USER GUIDE

TO

FAMILY PLANNING PROGRAM IMPACT MODEL

AND

FAMILY PLANNING PROGRAM COST-BENEFIT MODEL

MICROCOMPUTER-BASED MODELS

DEVELOPED BY

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UNDER THE

INTEGRATED POPULATION AND DEVELOPMENT PLANNING PROJECT - II

RESEARCH TRIANGLE INSTITUTE

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Table of Contents

Chapter 1: Introduction ................................................................. 1
   1.1 Description of the Famplan Model ........................................ 1
   1.2 Organization of the Manual ............................................... 2

Chapter 2: Methodology of the FAMILAN Model ................................. 3
   2.1 Description of FAMILAN Model .......................................... 3
   2.2 Family Planning Program Impact Model ................................ 3
      2.2.1 Calculating Continuing Users from Annual Acceptors .......... 3
      2.2.2 Calculating Age-specific Contraceptive Prevalence Rates ...... 6
      2.2.3 Calculating Age-specific Fertility Rates ....................... 7
      2.2.4 Projecting the Population ....................................... 9
   2.3 Cost-Benefit Family Planning Program Model (BCAM) ................. 9
      2.3.1 Sectoral Expenditures .......................................... 9
      2.3.2 Demographic Comparisons ..................................... 13
      2.3.3 Financial Implications ........................................ 14
      2.3.4 Quality of Service Indexes .................................... 15

Chapter 3. Installing and Implementing FAMILAN in Host .................... 18
   3.1 Introduction .................................................................. 18
   3.2 Hardware and Software Requirements .................................. 19
      3.2.1 Required and Recommended Hardware ........................... 19
      3.2.2 Required Software ................................................ 19
   3.3 Installing Host and FAMILAN on Microcomputer ...................... 22
      3.3.1 Review of DOS Commands to be used in the Installation Process 22
      3.3.2 Installing Host and FAMILAN software ........................ 23
   3.4 Using Host to Implement the FAMILAN Model ......................... 27
      3.4.1 Accessing FAMILAN ............................................... 27
      3.4.2 Using Host to Implement Famplan ............................... 28
         3.4.2.1 General Characteristics of Host .......................... 28
         3.4.2.2 The Basic Modelling Tasks ................................. 31
Chapter 4. Summary of Steps for Implementing the Famplan Model

4.1 Introduction

4.2 Steps for Implementing the Famplan Model

4.3 Input Variables in Famplan Model

4.4 Output Variables in Famplan Models
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Chapter 1: Introduction

1.1 Description of the Famplan Model

The Host-based FAMPLAN Model is composed of two models: the Family Planning Program Impact Model and the Benefit-Cost Analysis of the Family Planning Program Model. The Family Planning Program Impact Model (FPPIM), a stand-alone model, calculates the impact of an annual account of new acceptors of family planning programs on the contraceptive prevalence rates and age-specific fertility rates. The age-specific fertility rates are used in an integrated population projection model in the FPPIM to calculate births, age structure and population size, as well as other demographic statistics. An identical process is applied to calculate the hypothetical consequences of no family planning program on the same outputs to make comparative analyses of the two scenarios. This is achieved by assuming that there are no, or only some proportion of the actual, annual new acceptors of modern family planning methods during the period of analysis. The Benefit-Cost Analysis of the Family Planning Program Model (BCAM) requires two population projections, actual (with a family planning program) and hypothetical (without the family planning program), both generated by the FPPIM. The BCAM measures the impact of the family planning program on government expenditures by comparing actual and hypothetical expenditures in several social sectors. The internal rate of return on the investment in the family planning program and the benefit-cost ratio, a ratio of savings due to the family planning program to the costs of the family planning program are calculated. FAMPLAN projects the impact of Family Planning Programs and the Benefit-Cost Analysis over time for a maximum of thirty years.

The FPPIM is designed to be a comparative analysis of two scenarios of levels of family planning programs. A base set of assumptions is made to illustrate the hypothetical situation of having no active family planning program. This case is hypothetical in that the countries in which this model has been applied have established family planning programs at the national level. The comparative set of assumptions are developed to reflect the actual history and projected course of the family planning program.

The population projection is integrated into the FPPIM. It provides the users with single-year age population data on an annual basis. The methodology of the population projection will not be described in detail but the data requirements for that portion of the model will be described in the chapter on implementing the FAMPLAN model under Host.

