



# 2 DECISION • MASTER





# **DECISION?MASTER**

**This program can be used with the following computers  
(32K of memory is required):**

**Apple II**

**TRS-80/ Model I (Level II)**

**TRS-80/ Model II**

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# Contents

SECTION NO.	PAGE NO.
<b>1. Loading Instructions</b>	<b>11</b>
1. TRS-80 Model I (Level II) Loading Instructions	11
2. Making a Backup Diskette	11
3. Creating a Master Data Diskette	12
4. Creating Data Diskettes	13
5. How to Save a Decision	13
6. Examining a Data Diskette	14
7. Deleting Decision Files	14.1
8. Apple II Loading Instructions & Special Notes	BLUE INSERT
9. TRS-80 Model II Loading Instructions & Special Notes	GRAY INSERT
<b>2. Introduction</b>	<b>17</b>
<b>3. Decision Theory</b>	<b>21</b>
1. Weighted Factor Analysis	21
2. Alternative Futures	23
3. Present Value Theory	24
Present Value	24
Future Value	25
Internal Rate of Return	25
Discount Rate	26
4. The Final Decision	27
<b>4. Program Features</b>	<b>31</b>
1. New Decisions	31
2. Interfacing DecisionMaster With Financial Forecasting Programs	31
3. Help! (Screen-to-Manual Cross Reference)	32
4. Formatted Screen Data Entry System	32
5. Reviewing Previous Decisions	32
6. Error Corrections	33
<b>5. Learning to Use DecisionMaster</b>	<b>39</b>
1. Preliminary Data	39
2. Alternative Futures	39
3. Weighted Factor Analysis	40
4. Cash Flow Analysis	48

<b>6. Sample Decisions .....</b>	<b>59</b>
<b>Business Decisions .....</b>	<b>59</b>
1. Beyond Financial Forecasting .....	59
2. Hiring or Promoting an Employee .....	61
3. Evaluating a Stock Purchase .....	61
4. Leasing versus Buying .....	62
5. Expanding a Business .....	63
6. Going into Business for Yourself .....	63
7. Advertising .....	64
<b>Personal Decisions .....</b>	<b>65</b>
1. Major Purchases .....	65
2. Evaluating a Job Offer .....	65
3. Selecting a College .....	66
4. Selecting a Life Insurance Policy .....	66
5. Evaluating Political Candidates .....	67
6. Choosing a Family Vacation Spot .....	68
7. Arranging Furniture .....	69
<b>7. Screen-to-Manual Cross Reference .....</b>	<b>73</b>
<b>8. Bibliography .....</b>	<b>81</b>

## **Section 1**

# **Loading Instructions**



# Loading Instructions

## IMPORTANT

Before using the DecisionMaster program, you should do the following:

- a. **Make a Backup Diskette of the DecisionMaster Program.** Use the backup and store the original disk in a safe place.
- b. **Make a second Backup Diskette of the program for use in creating a Master Data Diskette** which will be used to create Data Diskettes for saving decisions.
- c. **Make several Data Diskettes** to have available for saving decisions.

The procedures for creating Backup Diskettes and Data Diskettes are in this section

## 1. TRS-80 Model I (Level II) Loading Instructions.

- a. Power up the system.
- b. Insert the DecisionMaster Program Diskette (backup copy) and press the RESET button. The following information will appear on your screen:  
DOS READY
- c. Type **BASIC 1**, RUN **"DM/BAS"** and press **ENTER**
- d. The words **INITIALIZING PROGRAM** will appear as the program loads.
- e. When the following menu appears, enter the number of your selection.
  1. NEW DECISION
  2. REVIEW PREVIOUS DECISION
  3. TERMINATE
- f. If you selected No. 1, you will be given a menu of decision types: enter the number of the decision type you wish to evaluate; the sequences for that type will automatically follow. (Refer to Section 4, Paragraph 1, for a discussion of decision types.)
- g. If you selected No. 2 (Review Previous Decision), follow the instructions for reviewing decisions in Section 4, Paragraph 5.
- h. The selection of No. 3 will terminate the program.

## 2. Making a Backup Diskette

- a. Power up the system
- b. Insert the original DecisionMaster Program Diskette (referred to below as the Source Diskette)

- c. Press the RESET button. The following will appear on your screen:  
**DOS READY**
- d. If you have a single disk drive, type the following:  
**COPY :0 TO :0 mm/dd/yy** and press **ENTER**.  
The mm/dd/yy refers to the date, i e., 03/17/81.
- e. If you have a dual disk drive, type the following:  
**COPY :0 TO :1 mm/dd/yy** and press **ENTER**.
- f. If you are using one disk drive, a message will appear on the screen telling you when to insert the Destination (blank) Diskette and when to insert the Source (Original Program) Diskette. The message will read: **PRESS ENTER WHEN SOURCE DISKETTE (or Destination Diskette) IS IN DRIVE 0**.
- g. If you are using two disk drives, the message will read: **PRESS ENTER WHEN SOURCE DISKETTE IS IN DRIVE 0 or PRESS ENTER WHEN DESTINATION DISKETTE IS IN DRIVE 1**
- h. When the backup is completed, this message will appear:  
**DISKETTE COPY COMPLETED — PRESS ENTER WHEN AN ULTRADOS DISKETTE IS IN DRIVE 0**.  
The Ultrados Diskette refers to the Source or Program Diskette.
- i. Now, repeat this procedure to make a *second* Backup Diskette. One will be used as the Program Diskette and one will be used to create a Master Data Diskette

### 3. Creating a Master Data Diskette

Using one of the Backup Diskettes you just created — **NOT THE ORIGINAL PROGRAM DISKETTE** — make a Master Diskette as follows. You'll use this Master Data Diskette to create Data Diskettes on which to store decisions.

- a. Power up the system and insert the Backup Diskette in the drive.
- b. Press the RESET button. **NOTE:** If you have just made the Backup Diskette and it is still in the drive, simply press **ENTER**.
- c. The following will appear on the screen:  
**DOS READY**  
To make room for your decision data you must now erase five files on the Backup Diskette that are not needed for saving decision data
- d. Type **KILL D/BAS.XX** and press **ENTER**.  
When the file is deleted, the line **DOS READY** will appear on your screen.
- e. Type **KILL F/BAS.XX** and press **ENTER**.
- f. Type **KILL DM/BAS** and press **ENTER**.

You now have a Master Data Diskette. Label it as such and use it for creating Data Diskettes for storing your decisions



## 5. Deleting Decision Files

To delete a decision file you no longer wish to save:

- a. Boot up the Program Diskette.
- b. Type **CATALOG** and press **RETURN**. You will see a list of the decision files on that diskette.
- c. Type **DELETE** and the exact name of the decision file as it is listed on the directory. Press **RETURN**. When the cursor appears, the decision has been deleted.
- d. If you are deleting a Decision Type 3, remember, there is a Main Decision File plus a Financial Data File for each future. The Main Decision File is stored under the name of the decision; the Financial Data Files are stored under the name of the decision plus the number of the future (e.g., **HOUSE1**, **HOUSE2**, etc.)

## 6. Special Apple Commands and Features

The DecisionMaster manual was written using a TRS-80 Model 1. Therefore, the commands in the manual are those for the TRS-80. Certain differences appear in the Apple computer.

a. The TRS-80 has four directional (arrow) keys: up, down, right and left. The DecisionMaster program uses Apple's right and left arrow keys for all directions in the following manner.

(1) If the directional indicator in the upper right corner of the screen looks like this **<>**, the left arrow key (**←**) will move the cursor to the left and the right arrow key (**→**) will move the cursor or the indicator to the right. This is the normal function of these keys and if there is no directional indicator on the screen these keys will function in their normal manner.

(2) However, if the directional indicator looks like this **Δ** the left arrow key will move the indicator up (**↑**) and the right arrow key will move the indicator down (**↓**). When you are entering values, you can change the direction of these keys by pressing the space bar. To change them back, simply press the space bar again.

b. We have used the common term indicator to refer to the cursor or the carat (**>**, **Δ**).

c. Because of the narrower width of the Apple screen, some column headings are stacked and vertical columns are highlighted for clarity.

d. With the Apple program, you have the option of entering the full name of the choice and its abbreviation in two steps, or entering just the one or two-letter abbreviation when the program asks you to **ENTER CHOICE**.

e. Whenever you see instructions to press **ENTER** — press **RETURN**.



## 4. Creating Data Diskettes

To create Data Diskettes, follow the procedure for making a Backup Diskette on pages 11 and 12, **EXCEPT** use the Master Data Diskette as the Source Diskette. Use blank, erased diskettes as the Destination Diskettes.

Label each of the completed diskettes as Data Diskettes. Store the Master Data Diskette in a safe place.

## 5. How to Save a Decision

You will be given an opportunity to save your decision data at the end of the weighted factor analysis for Decision Type 1 and at the end of the Bayesian analysis for Decisions Type 2 and 3. If you wish to save it, enter Y; if not, enter N. If you elect to save the decision, you will be asked to enter a code name for the decision (up to eight characters). You will then be instructed by the program to insert a Data Diskette.

Data Diskettes are created specifically for saving decisions (as explained in Paragraph 4 of this Section 1). When saving a decision, you will be instructed by the program when to insert a Data Diskette and when to reinsert the Program Diskette.

After the decision has been saved on the Data Diskette, remove it and add the decision name to the diskette label. When reviewing a decision, it can be referenced only by the name you originally gave it. Therefore, it is important to label the diskette carefully. It is also advisable to write the date of the decision on the label.

**Special requirements for Decision Type 3.** When you are doing a cash flow analysis, keep in mind the following

- a. A financial decision is comprised of the Main File plus a Financial Data File for *each* of futures evaluated in the cash flow analysis. (A nonfinancial<sup>1</sup> decision, with or without futures, consists of only one file.) The Main Decision File is saved under the name of the decision plus the number of the future. For example, if your decision name is HOUSE, the Main Decision File will be saved under HOUSE and the financial data will be saved under HOUSE1, HOUSE2, HOUSE3, and so forth.
- b. When you are doing a cash flow analysis, the decision data will be saved whether or not you elect to save it permanently. This is necessary so the program can go back and forth between the main program (the weighted factor/Bayesian analysis) and the financial program (the cash flow analysis). When you are asked if you wish to save the decision, enter

N if you do not wish to save it. The Main Decision File will then be saved under the name TEMP and the financial data under the names TEMP1, TEMP2, TEMP3, and so on. This is important to remember if you wish to delete these temporary files later. (Refer to *Deleting Decision Files* in this section.)

- c. You will have only one opportunity to save a financial decision; that is at the end of the Bayesian analysis before you begin the cash flow analysis. If you elect to save it, the financial data will be automatically saved
- d. For Decision Type 3, you will be instructed to insert the Data Diskette and the Program Diskette several times during the program—first, at the end of the Bayesian analysis and then at the beginning and end of each cash flow analysis for each future.
- e. If you are saving several decisions on the same diskette, be sure to check the amount of free storage space before you begin the program. (Refer to *Examining a Data Diskette* below for this procedure.) If you attempt to store a decision on a diskette without sufficient storage space, the program will tell you when the diskette is full. There may be times when a financial decision (Type No. 3) is stored on two diskettes. If this happens, be sure to label the diskettes properly so the correct diskette can be used when reviewing the decision. (If, for example, a financial file is stored on the second diskette, label it with the name of the decision and the number of the future it represents, e.g., HOUSE2.)

## 6. Examining a Data Diskette

You may need to examine a Data Diskette for one of two reasons: To find out the names of the files stored on the diskette and to find out how much free storage space is left on the diskette.

- a. **Directory.** To find out the names of the files stored on a Data Diskette, insert the diskette, boot up the system, type **DIR** and press **ENTER**. You will see a list of all the files on that disk. If you wish to delete any of the files, refer to *Deleting Decisions* in this section.
- b. **Free Storage Space.** To find out the amount of free storage space left on a Data Diskette, insert the diskette, boot up the system, type **FREE** and press **ENTER**. The amount of remaining storage space will be given in grans. A fresh Data Diskette contains approximately 49 grans of storage. Use the following guide to determine whether sufficient grans are available for another decision.

- Decision Type 1 requires a maximum of 3 grants.
- Decision Type 2 requires a maximum of 3 grants.
- Decision Type 3 requires a maximum of 3 grants for the weighted factor/Bayesian analysis and 4 grants for **each** future of the financial files.

These maximums are based on using the maximum number of choices, factors, futures, and cash flow items that the program allows. Your decisions may require less storage space.

## 7. Deleting Decision Files

To delete a decision file you no longer wish to save:

- Boot up the Data Diskette.
- Type **DIR** and press **ENTER**. You will see a list of the decision files on that diskette.
- Type **KILL** and the name of the decision file as it is listed on the directory. Press **ENTER**. When the DOS READY line appears, the decision has been deleted.
- If you are deleting a Decision Type 3, remember, there is a Main Decision File plus a Financial Data File for each future. The Main Decision File is stored under the name of the decision; the Financial Data Files are stored under the name of the decision plus the number of the future (e.g., HOUSE1, HOUSE2, etc.).



# APPLE NOTES

## IMPORTANT

The manual for the DecisionMaster program was written using a TRS-80 computer. This blue insert contains loading instructions and special information applicable to the Apple II computer. Please read this section first. Then use the rest of the manual to learn to use the program, substituting various Apple commands for the TRS-80 ones in the manual (See No. 6 below).

One of the major differences between the two versions is in the use of Data Diskettes. The TRS-80 program requires special data diskettes for storing decisions; *the Apple II does not*. The Apple program uses the program diskette for storing decisions. Therefore, rather than making data diskettes, you should make several backup copies of the original diskette and use them for both running the program and storing decisions. When one diskette is full, simply use a fresh one. Always keep a fresh backup diskette on hand. *Ignore all references in the manual to Data Diskettes.*

Before you use the program, follow the instructions in No. 2 below to make two or more backup copies of DecisionMaster diskette.

Apple users may ignore pages 11 through 14.1 as these are specific instructions for the TRS-80.

