

# **Automotive Repair Shop Accounting and Inventory Tracking System**

By

Brian Webb

Submitted to  
the Faculty of the Information Engineering Technology Program  
in Partial Fulfillment of the Requirements for  
the Degree of Bachelor of Science  
in Information Engineering Technology

University of Cincinnati  
College of Applied Science

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Date

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Professor Annu Prabhakar, Faculty Advisor

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Date

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Professor Lawrence Gilligan, Department Head

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Date

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## **Abstract**

A successful automotive repair shop will continue to grow exponentially as its client base does. This creates a rapidly expanding business where the demands of paperwork and record keeping become overwhelming. Since most shops are understaffed and overworked, the last thing that they want to think about is paperwork. Most small business owners don't feel hiring more people is an option. I have talked in detail with the owner of a small truck/car repair shop, and realized that he has many needs that could be much more cost efficient and accurate by automating the non-mechanical parts of his job. The use of a database application in a small business would free up time usually spent doing paperwork for more time doing the work that the business needs to accomplish. The use of a database application has the ability of enhancing inventory tracking, maintaining a customer database, and automating tedious accounting tasks. A real world application that I would like to develop would benefit small truck/car repair shops. This paper will outline solutions to this problem that will enable a small business owner not only to survive, but also to increase profits dramatically.

# **Automotive Repair Shop Accounting and Inventory Tracking System**

## **1. Statement of the Problem**

With current laws and regulations, small business owners can quickly become overwhelmed by paperwork and bookkeeping necessary to operate a business effectively. Unfortunately as the business becomes more successful, this problem seems to get worse. In a small automotive repair shop there is often not the ability or the space for several employees, which could be a possible solution to the work overload. Employees are very expensive, especially for a small business trying to cut down on expenses. For example, in March 1998, employer costs for employee compensation in the United States averaged \$19.76 per hour worked according to the United States Department of Labor's Bureau and Labor Statistics. The cost is continuing to grow and increases with establishment size (2). The owner often works late to satisfy his customers and catch up on the day's paperwork.

Good bookkeeping is one of the most predictable factors on the success or failure of a small business. In a website detailing the importance of good records, it states, "For those already in business, good record-keeping systems can increase the chances of staying in business and the opportunity to earn larger profits" (5). Due to the nature of entrepreneurship, a small business' success is very unpredictable. High failure rates exist in small businesses because the owner must be the "CEO, treasurer, production supervisor, marketing specialist, legal expert, etc" (7). Carefully handling all of these roles is not very easy for the owner of a small company with limited resources. To

successfully fulfill all of these duties, one must automate as much as the process as possible.

### **1.1 Bookkeeping in the Automotive Business**

A successful automotive repair shop entails countless hours of work. Good record keeping will help ensure success and decrease the stress of a small business. Things such as accurate billing, timely collection of the bills, and inventory control become key in fixing things properly and in a manner that will keep customers satisfied. “As a business begins to grow rapidly, the owners often work frantically to simply meet demand, minimizing the time they devote to keeping good records” (5).

Several small businesses are family owned and have grown over a number of years through a lot of hard work and large investments in expensive equipment. Taking time to invest in a computer-automated program such as Shop Assistant will assist in good record management may be a hard idea to accept after years of doing things in a more homegrown manner. However, doing so will open the company up to a whole new way of doing business. In a small business, the owner must be an expert at virtually everything and cannot possibly have enough time to review results from all of the information that can be provided by good records. A system that is easy to use and provides information that manual records could not, would make switching to a software application irresistible. Inquiries into issues of inventory control, customer demographics, and cash flow are timely questions with crucial answers.

Small business owners recognize the need for detailed information to answer these questions, but don't have the time or sometimes even the means of obtaining them. Hiring a bookkeeper entirely dedicated to this could be a solution, but in most small businesses the owner is trying to cut down on expenses and encourage growth at the same

time. Instead of hiring a bookkeeper to do these things, a solution to this problem that could provide much more information than just simple accounting, would be a uniquely designed software system such as Shop Assistant that could maintain the books, track the inventory and manage the customer population, all the while producing quick invoices and reports at the click of a button. With this application, the vital expertise necessary in all aspects of the business is available through several uniquely designed reports in the database.

## **1.2 The Importance of Detailed Records**

The use of a Shop Assistant in a small business can enhance the business by allowing growth in both business reporting and clientele. Good record keeping will allow the business to expand tremendously. Good record keeping gives the business the advantage of reviewing its successes and failures. If in the past a process or method has failed to produce the results wanted, organized records could save wasted time and money by revealing these problems.

Exactly what can detailed record keeping do for an automotive repair shop? Inventory control is one very important area to insure good operation and high customer satisfaction. Inventory control can make sure that you have parts available when needed to maintain good customer satisfaction, in turn increasing revenue (4). Good inventory control makes sure that an optimal number of parts relevant to your limited space is available, that there is quick job turn-around, and cash flow is maximized. “Having too much inventory and/or not enough stock is considered primary direct causes of business failure” (4).

