A.B.Frames

Customer Database

A Level Computing Project

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Create and use styles for section and paragraph headings. Then you will be able to automatically generate a table of contents. 12pt Times Roman, used in this report, is a good choice for body text.

Section 1 - Analysis

1. Introduction

A.B.Frames is a small privately-run business owned and run by Mr and Mrs Daniels. They specialise in selling works of art such as paintings and prints by local artists, and restoring and framing pictures, photographs, tapestries and so on. They have built up a large customer base and this is increasing every year.

Sales are boosted by holding regular exhibitions of paintings by various artists to which regular customers are invited as well as being advertised locally. Although the Daniels do hold a list of customers on a DOS-based filing system, they have no means of targetting customers who are likely to be interested in a particular exhibition, and automatically sending them invitations.

You must include an introduction. Background information about the business or organisation can be described if relevant. Then give an overview of what the project is about.

Mr and Mrs Daniels have decided to invest in a comprehensive customer information system to hold details of who their customers are, what orders or purchases they have made in the past, what their particular interests are and whether they attend exhibitions, so that they can offer their customers a better and more personalised service, save money on unproductive mailshots to the wrong customers, and boost sales by sending details of special offers, exhibitions etc. to carefully selected customers.

2. The investigation

Preparing for the interview

An interview with Mrs Daniels was arranged and a list of topics for discussion drawn up prior to the interview. These included:

- the precise objectives of the new system.
- the problems or weaknesses in the current DOS system and the manual system.
- the methods currently used to record data.
- the information that needs to be kept on each customer.
- the required output.
- the volume of data (e.g. number of existing customers, number of new customers each month/year).
- any hardware or software constraints - e.g. did they already have hardware or software which they proposed to use.

Summary of the interview

You are not encouraged to include an actual transcript of the interview; just give a summary of the information you gained.

A number of weaknesses in the current manual system and DOS file system came to light during the interview, and some new objectives were stated. These are discussed below.

Mrs Daniels has recently purchased a Pentium PC running Windows 95 and a laser printer. She has also purchased, on the recommendation of a friend, the Microsoft Office suite including MS Access. Her original idea was that she should learn how to use Access and develop the system herself, but having spent some time with an Access textbook realised that the task is more complex than she at first realised and would be simply too time-consuming.

There are about 500 regular customers on the old DOS system, with about 30 new customers being added every year.

3. Problems with the current system

i) Tracing previous orders placed by a customer

In your project, include sample input and output documents from the current system in an Appendix.

Each time a customer comes in to buy something or have a painting framed or restored, a job sheet is completed. The customer is given one copy, and the other copy is filed. An example is shown in Part 1, Figure 2.1. Frequently, a customer will come back several months later and ask, for example, for another tapestry to be framed 'using the same sort of frame as last time'. This means a lengthy search through hundreds of job sheets, and often the relevant one cannot be located.

ii) Inability to send targetted mailshots

The current DOS filing system does not hold any details on customers' particular interests or what past purchases they have. Currently it is not possible to send out a mailshot only to selected customers, although labels can be printed to all customers in the database. With the number of customers increasing every year, this is impractical and expensive.

ii) Lack of information about customer base

There is a general lack of information about who the most frequent customers are, who has not made any purchases for the past few years, what the most popular items are, etc. Access to summarised information of this kind could be useful for planning future stock purchases, marketing campaigns and so on.

This is one of the most important paragraphs in the report! If you identify and state the objectives clearly, the design and appraisal will be very much easier.

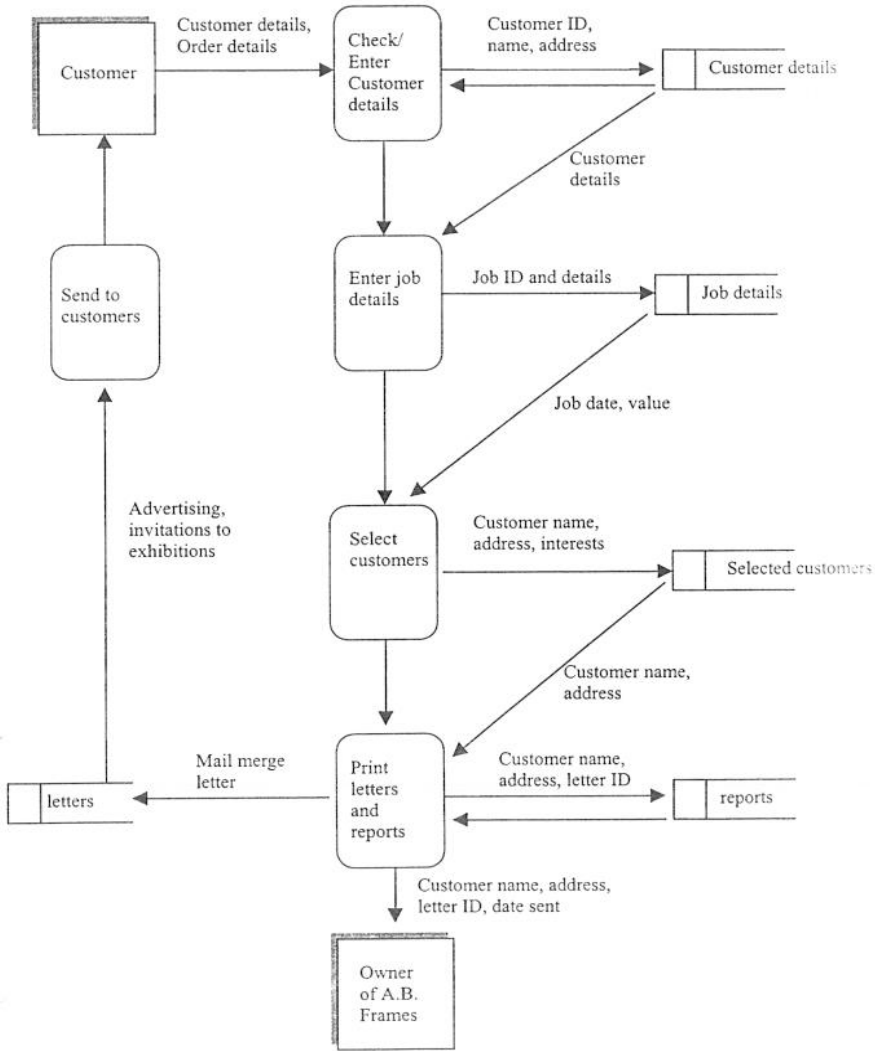
4. Objectives of the new system

The objectives may be stated in both quantitative and qualitative terms.

1. It should take less than 30 seconds to establish whether a customer is already on file.
2. It should be possible to go directly from the Customer Details screen to the entry of a job for that customer, without having to re-enter the customer's name, etc.
3. Data entry should be as fast and easy as possible, particularly as there are several hundred existing customers and jobs to be entered when the system is first installed.
4. It should take less than one minute to trace any past job for a customer.
5. There must be provision for multi-item jobs; for example a job could consist of the **restoration** and **framing** of a picture.
6. The new system is required to provide the following information:
   - a list of all business customers
   - a list of all customers interested in a given artist or given subject matter, or who are classified as 'Tapestry', 'Restoration' 'Framing' or 'Exhibition' customers
   - a list of all customers whose total jobs exceed a given value.
7. It should be possible to send a standard letter to selected customers, using criteria mentioned above.
8. The user must be able to create new letters whenever needed and perform a mail merge to selected customers.
9. The main menu should be displayed automatically when the database is loaded, and the whole system should be menu-driven.

5. Data flows

A data flow diagram of the proposed system is shown below:



6. Constraints and limitations

System boundaries (scope of proposed system)

The system to be developed is a customer information system, and is intended to enhance rather than replace the current system of recording jobs. If this proves successful, it will be possible at a future date to replace the current method of recording jobs so that the details are typed directly into the computer and the required copies printed out. This could then be extended to link into a computerised accounts system.

Specify the details of the hardware and software that will be used both for development and by the user, including the Version number

Software

The customer has requested that the system be developed using MS Access 7, so unless a good reason transpires for using an alternative program or package, Access will be the first choice of software.

Hardware

In order to run Access 7 and be able to perform a mail merge using Word, a PC 486 or Pentium with a minimum of 8Mb, and preferably 16Mb, will be required. A fast processor such as a P120 will be needed if the system is not going to appear slow in switching between screens.

The user has a Pentium P200 with 16Mb, which will be perfectly suitable, and similar machines are available for development work at the College.

The user's I.T. skills may be a relevant factor in the design of the system

User's level of information technology skills

Mrs Daniels is familiar with Word and has good keyboard skills, so should have no problem entering data and learning how to use the system. She would like to improve her knowledge of Access so that she can in the future perform new queries and reports as the need arises.

Assessment

This project involves the candidate in addressing and reporting on a problem associated with a real user. There is evidence of investigation, and data flows have been ascertained. Constraints on the hardware and software to be used have been identified.

Objectives have been ascertained and clearly stated, although the project does not seem to be a particularly demanding one, being a fairly standard database type of problem. However scope for further development has been noted.

Mark: Performance level 4: 10 out of 12. (Extensive investigation of a demanding open-ended problem showing very good appreciation of system requirements and demonstrating a high level of perception and consideration of a real user's needs. Clear and comprehensive set of system objectives.)

Section 2 - Design

1. Consideration of possible solutions

Check your syllabus carefully; the AEB requires A level candidates, but not AS candidates, to assess the feasibility of potential solutions and justify the chosen one.

A database package will be ideal for implementing the system for A.B.Frames, and as Mrs Daniels has requested that it be done in Access 7 this is the package that must be used. It would probably be possible to implement the system using Visual Basic or another programming language but it would take a lot longer and would involve the owners having to buy more software which is not really necessary, as Access has all the capabilities required.

I already have some experience of Access 7 and it is available both at home and at College for development.

