind of dictionary used as references in everyday life. The data dictionary is a reference work of data about data compiled by system analysts to guide them through analysis and design. As a document, it collects, coordinates, and confirms what a specific data term means to different people in the organizaiton. The data flow diagrams in Appendix C are an excellent starting point for collecting data dictionary entries.

System analysts must be aware of, and catalog, differnet terms that refer to the same data item. The helps to avoid duplication of effort, allows better communication between organizational departments sharing a database, and makes maintenance more straight forward. The data dictionary can also save as a consistent standard for data element.

The logical characteristic of current systems data stores, including name, description, alias, contents and organization. Identifies processes where the data are used and where immediate access to information is needed. Serves as the basis for identifying database requirements during system design. The data dictionary of the new system is represented in Appendix E.

3.2.4 FILE LAYOUT

The design of files includes decisions about the nature and content of the file itself, such as whether it is to be used for storing transaction details, historical data, or reference information. Among the decisions made during file design are the following:

- Which data items to include in a record format within the file
- Length of each record, based on the characteristics of the data item on which it is based.
- The sequencing or arrangement of records within the file (the storage structure such as sequential, index or relative)

And the data structures of the new system are represented in Appendix E.

3.3 HARDWARE REQUIREMENT

COMPUTER 486DX2-66 (FOR WORKSTATION)

- MEMORY 4 MB.
- DRIVE 1.2 MB. & 1.44 MB.
- HARDDISK 540 MB. (CORNER)
- VGA 1024 KB
- ETHERNET LAN CARD
- 14" SUPER VGA COLOR MONITOR
- KEYBOARD 101 KEYS
- MINITOWER CASE

COMPUTER 586DX-66 (FOR SERVER)

- MEMORY 16 MB.
- DRIVE 1.44 MB.
- HARDDISK 1.4 GB.
- VGA 1024 KB
- ETHERNET LAN CARD
- 14" VGA MONITOR
- KEYBOARD 101 KEYS
- TOWER CASE
- UPS 500 VA

PRINTER (EPSON 1170I)

LASER PRINTER HP 4L

3.4 SOFTWARE REQUIREMENT

NOVEL NETWARE 4.2

DOS 6.22

MICROSOFT OFFICE

- MICROSOFT WORD
- MICROSOFT EXCEL
- MICROSOFT ACCESS
- MICROSOFT POWERPOINT

PAGE MAKER V.5

COREL DRAW V.5

PHOTOSTYLER

VISIO V.3

PLASTIC SOFTWARE (4GL)

CA-CLIPPER 5.2 D

EXOSPACE V.1

3.5 COST /BENEFIT ANALYSIS

It is seen that due to the existing system has already had some existing hardware that new system require, and required some hardware to increase the efficiency of the system. And the cost of the implementation of the software application.

Implementation Costs.

System Development Cost	30,000
Employee Training	15,000
Total Implementation Cost	45,000

Annual Operating Cost

Maintenance Cost	10,000
Facilities Cost (Power, space, offices, Ribbon)	15,000
Total Annual Operating Cost	25,000

Benefits Expected

Tangible Benefits:

Estimating Benefits for the faster response time	30,000
Elimination of clerical personnel and manual operation	15,000
Total Annual Cost savings	45,000

Intangible Benefits:

- To reduce volume of paper produced and handled during operation.
- To provide better information for helping manager in decision making.
- To improve better in managerial control for the sales section.
- To improve the employee morale
- To improve efficiency of operation
- To be able to meet competition
- To provide the better service to customer.

PAYBACK PERIOD TO INSTALL THE NEW SYSTEM

Using the basic formula for after tax payback of:

$$\text{Payback Period} = \frac{I}{(1 - T)\ R}$$

where I = Investment or capital expenditure

T = Corporate tax rate in percent

R = Average annual return on investment

$$\text{Payback Period} = \frac{264{,}000}{(1 - 0.40)\ (45{,}000)}$$

$$= 9.7 \text{ years}$$

PRESENT VALUE OF THE PROPOSED SYSTEM

Using the basic formala for the net present value

NPV	=	Net present value
PV	=	Cost of the new system
R	=	Cash flow (Savings because of the new system)
K	=	Cost of money (intereset rate)
n	=	number of years the savings available

$$NPV = \frac{R_1}{(1+K)} + \frac{R_2}{(1+K)^2} + \frac{R_3}{(1+K)^3} + \ldots + \frac{R_n}{(1+K)^n} - PV$$

Annual savings = 45,000 - 25,000

= 20,000

K = 8 %

PV = 45,000

n = 5 years

$$NPV = \frac{20,000}{(1.08)} + \frac{20,000}{(1.08)^2} + \frac{20,000}{(1.08)^3} + \ldots + \frac{20,000}{(1.08)^5} - 45,000$$

= 18,518 + 17,146 + 15,876 + 14,700 + 13,611 - 45,000

= 34,851

Since the new present value is positive with a value of 34,851 , it can be concluded that the implementation of the proposed system is justifiable.

COST ESTIMATION

HARDWARE

- COMPUTER 80486DX2-66	(@28,000 X 3 SETS)	84,000
- COMPUTER 80586DX-90	(@80,000) (FILE SERVER)	80,000
- LAN CARD, CABLE AND INSTALLATION		20,000
TOTAL HARDWARE		**184,000**
- NOVEL NETWARE 4.0 (FOR FILE SERVER)		
- DOS 6.2 (FOR WORKSTATION)		
- MICROSOFT OFFICE		
- MICROSOFT POWERPOINT		
- MICROSOFT ACCESS		
- MICROSOFT EXCEL V.5		
- MICROSOFT WORD V.6		
- ALDUS PAGE MAKER V.5		
- COREL DRAW V. 5		
- PHOTOSTYLER V.2		
- VISIO V. 3		
TOTAL SOFTWARE		**80,000**
TOTAL COST		**264,000**

In the above cost estimation is one alternative *(PURCHASE)* , the reason that we buy the hardware instead of rental method or leased mothod. Because the rental method is worst. The company do not need to follow the technology all the time , the above hardware and software can support all jobs of the summer's inc. for a long period of time. Then the *PURCHASE* method is worth, and the company will be the asset.

There are more advantage as follows.

1. Least cost in long run.
2. Distinct tax advantages if a profit-making firm.
3. A business investment
4. Full control over equipment use.

3.6 SECURITY

Several Procedures Can Improve The Security Of Use Of Personal Computers.

1. Do not leave personal computers unattened if they contain sensitive information or are running sensitive computation.

Ease of use consideration for software have made it simple for unskilled users to learn how use new package. Similary, many packages use a similar user interface to reduce learning time, and some companies have adopted one standard data base manager or one standard spreadsheet package.

2. Do not leave printer unattended if they are printing sensitive output.

This restriction is especially important if one printer is shared by two or more computers or if the printer is located in a public place.

3. Secure media as carefully as you would the equivalent confidential reports.

Floppy disks containing sensitive information should be lock up. Machines with hard disks containing sensitive information show be locked up. Turnoff a personal computer after using it to clear volatile memory.

4. Do not allow eating, drining or smoking in any room containing a personal computer.

Crumbs and drinks can destroy hardware and media. Ash particles in smoke are large enough to ruin disk systems by becoming trapped between a read head and the medium.

5. Treat media with care.

The presure from ballpoint pen can damage a floppy disk.

6. Perform periodic backup.

Daily backups of changed files from a hard disk to a floppy disk or another device may be in order. Monthly backups of all file so that full system can be replaced in the event of a failure or so that backup copies are availableof even supposedly insignificant file.

7. Practice separation of authority.

Design sensitive procedures so that no person alone has authority to affect sensitive data.

We can secure the computer information by using the *LAN system (local area network)* because this system can prevent the unwanted person to access the system. There are two level of security in Local Area Network

1 the User Id 2. Password

These two levels of security can protect the unwanted person to access the data of the company. Because the person who can enter the corrected User Id. and Password , can enter into the system. And it will be more important in choose the type of the Local Area Network. There are many types of local area network. *1. Bus model 2. Ring Model 3. Star Model.* All these model have the different advantages . But in this case , we choose the ***Star Model*** . Because in Star model , we keep all storages in the centralized host (File Server) Then no one can enter into the system and get the sensitive data from the system, except the person who has the authority. and all storage spaces keep in the same room. Then it will be easy to secure these storages. And in star model , if one workstation in the system down or the cable to one workstation is errored , the other workstations can be run. Only the one workstation is downed. And it will be easy to check and repair the system.

There are some controls that depend on hardware.

1. Secure the equipment.

Portability is a special advantage of personal computers, but that portability is also a vulnerability. Simple as it sounds, bolting the computer to a desk or securing it with an adnesive or mechanical lock provides good security against theft. A computer can be unlocked to b moved and the rescured at its new location.

2. Consider using add- on security boards.

Some access control packages run in the limited personal computer environment. More sophisticated packages combine hardware (usually an added board) with software.

3.7 NETWORK

In a *star network*, each node is connected to a central "traffic controller" node. All transmissions flow from the source node to the traffice controller and then from the traffic controller to the destination node. Such a cnetral node is able to monitor and control traffic to defeat convert channels.

Each message is read only by the traffic controller (presumably for address only) and by the intended recipient. There is a unique path between any two nodes, and this path is inaccessible to any others. The exposure of a message to wrongful recipients is thus less than with the bus architecture.

Reliability is a problem with this topology, since there is only one path from a particular node to the central node. If that link fails, the peripheral node is unreachable. A node identifies itself to the central controller, which mush have this information in order to route transmission. The central controller can detect two nodes that identify themselves as the same node. Typically, however, the central controller does not perform any authentication of nodes. Each node is accepted to be whatever node it identifies itself to be.

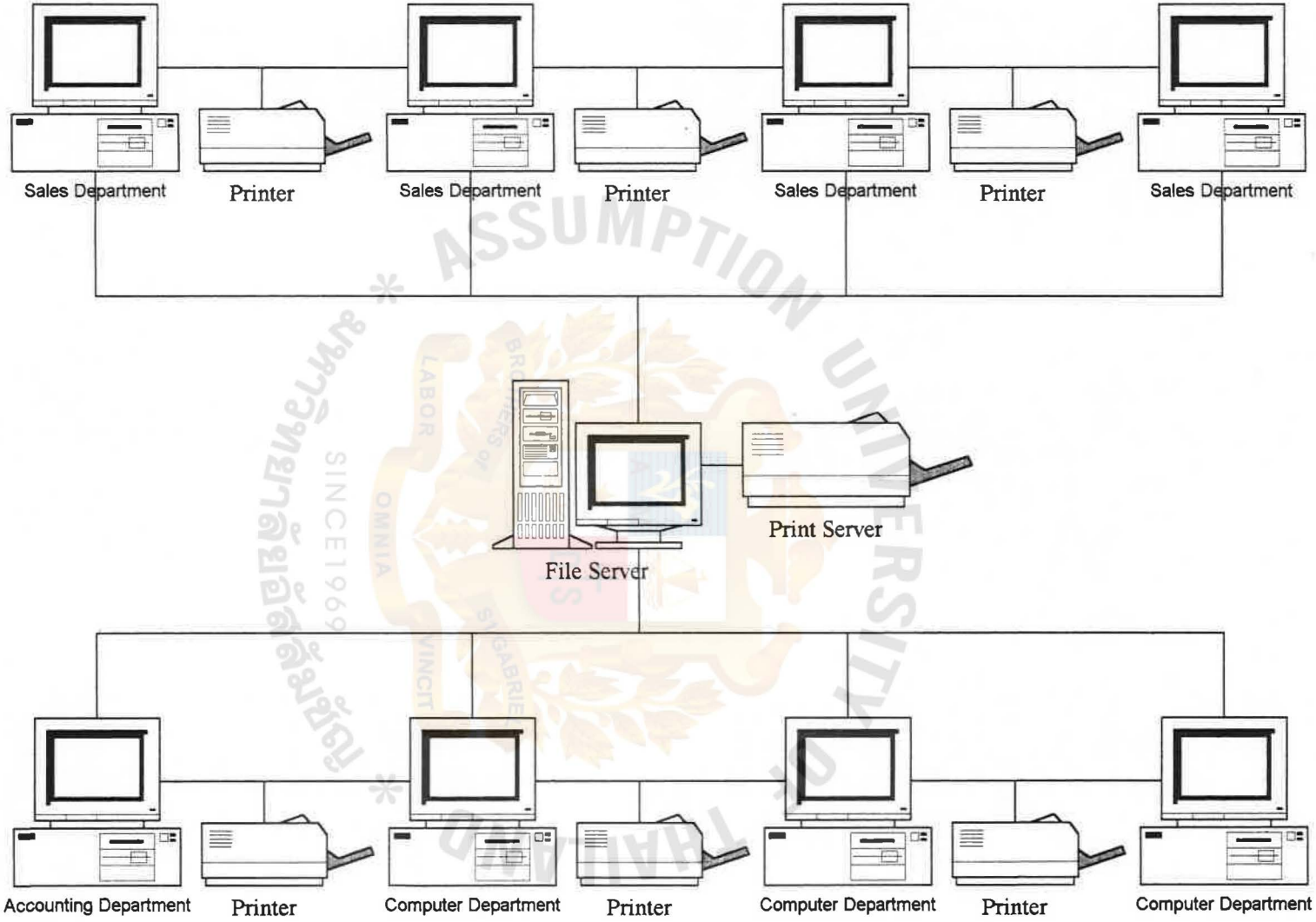

Figure 1-3 Network Layout of Peak Tower Co., Ltd.

4. IMPLEMENTATION PLAN

The reasons why project management needs models associated with a system development project.

1. To estimate the money, time and people required to develop the project.
2. To update and revise those estimates as the project continues.
3. To manage the tasks and activities of the people working on the project

The Project manager must not only manage tasks, he must manage people or himself. He must ensure that all the system analysts, programmer, system designer and the other personnel are doing what they should be doing when they should be doing it.

Each activity in Gantt Chart (Appendix F) is shown that the indication of when it begins and when it ends.

4.1 IMPLEMENTATION:

During the implementation phase, we concentrate on the individual module. Our starting point is the module's specification. It is often necessary to introduce an extra 'design' phase, the step from module specification ot executed code often being too large. The such case , we may take a advantage of some high level programming-language such as a pseudocode. (A pseudocode is a kind of program language. Its syntax and semantic are in general less struct that those of pascal.)

During, the design phase, a gobal structure has been improved though the introduction of module and this interfaces. Certainly in the more classic programming language(S), must of the structure tends to get lost in the transition form design to code.

The process specification of the new system as represented-Appendix G.

4.2 TEST PLAN AND RESULT

Testing:

Actually, it is wrong to say that testing is a phase following implementation. The suggests that we need not bother about testing until implementation is finished. This is not true. It is even fair to say that this is one of the biggest mistakes you can make.

Already during requirements analysis, attention has to be paid to testing. During the subsequent phases, testing is continued and refined. The earlier error are detected, the cheaper than correction.

Testing at phase boundaries comes in two flavors. We have to test that the transition from phase i to phase i+1 is corrected. (This is known as verification). We also have check that we are still on the right track as regards fulfilling user requirements (validation).

In general, the measuring efficiency and then turning and optimizing the software in the light of these measurements are also considered part of the test phase. After Testing, we might think that your work is completely done when we have finished testing the system. Unfortunately, there is more to do, though you may not be involved in your role as systems analyst. However, some (and often a large group of "someones") must carry out the final activities in a systems development project:

- Conversion
- Installation

Conversion is the task of translating the user's current files, forms, and databases to the format required by the new system. In some rare cases, this may not be a relevant activity, for there may not be any existing data. However, if the user is replacing a current system with a new system, this is likely to be a delicate and difficult task. A conversion plan needs to be developed, preferably as soon as the user implementation model is complete, to cover the following issues.

- If the user already has existing data associated with an existing system, he will probably want to use it until the last possible moment before "cutting over" to the new system.
- There may be such a large volume of existing data that it will be impractical to considering converting it all at once. Files and records may have to be converted on an incremental, as needed basis. This will obviously require careful coordination and planning.
- The conversion should be carried out in an automated fashion; this can only be done if the current files and data exist in some automated form. If so, it should be relatively straightforward to write a computer program (or to use an existing vendor -supplied package) to translate the current files into the format required for the new system. However, it sometimes turns out to be rather difficult to convert the data in an automated form, especially if the existing files are located on several different computers, in different formats, and so on. Indeed, developing the conversion software can turn out to be a major systems development project of its own!
- The existing data may contain errors; indeed, if the existing data were created manually and have been maintained manually, you can be virtually certain that there will be errors. Thus, part of the process of conversion is that of error detection and error correction, which can make the process even more difficult and time consuming. Some existing files and records may turn out to be illegible or incomprehensible; in other cases, it may be obvious that the existing data are wrong, but it may not be clear what the correct values are.
- In addition to converting existing files, it may be necessary to convert existing programs and procedures. In some cases, existing programs and procedures can be used in their present form; in other cases, they will have to be thrown away and completely replaced.

Installation of the new system may be an instantaneous affair, but it is often a major task. Usually, the following things must be done:

- Computer site preparation must precede the installation of the new system, usually by several months. This involves building or leasing a computer facility with appropriate power, space, lighting, and environmental controls. This is often done in conjuction with the comptuer hardware vendor or with the organization's computer operations department.
- User site preparation may also be required, especially in the case of on-line systems that have terminals and printers in the user's work area. In the simple cases, terminals can be distributed to the user's work area just before the system is installed; in some cases, though, an entirely new workspace environment may have to be constructed.
- Hardware installation, assuming that the new system requires its own computer hardware, is usually carried out by the hardware vendor; multiple vendors are sometimes involved , especially in the case of on-line and real time systems. In the case of a simple system developed for a personal computer, installation may be as simple as taking the computer out of a box and plugging it in.
- Software installation, which involves loading all the computer programs that were written for the new system onto the appropriate computer (s) and making them ready for operation.

4.3 IMPLEMENTED TESTING

The first thing to realize is that there are different strategies of testing: the two most common strategies are known as bottom-up testing and top-down testing. The bottom-up approach begins by testing small, individual modules in a stand-alone fashion: this is often called unit testing, module testing, or program testing. Then individual modules are combined together into larger and larger units to be tested enmasse; this is often referred to as subsystem testing. Finally, all the components of the system are combined together for testing; this known as system testing, and it is often followed by acceptance testing, where the user is allowed to submit his own test cases to verify that the system is working properly.

The top-down testing approach begin with a skeleton of the system; that is the testing strategy assumes that the top-level executive modules of the system have been developed, but that the lower-level modules exist only as dummy modules or stubs. Becuase most of the detailed system functions have not been implemented , the initial tests ar very limited; the purpose is simply to begin exercising the interfaces between mojor subsystems. Subsequent tests then become more and more comprehensive, exercising more and more detail aspects of the system. The top-down approach to testing is generally considered a preferable approach for most system today.

There are 3 types of testing that we use to test the software development project.

1. Functional testing: This is the most common form of testing; its purpose is to ensure that the system performs its normal functions properly. Thus, test cases will be developed and entered into the system; the output will be examined for correctness.

2. Recovery testing: The purpose of this kind of testing is to ensure that the system can recover properly from various types of failures. Recovery testing may require the project team to simulate hardware failure, power failure.

3. Performance testing: The purpose of this kind of testing is to ensure that the system can handle the volume data and incoming transactions specified in the user implementation model, as well as ensuring that it provides the response time required. This may require the project team to simulate a large network of on-line terminals, so that the system will fooled into thinking that it is operating under a heavy load.

4.4 CONVERSION

Conversion is the process of changing from the old system to the new one .

There are 4 ways of conversion.

1. Parallel System
2. Direction Conversion
3. Pilot System
4. Phase- In

Each way has it own advantage and disadvantage as the follows

1. Parallel System is operated along with the new system.

Advantage:

Offer greates security. The old system can take over if errors are found in the new system or if usage problems occur.

Disadvantage

Doubles operating costs. The new system may not get fair trial.

2. Direct conversation is replaced by the new one. The organization relies fully on the system.

Advantage

Forces users to make new system work. there are immediate benefits from new methods and controls.

Disadvantage

There is no other system to fall back on if difficulties arise with new system. Requires the most careful planning.

3. Pilot system is working version of system implemented in one part of the organization. Base on feedback , chanages are made and the system is installed in the rest the organization by one of the other methods.

Advantage

Provides experience and live test before implementation

Disadvantage

May give the impresion that the old system is unreliable and not error-free

4. Phase in is gradually implement system across all users.

Advantage

Allow some users to take advantage of the system early. Allows training and installation without unnecessary use of resources.

Disadvantage

A long phase-in cause user problems whether the project goes well (overenthusiasm) or not (resistance and lack of fair trial)

From the above information , we can choose the method of conversion. The best method that is very suitable to Peak Tower Co. is Pilot system. At this period of time, we take the Sales department to use the computering system instead of manual system. And when this system is accepted , we will use computer system in other department. At first, we should let the employees accept the computer system, and try to point out the advantage that the users can get from the computer system.

5. CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

For the concurrent (mannual) system, the officer will spend 10 or 30 minutes for each customer and a day or half a day for the report that the manager request. The manager will think that it is the time for the company to use the computerized system. Because there are many tangible and intangible benefits of the computerized system. It is worth for investment. The employee will be familiar with the computerized system, employee morale and the company can compete with the competitors.

After this system is completed (installed). The company can use this system to support their work. And this system can support many customers at the same time. Because this system can run on the Local Area Network (LAN). The company can purchase any computer and plug with the system in the case of the expansion of the business. The manager thinks that the investment of this system is worth. Because the company aslo has the LAN system and in the future, the company can develop any application and run on this LAN. And all of the data are shared. This system can be further expanded to the Accounting Department. It will reduce the paper work along the department and reduce any error.

The performance of the new system will be suited for the company. Because they can handle many projects at the same time. And the officer will spend only few minute for one customer. And when the manager requests for any report, the officer will spend only a few minute for presenting the report.

5.2 RECOMMENDATION

The successfulness of the Real Estate System does not achieve on the analysis and design phases except the implementation. The implemented state of the project development is the conversion of the design to an operating system which requires careful planning and control such as company development and training, acquisition, conversion, testing, operation evaluation and maintenance.

In addition, the package developed in the project still needs for the ongoing development, revision and modification similar to any other software packages to meet the user requirement.

The improvement could be done such as:

1. Any user inquiry
2. Recording the payment by cheque
3. Displaying the status of the cheque
4. Displaying the image of the housing unit (picture)
5. Connecting with the Accounting System

The package developed in the project is the ongoing activities that keeps the satisfied levels within the company under study.

In the future we think we will develop the System Interface to Accounting System for the Accounting Department. And for Sales Department, we may create the application that can show the images of the units. And for Accounting System, we will create the application that can accept the payment in many formats, such as Cash, Cheque, Credit card.

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รายละเอียดโครงการ

ชื่อโครงการ	:	การ์เด้นทัช บางนา-เทพารักษ์
ที่ตั้ง	:	การ์เด้นทัช บางนา-เทพารักษ์
	:	บางนาตราด ถนนเทพารักษ์
	:	สมุทรปราการ
บริษัท	:	นันทนา การ์เด้น

