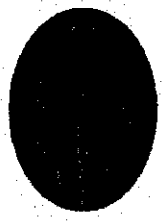

UNIVERSITI
TEKNOLOGI
PETRONAS

Electronic Preventive Maintenance

By

Siti Norazwina Binti Abdullah (5897)

Dissertation Submitted In Partial Fulfillment of
The Requirement for The
Bachelor of Technology (Hons)
(Information Communication Technology)

JULY 2007

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CERTIFICATION OF APPROVAL

Electronic Preventive Maintenance

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A project dissertation submitted to the
Information Communication Technology Programme
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(INFORMATION COMMUNICATION TECHNOLOGY)

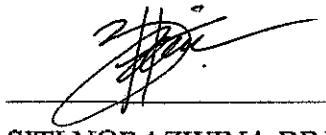
Approved by,

(Mrs. Nazleeni Samiha Haron)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
July 2007

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



SITI NORAZWINA BINTI ABDULLAH

ELECTRONIC PREVENTIVE MAINTENANCE

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Abstract

This project give the details about the approach and research done for electronic preventive maintenance system, which in this project will involved Microsoft Access, HanDBase® Software, VB .Net, Microsoft .Net framework, Microsoft Active Sync, Microsoft ActiveX Control and also some other software that will be used to support this system. This report will formerly cover about the analysis and design of the Electronic Preventive Maintenance project.

In plant fieldwork, conceptually the initial stage in any documentation procedure, the issue of portability is important in two senses: first, the sense of platform interoperability and second, in the sense of mobility. With this concept, it wills strong enough the reason why electronic preventive maintenance is a must in plant fieldwork.

The following are covered by the report:

- The details description of the current framework that can used to develop this system.
- The analysis of current system, problems of that current system, finds the solution for the problems and also the significant of the project.
- Relate the objective of the project and find the way to achieve the objective.
- Relevancy of the project and feasibility of project within scope and time frame.

ACKNOWLEDGEMENT

While undergoing final year project, infinite number of people provide an immeasurable amount of guidance, idea and support. Thousands of thanks goes out to all of those who lend me their hands, share their knowledge and experience besides ease my trouble with undivided support and commitment. Special thanks to my supervisor of this project and fellow colleagues, especially from EPEMSB that help me a lot through this semester. Your kindness and cooperation are highly appreciated. Thank you very much.

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ABBREVIATION AND NOMENCLATURES

1. EPEMSB – Ethylene / Polyethylene (M) Sdn. Bhd.
2. SD - (SanDisk) memory card
3. SAP – System Accounting Procedure
4. PDA – Personal Digital Assistant
5. DAQ - data acquisition signal waveform digitizers.
6. RFID – Radio Frequency Identification Technology.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Data logger is commonly used to describe a self contained, stand alone data acquisition system or device. It is comprised of a number of analog and digital inputs that are monitored, and the results or conditions of these inputs are then stored on local memory such as SD (SanDisk) memory card, flash memory card or others [1]. Electronic Preventive Maintenance is one kind of data logger to be used for maintenance purpose especially in Ethylene/Polyethylene (M) Sdn. Bhd. plant. This data logger will be used by all staff for preventive maintenance purpose in order to smooth up the plant operation using mobile computing solution and also mobility and portability approach.

1.2 Background of study

1.2.1 Motivation

Preventive maintenance is the care and servicing by personnel for the purpose of maintaining equipment and facilities in satisfactory operating condition by providing for systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects [2]. Maintenance states here, including tests, measurements, adjustments, and parts replacement, performed specifically to prevent faults from occurring.

The risk involved for preventive maintenance is human error involved when performing preventive maintenance especially when they are using conventional method in order to gather the info from the equipments and secondly, there might be equipment failure. Data logger is used, to store all those information, under one particular device, so that it will be easier for the preventive maintenance job to be done.

Human error is one of the risks involved when doing the preventive maintenance. Error refers to a difference between actual behavior or measurement and the norms or expectations for the behavior or measurement. Errors can occur even when individuals have the required knowledge to perform a task correctly, for examples, when the individual write words in a paper with his own handwritten; others might cannot read and understand the handwritten.

Probability and mobility approach is an approach that can support this system. Portability means that the software can easily ported i.e. made to run on a new {platform} and/or compile with a new {compiler} [46]. For this project, portability means a measure of system independence; portable programs can be moved to a new system by recompiling without having to make any other changes. It is the ability of a program to be run in various environments. Meanwhile, mobility means movement that involves changing the position of oneself or an object [47]. It is the ability to move or be moved from place to place. Range of motion is an important aspect of mobility and another factor in mobility is ease of access

1.2.2 Current System

Current system that has been used by EPEMSB to do preventive maintenance for their instrumentation is where;

- Technicians will get the schedule for preventive maintenance of the day, week, month or year. This preventive maintenance schedule is in the SAP system, and technicians need to open the system in order to refer to the schedule.

- Technicians have to manually analyze the data and perform the calculation.

- Technicians jot down all the information and data gathered during the maintenance. E.g.: tag no, error involve, calculation

- Technicians went to the office and write down the data gathered in the log book and also a form for further references.

1.3 Problem statement

- If SAP system down, the preventive maintenance cannot be done because technicians cannot access the schedule in the SAP system and there is no back-up for it. Technicians have to wait till the system gets back to normal in order to refer the schedule.

- Technicians have to bring papers and pen to jot down the information gathered during the maintenance and rewrite everything in a log book and a specific form, for further references. This required a lot of process to finish one job.

- Technicians have to manually analyze the data. They also have to perform calculation manually and the tag number for each instrument is analyze and filled by the technicians. This is not only time consuming but prone error, since all data were being written by each technician and sometimes they cannot be read and may lead to a wrong interpretation.

- Conventional filing system can cause missing of file and the data did not have any backup if anything happens.

- All preventive maintenance information gathering were done on a paper based form.

- Hard to refer to older record or to search for specific record because they were save using conventional filing system, which can cause a lots of trouble and extra hard work in order to find specific document that is needed.

- Hard to remember tag no for each instrument or equipment.

- No alarming system and just using manual scheduling where all technicians aware of the scheduling with their own effort.

- No data logger for Preventive Maintenance in the market.

1.4 Objective and scope of study

1.4.1 Objective

- To implement data logging system for preventive maintenance.

- To conduct studies in selecting tools for developing Electronic Preventive Maintenance.

1.4.2 Capabilities of the system

- To store data using electronic database system and this is to provide portability and ultra-mobility system for the user to collect and analyze each data gathered at the plant.

- To provide scheduling and alarming system for the technician to do the scheduled preventive maintenance

- To provide system tracking and system filing for the information gathered and also for further references.

1.4.3 Scope of study

1. To define and analyze the current system use by EPEMSB basically, how they gather information for preventive maintenance of equipments available in the plant especially for gas detector, and also thermocouple calibration.

2. To analyze the system to be used in the plant and try to identify what problem that might occur to prevent it before it's happen.

3. To identify and conceptualize the designing of the system that needs to be automated for the new system.

4. To develop a system that functioning with barcode scanning and for further enhancement, to make it a wireless database system. With this, the system in PDA can be linked straight to the database in the main server. This system can be accessed anywhere, anytime in the plant without having them to transfer the data each time they want to use the PDA since the storage of the PDA is small.

5. To implement the system at EPEMSB

6. To consider the safety issues of the hazardous place in order to implement the system in the hazardous plant.

7. Analyze the tools to be used to develop the system.

CHAPTER 2

LITERITURE REVIEW & THEORY

2.1 Portability and Mobility Approach

Portability and mobility approach is a new popular approach for the new era technologies in the world. All people want everything to be easy and at their fingertips. This is not an impossible thing to be realized with the technologies nowadays, the automated system for almost everything is almost possible. Some how, automated and computational application and approach can improve work quality and quantity. This is the reason why this approach was applied in this project. Based on Dafydd Gibbon, lecturer of faculty of linguistic and literature, University Bielefeld, Germany, "The present application area is computational support for this fieldwork documentation task within an integrated fieldwork resource environment. This concern is on the one hand more comprehensive than the currently popular issues of annotation-based data enhancement and web-based resource dissemination, and on the other hand orthogonal to these expensive technologies in that an effective but inexpensive practical new "low end high tech" technique for grass roots applications in geographically inaccessible areas is introduced" [7].

2.2 Mobile Computing Solution.

Mobile Computing is a generic term describing your ability to use technology 'untethered', that is not physically connected, or in remote or mobile (non-static) environments [22]. This also means, being able to use a computing device even when being mobile and therefore changing location [45]. Portability is one aspect of mobile computing. It is evolved in modern usage such that it requires that the mobile computing activity be connected wirelessly to and through the internet or to and through a private network. This connection ties the mobile device to centrally located information and/or application software through the use of battery powered, portable, and wireless computing and communication devices. This includes devices like laptops with wireless LAN or wireless WAN technology, smart mobile phones, wearable computers and Personal Digital Assistants (PDAs) with Bluetooth or IRDA interfaces.

Many types of mobile computers have been introduced since the 1990s, including the:

- Laptop computer
- Sub notebook
- Personal digital assistant (PDA)
- Portable data terminal (PDT)
- Mobile data terminal (MDT)
- Tablet personal computer
- Smart phone

2.3 Data Logger

A data logger is an electronic device that records data over time or in relation to location either with a built in instrument or sensor or via external instruments and sensors [10]. Increasingly, but not entirely, they are based on a digital processor (or computer). They generally are small, battery powered and portable. Data loggers vary between general purpose types for a range of measurement applications to very specific devices for measuring in one environment only [10]. It is common for general purpose types to be programmable however many remain as static machines with only a limited number of changeable parameters. Electronic data loggers have replaced chart recorders in many applications. Though they can be deployed while connected to a host PC over an Ethernet or serial port a data logger is more typically deployed as stand alone devices. Once the application is programmed into the unit, it is placed in location, the various input (sensors) and output signals are connected and the logging application is started. Sensors commonly connected include: Thermocouples, RTDs, Thermistors, strain gages, load cells, pressure sensors, and event counters such as turnstiles, liquid level and many more. (Some smaller units are designed to simply monitor temperature and RH, and require no external connections at all).

A data logger is used where a full PC-based DAQ (data acquisition signal waveform digitizers) system is not possible or desired. It is a High-speed data acquisition for real-time PC-based applications. Often this can be because the installation is in a hostile environment that most PCs cannot tolerate or because a PC based data acquisition system would simply be too large [11]. Unfortunately, security is also frequently a consideration and though the more powerful devices may be valued at many thousands of dollars, they are not as prone to theft as there is not too much use for a stolen data logger in the home and their may not be much of a market for "hot" units.

Examples of where these devices are used abound. A few of these examples are shown below:

- Monitoring temperature, pressure, strain and other physical phenomena in aircraft flight tests (even including logging info from Arinc 429 or other serial communications buses)

- Monitoring temperature, pressure, strain and other physical phenomena in automotive and in-vehicle tests including monitoring traffic and data transmitted on the vehicles CAN bus.

- Environmental monitoring for quality control in food processing, food storage, pharmaceutical manufacturing, and even monitoring the environment during various stages of contract assembly or semiconductor fabrication

- Monitoring stress and strain in large mechanical structures such as bridges, steel framed buildings, towers, launch pads etc.

- Monitoring environmental parameters in temperature and environmental chambers and test facilities.

- Replacing older, paper based chart recorders

These are only a few of the various applications which count on a data logger to record and store data. Almost any time something needs to be measured and the data stored for future reference, one of these flexible units may fit the bill. Software for most data loggers comes in the form of a simple "canned" configuration application that allows the user to select the inputs to be logged, the signal conditioning or linearization required, the sample rate, alarm conditions etc. Also the software needs to define how the logging application is to be started (e.g. time of day or based on a button push) and how it will be ended (e.g. in four hours, at a certain date/time or on an alarm condition). The software may also allow the user to select alarm conditions which may be used to control one or more outputs that can be used to notify of the alarm or even perform an emergency shut down of the system. Finally the application software typically is used to help the user download the data from the logger into an application that is used to analyze the logged data (e.g. Excel, MATLAB).

Many systems offer a fixed configuration where the number and type of inputs (and outputs if applicable) cannot be changed [15]. More powerful loggers such as UEI's UEILogger series allow the user to configure the data logger I/O to match the actual application's requirements.

2.4 Other Data Logger

There are several types of data loggers on the market today. Most fall under one of the following three categories: mechanical, electronic, or wireless and RFID. However, these categories can be slightly confusing or misleading, because many of them have similar features. For example, all three types are electronic devices. Additionally, data loggers can also be categorized by what they measure: temperature, humidity, shock, etc. So, what are the differences between each of this data logger will be defined below.

2.4.1 Mechanical Data Logger

Mechanical data loggers, such as Evidencia's DryPak, are true stand-alone devices, meaning that you do not need a computer to operate them. Plus, the data they collect is printed directly onto paper, in the form of a strip chart, enclosed within the data logger itself. Mechanical loggers are easily started by pulling a tab and, when you are ready to review the collected data, you simply remove the strip chart.

2.4.2 Electronic Data Loggers

Electronic data loggers, such as Evidencia's ThermAssure and WineSafe, require you to use a PC. By using a computer, you can do more with an electronic data logger than you can with a mechanical logger. Electronic data loggers are programmable [12]. For example, you can choose the interval readings, meaning it will record the conditions you want to monitor every "x" number of minutes or seconds. Also, with the help of special software, you can download the recorded data onto your PC. You can organize and analyze your data and decide how you want it reported.

Electronic Preventive Maintenance (this project) is more likely an Electronic Data Logger. This data logger use mobile computing solution system to provide mobility and portability approach. This data logger has a big database on the PC network, where all the data will be uploaded and stored to the server each time the work done by the technician. This data logger also will be provided with alarming and scheduling system to alert the technician for the preventive maintenance scheduled. It also provided with system tracking and system filing to the information gathered for further references. This data logger were using top down approach in order to identify project task and any related issues.

Other examples of electronic data logger is, The RainWise EDL logger incorporates a real time clock, 128K, 256K, 512K and 1MB bytes of Static non-volatile data RAM. Data save intervals are user selectable 1, 5 10, 15, 20, 30 and 60 minute save intervals. Other than data logging interval and reporting measurement units, the logger is factory configured for user selected sensors. No user programming or configuration is required. A number of telemetry options are also available. These include modems, radios, Ethernet and satellite.

2.4.3 Wireless Data loggers

Wireless data loggers, such as Evidencia's ThermAssureRF , are at the cutting edge of technology. They combine all the best features of electronic models with wireless access, remote control, and RFID temperature recording.

Just like the electronic loggers, they are fully programmable and easy to use. However, wireless data loggers offer even more. They are RFID recorders, cable free and allow you to remote access the data being collected. You can monitor the real-time conditions for several loggers at different locations creating the equivalent of a data logging network.

2.4.4 Temperature, humidity and more.

Data loggers can be built to monitor all sorts of environmental conditions [17]. Temperature and humidity are the most common. However, when needed, data loggers can monitor much more. For instance, data loggers have been used for many years by meteorological agencies to record humidity, temperature, and rain levels. Similarly, museums have been using elaborate mechanical data loggers to monitor and control the conditions in which pieces of art are being displayed or stored.

CHAPTER 3

METHODOLOGY / PROJECT WORK

3.1 Methodology used

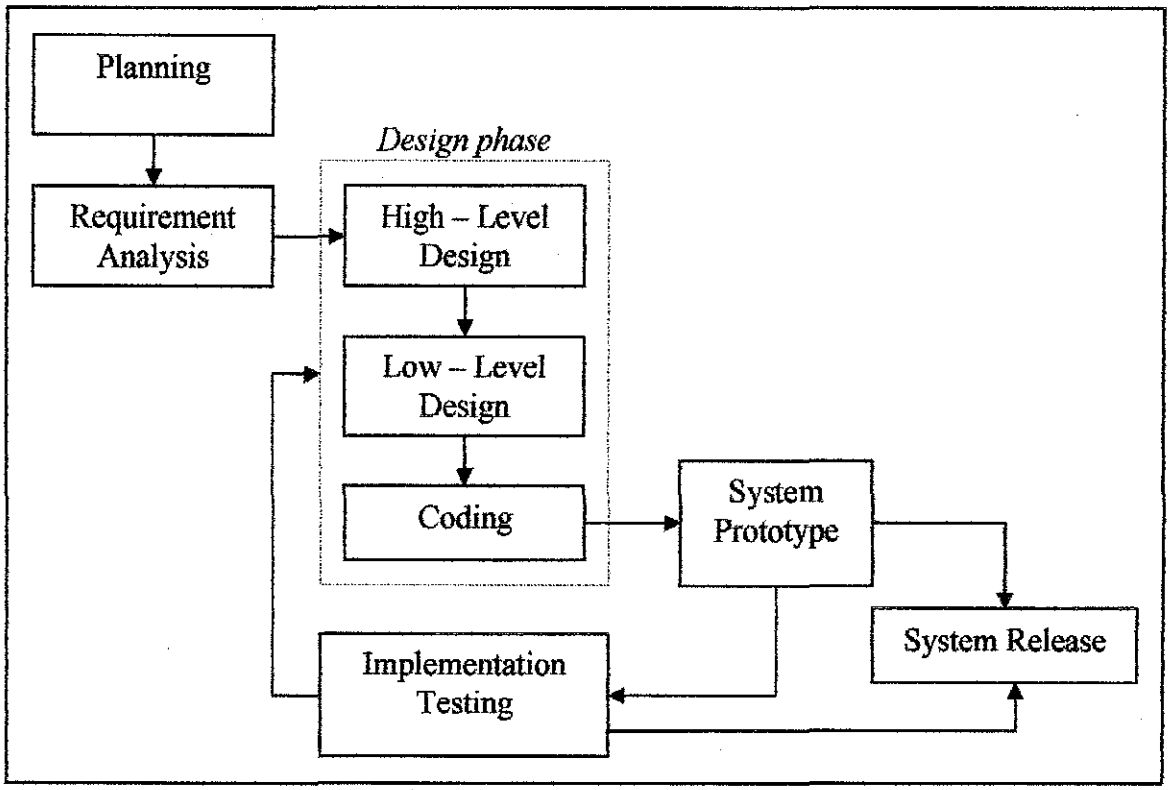


Figure 3.1: Prototype Model

The method will used in developing the system is Prototype Model. It is consists of (i) Planning, (ii) Requirement Analysis, (iii) Design Phase with three different levels

– High Level, Low Level, and Coding, (iv) System Prototype, (vi) Implementation Testing, and (vii) System Release. Each of the phases has its own role and reflects on how much the system will be progressing throughout the development stages of the system.

A prototyping based methodology performs the analysis, design and implementation phases concurrently and repeatedly in a cycle until the system is completed. Especially in design phase, it can be divided into three smaller sub – phases; the High – Level Design phase, the Low – Level Design phase, and also the Coding phase. All the phases will be done concurrently after one another for each functional and non – functional requirement. This phase will be repeated for each requirement that has been analyzed via the previous phase.

3.1.1 Requirement

3.1.1.1 User Requirement

- To store data using electronic database system

- To search data from database

3.1.1.2 Functional Requirement

- Scheduling and alarming system.

- System tracking and system filing

- Provide portability and ultra-mobility system.

3.2 Procedure Identification

3.2.1 Current System Flow

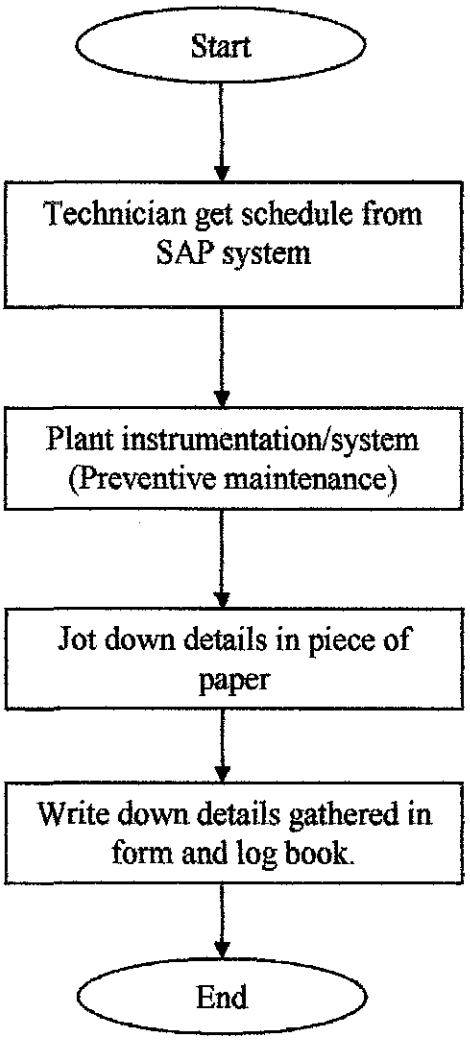


Figure 3.2.1: Current System Flow

Figure showing the current system flow for existing system in EPEMSB plant. It was a conventional system and need improvement in order to improve worker's performance in handling their job.

