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ADVERTISING MEDIA SELECTION WITH PC BASED LINEAR PROGRAMMING SOFTWARE FOR TOURISM AND TRAVEL ORGANIZATIONS

By

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ABSTRACT

ADVERTISING MEDIA SELECTION WITH PC BASED LINEAR PROGRAMMING SOFTWARE FOR TOURISM AND TRAVEL ORGANIZATIONS

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This research effort was undertaken to determine whether the WHAT'S BEST! linear programming package could be successfully applied to the media selection by tourism and travel organizations. The purpose is to evaluate the WHAT'S BEST! software specifically focusing on its appropriateness and ease of application to a realistic media allocation problem involving tourism and travel advertising. To provide a scenario for use in different tourism and travel organizations, secondary data were collected on reach, frequency, and unit costs of advertisements for 59 media variables (e.g., television, radio, direct mail, etc). Nine spreadsheet files were produced from a master spreadsheet file, representing $12, $5, and $1 million budgets using three different budget allocation strategies. WHAT'S BEST! was run on a Lotus 1-2-3 master spreadsheet file producing optimal advertising impression levels (represented by reach multiplied by frequency) for each of the output files. Results demonstrate that WHAT'S BEST! is a useful tool that could aid tourism and travel managers to better allocate their advertising budgets.

To my parents, and

Aunt's D. and N.

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CHAPTER I

INTRODUCTION

The purpose of this research effort was to investigate the use of linear programming PC software to solve advertising media selection problems for tourism and travel organizations. In the United States, almost $200 billion was spent on tourism and travel in 1988 (Discover America 2000, 1989, p. 15). In addition, tourism and travel directly generated 5.34 million jobs, $64.3 billion in payroll income, and $34.2 billion in federal, state, and local tax revenue (Discover America 2000, 1989, p. 15). Current trends in tourism and travel include a rapidly growing cruise market, soaring golf and resort vacations, ever-increasing interest in cultural tourism and growth in frequency of weekend trips (Discover America 2000, 1989, pp. 17-18). Royal Caribbean Cruise Lines will spend $35 million on advertising for fiscal 1991, up from $14 million in 1990 and $6 million in 1989 ("Last Minute News," 1990a, p. 45; 1990b, p. 35.) The importance of tourism and travel and the value it represents to various organizations and businesses is evident.

In any industry, making the best management decisions possible is crucial to marketers and advertising management teams. It is difficult to make quality decisions without first reducing advertising data via an objective process

to guide media selection in light of advertising budget considerations (Hodge & Clements, 1986, p. 5). The marketer needs to make use of all possible decision-making tools. The subject of advertising appropriations and media selection merits more attention than it often receives in the tourism and travel industry (Aaker & Myers, 1987, pp. 439-441; Frey, 1955, p. 1). To aid in making media selection decisions, one of the proven tools is linear programming. Linear programming applications to media selection have been completed by Engel and Warshaw (1964), Stasch (1965), Bass and Lonsdale (1966), Gensch (1968), Dallenbach and Bell (1970), and Schneiderjans (1984).

Recently the media selection task has been facilitated by ready availability of advanced modeling techniques and computer technology. Computer modeling is a powerful technique with a broad range of applications (Kelly, 1985, pp. 82-83; Martin, 1968, p. 3). Computer models are valuable as they often reveal relationships not apparent before, and having built a model, it is usually possible to analyze it mathematically to suggest new courses of action (Williams, 1985, p. 3). Quantitative methods of analysis are especially crucial to modern marketing and advertising decision makers because of the nature of what is riding on their decisions—often millions of dollars and the success or failure of the organization's ventures (Lapin, 1976, p. 13).

Currently, end-user computing, the use of computer-based information systems by anyone outside formal data-processing areas, is growing by leaps and bounds (Jarke, 1986, p. 73). This puts the computer's power in the hands of all management decision makers. Thus, a powerful mathematical programming process like linear programming can be used by tourism and travel marketers on their PC systems to aid in making crucial media selection decisions.

The process of linear programming was developed by George B. Dantzig and associates in 1947 (Gass, 1969, p. ix), but recent advancements have enhanced access to the process for addressing an array of everyday management problems. One of the new advancements has been to put the power of linear programming in the hands of the average manager or marketer with a linear programming software package called WHAT'S BEST!. It is designed for use on an IBM PC, or other 100% IBM Compatible with a minimum of 256K RAM. WHAT'S BEST! needs Lotus 1-2-3 Release 1A or 2.0, or Symphony Release 1.1 to run its linear programming applications. It is based on the LINDO optimization software of Professor Linus Schrage. WHAT'S BEST! could aid the average marketer with access to an inexpensive personal computer to make more sophisticated media selection decisions. It overcomes limitations of past linear programming packages due to its ease of operation. Thus, it is accessible to both a manager at a large organization or the small businessperson.

Having established the potential importance and value of this decision-making aid (linear programming) for media selection in the tourism and travel industry, the problem statement for this thesis can be described as follows: Can the WHAT'S BEST! linear programming package be successfully applied to a spreadsheet model, created in Lotus 1-2-3, for a tourism and travel media-selection problem, using secondary data sources?

Before proceeding, however, it is useful here for both interpreting what follows and for those interested in applying WHAT'S BEST! in their media selection decisions to note some of the obstacles and limitations that were encountered at the outset of this project. The first limitation involved obtaining up-to-date data. Second, this author, like many potential users of this technique,

lacked extensive in-depth knowledge of linear programming practices and thus had to rely on the claims made by the creators of WHAT'S BEST! as to its relative ease of use. Another limitation faced by the author was that no trials of the master spreadsheet file in actual media selection and advertising budget allocation processes could be made. It is difficult to convince an advertiser to release current figures about an advertising plan due to the factor of competitive intelligence. Thus, the situation depicted in this thesis is hypothetical but not atypical.

Although challenging, these obstacles did not prove impossible to surmount. Interviews and discussions were conducted with advertising account executives on both the buying and selling levels. Conducting research in a university setting also provides access to a wealth of secondary data through library searches. Finally, technical help is available to the user in computer hardware and software and linear programming techniques.

This paper includes five chapters including this introductory chapter. The second chapter presents a literature review which focuses on four areas: (a) linear programming; its history, and use in media selection problems; (b) advertising and its role, media plans, media variables, and reach, frequency, and cost per thousand definitions; (c) tourism and travel advertising processes; and (d) a discussion of linear programming applications including the WHAT'S BEST! software. In the third chapter, the methodology employed in this study is presented. It includes a more in-depth discussion of WHAT'S BEST!, sample files, file creation, derivation of figures for the models, budget selection, and budget allocation strategies. After the methods are discussed, results from applications are presented in the fourth chapter. Results are highlighted in tables

with accompanying discussions for each of the budget level scenarios developed. The final chapter is a summary chapter that looks at evaluation of the research effort, its implications, and recommendations for further study.

CHAPTER II

LITERATURE REVIEW

Linear programming was first developed and applied in 1947 by George B. Dantzig and associates for the U.S. Department of the Air Force (Gass, 1969, p. ix; Lee, 1976, p. 15). The original name of the technique was "programming of interdependent activities in a linear structure;" later this became known simply as linear programming (Lee, 1976, p. 15). The term "programming" in this context is not associated with computer programming. Rather, it refers to choosing a course or program of action (Wu& Coppins, 1981, p. xvi). Dantzig's research was continued by other scholars, including J. von Neumann, L. Hurwicz, and T.C. Koopmanns (Lee, 1976, p. 15). Their early applications of linear programming fell into three main categories: military applications, inter-industry economics, and problems involving zero-sum two-person games (Gass, 1969, p. ix). After these successful applications, linear programming was carried over into the government sector, business and industry, and not for profit organizations (Lee, 1976, p. 16). The first successful solution of a linear programming problem on a high-speed electronic computer occurred in January 1952 on the National Bureau of Standards SEAC machine (Gass, 1969, p. x). By 1970, IBM estimated that 25% of all scientific computing was devoted to solving linear

programming and related problems (Wu & Coppins, 1981, p. xvi). The rapid development and widespread use of computers have increased the number of linear programming applications in recent years. Presently, organizations apply linear programming to many managerial problems, such as blending fuel, capital investments, environmental protection, food processing, marketing mixes, personnel assignments, production scheduling, and transportation of goods and services (Anderson, Sweeney, & Williams, 1974, p. 220; Lee, 1976, p. 16). Linear programming has become an important tool not only of modern theoretical and applied mathematics but of business management as well.

Linear Programming Models

A linear programming problem can be described as follows. Optimize (find the best value of) a dependent variable by finding values for a set of independent variables, given that there are a variety of restrictions on the values of the independent variables. The dependent variable is a function of the independent variables. The objective is to choose a course of action that yields an optimal value for the dependent variable, referred to as the objective function. The independent variables are referred to as decision variables because a set (or sets) of values must be determined for them. The restrictions on the values of the decision variables are referred to as constraints (Wu & Coppins, 1981, pp. xvi-xvii). All these relationships and restrictions can be described mathematically.

The aim of this research effort was not to provide detailed mathematical models for linear programming. For more in-depth information regarding linear programming, it is recommended that the reader refer to An Illustrated Guide to Linear Programming by Gass, an introductory level text of linear programming

problems. Should a more advanced level of linear programming be desired, the text by Wu and Coppins titled Linear Programming and Extensions may prove helpful. However, to provide some basic understanding for the remainder of this research effort, the next section of this paper reveals some of the basics of linear programming problems.

A linear programming problem formulation must meet certain requirements. In addition to the relationship of the dependent and independent variables, a linear programming problem must have an explicit objective criterion to optimize. The objective function may be one of either maximization or minimization of the criterion but never both. Secondly, resources must be limited so that a decision problem must involve activities that require consumption of limited resources (eg. money). Also, linear programming requires that the total measure of outcome (objective criterion) and the total sum of resource usage must be additive. In addition, linear programming requires a complete divisibility of the resources utilized and the units of decision variables. For problems that require nonfractional values of resource utilization and decision variables, integer programming can be utilized. As well, linear programming implicitly assumes a decision problem in a static time period. To handle linear programming problems with uncertain coefficients, parametric linear programming and sensitivity analysis may be applied to the problem. Finally, the primary requirement of linear programming is linearity in the objective function and in the constraints. The term "linear" implies that all relationships among the decision variables must be directly proportional (Lee, 1976, pp. 17-18).

Therefore, all linear programming problems have certain characteristics in common. They are: (a) the system can be described in terms of a series of

possible activities, (b) the decision maker has to chose the most appropriate levels for each of the activities, (c) the decision maker is restricted by the availability of limited resources, and (d) there is a well-defined quantity that can be used to compare the desirability of different strategies (Salkin & Kornbluth, 1973, p. 4).

An LP model is built around the requirements and characteristics of a linear programming problem. The real thinking to modeling goes into the structuring of the model and into collecting required data inputs. The construction of the model focuses on isolating the aspects of the problem situation that are most important for analysis, determining relationships between relevant variables, deciding on the appropriate parameters, and evaluating its feasibility (Hughes & Grawiog, 1973, p. 131). A great deal of the value of any linear programming model is dependent on establishing restrictions or limitations that are relevant in number and magnitude (Hughes & Grawiog, 1973, p. 134). Also of vast importance in creating a valuable linear programming model are the data requirements. If the model is to supply meaningful and useful information for decision making, it is the effort put into data collection that determines whether or not sensible results will be obtained (Hughes & Grawiog, 1973, p. 141).

Linear programming models are usually applied to complex decision problems, which involve many interacting variables that contribute to the objective criterion function. Many management problems fall into this category, such as the media selection problem. Media selection applications of linear programming are aimed at helping marketers allocate a fixed advertising budget across various media variables (Anderson et al., 1974, p. 229; Lee, 1976, p. 19; Wu & Choppins, 1981, p. 164). Linear programming is a very effective tool for this type

of resource allocation problem (Lee, 1976, p. 19). In most of these applications, the objective function is taken to be the maximization of audience exposure, or impressions (Anderson et al., 1974, p. 229; Loomba, 1976, p. 23). The linear programming model will aid management in the decision to reach optimal impression levels using selected media variables such as television, radio, newspapers, magazines, direct mailings, and others (Anderson et al., 1974, p. 229; Loomba, 1976, p. 23). Restrictions on the allowable allocation of the advertising budget across the media variables are made on such considerations as company policy, contract requirements, availability of media, and the cost of advertisements (Anderson et al., 1974, p. 229; Lee, 1976, p. 20). Management may also have certain preferences regarding each of the media variables. The linear programming problem is to determine the advertising dollars to be allocated to each variable in order to obtain total effective exposure of the organization and its services (Lee, 1976, p. 20). A linear programming model for media selection problems can often be used to arrive at an approximation of the best decision, depending on how the model is constructed (Anderson et al., 1974, p. 233).

Media Selection Problems

To construct a useful and successful linear programming model for media selection problems, background information on advertising is necessary. Advertising is a component of the promotional mix, along with personal selling, publicity, and sales promotion. The promotional mix is part of the marketing mix which forms the overall marketing plan (Kaufmann, 1980, p. 48; Schewe & Smith,

1983, pp. 52-53). Advertising's goals often become goals of marketing. Advertising has a continuing responsibility to help management reach the higher-order goals of the company (Kaufmann, 1980, p. 49). Advertising is nonpersonal communication (i.e., the marketer does not personally interact with buyers) that is purchased by the marketer to promote a product or service through the mass media (Kaufmann, 1980, p. 49; Shewe & Smith, 1983, p. 53).

The advertising plan is broken down into objectives, budget, media, and copy components (Aaker & Myers, 1987, p. 30). The media plan sets out the details of the media schedule, which may include the specification of up to four types of media factors: (a) media class or the type of medium (e.g., television, radio, direct mail) to be used; (b) media vehicles, which provide the immediate environment for the advertisement, such as ABC News, Don Cherry Radio Show (a Canadian hockey analyst), or Time magazine; (c) media options, a description of the advertisement's characteristics, excluding copy and artwork, but including characteristics of size (e.g., full page), length (30 seconds), color (black and white), and location (inside front cover); and (d) media timing, how the media options are scheduled over a time period (Aaker & Myers, 1987, pp. 439-440).

Each major media class has characteristics that make it valuable to the media plan. Television can provide an active demonstration of the product or service. More than 94% of all homes in the United States have at least one television set (Kaufmann, 1987, p. 151). Television, then, is often the most efficient way to reach a large, national audience. Local or regional coverage can be gained by buying television time on a station-by-station basis (Dean, 1980, pp. 111-112; Kaufmann, 1987, p. 151). Newspapers can deliver advertisements to a target market on a daily basis. Newspapers offer highly efficient geographic

selectivity but are not very selective as to a particular target audience (Kaufmann, 1987, p. 151). Also, as television news coverage has become more complete, newspaper readership has begun to decline (Dean, 1980, p. 21). Magazines can offer audience selectivity, durability, editorial climate, high-quality color reproduction, and opportunities for regional coverage. Many magazines will have special sections or features closely connected in some way to a specific product or service. These features can be invaluable to a marketer (Dean, 1980, p. 22; Kaufmann, 1987, p. 151). Radio can go a long way toward establishing product identity in the minds of its audience. Radio can deliver an advertising message at a low cost per thousand, but it lacks a visual presentation, making it a supplementary medium (Dean, 1980, p. 21; Kaufmann, 1987, p. 151).

Other media classes that are important to consider included outdoor, transit, direct mail and specialty media advertising. Outdoor advertising involves the use of billboards and other signs. Outdoor advertising can be used on a national or local basis and offers flexibility and intensive market coverage. Outdoor advertising is mainly used in establishing an image or as a directional aid. However, outdoor advertising is mostly nonselective, with a lot of waste circulation (Dean, 1980, p. 22; Kaufmann, 1987, p. 151; Shewe & Smith, 1983, p. 520). Transit advertising can expose the advertising message to a captive audience and can be targeted to specific markets (e.g., commuters). Transit advertising uses signs inside and outside buses, taxis, streetcars, and commuter trains. However, the advertising message is delivered only to those within the vicinity of the ad (Rielly, 1980, pp. 153-154; Schewe & Smith, 1983, p. 520). Direct mail can offer the most personal and individualized advertising. It is highly selective, has minimal waste circulation, and the copy can be very flexible, as

each letter can appear personalized. However, mailing is becoming increasingly more expensive and many consumers consider direct mail advertising to be "junk mail" and never receive the intended advertising message (Dean, 1980, p. 22; Rielly, 1980, p. 155; Schewe & Smith, 1983, pp. 519-520). Specialty advertising can offer a wide range of opportunities to the marketer. Local directories, guides, and programs can be targeted to specific markets (e.g., new citizens, with a welcome guide), and an imprinted gift can be especially useful for thanking customers and establishing an image (Dean, 1980, pp. 22-23; Rielly, 1980, pp. 154-155).

The characteristics of each of the media classes discussed previously are summarized in Table 1.

Table 1. – Comparison of media characteristics.

Characteristic	Television	Newspaper	Magazines	Radio	Outdoor	Direct Mail	Specialty
Audience size	+	+	+	+	+	–	–
Selectivity	+	+	+	+	–	+	+
Exposure time	–	+	+	–	+	–	+
Quality of reproduction	+	–	+	–	–	+	–
Complexity potential	–	+	+	–	–	+	–
Wasted circulation	+	+	+	+	–	–	–
Flexibility in placing an ad	–	+	–	+	–	+	+
Availability of the medium	–	+	+	+	–	+	+
Prestige	+	–	+	–	–	–	–
Cost	+	–	+	–	–	–	–

Key: (+) = Relatively High (–) = Relatively Low

Source: Adapted from C.D. Schewe and R.M. Smith, Marketing: Concepts and Applications, 2nd ed. (New York: McGraw-Hill, 1983), p. 522.

The medium chosen must be able to convey the advertising message intended. Some marketers use the cost-per-thousand (CPM) figure as a guide to selecting media classes that will convey the advertising message to the intended market. The cost-per-thousand concept relates the size of medium's audience to the price of the medium. Illustration 1 indicates how cost-per-thousand is computed for an advertisement (Davis, 1985, p. 551).

Illustration 1 - Computing cost-per-thousand (C.P.M.).

$$\text{Cost per thousand} = \frac{\text{Price of medium to advertiser}}{\text{Delivered audience (thousands)}}$$

When computing the cost-per-thousand, both the numerator and the denominator in the cost-per-thousand equation may be difficult to determine. The price of a medium is not always well known. Print media (magazines and newspapers) have well-established rates. Radio and television have highly variable program costs. But, the major difficulties are encountered in establishing the size of the delivered audience. The term "reach" is commonly used to indicate how many potential buyers are reached by a specific advertising medium. Knowing the medium's cost and reach, a relevant cost-per-thousand figure can be obtained (Davis, 1985, p. 552; Kaufmann, 1987, p. 151). Reach figures measure the total number of potential buyers who will see, read, or hear an advertising message, given a particular media plan. The term "frequency" is used to measure the number of times a person, household, or family is exposed to an advertising message during a given time period (Davis, 1985, pp. 552-553; Kaufmann, 1987, p. 152).

The term "impressions" refers to the total number of exposures to an advertising message a person, household, or family may experience. An impression is a result of reach multiplied by frequency (Kaufmann, 1987, p. 153). The data to link sales to advertising impressions by type of media variable used is not readily available, so the quantitative analysis used in this research effort can not go beyond a maximization of impressions. Perhaps these data will be available in the future at which time a more accurate picture of the relationships between sales and advertising impressions may be developed.

Media Selection in Tourism and Travel

One of the problems a tourism and travel organization has in creating advertising impressions is found in the allocation of its advertising dollars. The problem is: How to get the most effective combination of media variables to produce an effective advertising allocation strategy (Starr, 1984, p. 148). For example, in 1982 the state of Illinois spent approximately $1 million on travel promotion, but by 1988 its spending had grown to approximately $10 million. Thus, it becomes essential that an appropriate media selection strategy be developed to account for the great volume of money spent on advertising (Ritchie & Goeldner, 1987, p. 481, and, Standard Dictionary of Advertisers, 1988, p. 43). How managers allocate advertising dollars to media variables becomes very important no matter the budget size. Most tourism and travel organizations allocate budgets of up to 5% of their sales revenue to advertising. However, there is considerable variation. Tour operators and cruise lines may allocate 15% of sales revenue to paid advertising. Meanwhile, minor hotel chains allocate less

than 1% of sales revenue to their advertising budget (Schmoll, 1977, p. 72; Wahab, Crampon, & Rothfield, 1976, p. 219). To meet total advertising impression objectives, the advertising campaign must achieve coverage of the target market. Coverage will not only depend on the proportion of the market that sees the advertisements (reach), but also on the frequency with which the advertisements are seen (Burkhart & Medlik, 1981, p. 209). Therefore, the allocation of the budget across the media variables becomes crucial to the success of the advertising campaign. Intangible products like tourism and travel can seldom be tried out or tested in advance by the consumer. Thus, tourism and travel organizations are very dependent on the presentations and descriptions provided by print and/or audiovisual media variables (Foxall, 1985, pp. 176-177).

Media Selection by Linear Programming

The mass media selection process is facilitated by the availability of quantitative data on audience profiles, demographics, circulation, reach, penetration, and cost-per-thousand measures. Computer-based media selection models are capable of producing media plans tailored to specific requirements. Models reduce the marketer's media data requirements to mathematical terms in the form of a series of equations. Computational techniques are used to carry out the matching of requirements with alternatives (Schmoll, 1977, p. 122). The computer model is designed to process data on the media variable alternatives and to select those alternatives which best meet the requirements set by the marketer. Because the computer has great mathematical capacity and because it treats data consistently and accurately, the solution proposed may be better

than one derived through less formalized procedures (Nylen, 1975, p. 268). Media selection models can be classified in terms of the computational method on which the model is based. The three basic approaches identified by Kotler, in Nylen (1975), are; mathematical programming, stepwise analysis, and simulation. One of the earlier linear programming models, a mathematical programming approach, was Batten, Barton, Durstine, and Osborn advertising agency's 1963 BBDO model (Engel, Warshaw, & Kinnear, 1983, p. 301; Nylen, 1975, pp. 268-269). This BBDO model's success created considerable interest in linear programming. It was followed by Young and Rubicam's HIGH ASSAY MEDIA MODEL. These models were developed for large advertising agencies, mostly for in-house use. Some of the models to follow, like MISER, MEDIAC, and ADMOD, have built on the strengths of these first models while overcoming some of their limitations (Aaker & Myers, 1987, pp. 450-459; Engel, Warshaw and Kinnear, 1983, p. 301; Nylen, 1975, pp. 268-271). Other examples of models or the beginnings of model formulations for media selection problems can be found in Anderson, Sweeney and Williams (1974); Lee (1976); Loomba (1976) and Wu and Coppins (1981).

There are a number of advantages and disadvantages to using linear programming models to solve media selection problems. The linear programming model is valuable because it:

1. Forces the marketer to define in specific terms the definitions of markets to be reached. Instead of guesses or hunches, specific data must be developed about the markets.
2. Requires quantification of qualitative factors. For example, editorial climate and related considerations are qualitative or subjective fac-

tors. The linear programming model requires management to quantify them in specific mathematical terms.

3. Can be applied to problems involving a variety of media. Assuming availability of data, the linear programming model can be applied to all media types.
4. Allows the blending of many factors. There is an opportunity to change relationships, and work with them while keeping them all at the forefront of the operation. This creates an effort that ends up examining the whole set of factors as they interact, not individual media elements operating in isolation of others (Engel and Kinnear, 1983, pp. 302-303).

The limitations of the linear programming model are:

1. The assumption of equal effects for repeat exposures. However, it is commonly believed that the response by the prospect will diminish after many exposures. This introduces nonlinearity into the response function (i.e. the second exposure has less impact than the first and impact declines further with each subsequent exposure). However, their impacts can be reduced by disaggregating the relevant variable in formulating the linear programming model.
2. The assumption of media costs. Linear programming models assume media costs are constant, not taking into account discounts for multiple time and space purchases. Introduction of discounts would make the cost function nonlinear. Again, disaggregation can reduce but not eliminate this limitation in the linear programming model.
3. Solutions determined without consideration of audience duplication.

Audience overlap cannot be handled with present computer algorithms.

4. The illusion of definiteness. The solution is only as good as the data and the assumptions on which it is built (Engel and Kinnear, 1983, pp. 303-304).

As noted, it is often possible to reduce the impact of these limitations by building more complex models. In other cases, it is often possible to evaluate the impacts of such limitations through sensitivity analyses which help the user to formulate a most relevant single model or a set of models which yield a range of outcomes within which a best solution is likely to be found.

Linear programming has become more readily available for practical use because of continuing developments in computer technology (both in terms of hardware and software). Most of the major computer manufacturers have developed their own linear programming packages for various clients. A large number of computer service firms provide packages on a time-sharing basis. However, it is usually only the large firms that can take advantage of these linear programming packages (Lee, 1976, p. 19). When readily accessible, application of linear programming models can be cost effective in allocation problems involving just a few thousand dollars (Engel & Warshaw, 1964, p. 47).

The building of linear programming models can be a very involved process, with the model builder needing extensive knowledge of linear programming practices. The cost of sophisticated hardware and software can also be prohibitive for the smaller tourism and travel organization. However, with the development of the linear programming package WHAT'S BEST! by General Optimization, Inc. in 1985, some of these problems are overcome. WHAT'S

BEST! is based on a well-known LINDO optimization software developed by Professor Linus Scharge (Savage, 1985, cover). WHAT'S BEST! allows for the creation of linear programming models on spreadsheet software using linear formulas. WHAT'S BEST! invokes the full power of linear programming procedures to find the mathematically optimal solution, which is typically unattainable in any other way (Savage, 1985, p. i). This puts the power of linear programming at the disposal of tourism and travel organizations without the associated cost and knowledge that may have deterred them in the past.

This review of the literature leads to the conclusion that linear programming can be used to assist in making media selection decisions. However, this tool was, until recently, not generally accessible because of limited access to computer systems needed to solve linear programming models and lack of knowledge required to effectively use it even if required hardware and software were accessible. The recent development of the WHAT'S BEST! linear programming software for solving linear programming models on most personal computers (PC's) and its modest cost and "user friendly" nature would appear to have removed the major obstacles to wider use of linear programming. Thus, this thesis evaluates the WHAT'S BEST! software specifically focusing on its appropriateness and ease of application to a realistic media allocation problem involving travel and tourism. If successful, this test should serve as a demonstration to stimulate use of WHAT'S BEST! as a tool to use in travel and tourism organizations.

CHAPTER III

METHODS

In this chapter, the methodology used in preparing this research effort will be discussed. This process begins with a brief overview of the computer system and software requirements necessary to run WHAT'S BEST!. A brief introduction to the sample files follows, that assists the user in learning and understanding WHAT'S BEST!. The remainder of the chapter discusses in detail the process used to arrive at the finished spreadsheet master file. These discussions are broken down into ten steps. They begin with the selection of the media variables to be used in the master spreadsheet file and finish with a discussion of how to execute the completed master spreadsheet file by recalculating the spreadsheet using macros. To better illustrate how each of these ten steps fit together, a diagram is provided in Illustration 2, on the following page.

To execute WHAT'S BEST! Release 1.2 program a minimum system requirement of Lotus 1-2-3 Release 1A or 2.0, or Symphony Release 1.1, and PS-DOS/MS-DOS 2.0 or higher is needed. An IBM PC or 100% IBM Compatible with 256K RAM minimum memory for the Personal Version of WHAT'S BEST! is necessary. Also, dual, double-sided, double-density floppy disk drives or one floppy and one hard disk drive are required. The program needs about 211K in

Illustration 2. -- Ten steps for development of the master spreadsheet

1. Select media variables
   eg. Newspaper, Full Page Ad

2. Obtain basic Reach data

3. Obtain basic Frequency data

4. Obtain basic Unit Cost data

5. Set format of master spreadsheet file
   eg. Label and position columns and rows

6. Determine spreadsheet cells to be calculated by WHAT'S BEST!
   eg. Objective cell - Total Impressions

7. Select budget levels for spreadsheet files

8. Select budget allocation strategies (3) for the spreadsheet files

9. Develop macros (3) for use in the master spreadsheet file

A) Instructional table B) Input menu C) Output menu

10. Determine process for calculation and recalculation of the master spreadsheet file

free memory to run the 256K Personal Version (Savage, 1985, pp. A-42, A-53). In this effort, Lotus 1-2-3 Release 2.2, MS-DOS 3.0, and a Zenith 100% IBM compatible computer with 512K RAM memory with one floppy and one hard disk drive were used.

The WHAT'S BEST! software program provides seven sample or demonstration files on disc that are described step-by-step in the program manual. For familiarization purposes, two files (PRODMIX and HOGFEED, for more detail refer to the WHAT'S BEST! manual) were selected from the section on Basic Modeling Concepts in the WHAT'S BEST! manual. Another two files (PRODMIX1 and TRUCK) were selected from the section on Advanced Modeling Concepts. These sample files can be followed in the text and on the computer screen as the demos are run. Approximately 30 to 45 minutes were spent on each sample file, gaining familiarization with the basic procedures of WHAT'S BEST! These sample files were referred to during the building of the master spreadsheet file to check formats and procedures. In this respect, the sample files are very important and serve a dual role, one of learning and guidance for the user.