Figure A-1 Screen for Description of the Project

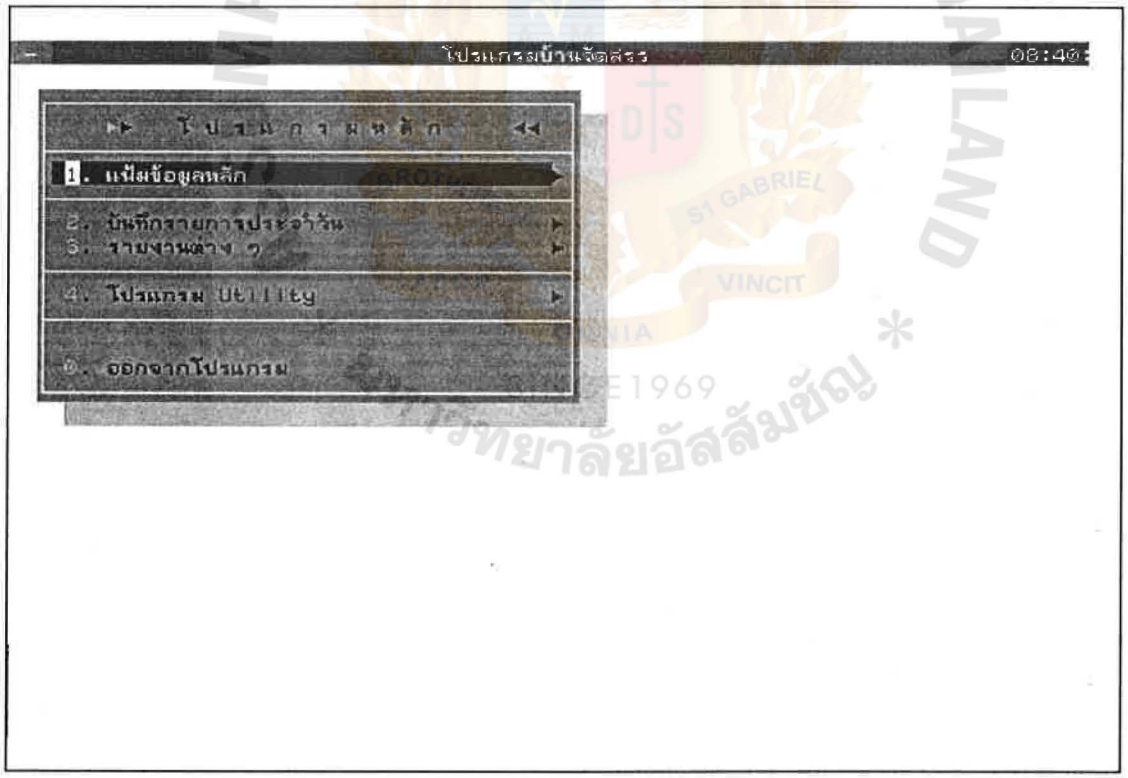


Figure A-2 Screen for Main Menu

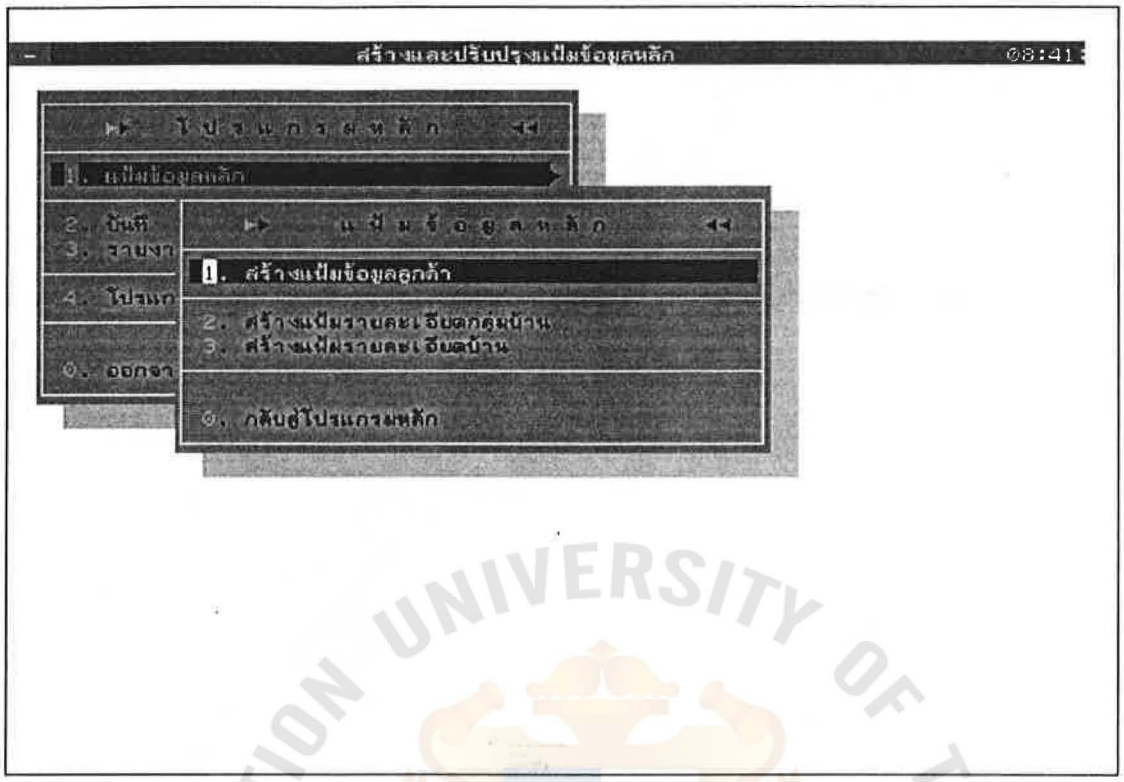


Figure A-3 Screen for Master File Menu

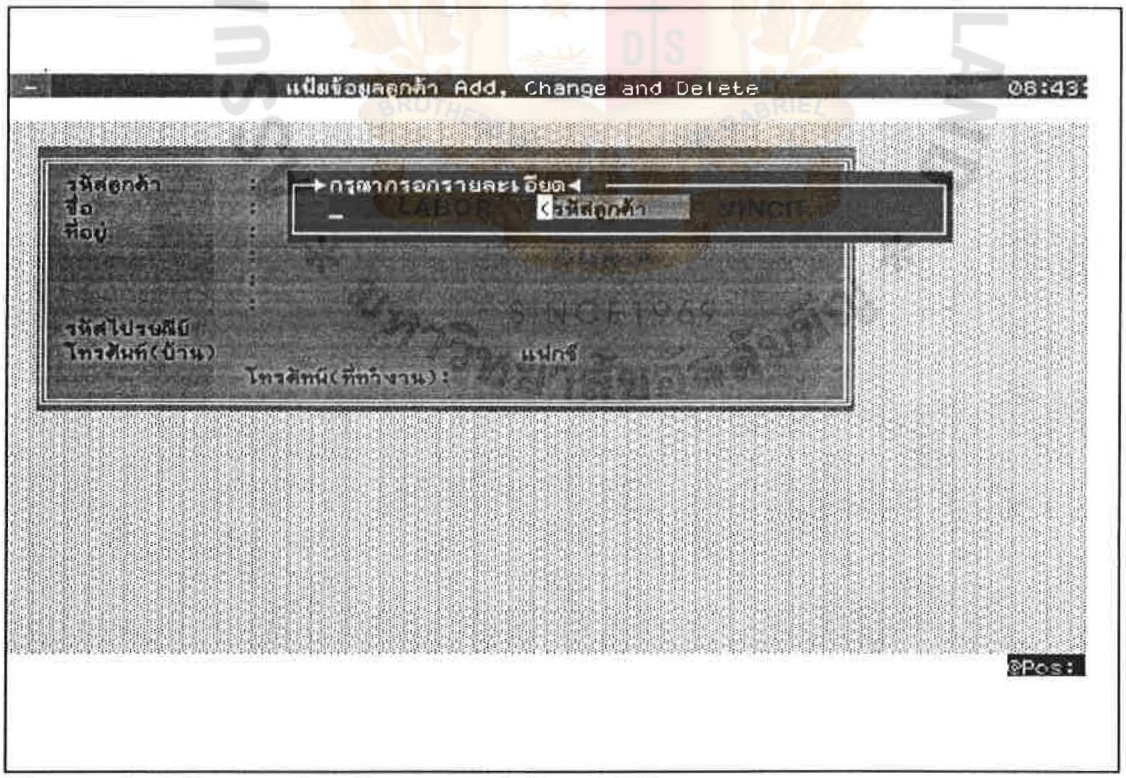


Figure A-4 Screen for Customer Master File

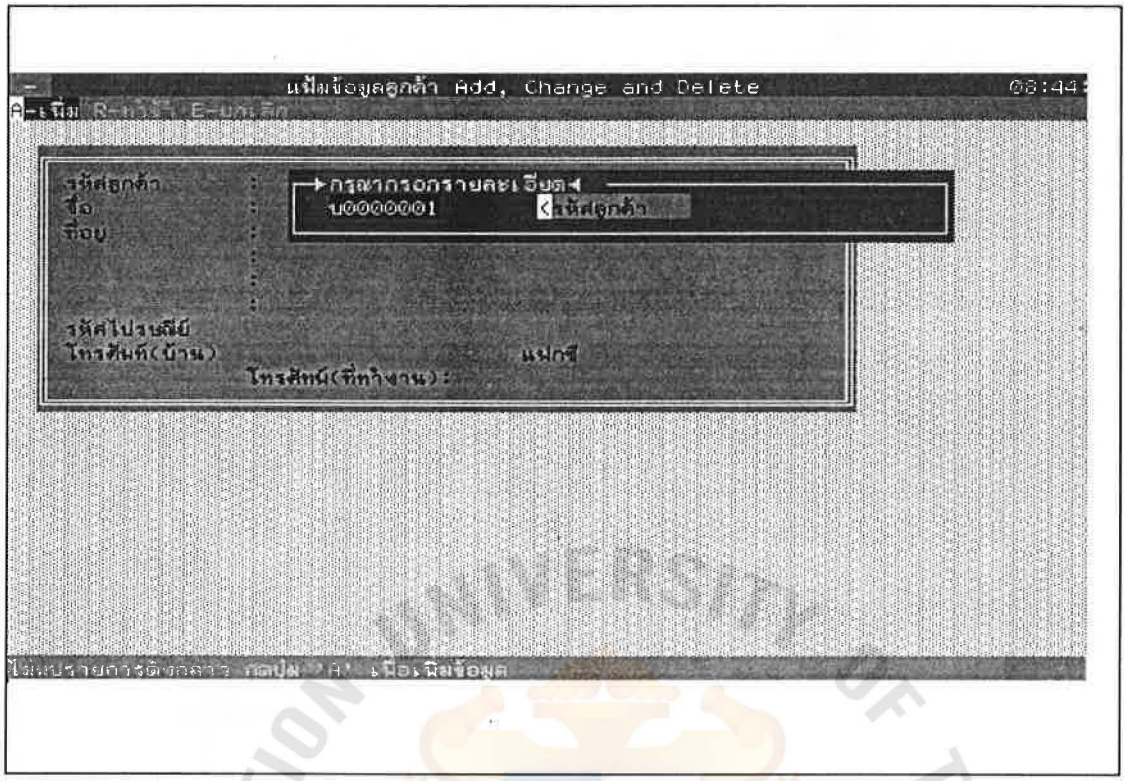


Figure A-5 Screen for Entering the Customer Code

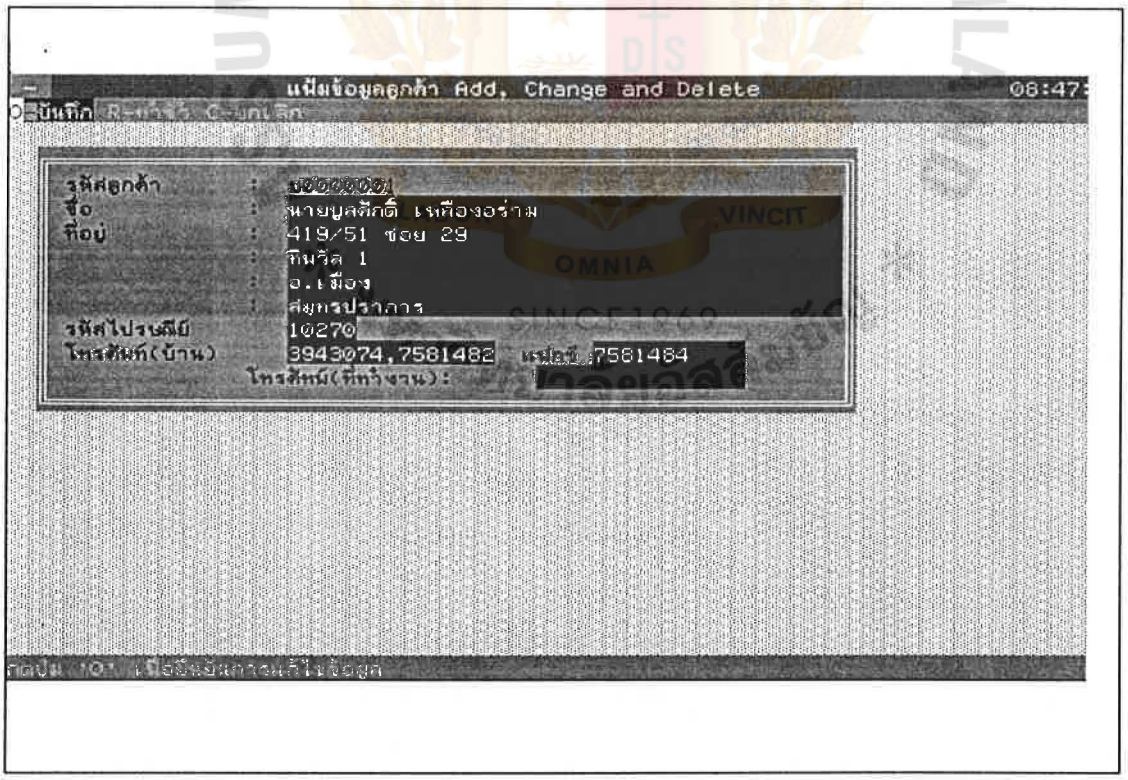


Figure A-6 Screen for Confirming the Entering of Customer Record

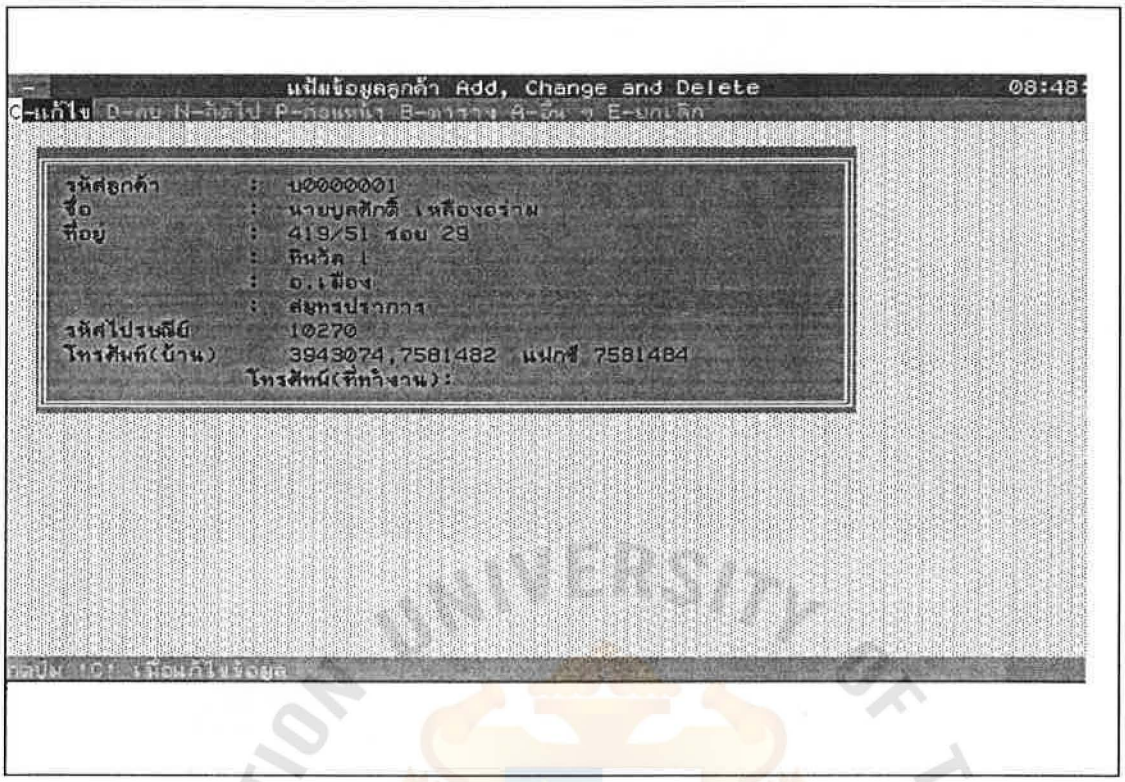


Figure A-7 Screen for Displaying Customer Record

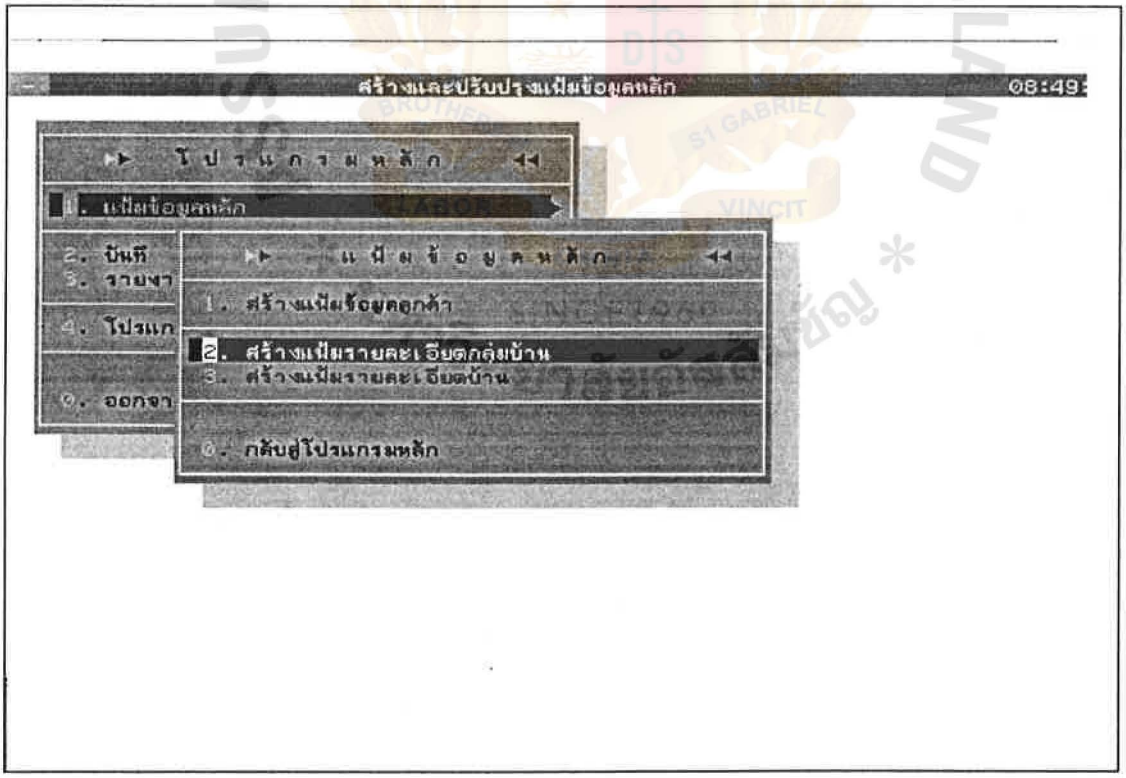


Figure A-8 Screen for Group of Unit (Menu)

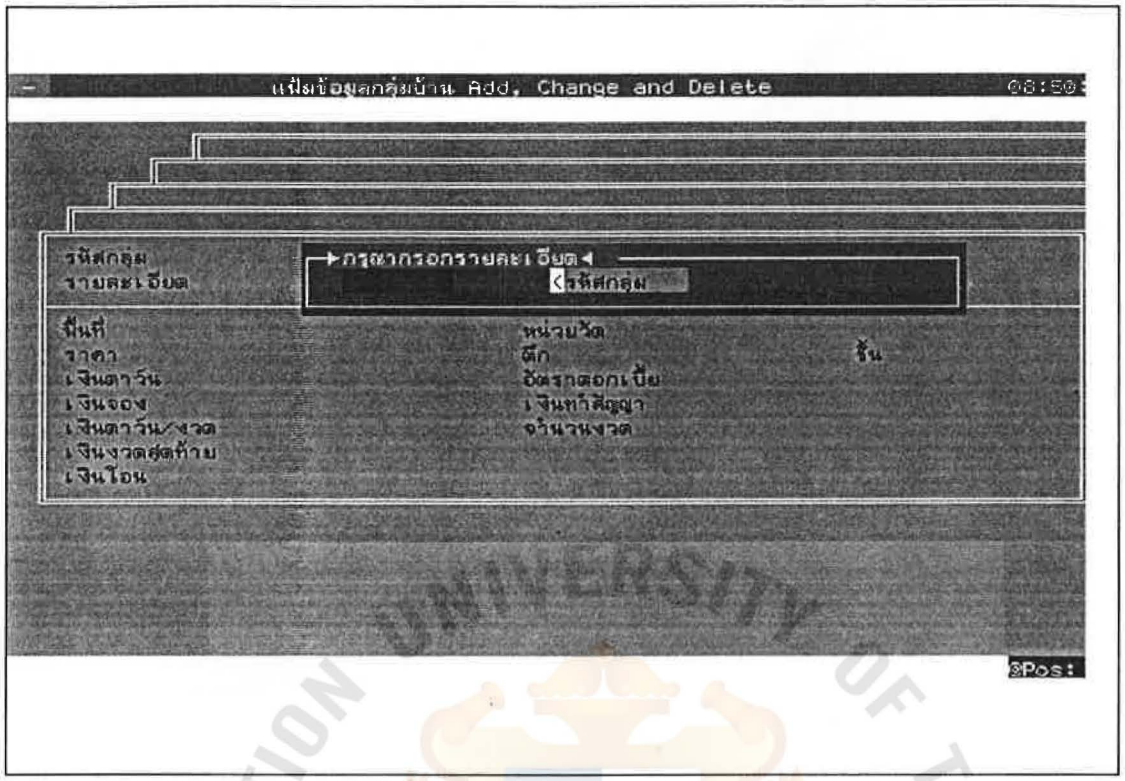


Figure A-9 Screen for Entering the Group of Unit

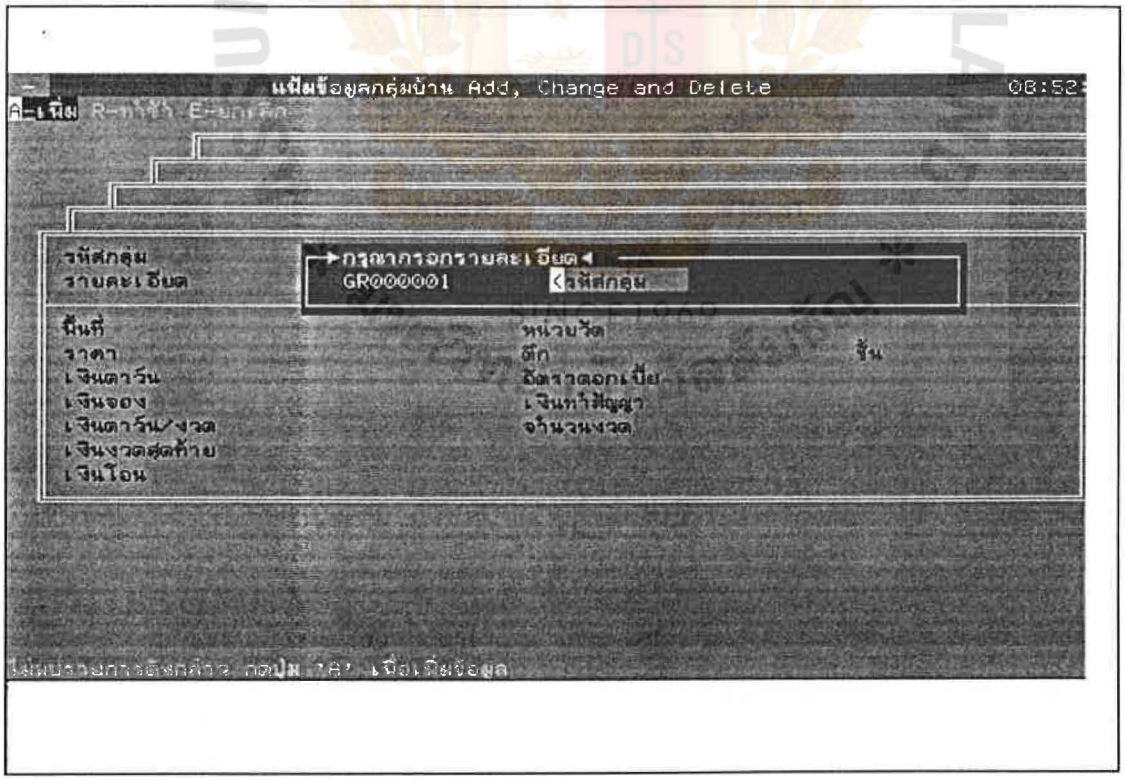


Figure A-10 Screen for Entering Identification of Group of Unit

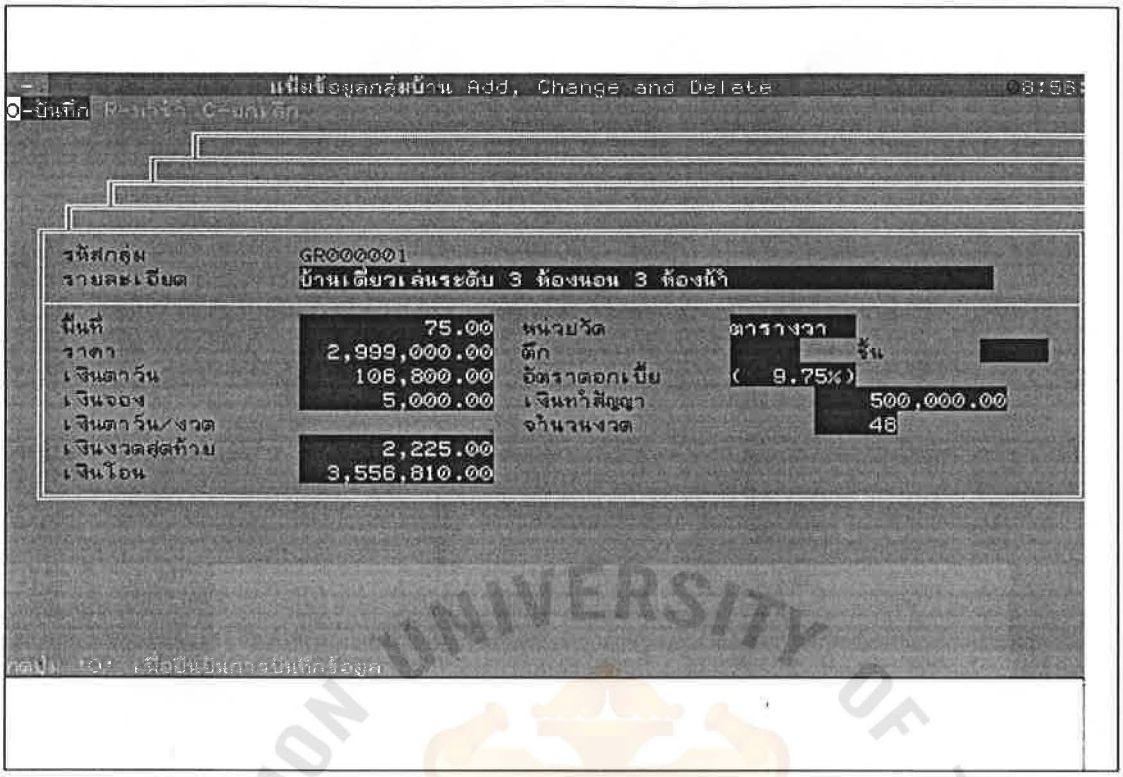


Figure A-11 Screen for Entering the Information of Group of Unit (Example)

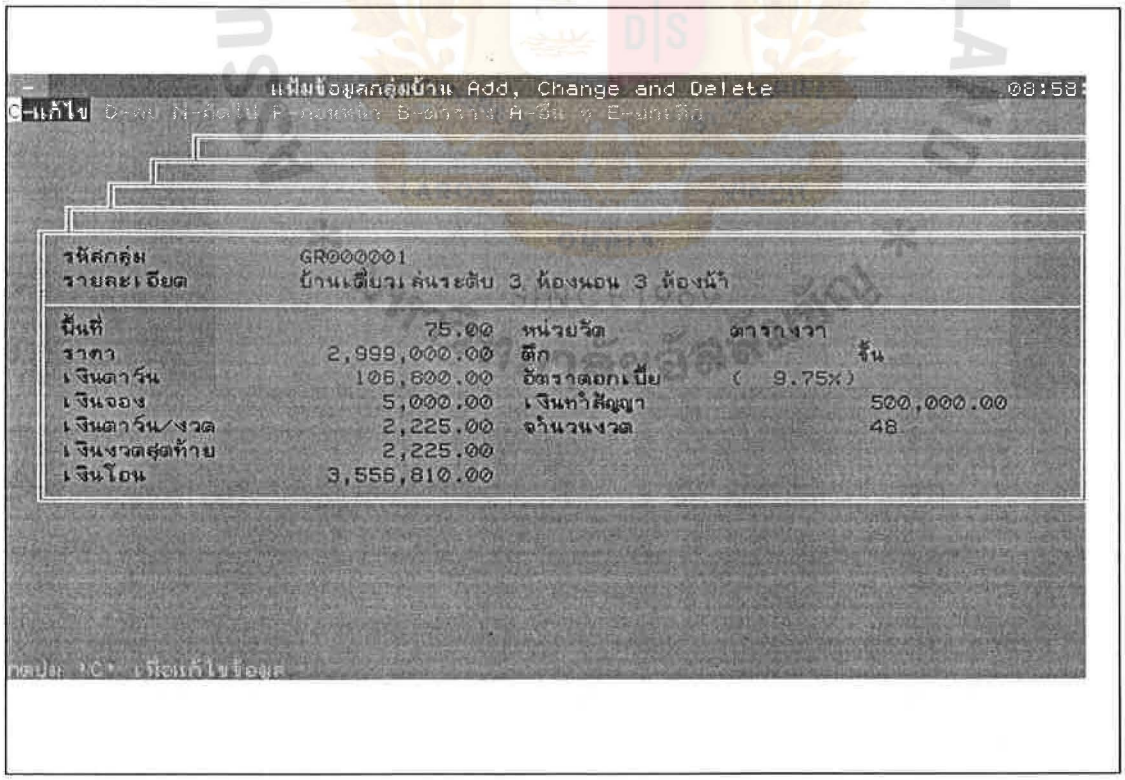


Figure A-12 Screen for Displaying the Information of Group of Unit

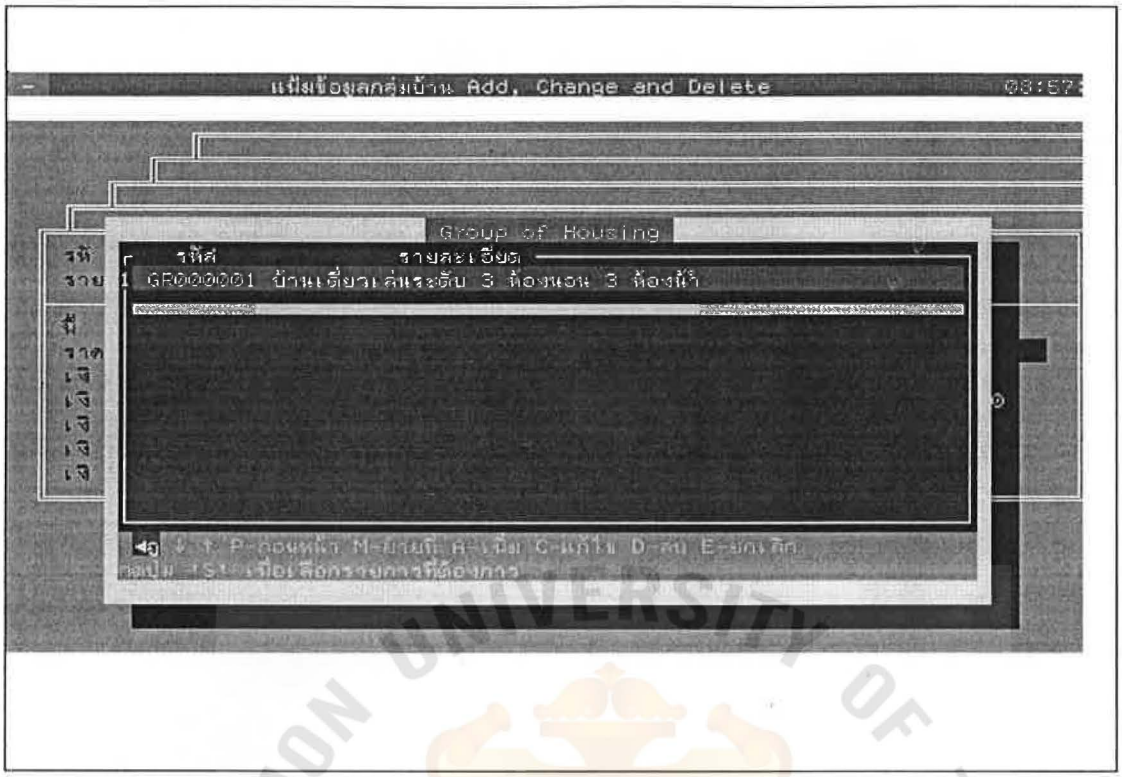


Figure A-13 Screen for Pop-up Menu for Retrieving Group of unit

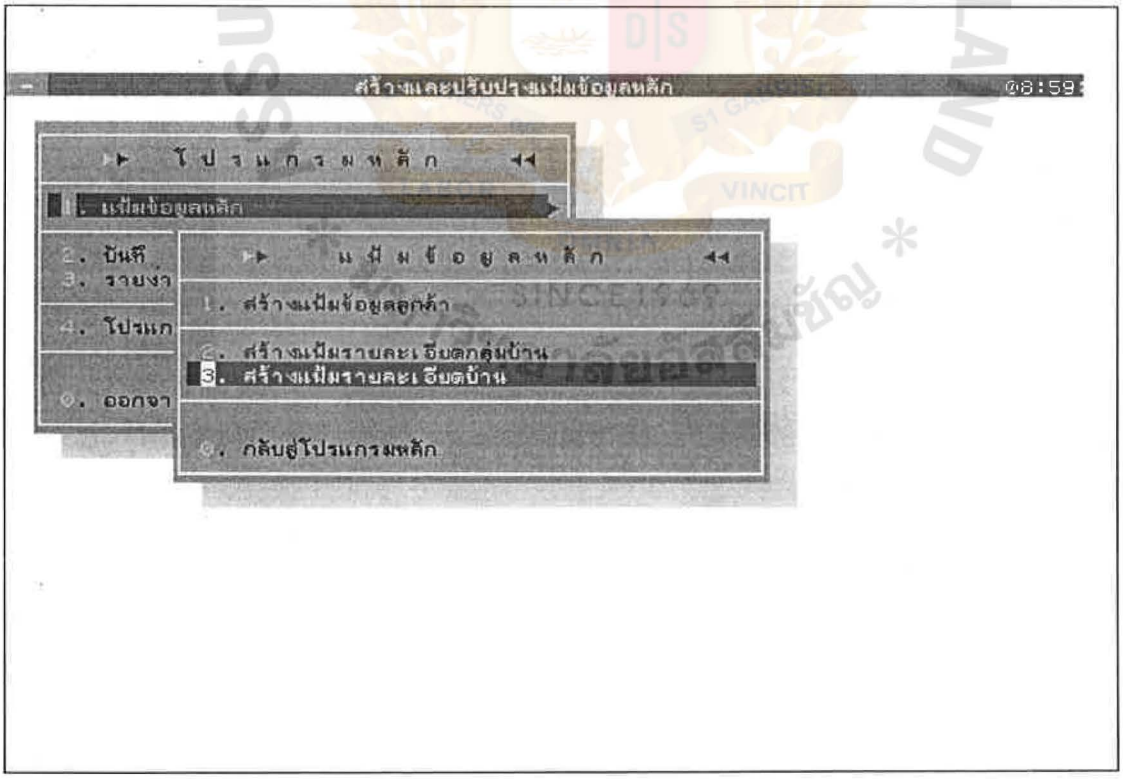


Figure A-14 Screen for Unit of housing (Menu)

