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**ACCOUNTING INFORMATION  
ANALYSIS AND DESIGN  
IN A SMALL BUSINESS  
ENVIRONMENT.**

**By Clive Mathews**

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## 1.0 INTRODUCTION

The computerisation of small businesses has been a topical issue as the cost of hardware and software has declined. Many small business operators are reluctant to computerise their accounting and information systems because of the perceived complexity of the transfer. The object of this project is to document the problems that occur when a small business converts from a manual to a computerised system, and the advantages to be gained by computerisation.

The research project will analyse the manual accounting and information system of a small business with the intention of designing a computerised accounting system. In the process the two systems will be evaluated as a mode for comparing practical advantages and disadvantages. The penetration of microcomputers into the small business environment has been rapid in the last few years. In response to this growth many software vendors are producing packages to accommodate the growth in this sector.

Firms in the manufacturing sector have been taking advantage of general bookkeeping systems, including Accounts Receivable, Accounts Payable, etc. The major advantage of a computerised system is their ability to save time. A more timely system can lead to improved effectiveness. Information for higher level decisions can also be obtained with less effort. Other benefits of computerised systems include their ability to ensure that all facets of the operation have been considered; the use of the information base for further decision making; and as a control function to ensure that all tasks are completed in a correct and timely manner. These characteristics can lead to enormous benefits for the Small Business Operator.

## 2.0 RESEARCH METHODOLOGY

The small business to be evaluated is a local travel agency. The current accounting and information system is entirely manual. The following research methodology has been developed:

5 Stages:

1. Review the current manual system operation from a procedural viewpoint.
2. Analyse the existing manual system and evaluate its strengths and weaknesses.
3. Design and program a computerised information system that would satisfy the evaluated needs of the company.
4. Document design problems encountered and compare and contrast these in terms of current literature developed from an operational and behavioural viewpoint.
5. Summarise the results.

### 3.0 COMPANY BACKGROUND

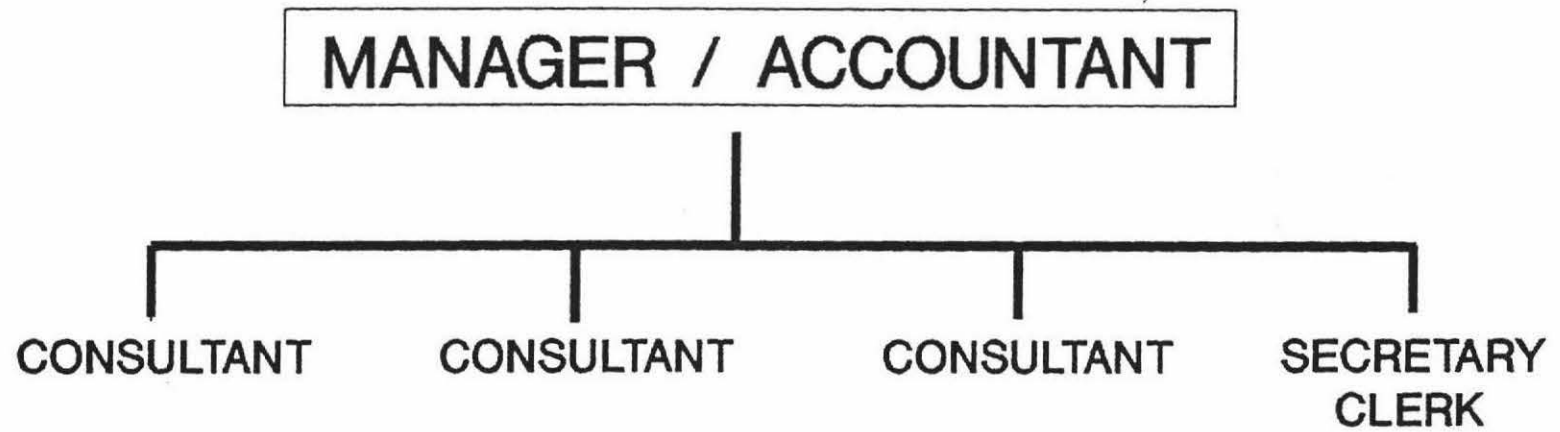
The company under examination is an existing Palmerston North company and for the purposes of this exercise will be referred to as 'XYZ Travel Ltd'.

XYZ Travel is an established travel agency based in Palmerston North. The company has been operating successfully for several years in the city, and its organisational structure is currently under review by management. Palmerston North has an expanding population base of approximately 75,000 people. It also has a transient population of approximately 6,000 university students (and staff). Palmerston North also has several large government institutions such as the Department of Scientific and Industrial Research (DSIR), Dairy Research Institute (DRI) and Ministry of Agriculture and Fisheries (MAF) and the educational institutions of Massey University and the Pacific College.

The travel agency has a staff of 5, consisting of three travel consultants, a secretary/clerk, and the manager who also acts as the company accountant.

Exhibit 1 is an organisational chart illustrating the flat structure of the agency. There is a certain amount of job rotation within the agency and this allows peak times to be handled with no additional staff. The company does not see any potential threats at this stage, although rising air travel prices had led to a marginal decline in sales. The agency is currently looking at diversification into other related areas which management were not prepared to discuss. A re-evaluation of their current operational methods is currently being conducted by the manager. One area identified is the manual accounting and booking systems which occupy a relatively significant part of the staff's time.

# ORGANISATIONAL CHART OF XYZ TRAVEL LTD



The Manager

The Manager is in his late forties. He has many years of experience in the travel industry and was formally a travel consultant for one of the local competing firms.

He has limited accounting experience and often spends what he considers to be an undue amount of time on the accounting functions due to this.

His computer knowledge is almost non existent and it would appear that he has resisted change in the past but has now realised that to be competitive, and survive, in the current economic climate that changes in this area are required. He feels that computers may be able to increase the efficiency of his operation by performing time consuming tasks.

He predicts a 50% growth rate over the next decade and is currently concerned that the existing accounting and booking system is not capable of servicing that growth. He is apprehensive about the introduction of computer technology as he believes that flexibility is the key in servicing travel needs and is unsure whether the same flexibility can be attained with modern technology.

At present he feels that there are several weak areas within the system:

- 1) due to his own limited accounting abilities management information is often not timely
- 2) there is too much paperwork and manual handling of routine functions by himself and the consultants
- 3) there is a high risk of delayed or unrecorded transactions

The Manager has looked at various software programs for the agency but has been unable to find one that suits his agency's individual requirements. He has mentioned that most of the software distributors are unwilling to make the significant changes needed without substantial additional payments.

#### Competition

There are presently 18 travel agents operating within Palmerston North, competing for essentially two distinct markets.

The first is the traditional vacation orientation market. The second which is much larger and less subject to economic fluctuation is the traveller connected with either the educational institutions or the government organisations.

Exhibit 2 is a complete list of travel agents operating in Palmerston North. There are few small independent travel agencies operating within the city, the majority are nationwide travel operators. The independent agencies must be affiliated to other travel operators in some way in order to gain discount fares. A series of phone calls to several agencies revealed that they are all offering the same airfares, meaning that competition may be based on non-price variables.

Exhibit 2

List of Travel Agents operating in Palmerston North as at 30-6-89

Holiday Shoppe  
Ian Flyger Travel Agent  
House of Travel  
Investment Travel  
AA Travel  
B & A Travel  
Qantas Airways Ltd  
Bonaventure Management Consultants Ltd  
Stars Travel International  
Australian Travel Bureau  
Focus Travel  
Premier Travel  
Thomas Cook Travel  
Air New Zealand  
Budget Travel  
Jetset  
Stephen Parsons House of Travel  
United Travel (Massey University)

Total Number of Agents = 18.

Revenue

Income is derived from commission on services sold. The commission levels vary from 5% to 9% for Domestic and International travel respectively. Individual travel agents can deal directly with the airlines, leading to 'override' commission on bulk travel sales. An override commission is an additional payment earned above the normal commission rate earned. Override commissions vary from 1% to 12% with the norm being 2% to 3%.

Travel agencies operate on relatively low commission rates in comparison with the high fixed costs of the industry. This means that it is important that agencies try to maximise efficiency and effectiveness of their operations. A high volume of sales is the most desirable outcome. Income from additional services such as insurance or theatre reservations can often mean the difference between a profit and a loss.

The essential need to manage effectively means that the information flow needs to be timely and error free.

#### 4.0 ANALYSIS OF EXISTING SYSTEM

XYZ Travel Ltd currently offers the following services:

##### A. Airline Reservations

- i) International
- ii) Domestic

##### B. Surface Travel

- i) Tourist
  - a) Tours
  - b) Day Trips
  - c) Other Ticket Reservations e.g Safari Parks
- ii) Point to Point travel via public transport, e.g trains, busses, ferry, etc.
- iii) Rental Services e.g. cars, boats, motorhomes etc

##### C. Entertainment Shows

- i) Concert Tickets
- ii) Meal Reservations

##### D. Airport Transfers

- i) Arranging for travellers to be picked up at airports and transferred to hotels, or other airports.

##### E. Accommodation Booking

##### F. Travel Insurance

G. Other - The agency will attempt to meet any specific needs required by the traveller.

### General Information Flow in the Existing System

The major flow of information begins when a customer discusses some type of travel plan with one of the consultants.

The client and the travel consultant develop a travel package, it may be simple or complex.

### National Reservation System

The consultants use the **Multi-Access Airlines Reservation System (Maars)**. This is a computer booking service that displays flight departure and arrival times, and allows the consultants to pre-book potential customers onto specified flights.

Maars is used by 94% of the travel agencies and allows access to 20 international airlines and 2 international hotel chains.

The Maars reservation system also allows the following services to be booked: Air Taxis; Car Rental; Scenic Flights; Hotel Accommodation; Surface Travel (Bus, Train, etc); and organised tours of selected companies.

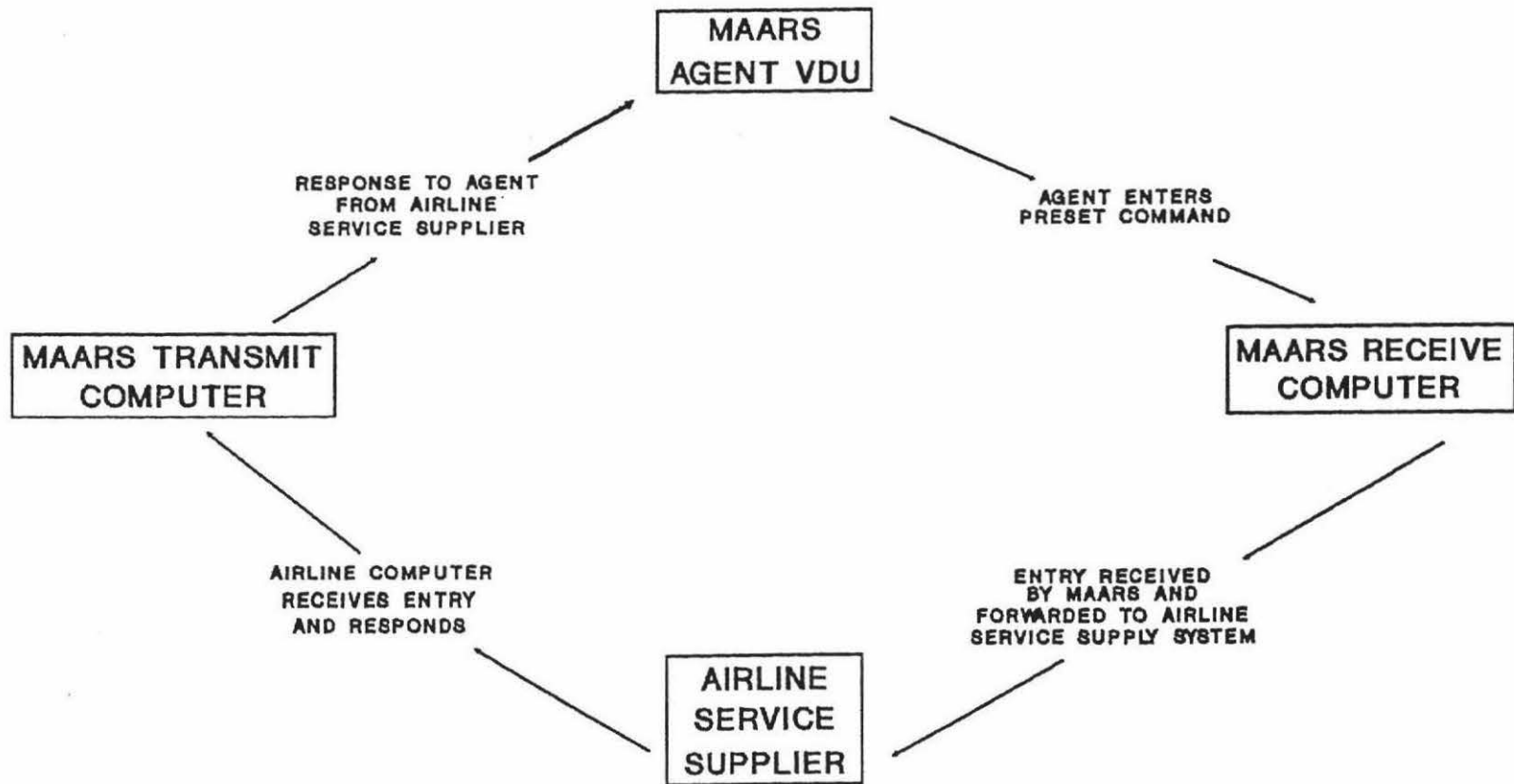
Exhibit 3 displays the procedure undertaken by Maars once a booking request has been made to an agency.

If clients wish to make additional travel arrangements such as theatre tickets the agency utilises outside companies who specialise in these forms of reservations.

Any travel operation that is not connected to Maars must be booked externally.

EXHIBIT 3

# Maars Reservation System



The serious deficiency of the Maars system is that data cannot be downloaded for accounting or information purposes. This means that the agency's accounts, sales and bookings must be recorded manually.

#### Internal Information Flow

After the consultant has made a preliminary reservation via Maars for the client. They complete a account card which passes to the secretary/clerk.

External reservations which are not booked via Maars require the consultant to complete an internal processing form which is sent along with any Maars reservation details, to the secretary who compiles the tickets.