After seeking basic knowledge of WHAT'S BEST!'s requirements and procedures, the first step is to create a file in Lotus 1-2-3 that would allow WHAT'S BEST! to invoke its linear programming procedures. Then obtain specific data to fill the Lotus 1-2-3 file. Fifty-nine media variables were selected from a compilation of seventy-eight media variables listed in Graham's (1969) Encyclopedia of Advertising. Media variables are those elements which make up the advertising strategy, such as a full page newspaper advertisement, a one page color magazine advertisement or a fifteen second cable television advertisement. The fifty-nine selections were made on the sole criterion of perceived relevance to advertising plans for tourism and travel organizations. Media

variables not selected included games, parade floats, yearbooks, and so on, as their advertising value did not appear consistent with the goals of an advertising plan for a typical tourism and travel organization.

Next, the process of collecting data for the master spreadsheet file begins. In the first three steps information on reach, frequency and unit cost data must be collected. It is important to note that obtaining these figures is made difficult by a secrecy that prevails throughout the advertising industry. Published figures are often acknowledged to be only estimates or approximations. This research effort used both figures in print publications and those obtained from discussions with account executives in advertising firms or in businesses who sell advertising time and space. For reasons of competitive secrecy, some of the sources of information asked not to be identified specifically. This term was agreed to when the data were obtained out of necessity and because citing all specific sources was deemed to be of minimal importance overall. It was the intention of this research effort to develop only reasonable estimates so that an evaluation of WHAT'S BEST! could be accomplished. The marketing or advertising manager for a tourism and travel organization should find the task of developing estimates for individual media variables to be less of a problem. A media sales representative should be more willing to provide media variable data as the assistance they provide may produce media sales. The manager may also have some of the media variable data available from past media purchases. This may provide some of the most valuable data for the manager. As stated previously, the objective of the research effort is to demonstrate the use of WHAT'S BEST! and evaluate it, and not to solve a specific media selection problem.

The second step is to develop reach data for the individual media variables. To begin with, values for television network media variables (15- and

30-second spots) were obtained from the Datafiles of Advertising Age, December 22, 1986. The reach for cable television (15- and 30-second spots) were obtained from a discussion with an account executive at a Michigan cable advertising distributor. The reach for local television (15- and 30-second spots) was obtained from a similar discussion with a local Michigan television station. The reach figures for the six newspaper media variables were obtained from discussions with an account executive at a Southern Ontario newspaper publishing company. These figures were said to match the circulation figures of a mid-size U.S. daily newspaper like the Arkansas Gazette, with its circulation of 221,594 ("Last Minute News," 1990c, pp. 5-14).

The reach figures for a weekly magazine, a monthly magazine, a business magazine, and a consumer-interest magazine were obtained from talking to two account executives at a local Lansing advertising agency. The weekly magazine selected was the April 24, 1990, issue of Business Week, the monthly magazine was Playboy (December 1989), the business magazine was Fortune (October 16, 1989), and the May 1990 issue of Mature Outlook for the consumer magazine. The reach data are admittedly best estimates by one of the account executives questioned in this matter. The reach figures were double-checked against circulation figures to ensure that the reach quote did not surpass the total paid circulation of the magazines. In only one case did this happen. The monthly magazine attributes much of its circulation to newsstand sales and not paid subscription figures. The magazines selected for use were chosen solely on the basis of availability of their reach and cost figures. For radio, the reach figures were obtained from the rate card of a mid-Michigan FM radio station and discussions with an account executive of that station.

The outdoor advertising reach figures were obtained from a discussion with an account executive at Adams Outdoor, Inc., a local Lansing firm. The transit reach figures were gleaned from a discussion with a knowledgeable employee of a Michigan transit company. These figures were admittedly rough estimations. The figures for the reach of direct-mail advertising came from a discussion with an employee of a Philadelphia, Pennsylvania, advertising firm. These figures for reach are based on the total distribution of all direct-mail advertisements produced at a given cost. The reach information for specialty media variables came from catalogues of merchandise provided by Sales Guide, Inc., of Wisconsin; NEBS (New England Business Service, Inc.) of Massachusetts; the Lesco Corporation of Michigan; and Artistic Greetings, Inc., of New York.

The third step is to develop frequency levels for each of the media variables used in the master spreadsheet file. The television media variables were all set at a frequency of 1.0, as reach and cost figures are for a single television advertisements. The frequency levels for the newspaper media variables was set at 2.0, as discussions with an account executive revealed that most newspapers bought are perused once and then read through more thoroughly, giving the advertisement a frequency of being noticed by the reader of 2.0. In other instances the newspaper is passed to another within a potential purchasing unit (eg. a couple, family, business associates, etc.). Thus the frequency of an advertisement may increase. The various frequency numbers for the four magazines were determined in discussions with account executives of two Lansing area advertising firms.

The frequency numbers for the radio media variables were arrived at after discussions with a radio station account executive. The frequency of 4.0 for 15-

and 30-second spots is based on a prime time (Monday-Friday 5:30 a.m. to 8:00 p.m., Saturday 10:00 a.m. to 3:00 p.m.) purchase of spots to run in an advertising campaign over a three-month period. The sponsorship of news and weather reports has a frequency rating of 6.0 as the bulk purchase of each would be greater and would run in non-prime-time hours as well as prime time.

The frequency numbers of the outdoor advertising media variables are based on estimates arrived at by the account executive at Adams Outdoor, Inc. These estimates are based on two factors: expected traffic patterns and billboard size. A frequency estimate of 5.0 for a 14 x 48 billboard as compared to 7.0 for a 12 x 25 billboard. With the "Rotary Plan," an advertiser may take a 4- to 12-month lease of the billboard space, with the option to repaint every 60 days. For this research effort, a six-month lease was selected and the numbers adjusted accordingly. The rotary plan was developed this way so as to approximate the effect of a six month lease with no repainting procedures.

The frequency numbers for transit advertising are the result of a discussion with a transit company employee. The frequency for the bus cards (i.e. advertising placards placed above passenger seats) is 4.0, higher than the 2.0 for station and bus-stop posters, as the transit user is more likely to be on the bus longer than at the bus stop or station, therefore greater opportunity for observation of the bus card.

For the direct-mail frequency, discussions indicated frequency estimates of 1.0 for leaflets, 3.0 for brochures, and 2.0 for newsletters. These numbers derived from the quality and the attractiveness of direct-mail options. A leaflet (1.0) is usually read quickly and does not hold the attention of the reader that a newsletter or brochure might. A newsletter (2.0) is approached much the same as a newspaper, often perused and then read through again for content. The

brochure (3.0) is quite often used over and over, as it may be read for its own merit, compared to others, and even used in making travel arrangements.

Frequency estimates for specialty media variables used in this study also vary widely across speciality media types. Directories (e.g., state park camping directory) were treated as an item that is first perused and then read for content, like newspapers, thus a frequency of 2.0. Catalogues (eg. state guide to special events) were given a frequency of 1.0. This is based on discussions that reveal that unless the catalogue is of specific interest or value to the reader, it is often not reused. Note that these media variables were not included in the direct-mail category because fifteen percent to forty percent, an estimate by an advertising firm employee, are distributed at travel bureaus and travel information centers. Banners have a frequency rating of 1.0, as they are usually observed just once. The location of banners (i.e., at park or event entrances/exits) has a major effect on their frequency rating. Thus, it is difficult to evaluate exact frequency figures.

The media variable in maps were assigned a frequency rating of 2.0, as is consistent with their use. T-shirts were assigned a frequency rating of 4.0, also based on their use, determined by considering the number of times a person would wear the T-shirt over a six-month period and having others view the advertisement on the T-shirt. The frequency for bumper stickers is 2.0 and is related to observation of the sticker and use of automobiles. This number was admittedly a rough estimate. The poster type selected in the specialty media category was one employed in giveaway promotions. It has a frequency value of 2.0. The frequency number is based on expected usage patterns. Note that a poster used (i.e., put up in home/office) may have a higher frequency rating, but accurate figures on this type of use were not readily available. Menus was assigned a frequency rating of 1.0, based on a single tourist's observation of the

menu. It would be higher if the regular patrons at a restaurant or diner has been selected as the target audience.

The last specialty media variable selected for the model was key ring tags. This represents an almost unlimited host of imprinted products which could be used in giveaways, or other promotional stunts for potential tourists and visitors. Key tags were selected from among such products as buttons, highlighters, lapel pins, luggage tags, golf tees, pens and pencils, shopping bags, signs, and yo-yo's. The key ring tags were assigned a frequency rating of 1.0 as their actual use patterns, like promotional posters, and their ability to make a lasting impression are not accurately noted by the companies that produce them, and less seems to be known by the people who use them (Dean, 1980, p. 23).

The unit cost estimates for each of the media variables were developed from a vast number of sources. The costs for 15- and 30-second network television commercials were obtained from the Datafiles of the December 22, 1986, issue of Advertising Age. The costs for the cable 15- and 30-second spots were obtained from a discussion with an account executive for a Michigan cable distributor. The costs are estimates for top-rate cable television shows on a major cable network like ESPN or Fox. The costs for the local 15- and 30-seconds spots were derived from a discussion with a local Michigan television station. The cost figures for the newspaper media variables came from discussions with an account executive at a Southern Ontario newspaper publishing company. These numbers were converted to U. S. dollar funds based on an exchange rate of thirteen percent.

In terms of the cost figures for the four magazines selected, initial numbers for one-page ads were determined from the "Media Works" section of Advertising

Age. The figures for the weekly magazine were taken from the March 6, 1989 issue of Advertising Age. The monthly magazines cost figures came from the August 6, 1990 issue. The business magazine cost figures came from the August 7, 1989 issue, and the July 30, 1990 issue of Advertising Age was the source used for the consumer magazine cost figures. To obtain cost figures for the media variable other than one-page ads, discussions were held with to account executives from a local Lansing advertising agency.

The costs for radio advertising came from a Mid-Michigan FM station's rate card and discussions with an account executive at a Mid-Michigan FM radio station. The figures for the radio news and weather reports are best estimates because sponsorships are arranged on a special-request basis. Since actual costs could not be determined without detailed negotiations, only approximations could be developed from the discussions with the account executive.

The costs for the outdoor advertising media variables were obtained from a telephone interview with an account executive at Adams Outdoor, Inc., Lansing, Michigan. Figures quoted include an estimate of set-up and production costs. The issue of volume discounts was discussed, but due to linearity requirements of the model, discounts were not included.

The transit variable costs were from a telephone interview with a knowledgeable Michigan transit company employee. The figures are based on her best estimates and, again, do not include discounts based on volume and length of campaign.

The cost figures for the direct-mail media variables came from discussions with an employee of a Philadelphia advertising firm and an employee involved in brochure production for a small Ontario firm. All Canadian dollar figures quoted were converted to U.S. dollar amounts.

The cost data for specialty media variables came from catalogues and quotes by sales representatives of Sales Guide, Inc., of Wisconsin; Lesco Corporation of Michigan; and Artistic Greetings, Inc., of New York. A catalogue from NEBS of Massachusetts was used, but a sales representative was not contacted. No effort was made to find a best product or lowest price among the companies. Products were chosen based only on ready availability of cost data.

To develop the model, reach, frequency, and cost data needed to be collected from outside sources, the other components of the model are established by the user to reflect internal conditions (e.g. the budget available). The software package converts inputs into the required format for linear programming (LP) analysis.

With these data collected, the fifth step in developing the model is to place them into a format which can be accessed and manipulated by both software packages used, (i.e. WHAT'S BEST! and Lotus 1-2-3). The model was based on the row/column format familiar to Lotus 1-2-3 and other spreadsheets where data is entered into specific cell locations in the Lotus 1-2-3 spreadsheet. The data discussed above, and other components established for the model (to be discussed later), were placed in 18 major columns. The first column for the model contains the media variables (eg. Radio and Direct Mail). The second column contains the Reach in 1,000's figures for each media variable, while the third column holds the Frequency numbers. The fourth column in the model is the Impressions column. It is created with a formula multiplying the Reach column spreadsheet cells, by those in the Frequency column.

After this column, the unit cost data collected are put into a fifth column headed Unit Cost in $1,000's. While the sixth column called CPM or cost-per-

thousand column was created with the formula Reach divided by Unit Cost. This column is valuable as a check to see that reach and cost figures are in line with industry standards.

The following column, Number of Units Selected, has all the numbers in the column set to zero. The WHAT'S BEST! program was then used to make this range an adjustable-cell range. By invoking the optimization command of WHAT'S BEST!, the value of these cells will be adjusted according to the optimal solution selected by WHAT'S BEST! The adjustable cell is also referred to as the decision variable (Daellenbauch & Bell, 1970, pp. 3-4; Savage, 1985, p. A-56). The eighth column refers to the Total Cost of Units Selected (in $1,000's). This column of cells uses the formula Number of Units (media variables) Selected multiplied by Unit Cost in $1,000.

The next three columns (nine, ten and eleven) are necessary to provide the constraints for the spreadsheet model. The first of these (the ninth overall column) contains the less than sign (<). This sign represents the mathematical term "less than or equal to" in the mathematical form of the LP model formulation. In Lotus 1-2-3, the (<) sign serves no computational function and is just a visual reminder in this spreadsheet model (Savage, 1985, p. A-34). The role of this (<) sign is that, when used with the command sequence [Prt Sc] [<] in the WHAT'S BEST! mode, it automates the creation of constraints and associated slack cells (Savage, 1985, p. A-34). These constraints fill the tenth column of the spreadsheet model under the title $ Limit. The eleventh column contains the associated slack cells which indicate the remainder of the allotted constraint not spent. A slack cell is a spreadsheet cell created to enforce a given constraint. It contains the formula for the remaining amount of a limited resource (such as money).

WHAT'S BEST! forces all slack cells to be non-negative during the optimization procedure in keeping with the linearity requirements of the linear programming model. This eleventh column is titled Non-Negative to represent the resource limitations set out in the spreadsheet model. A constraint requires WHAT'S BEST! to choose the best solution from those alternatives that are within the resource limitations (Savage, 1985, p. A-56). The constraints were developed through a subjective decision making process that looked at what would likely be appropriate levels for the number of media variables selected. To ensure that each category of media variables (i.e., television, radio, and so on) did not take complete control of all budget funds, each category of media variables was given an overall constraint. For example, television media variables generate very high numbers of impressions so overall constraints are needed for each media variable category so that all the budget won't be allocated to a media category like television with its high impression output, thus defeating a specific media allocation strategy. This ensures that a limited resource will not be used beyond its capacities during the optimization procedure (eg. more money will not be spent than is allowed in the budget). The role of these constraints are illustrated in Table 2 on the following page.

The twelfth column represents the total impressions generated for each media variable unit selected during optimization (e.g., six cable television 30-second spots). The formula for the column is impressions multiplied by the number of media units selected. The number of media units selected are generated by the WHAT'S BEST! model as it solves the linear programming (LP) matrix.

Table 2. - Location of individual cells in forming the linear programming spreadsheet constraints.

# of Units Selected	Total Cost of Units Selected $1,000's	Constraints	
		$ Limits	Non-Negative
1.00	100.00	<200	100
0.00	0.00	<200	200
2.00	100.00	<150	50
3.00	150.00	c <150	0
	a 350.00	d 500	150
	b 87.50		

a) The total cost of the units selected in the media category.

b) The average cost of the units in the media category.

c) The individual media variable constraint (eg. Transit Poster).

d) The media catergory constraint (eg. Transit Advertising).

The following column again contains the Number (#) of Units Selected; however, this time the numbers in this column will appear as integers. The column will be representative of the Number (#) of Units Selected at an Integer Value, and will be titled (#) of Units at (@) Integer Value. WHAT'S BEST!, in its optimization process, allows fractional values (real numbers) to be inserted into adjustable cells. However, fractional values are not truly representative of what can realistically be expected of media variables. This means that one can not realistically expect to select 5.32 Cable, 15-second spots for advertising on television, or that 13.83 billboards can be purchased for outdoor advertising. Thus the number for units selected of each media variable must be computed as

integer values. To combat this problem, WHAT'S BEST! does have a 0,1 Integer value option. However, the number of units to be selected can only be zero, or one, and release 1.2 only offers 42 of these Integer Variables. Since this process does not provide a workable solution to the problem of fractional values in this case, an alternate solution had to be developed. The creators of WHAT'S BEST! suggest the next most viable solution to produce workable results is that fractional values may be converted to integer values by rounding off answers returned by WHAT'S BEST! to the closest integers which do not violate any constraints (Savage, 1985, p. II-5). This suggestion is followed for column thirteen, to provide outputs that are more realistic for use in an advertising media solution problem. Thus, the Number (#) of Units at (@) Integer Value column contains a formula that is taken directly from the Number (#) of Units Selected column, using the cell values generated during the WHAT'S BEST! optimization process. The values in the cells are rounded off to the nearest integer.

The fourteenth column represents the total cost at integer value after recalculation (in $1,000's). This column's cell values are derived from a recalculation using the integer values for the media units selected from column thirteen and the Unit Cost in $1,000's data from column five. The column is titled Total Recalculated Cost of Integer Units Selected in $1,000's and is abbreviated in the spreadsheet as Total @ Recalc. Int. Unit Cost. The formula entered in the spreadsheet would read; If the "unit cost" multiplied by the rounded "number of units selected" is less than the "constraint limit" and the "number of units selected" is not zero, or the "unit cost" multiplied by the rounded "number of units selected" subtracted by –0.25 and is less than the "constraint limit" and is not zero, enter the value as the unit cost multiplied by the integer value of the number

The eighteenth and final column contains the total impressions generated for each media variable after the recalculation process. It uses integer values for the number of media units selected from column thirteen in its formula to find the total number of impressions after recalculation.

In the sixth step, the cell ranges are selected for the WHAT'S BEST! linear programming process. The first to be developed is the cell to be maximized. Maximize is a command that tells the linear programming code within WHAT'S BEST! to maximize the value of the formula in the cell. This cell then becomes the objective cell. During optimization, the linear programming code finds the combination of values of the adjustable cells (# Media Units to be Selected) that maximize the objective cell (Total Impressions) (Savage, 1985, p. A-58). The optimal solution is found when a combination of values of the adjustable cells that maximizes the objective cell is found, as compared to all other feasible alternatives (Savage, 1985, p. A-56). The value of the objective cell that is determined by the optimal solution is now referred to as the best or optimal value. The objective cell as indicated will be the sum of all impressions calculated in the twelfth column. The column is titled Total Impressions, and reading down this column one would calculate the total of all impressions. Thus, the objective cell will appear at the bottom of this column as a grand total of all impressions generated by the WHAT'S BEST! optimization process.

However, before optimization may begin WHAT'S BEST! needs a dollar amount or budget to allocate to the various media variables so that selection may begin. A convenient and practical place to enter the budget is under the Constraint Limit column (tenth column). Thus, the total budget amount will act as a constraint for the upper limit which WHAT'S BEST! may allocate. It is crucial

to have an upper limit so that the adjustable cells can not be increased infinitely during the maximization process (Savage, 1985, p. A-60). In making this upper limit constraint there is the need for a slack cell. This slack cell for the total budget constraint appears under the other slack cells in column eleven (Non-Negative). By adding a formula in the spreadsheet to sum the figures of column eight, the Total Cost of Units Selected in $1,000's, a figure can be arrived at to indicate how much of the total budget was spent. For convenience and practicality a total budget spent cell is put at the end of column eight and under that cell in the spreadsheet appears that net budget cell. The resultant figures from these two cells may be useful in evaluating the effectiveness of the spreadsheet developed.

These special spreadsheet cells are also put in place under their respective columns in the recalculation range (columns thirteen to eighteen). With these final constraints in place, along with the cell to maximize, it is necessary to select a budget in step seven. There were three budget levels selected for this research effort. The three levels were chosen to display the varying outcomes of the objective function at different levels of budget allocation. The first budget level selected was that of $12 million. This budget would be comparable with the Illinois Office of Tourism's budget, which was $10 million in 1988 (Standard Dictionary of Advertisers, 1988, p. 43). The $12 million budget scenario would also approximate the advertising allocation plan of the states of California, Florida, and Alaska, which spend even a larger amount on the promotion of tourism and travel than does Illinois, (Horton, 1985, p. 20; Meyers, 1985, p. 85). This scenario might also fit private tourism and travel organizations with very large advertising budgets, such as Embassy Suites Hotels, $10 million in 1990; Holiday Inns Hotels, $9 million in 1989; Choice Hotels International, $12 million

in 1990; and Pan American Airlines, $12.6 million in 1989 (Endicott, 1990, p. 45; "For the Record," 1990a, p. 33; Meyers, 1990, p. 16). The scenario could also apply to the national tourism office of a country like the Bahamas Ministry of Tourism, which will spend $13 million in fiscal 1991 to advertise in the United States and Canada ("Last Minute News," 1990b, p. 8).

The second budget level selected was $5 million. This budget would be similar to that of cruise lines like the Royal Caribbean Cruise Line ($6.6 million in 1989) and Carnival Cruise Lines ($6 million in 1989) (Endicott, 1990, p. 45). A mid-size state like North Carolina, Tennessee, or Wisconsin spends close to $5 million on tourism and travel promotion (Meyers, 1985, p. 85; Standard Dictionary of Advertisers, 1988, p. 1492). Also fitting this scenario is a foreign country's national tourism office, such as Bermuda's, which spent almost $6 million on newspaper, magazine, direct-mail, and spot radio advertisements, among others, for 1988 (Standard Dictionary of Advertisers, 1988, p. 951). The $5 million budget gives the model an opportunity to produce results for an organization other than those with big eight-figure budgets.

The third and final budget level selected was that of $1 million. This budget would be consistent with that spent on advertising by such tourism and travel organizations as Brevard County Tourist Development in Cape Canaveral, Florida ($1.2 million), the state of Georgia ($1.1 million), the Phoenix and Valley of the Sun Visitors and Convention Bureau ($800,000), or Copper Mountain Resort in Colorado, a similar $800,000 (Bearden-Mason, 1985, p. 20; Meyers, 1985, p. 85; "Newswatch," 1990a, p. 12, 1990b, p. 12). Some foreign countries advertising in the United States, like Barbados and Greece, also have advertising budgets in the $1 million range (Standard Dictionary of Advertisers, 1988, pp.

950, 992). The state of Nebraska would also fit in this scenario, spending a little more that $1 million for fiscal 1988, according to the Standard Dictionary of Advertisers (1988).

With the budget levels selected and the WHAT'S BEST! optimization process invoked and completed, some questions arise: "What would be the result if the constraints were altered?", "Could there be a more optimal solution if more money was spent on television?", or "Can smaller allocations be made to the Special Advertising media variables?" To address these questions, three budget allocation strategies were developed in step eight that could be deployed over each of the varying budget levels. To aid in the development and application of these scenarios, the media variable categories were grouped as follows; television alone, represented by TV; newspaper and radio, represented by News/ Radio; the weekly magazine, the monthly magazine, the business magazine, and the consumer magazine, all formed the group Magazine; outdoor advertising, transit advertising, and direct mail are represented by the group Other; and special media was placed in its own group, Special. With these five groups designated, formulas were created to distribute a set percentage of the total budget over each group. The budget amount allocated to each group would be reflected in the media category constraint as determined by it's individual formula. See Table 3, on the following page, for an example.

The formulas used for each media group would not allow one media category in a media group to take all the money allocated for that group. For instance, the media category Consumer Magazine could not spend all 60 percent of the budget allocated to the media group Magazines. The formula was based on the premise that no one media variable group would spend more than 50

Table 3. - A media category constraint as determined by a special media category formula.

# of Units Selected	Total Cost of Units Selected $1,000's	Constraints $ Limits	Non-Negative
1.00	100.00	< 200	100
0.00	0.00	< 200	200
2.00	100.00	< 150	50
3.00	150.00	< 150	0
	350.00	a 500	150
	87.50		

a) The media catergory constraint determined by a media group formula as applied to each budget scenario. For example, the value 500 can be derived from the formula:

+ $BUDGET * $SPECIAL

percent of the budget amount allocated to its media group. This was developed as part of the allocation strategy to ensure that no one media category became too dominate, thus creating as realistic a scenario as possible. As in the example above, consumer magazines would have no more than 30 percent (50 percent of 60 percent) of the total budget to allocate among its media variables. The formulas used for each of the media groups appear in Table 4 on the following page.

With the formulas set for each media group, the budget strategies could now be developed. The three budget allocation scenarios are based on three different distribution strategies, centered around the different media groups' potential for impression generation. First, a mixed strategy that favors no media group too heavily, but provides reasonable budget allocations to each. This mixed allocation strategy is represented by the letter A. The second scenario

Table 4. - Media category formulas

Media Category	Formula
TV	+ $BUDGET * $TV
News/Radio	+ 0.75 * $BUDGET * $RADIO
Magazines	+ 0.50 + $BUDGET * $MAGAZINE
Other media	+ 0.75 + $BUDGET * $OTHER
Special media	+ $BUDGET * $SPECIAL

uses an allocation strategy that favors providing the majority of the budget to the higher impression generating media groups. This high impression generating media strategy is represented by the letter B. The third allocation strategy focuses the bulk of the budget toward the low impression producing media groups (ie. Other and Special media). This low impression generating media strategy is represented by the letter C. An outline of these scenarios is presented in Table 5.

Table 5. - Maximum percentage of funds for the total budget available for each budget allocation strategy across the media groups in the master spreadsheet file.

Media Group	Budget Allocation Strategy A	Budget Allocation Strategy B	Budget Allocation Strategy C
TV	25.0%	50.0%	10.0%
News/Radio	12.5%	20.0%	10.0%
Magazines	37.5%	20.0%	30.0%
Other media	12.5%	5.0%	25.0%
Special media	12.5%	5.0%	25.0%
Total Budget	100%	100%	100%

Each of these three budget allocation strategy scenarios is then run for each of the three budget levels producing nine output spreadsheets. To aid in producing the nine output spreadsheets, each representing a different budget and budget allocation strategy scenario, a master spreadsheet/file was developed in Lotus 1-2-3. It contains all 18 major columns, the objective cell, and other cell groups used for analysis. The raw data is input into the master spreadsheet, along with the basic constraints for each media variable and the corresponding slack cells. Also the preliminary calculations of the number of impressions and the cost-per-thousand are included in the master file. All other cells are set to zero. To aid the deployment of the three different budget levels and three different scenarios for budget allocation, a Lotus 1-2-3 macro was developed for the master spreadsheet file. This instructional macro is intended to provide easier access to the adjustable cells contained within the master spreadsheet file, so it could then be deployed by those other than this author in a relatively straightforward and simplified way. This macro with its varying commands are displayed in Table 6 on the following page.

With this instructional table macro, the budget may be changed and any other budget allocation strategy by percentages may be entered for use in the master spreadsheet file. Adjustments that are deemed necessary can be completed by using the (<Alt A>) macro. This takes the user back to the master spreadsheet where the constraints appear. Changes in constraints may arise when budget levels are altered substantially, for example the $1 million dollar constraint limits used in the $1 million and $5 million dollar budgets in the television media category had to be changed to $2.5 million dollar constraint limits to allow allocation of the $12 million dollar budget to be more effectively utilized.

Table 6. - Instructional table macro as it appears in the Lotus 1-2-3 master spreadsheet file.

Instructions: (<ALT I> to return to this screen)

1) Enter total budget to be optimized ($1,000's): 2,500

2) Allocate budget to media groups by percentage.

Media Group	Budget Allocation %
Television =	45.0
News/Radio =	10.0
Magazines =	15.0
Other media =	15.0
Special media =	20.0
To total hit F9	100.0

3) To modify allocations to specific media variables, hit < ALT A >.

4) Invoke WHAT'S BEST! to optimize.

5) To display results, hit < ALT B >.

The figures input into the master file instructional table are generated as follows; the Total Budget to be Optimized in $1,000's uses a Lotus 1-2-3 macro of its own to reproduce the value input into the instructional table in the master file cell that contains the overall total budget constraint that follows at the end of column eight (Total Cost of Units Selected ($1,000's), while the percentages allocated to each of the media groups (eg. TV, News/Rad, etc.) have a macro of their own that will reproduce the corresponding allocated budget amount at each of the media categories in the master spreadsheet file (see Table 3). The

conversion from a percentage figure to a real dollar amount for each media group is accomplished in the spreadsheet column to the right of where the percentage figures are entered. Here a simple formula is used to convert the percentage value entered to a real dollar amount which is hidden from view on the computer screen. This cleans up the appearance of the instructional macro and creates the appearance of a user-friendly macro.

Another macro to aid analysis of the master spreadsheet file was developed that outputs results for fractional and integer values after optimization and recalculation. The two main tables of the macro show the results after optimization using fractional media units (eg. 5.32 cable television 15-second spot advertisements) and the results after optimization and recalculation using integer media units (eg. 5 cable television 15-second spot advertisements). Within each of these tables are two smaller tables, one of which contains the input menu , as it was adapted from the instructional menu. It has the total budget and percentage allocations as per the budget allocation strategy scenario currently being employed. For an example see Table 7, on the following page.

The second table is deemed an output menu. In contains the budget allocation in $1,000's for each of the media groups. Along with the number of impressions (in 1,000's) produced in each media group after the optimization process has been completed. The Cost per Impression is also displayed here for each media group and as an overall total for the complete budget of $12 or $5 or $1 million dollars depending on the budget allocation strategy scenario used.

The results in both the small tables of the output menu are produced based on optimization results using the fractional values and on recalculation results using the integer values. A sample of a fractional value table and an integer value table appear in Tables 8 and 9 respectively on page 47 of this paper.

Table 7. – Input menu for optimization in the master spreadsheet file.

Input Menu

Total budget ($1,000's) = 2,500

Media Group	Budget Allocation %
Television =	45.0
News/Radio =	10.0
Magazines =	15.0
Other media =	15.0
Special media =	20.0
To total hit F9	100.0

In order to present results using integer values, the master spreadsheet had to be divided into two large ranges, one in which WHAT'S BEST! would optimize the objective cell and one range that WHAT'S BEST! would not try to optimize. The one in which it would not try to optimize contains the integer columns (13 through 18). Also placed in this range are the instructional macro and the results macros, which need protection from random adjustment by WHAT'S BEST! during its optimization process.