Using this package it will be possible to

- set up the necessary tables and relationships
- produce customised input screens, using Visual Basic to automate data entry wherever possible and to perform various validations
- use Visual Basic modules to enable fast searches foe a particular customer and past jobs
- design reports as needed
- make and save queries to select certain customers for a mail merge
- link with MS Word to enable new letters to be composed and to perform mail merges to selected customers
- implement a customised menu system

2. Database design

An entity-relationship diagram such as this one is essential as part of the database design.

The database contains three entities, CUSTOMER, JOB and ITEM. These are related as follows:

Tables will be created for each of these entities.

3. Definition of data requirements

Document the type and length of each attribute carefully, BEFORE you start work in Access. Discrepancies in the type and length of foreign key fields in different tables can cause major problems later on

The tables will contain the following data:

CUSTOMER DETAILS

Attribute Name	*Comments*	*Data Type and Length*	*Validation*
CustomerID*	Automatically incremented	Long Integer	Unique primary key
Title		Text (4)	
Surname		Text (25)	
Initials	Automatically converted to uppercase	Text (3)	
Street		Text (30)	
Village		Text (30)	
Town		Text (30)	Default to Ipswich
County		Text (20)	Default to Suffolk
PostCode	Automatically converted to uppercase	Text (10)	
HomeTelephone		Text (15)	
WorkTelephone		Text (20)	
SalesCustomer		Yes/No	
FramingCustomer		Yes/No	
RestorationCustomer		Yes/No	
TapestryCustomer		Yes/No	
ExhibitionCustomer		Yes/No	
BusinessCustomer		Yes/No	
Business Name	Skipped if not Business Customer	Text	
CustomerNotes		Memo	

JOB DETAILS

Attribute Name	*Comments*	*Data Type*	*Validation*
JobNo*		Long Integer	Unique primary key
CustomerID		Integer	Must exist on CUSTOMER DETAILS table
Orderdate		Date	Must be a valid date
JobValue	Total of individual item values	Currency	(Automatically calculated)
ItemsInJob	The number of items on this Job sheet	Integer	(Automatically calculated)
JobNotes		Memo	

ITEM

Attribute Name	*Comments*	*Data Type and length*	*Validation*
ItemNo*	1,2 etc for items in Job	Long Integer	Must be numeric and unique
JobNo*	ItemNo and JobNo constitute the unique primary key	Integer	Must exist on JOB DETAILS table
ItemType	Will cause Check box on Customer Details form to be automatically set	Text (11)	Must be one of Sales, Framing, Exhibition, Tapestry or Restoration (Selected from list box)
ArtistName		Text (20)	Selected from combo box
SubjectMatter	Description of painting sold, e.g. Dogs, Portrait, Suffolk Landscape	Text (20)	selected from combo box
ItemValue	Price charged for Sale/Job	Currency	
ItemDescription		Text (30)	
Frame	Type and/or colour of frame	Text (20)	

4. Design of input forms

Two data entry forms are needed.

1. Customer Details

This form will be used for several purposes so it needs facilities to

- check to see whether a customer is already on the database
- add a new customer
- move to the Job sheet form to enter a new job for the current customer
- look through all the existing jobs for the current customer and bring up more details if necessary

Look at any specimen input documents to see if certain default values would be appropriate.

Validations will be performed automatically. The Customer ID field will be an integer field and will automatically increment when a new customer is added, to ensure a unique ID without the user having to know what the last ID used was. Wherever possible default values will be inserted automatically (e.g. most customers are from Ipswich, Suffolk so the relevant fields will default to those values). Tab order will also be used to speed data entry; e.g. if Business Customer is not checked, the field for Business Name will be automatically skipped.

In order to look up details for a particular job, the Job Number field in the subform can be double-clicked to automatically bring up the Job Sheet.

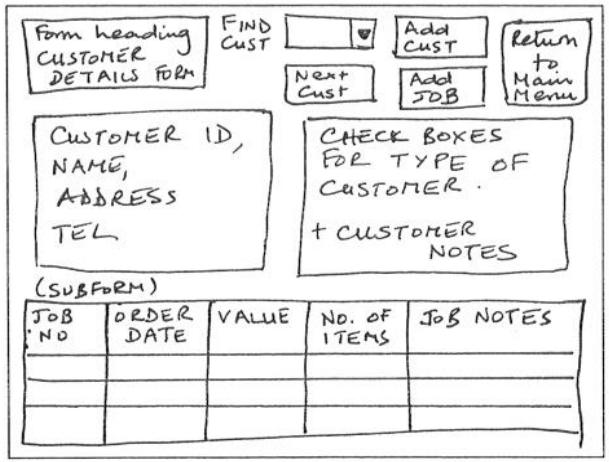
The Customer Details form will be as shown on the next page.

2. Job Details

This form will be accessible only from the Customer Details form when the Add Job button is pressed, or a Job ID on the Customer Details form is double-clicked as explained above.

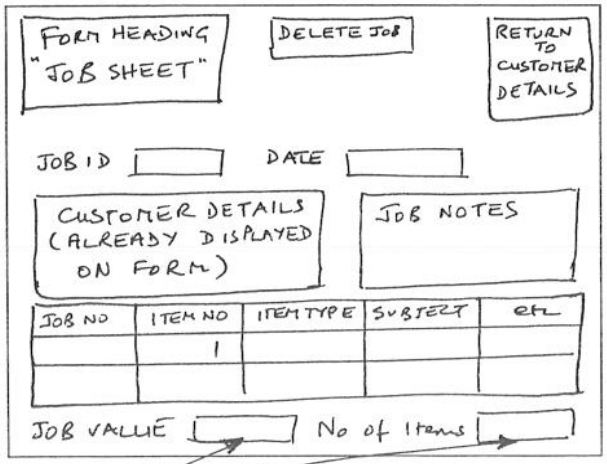
The Job Details form will be as shown on the next page.

CUSTOMER DETAILS FORM



Hand-drawn screen layouts are preferable to screenshots of your final screens. These should be drawn BEFORE you start work at the computer

JOB SHEET



CALCULATED AUTOMATICALLY

Alternatively, you could print out the screen as produced automatically by a wizard, and annotate it by hand to show how you intend to customise it.

5. Report design

It would be better to show a hand-drawn design for a proposed report. It is not necessary to use squared paper and lay out every character; simply show what headings you will use, what data will appear and in approximately what position.

The format of all the reports will be similar. The layout of the Business Customer report is shown below:

A.B Frames Ltd
Customer Database

Business Customer Report

ID	Name	Address	Home Telephone Work Telephone
16	Mr D Grieves	19 Church St Ipswich Suffolk IP7 5GF	567890 453210
576	Mrs P Mason	34 Kipling St Ipswich Suffolk IP6 4ER	745221 01728-998766

6. Mail merge

The Mail Merge option will allow the user to load up Word directly from Access, and specify which of several queries is to be used as the source of the data. The user is given the option to use an existing letter or create a new letter. This feature is not to be totally automated as the users wish to have the flexibility to create new letters themselves, and possibly even to create new queries when they become more confident in the use of the system.

When Mail Merge is selected on the menu, instructions on how to proceed will appear on screen.

Emphasise user involvement throughout.

After discussion with the user it was decided not to produce mailing labels, as there was less work involved in using window envelopes.

In order to keep a record of which customers have been mailed and when, reports have been designed using the same queries as those used in the mail merge, so that a list can be printed out and filed after performing a mail merge.

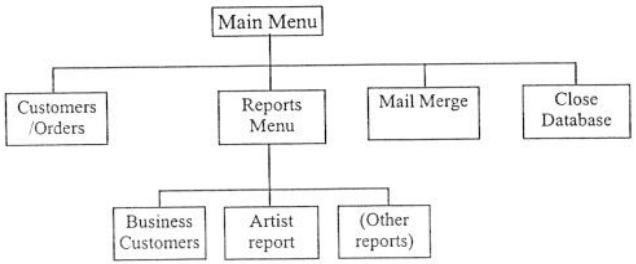
7. Queries

Queries which pick out various categories of customer will be created and saved, as follows:

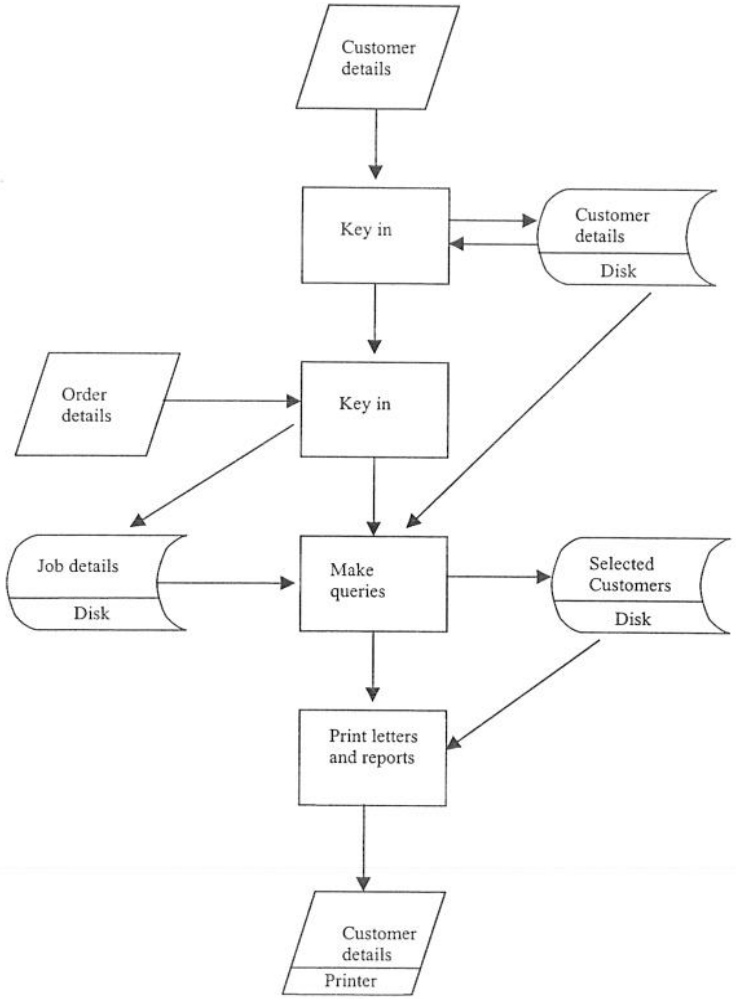
ArtistName Query	Allows user to specify an artist's name, then selects all customers who have purchased a painting by that artist
BusinessCustomer Query	Selects all Business Customers
ExhibitionCustomer Query	Selects all customers who have attended exhibitions
FramingCustomer Query	Selects all customers who have had a framing job done
JobValue Query	Allows user to specify a currency amount and then selects all customers who have had total jobs exceeding that amount
RestorationCustomer Query	Selects all customers who have had restoration work done
SalesCustomer Query	Selects all customers who have bought paintings etc.
SubjectMatter Query	Allows user to type in a specific subject matter and selects all customers who have had jobs specifying that subject matter
TapestryCustomer Query	Selects all customers who have had work done on Tapestries

8. Menu design

The menu structure is as follows:



9. Systems flowchart



10. Module design

Visual Basic modules will be used to automate many aspects of data entry and updating of customer records. Complete listings of the code for all buttons, events etc. in the two data entry forms are given in the Systems Maintenance Section.