#### Account Card

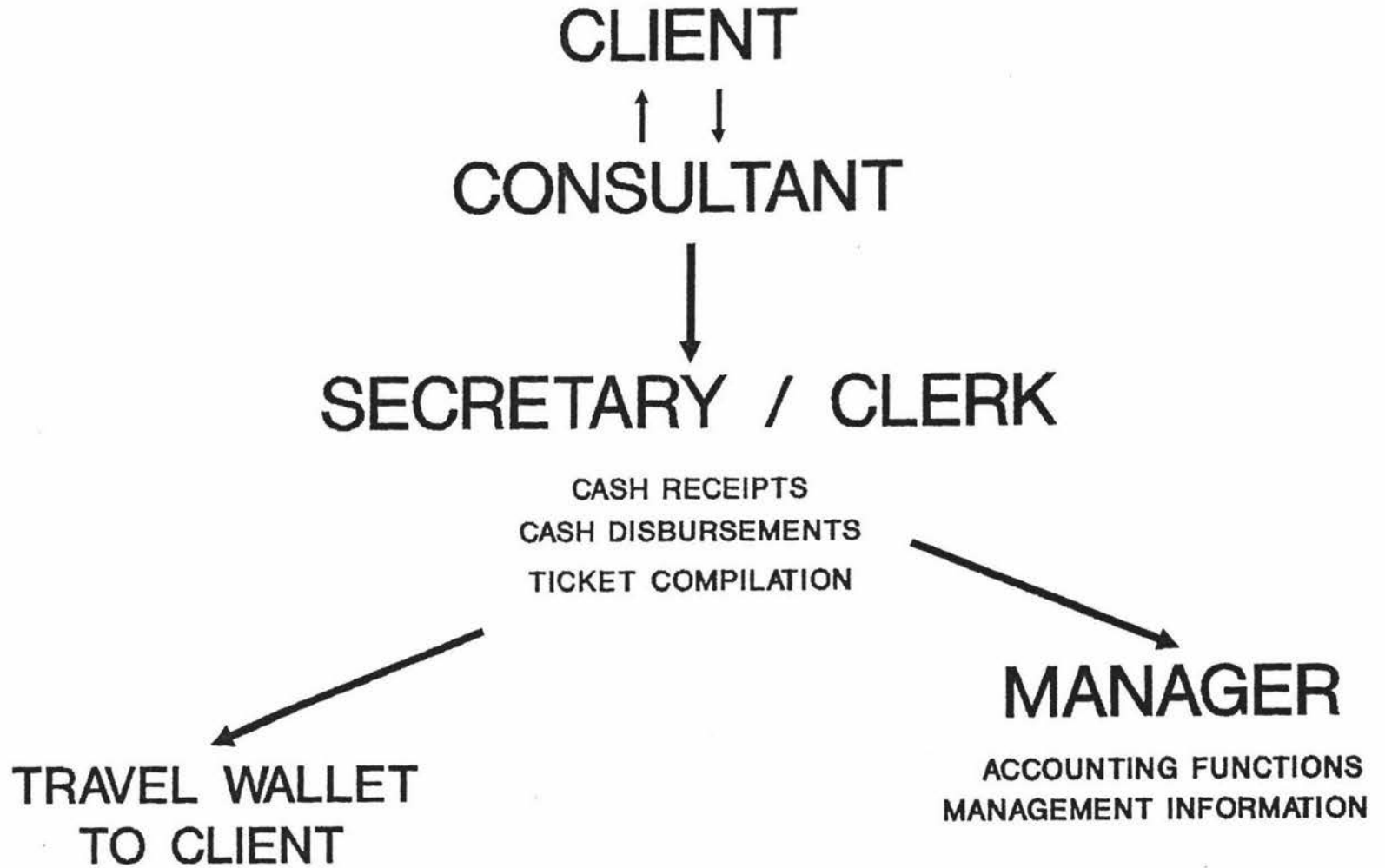
The account card is allocated the next consecutive six-digit number. This becomes the client account number and a ledger account is later started for this number.

The Account Card also includes the following details:

Full name and address, travel particulars, departure and return dates, the consultant name.

This completes the consultant handling of the client booking, and from this point the information flow divides with the secretary responsible for ticket compilation and the manager responsible for the recording of accounting information. (See Exhibit 4).

EXHIBIT 4



Secretary/Clerk

The secretary uses a personal computer with a common word processing package. There is also a spreadsheet package on the machine but this is seldom used.

The secretary is responsible for the compilation of tickets and vouchers, and general office duties. These duties include completing customer receipts, and recording amounts paid, and updating the cash disbursements book which monitors the day to day spending of the agency.

The secretary also does the banking for the agency.

There is a serious breakdown of internal control at this point because the secretary receives, records and banks the monies. The manager does not appear to be acting as a compensating control in any way. Greater separation of duties is required.

Cash Receipts Book

The receipts book records the customer account card number, date, amount paid, GST if applicable (there is no GST on international travel).

At this point if there appear to be any problems the booking is referred back to the consultant.

Cash Payments Book

The cash disbursements book records the outflows of money during each days trading.

## I. Payments

- a) The previous day's payments are recorded from the chequebook
- b) The payments are allocated a code from the chart of accounts
- c) The following information is recorded:  
Cheque number, Payee, Amount, GST.
- d) The column is totalled at the end of each day.

## II. Cash Receipts

- a) The money received is recorded from the cash receipts book, and the receipt number is added to the clients file.
- b) The column is totalled at the end of each day.

At 2:45 on each day the secretary does the banking.

The accounting records are then passed to the Manager who completes the accounting function.

### Accounting

The accounting functions are performed by the manager. He uses a series of ledger account books based on the Kalamazoo principle.

All the postings are done by hand. This is a slow and laborious task that occupies a considerable amount of the manager's time.

At the end of each month the manager prepares customer statements. The manager is also responsible for preparing two month GST returns on an accrual accounting basis.

### Compilation of Tickets

This function is performed by the secretary with assistance from the consultants on a rotational basis. As the agency grows this may become a full-time position.

When a booking is confirmed the details are relayed from the airline via a printer connected to the Maars system. The Maars output combined with the internal processing form are given to the secretary, and the tickets are subsequently compiled.

Other external bookings such as theatre tickets are also confirmed at this time.

Most tickets are bought through wholesalers whose trading volume enables the agency access to lower priced tickets. The agency will occasionally make up its own tickets, this requires access to airline plates. These can only be obtained when the agency has met a pre-determined sales target as determined by IATA (International Air Transport Association). This target is approximately \$350,000 of air transport sales per annum. This agency does qualify.

When the agency does make up its own tickets the ticket number is entered into the Maars system to indicate to the airline that the ticket has been issued.

If the agency does not have plates to issue tickets then the **nett** amount (gross amount - commission) must be paid to the issuing wholesaler before the ticket will be issued.

For most show bookings the ticket compiler deals with a wholesaler and makes reservations for the client.

When all of the clients travel arrangements have been confirmed the secretary prepares a travel wallet containing the tickets and other information required by the traveller.

Weaknesses of the Current System

The main weakness of the current system is the efficiency of its operation and its inability to cope with expansion.

More specifically:

- a) There is too much double handling and processing of information. The information process begins with the consultant and then moves via the secretary to manager for accounts processing.
- b) There is lack of internal control with the secretary being responsible for the receipting, posting and banking of cash.
- c) The current system, with its abundance of manual operations, is incapable of handling additional turnover without increased resources. These resources are unavailable in the current economic climate and an improvement in efficiency is being sought.
- d) There is a lack of management information. The manager's processing of the accounting information is often too slow meaning that any information subsequently gained is untimely and therefore of little use.

## 5.0 COMPUTER VERSUS MANUAL SYSTEM

The purpose of this review is to identify the benefits of small business computerisation, and to highlight some of the implementation problems that need to be considered with a computerised system. This review is not intended to be exhaustive, its purpose is to supplement the information given in the following section on the proposed system.

Taylor and Meinhardt (1985) believe that through the use of micro or mini computers a small business can develop a better and faster information system for decision making purposes. They identify that one special problem for small businesses is to define their computer information needs.

Malone (1985) believes that there is no doubt that recent advances in hardware along with declining prices can have beneficial effects for a small firm. He states ' It would appear that a carefully chosen and implemented computerised information system can provide significant benefits to small firm users' (p.16).

Farhoomand and Hrycyk (1985) examined the feasibility of computers in small business environments. They believed that implementation problems were a key issue. These issues were broken into three sections:

1. Technical Assistance. Poor documentation and technical support were cited as the most serious problems.
2. Conversion Problems. This encompassed the difficulties that were experienced during the transition from a manual to an automated system.

3. Personnel Problems. Users also indicated difficulties in training personnel. There was a general resistance from the employees in accepting the computer system.

In conclusion they state '....the majority of them (the users) saw the major benefits of computers in better and faster information access and improved customer services' (p.22). They also considered that software was an overriding consideration during all stages of computer implementation.

#### Software Design Considerations

Computer users have three available alternatives when acquiring their application software:

- 1) Purchase a prewritten software package
- 2) Develop software in-house
- 3) Have software developed by external consultants.

Each of these methods have advantages and disadvantages depending upon the individual situation.

Cheney (1983) states that 'Since the early 1970's there has been a tremendous growth in the use of mini-computers and micro-computers by small business' (p.50).

His study was concerned with four main areas:

- 1) Hardware and Software considerations
- 2) Support considerations
- 3) Success considerations
- 4) Implementation problems

Cheney identified three major implementation problems with software design:

- 1) Inflexible software packages
- 2) Problems with programming consultants
- 3) Program errors

#### Hardware Considerations

Those identified by Cheney were:

- 1) Inadequate maintenance
- 2) Data communication problems
- 3) Slow response time or turn around
- 4) Insufficient disk storage

#### Implementation Process

He identified the major problem in implementation to be user resistance, and also believes that the remedy is user involvement. Cheney divides resistance into three forms:

- 1) Avoidance
- 2) Projection
- 3) Aggression

He states 'Unfortunately, implementation problems often prevent companies from realising the benefits from their new computer systems' (p.58).

He suggests a strategy for avoiding these resistance problems. This involves several stages.

Stage 1 - Evaluate the past history of your organisation in terms of its operating success. The degree to which a new information system is accepted is in part determined by the problems the organisation has had in the past.

Stage 2 - Information System's staff should consider the users' expectations with regard to the new computer and their attitudes towards change and computer technology in general.

'Some users may feel that computers in general are dehumanising. They may feel that their status is somehow diminished because some of their duties are now being performed by the computer system' (p.59).

The systems professional must realise that users are not homogeneous; their goals, attitudes and expectations vary.

Stage 3 - Organisation's management must recognise that the implementation of a computer system is a change that requires substantial planning and the use of good communication skills to distribute relevant information.

Dologite (1981) notes that small and reliable computer systems are now within the budgets of most small businesses. She states '...a small computer can effortlessly provide timely information on which to make informed management decisions' (p.36).

A small computer can help management to manage more effectively by automating time consuming and often error prone manual routines. Management information can now be produced on demand at a terminal. Most small business computers are also designed to grow as the business grows, and additional or revised programs can be installed.

She notes that not all computer installations are successful. She believes that the problems can usually be traced to poor requirements planning or inadequate computer and program evaluation. Proper specification planning is an important pre-requisite to avoid the mis-match of user and small computer systems. Poor evaluation of the prospective program and associated hardware can also lead to bad experiences.

Programs that are developed from scratch require a lot of time and expertise to plan, program and test for accuracy.

She believes that '...if requirements planning and computer and program evaluation are objectively carried out, potential problems can be avoided' (p.46).

In conclusion she notes that many small businesses are already benefiting from the effective use of small computers. Computers can enable companies to handle great increases in business without a corresponding rise in expenses. The business manager obtains timely information on which to make informed decisions.

## 6.0 OBJECTIVES OF SYSTEM

The proposed system is a tailor made totally integrated package that will allow increased operational efficiency, and increased management information. The system will also eliminate the majority of the weaknesses identified in the manual system.

The computerised system should contain:

- a) a sales system for all forms of travel and accommodation. This booking system will produce the customer tax invoice and internal documentation, as well as calculate commission and gst and post the relevant amounts to the general ledger.

Credit notes and sales reversals are also available.

- b) An Accounts Receivable ledger.

Corporate clients, or those with accounts, can charge their travel to an account when booking and this will be done automatically. The balance will be posted to the receivables account. Monthly statements can be printed and on-line customer information is available. A credit limit facility has also been included in the program.

- c) An Accounts Payable Ledger.

When a sale is made, recharge amounts are calculated automatically, and are posted to the appropriate payables subsidiary ledger. This will assist in the monthly reconciliation of the payables account.

- d) A General Ledger.

The General Ledger will prepare accounts to the trial balance stage, the information can then be used to prepare the Balance Sheet and Income Statement. The printouts can be generated on a month to date or year to date basis.

e) Manual Journal Entry Facility.

The program will allow journal entries to be made for non sale items. The program will not accept journal entries that do not balance. This is to ensure that the General Ledger is kept in a state of constant balance.

f) GST Recording.

The program records the gst received and the gst Payable. This facilitates the preparation of gst returns. The program has been designed to allow for the inclusion of zero rated items, such as overseas travel and packages.

g) Management Information.

The program has been designed to provide maximum management information of both an accounting and non-accounting nature. The program will produce numerous printouts from inactive account listings to net monthly cash positions.

h) Security.

One of the major features of this program is the security of information. Each individual section of the program is has separate password access. If unauthorised access is attempted (by using an incorrect password) a beeper sounds and the screen displays a flashing message. A time clock is also being considered to restrict access to within certain usual business hours to eliminate any after hours interference with data.

Program modification is impossible (unless by the programmer) as the programs have been compiled into an executable file. The users do not have the source code. Data can only been modified by accessing files through the operating system which can be prevented.

i) Backup.

The program automatically posts and conducts a backup of the data every two hours, or when the system is shutdown. The data is backed up to a floppy disk. This means that the maximum data loss due to unforeseen circumstances is two hours.

j) Flexibility.

The program can be easily modified by the programmers to accommodate changes in the business needs, or to suit another client.

k) Help Function.

The program contains an on-line help function that can be accessed at any stage in the program by pressing the F1 key. The help will display information relating to the current operation.

The proposed system has been designed with two principle aims:

- 1) to reduce the double handling/input of data, and reduce document flows; and
- 2) to provide a complete management and accounting information system.

7.0 BASIC PROGRAMS AND PROCEDURES

The program was written with one core program Travel and many different levels of subroutines all being accessed and operated from the core program

In order to facilitate understanding a brief description of the purpose of each program will be given.

<u>File (Program Name)</u>	<u>Purpose</u>
ACCADD	to add a category to the chart of accounts
ACCDEL	to delete a category from the chart of accounts
ACCMOD	to modify a category in the chart of accounts
AGE	to age the debtors accounts
ALARM	incorrect password routine - security
CACOMP	dormant program shell - currently not used
CACUADD	to add a customer account
CACADEL	to delete a customer account
CACASCRI	screen for add/modify customer account
CACUVIEW	routine to view customer account details
CASHREP	program to produce cash report
CASTMT1	prints one statement
CASTMTHD	prints monthly statement header
CHARGE	routine for charge type sales
CHARGE2	routine for charge type reversals
CONFIRM	routine to display transaction for sale confirmation
CONFIRM2	routine to display transaction for reversal confirmation
CUSTOMENU	program for customer menu
CUSTSOUT	screen for displaying customer details
GSTREP	to produce GST report
HDG	procedure to display current heading

HELP (X, 1-10)	all these files relate to the on-line help function
ICON	file created but not currently being used
MAARS	program to display Maars Access message
MANBOOK	manual bookings menu
MENU (2,3)	displays outlines and instructions for menus
PASSWORD	program for testing for passwords - security
PRINTER	program for communicating output to printer
PUDAYSADD	program to add/mod public transport days
PUDAYSSEL	part of procedure to sell public transport
PUDESTADD	procedure to add/mod public transport destinations
PUDESTSEL	part of procedure to sell public transport
PUORIGADD	procedure to add/mod public transport origins
PUORIGSEL	part of procedure to sell public transport
PUPRICEADD	procedure to add/mod public transport prices
PUPRICESSEL	part of procedure to sell public transport
PUTIMESADD	procedure to add/mod public transport times
PUTIMESSEL	part of procedure to sell public transport
PYMTTYPE	program relating to method of payment
RECRETUR	program to print reversal documents and record transaction
RECVOUCH	program to print sales documents and record transaction
REPMENU	reports menu listing
RESERVADD	procedure to add/mod new rental services
RESERVSELL	procedure to sell rental services
SERVMENU	services add/mod menu
SHOWLIST (X,1..3)	procedure to display highlight bar on menus
SYSTEMU	options menu
TRAVEL	THE MAIN PROGRAM
TRAVIO	program to hold widely used procedures
TRCUSTMT	program for processing statements
TRCHACC	not used at present

TRCUPYMT	record customer payment
TRGENJNL	record general journal entries
TRINDEX	reindex databases
TRMTHBAL	program to produce monthly trial balance
TROPEN	program to open databases
TRPOST	program to post transactions to ledger accounts
TRSVADP2	program to add new public transport services
TRSVADRE	program to add new rental transport services
TRSVSAP2	program to mark public transport for services for transaction
TRSVSARE	program to mark rental transport services for transaction
TRYRBAL	produces year to date trial balance
WAIT	procedure to display wait message

A complete listing of the files used in the program is displayed as Exhibit 5.