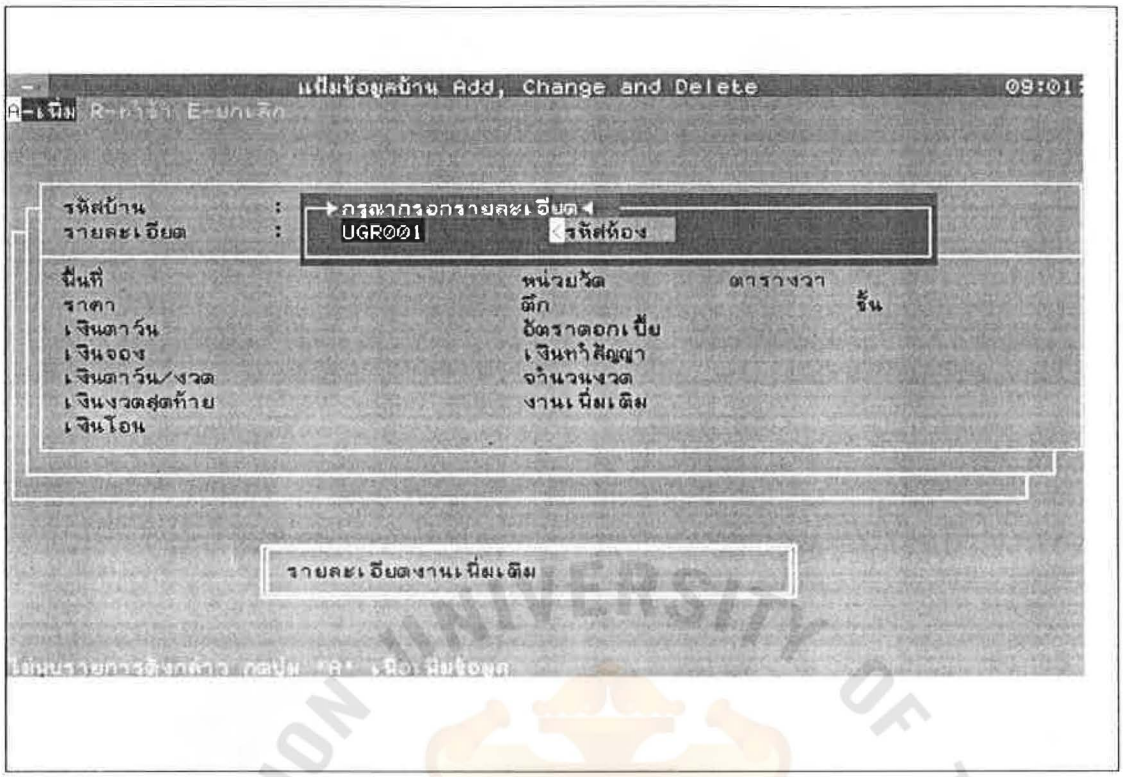


Figure A-15 Screen for Entering the Identification of Unit of Housing

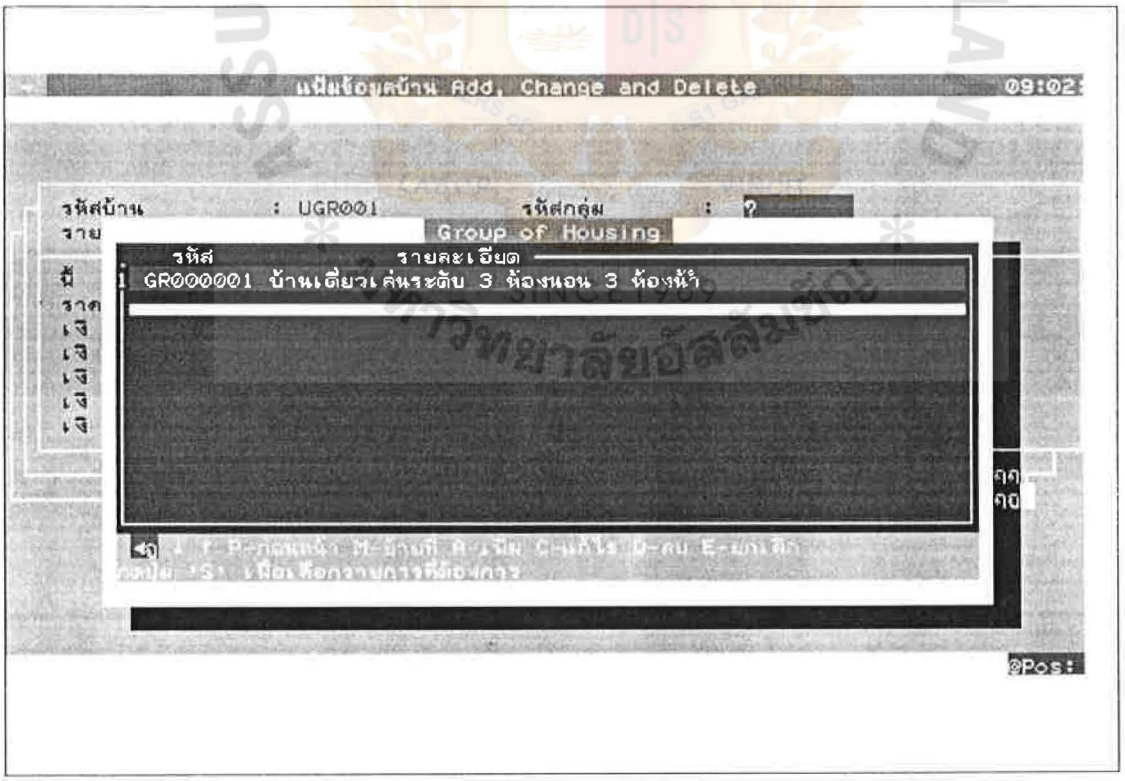


Figure A-16 Screen for Retrieving the Unit of Housing

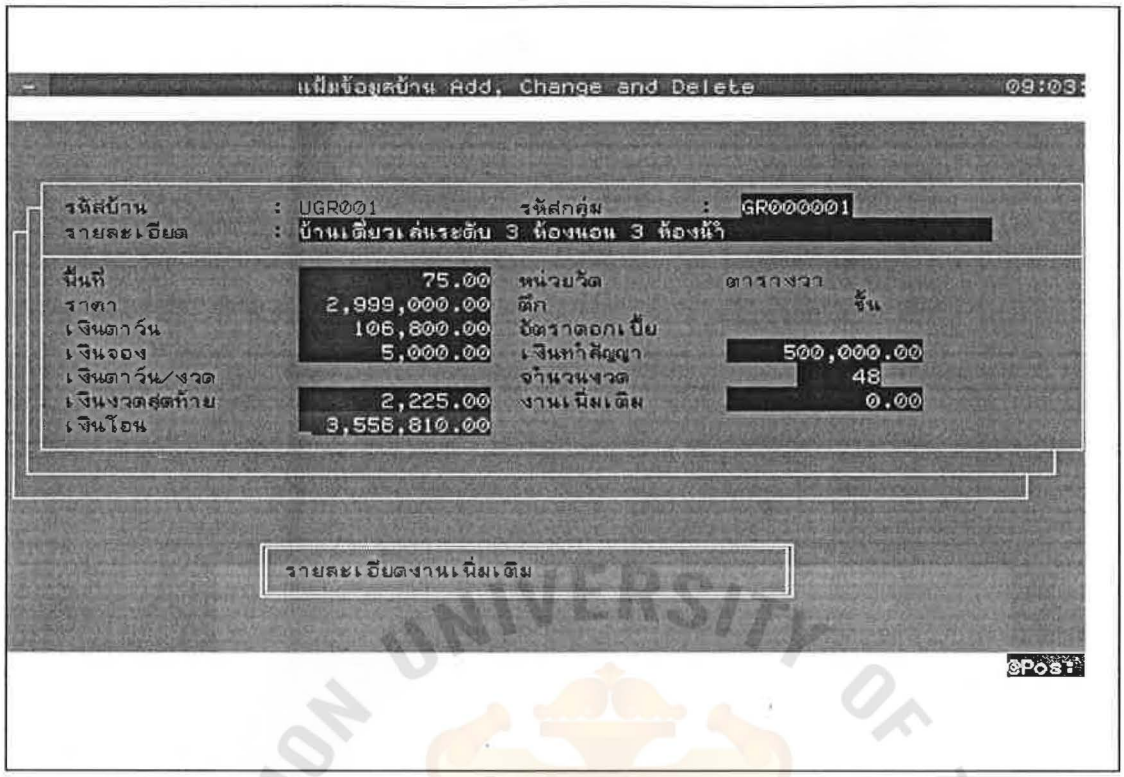


Figure A-17 Screen for Entering the Information of Unit

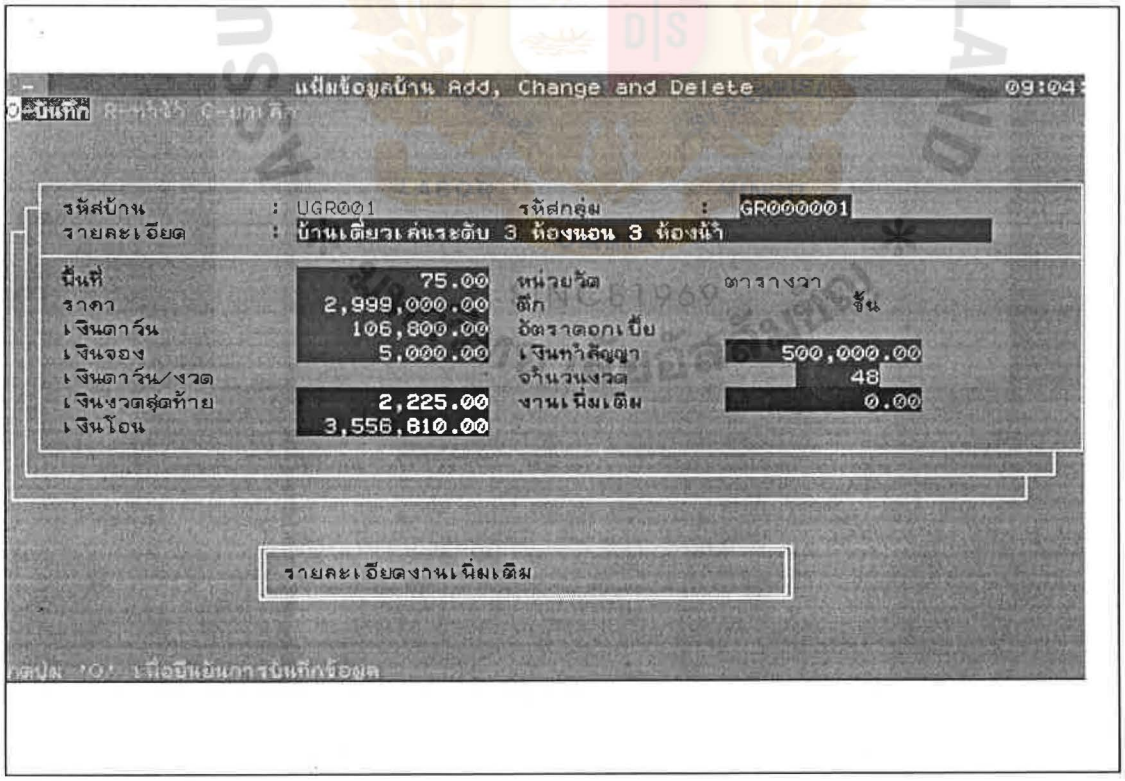


Figure A-18 Screen for Confirming the Information of Unit

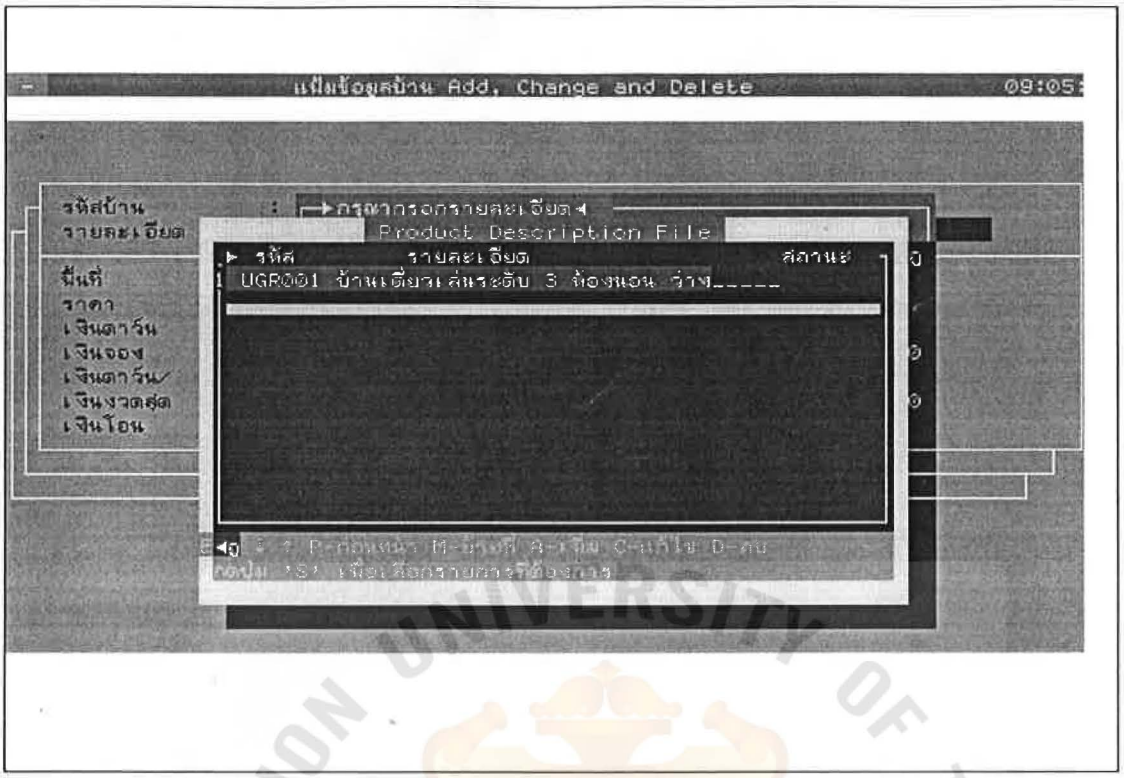


Figure A-19 Screen for Pop-up the Information of Unit

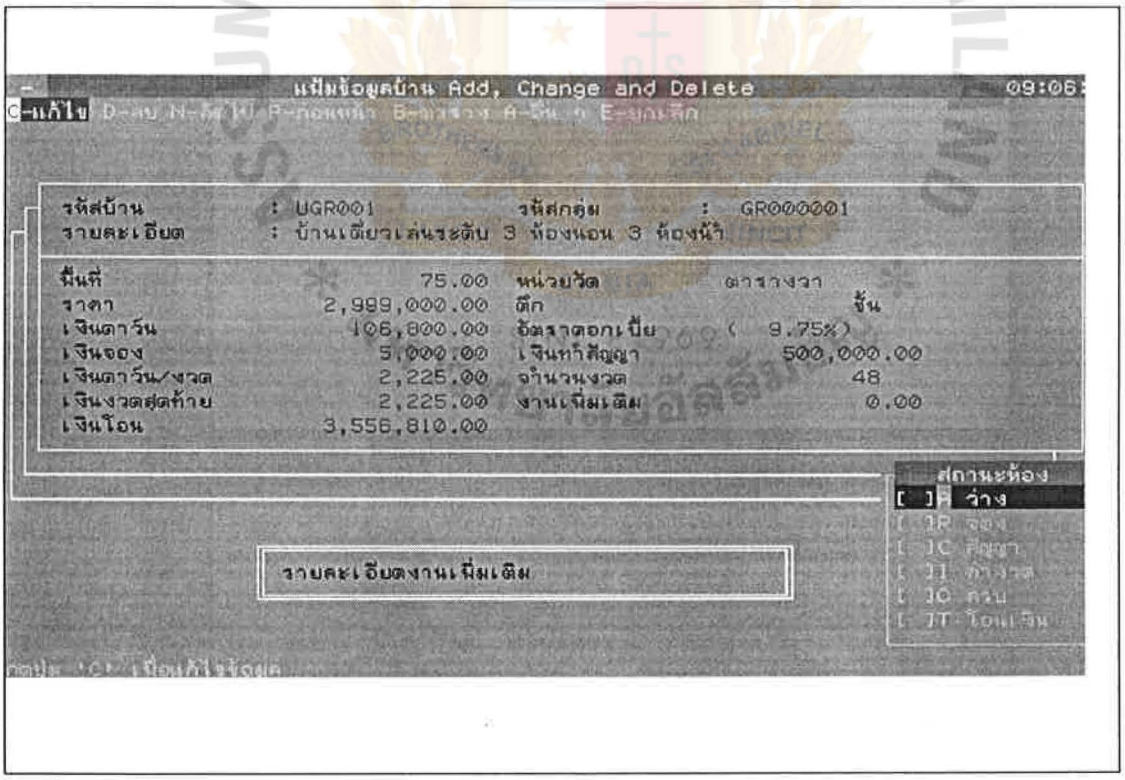


Figure A-20 Screen for Displaying the Information of the Unit

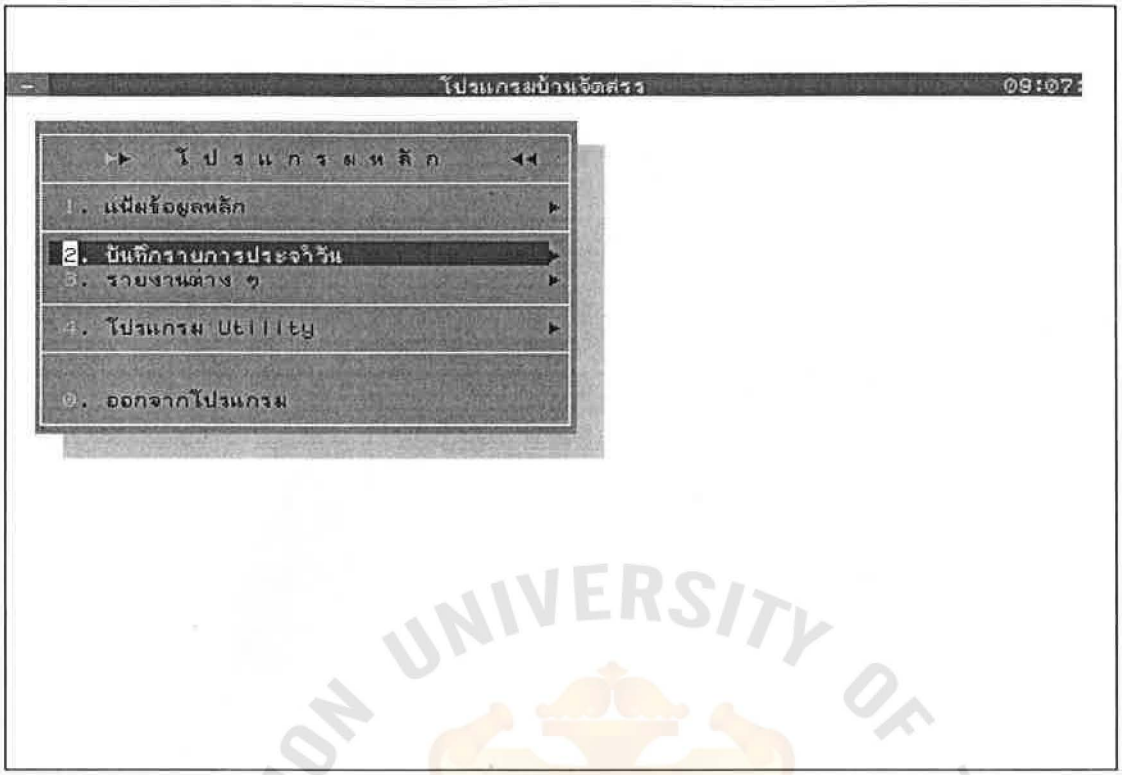


Figure A-21 Screen for Daily Transaction (Menu)

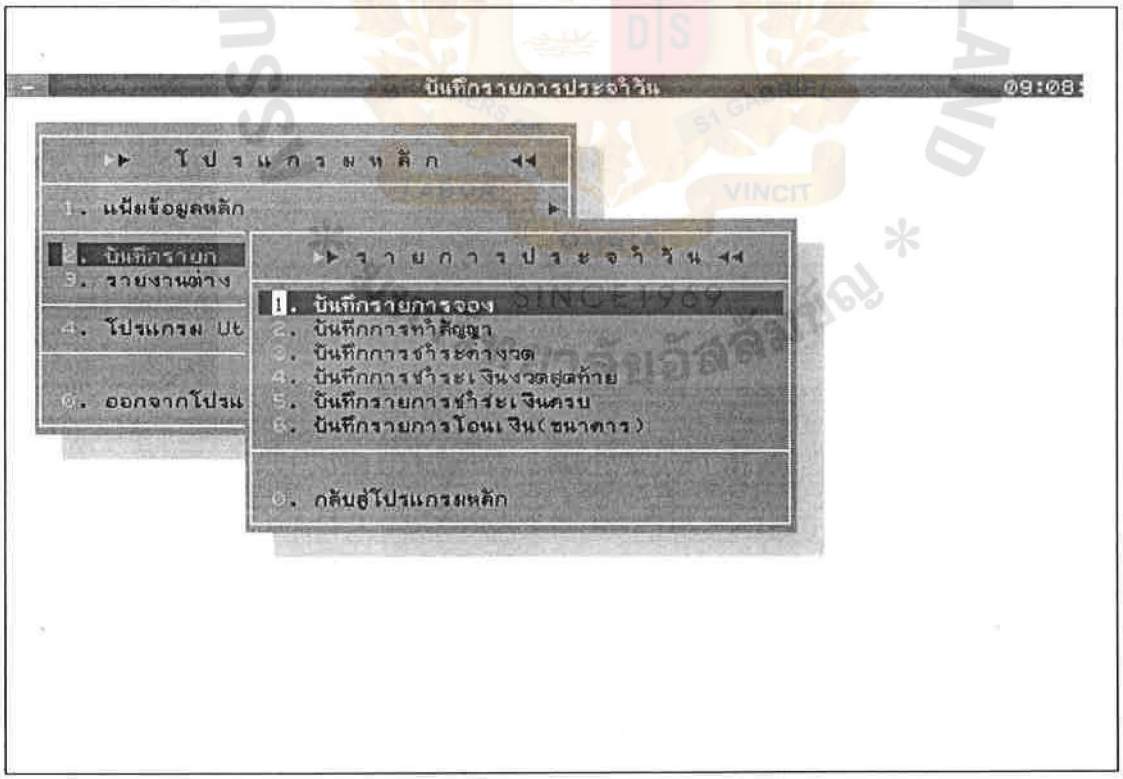


Figure A-22 Screen for Reserving the Unit (Menu)