To protect this range, a WBCALC range (as it is known in the WHAT'S BEST! manual) was developed. This is a functional option provided by WHAT'S BEST! so that all formulas in the WBCALC range are frozen at the pre-optimized values. The WBCALC range is then removed from calculation while WHAT'S BEST! is running (Savage, 1985, p. A-65). However, upon return to the spreadsheet in use, recalculations must be performed to display newly optimized

Table 8. – Sample output menu after optimization using fractional media units.

Output Menu

Net Budget ($1,000's) = 0

Media Group	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	1,000	100,500	0.0100
News/Radio	200	115,005	0.0575
Magazines	150	160,555	0.1070
Other media	150	501,000	0.3340
Special media	1,000	230,055	0.0230
Totals =	2,500	1,107,115	0.0443

Table 9. – Sample output menu after optimization using integer units.

Output Menu

Net Budget ($1,000's) = 155

Media Group	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	900	99,500	0.0110
News/Radio	190	100,005	0.0526
Magazines	120	140,525	0.1171
Other media	135	489,898	0.3629
Special media	1,000	230,055	0.0230
Totals =	2,345	1,059,983	0.0452

values (Savage, 1985, p. A-66). To aid the recalculation effort, a simple macro was added to the master spreadsheet that recalculates the WBCALC range and takes the user to the fractional and integer results macros to display the optimized and recalculated results. This macro is invoked using (<ALT>B) as indicated in the instructional table macro as displayed in step 5 of Table 6. Upon recalculation, the master spreadsheet is complete and can be altered or copied for future use.

CHAPTER IV

RESULTS

The master spreadsheet file for this research effort is contained in the tables that follow. To reproduce such a large file taken from a Lotus 1-2-3 output print file, it is necessary to divide the master spreadsheet file into different sections. Each section will maintain the first column (media variables) of the master spreadsheet file as reference guide.

For purposes of explanation, the master spreadsheet file is discussed as having three main ranges within the spreadsheet. The first range, made up of the first six columns, contains the basic data to be used in the WHAT'S BEST! calculations. This is where data on reach, frequency, impressions, and unit cost are stored in the master spreadsheet file.

The second range is made up of columns seven through twelve, containing the data to be manipulated by the WHAT'S BEST! program. The third range is columns fifteen to eighteen, where the numbers to be recalculated in to integers are stored in the master spreadsheet file. To better illustrate further discussions, Illustration 3 indicates how the ranges are divided into separate sections which can be viewed in Tables 10 through 21. Of note in this results discussion are the abbreviations, or spreadsheet codes, for columns and rows that are indicated in

capital letters throughout this chapter. This is to provide a better understanding of the Tables 10 through 21 and can be used for reference when viewing the appendices. To provide some continuity to the viewing of the master spreadsheet file in Tables 10 through 21, they are placed on pages 55 to 66 after the discussion of all the sections as presented in Illustration 3 are completed.

The following illustration indicates how all twelve sections would fit together to form the master spreadsheet file as they were adopted from the Lotus 1-2-3 output.

Illustration 3 – Lotus 1-2-3 output of the master spreadsheet file in sectional form.

Section 1 Table 10	Section 2 Table 11	Section 3 Table 12
Section 4 Table 13	Section 5 Table 14	Section 6 Table 15
Section 7 Table 16	Section 8 Table 17	Section 9 Table 18
Section 10 Table 19	Section 11 Table 20	Section 12 Table 21

The first section of the master spreadsheet is presented in Table 10 and has six columns and three rows of media categories. The first column lists the media variables (eg. NET 15's) in each media category (eg. TELEVISION) along with column 2, (REACH in 1,000's), column 3 (Frequency, abbreviated FREQ.), column 4 (Impressions, abbreviated IMPRSS in 1,000's), column 5 (UNIT COST in 1,000's) and column 6 (the cost per thousand dollars, abbreviated C.P.M.$).

The rows contain the media categories: television (TELEVISION), newspaper (NEWSPAPER), and weekly magazine (WEEKMG). The second section, Table 11 has columns seven through twelve, and the three media categories, as in Table 10 across the rows. Column 7 contains the number of units selected (# OF UNITS SELECTED) by WHAT'S BEST! during an optimization process. However, as with all adjustable cells (or those dependent on them) in the master spreadsheet file, these are set to zero. Column 8 is the TOTAL COST OF THE UNITS SELECTED IN $1,000's. Column 9 contains the notation (<), which means less than or equal to the constraint cell in WHAT'S BEST! LP program. For illustrative purposes in these tables, this column is closely combined with Column 10, the constraint limit ($LIMIT), under the overall heading Constraints. In column 11, the NON-NEGATIVE column are the slack cells generated by WHAT'S BEST! when the command sequence [Prt Sc] [<] is invoked. As these are adjustable cells, they too are set to zero in the master spreadsheet file. In column 12 are the total impressions in 1,000's (TOTAL IMPRSS) generated, also set to zero as these cells are dependent on the selection of media units in Column 7. The rows contain the media categories television, newspaper and weekly magazine.

The third section, Table 12, contains columns 13 through 18, and three rows of media categories. In Column 13 are the number of integer units selected after the recalculation process (abbreviated # OF UNITS @ INTEGER VALUE). Column 14 contains the total cost after recalculation of an integer value (abbreviated TOTAL @ INT. RECALC. UNIT COST). Column 15 contains the notation (<), which means less than or equal and represents the slack cell generation to WHAT'S BEST!. Column 16 holds the constraint limits ($ LIMIT), which do not change from the original WHAT'S BEST! optimization range

(columns seven through twelve) to the WBCALC recalculation range that holds columns thirteen through eighteen. Column 17 contains the slack cells and is titled NON-NEGATIVE as before in Column 11. In the final column, column 18, are the total number of impressions after recalculation (abbreviated TOTAL RECALC. IMPRSS.) using integer values instead of fractional values as is the case in Column 12. The rows contain the media categories television, newspaper and weekly magazine.

In the fourth section, Table 13 contains columns one through six as in section one. However, the rows are the media categories, monthly magazine (MNTH.MG), business magazine (BUSN.MG), and consumer magazine (CONS.MG). The fifth section, Table 14 contains columns seven through twelve, the same as section two, with three rows of media categories. The rows are monthly magazine, business magazine, and consumer magazine. The sixth section, Table 15 has columns thirteen through eighteen, the same as section three. There are three rows of media categories; monthly magazine, business magazine, and consumer magazine.

The seventh section, Table 16, has columns one through six as in section one (media variables, reach, frequency, impressions, unit cost and cost per thousand). There are four rows of media categories which are Radio, Outdoor Advertising, Transit and Direct Mail. The eighth section Table 17 has columns seven through twelve as are in section two (number of units selected, total cost of units selected, <, constraint limits, non-negative and total impressions). The four rows of media categories are radio, outdoor advertising, transit advertising, and direct mail advertising. The ninth section Table 18 has columns thirteen through eighteen, as are in section three (number of integer units selected, total cost recalculated for integer value, <, constraint limits, non-negative, and total

impressions recalculated). The four rows of media categories are radio, outdoor, transit and direct mail advertising.

The tenth section, Table 19, has the same column headings as are in section one. The row is for special advertising media variables. The eleventh section Table 20 has the same columns as section two with the special advertising media variables along its row. Also in this section is the area where the TOTAL BUDGET SPENT (in $1,000's), BUDGET LIMIT (in $1,000's), TOTAL NET BUDGET, and the total number of impressions (abbreviated, TOTAL IMPRSS. in $1,000's) , after optimization are calculated. The twelfth section, Table 21, has the same columns as section three with the row containing the special advertising media variables. As in section eleven (Table 20), this twelfth section contains the area where the BUDGET SPENT, BUDGET LIMIT, TOTAL NET BUDGET and TOTAL IMPRSS. in 1,000's, after recalculation using integer values, are computed.

Tables 10 through 21 represent section one through section twelve of the Lotus1-2-3 output (as detailed in Illustration 3) and follow on the next twelve pages. It is important to note that in the master spreadsheet file that some columns are set to zero before optimization and recalculation. This enables the user of the master spreadsheet file to follow WHAT'S BEST! through their own optimization process. Problems can be compounded greatly when values are left in the master file. Thus, it is recommended that work done there be sent to output files. Also note, that in the following tables some cells show the abbreviated formula for that cell as determined in the instructional macro (eg. + $RADIO, which represents the total constraint limit placed on the media category). Cells dependent on these specific cells are indicated with the notation "N.A.," as that figure would not yet be determined.

TABLE 10. — Master file, columns 1 thru 6, rows 1 thru 3 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
TELEVISION					
NET 15's	4,850	1.0	4,850	175.00	27.71
NET 30's	5,575	1.0	5,575	225.00	24.78
CAB 15's	3,335	1.0	3,335	110.00	30.32
CAB 30's	4,275	1.0	4,275	155.00	27.58
LOC 15's	545	1.0	545	30.00	18.17
LOC 30's	880	1.0	880	45.00	19.56
TOTAL	19,460		19,460	740.00	127.37
AVG.	3,243		3,243	123.33	21.23
NEWSPAPER					
FULL PG.	635	2.0	1,270	60.00	10.58
HALF PG.	425	2.0	850	47.00	9.04
6X4" PG.	165	2.0	330	22.00	7.50
8X4" PG.	190	2.0	380	28.50	6.67
4 PG. INS.	625	2.0	1,250	98.00	6.38
6 PG. INS.	630	2.0	1,260	109.50	5.75
TOTAL	2,670		5,340	365.00	45.92
AVG.	445		890	60.83	7.65
WEEK MG.					
FR COVER	1,150	3.0	345	100.00	11.50
BK COVER	905	3.0	2,715	85.00	10.65
2nd PAGE	775	3.0	2,325	70.00	11.07
3rd PAGE	745	3.0	2,235	60.00	12.42
EXT. FLAP	950	1.0	950	85.00	11.18
TWO PAGE	865	2.0	1,730	75.00	11.53
ONE PAGE	610	2.0	1,220	55.00	11.09
TOTAL	6,000		14,625	530.00	79.44
AVG.	857		2,089	75.71	11.35

TABLE 11. — Master file, columns 7 thru 12, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
TELEVISION					
NET 15's	0.00	0.00	< 2500	2,500	0
NET 30's	0.00	0.00	< 2500	2,500	0
CAB 15's	0.00	0.00	< 2500	2,500	0
CAB 30's	0.00	0.00	< 2500	2,500	0
LOC 15's	0.00	0.00	< 1000	1,000	0
LOC 30's	0.00	0.00	< 1000	1,000	0
TOTAL		0.00	+$TV	N.A.	0
AVG.		0.00			0
NEWSPAPER					
FULL PG.	0.00	0.00	< 500	500	0
HALF PG.	0.00	0.00	< 500	500	0
6X4" PG.	0.00	0.00	< 500	500	0
8X4" PG.	0.00	0.00	< 500	500	0
4 PG. INS.	0.00	0.00	< 500	500	0
6 PG. INS.	0.00	0.00	< 500	500	0
TOTAL		0.00	+$RADIO	N.A.	0
AVG.		0.00			0
WEEK MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
EXT. FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		0.00	+$MAGAZINE	N.A.	0
AVG.		0.00			0

TABLE 12. — Master file, columns 13 thru18, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL RECALC. IMPRSS.
TELEVISION					
NET 15's	0	0.00	< 2500	2,500	0
NET 30's	0	0.00	< 2500	2,500	0
CAB 15's	0	0.00	< 2500	2,500	0
CAB 30's	0	0.00	< 2500	2,500	0
LOC 15's	0	0.00	< 1000	1,000	0
LOC 30's	0	0.00	< 1000	1,000	0
TOTAL		0.00	N.A.	N.A.	0
AVG.		0.00			0
NEWSPAPER					
FULL PG.	0	0.00	< 500	500	0
HALF PG.	0	0.00	< 500	500	0
6X4" PG.	0	0.00	< 500	500	0
8X4" PG.	0	0.00	< 500	500	0
4 PG. INS.	0	0.00	< 500	500	0
6 PG. INS.	0	0.00	< 500	500	0
TOTAL		0.00	N.A.	N.A.	0
AVG.		0.00			0
WEEK MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
EXT. FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		0.00	N.A.	N.A.	0
AVG.		0.00			0

TABLE 13. — Master file, columns 1 thru 6, rows 4 thru 6 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
MNTH. MG.					
FR COVER	1,005	3.0	3,015	115.00	8.74
BK COVER	885	3.0	2,655	98.00	9.03
2nd PAGE	665	3.0	1,995	77.00	8.64
3rd PAGE	580	3.0	1,740	68.00	8.53
EXT.FLAP	825	1.0	845	95.00	8.68
TWO PAGE	605	2.0	1,210	75.00	8.07
ONE PAGE	535	2.0	1,070	38.50	13.90
TOTAL	5,100		12,510	566.50	65.58
AVG.	729		1,787	80.93	9.37
BUSN. MG.					
FR COVER	775	2.0	1,550	92.00	8.42
BK COVER	725	2.0	1,450	83.00	8.73
2nd PAGE	665	2.0	1,330	78.00	8.53
3rd PAGE	660	2.0	1,320	72.00	9.17
TWO PAGE	685	2.0	1,370	58.50	11.71
ONE PAGE	595	2.0	1,190	33.00	18.03
TOTAL	4,105		8,210	416.50	64.59
AVG.	684		1,368	69.42	10.77
CONS. MG.					
FR COVER	445	2.0	890	82.00	5.43
BK COVER	400	2.0	800	76.50	5.23
TWO PAGE	355	2.0	710	34.00	10.44
ONE PAGE	310	2.0	620	18.50	16.76
4PG. INS.	380	2.0	760	65.00	5.85
TOTAL	1,890		3,780	276.00	43.70
AVG.	378		756	55.20	8.74

TABLE 14. — Master file, columns 7 thru 12, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
MNTH. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
EXT.FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		0.00	+$MAGAZINE	N.A.	0
AVG.		0.00			0
BUSN. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		0.00	+$MAGAZINE	N.A.	0
AVG.		0.00			0
CONS. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
4PG. INS.	0.00	0.00	< 400	400	0
TOTAL		0.00	+$MAGAZINE	N.A.	0
AVG.		0.00			0

TABLE 15. — Master file, columns13 thru18, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
MNTH. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
EXT.FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		0.00	N.A.	N.A.	0
AVG.		0.00			0
BUSN. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		0.00	N.A.	N.A.	0
AVG.		0.00			0
CONS. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
4PG. INS.	0	0.00	< 400	400	0
TOTAL		0.00	N.A.	N.A.	0
AVG.		0.00			0

TABLE 16. — Master file, columns 1 thru 6, rows 7 thru 10 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
RADIO					
SPOT 15's	58	4.0	232	18.00	3.22
SPOT 30's	73	4.0	292	32.50	2.25
SP. NEWS	44	6.0	264	9.00	4.89
SP. REPORT	28	6.0	168	12.75	2.20
TOTAL	203		956	72.25	12.55
AVG.	51		239	18.06	3.14
OUTDOOR					
6M LEASE					
12X25	6	3.0	18	2.10	2.86
14X48	12	5.0	60	3.15	3.81
ROTARY PLAN					
12X25	12	3.0	36	15.60	0.77
14X48	18	5.0	90	17.40	1.03
TOTAL	48		204	38.25	6.47
AVG.	12		51	9.56	2.12
TRANSIT					
BUS CARD	45	4.0	180	22.25	2.02
POSTERS	65	2.0	130	36.50	1.78
TOTAL	110		310	58.75	3.80
AVG.	55		155	29.38	1.90
DIRECT MAIL					
LEAFLETS	5	1.0	5	0.60	8.33
BROCHURE	25	3.0	75	55.75	0.45
NEWSLETTER	12	1.0	12	2.25	5.33
TOTAL	42		92	58.60	14.12
AVG.	14		31	19.53	4.71

TABLE 17. — Master file, columns 7 thru 12, rows 7 thru 10 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
RADIO					
SPOT 15's	0.00	100.00	< 150	100	0
SPOT 30's	0.00	75.00	< 150	100	0
SP. NEWS	0.00	100.00	< 150	100	0
SP. REPORT	0.00	100.00	< 150	100	0
TOTAL		0.00	+$RADIO	N.A.	0
AVG.		0.00			0
OUTDOOR					
6M LEASE					
12X25	0.00	0.00	< 200	200	0
14X48	0.00	0.00	< 200	200	0
ROTARY PLAN					
12X25	0.00	0.00	< 200	200	0
14X48	0.00	0.00	< 200	200	0
TOTAL		0.00	+$OTHER	N.A.	0
AVG.		0.00			0
TRANSIT					
BUS CARD	0.00	0.00	< 300	300	0
POSTERS	0.00	0.00	< 300	300	0
TOTAL			+$OTHER	N.A.	0
AVG.					
DIRECT MAIL					
LEAFLETS	0.00	0.00	< 15	15	0
BROCHURE	0.00	0.00	< 200	200	0
NEWSLETTER	0.00	0.00	< 15	15	0
TOTAL		0.00	+$OTHER	N.A.	0
AVG.		0.00			0

TABLE 18.— Master file, columns 13 thru18, rows 7 thru10 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL RECALC. IMPRSS.
RADIO					
SPOT 15's	0	100.00	< 150	100	0
SPOT 30's	0	75.00	< 150	100	0
SP. NEWS	0	100.00	< 150	100	0
SP. REPORT	0	100.00	< 150	100	0
TOTAL		0.00	N.A.	N.A.	0
AVG.		0.00			0
OUTDOOR					
6M LEASE					
12X25	0	0.00	< 200	200	0
14X48	0	0.00	< 200	200	0
ROTARY PLAN					
12X25	0	0.00	< 200	200	0
14X48	0	0.00	< 200	200	0
TOTAL		0.00	N.A.	N.A.	0
AVG.		0.00			0
TRANSIT					
BUS CARD	0	0.00	< 300	300	0
POSTERS	0	0.00	< 300	300	0
TOTAL			N.A.	N.A.	0
AVG.					
DIRECT MAIL					
LEAFLETS	0	0.00	< 15	15	0
BROCHURE	0	0.00	< 200	200	0
NEWSLETTER	0	0.00	< 15	15	0
TOTAL		0.00	N.A.	N.A.	0
AVG.		0.00			0

TABLE 19. — Master file, columns 1 thru 6, row 11 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
SPECIAL MEDIA					
DIRECTORY	100	2.0	200	520.00	0.19
CATALOGUE	20	1.0	20	11.50	1.74
BANNERS	1	1.0	1	11.85	0.08
MAPS	25	2.0	50	88.75	0.28
IMPRINTS					
T-SHIRTS	1	4.0	4	5.00	0.20
B. STICK	5	2.0	10	3.70	1.35
POSTERS	5	2.0	10	10.00	0.50
MENUS	1	1.0	1	4.35	0.23
KEYS	24	1.0	24	9.50	2.53
TOTAL	232		722	719.65	7.11
AVG.	26		80	79.96	0.79

TABLE 20. — Master file, columns 7 thru 12, row 11 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0.00	0.00	< 1200	1,200	0
CATALOGUE	0.00	0.00	< 40	40	0
BANNERS	0.00	0.00	< 40	40	0
MAPS	0.00	0.00	< 600	600	0
IMPRINTS					
T-SHIRTS	0.00	0.00	< 30	30	0
B. STICK	0.00	0.00	< 30	30	0
POSTERS	0.00	0.00	< 30	30	0
MENUS	0.00	0.00	< 30	30	0
KEYS	0.00	0.00	< 30	30	0
TOTAL		0.00	+$SPECIAL	N.A.	0
AVG.		0.00			0

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
0.00	+$BUDGET	0	0

TABLE 21. — Master file, columns 13 thru 18, row 11 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0	0.00	< 1200	1,200	0
CATALOGUE	0	0.00	< 40	40	0
BANNERS	0	0.00	< 40	40	0
MAPS	0	0.00	< 600	600	0
IMPRINTS					
T-SHIRTS	0	0.00	< 30	30	0
B. STICK	0	0.00	< 30	30	0
POSTERS	0	0.00	< 30	30	0
MENUS	0	0.00	< 30	30	0
KEYS	0	0.00	< 30	30	0
TOTAL		0.00	N.A.	N.A.	0
AVG.		0.00			0

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
0.00	N.A.	0	0

With an overview of the master spreadsheet file complete, a discussion of the inputs and outputs for this research effort may be investigated. The first inputs into the master spreadsheet file are the three budget levels and the three budget allocation strategy scenarios applied to each budget level. This produced nine different output files that had been through the WHAT'S BEST! optimization and recalculation process. The output files for the $12 million budget level were labeled Best12A, Best12B and Best12C (which breaks down; Best for WHAT'S BEST!, 12 for the $12 million budget level, and A for the first budget allocation strategy scenario). The output files for the $5 million budget were labeled Best5A, Best5B, and Best5C. Meanwhile, the $1 million budget files were labeled Best1A, Best1B and Best1C. The A, B and C represent each of the three different budget allocation strategies (see Table 5). This follows the labeling pattern used in Table 5. These output files may all be found in the appendices; Best12A in appendix A, Best12B in appendix B, Best12C in appendix C, Best5A in appendix D, Best5B in appendix E, Best5C in appendix F, Best1A in appendix G, Best1B in appendix H, and Best1C in appendix J.

To produce these output files in the master spreadsheet file WHAT'S BEST! used 1,601 of 3,000 numeric cells, and 310 of 1,499 optimizable cells available. It also used 647 of 24,000 possible coefficients and 3,201 instructions of the 17,999 maximum that were available. Thus a substantial addition could be made to the master spreadsheet file without taxing the limits of the 1.2 version of WHAT'S BEST!. More powerful versions are available to deal with large scale optimization problems.

For each output file, the WHAT'S BEST! program generates an optimal solution after a certain number of attempts or tries to solve the linear programming matrix for which it has been invoked. Each of the files and the number of

tries WHAT'S BEST! took to find the most optimal and feasible (ie. maintaining the constraints) solution are presented in Table 22.

The total number of tries to find an optimal solution does not indicate any correlation between the number of attempts (or tries) and the number of total impressions computed. It appears the more tries the more impressions in the case of the Best12 files, but the Best1 and Best5 files don't indicate this correlation to hold true.

Table 22. - WHAT'S BEST! 's number of tries to find an optimal solution for each output file.

File Name	Feasible Solution After 100 Tries	Feasible Solution After 200 Tries	Optimal Solution in 1,000's	Optimal Solution's Number of Tries
Best12A	158,259.10	260,966.50	281,570.40	224
Best12B	233,339.90	283,932.50	307,015.30	229
Best12C	104,756.70	188,692.50	206,008.20	226
Best5A	81,260.05	118,638.30	125,110.10	219
Best5B	110,756.20	129,186.20	137,115.10	211
Best5C	56,281.38	86,480.23	91,208.23	220
Best1A	18,707.18	26,980.57	27,030.35	203
Best1B	23,560.15	• • •	28,898.54	197
Best1C	14,359.71	20,908.86	21,169.41	206

• All figures in columns 1, 2 and 3 are in thousands of impressions (1,000's)

The remainder of this Results Chapter is dedicated to comparisons of results between fractional value and integer value solutions for each allocation strategy and budget level. Comparisons are only made between outputs from

files with like budgets. Thus, Best12 files are only compared to other Best12 files and not Best12 vs. Best5. The comparisons will be made with the aid of the output file macro that was created for each spreadsheet file. These output file macros contain the results after optimization and recalculation. A sample output file follows in Table 23.

Table 23. - Sample ouput macro to display results for fractional and integer values.

RESULTS OF OPTIMIZATION USING FRACTIONAL MEDIA UNITS

Input Menu		**Output Menu**		
Total Budget ($1,000's) = 2,000		Net Budget ($1,000's) = 0		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	10.0	200	3,032	0.0150
News/Radio	10.0	200	2,729	0.0014
Magazines	20.0	400	10,997	0.0027
Other media	20.0	400	4,081	0.0010
Special media	40.0	800	12,888	0.0016
Totals =	100.0	2,000	33,727	0.0017

RESULTS OF OPTIMIZATION USING INTEGER MEDIA UNITS

Input Menu		**Output Menu**		
Total Budget ($1,000's) =2,000		Net Budget ($1,000's) = 75		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	10.0	150	3,000	0.0020
News/Radio	10.0	180	2,000	0.0011
Magazines	20.0	400	10,997	0.0027
Other media	20.0	400	4,081	0.0010
Special media	40.0	795	12,777	0.0016

The first output file to be discussed is that of Best 12A. After optimization and recalculation with the budget level $12 million and using budget allocation

strategy A (see Table 5), 281,570,000 (rounded to nearest thousand) impressions were produced using the number of selected media units in fractional values, while using integer value media units, 272,114,000 impressions were generated. This is a difference of 9,456,000 impressions. There is also a difference in the budget remaining after optimization and recalculation. The use of fractional values allows all of the budget to be consumed, ie. a net budget of zero dollars. Meanwhile, the use of integer values leaves a net budget of $405,000. There is such a large difference in impression levels and net budget levels because during the rounding of all the fractional media units to integer media units a portion of the budget remains unspent or not allocated. For example, in the media category television the optimal solution generated by WHAT'S BEST! selects 22.73 units of cable 15-second spot advertisements (a fractional value), but during recalculation to integer values this 22.73 becomes 22 units of cable 15-second spot advertisements. For more detail refer to Appendix A for detail concerning fractional and integer values selected in the optimal solutions to the $12 million budget using allocation strategy A. This results in an allocation loss of $80,300 dollars as the unit cost of one cable 15-second spot advertisement is $110,000. The $80,300 is then considered part of the net budget after the recalculation process. A complete display of the results macro for Best12A is in Table 24 on the following page.

The output file Best12B has a budget level of $12 million and uses budget allocation strategy B (see Table 5) and generates 307,015,000 impressions. After recalculation to integer values, it generates 298,356,000 impressions. A difference of 8,659,000 impressions. The net budget for fractional values is zero, but the net budget for integer values of media variables selected is $404,000.

Table 24. - Results macro for the spreadsheet $12 million budget, budget allocation strategy A

RESULTS OF OPTIMIZATION USING FRACTIONAL MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) = 12,000		Net Budget ($1,000's) = 0		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	25.0	3,000	89,653	0.0335
News/Radio	12.5	1,500	28,844	0.0520
Magazines	37.5	4,500	143,791	0.0313
Other media	12.5	1,500	17,867	0.0840
Special media	12.5	1,500	1,417	0.0558
Totals =	100.0	12,000	281,570	0.0426

RESULTS OF OPTIMIZATION USING INTEGER MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) =12,000		Net Budget ($1,000's) =405		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	25.0	2,945	87,920	0.0335
News/Radio	12.5	1,416	273,100	0.0519
Magazines	37.5	4,302	137,745	0.0312
Other media	12.5	1,492	17,779	0.0839
Special media	12.5	1,440	1,360	0.0589
Totals =	100.0	11,595	272,114	0.0426

Again, as in Best12A, the net budget computed after integer values are used is higher due to allocation loses during the rounding off process. The complete output results file for Best12B are related in Table 25 on the following page.

The final output file for this budget level, Best12C using $12 million dollars and allocation strategy C (see Table 5) has a total impression level of 206,008,000 impressions. However, this total level of impressions uses fractional values for media units selected to arrive at the optimal solution. Using integer values for

Table 25. - Results macro for the spreadsheet file,$12 million budget, budget allocation strategy B.

RESULTS OF OPTIMIZATION USING FRACTIONAL MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) = 12,000		Net Budget ($1,000's) = 0		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	50.0	6,000	172,662	0.0348
News/Radio	20.0	2,400	40,783	0.0558
Magazines	20.0	2,400	82,863	0.0290
Other media	5.0	600	9,977	0.0612
Special media	5.0	600	910	0.6596
Totals =	100.0	12,000	307,015	0.0391

RESULTS OF OPTIMIZATION USING INTEGER MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) =12,000		Net Budget ($1,000's) =404		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	50.0	5,800	166,920	0.0347
News/Radio	20.5	2,277	38,816	0.0587
Magazines	20.5	2,377	82,045	0.0290
Other media	5.0	589	9,715	0.0607
Special media	5.0	553	860	0.6426
Totals =	100.0	11,596	298,356	0.0389

the media units selected there are a total of 200,713,000 impressions. A difference of 5,296,000 impressions. The difference in total impression levels relates directly to the rounding off process as do the total net budget levels. For Best12C, using fractional values, there is a net budget of zero, and with integer values a net budget of $567,000. A complete display of the results for Best12C are portrayed in Table 26.

Table 26. - Results macro for the spreadsheet file, $12 million budget, budget allocation strategy C.