### 1. Loading Instructions

**Note:** DecisionMaster was written in AppleSoft and requires the AppleSoft Language Card.

#### a. DOS 3.2

- (1) Insert the DecisionMaster Backup Diskette.
- (2) Power up the system.
- (3) Type **(RESET)6(CTRL)P(RETURN)** (Words in parentheses indicate special Apple keys.)
- (4) The program automatically loads and starts.
- (5) The words **INITIALIZING PROGRAM** will appear as the program loads
- (6) When the following menu appears, enter the number of your selection.
  1. **NEW DECISION**
  2. **REVIEW PREVIOUS DECISION**
  3. **TERMINATE**
- (7) If you selected No. 1, you will be given a menu of decision types: enter the number of the decision type you wish to evaluate, the sequences for that type will automatically follow. (Refer to Section 4, Paragraph 1, for a discussion of decision types.)

- (8) If you selected No. 2 (Review Previous Decision), follow the instructions for reviewing decisions in Section 4, Paragraph 5.
- (9) The selection of No. 3 will terminate the program.

#### **b. DOS 3.3**

- (1) Insert your Basics 3.3 diskette.
- (2) Power up the system.
- (3) When you are instructed to insert your 13-sector diskette, insert the DecisionMaster Backup Diskette.
- (4) The program automatically loads and starts.
- (5) The words INITIALIZING PROGRAM will appear as the program loads.
- (6) When the following menu appears, enter the number of your selection.
  1. NEW DECISION
  2. REVIEW PREVIOUS DECISION
  3. TERMINATE
- (7) If you selected No. 1, you will be given a menu of decision types: enter the number of the decision type you wish to evaluate; the sequences for that type will automatically follow. (Refer to Section 4, Paragraph 1, for a discussion of decision types.)
- (8) If you selected No. 2 (Review Previous Decision), follow the instructions for reviewing decisions in Section 4, Paragraph 5.
- (9) The selection of No. 3 will terminate the program.

## **2. Making Backup Diskettes**

You will need two Backup Diskettes initially. One will be used as the Program Diskette on which you will save decisions; the other should be reserved for use when the first Backup Diskette is full. The original DecisionMaster diskette should be stored in a safe place once the first Backup Diskettes are made. Whenever one Backup Diskette is full, immediately make another Backup Diskette so that you will have two Backup Diskettes at all times. The procedure for making Backup Diskettes is as follows:

#### **a. DOS 3.2**

- (1) If you have *two disk drives*, use the copy routine in your System Diskette which came with your Apple system.
- (2) If you have only *one disk drive*, you will have to download according to the instructions 2a through 2m in DOS 3.3 below.

#### **b. DOS 3.3**

- (1) If you have *two disk drives*, use the copy routine in your DOS 3.2 System Master diskette which came with your Apple system.
- (2) If you have only *one disk drive*, do the following:



- (a) Load the original DecisionMaster Diskette.
- (b) When the opening menu appears, select the #3 option (which is Terminate).
- (c) Remove the DecisionMaster Diskette and insert a blank diskette which has previously been initialized as a DOS 3.2 diskette. (For instructions on initializing a diskette refer to page 13 in your Apple DOS manual.)
- (d) Type **SAVE DM1** and press **RETURN**.
- (e) Remove backup diskette and insert backup diskette.
- (f) Type **LOAD HELLO** and press **RETURN**.
- (g) Remove program diskette and insert backup diskette.
- (h) Type **SAVE HELLO** and press **RETURN**.
- (i) Remove backup diskette and insert program diskette.
- (j) Type **LOAD FINANCIAL** and press **RETURN**.
- (k) Remove program diskette and insert backup diskette.
- (l) Type **SAVE FINANCIAL** and press **RETURN**.
- (m) Remove backup diskette and label it: **PROGRAM DISKETTE BACKUP**.

### 3. How to Save a Decision

You will be given an opportunity to save your decision data at the end of the weighted factor analysis for Decision Type 1 and at the end of the Bayesian analysis for Decision Type 2 and 3. If you wish to save it, enter Y; if not, enter N. If you elect to save the decision, you will be asked to enter a code name for the decision (up to 30 characters).

After the decision has been saved, remove the Backup Diskette and add the decision name to the diskette label. When reviewing a decision, it can be referenced only by the name you originally gave it. Therefore, it is important to label the diskette carefully. It is also advisable to write the date of the decision on the label.

**Special requirements for Decision Type 3.** When you are doing a cash flow analysis, keep in mind the following:

a. A financial decision is comprised of the **Main File** plus a **Financial Data File** for each of futures evaluated in the cash flow analysis. (A nonfinancial decision, with or without futures, consists of only one file.) The Main Decision File is saved under the name of the decision plus the number of the future. For example, if your decision name is **HOUSE**, the Main Decision File will be saved under **HOUSE** and the financial data will be saved under **HOUSE1**, **HOUSE2**, **HOUSE3**, and so forth.

b. When you are doing a cash flow analysis, the decision data will be saved whether or not you elect to save it permanently. This is necessary so the program can go back and forth between the main program (the weighted factor/Bayesian

analysis) and the financial program (the cash flow analysis.) When you are asked if you wish to save the decision, enter **N** if you do not wish to save it. The Main Decision File will then be saved under the name **TEMP** and the financial data under the names **TEMP1**, **TEMP2**, **TEMP3**, and so on. This is important to remember if you wish to delete these temporary files later. (Refer to Deleting Decision Files in this section.)

c. You will have only one opportunity to save a financial decision; that is at the end of the Bayesian analysis before you begin the cash flow analysis. If you elect to save it, the financial data will be automatically saved.

d. If you are saving several decisions on the same diskette, be sure to check the amount of free storage space before you begin the program. (Refer to Examining a Diskette below for this procedure.) If you attempt to store a decision on a diskette without sufficient storage space, the program will tell you when the diskette is full. There may be times when a financial decision (Type No. 3) is stored on two diskettes. If this happens, be sure to label the diskettes properly so the correct diskette can be used when reviewing the decision. (If, for example, a financial file is stored on the second diskette, label it with the name of the decision and number of the future it represents, e.g., **HOUSE2**.)

## 4. Examining a Diskette

You may need to examine a DecisionMaster Diskette for one of two reasons: To find out the names of the files stored on the diskette and to find out how much free storage space is left on the diskette.

a. **Directory.** To find out the names of the files stored on a DecisionMaster Diskette, insert the diskette, boot up the system, type **CATALOG** and press **RETURN**. You will see a list of all the files on that disk. If you wish to delete any of the files, refer to Deleting Decisions in this section.

b. **Free Storage Space.** To find out the amount of free storage type **PRINT FRE (1)**. This will give you the amount of free bytes remaining in memory. To determine how many more decisions you may save, add together all of the sectors used up by each file in the catalog. A total of 496 sectors are available on a diskette.

A fresh DecisionMaster Backup Diskette contains 341 sectors available for storage. Use the following guide to determine whether sufficient storage space is available for your decision.

- Decision Type 1 requires a *maximum* of 7 sectors.
- Decision Type 2 requires a *maximum* of 7 sectors
- Decision Type 3 requires a *maximum* of 7 sectors for the weighted factor/Bayesian analysis and 23 sectors for each future of the financial files.

These maximums are based on using the maximum number of choices, factors, futures, and cash flow items that the program allows. Your decisions may require less storage space.

**Section 2**

**Introduction**



# Introduction

Decision making is an important part of our lives. We are faced with decisions daily on how to run our businesses, how to spend our money, how to do our jobs, how to care for our families. In the final analysis it is our ability to make good decisions that determines our success and happiness.

Yet most of us make the majority of our decisions with little or no organized thought. We may ask the advice of friends. We may make a list of pros and cons. We may fret and worry over the decision for days. But few of us have a *system* for analyzing the factors that affect our decisions—even when those decisions may change the course of our lives.

DecisionMaster now provides you with a *system* for effective decision making. That final step when you must choose among alternatives. Now, with the aid of your computer, you have access to some of business's most sophisticated decision-making tools. How does DecisionMaster work? Once you have selected the type of decision you wish to make, the program utilizes one or more of its basic sequences which are based on three decision-making theories: weighted factor analysis, the Bayes' Rule (for alternative futures), and present value theory. These theories are built into DecisionMaster's algorithms and are transparent to the user. You simply enter data relevant to your decision according to instructions on the screen. DecisionMaster does the rest.

DecisionMaster can be used in business decisions, in daily routine decisions, and in major life decisions. It can improve the effectiveness of your decision-making process in several ways. It helps you think through and evaluate your alternatives in nonfinancial decisions; it lets you take into consideration the uncertainties of the future; it allows you to consider the time value of money in order to evaluate the financial side of a decision; and it interfaces with financial forecasting programs such as VisiCalc™ to help you evaluate the important *nonfinancial* aspects of complex financial decisions.

To learn to use DecisionMaster, we strongly recommend that you practice with the example in Section 5. Once you complete that exercise, you should be able to use the program with ease.

You should also read Section 3, *Decision Theory* and Section 4, *Program Features*. After you have practiced the decision in Section 5 you may want to use the sample decisions in Section 6 for further practice.

If you have a question about what is required at any point in the program, just press ? and you will be referred to a numbered paragraph in Section 7 which will tell you exactly what to do.

**A note of caution:** When you first use DecisionMaster for routine decisions, the decision-making principles may seem deceptively simple. But a major purpose of decision theory and of this program is to train you to use rigorous, thorough methodology in making even the most routine decisions. Later when you use the program to make more complex decisions in which many choices and factors are involved and in which alternative futures must be considered

along with an analysis of complex cash flows, you will gain insight into the true potential of DecisionMaster.

### **Section 3**

## **Decision Theory**





# Decision Theory

In its most simple form decision making involves four steps:

1. Narrowing the choices available with regard to the decision at hand.
2. Determining the circumstances or conditions (factors) that will be significantly affected by the decision.
3. Deciding which of these factors is the most important, which is the next most important, and so on.
4. Rating each choice for its ability to satisfy each of the factors.

Regardless of the decision we make, we go through these steps in one fashion or another, usually wrestling with the various choices and factors in a haphazard manner. Business decision theory, however, offers us certain tools which can lead to more rational and usually more effective decisions. But these tools are not limited to business decisions. Applying them to important life decisions and even routine personal decisions can increase our chances of making better decisions in all areas of our lives. While all decisions retain a quality of uncertainty, we owe it to ourselves to make sure that the method used to make a decision is the best available.

This section deals with business decision theory in a very abbreviated and simplified form. It is not necessary for the purposes of our program to teach you the mathematical formulas and complex analyses that are a part of decision theory; we simply want to make you acquainted with a few general concepts and basic terms. For those of you who would like to pursue the subject, a bibliography is provided at the end of this manual.

## 1. Weighted Factor Analysis

One of the most simple decision theories is often referred to as *weighted factor analysis*. It is simply establishing numerical values for qualitative factors and weighting them for analysis. It begins with the four steps outlined above.

**a. Narrow your choices.** Most decisions deal with selecting between two alternatives or among a small number of alternatives. There may be a large number of choices available, but the circumstances surrounding the decision usually narrow the field automatically. The real struggle with the decision comes when the choices have been narrowed to the viable ones. This is when you should apply weighted factor analysis.

Suppose you are faced with a decision to buy a car. Your personal taste or budget will automatically exclude many makes and models. For the purpose of this example, let's say your choices have been narrowed to a BMW Coupe, a Mercedes 450 SEL, and a Cadillac Seville.

**b. Determine the factors relevant to your decision.** List all the circumstances or events you are going to consider with regard to your decision. Then narrow the list to the most important ones (ideally, ten or fewer). If you include a factor

that has very little bearing on your final decision, weighting the factors will be more difficult. In some cases there may be only three or four factors worthy of analysis.

To continue our car example, you might list as factors price, styling, gas mileage, reliability, resale value, size, performance, and service availability.

**c. Weight the factors for relative importance.** Now, establish numerical ratings for each of the factors. First, decide which of the factors is the most important to your decision. Which one really carries the most *weight* when you make that final choice? That factor should receive your highest numerical rating or weight. All other factors should then be compared to that factor with regard to their importance in your decision and given relatively lower weights.

It is important when weighting factors to make sure that your most important factor really carries the most weight, percentage-wise, in your decision. This is often difficult when you have many different factors or when you assign high weights to less important factors. Just keep in mind that the presence of insignificant factors will decrease the significance of the most important one.

In our example, you might want to eliminate styling and size as factors since you have probably taken them into account already by narrowing your choices to the three automobiles mentioned. You would then weight the remaining factors for their importance. (E.g., if you consider cost the most important factor, give it the highest weight and give the other factors relatively lower weights.)

**d. Rate each choice for each of the factors.** You must now evaluate each choice for each of the factors and give it a numerical value.

For example, consider which of your choices will give you the best gas mileage. The cars mentioned would probably have similar EPA mileage ratings, but you would select the one with the best rating and give it the highest value for the gas mileage factor; the other two models would receive slightly lower values. If, however, you had included a Volkswagon among your choices, it would get the highest value for gas mileage and the others, comparatively low values.

In rating your choices for the various factors, it is important to try to isolate each factor in your mind when relating it to the choices. Rate the choice for *that* factor and that factor only; then continue down your list and isolate the other factors in the same manner. It is also important to try to be objective so the value ratings you assign won't merely reflect your prejudices.

**e. Establish the total weighted value for each choice.** This final step is simply a mathematical one. The value ratings you gave to the choices for each factor are multiplied by the weight assigned to that factor. The choice with the highest total would be the one you have selected through your weights and value ratings.

Weighted factor analysis gives us a method for thinking through our decision and removing the emotional rationalization that often accompanies decision making. By quantifying our factors and choices we can arrive at an unbiased logical decision.

For relatively simple decisions, the five steps involved in weighted factor analysis will suffice, but for many important decisions a critical mistake is made if you stop at this point. That mistake involves not considering the uncertainty of the future. A decision theory referred to as the Bayes' Rule or *alternative futures* allows you to consider this important point.

## 2. Alternative Futures

One of the most common mistakes in decision making is to assume that the current situation will continue indefinitely. If you are considering whether or not to buy a house, you would probably make your decision based on your expectations that the current real estate climate will continue. But the future is always uncertain. What if interest rates go to 20%? What if a deep recession occurs? What if real estate values decline in general? To make the best possible decision in any situation you should take future uncertainties into account.

While no decision theory can predict future events, certain theories allow you to account for the *probability* of alternative futures. There are a number of probability theories, all consisting of complex mathematical formulas. The one we shall discuss briefly here which has become a cornerstone of modern decision theory is known as the Bayes' Rule. One of the several probability theories developed by the Reverend Mr. Thomas Bayes in the eighteenth century, this theory states in essence: "Choose the decision that minimizes your expected loss" (or conversely, "maximizes your expected gain").