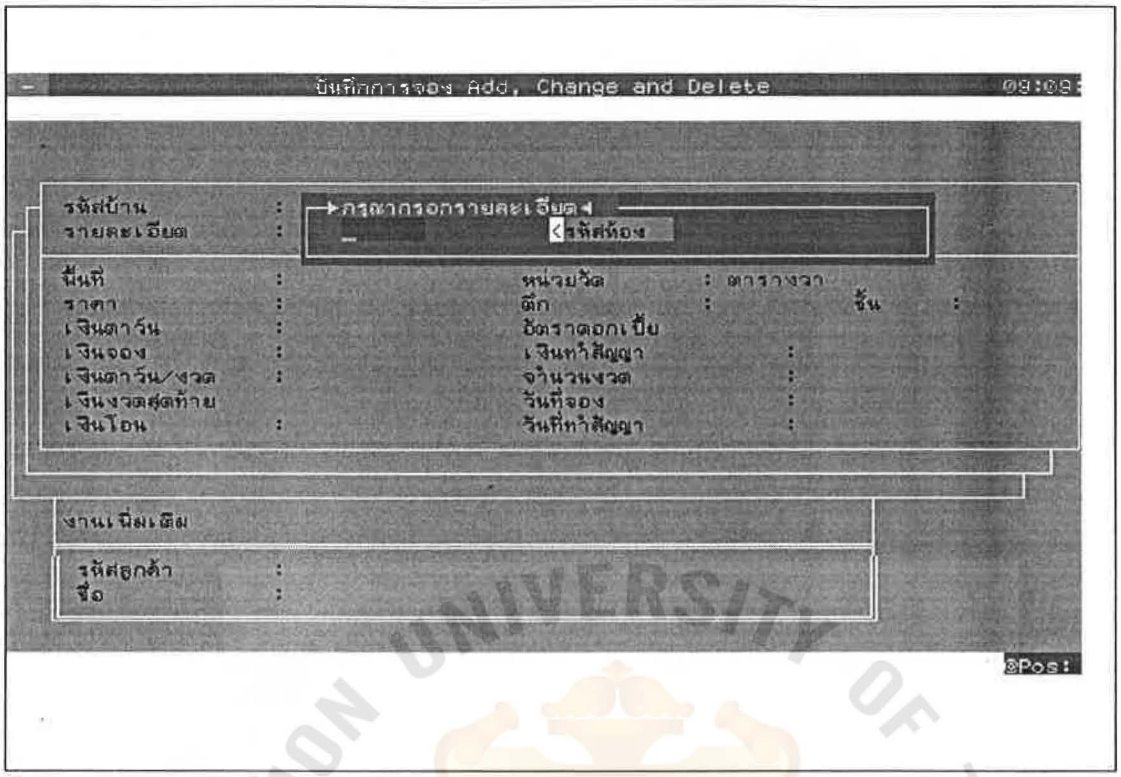


Figure A-23 Screen for Entering the Unit Reserved

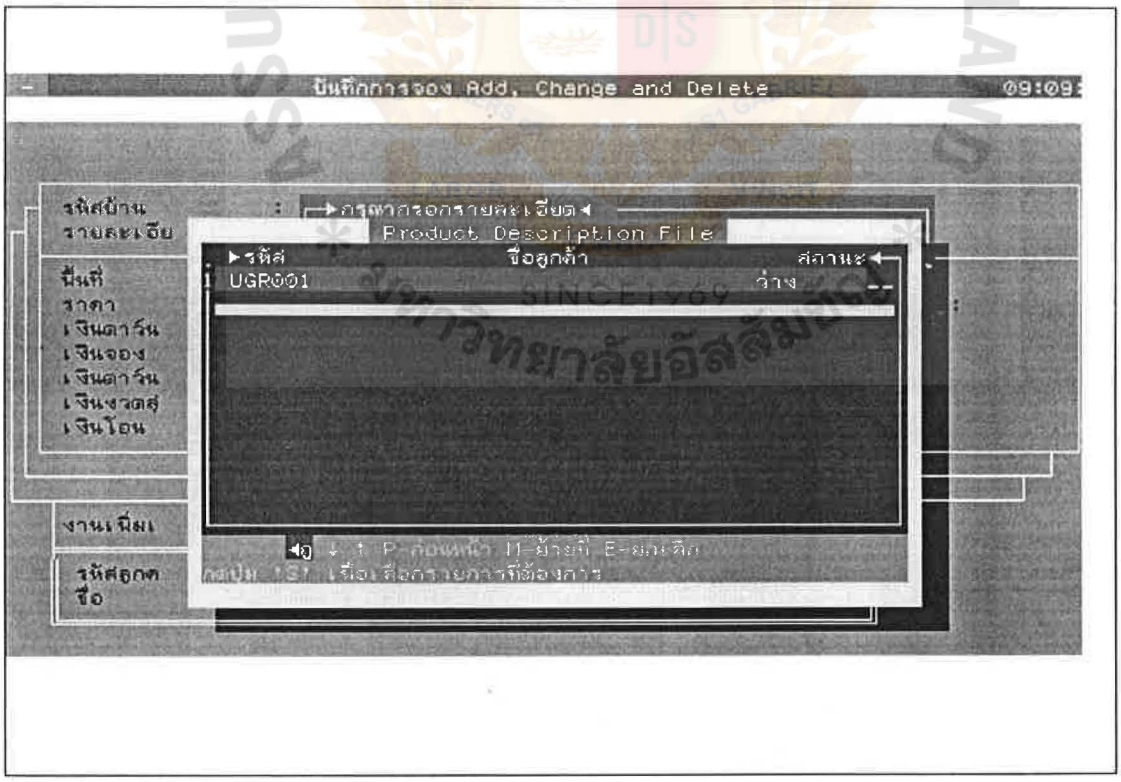


Figure A-24 Screen for Pop-Up Reserved Unit

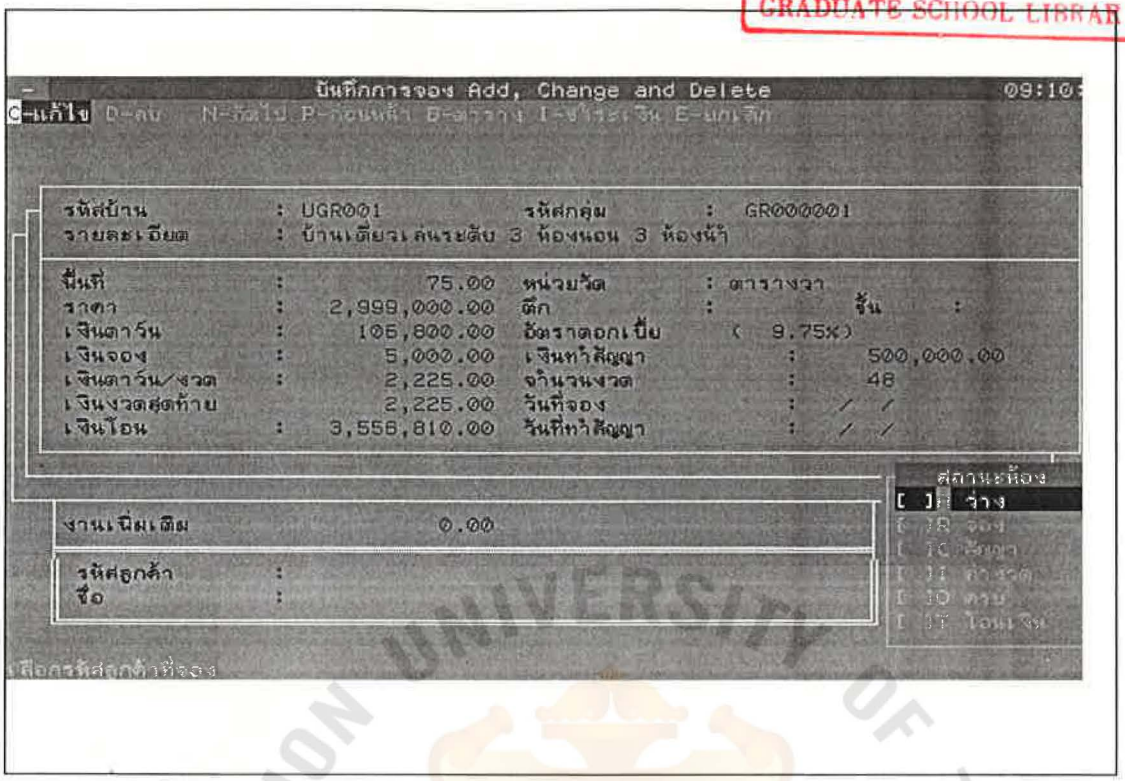


Figure A-25 Screen for Displaying the Reserved Unit

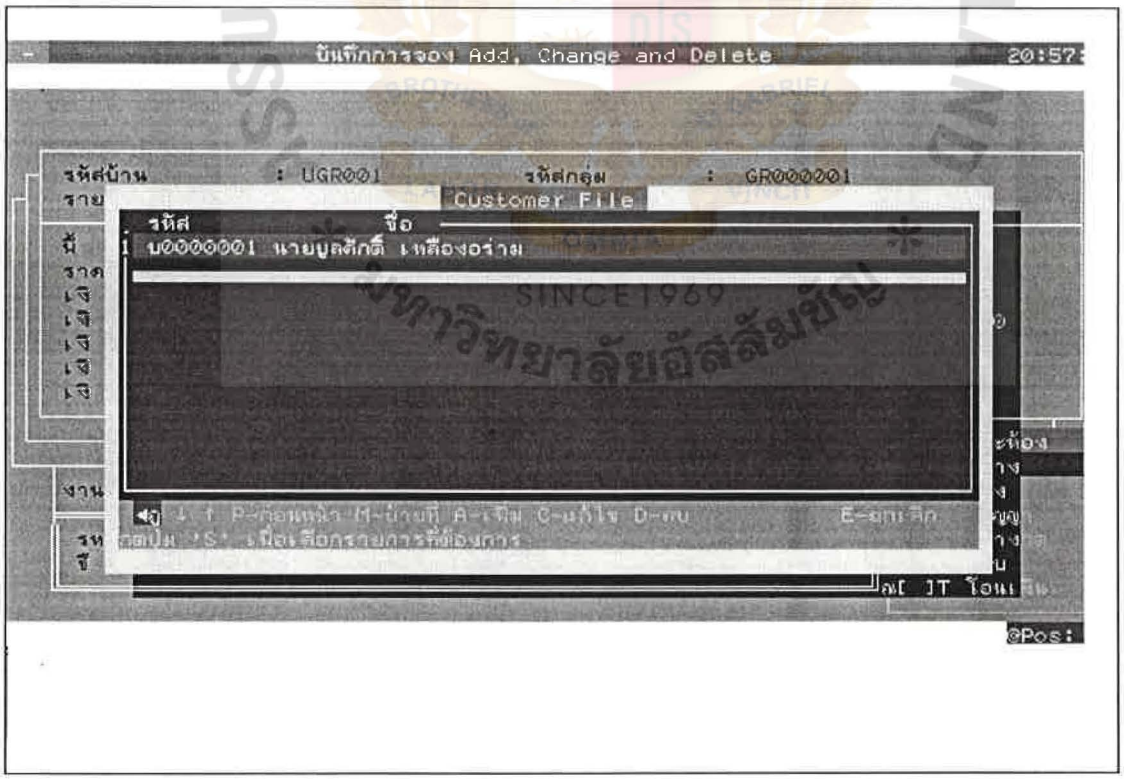


Figure A-26 Screen for Pop-up Customer Record to Reserved Unit

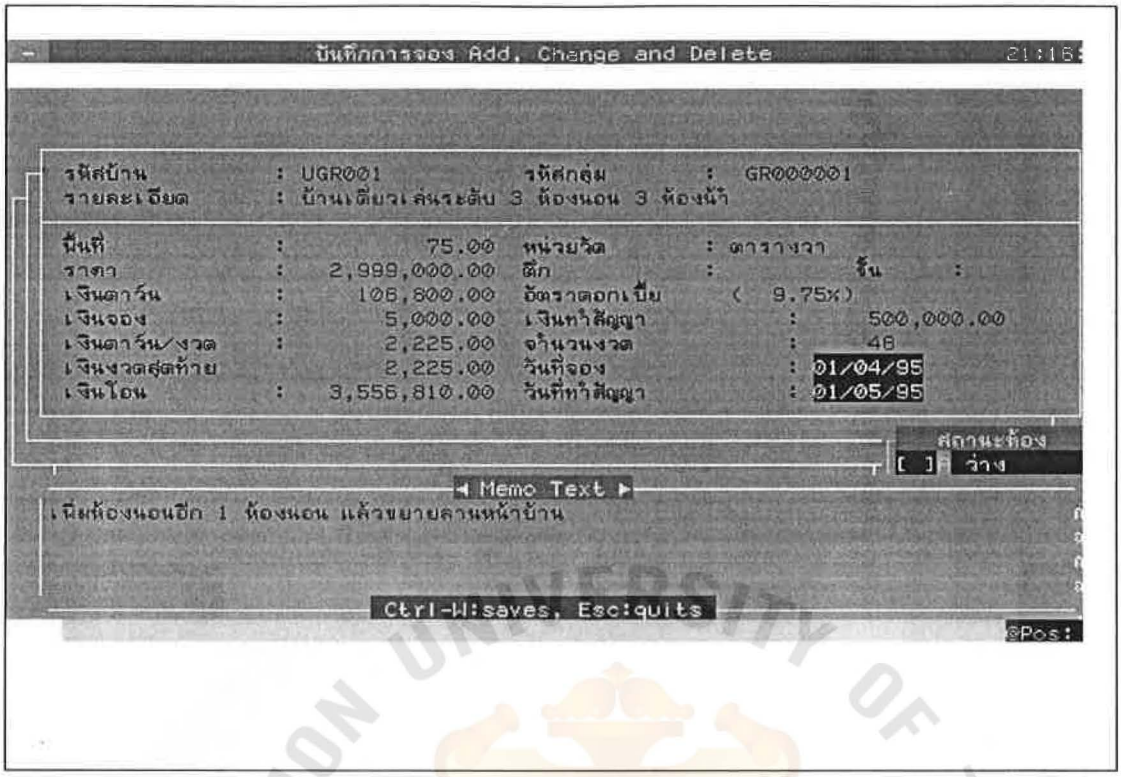


Figure A-27 Screen for Entering the Additional Work for Each Customer

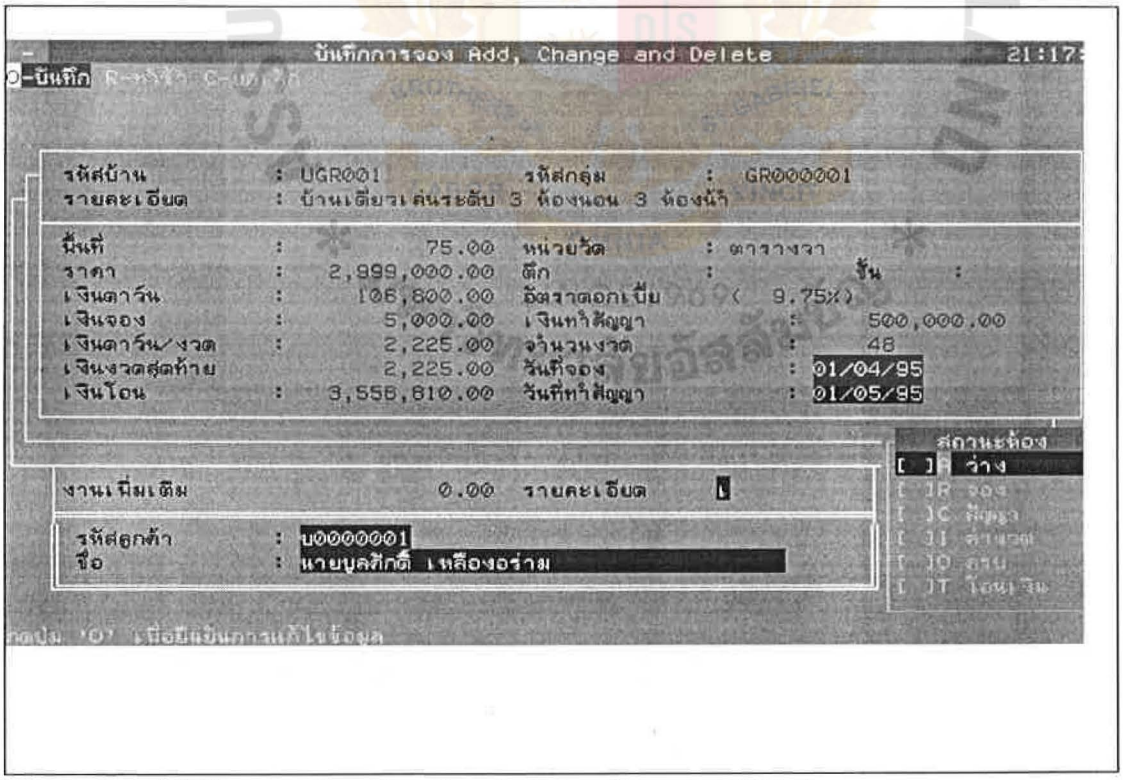


Figure A-28 Screen for Confirming the Reserved Unit

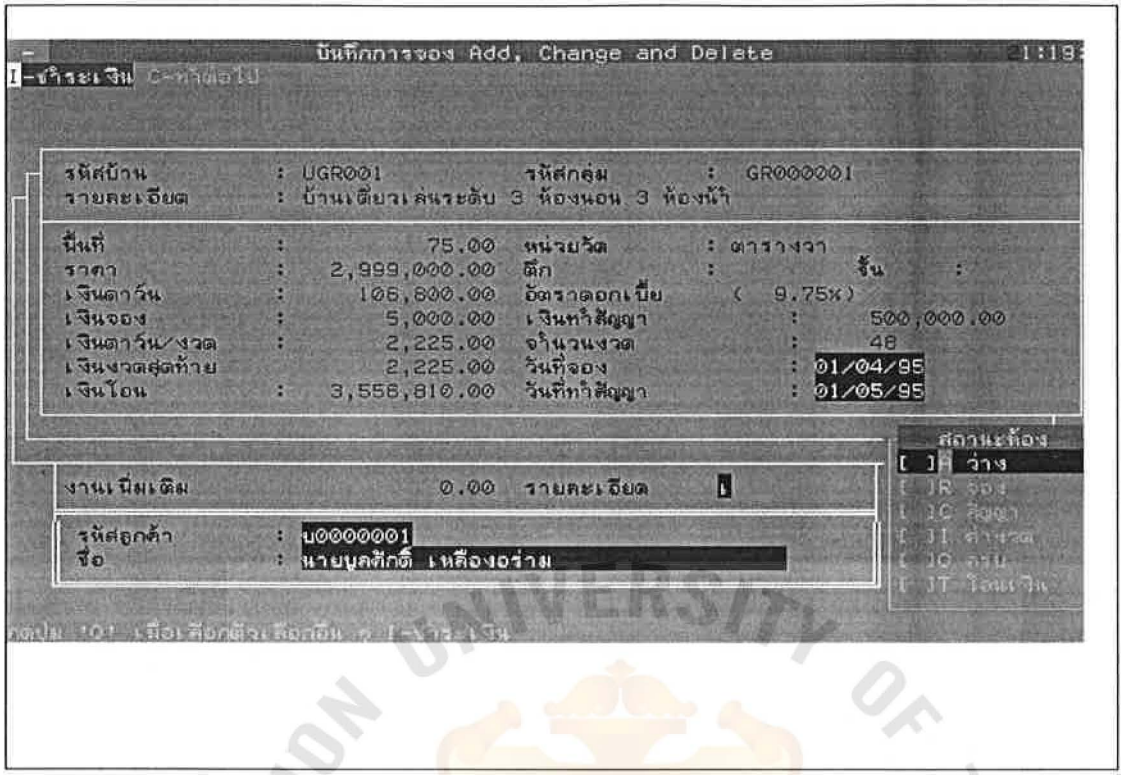


Figure A-29 Screen for Selecting the Option to pay the amount

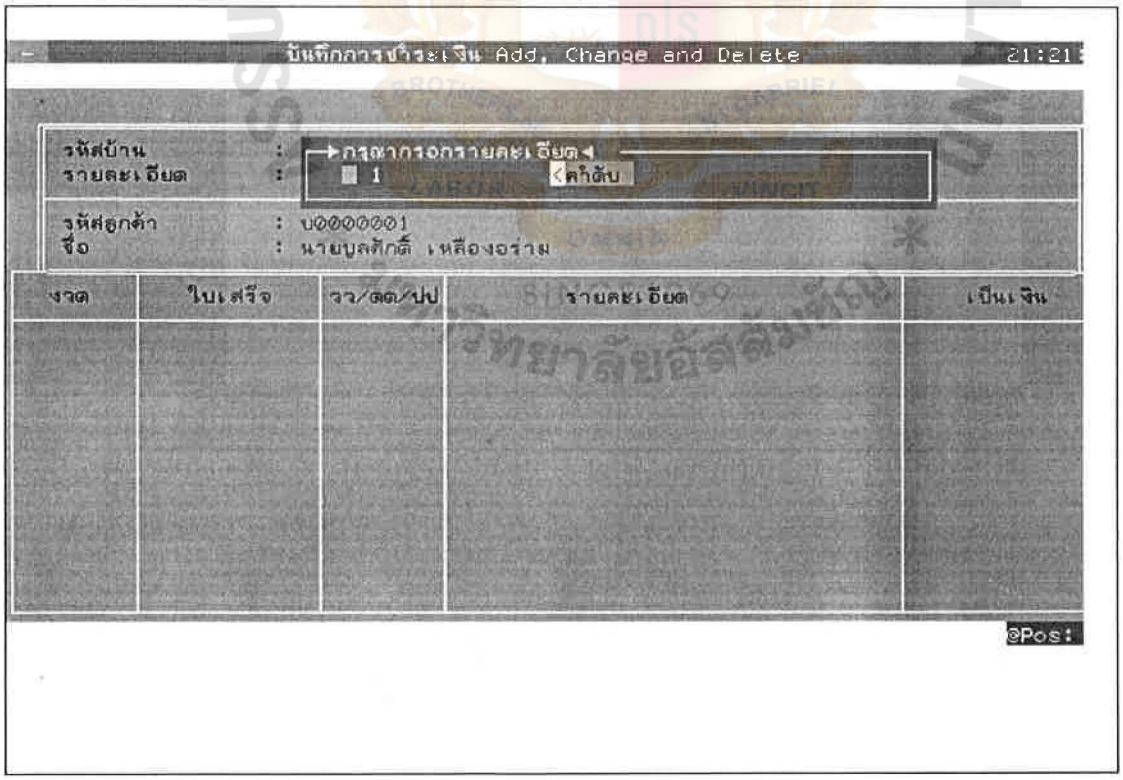


Figure A-30 Screen for Getting the Sequence of Customer's Payment

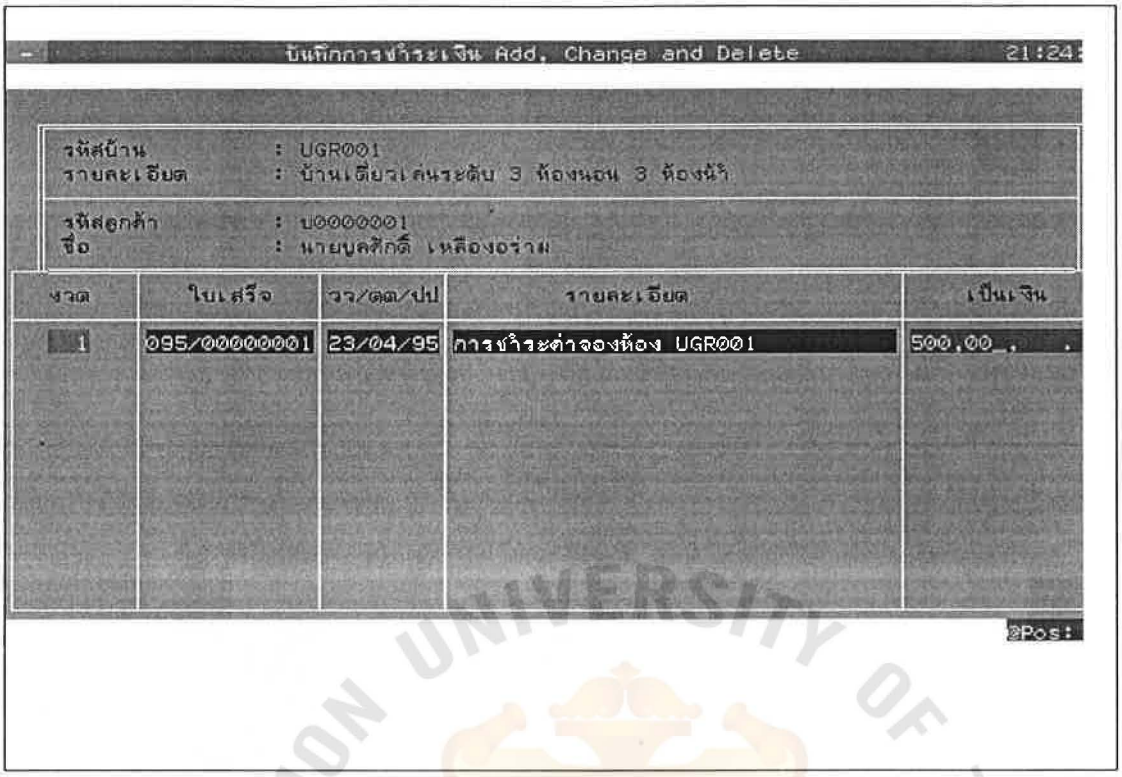


Figure A-31 Screen for Entering the Information of Customer's Payment

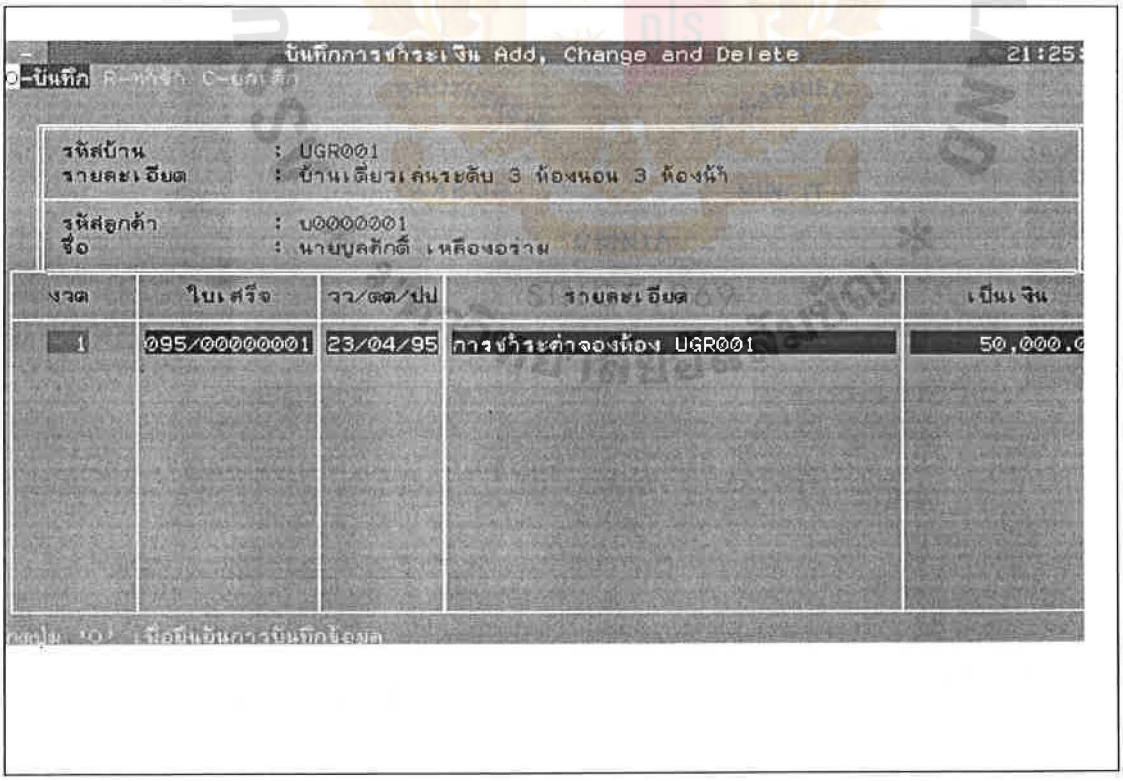


Figure A-32 Screen for Confirming the Customer's Payment

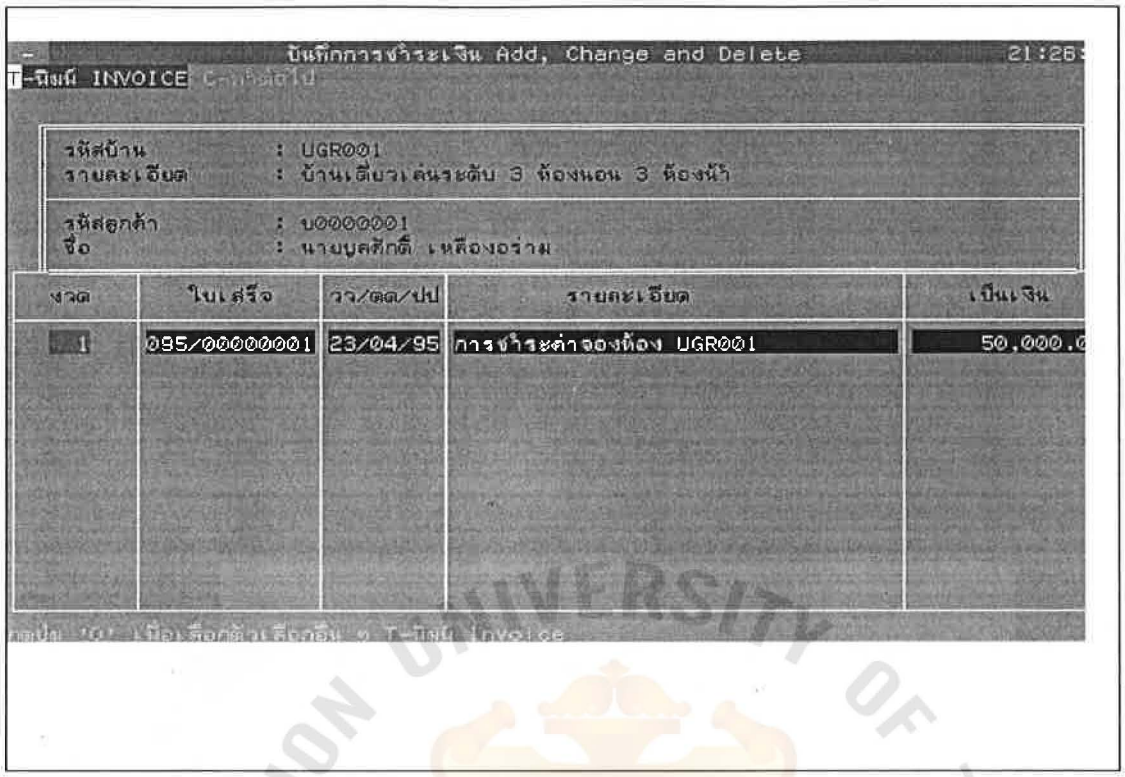


Figure A-33 Screen for Selecting the Printing the Receipt

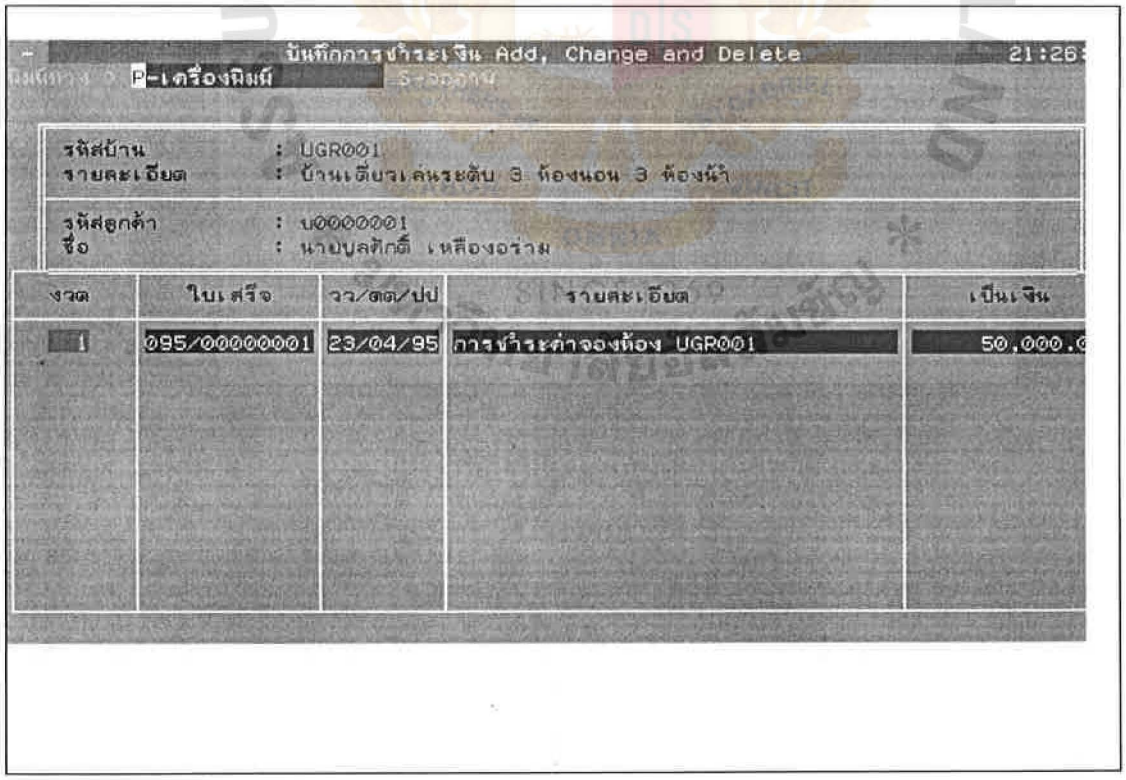


Figure A-34 Screen for Selecting the Way to print the Receipt

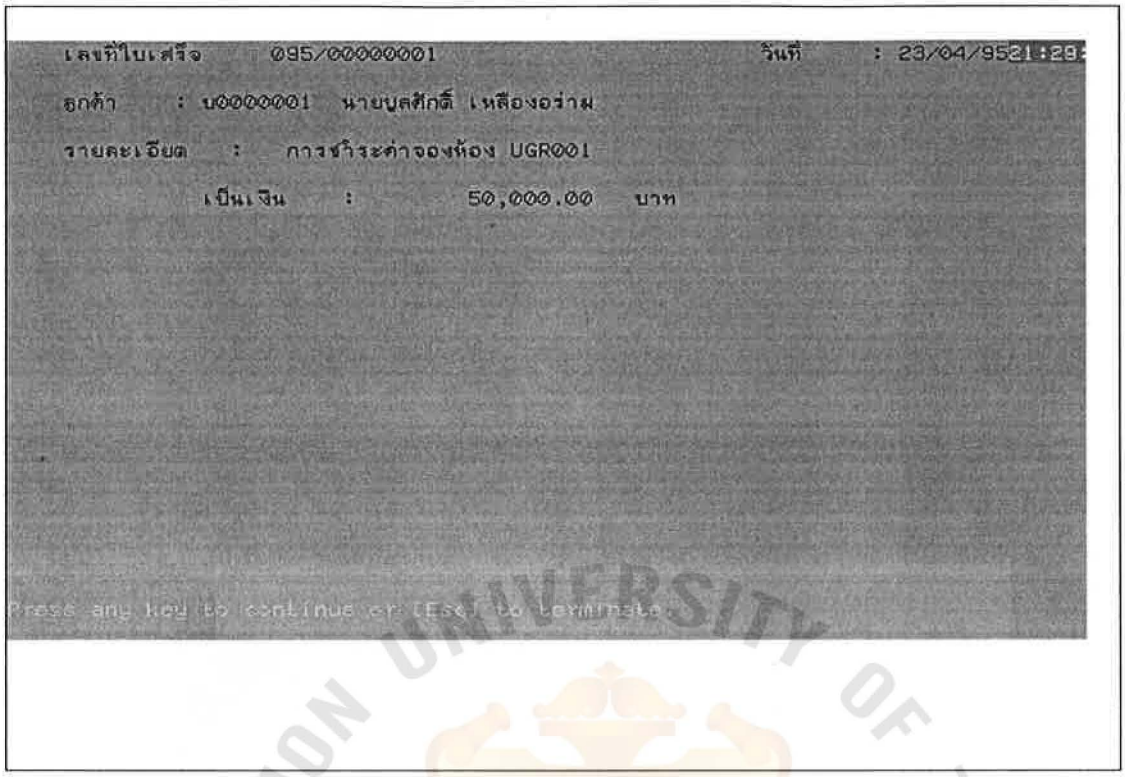
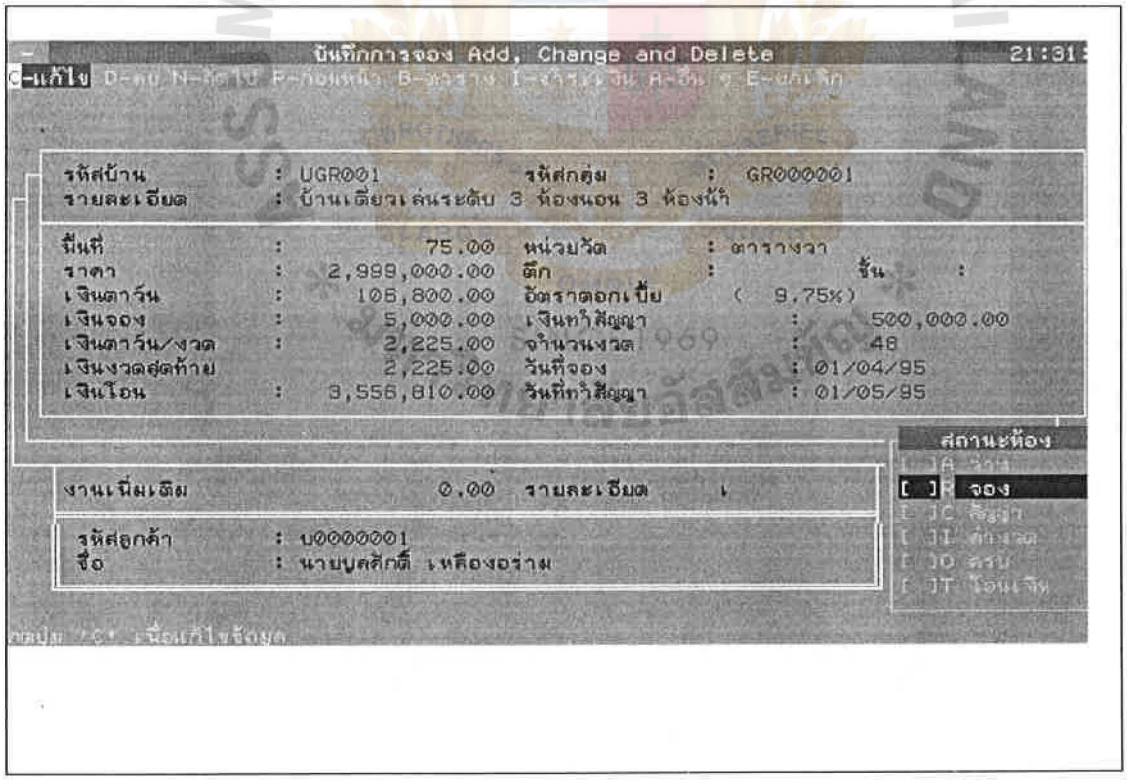


Figure A-35 Screen for the Sample of the Receipt



Figurea A-36 Screen for Displaying the Reserved Unit

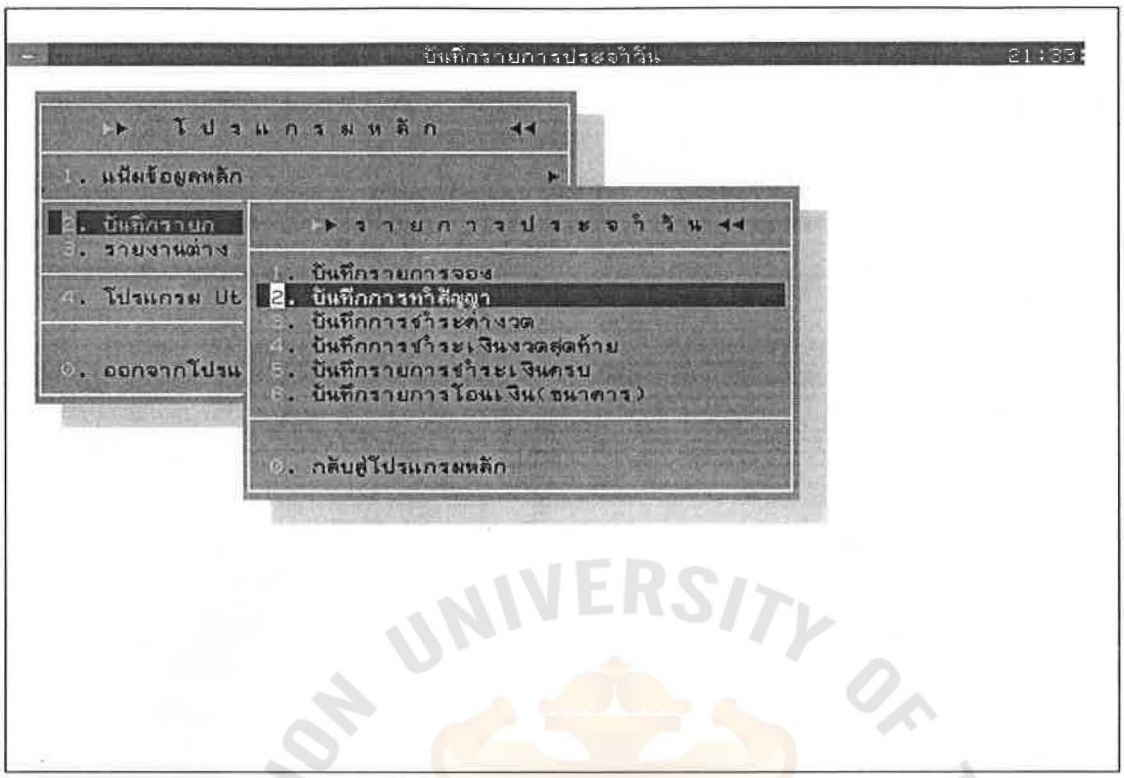


Figure A-37 Screen for Making the Contract (Menu)

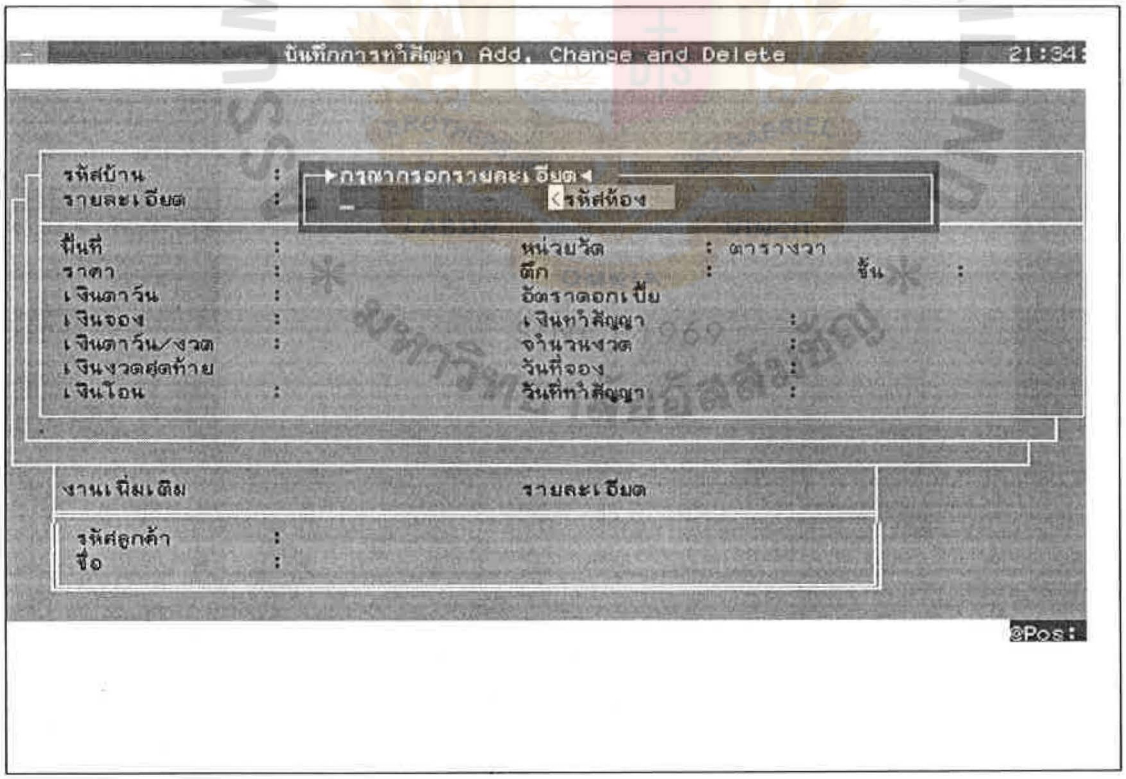


Figure A-38 Screen for Entering the Identification of Unit

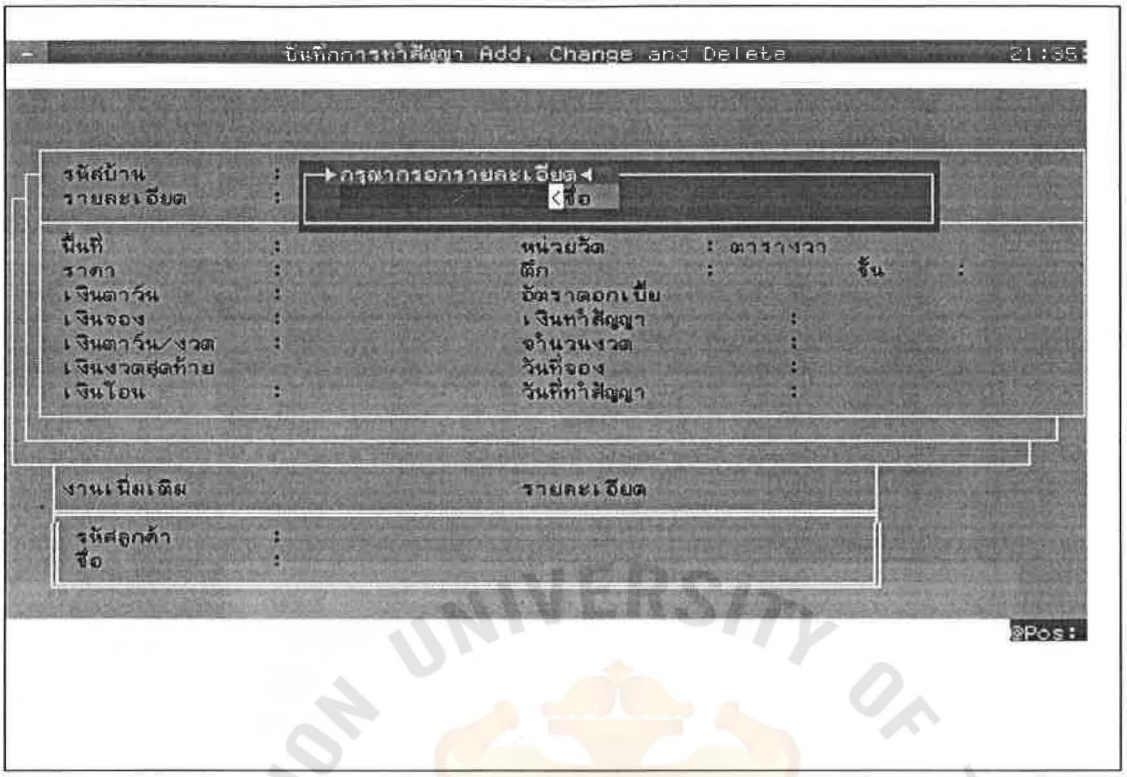


Figure A-39 Screen for Entering the Customer's Name (Reserved Unit)

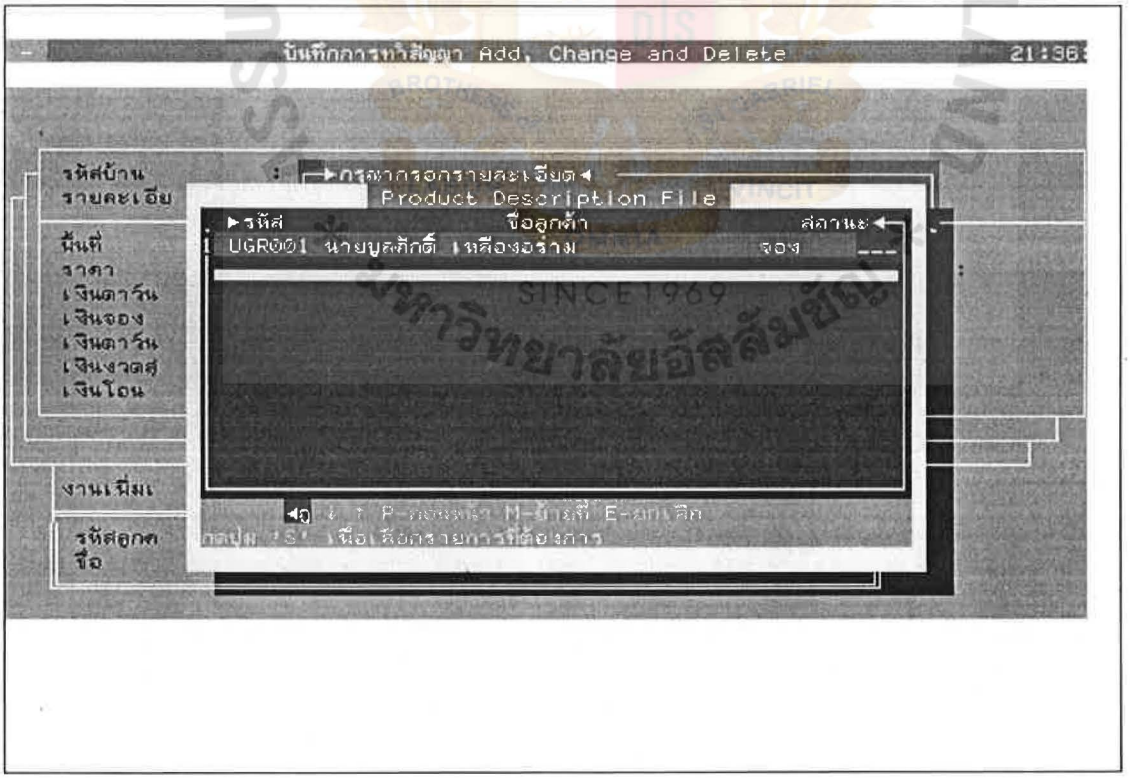


Figure A-40 Screen for Pop-Up Reserved Unit (All unit)

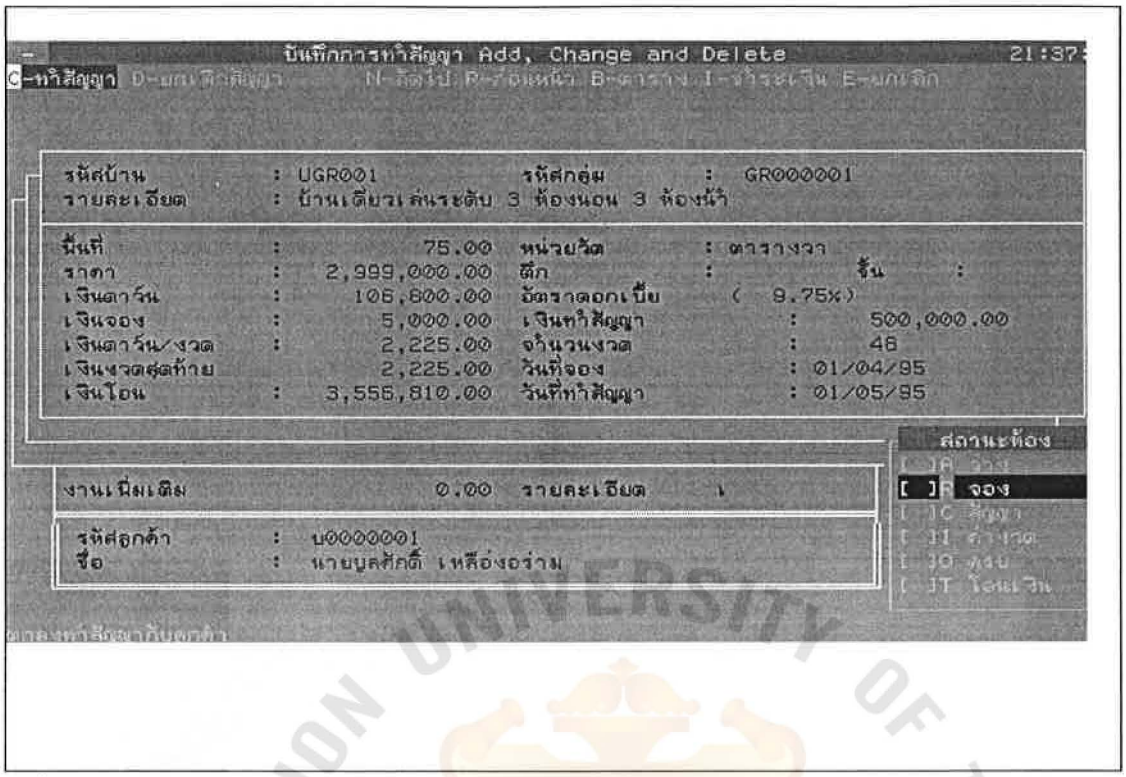


Figure A-41 Screen for Changing the Status of Unit (Reserved - Contract)

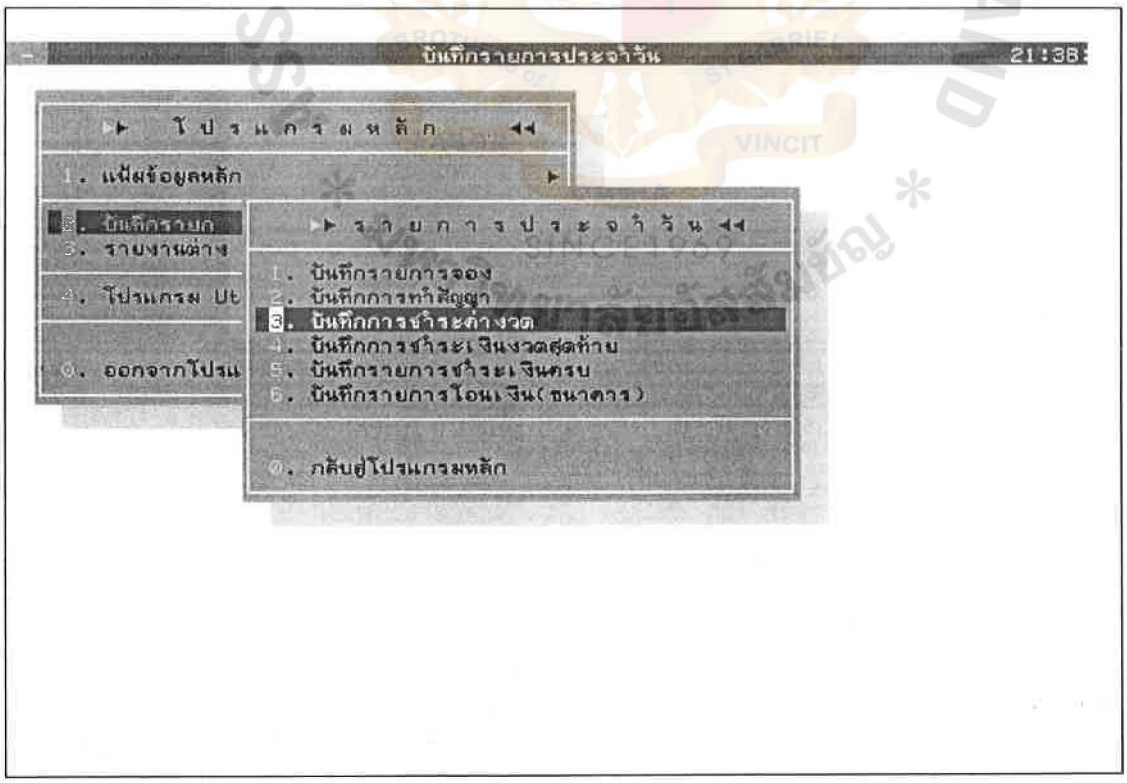


Figure A-42 Screen for Paying the Installment (Menu)

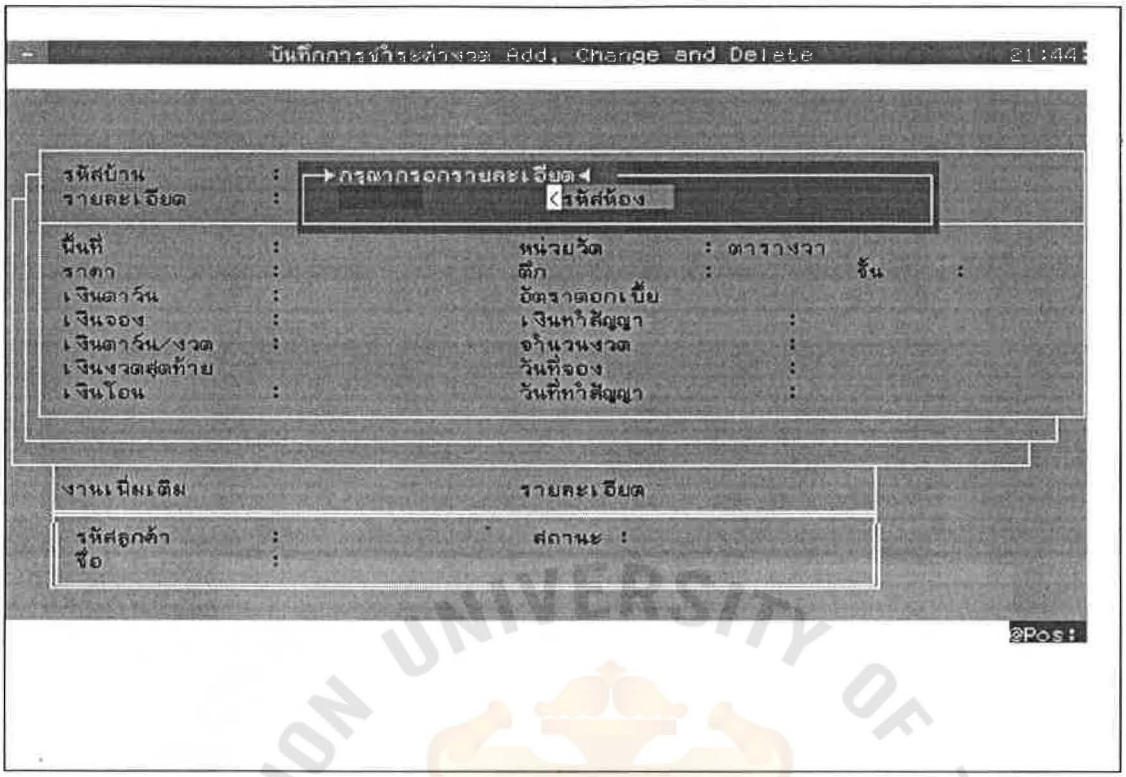


Figure A-43 Screen for Entering the Unit Code

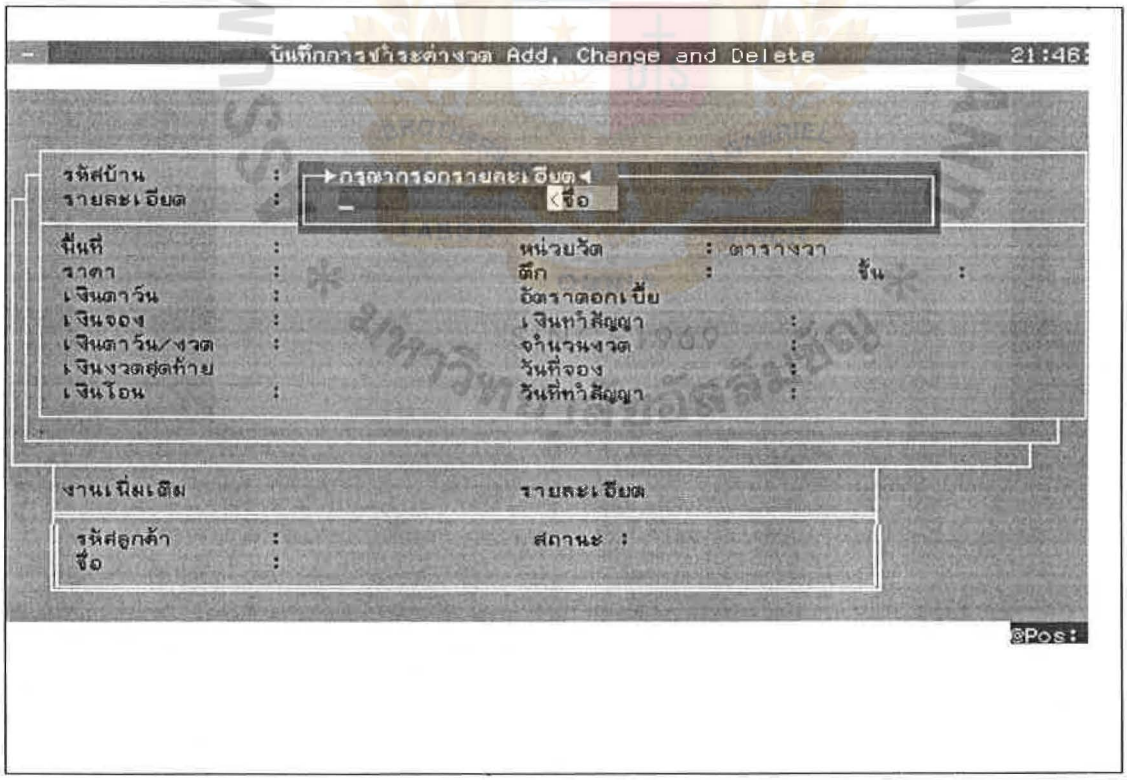


Figure A-44 Screen for Entering the Customer's Name

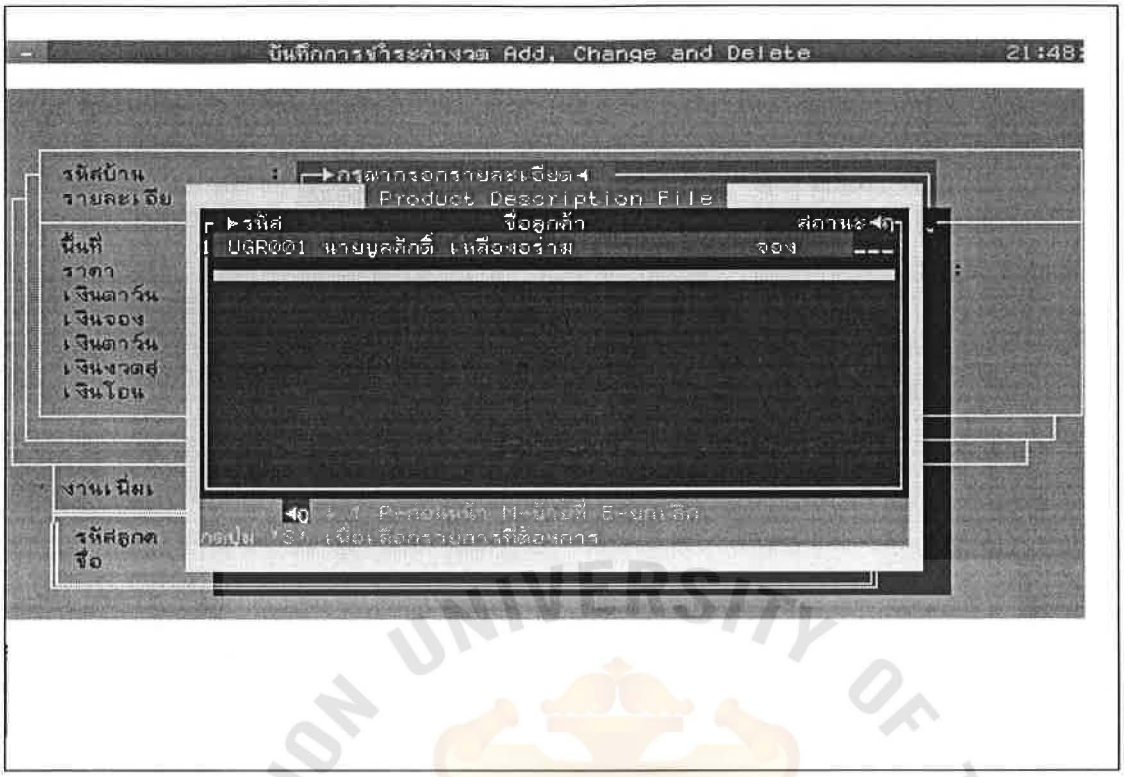


Figure A-45 Screen for Pop-Up Unit of Housing

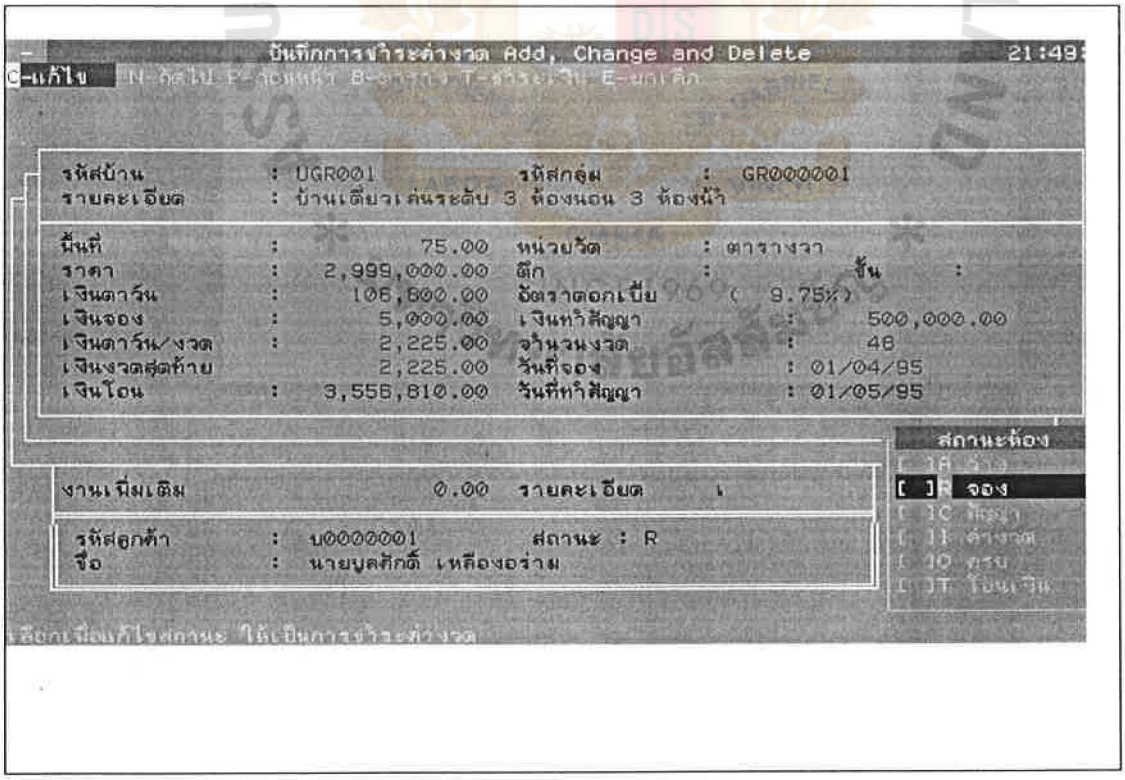


Figure A-46 Screen for Displaying the Unit (Command)