Entering a job for a new or existing customer

The design is expressed in the following pseudocode.

```
Select Add Customer/Order from Main Menu
For each Job Sheet:
    Use Find button to check if customer already on file
    If not found,
        Click Add Customer button to add customer details
        New Customer ID displayed in empty form
        Add customer details
    Endif
    Click Add Job button to add job details
    Job Sheet opens with customer details displayed
    Enter job details
    For each item:
        Enter Item details including Item type, cost
        Customer record updated automatically
    Next item
    Click Job total cost and No. of items in job to update automatically
    Return to Customer Details form
Next Job Sheet
```

Mail merge

The other main function of the database is to be able to select customers matching certain criteria and either view or print a report listing them, send them a new or existing letter, or both. The procedure for the Mail Merge will be:

```
Select Mail Merge from Main Menu
(On-screen instructions appear)
Follow instructions to
    Open database window
    Select appropriate query
    Select Office Links tool from Toolbar and select the Mail Merge option
    (Word opens automatically)
    If new letter required
    Then
        Write new letter, inserting merge fields
        Save letter
    Else
        Open existing letter
        Make any modifications required
    Endif
```



```
Select Tools, Mail Merge from menu to perform the Mail Merge
Close Word to return to Access
Select Reports from Main Menu
Print report to have hard copy listing of which customers mailed
```

Show how the design is influenced by the user's requirements or level of I.T. skills

Although it would be possible for the system to incorporate a basic letter corresponding to each query (for a particular selection of customers) the user opted to have a less automated mail merge as the situation will inevitably arise when they want to make a new query and create a new letter. This will be much easier for them if they have already got used to the procedure for performing a mail merge from scratch.

11. Security

A password will be attached to the database so that it is only accessible to someone who knows the password. Different access levels are not needed as Mr and Mrs Daniels are the only people who will be using the database.

12. Test strategy

You must describe an appropriate test strategy in the Design section. Put the detailed test plan and test results in the Testing section.

The test strategy will include five different types of testing as described below.

Logical testing

This will be used to test every aspect of each form, report and query as soon as it is implemented, using valid, invalid and extreme data. Test data will be added to test each code module and results compared with the expected results. Sufficient data will be added to ensure that there is at least one customer in each category (e.g. 'Tapestry Customer'). The test data that will be added initially is shown in Appendix 1. Subsequent tests will often involve adding new data which will then be deleted when the test works satisfactorily.

Functional testing

Each menu item will be tested in turn to ensure that no function has been missed out.

System testing

When the system is complete, the whole range of tests will be carried out again to ensure that no errors have been introduced.

Recovery testing

The computer will be re-booted while the database is open to ensure that data is not lost or corrupted in the event of a power failure.

Acceptance testing

The user will then be involved and asked to test all the capabilities of the program to ensure that all required functions are present and working in the manner expected. This testing may result in further refinements.

Assessment

The choice of Access to implement the system has been satisfactorily justified, both on the grounds that this is a package the users have already purchased and would like to use, and on the grounds that it is very suitable for this system and has all the required facilities.

The database has been correctly normalised, with three entities defined and the correct relationships between them specified. The data to be held has been suitably defined, with validations, default values and data entry shortcuts such as combo boxes, automatic conversion to uppercase etc. specified. There appears to be a weakness in that a job with ID 0 can inadvertently be added if the user chooses to return to the Customer Details form without entering a job.

The user interface design and the method of data entry have been carefully designed to overcome the problem of not being able to locate past jobs for a customer. Visual Basic modules have been used to update automatically details on a customer according to the type and value of items on the job sheet. The Mail Merge has not been totally automated but a reasonable justification has been given for the approach taken.

The report layout for Business customers looks neat and shows the required information.

The discussion on security is brief but satisfactory for this particular system.

The test strategy is well described and backed up by a comprehensive test plan shown in the Testing section.

Mark: Performance Level 4: 10 out of 12. (Very good design well fitted to the situation and incorporating all appropriate aspects.)

Section 3 - Testing

1. Test plan

Test No.	Test	Expected result
1	Test password	Only "ABF" accepted. Main menu opens automatically.
2	Test Main menu option Customer/Orders	Customer Details form opens
3	Enter first customer	Automatically given Customer ID 1. Default values correctly inserted
4	Enter customers 2 to 15	Customer ID incremented automatically, but can be changed by the user if required Initials and Post code capitalised automatically. Business name skipped if not business customer Tab order correct throughout form
5	Use Find Customer button to find Belles	Belles P located and displayed
6	Use the Next button to find next customer named Belles	Belles FR located and displayed
7	Press Next button again	Text on button changes to 'No More'
8	Press Add Customer, then Add Job before entering customer name	Customised error message appears: 'Enter customer details before entering job'. Customer form remains open.
9	Press Add Customer, enter customer name, then press Add Job button	Job Sheet opens with customer name displayed. Job can be entered.
10	Press 'Return to Customer Details'	Customer form opens showing the same customer and in the subform, the job that was just added.

Test No.	Test	Expected result
11	For customer 23 (Zelter) Add Job 31, 1 item, type 'Restoration'	'Restoration' category automatically checked on Customer Details, Job appears in subform.
12	For customer 23 Add Job 33, 1 item, type 'Framing'	'Framing' category automatically checked on Customer Details, Job appears in subform.
13	For customer 23 Add Job 34, 1 item, type 'Tapestry'	'Tapestry' category automatically checked on Customer Details, Job appears in subform.
14	For customer 23 Add Job 35, 1 item, type 'Exhibition'	'Exhibition' category automatically checked on Customer Details, Job appears in subform.
15	For customer 23 Add Job 36, 1 item, type 'Sales'	'Sales' category automatically checked on Customer Details, Job appears in subform.
16	For customer 2, add job 17 with 2 items Framing (£50) and Sales (£75), total value £125	Job total and Number of items correctly calculated, Customer Details form correctly refreshed
17	Add Job 777 for Customer 1 (L.P. Heathcote), date 2/3/00 to test 'millenium bug'	Date recorded as 02/03/2000
18	Attempt to add another job 777	Error message: Job ID must be unique
19	Attempt to leave Job form without entering a job for Customer 1	Job ID 0 is saved on file
20	Repeat previous test	Error message: Duplicate Job ID (because 2 jobs with ID 0)
21	In Customer Details form locate Customer 1 and highlight and delete Job ID 0	Job deleted
22	Double-click Job ID 777 in Customer details form with Customer 1 (L.P.Heathcote) on screen	Job form opens with details on screen

It's a good idea to test for the 'millenium bug' – i.e. is 00 interpreted as 1900 or 2000?

Test No.	Test	Expected result
23	Change Item 2 price from £0 to £20, and click in Total Price field	Total job price updated on Job Form and on Customer Details form
24	Print report of all business customers	All business customers appear on report
25	Print Artist report, entering artist 'Constable' for artist name	All customers who have bought a work by Constable should appear on report
26	Print Artist report, entering artist 'Reynolds' for whom there are no jobs	Message displayed saying that there are no customers fitting this category
27	Print Job Value report, specifying job value of £50	All customers with over £50 in jobs appear on report
28	Select Mail merge option	Mail merge instructions appear
29	Test Mail Merge for Exhibition customers, creating a new letter, by following Mail Merge instructions	Letters to L.P.Heathcote, Hallett, Thomas and Williams
30	Test Mail Merge for Customers whose jobs total over £1000, using existing letter	Letters to L.P.Heathcote and O.H.Head
31	Test Reports Menu option, then each submenu option	Reports correctly printed
32	Test Return to Main Menu button on Customer Details form	Main Menu appears
33	Select Close Database	Access closes down
34	Test 'recovery' after power failure	Only current changes lost

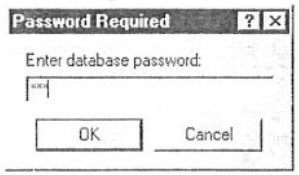
About 30 tests should be sufficient; don't go overboard in a project with a limit on the recommended size.

2. Test results

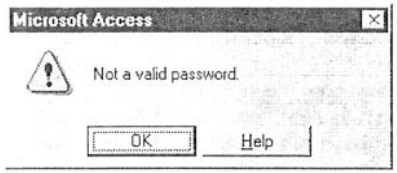
You can include test results in an Appendix. It is not necessary to put them into a word-processed document. Use hand annotation and highlighter pen to draw the reader's attention to the important points in the screenshot.

The test results for the final test run are shown below. Errors which came to light during earlier test runs were corrected and all tests gave expected results.