To arrive at this ideal decision you should identify several alternative futures and assign probabilities of occurrence to each. Often the futures are simply stated as *normal*, *pessimistic* and *optimistic* –allowing you to determine how your decision will be affected if the situation stays the same (normal), if it deteriorates (pessimistic), or if it improves (optimistic). By combining the probabilities mathematically, the Bayes' Rule allows you to arrive at the "expected future". Therefore, you don't have to base your decision on which future you *think* will occur; this theory allows you to take into consideration the likelihood of *each* of the futures occurring.

Alternative futures need not be stated in terms of normal, optimistic and pessimistic. It is better in fact to identify specific occurrences or events that might affect your particular decision. Just ask yourself "what if" such and such should occur that would directly affect your decision. An example of alternative futures that do not fall into the classic categories of normal, optimistic and pessimistic might be those for a proposed mining venture in which you expect to find different minerals. If the advisability of investing in the venture depends on extracting commercial quantities of specific minerals, your alternative futures might be stated as follows.

**Future No. 1:** A 50% chance of striking only decorative rock.

**Future No. 2:** A 40% chance of striking zinc or copper in commercial quantities, along with the decorative rock.

**Future No. 3:** An 8% chance of also striking silver in commercial quantities.

**Future No. 4:** A 2% chance of also striking gold in commercial quantities.

You would then evaluate your financial projections in light of each of these alternative futures to arrive at a decision that will "minimize your expected loss" or "maximize your expected gain."

Alternative futures can also be used with nonfinancial decisions. Let's suppose you are considering two candidates for a high-level management position in your company and the factors you've evaluated so far have left them in a fairly equal position. To bring the decision into sharper focus, let's examine two alternative futures. Suppose your industry went into a sudden and sharp decline, perhaps through technical obsolescence of your product. This sort of future might require management capabilities you had not previously considered. Which candidate could handle the situation better? On the other hand, suppose the industry experienced a sudden explosive growth. This future would require a manager with the ability to take advantage of the growth opportunities. Which candidate could best handle this kind of situation?

By assigning probabilities to each of these two alternative futures, plus the "normal" future (i.e., the situation continues the way it is now), you can make your decision based on an "expected future." Assigning probabilities, by the way, is a purely judgmental matter. Still, it allows you to take into account the uncertainty of the future.

### 3. Present Value Theory

When making investment decisions, we often fail to take into account the time value of money. We do not quantitatively account for money that comes to us at different times. But think about it. A thousand dollars is worth more today than it will be if we receive it two years from now. Disregarding inflation which decreases its purchasing power, the money we receive today can be invested in a savings account or other investment medium to earn interest while the future sum money does us no good until we actually receive it.

**Present Value.** In order to intelligently evaluate a proposed investment, you must therefore take into account the time value of money. To do so you must *discount* future flows of cash by a rate of interest that you could expect to receive on the money if you had it today to invest in some medium. This procedure of discounting cash flows is called *present value theory*. It allows us to determine the present value of money that comes to us at different times in the future.

Suppose you are evaluating a \$10,000 investment. Your financial projections indicate that the return on your investment will be paid back over a three-year period: \$3,000 the first year, \$4,000 the second year, and \$5,000 the third year. If you discounted these cash flows by a rate of interest of, say, 10%, you would see that the investment is not a good one. The present value of these cash flows is only \$9,700. You would be better off to put the \$10,000 in a certificate of deposit for three years.

**Future Value.** The process of discounting cash flows to arrive at the present value might be more easily understood if we look at the process in reverse. If you place \$1,000 in a savings account today that earns an interest rate of 10%, in one year it will cumulate to \$1,100, in two years to \$1,210, and in three years to \$1,331 (assuming annual compounding of interest). The figure we derive by compounding interest on a sum of money to some future point is called its *future value*. Present value simply reverses the process by discounting an expected flow of cash by the interest rate it would earn in such a savings account.

Sometimes it is simply easier to relate to future value than to present value. Take insurance policies, for example. Suppose you are comparing a whole life insurance policy with a cash value of \$4,000 with a term policy that has no cash value. The whole life policy costs \$200 a year for 20 years; the term policy costs \$80 a year. Which is the better buy? Most people would opt for the whole life policy, but present value methodology, stated in terms of future value, will show us that the term policy is clearly superior.

Let's examine the future value of these two policies using different interest rates. At 10% we see that \$200 a year for 20 years has a future value of \$12,654 (assuming annual compounding of interest). If we had put that \$200 into the whole life policy, we would have only \$4,000 in 20 years. The policy in effect costs us \$6,654. If we put \$80 a year into a 10% investment medium for 20 years, we would have \$5,061 at the end of that period. The term policy in effect costs us \$5,061 (since it has no cash value at the end of that time).

Using an interest rate of 8%, the \$200 will cumulate to \$9,912 in 20 years, making the whole life policy cost us \$5,912 (\$9,912 minus \$4,000); \$80 per year will cumulate to \$3,964, making the term policy cost us only \$3,964. In fact, we must go down to a 4% interest rate before the term policy becomes more expensive than the whole life policy. At 4% \$200 a year would cumulate to \$6,197 in 20 years, making the whole life policy cost us \$2,197 (\$6,197 minus \$4,000); \$80 per year at 4% would cumulate to \$2,479 per year, making the term policy cost \$282 more than the whole life policy. Assuming we could earn more than 4% on our investment, we would buy the term policy based on purely financial considerations. However, you should also consider nonfinancial factors, such as tax considerations, estate planning, insurability at the end of 20 years, and so forth.

Now, if we tried to state the time value of these cash flows in terms of present value, we could not relate to it as well. Because there is no net gain from the purchase of the policies, they would have a negative present value which would make comparison very difficult and confusing. In this and many other decisions, future value is much easier to comprehend. But whether you calculate the present value or future value of cash flows, you're using the same methodology to take into account the time value of money.

**Internal Rate of Return.** Another way to look at the time value of money is to calculate the *internal rate of return* of a proposed investment. The internal rate of return (also referred to as time-adjusted rate of return) is that rate of interest at which the present value of the outflows equals the present value of the inflows.

For example, let's suppose you are evaluating a project that requires a

\$10,000 investment. The rate at which you would discount the inflows (the return on that investment) so they equal the present value of the outflows (the amount of the investment and any subsequent expenses) would be the internal rate of return. (If the \$10,000 were your only expenditure there would be no need to discount that amount since it is happening at time zero: its present value is \$10,000.)

There is no easy way to arrive at the internal rate of return; rather, it is an iterative process of "guessing" the rate and then calculating the present value of the inflows and the outflows at that rate to see if they are equal. This process of guessing the rate is then repeated until the proper rate is found. Even a computer uses this iterative process: it simply does it more quickly.

Internal rate of return is often used when comparing various investment alternatives because it is usually easier to relate to than present value. You may have three investment alternatives that have present values of \$11,500, \$11,700 and \$12,000, respectively, using a discount rate of 10%. There is very little difference between these present values, and you might opt for one of the investments at this point on a purely emotional basis. But if you knew that the internal rates of return for the three deals were 12%, 15% and 18%, respectively, you would most likely select the latter since it gives you the widest margin of safety.

In essence, the internal rate of return tells you the rate of interest you would have to earn elsewhere to equal the investment opportunity at hand. It allows you to appreciate more clearly the true differences between investment alternatives so that these differences may be added to the nonfinancial considerations in a more precise fashion.

**Discount Rate.** Don't confuse internal rate of return with the *discount rate*. Discount rate is the arbitrary rate at which you discount cash flows to arrive at their present value or the rate at which you compound cash flows to arrive at their future value; internal rate of return is the *actual* rate the investment will earn based on its outflows and inflows.

How do you arrive at a discount rate? As an individual you might use the interest rate you could expect to receive if you invested that money in another medium. If you consider a savings account a reasonable alternative, use the rate you would expect to earn on that savings account. If you consider the stock market a more comfortable alternative, use the average return for the stock market. But if you must borrow the money to make the investment, you should use the rate you'd have to pay to borrow the money. Keep in mind also that the more speculative the venture you're considering, the higher the discount rate should be. In other words, it is not logical to use 8% (the interest rate for a savings account) to evaluate a speculative new business venture. One is simply not analogous to the other. Twenty to 30% or even more — the rate you might obtain when investing in a speculative stock — would be more appropriate.

Businesses typically use their cost of capital — the rate at which they can borrow money from a bank or other lending institution — as their standard discount rate. Larger, more sophisticated companies establish a cost of capital that takes into account the cost of equity capital as well as the cost of debt capital (the cost of equity capital being much higher). This figure is usually circulated

throughout the company for everyone to use as the discount rate when evaluating projects. The company policy might be, for example, to reject all projects that do not exceed a 20% discount rate.

When you use DecisionMaster's present value analysis (or cash flow analysis as we call it), you will receive three sets of data: present value, future value and internal rate of return. (The P/V Ratio given at the end of the cash flow analysis is the present value of the income divided by the present value of the expenses.) There will be times when *present value* is the best comparative tool; other times when *future value* makes more sense; and when you are comparing investment alternative the *internal rate of return* will help crystallize the differences among your alternatives. The formulas for all the decision theories discussed in this section are built into DecisionMaster's algorithms. All you have to do is enter specific data as called for during the program; calculations are performed automatically, and recalculations based on different discount rates, weights or values can be evaluated.

## 4. The Final Decision

The final decision, of course, is still up to you. When you have entered all your data, made all your judgmental evaluations, and completed all your analyses, *you* still have to make that final choice. Here are a few ways to help you interpret DecisionMaster's results in order to make a final decision.

**Weighted Factor Analysis.** If your decision requires only weighted factor analysis, the final choice is very simple. Just choose the alternative that has the highest total score. If you have given thoughtful consideration to weighting the factors and rating your choices, this total should reflect the best decision.

**Bayesian Analysis.** If you have considered alternative futures in your decision, there are three ways to select the best decision.

a. **The Bayes' Rule.** The highest total in the Bayes column will tell you which choice is the best decision given the weights and values of your factors and the probabilities of all your futures. It is the best decision for the "expected future," the one that will minimize your expected loss or maximize your expected gain.

b. **Max-Min Theory.** This theory says that you will select the alternative that "maximizes your minimum." When you compare the weighted factor totals for each future, each will have a high score and a low score. The choice that has the *highest low* would be your best decision under this theory. In other words, you would select the alternative that will give you the least possible chance of loss. This is a conservative way to make the final decision.

c. **Max-Max Theory.** This method is an optimistic approach to decision making. You would select the choice that has the *highest high* to "maximize your maximum." In other words, you would select the alternative that has the greatest chance for gain.

Once you understand the general principles of decision making, you will be able to use DecisionMaster with ease. Although no further study of decision

theory is required to use this program. a bibliography appears at the end of this manual if you wish to pursue the subject further.



#### **Section 4**

## **Program Features**



# Program Features

DecisionMaster allows you to make three general types of decisions, to save the data for each decision, and to review previous decisions. To familiarize you with the program, this section presents a brief synopsis of these and other special features.

## 1. New Decisions

If you select New Decision from the menu offered at the beginning of the program, you will be asked to select one of the following general types of decisions. You will then be guided through the basic sequence for that type of decision. The following decision types will appear on the screen.

a. **Routine Decisions (No Cash Flow Analysis).** This type of decision is basically nonfinancial and will use the weighted factor analysis sequence. Although a financial factor may be present, it is easily quantified by assigning a weight and values. For example, cost or salary or price may be a factor in a decision, but unless you wish to evaluate present or future values of cash flows or compare internal rates of return, it would not require cash flow analysis. Routine decisions may be as simple as buying a car or as complex as evaluating a job offer or anything in between.

b. **Decisions with Alternative Futures (No Cash Flow Analysis).** This type of decision is similar (in some cases identical) to the routine decisions discussed above. It is basically nonfinancial and utilizes the weighted factor analysis sequence along with alternative futures, which allows you to take into consideration the uncertainty of the future (i.e., normal, optimistic, pessimistic). This decision type should be selected when you think that possible future events might impact your decision differently. Such decisions might include filling a high-level management position, choosing a career, deciding whether to move to another city, and so on. Although each of these decisions could be made with just weighted factor analysis, you gain a broader perspective and a better chance of making the right decision by examining alternative futures.

c. **Decisions with Cash Flow Analysis and Optional Alternative Futures.** This decision type combines weighted factor analysis with cash flow analysis and gives you the option of evaluating alternative futures. If you wish to skip the alternative futures sequence, simply specify one future when asked to name your futures—it will automatically receive a probability of 100%. If you specify additional futures, you should do the cash flow analysis for each of the futures named in order to obtain a fair evaluation of each; however, you will have the option to skip the cash flow analysis for your additional futures if you like.

## 2. Interfacing DecisionMaster With Financial Forecasting Programs

Many financial decisions require the kind of analysis which is outside the scope of DecisionMaster's capabilities. When you have many revenue and expense items to forecast over some future periods, you may need a financial

forecasting program such as Visicalc™ to prepare pro forma cash flows. But no decision is based on purely financial considerations. That is why we recommend the use of DecisionMaster as an adjunct to financial forecasting programs. Once you have developed your net cash flows for each year for your various alternatives, you can evaluate the probabilities of those alternatives by using the alternative futures sequence of DecisionMaster. You can also examine other important factors, in addition to the financial factor, by using DecisionMaster's weighted factor analysis. And you can use DecisionMaster's cash flow analysis to examine present value, future value or internal rates of return for your alternatives. An example of the "marriage" of DecisionMaster with a financial forecasting program is shown in Section 6, Paragraph 1 under Business Decisions.

### **3. Help! (Screen-to-Manual Cross Reference)**

DecisionMaster features a unique screen-to-manual cross reference system that allows you to ask for help at any point in the program. If the screen gives you an instruction you don't understand, you don't have to search this entire manual looking for the right clue! Just press ? and the prompt line will refer you to one of the numbered paragraphs in Section 7 which will tell you exactly what is required at that point.

### **4. Formatted-Screen Data Entry System**

Entering data for a financial table is usually a cumbersome task: you must normally enter the data one line at a time, left to right, top to bottom. As you will see with DecisionMaster, it is frequently desirable to skip around and enter data first for factors and choices that you know best, leaving the more subjective ones till last. DecisionMaster's formatted-screen data entry system allows you to do just that. On the values screens you may move the indicator up, down, right, or left, just by pressing the appropriate arrow keys. (See Section 1 for appropriate Apple commands.)