It is also important to determine if the monthly sales will produce enough income to pay each month's bills. A small business web-site offered these common over-sites as

reasons for financial ruin: failure to recognize seasonal trends, excessive cash taken from business for living expenses, too rapid expansion, and slow collection of accounts if credit is extended to customers (6). These examples illustrate the importance of keeping detailed records and understanding what their results mean for the success of a small business.

## **2. Description of the Solution**

There are many areas of a database application that will help a small business. One such area is in accounting. A small business needs to have accurate records in order to collect delinquent bills, track sales for tax purposes, provide an annual statement, an income statement, and various other types of helpful reports (8, pp.11-15). The database would allow the owner to do all of this and provide point of sale assistance such as quickly converting estimates to invoices, and scheduling customer appointments.

The database would allow the necessary data entry to make all of these reports available at the touch of a button. This would avoid the rush around tax time to get all of the books together, because it is already set up to do so. The most attractive aspect of the design is the report generation system allowing the user to run queries on the database and print highly effective and meaningful reports. After a lengthy investigation into the types of data a business needs to summarize, these reports have been designed to be ready after the click of a button and a few command prompts.

Another great use of the database will be accounts due and paid. Instead of having to write out customer invoices by hand, they can be electronically produced now, enabling an archive to be available of past services. The invoice will enable the service done to be very descriptive in nature, showing a list of all charges by description and part number if

applicable. This will also allow for quick status reports of customers with overdue accounts.

Another area that will benefit a small business is inventory tracking. A business owner will be able to view reports of data that will show which products are moving off the shelves and which products aren't. This can help in either ordering more or less of a product. As a result, this will provide better service and more optimal cash flow. The shop owner will not have the problem of keeping a car more days than necessary while he waits for a part to come in.

The inventory tracking capabilities also allows the owner to look at inventory by the vendor level. This allows an analysis of which vendors have the best prices and the best quality. Maintaining a sound inventory will allow the business to operate at its most efficient levels when it comes to customer satisfaction and cash flow. Good records can help monitor the progress of the business. Records can show whether your business is improving, what products are selling and what changes could be made to help the business.

By maintaining good customer information, the owner will be able to better understand his or her typical customer. The application allows the owner to look at frequent customers and areas most of its customers tend to live in. This will aid in the development of effective marketing strategies, which take advantage of this information and allow the owner to see problems such as advertising not reaching certain areas or customer dissatisfaction.

The database also has the capability to perform mass mailings announcing specials and sales. The owner is also able to reflect these sales in the invoices that are produced. The database has the ability to search the customer information according to

user specifications to help pinpoint repeat customers and their interests, allowing for target marketing of certain customer demographics. Keeping good customer information will also enable the owner to view services rendered to a customer throughout a particular vehicle's history, which will be a unique way to help increase customer satisfaction.

## **2.1 User Profile**

The intended user for this product will typically be a shop owner or shop manager. This person will normally have an expertise in automotive repairs and will be familiar with many different types of computer diagnostics equipment. The users IT literacy will be similar to a typical user knowing basic tasks. The user will not likely have the training to be able to decipher data or software errors within an application. This will require a stable product that uses data validation rules and appropriate defaults, error checking and a logical flow of menu choices.

## **2.2 Design Protocol**

To understand the organizational scheme of this software, see appendix A. Appendix A attempts to mimic the design of the database by beginning at the top level menu, and mapping through to final screens for input and final reports produced by these processes. Notice that the top-level menu offers entry to four separate modules. The square boxes represent menus and the diamonds represent a decision point where action is decided based on the click of a button. From these decision points, the software may be forwarded to more comprehensive sub-menus, or it may go directly to the form or report that was chosen.

The interface is designed in much the same way. It is as organized and simple as possible to meet the needs of the end-users. Moving through the database will be very simple because most data entry is done through lookup tables and selecting the proper

choice from those tables. Reports and processes will be run smoothly by prompting the user with specific criteria and promptly producing the reports and information that is needed.

The software is very menu driven, with easy button clicks guiding the user to their desired result. Icons, such as pointing fingers, trashcans, and erasers, help to describe the action the user is about to take and also make the application very user-friendly. The colors were chosen to be pleasing to the eye and appear sophisticated. The background is dark gray and the fonts are mostly blacks and navy blues. Some data entry points are shaded by lighter shades of gray.

The application is designed for users that most likely will not be sophisticated in the information technology arena. Because of this, the application needs to be very user-friendly and accommodate these needs. The database is robust enough to be not only stable, but also to allow for expansion as the business' needs grow, while still maintaining a highly effective performance. The application includes error handling so that it will not crash too often and corrupt important data and give clues to where problems reside. The software will use a sophisticated interface with Visual Basic forms that will give a professional and user-friendly appearance. In order to make data entry efficient and error free the use of correct default and data validation rules for the database fields are used where applicable.