3.2.2 Proposed System Flow for Entering Data

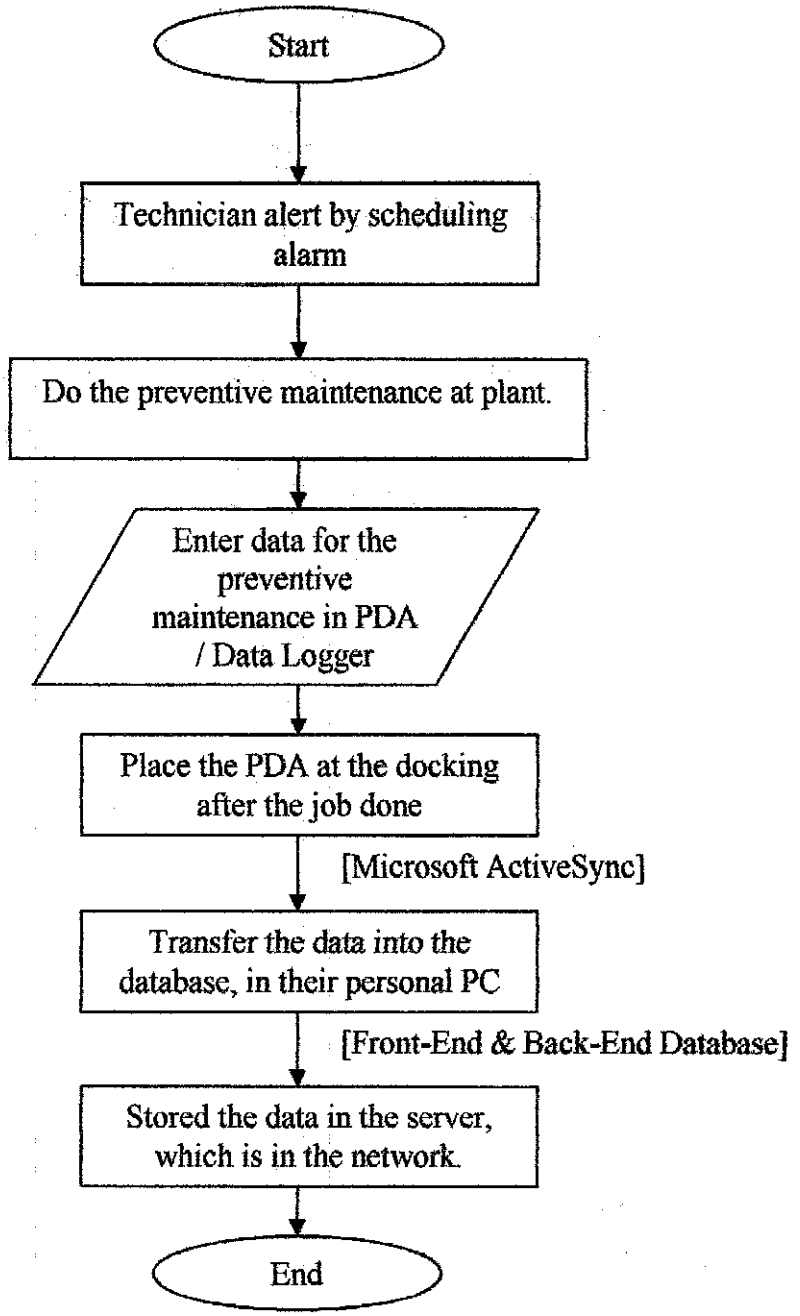


Figure 3.2.2: Proposed System Flow for Entering data

Figure shows the proposed flow for entering data into the system, starting from technician part until the information gathered using PDA and then it will be transferred to database in network.

3.2.3 Proposed System Flow for Retrieving Data

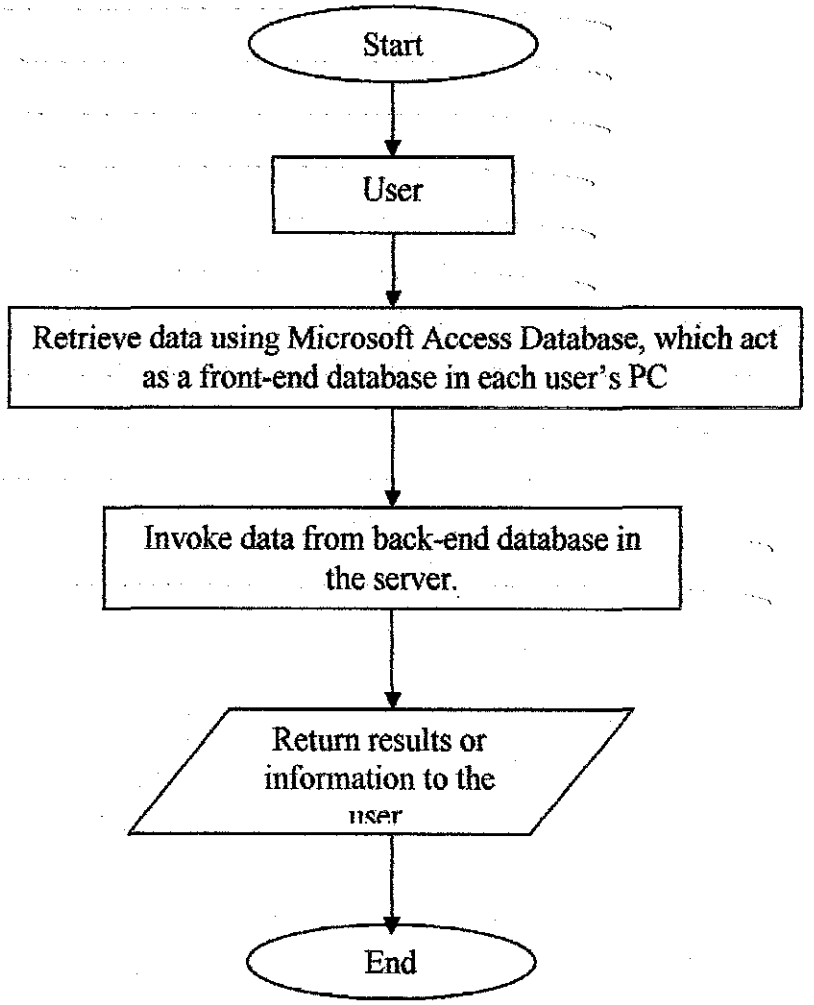


Figure 3.2.3: Proposed System Flow for Retrieving Data

Figure 3.2.3 shows the step proposed for retrieving data from the database in the network. User has to invoke data from database using Microsoft Access interface, and then the server will answer the invocation and return the information needed.

3.2.4 System Architecture

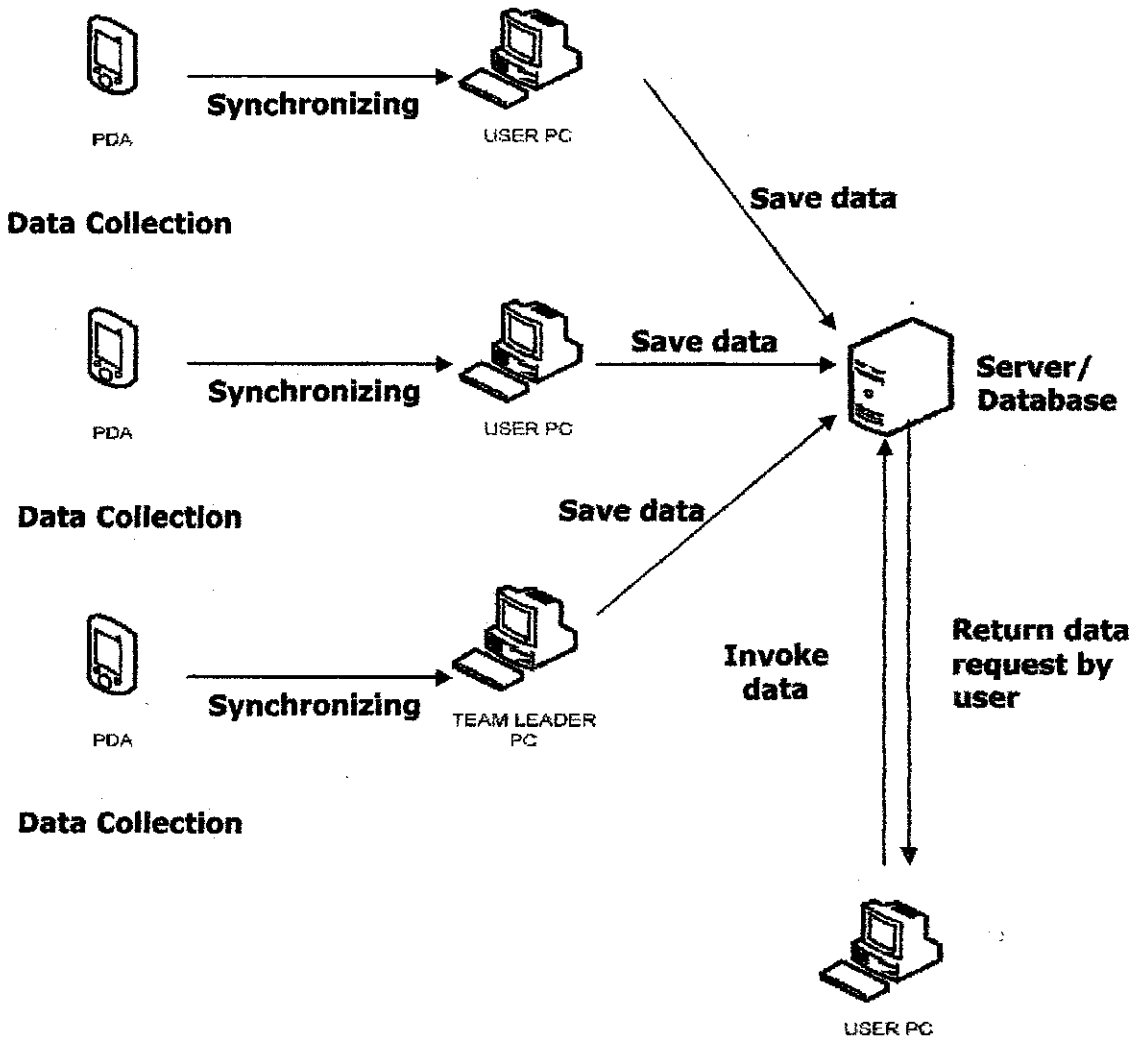


Figure 3.2.4: System Architecture

Figure 3.2.4 shows the system architecture for the system. It shows how the system will be synchronize with the PDA system, how user can invoke from the database and save data gathered into the database. Server will be the back-end database; meanwhile the front-end database will be stored in each staff's personal computer.

3.3 Entity Relationship Diagram

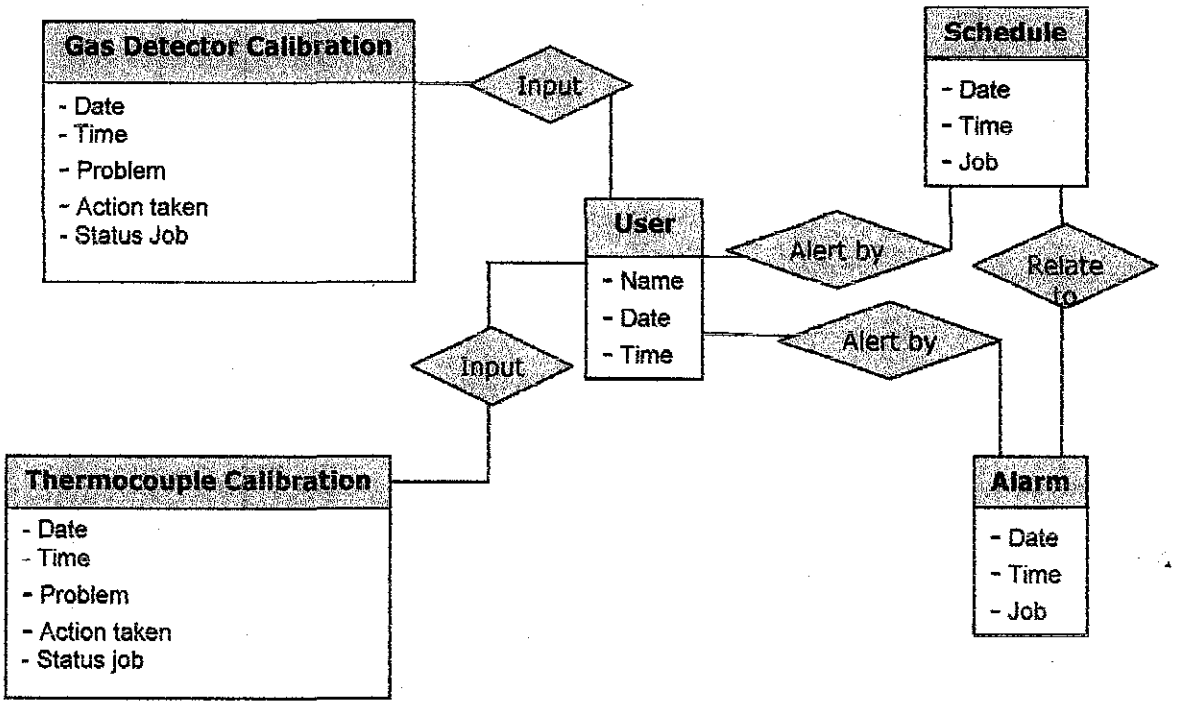


Figure 3.3: Entity Relationship Diagram

Using entity relationship diagram, this will clearly shows how each of the form react for each user for example the scheduling for each of them, and what type of preventive maintenance should be done by them. They will be alert using alarm.

3.4 Data Flow Diagram

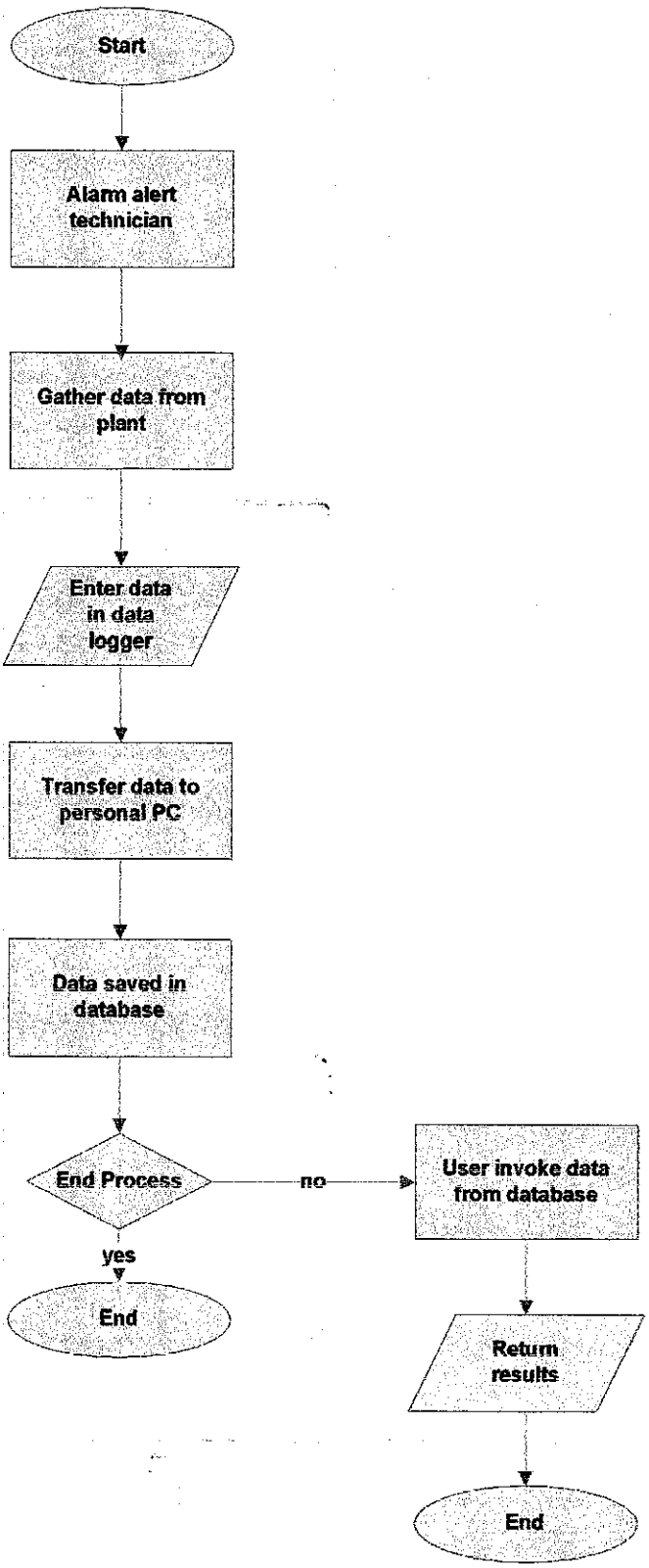


Figure 3.4: Flow Chart

Figure 3.4 representing the flow chart shows how the system work starting from the alarm alert for the technician, information gathering process, transferring and synchronization process, and last but not least the invocation process flow from users.

3.5 Class Diagram

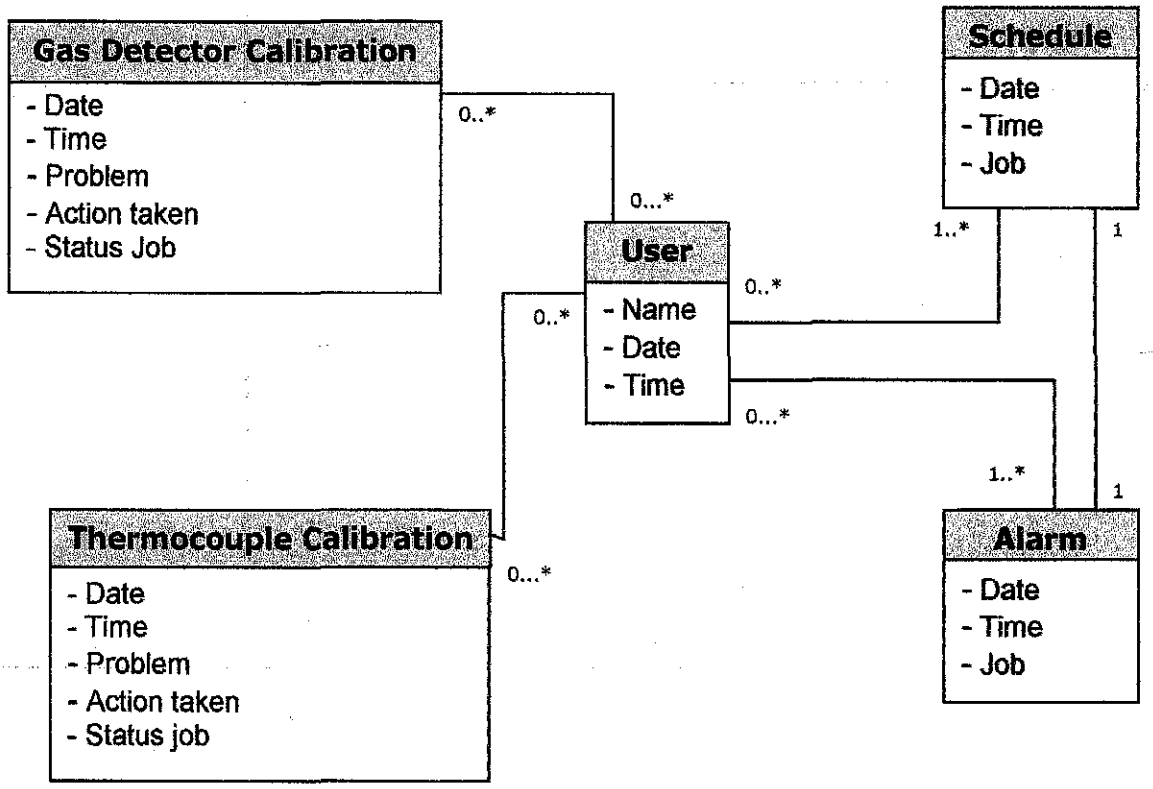


Figure 3.5: Class Diagram

Figure 3.5 shows the class diagram for the system. This shows the relationship between each of the element in the system, for example, user and form relationship is one to many, which means, one user can create many reports, and one reports also may contain more than one name for the person who doing the job, because the job in plant mostly be done in group.

3.6 Use Case Diagram

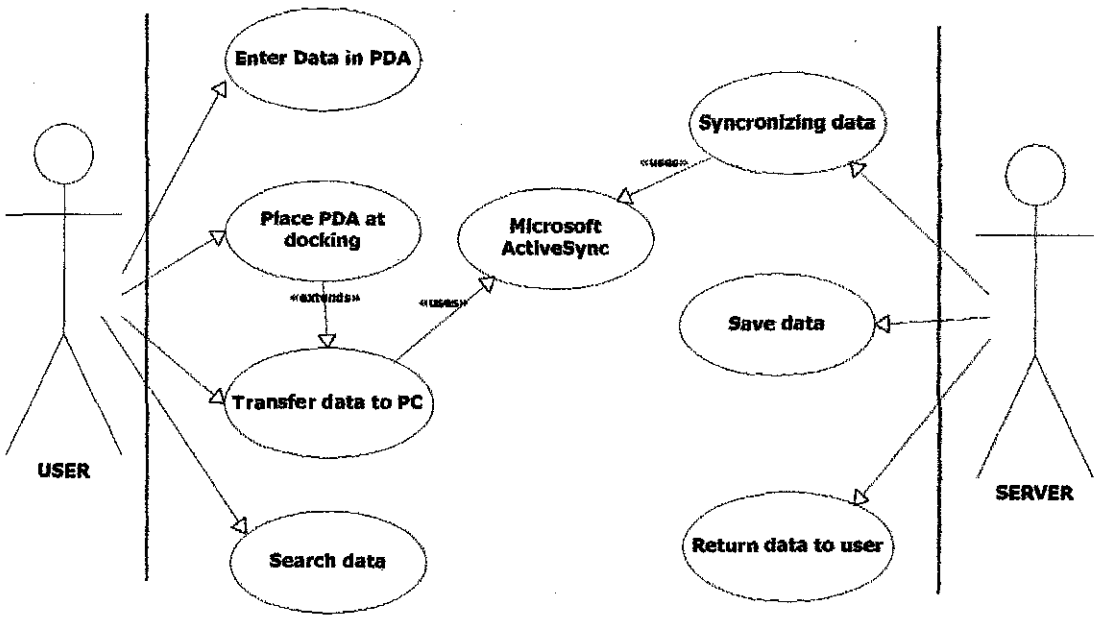


Figure 3.6: Use Case Diagram

Figure 3.6 shows the use case diagram for the system. It shows how the user and the server react to each other. User can enter data in PDA and then transfer it to PC, and user also can search the data from the server. Meanwhile, the server has the job to synchronizing the data, between the data in database and the data from PDA, save the data in the database and also return the data to the user when invoked.

3.7 Tools Required

3.7.1 Microsoft Access Database

Microsoft Access database were being used for this project because it can provide better database, because it was combined with Microsoft .Net for its framework, VB.Net for its interface and also with help of Microsoft ActiveX, in order to provide better interface and user's satisfaction. Microsoft Access also can provide front-end and back-end database, which will allow the system to be accessed by everyone, at any time, without any limitation of the user can accessed it in one time.

3.7.2 Microsoft ActiveSync

ActiveSync is a synchronization program developed by Microsoft. It allows a mobile device to be synchronized with either a desktop PC, or a server running Microsoft Exchange Server or Kerio MailServer. Only Personal Information Manager (PIM) data (Email/Calendar/Contacts) may be synchronized with the Exchange Server. (Tasks may also be synchronized with Exchange Server on Windows Mobile 5.0 devices.) The PC synchronization option, however, allows PIM synchronization with Microsoft Outlook, along with Internet "favorites", files, and tasks, amongst other data types. Supported mobile devices include PDAs or Smart phones running Windows Mobile, or the Windows CE operating system, along with devices that do not use a Microsoft operating system[13], such as the Symbian platform. ActiveSync also provides for the manual transfer of files to a mobile device, along with limited backup/restore functionality, and the ability to install and uninstall mobile device applications.