### **5. Reviewing Previous Decisions**

To review a previous decision:

- a. Load the DecisionMaster Program Diskette according to the loading instruction.
- b. When the menu appears, enter 2 for Review Previous Decision.
- c. Enter the code name of the decision you wish to review when instructed to do so.
- d. Insert the Data Diskette that contains the decision when instructed to do so. After the decision data is loaded, you will be instructed to insert the Program Diskette.

**Decision No. 1.** The final Weighted Factor Screen will appear. To recall the previous screens enter Y in response to the ANY CHANGES question, then enter the code for the screen you wish to review.

**Decision No. 2.** The final Bayesian Screen will appear. To recall the previous screens enter Y in response to the ANY CHANGES question, then enter the *number*, not the name, of the future you wish to review. Then enter the code for the Factors, Weights, Choices or Values screens.

**Decision No. 3.** The final Bayesian Screen will appear. To recall the previous screens of the weighted factor analysis, follow the instructions for Decision No. 2 above. To review the cash flow data screens, first enter N in response to the ANY CHANGES question, then enter Y in response to the question DO YOU WISH TO DO THE CASH FLOW ANALYSIS. Enter the *number*, not the name of the future you wish to review. The final Cash Flow Screen for that future will be recalled; you can then recall the expense and income tables for each choice by entering the appropriate codes.

e. **Partial Decisions.** If your decision was only partially completed, you can complete the data by recalling the screens which are incomplete and entering the missing data as *changes*. All weighted factor screens can be recalled from the Bayesian Screen. Expense and income tables can be recalled from the final Cash Flow Screen for each future.

f. **Resaving the Decision.** If you have changed any of the decision data, you should resave it to incorporate the changes. When asked if you wish to save the decision (at the Bayesian Screen) enter Y; then enter the *same decision name* as the old decision. If you have not made any changes, the decision will be retained in its previous form. (See Section 1 for more information on how to save a decision.)

## 6. Error Corrections

After data has been completed for any screen, you are given a chance to make changes. If you enter N in response to the ANY CHANGES question, the program will continue to the next screen. If you enter Y, one of several things may happen depending on where you are in the sequence.

**Weights and Values.** The indicator will go to the first position for weights or values. Move the indicator to the figure you wish to change and type in the new figure. *Do not press ENTER until all changes have been made.*

**Probabilities.** The indicator will go to the first probability. Move it to the probability you wish to change and enter R for revise. Type in the new two-digit figure and press ENTER. You must now adjust the other probabilities so they will equal 100. Repeat the above procedure until the total of the probabilities equals 100; then press ENTER again to continue the program.

**Choices, Factors or Futures.** If you wish to change the name of a choice, factor or future, you must indicate whether you wish to add, delete or revise the word. In response to the ANY CHANGES question, enter Y; then proceed as follows in response to the A/R/D question.

**To add a choice:** Enter A. The indicator will move to the next available choice position. Enter the name of the new choice and a one or two-character abbreviation. *You must recall the values screen for each future in order to evaluate all the factors for the new choice.*

**To add a factor:** Enter A. The indicator will move to the next available factor position. Type the name of the new factor and press ENTER. *You must recall the weight and values screens in order to weight and evaluate the new factor.*

**To add a future:** Enter A. The indicator will move to the next available future position. Type the name of the new future and press ENTER. *The indicator will automatically go to the first position of the probabilities column.* Move the indicator to the probability space opposite the new future and assign its probability; then adjust the other probabilities so the total will equal 100. *Do not press ENTER until all probabilities have been adjusted.*

**To revise a choice, factor or future:** Move the indicator to the item to be revised and enter R. The prompt line will instruct you to enter the new item. Type in the revised item (and the abbreviation if you're revising a choice) and press ENTER. The revised word will appear in place of the previous one.

**To delete a choice, factor or future:** Move the indicator to the item you wish to delete and enter D. The question OK TO DELETE will appear in the prompt line. If the indicator is positioned at the item you wish to delete, enter Y. That item will disappear and the following items will move to close the gap left by the deletion. If the indicator is *not* positioned at the proper item to be deleted, enter N; the delete question will disappear and you must enter D again if you wish to delete an item.

**Note:** Whenever you delete a choice, factor, or future, the weights, values and/or probabilities connected to the item will also be deleted. *This is, in fact, the only way to delete these figures.* If you delete a future, you must adjust remaining probabilities so they will equal 100.

**Cash Flow Tables:** The procedure for changing expense or income items in cash flow tables is a little different.

**To add or delete an expense or income item:** Enter Y in response to the ANY CHANGES question. Then continue as follows:

**To add an item:** Enter A for Add. A new line number will appear on the screen. Enter the name of the new item and then enter the rest of the data for that line.

**To delete an item:** Enter D for Delete. Then enter the line number of the item you wish to delete and press ENTER. The entire line will disappear and the following items will move up to fill the gap left by the deletion.

**To revise an expense or income item:** Enter Y in response to the ANY CHANGES question. Then enter R for Revise and the following will appear in the prompt line

**Enter Line No.** Enter the line number of the item you wish to revise.

**T/A/M** Enter the code for the item you wish to change: **T** for the title of the lump expense or lump income; **A** for the amount; or **M** for the month. Then type in the revised word or figure and press **ENTER**.

**T/A/B/E/F** Enter the code for the item you wish to change: **T** for title of the regular expense or regular income, **A** for amount; **B** for beginning month; **E** for ending month, or **F** for frequency. Then type in the revised word or figure and press **ENTER**

**Final Screens.** If you are at one of the final sequence screens, you may recall previous screens in order to make corrections.

**Weighted Factor Screen:** Enter **Y** in response to the **ANY CHANGES** question. Then enter the following codes to recall a previous screen: **F** for Factors, **W** for Weights, **C** for Choices, or **V** for Values.

**Bayesian Screen:** Enter **Y** in response to the **ANY CHANGES** question. Then enter the *number*, not the name of the future you wish to recall. Then enter the above codes for the Factors, Weights, Choices or Values screens.

**Present Value Screens:** Enter **Y** in response to the **ANY CHANGES** question. Then enter the *number* listed on the screen for the expense or income table you wish to change.

**Cash Flow Screens:** On these screens there are two revision sequences. If you wish to change the *values* on this screen, enter **Y** in response to the **ANY CHANGES TO VALUES** question. Then enter the new values. If you wish to recall previous screens, first enter **N** in response to the **ANY CHANGES TO VALUES** question, then enter **Y** in response to the question **ANY CHANGES TO FINANCIAL DATA**. Next, enter the number of the choice you wish to change; then enter the number listed on the screen of the expense or income table you wish to change.

**Note:** To return to the final screen, press **ENTER** or enter **N** in response to the **ANY CHANGES** question.





## **Section 5**

# **Learning to Use DecisionMaster**



# Learning to Use DecisionMaster

To teach you how to use DecisionMaster, we will take you step by step through a decision that utilizes all three basic sequences of the program: weighted factor analysis, alternative futures, and cash flow analysis.

**The Decision.** Let's suppose we have a family of four who is faced with a decision to buy a house. Their three choices are:

1. A house larger than their present home, located in a slightly better neighborhood. Cost: \$105,000. Downpayment: \$5,000. Monthly payment: \$950.
2. A condominium in a downtown high-rise building. Cost: \$95,000. Downpayment: \$10,000. Monthly payment: \$900.
3. A large duplex. The family would live in one side and rent the other. Cost: \$120,000. Downpayment: \$20,000. Monthly payment: \$1,050.

To keep our decision as simple as possible, we will assume that all three properties are in good condition with no renovations necessary.

Load the program according to the instructions in Section 1 of this manual.

## Preliminary Data

After the program has been initialized, enter 1 for New Decision.

Next you are asked which type of decision you wish to make. Buying a house would normally be a routine decision (Decision Type No. 1). However, since the purpose of this section is to teach you to use the program, enter 3 for Decisions With Cash Flow Analysis and Optional Alternative Futures. This decision type combines all three basic sequences of the program. Once you go through these sequences, you'll find it easy to use Decision Types 1 and 2.

## Alternative Futures

Before we begin our analysis, we must indicate the futures we wish to consider. These will appear later in the program as we evaluate our choices for the weighted factor analysis and cash flow analysis.

### 1. Futures Data

You are instructed to enter the futures to be considered in your decision (maximum of five futures).

To define our alternative futures we should consider possible events or circumstances which could happen that would directly affect our decision. The usual procedure is to define the futures as *normal* (the situation stays pretty much the same as it is now), *optimistic* (the situation improves greatly), and *pessimistic* (the situation deteriorates). It is important, however, to be as specific as possible in defining events or circumstances that might affect *this* particular decision. (If you wish to review this decision theory, refer to *Alternative Futures* in Section 3.)

With regard to the duplex, two specific circumstances might occur which would directly affect our decision. (1) What if we were unable to rent the duplex? We are expecting it to *produce* income, but if we can't keep it rented we will have an increased financial burden. (2) What if our income were to drop suddenly? Assuming the duplex could stay rented, it would provide us with a supplemental income. (There are, of course, other alternative futures: high vacancies plus reduced income, general deflation of all real estate properties, and so on, but for the sake of simplicity we'll limit our futures to these two, plus a normal future.)

Enter a code name for each of the futures:

**NORM**  
**HI VAC**  
**LO INC**

**Note:** Always enter the *normal* future first because the values that you enter for Future No. 1 will be used for comparison with subsequent futures. This will become clear later in the program.

Press **ENTER** again after you've entered the last future.

## **2. Probabilities**

You are now asked to enter probabilities for each future. *Do not press ENTER.* The indicator will move down the column automatically as you enter the figures. *Enter all probabilities as two-digit figures; do not enter a percent sign.* The total of all probabilities must equal 100.

Assigning probabilities is simply indicating the likelihood, in your opinion, of each of the futures occurring. Let's assume the normal future is most likely to continue, but the other two futures have an equal but considerably lesser chance of occurring. Therefore, give **NORM** a probability of **60** and **HI VAC** and **LO INC** each a probability of **20**.

When you have assigned probabilities for all your futures, you will be asked for **ANY CHANGES? (Y/N)**. If there are no changes, enter **N**.

**Note:** You may skip the alternative futures sequence of Decision Type 3 by entering only one future. It will automatically receive a probability of 100%.

## **Weighted Factor Analysis**

We will now begin the weighted factor analysis. Notice that the word **NORM** appears at the top right of the screen. This is to indicate that you will be evaluating your choices and factors for your Future No. 1. First, we must enter our choices and factors; they will remain the same throughout the evaluation of each future.

## 1. Choices

You are asked whether you wish to enter Factors or Choices first. Since we already know what our choices are, enter C for Choices. Then enter the names of the choices, along with a one or two-character abbreviation for each.

**HOUSE** Abbreviation **HO**

**DUPLEX** Abbreviation **DU**

**CONDOMINIUM** Abbreviation **CO**

Notice that the abbreviations appear at the top of the screen—the full names of the choices will appear later in the program. When you have entered the last choice, press **ENTER** again to continue the program. (The program allows for ten choices with Decisions Type 1 and 2; with *Decision Type 3 using the cash flow analysis*, you are limited to six choices.)

The **ANY CHANGES** question appears in the prompt line. Enter N for no changes. (Note: If you wish to make changes at this point, refer to Section 4, Paragraph 6 for the procedures on error corrections.)

## 2. Factors

Notice that your choices have temporarily disappeared and the indicator is located at the second factor position, below **FINANCIAL**. ~~The **FINANCIAL** factor appears automatically when you selection Decision No. 3.~~ It will not appear with the sequences for Decisions No. 1 or 2. We will ignore this factor for the moment.

Selecting factors requires a bit of discussion at this point. A factor is something that will be affected by or will contribute to your decision. It is important to select only the most important factors; in most instances your decision will probably be better if you limit your factors to six or eight. Why? Because the more factors you take into consideration, the harder it is to weight them for their relative importance. A fewer number of factors can be handled much more realistically, although DecisionMaster allows for 12 factors.

**Note:** Factors are limited to 12 because, as you will see later, it is important to see all the factors on the screen at one time. Furthermore, if you have selected the most important factors, it is highly unlikely that an additional factor will have any significant bearing on your final decision.

We've selected the following factors for our decision. To enter them, type the name of the factor and press **ENTER**. Flag negative factors with a minus sign (the significance of this will be explained later). When you have entered the last factor, press **ENTER** again.

**BUDGET**  
**COMMUTING-**  
**NEIGHBORHOOD**  
**SCHOOLS**  
**UPKEEP-**

## SHOPPING PRESTIGE PRIVACY

Now, let's study our factors to see if we want to make any changes. **SHOPPING** is perhaps too narrowly defined; we are also concerned with the convenience of swimming pools, parks, tennis courts, and other recreational facilities. So let's change **SHOPPING** to **AMENITIES**. Enter **Y** in response to the **ANY CHANGES** question. The indicator automatically moves to the second factor position. (The **FINANCIAL** factor is locked in—we cannot change it.) Move the indicator to **SHOPPING** with the down arrow key, and enter **R** in response to the **A/ R/ D (Add/ Revise/ Delete)** question. Type in **AMENITIES**. When you press **ENTER**, **SHOPPING** changes to **AMENITIES**.

In reviewing our list we decide that **PRESTIGE** is too similar to **NEIGHBORHOOD** to be included as a separate factor, so let's delete it. Enter **Y** in response to the **ANY CHANGES** question, and move the indicator to **PRESTIGE**. Enter **D** for delete. If the indicator is in the proper position, enter **Y** in response to the question **OK TO DELETE**. Notice that **PRESTIGE** has disappeared and the other factors have moved up to fill the space.

**Note:** If you had entered **N** when asked **OK TO DELETE**, the question would have disappeared and you would have had to repeat the procedure. The purpose, of course, is to prevent deleting something by mistake.

Enter **N** in response to the **ANY CHANGES** question to continue the program.

### 3. Weights

Notice that a new column entitled **WEIGHTS** appears on the screen. We must now weight our factors, i.e., decide which is the most important and then judge the relative importance of the others. This allows the most important factor or factors to carry the most weight in our decision. When weighting factors keep the following points in mind.