Since everyone makes mistakes, especially when typing, this application will be driven by Active Data Object coding (ADO). This allows changes to the database to be implemented only when an event occurs. With this method, the user will be able to edit data and then discard mistakes without ever actually affecting records in the database until a predefined event, such as clicking a save button, occurs. With the use of Visual

Basic forms and unbound controls with ADO to populate the data, the application will fit the needs of a variety of users' skills.

ADO is Microsoft's generic set of data engine object models that provides references not only to objects stored by the JET database engine, but also to data objects stored in other database products such as SQL Server. Access 2000 provides direct support for ADO with built-in libraries and direct references to key objects in the model from the Access application object. Using ADO will enable the application to be upsized to an Active X data engine such as SQL Server. So in the case that the business someday needs to accommodate multiple users or have larger storage capacity, the possibility is there. In this way, as the business grows, its investment in this software is not outgrown with it.

### **3. Objectives of the Project**

This application has four modules Inventory Control, Marketing/Advertising, Invoicing/Estimating and Accounting modules. Each module enables the user to simplify tasks related to an automotive shop.

The Inventory Control module consists of five parts. The first is an inventory report that can be run at the users discretion. This report flags any parts or items that meet the minimum order point criteria specified by the user. This report allows users to order additional parts to meet the maximum order point. This ensures enough parts are on hand to meet customer needs. The second part of the inventory control module allows the user to adjust the minimum and maximum order points due to product flow and customer needs. Part three allows input of new parts or ordered parts to be added to the inventory. Part four allows the user to search for orders from a vendor by invoice number. Part five of the inventory control module allows input of specific vendor

information such as phone numbers, address, parts normally ordered and contact information.

The Marketing/Advertising module consists of customer demographics capabilities and advertising. By maintaining good customer information, the owner will be able to better understand his or her typical customer. The application allows the owner to look at frequent customers and areas where most of his customer base lives. This will aid in the development of effective marketing strategies. Which takes advantage of this information and allows the owner to see problems such as advertising not reaching certain areas or customer dissatisfaction. The database is able to support mass mailings announcing special and sales. The owner is also able to reflect these sales in the invoices that are produced. The database has the ability to search the customer information allowing for target marketing of certain customer demographics. Keeping good customer information will also enable the owner to view services rendered to a customer throughout a particular vehicle's history. This will be a unique way to help increase customer satisfaction.

The Invoicing/Work Orders module allows users to create work orders identifying a customers' stated problem with a vehicle, make of vehicle, vehicle model, requests, drop off date and other crucial information about customer and vehicle information. Users will be able to create invoices from work order information where parts and their numbers are chosen through filtered lookups and consequently the inventory counts are affected. Users are able to create total invoices that will show all parts used, labor and warranty information. One additional feature will be the retention of historical information about customers and their vehicle maintenance history.

The Accounting Module will help the small business retain accurate records in order to collect delinquent bill, track sales for tax purposes, provide annual statements, income statements, and various other types of helpful reports. The application will allow the necessary data entry to make all of these reports available at the touch of a button. Some of the other benefits of the Accounting Module will include single entry accounting, accounts due/paid and tax reporting information. Included in the Accounting Module is a payroll section that will track employee wages, hours worked and W-2 information needed for government reporting.

#### **4. Design and Development**

##### **4.1 Budget**

The expense of the project should is minimal. The costs originate from the price of the software and needed literature to support the project.

The following are expenses incurred:

- \$999.00 for **Office 2000 Developer**, providing the ability to create a run-time version of the Access application.
- \$150.00 for **various books and other sources** required for completion of the project in a professional and successful manner.
- \$800.00 for **IBM Compatible P.C.** 600 MHz, 128MB Ram, 10 GB hard drive, 17" monitor and printer.
- Total expense: **\$1949.00**

##### **4.2 Timeline**

Recognizing the work required to make this project successful, an ample amount of planning was involved. The project was constructed in four phases. Phase I included researching basic needs of a small business from accounting to inventory control to

mailing lists. Research of valuable forms and reports needed at tax time was also essential. Phase II included creating useful tables and queries using information from Phase I. Phase III focused on creating VB forms that enhanced the usability of the product. This phase also included error control and improving the overall look of the product. Phase IV focused on pulling everything together and getting a complete package feel for the product. This included minor appearance changes, and tweaking of the database code to make the application more fault-tolerant.

Time management was essential to the successful deployment of this project. Please see the timeline in appendix B for more specific details. Considerable amounts of time were spent learning new technologies through books and the Internet. Phase I was completed at the end of Senior Design I. Phase II was completed between the break of fall and winter quarter. Phase III was completed at the end of Senior Design II, leaving Senior Design III performing beta testing and working out all the bugs. This also allowed me with ample time to make any changes need in design and visual enhancements.