3.7.3 HanDBase® 3.0 Software

HanDBase® 3.0 Software is database software for PDA or other mobile computing device which is lighter software and just need a little hard disk space and memory. This software is to replace the Microsoft Access software in the mobile device since the mobile device or PDA did not support Microsoft Access.

In the PDA, the data will be stored and after each job or preventive maintenance is completed for the day, the PDA will be placed at the docking system, and then the data will be transfer to the main computer, to transfer it to the main database in the server. By using Microsoft Active Sync, the data from HanDBase will be synchronizing with the data in the original database which is place in the main/origin server.

3.7.4 Enterprise PDA – Symbol PPT 8800 Series.

Basically, this type of PDA was chosen because it can provide safety for hazardous place such as in the plant because it has laser safety CDRH Class II, IEC Class 2 and also have hazardous locations certification to UL for use in Class 1, Division 2, Groups A, B, C, D for specific PPT88XX configuration. This all is the basic safety code for hazardous place like EPEMSB plant. See appendix for detail PDA specifications.

CHAPTER 4

RESULTS & DISCUSSION

4.1 Results

HanDBase® 3.0 Software will be use instead of Java™ 2 Micro Edition (J2ME) because this type of application cannot be implemented in Microsoft Pocket PDA 2003. HanDBase® 3.0 Software is light software, using less memory and hard disk space since the PDA storage and memory are limited. While in Personal Computer, the system will be using Microsoft Access Database which with help of MS SQL, VB. Net. .Net Framework and also Microsoft ActiveX.

The PDA used for the electronic preventive maintenance must meet plant specification, because it must adaptable to plant regulations which will not give any effect or harm to the plant. Symbol PPT 8800 series will be used for this project because it meets most of the plant requirements. It has laser safety CDRH class III and also IEC class 2 which are safe for hazardous place and also meet the plant regulation.

Most of the data logger available in the market is related to mechanical data logger and not including preventive maintenance or instrumentation calibration data logger.

4.2 Discussion

4.2.1 Program's Function

Electronic Preventive Maintenance is an extensible program. Extensible means an architectural property of a program that allows its capabilities to expand. For example, in this program, it is using Microsoft Access and HanDBase® as the database for both Personal computer and PDA. Both of these programs are easily extended. It can be added, dropped, deleted and recreated its entire attribute. It's the option that only available for administrator's access. Additional Microsoft Active Sync software used to synchronize and manage the data between the PC and also the PDA for further storage and redevelopment.

HanDBase® was use as the database interface in PDA. The software is light and its can be supported by the PDA. HanDBase® program can be recreated, re-edit, to be added and remove the attribute.

Microsoft Access is an extensible form of database to store all the data and information about the preventive maintenance and the checklist needed to do the preventive maintenance [13]. With help with Microsoft .Net framework, MS SQL, VB .Net and also Microsoft ActiveX, this will enable to create a database that can manage all the information or plant's data better and help to store all the data in a proper place for future referential. The database will be placed at the origin server (back-end database) and the accesses were limited to the restricted person only such as the executive and also the technician at the department related. All the information entered in each computer (front-end database), will be stored at one database, in the origin server, so that there will not be any redundant data or information in the database.

Microsoft ActiveSync also acts as a middleware between the PDA and also the PC itself in order to convert the data from HanDBase® software to Microsoft Access software and sync it together. This software also extensible

because the option of this software can be set as the setting that it supposed to be in react with the Electronic Preventive Maintenance system.

4.2.2 Screenshot

4.2.2.1 Daily Work Form - PC

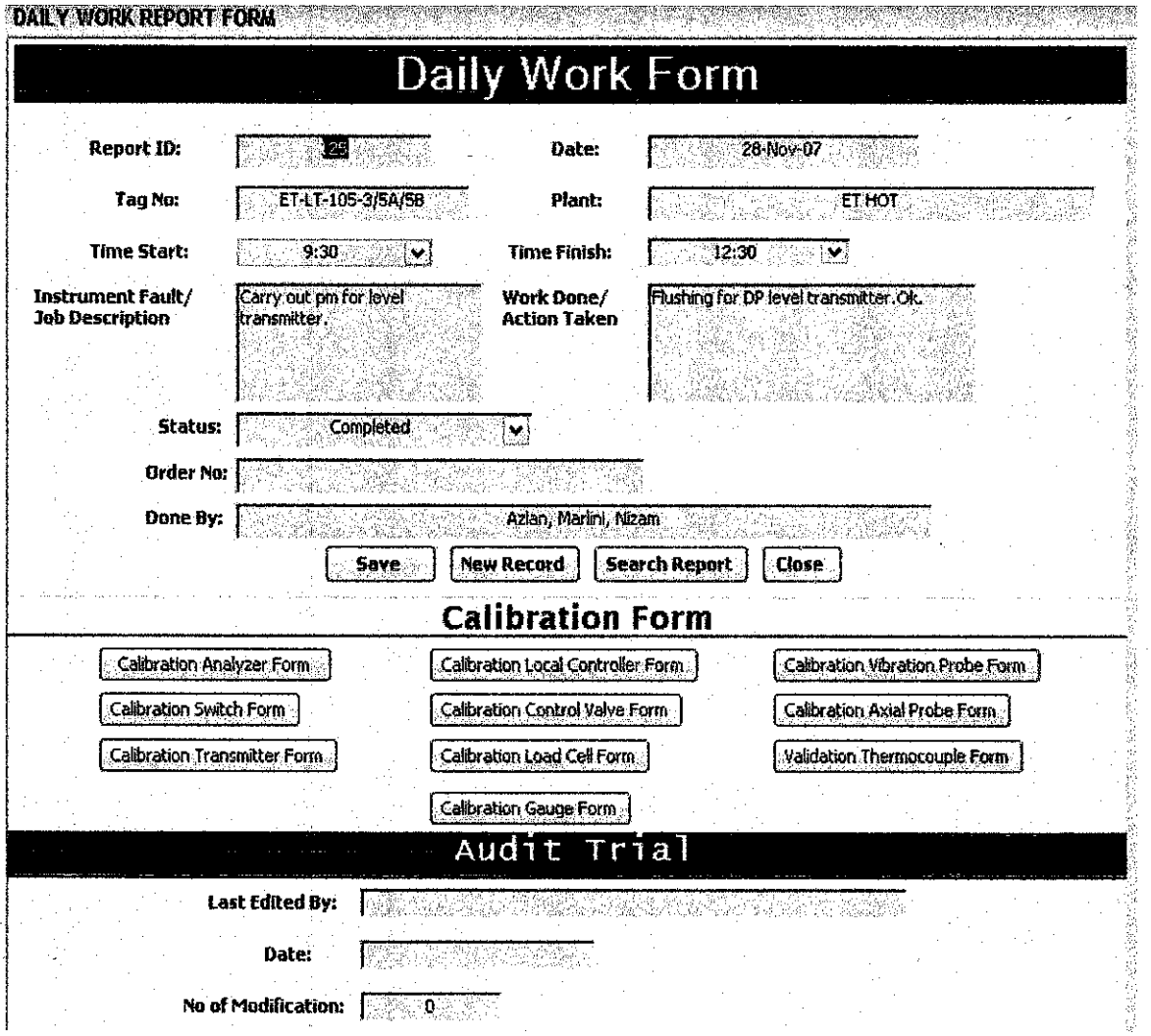


Figure 4.1: Daily Work Form

Shown figure 4.1 is the interface for Daily Work Form that will be loaded to each staff personal computer. This form will be used by the staff to fill in the job done daily in order to keep record each of the job and to track in order for better improvement of the plant.

Report ID will represent the unique number of each report entered. In the system, the report will create an auto-running number for report being generated. This report ID may help users to keep track the total number of reports that have been created. At the same time, it may help them using the id as references to search for a specific report

The system was used to capture various types of documents. All documents are able to be update at anytime. The latest update can be accessible to all. They will continuously update the report until it is completed.

Figure 4.2: Report Status

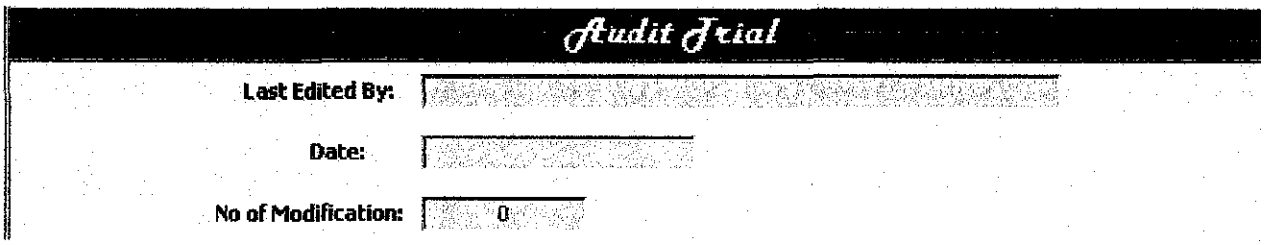


Figure 4.3: Audit Status

Daily Report

Start	Finish	Tag No	Plant	Job Description	Action	Status	Done By
				27-Nov-02			
9:30	14:15	EE-0-AI302	EI HDI	COMPONENT FOR CO2 MISSING.	CHECK FLOW AND PRESSURE CONDITION FOR SAMPLING SYSTEM FOUND ALL OK DONE FLOW CHECK FOR C.C SYSTEM FOUND LOW FLOW RATE. DONE SOME ADJUSTMENT ON FLOW STILL CANNOT GET ACCURATE FLOW. REMOVE THE COLUMN, FINAL SEPARATION FOR CO2). STILL CANNOT GET FLOW SET TIME CHANGE NEW COLUMN AND DONE FLOW/C HECKED. DONE CALIBRATION.	Completed	Ivan Aslan, Ivan Suleiman
				03-Nov-06			
10:00	10:30	UI-0-PS039CB	EI OBL	Calibration for pressure switch	Done calibration. Pressure switch in good condition	Completed	Aslan, Hisam
9:30	10:00	UI-0-PS039CA	EI OBL	Calibration for Boiler C shutdown	Done calibration(s). Pressure switch in good condition	Completed	Aslan, Hisam
11:00	11:30	UI-0-PS039CA	EI OBL	Request for calibration on pressure switch.	Done calibration. Pressure switch in normal condition	Completed	Aslan, Hisam
10:30	11:00	UI-0-PS039CC	EI OBL	Calibration for Boiler C shutdown list.	Done calibration. Pressure switch in good condition.	Completed	Aslan, Hisam
				05-Nov-06			

Tuesday, August 07, 2007 Page 1 of 6

Figure 4.4: Print Format

Print format is use to print the document entered into form format. This function is applicable for all daily work report and calibrations sheet.

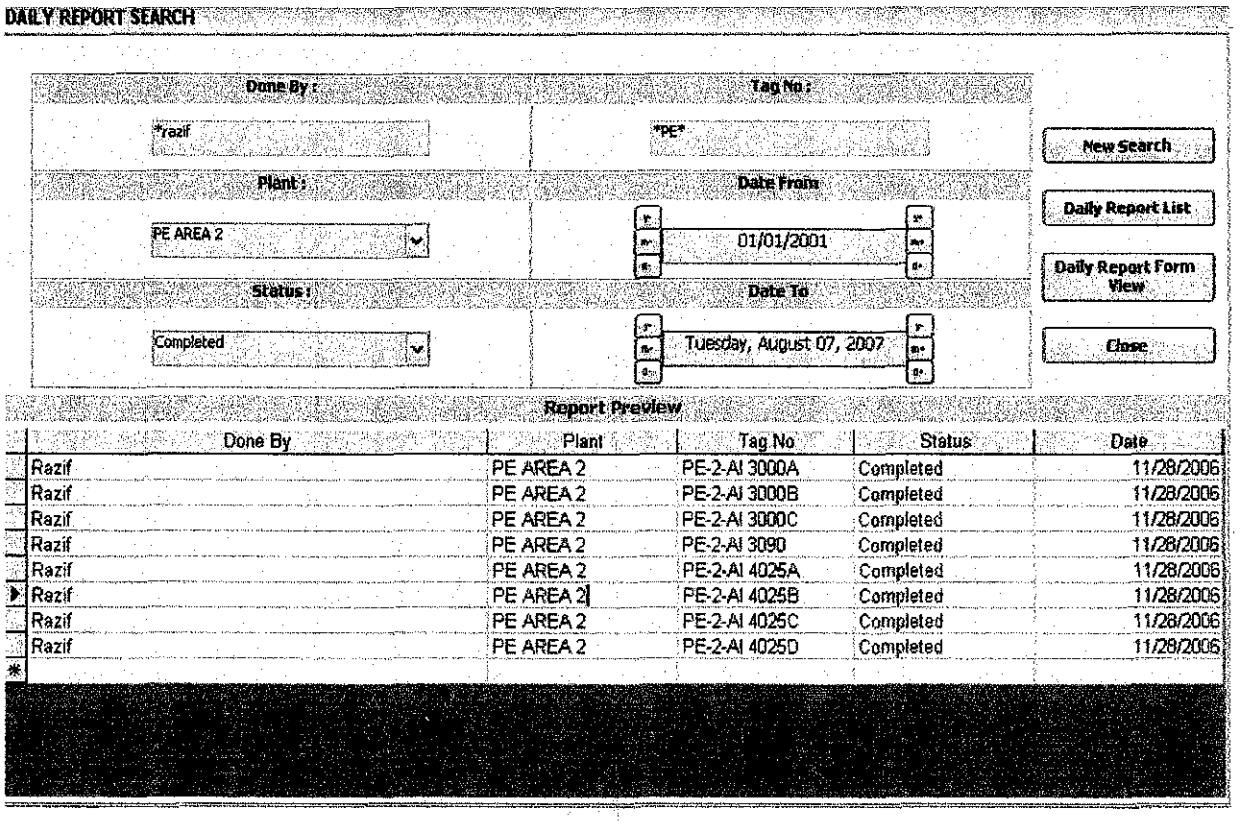


Figure 4.5: Search Report

The system provides searching facility to the users. Users may search report/documents using this facility. Searching is important and help users a lot to find the specific report when needed. Through searching facility, it will help users to save their time. There is no need for them to browse through one by one report in order to find the required report.

4.2.2.1 Calibration Switch Form - PC

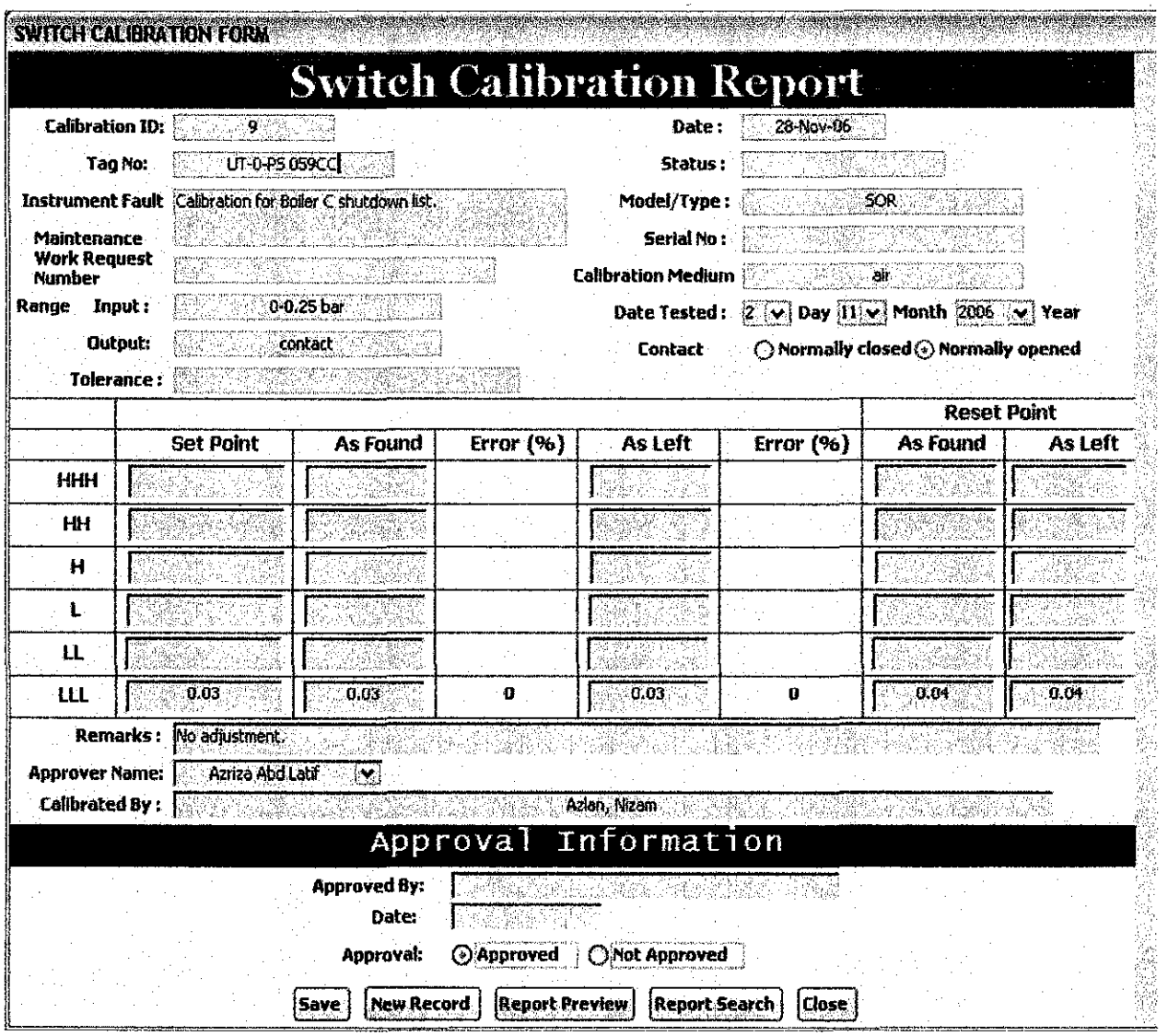
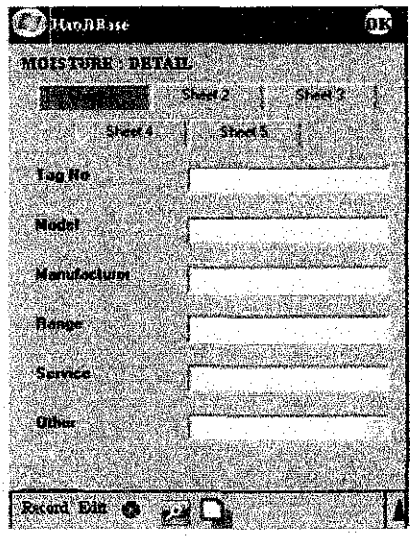


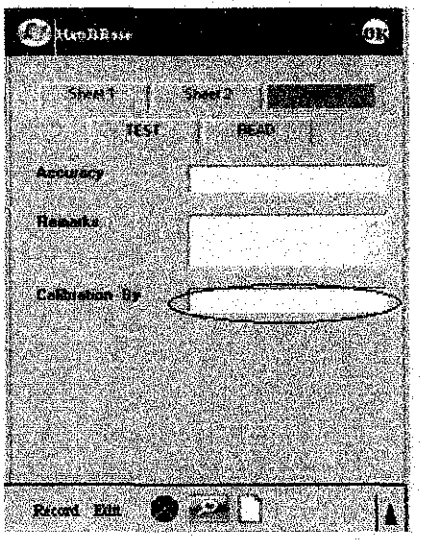
Figure 4.6: Calibration Switch Form

Present are the interface for Calibration Switch Form that will gather all the information needed for Switch Maintenance. Each calibration was recorded and the calculation for each of the error will be auto-calculated by the system. This report will be approved by the superior of the department in order to make sure no mistakes done.

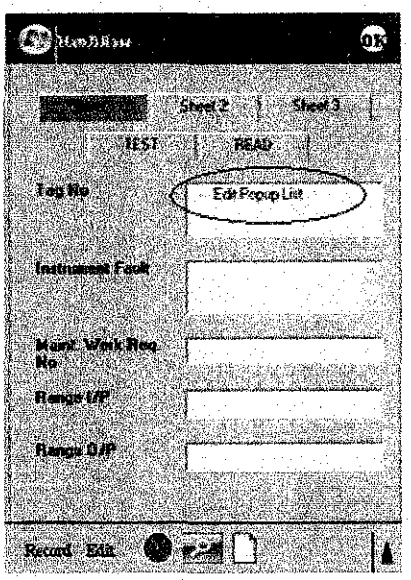
4.2.2.1 HanDBase Form - PDA



Main Page View



Calibration by View



Edit popup List View

Figure 4.7: HanDBase Form

Figure 4.7 shows the example of the form existing in the PDA, using HanDBase software. In main page is where the user will have to key in all the information that they have to gather from the plant and also the person who calibrated the results and information. There's also an option for editing the popup list. This is for entering the tag no that is not in the list given in the form.

4.2.3 Evaluation

Due to some problem occurred and time constraint, I cannot manage to evaluate the program development in EPEMSB plant, but they are agreed to use this system and it has been used starting from August 2007.

The program constraints on two things that can be improve from older system, which are time and human errors. Both of this error are already been proven that it can be improved.

New system are more time consuming rather than older system, because workers do not have to do multiple jobs in order to accomplish one preventive maintenance for one equipment. The new system uses the technology, to help technicians do their job more efficiently and more time consuming. This is proven because the technicians now only have to bring a PDA to the plant and enter all the information needed during the preventive maintenance at the plant.

This system can reduce human error, for example, when technicians using the handwriting, there might be possibilities that others cannot read their handwriting. But using this program, all of the writing is using computer writing, and it might lessen the error made by the human.

4.2.4 Future Recommendation

Further work will be done especially focusing on the research to make this Electronic Preventive Maintenance into a completely wireless database and for the database in mobile device, it will using ASP.Net for mobile technology, which will reduce the cost for purchasing the HanDBase products and also when improving for wireless approach, it can be more on mobile and portable application.

CHAPTER 5

CONCLUSION

The data logging system can be implementing at EPEMSB based on the studies done at the plant and also the information gathered from the staff there. PDA Symbol PPT 8800 series were chosen as it meets most of the plant requirements and rules meanwhile HanDBase® 3.0 Software will be use for the database in PDA since it is lighter and use less memory space. For the synchronization of the data from the PDA to the data in database, Microsoft ActiveSync will be use.