A greater analysis of the structure and the levels of subroutines used is covered in the following section.

EXHIBIT 5

System: Travel Manager

Author:

Clive Mathews

File List

Date: 8/15/89

Time: 22:40

-----  
Programs and procedures:

ACCADD (procedure in TRCHACC.PRG)  
ACCDEL (procedure in TRCHACC.PRG)  
ACCMOD (procedure in TRCHACC.PRG)  
AGE.PRG  
ALARM.PRG  
CACOMP.PRG  
CACUADD.PRG  
CACUDEL.PRG  
CACUSCR1 (procedure in CACUADD.PRG)  
CACUVIEW.PRG  
CASHREP.PRG  
CASTMT1.PRG  
CASTMTHD.PRG  
CHARGE (procedure in RECVOUCH.PRG)  
CHARGE2 (procedure in RECRETUR.PRG)  
CONFIRM (procedure in RECVOUCH.PRG)  
CONFIRM2 (procedure in RECRETUR.PRG)  
CUSTMENU.PRG  
CUSTSOUT (procedure in TRAVIO.PRG)  
GSTREP.PRG  
HDG (procedure in TRAVIO.PRG)  
HELP.PRG  
HELP1 (procedure in HELP.PRG)  
HELP10 (procedure in HELP.PRG)  
HELP2 (procedure in HELP.PRG)  
HELP3 (procedure in HELP.PRG)  
HELP4 (procedure in HELP.PRG)  
HELP5 (procedure in HELP.PRG)  
HELP6 (procedure in HELP.PRG)  
HELP7 (procedure in HELP.PRG)  
HELP8 (procedure in HELP.PRG)  
HELP9 (procedure in HELP.PRG)  
HELFX (procedure in TRAVIO.PRG)  
ICON (procedure in TRAVIO.PRG)  
MAARS.PRG  
MANBOOK.PRG  
MENU (procedure in TRAVIO.PRG)  
MENU2 (procedure in TRAVIO.PRG)  
MENU3 (procedure in REPMENU.PRG)  
PASSWORD.PRG  
PRINTER (procedure in TRAVIO.PRG)  
PUDAYSADD (procedure in TRSVADP2.PRG)  
PUDAYSSEL (procedure in TRSVSAP2.PRG)  
PUDESTADD (procedure in TRSVADP2.PRG)  
PUDESTSEL (procedure in TRSVSAP2.PRG)  
PUORIGADD (procedure in TRSVADP2.PRG)  
PUORIGSEL (procedure in TRSVSAP2.PRG)  
PUPRICEADD (procedure in TRSVADP2.PRG)  
PUPRICESSEL (procedure in TRSVSAP2.PRG)  
PUTIMESADD (procedure in TRSVADP2.PRG)  
PUTIMESSEL (procedure in TRSVSAP2.PRG)

EXHIBIT 5 (cont)

PYMTTYPE.PRG  
RECRETUR.PRG  
RECVOUCH.PRG  
REPMENU.PRG  
RESERVADD (procedure in TRSVADRE.PRG)  
RESERVESELL (procedure in TRSVSARE.PRG)  
SERVMENU.PRG  
SHOWLIST (procedure in TRAVIO.PRG)  
SHOWLIST2 (procedure in TRAVIO.PRG)  
SHOWLIST3 (procedure in TRAVIO.PRG)  
SHOWLISTX (procedure in TRAVIO.PRG)  
SHOWLISTX2 (procedure in TRAVIO.PRG)  
SYSTEMENU.PRG  
TRAVEL.PRG  
TRAVIO.PRG  
TRCASTMT.PRG  
TRCHACC.PRG  
TRCUFYMT.PRG  
TRGENJNL.PRG  
TRINDEX.PRG  
TRMTHBAL.PRG  
TROPEN.PRG  
TRPOST.PRG  
TRSVADP2.PRG  
TRSVADRE.PRG  
TRSVSAP2.PRG  
TRSVSARE.PRG  
TRYRBAL.PRG  
WAIT (procedure in TRAVIO.PRG)

## Procedure files:

TRAVIO.PRG

## Databases:

CHARTACC.DBF  
CUSTOMER.DBF  
INVOICES.DBF  
PUBSERV.DBF  
PYMTTYPE.DBF  
RENTCAT.DBF  
RENTSERV.DBF  
SORT.DBF  
SPARENUM.DBF  
SYS.DBF  
TEXT.DBF  
TRANS.DBF

## Index files:

CNUMBER.NTX

## Report forms:

CRLIST.FRM  
DAYREP.FRM  
DRLIST.FRM  
PULIST.FRM  
RELIST.FRM

## Memory files:

SSAPMEM.MEM

## 8.0 OVERALL STRUCTURE

The overall structure of the program is best shown by tree diagrams of the main program (Travel), and the main subsystems.

A tree diagram of the Travel program is shown as Exhibit 6. The other main subsystems are referenced from the Travel.

For a more detailed explanation of the overall structure a computer analysis of the databases and program files is shown as Exhibit 13. A computer generated Procedure and Function Summary is attached as Appendix 1, and a detailed Cross-Reference Report is attached as Appendix 3.

EXHIBIT 6

TRAVEL

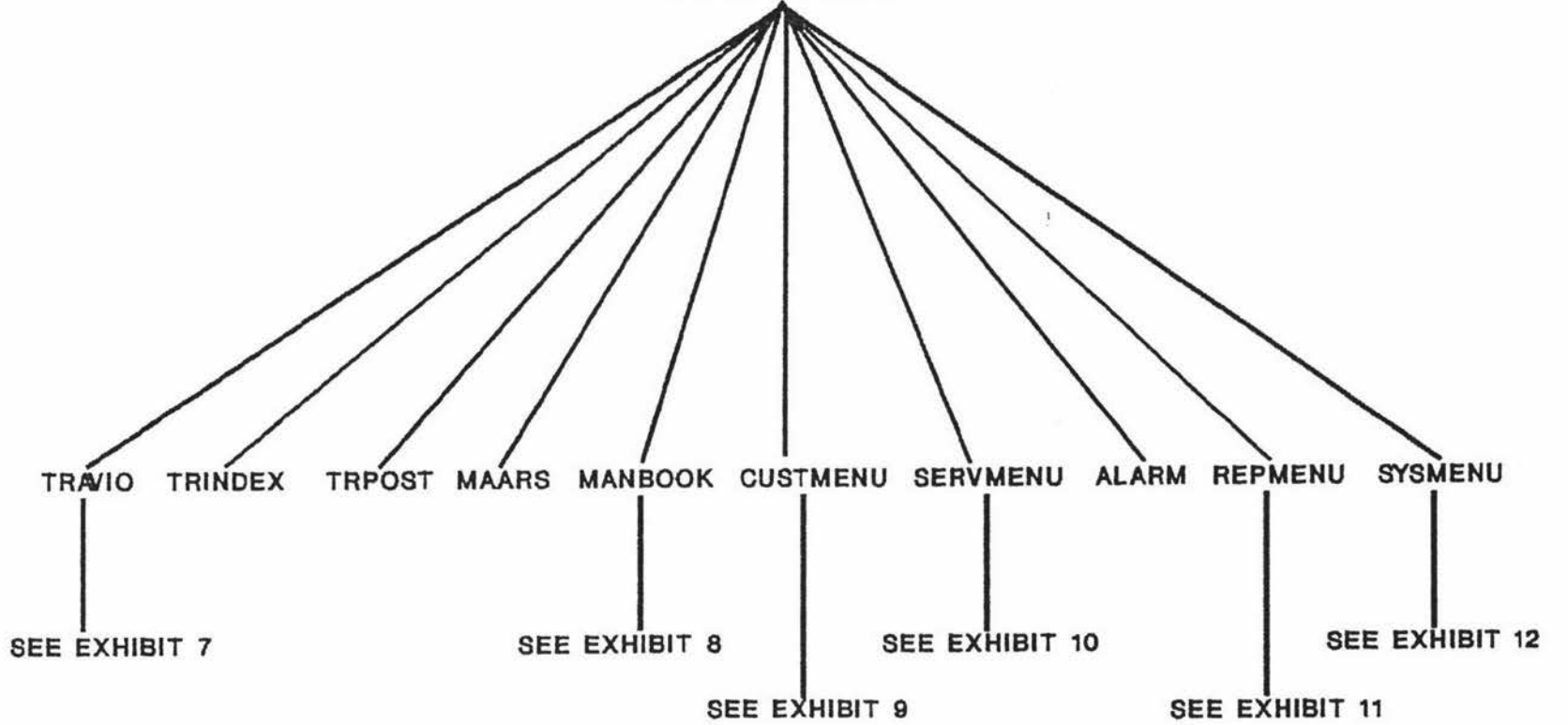
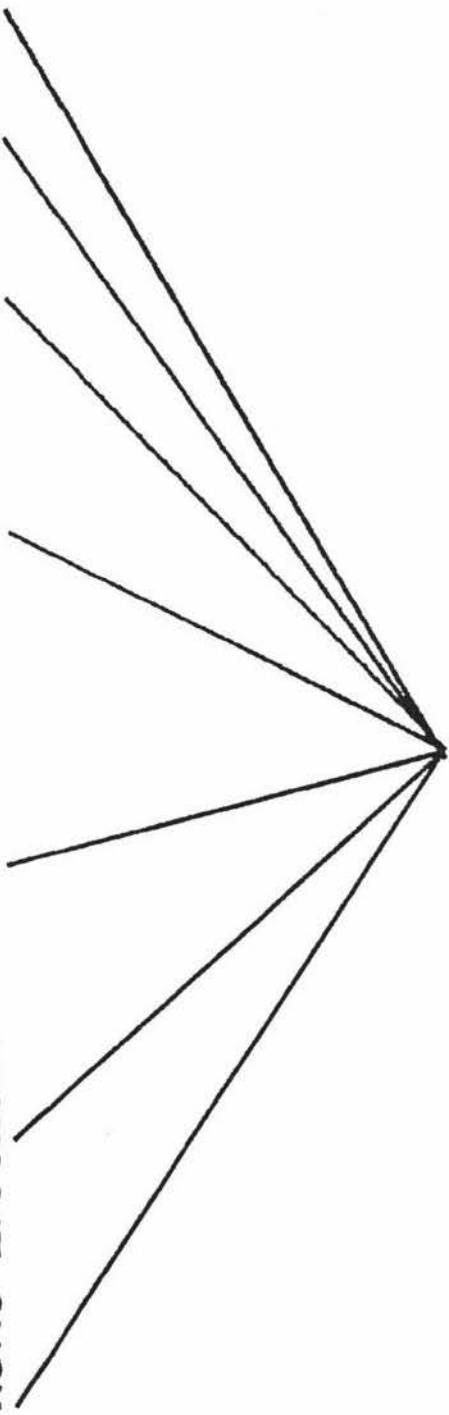