### **4.3 Hardware and Software**

An excellent feature to this application is its ability to be very simple or potentially very complex. For most small businesses, the ability to network and have multiple users is not a key priority until the business grows a lot while understanding the company's cash flow and weaknesses is a key concern for insuring success. So, with this in mind, the application was designed to accommodate a standard personal computer with minimal software requirements. As the business grows and the owners desire it, the application could be converted to accommodate multiple users and have more data capacity. This is an advantage of using Access with ADO coding since it is compatible

with more robust environments such as SQL Server. The hardware and software requirements are listed below.

- Windows 98
- Run-time version of the Access application (to prevent tampering with the database's content)
- Pentium processor or better
- At least 1 GB of hard disk space available for optimal performance
- 64 MB of RAM
- Laser quality printer

## **5. Proof of Design**

The goal of this project was to design a comprehensive automotive repair shop application, in which the heavy burden of record keeping and reporting in a small business would be lightened. The key deliverables of the application were to design four modules: inventory control, marketing and advertising, invoicing, and accounting. All four of these modules have been completed, each with very intricate functions, which allow the user to have the reports and information they may need at the touch of a button.

The inventory control module creates necessary inventory reports, vendor reports, and new supplies orders. It also allows users to track part flow, allowing an optimal inventory level to be maintained for the most profitable cash flow. The invoicing and quoting module allows employees to enter new estimate requests into the system and change them to invoices at the click of a button. These invoices have lookup tables for proper part numbers and total the work, including labor charges automatically.

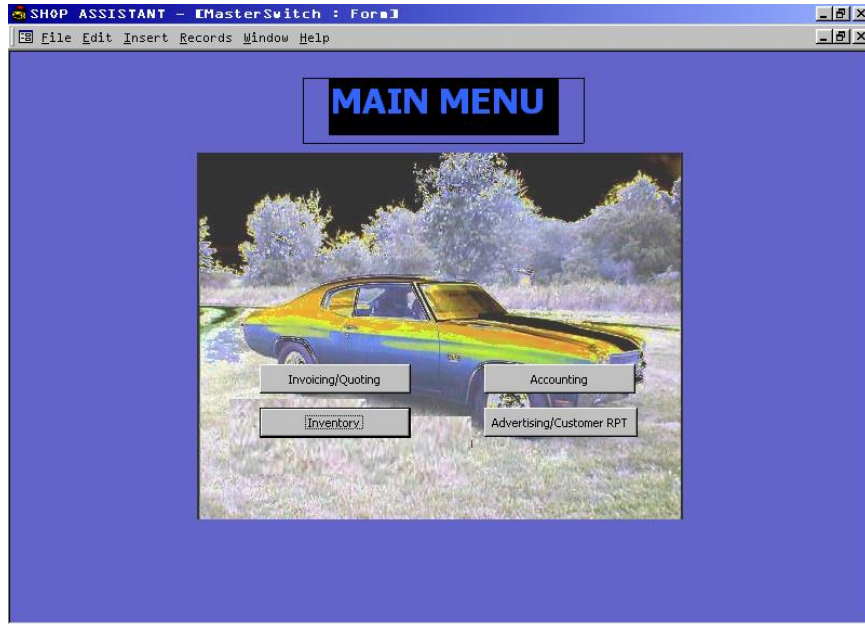
The accounting module provides payroll, general ledger and special reporting options. Checks are generated within the payroll system where time is entered onto the

system. Hours and Wages reports are available, as are more comprehensive reporting systems generally viewed quarterly or annually for taxes.

The advertising module accommodates the business' need for target marketing by providing mass mailing capabilities and "Services-Due" reminders. It also provides for customer demographic inquiries and allows implementation of sales on a global or part level.

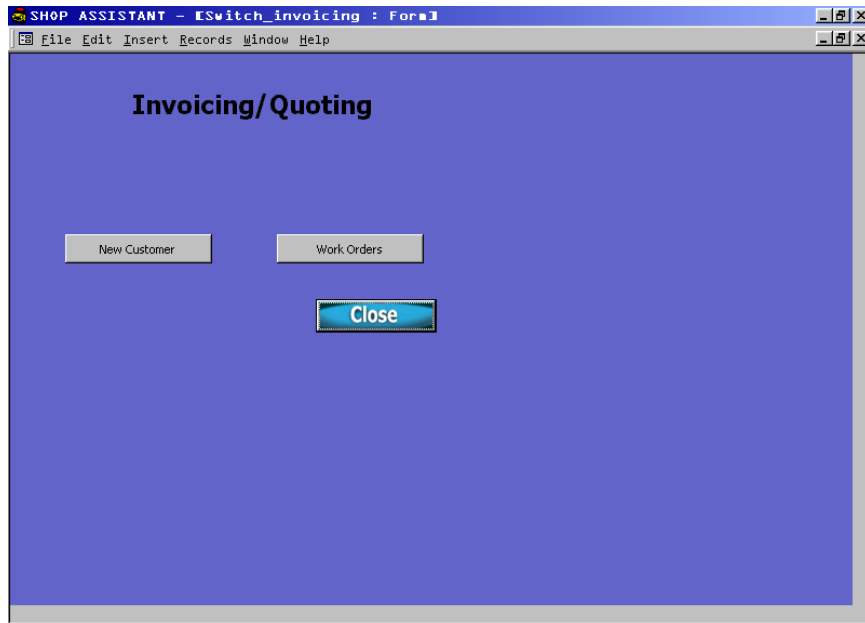
Important to the design was to create a program, which operates in the most user-friendly and efficient manner. The use of ADO coding created a professional interface in which data was quickly populated into forms so that the employee could be assured of robust data entry. The data entry for inventory parts and services is an example of an area of the application that uses ADO coding. In this way the application saves time and becomes more robust as data entry problems become eliminated and error boxes can instruct the user what they may be doing incorrectly.