This project can provide portability and ultra-mobility system for the user to collect and analyze each data gathered at the plant in order to improve the maintainability of each instrument in EPEMSB and also to improve their job performance in the future.

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APPENDICES

Appendix I

Daily Work Form

```
Private Sub Form_Open(Cancel As Integer)
On Error GoTo Err_NewRecordCommand_Click

    DoCmd.GoToRecord , , acNewRec
Exit_NewRecordCommand_Click:
    Exit Sub

Err_NewRecordCommand_Click:
    MsgBox Err.Description
    Resume Exit_NewRecordCommand_Click
End Sub
Private Sub Savebutton_Click()
On Error GoTo Err_Savebutton_Click


    DoCmd.DoMenuItem acFormBar, acRecordsMenu, acSaveRecord, ,
acMenuVer70

Exit_Savebutton_Click:
    Exit Sub

Err_Savebutton_Click:
    MsgBox Err.Description
    Resume Exit_Savebutton_Click

End Sub

Private Sub save_Click()
On Error GoTo Err_Save_Click


    DoCmd.GoToRecord , , acNewRec
```

```
Exit_Save_Click:
    Exit Sub

Err_Save_Click:
    MsgBox Err.Description
    Resume Exit_Save_Click

End Sub
Private Sub new_Click()
On Error GoTo Err_new_Click


    DoCmd.GoToRecord , , acNewRec

Exit_new_Click:
    Exit Sub

Err_new_Click:
    MsgBox Err.Description
    Resume Exit_new_Click

End Sub


Private Sub saverecord_Click()
On Error GoTo Err_saverecord_Click


    DoCmd.DoMenuItem acFormBar, acRecordsMenu, acSaveRecord, ,
acMenuVer70

Exit_saverecord_Click:
    Exit Sub

Err_saverecord_Click:
    MsgBox Err.Description
    Resume Exit_saverecord_Click
```

```
End Sub
Private Sub preview_Click()
On Error GoTo Err_preview_Click

    Dim stDocName As String

    stDocName = "DailyWorkReport"
    DoCmd.OpenReport stDocName, acPreview

Exit_preview_Click:
    Exit Sub

Err_preview_Click:
    MsgBox Err.Description
    Resume Exit_preview_Click

End Sub
Private Sub AnalyzerForm_Click()
On Error GoTo Err_AnalyzerForm_Click

    Dim stDocName As String
    Dim stLinkCriteria As String

    stDocName = "CalibAnalyzer"
    DoCmd.OpenForm stDocName, , , stLinkCriteria

Exit_AnalyzerForm_Click:
    Exit Sub

Err_AnalyzerForm_Click:
    MsgBox Err.Description
    Resume Exit_AnalyzerForm_Click

End Sub
Private Sub CloseForm_Click()
On Error GoTo Err_CloseForm_Click
```

```
    DoCmd.close

Exit_CloseForm_Click:
    Exit Sub

Err_CloseForm_Click:
    MsgBox Err.Description
    Resume Exit_CloseForm_Click

End Sub
Private Sub CalibSwitch_Click()
On Error GoTo Err_CalibSwitch_Click

    Dim stDocName As String
    Dim stLinkCriteria As String

    stDocName = "CalibSwitch"
    DoCmd.OpenForm stDocName, , , stLinkCriteria

Exit_CalibSwitch_Click:
    Exit Sub

Err_CalibSwitch_Click:
    MsgBox Err.Description
    Resume Exit_CalibSwitch_Click

End Sub


Private Sub transmitter_Click()
On Error GoTo Err_transmitter_Click

    Dim stDocName As String
    Dim stLinkCriteria As String

    stDocName = "CalibTrans"
    DoCmd.OpenForm stDocName, , , stLinkCriteria
```

```
Exit_transmitter_Click:
    Exit Sub

Err_transmitter_Click:
    MsgBox Err.Description
    Resume Exit_transmitter_Click

End Sub
Private Sub LocalControl_Click()
On Error GoTo Err_LocalControl_Click

    Dim stDocName As String
    Dim stLinkCriteria As String

    stDocName = "CalibController"
    DoCmd.OpenForm stDocName, , , stLinkCriteria

Exit_LocalControl_Click:
    Exit Sub

Err_LocalControl_Click:
    MsgBox Err.Description
    Resume Exit_LocalControl_Click

End Sub
Private Sub ControlValve_Click()
On Error GoTo Err_ControlValve_Click

    Dim stDocName As String
    Dim stLinkCriteria As String

    stDocName = "CalibControlValve"
    DoCmd.OpenForm stDocName, , , stLinkCriteria

Exit_ControlValve_Click:
    Exit Sub

Err_ControlValve_Click:
```

```
    MsgBox Err.Description
    Resume Exit_ControlValve_Click

End Sub
Private Sub LoadCell_Click()
On Error GoTo Err_LoadCell_Click

    Dim stDocName As String
    Dim stLinkCriteria As String

    stDocName = "CalibLoadCell"
    DoCmd.OpenForm stDocName, , , stLinkCriteria

Exit_LoadCell_Click:
    Exit Sub

Err_LoadCell_Click:
    MsgBox Err.Description
    Resume Exit_LoadCell_Click

End Sub
Private Sub VibrationProbe_Click()
On Error GoTo Err_VibrationProbe_Click

    Dim stDocName As String
    Dim stLinkCriteria As String

    stDocName = "CalibProbe"
    DoCmd.OpenForm stDocName, , , stLinkCriteria

Exit_VibrationProbe_Click:
    Exit Sub

Err_VibrationProbe_Click:
    MsgBox Err.Description
    Resume Exit_VibrationProbe_Click

End Sub
```

```
Private Sub AxialProbe_Click()
On Error GoTo Err_AxialProbe_Click

    Dim stDocName As String
    Dim stLinkCriteria As String

    stDocName = "CalibAxialProbe"
    DoCmd.OpenForm stDocName, , , stLinkCriteria

Exit_AxialProbe_Click:
    Exit Sub

Err_AxialProbe_Click:
    MsgBox Err.Description
    Resume Exit_AxialProbe_Click

End Sub
Private Sub Validation_Click()
On Error GoTo Err_Validation_Click

    Dim stDocName As String
    Dim stLinkCriteria As String

    stDocName = "ValidThermocouple"
    DoCmd.OpenForm stDocName, , , stLinkCriteria

Exit_Validation_Click:
    Exit Sub

Err_Validation_Click:
    MsgBox Err.Description
    Resume Exit_Validation_Click

End Sub
Private Sub Gauge_Click()
On Error GoTo Err_Gauge_Click

    Dim stDocName As String
```

```
    Dim stLinkCriteria As String

    stDocName = "CalibGauge"
    DoCmd.OpenForm stDocName, , , stLinkCriteria

Exit_Gauge_Click:
    Exit Sub

Err_Gauge_Click:
    MsgBox Err.Description
    Resume Exit_Gauge_Click

End Sub
Private Sub print6_Click()
On Error GoTo Err_print6_Click

    Dim stDocName As String

    stDocName = "DailyWorkReport"
    DoCmd.OpenReport stDocName, acNormal

Exit_print6_Click:
    Exit Sub

Err_print6_Click:
    MsgBox Err.Description
    Resume Exit_print6_Click

End Sub
Private Sub searchReport_Click()
On Error GoTo Err_searchReport_Click

    Dim stDocName As String
    Dim stLinkCriteria As String

    stDocName = "SearchRecord"
    DoCmd.OpenForm stDocName, , , stLinkCriteria
```

```
Exit_searchReport_Click:
    Exit Sub

Err_searchReport_Click:
    MsgBox Err.Description
    Resume Exit_searchReport_Click

End Sub
Private Sub Command115_Click()
On Error GoTo Err_Command115_Click

    Dim stDocName As String

    stDocName = "DailyReport"
    DoCmd.OpenReport stDocName, acPreview

Exit_Command115_Click:
    Exit Sub

Err_Command115_Click:
    MsgBox Err.Description
    Resume Exit_Command115_Click

End Sub
```

Calibration Switch Form

```
Option Compare Database

Private Sub reset_Click()
On Error GoTo Err_reset_Click


    DoCmd.DoMenuItem acFormBar, acRecordsMenu, 5, , acMenuVer70

Exit_reset_Click:
    Exit Sub

Err_reset_Click:
    MsgBox Err.Description
    Resume Exit_reset_Click

End Sub

Private Sub AsFound1_Exit(Cancel As Integer)
    Me![Text113] = ((Me![AsFound1] - Me![SetPoint1]) / Me![SetPoint1])
* 100
End Sub

Private Sub AsFound3_Exit(Cancel As Integer)
    Me![Text115] = ((Me![AsFound3] - Me![SetPoint3]) / Me![SetPoint3])
* 100
End Sub

Private Sub AsFound4_Exit(Cancel As Integer)
    Me![Text116] = ((Me![AsFound4] - Me![SetPoint4]) / Me![SetPoint4])
* 100
End Sub

Private Sub AsFound5_Exit(Cancel As Integer)
    Me![Text117] = ((Me![AsFound5] - Me![SetPoint5]) / Me![SetPoint5])
* 100
End Sub
```

```
Private Sub AsFound6_Exit(Cancel As Integer)
    Me![Text118] = ((Me![AsFound6] - Me![SetPoint6]) / Me![SetPoint6])
* 100
End Sub

Private Sub AsLeft1_Exit(Cancel As Integer)
    Me![Text119] = ((Me![AsLeft1] - Me![SetPoint1]) / Me![SetPoint1]) *
100
End Sub

Private Sub AsLeft3_Exit(Cancel As Integer)
    Me![Text121] = ((Me![AsLeft3] - Me![SetPoint3]) / Me![SetPoint3]) *
100
End Sub

Private Sub AsLeft4_Exit(Cancel As Integer)
    Me![Text122] = ((Me![AsLeft4] - Me![SetPoint4]) / Me![SetPoint4]) *
100
End Sub

Private Sub AsLeft5_Exit(Cancel As Integer)
    Me![Text123] = ((Me![AsLeft5] - Me![SetPoint5]) / Me![SetPoint5]) *
100
End Sub

Private Sub AsLeft6_Exit(Cancel As Integer)
    Me![Text124] = ((Me![AsLeft6] - Me![SetPoint6]) / Me![SetPoint6]) *
100
End Sub

Private Sub CalibratedBy_Change()
    Me![CalibSwitchTableSet].Requery
End Sub

Private Sub CalibratedBy_Enter()
On Error GoTo Err_Perhatian_Click
```

```
    Dim stDocName As String
    Dim stLinkCriteria As String

    stDocName = "InstStaffListCS"
    DoCmd.OpenForm stDocName, , , stLinkCriteria


Exit_Perhatian_Click:
    Exit Sub

Err_Perhatian_Click:
    MsgBox Err.Description
    Resume Exit_Perhatian_Click
End Sub

Private Sub Form_Open(Cancel As Integer)
On Error GoTo Err_NewRecordCommand_Click

    DoCmd.GoToRecord , , acNewRec
Exit_NewRecordCommand_Click:
    Exit Sub

Err_NewRecordCommand_Click:
    MsgBox Err.Description
    Resume Exit_NewRecordCommand_Click
End Sub

Private Sub save_Click()
On Error GoTo Err_Save_Click


    DoCmd.DoMenuItem acFormBar, acRecordsMenu, acSaveRecord, ,
acMenuVer70

Exit_Save_Click:
    Exit Sub

Err_Save_Click:
```

```
    MsgBox Err.Description
    Resume Exit_Save_Click

End Sub
Private Sub new_Click()
On Error GoTo Err_new_Click


    DoCmd.GoToRecord , , acNewRec

Exit_new_Click:
    Exit Sub

Err_new_Click:
    MsgBox Err.Description
    Resume Exit_new_Click

End Sub
Private Sub preview_Click()
On Error GoTo Err_preview_Click

    Dim stDocName As String

    stDocName = "CalibSwitchReport"
    DoCmd.OpenReport stDocName, acPreview

Exit_preview_Click:
    Exit Sub

Err_preview_Click:
    MsgBox Err.Description
    Resume Exit_preview_Click

End Sub
Private Sub Close_Click()
On Error GoTo Err_Close_Click
```

```
    DoCmd.close

Exit_Close_Click:
    Exit Sub

Err_Close_Click:
    MsgBox Err.Description
    Resume Exit_Close_Click

End Sub
Private Sub print6_Click()
On Error GoTo Err_print6_Click

    Dim stDocName As String

    stDocName = "CalibSwitchReport"
    DoCmd.OpenReport stDocName, acNormal

Exit_print6_Click:
    Exit Sub

Err_print6_Click:
    MsgBox Err.Description
    Resume Exit_print6_Click

End Sub
Private Sub Command137_Click()
On Error GoTo Err_Command137_Click

    Dim stDocName As String
    Dim stLinkCriteria As String

    stDocName = "SearchSwitch"
    DoCmd.OpenForm stDocName, , , stLinkCriteria

Exit_Command137_Click:
    Exit Sub
```

```
Err_Command137_Click:
    MsgBox Err.Description
    Resume Exit_Command137_Click

End Sub

Private Sub Text80_Exit(Cancel As Integer)
    Me![Text114] = ((Me![AsFound2] - Me![SetPoint2]) / Me![SetPoint2])
* 100
End Sub

Private Sub Text89_Exit(Cancel As Integer)
    Me![Text120] = ((Me![AsLeft2] - Me![SetPoint2]) / Me![SetPoint2]) *
100
End Sub
```

Appendix II

USER MANUAL

ELECTRONIC PREVENTIVE MAINTENANCE

Step 1

1.0 Install HanDBase ® Professional for Pocket PC and Windows Mobile

- 1.1. Install To Desktop PC
- 1.2. Install To Pocket PC

2.0 Install Microsoft Active Sync

- 2.1. Install Microsoft ActiveSync for the first time to workstation
- 2.2. New user on workstation

Step 2

3.0 How to use Electronics Preventive Maintenance

4.0 Synchronize the data between Pocket PC and Desktop PC

5.0 Data Exchange For Microsoft Access

Step 1

1.0 Install HanDBase ® Professional for Pocket PC and Windows Mobile

1.1 Install To Desktop PC

1.1.1. Get the software setup and click the icon.

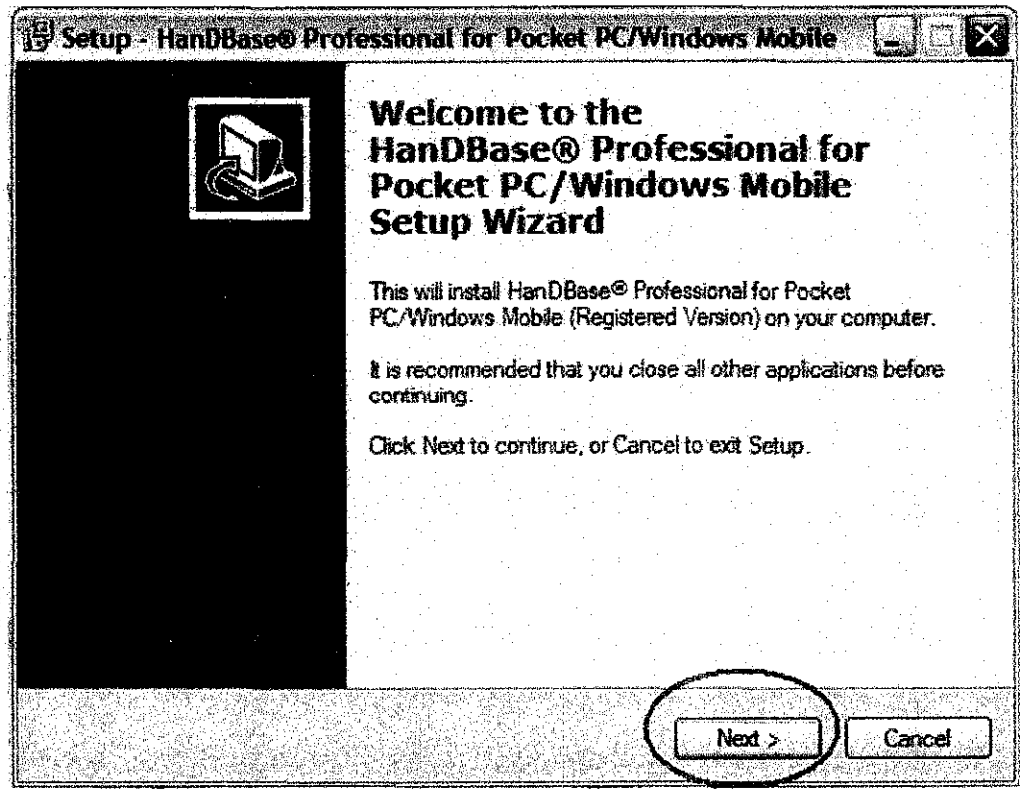


Figure 1: Setup window

1.1.2. Click button next to install the HanDBase ® Professional for Pocket PC and Windows Mobile

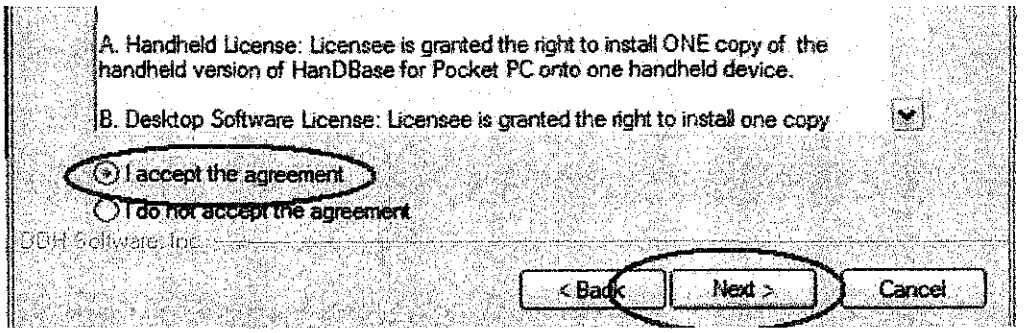


Figure 2: Agreement window

1.1.3. Read the License agreement and click the radio button for I accept the agreement and click button next.

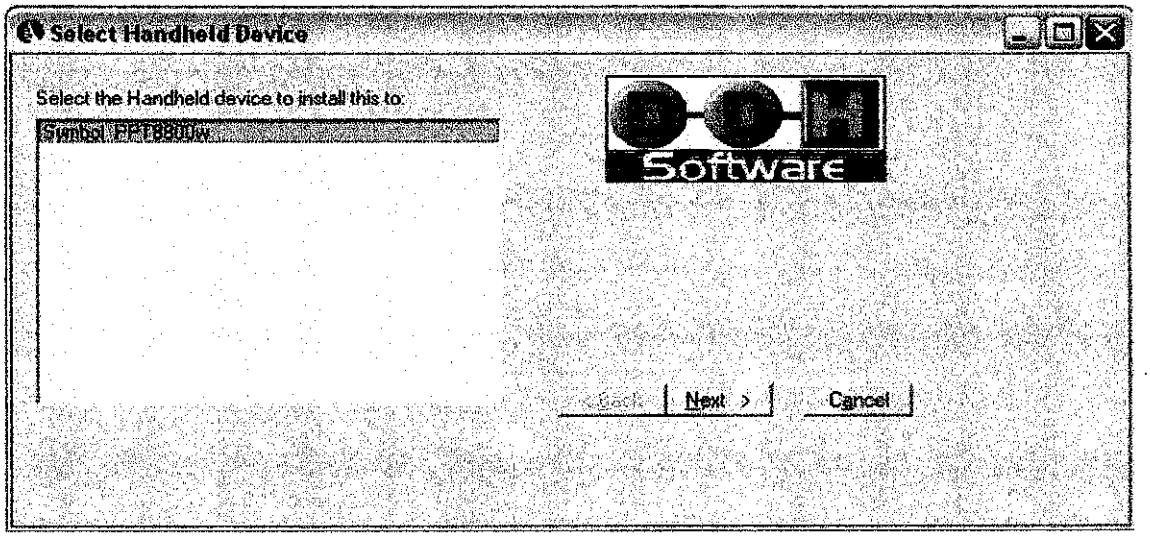


Figure 3: Select Handheld window

1.1.4. On the Select Handheld Device, highlight Symbol_PPT 8800w and click next button.

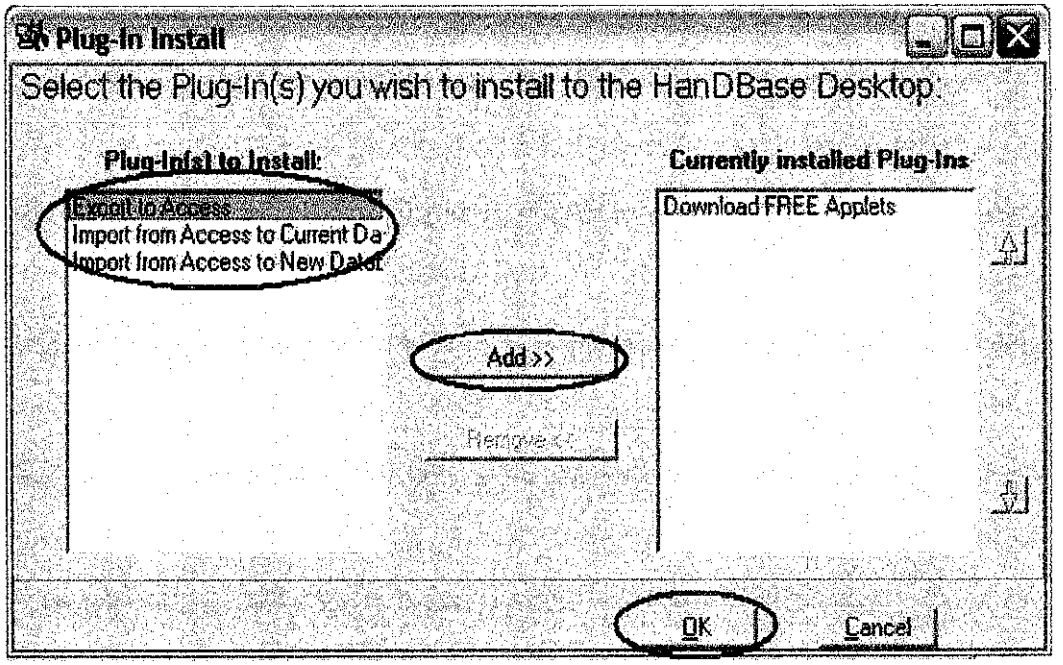


Figure 4: Plug-in Window

1.1.5. On the plug-in Install window, select all Plug-in to Install and click button OK. Click Finish button when installation is complete.