EXHIBIT 7

TRAVIO

WAIT HDG MENU SHOWLISTX2 SHOWLIST2 CUSTSOAT SHOWLIST



# MANBOOK

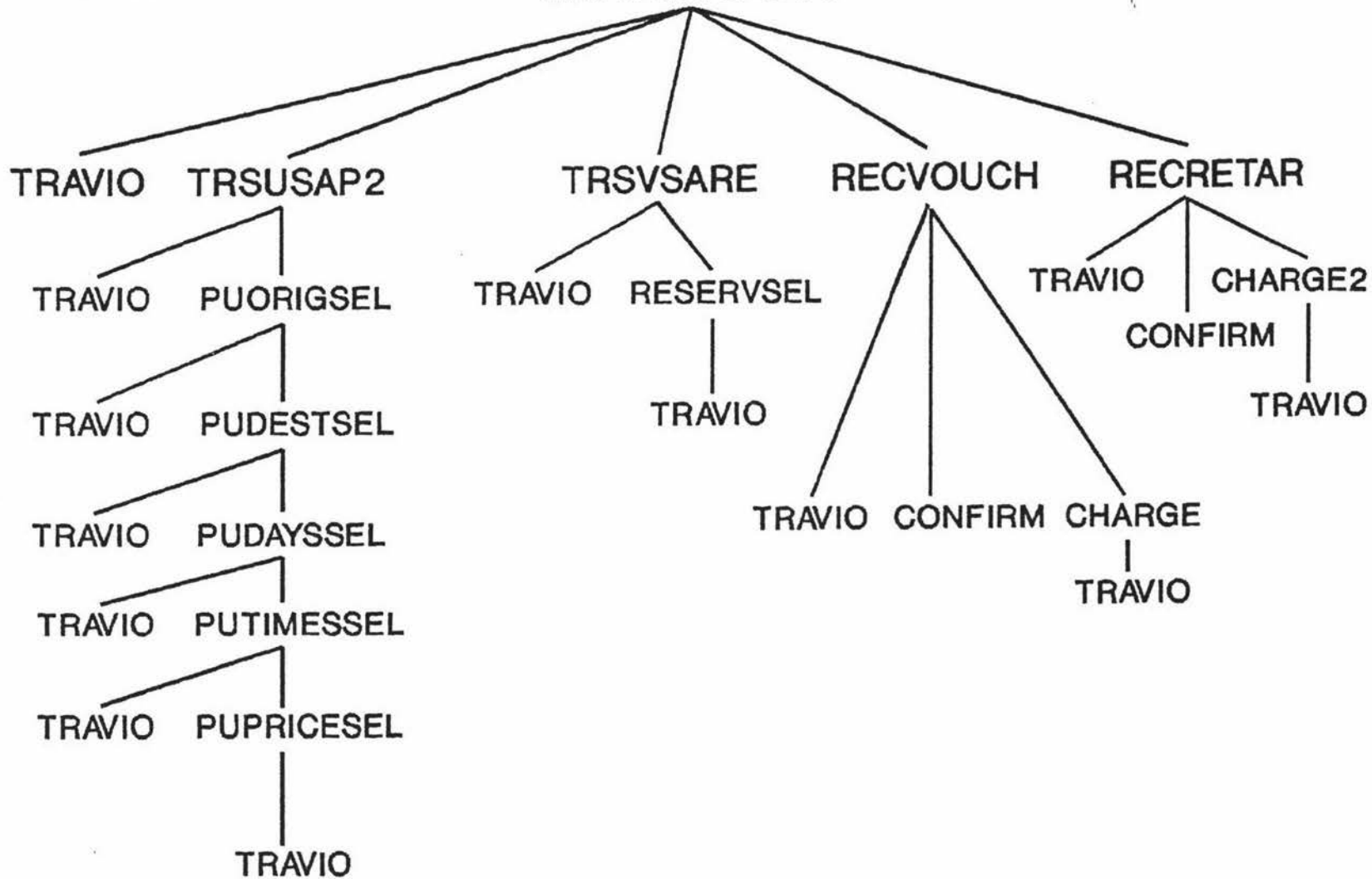


EXHIBIT 9

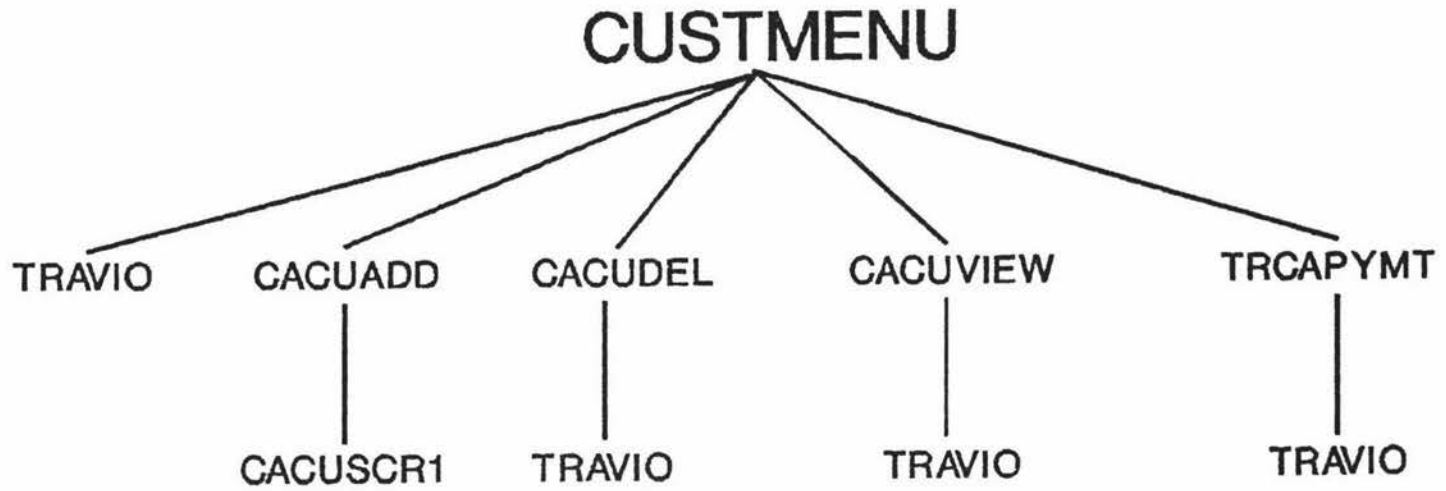


EXHIBIT 10

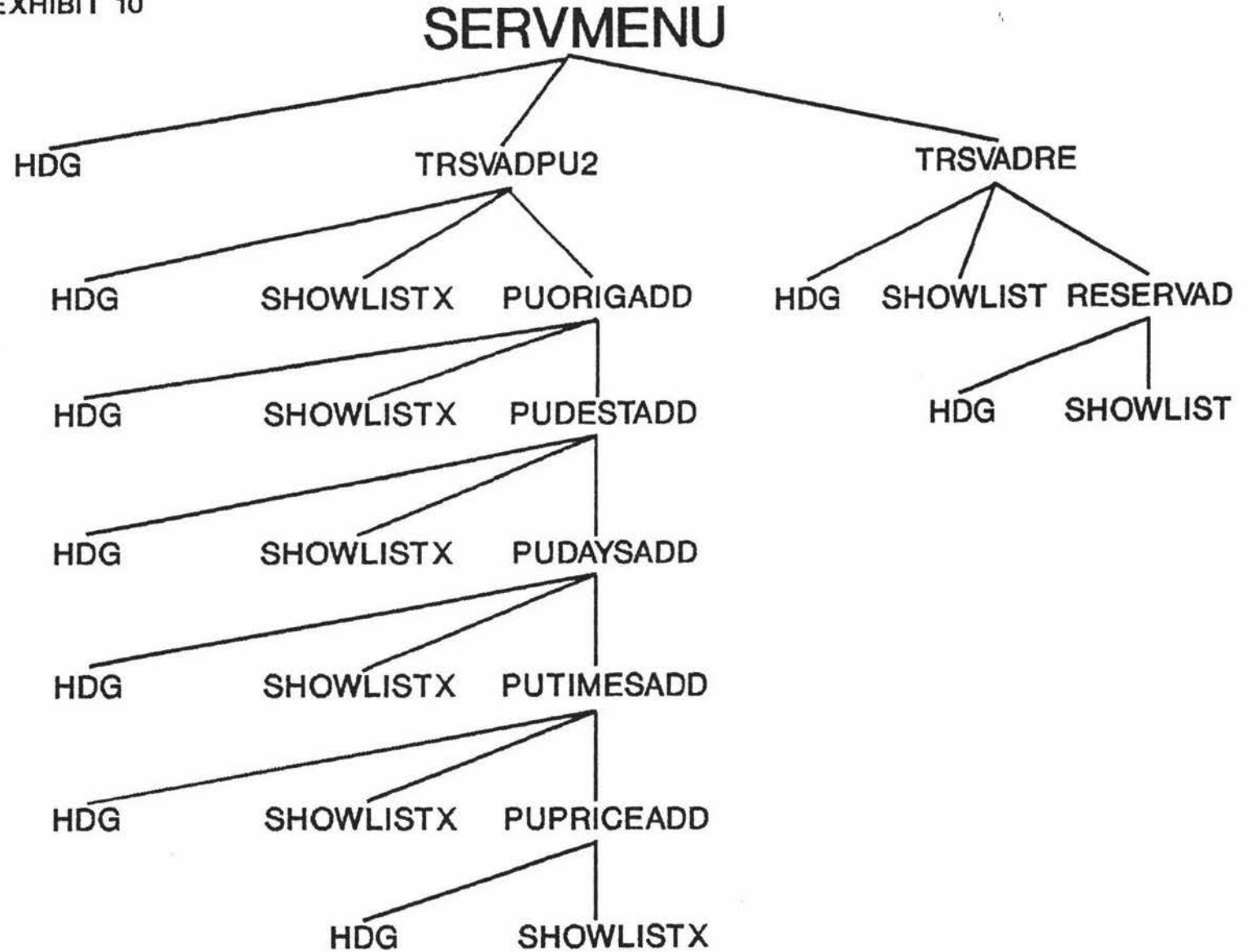
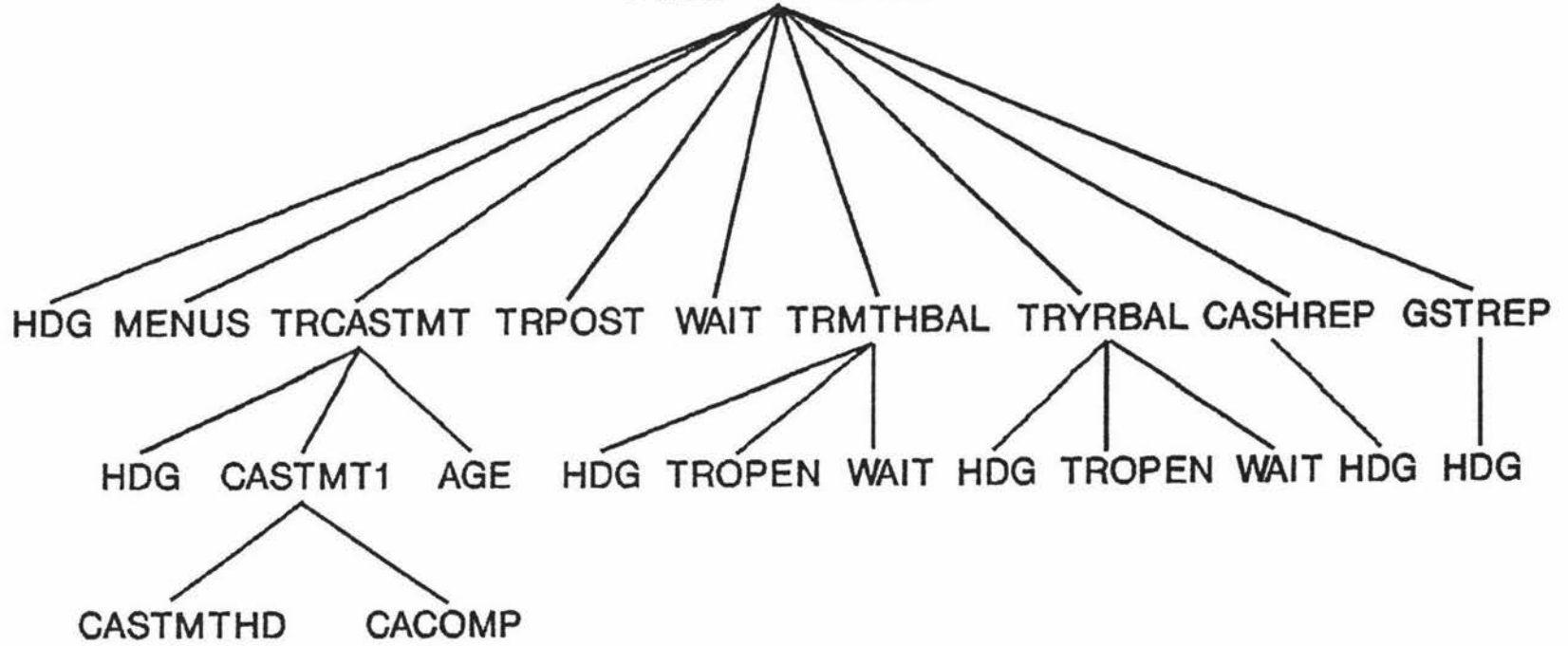
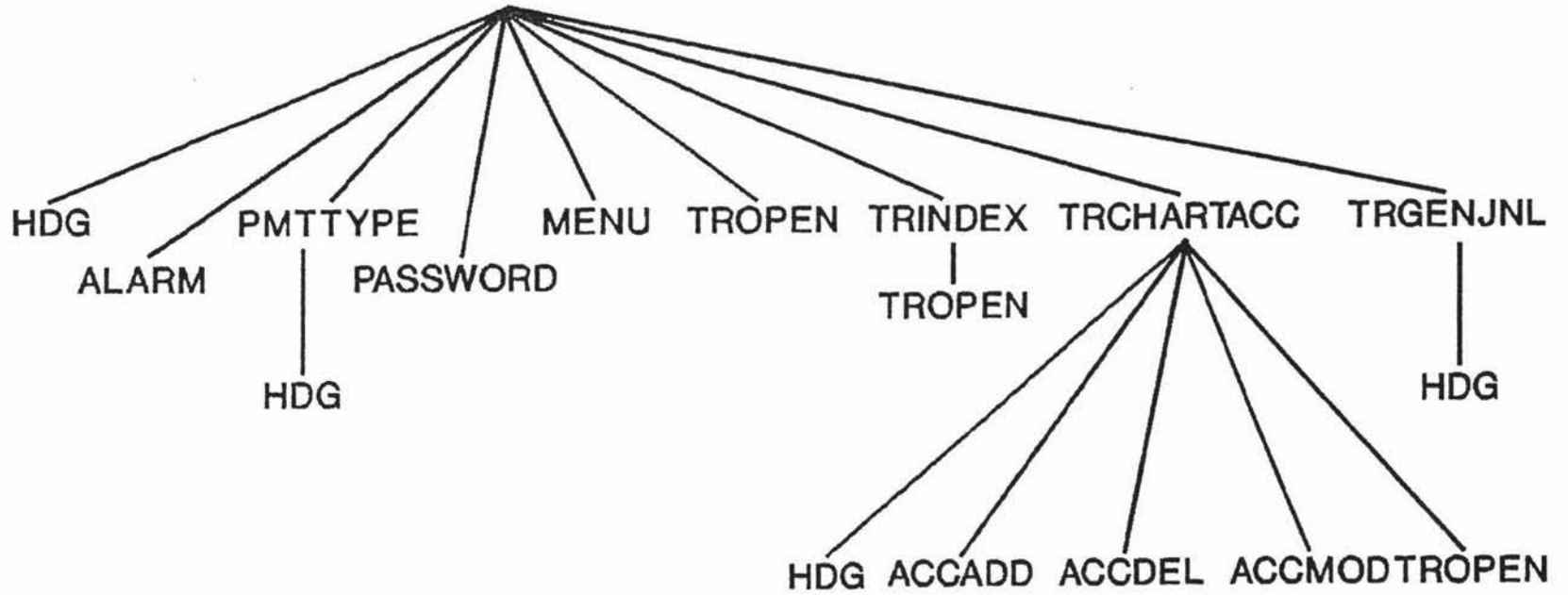


EXHIBIT 11

# REPMENU



# SYSTEMENU







PUDESTADD (procedure in TRSVADP2.PRG)  
     HDG (procedure in TRAVIO.PRG)  
     SHOWLISTX (procedure in TRAVIO.PRG)  
     PUDAYSADD (procedure in TRSVADP2.PRG)  
         HDG (procedure in TRAVIO.PRG)  
         SHOWLISTX (procedure in TRAVIO.PRG)  
         PUTIMESADD (procedure in TRSVADP2.PRG)  
             HDG (procedure in TRAVIO.PRG)  
             SHOWLISTX (procedure in TRAVIO.PRG)  
             PUPRICEADD (procedure in TRSVADP2.PRG)  
                 HDG (procedure in TRAVIO.PRG)  
                 SHOWLISTX (procedure in TRAVIO.PRG)  
 PUDAYSADD (procedure in TRSVADP2.PRG)  
     HDG (procedure in TRAVIO.PRG)  
     SHOWLISTX (procedure in TRAVIO.PRG)  
     PUTIMESADD (procedure in TRSVADP2.PRG)  
         HDG (procedure in TRAVIO.PRG)  
         SHOWLISTX (procedure in TRAVIO.PRG)  
         PUPRICEADD (procedure in TRSVADP2.PRG)  
             HDG (procedure in TRAVIO.PRG)  
             SHOWLISTX (procedure in TRAVIO.PRG)  
 PUTIMESADD (procedure in TRSVADP2.PRG)  
     HDG (procedure in TRAVIO.PRG)  
     SHOWLISTX (procedure in TRAVIO.PRG)  
     PUPRICEADD (procedure in TRSVADP2.PRG)  
         HDG (procedure in TRAVIO.PRG)  
         SHOWLISTX (procedure in TRAVIO.PRG)  
 PUPRICEADD (procedure in TRSVADP2.PRG)  
     HDG (procedure in TRAVIO.PRG)  
     SHOWLISTX (procedure in TRAVIO.PRG)  
 TRSVADRE.PRG  
     HDG (procedure in TRAVIO.PRG)  
     SHOWLIST (procedure in TRAVIO.PRG)  
     RESERVADD (procedure in TRSVADRE.PRG)  
         HDG (procedure in TRAVIO.PRG)  
         SHOWLIST (procedure in TRAVIO.PRG)  
 ALARM.PRG  
 REPMENU.PRG  
     HDG (procedure in TRAVIO.PRG)  
     MENU3 (procedure in REPMENU.PRG)  
 TRCASTMT.PRG  
     HDG (procedure in TRAVIO.PRG)  
     CASTMT1.PRG  
         CASTMTHD.PRG  
         CACOMP.PRG  
     AGE.PRG  
 TRPOST.PRG  
 WAIT (procedure in TRAVIO.PRG)  
 TRMTHBAL.PRG  
     CHARTACC.DBF (database)  
     SORT.DBF (database)  
     HDG (procedure in TRAVIO.PRG)  
     TROPEN.PRG  
         CUSTOMER.DBF (database)  
         RENTSERV.DBF (database)  
         PUBSERV.DBF (database)  
         TEXT.DBF (database)  
         SPARENUM.DBF (database)  
         SYS.DBF (database)  
         CHARTACC.DBF (database)  
         RENTCAT.DBF (database)  
         INVOICES.DBF (database)  
         SORT.DBF (database)  
         PYMTTYPE.DBF (database)  
         TRANS.DBF (database)  
         WAIT (procedure in TRAVIO.PRG)  
 WAIT (procedure in TRAVIO.PRG)

```

TRYRBAI.PRG
  CHARTACC.DBF (database)
  SORT.DBF (database)
  HDG (procedure in TRAVIO.PRG)
  TROPEN.PRG
    CUSTOMER.DBF (database)
    RENTSERV.DBF (database)
    PUBSERV.DBF (database)
    TEXT.DBF (database)
    SPARENUM.DBF (database)
    SYS.DBF (database)
    CHARTACC.DBF (database)
    RENTCAT.DBF (database)
    INVOICES.DBF (database)
    SORT.DBF (database)
    PYMTTYPE.DBF (database)
    TRANS.DBF (database)
    WAIT (procedure in TRAVIO.PRG)
  WAIT (procedure in TRAVIO.PRG)
GSTREP.PRG
  HDG (procedure in TRAVIO.PRG)
CASHREP.PRG
  HDG (procedure in TRAVIO.PRG)
SYSTEMENU.PRG
  HDG (procedure in TRAVIO.PRG)
  MENU (procedure in TRAVIO.PRG)
  PYMTTYPE.PRG
    HDG (procedure in TRAVIO.PRG)
PASSWORD.PRG
ALARM.PRG
TROPEN.PRG
  CUSTOMER.DBF (database)
  RENTSERV.DBF (database)
  PUBSERV.DBF (database)
  TEXT.DBF (database)
  SPARENUM.DBF (database)
  SYS.DBF (database)
  CHARTACC.DBF (database)
  RENTCAT.DBF (database)
  INVOICES.DBF (database)
  SORT.DBF (database)
  PYMTTYPE.DBF (database)
  TRANS.DBF (database)
  WAIT (procedure in TRAVIO.PRG)
TRINDEX.PRG
  CUSTOMER.DBF (database)
  TROPEN.PRG
    CUSTOMER.DBF (database)
    RENTSERV.DBF (database)
    PUBSERV.DBF (database)
    TEXT.DBF (database)
    SPARENUM.DBF (database)
    SYS.DBF (database)
    CHARTACC.DBF (database)
    RENTCAT.DBF (database)
    INVOICES.DBF (database)
    SORT.DBF (database)
    PYMTTYPE.DBF (database)
    TRANS.DBF (database)
    WAIT (procedure in TRAVIO.PRG)