The FAMPLAN Model was designed to be used on an IBM or IBM-compatible microcomputer and implemented under Host, a software modelling "shell" developed at RTI. The methodology used in the model was translated into a Turbo-Pascal program, the same language in which Host was written.
1.2 Organization of the Manual

The user manual for the FAMPLAN model describes the methodology of the model in Chapter 2. Software and hardware required to run the model and how to use the model on a microcomputer, e.g. run simulations under various assumptions and view and print the results are presented in Chapter 3. Chapter 4 provides a step-by-step summary of the implementation of the model on the microcomputer.
Chapter 2: Methodology of the FAMPLAN Model

2.1 Description of FAMPLAN Model

The FAMPLAN Model is composed of two distinct models: the Family Planning Program Impact Model (FPPIM) and the Benefit-Cost Analysis of the Family Planning Program Model (BCAM). The FPPIM may be implemented separately from the BCAM, but the BCAM requires output generated by the FPPIM.

2.2 Family Planning Program Impact Model

In the FPPIM, age-specific fertility rates are calculated from the number of annual acceptors of each contraceptive method through a series of relationships in which the number of continuing users by method and age and age-specific and total contraceptive prevalence rates are also calculated. The projected annual age-specific fertility rates are used in an integrated population projection model to project the population for the next time period. Each series of calculations is described in detail.

2.2.1 Calculating Continuing Users from Annual Acceptors

To calculate the number of continuing users by method and by age from the number of annual new acceptors of family planning methods the following intermediate calculations are required.

The annual number of new acceptors in the national family planning program of family planning methods (ACPT) are first adjusted for a substitution effect of acceptors who would practice family planning in absence of a government program (equation 1). The substitution effect coefficient (SUBSTITU), a coefficient that accounts for acceptors of private sources of contraceptives or the substitution effect of acceptors of family planning methods in the absence of a national program, is applied to the number of annual acceptors of contraceptive methods to calculate the adjusted number of new acceptors of family planning methods (ADJUACPT).

The number of new acceptors and the substitution effect coefficient by method and year of acceptance is required input for every year of the projection. The substitution effect coefficient is expressed as a number between 0 and one.

\[ \text{ADJUACPT}(m,T) = \text{SUBSTITU}(m,T) \times \text{ACPT}(m,T) \]

where:

- \( \text{ADJUACPT}(m,T) \) = Adjusted acceptors of the mth method in the j to j+4 group in year T
- \( \text{SUBSTITU}(m,T) \) = Substitution Effect Coefficient
- \( \text{ACPT}(m,T) \) = Number of annual acceptors of contraceptive methods
and where:

\( m \) = Methods of contraception  
\( T \) = Year of acceptance of contraceptive method

The distribution by fertile age-groups of acceptors of family planning methods (AGEDIST) is applied to the adjusted number of annual new acceptors to give the age-specific number of new acceptors of family planning methods (ASACPT) (equation 2).

The age-group distribution of acceptors of family planning methods (AGEDIST), expressed as a decimal, is required input for every year of the projection.

\[
(2) \quad \text{ASACPT}(m,j,T) = \text{ADJUACPT}(m,T) \times \text{AGEDIST}(m,j,T)
\]

where:

\( \text{ASACPT}(m,j,T) \) = Acceptors of contraceptive methods by five-year fertile age group in year \( T \)

\( \text{AGEDIST}(m,j,T) \) = Proportion of five-year fertile age group using each contraceptive method

and where:

\( j \) = Five-year age group, \( j = 15, 20, 25, 30, 35, 40, 45 \)

A decay function is applied to the adjusted number of annual acceptors to calculate the continuing users in each method (CONACPT). In equation 3, the parameter INITIAL takes into consideration the distribution of acceptors over the twelve month period and determines the proportion of initial acceptor who would have impact on fertility during the first year of acceptance. The five-year age-group continuing acceptors are converted to single age continuing acceptors (CONSIN) in equation 4.