The design protocol called for an easy to use interface in which the software could be navigated through button clicks and a comprehensive menu system. See the below screen prints to see how this was accomplished:



**Figure 1. Main menu**

Figure 1 displays the main menu of Shop Assistant. There are four main modules: invoicing/quoting, inventory, accounting, and advertising/customer reporting. From each of these buttons, the user will be directed to another menu, which gives the various options within that module.



**Figure 2. Invoicing/Quoting Submenu**

This is the invoicing and quoting module menu. From here you can reach the form, which allows for new customer entry or enter and modify work invoices and estimates.

The screenshot shows a window titled 'SHOP ASSISTANT - EfrAddNewCustomer : Form'. The menu bar includes 'File', 'Edit', 'Insert', 'Records', 'Window', and 'Help'. The main area is titled 'Customer Information' and contains the following fields:

- Customer ID: [ ] [ ] [ ]
- Address: [ ]
- City: [ ] [ ] [ ]
- Home Phone: [ ] Work Phone: [ ]
- Pager: [ ] Fax: [ ]

At the bottom of the form are three buttons: 'Save', 'Add New', and 'Close'.

**Figure 3. Adding a new customer to the database**

Figure 3 shows the form used to add new customers to the system. This form uses ADO coding which allows for more robust data entry. Data is not saved to the database until a click event occurs. In this case the “save” button is that event.

The screenshot shows a window titled 'SHOP ASSISTANT' with a menu bar 'File Edit Insert Records Window Help'. The main area is titled 'Work Orders' and displays the following information:

BM Automotive Repair, INC.  
136 Highway 10  
Cold Springs, Kentucky 41076

Check to convert estimate to invoice

Mechanic: Dan Ryan

Work Order# 1 Customer ID# 10 Customer Vehicle ID# 15

First Name Eddie Senior Last Name webb

Home Phone: (513) 922-7895 Work Phone: (513) 922-6699

Address: 654 Neeb Rd City: Delhi State: OH Zip: 58964

Make Chevrolet Model: chevelle Year: 1968 Engine: 327 Trans: Manual

Customer Description and Resolution: Customer needs a tune-up, tire rotation/balance, fluid change

Itemized Detail:

Item ID	Part No	Model	Description	Unit Price	Cust I
17	123	citation	pvc valve	\$3.99	
18	12344	Avenger	valve stem	\$1.99	
(AutoNumber)					

At the bottom of the form are five buttons: 'ADD NEW', 'SAVE', 'PREVIOUS', 'NEXT', and 'Close'.

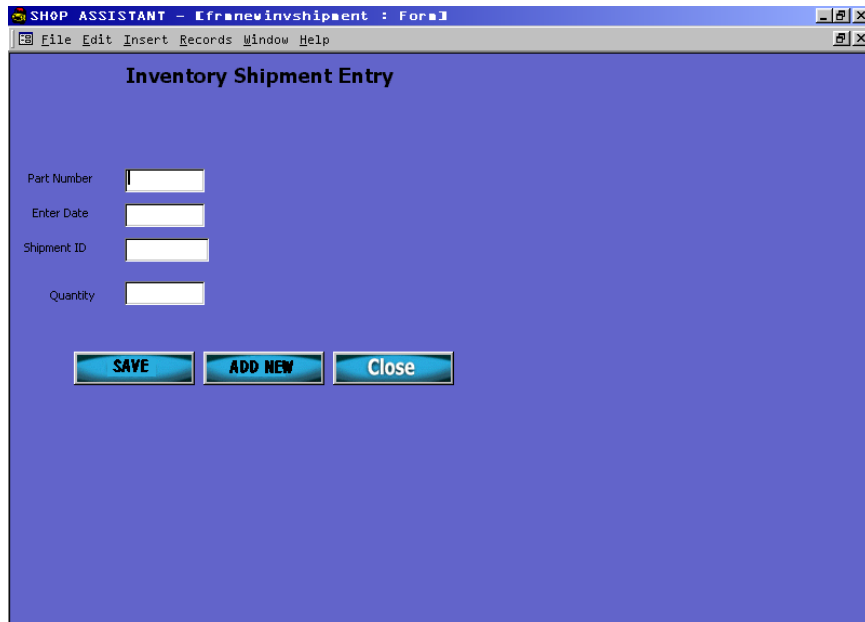
**Figure 4. Work Order or Estimate form**

Figure 4 shows the applications work order and estimate data entry. The information in the top section is the customer information and general data. The itemized detail shows the actual parts used in the work. This is where the cost for each part and labor is analyzed.