```

TRCHACC.PRG

- CHARTACC.DBF (database)
- HDG (procedure in TRAVIO.PRG)
- ACCADD (procedure in TRCHACC.PRG)
- ACCDEL (procedure in TRCHACC.PRG)
- ACCMOD (procedure in TRCHACC.PRG)
- TROPEN.PRG
  - CUSTOMER.DBF (database)
  - RENTSERV.DBF (database)
  - PUBSERV.DBF (database)
  - TEXT.DBF (database)
  - SPARENUM.DBF (database)
  - SYS.DBF (database)
  - CHARTACC.DBF (database)
  - RENTCAT.DBF (database)
  - INVOICES.DBF (database)
  - SORT.DBF (database)
  - PYMTTYPE.DBF (database)
  - TRANS.DBF (database)
  - WAIT (procedure in TRAVIO.PRG)

TRGENJNL.PRG

- TRANS.DBF (database)
- CHARTACC.DBF (database)
- HDG (procedure in TRAVIO.PRG)

## 9.0 DATABASE STRUCTURE

The Database structure is vital to the efficient and effective use of computer resources. Well planned database structure can eliminate redundancy, maintain control of requests, allow changes to be made to the schema, and assist in the production of meaningful reports.

A database structure must be designed to achieve the following objectives:

1. Control Redundancy

Redundant data occupies space and is wasteful. A well designed database stores the data only once, which controls redundancy and improves the performance of the system.

2. Be Easy to Learn and Use

A database must be user-friendly in its use. Data must also be able to be modified without affecting the use of that data.

3. Data Independence

The database must be flexible to allow changes in software and hardware. The database must be able to be 'finetuned' to improve performance when linked with other software.

4. More Information at Low Cost

The cost of use, storing and modifying data must be kept to a minimum.

5. Accuracy and Integrity

The accuracy refers to the need for data quality and content to be constant. Integrity refers to the detection and correction of inaccurate data.

6. Recovery from Failure

The database must be able to be recovered quickly and at low cost while ensuring continued accuracy and integrity

7. Privacy and Security

Security measures must be taken to prevent unauthorised access. Security also means that databases are protected from various forms of destruction.

8. Performance

This relates to response times for inquiries by data users. This will vary depending on the nature of the information being retrieved.

When designing Travel Manager each of the above issues was considered and the individual databases were designed to reflect these needs.

A detailed breakdown of the structure of each individual database used is shown as Database Structure Summary in Appendix 2, and an alphabetical listing of the individual fields used is shown as Dictionary in Appendix 4.

To demonstrate how the individual databases were designed I will examine the Customer.Dbf (shown as Exhibit 14) and explain the fields and their respective sizes.

Number        This is a computer generated customer number allocated when the account is opened. 4 digits was considered to be sufficient for this client allowing up to 9999 clients.

Name            These fields were obviously for recording name and addresses.

Addr1..3

EXHIBIT 14

System: Travel Manager

Author: Clive Mathews

Database Structure Summary

Date: 8/15/89

Time: 22:39

-----  
Structure for database : CUSTOMER.DBF

Number of data records : 14

Date of last update : 8/15/89

Field	Field name	Type	Width	Dec
1	NUMBER	Numeric	4	
2	NAME	Character	30	
3	ADDR1	Character	30	
4	ADDR2	Character	30	
5	ADDR3	Character	30	
6	PHONE	Character	12	
7	CRLIMIT	Numeric	9	2
8	MONTH3	Numeric	9	2
9	MONTH2	Numeric	9	2
10	CURRENT	Numeric	9	2
11	BALANCE	Numeric	9	2
12	YRTODATE	Numeric	10	2
13	CONTACT	Character	30	
14	NUMTRANS	Numeric	2	
15	MONTH1	Numeric	9	2
16	TRANS	Logical	1	
17	DEBTOR	Logical	1	
** Total **			235	

Used by: TRINDEX.PRG

Used by: TROPEN.PRG

Phone This allowed space for the Std code and up to a 7 digit phone number.

Crlimit This referred to the credit limit on the client account

Month3 Month3, Month2, Month1 and Current referred to the ageing of the

Month2 accounts, showing amounts outstanding.

Month1

Current Balance referred to the ending balance of the account.

Balance The 9 digits allowed amounts up to \$999999.99 to be recorded.

Yrtodate This kept a continuous record of the total sales for the year to date. Amounts up to \$9999999.99 allowed.

Contact This field recorded the contact name of the account if there were enquiries.

Numtrans This recorded the total number of transactions processed through the account.

Trans This identified whether any transactions had been processed in the current month or if there was a balance other than \$0. If so, then a statement was run at month end.

Debtor In order to facilitate faster processing, both the debtors and creditors are stored in this database. This field determines whether the customer is a debtor, creditor or both.

## 10.0 OPERATION OF THE SYSTEM

The basic relationships inherent in the system have already been explained in Section 8 (Overall Structure). The purpose of this section is to explain what Travel Manager is, and how to use it.

Travel Manager is a powerful new application for use in the retail travel industry. Travel Manager was designed with the needs of the travel agent in mind.

Travel Manager is a user friendly, menu driven program that records sales transactions, produces transaction records and processes the firms accounting records to trial balance stage.

Travel Manager provides useful accounting information and maintains a general ledger as well as Accounts Receivable and Accounts Payable subsidiary ledgers. Debtors statements are produced on standard R201/AL statement paper.

Travel Manager is self explanatory to the user; the following manual is provided to clarify certain operations.

Travel Manager provides online help for most screens of the program. This help can be accessed at any time by hitting the "F1" key.

## SYSTEM REQUIREMENTS

Travel Manager requires an IBM Compatible XT or AT computer to operate. Travel Manager can be used on machines with any graphics card.

Travel Manager requires 512K of RAM, 1 hard disk drive and 1 floppy disk drive. The capacity of the hard disk will depend upon the number of customers, services and transactions of the firm, however a 10mb hard drive is sufficient for all but the largest of organisations.

Travel Manager may also be used in a network environment.

## INSTALATION PROCEDURE

Before Travel Manager will operate, it is necessary to install the program onto the hard disk drive.

This is done as follows:

1. Insert the #1 disk in drive "A".
2. Type "a:" then hit "ENTER".
3. Type "hdinst".

The computer will load Travel Manager onto the Hard Disk.

## OPERATION INSTRUCTIONS

To start Travel Manager after turning on the computer, change into the travel directory (cd\travel) then type "travel" "ENTER", or if your computer has a menu system, simply choose the "Travel Manager" option.

Shown below is the Travel Manager opening menu. All screens in the program are headed with the current operation or title, and the date. To ensure transactions are correctly recorded, the date should be checked when the program is first entered. If the date is incorrect it should be alter using SET DATE in the OPTIONS Menu.

\*\*\*TRAVEL MANAGER\*\*\*

Date: 12/08/89

MAIN MENU	How to use the Program
Log Into Maars	Start Move the highlighted bar in the menu to any selection and press the Enter key ↵ The and keys on the right side of the keyboard move the highlighted bar.
Manual Bookings	
Customer Menu	
Services Menu	
Reports and Listings	
Options Menu	
Daily Backup& Shutdown	Exit Highlight EXIT at the bottom of the menu then press Enter ↵  By I Stephens and C Mathews

Menu Options:

Options on the menus are selected by moving the highlighted bar then pressing enter, or by typing the first letter of the required option. If arrow keys are used for selection, then brief descriptions of the highlighted option are displayed on the bottom line of the screen.

#### MAIN MENU OPTIONS

##### LOG INTO MAARS

This option is used to access the Maars on-line booking network. Instructions on how to access the Maars network are contained in the Maars Network Instruction Manual.

##### MANUAL BOOKINGS

This option allows the operator to book or cancel services that do not subscribe to the Maars network. Choosing this option will display the Manual Bookings Menu to the user. This Menu is discussed later.

#### CUSTOMER MENU

The Customer Menu provides functions to allow the addition, modification deletion and inspection of customer files. The routine to record customer account payments is also included in the Customer Menu. These operations are described later.

#### SERVICES MENU

This menu is accessed by selection, then entry of the correct password. This password is password one and can be altered from the options menu. Entry of an incorrect password will result in the sounding of an alarm. The services menu allows the addition or modification of Rental or Public Transport type services used in the manual booking routine.

#### REPORTS AND LISTINGS

This option accesses the Reports and Listings Menu via password 2, discussed later.

## OPTIONS MENU

The Options Menu provides miscellaneous program functions via password 3. These options are discussed later.

## DAILY BACKUP & SHUTDOWN

This option saves the days transactions, posts them to ledger accounts then backs up data to floppy disk.

## MANUAL BOOKINGS MENU OPTIONS

RECORD MANUAL BOOKINGS

Date: 12/08/89

CHOOSE AN OPTION	How to use the Program
Public Transport Sale	Start
Rental Services Sale	Move the highlighted bar in the menu to any selection and press the Enter key ↵
Sale Transaction	The and keys on the right side of the keyboard move the highlighted bar.
Reversal Transaction	Exit
Cancel Selections	Highlight EXIT at the bottom of the menu then press Enter ↵
QUIT	By I Stephens and C Mathews

Menu Options:

Shown above is the Record Manual Bookings Menu. This menu is to record or reverse a manual booking.

The first two options on the menu allow the user to mark services for a transaction.

The second two options determine the type of transaction perform necessary operations and printing transaction details. The Cancel Selections option removes all service marks.

Shown below is the screen for marking public transport records for sale or reversal.

PUBLIC TRANSPORT SALES

Date: 12/08/89

---

Category:
From:
To:
Day:
Time:
Service:
Price:

PLANES
TRAINS
TEST
BUSSES
ADD
QUIT

Category, origin, destination, day, time and service are chosen by moving the highlighted bar on the list of available options to the desired choice then pressing enter. Choosing "QUIT" will return the user to the previous option list.

The final screen for marking options is shown below. Firstly the month and year of the booking must be entered. The program then produces the calendar for that month. The user must then enter the date of the booking, followed by the ticket or voucher number.

PUBLIC TRANSPORT SALES

Date: 12/08/89

Category: PLANES
From: PALMERSTON NTH
To: WELLINGTON
Day: MONDAY
Time: 11AM
Service: AIR NEW ZEALAND
Price:

October 1989						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Enter Month Required: 10    Year: 89  
 Enter Date of Booking 18/10/89  
 Enter Ticket Number 76548

AIR NEW ZEALAND	75.00
ADD	
QUIT	

After marking services required, a transaction type must be selected from the Manual Bookings Menu. Upon doing this, the customer name and consultant number are requested, then the transaction is displayed on the screen (below) for confirmation, then the sale or reversal document is printed.

CUSTOMER: JOE BLOGGS                      DATE: 14/08/89      CONSULTANT:              123

DESCRIPTION	TICKET/VOUCHER NUMBER	TOTAL GROSS
-----		
	SUBTOTAL	0.00
	GST	0.00
	TOTAL	0.00

Is the Above Correct Y

Next the user must enter the payment method used. Selection again is made using arrow keys then ENTER.

PAYMENT METHOD ENTRY

Date: 14/08/89

---

Amount Payable:              84.38  
 CHARGE  
 CASH  
 CHEQUE  
 VISA  
 BANKCARD  
 DINERS  
 AMEX

If the transaction is a "Charge" transaction, the user is prompted for the Customer's account number, after which, customer details are displayed for confirmation.

CUSTOMER DETAIL SCREEN

Date: 12/08/89

-----  
CUSTOMER NUMBER 1003

CONTACT PERSON: JOE BLOGGS  
CUSTOMER NAME : JOE BLOGGS LTD  
ADDRESS : 15 BLOGGS ROAD  
RD1  
TAIHAPE  
PHONE : (123)987654

TOTAL BALANCE : 4567.52                      CREDIT LIMIT : 300.00

CURRENT : 0.00  
ONE MONTH : 1000.00  
TWO MONTHS : 2000.00  
THREE MONTHS & OVER : 1567.52

Is this The Correct Customer? (Y)es, (N)o, (Q)uit Q

The user has the option to quit, for cases such as the customer being in excess of his credit limit.

When payment amounts equal the sale price, a Credit Note or Tax Invoice is issued.

CUSTOMER MAINTENANCE MENU

The options on the Customer Maintenance Menu are fairly straight forward.

CUSTOMER MAINTENANCE FUNCTIONS

Date: 14/08/89

CUSTOMER MAINTENANCE MENU	How to use the Program
Add a Customer	Start Move the highlighted bar in the menu to any selection and press the Enter key ↵ The and keys on the right side of the keyboard move the highlighted bar.
Modify a Customer	
Delete a Customer	
View a Customer	
Record Payments	
	Exit Highlight EXIT at the bottom of the menu then press Enter ↵
TRAVEL MAIN MENU	By I Stephens and C Mathews

Menu Options:

The add customer routine prompts for data as shown below.

## CUSTOMER NUMBER 1003

CUSTOMER NAME :  
CONTACT NAME :  
ADDRESS :  
  
PHONE : ( )  
CREDIT LIMIT : 0.00

MODIFY A CUSTOMER uses a similar screen to alter data held on a customer. The account number for the customer must, however, first be entered

DELETE A CUSTOMER prompts for for customer number then displays account details for confirmation of deletion. A customer with an outstanding balance may not be deleted from the file.

VIEW CUSTOMER DETAILS simply displays information held on a customer after entry of their number.

RECORD CUSTOMER PAYMENTS, prompts for account number, amount and receipt number. The transaction is then recorded for display on the statement, and the customer's outstanding balance is adjusted accordingly.