If \( t = T \), then

\[
(3) \quad \text{CONACPT}(m,j,T,t) = \text{INITIAL}(m) \times [\text{ASACPT}(m,j,T) \times \text{ALPHADEC}(m,j)]
\]

If \( t > T \), then

\[
(3a) \quad \text{CONACPT}(m,j,T,t) = \text{ASACPT}(m,j,T) \times \text{ALPHADEC}(m,j) \times \exp \left[ -\text{BETADEC}(m,j) \times (t-T) \right]
\]

(4) \quad \text{CONSIN}(m,h,T,t) = 1/5 \times \text{CONACPT}(m,j,T,t)
where:

\[ \text{CONACPT}(m,j,T,t) = \text{Continuing users of the } m\text{th method in year } t \text{ who started in year } T \text{ and were in the age group } j \text{ to } j+4 \text{ in year } T \]

\[ \*INITIAL(m) = \text{Parameter value for determining proportion of annual acceptors who would have impact on fertility in the initial year} \]

\[ \*\text{ALPHADEC}(m,j) = \text{Alpha parameter in decay function} \]

\[ \*\text{BETADEC}(m,j) = \text{Beta parameter in decay function} \]

\[ \text{CONSIN}(m,h,T,t) = \text{Continuing users of method } m \text{ in year } t \text{ by single age } h \text{ at time of acceptance and the year of acceptance} \]

and where:

\[ t = \text{year of the projection} \]

This single age cohort of annual acceptors in each year of the projection that continues using in subsequent years is converted to the total number of users of each method\((m)\) at their current age\((k)\) in each year of the projection\((t)\) in equation 5.

\[ \text{min}[k-15:t-1971] \]

\[ \text{CONUSER}(m,k,t) = \sum_{b=0} \text{CONSIN}(m,k-b,t-b,t) \]

where:

\[ \text{CONUSER}(m,k,t) = \text{Total number of users of method } m \text{ at current age } k \text{ in year } t \]

and where:

\[ k = \text{Current age of user} \]

Age-group and method-specific users in each year of the projection are calculated from the total number of continuing users calculated in the previous equation by summing over appropriate dimensions of the continuing users, i.e. current single age\((k)\), and age and method specific users, i.e. methods\((m)\) and age-group\((j)\).

\[ \text{AMSUSER}(m,j,t) = \sum_{k=j}^{j+4} \text{CONUSER}(m,k,t) \]

\[ \text{MSUSER}(m,t) = \sum_{j=15}^{45} \text{AMSUSER}(m,j,t) \]
where:

AMSUSER(m,j,t) = Age and method specific users in year t
MSUSER(m,t) = Method-specific users in year t
ASUSER(j,t) = Age-specific users in year t

2.2.2 Calculating Age-specific Contraceptive Prevalence Rates

The calculation of age-specific contraceptive prevalence rates in each year requires the number of women in the fertile age groups which is an output from the population projection. In the first year of the projection, the initial population is exogeneous. The age-specific proportions of married women of reproductive age (ASPROPMA), expressed as decimals, are applied to the number of women of reproductive age (ASWOMEN) to obtain the number of married women of reproductive age in each fertile age group (ASMAWOMEN) in each year of the projection (equation 9). The total number of contraceptive users in each fertile age-group divided by the age-specific number of married women of reproductive age gives the contraceptive prevalence rates for each fertile age-group (equation 10). The annual overall contraceptive prevalence rate is then calculated from the age-specific contraceptive prevalence rates (equation 11).

The number of married women of reproductive age is provided by the population projection which is integrated in the FPPI model. The age-specific proportion of married women of reproductive age which is required for every year of the projection is exogeneous to the model.

\[
(9) \quad ASMAWOMEN(j,t) = ASWOMEN(j,t) \times ASPROPMA(j,t)
\]

\[
(10) \quad ASPREVA(j,t) = ASUSER(j,t) / ASMAWOMEN(j,t)
\]

\[
(11) \quad PREVALEN(t) = \sum_{j} ASUSER(j,t) / \sum_{j} ASMAWOMEN(j,t)
\]

where:

ASMAWOMEN(j,t) = Number of married women in the j to j+4 group in year t
**ASWOMEN(j,t) = Number of women in the j to j+4 group in year t
*ASPROPMA(j,t) = Proportion of married women of reproductive age in five year fertile age-groups
ASPREVA(j,t) = Age-specific contraceptive prevalence rates in year t
PREVALEN(t) = Total contraceptive prevalence rates in year t
2.2.3 Calculating Age-specific Fertility Rates

Based on Bongaarts' approximate determinants of fertility model, age-specific contraceptive effectiveness, an index of contraception and an index of post-partum infecundability, and the age-specific fertility rates are calculated in a series of equations in each year of the projection.