- a. Use weights of 1 to 9, with 9 being assigned to the most important factor.
- b. To enter weights simply press the desired figure and move the indicator down the column. *Do not press ENTER until all weights have been assigned.*
- c. To change a weight simply move the indicator to the appropriate figure and press the correct key; it will change automatically.
- d. Assigning weights is a purely personal judgment. Select the most important factor first and give it a weight of 9; then compare the other factors to that one and weight them accordingly. If you have two or more factors of equal importance give them equal ratings.
- e. Be very careful to maintain a wide spread between the most important factor or factors and all the rest. For example, if **FINANCIAL** is the overriding consideration in our decision, it should be given a weight of 9 and the other factor

weights should be 4 or lower so that any two of them together will not equal the weight of the most important factor. There are exceptions, however; in our decision BUDGET and SCHOOLS are only slightly less important than FINANCIAL, so their weights are only one and two points lower.

We have assigned the following weights:

FINANCIAL	9
BUDGET	7
COMMUTING-	4
NEIGHBORHOOD	3
SCHOOLS	8
UPKEEP-	4
AMENITIES	3
PRIVACY	2

When you have entered these weights, press ENTER.

At this point a percentage column appears opposite the weights to show you the actual percentage weight that the factors will carry in the decision. We want to make sure that our most important factors carry the most weight. Combined, FINANCIAL, BUDGET, and SCHOOLS will account for 59% of our decision. We believe that is satisfactory so we will enter N for no changes to continue the program.

**Note:** You may change any of the weights at this point in order to change the percentages. Simply enter Y in response to the ANY CHANGES question; then move the indicator to the weight you wish to change. If you wish to delete a factor at this point, give it a weight of zero—you can delete it later in the program. To see a new percentage listing press ENTER. Continue this procedure until you are satisfied with the percentages of the factor weights.

#### 4. Values

The weights and percentages have now disappeared and the screen reflects your CHOICES and FACTORS. The prompt line instructs you to ENTER VALUES. The word NORM at the top right of the screen reminds you that you are evaluating your *normal* future. To enter values, give a rating of 0 to 9 to each choice as it relates to each factor.

**Note:** Do not press ENTER until all values have been assigned. To enter values, simply move the indicator right, left, up or down, with the proper arrow key. This is DecisionMaster's unique *formatted-screen data entry system*. To change any value, simply move the indicator to the value you wish to change and press the correct figure key. *If you press ENTER accidentally, you must enter Y in response to the ANY CHANGES question in order to continue to enter values.*

a. Take one factor at a time and consider which of the choices would be *best* for that factor. Then give it the highest value rating. Now rate the other choices for that factor, giving them comparative values. *Keep in mind the future that you're evaluating.*

b. Usually the best choice for a factor would get a value of 9, but you can reduce the importance of the choice by giving it a less-than-maximum rating. If none of the choices reflects the best possible situation, give the best one a high of 8 instead of 9. In our decision we gave NEIGHBORHOOD and AMENITIES each a high of 8. Our reasoning? There *is* a better neighborhood we'd like to live in than the choices offered, and although the condominium has more amenities than the house or the duplex, it doesn't have *all* the amenities we would like

c. Try to isolate each factor when assigning values. Take BUDGET, for example, and think only of how your budget will be affected by each of the choices. Don't try to tip the scales by giving lower values to your least favorite choices. If you do, the final decision will simply reflect your prejudices. •

d. Notice that the FINANCIAL factor reflects zeroes. If you try to change those values you'll find that they are locked in. This is to prevent you from inadvertently assigning values to this factor before the cash flow analysis is made. Ignore this factor for the moment. When the cash flow analysis is completed, you will be given an opportunity to enter values for this factor.

e. **Negative factors.** Negative factors should be flagged with a minus sign (-) when originally entered. This is to remind you to assign the *highest* value to the choice that has the *least* amount of the negative factor. The tendency is to do just the opposite. In other words, the best choice would be the one that offers the minimum amount of the negative factor. In our decision COMMUTING and UPKEEP are negative factors—we want to have as little of them as possible. Therefore, our ratings reflect that the condominium has the least commuting distance to our downtown office (it gets the highest rating) and the house has the most (it gets the lowest rating). The condominium also involves the least amount of upkeep (so it gets the highest rating for this factor); the duplex has the most since we'll have to take care of the leased unit as well (it gets the lowest rating).

When assigning values, remember there is no "right" answer. These are personal evaluations, and when you're making a real decision they should reflect *your* thoughts. Our values screen for the NORMAL future looks like this:

	HO	DU	CO
FINANCIAL	0	0	0
BUDGET	9	5	3
COMMUTING-	4	6	9
NEIGHBORHOOD	8	3	7
SCHOOLS	9	7	4
UPKEEP-	4	1	9
AMENITIES	4	6	8
PRIVACY	9	1	4



When you have entered these values, press **ENTER**.

**Note:** At this point you can change only the value ratings. You'll be given a chance later in the program to change Factors, Weights, Choices or Values.

If you do not wish to make any changes, enter N for no changes and watch what happens.

## 5. Weighted Factor Screen for Future No. 1

The weighted factor analysis for Future No. 1 is now complete. The totals that appear for each column reflect the total weighted values for each of the three choices. The highest total, where the indicator is positioned, is the best choice considering the information given. *These totals do not include the FINANCIAL factor, however, and it carries the heaviest weight in our decision.* Without the FINANCIAL factor, the house with a total weighted value of 221 appears to be the best decision, but not by an overwhelming margin.

## 6. Changing Previous Screens

At this point you can recall any of the previous screens to make changes or to review. Enter Y in response to the **ANY CHANGES** question. The prompt line will ask which item you wish to change: Factors, Weights, Choices or Values. By entering the proper code you can recall any of those screens. You may add, delete or revise factors or choices; you may revise any weight or value figure. If you add a factor or choice you will then have to recall the weight and/or value screen in order to enter the weights and values for the new factor or choice. If you delete a factor or choice, the weight and/or values attached to that factor or choice are automatically deleted. If you need additional assistance in making changes, refer to Paragraph 6 of Section 4.

To return to the weighted factor screen press **ENTER** or enter N when asked the **ANY CHANGES** question.

## 7. Future No. 2

You are asked if you wish to do the **HIGH VACANCY FUTURE**. Enter Y for yes.

**Note:** You have the option to skip your additional futures. By entering N to the questions regarding subsequent futures, you would find yourself at the beginning of the cash flow analysis. For demonstration purposes, however, we will evaluate each future.

The figures you see on the screen are the values you entered for Future No. 1, but notice that the words **HI VAC** appear on the upper right of the screen. We will now enter values based on a future that may include high vacancies in rental properties.

Values for Future No. 1 are shown for two reasons. (1) Often, only a few values will change from one future to another. Therefore, it is easier to change only those values that will be affected, rather than having to input all new values.

(2) It is helpful to have a point of reference when you are evaluating subsequent futures. *Future No. 1 will always be used as the standard of comparison for each additional future.*

We will make only one change for the HIGH VACANCY FUTURE. Being unable to rent the duplex would put a great strain on our budget. Therefore, we will drop the value for BUDGET under DUPLEX. (The FINANCIAL factor will also change, but we cannot enter values for it until we complete the cash flow analysis.)

Press ENTER; then move the indicator to the value for BUDGET under DUPLEX and change the figure to 1. Then press ENTER and then N when asked for changes. The screen now reflects the weighted factor totals for the HIGH VACANCY FUTURE. The house still appears to be the best decision, but remember, we have not evaluated the FINANCIAL factor.

To continue the program, enter N for no changes.

## 8. Future No. 3

You are now asked if you wish to do the LOW INCOME FUTURE. Enter Y for yes. The values for Future No. 1 appear on the screen, but the words LOINC on the upper right of the screen remind you that you're evaluating your LOW INCOME FUTURE.

With a lowered income several factors would change:

**BUDGET:** If we bought the duplex, we would have income-producing property with which to supplement our income. So let's change the values for BUDGET to: HO 4 DU 9 CO 3.

**NEIGHBORHOOD:** With a reduced income it might be more difficult to "keep up with the Joneses" in the more prestigious neighborhoods. Moving to the duplex neighborhood might fit our situation better. So let's change the values for NEIGHBORHOOD to: HO 6 DU 4 CO 5.

**AMENITIES:** We might not be able to use all the amenities of the condominium if our income were reduced, so let's drop the value for CONDO two points for this factor — from an 8 to a 6.

All other values will stay the same.

When you have made the above changes, press ENTER and then N for no changes. The weighted factor totals for the LOW INCOME FUTURE now appear. The house still appears to be the best decision for a future with a reduced income, but only by one point. Too, keep in mind we haven't evaluated the FINANCIAL factor yet.

Enter N for no changes to continue the program.

## 9. Bayesian Screen

This is your Bayesian Screen.

CHOICES	NORMAL	HI VAC	LO INC.	BAYES
HOUSE	221	221	180	212
DUPLEX	148	120	179	150
CONDO	178	178	166	177

The figures in the first three columns show the weighted factor totals for your choices for each of your futures. The column on the right shows the Bayes totals which take into account the probabilities of each of the futures.

**Note:** If you had selected Decision Type 2 this would be your final screen and you would make your decision based on your interpretation of these figures. You can interpret them in several ways. The more conservative approach would be to select the choice which has the *highest low* (based on the Max-Min Theory). In that case you would buy the house because it has a low of 180 for the Low Income Future which is higher than any of the other lows. The more optimistic approach would be to select the choice with the *highest high*. In that case you would still buy the house because with a total of 221 for both the Normal and the High Vacancy Futures, it has the highest score of any of the choices. The middle approach would be to take the choice with the highest Bayes total, based on the Bayes' Rule which takes into account all the futures. Again, the house is the best choice with a Bayes total of 212, the highest of the three choices.

However, we still have not considered the FINANCIAL factor, and it carries the heaviest weight in our decision.

## 10. Changing Previous Screens

At this point you can still make changes on your previous screens. To do so, enter **Y** in response to the **ANY CHANGES** question. You will be asked **WHICH FUTURE**. Enter the *number*, not the name, of the future you wish to change or review. The values screen for that future will be recalled. Then by entering the proper code for Factors, Weights, Choices or Values, you can recall any of those screens for changes or review.

## 11. Saving the Decision

You are now asked if you wish to save this decision. *This will be your only opportunity to save the decision.* If you enter **Y** the previous decision data and all the cash flow data that will be entered subsequently will be saved for later review. If you enter **N** the data will be saved only temporarily in order to do the cash flow analysis. Either way, you will need a Data Diskette on which to save the data either temporarily or permanently. The computer will tell you when to insert the Data Diskette and when to insert the Program Diskette, at this point in the program and later in the cash flow analysis sequence. (Refer to Section 1 for a full explanation on saving decisions and making Data Diskettes.)

Enter **Y** for yes if you wish to save this decision; then enter a code name (up to eight characters) for the decision. We will now proceed to the cash flow analysis.

## Cash Flow Analysis

You are asked if you wish to do the cash flow analysis. Enter **Y** for yes. (If you had chosen not to do the cash flow analysis, the program would have returned to the beginning screen so you could begin a new decision or terminate the program.)

You are asked **WHICH FUTURE**. Enter the *number*, not the name, of the future you wish to evaluate. Enter **1** for Future No. 1.

As the disk drives whirrs and the red light goes on and off, the decision data is being recorded either permanently or temporarily on the diskette and the cash flow analysis sequence is being loaded.

### 1. Future Comparison Period

You are instructed to **ENTER FUTURE PERIOD FOR END COMPARISON**. The cash flow analysis must cover a finite period, so you must identify that period. *Always state the future comparison period in number of months*. Let's say we'll sell the property in five years. Enter **60** as the future period for end comparison. Enter **N** for no changes.

### 2. Discount Rate

You are asked to enter the *discount rate*. This is the interest rate that will be used to discount the cash flows. Since we would probably otherwise invest the money in a savings account at, say, 8%, we could use 8% as the discount rate; however, there is some degree of risk involved, so we'll use a discount rate of 10%. (For a discussion of discount rate, refer to *Discount Rate* under *Present Value Theory* in Section 3. Enter **N** in response to the **ANY CHANGES** question.

**Note:** Always enter the discount rate as a two-digit figure. E.g., if your discount rate is 8%, enter it as **08**. Do not enter the decimal or percent sign.

### 3. Lump Expenses

We will now enter expenses and income for Choice No. 1, beginning with Lump Expenses. A lump expense is a one-time expense during the course of a transaction. For the house, we will have three lump expenses: ... downpayment, closing costs, and payoff of the note when we sell the house at the end of five years. So enter **Y** in response to the question **ANY LUMP EXPENSES**.

Enter the lump expenses as follows:

LUMP EXPENSE	AMT.	MONTH
1. Downpayment	5000	0
2. Closing Costs	1000	0
3. Note Payoff	95000	60

For the purposes of the cash flow analysis, you should consider the point at which you consummate the transaction as month 0. The end of 30 days is month 1, the end of 60 days is month 2, and so on. Therefore, the downpayment and closing costs, which are paid to consummate the transaction, are entered as month 0. The sale of the house will take place in five years, so the month for the note payoff is entered as month 60.

When you have entered these expenses, press **ENTER** again, then enter **N** for no changes.

#### 4. Regular Expenses

Regular expenses are those that reoccur regularly over the time period being considered. In our example, they would include the mortgage payment, taxes and insurance. So enter **Y** in response to the question **ANY REGULAR EXPENSES**. The column headings for this table include three new ones. **BEG MONTH** refers to the month the regular expense begins. For our mortgage, taxes and insurance it would be one month after we consummate the transaction – month 1. **END MONTH** refers to the month the regular expense ends, usually though not always the same as the period of comparison. **FREQUENCY** refers to how often the expense occurs. This should be stated in terms of months: **1** for monthly, **3** for quarterly, **6** for bi-annually, and **12** for annually. Enter the regular expenses as follows:

REGULAR EXPENSE	AMT.	BEG. MO.	END. MO.	FREQ.
1. Mortgage	950	1	60	1
2. Tax/Ins	200	1	60	1

After the last entry, press **ENTER** again, then enter **N** for no changes to continue the program.

#### 5. Lump Income

Lump income includes any irregular sums of money you expect to receive during the comparison period. We expect a lump income when we sell the house in five years, so enter **Y** in response to the **ANY LUMP INCOME** question.

The Lump Income table now appears on your screen. Notice that the column headings are similar to those for Lump Expenses. Enter the following lump income: (The amount is our "guesstimate" of the sales price in five years.)

LUMP INCOME	AMT.	MONTH
1. Sale	155000	60

Press **ENTER** after the last entry, then enter **N** for no changes.