RESULTS OF OPTIMIZATION USING FRACTIONAL MEDIA UNITS

Input Menu

Total Budget ($1,000's) = 12,000

Output Menu

Net Budget ($1,000's) = 0

Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	10.0	1,200	36,382	0.0330
News/Radio	10.5	1,200	24,194	0.0496
Magazines	30.0	3,600	118,875	0.0303
Other media	25.0	3,000	24,532	0.1223
Special media	25.0	3,000	2,026	1.4809
Totals =	100.0	12,000	206,008	0.0583

RESULTS OF OPTIMIZATION USING INTEGER MEDIA UNITS

Input Menu

Total Budget ($1,000's) =12,000

Output Menu

Net Budget ($1,000's) =567

Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	10.0	1,210	36,685	0.0330
News/Radio	10.0	1,416	23,032	0.0495
Magazines	30.0	3,476	114,945	0.0302
Other media	25.0	2,949	24,191	0.1219
Special media	25.0	2,658	1,860	0.4288
Totals =	100.0	11,433	272,114	0.0570

The output file Best12B generates the greatest number of total impressions (307,015,000 and 298,356,000) for both the functional and integer value results respectively. This compares to 281,570,000 impressions (fractional) and 272,114,000 impressions (integer) for Best12A and 206,008,000 impressions (fractional) and 200,713,000 (integer) for Best12C. The levels of impressions generated are directly related to the allocation scenarios that each output file had

assigned to it. Best12B produces the greatest level of impressions because 50% of the budget is allocated to the media group, TV. Television is considered to have the highest potential for generating impressions. This is confirmed by the high reach and impression levels that the television media variables have in the data gathered for this study. When television reach and impressions values are contrasted with a media category like direct mail, there is an obvious advantage that television has over the other media categories in terms of the potential impression generation capabilities that exist within the media variables in television. Therefore, the more that is allocated to television the higher the impression levels will be.

The cost per impression is lowest for Best12B at 0.0391 with 307,915,000 impressions generated. Next is Best12A at 0.0426 with 281,570,000 impressions, and then comes Best12C at 0.0583 with 200,713,000 impressions. The high impression producing media groups, TV and Magazines, consistently have the lowest cost per impression levels, followed by the media groups News/Radio and Other Media which are the middle range impression producers and have the next lowest Cost per Impression values. The media group, Special Media, trails all other groups with the highest Cost per Impression figures.

In the output file for Best5A, the $5 million budget level is used along with budget allocation scenario A (see Table 5). The optimal solution gives a total impressions level of 125,110,000 impressions with a net budget of zero dollars. After recalculation from fractional values to integer values the total impressions level is 121,190,000, and a net budget of $156,000 remains. The difference in impression levels is 3,920,000. The differences are caused by two major allocation loses. The first in the media group, TV, where $40,000 remained, and

secondly, in Magazines, where $75,000 remained unallocated after the recalculation to integer values. This means that $1,210,000 was spent out of the possible $1,250,000 allocated to the media group TV. Meanwhile, $1,800,000 of the budget was allocated for the media group Magazines, out of a possible $1,875,000. The main budget allocation loss in the media group TV occured when 11.36 units of cable 15-second spot advertisements became 11 units after recalculation to integer values. The main budget allocation losses in the media group Magazines happened when 6.67 units of the 3rd page advertisement in the media category Weekly Magazine were converted to 6 units and when 3.57 units of the one page advertisements in the media category Monthly Magazine were converted to 3 units. A complete display of the results from the Best5A spreadsheet output file can be found in Table 27 on this and the following page.

Table 27. - Results macro for the spreadsheet file,$5 million budget, budget allocation strategy A.

RESULTS OF OPTIMIZATION USING FRACTIONAL MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) = 5,000		Net Budget ($1,000's) = 0		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	25.0	1,250	37,898	0.0330
News/Radio	12.5	625	14,404	0.0434
Magazines	37.5	1,875	64,918	0.0289
Other media	12.5	625	7,348	0.0851
Special media	12.5	625	542	1.1523
Totals =	100.0	5,000	125,110	0.0400

Table 27 (cont'd)

RESULTS OF OPTIMIZATION USING INTEGER MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) =5,000		Net Budget ($1,000's) =156		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	25.0	1,945	36,685	0.0330
News/Radio	12.5	624	14,384	0.0434
Magazines	37.5	1,800	62,370	0.0289
Other media	12.5	613	7,235	0.0848
Special media	12.5	596	516	1.1557
Totals =	100.0	4,844	121,190	0.0400

For the output file Best5B that has a $5 million budget and the budget allocation scenario B (see Table 5) the optimal solution found was a total impressions level of 137,155,000 with a zero net budget. After the recalculation to integer values the impressions level is 131,929,000 with a net budget of $184,000.

Of this $184,000 dollars, $171,000 results from budget allocation losses when fractional values are converted to integer values for these media groups selected during optimization. The media group TV was allocated $2,500,000 and used $2,420,000, a net of $80,000. The media group Magazines was allocated $1,000,000 and used $948,000, a net of $52,000. And third the media group News/Radio was also allocated $1 million dollars and used $961,000, a net of $39,000. The results of Best5B are found in Table 28 following page.

In the output file for Best5C, the $5 million budget level is used in conjunction with budget allocation scenario C (see Table 5). The optimal solution has a total impressions level of 91,208,000 impressions with a net budget of zero

Table 28. - Results macro for the spreadsheet file, $5 million budget, budget allocation strategy B.

RESULTS OF OPTIMIZATION USING FRACTIONAL MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) = 5,000		Net Budget ($1,000's) = 0		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	50.0	2,500	75,795	0.0330
News/Radio	20.0	1,000	20,783	0.0480
Magazines	20.0	1,000	36,863	0.0277
Other media	5.0	250	4,977	0.0613
Special media	5.0	250	331	0.7550
Totals =	100.0	5,000	137,155	0.0365

RESULTS OF OPTIMIZATION USING INTEGER MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) =5,000		Net Budget ($1,000's) =184		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	50.0	2,420	73,370	0.0330
News/Radio	20.0	961	19,978	0.0481
Magazines	20.0	949	34,240	0.0277
Other media	5.0	245	4,025	0.0610
Special media	5.0	241	316	0.7638
Totals =	100.0	4,816	131,929	0.0365

when the fractional values are used during optimization. After recalculation, the total impression level is 85,863,000, with a net budget remaining of $229,000, using integer values. The reason for the differences again lie in the rounding off process. In terms of dollars left unspent among the media groups after recalculation, there is $35,000 left in the media group Other (Outdoor, Transit and Direct Mail), another $45,000 left unallocated for the media group Special, and

$60,000 unspent in the media group TV. The major budget allocation losses occur in the media group Magazines where $1,407,500 was spent out of a $1,500,000 total. The $92,000 left unallocated is due to rounding in the media category Weekly Magazine where 3.50 front covers and 6.67 third pages became 3 and 6 respectively. The results for the output file, Best5C can be found in Table 29.

Table 29. - Results macro for the spreadsheet file, $5 million budget, budget allocation strategy C.

RESULTS OF OPTIMIZATION USING FRACTIONAL MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) = 5,000		Net Budget ($1,000's) = 0		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	10.0	500	15,159	0.0330
News/Radio	10.0	500	11,808	0.0423
Magazines	30.0	1,500	53,129	0.0282
Other media	25.0	1,250	10,305	0.1223
Special media	25.0	1,250	807	1.5491
Totals =	100.0	5,000	91,208	0.0548

RESULTS OF OPTIMIZATION USING INTEGER MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) =5,000		Net Budget ($1,000's) =229		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	10.0	440	13,340	0.0330
News/Radio	10.0	504	11,844	0.0426
Magazines	30.0	1,408	49,820	0.0283
Other media	25.0	1,215	10,093	0.1204
Special media	25.0	1,205	766	1.5732
Totals =	100.0	4,771	85,863	0.0556

The Best5C output file produces the fewest number of total impressions, fractional or integer value, in comparison to Best5A and Best5B. Best5B produces the most impressions, 137,155,000 and 131,929,000, fractional and integer respectively. This is due to the budget allocation strategy that has 50%, or $2,500,000 allocated to the media group TV.

The cost per impression is also lowest for Best5B at 0.0365 with 131,929,000 impressions, then follows Best5A at 0.0400 with 121,190,000 impressions, and then comes Best5C at 0.0556 with 85,863 impressions. These figures occur for Best5B as it follows a high impression generating budget allocation strategy where 50% of the budget does to TV, with the low generating media groups Other and Special media, each only getting 5% of the budget.

In the output file for Best1A, the budget level is $1 million dollars and is used with budget allocation strategy scenario A (see Table 5). The optimal solution gives a total impression level of 27,030,000 impressions and a net budget of zero. After the recalculation process from fractional values to integer values, the total impression level is 24,122,000, with a net budget remaining of $123,000. The difference in impression levels is 2,908,000. The differences are caused by three major budget allocation loses. First in the media group News/ Radio where $35,000 remained, then in the groups TV and Magazine, where $30,000 remained for each media group. This means that of a possible $750,000 allocated among these media groups only $655,000 was actually used up after recalculation to integer values. The main loss in media group News/Radio occurred when 0.52 full page newspaper advertisements were rounded to zero. The losses in the media groups TV and Magazines came from 2.27 Cable 15-second spot television advertisements being rounded to 2.0, and from 5.68 one

page business magazine advertisements being converted to 5.0. A complete table of results macro from Best1A is available in Table 30.

Table 30. - Results macro for the spreadsheet file, $1 million budget, budget allocation strategy A.

RESULTS OF OPTIMIZATION USING FRACTIONAL MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) = 1,000		Net Budget ($1,000's) = 0		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	25.0	250	7,653	0.0330
News/Radio	12.5	125	3,844	0.0366
Magazines	37.5	375	13,791	0.0273
Other media	12.5	125	2,867	0.0612
Special media	12.5	125	251	0.4971
Totals =	100.0	1,000	27,030	0.0370

RESULTS OF OPTIMIZATION USING INTEGER MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) =1,000		Net Budget ($1,000's) =123		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	25.0	220	6,670	0.0330
News/Radio	12.5	90	2,640	0.0341
Magazines	37.5	345	12,655	0.0273
Other media	12.5	110	1,925	0.0569
Special media	12.5	113	232	0.4853
Totals =	100.0	877	24,122	0.0364

For the output file Best1B, that has a $1 million dollar budget and the budget allocation strategy scenario B (see Table 5), the optimal solution found was a total impressions level of 28,899,000 with a net budget of zero. After

completing the recalculation process the impression level 25,592,000 impressions. There was a net budget of $98,000 remaining for this spreadsheet output file after recalculation. This $98,000 is a result of budget allocation losses among two main media groups. The media group TV was allocated $500,000 of the budget, and used only $440,000, a difference of $60,000. The $60,000 dollar loss occured when 4.55 units of the 15-second spot cable television advertisements were rounded to 4 units. The media group Magazines was allocated $200,000 of the budget, of which only $159,000 was spent, for a net remainder of $41,000. The $41,000 budget allocation loss happened in large part to a fractional 1.67 3rd page weekly magazine advertisements being converted to 1.0, as .67 of the unit cost of $60,000 approximatelyis $40,200. This makes up most of the $41,000 of the lost budget allocations in this media group. The results for the spreadsheet output file Best1B can be found in Table 31. The first part of the table for the results after optimization using fractional media units are found on this page while the results after optimization using integer media units are continued in the table on the following page.

Table 31. - Results macro for the spreadsheet file, $1 million budget, budget allocation strategy B.

RESULTS OF OPTIMIZATION USING FRACTIONAL MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) = 1,000		Net Budget ($1,000's) = 0		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	50.0	500	15,159	0.0330
News/Radio	20.0	200	5,458	0.0366
Magazines	20.0	200	7,331	0.0273
Other media	5.0	50	818	0.0611
Special media	5.0	50	132	0.3799
Totals =	100.0	1,000	28,899	0.0346

Table 31 (cond't.)

RESULTS OF OPTIMIZATION USING INTEGER MEDIA UNITS

Input Menu		Output Menu		
Total Budget ($1,000's) =1,000		Net Budget ($1,000's) =98		
Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	50.0	440	13,340	0.0330
News/Radio	20.0	204	5,494	0.0371
Magazines	20.0	159	5,805	0.0274
Other media	5.0	50	825	0.0611
Special media	5.0	49	128	0.3797
Totals =	100.0	902	25,592	0.0352

In the file Best1C, the $1 million budget level is used in conjunction with the budget allocation strategy scenario C (see Table 5). The optimal solution has a total impressions level of 21,169,000 with a net budget of zero, when using fractional values. After recalculation, the total impression level is 19,018,000 impressions along with a net budget remaining of $79,000, using integer values. The reason for the difference of 2,151,000 impressions lie in the rounding off process. In terms of dollars unallocated after recalculation, the greatest portion is in the media group Magazines. In this media group, $48,000 is left unused due to the rounding of 4.55 one page business magazine advertisements to 4.0 and 2.50 3rd page weekly magazine advertisements being rounded to 2.0. The business magazine media variable has $18,000 and the weekly magazine media variable has $30,000 that is not allocated after the rounding-off process in the media group Magazines. A table of results for Best1C can be found in Table 32 on the following page.

Table 32. - Results macro for the spreadsheet file, $1 million budget, budget allocation strategy C.

RESULTS OF OPTIMIZATION USING FRACTIONAL MEDIA UNITS

Input Menu

Total Budget ($1,000's) = 1,000

Output Menu

Net Budget ($1,000's) = 0

Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	10.0	100	3,032	0.0330
News/Radio	10.5	100	2,729	0.0366
Magazines	30.0	300	10,997	0.0273
Other media	25.0	250	4,081	0.0613
Special media	25.0	250	331	0.7550
Totals =	100.0	1,000	21,169	0.0472

RESULTS OF OPTIMIZATION USING INTEGER MEDIA UNITS

Input Menu

Total Budget ($1,000's) =1,000

Output Menu

Net Budget ($1,000's) =79

Media Group	Budget Allocation %	Budget Allocation $1,000's	Impressions 1,000's	Cost/ Impression
Television	10.0	110	3,335	0.0330
News/Radio	10.0	72	2,112	0.0341
Magazines	30.0	252	9,230	0.0273
Other media	25.0	245	4,025	0.0610
Special media	25.0	241	316	0.7638
Totals =	100.0	921	19,018	0.0484

In summary, the output file Best1B produces the greatest number of total impressions for fractional values (28,899,000) and integer values (25,592,000). This compares to 27,030,000 impressions (fractional) and 24,122,000 impressions (integer) for Best1A and 21,169,000 and 19,018,000 impressions, fractional and integer respectively, for Best1C. As with the other output files Best12 and Best5, the levels of impressions produced are directly related to the

allocation scenarios that each output file follows. Best1B generates the highest level of impressions due to the fact that it is allotted 50% of the total budget for the media group TV. This group has the greatest potential for generating impressions with its high levels of reach and impressions. However, allocating all the budget to these few media groups will have dire effects on the overall media advertising strategy that must be well rounded and cover all potential advertising strategies and media variables. Thus, part of the budget is destined to go to the lower potential impression generating media groups.

The Cost per Impression is lowest for Best1B at 0.0346 with 28,899,000 impressions generated. Next is Best1A at 0.0370 with 27,030,000 impressions, followed by Best1C at 0.472 with 21,169,000 impressions. The higher impression generating media groups also have the lower Cost per Impressions levels, as indicated previously. This focuses the attention on the way the budget is allocated and further illustrates the need for a "best" allocation strategy. However this optimization of total impressions is only one goal of the total advertising process.

From all the output files Best12A through Best1C, it is evident that an almost endless possible combination of media variables would satisfy the basic conditions specified. So, rather than developing all such combinations and sorting them to find the best single optimal solution, which is practically prohibitive given time and money constraints, it is necessary to determine what best suits a marketing manager's individual budget allocation and budget level situation.

CHAPTER V

SUMMARY

This research effort undertook the task of successfully applying a commercially developed linear programming package, WHAT'S BEST!, to a media selection problem. The problem was divided on the basis of three budget levels ($12 million, $5 million, and $1 million) and three budget allocation strategies (A, the mixed media allocation strategy; B, the high impression media generating strategy; and C, the low impression media generating strategy), then a master spreadsheet was developed in Lotus 1-2-3. The spreadsheet output files created were Best12A, Best12B, Best12C, Best5A, Best5B, Best5C, Best1A, Best1B and Best1C. Each spreadsheet file had a possible 59 media variables to select from, contained in 11 media categories which were compiled into five media groups. Advertising dollars were allocated to each media variable, based on a combination of reach, frequency, and unit cost. The objective cell was based on total impressions (impressions being a function of reach and frequency) and was designated as the cell to contain the formula to be maximized. Master spreadsheet files were created (as in Tables 10 through 21), and the WHAT'S BEST! linear programming package invoked for each of the nine files (three budget levels each constrained by three allocation strategies). WHAT'S BEST!

successfully completed finding an optimal solution for each of the nine output files. However, the optimal solution found in each case yielded fractional values in the adjustable cells (Number of Units Selected). A fractional unit, or units (eg. 3.36 Newspaper advertisements) is not acceptable to a purchaser of media advertisements. So a recalculation process was then invoked to provide integer values for the Number of Units Selected. This produced satisfactory results but did not fully utilize promotion budgets available. Another optimization process, or an updated release of WHAT'S BEST!, may be able to reduce the net budget levels closer to zero.

In summarizing this research effort, there are three main areas to discuss. They are: 1) an evaluation of the computer spreadsheet and linear programming package, 2) implications of the research, and 3) recommendations based on the research.

In evaluating the application of the WHAT'S BEST!'s linear programming package to the master spreadsheet developed on Lotus 1-2-3, there are three main questions to be pondered. First, did the master spreadsheet and the linear programming package fulfill the roles for which they were intended? From the successful application of WHAT'S BEST! to the master spreadsheet file and its subsequent nine output files, allowing for recalculation, it can be stated that both roles were fulfilled. The linear programming package found optimal solutions to all the different scenarios and followed all the constraints placed in the master spreadsheet. However, WHAT'S BEST! version 1.2 is limited by its inability to produce non-fractional results in the adjustable cells. It's only integer values are 0/1 options and there aren't enough of these 0/1 cells available in this version of WHAT'S BEST! to suggest an alternate format in the spreadsheet files. Efforts can be made to overcome this limitation and the recalculation to integer values

is one such attempt. But the precise results of the optional solution must be sacrificed to complete the recalculation effort. The good news is that the sacrificing of the optimal results in this fashion may not have to continue. From discussions with General Optimization, Inc. of Chicago it appears that a new and vastly different version of WHAT'S BEST! is under development in to test phases. It will allow for integer values to be assigned to adjustable cells as one of its many new features.

In evaluating the computer spreadsheet, there are a number of problems which must be addressed. The master spreadsheet was created so that scaling problems were overcome. A scaling problem results when the difference between the largest value and the smallest value is too great. Thus, figures are placed in the master spreadsheet as 175, but are read in the $1,000's ($175,000). The master spreadsheet was also created in such a way that unbounded problems would not occur. An unbounded problem is one in which there are no limitations on the adjustable cells. Unbounded cells can be increased infinitely and produce an optimizing error. With the spreadsheet free of these formulation problems, WHAT'S BEST! was able to do its task successfully on the Lotus 1-2-3 spreadsheet software program.

The second question to ponder is: Are the results usable? As the research effort used differing budget levels and allocation scenarios based loosely on information gleaned from a variety of sources but borrowing heavily from previous budgets for state and foreign national tourist organizations found in the Directory of Advertisers (1988), it may not be wise to translate the results of this research effort directly to an actual media selection and advertising budget allocation situation. However, the management decision process, crucial to the success of any media selection and advertising budget allocation problem, could

be significantly aided by these results. The master spreadsheet developed and the linear programming package used are in no way intended to replace the management decision process, but rather to enhance it.

The master spreadsheet file will aid in making tough problems a little easier to handle. The master spreadsheet becomes a base from which to make further decisions. For example, in the Best12 files, a marketer may decide against using the full page newspaper advertisement that is a part of each Best12 file's optimal situation. This may be a decision based on past experience or learned knowledge that a full page newspaper advertisement will not be as effective in the overall campaign. Perhaps the marketer will decide to put the money allocated for the full page into quarter page newspaper advertisements. The master spreadsheet file proves its worth as a base for aiding management decisions, because of its adaptability to quickly assess the impacts of alternatives.

The master spreadsheet may also aid management decisions as a guideline. The marketer and/or management team develop what they believe is a solid advertising-allocation plan. The master spreadsheet is used as a guideline to search out areas the marketer may have overlooked. It can be used to double-check that too much or too little is not placed in one media variable or category of media.

The value of this spreadsheet and optimization process may also be demonstrated by its use in small tourism business situations. The marketer in this instance may not have the access to the personnel or resources that a state tourism and travel organization or large private company would have. The master spreadsheet file can aid significantly in this marketer's decision-making situation.

The third question to be posed in evaluating this research is: Can practical use be made of this linear programming package, WHAT'S BEST!? To the

average decision maker in a small to mid-size tourism and travel business, the concept of linear programming models may seem to be beyond contemplation. However, this research was completed, the spreadsheet files were developed, and the linear programming package was used without having an in-depth knowledge of the concepts of linear programming and without an extensive background in the mathematics associated with linear programming algorithms. With some basic study of the concept of model formulation and an idea of how linear programming works and acts, the average decision maker can make excellent use of this valuable tool. For that matter, even those involved with large organizations and businesses could benefit from the WHAT'S BEST! linear programming package. A working knowledge of Lotus 1-2-3 is very helpful. Even so, knowing a few basic commands like file retrieve, file save, print, and how to enter formulas is all that is really necessary to get started. Furthermore, with the instructional macro developed in the master spreadsheet, it becomes a simple matter of inputting the desired numbers, percentages, or budget level in to the instructional screen presented within the master spreadsheet. Thus, this tool development can be used by tourism managers with minimal computer skills.

In terms of implications of this research effort, there are two main areas that can be explored. First, there are acknowledged limitations to this research effort and to using linear programming for media selection. However, the objective of this research was to demonstrate a use for the linear programming package WHAT'S BEST!, and that has been done. In consideration of the limitations, some of the major ones discussed in the literature review and reiterated here have been approached with some success. The recalculation process and the use of the WBCALC range are also important in overcoming some of these limitations.

A limitation to linear programming in the past has been that it cannot account for media discounts related to volume purchases. To avoid this, discounts were placed in media package buys in the instance of radio spots and radio report sponsorships. Thus, the unit cost reflects a package buy rather than single per-spot or per-sponsorship cost. This was also done for direct-mail advertising variables and some of the specialty media variables like keys and bumper stickers.

Another limitation is that of reduced exposure value for repeat media usage. In an attempt to approach this problem, advertising account executives were asked for input into frequency figures. This was to avoid overestimation of frequency figures, thereby adding to the reduced exposure effect. Also, by constraining each media variable and then each category, it was suggested by one account executive that this might also help in the reduced exposure effect. This ensures that not all budget funds for a given media category are allocated to just one variable. Admittedly, it does not completely overcome the problem, but there are preventative measures available to ensure a limiting of the exposure-reduction effect.

A further limitation is that of the problem with fractional purchases of a media variable. The simplex method of the basic linear programming algorithm used in version 1.2 of WHAT'S BEST! will not guarantee the purchase of full pages in a magazine or complete television commercials. The optimal solution may be 3.25 one-page magazine advertisements or 7.832 15-second spot television commercials. To overcome this problem, the results of the number of media variables selected were set in a recalculation range format (WBCALC) that doesn't allow values in the range to be adjusted by WHAT'S BEST! so that they can be recalculated after the optimization process. To overcome this problem

completely, integer programming is necessary. It guarantees that nonfractional units are selected. WHAT'S BEST!, as indicated previously, offers the integer programming option, but compared to its maximum program limit for optimizable cells (400) or coefficients (6,400), there are only 40 integer 0/1 cells available in the version 1.2, used in this research effort.

A second area to be explored in future research is that of up-to-date data. A problem in the past has been that researchers using linear programming for media selection were not privy to up-to-date data. And those at large advertising firms who may have had data that were current and were using linear programming models would not release crucial data for general use. This research effort in no way claims to have up-to-date unit costs, but with access to advertising account executives and the availability of relatively accurate trade papers like the Standard Dictionary of Advertisers and the Advertising Age newspapers, some very workable unit cost figures were obtained. In the real world, a cooperative agreement between a tourism and travel business and a local advertising firm would be far easier to establish to obtain actual cost and exposure data. Also, in terms of updating unit costs or, for that matter, any other figure in the master spreadsheet file, the process is very simple because the spreadsheet was created to adapt to such a likelihood as changing cost values. The real advantage in using this tool is that, once the basic model is created, new data can be quickly inserted and their impact analyzed.

The final area to discuss in terms of summarizing this research effort is that of recommendations from what was learned. There are five main recommendations that are thought to be of value in furthering research in the area of media selection by linear programming using WHAT'S BEST!.

First, more media variables need to be added. Fifty-nine media variables are used in the master spreadsheet file. This number of media variables could be increased to 75 or even 100. Consideration should be given to breaking down categories. For example, network television could be broken down into variables that address special events (e.g., Super Bowl) and seasonal buys. Seasonal buys would help to overcome the limitation of advertisement scheduling in linear programming efforts. Furthermore, magazine advertisement could be broken down into color and black-and-white advertisement. Color is becoming more popular and affordable in newspaper; it should be given consideration. Transit advertising can be broken down into more media variables according to different bus systems in a regional area. Not only can the 59 variables used in the master spreadsheet file be broken down or expanded upon, but new media variables and categories can be added. For example, trade shows, point-of-purchase displays, and co-op advertisements could be introduced.

Second, figures such as reach, frequency, and unit cost can be strengthened with continuing efforts to keep them up-to-date. Following Advertising Age's "Media Works" section is of great value in this effort. "Media Works" covers magazines, radio, and television, and may include some newspaper data. The most accurate and up-to-date figures are important to the practicality and use of the models, so it is crucial to stay on top of these.

Third, a more detailed set of macros developed for the master spreadsheet file on Lotus 1-2-3 would be helpful to aid in altering the spreadsheets and manipulating data. Detailed macros could be instructional in nature or could aid in the adaptation of the master spreadsheet file to differing situations. They could select only certain media categories or variables to be used in the advertising budget allocation plan. For example, a small tourism and travel business might

not be able to afford television advertising. This media category could then be frozen out of the optimization process.

A fourth recommendation is that media variables could be defined more closely in terms of geographic area reached, which is very important to large national tourism and travel organizations or state agencies looking to target a particular geographic market. Media variables could also be defined in terms of the demographics and characteristics of the target group they reach. For example, Vogue and Good Housekeeping are both targeted to females, but each reaches a different segment of the population. An important part of this recommendation is the setting up of appropriate constraints in an effort not to go overboard with a certain media variable and to make sure that there is not too much audience duplication and that the exposure reduction effect is not overly enhanced.

A fifth and final recommendation is that integer programming methods should be used to ensure the best possible results. To implement this recommendation, it is necessary to obtain the updated version of WHAT'S BEST!, however, details on its potential release are not available at this time.

Other minor recommendations include using a more current version of Lotus 1-2-3, which incorporates a number of time-saving features that would be beneficial to the models, especially if more detailed macros are to be developed. Another minor recommendation is that, to speed optimization calculations, the installation of an 80287 Math Co-Processor will speed calculations by about three times. While making minor adjustments in the master spreadsheet file , time can grow long waiting for WHAT'S BEST! to recalculate large ranges of adjustable cells.

A further recommendation for those with little or no linear programming experience is to read Saul I. Gass's An Illustrated Guide to Linear Programming (1970). It is quite easy to understand, well laid out, and has informative and useful graphs and examples. As well, it has a detailed bibliography for further study.

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APPENDICES

APPENDIX A

BEST 12.A SPREADSHEET FILE;

as it represents the optimal solution output file for a $12 million dollar budget and the budget allocation strategy A (mixed media strategy).