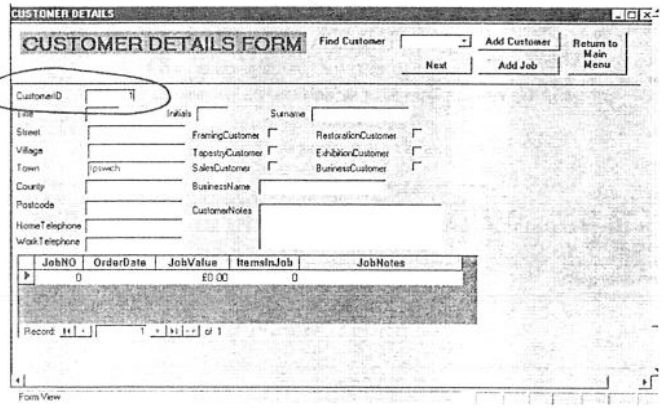
Test 1: test password



When the correct password was entered, the database opened. Otherwise, the following message was displayed:



Test 2. Enter first customer in empty database

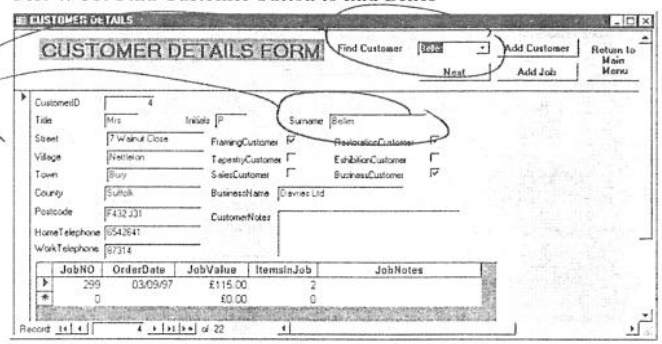


Customer ID correctly set to 1

Test 3: Enter customers 2 to 15

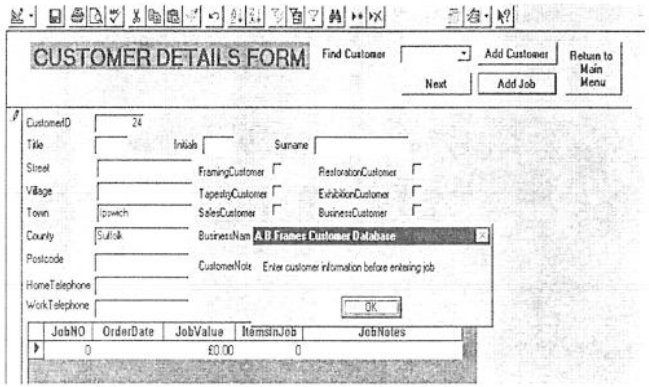
Customer details entered. All different options, defaults and fields were tested during data entry. The tests resulted in some minor changes to field order, tab order, and default values to make data entry as smooth as possible. During user testing, the addition of a 'Delete Customer' button was discussed but rejected as the user is quite at ease with using the built-in Access 'Delete' button on the toolbar.

Test 4: Use Find Customer button to find Belles



Record for 'Belles' is displayed when selected in combo box

Test 8: Attempt to add job before entering customer details

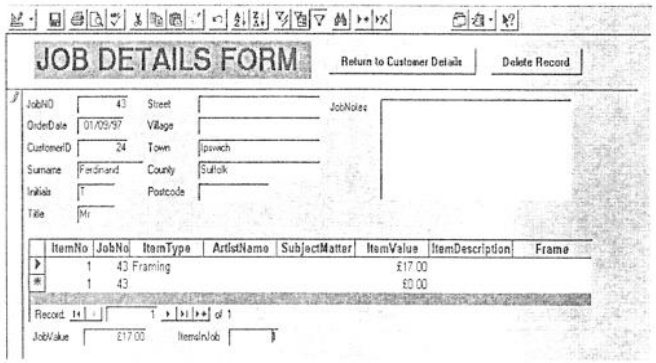


Comment: This test initially resulted in the Job form opening with no customer details displayed, which would have left a job on the file for an unknown customer if the user had not noticed that they had forgotten to enter at least the customer's name. The message appears if the surname field is left empty when Add Job is pressed.

Test 9: Add customer name only, and then press Add Job

Comment: This was an unexpected result: the customer details had not been saved by Access prior to opening the Job Sheet. The problem was fixed by inserting a line of code ***Me.Refresh*** *in the module attached to the 'Add Job' button on the customer sheet.*

The test was repeated and worked satisfactorily as shown below.



In cases where it is difficult to show evidence that the test worked correctly, you could ask your teacher/lecturer to perform the test and sign it off.

Test 10: Press 'Return to Customer' button

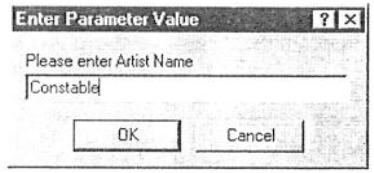
Comment: Initially this had the effect of returning to the Customer form but always showing Record number 1 instead of the customer for whom the job was added. The reason for this was that the Requery command was used unnecessarily on the After Update event property of the Job form. (See systems documentation)

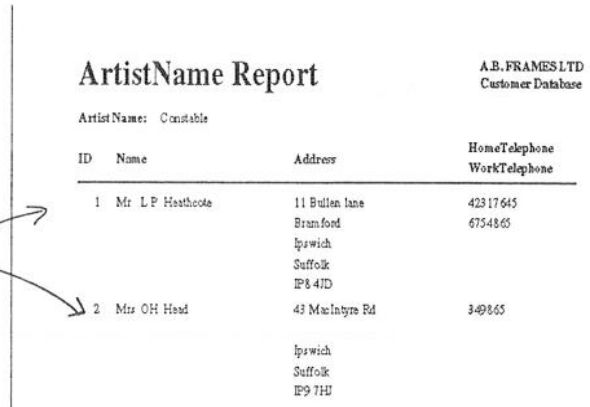
The code was removed and the test worked satisfactorily.

Teacher's signature:

Works Satisfactorily
J R Hartley

Test 25: Print Artist report





ArtistName Report

A.B. FRAMES LTD
Customer Database

Artist Name: Constable

ID	Name	Address	HomeTelephone WorkTelephone
1	Mr L P Heathcote	11 Bullen lane Bramford Ipswich Suffolk IP8 4JD	423 17645 6754865
2	Mrs OH Head	43 MacIntyre Rd Ipswich Suffolk IP9 7HJ	349865

These are the only two customers who have bought works by Constable

Test 29: Mail Merge for Exhibition Customers

This output would look more authentic if it was NOT pasted into a word-processed document. Aim at authenticity rather than neatness in your evidence of testing.

Mrs C A Hallet
St Helens Street
Ipswich
Suffolk FG4 ÚY7

Dear Mrs Hallet

We have pleasure in inviting you to the Private View of an exhibition of recent East Anglian landscapes in watercolour from the studio of the well known artist ***Michael Nolan*** at the A.B.Frames Gallery on Thursday 21st August 1997.

Etc etc

Comments on test results can be added by hand. You should also comment on significant test results in the Systems Maintenance section.

Comment: The test allowed the user to create a new letter for Exhibition customers, which is automatically stored in the 'My Documents' directory. This is convenient for the end user but for test purposes at school/college had to be changed.

There was no 'village' in the above address and by selecting the option to suppress blank lines in the mail merge dialogue box, no unsightly spaces are left.

(In the project write-up, other tests would be shown as above)

Assessment

A good volume of test data has been used, sufficient to demonstrate all aspects of the program. Annotated test output has been shown for each test, with comments where necessary, and the test strategy includes testing of exceptional cases and invalid actions and data. The system appeared robust when tested in class by the teacher, who attempted to provoke system failure.

Mark: Performance Level 4: 5 out of 6. (All significant aspects thoroughly tested using appropriate data designed to provoke failure.)

Section 4 - System Maintenance

This section should give sufficient information to enable a programmer or someone reasonably expert in the software (e.g. Access in this case) to maintain your system

1. System overview

This Customer Information system is designed to keep records of customer profiles and their past orders. It is designed to run alongside the current manual system of recording orders, rather than replacing it. The computer will be in the shop and the owner can use it to check whether a customer who comes in is already on the database, or to check on past orders.

New data will be added to the database at a convenient time, possibly at the end of the week. The procedure that the user will follow is described in the Design Section.

2. Tables and Relationships

Tables and relationships were set up as specified in the Design Section. An extra table ITEM TYPE was set up to be used as the source for the Item Type list box in the Item subform of the Job Sheet. It has only one field, specifying different types of item such as Framing, Tapestry etc.

3. Forms

The menu structure was set up as specified in the Design Section. Forms were used as follows:

1. AB Main Menu (see user manual for screenshot)

This is specified as the startup form (using Tools, Startup) and loads automatically when the database is opened.

All buttons either opening other forms or reports, or quitting the database, were placed using wizards.

Macros/Modules used:

On Open event uses a custom-made macro named Maximise, which maximises the form.

2. AB Reports Menu (see User Manual for screenshot)

All buttons placed using wizards. Maximise macro runs on opening form.

3. Input forms (see User Manual for screenshots)

Draw the readers attention to code given in an Appendix.

All buttons and many fields have code modules attached. Listings are shown in Appendix 2.

There is no need to repeat pseudocode given in the Design section, but you could refer the reader to it.

The Customer Details form has a combo box (FindIt) displaying customer surnames so that the user can look up the record for any customer. The record source for this box is a query as follows:

```
SELECT DISTINCT [CUSTOMER DETAILS].Surname
FROM [CUSTOMER DETAILS]
WHERE ((([CUSTOMER DETAILS].Surname) Is Not Null))
ORDER BY [CUSTOMER DETAILS].Surname;
```

When a surname is selected, a macro named FindCustomer is executed to find and display the first record with the selected surname.