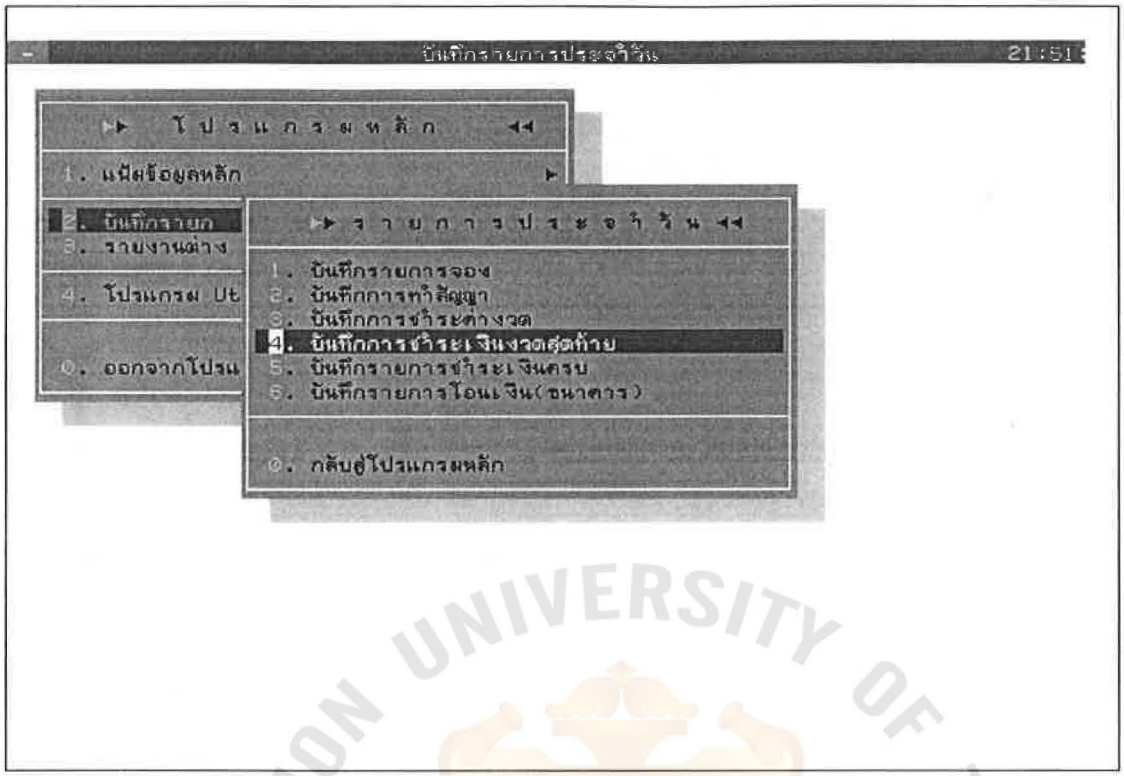


Figure A-47 Screen for Paying the Last Installment (Menu)

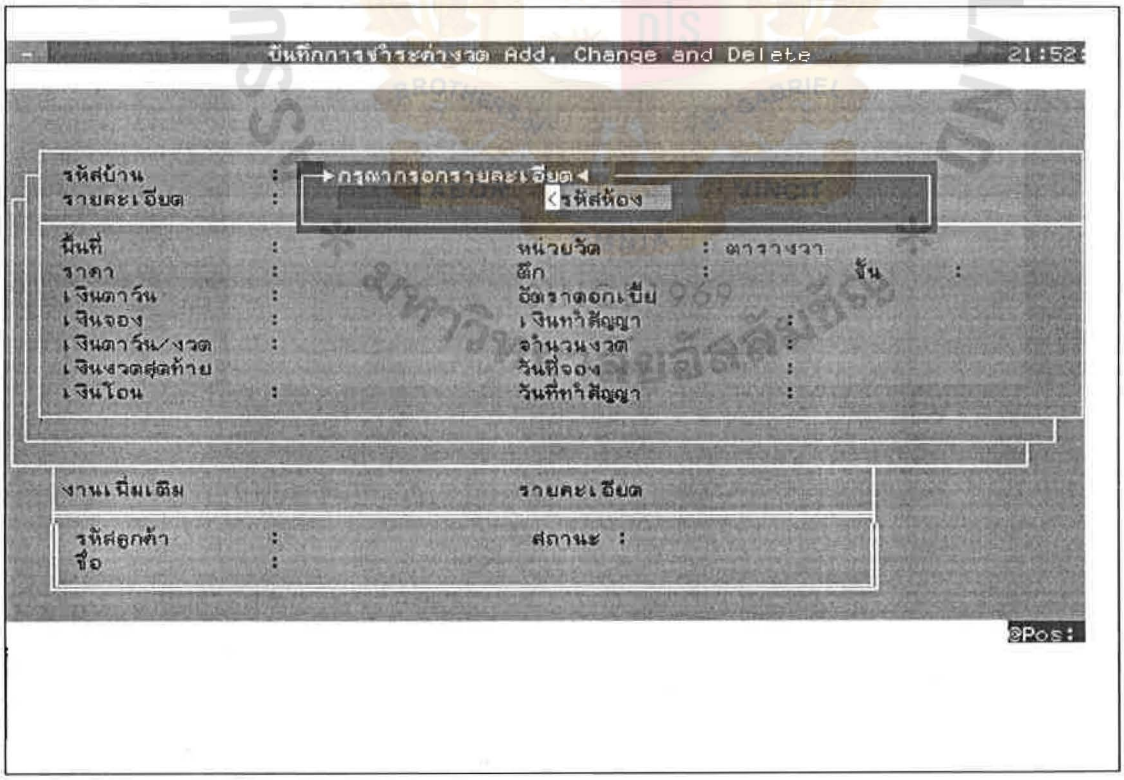


Figure A-48 Screen for Entering the Unit Code in Paying Last Installment

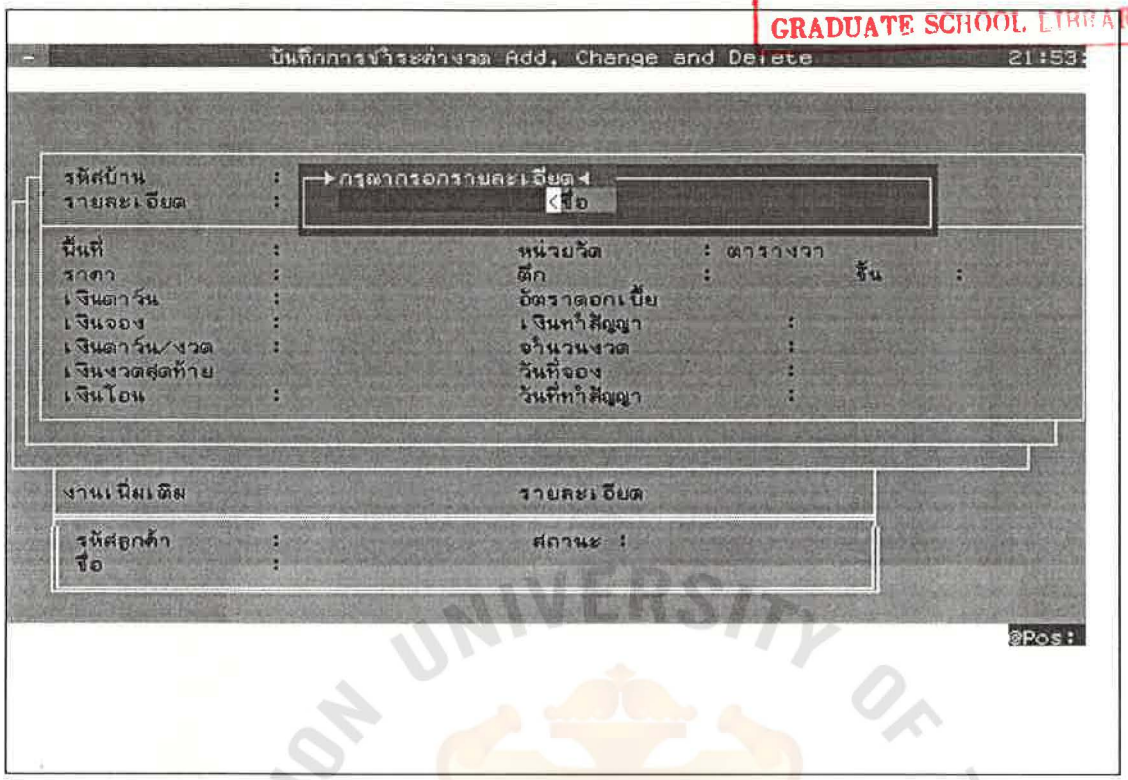


Figure A-49 Screen for Entering the Customer's Name in Last Installment

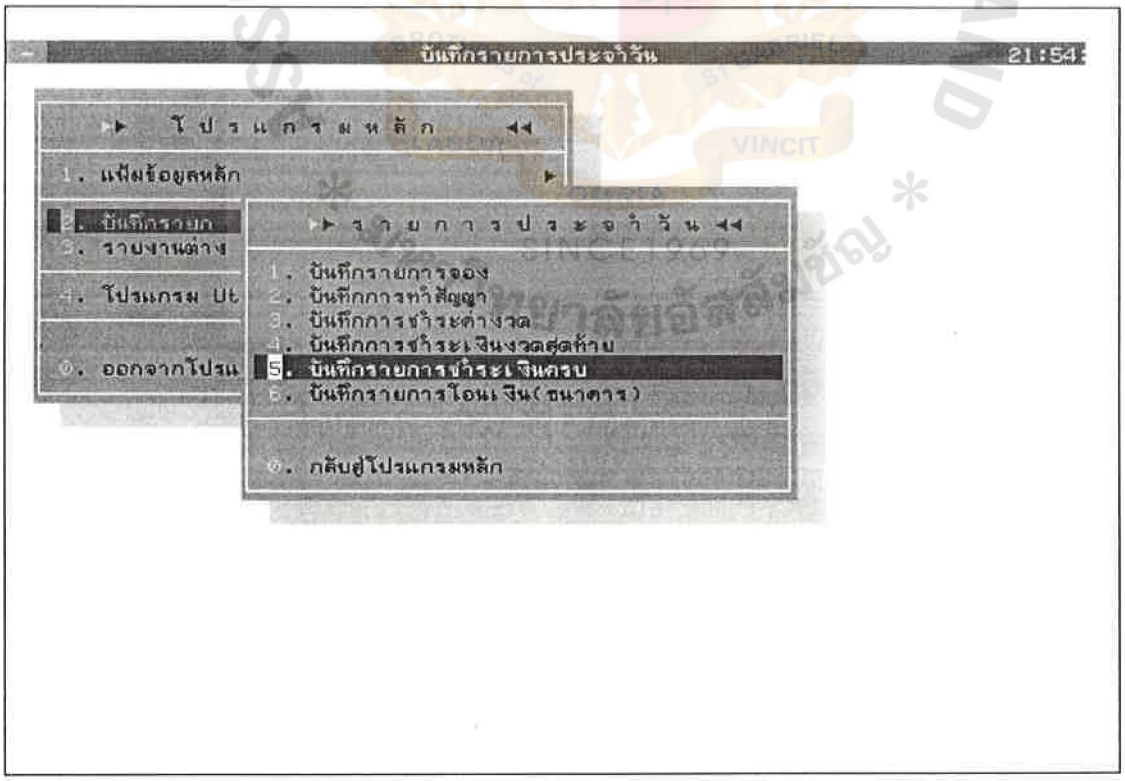


Figure A-50 Screen for Completed Payment (Menu)

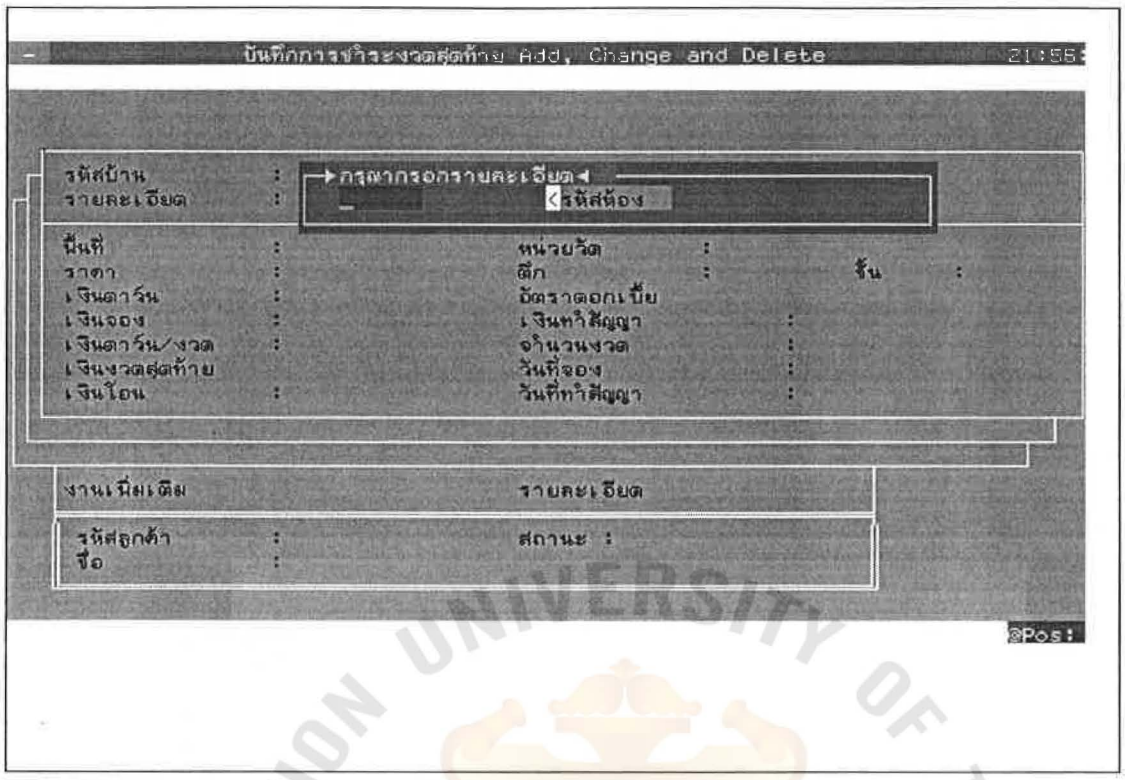


Figure A-51 Screen for Entering the Unit Code in Completed Payment

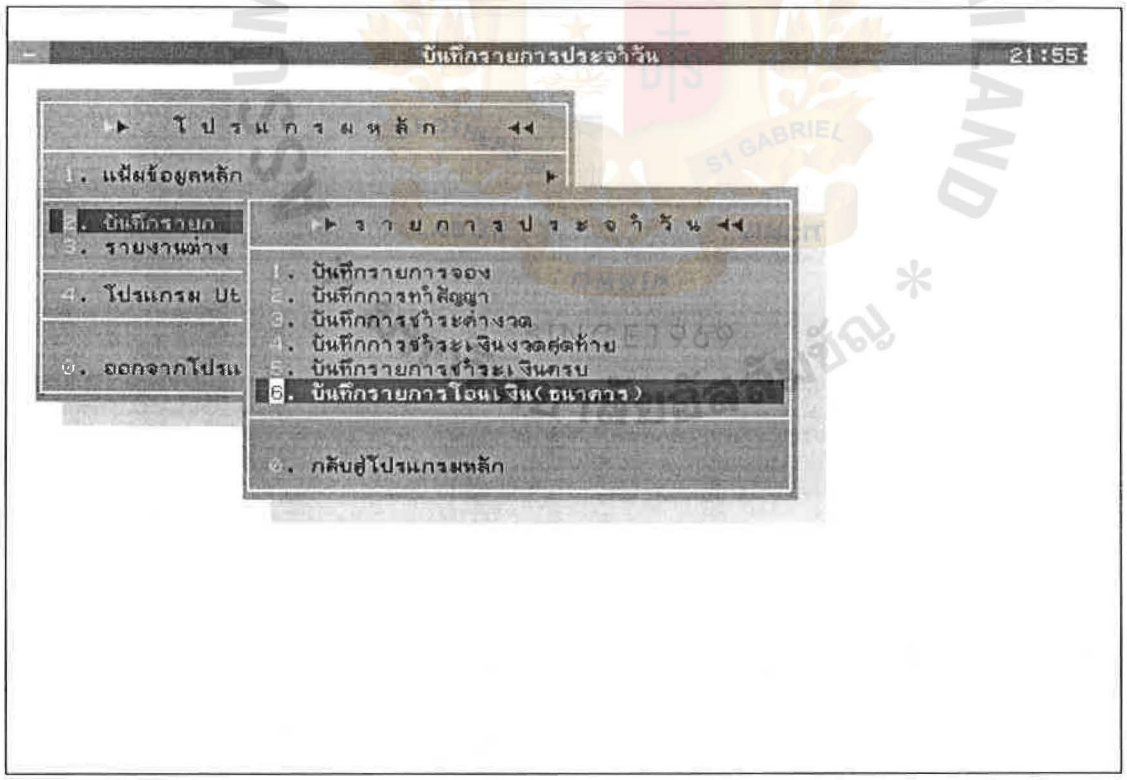


Figure A-52 Screen for Transferred Money to Bank (Menu)

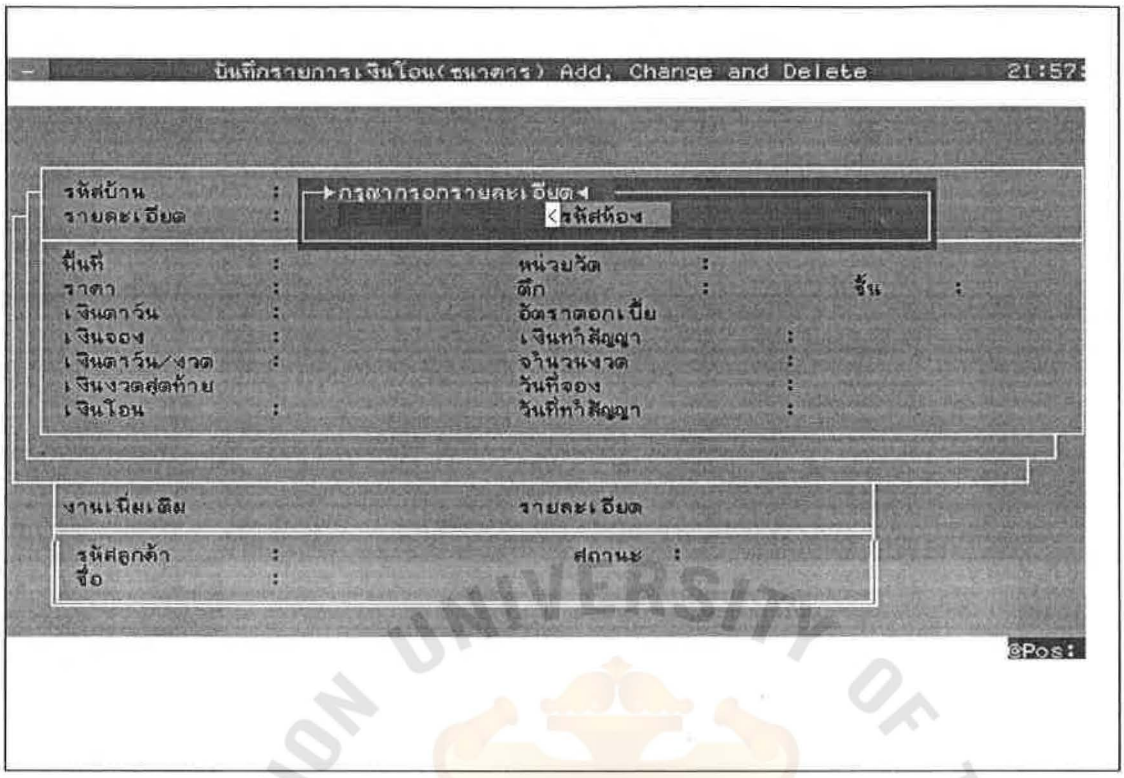


Figure A-53 Screen for Entering the Unit Code in Transferred Money

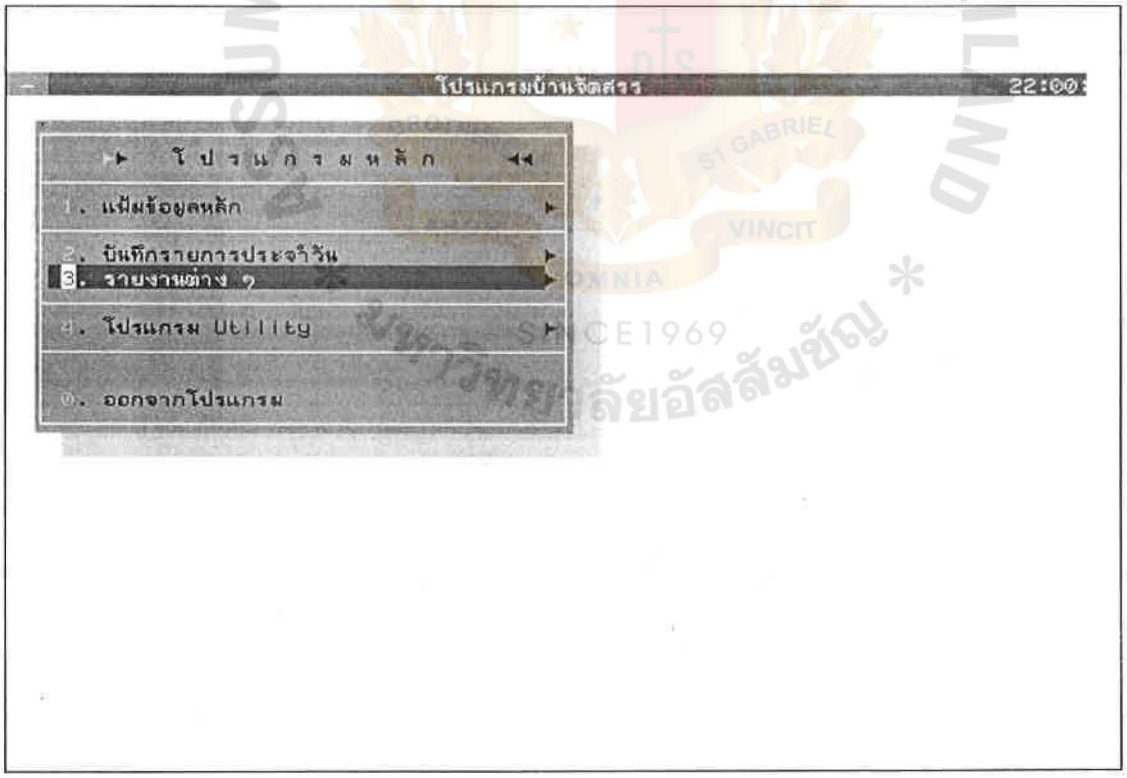


Figure A-54 Screen for Reporting Menu

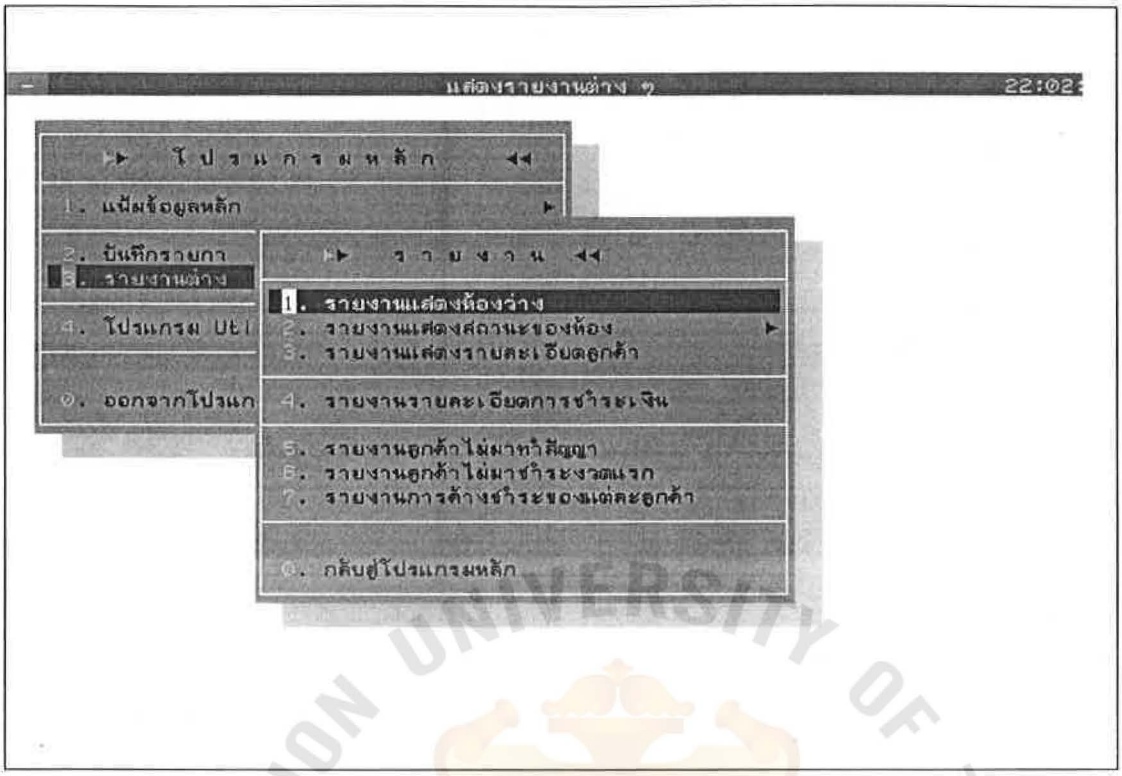


Figure A-55 Screen for Submenu of Report

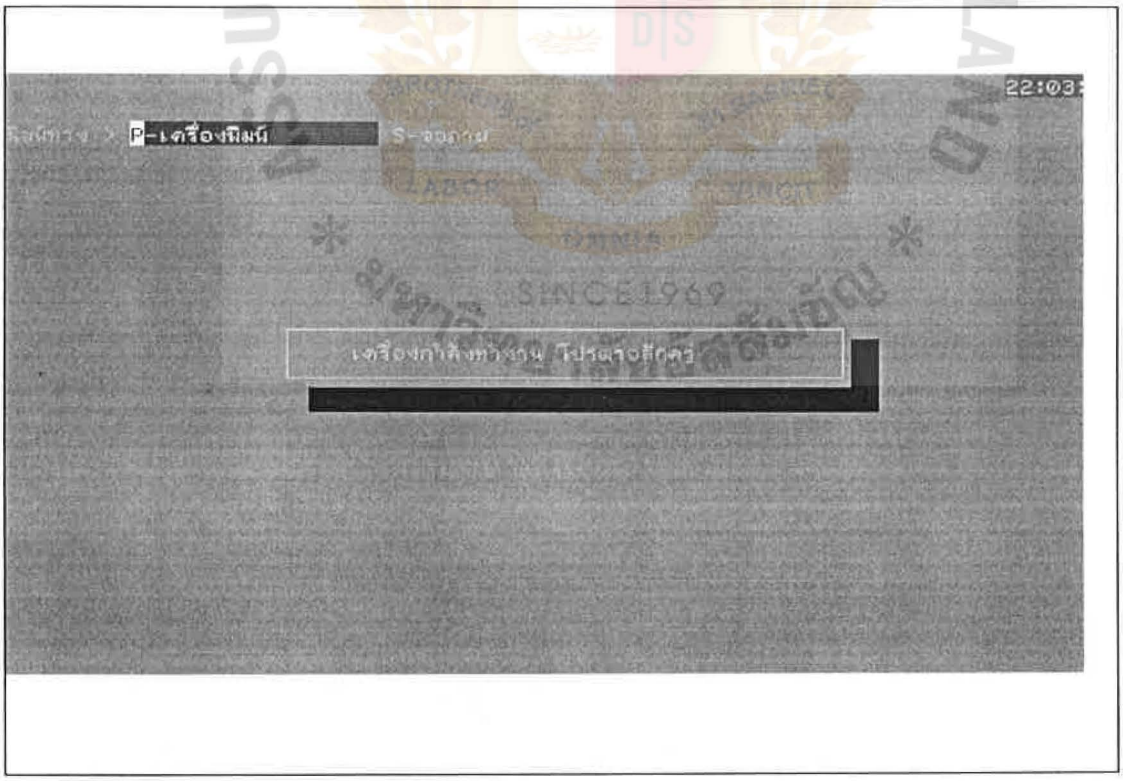


Figure A-56 Screen for Selecting the Output Type in every report

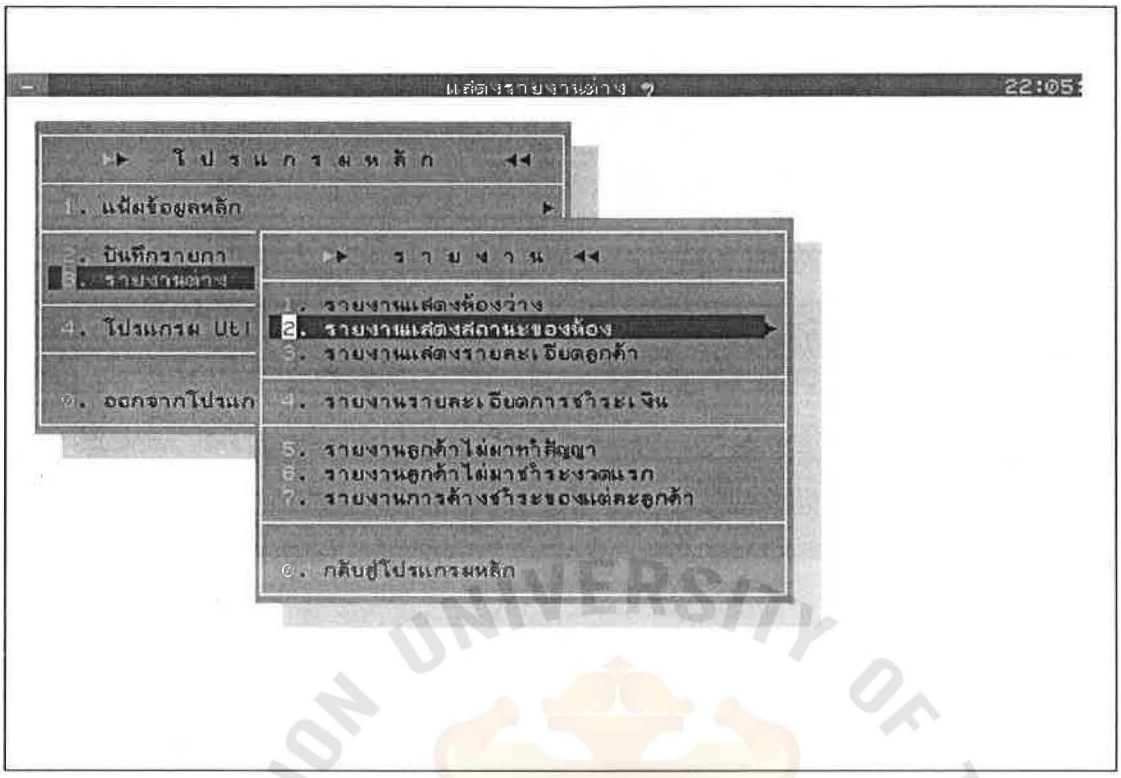


Figure A-57 Screen for Displaying Available Unit (Menu)

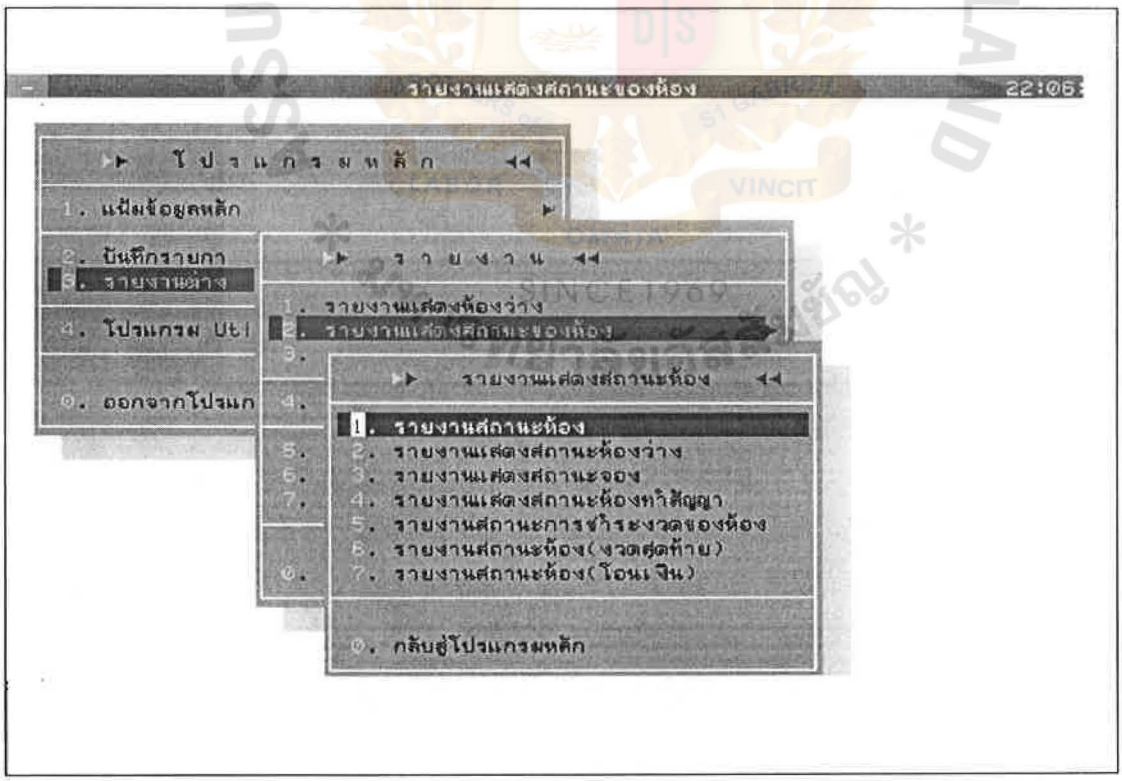


Figure A-58 Screen for Displaying the Status of Unit (Menu)