APPENDIX A — Best12.A, columns 1 thru 6, rows 1 thru 3 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
TELEVISION					
NET 15's	4,850	1.0	4,850	175.00	27.71
NET 30's	5,575	1.0	5,575	225.00	24.78
CAB 15's	3,335	1.0	3,335	110.00	30.32
CAB 30's	4,275	1.0	4,275	155.00	27.58
LOC 15's	545	1.0	545	30.00	18.17
LOC 30's	880	1.0	880	45.00	19.56
TOTAL	19,460		19,460	740.00	127.37
AVG.	3,243		3,243	123.33	21.23
NEWSPAPER					
FULL PG.	635	2.0	1,270	60.00	10.58
HALF PG.	425	2.0	850	47.00	9.04
6X4" PG.	165	2.0	330	22.00	7.50
8X4" PG.	190	2.0	380	28.50	6.67
4 PG. INS.	625	2.0	1,250	98.00	6.38
6 PG. INS.	630	2.0	1,260	109.50	5.75
TOTAL	2,670		5,340	365.00	45.92
AVG.	445		890	60.83	7.65
WEEK MG.					
FR COVER	1,150	3.0	345	100.00	11.50
BK COVER	905	3.0	2,715	85.00	10.65
2nd PAGE	775	3.0	2,325	70.00	11.07
3rd PAGE	745	3.0	2,235	60.00	12.42
EXT. FLAP	950	1.0	950	85.00	11.18
TWO PAGE	865	2.0	1,730	75.00	11.53
ONE PAGE	610	2.0	1,220	55.00	11.09
TOTAL	6,000		14,625	530.00	79.44
AVG.	857		2,089	75.71	11.35

APPENIX A — Best12.A, columns 7 thru 12, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
TELEVISION					
NET 15's	2.86	500.00	< 2500	0	13,857
NET 30's	0.00	0.00	< 2500	2,500	0
CAB 15's	22.73	2500.00	< 2500	0	75,795
CAB 30's	0.00	0.00	< 2500	1,500	0
LOC 15's	0.00	0.00	< 1000	1,000	0
LOC 30's	0.00	0.00	< 1000	1,000	0
TOTAL		3000.00	< 3000	0	89,652
AVG.		500.00			14,942
NEWSPAPER					
FULL PG.	8.33	500.00	< 500	0	10,583
HALF PG.	10.64	500.00	< 500	0	9,043
6X4" PG.	5.68	125.00	< 500	375	1,875
8X4" PG.	0.00	0.00	< 500	500	0
4 PG. INS.	0.00	0.00	< 500	500	0
6 PG. INS.	0.00	0.00	< 500	500	0
TOTAL		1125.00	< 1125	0	21,501
AVG.		187.50			3,584
WEEK MG.					
FR COVER	5.00	500.00	< 500	0	17,250
BK COVER	5.88	500.00	< 500	0	15,971
2nd PAGE	7.14	500.00	< 500	0	16,607
3rd PAGE	8.33	500.00	< 500	0	18,625
EXT. FLAP	0.00	0.00	< 500	500	0
TWO PAGE	0.00	0.00	< 500	500	0
ONE PAGE	0.00	0.00	< 500	500	0
TOTAL		2000.00	< 2250	250	68,453
AVG.		285.71			9,779

APPENDIX A — Best12.A, columns13 thru18, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
TELEVISION					
NET 15's	3	525.00	< 2500	1,975	14,550
NET 30's	0	0.00	< 2500	2,500	0
CAB 15's	22	2420.00	< 2500	80	73,370
CAB 30's	0	0.00	< 2500	1,500	0
LOC 15's	0	0.00	< 1000	1,000	0
LOC 30's	0	0.00	< 1000	1,000	0
TOTAL		2945.00	< 3000	55	87,920
AVG.		490.83			14,653
NEWSPAPER					
FULL PG.	8	480.00	< 500	20	10,160
HALF PG.	10	470.00	< 500	30	8,500
6X4" PG.	5	110.00	< 500	390	1,650
8X4" PG.	0	0.00	< 500	500	0
4 PG. INS.	0	0.00	< 500	500	0
6 PG. INS.	0	0.00	< 500	500	0
TOTAL		1060.00	< 1125	0	20,310
AVG.		176.67			3,385
WEEK MG.					
FR COVER	5	500.00	< 500	0	17,250
BK COVER	5	425.00	< 500	75	13,575
2nd PAGE	7	490.00	< 500	10	16,275
3rd PAGE	8	480.00	< 500	20	17,880
EXT. FLAP	0	0.00	< 500	500	0
TWO PAGE	0	0.00	< 500	500	0
ONE PAGE	0	0.00	< 500	500	0
TOTAL		1895.00	< 2250	355	64,980
AVG.		270.71			9,283

APPENDIX A — Best12.A, columns 1 thru 6, rows 4 thru 6 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
MNTH. MG.					
FR COVER	1,005	3.0	3,015	115.00	8.74
BK COVER	885	3.0	2,655	98.00	9.03
2nd PAGE	665	3.0	1,995	77.00	8.64
3rd PAGE	580	3.0	1,740	68.00	8.53
EXT.FLAP	825	1.0	845	95.00	8.68
TWO PAGE	605	2.0	1,210	75.00	8.07
ONE PAGE	535	2.0	1,070	38.50	13.90
TOTAL	5,100		12,510	566.50	65.58
AVG.	729		1,787	80.93	9.37
BUSN. MG.					
FR COVER	775	2.0	1,550	92.00	8.42
BK COVER	725	2.0	1,450	83.00	8.73
2nd PAGE	665	2.0	1,330	78.00	8.53
3rd PAGE	660	2.0	1,320	72.00	9.17
TWO PAGE	685	2.0	1,370	58.50	11.71
ONE PAGE	595	2.0	1,190	33.00	18.03
TOTAL	4,105		8,210	416.50	64.59
AVG.	684		1,368	69.42	10.77
CONS. MG.					
FR COVER	445	2.0	890	82.00	5.43
BK COVER	400	2.0	800	76.50	5.23
TWO PAGE	355	2.0	710	34.00	10.44
ONE PAGE	310	2.0	620	18.50	16.76
4PG. INS.	380	2.0	760	65.00	5.85
TOTAL	1,890		3,780	276.00	43.70
AVG.	378		756	55.20	8.74

APPENDIX A— Best12.A, columns 7 thru 12, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
MNTH. MG.					
FR COVER	4.35	500.00	< 500	0	13,109
BK COVER	5.10	500.00	< 500	0	13,546
2nd PAGE	0.00	0.00	< 500	500	0
3rd PAGE	0.00	0.00	< 500	500	0
EXT.FLAP	0.00	0.00	< 500	500	0
TWO PAGE	0.00	0.00	< 500	500	0
ONE PAGE	12.99	500.00	< 500	0	13,896
TOTAL		1500.00	< 2250	750	40,551
AVG.		214.29			5,793
BUSN. MG.					
FR COVER	0.00	0.00	< 500	500	0
BK COVER	0.00	0.00	< 500	500	0
2nd PAGE	0.00	0.00	< 500	500	0
3rd PAGE	0.00	0.00	< 500	500	0
TWO PAGE	0.00	0.00	< 500	300	0
ONE PAGE	15.15	500.00	< 500	0	18,030
TOTAL		500.00	< 2250	1,750	18,030
AVG.		83.33			3,005
CONS. MG.					
FR COVER	0.00	0.00	< 500	500	0
BK COVER	0.00	0.00	< 500	500	0
TWO PAGE	0.00	0.00	< 500	500	0
ONE PAGE	27.03	500.00	< 500	0	16,757
4PG. INS.	0.00	0.00	< 500	500	0
TOTAL		500.00	< 2250	1,750	16,757
AVG.		100.00			3,351

APPENDIX A — Best12.A, columns 13 thru18, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL RECALC. IMPRSS.
MNTH. MG.					
FR COVER	4	460.00	< 500	40	12,060
BK COVER	5	490.00	< 500	10	13,275
2nd PAGE	0	0.00	< 500	500	0
3rd PAGE	0	0.00	< 500	500	0
EXT.FLAP	0	0.00	< 500	500	0
TWO PAGE	0	0.00	< 500	500	0
ONE PAGE	12	462.00	< 500	38	12,840
TOTAL		1412.00	< 2250	838	38,175
AVG.		201.71			5,454
BUSN. MG.					
FR COVER	0	0.00	< 500	500	0
BK COVER	0	0.00	< 500	500	0
2nd PAGE	0	0.00	< 500	500	0
3rd PAGE	0	0.00	< 500	500	0
TWO PAGE	0	0.00	< 500	300	0
ONE PAGE	15	495.00	< 500	5	17,850
TOTAL		495.00	< 2250	1,755	17,850
AVG.		82.50			2,975
CONS. MG.					
FR COVER	0	0.00	< 500	500	0
BK COVER	0	0.00	< 500	500	0
TWO PAGE	0	0.00	< 500	500	0
ONE PAGE	27	499.50	< 500	1	16,740
4PG. INS.	0	0.00	< 500	500	0
TOTAL		499.50	< 2250	1,751	16,740
AVG.		99.90			3,348

APPENDIX A — Best12.A, columns 1 thru 6, rows 7 thru10 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
RADIO					
SPOT 15's	58	4.0	232	18.00	3.22
SPOT 30's	73	4.0	292	32.50	2.25
SP. NEWS	44	6.0	264	9.00	4.89
SP. REPORT	28	6.0	168	12.75	2.20
TOTAL	203		956	72.25	12.55
AVG.	51		239	18.06	3.14
OUTDOOR					
6M LEASE					
12X25	6	3.0	18	2.10	2.86
14X48	12	5.0	60	3.15	3.81
ROTARY PLAN					
12X25	12	3.0	36	15.60	0.77
14X48	18	5.0	90	17.40	1.03
TOTAL	48		204	38.25	6.47
AVG.	12		51	9.56	2.12
TRANSIT					
BUS CARD	45	4.0	180	22.25	2.02
POSTERS	65	2.0	130	36.50	1.78
TOTAL	110		310	58.75	3.80
AVG.	55		155	29.38	1.90
DIRECT MAIL					
LEAFLETS	5	1.0	5	0.60	8.33
BROCHURE	25	3.0	75	55.75	0.45
NEWSLETTER	12	1.0	12	2.25	5.33
TOTAL	42		92	58.60	14.12
AVG.	14		31	19.53	4.71

APPENDIX A — Best12.A, columns 7 thru 12, rows 7 thru 10 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
RADIO					
SPOT 15's	4.17	75.00	< 150	75	967
SPOT 30's	0.00	0.00	< 150	150	0
SP. NEWS	16.67	150.00	< 150	0	4,400
SP. REPORT	11.76	150.00	< 150	0	1,976
TOTAL		375.00	< 1125	750	7,343
AVG.		93.75			1,836
OUTDOOR					
6M LEASE					
12X25	238.10	500.00	< 500	0	4,286
14X48	158.73	500.00	< 500	0	9,524
ROTARY PLAN					
12X25	0.00	0.00	< 500	500	0
14X48	0.00	0.00	< 500	500	0
TOTAL		1000.00	< 1125	125	13,810
AVG.		250.00			3,453
TRANSIT					
BUS CARD	20.22	450.00	< 600	150	3,640
POSTERS	0.00	0.00	< 600	600	0
TOTAL		450.00	< 1125	675	3,640
AVG.		225.00			1,820
DIRECT MAIL					
LEAFLETS	83.33	50.00	< 50	0	417
BROCHURE	0.00	0.00	< 600	600	0
NEWSLETTER	0.00	0.00	< 50	50	0
TOTAL		50.00	< 1125	1,075	417
AVG.		16.67			139

APPENDIX A— Best12.A, columns13 thru18, rows 7 thru10 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL RECALC. IMPRSS.
RADIO					
SPOT 15's	4	72.00	< 150	78	928
SPOT 30's	0	0.00	< 150	150	0
SP. NEWS	17	144.00	< 150	6	4,224
SP. REPORT	12	140.25	< 150	10	1,848
TOTAL		356.25	< 1125	769	7,000
AVG.		89.06			1,750
OUTDOOR					
6M LEASE					
12X25	238	499.80	< 500	0	4,284
14X48	158	497.70	< 500	2	9,480
ROTARY PLAN					
12X25	0	0.00	< 500	500	0
14X48	0	0.00	< 500	500	0
TOTAL		997.50	< 1125	128	13,764
AVG.		249.38			3,441
TRANSIT					
BUS CARD	20	445.00	< 600	155	3,600
POSTERS	0	0.00	< 600	600	0
TOTAL		445.00	< 1125	680	3,600
AVG.		222.50			1,800
DIRECT MAIL					
LEAFLETS	83	49.80	< 50	0	415
BROCHURE	0	0.00	< 600	600	0
NEWSLETTER	0	0.00	< 50	50	0
TOTAL		49.80	< 1125	1,075	415
AVG.		16.60			138

APPENDIX A — Best12.A, columns 1 thru 6, row11 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
SPECIAL MEDIA					
DIRECTORY	100	2.0	200	520.00	0.19
CATALOGUE	20	1.0	20	11.50	1.74
BANNERS	1	1.0	1	11.85	0.08
MAPS	25	2.0	50	88.75	0.28
IMPRINTS					
T-SHIRTS	1	4.0	4	5.00	0.20
B. STICK	5	2.0	10	3.70	1.35
POSTERS	5	2.0	10	10.00	0.50
MENUS	1	1.0	1	4.35	0.23
KEYS	24	1.0	24	9.50	2.53
TOTAL	232		722	719.65	7.11
AVG.	26		80	79.96	0.79

APPENDIX A — Best12.A, columns 7 thru 12, row 11 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0.00	0.00	< 2400	2,400	0
CATALOGUE	6.96	80.00	< 80	0	139
BANNERS	0.00	0.00	< 80	80	0
MAPS	11.49	1020.00	< 1200	180	575
IMPRINTS					
T-SHIRTS	20.00	100.00	< 100	0	80
B. STICK	27.03	100.00	< 100	0	270
POSTERS	10.00	100.00	< 100	0	100
MENUS	0.00	0.00	< 100	100	0
KEYS	10.53	100.00	< 100	0	253
TOTAL		1500.00	< 1500	0	1,417
AVG.		166.67			157

	BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
	12000.00	< 12,000	0	281,570

APPENDIX A — Best12.A, columns 13 thru 18, row 11 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL RECALC. IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0	0.00	< 2400	2,400	0
CATALOGUE	6	69.00	< 80	11	120
BANNERS	0	0.00	< 80	80	0
MAPS	11	976.25	< 1200	224	550
IMPRINTS					
T-SHIRTS	20	100.00	< 100	0	80
B. STICK	27	99.90	< 100	0	270
POSTERS	10	100.00	< 100	0	100
MENUS	0	0.00	< 100	100	0
KEYS	11	95.00	< 100	5	240
TOTAL		1440.15	< 1500	60	1,360
AVG.		160.02			151

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
11595.20	< 12,000	405	272,114

APPENDIX B

BEST 12.B SPREADSHEET FILE;

as it represents the optimal solution output file for a $12 million dollar budget and the budget allocation strategy B (high impression media generating strategy).

APPENDIX B — Best12.B, columns 1 thru 6, rows 1 thru 3 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
TELEVISION					
NET 15's	4,850	1.0	4,850	175.00	27.71
NET 30's	5,575	1.0	5,575	225.00	24.78
CAB 15's	3,335	1.0	3,335	110.00	30.32
CAB 30's	4,275	1.0	4,275	155.00	27.58
LOC 15's	545	1.0	545	30.00	18.17
LOC 30's	880	1.0	880	45.00	19.56
TOTAL	19,460		19,460	740.00	127.37
AVG.	3,243		3,243	123.33	21.23
NEWSPAPER					
FULL PG.	635	2.0	1,270	60.00	10.58
HALF PG.	425	2.0	850	47.00	9.04
6X4" PG.	165	2.0	330	22.00	7.50
8X4" PG.	190	2.0	380	28.50	6.67
4 PG. INS.	625	2.0	1,250	98.00	6.38
6 PG. INS.	630	2.0	1,260	109.50	5.75
TOTAL	2,670		5,340	365.00	45.92
AVG.	445		890	60.83	7.65
WEEK MG.					
FR COVER	1,150	3.0	345	100.00	11.50
BK COVER	905	3.0	2,715	85.00	10.65
2nd PAGE	775	3.0	2,325	70.00	11.07
3rd PAGE	745	3.0	2,235	60.00	12.42
EXT. FLAP	950	1.0	950	85.00	11.18
TWO PAGE	865	2.0	1,730	75.00	11.53
ONE PAGE	610	2.0	1,220	55.00	11.09
TOTAL	6,000		14,625	530.00	79.44
AVG.	857		2,089	75.71	11.35

APPENDIX B — Best12.B, columns 7 thru 12, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
TELEVISION					
NET 15's	14.29	2500.00	< 2500	0	69,286
NET 30's	0.00	0.00	< 2500	2,500	0
CAB 15's	22.73	2500.00	< 2500	0	75,795
CAB 30's	6.45	1000.00	< 2500	1,500	27,581
LOC 15's	0.00	0.00	< 1000	1,000	0
LOC 30's	0.00	0.00	< 1000	1,000	0
TOTAL		6000.00	< 6000	0	172,662
AVG.		1000.00			28,777
NEWSPAPER					
FULL PG.	8.33	500.00	< 500	0	10,583
HALF PG.	10.64	500.00	< 500	0	9,043
6X4" PG.	22.73	500.00	< 500	0	7,500
8X4" PG.	10.53	300.00	< 500	200	4,000
4 PG. INS.	0.00	0.00	< 500	500	0
6 PG. INS.	0.00	0.00	< 500	500	0
TOTAL		1800.00	< 1800	0	31,126
AVG.		300.00			5,188
WEEK MG.					
FR COVER	5.00	500.00	< 500	0	17,250
BK COVER	0.00	0.00	< 500	500	0
2nd PAGE	2.86	200.00	< 500	300	6,643
3rd PAGE	8.33	500.00	< 500	0	18,625
EXT. FLAP	0.00	0.00	< 500	500	0
TWO PAGE	0.00	0.00	< 500	500	0
ONE PAGE	0.00	0.00	< 500	500	0
TOTAL		1200.00	< 1200	0	42,518
AVG.		171.43			6,074

APPENDIX B — Best12.B, columns 13 thru18, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
TELEVISION					
NET 15's	14	2450.00	< 2500	50	67,900
NET 30's	0	0.00	< 2500	2,500	0
CAB 15's	23	2420.00	< 2500	80	73,370
CAB 30's	6	930.00	< 2500	1,570	25,650
LOC 15's	0	0.00	< 1000	1,000	0
LOC 30's	0	0.00	< 1000	1,000	0
TOTAL		5800.00	< 6000	0	166,920
AVG.		966.67			27,820
NEWSPAPER					
FULL PG.	8	480.00	< 500	20	10,160
HALF PG.	10	470.00	< 500	30	8,500
6X4" PG.	22	484.00	< 500	16	7,260
8X4" PG.	10	285.00	< 500	215	3,800
4 PG. INS.	0	0.00	< 500	500	0
6 PG. INS.	0	0.00	< 500	500	0
TOTAL		1719.00	< 1800	81	29,720
AVG.		286.50			4,953
WEEK MG.					
FR COVER	5	500.00	< 500	0	17,250
BK COVER	0	0.00	< 500	500	0
2nd PAGE	3	210.00	< 500	290	6,975
3rd PAGE	8	480.00	< 500	20	17,880
EXT. FLAP	0	0.00	< 500	500	0
TWO PAGE	0	0.00	< 500	500	0
ONE PAGE	0	0.00	< 500	500	0
TOTAL		1190.00	< 1200	10	42,105
AVG.		170.00			6,015

APPENDIX B — Best12.B, columns 1 thru 6, rows 4 thru 6 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
MNTH. MG.					
FR COVER	1,005	3.0	3,015	115.00	8.74
BK COVER	885	3.0	2,655	98.00	9.03
2nd PAGE	665	3.0	1,995	77.00	8.64
3rd PAGE	580	3.0	1,740	68.00	8.53
EXT.FLAP	825	1.0	845	95.00	8.68
TWO PAGE	605	2.0	1,210	75.00	8.07
ONE PAGE	535	2.0	1,070	38.50	13.90
TOTAL	5,100		12,510	566.50	65.58
AVG.	729		1,787	80.93	9.37
BUSN. MG.					
FR COVER	775	2.0	1,550	92.00	8.42
BK COVER	725	2.0	1,450	83.00	8.73
2nd PAGE	665	2.0	1,330	78.00	8.53
3rd PAGE	660	2.0	1,320	72.00	9.17
TWO PAGE	685	2.0	1,370	58.50	11.71
ONE PAGE	595	2.0	1,190	33.00	18.03
TOTAL	4,105		8,210	416.50	64.59
AVG.	684		1,368	69.42	10.77
CONS. MG.					
FR COVER	445	2.0	890	82.00	5.43
BK COVER	400	2.0	800	76.50	5.23
TWO PAGE	355	2.0	710	34.00	10.44
ONE PAGE	310	2.0	620	18.50	16.76
4PG. INS.	380	2.0	760	65.00	5.85
TOTAL	1,890		3,780	276.00	43.70
AVG.	378		756	55.20	8.74

APPENDIX B — Best12.B, columns 7 thru 12, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
MNTH. MG.					
FR COVER	0.00	0.00	< 500	500	0
BK COVER	0.00	0.00	< 500	500	0
2nd PAGE	0.00	0.00	< 500	500	0
3rd PAGE	0.00	0.00	< 500	500	0
EXT.FLAP	0.00	0.00	< 500	500	0
TWO PAGE	0.00	0.00	< 500	500	0
ONE PAGE	5.19	200.00	< 500	300	5,558
TOTAL		200.00	< 1200	1,000	5,558
AVG.		28.57			794
BUSN. MG.					
FR COVER	0.00	0.00	< 500	500	0
BK COVER	0.00	0.00	< 500	500	0
2nd PAGE	0.00	0.00	< 500	500	0
3rd PAGE	0.00	0.00	< 500	500	0
TWO PAGE	0.00	0.00	< 500	300	0
ONE PAGE	15.15	500.00	< 500	0	18,030
TOTAL		500.00	< 1200	700	18,030
AVG.		83.33			3,005
CONS. MG.					
FR COVER	0.00	0.00	< 500	500	0
BK COVER	0.00	0.00	< 500	500	0
TWO PAGE	0.00	0.00	< 500	500	0
ONE PAGE	27.03	500.00	< 500	0	16,757
4PG. INS.	0.00	0.00	< 500	500	0
TOTAL		500.00	< 1200	700	16,757
AVG.		100.00			3,351

APPENDIX B — Best12.B, columns 13 thru18, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL RECALC. IMPRSS.
MNTH. MG.					
FR COVER	0	0.00	< 500	500	0
BK COVER	0	0.00	< 500	500	0
2nd PAGE	0	0.00	< 500	500	0
3rd PAGE	0	0.00	< 500	500	0
EXT.FLAP	0	0.00	< 500	500	0
TWO PAGE	0	0.00	< 500	500	0
ONE PAGE	5	192.50	< 500	308	5,350
TOTAL		192.50	< 1200	1,008	5,350
AVG.		27.50			764
BUSN. MG.					
FR COVER	0	0.00	< 500	500	0
BK COVER	0	0.00	< 500	500	0
2nd PAGE	0	0.00	< 500	500	0
3rd PAGE	0	0.00	< 500	500	0
TWO PAGE	0	0.00	< 500	300	0
ONE PAGE	15	495.00	< 500	5	17,850
TOTAL		495.00	< 1200	705	17,850
AVG.		82.50			2,975
CONS. MG.					
FR COVER	0	0.00	< 500	500	0
BK COVER	0	0.00	< 500	500	0
TWO PAGE	0	0.00	< 500	500	0
ONE PAGE	27	499.50	< 500	1	16,740
4PG. INS.	0	0.00	< 500	500	0
TOTAL		499.50	< 1200	701	16,740
AVG.		99.90			3,348

APPENDIX B— Best12.B, columns 1 thru 6, rows 7 thru10 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
RADIO					
SPOT 15's	58	4.0	232	18.00	3.22
SPOT 30's	73	4.0	292	32.50	2.25
SP. NEWS	44	6.0	264	9.00	4.89
SP. REPORT	28	6.0	168	12.75	2.20
TOTAL	203		956	72.25	12.55
AVG.	51		239	18.06	3.14
OUTDOOR					
6M LEASE					
12X25	6	3.0	18	2.10	2.86
14X48	12	5.0	60	3.15	3.81
ROTARY PLAN					
12X25	12	3.0	36	15.60	0.77
14X48	18	5.0	90	17.40	1.03
TOTAL	48		204	38.25	6.47
AVG.	12		51	9.56	2.12
TRANSIT					
BUS CARD	45	4.0	180	22.25	2.02
POSTERS	65	2.0	130	36.50	1.78
TOTAL	110		310	58.75	3.80
AVG.	55		155	29.38	1.90
DIRECT MAIL					
LEAFLETS	5	1.0	5	0.60	8.33
BROCHURE	25	3.0	75	55.75	0.45
NEWSLETTER	12	1.0	12	2.25	5.33
TOTAL	42		92	58.60	14.12
AVG.	14		31	19.53	4.71

APPENDIX B — Best12.B, columns 7 thru 12, rows 7 thru 10 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
RADIO					
SPOT 15's	8.33	150.00	< 150	0	1,933
SPOT 30's	4.62	150.00	< 150	0	1,348
SP. NEWS	16.67	150.00	< 150	0	4,400
SP. REPORT	11.76	150.00	< 150	0	1,976
TOTAL		600.00	< 1800	1,200	9,657
AVG.		150.00			2,414
OUTDOOR					
6M LEASE					
12X25	0.00	0.00	< 500	500	0
14X48	142.86	450.00	< 500	50	8,571
ROTARY PLAN					
12X25	0.00	0.00	< 500	500	0
14X48	0.00	0.00	< 500	500	0
TOTAL		450.00	< 450	0	8,571
AVG.		112.50			2,143
TRANSIT					
BUS CARD	4.49	100.00	< 600	500	809
POSTERS	0.00	0.00	< 600	600	0
TOTAL		100.00	< 450	350	809
AVG.		50.00			405
DIRECT MAIL					
LEAFLETS	83.33	50.00	< 50	0	417
BROCHURE	0.00	0.00	< 600	600	0
NEWSLETTER	0.00	0.00	< 50	50	0
TOTAL		50.00	< 450	400	417
AVG.		16.67			139

APPENDIX B — Best12.B, columns13 thru18, rows 7 thru10 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL RECALC. IMPRSS.
RADIO					
SPOT 15's	8	144.00	< 150	6	1,856
SPOT 30's	4	130.00	< 150	20	1,168
SP. NEWS	16	144.00	< 150	6	4,224
SP. REPORT	11	140.25	< 150	10	1,848
TOTAL		558.25	< 1800	1,242	9,096
AVG.		139.56			2,274
OUTDOOR					
6M LEASE					
12X25	0	0.00	< 500	500	0
14X48	143	450.45	< 500	50	8,580
ROTARY PLAN					
12X25	0	0.00	< 500	500	0
14X48	0	0.00	< 500	500	0
TOTAL		450.45	< 450	0	8,580
AVG.		112.61			2,145
TRANSIT					
BUS CARD	4	89.00	< 600	511	720
POSTERS	0	0.00	< 600	600	0
TOTAL		89.00	< 450	361	720
AVG.		44.50			360
DIRECT MAIL					
LEAFLETS	83	49.80	< 50	0	415
BROCHURE	0	0.00	< 600	600	0
NEWSLETTER	0	0.00	< 50	50	0
TOTAL		49.80	< 450	400	415
AVG.		16.60			138

APPENDIX B— Best12.B, columns 1 thru 6, row 11 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
SPECIAL MEDIA					
DIRECTORY	100	2.0	200	520.00	0.19
CATALOGUE	20	1.0	20	11.50	1.74
BANNERS	1	1.0	1	11.85	0.08
MAPS	25	2.0	50	88.75	0.28
IMPRINTS					
T-SHIRTS	1	4.0	4	5.00	0.20
B. STICK	5	2.0	10	3.70	1.35
POSTERS	5	2.0	10	10.00	0.50
MENUS	1	1.0	1	4.35	0.23
KEYS	24	1.0	24	9.50	2.53
TOTAL	232		722	719.65	7.11
AVG.	26		80	79.96	0.79

APPENDIX B— Best12.B, columns 7 thru 12, row 11 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0.00	0.00	< 2400	2,400	0
CATALOGUE	6.96	80.00	< 80	0	139
BANNERS	0.00	0.00	< 80	80	0
MAPS	1.35	120.00	< 1200	1,080	68
IMPRINTS					
T-SHIRTS	20.00	100.00	< 100	0	80
B. STICK	27.03	100.00	< 100	0	270
POSTERS	10.00	100.00	< 100	0	100
MENUS	0.00	0.00	< 100	100	0
KEYS	10.53	100.00	< 100	0	253
TOTAL		600.00	< 600	0	910
AVG.		66.67			101

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
12000.00	< 12,000	0	307,015

APPENDIX B — Best12.B, columns 13 thru 18, row 11 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0	0.00	< 2400	2,400	0
CATALOGUE	6	69.00	< 80	11	120
BANNERS	0	0.00	< 80	80	0
MAPS	1	88.75	< 1200	1,111	50
IMPRINTS					
T-SHIRTS	20	100.00	< 100	0	80
B. STICK	27	99.90	< 100	0	270
POSTERS	10	100.00	< 100	0	100
MENUS	0	0.00	< 100	100	0
KEYS	10	95.00	< 100	5	240
TOTAL		552.65	< 600	47	860
AVG.		61.41			96

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
11596.15	< 12,000	404	298,356

APPENDIX C

BEST 12.C SPREADSHEET FILE;

as it represents the optimal solution output file for a $12 million dollar budget and the budget allocation strategy C (low impression media generating strategy).