#### 6. Regular Income

Regular income is any sum you expect to receive regularly over the time period being considered. At first thought, you would assume the house you live

in has no regular income. To make the investment decision realistic, however, we should allow for the rent we would have to pay for living quarters elsewhere. We are in effect paying rent to ourselves. We'll use a figure of \$500 a month. It is not equal to our mortgage payment, but it is an amount we would probably need to rent an average house or apartment for a family of four. Enter Y in response to the **ANY REGULAR INCOME** question, then enter the regular income as follows: (Notice that the column headings are the same as for Regular Expenses.)

<b>REGULAR INCOME</b>	<b>AMT.</b>	<b>BEG. MO.</b>	<b>END. MO.</b>	<b>FREQ.</b>
<b>1. Rent Allow.</b>	<b>500</b>	<b>1</b>	<b>60</b>	<b>1</b>

Press **ENTER** after the last entry, then enter **N** for no changes to continue the program.

## 7. Present Value for Choice No. 1

The words **BUSY CALCULATING** will appear on your screen as the computer calculates the present value and future value of the expenses and income. After a few seconds you will see the the present value and future value figures for Choice No. 1. **P/I** is the present value of the income; **P/ E** is the present value of the expenses; **F/I** is the future value of the income; and **F/ E** is the future value of the expenses. *If you wish to use the present value figures for Choice No. 1, write them down at this point.* Although the future value figures will appear on your final cash flow screen for this future, the present value will be stated as a *present value ratio*. (The **P/V Ratio** is arrived at by dividing the present value of the income by the present value of the expenses)

## 8. Changing Previous Cash Flow Screens

At this point you may change any of the data on the income and expense tables for Choice No. 1. To do so, enter **Y** in response to the **ANY CHANGES** question, then enter the number listed on the screen for the table you wish to change. When that table reappears, enter **Y** in response to the **ANY CHANGES** question. Then enter the code for Add, Revise or Delete and the codes for the line number and column heading you wish to change. When the change has been made, you can return to the Present Value Screen by entering **N** for no changes. *Present and future values will be recalculated if previous screens are recalled.*

If you need assistance in making changes on these tables, refer to *Error Corrections* in Section 4.

To continue the program, enter **N** for no changes.

## 9. Cash Flow Analysis for Choice No. 2

We will now repeat the four expense and income tables for Choice No. 2, the duplex. The expense and income items are listed below. Enter them in the same manner you entered the expenses and income for Choice No. 1.

LUMP EXPENSE		AMT.	MONTH	
1. Downpayment		20000	0	
2. Closing Costs		1000	0	
3. Note Payoff		94000	60	

  

REGULAR EXPENSE	AMT.	BEG. MO.	END. MO.	FREQ.
1. Mortgage	1050	1	60	1
2. Tax/Ins.	300	1	60	1
3. Expenses R.U.	150	1	60	1
(Expenses of rental unit)				

  

LUMP INCOME		AMT.	MONTH	
1. Sale		160000	60	

  

REGULAR INCOME	AMT.	BEG. MO.	END. MO.	FREQ.
1. Rent	650	1	60	1
2. Rent Allow.	500	1	60	1

When you have entered all the expenses and income for the duplex, the present value screen for this choice will appear. Write down the present value figures if you wish to use them later (as they will not appear on the final screen). Make any necessary changes by recalling the appropriate screen; then enter N for no changes to continue the program.

## 10. Cash Flow Analysis for Choice No. 3

We will now enter the expenses and income items for Choice No. 3, the condominium. They are listed below; enter them as you did for the house and the duplex.

LUMP EXPENSES		AMT.	MONTH	
1. Downpayment		10000	0	
2. Closing Costs		1000	0	
3. Note Payoff		80000	60	

  

REGULAR EXPENSE	AMT.	BEG. MO.	END. MO.	FREQ.
1. Mortgage	900	1	60	1
2. Tax/Ins.	300	1	60	1
3. Maint.	150	1	60	1

LUMP INCOME	AMT.	MONTH		
1. Sale	130000	60		
REGULAR INCOME	AMT.	BEG. MO.	END. MO.	FREQ.
1. Rent Allow.	500	1	60	1

When you have entered all the expenses and income for the condominium, the present value screen for this choice will appear. Write down the present value figures if you wish to use them later (as they will not appear on the final screen). Make any changes necessary for this choice by recalling the appropriate screen; then enter N for no changes to continue the program.

## 11. Internal Rate of Return

You are now asked if you wish to compare internal rates of return for your various choices. The internal rate of return is used to compare various investment alternatives. (For a discussion of this subject refer to *Present Value Theory* in Section 3.) Because calculating these rates may require a bit of time, the option to do it or not do it is given. Since we are demonstrating the program, we will opt to do the internal rates of return. Enter Y for yes. The words **BUSY CALCULATING** will appear on your screen. This process can take from a few seconds to several minutes, depending on the number of expense and income items you have entered.

## 12. Evaluating the Cash Flow Analysis

The cash flow analysis for Future No. 1 is almost complete. The figures you see on your screen are the present value ratio (P/V Ratio), the future value of income and expenses, and the internal rate of return for each of your choices for Future No. 1. We must now use these figures to evaluate the **FINANCIAL** factor that appeared in the original factor screen at the beginning of the program. The duplex is the best financial choice with the highest P/V ratio and internal rate of return. The condominium, surprisingly, has no actual internal rate of return since the amount invested is larger than the amount returned. In response to the **ENTER VALUES** instruction, enter 6 as the value for the **FINANCIAL** factor for the house. Then enter values of 8 for the duplex and 1 for the condominium.

The **ANY CHANGES** question that appears in the prompt line refers to the values you just entered. If you wish to change any of these values, enter Y and make your changes. If not, enter N for no changes.

The prompt line now asks if you wish to make any changes to the financial data. At this point you can recall any of the expense or income tables for any of your choices for this future. If you wish to do so, enter Y for yes, then enter the number of the choice, then the number listed on the screen for the expense or income table you wish to review. Note: If a cash flow table is recalled, the present values and future values for that choice will be recalculated, and the Present Value Screen for that choice will reappear. To continue the program, press N for no changes. You will then be asked again if you wish to do the internal



rate of return. If you press **Y**, the IRR for all choices will be calculated (or recalculated, if you chose to do the internal rate of return in No. 11 above); if you press **N** for no, the program will return to the Cash Flow Analysis Screen for Future No. 1. To continue the program from this point, enter **N** in response to the **ANY CHANGES** questions.

**Note:** When doing a cash flow analysis, you must insert the Data Diskette at certain points in the program in order to save the cash flow data. The program will tell you when to insert the Data Diskette and when to insert the Program Diskette.

### 13. Return to the Bayesian Screen

The words **TRANSFERRING CONTROL BACK TO MAIN PROGRAM** now appear on your screen. The program is returning to the original Bayesian Screen. When that screen appears you will see an asterisk below Future No. 1; this indicates that the cash flow analysis has been completed for this future. These figures now reflect the values you assigned to the **FINANCIAL** factor after the cash flow analysis. The figures in the Bayes column have also changed, reflecting the new figures for Future No. 1.

Let's take a look at the original values screen for Future No. 1. Enter **Y** in response to the **ANY CHANGES** question; then enter **1** for **WHICH FUTURE**, then **V** to recall the values screen. *Notice that the values you entered for the cash flow analysis now appear opposite the **FINANCIAL** factor instead of the zeroes as before.* Return to the Bayesian Screen by entering **N** in response to the **ANY CHANGES** question on this and the subsequent weighted factor screen.

As you probably realize you can recall any of the weighted factor screens once you are at the Bayesian Screen. We do not wish to make any changes, however, so enter **N** for no changes.

### 14. Continue or Exit

You are now asked if you wish to do another future. You might occasionally find that the cash flow analysis for the first future gave such an overwhelming margin to one of your choices, evaluation of cash flows for additional futures might not be necessary. Therefore, you have the option to end the program at this point. To do so, you would enter **N** in response to the question **DO YOU WISH TO DO ANOTHER FUTURE**. The program would then return to the initial screen so you could begin another decision or terminate the program.

For this exercise we will continue with the rest of the cash flow analysis. Enter **Y** for yes, then enter **2** in response to the question **WHICH FUTURE**. The program will now transfer control to the cash flow analysis program.

### 15. Cash Flow Analysis for Future No. 2

We will now repeat the same screens for all three choices for the **HIGH VACANCY FUTURE**. The expenses and income for each choice are listed below. The items in bold type are the only items that will change for this future. We have assumed that we can rent the duplex only half of the time; therefore, rent income from the duplex has been cut in half. Also, if there are lots of

vacancies in rental properties, we can assume that in general real estate property will not appreciate in value as much as it normally would. Therefore, we have decreased the future sales price of each of the properties. Enter the expenses and income just as you did for Future No. 1.

#### CHOICE NO. 1: HOUSE

LUMP EXPENSE		AMT.	MONTH	
1. Downpayment		5000	0	
2. Close Costs		1000	0	
3. Note Payoff		95000	60	
REGULAR EXPENSE	AMT.	BEG. MO.	END. MO.	FREQ.
1. Mortgage	950	1	60	1
2. Tax/Ins	200	1	60	1
LUMP INCOME		AMT.	MONTH	
1. Sale		150000	60	
REGULAR INCOME	AMT.	BEG. MO.	END. MO.	FREQ.
1. Rent Allow.	500	1	60	1

#### CHOICE NO. 2: DUPLEX

LUMP EXPENSE		AMT.	MONTH	
1. Downpayment		20000	0	
2. Closing Costs		1000	0	
3. Note Payoff		94000	60	
REGULAR EXPENSE	AMT.	BEG. MO.	END. MO.	FREQ.
1. Mortgage	1050	1	60	1
2. Tax/Ins.	300	1	60	1
3. Expenses R.U. (Expenses of rental unit)	150	1	60	1
LUMP INCOME		AMT.	MONTH	
1. Sale		140000	60	
REGULAR INCOME	AMT.	BEG. MO.	END. MO.	FREQ.
1. Rent	325	1	60	1
2. Rent Allow.	500	1	60	1

### CHOICE NO. 3: CONDOMINIUM

LUMP EXPENSES	AMT.	MONTH
1. Downpayment	10000	0
2. Closing Costs	1000	0
3. Note Payoff	80000	60

REGULAR EXPENSE	AMT.	BEG. MO.	END. MO.	FREQ.
1. Mortgage	900	1	60	1
2. Tax/Ins.	300	1	60	1
3. Maint.	150	1	60	1

LUMP INCOME	AMT.	MONTH
1. Sale	120000	60

REGULAR INCOME	AMT.	BEG. MO.	END. MO.	FREQ.
1. Rent Allow.	500	1	60	1

When you arrive at the cash flow analysis screen, enter values for the **FINANCIAL** factor for each choice, *keeping in mind a future with high vacancies in rental properties*. With a P/V ratio of .97 and an internal rate of return of 7 the house will receive the highest rating for the financial factor since neither the duplex nor the condominium have a positive return. Give the house a 6 and the duplex and the condominium each a 1.

Return to the Bayesian Screen by entering N in response to the **ANY CHANGES** questions. The asterisk below Future No. 2 indicates that the cash flow analysis has been added to the previous analysis for this future. (If you recall the original values screen for the **HIGH VACANCY FUTURE**, you will see that the value ratings have automatically been entered for the **FINANCIAL** factor.) To continue the program, enter N for no changes, then Y in response to the question **DO YOU WISH TO DO ANOTHER FUTURE**, then 3 for **WHICH FUTURE**.

### 16. Cash Flow Analysis for Future No. 3

We will now repeat the cash flow analysis for the **LOW INCOME FUTURE**. The expenses and income for this future are identical to those we entered for Future No. 1. However, the *values* we assign to our choices will differ from the Normal future.

Refer to the previous expense and income tables for Future No. 1, and enter the same data for each choice for this future. When you arrive at the final cash flow screen, enter the following values: House 6, Duplex 9, and Condominium 1. Although the cash flow data is identical to the Normal future, we increased the rating of the duplex one point because in a low income environment the extra income from the duplex would be critical. The values for the house and condo are the same as for the Normal future.

To return to the Bayesian Screen, enter N to the ANY CHANGES questions.

## 17. Analysis Complete

If you entered all the data as we instructed, your *final* Bayesian Screen should look like this:

CHOICES	NORMAL	HI VAC	LO INC.	BAY
HOUSE	275	275	235	.
DUPLEX	220	129	260	21
CONDO	187	187	175	11

This screen reflects the weighted factor analysis, Bayesian analysis, and cash flow analysis for this decision. With this data we can now make our *final* decision. If we go with the Bayes' Rule (which takes into account the probabilities of *all* the futures), we would select the choice with the highest Bayes total. If we are very conservative, we would select the choice with the *highest low* which would minimize our potential loss. If we are more optimistic we would go with the choice with the *highest high* in order to maximize our potential gain. In this case, the final decision is easy since the HOUSE is the best choice regardless of the method we use for making the final decision. (For discussion of final decision theory, refer to Section 3.)

To exit the program, enter N for no changes. The program will return to the beginning screen where you can begin a new analysis, review a previous decision or terminate the program.

You have now experienced the complete decision analysis of Decision Master. If you'd like more practice, use the decision examples in Section 6.

## **Section 6**

# **Sample Decisions**



# Sample Decisions

The following examples are provided to illustrate ways in which DecisionMaster can be used. They are not meant to be a rigid guide in making certain types of decisions. Rather, you should use them for practice or as a stimulus in developing your own decision data. In the end, of course, DecisionMaster can only help you evaluate your alternatives; the final decision and the responsibility for that decision rests with you.

## Business Decisions

Following are a few of the hundreds of opportunities to use DecisionMaster in your business. As you use the program, you'll discover an increasingly broad range of applications.

### 1. Beyond Financial Forecasting

DecisionMaster is the perfect companion to financial forecasting programs such as Visicalc™. In a sense DecisionMaster takes up where those programs leave off. To show you how DecisionMaster interacts with a financial forecasting program, let's evaluate a financial decision.

Let's suppose you are faced with a decision to install an energy management system in a complex environment with many different buildings, such as a college campus. In order to analyze the potential of the system you need to know the estimated energy savings and the projected inflation rate of energy costs over the next several years. The manufacturer of the system has claimed it will save at least 20% per year on your electric bills, and the Department of Energy has forecasted the inflation rate of energy costs at 15% per year for the next five years. Using a financial forecasting program you would develop five-year pro formas assuming escalation of energy costs at 15% per year and energy savings at 20% per year, taking into account the downpayment, monthly payments, maintenance costs, breakdowns, etc.