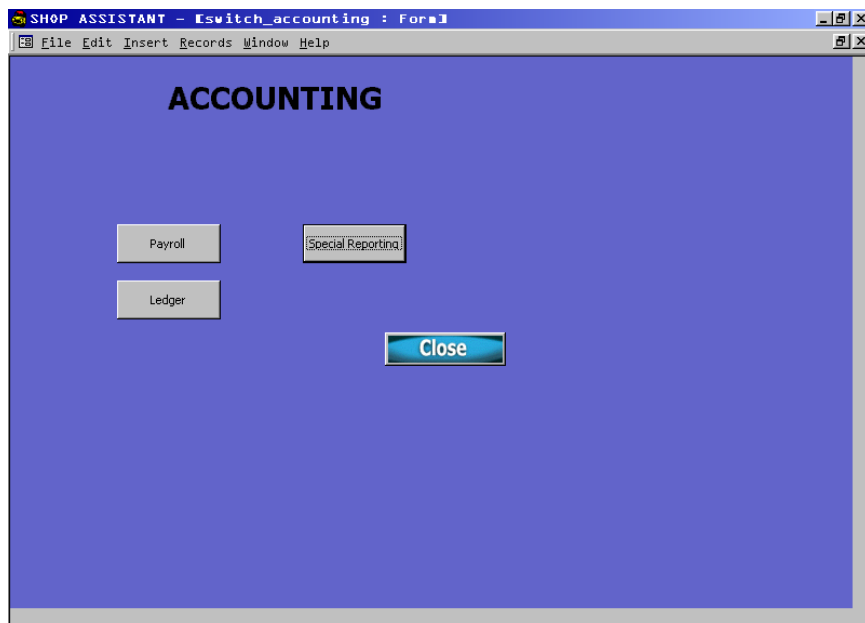
**Figure 5. Inventory Module Submenu**

Figure 5 is the menu for the inventory module. From here, the user can navigate to specialized inventory reports, add new parts to the database, edit inventory order points and add new vendor shipments to the inventory database.



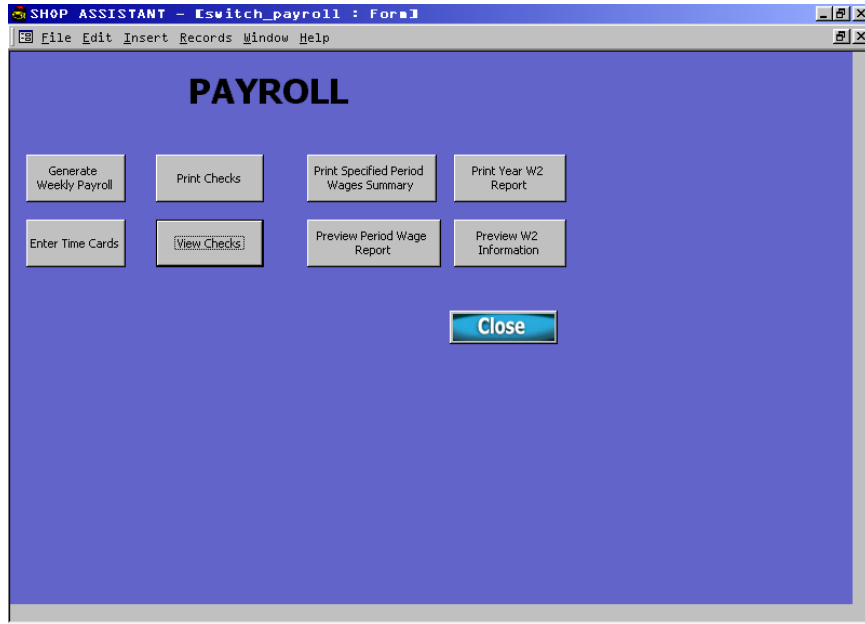
**Figure 6. Form to add vendor shipment to inventory database**

Figure 6 displays the form used to add newly shipped inventory into the database. This form uses ADO coding also.