4. MailMergeHelp form (see user manual for screenshot)

There are no modules attached to this form.

3. Queries

Queries for reports are as listed in the Design Section. The other query named **CustomerJob Query** is used as the source for the Job Sheet, and combines all the Job sheet fields with the name and address fields for the customer so that these can be displayed on the Job Sheet.

4. Reports

These are as described in the User manual. All reports were created using wizards and then tailored to produce a more appropriate layout.

5. Mail merge letters

A sample letter named Exhibition letter was created and placed in the My Documents directory, which is the default directory for Word

documents in Windows 95. The user may choose to save new letters in a different directory.

6. Macros and general modules

All listings are shown in Appendix 2.

Module name: Misc.

(General Declarations)

Purpose: To declare two global variables used in the Customer Details form and Job Sheet forms.

(Function IsOpen)

Purpose: To check whether a form is open. The function uses the Visual Basic SysCmd function, which returns the state of a specified database object to indicate whether the object is open, a new object, or has been changed but not saved.

Module name: Maximise

Purpose: To maximise all forms on opening

7. Discussion of test results

You can print out the test data that you use directly from Access, either by creating a special report or by printing the tables. Do this regularly as you add new tests, so that you can easily see what output to expect from various queries and reports.

Two extra reports named Customer Details Test Data and Jobs Test Data were generated using wizards to give a hard copy of all test data used during testing. This greatly simplified the process of determining the expected output for many of the tests, and what data to use for new tests when new modules were added. The two reports are printed in Appendix 1.

The tests threw up several minor errors which have been corrected. The following points were noted:

- if the user enters a Job ID that already exists, he/she is not informed of the error until an attempt is made to leave the form, either to enter the Item subform, delete the record or return to the Customer form. Solution: display a message on leaving the field.
- if the user has inadvertently left 0 in the Job ID field and then attempts to return to the Customer Details form, a Job with ID 0 will be saved the first time. The second time, a 'Duplicate ID' error message will be displayed. The user will have to enter a different ID and then delete the record. Solution: As above; display a message on leaving field, ('Job ID must be entered')

- If Word is already open when the user starts the Mail Merge from Access, a second version of Word is automatically opened, which could cause 'Out of Memory' problems. Solution: Educate the user to close Word first, or perform the Mail Merge directly from Word.

The complete system occupied over 7 Mb of hard disk space. In order to transfer it to the user's machine it was zipped onto 2 floppy disks. The following problems arose on the user's PC:

- The screen was an older model, of lower resolution, which meant that some of the text on the forms did not fit on the screen. The forms were adjusted for the user's screen.
- The procedure for splitting the database into separate files for Data and Application (using Tools, Add-ins, Database Splitter) resulted in a message 'Not available' so this could not be done. This means that when a backup is done, the application as well as the data has to be backed up. It also means that it is not possible to hold on the owner's machine, a separate file of test data for use in the event of any problems arising.

Assessment

The system overview gives a clear overall picture of the methods used in the application. There has been extensive use of Visual Basic to tailor the system to the user's requirements and the listings are adequately documented to enable another programmer to make modifications if required. All the objects used in the database have been described.

Significant test results have been discussed satisfactorily.

Mark: Performance Level 4: 5 out of 6 (Very good system design. Very good, clear and comprehensive illustration and description of features of the package used including the tailoring.)

Section 5 - User Documentation

See separate section at the end of the Project documentation.

Assessment

The user manual is well presented, with screenshots to help the user, and all aspects of the program including backup are carefully explained.

Mark: Performance Level 4: 5 out of 6 (Well presented, comprehensive documentation for a substantial project at a level appropriate for the prospective user.)

Section 6 - Appraisal

Relate your appraisal to the objectives listed in the Analysis section.

Note that the AEB only allocates 5% of the total marks to the Appraisal, whereas other Boards may allocate up to 20% to this section.

The system has been completed and installed on the user's PC. It was completed in the manner originally designed and agreed with the user, and is straightforward to use.

Referring to the original objectives listed in the Analysis section:

1. It takes only a few seconds to establish whether a customer is on file with the 50 or so records on file at the moment.
2. It is easy to go from the Customer Details form to the Job Sheet using a command button, and details are automatically displayed in the Job Sheet.
3. Mrs Daniels had some problems initially with data entry, confusing Jobs and Items, as this aspect works a little differently from the manual system. However she has now entered data for over 100 customers and has no problems to report.

   Particular attention has been paid to default values, tab order, automatic capitalisation of Initials and Post Code. One problem which has come to light is that only 4 characters were allowed for

'Title', and sometimes Mrs Daniels would like to enter 'Mr and Mrs'. This can easily be adjusted.

4. All jobs for a particular customer are displayed in a subform, so it is a matter of a few seconds to double-click on a particular job to bring up the details. However, the system does not allow the user to easily look up a job from the job number (JobNo); a job can only be located by first looking up the customer, and then double-clicking the job number in the subform. It would be a good idea to add this look-up facility to the Job sheet, and it would be quite simple to add a button to do so.
5. Multi-item jobs are provided for by using a subform in the Job Sheet.
6. All reports are implemented as specified.
7. The user has found the mail merge quite complex to perform, and in retrospect it may have been a good idea to set up sample letters to match each data source query, as it would then be possible to automate this aspect of the program more fully. However some of the problems are more to do with the user's unfamiliarity with the process of changing directories in Windows 95, and remembering where letters have been stored, than with weaknesses in the customer database.
8. See 7 above. When Mrs Daniels has completed the data entry of existing customers, I plan to go over with her the steps involved in writing a new letter and performing the mail merge, using her computer.
9. The menus work as planned.

Some other minor problems have been noted in the 'Discussion of Test Results' in the Systems Maintenance section.

The next stage in computerisation could very well be to integrate this database with an Accounts system, since all orders are stored together with the order values.

You should ask the user to write you a letter realistically evaluating the strengths and weaknesses of your system from their point of view. This MUST be authentic to be of any value.

The AEB mark scheme specifies the inclusion of 'significant feedback from a real user' for full marks in this section.

Assessment

Mark: Performance Level 3: 2 out of 3. (Good appraisal relating to a substantial project, with achievements related to objectives, and analysis of improvements needed with indication of how these could be incorporated.)

Assessment of Technical Solution

(The user manual gives a good picture of how the final system works, but the assessor will need to see a demonstration to assess the implementation, and will note down any good and bad points on the assessment sheet which is sent to the moderator.)

The two data entry forms have been carefully tailored to the user's requirements, with Visual Basic code behind many of the fields to automate or validate data entry where possible. Individual customers can quickly be located using the Find Customer button and all a customer's past jobs are summarised in a subform. Details of a job can be accessed by double-clicking the appropriate job number.

The Mail Merge, which is an important part of the user's requirements (as a means of keeping in touch with customers) is only partially automated, with the user following instructions to automatically load Word and either create a new letter or use an existing one, selecting the appropriate data source and inserting the merge fields.

Testing by the class teacher revealed no errors and only one or two minor weaknesses (e.g. Item number defaults to 1 but could automatically increment to 2, 3 etc. for subsequent items for the same job.) All parts of the system were easy and convenient to use.

Mark: Performance Level 4: 10 out of 12 (Very good use of the appropriate features of the package tailored to produce a robust, fully working solution.)

Assessment of Quality of Language

In general the report is well written with no obvious mistakes of spelling or grammar.

Mark: Performance Level 1: 3 out of 3. (Clearly and logically presented. Grammar, punctuation and spelling of an acceptable standard with few and minor errors.)

This report is approximately 6000 words, excluding user manual, test data and module listings. This is the recommended limit for an AEB A Level project.

Overall grade

Overall grade for this project:	Analysis	10	out of	12
	Design	10	out of	12
	Technical solution	10	out of	12
	System Testing	5	out of	6
	System Maintenance	5	out of	6
	User Manual	5	out of	6
	Appraisal	2	out of	3
	Quality of Language	3	out of	3
Total	52 out of 60 = 87% (Grade A)			

A.B.Frames

Customer Database

User Manual

User Manual

Your user manual should contain a separate table of contents

Table of Contents

Start with an introduction so the user knows immediately what the system is all about.

Introduction

This Customer Information system is designed to help you with two main tasks:

- keep track of all customer jobs so that you can easily look up a past job if required, or find out who your best customers are
- keep track of all your customers and their major interests, such as particular artists or subjects, having tapestries framed, etc. so that you can send letters to carefully selected customers informing them of exhibitions, special offers and so on.

The system has been designed in Access 7 running under Windows 95. You will need a PC with at least 16Mb of memory, and 12Mb of free space on your hard disk to use the system effectively.

Initial Set-up

Passwords

To remove or change the current password required to enter the database, you must choose *Unset Database Password* from the *Tools > Security* menu at the top of the screen. If you then wish to add a new password, go again to the *Tools* menu and the option should now have changed to *Set Database Password*. Select this option, and then type in and verify the new password when asked. **Note: the password is case sensitive, e.g. if the password is "AB", it will not allow access if you type in "ab".**

Menu options

The Main Menu will automatically appear when you open the database.

Include screenshots of all the important screens

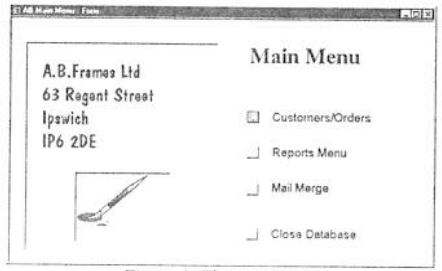


Figure 1: The main menu

Entering Customers and Jobs

Adding a Customer

To enter a new customer you select Customers/Orders from the Main Menu to open the Customer Details form. Click the *Add Customer* Button, and the *CustomerID* will automatically increment its value. You can then enter all other details.