First the proportion of contraceptive users in each five-year fertile age group using each method (ASMDIST) is calculated by dividing the age- and method-specific users by the age-specific users (equation 12).

The age-specific contraceptive effectiveness is calculated annually for each fertile age-group (equation 13). The product of the contraceptive effectiveness level for each method and the proportion of contraceptive users in each five-year fertile age group using each method is summed over the different methods to give the age-specific overall contraceptive effectiveness.

The effectiveness of each method included in the analysis, expressed as a decimal, is a required parameter in the model.

\[
(12) \quad \text{ASMDIST}(m,j,t) = \frac{\text{AMSUSER}(m,j,t)}{\text{ASUSER}(j,t)}
\]

\[
(13) \quad \text{ASAVEF}(j,t) = \sum_{m=1}^{M} \text{ASMDIST}(m,j,t) \times \text{EFFECT}(m)
\]

where:

- \text{ASMDIST}(m,j,t) = \text{Proportion of users of each method for each fertile age-group}
- \text{ASAVEF}(j,t) = \text{Overall contraceptive effectiveness for each fertile age-group}
- \text{EFFECT}(m) = \text{Effectiveness level for each contraceptive method, expressed as a decimal}

The index of contraception for each five-year fertile age-group (ASCC) is calculated in each time period from the product of the sterility coefficient (STERCOEF) of each fertile age-group parameter, the age-specific contraceptive prevalence rates, and the age-specific contraceptive effectiveness rates (equation 14).

\[
(14) \quad \text{ASCC}(j,t) = 1 - \text{STERCOEF}(j) \times \text{ASPREVA}(j,t) \times \text{ASAVEF}(j,t)
\]

where:

- \text{ASCC}(j,t) = \text{Index of contraception}
- \text{STERCOEF}(j) = \text{Sterility coefficient for each fertile age-group}
- \text{ASPREVA}(j,t) = \text{Age-specific contraceptive prevalence rate for each fertile age-group}
ASAVEF(j,t) = Age-specific contraceptive effectiveness for each fertile age-group

The index of contraception is required in the calculation of the age-specific fertility rates for each year. For the calculation of the index of contraception in the year 1970, the ASPREVA for 1970 is a given and the ASAVEF for 1970 is set equal to the 1971 values.

The index of postpartum infecundability for each fertile age-group is required for the calculation of the age-specific fertility rates. This index must also be calculated for 1970, the year prior to the first year of the projection of the model. Depending on data availability, two options are provided for calculating this index.

If the duration of breastfeeding (BRFEED), which is expressed in the number of months the mother breastfeeds, is available then these values are substituted into an intermediary relationship (equation 15). The result of this calculation, POSTINFE, is the duration of postpartum infecundability, expressed in the number of months of infecundability following birth, and is used to calculate the index of postpartum infecundability (ASCI) (equation 16). If the duration of postpartum infecundability, which is expressed in months, for each fertile age-group (POSTINFE) is available then this value may be substituted directly into equation 16.

The duration of breastfeeding or the duration of postpartum infecundability is required input for each period of the projection and the year prior to the first year of the projection.

(15) \[ \text{ASCI}(j,t) = 20 / (18.5 + \text{POSTINFE}(j,t)) \]

(16) \[ \text{POSTINFE}(j,t) = 1.753 \times \exp\left[ .1396 \times \text{BRFEED}(t) - .001872 \times \text{BRFEED}(t) \times \text{BRFEED}(t) \right] \]

where:

ASCI(j,t) = Index of post partum infecundability for each fertile age-group
POSTINFE(j,t) = Duration of postpartum infecundability for each fertile age-group
BRFEED(t) = Duration of breastfeeding