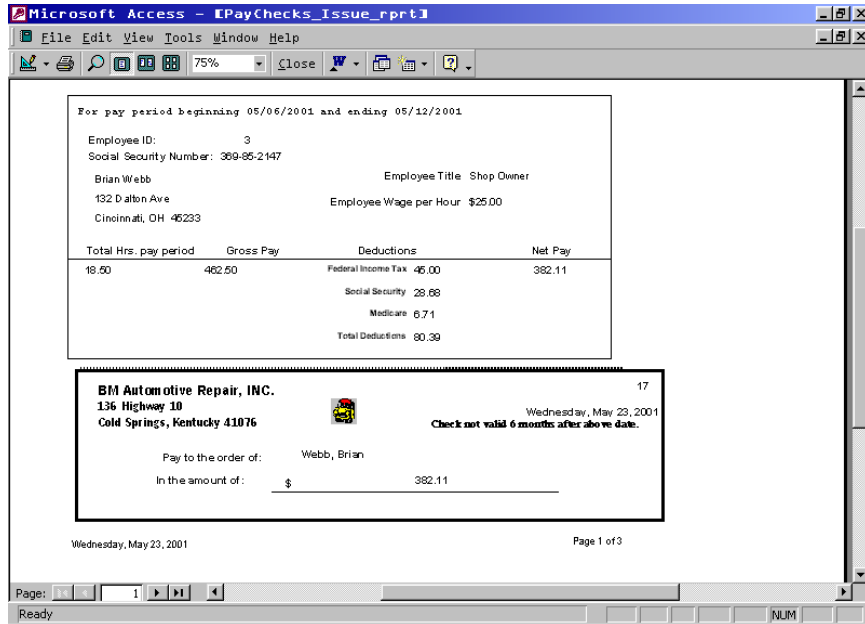
**Figure 7. Accounting Module Menu**

The menu for the accounting module is displayed in figure 7. From this menu, it is possible to navigate to the payroll utilities, ledger activities, and special reporting.



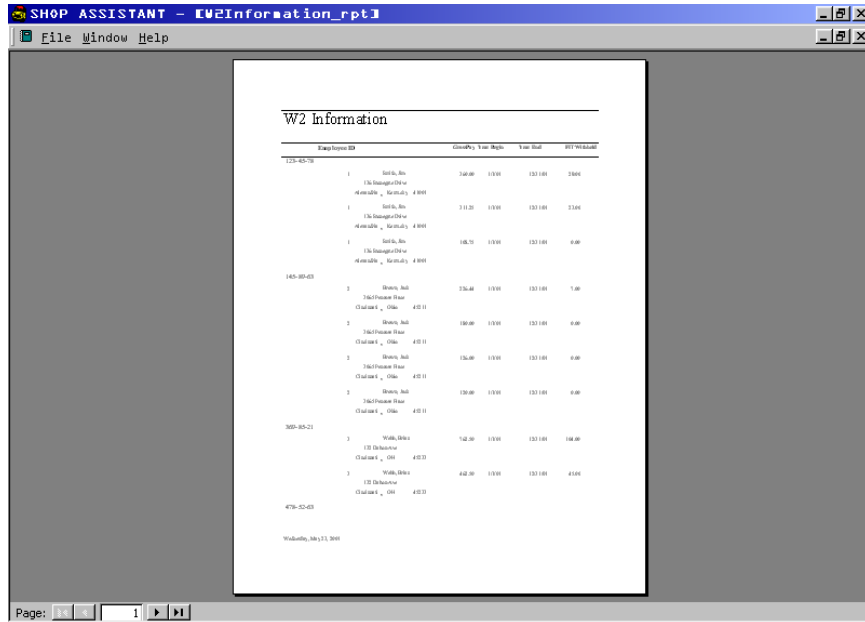
**Figure 8. Payroll Utilities Menu**

Figure 8 displays the payroll menu. From this menu, it is possible to generate payroll at the click of a button. The user can view and print paychecks, look at wage summaries for specified periods of time, and view W2 information by employee. The ability to look at wage information in specified time periods aids in preparation of quarterly and annual 941 Wage forms required by the federal government. The W2 information provides all of the necessary data, including federal income tax withholdings, Medicare and Social Security deductions.



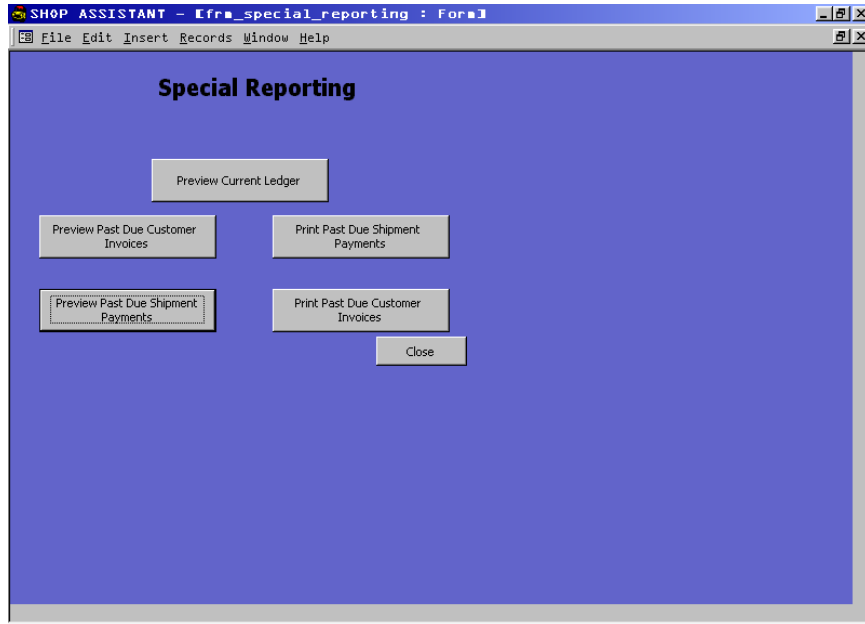
**Figure 9. Generated Paycheck Example**