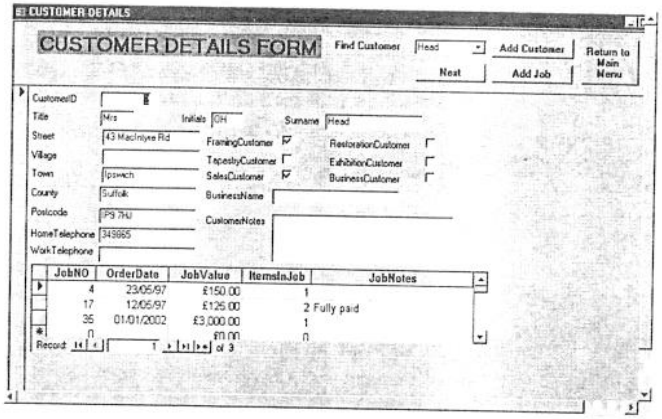


Figure 2: The Customer Details form

Notes on the Customer Details Form:

Give the user guidance on data entry where necessary

- Ipswich is the default town, and Suffolk the default County but you can of course change these entries
- If you enter Customer Initials or Postcode in lower case letters, they will automatically change to upper case on leaving the field
- If you do not specify that the customer is a business customer, when you tab out of the BusinessCustomer (Yes/No) field the BusinessName field will be skipped.

Adding a job

In order to add a job for a customer you must first have that customer's details up on the Customer Details form (this will already be the case if you have just entered the customer). You can find any customer's record by clicking the arrow in the *Find Customer* box at the top of the form, and selecting the surname of the customer you are looking for. Alternatively you can type in the surname you are looking for in the box. If the details that appear have the correct surname but it is not the correct customer, clicking the *Next* button will take you to the next customer with that surname.

When you have the correct details on screen, select the *Add Job* button. This will take you to the Job Details form, and the Customer ID, name and address should automatically appear in the top right of the form. You can then enter the *Job No* and *Order date*, followed by the rest of the Job Details.

When this is complete, return to the Customer Details form by clicking the *Return to Customer Details form* button at the top right of the form. On return to the Customer Details form you will see that the Job details you have just entered are in the box at the bottom of the form, along with all other previous jobs.

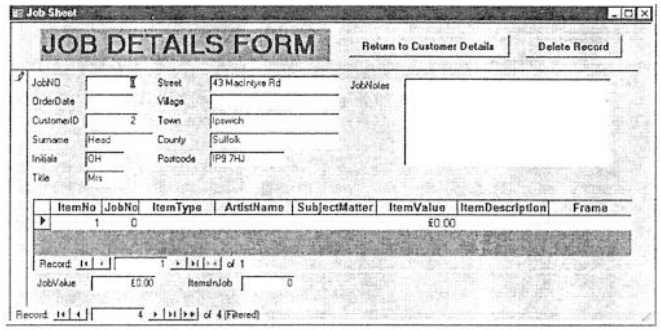


Figure 3: The Job Details form

Notes on the Job Details form

- After entering the items, when you tab into the Job Value and Items In Job fields, they will be automatically calculated and displayed.

- You should not leave JobNo as 0, even if you change your mind about entering a new job for this customer. Instead, press the Delete Record button, which will make the JobNo field blank, and it will then be safe to exit the form.

Changing Job Details

In order to change details of a job, you must have the relevant customer's details up on the Customer Details form. Find the job in the box at the bottom of the form, and double-click on the *Job No* of the job you wish to change, and this will take you to the Job Details form.

If you want to delete the job altogether, you can do this in the Customer Details form by simply highlighting the row which contains the job you wish to delete, and pressing *Delete* on the keyboard. Deleting can also be done using the *Delete* button on the Job Details Form.

Looking up Customer Details

Looking up previous jobs for a customer

Find the relevant customer using the *Find Customer* box, and the *Next* button. You can then see the summary of each job the customer has had done in the box at the bottom of the screen. In order to see the full job details, double-click on the *Job No* of the job you want to see, and this will take you to the Job Details form.

Reports

When you select **Reports Menu** from the main menu, a second menu appears:

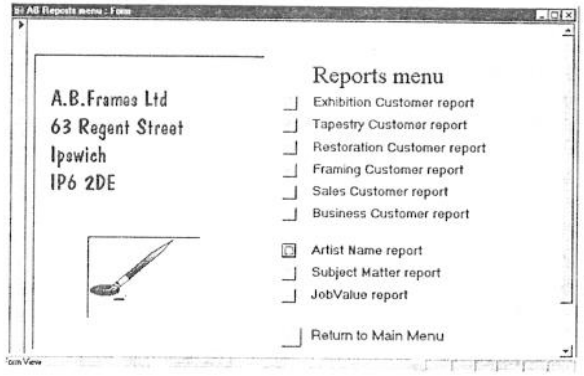


Figure 4: The Reports menu

Summary of Each Report

Report Name	What It Does	Query it is Based on
Exhibition Customer report	Produces a list of every customer who has bought something at an exhibition, or is selected on the *Customer Details Form* as being an exhibition Customer.	ExhibitionCustomer query
Tapestry Customer report	Produces a list of every customer who has had a tapestry framed, or who is selected on the *Customer Details Form* as being a Tapestry Customer	TapestryCustomer query
Restoration Customer report	Produces a list of every customer who has had something restored or who is selected on the *Customer Details Form* as being a restoration Customer	RestorationCustomer query
Framing Customer report	Produces a list of every customer who has had something framed, or who is selected on the Customer Details form as being a framing Customer	FramingCustomer query
Sales Customer report	Produces a list of every customer who has bought something, or who is selected on the Customer Details form as being a Sales Customer	SalesCustomer query

Artist Name report	Produces a list of every customer who has bought a certain artist's work, either as a normal sale or in an exhibition	ArtistName query
Business Customer report	Produces a list of every customer who is selected on the *Customer Details Form* as being a Business Customer. It will include the business Names	BusinessCustomer query
Subject Matter report	Produces a list of every customer who has bought a picture containing certain Subject Matter	SubjectMatter query
JobValue report	Produces a list of every customer who has spent more than the amount you type in	JobValue query

Viewing a report on screen

In the Reports Menu, click the report you want to view. If the report requires information, a dialogue box will appear asking you to type in a word or value. The report will then appear on screen for you to view. If the report is more than one page long, you can get to the other pages by using the navigation buttons at the bottom of the screen as shown below:

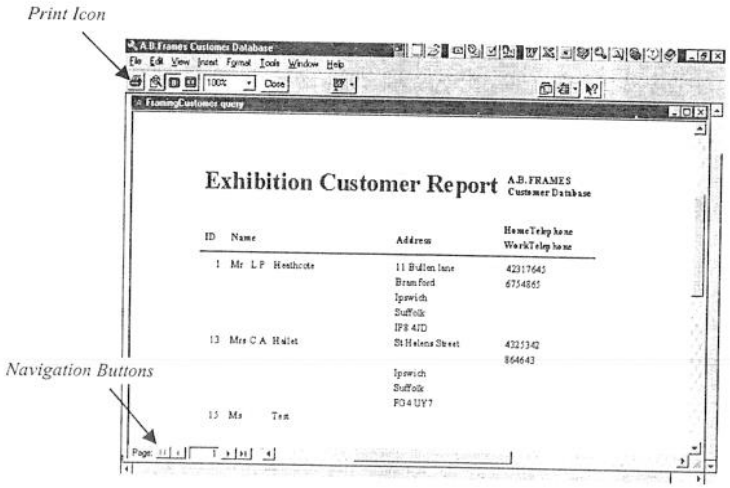


Figure 5: Viewing a report before printing it

Printing a report

To print a report you first view it on screen as above, then click the print icon at the top of the screen, shown above.

Mail Merge

For each query that you will want to use as the basis of a mail merge you will need a different merge letter, which you will create yourself as the need arises, and save in the My Documents directory using a meaningful name (e.g. **Sales letter Sep 97.doc** for a letter sent to all Sales customers in September 1997).

To perform a mail merge, you can select the Mail Merge option from the main menu to bring up further instructions, as shown below. Once you get used to the process, you can skip the menu option and open the database window directly.

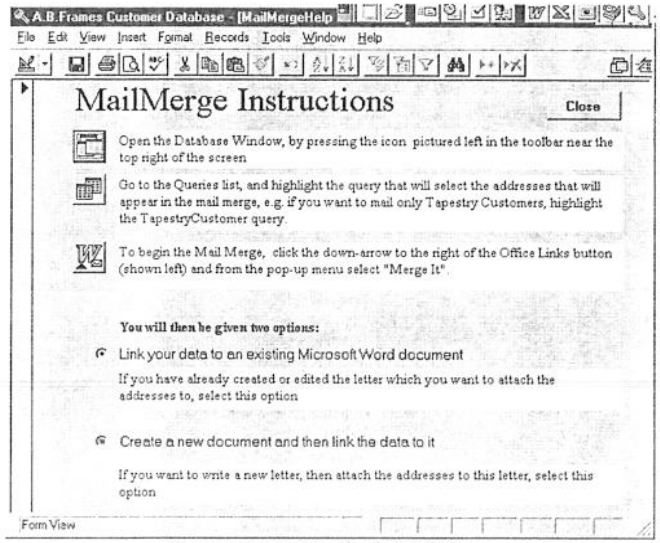


Figure 6: Instructions for the Mail Merge

The steps in the Mail Merge are as follows:

1. From the database window, click the Queries tab and click BusinessCustomer Query to select it. This will be the source of names and addresses for the mail merge.

1. Press the down arrow to the right of the OfficeLinks tool. Select Merge it from the pop-up menu.

OfficeLinks tool

2. The Microsoft Word Mail Merge Wizard dialogue box opens. If you want to create a new letter, select the second option: Create a new document and then link the data to it.

3. Word opens ready to create the standard letter. Press Enter about 6 times to leave some space at the top of the letter for a standard letterhead, inserting the date, etc.