You should consider, however, that energy costs may not escalate at such a rapid rate and that the system may not generate the maximum savings estimated by the manufacturer. Therefore, you would want to develop other pro formas based on more conservative estimates: (1) Energy costs escalating at, say, 10% per year and (2) energy savings of only 10% per year. By combining the various possibilities you would end up with four sets of pro formas with which to make your decision.

The financial forecasting is now finished. But how can you intelligently choose among these four alternatives? Which of the projected costs and savings can be counted on to happen? How much weight should the purely financial aspect of the decision carry? What about the fact that the maintenance people dislike the system? That management is wary? That the system cannot maintain a consistent comfort level throughout the hot summer months?

**This is where DecisionMaster comes in—to evaluate the decision beyond the financial forecasts.**

**You can develop four alternative futures:**

**Future No. 1:** Energy costs will escalate 15% each year and the system will generate 20% savings.

**Future No. 2:** Energy costs will escalate 15% per year but energy savings will be only 10%.

**Future No. 3:** Energy costs will increase only 10% per year and energy savings will be 20%.

**Future No. 4:** Energy costs will increase only 10% per year and energy savings will be only 10%.

For each of these futures, you would assign a probability of occurrence. (The total of all probabilities must equal 100.)

Now you should consider the qualitative factors involved in the decision—the specific factors that will be affected by your decision to install or not install the system. We would list the following:

- Financial (automatic with cash flow analysis)
- Maintenance Consideration
- Management Consideration
- Student/Faculty Consideration
- Public Image Consideration

By weighting these factors and rating each choice for each factor for each future, you are taking the decision beyond the purely financial analysis and giving it a broader scope and a more prudent evaluation. You must, however, do the cash flow analysis to complete the evaluation.

Using the net results for each year obtained with the financial forecasting program, use DecisionMaster to discount your cash flows for your expenses and income items. You would probably want to use a discount factor equal to the rate at which you could borrow the money for the investment or the interest rate you could earn on the money in another medium. After you complete the cash flows for each future, you will enter the values for the financial factor. Your final Bayesian screen will then give you the whole picture.

You can see with this example that financial forecasting programs provide only part of the data needed for decision making. By using DecisionMaster in conjunction with those programs, you can make your final decision knowing you've evaluated *all* the important aspects of the situation.



## **2. Hiring or Promoting an Employee to a Top Management Position**

Certainly no one would deny that hiring personnel is one of the most important functions in any company. DecisionMaster gives you a method for taking into account the many factors inherent in any personnel evaluation so you can arrive at a well thought-out decision, rather than letting emotional bias cloud your judgment. Selecting the list of factors to be evaluated is one of the most important steps. Such factors might include:

- Experience or Past Performance
- Intelligence
- Attitude Toward Job
- Personality or Appearance
- Integrity or Loyalty
- Salary Requirements or Cost of Recruitment
- Ambition
- Stability
- Supervisory Ability
- Dedication

First, you would decide which factors are the most important for the position you're trying to fill; then you would weight them accordingly and rate each candidate for each factor (i.e., assign values to each factor for each choice). Further, you might wish to examine alternative futures if the job is a key management position. For example, how would each candidate handle the responsibilities if there were a downturn in the company's fortunes? Or how would each do if the company suddenly experienced explosive growth? Certain candidates might not perform well in one of these environments, and evaluating that aspect of the decision could be very important. Your futures could be stated as (1) Normal Company Growth, (2) Negative Company Growth, and (3) Extraordinary Company Growth.

## **3. Evaluating a Stock Purchase**

A decision to buy stock is often not one that requires detailed financial forecasting. Normally, the decision can be made with DecisionMaster alone since only a few financial considerations are needed (i.e., amount of investment, projected dividends, projected selling price). You should be more concerned with other factors that deal primarily with the performance of the company whose stock you're buying, such as:

- Financial (automatic with cash flow analysis)
- Company Growth History

- Company Management
- Past Performance of the Stock
- P/E Ratio
- Volatility of Company in the Past
- Amount of Risk Involved
- Susceptibility to Market Fluctuations

If you are considering, for example, a high growth stock, a Blue Chip stock, and an over-the-counter stock, you would rate each of them for the above factors (after you had weighted the factors for their relative importance). In addition, you might want to consider each stock's performance under different futures (e.g., Bullish, Bearish, or Static).

The cash flow sequence of DecisionMaster would be used to discount cash flows of your expenses and income (investment, projected dividends, projected selling price). You would then rate each choice for the FINANCIAL factor so that it could be combined with the other factors to present you with the overall picture.

#### **4. Leasing versus Buying**

A common business decision is whether to lease or buy office equipment. Your choices are usually to rent the equipment, buy it new or used, or lease it with a purchase option. In order to find out which of these options is the best, you would consider such factors as:

- Financial (automatic with cash flow analysis)
- Delivery Requirement
- Budget Consideration
- Tax Advantages/ Disadvantages
- Effect on Credit Lines
- Service Consideration
- Risk of Equipment Obsolescence

On smaller items, such as one or two typewriters, it would probably not be necessary to use alternative futures; however, if the decision is to lease or buy 50 typewriters or a factory full of manufacturing equipment, evaluating alternative futures (e.g., normal, optimistic, and pessimistic) would be advisable. You would then use the cash flow analysis to examine the FINANCIAL factor (downpayment, monthly payments, residual value, etc.).

## **5. Expanding a Business**

A common problem facing business owners or executives is whether or not to expand their business. DecisionMaster allows you to examine the factors involved and evaluate the decision with regard to future uncertainties. Let's suppose your decision is whether or not to add a new software product to your dealer line. The factors you could evaluate might include:

- Demand for the Product
- Impact on Inventory Costs
- Financial Considerations
- Aid in Selling Hardware
- Support From Software Manufacturer
- Strength of documentation
- Effect on Dealership Image

Depending on the complexity of the situation you may or may not wish to go through the cash flow analysis or alternative futures. If you do, you might wish to consider income and expense items such as cost of inventory, monthly sales, monthly expenses, and final liquidation for the cash flow analysis. (The automatic FINANCIAL factor would take the place of the FINANCIAL CONSIDERATIONS factor above.) Your alternative futures might be based on whether the product has (1) a short-lived success, (2) long ascending sales, or (3) long descending sales.

## **6. Going Into Business for Yourself**

One of the toughest decisions confronting many of us is whether or not to leave the security of our current job and go into business for ourselves. If you are ever faced with this decision, using DecisionMaster can help you organize your thoughts and evaluate the opportunity. Selecting a list of factors will be your first important step. They might include:

- Financial Considerations
- Security Considerations
- Initiative Requirements
- Potential Earnings
- Personal Satisfaction
- Risk
- Time and Effort Dedication
- Family Attitude
- Personal Strain

Weighting these factors will help you determine which is the most important to you; then evaluating your choices will make the final decision easier. You might also want to examine the decision under different possible futures, such as: (1) the economy flourishes, (2) the economy goes into a recession (3) the economy stabilizes. By assigning probabilities to each of these futures you can arrive at the best decision for the "expected future."

## **7. Advertising**

DecisionMaster cannot help you design an ad for your company or product. It can, however, help you at various other stages of the advertising process. You can use DecisionMaster to help you select advertising media, to evaluate two more proposed advertising campaigns, or to aid in the selection of an advertising agency.

Suppose you are evaluating media for a consumer product. Your choices might include magazines, newspapers, radio, and television. Your factors, any or all of the following:

- Availability of Targeted Market
- Cost per Thousand
- Production Cost for Ad
- Adaptability of Product to Medium
- Time or Space Limitations
- Merchandising Adaptability

If you were evaluating two proposed print advertisements, your factors might include:

- Ability to Attract Attention
- Ability to Hold Attention
- Ability to Sell the Product
- Production Costs

If you are selecting a new advertising agency, you might want to evaluate the contenders against the following criteria:

- Portfolio of Past Work
- Compatibility of Agency Staff
- Understanding of Your Business or Product
- Experience in Your Field
- Size Relative to Servicing of Account
- Cost / Billing Procedures

# Personal Decisions

You'll find DecisionMaster invaluable when it comes to personal decisions. Two of the most common ones are discussed in other sections of this manual. Buying a house is the example used in Section 5, and buying a car is discussed in Section 3. But there are hundreds of other personal decisions that can benefit from the methodology of DecisionMaster. Following are just a few examples.

## 1. Major Purchases

DecisionMaster can help you evaluate any major purchase, from a video tape recorder to a microcomputer to a sailboat. Your decision might be to buy or not to buy, or it might be selecting among several different brands. To show you how DecisionMaster can be used in this type of decision, we will use the purchase of a microcomputer as our example. (Of course, if you have purchased DecisionMaster you have obviously already made this decision!) Your choices might include: Apple II, TRS-80, PET, Atari, and Hewlett-Packard. Your factors:

- Manufacturer's Stability
- Software Availability
- Reliability of Computer
- Service Availability
- Cost
- Graphics
- Peripheral Availability
- System Software Capability

The weight you assign these factors, or whether you include them all or add others, depends on their importance to you. It might be an interesting exercise to evaluate the computers mentioned to see if you did in fact buy the computer that is the "best" decision according to this analysis!

## 2. Evaluating a Job Offer

Many of us are faced with changing jobs, and it is often difficult to judge the merits of different job offers. But DecisionMaster makes it easier by allowing you to select and weight the factors that are important to you. The ones we've selected may not include some you consider important, but they may help you develop your own factors if you are faced with this decision.

- Salary
- Opportunity for Advancement

- Prestige in Your Field
- Desirability of Location
- Employee Benefits
- Stability of Company
- Size of Company
- Compatibility of Co-Workers
- Compatibility of Supervisor
- Working Conditions
- Responsibility/Stress
- Travel Requirements

You might also wish to evaluate the offers under different futures; for example, good economic conditions versus a recessionary economy.

### **3. Selecting a College**

An important decision you may face is selecting a college for yourself or your children. Although the decision often rests on which college accepts you, you still must decide which ones to apply to. Once your choice is narrowed to three or four colleges, you may wish to evaluate them with the aid of DecisionMaster. The following factors might be included:

- Cost of Tuition, Room and Board
- Desirability of Location
- Overall Prestige
- Curriculum
- Reputation in Chosen Field of Study
- Quality of Professors
- Educational Philosophy
- Scholarship Availability
- Campus Activities

### **4. Selecting a Life Insurance Policy**

At one time or another, we are all faced with buying a life insurance policy. The future value of a whole life policy versus a term policy is discussed in Section 3. It was pointed out that a whole life policy has a very high future cost in

some cases. If you are faced with this decision, you might wish to use the cash flow analysis of DecisionMaster to arrive at the future cost of the policy you are planning to buy.

Use a discount rate equal to the interest rate you could get on a savings account; use the term of the policy as the future period covered; use the annual cost of the policy as your regular expense; and use the cash value of the policy as your lump income payable at the end of the term. You would have no lump expenses and no regular income unless the policy paid dividends. The term policy would have only one regular expense item: the annual cost of the policy.

Before you do the cash flow analysis, however, you need to examine a few other factors:

- Impact on Your Monthly Budget
- Tax Considerations
- Insurability at End of Term
- Spouse's Attitude
- Other Services From Agent
- Self-Discipline

The last factor has to do with whether you have the self-discipline to save the extra money you would spend on the whole life policy. If you use an insurance policy as a way of "forced savings," you would probably rate the whole life policy very high for this factor.

You can also evaluate the desirability of two similar policies. Many of the factors would be the same as above, but you might also wish to include Company Stability and Agent Competence.

Alternative futures that could be evaluated might include: (1) Savings rates average 8% or the same as the discount rate you used; (2) Savings rates fall two points below your discount rate; (3) Savings rate rise two points above your discount rate. If you are evaluating mutual policies, the futures might be stated as follows: (1) Dividends will be as projected; (2) Dividends rise; (3) Dividends fall.

## **5. Evaluating Political Candidates**

You can clear the haze of a heated political campaign by using DecisionMaster for a thoughtful evaluation of the political candidates. Following are some of the factors you might use to evaluate a Presidential candidate. Other political races would obviously require different factors.

- Experience in Governing
- Past Performance in Office
- Intelligence

- International Expertise
- Leadership Ability
- Ability to Work With Congress
- Economic Policy
- Trustworthiness
- Ability to Handle Crises
- Economic Philosophy
- Individual Domestic Issues

You might also wish to evaluate Presidential candidates under different futures, such as (1) international tension increases and (2) international tension decreases.

## **6. Choosing a Family Vacation Spot**

An untold number of arguments have ensued over where to spend the family vacation. Now DecisionMaster can assume the role of arbiter in these kinds of family decisions! Maybe your choices are as diverse as camping in the mountains, renting a beach house, spending a week at Disneyland, or going to see the grandparents. Whatever the choices, here are some factors you might wish to include:

- Cost
- Time Required
- Accommodations
- Activities for Children
- Activities for Adults
- Hassle Involved
- Relaxation Quotient
- Husband's Preference
- Wife's Preference
- Children's Preference

You might try using DecisionMaster as a "voting machine," letting each family member cast his vote by rating the choices for his own factor. Another way to give family members a vote is to use each individual's name as a future and use the probability column to "weight" the vote. (E.g., the husband and wife could get a weight of 35% each and the children could split the remaining 30%.) This way, each member could rate the choices and factors for his "future"; the highest total in the Bayes column on the final screen would then represent the "democratic" decision. If you use this method of voting, you would, of course, delete HUSBAND'S PREFERENCE, WIFE'S PREFERENCE, and CHILDREN'S PREFERENCE as factors.



## **7. Arranging Furniture**

Who would have thought you could use a computer to arrange furniture? You can, by evaluating the arrangement *before* you move the furniture. Work out on paper two or three different furniture arrangements; then evaluate them with DecisionMaster using the following factors:

- Traffic Flow
- Balance of Heavy Furniture
- Availability of light for plants
- Conversation Ease
- Effectiveness of Lighting
- Maximizing of Focal Point
- Accessories Compatibility

**Rearranging furniture was never so easy!**

In this section we have covered a very wide range of decisions. But that is precisely the value of DecisionMaster. It can be used to make important business decisions and routine personal ones—and anything in between. These examples were meant to show you DecisionMaster's versatility and to help you develop factors and futures for your own decisions.