APPENDIX C — Best12.C, columns 1 thru 6, rows 1 thru 3 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
TELEVISION					
NET 15's	4,850	1.0	4,850	175.00	27.71
NET 30's	5,575	1.0	5,575	225.00	24.78
CAB 15's	3,335	1.0	3,335	110.00	30.32
CAB 30's	4,275	1.0	4,275	155.00	27.58
LOC 15's	545	1.0	545	30.00	18.17
LOC 30's	880	1.0	880	45.00	19.56
TOTAL	19,460		19,460	740.00	127.37
AVG.	3,243		3,243	123.33	21.23
NEWSPAPER					
FULL PG.	635	2.0	1,270	60.00	10.58
HALF PG.	425	2.0	850	47.00	9.04
6X4" PG.	165	2.0	330	22.00	7.50
8X4" PG.	190	2.0	380	28.50	6.67
4 PG. INS.	625	2.0	1,250	98.00	6.38
6 PG. INS.	630	2.0	1,260	109.50	5.75
TOTAL	2,670		5,340	365.00	45.92
AVG.	445		890	60.83	7.65
WEEK MG.					
FR COVER	1,150	3.0	345	100.00	11.50
BK COVER	905	3.0	2,715	85.00	10.65
2nd PAGE	775	3.0	2,325	70.00	11.07
3rd PAGE	745	3.0	2,235	60.00	12.42
EXT. FLAP	950	1.0	950	85.00	11.18
TWO PAGE	865	2.0	1,730	75.00	11.53
ONE PAGE	610	2.0	1,220	55.00	11.09
TOTAL	6,000		14,625	530.00	79.44
AVG.	857		2,089	75.71	11.35

APPENDIX C — Best12.C, columns 7 thru 12, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
TELEVISION					
NET 15's	0.00	0.00	< 2500	2,500	0
NET 30's	0.00	0.00	< 2500	2,500	0
CAB 15's	10.91	1200.00	< 2500	1,300	36,382
CAB 30's	0.00	0.00	< 2500	1,500	0
LOC 15's	0.00	0.00	< 1000	1,000	0
LOC 30's	0.00	0.00	< 1000	1,000	0
TOTAL		1200.00	< 1200	0	36,382
AVG.		200.00			6,064
NEWSPAPER					
FULL PG.	8.33	500.00	< 500	0	10,583
HALF PG.	8.51	400.00	< 500	100	7,234
6X4" PG.	0.00	0.00	< 500	500	0
8X4" PG.	0.00	0.00	< 500	500	0
4 PG. INS.	0.00	0.00	< 500	500	0
6 PG. INS.	0.00	0.00	< 500	500	0
TOTAL		900.00	< 900	0	17,817
AVG.		150.00			2,970
WEEK MG.					
FR COVER	5.00	500.00	< 500	0	17,250
BK COVER	3.53	300.00	< 500	200	9,582
2nd PAGE	7.14	500.00	< 500	0	16,607
3rd PAGE	8.33	500.00	< 500	0	18,625
EXT. FLAP	0.00	0.00	< 500	500	0
TWO PAGE	0.00	0.00	< 500	500	0
ONE PAGE	0.00	0.00	< 500	500	0
TOTAL		1800.00	< 1800	0	62,064
AVG.		257.14			8,866

APPENDIX C— Best12.C, columns 13 thru 18, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
TELEVISION					
NET 15's	0	0.00	< 2500	2,500	0
NET 30's	0	0.00	< 2500	2,500	0
CAB 15's	11	1210.00	< 2500	1,290	36,385
CAB 30's	0	0.00	< 2500	1,500	0
LOC 15's	0	0.00	< 1000	1,000	0
LOC 30's	0	0.00	< 1000	1,000	0
TOTAL		1210.00	< 1200	-10	36,385
AVG.		201.67			6,064
NEWSPAPER					
FULL PG.	8	480.00	< 500	20	10,160
HALF PG.	8	376.00	< 500	124	6,800
6X4" PG.	0	0.00	< 500	500	0
8X4" PG.	0	0.00	< 500	500	0
4 PG. INS.	0	0.00	< 500	500	0
6 PG. INS.	0	0.00	< 500	500	0
TOTAL		856.00	< 900	44	16,960
AVG.		142.67			2,827
WEEK MG.					
FR COVER	5	500.00	< 500	0	17,250
BK COVER	3	255.00	< 500	245	8,145
2nd PAGE	7	490.00	< 500	10	16,275
3rd PAGE	8	480.00	< 500	20	17,880
EXT. FLAP	0	0.00	< 500	500	0
TWO PAGE	0	0.00	< 500	500	0
ONE PAGE	0	0.00	< 500	500	0
TOTAL		1725.00	< 1800	75	59,550
AVG.		246.43			8,507

APPENDIX C— Best12.C, columns 1 thru 6, rows 4 thru 6 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
MNTH. MG.					
FR COVER	1,005	3.0	3,015	115.00	8.74
BK COVER	885	3.0	2,655	98.00	9.03
2nd PAGE	665	3.0	1,995	77.00	8.64
3rd PAGE	580	3.0	1,740	68.00	8.53
EXT.FLAP	825	1.0	845	95.00	8.68
TWO PAGE	605	2.0	1,210	75.00	8.07
ONE PAGE	535	2.0	1,070	38.50	13.90
TOTAL	5,100		12,510	566.50	65.58
AVG.	729		1,787	80.93	9.37
BUSN. MG.					
FR COVER	775	2.0	1,550	92.00	8.42
BK COVER	725	2.0	1,450	83.00	8.73
2nd PAGE	665	2.0	1,330	78.00	8.53
3rd PAGE	660	2.0	1,320	72.00	9.17
TWO PAGE	685	2.0	1,370	58.50	11.71
ONE PAGE	595	2.0	1,190	33.00	18.03
TOTAL	4,105		8,210	416.50	64.59
AVG.	684		1,368	69.42	10.77
CONS. MG.					
FR COVER	445	2.0	890	82.00	5.43
BK COVER	400	2.0	800	76.50	5.23
TWO PAGE	355	2.0	710	34.00	10.44
ONE PAGE	310	2.0	620	18.50	16.76
4PG. INS.	380	2.0	760	65.00	5.85
TOTAL	1,890		3,780	276.00	43.70
AVG.	378		756	55.20	8.74

APPENDIX C — Best12.C, columns 7 thru 12, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
MNTH. MG.					
FR COVER	0.00	0.00	< 500	500	0
BK COVER	3.06	300.00	< 500	200	8,128
2nd PAGE	0.00	0.00	< 500	500	0
3rd PAGE	0.00	0.00	< 500	500	0
EXT.FLAP	0.00	0.00	< 500	500	0
TWO PAGE	0.00	0.00	< 500	500	0
ONE PAGE	12.99	500.00	< 500	0	13,896
TOTAL		800.00	< 1800	1,000	22,024
AVG.		114.29			3,146
BUSN. MG.					
FR COVER	0.00	0.00	< 500	500	0
BK COVER	0.00	0.00	< 500	500	0
2nd PAGE	0.00	0.00	< 500	500	0
3rd PAGE	0.00	0.00	< 500	500	0
TWO PAGE	0.00	0.00	< 500	300	0
ONE PAGE	15.15	500.00	< 500	0	18,030
TOTAL		500.00	< 1800	1,300	18,030
AVG.		83.33			3,005
CONS. MG.					
FR COVER	0.00	0.00	< 500	500	0
BK COVER	0.00	0.00	< 500	500	0
TWO PAGE	0.00	0.00	< 500	500	0
ONE PAGE	27.03	500.00	< 500	0	16,757
4PG. INS.	0.00	0.00	< 500	500	0
TOTAL		500.00	< 1800	1,300	16,757
AVG.		100.00			3,351

APPENDIX C— Best12.C, columns 13 thru 18, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
MNTH. MG.					
FR COVER	0	0.00	< 500	500	0
BK COVER	3	294.00	< 500	206	7,965
2nd PAGE	0	0.00	< 500	500	0
3rd PAGE	0	0.00	< 500	500	0
EXT.FLAP	0	0.00	< 500	500	0
TWO PAGE	0	0.00	< 500	500	0
ONE PAGE	12	462.00	< 500	38	12,840
TOTAL		756.00	< 1800	1,044	20,805
AVG.		108.00			2,972
BUSN. MG.					
FR COVER	0	0.00	< 500	500	0
BK COVER	0	0.00	< 500	500	0
2nd PAGE	0	0.00	< 500	500	0
3rd PAGE	0	0.00	< 500	500	0
TWO PAGE	0	0.00	< 500	300	0
ONE PAGE	15	495.00	< 500	5	17,850
TOTAL		495.00	< 1800	1,305	17,850
AVG.		82.50			2,975
CONS. MG.					
FR COVER	0	0.00	< 500	500	0
BK COVER	0	0.00	< 500	500	0
TWO PAGE	0	0.00	< 500	500	0
ONE PAGE	27	499.50	< 500	1	16,740
4PG. INS.	0	0.00	< 500	500	0
TOTAL		499.50	< 1800	1,301	16,740
AVG.		99.90			3,348

APPENDIX C — Best12.C, columns 1 thru 6, rows 7 thru 10 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
RADIO					
SPOT 15's	58	4.0	232	18.00	3.22
SPOT 30's	73	4.0	292	32.50	2.25
SP. NEWS	44	6.0	264	9.00	4.89
SP. REPORT	28	6.0	168	12.75	2.20
TOTAL	203		956	72.25	12.55
AVG.	51		239	18.06	3.14
OUTDOOR					
6M LEASE					
12X25	6	3.0	18	2.10	2.86
14X48	12	5.0	60	3.15	3.81
ROTARY PLAN					
12X25	12	3.0	36	15.60	0.77
14X48	18	5.0	90	17.40	1.03
TOTAL	48		204	38.25	6.47
AVG.	12		51	9.56	2.12
TRANSIT					
BUS CARD	45	4.0	180	22.25	2.02
POSTERS	65	2.0	130	36.50	1.78
TOTAL	110		310	58.75	3.80
AVG.	55		155	29.38	1.90
DIRECT MAIL					
LEAFLETS	5	1.0	5	0.60	8.33
BROCHURE	25	3.0	75	55.75	0.45
NEWSLETTER	12	1.0	12	2.25	5.33
TOTAL	42		92	58.60	14.12
AVG.	14		31	19.53	4.71

APPENDIX C — Best12.C, columns 7 thru 12, rows 7 thru 10 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
RADIO					
SPOT 15's	0.00	0.00	< 150	150	0
SPOT 30's	0.00	0.00	< 150	150	0
SP. NEWS	16.67	150.00	< 150	0	4,400
SP. REPORT	11.76	150.00	< 150	0	1,976
TOTAL		300.00	< 900	600	6,376
AVG.		75.00			1,594
OUTDOOR					
6M LEASE					
12X25	238.10	500.00	< 500	0	4,286
14X48	158.73	500.00	< 500	0	9,524
ROTARY PLAN					
12X25	12.82	200.00	< 500	300	462
14X48	28.74	500.00	< 500	0	2,586
TOTAL		1700.00	< 2250	550	16,858
AVG.		425.00			4,215
TRANSIT					
BUS CARD	26.97	600.00	< 600	0	4,854
POSTERS	16.44	600.00	< 600	0	2,137
TOTAL		1200.00	< 2250	1,050	6,991
AVG.		600.00			3,496
DIRECT MAIL					
LEAFLETS	83.33	50.00	< 50	0	417
BROCHURE	0.00	0.00	< 600	600	0
NEWSLETTER	22.22	50.00	< 50	0	267
TOTAL		100.00	< 2250	2,150	684
AVG.		33.33			228

APPENDIX C — Best12.C, columns13 thru18, rows 7 thru 10 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL RECALC. IMPRSS.
RADIO					
SPOT 15's	0	0.00	< 150	150	0
SPOT 30's	0	0.00	< 150	150	0
SP. NEWS	16	144.50	< 150	6	4,224
SP. REPORT	11	140.25	< 150	10	1,848
TOTAL		284.75	< 900	616	6,072
AVG.		71.19			1,518
OUTDOOR					
6M LEASE					
12X25	238	499.80	< 500	0	4,284
14X48	159	497.70	< 500	2	9,480
ROTARY PLAN					
12X25	13	202.80	< 500	297	468
14X48	28	487.20	< 500	13	2,520
TOTAL		1687.50	< 2250	563	16,752
AVG.		421.88			4,188
TRANSIT					
BUS CARD	26	578.50	< 600	22	4,680
POSTERS	16	584.00	< 600	16	2,080
TOTAL		1162.50	< 2250	1,088	6,760
AVG.		581.25			3,380
DIRECT MAIL					
LEAFLETS	83	49.80	< 50	0	415
BROCHURE	0	0.00	< 600	600	0
NEWSLETTER	22	49.50	< 50	1	264
TOTAL		99.30	< 2250	2,152	679
AVG.		33.10			226

APPENDIX C — Best12.C, columns 1 thru 6, row 11 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
SPECIAL MEDIA					
DIRECTORY	100	2.0	200	520.00	0.19
CATALOGUE	20	1.0	20	11.50	1.74
BANNERS	1	1.0	1	11.85	0.08
MAPS	25	2.0	50	88.75	0.28
IMPRINTS					
T-SHIRTS	1	4.0	4	5.00	0.20
B. STICK	5	2.0	10	3.70	1.35
POSTERS	5	2.0	10	10.00	0.50
MENUS	1	1.0	1	4.35	0.23
KEYS	24	1.0	24	9.50	2.53
TOTAL	232		722	719.65	7.11
AVG.	26		80	79.96	0.79

APPENDIX C — Best12.C, columns 7 thru 12, row 11 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
SPECIAL MEDIA					
DIRECTORY	2.54	1320.00	< 2400	1,080	508
CATALOGUE	6.96	80.00	< 80	0	139
BANNERS	0.00	0.00	< 80	80	0
MAPS	13.52	1200.00	< 1200	0	676
IMPRINTS					
T-SHIRTS	20.00	100.00	< 100	0	80
B. STICK	27.03	100.00	< 100	0	270
POSTERS	10.00	100.00	< 100	0	100
MENUS	0.00	0.00	< 100	100	0
KEYS	10.53	100.00	< 100	0	253
TOTAL		3000.00	< 3000	0	2,026
AVG.		333.33			225

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
12000.00	< 12,000	0	206,008

APPENDIX C — Best12.C, columns 13 thru 18, row 11 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL RECALC. IMPRSS.
SPECIAL MEDIA					
DIRECTORY	2	1040.00	< 2400	1,360	400
CATALOGUE	6	69.00	< 80	11	120
BANNERS	0	0.00	< 80	80	0
MAPS	13	1153.75	< 1200	46	650
IMPRINTS					
T-SHIRTS	20	100.00	< 100	0	80
B. STICK	27	99.90	< 100	0	270
POSTERS	10	100.00	< 100	0	100
MENUS	0	0.00	< 100	100	0
KEYS	11	95.00	< 100	5	240
TOTAL		2657.65	< 3000	342	1,860
AVG.		295.29			207

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
11432.70	< 12,000	567	200,713

APPENDIX D

BEST 5.A SPREADSHEET FILE;

as it represents the optimal solution output file for a $5 million dollar budget and the budget allocation strategy A (mixed media strategy).

APPENDIX D. — Best5.A, columns 1 thru 6, rows 1 thru 3 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
TELEVISION					
NET 15's	4,850	1.0	4,850	175.00	27.71
NET 30's	5,575	1.0	5,575	225.00	24.78
CAB 15's	3,335	1.0	3,335	110.00	30.32
CAB 30's	4,275	1.0	4,275	155.00	27.58
LOC 15's	545	1.0	545	30.00	18.17
LOC 30's	880	1.0	880	45.00	19.56
TOTAL	19,460		19,460	740.00	127.37
AVG.	3,243		3,243	123.33	21.23
NEWSPAPER					
FULL PG.	635	2.0	1,270	60.00	10.58
HALF PG.	425	2.0	850	47.00	9.04
6X4" PG.	165	2.0	330	22.00	7.50
8X4" PG.	190	2.0	380	28.50	6.67
4 PG. INS.	625	2.0	1,250	98.00	6.38
6 PG. INS.	630	2.0	1,260	109.50	5.75
TOTAL	2,670		5,340	365.00	45.92
AVG.	445		890	60.83	7.65
WEEK MG.					
FR COVER	1,150	3.0	345	100.00	11.50
BK COVER	905	3.0	2,715	85.00	10.65
2nd PAGE	775	3.0	2,325	70.00	11.07
3rd PAGE	745	3.0	2,235	60.00	12.42
EXT. FLAP	950	1.0	950	85.00	11.18
TWO PAGE	865	2.0	1,730	75.00	11.53
ONE PAGE	610	2.0	1,220	55.00	11.09
TOTAL	6,000		14,625	530.00	79.44
AVG.	857		2,089	75.71	11.35

APPENDIX D. — Best5.A, columns 7 thru 12, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
TELEVISION					
NET 15's	0.00	250.00	< 2500	2,500	0
NET 30's	0.00	0.00	< 2500	2,500	0
CAB 15's	11.36	1250.00	< 2500	1,250	37,898
CAB 30's	0.00	0.00	< 2500	2,500	0
LOC 15's	0.00	0.00	< 1000	1,000	0
LOC 30's	0.00	0.00	< 1000	1,000	0
TOTAL		1250.00	< 1250	0	37,898
AVG.		208.33			6,316
NEWSPAPER					
FULL PG.	7.81	468.75	< 500	31	9,922
HALF PG.	0.00	0.00	< 500	500	0
6X4" PG.	0.00	0.00	< 500	500	0
8X4" PG.	0.00	0.00	< 500	500	0
4 PG. INS.	0.00	0.00	< 500	500	0
6 PG. INS.	0.00	0.00	< 500	500	0
TOTAL		468.75	< 468.75	0	9,922
AVG.		78.13			1,654
WEEK MG.					
FR COVER	4.00	400.00	< 400	0	13,800
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	1.96	137.50	< 400	262	4,567
3rd PAGE	6.67	400.00	< 400	0	14,900
EXT. FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		937.50	< 937.5	0	33,267
AVG.		133.93			4,752

APPENDIX D. — Best5.A, columns13 thru18, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
TELEVISION					
NET 15's	0	0.00	< 2500	2,500	0
NET 30's	0	0.00	< 2500	2,500	0
CAB 15's	11	1210.00	< 2500	1,290	36,685
CAB 30's	0	0.00	< 2500	2,500	0
LOC 15's	0	0.00	< 1000	1,000	0
LOC 30's	0	0.00	< 1000	1,000	0
TOTAL		1210.00	< 1250	40	36,685
AVG.		201.67			6,114
NEWSPAPER					
FULL PG.	8	480.00	< 500	20	10,160
HALF PG.	0	0.00	< 500	500	0
6X4" PG.	0	0.00	< 500	500	0
8X4" PG.	0	0.00	< 500	500	0
4 PG. INS.	0	0.00	< 500	500	0
6 PG. INS.	0	0.00	< 500	500	0
TOTAL		480.00	< 468.75	-11	10,160
AVG.		80.00			1,693
WEEK MG.					
FR COVER	4	400.00	< 400	0	13,800
BK COVER	0	0.00	< 400	400	0
2nd PAGE	2	137.50	< 400	260	4,650
3rd PAGE	6	400.00	< 400	40	13,410
EXT. FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		900.00	< 937.5	38	31,860
AVG.		128.57			4,551

APPENDIX D. — Best5.A, columns 1 thru 6, rows 4 thru 6 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
MNTH. MG.					
FR COVER	1,005	3.0	3,015	115.00	8.74
BK COVER	885	3.0	2,655	98.00	9.03
2nd PAGE	665	3.0	1,995	77.00	8.64
3rd PAGE	580	3.0	1,740	68.00	8.53
EXT.FLAP	825	1.0	845	95.00	8.68
TWO PAGE	605	2.0	1,210	75.00	8.07
ONE PAGE	535	2.0	1,070	38.50	13.90
TOTAL	5,100		12,510	566.50	65.58
AVG.	729		1,787	80.93	9.37
BUSN. MG.					
FR COVER	775	2.0	1,550	92.00	8.42
BK COVER	725	2.0	1,450	83.00	8.73
2nd PAGE	665	2.0	1,330	78.00	8.53
3rd PAGE	660	2.0	1,320	72.00	9.17
TWO PAGE	685	2.0	1,370	58.50	11.71
ONE PAGE	595	2.0	1,190	33.00	18.03
TOTAL	4,105		8,210	416.50	64.59
AVG.	684		1,368	69.42	10.77
CONS. MG.					
FR COVER	445	2.0	890	82.00	5.43
BK COVER	400	2.0	800	76.50	5.23
TWO PAGE	355	2.0	710	34.00	10.44
ONE PAGE	310	2.0	620	18.50	16.76
4PG. INS.	380	2.0	760	65.00	5.85
TOTAL	1,890		3,780	276.00	43.70
AVG.	378		756	55.20	8.74

APPENDIX D. — Best5.A, columns 7 thru 12, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
MNTH. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
EXT.FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	3.57	137.50	< 400	262	3,821
TOTAL		137.50	< 937.5	800	3,821
AVG.		19.64			546
BUSN. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	12.12	400.00	< 400	0	14,424
TOTAL		400.00	< 937.50	538	14,424
AVG.		66.67			2,404
CONS. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	21.62	400.00	< 400	0	13,405
4PG. INS.	0.00	0.00	< 400	400	0
TOTAL		400.00	< 937.5	538	13,405
AVG.		80.00			2,681

APPENDIX D. — Best5.A, columns13 thru18, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL RECALC. IMPRSS.
MNTH. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
EXT.FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	3	115.50	< 400	285	3,210
TOTAL		115.50	< 937.5	822	3,210
AVG.		16.50			459
BUSN. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	12	396.00	< 400	0	14,280
TOTAL		396.00	< 937.50	542	14,280
AVG.		66.00			2,380
CONS. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	21	388.50	< 400	12	13,020
4PG. INS.	0	0.00	< 400	400	0
TOTAL		388.50	< 937.5	549	13,020
AVG.		77.70			2,604

APPENDIX D. — Best5.A, columns 1 thru 6, rows 7 thru10 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
RADIO					
SPOT 15's	58	4.0	232	18.00	3.22
SPOT 30's	73	4.0	292	32.50	2.25
SP. NEWS	44	6.0	264	9.00	4.89
SP. REPORT	28	6.0	168	12.75	2.20
TOTAL	203		956	72.25	12.55
AVG.	51		239	18.06	3.14
OUTDOOR					
6M LEASE					
12X25	6	3.0	18	2.10	2.86
14X48	12	5.0	60	3.15	3.81
ROTARY PLAN					
12X25	12	3.0	36	15.60	0.77
14X48	18	5.0	90	17.40	1.03
TOTAL	48		204	38.25	6.47
AVG.	12		51	9.56	2.12
TRANSIT					
BUS CARD	45	4.0	180	22.25	2.02
POSTERS	65	2.0	130	36.50	1.78
TOTAL	110		310	58.75	3.80
AVG.	55		155	29.38	1.90
DIRECT MAIL					
LEAFLETS	5	1.0	5	0.60	8.33
BROCHURE	25	3.0	75	55.75	0.45
NEWSLETTER	12	1.0	12	2.25	5.33
TOTAL	42		92	58.60	14.12
AVG.	14		31	19.53	4.71

APPENDIX D. — Best5.A, columns 7 thru12, rows 7 thru10 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
RADIO					
SPOT 15's	0.00	0.00	< 150	150	0
SPOT 30's	0.00	0.00	< 150	150	0
SP. NEWS	16.67	100.00	< 150	0	4,400
SP. REPORT	0.49	6.25	< 150	144	82
TOTAL		156.25	< 468.75	312	4,482
AVG.		39.06			1,121
OUTDOOR					
6M LEASE					
12X25	95.24	200.00	< 200	0	1,714
14X48	63.49	200.00	< 200	0	3,810
ROTARY PLAN					
12X25	0.00	0.00	< 200	200	0
14X48	0.00	0.00	< 200	200	0
TOTAL		400.00	< 468.75	69	5,524
AVG.		100.00			1,381
TRANSIT					
BUS CARD	9.44	210.00	< 300	90	1,699
POSTERS	0.00	0.00	< 300	300	0
TOTAL		210.00	< 468.75	259	1,699
AVG.		105.00			849
DIRECT MAIL					
LEAFLETS	25.00	15.00	< 15	0	125
BROCHURE	0.00	0.00	< 200	200	0
NEWSLETTER	0.00	0.00	< 15	15	0
TOTAL		15.00	< 468.75	454	125
AVG.		5.00			42

APPENDIX D. — Best5.A, columns13 thru18, rows7 thru10 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL RECALC. IMPRSS.
RADIO					
SPOT 15's	0	0.00	< 150	150	0
SPOT 30's	0	0.00	< 150	150	0
SP. NEWS	16	144.00	< 150	6	4,224
SP. REPORT	0	0.00	< 150	150	0
TOTAL		144.00	< 468.75	325	4,224
AVG.		36.00			1,056
OUTDOOR					
6M LEASE					
12X25	95	199.50	< 200	1	1,710
14X48	63	198.45	< 200	2	3,780
ROTARY PLAN					
12X25	0	50.00	< 200	200	0
14X48	0	50.00	< 200	200	0
TOTAL		397.95	< 468.75	71	5,490
AVG.		99.49			1,373
TRANSIT					
BUS CARD	9	200.25	< 300	100	1,620
POSTERS	0	0.00	< 300	300	0
TOTAL		200.25	< 468.75	269	1,620
AVG.		100.13			810
DIRECT MAIL					
LEAFLETS	25	15.00	< 15	0	125
BROCHURE	0	0.00	< 200	200	0
NEWSLETTER	0	0.00	< 15	15	0
TOTAL		15.00	< 468.75	454	125
AVG.		5.00			42

APPENDIX D. — Best5.A, columns 1 thru 6, row11 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
SPECIAL MEDIA					
DIRECTORY	100	3.0	300	520.00	0.19
CATALOGUE	20	3.0	60	11.50	1.74
BANNERS	1	1.0	1	11.85	0.08
MAPS	75	4.0	300	143.75	0.52
IMPRINTS					
T-SHIRTS	1	6.0	6	5.00	0.20
B. STICK	5	4.0	20	3.70	1.35
POSTERS	5	2.0	10	10.00	0.50
MENUS	1	1.0	1	4.35	0.23
KEYS	24	1.0	24	9.50	2.53
TOTAL	232		722	719.65	7.35
AVG.	26		80	79.96	0.82

APPENDIX D. — Best5.A, columns 7 thru 12, row11 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0.00	0.00	< 1200	1,200	0
CATALOGUE	3.48	40.00	< 40	0	70
BANNERS	0.00	0.00	< 40	40	0
MAPS	5.24	465.00	< 600	135	262
IMPRINTS					
T-SHIRTS	6.00	30.00	< 30	0	24
B. STICK	8.11	30.00	< 30	0	81
POSTERS	3.00	30.00	< 30	0	30
MENUS	0.00	0.00	< 30	30	0
KEYS	3.16	30.00	< 30	0	76
TOTAL		625.00	< 625	0	542
AVG.		69.44			60

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
5000.00	< 5,000	0	125,110

APPENDIX D. — Best5.A, columns13 thru18, row11 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL RECALC. IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0	0.00	< 1200	1,200	0
CATALOGUE	3	34.50	< 40	6	60
BANNERS	0	0.00	< 40	40	0
MAPS	5	443.75	< 600	156	250
IMPRINTS					
T-SHIRTS	6	30.00	< 30	0	24
B. STICK	8	29.60	< 30	0	80
POSTERS	3	30.00	< 30	0	30
MENUS	0	0.00	< 30	30	0
KEYS	3	28.50	< 30	2	72
TOTAL		596.35	< 625	29	516
AVG.		69.44			57

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
4843.55	< 5,000	156	121,190

APPENDIX E

BEST 5.B SPREADSHEET FILE;

as it represents the optimal solution output file for a $5 million dollar budget and the budget allocation strategy B (high impression media generating strategy).