Age-specific fertility rates are calculated according to the relationship in equation 17 for every year of the projection (ASFR). The calculation requires results from the previous calculations as well as the age-specific fertility rates and the age-specific proportion of married women of reproductive age from the previous year.
\[
\text{ASFR}(j,t) = \text{ASFR}(j,t-1) \times \frac{[\text{ASPROPMA}(j,t)/\text{ASPROPMA}(j,t-1)]}{[\text{ASCI}(j,t)/\text{ASCI}(j,t-1)]} \times \frac{[\text{ASCC}(j,t)/\text{ASCC}(j,t-1)]}{[\text{ASCI}(j,t)/\text{ASCI}(j,t-1)]}
\]

\begin{align*}
\text{ASFR}(j,t) & = \text{Age-specific fertility rates in year } t \\
\text{ASFR}(j,t-1) & = \text{Age-specific fertility rates in year } t-1 \\
\text{ASPROPMA}(j,t) & = \text{Age-specific proportion of married women of reproductive age in year } t \\
\text{ASPROPMA}(j,t-1) & = \text{Age-specific proportion of married women of reproductive age in year } t-1 \\
\text{ASCC}(j,t) & = \text{Index of contraception in year } t \\
\text{ASCI}(j,t) & = \text{Index of postpartum Infecundability in year } t \\
\text{ASCC}(j,t-1) & = \text{Index of contraception in year } t-1 \\
\text{ASCI}(j,t-1) & = \text{Index of postpartum infecundability in year } t-1
\end{align*}

2.2.4 Projecting the Population

The calculated age-specific fertility rates are used in a population projection for the current year. The primary outputs of the population projection that are used in the family planning program impact portion of the model are the number of married women of reproductive age and the population. The number of births, under the two family planning program scenarios, may be compared in the FPPIM. The school-age and total population and the number of births are required for appropriate calculations in the BCAM.

2.3 Cost-Benefit Family Planning Program Model (BCAM)

In the Benefit-Cost Analysis of the Family Planning Program Model (BCAM) government expenditures are first calculated for each sector in the analysis under each family planning program scenario: with and without a family planning program. Comparative financial implications of the two scenarios are then calculated. The financial measures include the benefit-cost ratio, the net savings of government expenditures due to the family planning program, and the internal rate of return on the government investment in the family planning program. Two principal demographic comparative measures are calculated, births averted and percentage reduction in fertility rates. Indexes of the quality of service in each social service sector are calculated as well as the differences in the quality of service in each sector under two scenarios representing the different levels of a family planning program. The series of calculations will be described in detail.

2.3.1 Sectoral Expenditures

Sectoral expenditures are calculated annually and require the appropriate population data, from the population projection under both the with and without family planning program scenarios, and per capita capital
and current government expenditure in each sector. Sectoral expenditures in four sectors have been developed for the current version of the BCAM: education, health, social welfare and food subsidy.

Educational Expenditures

The number of students and educational expenditures by level of education are calculated annually. Enrollment rates for each level of school are multiplied by the projected number of students in the that level to give the number of students by level of education. Education expenditures are calculated based on the number of students in the primary and two levels of secondary school and the per capita current and capital expenditures in each year of the projection. To calculate the annual government expenditures on education for each level of school the per capita current government expenditure is multiplied by the number of students and added to the product of the per capita current government expenditure and the difference between the enrollment projected for the next year and the projected enrollment in the current year. Similar equations for the two levels of secondary schools complete the calculations for the projected number of students and expenditures by level of education.

(18) $PRSTUDENT(t) = POP510(t) \times PRENROLL(t)$

(19) $PRDEXPE(t) = PRSTUDENT(t) \times PRCURPE(t) + [PRSTUDENT(t+1) - PRSTUDENT(t)] \times PRCAPPE(t)$

$PRSTUDENT(t) =$ Primary school students in year $t$
$PRDEXPE(t) =$ Primary school educational expenditures in year $t$
$POP510(t) =$ Population for primary school aged children, age 5 - 10, (the ages for each level may be specified by user)
$PRENROLL(t) =$ Enrollment rate for primary school

(20) $JHSTUDENT(t) = POP1115(t) \times JHENROLL(t)$

(21) $JHEDEXPE(t) = JHSTUDENT(t) \times JHCURPE(t) + [JHSTUDENT(t+1) - JHSTUDENT(t)] \times JHCAPPE(t)$

where:

$JHSTUDENT(t) =$ Number of students in junior high school (first level secondary) in year $t$
$POP1115(t) =$ Population of age 11 to 15
$JHENROLL(t) =$ Junior high school enrollment rate in year $t$
$JHEDEXPE(t) =$ Education expenditures in junior high school (first level secondary) in year $t$
$JHSTUDENT(t) =$ Number of students in junior high school (first level secondary) in year $t$
$JHSTUDENT(t+1) =$ Number of students in junior high school (first level secondary) in year $t+1$
$JHCURPE(t) =$ Junior high school per student current expenditures
$JHCAPPE(t) =$ Junior high per capita capital expenditures in year $t$
(22) \( \text{SHSTUDENT}(t) = \text{POP1115}(t) \times \text{SHENROLL}(t) \)