SERVICES MENU

The services menu (below) allows the user to add or alter Public Transport or Rental Type services, that do not subscribe to the Maars Booking Network.

Date: 12/08/89

SERVICES MAINTENANCE MENU	How to use the Program
Add/Alter Public	Start
Add/Alter Rental	Move the highlighted bar in the menu to any selection and press the Enter key ↵
	The and keys on the right side of the keyboard move the highlighted bar.
	Exit
	Highlight EXIT at the bottom of the menu then press Enter ↵
TRAVEL MAIN MENU	By I Stephens and C Mathews

Menu Options:

The format of screens for addition and modification is similar to that of marking services for sales or reversal. Upon selection the add/alter option, lists of categories recorded are displayed, as well as an add option for the entry of new categories. The quit option returns the operator to the previous list of options, or menu.

The process for adding or modifying origins, destinations, days, times and services follow require the same steps as adding or modifying categories. When entering new services, the user must also enter the price, commission rate and whether GST applies.

When a category (etc.) is selected the program is in modify mode. Firstly the user has the option to change the recorded description/name. The program then allows the user to add or modify the next "layer" of options. For example, if a user wishes to alter a category, the category name is prompted for possible change, then a list of options (public transport) or services (rental services) is displayed, as well as the option to add more origins/services.

REPORTS AND LISTINGS MENU OPTIONS

Travel Manager provides a number of useful management reports as shown in the menu below.

LISTINGS AND REPORTS MENU

Date: 14/08/89

LISTINGS	REPORTS
Rental Services List	Print Monthly Stmts
Public Transport List	Daily Report
Debtors List	Month's Trial Balance
Creditors List	Year's Trial Balance
	GST Position Report
	Cash Position Report
	TRAVEL MAIN MENU

The reports provide the following information.

RENTAL SERVICES LIST provides a listing of all non-Maars rental type services, grouped on category, including commission rates, locations, prices etc. for each service.

PUBLIC TRANSPORT LIST provides a listing of all non-Maars public transport type services, also grouped on category as well as origins, destinations, prices etc. for each service.

DEBTORS LIST provides an aged listing of debtors and balances. Each age column and total is totaled for control purposes.

CREDITORS LIST provides a listing of creditors and amounts owed to each, which is totaled to provide management information.

PRINT MONTHLY STATEMENTS produces monthly statements to debtors on standard R201/AL statement paper. Data is backed up to floppy disk before statements are printed. After statements are produced, the user is asked if debtors accounts are to be aged. If an error has occurred during printing, accounts should not be aged; the data should be restored from floppy disk and statements reprinted.

DAILY REPORT provides a one line summary for each of the day's transactions, with a total of the net amount of the days transactions. The report is grouped on general ledger numbers with a sub-total for each group. Included in each line is the time the transaction was recorded, the date the transaction occurred, the general ledger posting number and the debtors/creditors posting number where applicable.

MONTHS TRIAL BALANCE provides a trial balance for the month to date. After printing the trial balance, the option is provided to age the trial balance into the year column

YEARS TRIAL BALANCE provides a trial balance for the year up to the date of the last aging of the monthly trial balance. At year end, the monthly trial balance should be aged, then a yearly trial balance produced. The accountant should next perform closing journal entries, then print and re-age the monthly trial balance, then re-print the yearly trial balance. Finally, reversal transactions should be entered and the monthly trial balance again printed and aged, and the yearly trial balance produced. These reports should be used to help produce annual accounts.

GST REPORT is a simple GST summary on inputs and outputs, showing the net GST owing/owed. This report helps the accountant produce the GST return and provides him with the information required to perform necessary journal entries upon the completion and payment of the return.

CASH REPORT is a report for management to allow the determination of cash position at any time. The report shows bank balance (Note: this does not include un-banked credit cards), plus accounts, receivable, less accounts payable and plus or minus net GST owing/owed.

OPTIONS MENU

The options menu provides additional program functions as shown below.

SYSTEM OPTIONS PROGRAMS

Date: 12/08/89

OPTIONS MENU	How to use the Program
Add New Payment Method	Start Move the highlighted bar in the menu to any selection and press the Enter key ↵ The and keys on the right side of the keyboard move the highlighted bar.  Exit Highlight EXIT at the bottom of the menu then press Enter ↵  By I Stephens and C Mathews
Mem Variables Changes	
Backup Data	
Restore Data	
Chart of Accounts	
General Journal Entries	
Set Date	
TRAVEL MAIN MENU	

Menu Options:

ADD NEW PAYMENT METHOD allows the user to add or alter methods by which the customer may pay for services. When adding methods, a General Journal posting account must also be entered.

MEM VARIABLE CHANGES allows the user to alter system passwords and GST rate. Entry of password 5 is necessary to access this option.

BACKUP DATA backs up data held on the hard disk drive onto floppy disks. This function is also performed automatically upon shut down. At least two generations of backups should be kept at all times, at least one copy at a separate location.

RESTORE DATA allows restoration of backed up data from floppy disk after corruption or some other mishap.

CHART OF ACCOUNTS allows the user to add, modify or delete chart of accounts categories and headings. This routine is fully self explanatory.

GENERAL JOURNAL ENTRIES. This option allows the user to enter transactions that are not performed automatically by the sales and reversal routines.

Account number, transaction date and debit and credit amounts are prompted for. Transactions are aborted by the entry of zero for both debit and credit. A running balance is displayed throughout the transaction; when this balance is zero (ie debits and credits are equal) the user has the option to abort, save or continue the journal entry.

SET DATE. This option allows the user to change the system time and date if it is not correct. NOTE: for the accurate recording of transaction, it must ensure the system date and time are correct.

## 11.0 PROBLEMS ENCOUNTERED

This section highlights the difficulties encountered while programming. These can be divided into three main categories:

- a) Hardware limitations
- b) Software limitations
- c) Other

### Hardware Limitations

- \* the machine being used for programming and compiling was a PC XT Clone. The main source of frustration was the time being taken to compile from source to object code.
- \* as the program grew there were problems encountered with the RAM capacity of the machine. Another machine with 640K RAM was needed to complete the program.

### Software Limitations

- \* the programming language being used was Dbase III+. It was found that Dbase will only allow 10 databases to be open, and in use at the same time. This caused time delays during the original stages of the program, and required some restructuring from the initial plan.
- \* the problem with accessing databases was not only restricted to Dbase. The Compiler being used would only allow a maximum of 15 databases to be accessed simultaneously. Once again some restructuring was required.

The compiling program allowed up to 14 databases to be open at one time. This initially was another limitation that required restructuring to take place.

Other**Implementing Problems**

- \* Acceptance - the staff were initially reluctant to use the new system.
  
- \* Training - this was necessary and took longer than anticipated because of the lack of computer literacy of the staff and the Manager. Many simple aspects almost taken for granted had to be covered.
  
- \* Adjustments - during the implementation stage there were several minor modification that had to be made because the information collected had been misinterpreted.
  
- \* Initial Delays - it took longer than expected to get the system operational because of the modifications and the staff training and this caused unwanted tension.
  
- \* Conversion from manual to computerised system - the staff are still not using the system to its fullest. For a period of time both the manual and the computerised system will be operated in parallel until the Manager feels confident that he and the rest of his staff are able to use the computer effectively.

**Design Problems**

- \* Obtaining information from the client - this was often difficult and time consuming. The clients' staff were initially reluctant to talk about their jobs and general procedures.

There was also a lack of basic information that should have existed such as procedures documentation and job descriptions.

- \* The problems of obtaining information meant that additional time was taken due to having to stop designing/programming to get vital pieces of information as they were needed.

#### General

- \* there was a difficulty translating some design ideas to program code. This was due to the fact that the programmers were reaching the extremes of their programming abilities (as well as that of Dbase).
- \* there was also the problem that too much data (some later discarded) was being stored. This was an example of the information overload syndrome where all data is stored in the 'hope' that it may be useful.
- \* some aspects of the program were practical but not aesthetically pleasing. This led to conflict between what we wanted and what was possible.

## 12.0 CONCLUSIONS

The programming of an individually tailored information system for the travel agent appears to have been successful. The manager believes that the package is commercially viable, after various modifications. Several other travel agencies have been shown the package and have expressed interest.

The project proved valuable because it highlighted the difficulty in system design and programming. The program took several months to design by the author and several more to program. The testing was an important stage, and required many minor modifications to be done.

The project would not have been economically feasible for the travel agent if commissioned as a software program to be specifically developed. Customised packages are unique to each client and this means that the cost is much higher than a pre-designed package that is being marketed to the industry. The author feels that the cost factor would have been excessive.

The program designed is a totally integrated package that incorporates all aspects of the travel agency's manual system and increases speed and efficiency, providing management and accounting information on a timely basis.

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System: Travel Manager

APPENDIX 1

Author: Clive Mathews

Procedure and Function Summary

Date: 8/15/89

Time: 22:38

-----  
TRAVIO.PRG

Contains: HDG (lines 33 to 39)

Called by: TRAVEL.PRG

Called by: CUSTSQUT (procedure in TRAVIO.PRG)

Called by: MAARS.PRG

Called by: MANBOOK.PRG

Called by: CUSTMENU.PRG

Called by: SERVMENU.PRG

Called by: REPMENU.PRG

Called by: SYSMENU.PRG

Called by: TRSVSAP2.PRG

Called by: TRSVSARE.PRG

Called by: RECVOUCH.PRG

Called by: RECRETUR.PRG

Called by: CACUDEL.PRG

Called by: TRCUPYMT.PRG

Called by: TRSVADP2.PRG

Called by: TRSVADRE.PRG

Called by: TRCASTMT.PRG

Called by: TRMTHBAL.PRG

Called by: TRYRBAL.PRG

Called by: GSTREP.PRG

Called by: CASHREP.PRG

Called by: PYMTTYPE.PRG

Called by: TRCHACC.PRG

Called by: TRGENJNL.PRG

Called by: PUORIGSEL (procedure in TRSVSAP2.PRG)

Called by: PUORIGADD (procedure in TRSVADP2.PRG)

Called by: PUDESTADD (procedure in TRSVADP2.PRG)

Called by: PUDAYSADD (procedure in TRSVADP2.PRG)

Called by: PUTIMESADD (procedure in TRSVADP2.PRG)

Called by: PUPRICEADD (procedure in TRSVADP2.PRG)

Called by: RESERVADD (procedure in TRSVADRE.PRG)

Contains: PRINTER (lines 40 to 47)

Calls: CUSTSQUT (procedure in TRAVIO.PRG)

Contains: CUSTSQUT (lines 48 to 68)

Called by: PRINTER (procedure in TRAVIO.PRG)

Called by: RECVOUCH.PRG

Called by: RECRETUR.PRG

Called by: CACUDEL.PRG

Called by: CACUVIEW.PRG

Called by: CHARGE (procedure in RECVOUCH.PRG)

Called by: CHARGE2 (procedure in RECRETUR.PRG)

Calls: HDG (procedure in TRAVIO.PRG)

Contains: HELPX (lines 69 to 78)

Contains: ICON (lines 79 to 82)

Contains: WAIT (lines 96 to 100)

Called by: TRAVEL.PRG

Called by: REPMENU.PRG

Called by: TROPEN.PRG

Called by: TRMTHBAL.PRG

Called by: TRYRBAL.PRG

APPENDIX 1 (cont)

Contains: MENU (lines 109 to 160)  
Called by: TRAVEL.PRG  
Called by: MANBOOK.PRG  
Called by: CUSTMENU.PRG  
Called by: SERVMENU.PRG  
Called by: SYSMENU.PRG

Contains: MENU2 (lines 161 to 183)

Contains: SHOWLIST (lines 184 to 226)  
Called by: TRSVADRE.PRG  
Called by: RESERVADD (procedure in TRSVADRE.PRG)

Contains: SHOWLISTX (lines 227 to 273)  
Called by: TRSVADP2.PRG  
Called by: PUORIGADD (procedure in TRSVADP2.PRG)  
Called by: PUDESTADD (procedure in TRSVADP2.PRG)  
Called by: PUDAYSADD (procedure in TRSVADP2.PRG)  
Called by: PUTIMESADD (procedure in TRSVADP2.PRG)  
Called by: PUPRICEADD (procedure in TRSVADP2.PRG)

Contains: SHOWLISTX2 (lines 274 to 314)  
Called by: TRSVSAP2.PRG  
Called by: PUORIGSEL (procedure in TRSVSAP2.PRG)  
Called by: PUDESTSEL (procedure in TRSVSAP2.PRG)  
Called by: PUDAYSSEL (procedure in TRSVSAP2.PRG)  
Called by: PUTIMESSEL (procedure in TRSVSAP2.PRG)  
Called by: PUPRICESEL (procedure in TRSVSAP2.PRG)

Contains: SHOWLIST2 (lines 315 to 356)  
Called by: TRSVSARE.PRG  
Called by: RESERVSELL (procedure in TRSVSARE.PRG)

Contains: SHOWLIST3 (lines 357 to 391)

---

APPENDIX 2

System: Travel Manager  
 Author: Clive Mathews  
 Database Structure Summary  
 Date: 8/15/89  
 Time: 22:39

---

Structure for database : CUSTOMER.DBF  
 Number of data records : 14  
 Date of last update : 8/15/89

Field	Field name	Type	Width	Dec
1	NUMBER	Numeric	4	
2	NAME	Character	30	
3	ADDR1	Character	30	
4	ADDR2	Character	30	
5	ADDR3	Character	30	
6	PHONE	Character	12	
7	CRLIMIT	Numeric	9	2
8	MONTH3	Numeric	9	2
9	MONTH2	Numeric	9	2
10	CURRENT	Numeric	9	2
11	BALANCE	Numeric	9	2
12	YRTODATE	Numeric	10	2
13	CONTACT	Character	30	
14	NUMTRANS	Numeric	2	
15	MONTH1	Numeric	9	2
16	TRANS	Logical	1	
17	DEBTOR	Logical	1	
** Total **			235	

Used by: TRINDEX.PRG  
 Used by: TROPEN.PRG

---

Structure for database : RENTSERV.DBF  
 Number of data records : 4  
 Date of last update : 8/15/89

Field	Field name	Type	Width	Dec
1	CATAGORY	Character	15	
2	NAME	Character	15	
3	LOCATION	Character	15	
4	LOCATION2	Character	15	
5	RATE	Numeric	8	2
6	PERIOD	Character	10	
7	PERIOD2	Numeric	4	1
8	VOUCHER	Logical	1	
9	DATE	Date	8	
10	COMMRATE	Numeric	5	2
11	NUMBER	Numeric	10	
12	GST	Logical	1	
13	GLNUMBER	Numeric	4	
14	DLNUMBER	Numeric	4	
** Total **			116	

Used by: TROPEN.PRG

APPENDIX 2 (cont)


---

Structure for database : PUBSERV.DBF

Number of data records : 29

Date of last update : 8/15/89

Field	Field name	Type	Width	Dec
1	CATEGORY	Character	15	
2	ORIGIN	Character	15	
3	DESTINATIO	Character	15	
4	DEPARTURES	Character	15	
5	TIMES	Character	15	
6	NAME	Character	15	
7	PRICE	Numeric	8	2
8	VOUCHER	Logical	1	
9	DATE	Date	8	
10	COMMRATE	Numeric	5	2
11	NUMBER	Numeric	10	
12	GST	Logical	1	
13	GLNUMBER	Numeric	4	
14	DLNUMBER	Numeric	4	
** Total **			132	

Used by: TROPEN.PRG

---

Structure for database : TEXT.DBF

Number of data records : 10

Date of last update : 8/15/89

Field	Field name	Type	Width	Dec
1	L1	Character	30	
** Total **			31	

Used by: TROPEN.PRG

---

Structure for database : SPARENUM.DBF

Number of data records : 17997

Date of last update : 8/15/89

Field	Field name	Type	Width	Dec
1	RETNUM	Numeric	4	
** Total **			5	

Used by: TROPEN.PRG

---

Structure for database : SYS.DBF

Number of data records : 1

Date of last update : 8/15/89

Field	Field name	Type	Width	Dec
1	INVNUMBER	Numeric	8	
2	RETNUMBER	Numeric	8	
3	LASTPOST	Character	2	
** Total **			19	

Used by: TROPEN.PRG

APPENDIX 2 (cont.)