APPENDIX E. — Best5.B, columns 1 thru 6, rows 1 thru 3 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
TELEVISION					
NET 15's	4,850	1.0	4,850	175.00	27.71
NET 30's	5,575	1.0	5,575	225.00	24.78
CAB 15's	3,335	1.0	3,335	110.00	30.32
CAB 30's	4,275	1.0	4,275	155.00	27.58
LOC 15's	545	1.0	545	30.00	18.17
LOC 30's	880	1.0	880	45.00	19.56
TOTAL	19,460		19,460	740.00	127.37
AVG.	3,243		3,243	123.33	21.23
NEWSPAPER					
FULL PG.	635	2.0	1,270	60.00	10.58
HALF PG.	425	2.0	850	47.00	9.04
6X4" PG.	165	2.0	330	22.00	7.50
8X4" PG.	190	2.0	380	28.50	6.67
4 PG. INS.	625	2.0	1,250	98.00	6.38
6 PG. INS.	630	2.0	1,260	109.50	5.75
TOTAL	2,670		5,340	365.00	45.92
AVG.	445		890	60.83	7.65
WEEK MG.					
FR COVER	1,150	3.0	345	100.00	11.50
BK COVER	905	3.0	2,715	85.00	10.65
2nd PAGE	775	3.0	2,325	70.00	11.07
3rd PAGE	745	3.0	2,235	60.00	12.42
EXT. FLAP	950	1.0	950	85.00	11.18
TWO PAGE	865	2.0	1,730	75.00	11.53
ONE PAGE	610	2.0	1,220	55.00	11.09
TOTAL	6,000		14,625	530.00	79.44
AVG.	857		2,089	75.71	11.35

APPENDIX E. — Best5.B, columns 7 thru 12, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
TELEVISION					
NET 15's	0.00	0.00	< 2500	2,500	0
NET 30's	0.00	0.00	< 2500	2,500	0
CAB 15's	22.73	2500.00	< 2500	0	75,795
CAB 30's	0.00	0.00	< 2500	2,500	0
LOC 15's	0.00	0.00	< 1000	1,000	0
LOC 30's	0.00	0.00	< 1000	1,000	0
TOTAL		2500.00	< 2500	0	75,795
AVG.		416.67			12,633
NEWSPAPER					
FULL PG.	8.33	500.00	< 500	0	10,583
HALF PG.	5.32	250.00	< 500	250	4,521
6X4" PG.	0.00	0.00	< 500	500	0
8X4" PG.	0.00	0.00	< 500	500	0
4 PG. INS.	0.00	0.00	< 500	500	0
6 PG. INS.	0.00	0.00	< 500	500	0
TOTAL		750.00	< 750	0	15,105
AVG.		125.00			2,517
WEEK MG.					
FR COVER	1.00	100.00	< 400	300	3,450
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	6.67	400.00	< 400	0	14,900
EXT. FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		500.00	< 500	0	18,350
AVG.		71.43			2,621

APPENDIX E. — Best5.B , columns13 thru18, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
TELEVISION					
NET 15's	0	0.00	< 2500	2,500	0
NET 30's	0	0.00	< 2500	2,500	0
CAB 15's	22	2420.00	< 2500	80	73,370
CAB 30's	0	0.00	< 2500	2,500	0
LOC 15's	0	0.00	< 1000	1,000	0
LOC 30's	0	0.00	< 1000	1,000	0
TOTAL		2420.00	< 2500	80	73,370
AVG.		403.33			12,228
NEWSPAPER					
FULL PG.	8	480.00	< 500	20	10,160
HALF PG.	5	235.00	< 500	265	4,250
6X4" PG.	0	0.00	< 500	500	0
8X4" PG.	0	0.00	< 500	500	0
4 PG. INS.	0	0.00	< 500	500	0
6 PG. INS.	0	0.00	< 500	500	0
TOTAL		715.00	< 750	35	14,410
AVG.		119.18			2,402
WEEK MG.					
FR COVER	1	100.00	< 400	300	3,450
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	6	360.00	< 400	40	13,410
EXT. FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		460.00	< 500	40	16,860
AVG.		65.71			2,409

APPENDIX E. — Best5.B, columns 1 thru 6, rows 4 thru 6 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
MNTH. MG.					
FR COVER	1,005	3.0	3,015	115.00	8.74
BK COVER	885	3.0	2,655	98.00	9.03
2nd PAGE	665	3.0	1,995	77.00	8.64
3rd PAGE	580	3.0	1,740	68.00	8.53
EXT.FLAP	825	1.0	845	95.00	8.68
TWO PAGE	605	2.0	1,210	75.00	8.07
ONE PAGE	535	2.0	1,070	38.50	13.90
TOTAL	5,100		12,510	566.50	65.58
AVG.	729		1,787	80.93	9.37
BUSN. MG.					
FR COVER	775	2.0	1,550	92.00	8.42
BK COVER	725	2.0	1,450	83.00	8.73
2nd PAGE	665	2.0	1,330	78.00	8.53
3rd PAGE	660	2.0	1,320	72.00	9.17
TWO PAGE	685	2.0	1,370	58.50	11.71
ONE PAGE	595	2.0	1,190	33.00	18.03
TOTAL	4,105		8,210	416.50	64.59
AVG.	684		1,368	69.42	10.77
CONS. MG.					
FR COVER	445	2.0	890	82.00	5.43
BK COVER	400	2.0	800	76.50	5.23
TWO PAGE	355	2.0	710	34.00	10.44
ONE PAGE	310	2.0	620	18.50	16.76
4PG. INS.	380	2.0	760	65.00	5.85
TOTAL	1,890		3,780	276.00	43.70
AVG.	378		756	55.20	8.74

APPENDIX E. — Best5.B, columns 7 thru 12, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
MNTH. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
EXT.FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		0.00	< 500	500	0
AVG.		0.00			0
BUSN. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	12.12	400.00	< 400	0	14,424
TOTAL		400.00	< 500	100	14,424
AVG.		66.67			2,404
CONS. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	5.41	100.00	< 400	0	3,351
4PG. INS.	0.00	0.00	< 400	400	0
TOTAL		100.00	< 500	400	3,351
AVG.		20.00			670

APPENDIX E. — Best5.B, columns13 thru18, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
MNTH. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
EXT.FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		0.00	< 500	500	0
AVG.		0.00			0
BUSN. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	12	396.00	< 400	4	14,280
TOTAL		396.00	< 500	104	14,280
AVG.		66.00			2,380
CONS. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	5	92.50	< 400	308	3,100
4PG. INS.	0	0.00	< 400	400	0
TOTAL		92.50	< 500	408	3,100
AVG.		18.50			620

APPENDIX E. — Best5.B, columns 1 thru 6, rows 7 thru10 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
RADIO					
SPOT 15's	58	4.0	232	18.00	3.22
SPOT 30's	73	4.0	292	32.50	2.25
SP. NEWS	44	6.0	264	9.00	4.89
SP. REPORT	28	6.0	168	12.75	2.20
TOTAL	203		956	72.25	12.55
AVG.	51		239	18.06	3.14
OUTDOOR					
6M LEASE					
12X25	6	3.0	18	2.10	2.86
14X48	12	5.0	60	3.15	3.81
ROTARY PLAN					
12X25	12	3.0	36	15.60	0.77
14X48	18	5.0	90	17.40	1.03
TOTAL	48		204	38.25	6.47
AVG.	12		51	9.56	2.12
TRANSIT					
BUS CARD	45	4.0	180	22.25	2.02
POSTERS	65	2.0	130	36.50	1.78
TOTAL	110		310	58.75	3.80
AVG.	55		155	29.38	1.90
DIRECT MAIL					
LEAFLETS	5	1.0	5	0.60	8.33
BROCHURE	25	3.0	75	55.75	0.45
NEWSLETTER	12	1.0	12	2.25	5.33
TOTAL	42		92	58.60	14.12
AVG.	14		31	19.53	4.71

APPENDIX E. — Best5.B, columns 7 thru12, rows 7 thru10 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
RADIO					
SPOT 15's	0.00	0.00	< 150	150	0
SPOT 30's	0.00	0.00	< 150	150	0
SP. NEWS	16.67	150.00	< 150	0	4,400
SP. REPORT	7.84	100.00	< 150	50	1,318
TOTAL		250.00	< 750	312	5,718
AVG.		62.50			1,429
OUTDOOR					
6M LEASE					
12X25	0.00	0.00	< 200	200	0
14X48	59.52	187.50	< 200	12	3,571
ROTARY PLAN					
12X25	0.00	0.00	< 200	200	0
14X48	0.00	0.00	< 200	200	0
TOTAL		187.50	< 187.5	0	3,571
AVG.		46.88			893
TRANSIT					
BUS CARD	2.13	47.50	< 300	253	384
POSTERS	0.00	0.00	< 300	300	0
TOTAL		47.50	< 187.5	140	384
AVG.		23.75			192
DIRECT MAIL					
LEAFLETS	25.00	15.00	< 15	0	125
BROCHURE	0.00	0.00	< 200	200	0
NEWSLETTER	0.00	0.00	< 15	15	0
TOTAL		15.00	< 187.5	173	125
AVG.		5.00			42

APPENDIX E. — Best5.B, columns13 thru18, rows7 thru10 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
RADIO					
SPOT 15's	0	0.00	< 150	150	0
SPOT 30's	0	0.00	< 150	150	0
SP. NEWS	16	144.00	< 150	6	4,224
SP. REPORT	8	102.00	< 150	48	1,344
TOTAL		246.00	< 750	504	5,568
AVG.		61.50			1,392
OUTDOOR					
6M LEASE					
12X25	0	0.00	< 200	200	0
14X48	59	185.85	< 200	14	3,540
ROTARY PLAN					
12X25	0	0.00	< 200	200	0
14X48	0	0.00	< 200	200	0
TOTAL		185.50	< 187.5	2	3,540
AVG.		46.46			885
TRANSIT					
BUS CARD	2	44.50	< 300	256	360
POSTERS	0	0.00	< 300	300	0
TOTAL		44.50	< 187.5	143	360
AVG.		22.25			180
DIRECT MAIL					
LEAFLETS	25	15.00	< 15	0	125
BROCHURE	0	0.00	< 200	200	0
NEWSLETTER	0	0.00	< 15	15	0
TOTAL		15.00	< 187.5	173	125
AVG.		5.00			42

APPENDIX E. — Best5.B, columns 1 thru 6, row 11 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
SPECIAL MEDIA					
DIRECTORY	100	3.0	300	520.00	0.19
CATALOGUE	20	3.0	60	11.50	1.74
BANNERS	1	1.0	1	11.85	0.08
MAPS	75	4.0	300	143.75	0.52
IMPRINTS					
T-SHIRTS	1	6.0	6	5.00	0.20
B. STICK	5	4.0	20	3.70	1.35
POSTERS	5	2.0	10	10.00	0.50
MENUS	1	1.0	1	4.35	0.23
KEYS	24	1.0	24	9.50	2.53
TOTAL	232		722	719.65	7.35
AVG.	26		80	79.96	0.82

APPENDIX E. — Best5.B, columns 7 thru 12, row11 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0.00	0.00	< 1200	1,200	0
CATALOGUE	3.48	40.00	< 40	0	70
BANNERS	0.00	0.00	< 40	40	0
MAPS	1.01	90.00	< 600	510	51
IMPRINTS					
T-SHIRTS	6.00	30.00	< 30	0	24
B. STICK	8.11	30.00	< 30	0	81
POSTERS	3.00	30.00	< 30	0	30
MENUS	0.00	0.00	< 30	30	0
KEYS	3.16	30.00	< 30	0	76
TOTAL		250.00	< 250	0	331
AVG.		27.78			37

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
5000.00	< 5,000	0	137,155

APPENDIX E. — Best5.B, columns 13 thru 18, row11 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0	0.00	< 1200	1,200	0
CATALOGUE	3	34.50	< 40	6	60
BANNERS	0	0.00	< 40	40	0
MAPS	1	88.75	< 600	511	50
IMPRINTS					
T-SHIRTS	6	30.00	< 30	0	24
B. STICK	8	29.60	< 30	0	80
POSTERS	3	30.00	< 30	0	30
MENUS	0	0.00	< 30	30	0
KEYS	3	28.50	< 30	2	72
TOTAL		241.35	< 250	9	316
AVG.		27.78			35

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
4816.20	< 5,000	184	131,929

APPENDIX F

BEST 5.C SPREADSHEET FILE;

as it represents the optimal solution output file for a $5 million dollar budget and the budget allocation strategy C (low impression media generating strategy).

APPENDIX F. — Best5.C, columns 1 thru 6, rows 1 thru 3 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
TELEVISION					
NET 15's	4,850	1.0	4,850	175.00	27.71
NET 30's	5,575	1.0	5,575	225.00	24.78
CAB 15's	3,335	1.0	3,335	110.00	30.32
CAB 30's	4,275	1.0	4,275	155.00	27.58
LOC 15's	545	1.0	545	30.00	18.17
LOC 30's	880	1.0	880	45.00	19.56
TOTAL	19,460		19,460	740.00	127.37
AVG.	3,243		3,243	123.33	21.23
NEWSPAPER					
FULL PG.	635	2.0	1,270	60.00	10.58
HALF PG.	425	2.0	850	47.00	9.04
6X4" PG.	165	2.0	330	22.00	7.50
8X4" PG.	190	2.0	380	28.50	6.67
4 PG. INS.	625	2.0	1,250	98.00	6.38
6 PG. INS.	630	2.0	1,260	109.50	5.75
TOTAL	2,670		5,340	365.00	45.92
AVG.	445		890	60.83	7.65
WEEK MG.					
FR COVER	1,150	3.0	345	100.00	11.50
BK COVER	905	3.0	2,715	85.00	10.65
2nd PAGE	775	3.0	2,325	70.00	11.07
3rd PAGE	745	3.0	2,235	60.00	12.42
EXT. FLAP	950	1.0	950	85.00	11.18
TWO PAGE	865	2.0	1,730	75.00	11.53
ONE PAGE	610	2.0	1,220	55.00	11.09
TOTAL	6,000		14,625	530.00	79.44
AVG.	857		2,089	75.71	11.35

APPENDIX F. — Best5.C, columns 7 thru 12, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
TELEVISION					
NET 15's	0.00	0.00	< 2500	2,500	0
NET 30's	0.00	0.00	< 2500	2,500	0
CAB 15's	4.55	500.00	< 2500	2,000	15,159
CAB 30's	0.00	0.00	< 2500	2,500	0
LOC 15's	0.00	0.00	< 1000	1,000	0
LOC 30's	0.00	0.00	< 1000	1,000	0
TOTAL		500.00	< 500	0	15,159
AVG.		83.33			2,527
NEWSPAPER					
FULL PG.	5.83	350.00	< 500	150	10,583
HALF PG.	0.00	0.00	< 500	250	4,521
6X4" PG.	0.00	0.00	< 500	500	0
8X4" PG.	0.00	0.00	< 500	500	0
4 PG. INS.	0.00	0.00	< 500	500	0
6 PG. INS.	0.00	0.00	< 500	500	0
TOTAL		350.00	< 375	25	15,105
AVG.		58.33			2,517
WEEK MG.					
FR COVER	3.50	350.00	< 400	50	12,075
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	6.67	400.00	< 400	0	14,900
EXT. FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		750.00	< 750	0	26,975
AVG.		107.14			3,854

APPENDIX F. — Best5.C, columns13 thru18, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
TELEVISION					
NET 15's	0	0.00	< 2500	2,500	0
NET 30's	0	0.00	< 2500	2,500	0
CAB 15's	4	440.00	< 2500	2,060	13,340
CAB 30's	0	0.00	< 2500	2,500	0
LOC 15's	0	0.00	< 1000	1,000	0
LOC 30's	0	0.00	< 1000	1,000	0
TOTAL		440.00	< 500	60	13,340
AVG.		73.33			2,223
NEWSPAPER					
FULL PG.	6	360.00	< 500	140	7,620
HALF PG.	0	0.00	< 500	500	4,521
6X4" PG.	0	0.00	< 500	500	0
8X4" PG.	0	0.00	< 500	500	0
4 PG. INS.	0	0.00	< 500	500	0
6 PG. INS.	0	0.00	< 500	500	0
TOTAL		3690.00	< 375	15	7,620
AVG.		60.00			1,270
WEEK MG.					
FR COVER	3	300.00	< 400	100	10,350
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	6	360.00	< 400	40	13,410
EXT. FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		660.00	< 750	90	23,760
AVG.		94.29			3,394

APPENDIX F. — Best5.C, columns 1 thru 6, rows 4 thru 6 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
MNTH. MG.					
FR COVER	1,005	3.0	3,015	115.00	8.74
BK COVER	885	3.0	2,655	98.00	9.03
2nd PAGE	665	3.0	1,995	77.00	8.64
3rd PAGE	580	3.0	1,740	68.00	8.53
EXT.FLAP	825	1.0	845	95.00	8.68
TWO PAGE	605	2.0	1,210	75.00	8.07
ONE PAGE	535	2.0	1,070	38.50	13.90
TOTAL	5,100		12,510	566.50	65.58
AVG.	729		1,787	80.93	9.37
BUSN. MG.					
FR COVER	775	2.0	1,550	92.00	8.42
BK COVER	725	2.0	1,450	83.00	8.73
2nd PAGE	665	2.0	1,330	78.00	8.53
3rd PAGE	660	2.0	1,320	72.00	9.17
TWO PAGE	685	2.0	1,370	58.50	11.71
ONE PAGE	595	2.0	1,190	33.00	18.03
TOTAL	4,105		8,210	416.50	64.59
AVG.	684		1,368	69.42	10.77
CONS. MG.					
FR COVER	445	2.0	890	82.00	5.43
BK COVER	400	2.0	800	76.50	5.23
TWO PAGE	355	2.0	710	34.00	10.44
ONE PAGE	310	2.0	620	18.50	16.76
4PG. INS.	380	2.0	760	65.00	5.85
TOTAL	1,890		3,780	276.00	43.70
AVG.	378		756	55.20	8.74

APPENDIX F. — Best5.C, columns 7 thru 12, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
MNTH. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
EXT.FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		0.00	< 750	500	0
AVG.		0.00			0
BUSN. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	12.12	400.00	< 400	0	14,424
TOTAL		400.00	< 750	350	14,424
AVG.		66.67			2,404
CONS. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	18.92	350.00	< 400	0	11,730
4PG. INS.	0.00	0.00	< 400	400	0
TOTAL		350.00	< 750	400	11,730
AVG.		70.00			2,346

APPENDIX F. — Best5.C, columns13 thru18, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
MNTH. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
EXT.FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		0.00	< 750	750	0
AVG.		0.00			0
BUSN. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	12	396.00	< 400	4	14,280
TOTAL		396.00	< 750	354	14,280
AVG.		66.00			2,380
CONS. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	19	351.50	< 400	49	11,780
4PG. INS.	0	0.00	< 400	400	0
TOTAL		350.00	< 750	399	11,780
AVG.		70.00			2,356

APPENDIX F. — Best5.C, columns 1 thru 6, rows 7 thru10 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
RADIO					
SPOT 15's	58	4.0	232	18.00	3.22
SPOT 30's	73	4.0	292	32.50	2.25
SP. NEWS	44	6.0	264	9.00	4.89
SP. REPORT	28	6.0	168	12.75	2.20
TOTAL	203		956	72.25	12.55
AVG.	51		239	18.06	3.14
OUTDOOR					
6M LEASE					
12X25	6	3.0	18	2.10	2.86
14X48	12	5.0	60	3.15	3.81
ROTARY PLAN					
12X25	12	3.0	36	15.60	0.77
14X48	18	5.0	90	17.40	1.03
TOTAL	48		204	38.25	6.47
AVG.	12		51	9.56	2.12
TRANSIT					
BUS CARD	45	4.0	180	22.25	2.02
POSTERS	65	2.0	130	36.50	1.78
TOTAL	110		310	58.75	3.80
AVG.	55		155	29.38	1.90
DIRECT MAIL					
LEAFLETS	5	1.0	5	0.60	8.33
BROCHURE	25	3.0	75	55.75	0.45
NEWSLETTER	12	1.0	12	2.25	5.33
TOTAL	42		92	58.60	14.12
AVG.	14		31	19.53	4.71

APPENDIX F. — Best5.C, columns 7 thru12, rows 7 thru10 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
RADIO					
SPOT 15's	0.00	0.00	< 150	150	0
SPOT 30's	0.00	0.00	< 150	150	0
SP. NEWS	16.67	150.00	< 150	0	4,400
SP. REPORT	0.00	0.00	< 150	150	0
TOTAL		150.00	< 375	225	4,400
AVG.		37.50			1,100
OUTDOOR					
6M LEASE					
12X25	95.24	200.00	< 200	0	1,714
14X48	63.49	200.00	< 200	0	3,810
ROTARY PLAN					
12X25	1.28	20.00	< 200	180	46
14X48	11.49	200.00	< 200	0	1,034
TOTAL		620.00	< 937.5	318	6,604
AVG.		155.00			1,651
TRANSIT					
BUS CARD	13.48	300.00	< 300	0	2,427
POSTERS	8.22	300.00	< 300	0	1,068
TOTAL		47.50	< 937.5	337	3,495
AVG.		23.75			1,748
DIRECT MAIL					
LEAFLETS	25.00	15.00	< 15	0	125
BROCHURE	0.00	0.00	< 200	200	0
NEWSLETTER	6.67	15.00	< 15	0	80
TOTAL		30.00	< 937.5	907	205
AVG.		10.00			68

APPENDIX F. — Best5.C, columns13 thru18, rows7 thru10 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
RADIO					
SPOT 15's	0	0.00	< 150	150	0
SPOT 30's	0	0.00	< 150	150	0
SP. NEWS	16	144.00	< 150	6	4,224
SP. REPORT	0	0.00	< 150	150	0
TOTAL		144.00	< 375	231	4,224
AVG.		36.00			1,056
OUTDOOR					
6M LEASE					
12X25	95	199.50	< 200	1	1,710
14X48	63	198.45	< 200	2	3,780
ROTARY PLAN					
12X25	1	15.60	< 200	184	36
14X48	11	191.40	< 200	9	990
TOTAL		604.95	< 937.5	333	6,516
AVG.		151.24			1,629
TRANSIT					
BUS CARD	13	289.25	< 300	11	2,340
POSTERS	8	292.00	< 300	8	1,040
TOTAL		581.25	< 937.5	356	3,380
AVG.		290.63			1,690
DIRECT MAIL					
LEAFLETS	25	15.00	< 15	0	125
BROCHURE	0	0.00	< 200	200	0
NEWSLETTER	6	13.50	< 15	2	72
TOTAL		28.50	< 937.5	909	197
AVG.		9.50			66

APPENDIX F. — Best5.C, columns 1 thru 6, row11 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
SPECIAL MEDIA					
DIRECTORY	100	3.0	300	520.00	0.19
CATALOGUE	20	3.0	60	11.50	1.74
BANNERS	1	1.0	1	11.85	0.08
MAPS	75	4.0	300	143.75	0.52
IMPRINTS					
T-SHIRTS	1	6.0	6	5.00	0.20
B. STICK	5	4.0	20	3.70	1.35
POSTERS	5	2.0	10	10.00	0.50
MENUS	1	1.0	1	4.35	0.23
KEYS	24	1.0	24	9.50	2.53
TOTAL	232		722	719.65	7.35
AVG.	26		80	79.96	0.82

APPENDIX F. — Best5.C, columns 7 thru 12, row11 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0.94	0.00	< 1200	710	188
CATALOGUE	3.48	40.00	< 40	0	70
BANNERS	0.00	0.00	< 40	40	0
MAPS	6.76	90.00	< 600	0	338
IMPRINTS					
T-SHIRTS	6.00	30.00	< 30	0	24
B. STICK	8.11	30.00	< 30	0	81
POSTERS	3.00	30.00	< 30	0	30
MENUS	0.00	0.00	< 30	30	0
KEYS	3.16	30.00	< 30	0	76
TOTAL		1250.00	< 1250	0	807
AVG.		138.89			90

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
5000.00	< 5,000	0	91,208

APPENDIX F. — Best5.C, columns13 thru18, row11 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
SPECIAL MEDIA					
DIRECTORY	1	520.00	< 1200	680	200
CATALOGUE	3	34.50	< 40	6	60
BANNERS	0	0.00	< 40	40	0
MAPS	6	532.50	< 600	68	300
IMPRINTS					
T-SHIRTS	6	30.00	< 30	0	24
B. STICK	8	29.60	< 30	0	80
POSTERS	3	30.00	< 30	0	30
MENUS	0	0.00	< 30	30	0
KEYS	3	28.50	< 30	2	72
TOTAL		1205.10	< 1250	0	766
AVG.		138.89			85

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
4771.30	< 5,000	229	85,863

APPENDIX G

BEST 1.A SPREADSHEET FILE;

as it represents the optimal solution output file for a $1 million dollar budget and the budget allocation strategy A (mixed media strategy).

APPENDIX G. — Best1.A, columns 1 thru 6, rows 1 thru 3 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
TELEVISION					
NET 15's	4,850	1.0	4,850	175.00	27.71
NET 30's	5,575	1.0	5,575	225.00	24.78
CAB 15's	3,335	1.0	3,335	110.00	30.32
CAB 30's	4,275	1.0	4,275	155.00	27.58
LOC 15's	545	1.0	545	30.00	18.17
LOC 30's	880	1.0	880	45.00	19.56
TOTAL	19,460		19,460	740.00	127.37
AVG.	3,243		3,243	123.33	21.23
NEWSPAPER					
FULL PG.	635	2.0	1,270	60.00	10.58
HALF PG.	425	2.0	850	47.00	9.04
6X4" PG.	165	2.0	330	22.00	7.50
8X4" PG.	190	2.0	380	28.50	6.67
4 PG. INS.	625	2.0	1,250	98.00	6.38
6 PG. INS.	630	2.0	1,260	109.50	5.75
TOTAL	2,670		5,340	365.00	45.92
AVG.	445		890	60.83	7.65
WEEK MG.					
FR COVER	1,150	3.0	345	100.00	11.50
BK COVER	905	3.0	2,715	85.00	10.65
2nd PAGE	775	3.0	2,325	70.00	11.07
3rd PAGE	745	3.0	2,235	60.00	12.42
EXT. FLAP	950	1.0	950	85.00	11.18
TWO PAGE	865	2.0	1,730	75.00	11.53
ONE PAGE	610	2.0	1,220	55.00	11.09
TOTAL	6,000		14,625	530.00	79.44
AVG.	857		2,089	75.71	11.35

APPENDIX G. — Best1.A, columns 7 thru 12, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
TELEVISION					
NET 15's	0.00	0.00	< 2500	2,500	0
NET 30's	0.00	0.00	< 2500	2,500	0
CAB 15's	2.27	250.00	< 2500	2,250	7,580
CAB 30's	0.00	0.00	< 2500	2,500	0
LOC 15's	0.00	0.00	< 1000	1,000	0
LOC 30's	0.00	0.00	< 1000	1,000	0
TOTAL		250.00	< 250	0	7,580
AVG.		41.67			0
NEWSPAPER					
FULL PG.	0.52	31.25	< 500	469	661
HALF PG.	0.00	0.00	< 500	500	0
6X4" PG.	0.00	0.00	< 500	500	0
8X4" PG.	0.00	0.00	< 500	500	0
4 PG. INS.	0.00	0.00	< 500	500	0
6 PG. INS.	0.00	0.00	< 500	500	0
TOTAL		31.25	< 93.75	63	661
AVG.		5.21			110
WEEK MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	3.13	187.50	< 400	213	6,984
EXT. FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		187.50	< 187.5	0	6,984
AVG.		26.79			998

APPENDIX G. — Best1.A, columns 13 thru 18, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
TELEVISION					
NET 15's	0	0.00	< 2500	2,500	0
NET 30's	0	0.00	< 2500	2,500	0
CAB 15's	2	220.00	< 2500	2,280	6,670
CAB 30's	0	0.00	< 2500	2,500	0
LOC 15's	0	0.00	< 1000	1,000	0
LOC 30's	0	0.00	< 1000	1,000	0
TOTAL		220.00	< 250	30	6,670
AVG.		36.67			1,112
NEWSPAPER					
FULL PG.	0	0.00	< 500	500	0
HALF PG.	0	0.00	< 500	500	0
6X4" PG.	0	0.00	< 500	500	0
8X4" PG.	0	0.00	< 500	500	0
4 PG. INS.	0	0.00	< 500	500	0
6 PG. INS.	0	0.00	< 500	500	0
TOTAL		0.00	< 93.75	94	0.00
AVG.		0.00			0.00
WEEK MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	3	180.00	< 400	220	6,705
EXT. FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		180.00	< 187.5	8	6,705
AVG.		25.71			958

APPENDIX G. — BEST1.A, columns 7 thru 12, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
MNTH. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
EXT.FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		0.00	< 187.5	188	0
AVG.		0.00			0
BUSN. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	5.68	187.50	< 400	213	6,761
TOTAL		187.50	< 187.5	0	6,761
AVG.		31.25			1,127
CONS. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
4PG. INS.	0.00	0.00	< 400	400	0
TOTAL		0.00	< 187.5	188	0
AVG.		0.00			0

APPENDIX G. — Best1.A, columns 1 thru 6, rows 4 thru 6 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
MNTH. MG.					
FR COVER	1,005	3.0	3,015	115.00	8.74
BK COVER	885	3.0	2,655	98.00	9.03
2nd PAGE	665	3.0	1,995	77.00	8.64
3rd PAGE	580	3.0	1,740	68.00	8.53
EXT.FLAP	825	1.0	845	95.00	8.68
TWO PAGE	605	2.0	1,210	75.00	8.07
ONE PAGE	535	2.0	1,070	38.50	13.90
TOTAL	5,100		12,510	566.50	65.58
AVG.	729		1,787	80.93	9.37
BUSN. MG.					
FR COVER	775	2.0	1,550	92.00	8.42
BK COVER	725	2.0	1,450	83.00	8.73
2nd PAGE	665	2.0	1,330	78.00	8.53
3rd PAGE	660	2.0	1,320	72.00	9.17
TWO PAGE	685	2.0	1,370	58.50	11.71
ONE PAGE	595	2.0	1,190	33.00	18.03
TOTAL	4,105		8,210	416.50	64.59
AVG.	684		1,368	69.42	10.77
CONS. MG.					
FR COVER	445	2.0	890	82.00	5.43
BK COVER	400	2.0	800	76.50	5.23
TWO PAGE	355	2.0	710	34.00	10.44
ONE PAGE	310	2.0	620	18.50	16.76
4PG. INS.	380	2.0	760	65.00	5.85
TOTAL	1,890		3,780	276.00	43.70
AVG.	378		756	55.20	8.74

APPENDIX G. — BEST1.A, columns 13 thru 18, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
MNTH. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
EXT.FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		0.00	< 187.5	188	0
AVG.		0.00			0
BUSN. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	5	165.00	< 400	235	5,950
TOTAL		165.00	< 187.5	23	5,950
AVG.		27.50			992
CONS. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
4PG. INS.	0	0.00	< 400	400	0
TOTAL		0.00	< 187.5	188	0
AVG.		0.00			0

APPENDIX G. — Best1.A, columns 1 thru 6, rows 7 thru10 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
RADIO					
SPOT 15's	58	4.0	232	18.00	3.22
SPOT 30's	73	4.0	292	32.50	2.25
SP. NEWS	44	6.0	264	9.00	4.89
SP. REPORT	28	6.0	168	12.75	2.20
TOTAL	203		956	72.25	12.55
AVG.	51		239	18.06	3.14
OUTDOOR					
6M LEASE					
12X25	6	3.0	18	2.10	2.86
14X48	12	5.0	60	3.15	3.81
ROTARY PLAN					
12X25	12	3.0	36	15.60	0.77
14X48	18	5.0	90	17.40	1.03
TOTAL	48		204	38.25	6.47
AVG.	12		51	9.56	2.12
TRANSIT					
BUS CARD	45	4.0	180	22.25	2.02
POSTERS	65	2.0	130	36.50	1.78
TOTAL	110		310	58.75	3.80
AVG.	55		155	29.38	1.90
DIRECT MAIL					
LEAFLETS	5	1.0	5	0.60	8.33
BROCHURE	25	3.0	75	55.75	0.45
NEWSLETTER	12	1.0	12	2.25	5.33
TOTAL	42		92	58.60	14.12
AVG.	14		31	19.53	4.71

APPENDIX G. — BEST1.A, columns 7 thru 12, rows 7 thru 10 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
RADIO					
SPOT 15's	0.00	0.00	< 150	100	0
SPOT 30's	0.00	0.00	< 150	100	0
SP. NEWS	10.42	93.75	< 150	56	2,750
SP. REPORT	0.00	0.00	< 150	100	0
TOTAL		93.75	< 93.75	0	2,750
AVG.		23.44			688
OUTDOOR					
6M LEASE					
12X25	0.00	0.00	< 200	200	0
14X48	29.76	93.75	< 200	106	1,786
ROTARY PLAN					
12X25	0.00	0.00	< 200	200	0
14X48	0.00	0.00	< 200	200	0
TOTAL		93.75	< 93.75	0	1,786
AVG.		23.44			447
TRANSIT					
BUS CARD	0.73	16.25	< 300	284	131
POSTERS	0.00	0.00	< 300	300	0
TOTAL		16.25	< 93.75	77	131
AVG.		8.13			66
DIRECT MAIL					
LEAFLETS	25.00	15.00	< 15	0	125
BROCHURE	0.00	0.00	< 200	200	0
NEWSLETTER	0.00	0.00	< 15	15	0
TOTAL		15.00	< 93.75	79	125
AVG.		5.00			42

APPENDIX G.— BEST1.A, columns 13 thru18, rows 7 thru10 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
RADIO					
SPOT 15's	0	0.00	< 150	100	0
SPOT 30's	0	0.00	< 150	100	0
SP. NEWS	10	90.00	< 150	60	2,640
SP. REPORT	0	0.00	< 150	100	0
TOTAL		90.00	< 93.75	4	2,640
AVG.		22.50			660
OUTDOOR					
6M LEASE					
12X25	0	0.00	< 200	200	0
14X48	30	94.50	< 200	106	1,800
ROTARY PLAN					
12X25	0	0.00	< 200	200	0
14X48	0	0.00	< 200	200	0
TOTAL		94.50	< 93.75	-1	1,800
AVG.		23.63			450
TRANSIT					
BUS CARD	0	0.00	< 300	300	0
POSTERS	0	0.00	< 300	300	0
TOTAL		0.00	< 93.75	94	0.00
AVG.		0.00			0.00
DIRECT MAIL					
LEAFLETS	25	15.00	< 15	0	125
BROCHURE	0	0.00	< 200	200	0
NEWSLETTER	0	0.00	< 15	15	0
TOTAL		15.00	< 93.75	79	125
AVG.		5.00			42

APPENDIX G. — Best1.A, columns 1 thru 6, row11 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
SPECIAL MEDIA					
DIRECTORY	100	2.0	200	520.00	0.19
CATALOGUE	20	1.0	20	11.50	1.74
BANNERS	1	1.0	1	11.85	0.08
MAPS	25	2.0	50	88.75	0.28
IMPRINTS					
T-SHIRTS	1	4.0	4	5.00	0.20
B. STICK	5	2.0	10	3.70	1.35
POSTERS	5	2.0	10	10.00	0.50
MENUS	1	1.0	1	4.35	0.23
KEYS	24	1.0	24	9.50	2.53
TOTAL	232		722	719.65	7.11
AVG.	26		80	79.96	0.79

APPENDIX G. — BEST1.A, columns 7 thru 12, row 11 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0.00	0.00	< 1200	1,200	0
CATALOGUE	3.48	40.00	< 40	0	70
BANNERS	0.00	0.00	< 40	40	0
MAPS	0.00	0.00	< 600	600	0
IMPRINTS					
T-SHIRTS	0.00	0.00	< 30	30	0
B. STICK	8.11	30.00	< 30	0	81
POSTERS	2.50	25.00	< 30	5	25
MENUS	0.00	0.00	< 30	30	0
KEYS	3.16	30.00	< 30	0	76
TOTAL		125.00	< 125	0	252
AVG.		13.89			28

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
1,000.00	< 1000	0	27,030

APPENDIX G. — BEST1.A, columns 13 thru 18, row 11 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0	0.00	< 1200	1,200	0
CATALOGUE	3	34.50	< 40	6	60
BANNERS	0	0.00	< 40	40	0
MAPS	0	0.00	< 600	600	0
IMPRINTS					
T-SHIRTS	0	0.00	< 30	30	0
B. STICK	8	29.60	< 30	0	80
POSTERS	2	20.00	< 30	10	20
MENUS	0	0.00	< 30	30	0
KEYS	3	28.50	< 30	2	72
TOTAL		112.60	< 125	12	232
AVG.		12.51			26

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
877.10	1,000	123	24,122

APPENDIX H

BEST 1.B SPREADSHEET FILE;

as it represents the optimal solution output file for a $1 million dollar budget and the budget allocation strategy B (high impression media generating strategy strategy).