4. Click the Insert Merge Field in the menu bar. The field list is displayed.

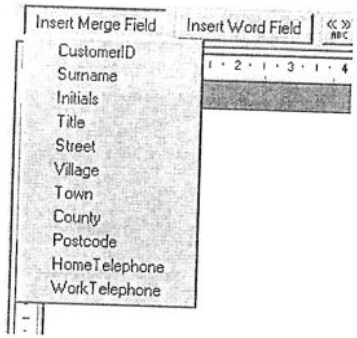


Figure 7: Inserting merge fields

6. Click Title. The field <<Title>> is placed in your letter. Place the other fields for name and address, leaving spaces and pressing Enter for each new line. The actual text of the letter will be altered by the user. Your letter should appear something like Figure 8.

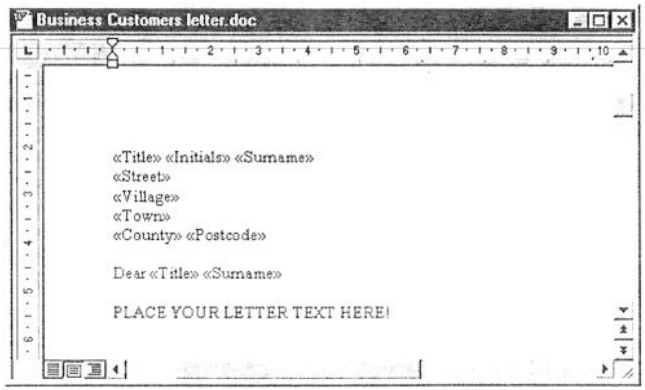


Figure 8: The mail merge letter for the selected customers

7. Select Tools, Mail Merge and click Step 3: Merge.

8. In the next dialogue box, click Merge.

9. A letter appears for each selected customer, which can be printed.

10. Close without saving - you do not need to keep the letters, which are distinct from the master letter where the merge fields were placed. Save this document as "Business Customers Letter" or some other suitable title, in a convenient directory e.g. My Documents.

If you have a merge letter for the query you wish to use, open up that letter so you have it on screen, and make any changes you wish to it, such as changing the date, and the main letter. The merge fields should not need to be changed.

1. Go to Tools, Mail Merge, then Option 3: Merge. Select Merge from the next menu.

2. Go to File, Print, Current Page to check the letters.

3. If the letter is satisfactory, print all the letters by going to File, Print, All.

4. Close the actual merge document without saving. Access will have given it a name such as Form Letters1.

Keeping a record of who was mailed

If you would like to keep a record of who you have mailed, you should print a report straight after you have done the mail merge. For example, if you have mailed all tapestry customers using a merge based on the TapestryCustomer query, then go to the reports menu and click Tapestry Customer Report, and then print the report by pressing the print icon as explained earlier. The list of customers on the report will be exactly the same customers as those who are in the mail merge.

Backing Up the System

You should include a paragraph on backup procedures

If you are backing up for the first time, have 2 formatted 1.4Mb diskettes, labelled #1, #2;

1. Close down the database
2. Insert disk #1
3. Select Start>>Programs>>MS-DOS Prompt, or double-click the MSDOS Prompt icon from the main Windows screen.
4. Type in CD \ZIP in the DOS Prompt
5. Type in BAKMF. The system may request a second disk, if so just insert disk #2.
6. Type EXIT and you will be returned to Windows.

   (BAKMF.BAT has the command line

   PKUNZIP -& A:\ABFRAME.ZIP C:\ABDB\ABFRAME.MDB)

Restoring from Backup Disks

If you lose data for any reason and need to restore the database from your backup disks, follow the following steps:

You can also include your name and telephone number as the 'Help-line number' to contact in the event of any problems arising.

1. Select Start>>Programs>>MS-DOS Prompt, or double-click the MSDOS Prompt icon from the main Windows screen.
2. Type in CD \ZIP at the DOS prompt
3. Type PKUNZIP A:\ABFRAME.ZIP C:\ABDB
4. Type EXIT and you will be returned to Windows.

   The existing file will be overwritten.

Appendix 1

Test Data

CUSTOMER DETAILS

ID	Title	Surname	Init	Street	Town	County	Postcode	Sales	Framing	Rest	Tapestry	Exhib	Bus	BusinessName
1	Mr	Heathcote	L P	11 Bullen lane	Ipswich	Suffolk	IP8 4JD	☑	☑	☑	☑	☑	☐	
2	Mrs	Head	OH	43 MacIntyre Rd	Ipswich	Suffolk	IP9 7HJ	☑	☑	☐	☐	☐	☐	
3	Ms	James	S.J	57 Orchard Close	Ipswich	Suffolk	IP15 9T	☐	☐	☑	☐	☐	☑	Solos
4	Mrs	Belles	P	7 Walnut Close	Bury	Suffolk	F432 J	☐	☑	☑	☐	☐	☑	Davries Ltd
5	Mr	Jaynes	PE	34Hervey Street	Sudbury	Suffolk	IP8 7H	☐	☑	☑	☑	☐	☐	
6	Mr	Belles	FR	78 The Street	Ipswich	Suffolk	1p4 2d	☐	☑	☐	☑	☐	☐	
7	Mr	Cladon	RB	16 Chiltern Ave	Ipswich	Suffolk	IP7 4W	☑	☐	☐	☐	☐	☐	
9	Mrs	Heathcote	PM	78 Christchurch St	Ipswich	Suffolk	IP4 2D	☑	☑	☑	☐	☐	☐	
10	Mr	Blair	T	10 Downing Street	London		54Y 5H	☑	☑	☑	☑	☐	☐	
11	Mr	Feavyour	JA	29 Hervey Street	Ipswich	Suffolk	ER3 RT	☐	☐	☐	☐	☐	☐	
12	Mrs	Smith	A S	33 Northgate Street	Ipswich	Suffolk	GH3 T	☑	☐	☐	☐	☐	☐	
13	Mrs	Hallet	C A	St Helens Street	Ipswich	Suffolk	FG4 U	☐	☐	☐	☐	☑	☐	
14	Mrs	Cooper	C S	99 Wimble Street	Ealing	London	W12 6	☐	☐	☐	☐	☐	☐	
15	Ms	Thomas	P.J	56 Rosecroft Rd	Ipswich	Suffolk		☐	☐	☐	☐	☑	☐	
16	Mr	James	ER	25 Roman Road	Colchest	Essex	CO9 7Y	☐	☐	☐	☐	☐	☐	
17	Mrs	Williams	GH	12 Burlington Rd	Ipswich	Suffolk		☐	☐	☐	☐	☑	☐	
18	Mrs	Morgan	CT	10 St Mathews Stre	Ipswich	Suffolk		☐	☐	☐	☐	☐	☐	
19	Mrs	Golding	D	13 Bullen Lane	Ipswich	Suffolk	IP8 4JD	☑	☑	☐	☐	☐	☐	
20	Miss	Johns		21 Benacre Road	Ipswich	Suffolk		☐	☑	☐	☐	☐	☐	

ID	Title	Surname	Init	Street	Town	County	Postcode	Sales	Framing	Rest	Tapestry	Exhib	Bus	BusinessName
21	Mrs	Weeden	J	Chalet, Church Rd	Ipswich	Suffolk		☐	☑	☐	☐	☐	☐	
22	Miss	Heathcote	FR	56 Withipoll Street	Ipswich	Suffolk	IP4 3S	☑	☑	☐	☐	☑	☐	
23	Mr	Zelter	Z	The White House	Orford	Suffolk		☐	☑	☐	☑	☐	☐	
24	Mr	Ferdinand	T		Ipswich	Suffolk		☐	☑	☐	☐	☐	☐	
25	Mr	Honeycut	BJ	Back Road	Porking	Suffolk	IP4 5F	☐	☑	☐	☐	☐	☐	
26	Mr	Pierce	HK	13 High St	Little Sno	Suffolk	IP7 2N	☐	☐	☐	☑	☐	☑	
27	Mrs	Donohue	K	Wisteria Rise		Suffolk	IP9 5G	☐	☐	☑	☐	☐	☑	
28	Ms	Jones	B	Hill House	Wutherin	Norfolk	NN6 8D	☐	☐	☐	☐	☑	☐	
29	Mr	Colquhoun	L		Dublin	Eire	EI9 5M	☐	☐	☐	☐	☐	☑	
30	Cmd	Chumley	S	Moby Dock		Suffolk	IP7 3K	☑	☐	☐	☐	☐	☐	
31	Mr	Honeycut	W	Tide Mill	Woodbrid	Suffolk	IP23 6	☐	☐	☐	☑	☐	☑	
32	Col	Carruthers	JP	Alamein Close	Aldershot	Hants	HA3 9H	☐	☐	☑	☐	☐	☑	

JOBS

JobNo	ItemNo	ItemType	ArtistName	SubjectMatter	ItemValue	CustomerID	OrderDate
4	1	Sales	Constable		£150.00	2	23/05/97
17	1	Framing			£50.00	2	12/05/97
17	2	Sales	James Harvey	dogs	£75.00	2	12/05/97
31	1	Restoration			£55.00	23	
33	1	Framing			£300.00	23	
34	1	Tapestry			£760.00	23	
35	1	Exhibition			£3,000.00	2	01/01/2002
36	1				£2,500.00	1	01/01/2000
43	1	Framing			£17.00	24	01/09/97
45	1	Sales			£23.00	5	
76	1	Sales			£44.00	7	02/03/97
76	2	sales			£3.00	7	02/03/97
123	1	sales			£73.00	5	02/02/97
299	1	Restoration			£55.00	4	03/09/97
299	2				£60.00	4	03/09/97