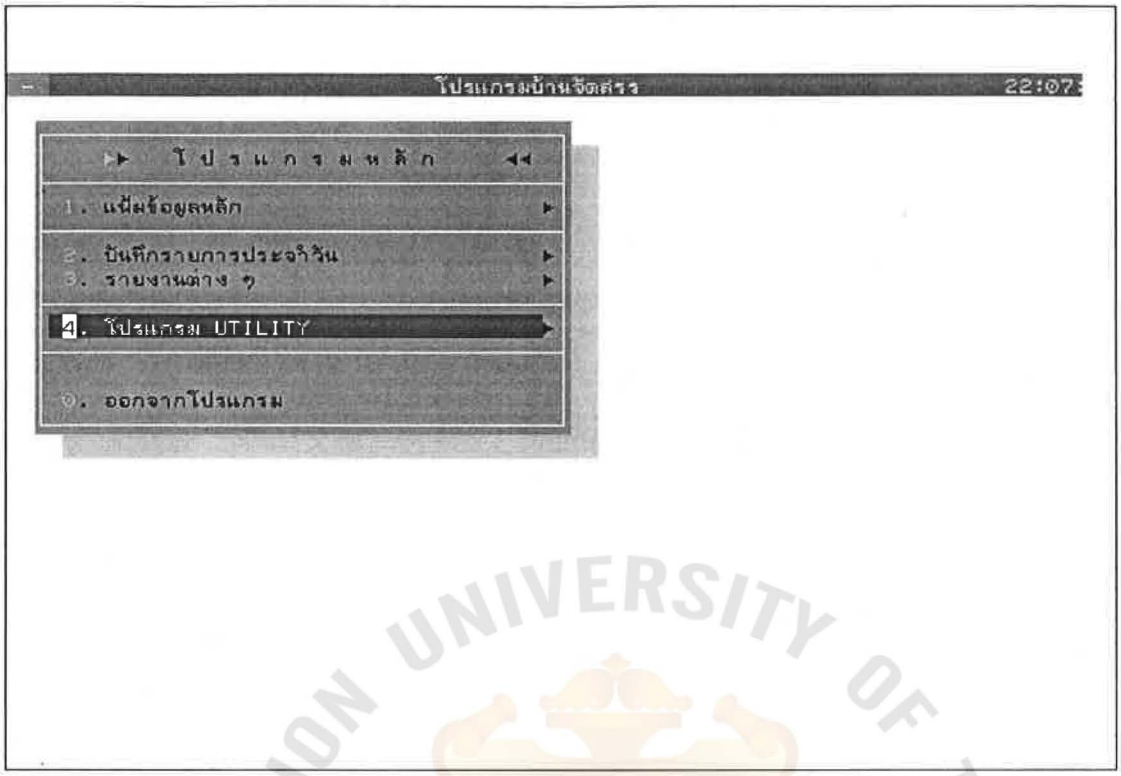


Figure A-59 Screen for Utility Menu

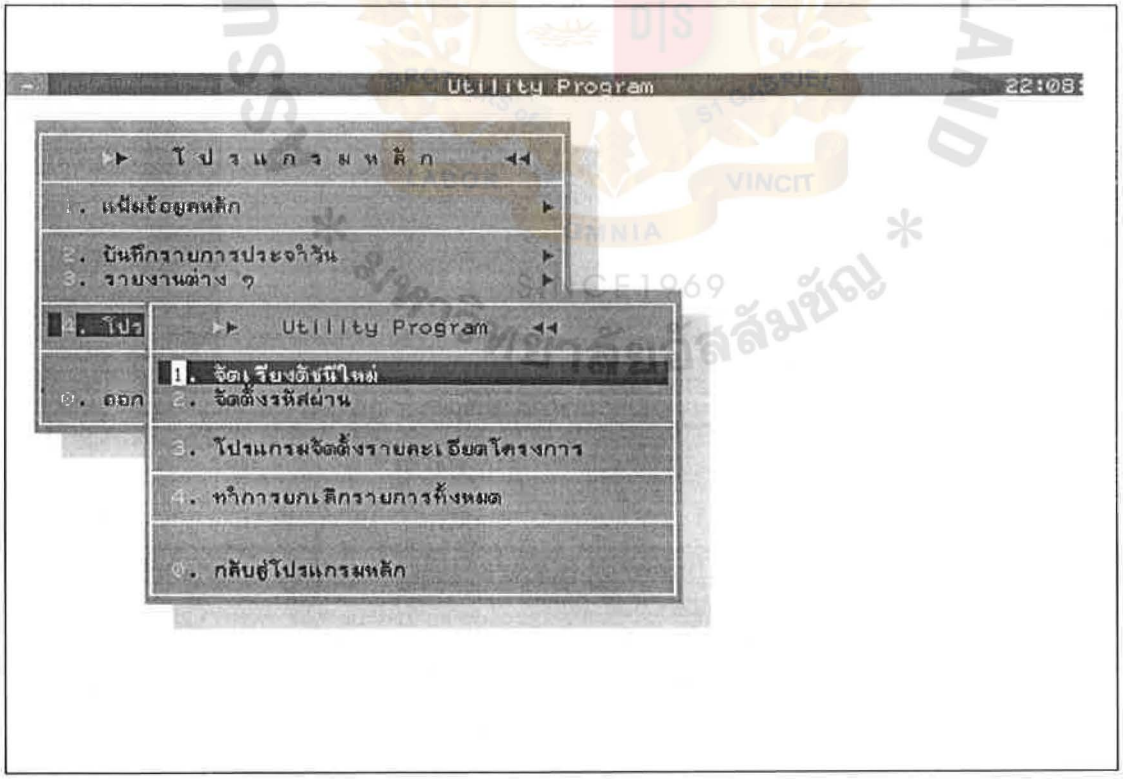


Figure A-60 Screen for Submenu in Utility Menu

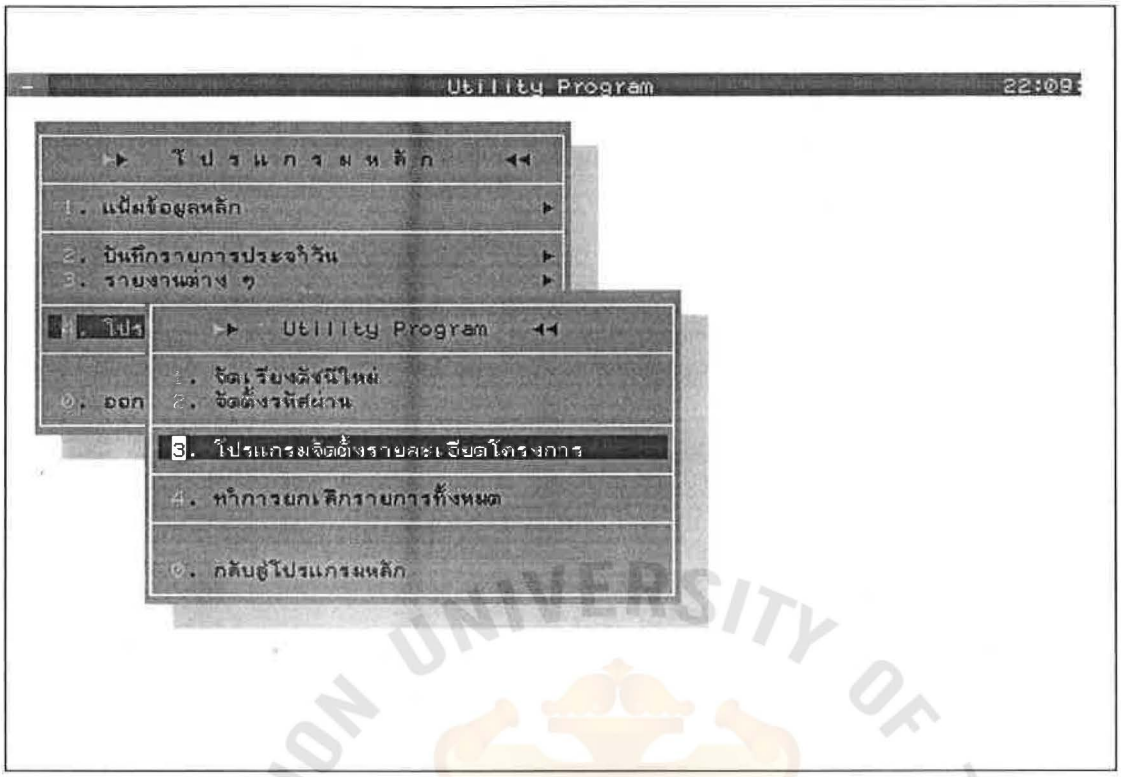


Figure A-61 Screen for Description of the Project (Menu)

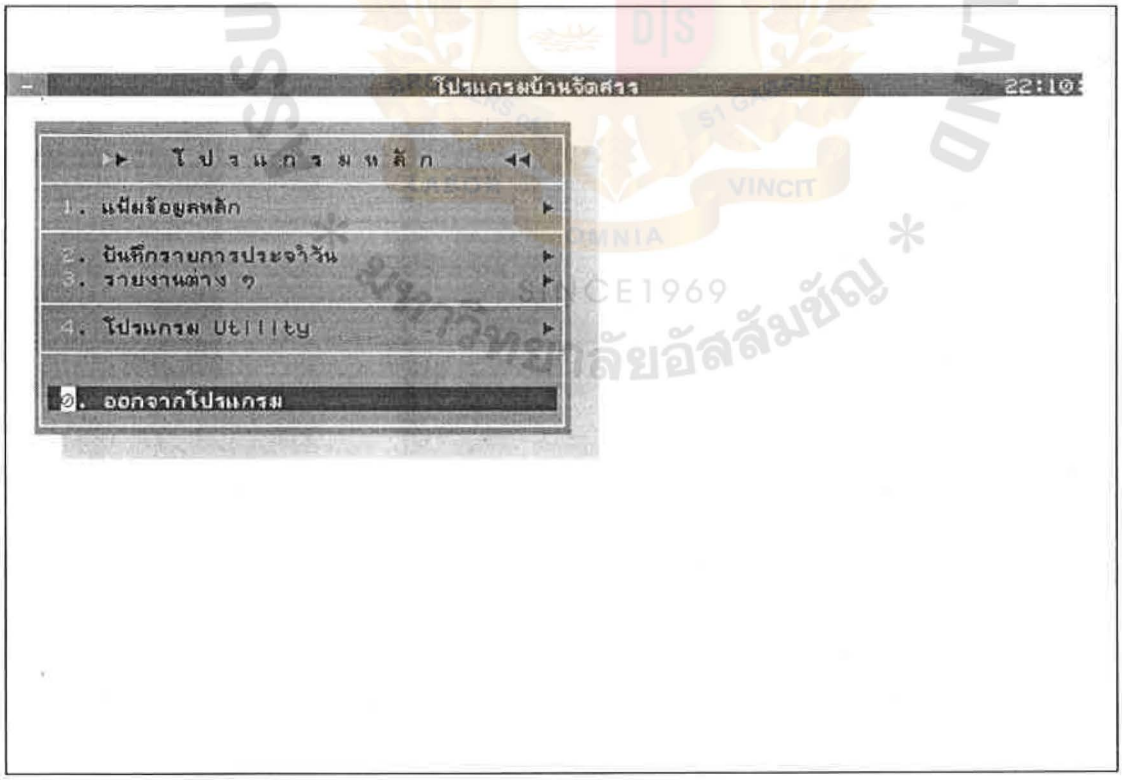


Figure A-62 Screen for Exited Choice in Menu

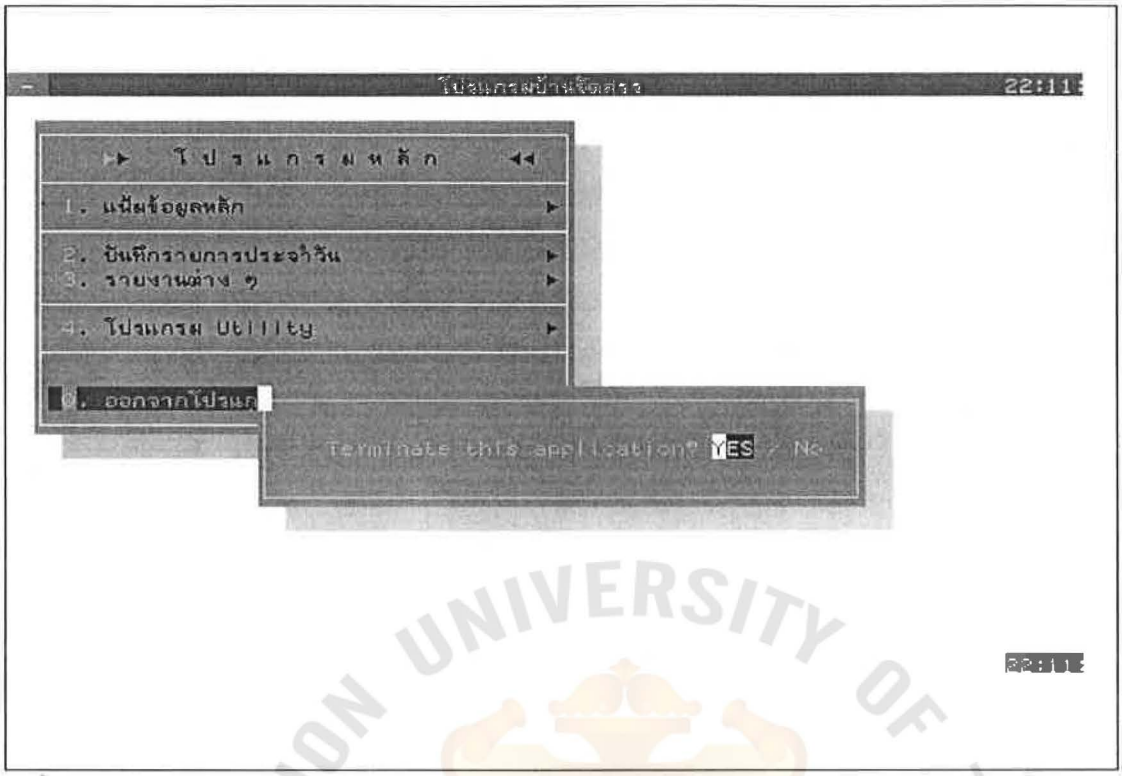


Figure A-63 Screen for Confirming to Exited from the Program

โปรแกรมบ้านจัดสรร

รายงานแสดงรายละเอียดการชำระเงินของลูกค้า

พิมพ์ dd/mm/yy หน้าที่ &##&

รหัส XXXXXX ลูกค้า : XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ใบเสร็จ	วันที่	รายละเอียด	เป็นเงิน
XXXXXXXXXX	DD/MM/YY	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	999,999,999.99
XXXXXXXXXX	DD/MM/YY	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	999,999,999.99
...	...	...	...
...	...	...	...
...	...	...	...

Figure B-1 Report for Displaying the Customers' Payments

โปรแกรมบ้านจัดสรร

รายงานแสดงห้องคงเหลือ (ห้องว่าง)

พิมพ์ dd/mm/yy หน้าที่ &##&

รหัส	รายละเอียด	พื้นที่	ราคา
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	999,999,999	999,999,999.99
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	999,999,999	999,999,999.99
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	999,999,999	999,999,999.99
...	...	...	...
...	...	...	...
...	...	...	...
	รวมทั้งสิ้น		999,999,999.99

Figure B-2 Report for Displaying Available Units

โปรแกรมบ้านจัดสรร

รายงานแสดงสถานะบ้าน

พิมพ์ dd/mm/yy หน้าที่ &##&

รหัส	รายละเอียด	ราคา	สถานะ
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	999,999,999.99	XXXXXX (ว่าง)
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	999,999,999.99	XXXXXX (จอง)
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	999,999,999.99	XXXXXX (สัญญา)
...	...	...	...
...	...	...	...
...	...	...	...

Figure B-3 Report For Displaying the Status of Units

โปรแกรมบ้านจัดสรร

รายงานแสดงสถานะบ้านและลูกค้า

พิมพ์ dd/mm/yy หน้าที่ &##&

รหัส	รายละเอียด	ลูกค้า	สถานะ
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXX (จอง)
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXX (จอง)
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXX (จอง)
...	...	...	...
...	...	...	...
...	...	...	...

Figure B-4 Report For Displaying the Status of Units and Customer Name

โปรแกรมบ้านจัดสรร

รายงานแสดงบ้านที่ถูกจอง

พิมพ์ dd/mm/yy **หน้าที่ &##&**

รหัส	รายละเอียด	ลูกค้า
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
...	...	...
...	...	...
...	...	...

Figure B-5 Report for Displaying the Reserved Units with the Customer

โปรแกรมบ้านจัดสรร

รายงานแสดงบ้านที่ทำสัญญา

พิมพ์ dd/mm/yy **หน้าที่ &##&**

รหัส	รายละเอียด	ลูกค้า
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
...	...	...
...	...	...
...	...	...

Figure B-6 Report for Displaying the Units that make Contract with the Customer

โปรแกรมบ้านจัดสรร

รายงานแสดงบ้านที่อยู่ในสถานะการชำระค่างวด

พิมพ์ dd/mm/yy หน้าที่ &##&

รหัส	รายละเอียด	ลูกค้า
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
...	...	...
...	...	...
...	...	...

Figure B-7 Report for Displaying the Units that pay the Installment with the Customer

โปรแกรมบ้านจัดสรร

รายงานแสดงบ้านที่ชำระงวดสุดท้าย

พิมพ์ dd/mm/yy หน้าที่ &##&

รหัส	รายละเอียด	ลูกค้า
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
...	...	...
...	...	...
...	...	...

Figure B-8 Report for Displaying the Units that pay the Last Installment with the Customer

โปรแกรมบ้านจัดสรร

รายงานแสดงบ้านที่โอนเงินไปธนาคาร

พิมพ์ dd/mm/yy หน้าที่ &###&

รหัส	รายละเอียด	ลูกค้า
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX
...	...	...
...	...	...
...	...	...

Figure B-9 Report for Displaying the Units that transfer to Bank with the Customer

โปรแกรมบ้านจัดสรร

รายงานแสดงการค้างการชำระเงินของลูกค้า ในสถานะ (การจอง)

พิมพ์ dd/mm/yy หน้าที่ &###&

รหัส	รายละเอียด	ลูกค้า	สถานะ
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXX (จอง)
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXX (จอง)
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXX (จอง)
...	...	...	...
...	...	...	...
...	...	...	...

Figure B-10 Report for Displaying the Unpaid of the Reserved Unit

โปรแกรมบ้านจัดสรร

รายงานแสดงการค้างการชำระเงินของลูกค้า ในสถานะ (การทำสัญญา)

พิมพ์ dd/mm/yy หน้าที่ &###&

รหัส	รายละเอียด	ลูกค้า	สถานะ
XXXXXX (สัญญา)	XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXX
XXXXXX (สัญญา)	XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXX
XXXXXX (สัญญา)	XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXX
...	...	...	...
...	...	...	...
...	...	...	...

Figure B-11 Report For Displaying the Unpaid for the Units that make Contract

โปรแกรมบ้านจัดสรร

รายงานสรุปยอดขายของโครงการ

พิมพ์ dd/mm/yy หน้าที่ &###&

รหัส	รายละเอียด	ทั้งหมด	ขาย	คงเหลือ
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	100%	##.##%	##.##%
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	100%	##.##%	##.##%
XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	100%	##.##%	##.##%
...	...	...	...	...
...	...	...	...	...
...	...	...	...	...

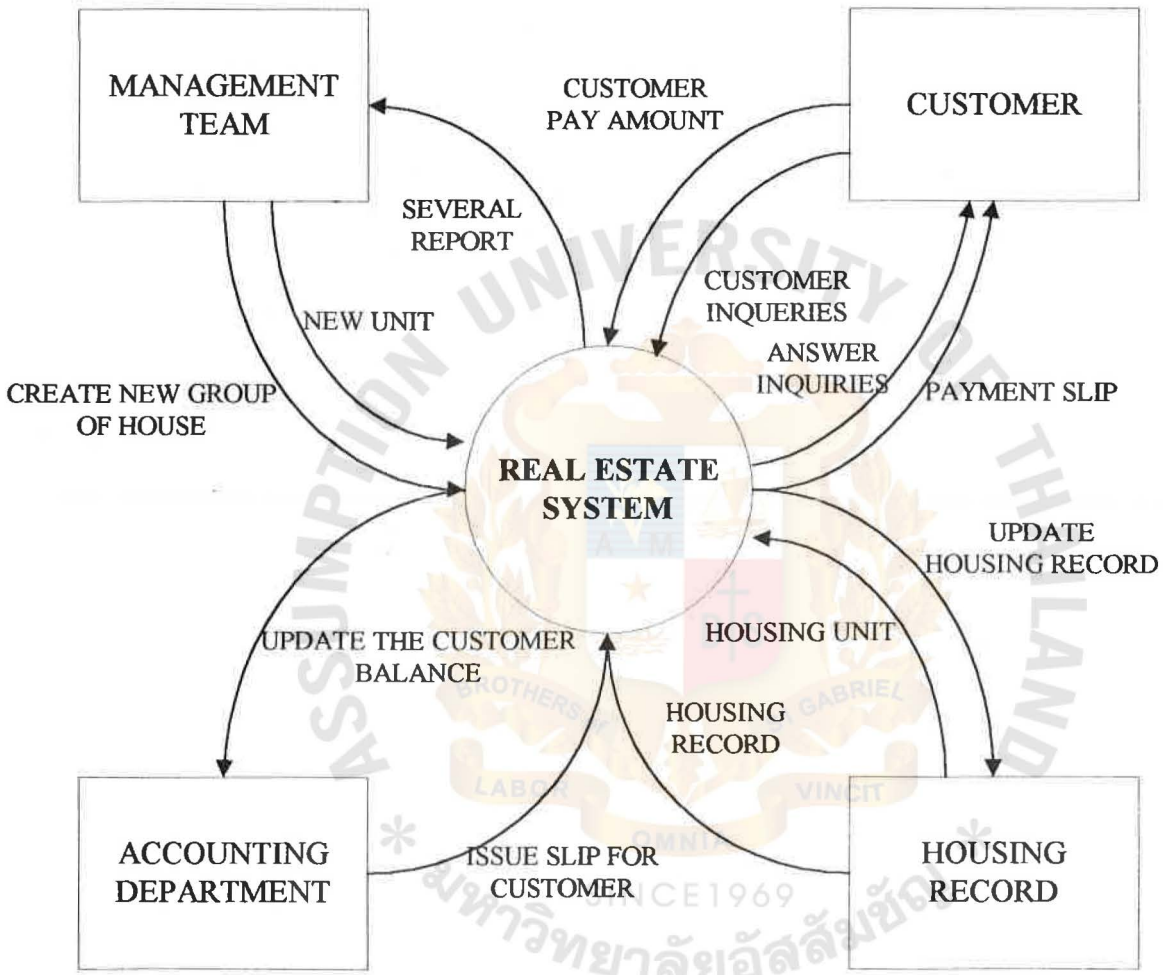


FIGURE C-1 THE CONTEXT DIAGRAM OF REAL ESTATE SYSTEM

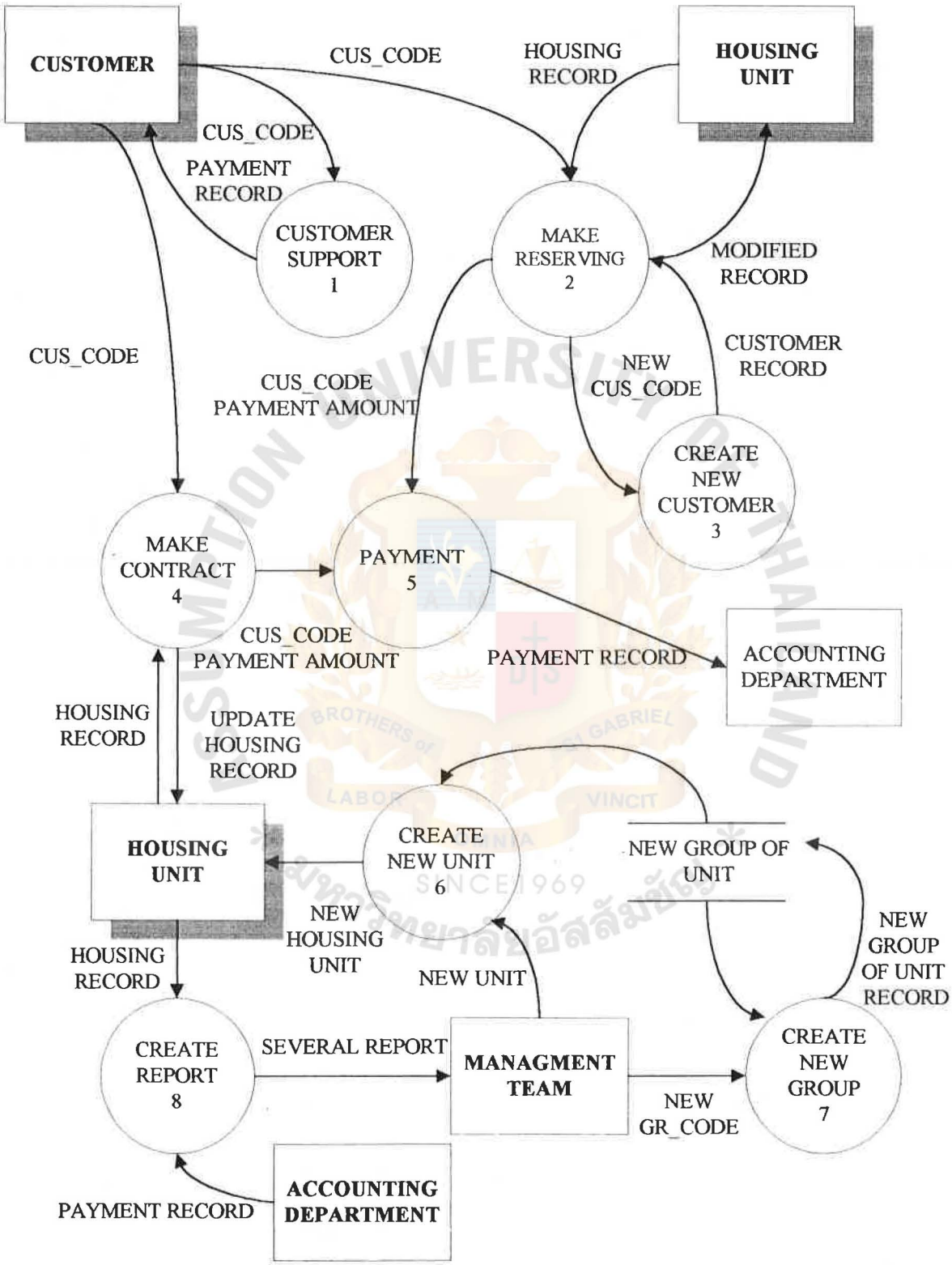


FIGURE C-2 THE DATA FLOW DIAGRAM LEVEL 0 OF REAL ESTATE SYSTEM

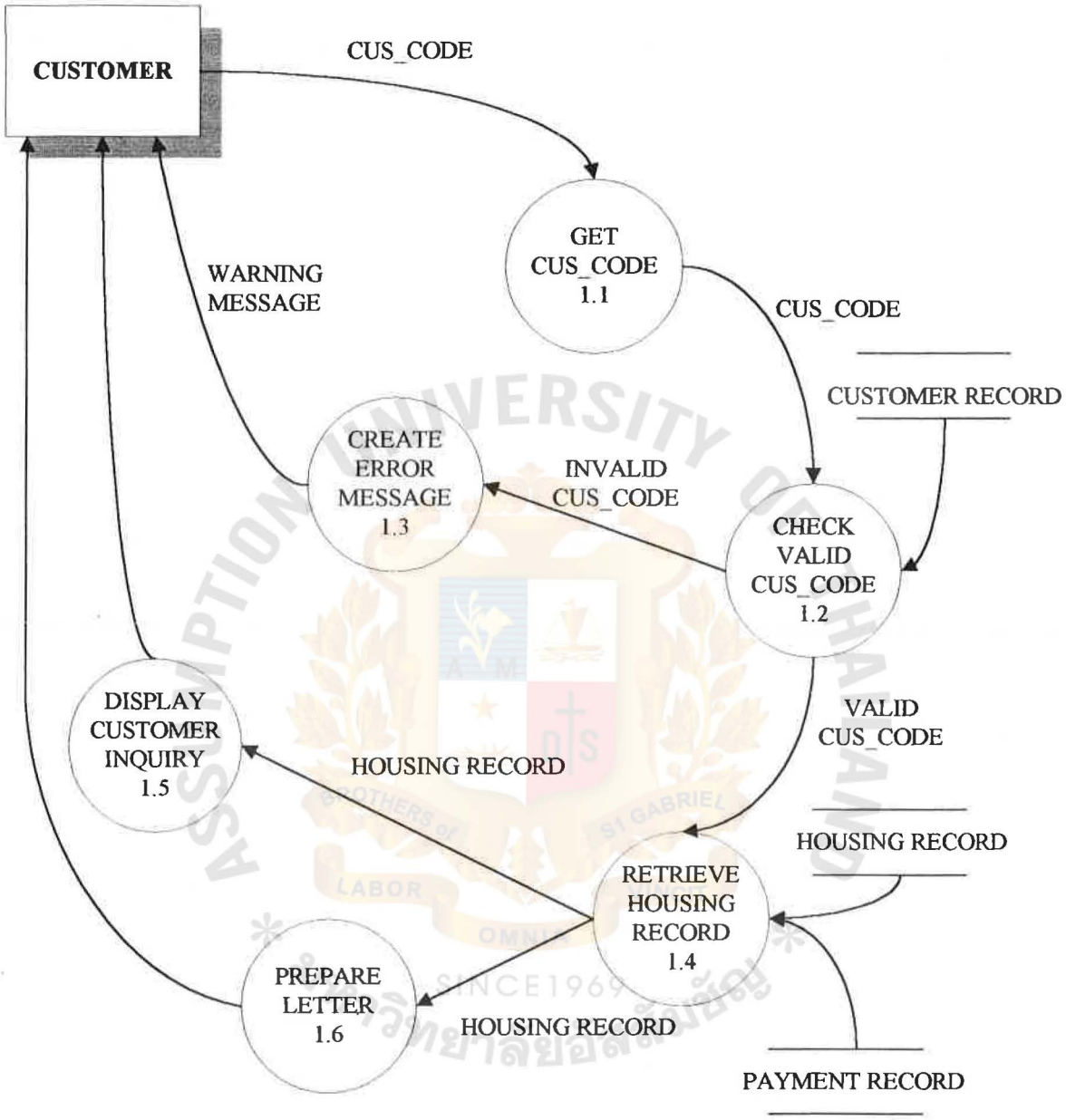


FIGURE C-3 THE DATA FLOW DIAGRAM
LEVEL 1
(CUSTOMER SUPPORT)

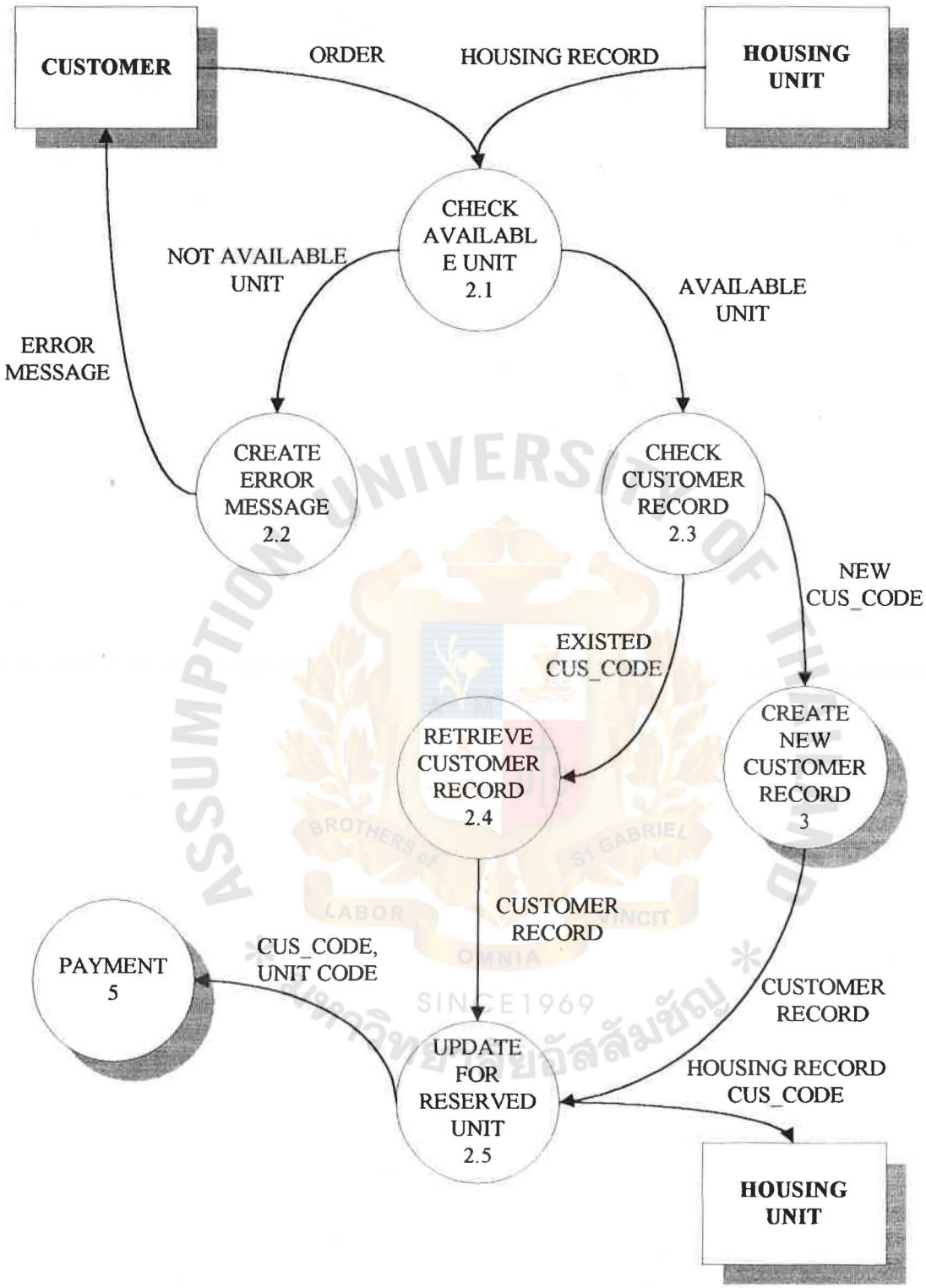


FIGURE C-4 THE DATA FLOW DIAGRAM LEVEL 1 (MAKING THE RESERVATION)

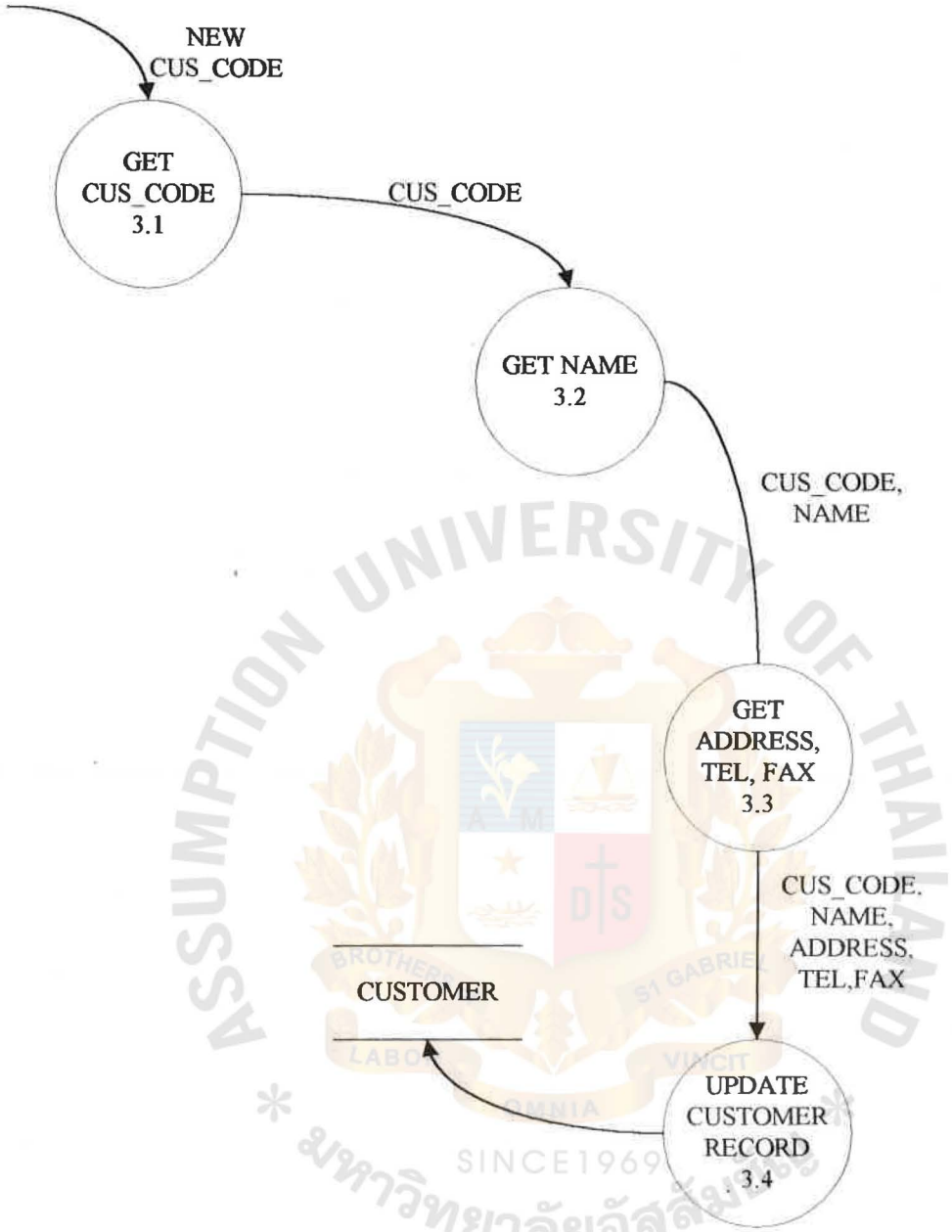


FIGURE C-5 THE DATA FLOW DIAGRAM
LEVEL 1
(CREATING NEW CUSTOMER)