Structure for database : CHARTACC.DBF  
 Number of data records : 34  
 Date of last update : 8/15/89

Field	Field name	Type	Width	Dec
1	NUMBER	Numeric	4	
2	DESCRIPTIO	Character	15	
3	MONTHTODAT	Numeric	10	2
4	YEARTODATE	Numeric	12	2
5	UPDATE	Logical	1	
** Total **			43	

Used by: TROPEN.PRG  
 Used by: TRMTHBAL.PRG  
 Used by: TRYRBAL.PRG  
 Used by: TRCHACC.PRG  
 Used by: TRGENJNL.PRG

Structure for database : RENTCAT.DBF  
 Number of data records : 5  
 Date of last update : 8/15/89

Field	Field name	Type	Width	Dec
1	NAME	Character	15	
2	GLNUMBER	Numeric	4	
** Total **			20	

Used by: TROPEN.PRG

Structure for database : INVOICES.DBF  
 Number of data records : 4  
 Date of last update : 8/15/89

Field	Field name	Type	Width	Dec
1	NUMBER	Numeric	7	
2	DATE	Date	8	
3	AMOUNT	Numeric	9	2
4	RETNUM	Numeric	4	
5	TYPE	Character	4	
** Total **			33	

Used by: TROPEN.PRG

Structure for database : SORT.DBF  
 Number of data records : 34  
 Date of last update : 8/15/89

Field	Field name	Type	Width	Dec
1	NUMBER	Numeric	4	
2	DESCRIPTIO	Character	15	
3	MONTHTODAT	Numeric	10	2
4	YEARTODATE	Numeric	12	2
5	UPDATE	Logical	1	
** Total **			43	

Used by: TROPEN.PRG  
 Used by: TRMTHBAL.PRG  
 Used by: TRYRBAL.PRG

APPENDIX 2 (cont)


---

Structure for database : PYMTTYPE.DBF

Number of data records : 10

Date of last update : 8/14/89

Field	Field name	Type	Width	Dec
1	TYPE	Character	10	
2	AMOUNT	Numeric	8	2
3	GLNUMBER	Numeric	4	
** Total **			23	

Used by: TROPEN.PRG

---

Structure for database : TRANS.DBF

Number of data records : 20

Date of last update : 8/15/89

Field	Field name	Type	Width	Dec
1	DATE	Date	8	
2	POSTDATE	Date	8	
3	TIME	Character	8	
4	VOUCHER	Numeric	8	
5	AMOUNT	Numeric	10	2
6	PYMTTYPE	Character	10	
7	GLNUMBER	Numeric	4	
8	DLNUMBER	Numeric	4	
9	POSTED	Logical	1	
** Total **			62	

Used by: TROPEN.PRG

Used by: TRGENJNL.PRG

---

APPENDIX 3

System: Travel Manager

Author: Clive Mathews

Broken Cross-Reference Report

Date: 8/15/89

Time: 22:38

Legend for context symbols:

(blank) reference does not change the variable or field value.

= variable or field is changed in an assignment statement.

x variable is released.

G GET statement changes variable or field.

R field is replaced.

P variable is declared PUBLIC.

V variable is declared PRIVATE.

!&amp; variable is referenced in a macro---takes preference over all others.

? reference is of unknown type.

DBF			
SYSMENU.PRG	63	67	
TRCASTMT.PRG	46		
-			
BS			
GSTREP.PRG	40		
-			
ACCADD			
TRCHACC.PRG	67	80	
-			
ACCDEL			
TRCHACC.PRG	69	112	
-			
ACCMOD			
TRCHACC.PRG	71	142	
-			
ADDR1			
TRAVIO.PRG	56		
CACUADD.PRG	79	131R	
CASTMTHD.PRG	24	24	
-			
ADDR2			
TRAVIO.PRG	57		
CACUADD.PRG	80	132R	
CASTMTHD.PRG	26	26	
-			
ADDR3			
TRAVIO.PRG	58		
CACUADD.PRG	81	133R	
CASTMTHD.PRG	28	28	
-			
PAGE			
TRCASTMT.PRG	85		
-			
ALARM			
TRAVEL.PRG	80	90	100
SYSMENU.PRG	59		





85.  
APPENDIX 3 (cont)

DOM										
GSTREP.PRG	36=	38=	40							
DOMMRATE										
RECVOUCH.PRG	60	60	62	65	67	71R	73R	75R	77R	86
	86	88	91	93	97R	99R	101R	103R	299	303
	319	323								
RECRETUR.PRG	60	60	62	65	67	71R	73R	75R	77R	86
	86	88	91	93	97R	99R	101R	103R	299	303
	319	323								
TRSVADP2.PRG	369R	416	435R							
TRSVADRE.PRG	127R	176	204R							
CONFIRM2										
RECRETUR.PRG	32	273								
CONNUM										
RECVOUCH.PRG	27=	296	44	277						
RECRETUR.PRG	27=	296	44	277						
CONTACT										
TRAVIO.PRG	55									
CACUADD.PRG	82	134R								
TRCUPYMT.PRG	37									
CASTMTHD.PRG	30									
COR										
TRCUPYMT.PRG	49=	51	60=	61						
CRLIMIT										
TRAVIO.PRG	61									
CACUADD.PRG	84	140R								
CRLIST										
REPMENU.PRG	115									
CURRENT										
TRAVIO.PRG	62									
TRPOST.PRG	26R	26R	55	57R	60R					
CACUADD.PRG	87	141R								
CASTMT1.PRG	122	126								
AGE.PRG	19	20	21R							
CUSTMENU										
TRAVEL.PRG	71									
CUSTOMER										
TRINDEX.PRG	28									
TRPOST.PRG	23									
REPMENU.PRG	94	107								
TROPEN.PRG	43									
RECVOUCH.PRG	164	237								
RECRETUR.PRG	164	237								
CACUADD.PRG	27	67	122							
CACUDEL.PRG	28									
CACUVIEW.PRG	18									
TRCUPYMT.PRG	17	66R								
TRSVADP2.PRG	370	399								
TRSVADRE.PRG	128	157								
TRCASTMT.PRG	57	64	87							
CASTMT1.PRG	49	49	119	141R						
AGE.PRG	13									
CASTMTHD.PRG	22	22	24	24	26	26	28	28	30	35

APPENDIX 3 (cont)

USTSOUT										
TRAVIO.PRG	42	48								
RECVOUCH.PRG	259									
RECRETUR.PRG	259									
CACUDEL.PRG	51									
CACUVIEW.PRG	40									
DAYREF										
REPMENU.PRG	130									
EBTOR										
TRPOST.PRG	64									
REPMENU.PRG	102	115								
CACUADD.PRG	143R									
TRSVADP2.PRG	371	404R								
TRSVADRE.PRG	129	162R								
TRCASTMT.PRG	58									
DEPARTURES										
TRSVSAP2.PRG	81	99	106	115	133					
TRSVADP2.PRG	168	225	240	251R	255	260	270R	280	295	306R
	315	325R	337	357	369R	425	435R			
DESCRIPT										
CASTMT1.PRG	68=	70=	72=	74=	76=	78=	80=	82=	84	
DESCRIPTIO										
TRSVADP2.PRG	79R									
TRSVADRE.PRG	63R									
TRMTHBAL.PRG	43	47								
TRYRBAL.PRG	43	47								
TRCHACC.PRG	37	55	105R	131	163	172R				
TRGENJNL.PRG	52									
DESTINATIO										
TRSVSAP2.PRG	64	81	88	99	115	133				
TRSVADP2.PRG	112	168	183	194R	198	203	213R	225	240	251R
	260	270R	280	295	306R	315	325R	337	357	369R
	425	435R								
DLNUMBER										
TRPOST.PRG	22	24	67							
RECVOUCH.PRG	73R	73R	99R	99R	164R					
RECRETUR.PRG	73R	73R	99R	99R	164R					
TRCUPYMT.PRG	66R									
TRSVADP2.PRG	398R	406R								
TRSVADRE.PRG	156R	164R								
DRLIST										
REPMENU.PRG	102									
END										
MANBOOK.PRG	53									
TRSVSARE.PRG	93									
FINCHG										
CASTMT1.PRG	22V	28								
FLAG										
RECVOUCH.PRG	238=	239	269=							
RECRETUR.PRG	238=	239	269=							
CACUVIEW.PRG	19=	20	42=							
FOUR										
ALARM.PRG	18=	25=	28	32	32					



APPENDIX 3 (cont)

HELP2									
HELP.PRG	49	127							
HELP3									
HELP.PRG	51	174							
HELP4									
HELP.PRG	53	189							
HELP5									
HELP.PRG	55	213							
HELP6									
HELP.PRG	57	240							
HELP7									
HELP.PRG	59	276							
HELP8									
HELP.PRG	61	297							
HELP9									
HELP.PRG	63	325							
HELFX									
TRAVIO.PRG	69								
I									
TRCHACC.PRG	53								
TRGENJNL.PRG	51	61							
ICON									
TRAVIO.PRG	79								
INVNUM									
TRCUPYMT.PRG	21=	53G	66R	69R					
INVOICES									
TRPOST.PRG	65								
TROPEN.PRG	60								
CACUADD.PRG	118								
TRCASTMT.PRG	29	29	69						
CASTMT1.PRG	42	139							
L1									
TRSVSAP2.PRG	180	184							
TRSVSARE.PRG	99	103							
LASTPOST									
TRAVEL.PRG	37R								
LOCATION									
TRAVIO.PRG	327								
TRSVSARE.PRG	54	115	118						
TRSVADRE.PRG	127R	173	204R						
LOCATION2									
TRSVSARE.PRG	126R								
RECVOUCH.PRG	86	212	312						
RECRETUR.PRG	86	212	312						
MAARS									
TRAVEL.PRG	67								
MACC									
TRCHACC.PRG	36=	38G	40	45	50	50	85	85	115
	147	147							11

## APPENDIX 3 (cont)

MACC2										
TRCHACC.PRG	82=	85	85	86G	88	92	96=	105R	114=	11
	115	116G	118	122	126=	144=	147	147	148G	15
	154	158=	172R							
MACCT										
CACUDEL.PRG	30=	32G	36	42	43					
TRCASTMT.PRG	26P	62=								
CASTMT1.PRG	43	141								
CASTMTHD.PRG	19									
MADDR1										
CACUADD.PRG	36=	79	94	131	169G					
MADDR2										
CACUADD.PRG	37=	80	94	132	170G					
MADDR3										
CACUADD.PRG	38=	81	94	133	171G					
MAMOUNT										
TRPOST.PRG	28=	30	32	33	34=	36	36	40	41	4
	44	44	48	49	50=	52	52	56	57	5
	60									
MANBOOK.PRG	27=	28P								
TRSVSARE.PRG	127	127								
RECVOUCH.PRG	131=	135	155	155						
RECRETUR.PRG	131=	135	155	155						
TRCUPYMT.PRG	50=	55G	57	66R	69R					
MAMT										
RECVOUCH.PRG	147=	148G	154	155						
RECRETUR.PRG	147=	148G	154	155						
MANBOOK										
TRAVEL.PRG	69									
MBAL										
TRPOST.PRG	30=	62								
CACUADD.PRG	23V									
TRGENJNL.PRG	31=	60	60	62	74					
CASTMT1.PRG	50	95	95							
MBALANCE										
CACUADD.PRG	44=	88	96	121	139					
MCAT										
TRSVSAP2.PRG	53=	54	64	81	99	115	133			
TRSVSARE.PRG	37=	38								
TRSVADP2.PRG	56=	57G	60	68	71	79R	85=	86G	90	9
	100	112	126	137R	146	156R	168	183	194R	20
	213R	225	240	251R	260	270R	280	295	306R	31
	325R	337	357	369R	425	435R				
TRSVADRE.PRG	40=	41G	44	52	55	63R	69=	70G	74	8
	84	127R	204R							
MCOM										
TRSVADP2.PRG	351=	354G	369	416=	420G	435				
TRSVADRE.PRG	107=	123G	127R	176=	196G	204				
MCONTACT										
CACUADD.PRG	35=	82	94	134	168G					

## APPENDIX 3 (cont)

MCREDIT										
TRMTHBAL.PRG	39=	48	48	53						
TRYRBAL.PRG	39=	48	48	53						
TRGENJNL.PRG	38=	57G	60	68	70					
CASTMT1.PRG	22V	48								
MCRLIMIT										
CACUADD.PRG	40=	84	96	140	173G					
MCURRENT										
CACUADD.PRG	46=	87	96	141						
MDATE										
TRSVSAP2.PRG	142=	143	144	189=	190G	198R				
TRSVSARE.PRG	61=	62	63	109=	111G					
TRCUPYMT.PRG	48=	54G	66R	69R						
TRCASTMT.PRG	26P	29	30G							
TRGENJNL.PRG	28=	39G	66R	70R						
CASTMT1.PRG	134	141R								
CASTMTHD.PRG	36	37								
MDAYS										
TRSVSAP2.PRG	106=	107	115	133						
TRSVADP2.PRG	235=	237G	240	248	251	255=	256G	260	268	27
	280	295	306R	315	325R	337	357	365	369R	42
	432	435R								
MDEBIT										
TRMTHBAL.PRG	38=	44	44	53						
TRYRBAL.PRG	38=	44	44	53						
TRGENJNL.PRG	37=	54G	56	60	64	66				
CASTMT1.PRG	22V	47								
MDESC										
TRCHACC.PRG	83=	101G	105	145=	163=	169G	172			
MDEST										
TRSVSAP2.PRG	88=	89	99	115	133					
TRSVADP2.PRG	178=	180G	183	191	194	198=	199G	203	211	21
	225	240	251R	260	270	280	295	306R	315	32
	337	357	369R	425	435R					
MDL										
TRSVADP2.PRG	386=	392=	393G	398	401	406	407			
TRSVADRE.PRG	145=	151=	152G	156	159	164	165			
MENU2										
TRAVIO.PRG	161									
MENU3										
REPMENU.PRG	39	151								
MFIELD										
TRAVIO.PRG	237&	284&								
TRSVSAP2.PRG	28P	45=	65=	82=	100=	116=	134=			
TRSVADP2.PRG	28P	45=	113=	169=	226=	281=	338=			
MFINAL										
CASTMT1.PRG	115									
MGL										
TRSVSAP2.PRG	28P	50V								
TRSVADP2.PRG	28P	50V	75=	76	76	79R	81	101=	398R	
TRSVADRE.PRG	59=	60	60	63R	65					
MGST										
TRSVADP2.PRG	417=	421G	436							
TRSVADRE.PRG	177=	197G	205							