JobNo	ItemNo	ItemType	ArtistName	SubjectMatter	ItemValue	CustomerID	OrderDate
599	1	framing			£23.00	1	03/06/97
599	2	sales			£7.00	1	03/06/97
677	1	Sales			£11.00	1	01/01/97
777	1	framing			£33.00	1	02/03/2000
777	2	sales	Andrew Foster	flowers	£0.00	1	02/03/2000
777	3	sales	Mondrian	cubes	£0.00	1	02/03/2000
778	1	Sales	Andrew Foster	dogs	£50.00	22	03/05/97
778	2	Framing		cats	£20.00	22	03/05/97
911	1	Sales	James Harvey	dogs	£50.00	12	09/07/97
3337	1	Sales		flowers	£35.00	10	03/09/97
3337	2	Framing			£25.00	10	03/09/97
3337	3	Restoration			£5.00	10	03/09/97
3337	4	Sales			£5.00	10	03/09/97
3337	5	Restoration			£10.00	10	03/09/97
5098	1	Framing			£20.10	21	01/09/95
5099	1	Framing			£48.00	20	05/09/95
5656	1	Sales	Andrew Foster	dogs	£60.00	19	05/07/97
5656	2	Framing			£40.00	19	05/07/97

Appendix 2

Module Listings

MODULE LISTINGS

1. Global Module

Name: **MISC**

Purpose: **To declare global variables**

To define global function IsOpen

Annotate your listings by hand. Make clear which modules YOU wrote, and which code was created automatically by wizards.

```
Option Compare Database
        Public DisplayJob As Boolean
        Public JobNum As Long
Option Explicit

Public Function IsOpen(ByVal StrFormName As String) As Boolean
' Returns true if the specified form is open in form view

Const conDesignView = 0
Const conObjStateClosed = 0
IsOpen = False
If SysCmd(acSysCmdGetObjectState, acForm, StrFormName) <>
conObjStateClosed Then
   If Forms(StrFormName).CurrentView <> conDesignView Then
      IsOpen = True
   End If
End If

End Function
```

Used in Job Sheet and Item Subform

SysCmd is a built-in Visual Basic function

2. Customer Details form (see User Manual for screenshot)

All buttons and many fields have code modules attached. Listings are shown below.

```
Option Compare Database
Option Explicit

Private Sub BusinessCustomer_Exit(Cancel As Integer)
 'Skip the Business Name control if not a business customer
   If BusinessCustomer = True Then
      BusinessName.SetFocus
   Else
      CustomerNotes.SetFocus
   End If
End Sub
```

```
Private Sub FindNext_Click()
'This module runs when the Find Next button is presssed.
'It finds the next customer with the same surname as the current record.
'If there are no more matching customers, the button caption changes to 'No More'

   Dim CR As String

   CR = CustomerID
   Surname.SetFocus
   DoCmd.FindRecord (Surname), , , , , False
   FindNext.SetFocus

   If CustomerID = CR Then
      FindNext.Caption = "No more"
   End If
End Sub


Private Sub FindNext_LostFocus()
   FindNext.Caption = "Next"
End Sub

Private Sub Form_Current()
'This ensures that the surname in the combo box matches the current record
   FindIt = Surname
End Sub


Sub AddCustomer_Click()
'This module runs when the Add Customer button is clicked

Dim CustID As Long                          'variable type Long Integer
On Error GoTo Err_AddCustomer_Click         'built-in error routine

   DoCmd.GoToRecord , , acLast
   CustID = CustomerID                      'save the value of CustomerID
   If CustID = 0 Then                       'allow for the very first record
      CustomerID = 1
   Else
      DoCmd.GoToRecord , , acNext           'go to a new record
      CustomerID = CustID + 1               'increment the Customer ID
   End If
   Title.SetFocus                           'move cursor to Title control

Exit_AddCustomer_Click:
   Exit Sub

Err_AddCustomer_Click:
   MsgBox Err.Description
   Resume Exit_AddCustomer_Click

End Sub
```

Must set the last parameter to False otherwise it gets stuck on current record

This module automatically assigns the next number to a new Customer


```
Private Sub Initials_Exit(Cancel As Integer)
 'Change Initials to uppercase
   Initials = UCase(Initials)
End Sub


Private Sub Postcode_Exit(Cancel As Integer)
   'Change Post Code to Uppercase
   Postcode = UCase(Postcode)
End Sub


Sub AddJob_Click()
On Error GoTo Err_AddJob_Click
'Clicking the Add Job button causes this module to be run

   Dim stDocName As String
   Dim stLinkCriteria As String

   'The form must be refreshed before opening the Job sheet
   'in order to save the customer record

   Me.Refresh

   If IsNull(Me![Surname]) Then
      MsgBox "Enter customer information before entering job"
   Else
      'DisplayJob is a global variable defined in Misc
      'and tested in Job Sheet On Open to determine what
      'event opened the Job Sheet, pressing the Add Job button
      'or double-clicking a Job ID in the subform.

      DisplayJob = False
      stDocName = "Job Sheet"

      stLinkCriteria = "[CustomerID]=" & Me![CustomerID]
      DoCmd.OpenForm stDocName, , , stLinkCriteria
   End If

Exit_AddJob_Click:
   Exit Sub

Err_AddJob_Click:
   MsgBox Err.Description
   Resume Exit_AddJob_Click

End Sub
```

This code is created automatically by the wizard when you place a command button to open a form

```
Sub Menu_Click()
'This runs when the Return to Main Menu button is clicked
On Error GoTo Err_Menu_Click

   Dim stDocName As String
   Dim stLinkCriteria As String

   stDocName = "AB Main Menu"
   DoCmd.OpenForm stDocName, , , stLinkCriteria

Exit_Menu_Click:
   Exit Sub

Err_Menu_Click:
   MsgBox Err.Description
   Resume Exit_Menu_Click

End Sub
```

command button code created automatically by wizard

3. Jobs (Subform)

This subform of the customer form displays a summary of all the previous jobs for the current customer. Details of any job can be obtained by double-clicking a Job ID.

The Double-click event module is shown below.

```
Private Sub JobNO_DblClick(Cancel As Integer)
'DisplayJob and JobNum are public variables declared in the module Misc.
'DisplayJob is  is set to TRUE here
'to indicate that the user has double-clicked JobNo.
'It will be tested in the Open event of the Job Sheet form.
'JobNum will also be used in the Open event of the Job Sheet form.
'to enable the correct Job Sheet to be found and displayed.

   DisplayJob = True
   JobNum = JobNo
   DoCmd.OpenForm "Job Sheet"
End Sub
```

Current job number saved in JobNum

4. Job Sheet (see user manual for screenshot)

The Job sheet is opened directly from the Customer Details form. Modules attached to various events are shown below:

```
Private Sub Form_AfterUpdate()
   If IsOpen("Customer Details Form") Then
   'Requery the subform in the Customer Details form to show new job
   '    Forms![Customer Details Form].Requery

   'Note: Testing showed that this code was not necessary and caused
   'the customer form to open at the first record instead of the current record.

   Else
      MsgBox "Customer Form not open"
   End If
End Sub
```

Function IsOpen is defined in global module MISC

```
Private Sub Form_Open(Cancel As Integer)
   If IsOpen("Customer Details form") Then
'DisplayJob is set to TRUE in the Job (Subform) of the Customer Details form
'when a user double-clicks JobNo.
'DisplayJob is set to FALSE if the user clicks the AddJob button.
    If DisplayJob = False Then
      DoCmd.GoToRecord , , acLast
      If Not IsNull(Me![JobNo]) Then
         DoCmd.GoToRecord , , acNext
      End If
      Forms![Job Sheet]![CustomerID] = Forms![Customer Details
form]![CustomerID]

    Else
      'user wants to display a job whose number was stored in JobNum
      'in the Double-click event code in Jobs (Subform)
      'so look for that job and display it

      JobNo.SetFocus
      DoCmd.FindRecord jobNum
    End If
   Else
      MsgBox "The Customer Details form must be open before you can enter a job"
      DoCmd.Close acForm, "Job Sheet"
   End If
End Sub
```

```
Private Sub ItemsInJob_Enter()
   Forms![Job Sheet]![ItemsInJob] = DCount("[ItemNo]", "ITEM",
"[JobNo]=Forms![Job Sheet].[JobNo]")
End Sub

Private Sub JobValue_Enter()
Forms![Job Sheet]![JobValue] = DSum("[ItemValue]", "ITEM",
"[JobNo]=Forms![Job Sheet].[JobNo]")
End Sub


Sub ReturnToCustomer_Click()
On Error GoTo Err_ReturnToCustomer_Click

'refresh the Customer Details form so that it displays
'the changes made in this form
   Forms![Customer Details form].Refresh

   DoCmd.Close
Exit_ReturnToCustomer_Click:
   Exit Sub

Err_ReturnToCustomer_Click:
   MsgBox Err.Description
   Resume Exit_ReturnToCustomer_Click

End Sub
Sub delete_Click()
On Error GoTo Err_delete_Click

   DoCmd.DoMenuItem acFormBar, acEditMenu, 8, , acMenuVer70
   DoCmd.DoMenuItem acFormBar, acEditMenu, 6, , acMenuVer70

Exit_delete_Click:
   Exit Sub

Err_delete_Click:
   MsgBox Err.Description
   Resume Exit_delete_Click

End Sub
```

These lines were added to the code generated automatically by the command button wizard

5. Items (subform)

This subform allows the user to enter several items on one job sheet. Code for the Item Type exit event module is shown below.

```
Private Sub ItemType_Exit(Cancel As Integer)

'Sets the relevant field in the CUSTOMER table according to ItemType

   If IsOpen("Customer Details form") Then
      Select Case Me![ItemType]
         Case "Exhibition"
            Forms![Customer Details form]![ExhibitionCustomer] = True
         Case "Framing"
            Forms![Customer Details form]![FramingCustomer] = True
         Case "Restoration"
            Forms![Customer Details form]![RestorationCustomer] = True
         Case "Sales"
            Forms![Customer Details form]![SalesCustomer] = True
         Case "Tapestry"
            Forms![Customer Details form]![TapestryCustomer] = True
      End Select
   Else
      MsgBox "The Customer form must be open "
   End If
End Sub
```