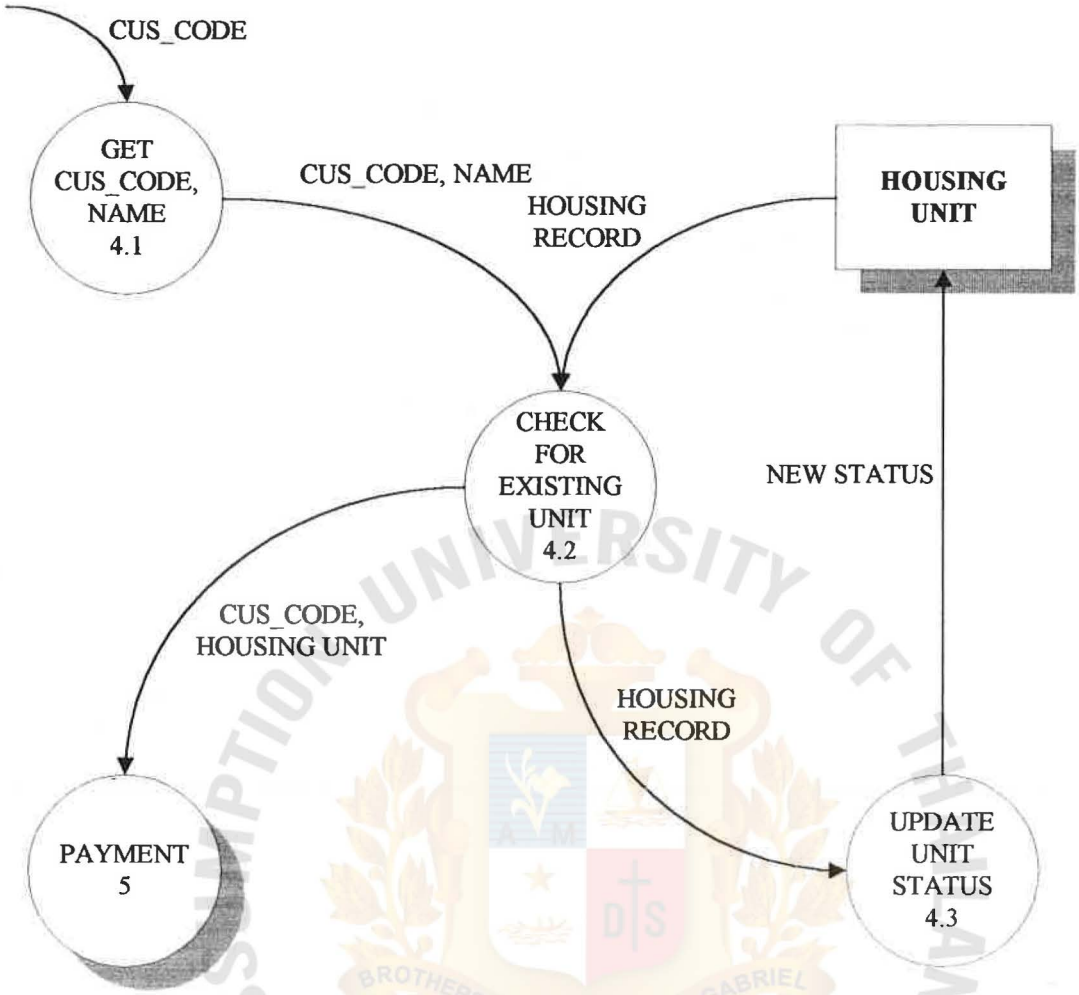


FIGURE C-6 THE DATA FLOW DIAGRAM
LEVEL 1
(MAKING THE CONTRACT)

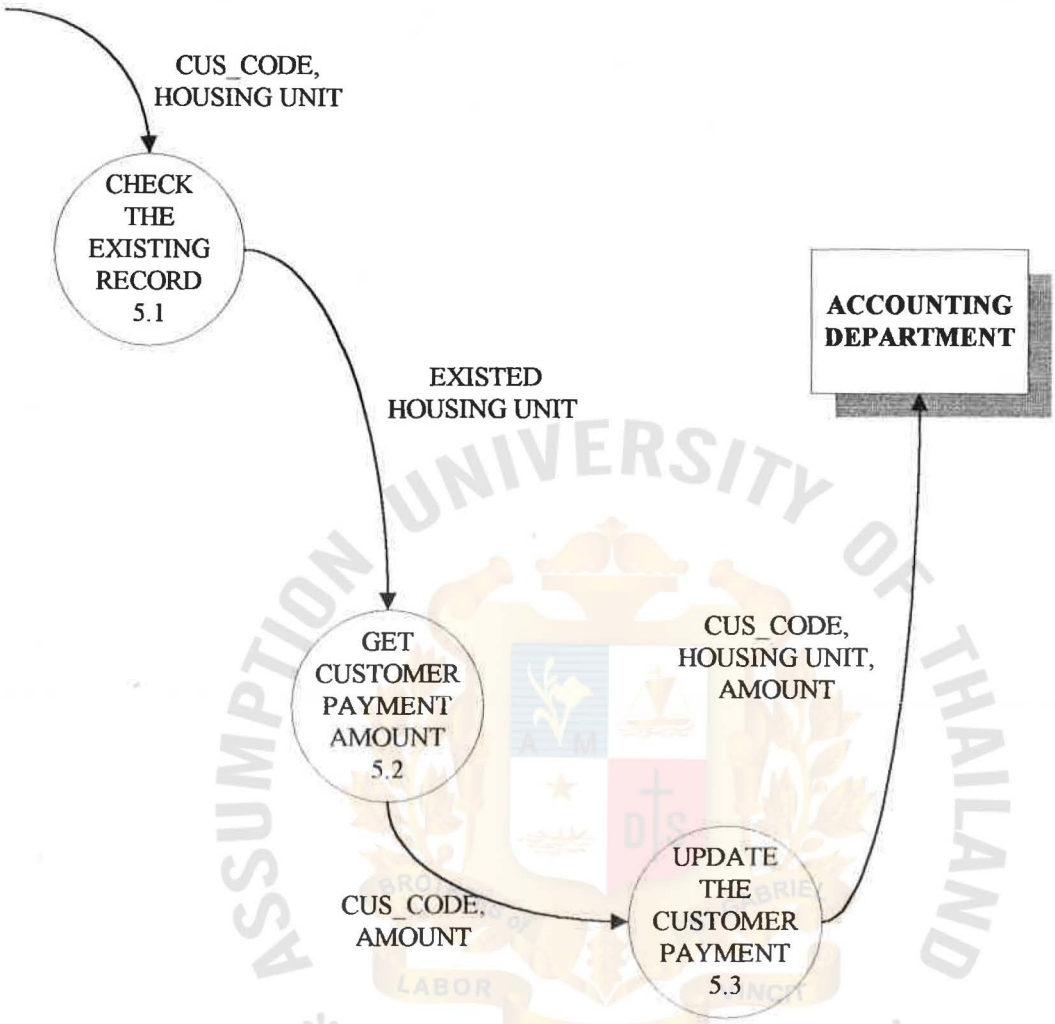


FIGURE C-7 THE DATA FLOW DIAGRAM
LEVEL 1
(PAYMENT)

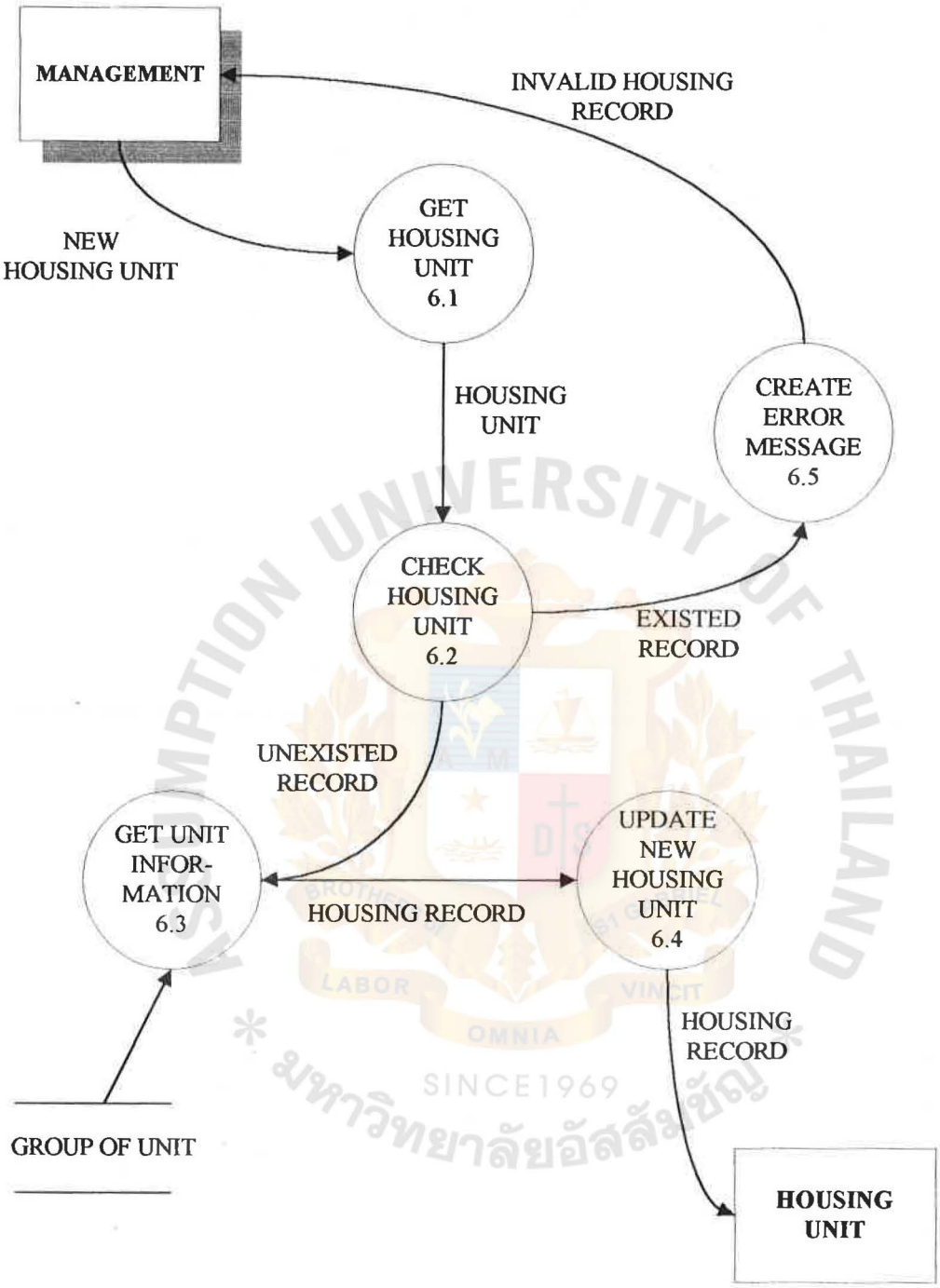


FIGURE C-8 THE DATA FLOW DIAGRAM LEVEL 1 (CREATING NEW UNIT)

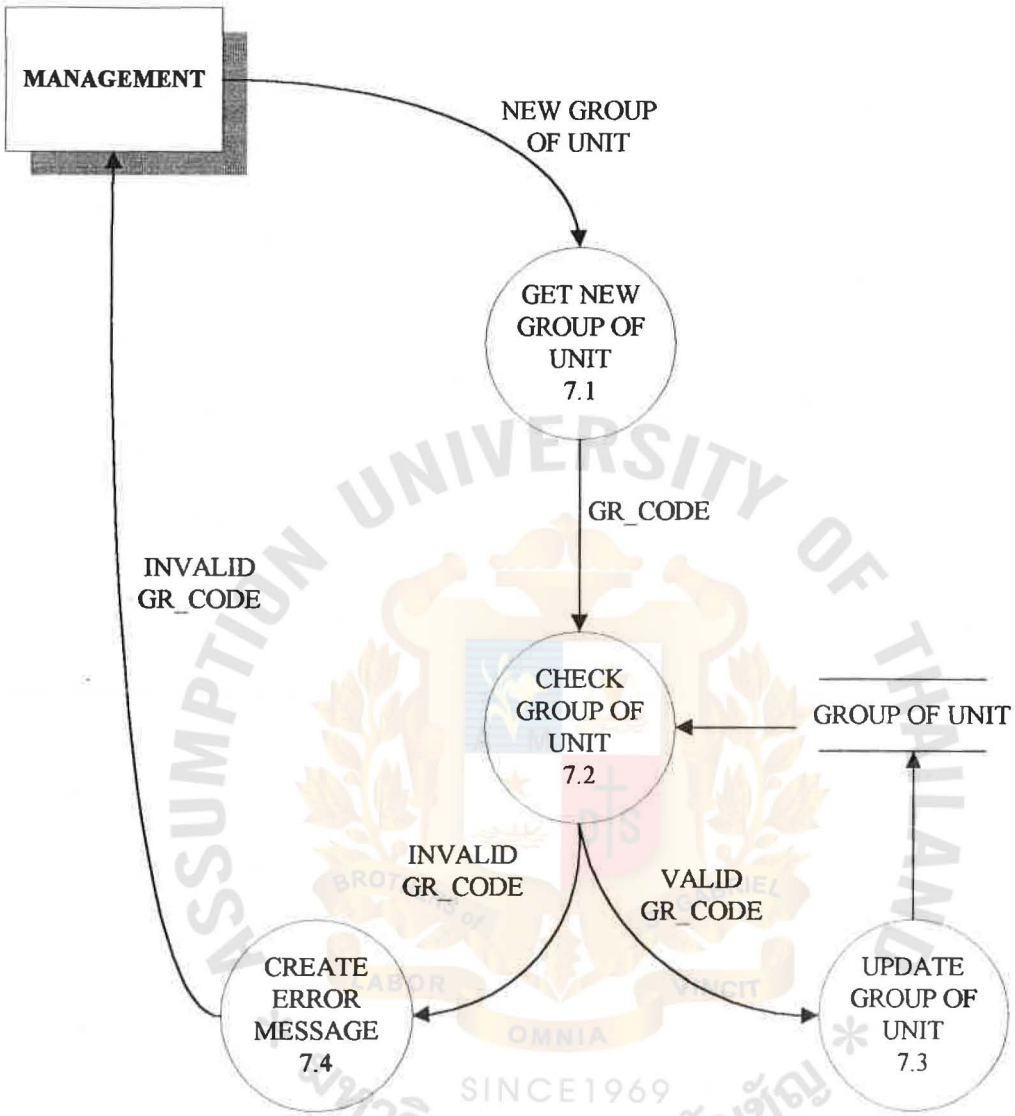


FIGURE C-9 THE DATA FLOW DIAGRAM LEVEL 1 (CREATING NEW GROUP)

FIGURE D-1 THE STRUCTURE CHART OF THE NEW SYSTEM FOR REAL ESTATE COMPANY

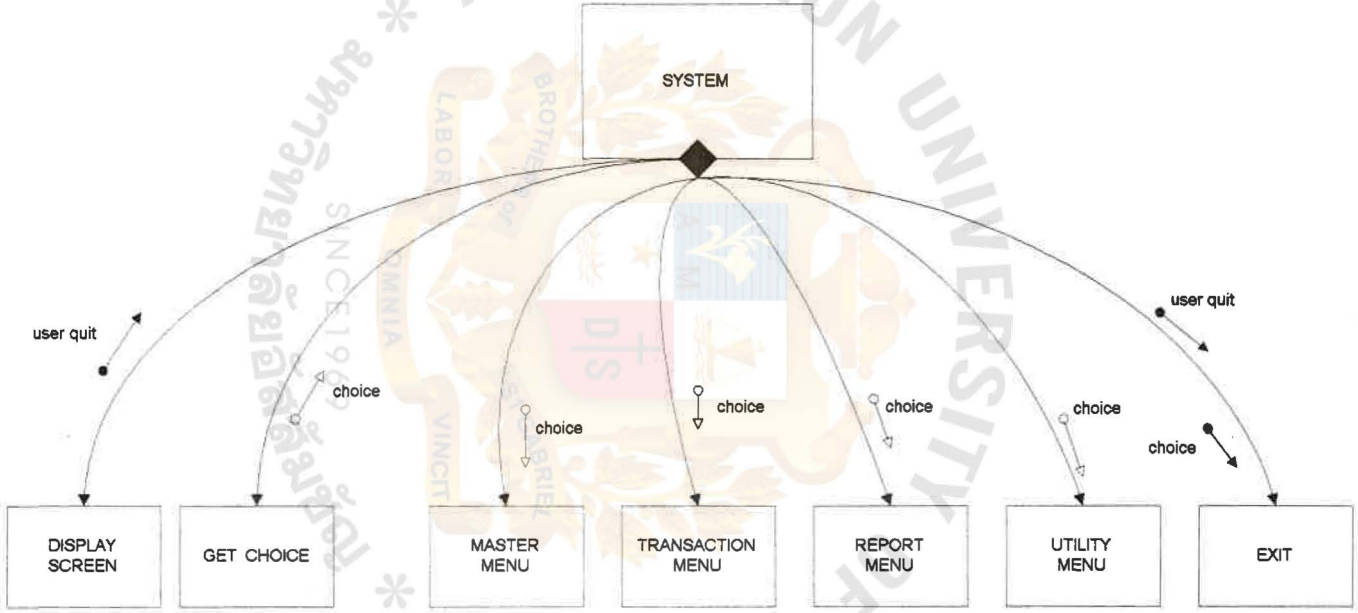


FIGURE D-2 THE STRUCTURE CHART OF THE NEW SYSTEM (MENU FOR MASTER FILE)

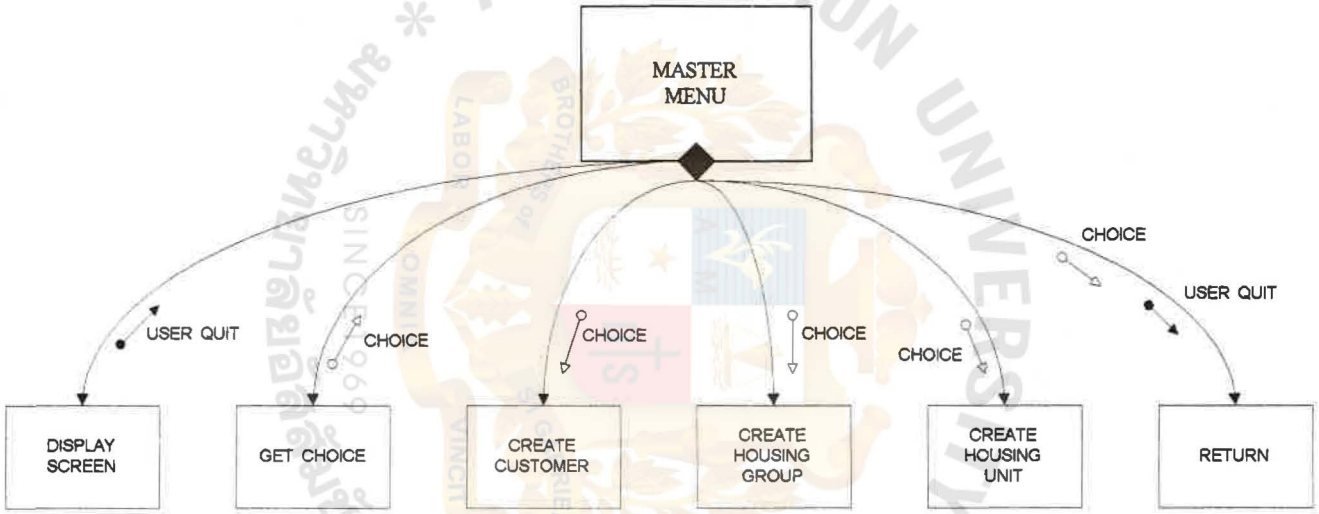


FIGURE D-3 THE STRUCTURE CHART OF THE NEW SYSTEM (MENU FOR TRANSACTION RECORD)

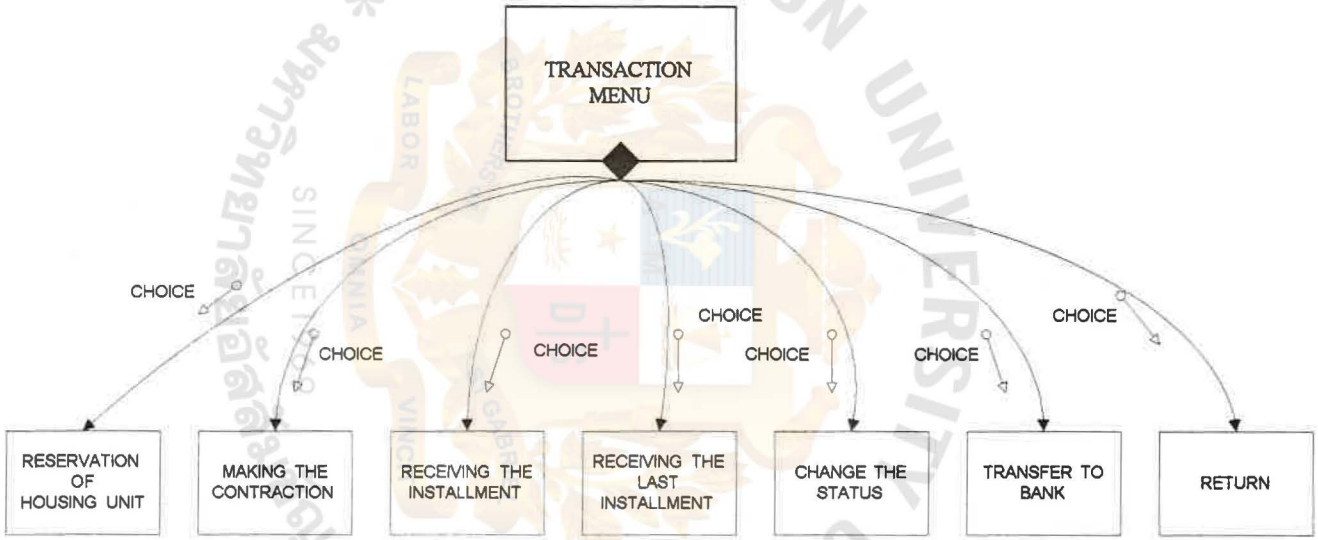


FIGURE D-4 THE STRUCTURE CHART OF THE NEW SYSTEM (MENU FOR REPORT)

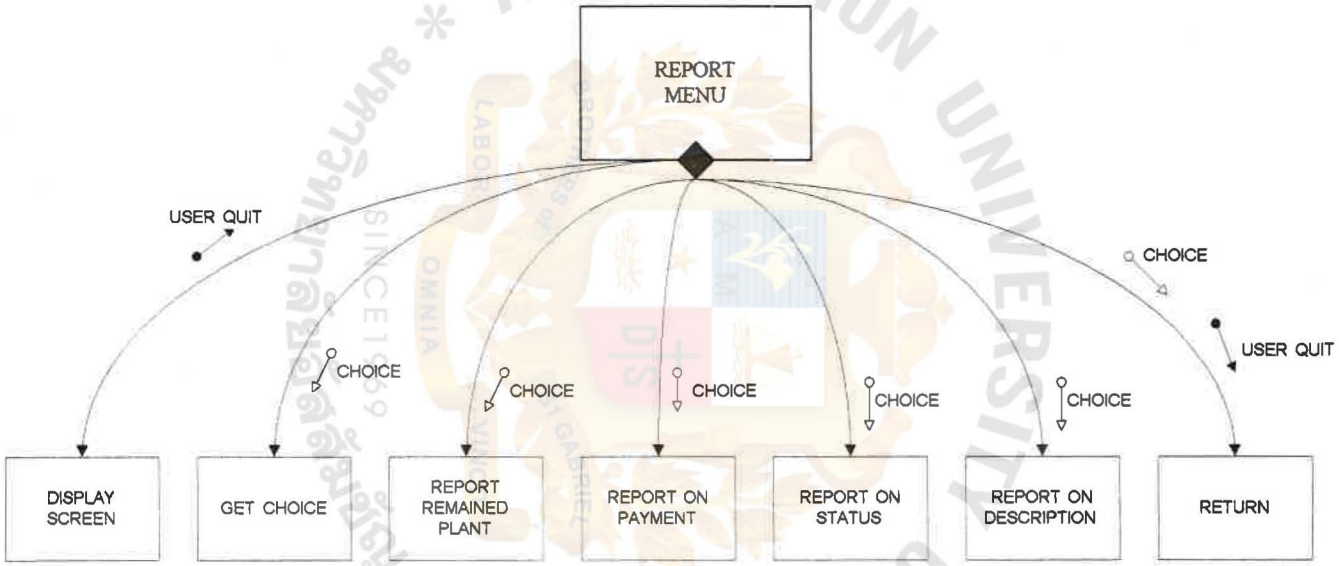


FIGURE D-5 THE STRUCTURE CHART OF THE NEW SYSTEM (CREATING CUSTOMER)

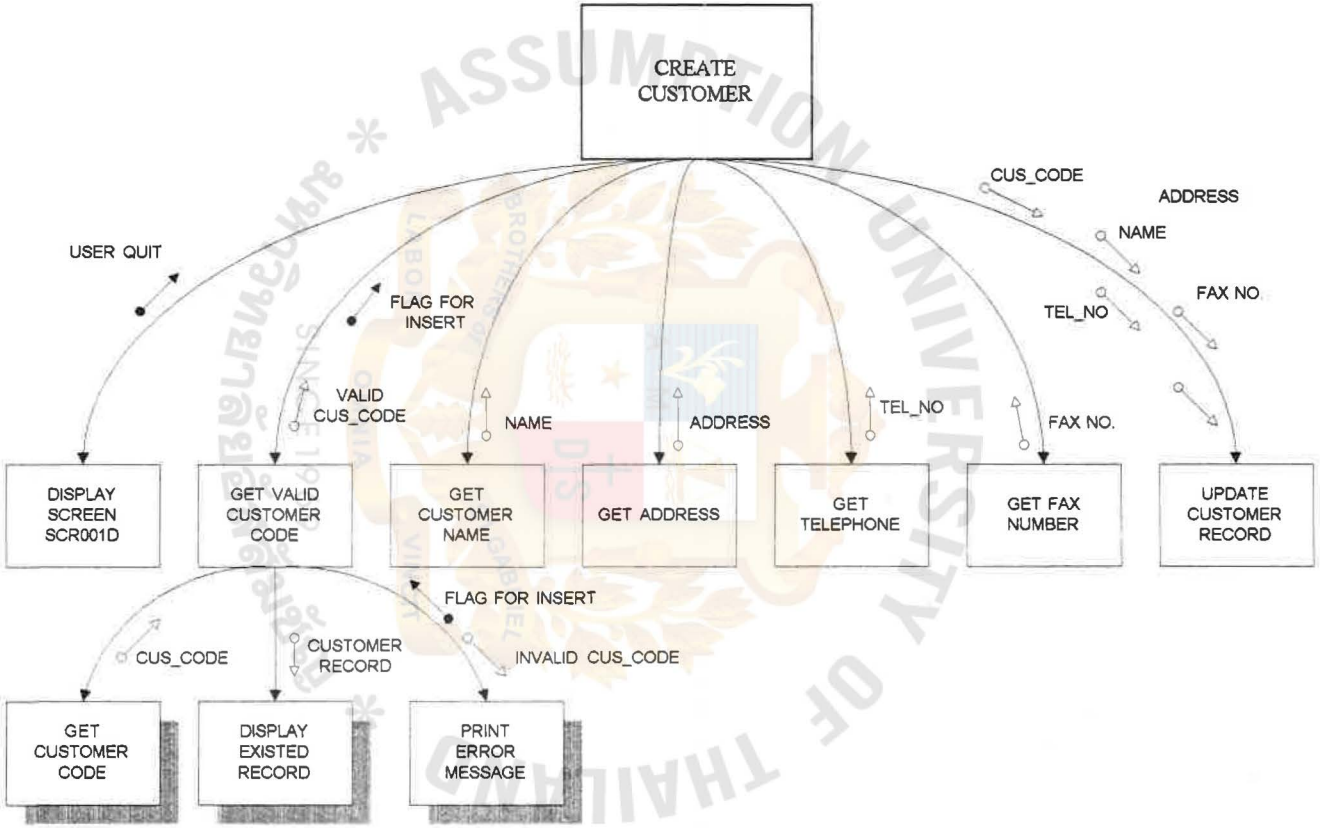


FIGURE D-6 THE STRUCTURE CHART OF THE NEW SYSTEM (CREATING HOUSING RECORD)

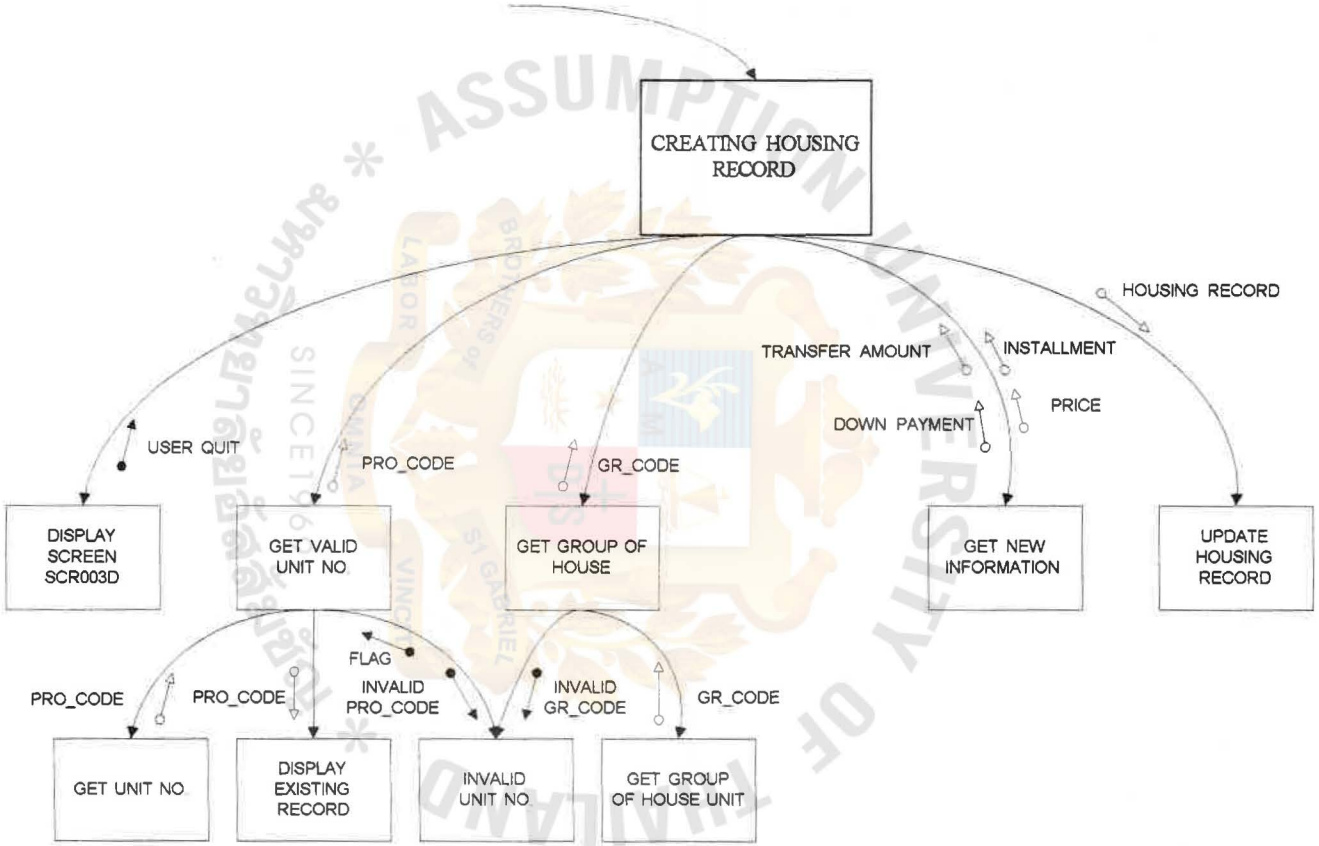


FIGURE D-7 THE STRUCTURE CHART OF THE NEW SYSTEM (CREATING THE GROUP OF HOUSING)

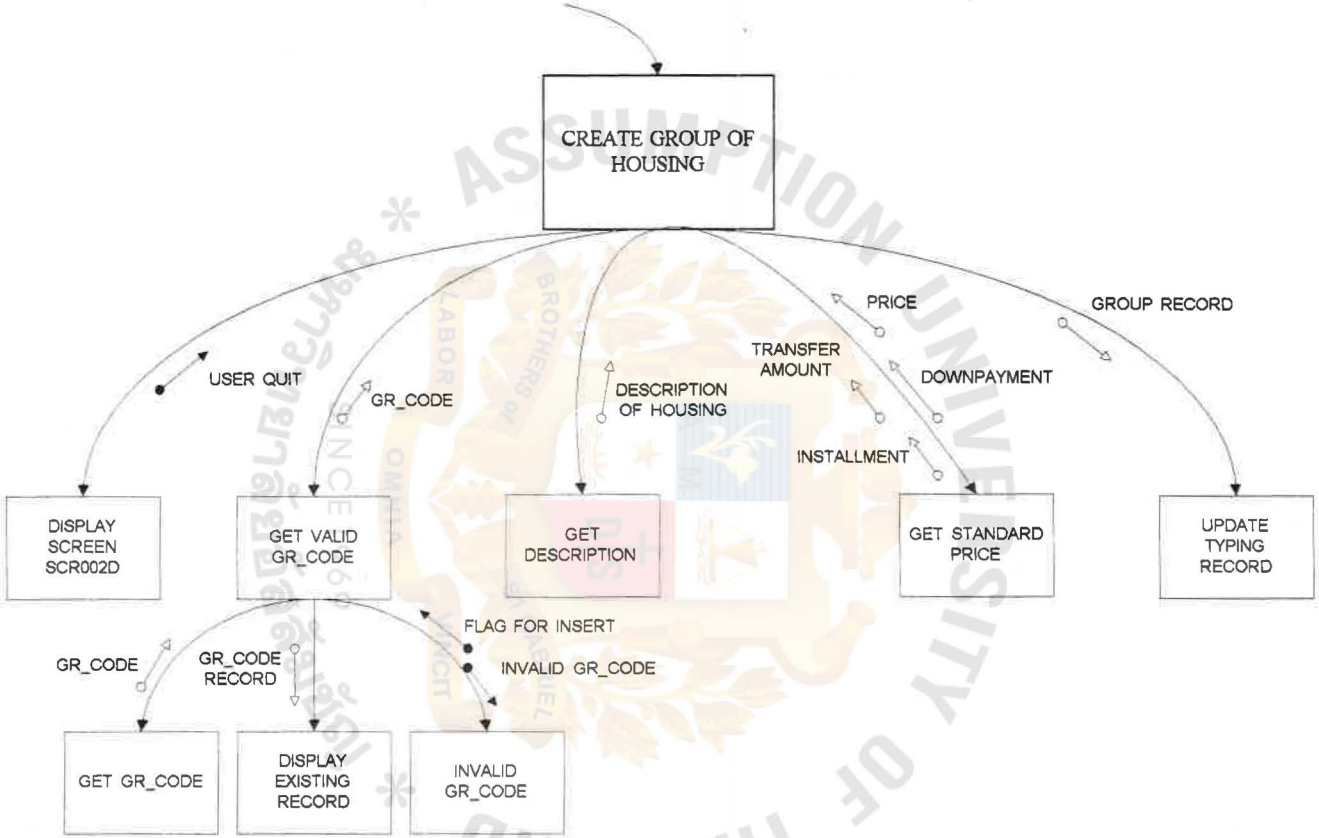


FIGURE D-8 THE STRUCTURE CHART OF THE NEW SYSTEM (RESERVATION)