## APPENDIX 3 (cont)

## MHDG

TRAVEL.PRG	27P	46=	49	50=						
HELP.PRG	41=	42								
TRAVIO.PRG	35	50=								
MAARS.PRG	16=									
MANBOOK.PRG	31=									
CUSTOMENU.PRG	22=									
REFMENU.PRG	35=	36	37=	69=	83=	98=	111=	126=		
SYSMENU.PRG	28=									
TRSVSAP2.PRG	41=									
TRSVSARE.PRG	24=									
RECVOUCH.PRG	24=	36=	133=							
RECRETUR.PRG	24=	36=	133=							
CACUDEL.PRG	26=									
TRSVADP2.PRG	41=	54=	83=	110=	120=	139=	166=	176=	196=	2
	233=	253=	278=	288=	308=	334=	347=	412=		
TRSVADRE.PRG	30=	38=	67=	93=	102=	170=				
TRMTHBAL.PRG	24									
TRYRBAL.PRG	25									
GSTREP.PRG	16=									
CASHREP.PRG	16=									
PYMTTYPE.PRG	16=									
PASSWORD.PRG	15=									
TRCHACC.PRG	26=									
TRGENJNL.PRG	25=									

## MLINE

TRSVSAP2.PRG	182=	184	186	186						
TRSVSARE.PRG	101=	103	105	105						
TRGENJNL.PRG	27=	29	30	30	39	40	52	54	57	
	82	82								

## MLDC

TRSVSARE.PRG	54=	55	116G	118=	121	126R				
TRSVADRE.PRG	105=	119G	127R	173=	192G	199	204R			

## MMON

TRSVSAP2.PRG	143=	146G	150	152	154	156	158	160	162	1
	166	168	170	172	189					
TRSVSARE.PRG	62=	65G	69	71	73	75	77	79	81	
	85	87	89	91	109					

## MMONTH

TRPOST.PRG	31=	32	33	36	39=	40	41	44	47=	
	49	52	55=	56	57	60				

## MMONTH1

CACUADD.PRG	42=	138								
AGE.PRG	18=	20=	23							

## MMONTH2

CACUADD.PRG	41=	86	96	137						
AGE.PRG	17=	23R								

## MMONTH3

CACUADD.PRG	43=	85	96	136						
AGE.PRG	16=	23R								

## MMTH

TRSVSAP2.PRG	151=	153=	155=	157=	159=	161=	163=	165=	167=	
	171=	173=	176&							
TRSVSARE.PRG	70=	72=	74=	76=	78=	80=	82=	84=	86=	
	90=	92=	95&							

## APPENDIX 3 (cont)

MNAME										
RECVOUCH.PRG	26=	28G	44	192	277					
RECRETUR.PRG	26=	28G	44	192	277					
CACUADD.PRG	34=	78	94	130	167G					
MNUM										
TRSVSAP2.PRG	136=	191G	198							
TRSVSARE.PRG	60=	114G	126							
TRCUPYMT.PRG	20=	27G	29	32	34					
MNUMBER										
CACUADD.PRG	33	49G	57=	62	69	70	77	121R	129	16
MODE										
GSTREP.PRG	18=	19G	21	41						
CASHREP.PRG	18=	19G	21	47						
MOK										
CACUADD.PRG	23V	100	101	107G	109					
CACUDEL.PRG	44	55	62G	64	68	70	73	75G		
TRCASTMT.PRG	32=	33	33	34=	36G	41				
PASSWORD.PRG	33=	34	43G	46						
MONTH1										
TRAVIO.PRG	63									
TRPOST.PRG	47	49R	53R							
CACUADD.PRG	138R									
CASTMT1.PRG	125	127								
AGE.PRG	17	23R								
MONTH2										
TRAVIO.PRG	64									
TRPOST.PRG	39	41R	45R							
CACUADD.PRG	86	137R								
CASTMT1.PRG	49	124	132							
AGE.PRG	16	23R								
MONTH3										
TRAVIO.PRG	65									
TRPOST.PRG	31	33R	37R							
CACUADD.PRG	85	136R								
CASTMT1.PRG	49	123	137							
AGE.PRG	16	23R								
MONTHTODAT										
TRPOST.PRG	20R	20								
TRMTHBAL.PRG	42	43	44	46	47	48	62	63R		
GSTREP.PRG	30	31	33	34						
CASHREP.PRG	30	31	33	34	36	37	41	43		
MORIG										
TRSVSAP2.PRG	71=	72	81	99	115	133				
TRSVADP2.PRG	122=	123G	126	134	137	141=	142G	146	154	15
	168	183	194R	203	213R	225	240	251R	260	27
	280	295	306R	315	325R	337	357	369R	425	43
MOVERDUE										
CASTMT1.PRG	49									
MPAGE										
CASTMT1.PRG	22V	26	102	103	103	113	113	136		
CASTMTHD.PRG	36	37								
MPER										
TRSVSARE.PRG	58=	113G	126R							
TRSVADRE.PRG	106=	121G	127R	174=	194G	200	204R			



## APPENDIX 3 (cont)

NET2											
CASHREP.PRG	39=	44	45								
NEW											
CACUADD.PRG	23V										
NUM											
RECVOUCH.PRG	240=	246	248	252	253						
RECRETUR.PRG	240=	246	248	252	253						
CACUVIEW.PRG	22=	28	30	34	35						
NUMBER											
TRAVIO.PRG	53										
TRINDEX.PRG	29										
TRPOST.PRG	19	24									
TRSVSAP2.PRG	198R										
TRSVSARE.PRG	126R										
RECVOUCH.PRG	60	86	164	204	212	253	292	312			
RECRETUR.PRG	60	86	164	204	212	253	292	312			
CACUADD.PRG	70	77	129R								
CACUDEL.PRG	43										
CACUVIEW.PRG	35										
TRCUPYMT.PRG	34	35	66R								
TRSVADP2.PRG	73	73	75	79R	376	386	401R				
TRSVADRE.PRG	57	57	59	63R	135	145	159R				
TRCASTMT.PRG	62										
TRMTHBAL.PRG	22	43	47								
TRYRBAL.PRG	22	43	47								
GSTREP.PRG	29	32									
CASHREP.PRG	29	32	35	40	42						
TRCHACC.PRG	31	37	37	37	45	50	50	55	92	10	
	122	154	172R								
TRGENJNL.PRG	46										
CASTMT1.PRG	59	60	85	86	131						
CASTMTHD.PRG	35	37									
OK											
CACUADD.PRG	23V										
ONE											
ALARM.PRG	15=	22=	28	29	29						
OPT											
TRAVIO.PRG	187=	213=	216=	220=	222	222	222	224=	232=	25	
	261=	264=	267	267	267	269=	279=	302=	305=	30	
	308	308	310=	320=	342=	346=	349	349	351=	36	
	383=	387=	389	389	391=						
TRSVSAP2.PRG	43P	49	68	85	103	119	138				
TRSVSARE.PRG	32P	34	49								
TRSVADP2.PRG	43P	49	53	116	119	172	175	229	232	28	
	287	343	346								
TRSVADRE.PRG	32P	34	37	98	101						
OPTION											
TRAVEL.PRG	53	62G	66	68	70	72	82	92	102		
MANBOOK.PRG	40=	41G	43	45	47	49	51				
CUSTOMENU.PRG	23=	34G	38	41	44	46	48	50			
SERVMENU.PRG	26G	30	32	34							
SYSTEMENU.PRG	26=	41G	48	51	61	65	70	72	74	7	
ORIGIN											
TRSVSAP2.PRG	44	64	71	81	99	115	133				
TRSVADP2.PRG	44	112	126	137R	141	146	156R	168	183	19	
	203	213R	225	240	251R	260	270R	280	295	30	
	315	325R	337	357	369R	425	435R				







## APPENDIX 3 (cont)

REPLACE										
TRAVEL.PRG	37									
TRPOST.PRG	20	26	29	33	37	41	45	49	53	5
	60	62	67	71						
MANBOOK.PRG	21	26								
TRSVSAP2.PRG	198									
TRSVSARE.PRG	126									
RECVOUCH.PRG	71	73	75	77	97	99	101	103	122	12
	130	154	162	164						
RECRETUR.PRG	71	73	75	77	97	99	101	103	122	12
	130	154	162	164						
CACUADD.PRG	121	129	130	131	132	133	134	135	136	13
	138	139	140	141	142	143	145			
TRCUPYMT.PRG	66	67	69							
TRSVADP2.PRG	71	79	81	100	137	156	194	213	251	27
	306	325	369	398	401	402	403	404	406	43
	437	439								
TRSVADRE.PRG	55	63	65	84	127	156	159	160	161	16
	164	204	206	208						
TRCASTMT.PRG	65									
TRMTHBAL.PRG	62	63								
TRCHACC.PRG	105	107	109	172	174	176				
TRGENJNL.PRG	66	70								
CASTMT1.PRG	141									
AGE.PRG	21	23								
REPMENU										
TRAVEL.PRG	88									
RESERVADD										
TRSVADRE.PRG	85	89								
RESERVSSELL										
TRSVSARE.PRG	39	41								
RETNUM										
TRPOST.PRG	67R									
CACUADD.PRG	57	121R								
TRSVADP2.PRG	392	407								
TRSVADRE.PRG	151	165								
CASTMT1.PRG	43	141R								
RETURN										
HELP.PRG	37	72	125	172	210	237	273	294	322	
TRAVIO.PRG	38	45	66	94	107	159	258	265	270	30
	311	347	352							
TRINDEX.PRG	32									
TRPOST.PRG	74									
MAARS.PRG	27									
MANBOOK.PRG	52									
CUSTOMENU.PRG	54									
SERVMENU.PRG	38									
REPMENU.PRG	58	145								
SYSTEMENU.PRG	85									
TROPEN.PRG	67									
TRSVSAP2.PRG	51	56	69	74	86	91	104	109	120	12
	139	201								
TRSVSARE.PRG	35	50	129							
RECVOUCH.PRG	34	250	267							
RECRETUR.PRG	34	250	267							
CACUADD.PRG	112	160	196							
CACUDEL.PRG	85									
CACUVIEW.PRG	32									
TRCUPYMT.PRG	30									
TRSVADP2.PRG	51	117	160	173	230	285	344	442		

## APPENDIX 3 (cont)

TRSVADRE.PRG	35	99								
TRCASTMT.PRG	42	89								
TRMTHBAL.PRG	33	67								
TRYRBAL.PRG	33	58								
GSTREP.PRG	48									
CASHREP.PRG	54									
PASSWORD.PRG	52									
TRCHACC.PRG	74	89	119	151						
TRGENJNL.PRG	95									
CASTMTHD.PRG	41									
CACOMP.PRG	42									
RTOTAL										
TRCUPYMT.PRG	18=									
SERVMENU										
TRAVEL.PRG	78									
SHOWLIST										
TRAVIO.PRG	184									
TRSVADRE.PRG	33	96								
SHOWLIST2										
TRAVIO.PRG	315									
TRSVSARE.PRG	33	47								
SHOWLIST3										
TRAVIO.PRG	357									
SHOWLISTX										
TRAVIO.PRG	227									
TRSVADP2.PRG	47	114	170	227	282	339				
SHOWLISTX2										
TRAVIO.PRG	274									
TRSVSAP2.PRG	47	66	83	101	117	135				
SORT.DBF										
TRCHACC.PRG	32									
SPARENUM										
TROPEN.PRG	52									
CACUADD.PRG	52	110								
TRSVADP2.PRG	387	407	408							
TRSVADRE.PRG	146	165	166							
SSAPMEM										
TRAVEL.PRG	29									
PASSWORD.PRG	18	47								
SSAPMEM.MEM										
SYSTEMU.PRG	83									
SYS										
TRAVEL.PRG	36	41								
TROPEN.PRG	54									
SYSTEMU										
TRAVEL.PRG	98									
TCOMM										
RECVOUCH.PRG	50=	62	62	88	88	114	283=	299	299	31
	319									
RECRETUR.PRG	50=	62	62	88	88	114	283=	299	299	31
	319									





APPENDIX 4

System: Travel Manager

Author:

Clive Mathews

Data Dictionary

Date: 8/15/89

Time: 22:40

Field Name	Type	Len	Dec	Database
ADDR1	C	30	0	CUSTOMER.DBF
ADDR2	C	30	0	CUSTOMER.DBF
ADDR3	C	30	0	CUSTOMER.DBF
AMOUNT	N	9	2	INVOICES.DBF
AMOUNT	N	8	2	PYMTTYPE.DBF
AMOUNT	N	10	2	TRANS.DBF
BALANCE	N	9	2	CUSTOMER.DBF
CATAGORY	C	15	0	RENTSERV.DBF
CATEGORY	C	15	0	PUBSERV.DBF
COMMRATE	N	5	2	RENTSERV.DBF
				PUBSERV.DBF
CONTACT	C	30	0	CUSTOMER.DBF
CRLIMIT	N	9	2	CUSTOMER.DBF
CURRENT	N	9	2	CUSTOMER.DBF
DATE	D	8	0	RENTSERV.DBF
				PUBSERV.DBF
				INVOICES.DBF
				TRANS.DBF
DEBTOR	L	1	0	CUSTOMER.DBF
DEPARTURES	C	15	0	PUBSERV.DBF
DESCRIPTIO	C	15	0	CHARTACC.DBF
				SORT.DBF
DESTINATIO	C	15	0	PUBSERV.DBF
DLNUMBER	N	4	0	RENTSERV.DBF
				PUBSERV.DBF
				TRANS.DBF
GLNUMBER	N	4	0	RENTSERV.DBF
				PUBSERV.DBF
				RENTCAT.DBF
				PYMTTYPE.DBF
				TRANS.DBF
GST	L	1	0	RENTSERV.DBF
				PUBSERV.DBF
INVNUMBER	N	8	0	SYS.DBF
L1	C	30	0	TEXT.DBF
LASTPOST	C	2	0	SYS.DBF
LOCATION	C	15	0	RENTSERV.DBF
LOCATION2	C	15	0	RENTSERV.DBF
MONTH1	N	9	2	CUSTOMER.DBF
MONTH2	N	9	2	CUSTOMER.DBF
MONTH3	N	9	2	CUSTOMER.DBF
MONTHTODAT	N	10	2	CHARTACC.DBF
				SORT.DBF
NAME	C	30	0	CUSTOMER.DBF
NAME	C	15	0	RENTSERV.DBF
				PUBSERV.DBF
				RENTCAT.DBF
NUMBER	N	4	0	CUSTOMER.DBF
NUMBER	N	10	0	RENTSERV.DBF
				PUBSERV.DBF
NUMBER	N	4	0	CHARTACC.DBF
NUMBER	N	7	0	INVOICES.DBF
NUMBER	N	4	0	SORT.DBF

## APPENDIX 4 (cont)

NUMTRANS	N	2	0	CUSTOMER.DBF
ORIGIN	C	15	0	PUBSERV.DBF
PERIOD	C	10	0	RENTSERV.DBF
PERIOD2	N	4	1	RENTSERV.DBF
PHONE	C	12	0	CUSTOMER.DBF
POSTDATE	D	8	0	TRANS.DBF
POSTED	L	1	0	TRANS.DBF
PRICE	N	8	2	PUBSERV.DBF
PYMTTYPE	C	10	0	TRANS.DBF
RATE	N	8	2	RENTSERV.DBF
RETNUM	N	4	0	SPARENUM.DBF
				INVOICES.DBF
RETNUMBER	N	8	0	SYS.DBF
TIME	C	8	0	TRANS.DBF
TIMES	C	15	0	PUBSERV.DBF
TRANS	L	1	0	CUSTOMER.DBF
TYPE	C	4	0	INVOICES.DBF
TYPE	C	10	0	PYMTTYPE.DBF
UPDATE	L	1	0	CHARTACC.DBF
				SORT.DBF
VOUCHER	L	1	0	RENTSERV.DBF
				PUBSERV.DBF
VOUCHER	N	8	0	TRANS.DBF
YEARTODATE	N	12	2	CHARTACC.DBF
				SORT.DBF
YRTODATE	N	10	2	CUSTOMER.DBF

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