1.2.Install To Pocket PC

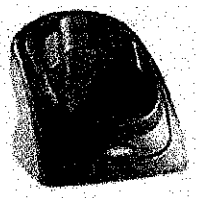


Figure 4: Cradle

1.2.1. Put the Pocket PC on the cradle

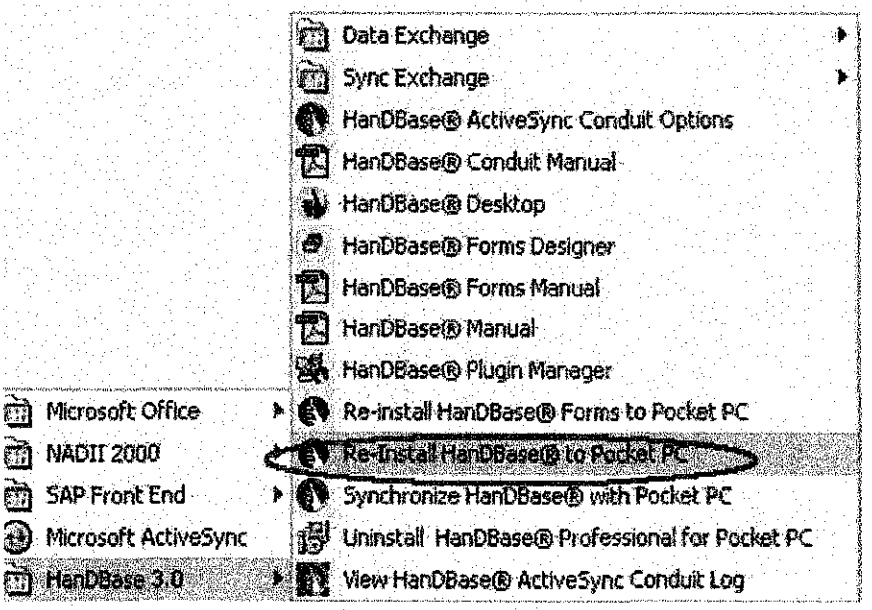


Figure 5: From Start menu

1.2.2. Go to the Start Menu → All Programs → HanDBase 3.0 → Re-Install HanDBase® to Pocket PC and click.

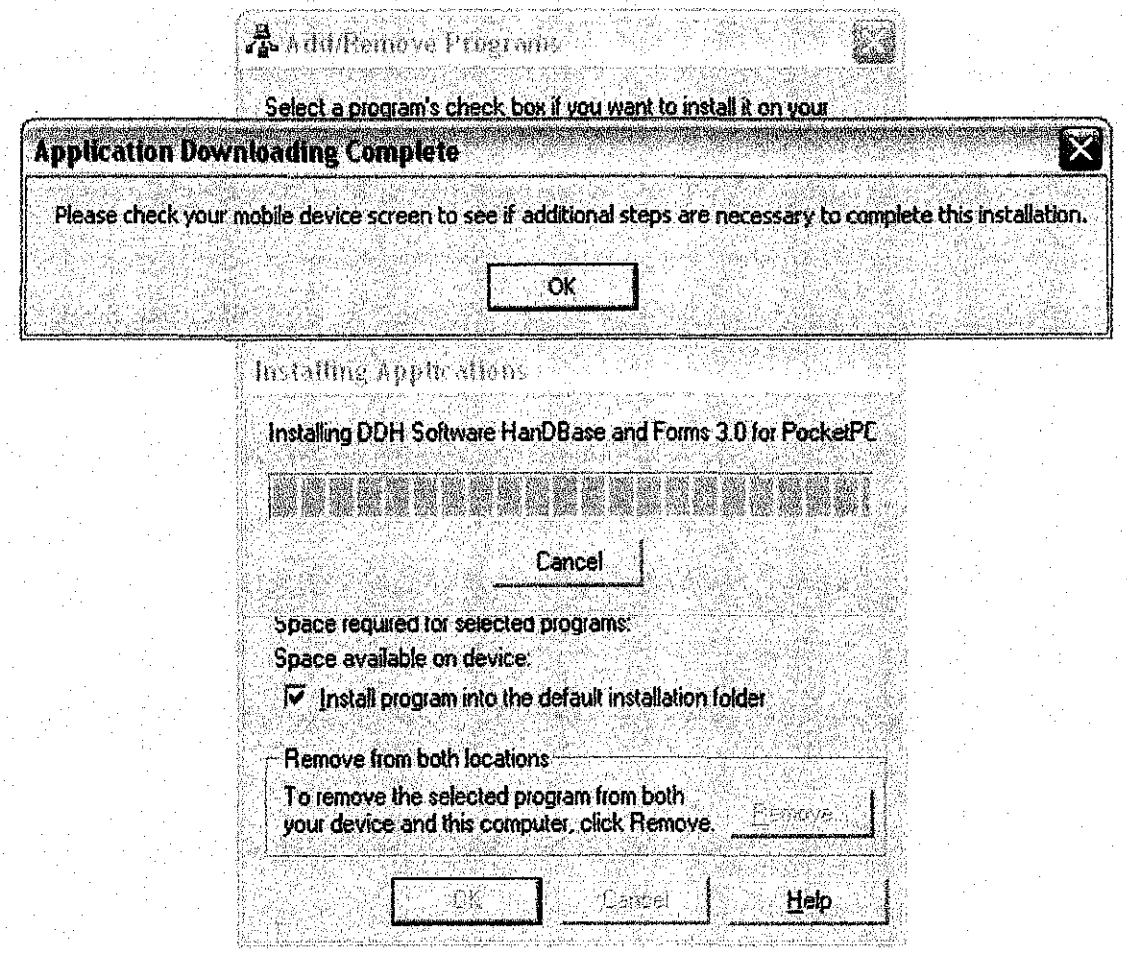


Figure 6: Installing application window

1.2.3. Wait for the Installing Application is complete and when Application Downloading Complete click button OK.

1.2.4. HanDBase® Profesional finish installed.

1.2.5. Go to Pocket PC and open the HanDBase by Start Menu→ HanDBase

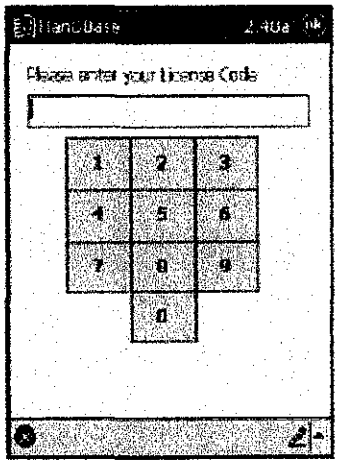


Figure 7: License Code

1.2.6. The window will request the license code, enter the code and click OK.

1.2.7. The data will synchronize and Electronic Preventive Maintenance will install in Pocket PC.

2.0 Install Microsoft Active Sync

2.1. Install Microsoft ActiveSync for the first time to workstation

2.1.1. Get the software setup from Microsoft and install the software on workstation and click next until setup complete window appear and click finish.

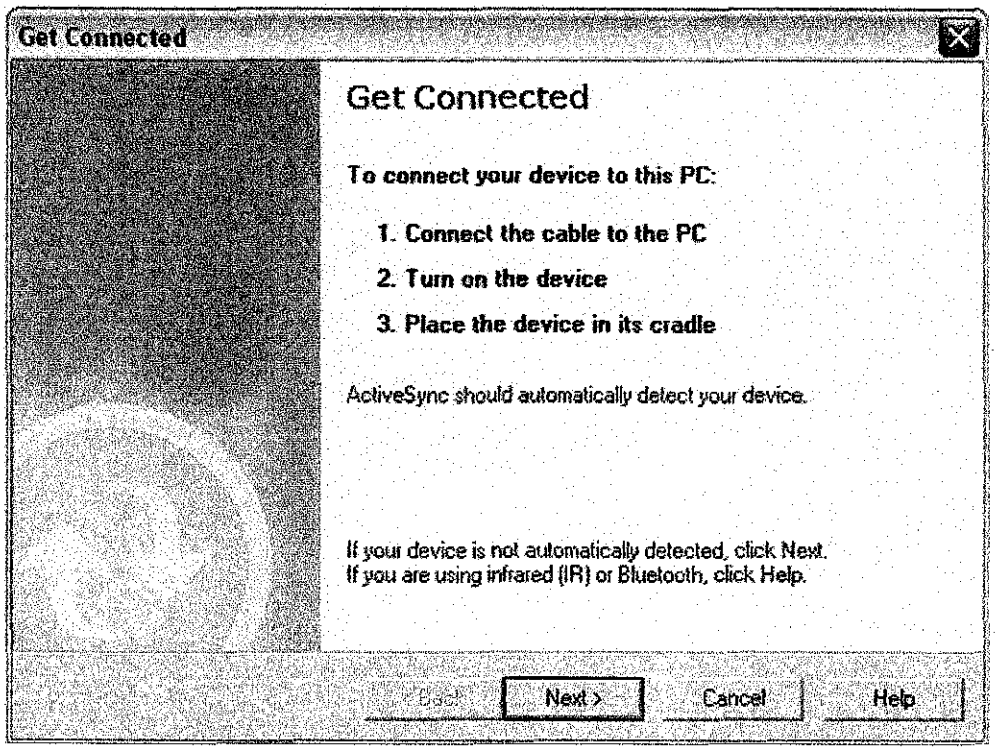


Figure 8: Get connected Window

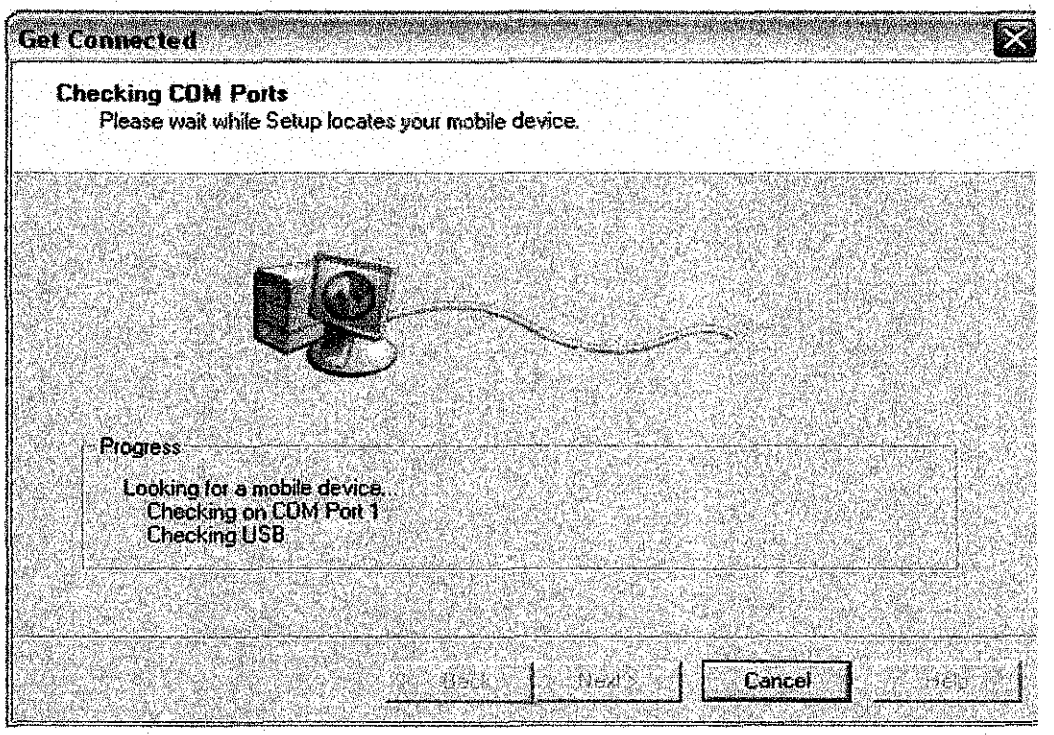


Figure 9: The computer find the connection port between the cradle and PC

2.1.2. Get connected window will appear and click next and the computer will checking the computer port to make sure the Pocket PC and PC can communicate well.

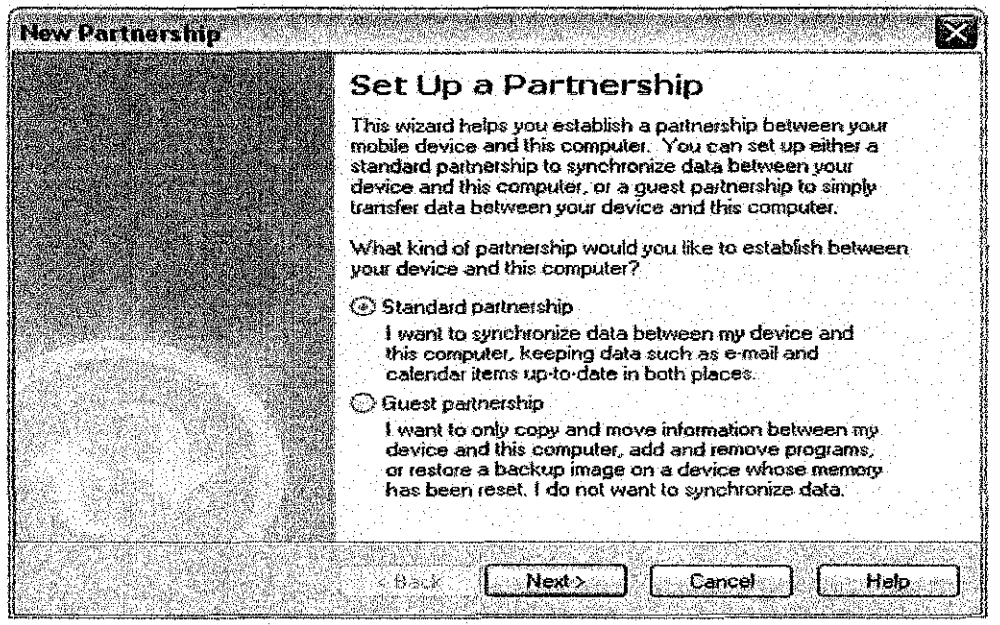


Figure 10: Partnership Setup window

2.1.3. On the Partnership Setup window, choose the standard partnership and click next button.

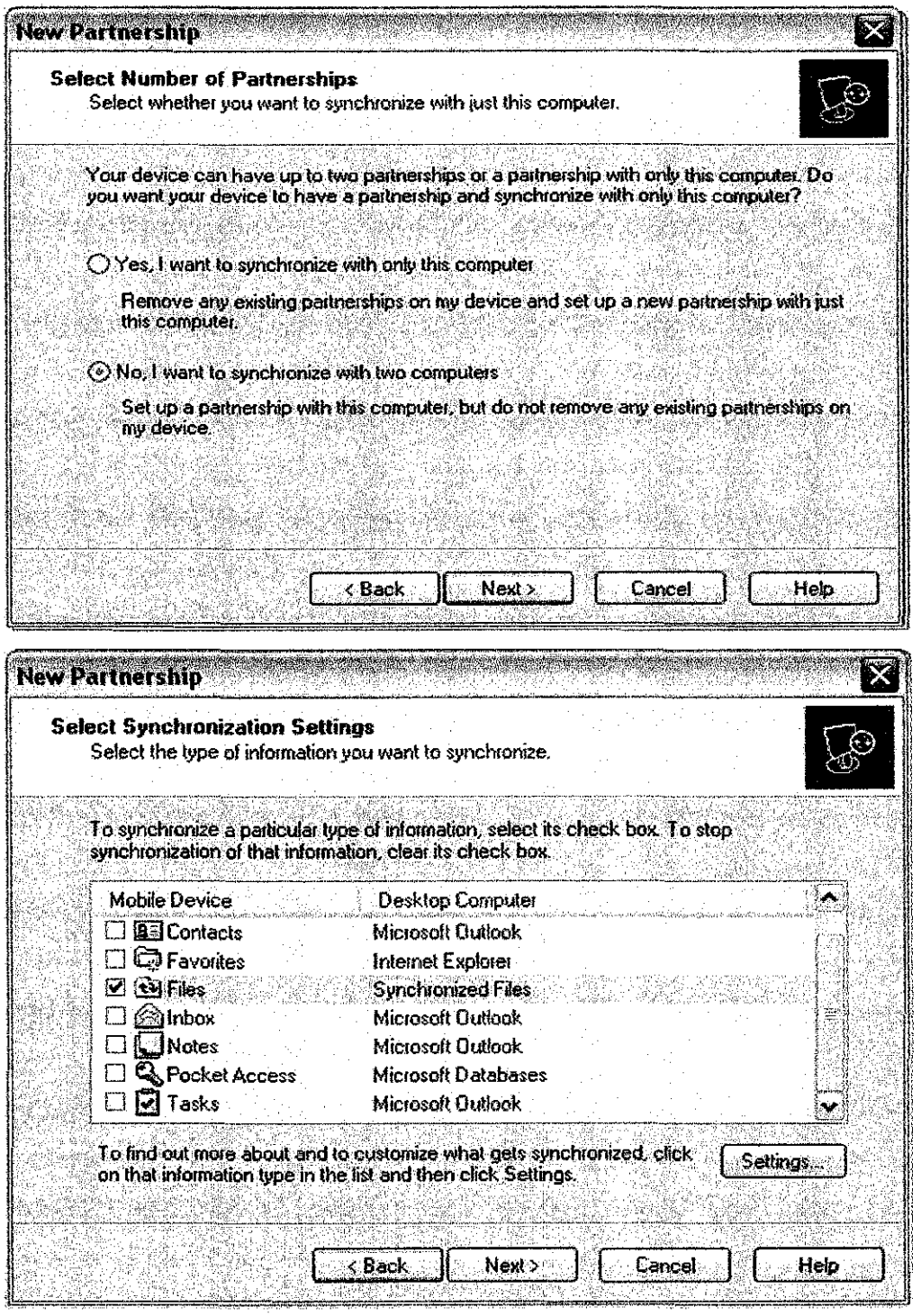


Figure 11: New Partnership windows

2.1.4. To set that Pocket PC can communicating with two computers or workstation to transferring data and check the files check box to set as synchronized file.

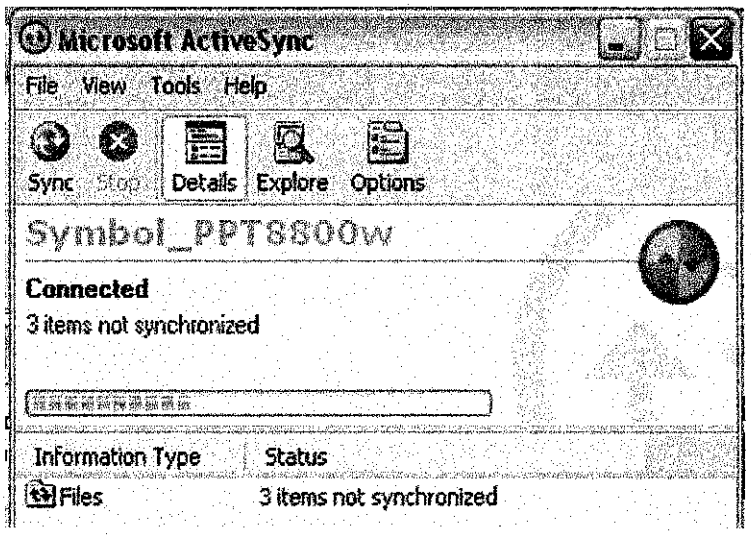
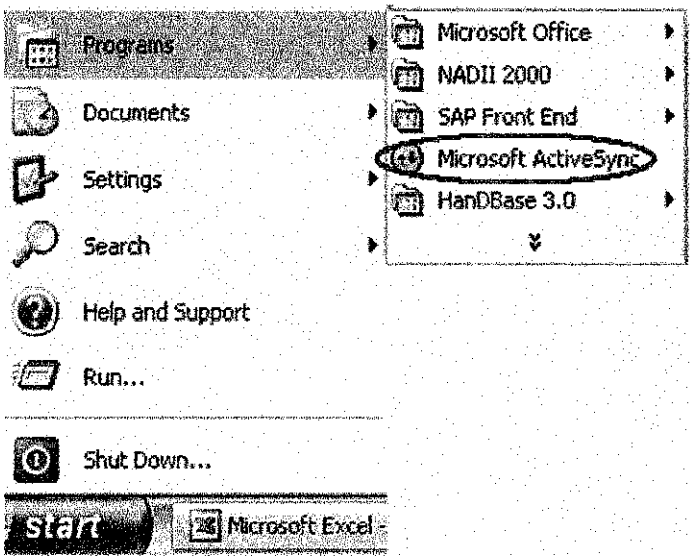


Figure 12: Microsoft ActiveSync window

2.1.5. The file will be synchronizing when Microsoft ActiveSync window appear.

2.1.6.

2.2. New user on workstation



2.2.1. Go to Start menu → All programs → Microsoft ActiveSync and click. Then follow the step of 2.1.1 – 2.1.5

Step 2

6.0 How to use Electronics Preventive Maintenance

6.1. Open the HanDBase on Pocket PC by tab Start Menu→ HanDBase

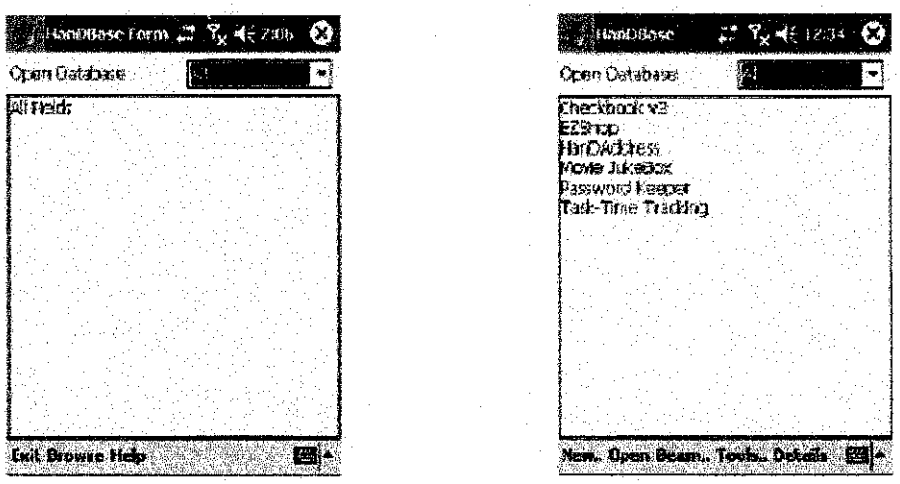


Figure 13: Open Database view

6.2. On the Open Database window, select Open Database All on drop down menu and the name of the database will display. To open an existing database, you can either double tap the database in the list you would like to open or you can select the database in the list and then tap 'Open' menu item.