APPENDIX H. — Best1.B, columns 1 thru 6, rows 1 thru 3 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
TELEVISION					
NET 15's	4,850	1.0	4,850	175.00	27.71
NET 30's	5,575	1.0	5,575	225.00	24.78
CAB 15's	3,335	1.0	3,335	110.00	30.32
CAB 30's	4,275	1.0	4,275	155.00	27.58
LOC 15's	545	1.0	545	30.00	18.17
LOC 30's	880	1.0	880	45.00	19.56
TOTAL	19,460		19,460	740.00	127.37
AVG.	3,243		3,243	123.33	21.23
NEWSPAPER					
FULL PG.	635	2.0	1,270	60.00	10.58
HALF PG.	425	2.0	850	47.00	9.04
6X4" PG.	165	2.0	330	22.00	7.50
8X4" PG.	190	2.0	380	28.50	6.67
4 PG. INS.	625	2.0	1,250	98.00	6.38
6 PG. INS.	630	2.0	1,260	109.50	5.75
TOTAL	2,670		5,340	365.00	45.92
AVG.	445		890	60.83	7.65
WEEK MG.					
FR COVER	1,150	3.0	345	100.00	11.50
BK COVER	905	3.0	2,715	85.00	10.65
2nd PAGE	775	3.0	2,325	70.00	11.07
3rd PAGE	745	3.0	2,235	60.00	12.42
EXT. FLAP	950	1.0	950	85.00	11.18
TWO PAGE	865	2.0	1,730	75.00	11.53
ONE PAGE	610	2.0	1,220	55.00	11.09
TOTAL	6,000		14,625	530.00	79.44
AVG.	857		2,089	75.71	11.35

APPENDIX H. — Best1.B, columns 7 thru 12, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
TELEVISION					
NET 15's	0.00	0.00	< 2500	2,500	0
NET 30's	0.00	0.00	< 2500	2,500	0
CAB 15's	4.55	500.00	< 2500	2,000	15,159
CAB 30's	0.00	0.00	< 2500	2,500	0
LOC 15's	0.00	0.00	< 1000	1,000	0
LOC 30's	0.00	0.00	< 1000	1,000	0
TOTAL		500.00	< 500	0	15,159
AVG.		83.33			2,527
NEWSPAPER					
FULL PG.	0.83	50.00	< 500	450	1,058
HALF PG.	0.00	0.00	< 500	500	0
6X4" PG.	0.00	0.00	< 500	500	0
8X4" PG.	0.00	0.00	< 500	500	0
4 PG. INS.	0.00	0.00	< 500	500	0
6 PG. INS.	0.00	0.00	< 500	500	0
TOTAL		50.00	< 150	100	1,058
AVG.		8.33			176
WEEK MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	1.67	100.00	< 400	300	3,725
EXT. FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		100.00	< 100	0	3,725
AVG.		14.29			532

APPENDIX H. — Best1.B, columns 13 thru 18, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
TELEVISION					
NET 15's	0	0.00	< 2500	2,500	0
NET 30's	0	0.00	< 2500	2,500	0
CAB 15's	4	440.00	< 2500	2,060	13,340
CAB 30's	0	0.00	< 2500	2,500	0
LOC 15's	0	0.00	< 1000	1,000	0
LOC 30's	0	0.00	< 1000	1,000	0
TOTAL		440.00	< 500	60	13,340
AVG.		73.33			2,223
NEWSPAPER					
FULL PG.	1	60.00	< 500	440	1,270
HALF PG.	0	0.00	< 500	500	0
6X4" PG.	0	0.00	< 500	500	0
8X4" PG.	0	0.00	< 500	500	0
4 PG. INS.	0	0.00	< 500	500	0
6 PG. INS.	0	0.00	< 500	500	0
TOTAL		60.00	< 150	90	1,270.00
AVG.		10.00			211.67
WEEK MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	1	60.00	< 400	340	2,235
EXT. FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		60.00	< 100	40	2,235
AVG.		8.57			319

APPENDIX H. — Best1.B, columns 1 thru 6, rows 4 thru 6 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
MNTH. MG.					
FR COVER	1,005	3.0	3,015	115.00	8.74
BK COVER	885	3.0	2,655	98.00	9.03
2nd PAGE	665	3.0	1,995	77.00	8.64
3rd PAGE	580	3.0	1,740	68.00	8.53
EXT.FLAP	825	1.0	845	95.00	8.68
TWO PAGE	605	2.0	1,210	75.00	8.07
ONE PAGE	535	2.0	1,070	38.50	13.90
TOTAL	5,100		12,510	566.50	65.58
AVG.	729		1,787	80.93	9.37
BUSN. MG.					
FR COVER	775	2.0	1,550	92.00	8.42
BK COVER	725	2.0	1,450	83.00	8.73
2nd PAGE	665	2.0	1,330	78.00	8.53
3rd PAGE	660	2.0	1,320	72.00	9.17
TWO PAGE	685	2.0	1,370	58.50	11.71
ONE PAGE	595	2.0	1,190	33.00	18.03
TOTAL	4,105		8,210	416.50	64.59
AVG.	684		1,368	69.42	10.77
CONS. MG.					
FR COVER	445	2.0	890	82.00	5.43
BK COVER	400	2.0	800	76.50	5.23
TWO PAGE	355	2.0	710	34.00	10.44
ONE PAGE	310	2.0	620	18.50	16.76
4PG. INS.	380	2.0	760	65.00	5.85
TOTAL	1,890		3,780	276.00	43.70
AVG.	378		756	55.20	8.74

APPENDIX H. — Best1.B, columns 7 thru 12, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
MNTH. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
EXT.FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		0.00	< 100	100	0
AVG.		0.00			0
BUSN. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	3.03	100.00	< 400	300	3,606
TOTAL		100.00	< 100	0	3,606
AVG.		16.67			601
CONS. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
4PG. INS.	0.00	0.00	< 400	400	0
TOTAL		0.00	< 100	100	0
AVG.		0.00			0

APPENDIX H. — BEST1.B, columns 13 thru 18, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
MNTH. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
EXT.FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		0.00	< 100	100	0
AVG.		0.00			0
BUSN. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	3	99.00	< 400	301	3,570
TOTAL		99.00	< 100	1	3,570
AVG.		16.50			595
CONS. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
4PG. INS.	0	0.00	< 400	400	0
TOTAL		0.00	< 100	100	0
AVG.		0.00			0

APPENDIX H. — Best1.B, columns 1 thru 6, row11 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
SPECIAL MEDIA					
DIRECTORY	100	3.0	300	520.00	0.19
CATALOGUE	20	3.0	60	11.50	1.74
BANNERS	1	1.0	1	11.85	0.08
MAPS	75	4.0	300	143.75	0.52
IMPRINTS					
T-SHIRTS	1	6.0	6	5.00	0.20
B. STICK	5	4.0	20	3.70	1.35
POSTERS	5	2.0	10	10.00	0.50
MENUS	1	1.0	1	4.35	0.23
KEYS	24	1.0	24	9.50	2.53
TOTAL	232		722	719.65	7.35
AVG.	26		80	79.96	0.82

APPENDIX H. — Best1.B, columns 7 thru 12, row 11 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0.00	0.00	< 1200	1,200	0
CATALOGUE	0.00	0.00	< 40	40	0
BANNERS	0.00	0.00	< 40	40	0
MAPS	0.00	0.00	< 600	600	0
IMPRINTS					
T-SHIRTS	0.00	0.00	< 30	30	0
B. STICK	8.11	30.00	< 30	0	81
POSTERS	0.00	0.00	< 30	30	0
MENUS	0.00	0.00	< 30	30	0
KEYS	2.11	20.00	< 30	10	51
TOTAL		50.00	< 50	0	132
AVG.		5.56			15

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
1,000.00	< 1000	0	28,899

APPENDIX H. — BEST1.B, columns 13 thru 18, row 11 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0	0.00	< 1200	1,200	0
CATALOGUE	0	0.00	< 40	40	0
BANNERS	0	0.00	< 40	40	0
MAPS	0	0.00	< 600	600	0
IMPRINTS					
T-SHIRTS	0	0.00	< 30	30	0
B. STICK	8	29.60	< 30	0	80
POSTERS	0	0.00	< 30	30	0
MENUS	0	0.00	< 30	30	0
KEYS	2	19.00	< 30	11	48
TOTAL		48.60	< 50	1	128
AVG.		5.40			14

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
902.00	1,000	98	25,592

APPENDIX H. — Best1.B, columns 1 thru 6, rows 7 thru10 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
RADIO					
SPOT 15's	58	4.0	232	18.00	3.22
SPOT 30's	73	4.0	292	32.50	2.25
SP. NEWS	44	6.0	264	9.00	4.89
SP. REPORT	28	6.0	168	12.75	2.20
TOTAL	203		956	72.25	12.55
AVG.	51		239	18.06	3.14
OUTDOOR					
6M LEASE					
12X25	6	3.0	18	2.10	2.86
14X48	12	5.0	60	3.15	3.81
ROTARY PLAN					
12X25	12	3.0	36	15.60	0.77
14X48	18	5.0	90	17.40	1.03
TOTAL	48		204	38.25	6.47
AVG.	12		51	9.56	2.12
TRANSIT					
BUS CARD	45	4.0	180	22.25	2.02
POSTERS	65	2.0	130	36.50	1.78
TOTAL	110		310	58.75	3.80
AVG.	55		155	29.38	1.90
DIRECT MAIL					
LEAFLETS	5	1.0	5	0.60	8.33
BROCHURE	25	3.0	75	55.75	0.45
NEWSLETTER	12	1.0	12	2.25	5.33
TOTAL	42		92	58.60	14.12
AVG.	14		31	19.53	4.71

APPENDIX H. — Best1.B, columns 7 thru12, rows 7 thru10 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
RADIO					
SPOT 15's	0.00	0.00	< 150	100	0
SPOT 30's	0.00	0.00	< 150	100	0
SP. NEWS	16.67	150.00	< 150	0	4,400
SP. REPORT	0.00	0.00	< 150	100	0
TOTAL		150.00	< 150	0	4,400
AVG.		37.50			1,100
OUTDOOR					
6M LEASE					
12X25	0.00	0.00	< 200	200	0
14X48	11.90	37.50	< 200	163	714
ROTARY PLAN					
12X25	0.00	0.00	< 200	200	0
14X48	0.00	0.00	< 200	200	0
TOTAL		37.50	< 37.5	0	714
AVG.		9.38			179
TRANSIT					
BUS CARD	0.00	0.00	< 300	300	0
POSTERS	0.00	0.00	< 300	300	0
TOTAL		0.00	< 37.5	38	0
AVG.		0.00			0
DIRECT MAIL					
LEAFLETS	20.83	12.50	< 15	3	104
BROCHURE	0.00	0.00	< 200	200	0
NEWSLETTER	0.00	0.00	< 15	15	0
TOTAL		12.50	< 37.5	25	104
AVG.		4.17			35

APPENDIX H.— BEST1.B, columns 13 thru 18, rows 7 thru 10 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
RADIO					
SPOT 15's	0	0.00	< 150	100	0
SPOT 30's	0	0.00	< 150	100	0
SP. NEWS	16	144.00	< 150	6	4,224
SP. REPORT	0	0.00	< 150	100	0
TOTAL		144.00	< 150	6	4,224
AVG.		36.00			1,056
OUTDOOR					
6M LEASE					
12X25	0	0.00	< 200	200	0
14X48	12	37.80	< 200	162	720
ROTARY PLAN					
12X25	0	0.00	< 200	200	0
14X48	0	0.00	< 200	200	0
TOTAL		37.80	< 37.5	0	720
AVG.		9.45			180
TRANSIT					
BUS CARD	0	0.00	< 300	300	0
POSTERS	0	0.00	< 300	300	0
TOTAL		0.00	< 37.5	38	0
AVG.		0.00			0
DIRECT MAIL					
LEAFLETS	21	12.60	< 15	2	105
BROCHURE	0	0.00	< 200	200	0
NEWSLETTER	0	0.00	< 15	15	0
TOTAL		12.60	< 37.5	25	105.00
AVG.		4.20			35.00

APPENDIX J

BEST 1.C SPREADSHEET FILE;

as it represents the optimal solution output file for a $1 million dollar budget and the budget allocation strategy C (low impression media generating strategy).

APPENDIX J. — Best1.C, columns 1 thru 6, rows 1 thru 3 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
TELEVISION					
NET 15's	4,850	1.0	4,850	175.00	27.71
NET 30's	5,575	1.0	5,575	225.00	24.78
CAB 15's	3,335	1.0	3,335	110.00	30.32
CAB 30's	4,275	1.0	4,275	155.00	27.58
LOC 15's	545	1.0	545	30.00	18.17
LOC 30's	880	1.0	880	45.00	19.56
TOTAL	19,460		19,460	740.00	127.37
AVG.	3,243		3,243	123.33	21.23
NEWSPAPER					
FULL PG.	635	2.0	1,270	60.00	10.58
HALF PG.	425	2.0	850	47.00	9.04
6X4" PG.	165	2.0	330	22.00	7.50
8X4" PG.	190	2.0	380	28.50	6.67
4 PG. INS.	625	2.0	1,250	98.00	6.38
6 PG. INS.	630	2.0	1,260	109.50	5.75
TOTAL	2,670		5,340	365.00	45.92
AVG.	445		890	60.83	7.65
WEEK MG.					
FR COVER	1,150	3.0	345	100.00	11.50
BK COVER	905	3.0	2,715	85.00	10.65
2nd PAGE	775	3.0	2,325	70.00	11.07
3rd PAGE	745	3.0	2,235	60.00	12.42
EXT. FLAP	950	1.0	950	85.00	11.18
TWO PAGE	865	2.0	1,730	75.00	11.53
ONE PAGE	610	2.0	1,220	55.00	11.09
TOTAL	6,000		14,625	530.00	79.44
AVG.	857		2,089	75.71	11.35

APPENDIX J. — Best1.C, columns 7 thru 12, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
TELEVISION					
NET 15's	0.00	0.00	< 2500	2,500	0
NET 30's	0.00	0.00	< 2500	2,500	0
CAB 15's	0.91	100.00	< 2500	2,400	3,032
CAB 30's	0.00	0.00	< 2500	2,500	0
LOC 15's	0.00	0.00	< 1000	1,000	0
LOC 30's	0.00	0.00	< 1000	1,000	0
TOTAL		100.00	< 100	0	3,032
AVG.		16.67			505
NEWSPAPER					
FULL PG.	0.42	25.00	< 500	475	529
HALF PG.	0.00	0.00	< 500	500	0
6X4" PG.	0.00	0.00	< 500	500	0
8X4" PG.	0.00	0.00	< 500	500	0
4 PG. INS.	0.00	0.00	< 500	500	0
6 PG. INS.	0.00	0.00	< 500	500	0
TOTAL		25.00	< 75	50	529
AVG.		4.17			88
WEEK MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	2.50	150.00	< 400	250	5,588
EXT. FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		150.00	< 150	0	5,588
AVG.		21.43			798

APPENDIX J. — Best1.C, columns 13 thru 18, rows 1 thru 3 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
TELEVISION					
NET 15's	0	0.00	< 2500	2,500	0
NET 30's	0	0.00	< 2500	2,500	0
CAB 15's	1	110.00	< 2500	2,390	3,335
CAB 30's	0	0.00	< 2500	2,500	0
LOC 15's	0	0.00	< 1000	1,000	0
LOC 30's	0	0.00	< 1000	1,000	0
TOTAL		110.00	< 100	-10	3,335
AVG.		18.33			556
NEWSPAPER					
FULL PG.	0	0.00	< 500	500	0
HALF PG.	0	0.00	< 500	500	0
6X4" PG.	0	0.00	< 500	500	0
8X4" PG.	0	0.00	< 500	500	0
4 PG. INS.	0	0.00	< 500	500	0
6 PG. INS.	0	0.00	< 500	500	0
TOTAL		0.00	< 75	75	0
AVG.		0.00			0
WEEK MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	2	120.00	< 400	280	4,470
EXT. FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		120.00	< 150	30	4,470
AVG.		17.14			639

APPENDIX J. — Best1.C, columns 1 thru 6, rows 4 thru 6 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
MNTH. MG.					
FR COVER	1,005	3.0	3,015	115.00	8.74
BK COVER	885	3.0	2,655	98.00	9.03
2nd PAGE	665	3.0	1,995	77.00	8.64
3rd PAGE	580	3.0	1,740	68.00	8.53
EXT.FLAP	825	1.0	845	95.00	8.68
TWO PAGE	605	2.0	1,210	75.00	8.07
ONE PAGE	535	2.0	1,070	38.50	13.90
TOTAL	5,100		12,510	566.50	65.58
AVG.	729		1,787	80.93	9.37
BUSN. MG.					
FR COVER	775	2.0	1,550	92.00	8.42
BK COVER	725	2.0	1,450	83.00	8.73
2nd PAGE	665	2.0	1,330	78.00	8.53
3rd PAGE	660	2.0	1,320	72.00	9.17
TWO PAGE	685	2.0	1,370	58.50	11.71
ONE PAGE	595	2.0	1,190	33.00	18.03
TOTAL	4,105		8,210	416.50	64.59
AVG.	684		1,368	69.42	10.77
CONS. MG.					
FR COVER	445	2.0	890	82.00	5.43
BK COVER	400	2.0	800	76.50	5.23
TWO PAGE	355	2.0	710	34.00	10.44
ONE PAGE	310	2.0	620	18.50	16.76
4PG. INS.	380	2.0	760	65.00	5.85
TOTAL	1,890		3,780	276.00	43.70
AVG.	378		756	55.20	8.74

APPENDIX J. — Best1.C, columns 7 thru 12, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
MNTH. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
EXT.FLAP	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
TOTAL		0.00	< 150	150	0
AVG.		0.00			0
BUSN. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
2nd PAGE	0.00	0.00	< 400	400	0
3rd PAGE	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	4.55	150.00	< 400	250	5,409
TOTAL		150.00	< 150	0	5,409
AVG.		25.00			902
CONS. MG.					
FR COVER	0.00	0.00	< 400	400	0
BK COVER	0.00	0.00	< 400	400	0
TWO PAGE	0.00	0.00	< 400	400	0
ONE PAGE	0.00	0.00	< 400	400	0
4PG. INS.	0.00	0.00	< 400	400	0
TOTAL		0.00	< 150	150	0
AVG.		0.00			0

APPENDIX J. — BEST1.C, columns 13 thru 18, rows 4 thru 6 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
MNTH. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
EXT.FLAP	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
TOTAL		0.00	< 150	150	0
AVG.		0.00			0
BUSN. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
2nd PAGE	0	0.00	< 400	400	0
3rd PAGE	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	4	132.00	< 400	268	4,760
TOTAL		132.00	< 150	18	4,760
AVG.		22.00			793
CONS. MG.					
FR COVER	0	0.00	< 400	400	0
BK COVER	0	0.00	< 400	400	0
TWO PAGE	0	0.00	< 400	400	0
ONE PAGE	0	0.00	< 400	400	0
4PG. INS.	0	0.00	< 400	400	0
TOTAL		0.00	< 150	150	0
AVG.		0.00			0

APPENDIX J. — Best1.C, columns 1 thru 6, rows 7 thru10 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
RADIO					
SPOT 15's	58	4.0	232	18.00	3.22
SPOT 30's	73	4.0	292	32.50	2.25
SP. NEWS	44	6.0	264	9.00	4.89
SP. REPORT	28	6.0	168	12.75	2.20
TOTAL	203		956	72.25	12.55
AVG.	51		239	18.06	3.14
OUTDOOR					
6M LEASE					
12X25	6	3.0	18	2.10	2.86
14X48	12	5.0	60	3.15	3.81
ROTARY PLAN					
12X25	12	3.0	36	15.60	0.77
14X48	18	5.0	90	17.40	1.03
TOTAL	48		204	38.25	6.47
AVG.	12		51	9.56	2.12
TRANSIT					
BUS CARD	45	4.0	180	22.25	2.02
POSTERS	65	2.0	130	36.50	1.78
TOTAL	110		310	58.75	3.80
AVG.	55		155	29.38	1.90
DIRECT MAIL					
LEAFLETS	5	1.0	5	0.60	8.33
BROCHURE	25	3.0	75	55.75	0.45
NEWSLETTER	12	1.0	12	2.25	5.33
TOTAL	42		92	58.60	14.12
AVG.	14		31	19.53	4.71

APPENDIX J. — Best1.C, columns 7 thru12, rows 7 thru10 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL IMPRSS.
RADIO					
SPOT 15's	0.00	0.00	< 150	100	0
SPOT 30's	0.00	0.00	< 150	100	0
SP. NEWS	8.33	75.00	< 150	75	2,200
SP. REPORT	0.00	0.00	< 150	100	0
TOTAL		75.00	< 75	0	2,200
AVG.		18.75			550
OUTDOOR					
6M LEASE					
12X25	0.00	0.00	< 200	200	0
14X48	59.92	187.50	< 200	12	3,571
ROTARY PLAN					
12X25	0.00	0.00	< 200	200	0
14X48	0.00	0.00	< 200	200	0
TOTAL		187.50	< 187.5	0	3,571
AVG.		46.88			893
TRANSIT					
BUS CARD	2.13	47.50	< 300	253	384
POSTERS	0.00	0.00	< 300	300	0
TOTAL		47.50	< 187.5	140	384
AVG.		23.75			192
DIRECT MAIL					
LEAFLETS	25.00	15.00	< 15	0	125
BROCHURE	0.00	0.00	< 200	200	0
NEWSLETTER	0.00	0.00	< 15	15	0
TOTAL		15.00	< 187.5	173	125
AVG.		5.00			42

APPENDIX J.— BEST1.C, columns 13 thru18, rows 7 thru10 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
RADIO					
SPOT 15's	0	0.00	< 150	100	0
SPOT 30's	0	0.00	< 150	100	0
SP. NEWS	8	72.00	< 150	78	2,112
SP. REPORT	0	0.00	< 150	100	0
TOTAL		72.00	< 75	3	2,112
AVG.		18.00			528
OUTDOOR					
6M LEASE					
12X25	0	0.00	< 200	200	0
14X48	59	185.85	< 200	14	3,540
ROTARY PLAN					
12X25	0	0.00	< 200	200	0
14X48	0	0.00	< 200	200	0
TOTAL		185.85	< 187.5	2	3,540
AVG.		46.46			885
TRANSIT					
BUS CARD	2	44.50	< 300	256	360
POSTERS	0	0.00	< 300	300	0
TOTAL		44.50	< 187.5	140	360
AVG.		22.25			180
DIRECT MAIL					
LEAFLETS	25	15.00	< 15	0	125
BROCHURE	0	0.00	< 200	200	0
NEWSLETTER	0	0.00	< 15	15	0
TOTAL		15.00	< 187.5	173	125
AVG.		5.00			42

APPENDIX J. — Best1.C, columns 1 thru 6, row11 of computer printout

	REACH 1,000's	FREQ.	IMPRSS. 1,000's	UNIT COST $1000's	C.P.M. $
MEDIA VARIABLES					
SPECIAL MEDIA					
DIRECTORY	100	3.0	300	520.00	0.19
CATALOGUE	20	3.0	60	11.50	1.74
BANNERS	1	1.0	1	11.85	0.08
MAPS	75	4.0	300	143.75	0.52
IMPRINTS					
T-SHIRTS	1	6.0	6	5.00	0.20
B. STICK	5	4.0	20	3.70	1.35
POSTERS	5	2.0	10	10.00	0.50
MENUS	1	1.0	1	4.35	0.23
KEYS	24	1.0	24	9.50	2.53
TOTAL	232		722	719.65	7.35
AVG.	26		80	79.96	0.82

APPENDIX J. — Best1.C, columns 7 thru 12, row 11 of computer printout

MEDIA VARIABLES	#OF UNITS SELECTED	TOTAL COST OF UNITS SELECTED $1,000's	CONSTRAINTS $ LIMIT	CONSTRAINTS NON-NEGATIVE	TOTAL IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0.00	0.00	< 1200	1,200	0
CATALOGUE	3.48	40.00	< 40	0	70
BANNERS	0.00	0.00	< 40	40	0
MAPS	1.01	90.00	< 600	510	51
IMPRINTS					
T-SHIRTS	6.00	30.00	< 30	0	24
B. STICK	8.11	30.00	< 30	0	81
POSTERS	3.00	30.00	< 30	0	30
MENUS	0.00	0.00	< 30	30	0
KEYS	3.16	30.00	< 30	0	76
TOTAL		250.00	< 250	0	332
AVG.		27.78			37

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
1,000.00	< 1000	0	21,169

APPENDIX J. — BEST1.C, columns 13 thru 18, row 11 of computer printout

MEDIA VARIABLES	#0F UNITS @INTEGER VALUE	TOTAL @INT. RECALC. UNIT COST	CONSTRAINTS $ LIMIT	NON-NEGATIVE	TOTAL RECALC. IMPRSS.
SPECIAL MEDIA					
DIRECTORY	0	0.00	< 1200	1,200	0
CATALOGUE	3	34.50	< 40	0	60
BANNERS	0	0.00	< 40	40	0
MAPS	1	88.75	< 600	510	50
IMPRINTS					
T-SHIRTS	6	30.00	< 30	0	24
B. STICK	8	29.60	< 30	0	80
POSTERS	3	30.00	< 30	0	30
MENUS	0	0.00	< 30	30	0
KEYS	3	28.50	< 30	0	72
TOTAL		241.35	< 250	9	316
AVG.		26.82			35

BUDGET SPENT $1,000's	BUDGET LIMIT $1,000's	TOTAL NET BUDGET	TOTAL IMPRSS. 1,000's
920.70	1,000	79	19,018