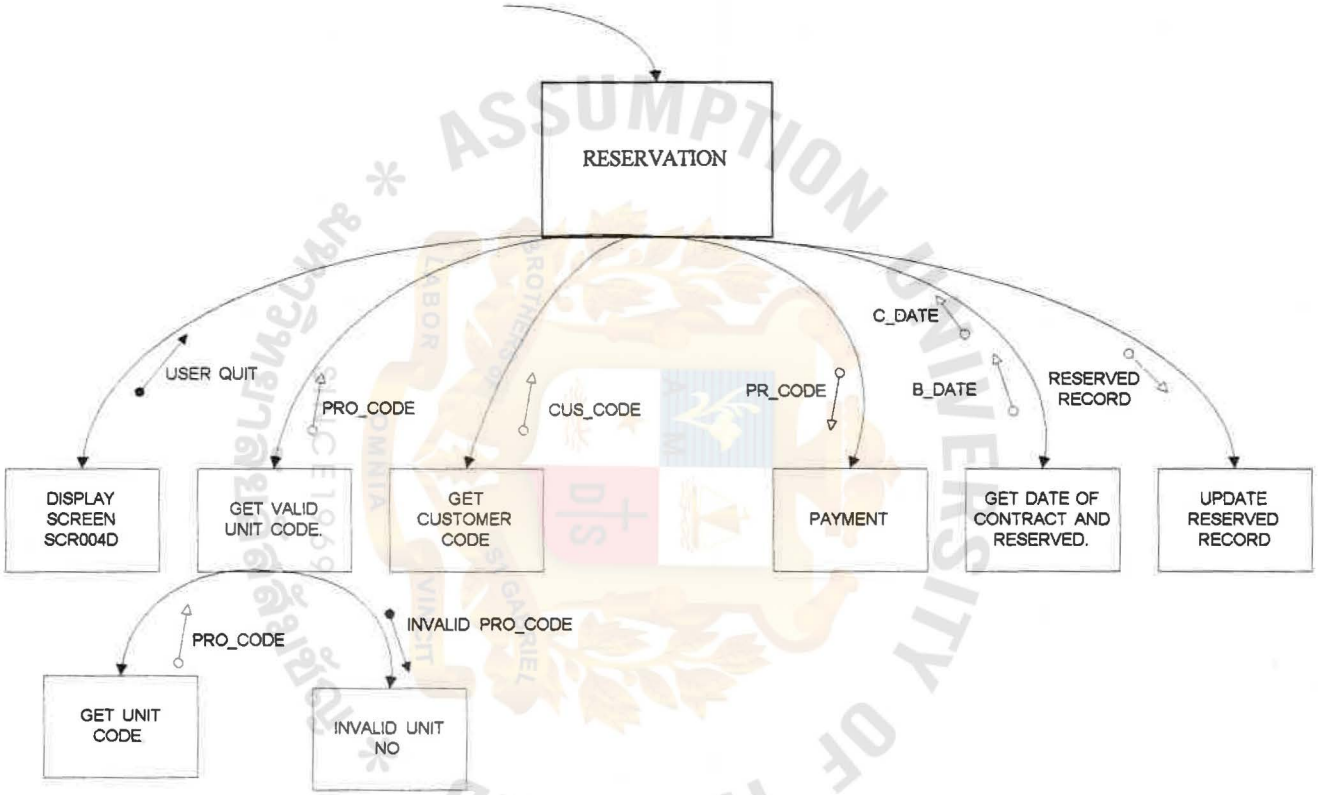


FIGURE D-9 THE STRUCTURE CHART OF THE NEW SYSTEM (MAKING CONTRACT)

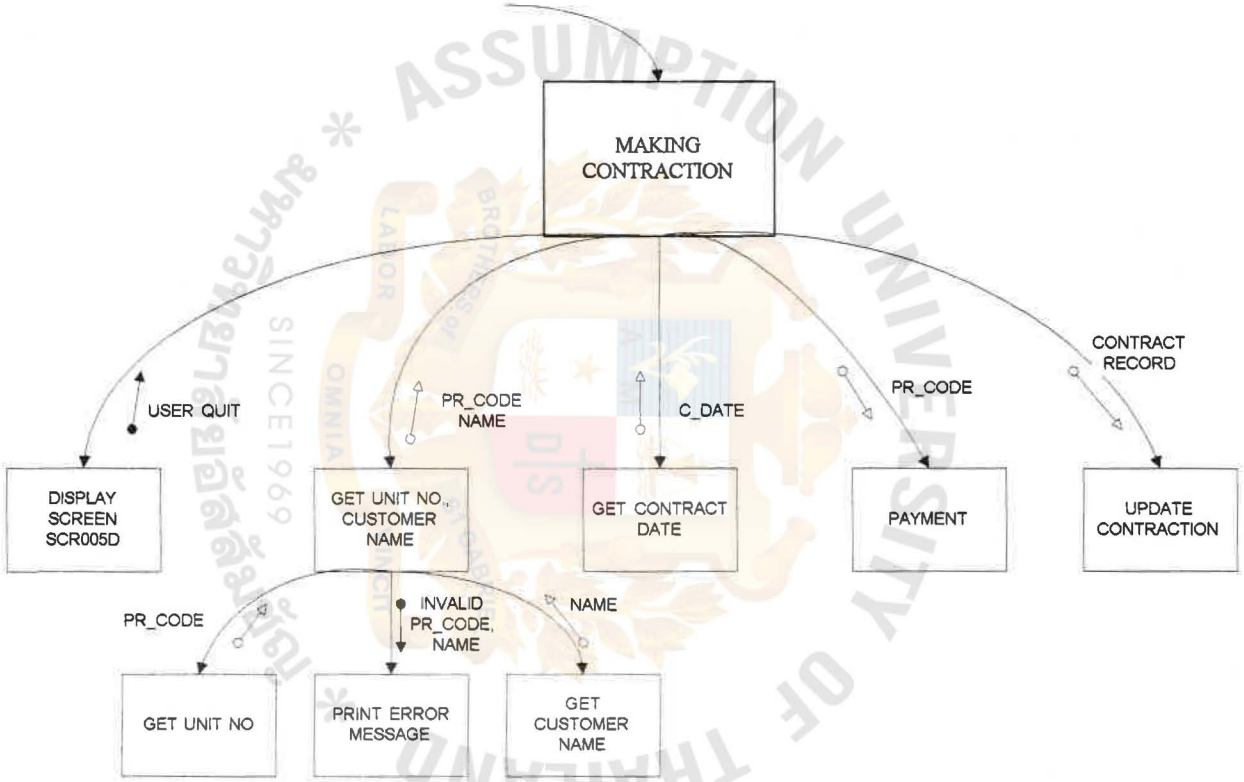


FIGURE D-10 THE STRUCTURE CHART OF THE NEW SYSTEM (PAYMENT)

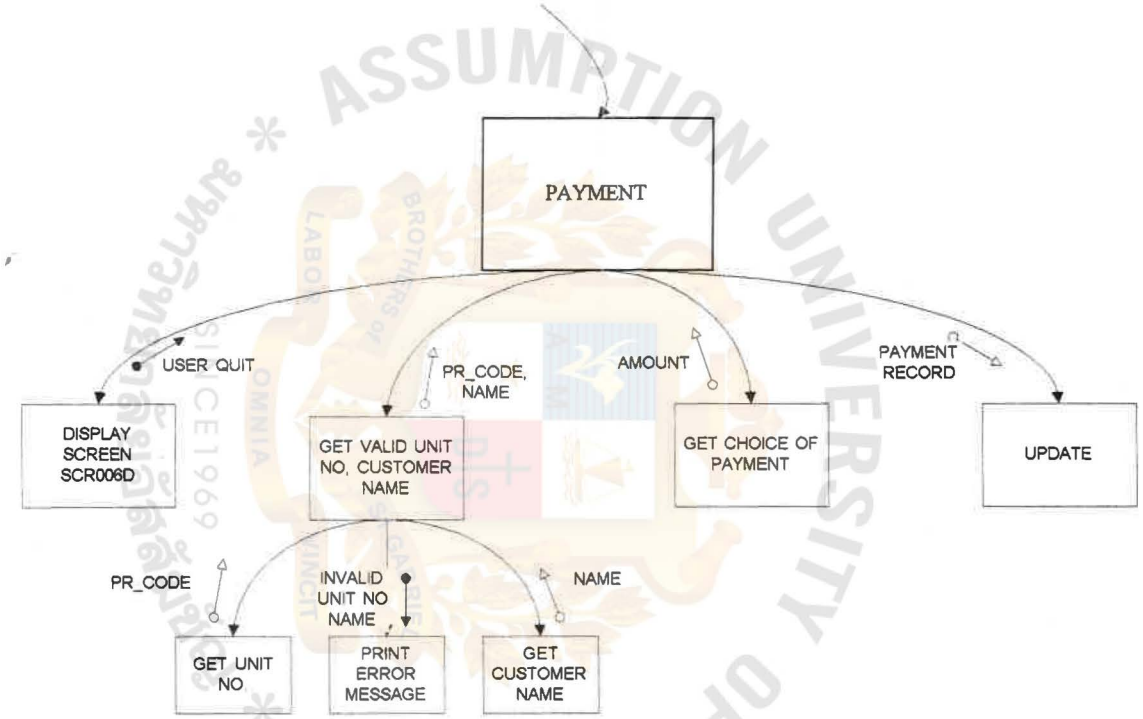


FIGURE D-11 THE STRUCTURE CHART OF THE NEW SYSTEM (RECEIVING THE INSTALLMENT)

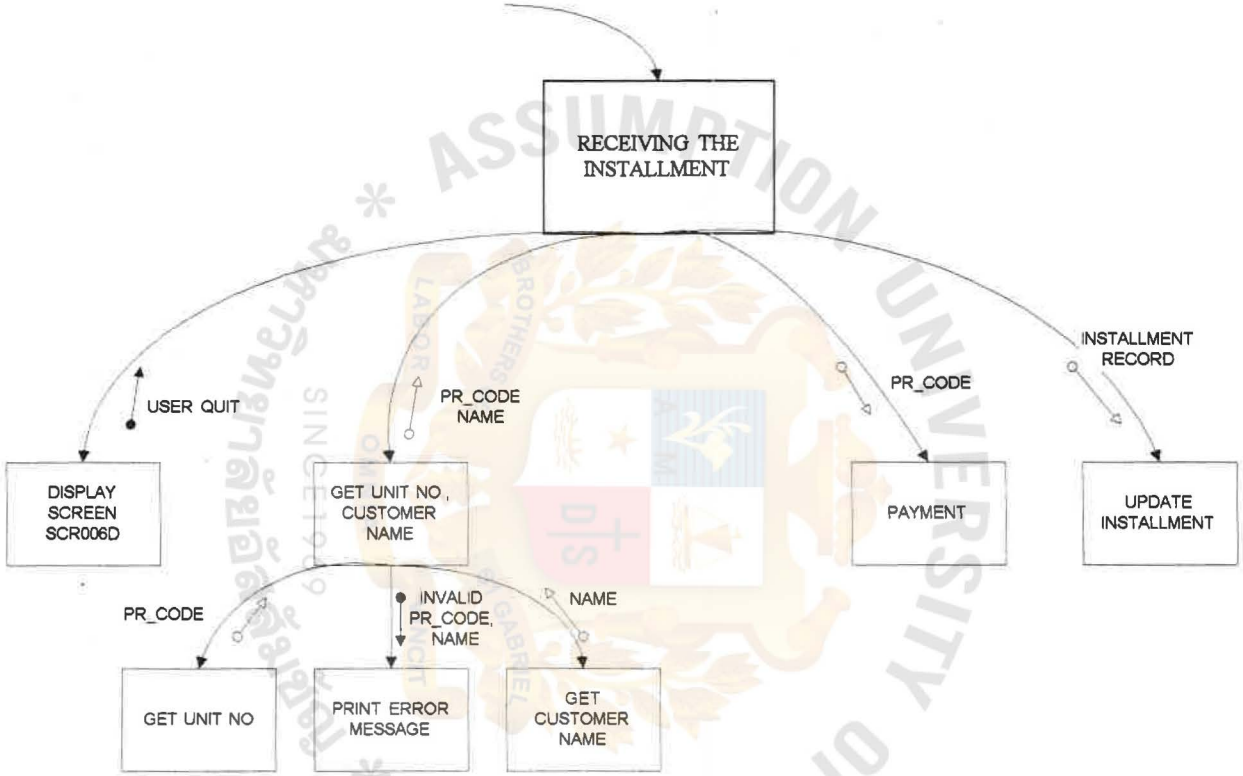


FIGURE D-12 THE STRUCTURE CHART OF THE NEW SYSTEM (RECEIVING THE LAST INSTALLMENT)

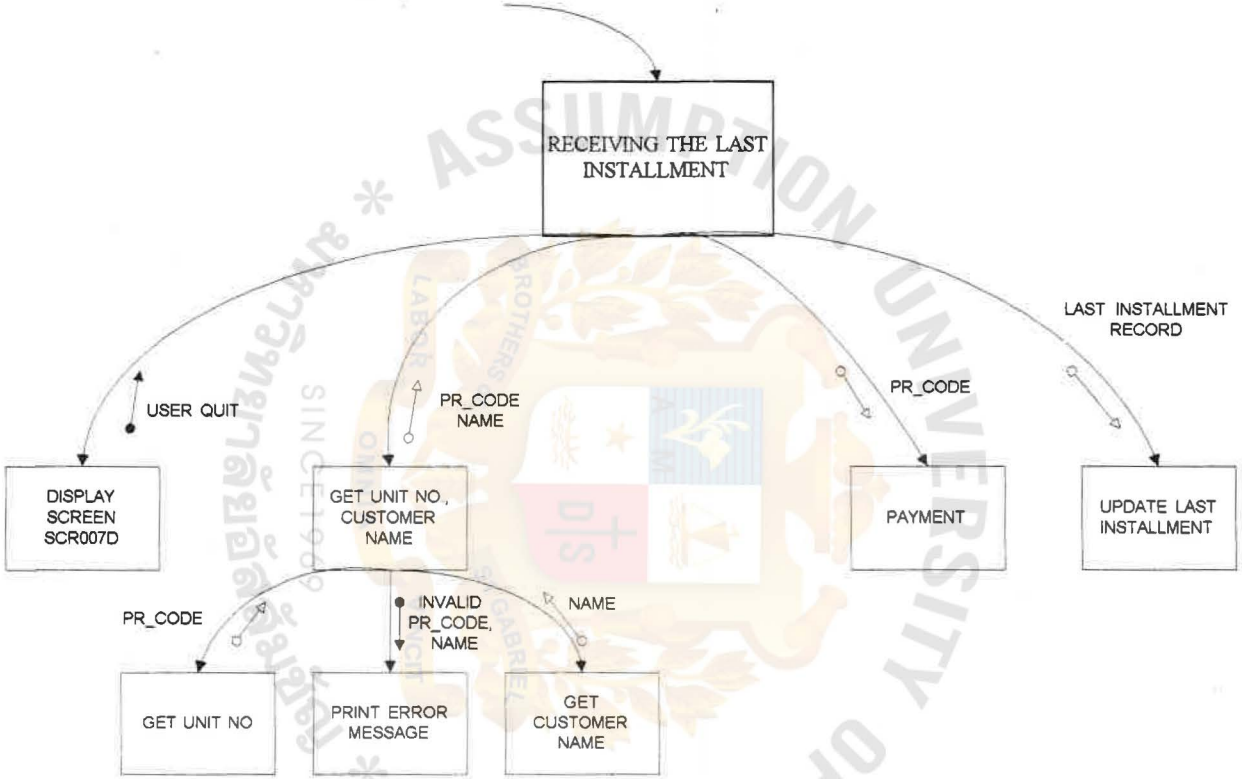


FIGURE D-13 THE STRUCTURE CHART OF THE NEW SYSTEM (COMPLETED THE PAYMENT)

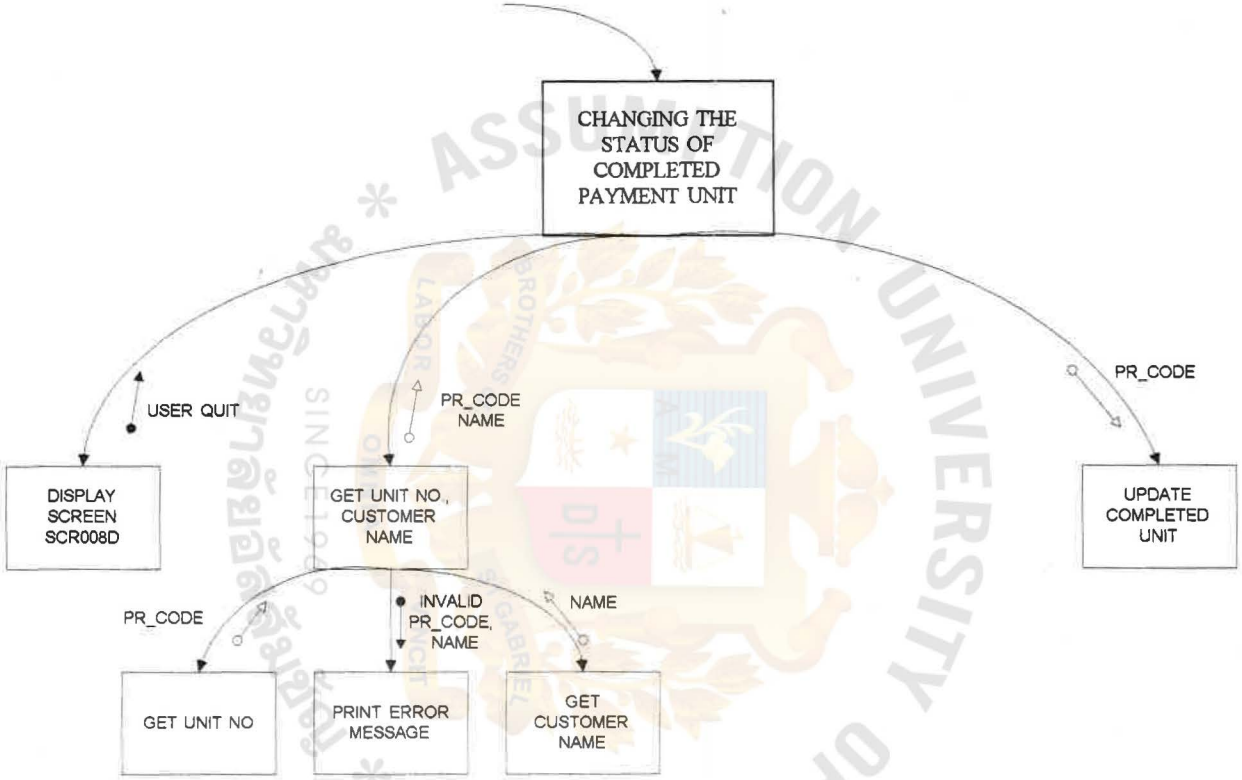
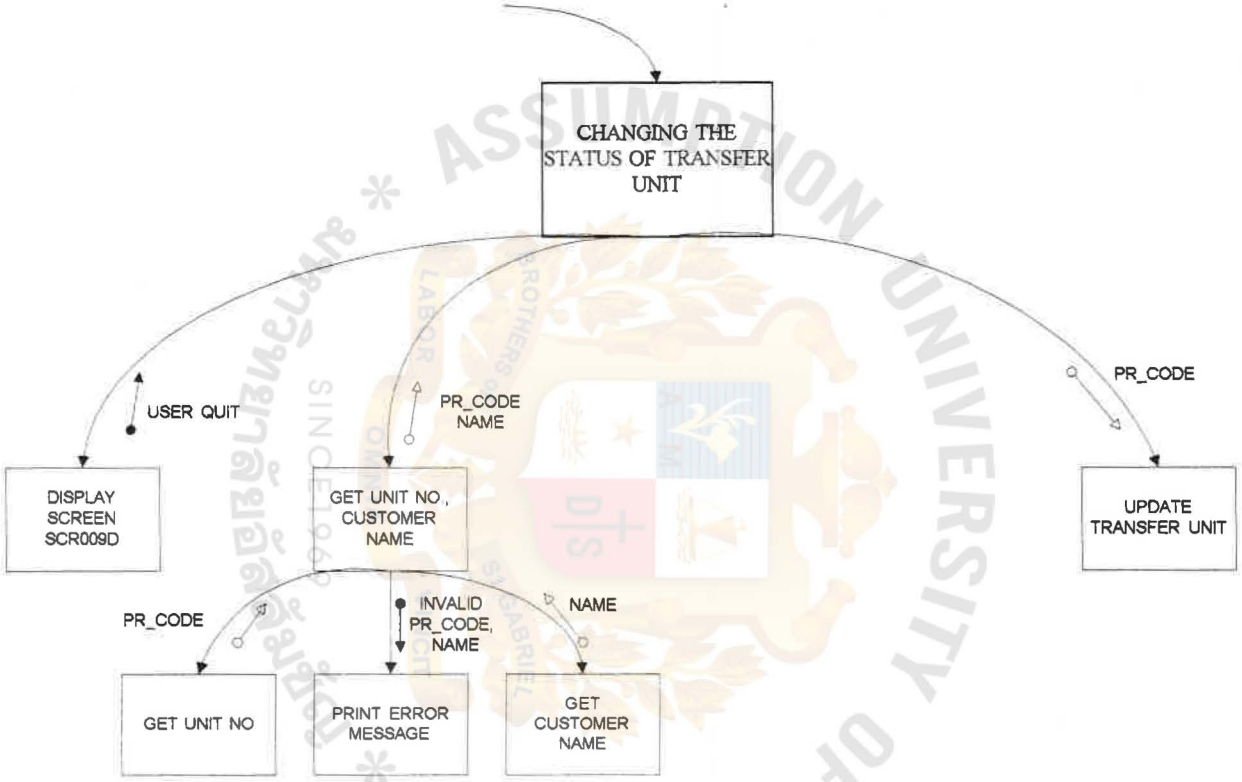


FIGURE D-14 THE STRUCTURE CHART OF THE NEW SYSTEM (TRANSFER UNIT)



DATA DICTIONARY

PJCOM **Company File or Project's Name**

PJXCOM **The Index of Company File (Primary Key - Project)**

Field Name	Type	Len	Dec	Description
Project	Character	30	0	Name of the project
Addr1	Character	50	0	The first line of the address
Addr2	Character	50	0	The second line of the address
Addr3	Character	50	0	The third line of the address
Addr4	Character	50	0	The fifth line of the address
Company	Character	30	0	The name of the company

PJCUS **Customer File**

PJXCUS **The Index of Customer File (Primary Key - Cus_code)**

Field Name	Type	Len	Dec	Description
Cus_code	Character	8	0	Customer's Identification
Name	Character	50	0	Customer's Name
Addr1	Character	50	0	The first line of the address
Addr2	Character	50	0	The second line of the address
Addr3	Character	50	0	The third line of the address
Addr4	Character	50	0	The forth line of the address
Zip	Character	5	0	The zip code
Tel_H	Character	20	0	The Telephone of customer (home)
Tel_o	Character	20	0	The Telephone of customer (office)
Fax	Character	10	0	The Faxual number of customer

PJPR2	File that contains the payment of the customer

PJXPR2	The Index of File of Payment (Primary Key - Pro_code+STR(Line,2)

Field Name	Type	Len	Dec	Description
Pro_code	Character	6	0	The code of unit
Cus_code	Character	8	0	Customer's Identification
Name	Character	50	0	Customer's Name
Line	Numeric	3	0	The sequence of the payment rec.
Invoice	Character	12	0	The invoice numbers are issued
Date	Date	8	0	The date of issued invoice
Descrip	Character	50	0	The description of the payment
Amount	Numeric	14	2	The amount of payment

PJPRO	**Unit (product) file**

PJXPRO	**The index of Unit File (Primary Key - Pro_code)**
PJXPRO1	**The Secondary Index File (Index Key - Name)**
PJXPRO2	**The Secondary Index File (Index Key - Gr_code)**

Field Name	Type	Len	Dec	Description
Pro_code	Character	6	0	The code of unit
Gr_code	Character	8	0	The code of the group of unit
Cus_code	Character	8	0	The customer's identification
Name	Character	50	0	The customer's name
Descrip	Character	50	0	The description of the unit
B_date	Date	8	0	The date of reservation
C_date	Date	8	0	The date of making contract
Add_amt	Numeric	14	2	The amount of Additional Work that the customer requests
Add_work	Memo	10	0	The remark of the Additional work that contains the list that customer orders to change or add from the statndard
Area	Numeric	10	2	The area of the unit
Price	Numeric	14	2	The price of the unit
T_down	Numeric	14	2	The down payment of unit
Bk_amt	Numeric	14	2	The amount of payment for reservation
Ct_amt	Numeric	14	2	The amount of payment for making contract
Install	Numeric	5	0	The number of installment
Lt_amt	Numeric	14	2	The amount of last installment
Tr_amt	Numeric	14	2	The amount of transferred money
Status	Character	1	0	The status of company A - Available R - Reservation C - Make contract I - Installment L - Last payment T - Transfer to Bank

PJTPE	Group of Unit File

PJXTPE	The Index of Group of Unit File (Primary Key - Gr_code)

Field Name	Type	Len	Dec	Description
Gr_code	Character	8	0	The code of group of unit (code of standard)
Descrip	Character	50	0	The description of group of unit (standard unit)
Area	Numeric	14	2	The area of standard unit
Unit	Character	9	0	The measurement of standard unit
Price	Numeric	14	2	The price of standard unit
Build	Character	5	0	The building of the standard unit
Floor	Character	5	0	The floor of the standard unit
T_down	Numeric	14	2	The down payment of standard unit
Interest	Numeric	5	2	The rate of interest
Bk_amt	Numeric	14	2	The amount for reservation
Ct_amt	Numeric	14	2	The amount for making contract
Install	Numeric	5	0	The number of installment
Lt_amt	Numeric	14	2	The last amount of installment
Tr_amt	Numeric	14	2	The amount of transferred amount

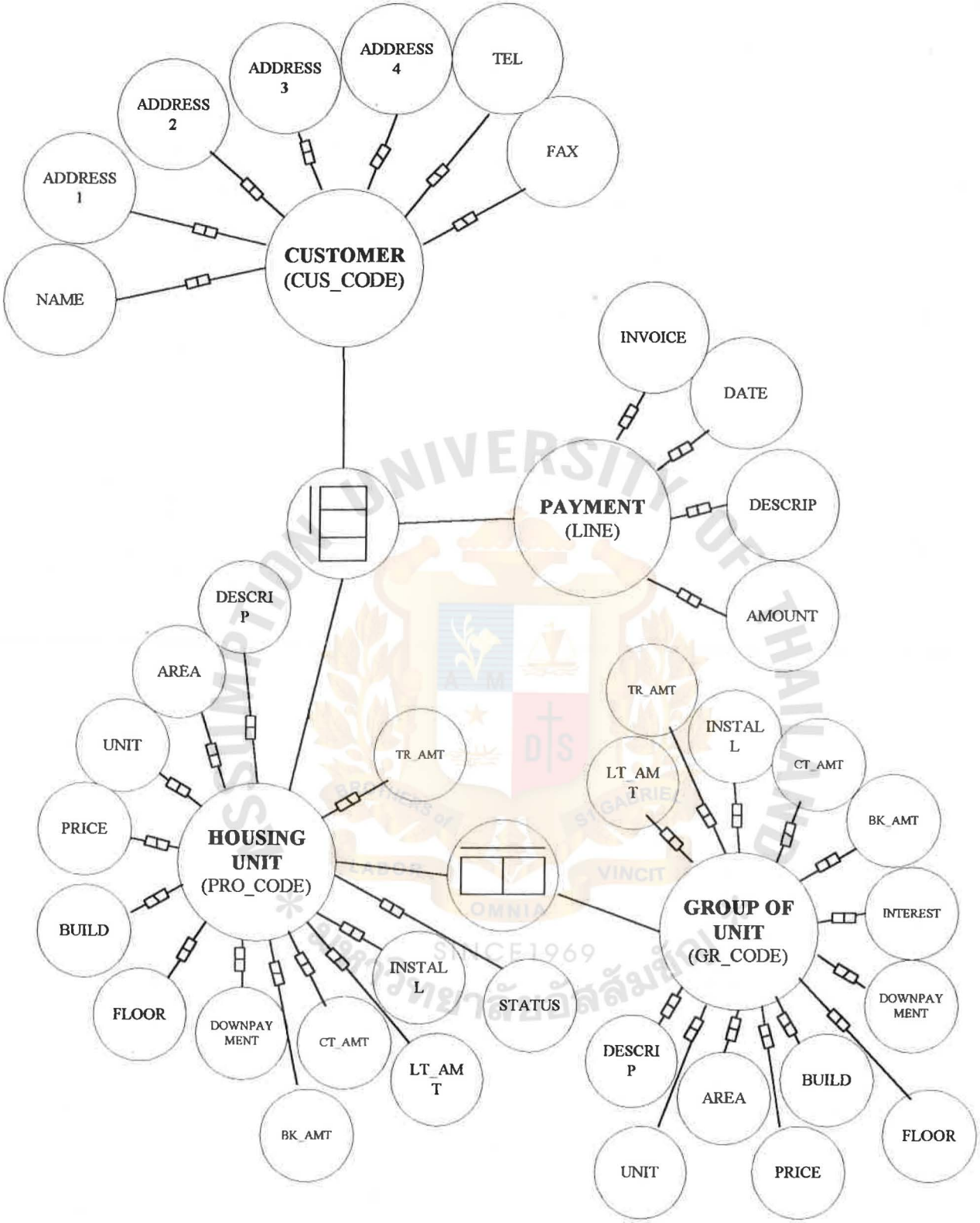


FIGURE 1-4 NIAM FOR DATA STRUCTURE

PROCESS SPECIFICATION

Process Specification 1.1		**Get Cus_code**
Pre-condition	**:**	**None**
Post-condition	**:**	**Cus_code**

```
Begin
        get cus_code
End
```

Process Specification 1.2		**Check Cus_code**
Pre-condition	**:**	**Cus_code**
Post-condition	**:**	**Valid cus_code**

```
Begin
        Find cus_code
        If found
                Do retrieve customer record
        Else
                Do create error
        Endif
End
```

Process Specification 1.3		**Create Error**
Pre-condition	**:**	**Invalid cus_code**
Post-condition	**:**	**None**

```
Begin
        Display 'Can not find this customer record'
End
```

Process Specification 1.4		**Retrieve customer record**
Pre-condition	**:**	**Valid cus_code**
Post-condition	**:**	**Payment record**

```
Begin
        Tname       =       name
        Thouse      =       pro_code
        Tdescrip    =       descrip
        Find thouse
        If found
                Tarea       =       area
                Tprice      =       price
                Tdown       =       T_down
                Treserve    =       Bk_amt
        Endif
End
```

Process Specification 1.5		**Display customer request**
Pre-condition	**:**	**Payment record**
Post-condition	**:**	**None**

```
Begin
        Display payment record
End
```

Process Specification 1.6		**Prepare Letter**
Pre-condition	**:**	**Name,address1,address2,address3 address4**
Post-condition	**:**	**Letter**

```
Begin
        Print letter
End
```

Process Specification 2.1	**Check available unit**
Pre-condition :	**Pro_code**
Post-condition :	**Valid pro_code**

```
Begin
        Find   pro_code
        If found and status = 'A'
                Do check customer
        Else
                do error message1
        Endif
End
```

Process Specification 2.2	**Error message1**
Pre-condition :	**Invalid pro_code, not available**
Post-condition :	**None**

```
Begin
        Display 'This unit is not available'
End
```

Process Specification 2.3	**Check Customer**
Pre-condition :	**Pro_code**
Post-condition :	**valid cus_code,pro_code**

```
Begin
        Get cus_code
        Find cus_code
        If found
                Do retrieve customer
        Else
                Do create new customer
        Endif
End
```

Process Specification 2.4		**Retrieve Customer Record**
Pre-condition	**:**	**Cus_code**
Post-condition	**:**	**Customer record**

```
Begin
        Tname       =    name
        Taddress1   =    addr1
        Taddress2   =    addr2
        Taddress3   =    addr3
        Taddress4   =    addr4
        Ttel        =    tel
        Tfax        =    fax
End
```

Process Specification 2.5		**Updated Reserved Unit**
Pre-condition	**:**	**Pro_code,cus_code, name**
Post-condition	**:**	**Reserved Unit**

```
Begin
        Replace cus_code  with cus_code
        Replace name      with name
        Replace status    with "R"
End
```

Process Specification 3.1		**Get cus_code**
Pre-condition	**:**	**None**
Post-condition	**:**	**Cus_code**

```
Begin
        Get cus_code
End
```

Process Specification 3.2		**Get name**
Pre-condition	**:**	**None**
Post-condition	**:**	**Cus_code,name**

```
Begin
        Get name
End
```

Process Specification 3.3	**Get address , fax, tel**
Pre-condition :	**Cus_code,name**
Post-condition :	**Cus_code, name, address, tel, fax**

```
Begin
        Get address1
        Get address2
        Get address3
        Get address4
        Get Tel
        Get Fax
End
```

Process Specification 3.4	**Update Customer**
Pre-condition :	**Cus_code, Name, Address, Tel, Fax**
Post-condition :	**Customer Record**

```
Begin
        Replace cus_code  with cus_code
        Replace name      with name
        Replace address   with address
        Replace tel       with tel
        Replace fax       with fax
End
```

Process Specification 4.1	**Get cus_code, name**
Pre-condition :	**None**
Post-condition :	**Pro_code, name**

```
Begin
        Get pro_code
        If pro_code is empty
                Get name
        Endif
End
```

Process Specification 4.2		**Check existed unit**
Pre-condition	**:**	**Pro_code, name**
Post-condition	**:**	**New status of unit**

```
Begin
        If pro_code is not empty
                Find pro_code
        Else
                Find name
        Endif
End
```

Process Specification 4.3		**Updated Status**
Pre-condition	**:**	**Pro_code, name**
Post-condition	**:**	**None**

```
Begin
        Replace status      with "B"
End
```

Process Specification 5.1		**Check existed record**
Pre-condition	**:**	**Cus_code, name, line**
Post-condition	**:**	**None**

```
Begin
        Find name+str(line,2)
        If found
                Do get Payment amount
        Endif
End
```

Process Specification 5.2	**Get customer payment amount**
Pre-condition :	**Pro_code, Name**
Post-condition :	**Pro_code, Name, Amount**

```
Begin
        Get Tline
        Get Tinvoice
        Get Tdescrip
        Get Tdate
        Get Tamount
End
```

Process Specification 5.3	**Updated customer Payment**
Pre-condition :	**Pre_code, Line, Amount, Descrip, Date,**
Post-condition :	**None**

```
Begin
        Replace line        with tline
        Replace invoice     with tinvoice
        Replace date        with tdate
        Replace descrip     with tdescrip
        Replace amount      with tamount
End
```

Process Specification 6.1	**Get Pro_code [Get code of unit]**
Pre-condition :	**None**
Post-condition :	**Pro_code**

```
Begin
        Get pro_code
End
```

Process Specification 6.2	**Check code of unit**
Pre-condition :	**Pro_code**
Post-condition :	**Not existed pro_code**

```
Begin
        Find pro_code
        If found
                Do create error 2
        Else
                Do get  Information of unit
        Endif
End
```

Process Specification 6.3	**Get Information of Unit**
Pre-condition :	**Pro_code**
Post-condition :	**Pro_code, descrip, area, price, t_down, bk_amt, install, tr_amt**

```
Begin
        Get area
        Get descrip
        Get price
        Get t_down
        Get bk_amt
        Get install
        Get tr_amt
End
```

Process Specification 6.4	**Create Error 2**
Pre-condition :	**None**
Post-condition :	**None**

```
Begin
        Display 'The code of this unit is already existed'
End
```

Process Specification 7.1	**Get new group of unit**
Pre-condition :	**None**
Post-condition :	**Gr_code**

```
Begin
        Get gr_code
End
```

Process Specification 7.2	**Check group of unit**
Pre-condition :	**Gr_code**
Post-condition :	**Unexisted gr_code**

```
Begin
        Find Gr_code
        If found
                Do create error 3
        Else
                Do Get Group of Information
        Endif
End
```

Process Specification 7.3	**Get Group of Information**
Pre-condition :	**Gr_code**
Post-condition :	**Group of unit record**

```
Begin
        Get area
        Get descrip
        Get price
        Get t_down
        Get bk_amt
        Get install
        Get tr_amt
End
```

Process Specification 7.4		**Create Error 3**
Pre-condition	**:**	**None**
Post-condition	**:**	**None**

```
Begin
        Display 'This code  of group is already existed'
End
```