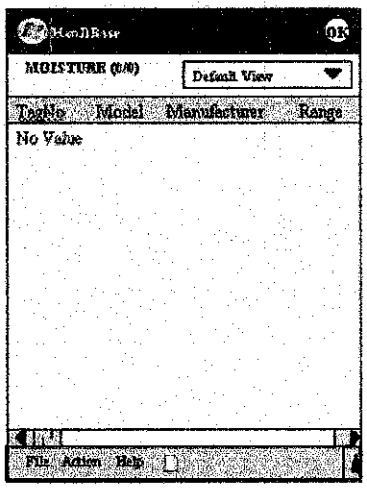
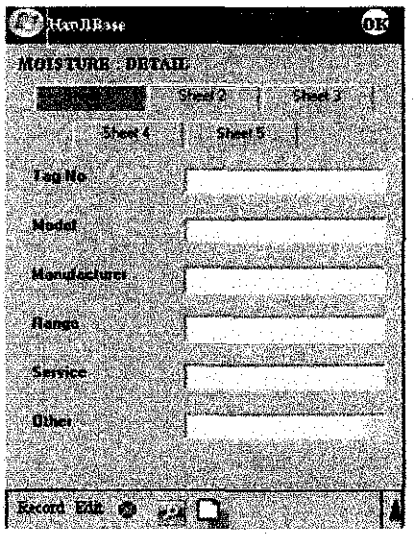


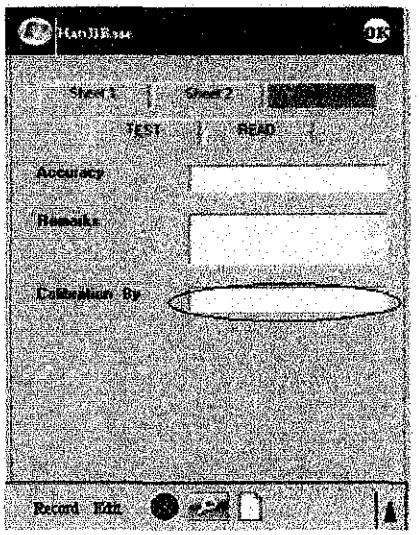
Figure 14: Database by Default View

6.3. Choose the database and tab open. The database will open and tab icon new to insert the data.

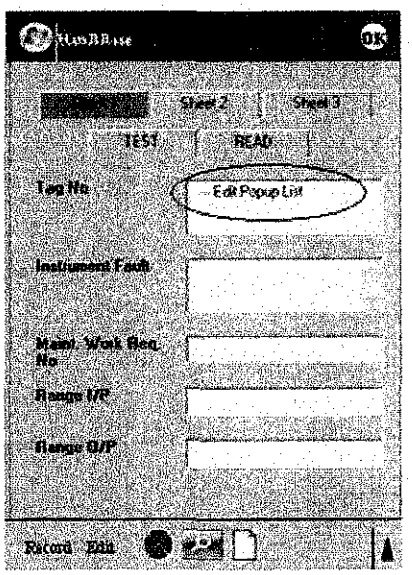
6.4. Insert Data by Form



Main Page



Calibration By



Edit popup List

Figure 15: Example form of Electronic Preventive Maintenance

6.4.1. Insert the data into text box. Click the Tab menu to insert the data to others text box.

6.4.2. For calibration by data, users need to insert full name of person who make the calibration.

6.4.3. To insert the data into Popup List, users need to click the popup list and make a new popup list. The value that will enter will be holding on the

page and for next record data user will able to reuse the value by select from the list.

6.4.4. After finish insert the data, click button 'OK' on the top of form and done.

6.4.5. If you want to cancel the report click  and the form will close.

6.5. Delete Data

6.5.1. After synchronized the data in Pocket Pc, you need to delete all record to make sure Pocket PC is able to insert new record.

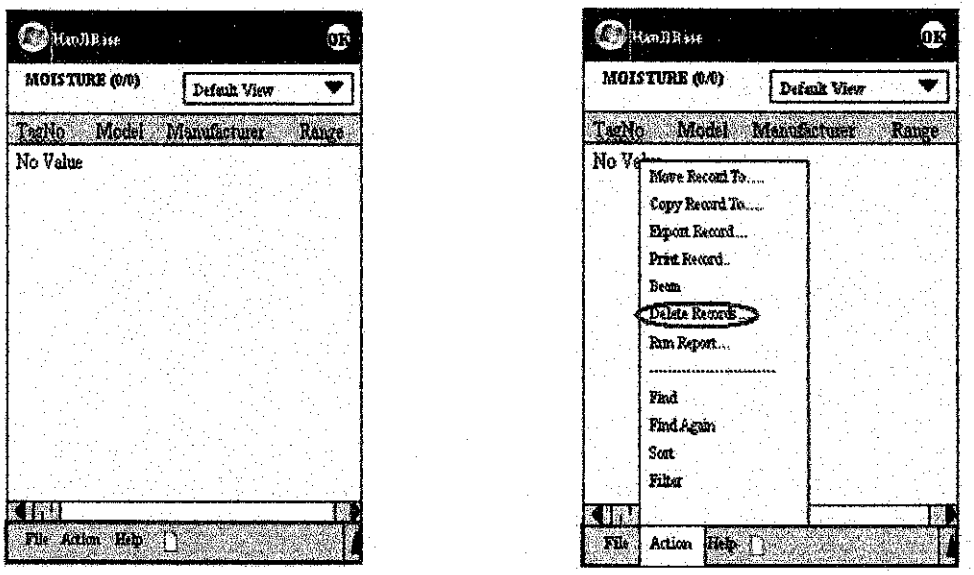


Figure 16: Database by Default View

6.5.2. Open the database by default view and go to 'Action' and click Delete Records.

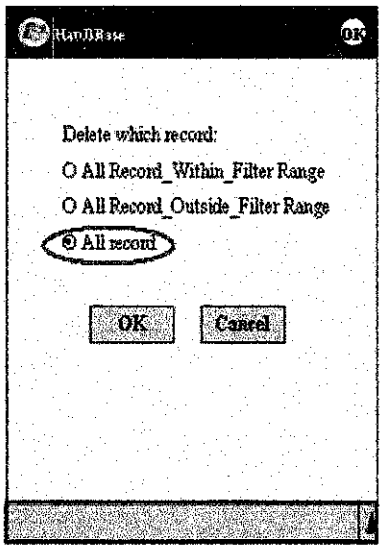


Figure 17: Delete Record

6.5.3. Choose 'All Record' radio button and click button 'OK' to delete all database record capture in Pocket PC

7.0 Synchronize the data between Pocket PC and Desktop PC

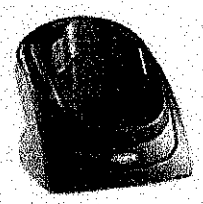


Figure 18: Cradle

7.1. Put the Pocket PC on the cradle

7.2. The file will synchronize automatically

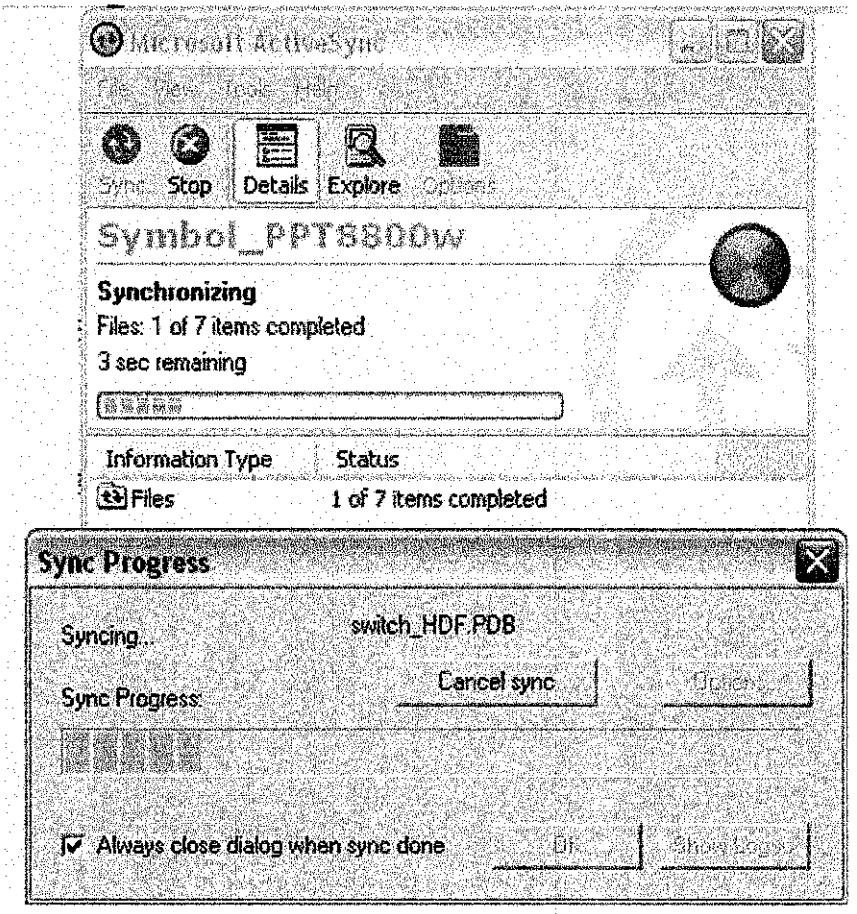


Figure 19: Synchronizing window

NOTE: The Automatic Synchronization occurs as soon as you connect your handheld to your Desktop computer. Because it functions this way it will run simultaneously with the Standard ActiveSync® Conduits.

8.0 Data Exchange For Microsoft Access

8.1. To export the database from HanDBase® (PDB) file to MS Access (MDB) file open the HanDBase ® Desktop

Icon of HanDBase Desktop

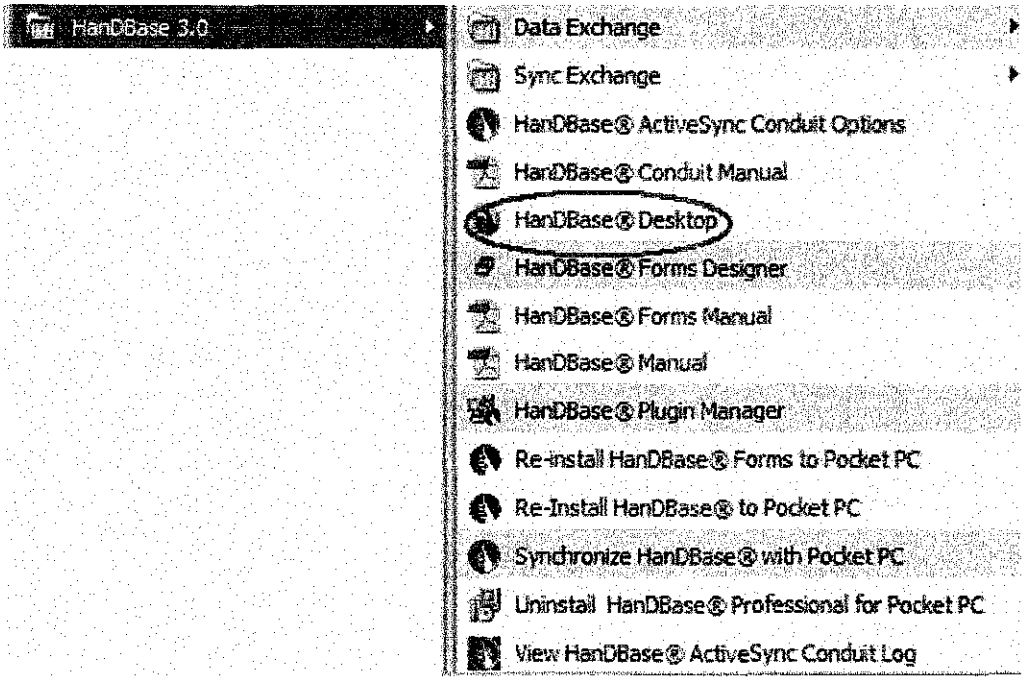


Figure 20: HanDBase Desktop from Start Menu

8.2. Click the icon on the desktop or go to **Start menu → All Program→ HanDBase 3.0 → HanDBase® Desktop** to open HanDBase® Desktop

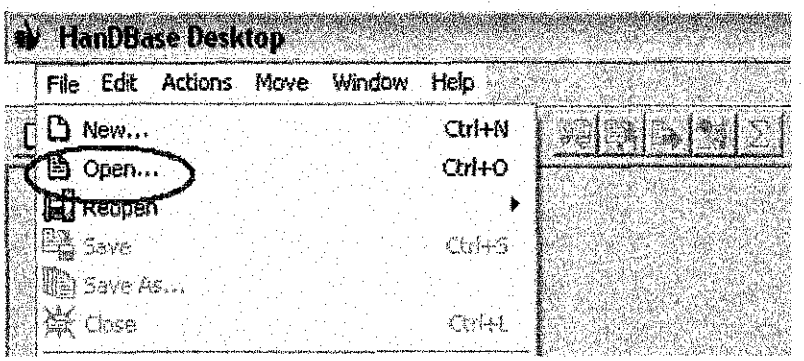


Figure 21: Open Database by menu bar

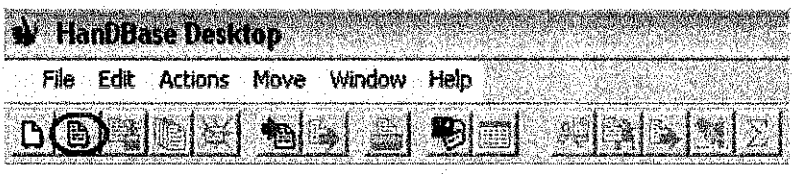


Figure 22: Open Database by icon

8.3. On the HanDBase® Desktop window open the database by click at menu bar or the icon on the top of HanDBase® Desktop window.

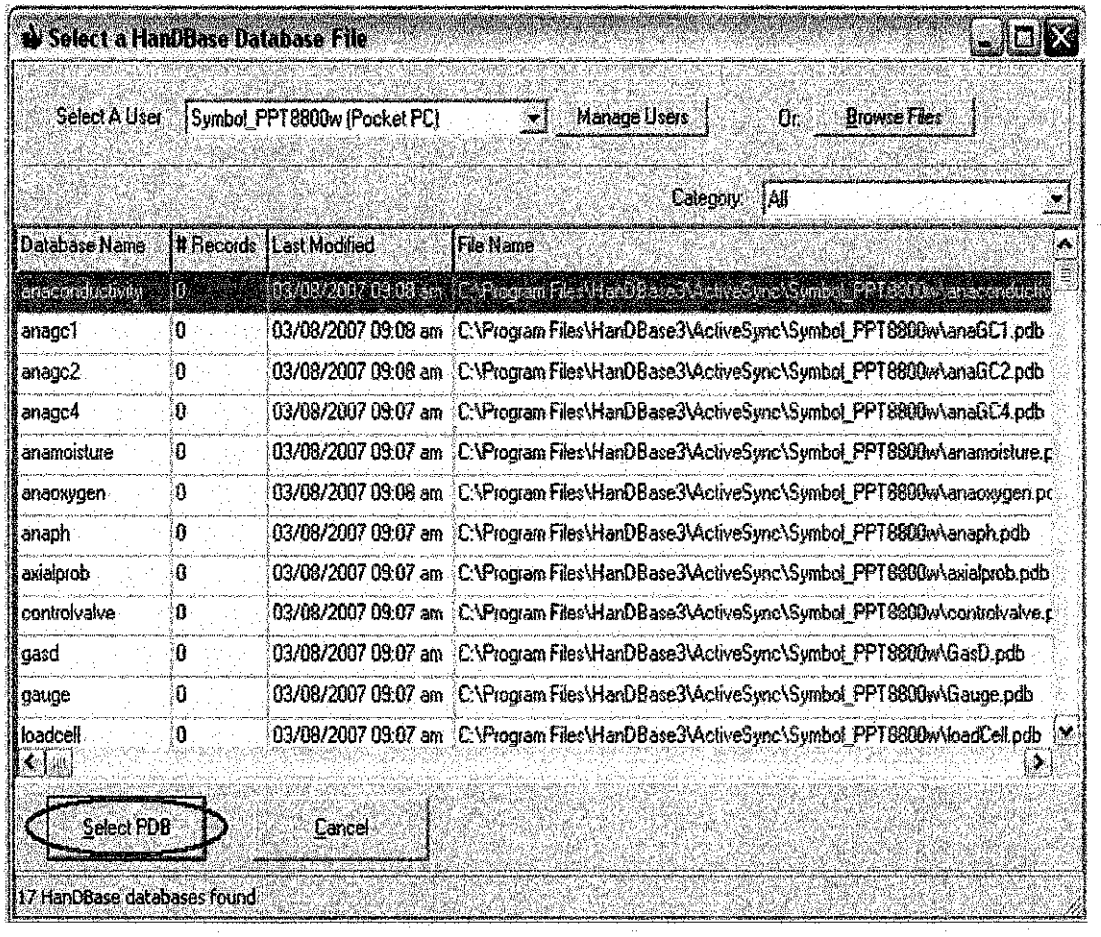


Figure 23: HanDBase database window

8.4. To open the database, choose the database by Database name field and click select Database button. By open the database, user can check the database before the data export to the Instrument Database.

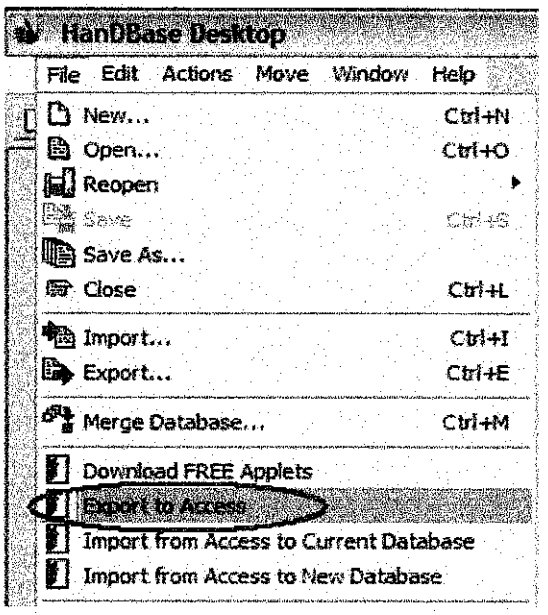


Figure 24: Export to Access by menu bar on HanDBase Desktop window

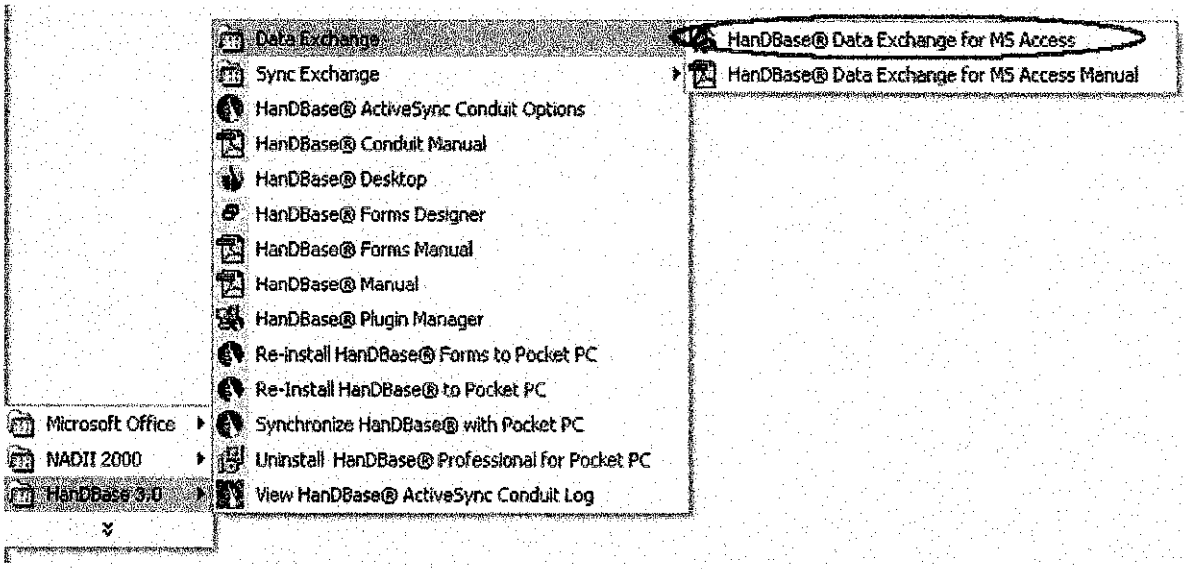


Figure 25: Export to Access by Start Menu

8.5. To export the data to Instrument Database, Click file on menu bar and click Export to Access or user also can export the data with click on **Start Menu → All Program →HanDBase 3.0 → Data exchange → HanDBase® Data Exchange for MS Access**