An example of the pre-printed paycheck option is displayed in figure 9.



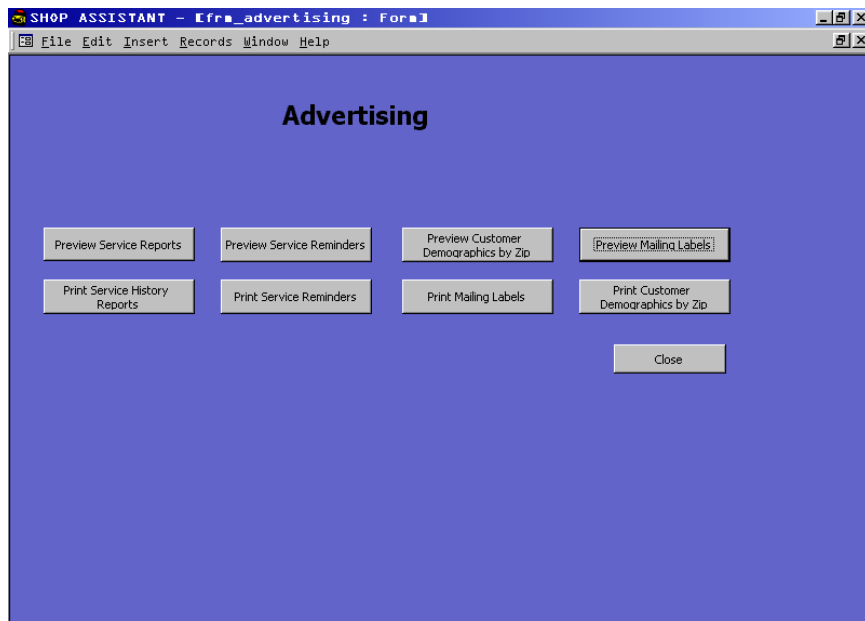
**Figure 10. Yearly W2 Summaries Report**

Figure 10 displays Shop Assistant's ability to summarize annual W2 information by each employee.



**Figure 11. Special Reporting Menu**

The Special Reporting menu is displayed in figure 11. In this facility, the user can view a list of past due customer invoices, overdue payments to the shop's vendors, and look at current ledger summaries.



**Figure 12. Advertising Module Menu**

Figure 12 shows the menu, which navigates through the advertising module. From here, several useful reports can be viewed or printed.



**Figure 13. Services Due Reminder**

From the advertising module, clicking on the services due reminder button will generate the print out in Figure 13. This button activates a query which generates reminders for those customers who had oil changes outside of 90 days from the day the query is run.

## **6. Conclusions and Recommendations**

Shop Assistant is very creative and works well for small businesses. This software fits its design in that it is sophisticated enough for the business that would otherwise continue to do things mostly manually. It is not so complex that it would fit the needs of a larger business, but it's design and cost were not intended for this. Shop Assistant does what it was created for; it provides a way of monitoring a small business to promote profitability and success in a way the manual record keeping could not do. While I am pleased with this application, there are things I would like to have approached differently. There are several features I would have added, different coding to the

application itself, and a few other additions that would have made this program even better. Time, resources and a little more foresight would have made these things possible.

For example, using Visual Basic would have made the deployment of certain things a lot smoother. Visual Basic allows you to create a compiled executable file that is easily distributed. Visual Basic inherently has more functionality in the form design. Visual Basic would have created something that displayed itself more like an application than an Access database. It allows more coding options. In addition, I would have done a more thorough job in debugging to create a more robust environment and performed more usability testing.

Some features I would have added are:

- Create an interface to keep track of payment transactions with a cash drawer that uses a parallel port to open the drawer.
- Implement a credit card payment feature.
- Create a user manual to reduce user questions.
- Use an interface that provides a time clock for employees that keeps track of signing in and out and records breaks. This interface would tie directly to the payroll system.

Overall, this was a very positive experience, which required a lot of thought, hard work and creativity. It allowed me the opportunity to explore the power of databases and ADO coding. It also forced me to apply this knowledge outside of the classroom, by finding applicable ways to use it. In the end, I had a product that I could be proud of.

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