(23) \( \text{SHEDEXPE}(t) = \text{SHSTUDENT}(t) \times \text{SHCURPE}(t) + [\text{SHSTUDENT}(t+1) - \text{SHSTUDENT}(t)] \times \text{SHCAPPE}(t) \)

where:

\( \text{SHSTUDENT}(t) \) = Number of students in senior high school (second level secondary) in year \( t \)

\( \text{POP1617}(t) \) = Population of 16 to 17 year olds

\( \text{SHENROLL}(t) \) = Senior high school enrollment rate in year \( t \)

\( \text{SHEDEXPE}(t) \) = Education expenditures in senior high school (second level secondary) in year \( t \)

\( \text{SHSTUDENT}(t) \) = Number of students in senior high school (second level secondary) in year \( t \)

\( \text{SHCURPE}(t) \) = Senior high school per student current expenditures

\( \text{SHSTUDENT}(t+1) \) = Number of students in senior high school (second level secondary) in year \( t+1 \)

\( \text{SHCAPPE}(t) \) = Senior high per capita capital expenditures in year \( t \)

Total education expenditures is simply the sum of the expenditures for all levels of education (equation 24).

(24) \( \text{TOTEDEX}(t) = \text{PREDEXPE}(t) + \text{JHEDEXPE}(t) + \text{SHEDEXPE}(t) \)

\( \text{TOTEDEX}(t) \) = Total education expenditure in year \( t \)

\( \text{PREDEXPE}(t) \) = Primary education expenditures in year \( t \)

\( \text{JHEDEXPE}(t) \) = Junior high (first level secondary) education expenditures in year \( t \)

\( \text{SHEDEXPE}(t) \) = Senior high (second level secondary) education expenditures in year \( t \)

Expenditures in other sectors are calculated using the same methodology as the education expenditures. The difference is that in other sectors the expenditure level is related to total population, not just school-age specific population. In the current version of the model, the health and social services expenditures are calculated (equations 25 and 26).

Health Expenditure

(25) \( \text{TOTHEEX}(t) = \text{POPULATE}(t) \times \text{ECURPE}(t) + [\text{POPULATE}(t+1) - \text{POPULATE}(t)] \times \text{HECAPPE}(t) \)

where:

\( \text{TOTHEEX}(t) \) = Total health expenditures in year \( t \)

\( \text{POPULATE}(t) \) = Total population in year \( t \)

\( \text{POPULATE}(t+1) \) = Total population in the next year, \( t+1 \)

\( \text{ECURPE}(t) \) = Per capita current expenditures in the health sector

\( \text{HECAPPE}(t) \) = Per capita capital expenditures in the health sector
Other Social Service Expenditure

(26) \[ \text{TOTSSEX}(t) = \text{POPULATE}(t) \times \text{SSCURPE}(t) + [\text{POPULATE}(t+1) - \text{POPULATE}(t)] \times \text{SSCAPPE}(t) \]

where:

\text{TOTSSEX}(t) = \text{Total social services expenditures in year } t \\
\text{POPULATE}(t) = \text{Total population in year } t \\
\text{POPULATE}(t+1) = \text{Total population in the next year, } t+1 \\
\text{SSCURPE}(t) = \text{Per capita current expenditures in the social services sector} \\
\text{SSCAPPE}(t) = \text{Per capita capital expenditures in the social services sector}

In other sectors or population-related programs where only a proportion of the population is affected, expenditures are calculated based on that proportion. Current expenditures may be the only appropriate expenditures to include in the analysis for some sectors or programs. The food subsidy program that is included in the current version of the model is such a program. Food subsidies are usually only distributed to a portion of the population and capital expenditures are not incurred to a major extent in such a program.

Food Subsidy

The proportion of the population receiving food subsidies (FOODAID) is first multiplied by the total population (POPULATE) to give the number of food subsidy recipients each year (FDRECIPI) (equation 27). The total food subsidy expenditures (TOTFDEX) is simply the product of the per capita current expenditure on the food subsidy program (FDCURPE) and the number of food subsidy recipients (equation 28).