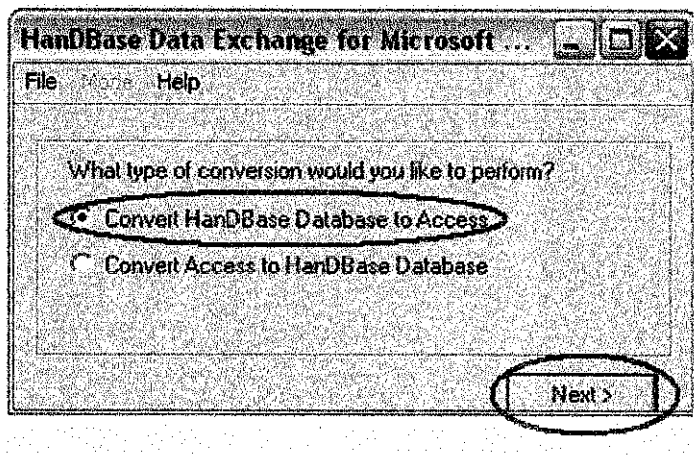


Figure 26: Window to choose the type of conversion

8.6. When the window appears, choose the Convert HanDBase Database to Acces radio button and click next.

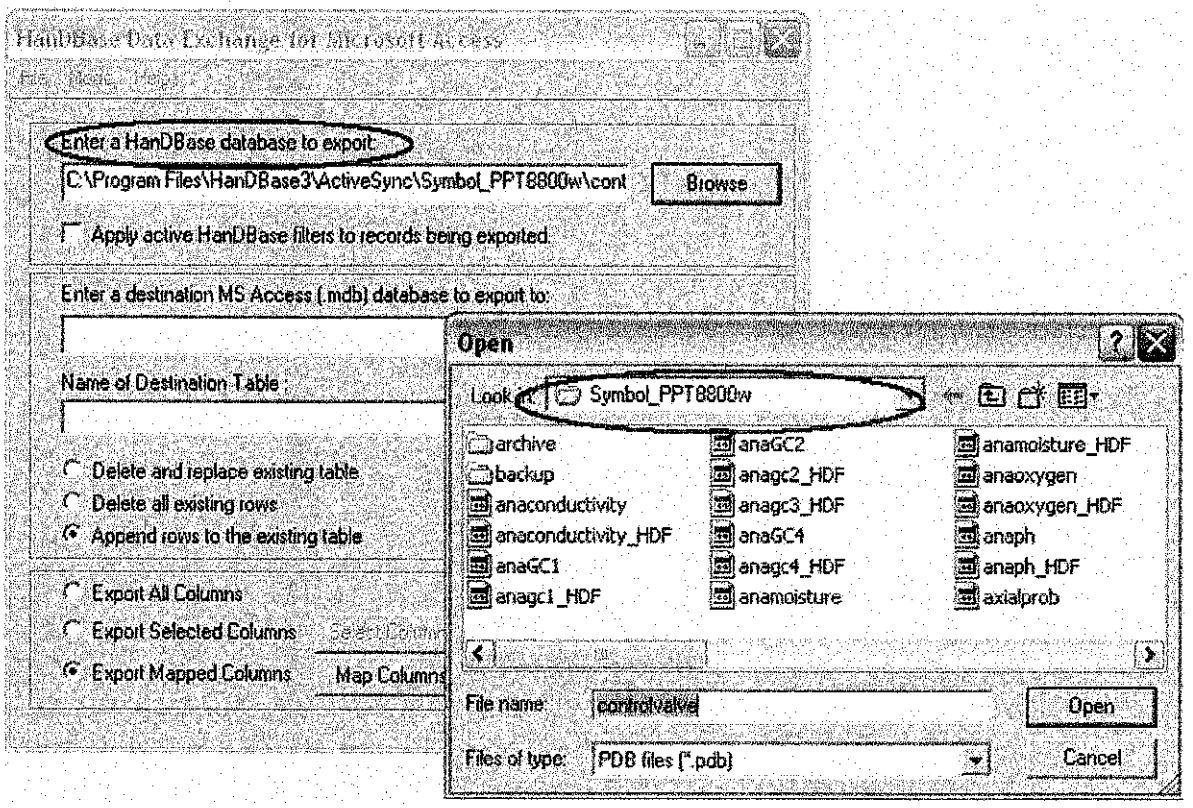


Figure 27: To find (*pdb) file to be export

8.7. Enter a HanDBase database to export by browse the directory of the file on Symbol_PPT 8800w and select the file.

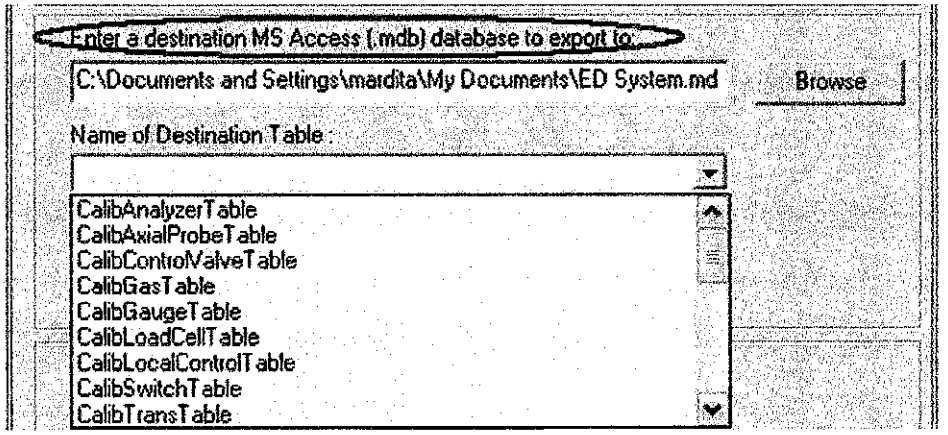


Figure 28: The destination data to export to

8.8. Then enter a destination MS Access (.mdb) database to export to (common p) and choose the table of the destination.

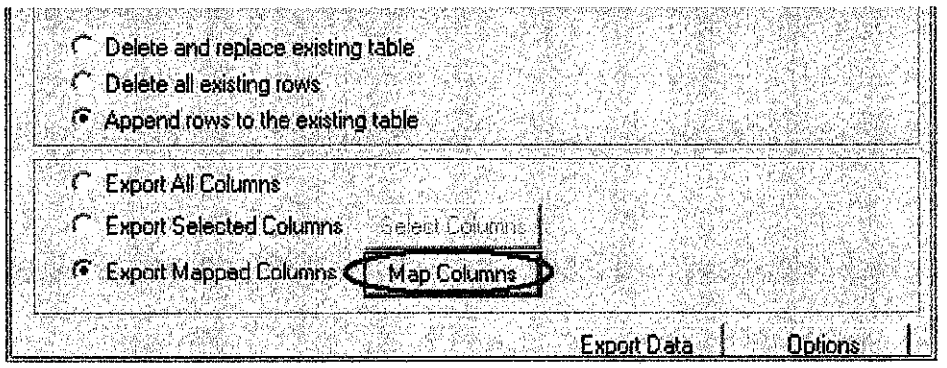


Figure 29: Detail of the data before export data.

8.9. After enter the destination table, click to Append row to existing table and Export mapped Columns radio button and click the Mapped button to map the field.

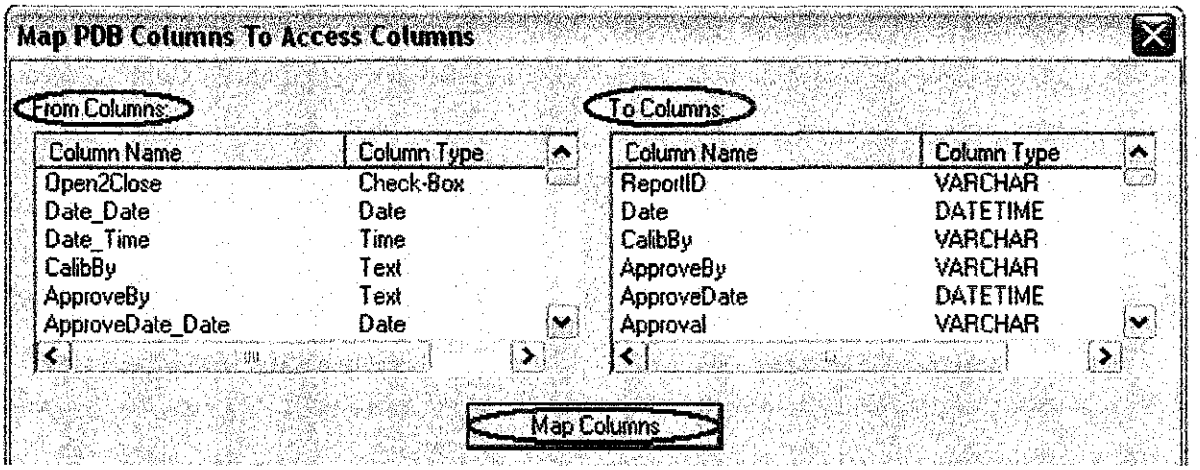


Figure 30: To mapped the field

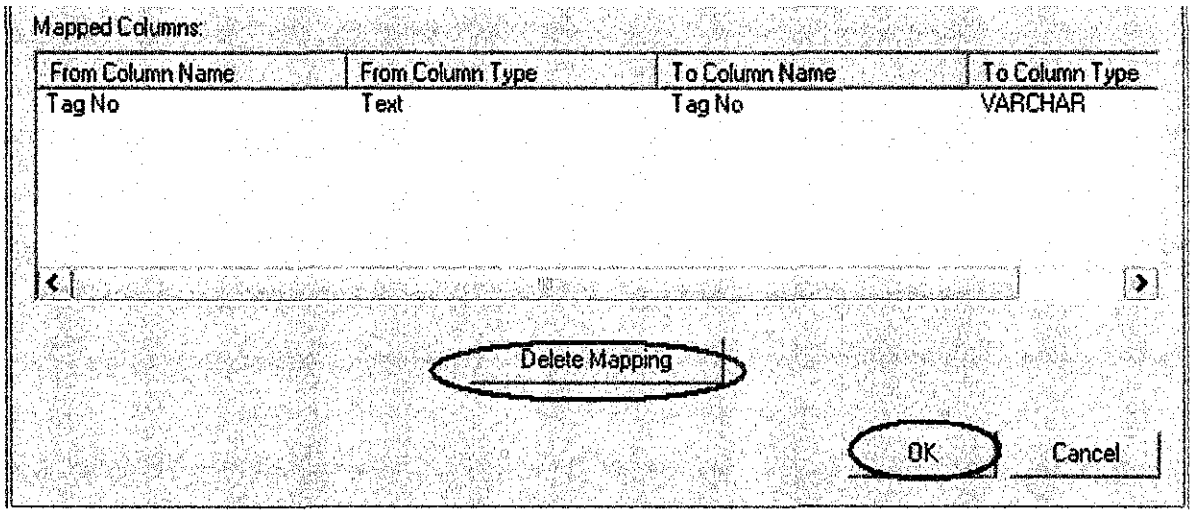


Figure 31: Delete the mapping

8.10. On the Map PDB Columns to Access Columns window, choose From Columns and To Columns then click map Columns button to map the field. All mapped field will display on the Mapped Columns. To delete the mapping columns click Delete Mapping button and click OK button after done.

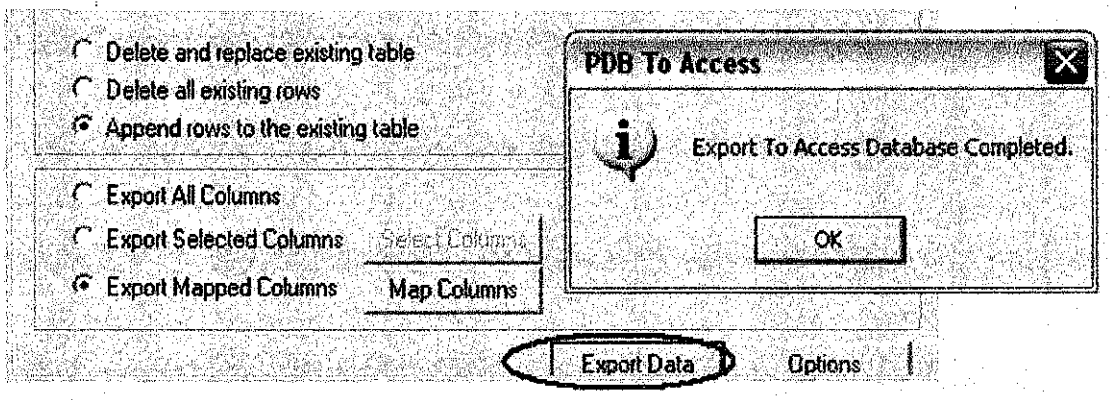


Figure 32: Complete Export Data

8.11. Click the Export Data and wait the PDB to Access window appear and click OK. The data already export to Instrument Database and close all windows.

9.0 Opening Database in MS Access

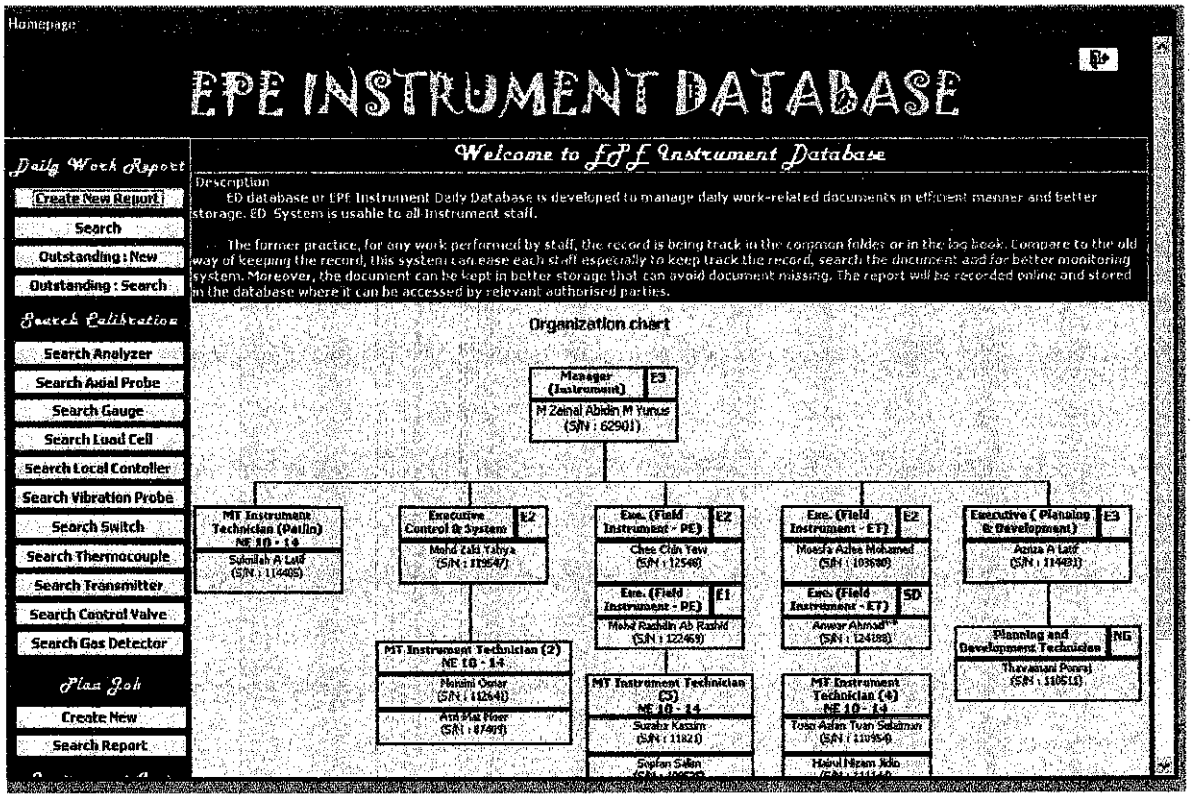


Figure 33: MS Access Database

This figure shows the first page user will see when opened the database in PC

- There were 4 buttons under Daily Work Report menu, each for create new report, search daily work report, outstanding item and also outstanding item search.
- The buttons under Search menu were link to search calibrations sheet.
- Buttons under Plan Job menu were for creating new Instrument Plan Job report, and also for searching Plan Job report.
- Meanwhile, the buttons under Instrument Cost Menu were for creating new
- Instrument Cost Report and also Instrument Cost Report search.

9.1 Daily Work Report Form

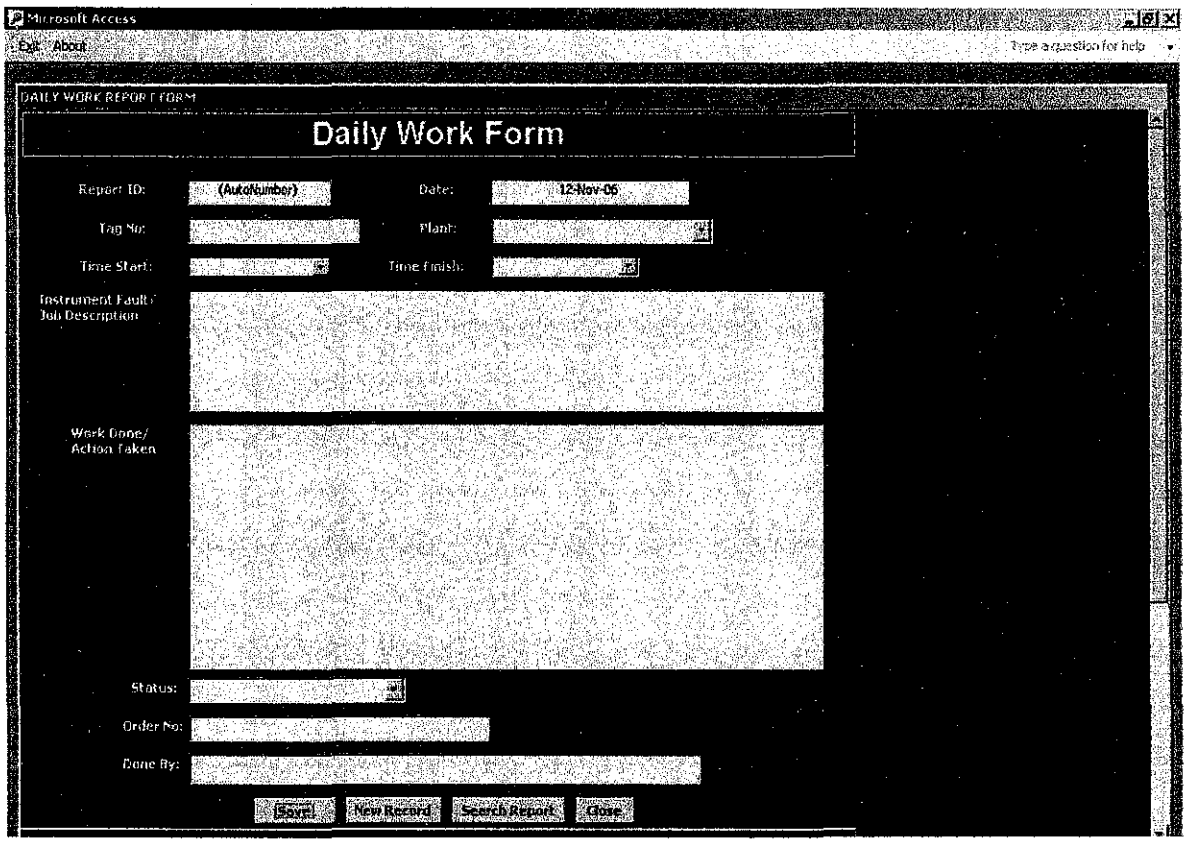


Figure 34: Daily Work Form

- Enter each field with data and click "Save" button when done entering the data.
- Make sure to fill in data in each field available.

9.2 How to Search Daily Work Report

To search certain report, click "Search report" button and it will link to Search Report form.

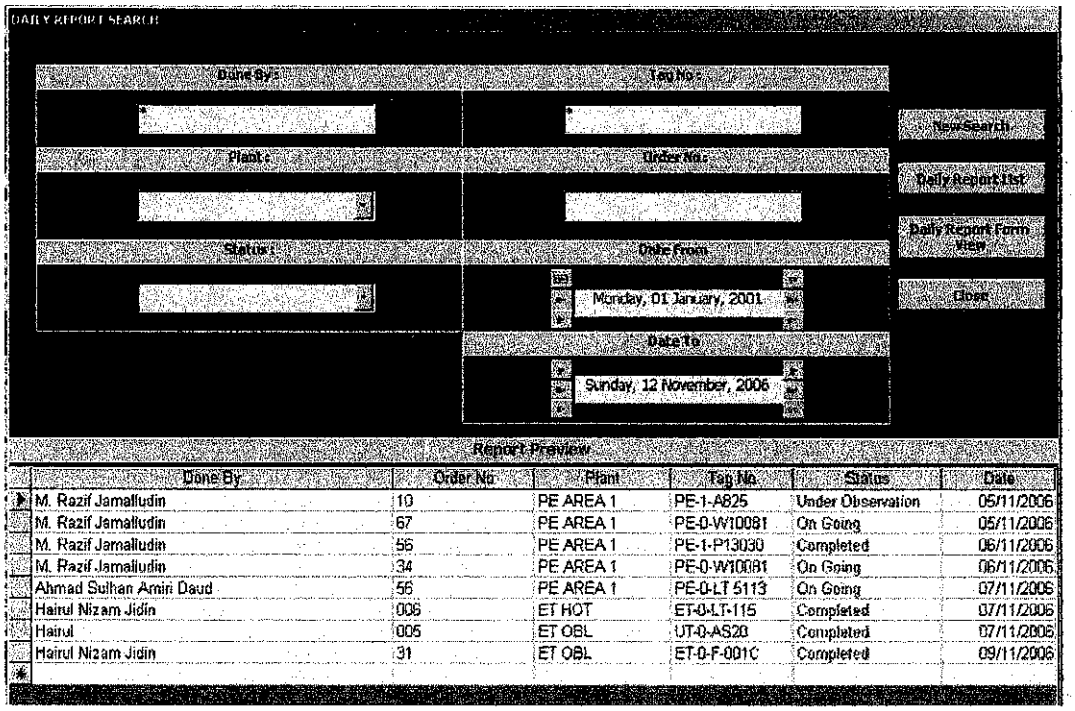


Figure 35: Search Page

- To enter data to be search in "Done By" and "Tag No" field, the field which is showing "*" as the default value, user must enter the data to be search in certain format :

  E.g.: *Mohamad* or *123*

- "New Search" button is used to create new search or refresh the data.
- "Daily Report List" button is used to preview report in list format like in Figure 36.
- From this report preview, user can print the report as their references or for other uses.