Once you've used DecisionMaster a few times, you may find you can't make a decision without it.



## **Section 7**

# **Screen-to-Manual Cross Reference**



## Screen-to-Manual Cross Reference

This section contains the numbered paragraphs for the screen-to-manual cross reference system. Any time you need assistance during the program, press ? and you will be referred to one of the numbered paragraphs below which will tell you exactly what is required.

**101.** Enter 1 if you wish to make a new decision. Enter 2 if you wish to review a previous decision. Enter 3 if you wish to terminate the program.

**102.** If you have a simple decision that does not involve cash flows or alternative futures, enter 1. If you wish to evaluate alternative futures, enter 2. If you wish to evaluate both alternative futures and present value of cash flows, enter 3. If you are not sure which decision type you want, enter 3 and option yourself out of those sequences you do not want. (Refer to Section 4, Paragraph 1 for a discussion of decision types.)

**103.** Enter the title of the most likely future first (usually the *normal* future). The first future entered will be used as a standard of comparison for all other futures. Futures are limited to 6 characters. After entering the first future, enter remaining futures in any order you wish. When you have entered all futures—if fewer than five press ENTER to assign probabilities. If you do not wish to evaluate futures, enter NORMAL as your first and only future; it will automatically receive a probability of 100.

**104.** For each future enter a figure which indicates the percentage of time you expect that future to occur. Enter single-digit figures as two digits, e.g., 9 would be entered as 09. *The total of the probabilities for all futures must equal 100.* If you enter only one future, it automatically receives a probability of 100.

**105.** The total of your probabilities does not equal 100. Adjust figures to equal 100 by moving the indicator to the figures to be changed. Enter R; type in new figure and press ENTER.

**106.** If you wish to make a change to the data you just entered, enter Y. If not, enter N. If you have accidentally hit ENTER before completing the data called for, enter Y and you can continue to enter the necessary data. If you are at one of the final sequence screens, changes may be made on previous screens by entering Y and then recalling the previous screen.

**107.** If you wish to add a title, enter A. If wish to change a title, move the indicator to the title you wish to change, and enter R. If you wish to delete a title, move the indicator to the title you wish to delete, and enter D.

**108.** Type the name of the new future. Press ENTER.

**109.** Type the name of the revised future. Press ENTER.

**110.** If the indicator is on the title you wish to delete, enter Y. If it is not, enter N, and move the indicator to the title to be deleted. Then enter D again and then Y. **Note:** You can delete only titles (i.e., futures, factors, choices, expenses or income items). Figures (i.e., weights, values, cash flow figures,) cannot be deleted except in conjunction with the title to which they refer; they are deleted automatically when the title to which they are connected is deleted.

**111.** Move the indicator to the probability you wish to change. Enter **R**, then type new two-digit figure and press **ENTER**.

**112.** Press **ENTER** to continue the program.

**113.** Enter **C** if you wish to enter Choices first; enter **F** if you wish to enter factors first. Entering choices first often assists in defining the factors.

**114.** Type the name of your choice and press **ENTER**. Choice names are limited to 12 characters. You may enter up to 10 choices for Decisions Type 1 and 2; Decision Type 3 is limited to 6 choices. Press **ENTER** to continue the program.

**115.** Type a one or two-letter abbreviation for the choice you just entered. Press **ENTER**. **Note:** The abbreviation will be used on this screen; the full name of the choice will be used later in the program.

**116.** You have entered the maximum number of choices, futures, or factors. You wish to add an additional title, you must first delete one.

**117.** Type the name of your first factor; press **ENTER**. Factor names are limited to 12 characters. Continue for as many as 12 factors. When you have entered all factors—if fewer than 12—press **ENTER** again to continue the program. **Note:** If you selected Decision Type 3 at the beginning of the program, **FINANCIAL** will automatically appear as your first factor. (Refer to Paragraph 2 under *Weighted Factor Analysis* in Section 6 for a discussion on selecting factors.)

**118.** Assign each factor a weight from 1 to 9. Move the indicator up or down the column with the up or down arrow key. *Do not press ENTER until you have assigned all weights.* The most important factor should be given a weight of 9 and the other factor weights scaled down accordingly. You may give equal weights to two or more factors. (For a discussion of weighting factors, refer to Paragraph 3 under *Weighted Factor Analysis* in Section 5.)

**119.** Rate each choice for each factor, assigning values of 0 to 9.

a. Consider one factor at a time; decide which choice is the best for *that* factor and give it a value of 7, 8, or 9. Then assign relatively lower values for the other choices for that factor. (For a discussion of assigning values, refer to Paragraph 4 under *Weighted Factor Analysis* in Section 6.)

b. Keep in mind the future you are evaluating; it is noted on the top right of the screen. (If you selected Decision No. 1, there will be no future indicated.)

c. You can enter values in any order by moving the indicator up, down, left or right with the appropriate arrow keys. You may revise any value simply by positioning the indicator on the figure you wish to change and typing in the new figure. *Do not press ENTER until you have finished typing in all the values.*

d. If you selected Decision No. 3, you will not be able to enter values for the **FINANCIAL** factor until after the cash flow analysis is completed.

**120.** You have exceeded the maximum number of characters for this entry. Press **ENTER** to continue.

**121.** You entered a nonexistent line number for this screen. Press **ENTER** to continue.

**122.** The maximum number of lines for this screen have been entered. Press **ENTER** to continue.

**123.** Any of the data that has been entered may be changed. If you wish to add, revise, or delete your factors, weights, choices or values, or if you wish to review one of those screens, enter the following codes: **F** for Factors, **W** for Weights, **C** for Choices, or **V** for Values.

**124.** Type the revised name of the factor. Press **ENTER**.

**125.** Type the name of the new factor. Press **ENTER**.

**126.** This screen reflects the weighted factor totals for the choice noted in the corner of the screen. The indicator is pointing at the best decision given the weights and values entered.

**a.** If you selected Decision No. 1, this is your final screen. (There will be no future noted in the corner of the screen.) If you wish to make changes to previous screens, you may do so by entering **Y** and then the code for the appropriate screen. If you do not wish to make changes, enter **N**; you will be given an opportunity to save your decision data.

**b.** If you selected Decision No. 1 or No. 2 you will see this screen for each of the futures named. You may change previous screens for the future noted in the corner of the screen by entering **Y** and then entering the appropriate code for the screen you wish to change. Otherwise, enter **N** to continue the program.

**127.** If you wish to evaluate the future named, enter **Y**. If not, enter **N**. (Note: If the evaluation thus far has resulted in an overwhelmingly clearcut choice and you believe the results won't change for your other futures, you might wish to skip the other futures.)

**128.** This is the Bayesian Screen which shows the total weighted factors for each choice for each future. The column at the right shows the Bayesian results.

**a.** If you selected Decision No. 2 this is your final screen. (Refer to Paragraph 4 of Section 3 for a discussion of final decision theory.) If you wish to make changes on previous screens, enter **Y**. If not, enter **N** and you will have the opportunity to save your decision data.

**b.** If you selected Decision No. 3 this screen does not reflect the values for the **FINANCIAL** factor. If you wish to make changes on previous screens, enter **Y**. If not, enter **N** to continue on to the cash flow analysis.

**129.** Enter the *number*, not the name, of the future you would like to review change. You will then be able to recall various screens for changing facts, weights, choices or values.

**130.** If you wish to save the decision, enter **Y**. If not, enter **N**. *This will be your only opportunity to save this decision.* If you are in Decision No. 3 sequence, a cash flow analysis will be automatically saved if you elect to save the decision; you elect not to save the decision, the data will be retained temporarily in order to do the cash flow analysis.

**131.** Enter a name for your decision, up to 8 characters.

**132.** If you wish to do the cash flow analysis, enter **Y**. If not, enter **N** and program will return to the initial screen where you can begin another analysis; terminate the program.

**133.** Enter the *number*, not the name, of the future for the cash flow analysis.

**134.** Enter the future period for which you wish to evaluate cash flows. It must be stated in terms of *months*.

**135.** Enter the interest rate to be used to discount the cash flows. This must be a two-digit figure — e.g., 9% would be entered as **09**. *Do not enter a percent sign or decimal point.*

**136.** If you have any lump expenses (or lump income, if you are at the lump income table) for the choice noted at the top of the screen, enter **Y**. If not, enter **N**. A lump expense is a one-time expense over the period being considered (Lump income is any income received in a lump sum over the period being considered.)

**137.** Enter a name for the lump expense (or lump income, if you are at the lump income table), up to 10 characters. You may enter up to 7 expense (or income) items.

**138.** Enter the amount of the lump expense (or lump income, if you are at the lump income table). *Do not enter commas or dollar signs.*

**139.** Enter the month the lump expense (or lump income, if you are at the lump income table) will occur. Enter **0** if the expense must be paid (or the income must be received) at the consummation of the transaction. The end of 30 days will be month 1; the end of 60 days, month 2; and so on.

**140.** If you expect to incur any regular expenses for this choice during the period of comparison (or, if you are at the regular income table, if you expect to receive any regular income) enter **Y**. If not, enter **N**.

**141.** Enter a name for the regular expense (or regular income, if you are at the regular income table), up to 10 characters. You may enter up to 7 regular expenses (regular income).

**142.** Enter the amount of the regular expense (or regular income, if you are at the regular income table). *Do not enter commas or dollar signs.*

**143.** Enter the month the regular expense (or regular income, if you are at the regular income table) begins, counting the first 30 days as month 1, 60 days as month 2, and so on.



**144.** Enter the month the regular expense (or regular income, if you are at the regular income table) will end.

**145.** Enter a figure for how often the regular expense (or regular income, if you are at the regular income table) occurs. *This must be stated in terms of months: 1 equals monthly; 3 equals quarterly; 6 equals biannually; 12 equals annually.*

**146.** Enter **A** if you wish to add a new item. Enter **D** if you wish to delete an item. Enter **R** if you wish to revise an item or figure. **Note:** If you *add* an item, you should complete the entire line. If you *delete* an item, you will delete the entire line. You may *revise* items or figures, but you cannot add or delete figures alone.

**147.** Enter the line number of the item or figure you wish to revise or the line you wish to delete.

**148.** Enter the letter code of the column you wish to revise:

**Lump Expenses or Lump Income Tables:** **T** for title of expense or income item; **A** for amount; **M** for month.

**Regular Expenses or Regular Income Tables:** **T** for title of expense or income item; **A** for amount; **B** for beginning month; **E** for ending month; **F** for frequency.

**149.** Type the revised name for the expense or income item. Press **ENTER**.

**150.** Type the revised amount. Press **ENTER**.

**151.** Type the revised month. Press **ENTER**.

**152.** Type the revised frequency. Press **ENTER**. 1 equals monthly; 3 equals quarterly; 6 equals biannually; 12 equals annually.

**153.** If you wish to revise Futures, enter **F**; if you wish to revise Probabilities, enter **P**. *All probabilities must total 100.*

**154.** These are the present values and future values of the expenses and income for the choice noted on the screen. *If you wish to use the present value figures, write them down.* They will appear on the final cash flow screen only as a **P/V Ratio**. If you wish to make any changes in expense and income tables for this choice, enter **Y**. If not, enter **N** to continue the program.

**155.** Enter the *number* of the expense or income table you wish to change or review.

**156.** This screen reflects the results of the cash flow analysis for the future noted on the screen. The **P/V Ratio** is the present value of the income divided by the present value of the expenses. **F—INC** is the future value of the income; **F—EXP** is the future value of the expenses; **IRR** is the internal rate of return. You should rate each of the choices for the **FINANCIAL** factor by assigning values of 0 to 9. Enter **9** for the best choice for the **FINANCIAL** factor based on the results of the cash flow analysis; rate the other accordingly.

**157.** If you wish to change any of the *values* you just entered, enter **Y**. If not, enter **N**.

**158.** If you wish to change or review any of the expense or income data for any of the choices for this future, enter **Y**. If not, enter **N**. (**Note:** If you change or review any financial data, the present value, future value and internal rates of return (if you elected to do the latter) will be recalculated.)

**159.** Enter the *number* of the choice you wish to review or change

**160.** If you wish to do the cash flow analysis for another future, enter **Y**. If not, enter **N** and the program will return to the initial screen where you can begin a new analysis or terminate the program.

**161.** Type the code name of the decision you would like to review; press **ENTER**. For the procedure on reviewing previous decisions, refer to Section 4

**162.** The Data Diskette is full. Insert a fresh Data Diskette or one on which there is sufficient space for your decision data. Decisions Type 1 and 2 each require maximum of 3 grans for storage; Decision Type 3 requires a maximum of 3 grans for the Main Decision File and 4 grans for each future of Financial Data Files. To determine the amount of free storage on a Data Diskette refer to *Examining a Data Diskette* in Section 1.

**163.** The figures shown on this screen are the values you entered for Future No. 1. Press **ENTER** to change the values for this future. *Change only those values that are necessary to reflect your evaluation of this future*; move the indicator to the figures to be changed and type in the new figures. When all changes have been made, press **ENTER**.

**164.** If you wish to do the internal rate of return for this future, enter **Y** for yes. If not, enter **N**. Calculating the internal rate of return may take from several seconds to several minutes, depending on the number of expense and income items and the number of choices. (Refer to Section 3 for a discussion of internal rate of return.)

**165.** Enter the number of the choice whose value you wish to change.

**166.** Enter the new value for the choice you are changing.

**167.** Insert a Data Diskette to save this decision data. A Data Diskette is a diskette created for the specific purpose of saving decisions in the DecisionMaster program. (Refer to Section 1 for details on how to create a Data Diskette.) If you are doing Decision Type 3, the decision data will be saved in order to do the cash flow analysis *regardless of whether or not you elected to save the decision*. (These temporarily saved decisions may be deleted later; refer to Section 1 for the procedure on deleting decisions.)

**168.** Insert the DecisionMaster Program Diskette. This is necessary so the program can be loaded into memory. It is necessary to interchange the Program Diskette and the Data Diskette when doing one of the following:

- a. Saving a decision.
- b. Loading a previous decision for review.
- c. Doing the cash flow analysis in Decision Type 3.

**169.** You have entered an incomplete or wrong decision name. It is also possible that you have the correct decision name and the wrong Data Diskette. Caution must be exercised when reviewing a financial decision (Type 3) if all the financial files are not on the same diskette with the Main Decision File. (See *How to Save a Decision* in Section 1 for an explanation of these files.)

## **Section 8**

# **Bibliography**



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