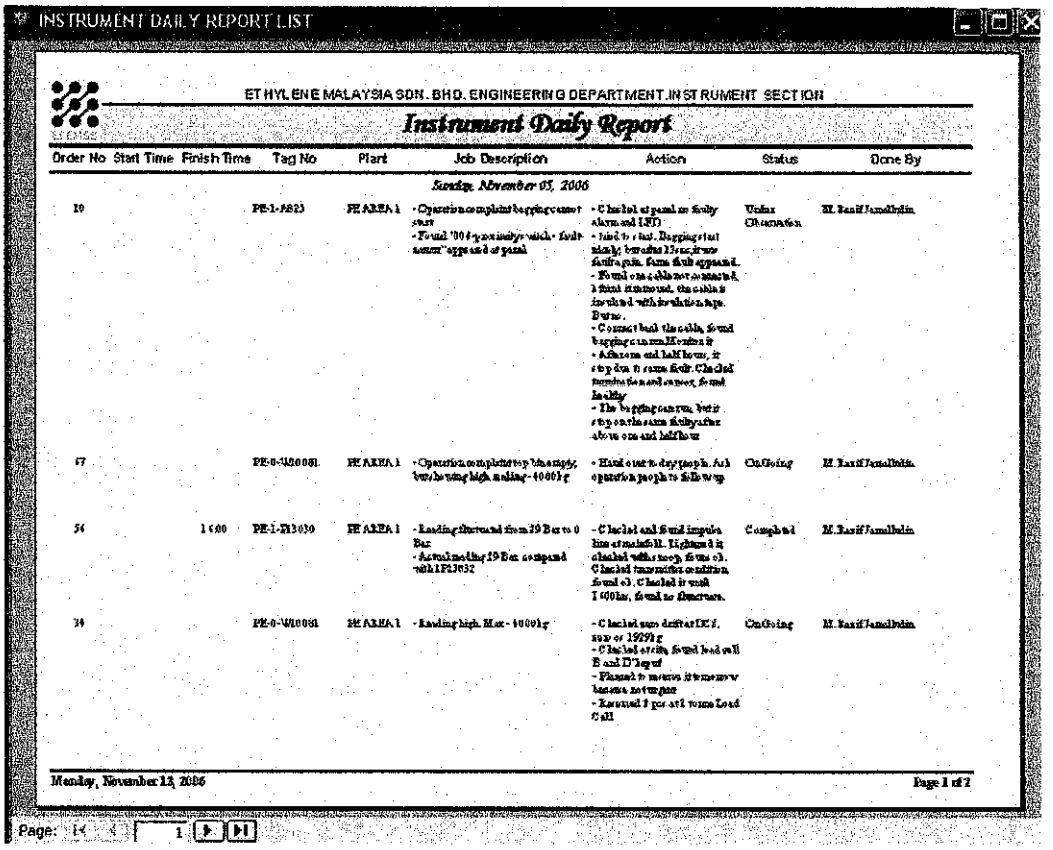


Figure 36: Daily Report List

- "Daily Report Form View" button is used to preview report in form format as showed in Figure 37 and the report can be printed for references.

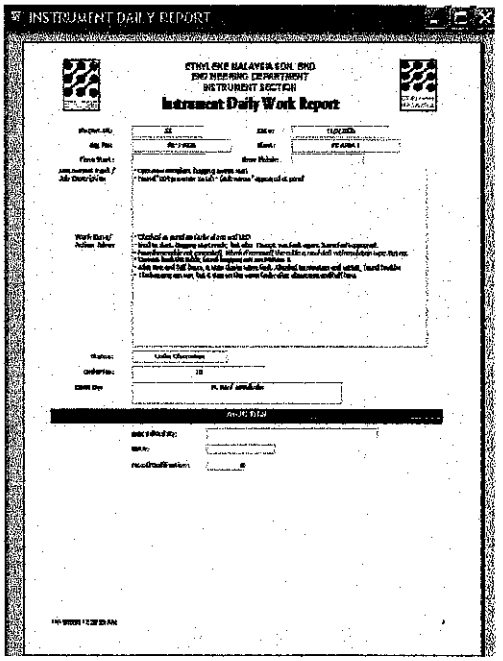


Figure 37: Daily Report Form View

9.3 How to Create Calibration Report.

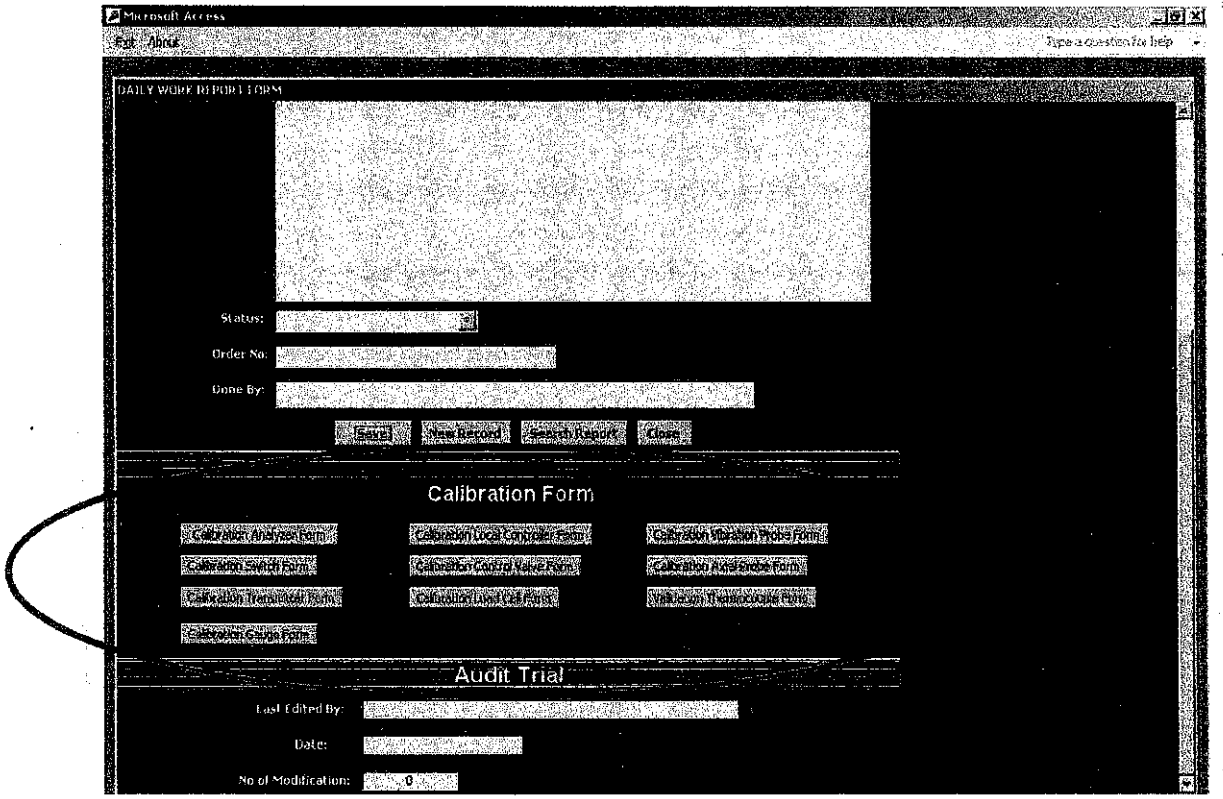


Figure 38: Calibration report

- Calibration Form link button were placed in Daily Work Report page. This button will link to each calibration sheet form that available in the system.
- Click the calibration form button to be filled in, the form will be displayed.
- After entering data and information in calibration sheet form, click "Save" button to save the data in the database. Please take note to completely fill the entire data field. See Figure 38.

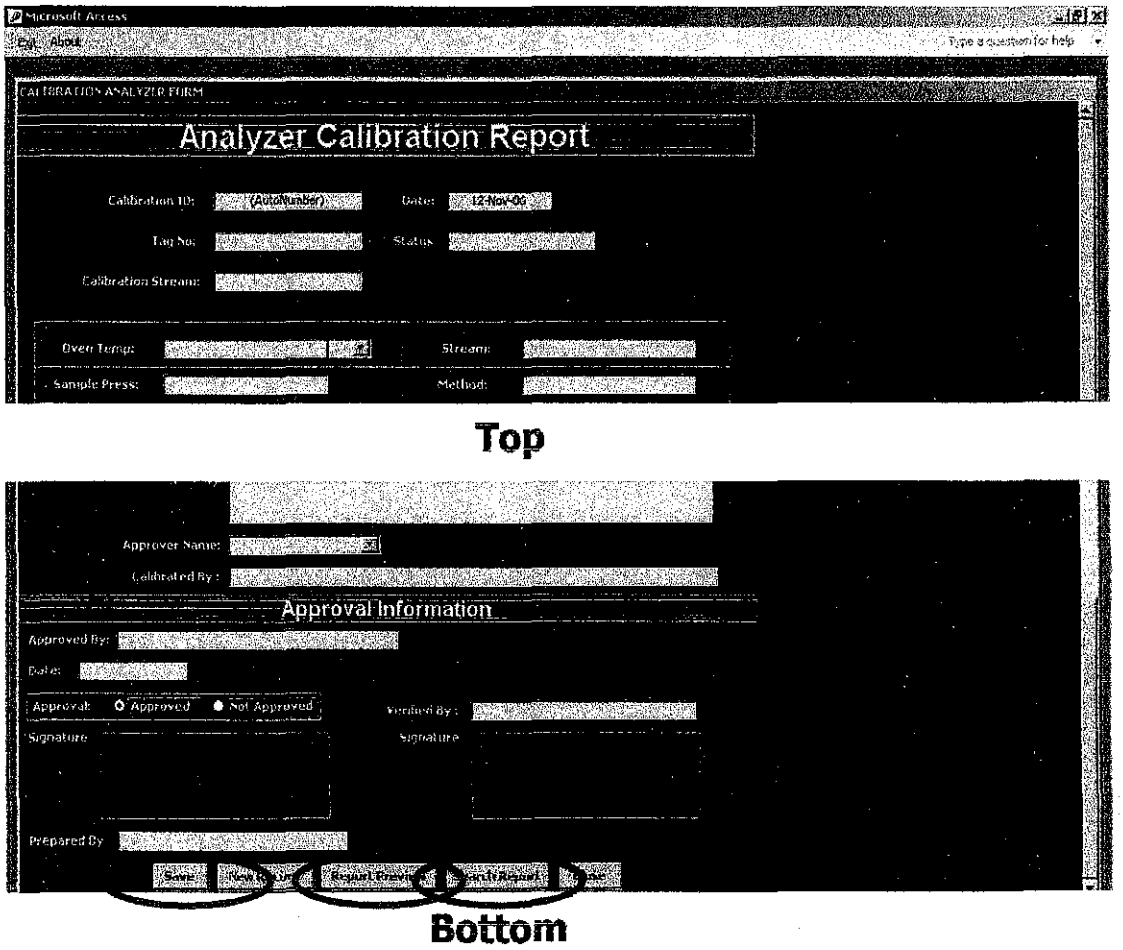


Figure 39: Analyzer Calibration Report

- To view report for the calibration sheet form that were entered, click "Report Preview" button. It will link to current report entered.

9.4 How to Search Calibration Report

To search the available report in the database, click "Search Report" button that will bring user to calibration search page. See Figure 39.

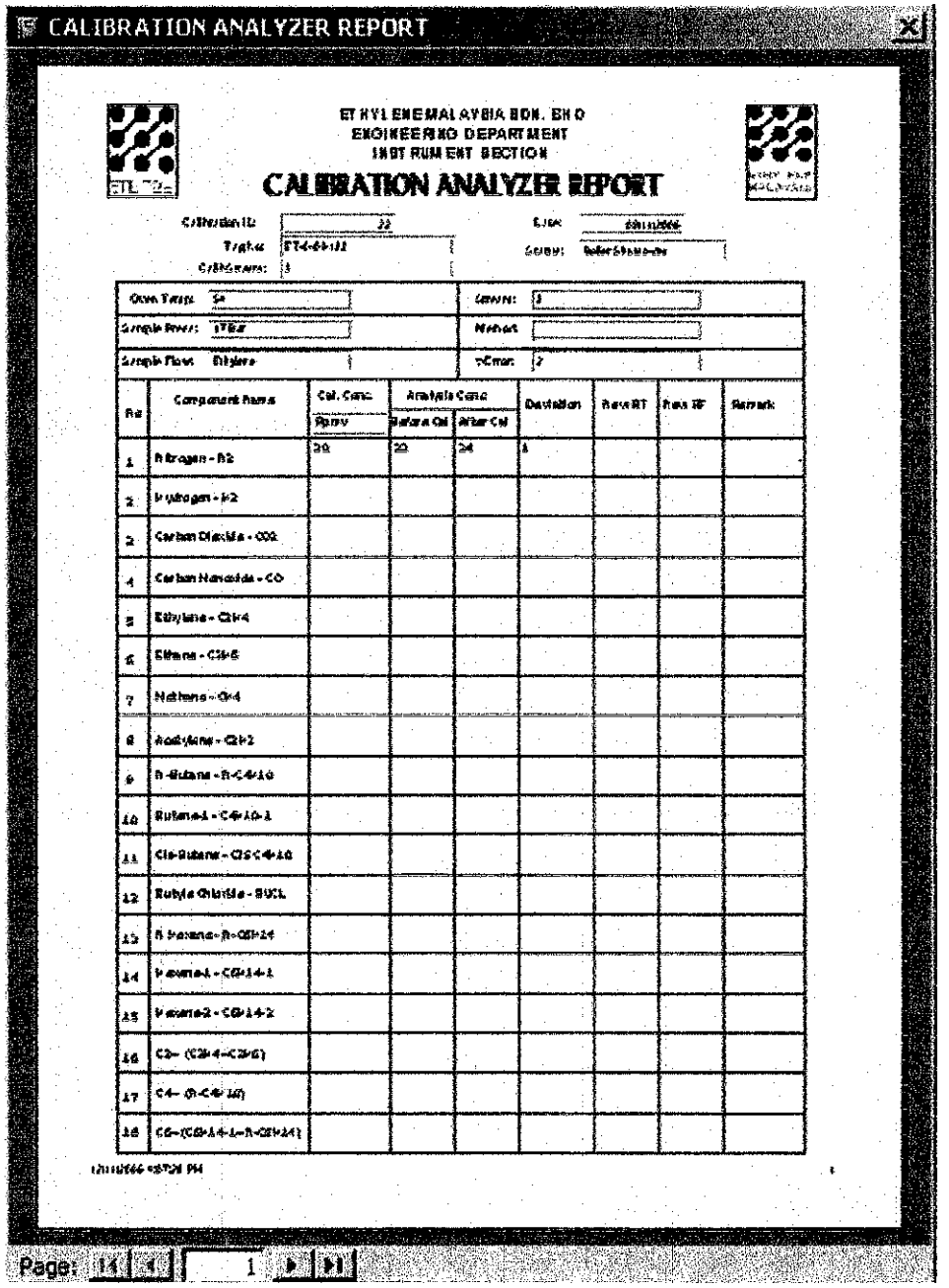


Figure 40: Calibration Analyzer Report

- Report can be print from report preview.

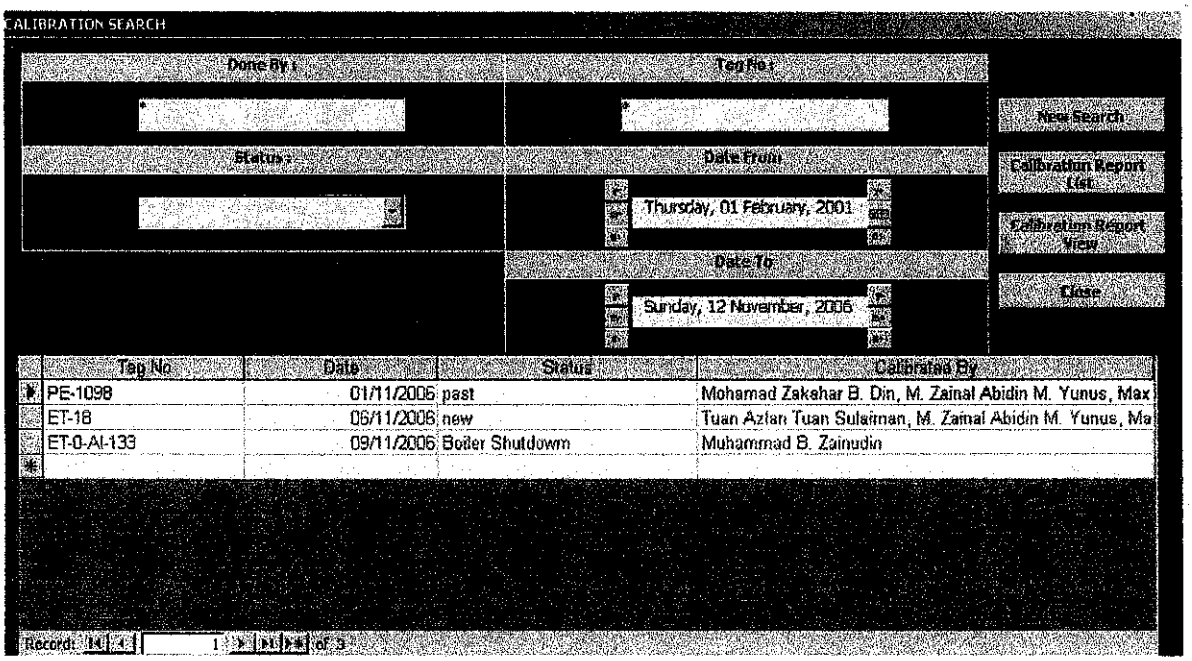


Figure 41: Calibration Search

- From search page, user can preview calibration report list (see Figure 42) and calibration report form view (see Figure 40)

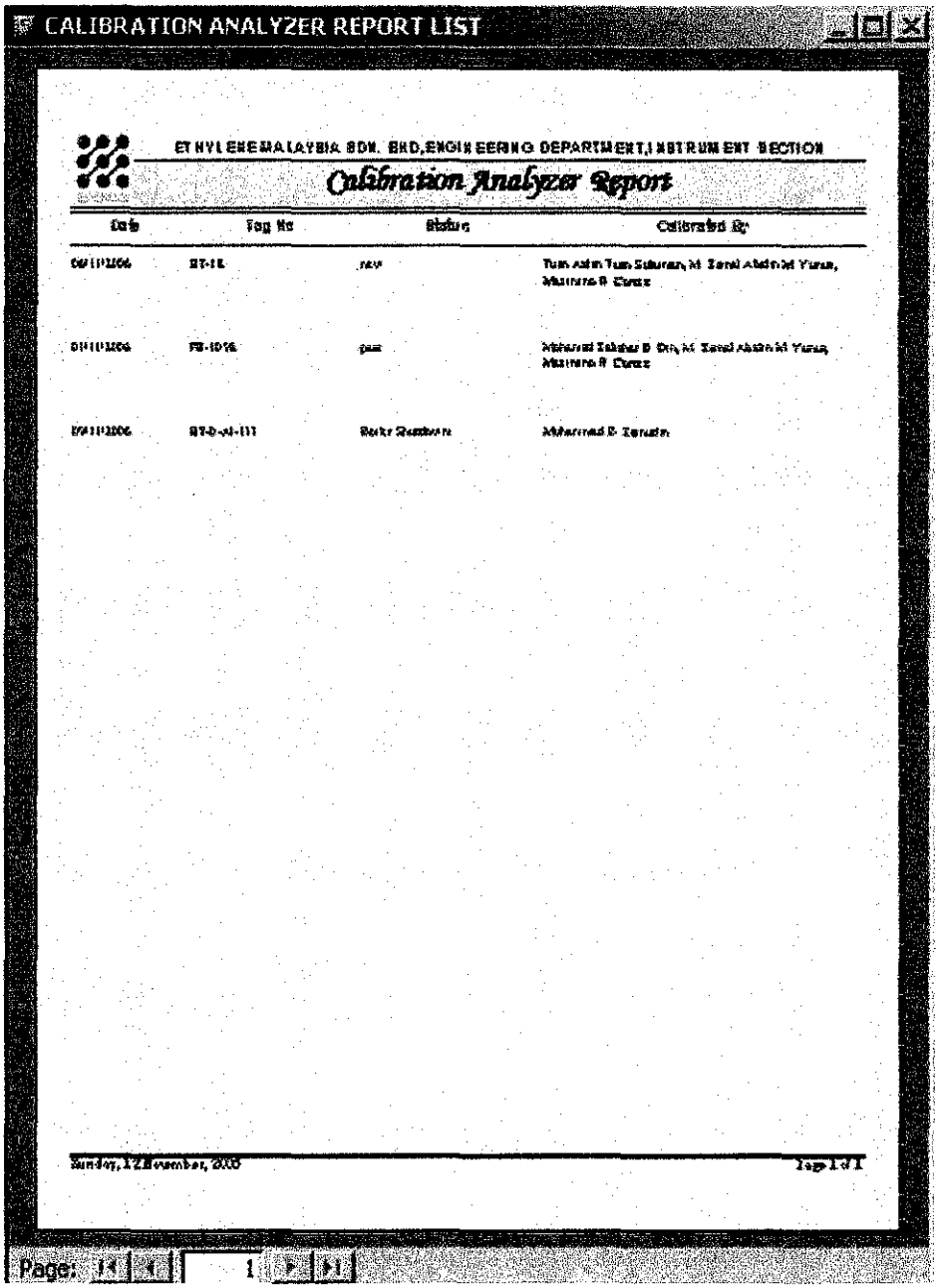


Figure 42: Calibration Report List

Appendix III

PPT 8800 Series
With Windows Mobile ™ 2003 software for Pocket PCs

Features	Benefits
Small and lightweight	Fits in your pocket or on the hip
Large vibrant color display	Easy to see in many environments
Extremely rugged	Endures extreme temperatures and multiple drops to concrete
Sealed to IP54 standards	Protects against water and dust to ensure reliable performance in rough conditions
1D laser bar code scanning with RSS support	Captures information accurately every time
Standards-based wireless networking: IEEE 802.11b (WLAN), Bluetooth™ (WPAN) or IEEE 802.11b/built-in Bluetooth coexistence solution	Enables real-time communications and decision making; secure mobile transactions and investment protection
Microsoft Windows Mobile 2003 software for Pocket PCs	Microsoft's latest standard operating system for handheld devices
Intel® XScale™ architecture running at 400 MHz	High-speed CPU performance for robust enterprise applications
Rechargeable/replaceable lithium-ion battery	Maximum usage between charges increases mobile worker efficiency
Backlit keypad options	Flexible functionality and keypad layout for targeted applications
Serial, USB and IrDA Connectivity	Provides multiple communication and charging options, and support for an array of snap-on accessories
Supports AirBEAM®	Enhances wireless device management specifically for enterprises

Regulatory	
Electrical Safety:	Certified to UL1950, CSA C22.2 No. 950, EN60950/IEC950
EMI/RFI:	FCC Part 15 Class B, ICES-003 Class B, European Union EMC Directive, Australian SMA
Laser Safety:	CDRH Class II, IEC Class 2
Hazardous Locations:	Certified to UL for use in Class I, Division 2, Groups A, B, C, D for specific PPT88XX configurations