(27) \[ \text{FDRECIPI}(t) = \text{POPULATE}(t) \times \text{FOODAID}(t) \]
(28) \[ \text{TOTFDEX}(t) = \text{FDRECIPI}(t) \times \text{FDCURPE}(t) \]

\text{FDRECIPI}(t) = \text{Number of food subsidy recipients in year } t \\
\text{POPULATE}(t) = \text{Total population in year } t \\
\text{FOODAID}(t) = \text{Proportion of population receiving food subsidies} \\
\text{TOTFDEX}(t) = \text{Total food subsidy expenditures in year } t \\
\text{FDCURPE}(t) = \text{Per capita current expenditure for food subsidy program}

Finally, total government expenditures in all population related sectors and/or program are summed (equation 29).
\[ \text{TOTAEXP}(t) = \text{TOTEDEX}(t) + \text{TOTHEEX}(t) + \text{TOTSSEX}(t) + \text{TOTFDEX}(t) \]

where:

\[ \text{TOTAEXP}(t) = \text{Total expenditures in year } t \]

Major outputs of the benefit-cost analysis model include the comparative financial, demographic, and quality of service measures. The total expenditures for the social sectors which are calculated for each family planning scenario are used in the calculations of the comparative financial measures, the benefit-cost ratio, the net savings due to the family planning program and the internal rate of return on the government investment in the family planning program. The population projections for two family planning program scenarios generated in the FPPIM are used to calculate the comparative demographic measures, the annual number of births averted and the cumulative number of births averted and the percentage reduction in age-specific and total fertility rates due to the family planning program. The expenditures in the social services sectors expenditures and the projected population are used to calculate the difference in the quality of service index in the two family planning program scenarios for each social service sector in each year of the projection.

2.3.2 Demographic Comparisons

Output from the population projections under the two family planning program scenarios are used to calculate the comparative demographic measures. The number of births averted due to the family planning program is simply the difference in the number of births under two family planning program scenarios (equation 34). The cumulative number of births is also calculated (CBIRTHAVT) (equation 35).

\[ \text{BIRTHAVT}(t,1) = \text{BIRTH}(t,2) - \text{BIRTH}(t,1) \]

where:

\[ \text{BIRTHAVT}(t,1) = \text{Births Averted by FPP} \]
\[ \text{BIRTH}(t,s) = \text{Number of births in year } t \text{ in each scenario } s \ (1,2) \]

\[ \text{CBIRTHAVT}(t) = \text{CBIRTHAVT}(t-1) + \text{BIRTHAVT}(t) \]

where:

\[ \text{CBIRTHAVT}(t) = \text{Cumulative births averted due to family planning program in current year } t \]
\[ \text{CBIRTHAVT}(t-1) = \text{Cumulative births averted due to family planning program in previous year, } t-1 \]
The percentage of births averted due to FPP (PERCBIAV) is calculated as a percentage of the total births calculated under the no FPP scenario (equation 36).

\[
(36) \quad \text{PERCBIAV}(t) = \frac{\text{BIRTHAVT}(t,1)}{\text{BIRTH}(t,2)}
\]

where:

\[
\text{PERCBIAV}(t) = \text{Percentage of births averted due to FPP}
\]

The percentage of the reduction in fertility rates as the result of the FPP is calculated for total fertility rates and age-specific fertility rates.

\[
(37) \quad \text{PERCTFR}(t) = \frac{\text{TFR}(t,2) - \text{TFR}(t,1)}{\text{TFR}(t,2)}
\]

\[
(38) \quad \text{PERCASFR}(j,t) = \frac{\text{ASFR}(j,t,2) - \text{ASFR}(j,t,1)}{\text{ASFR}(j,t,2)}
\]

where:

\[
\text{PERCTFR}(t,1) = \text{Percentage reduction in total fertility rate as a result of FPP}
\]

\[
\text{TFR}(t,s) = \text{Total fertility rate for each scenario s}
\]

\[
\text{PERCASFR}(j,t,s) = \text{Percentage reduction in age-specific fertility rate as a result of FPP for each scenario s}
\]

\[
\text{ASFR}(j,t,s) = \text{Age-specific fertility rate for each scenario s}
\]

2.3.3 Financial Implications

To calculate the benefit-cost ratio, first the difference in the total expenditures in the social services sectors is calculated (equation 30). This difference is considered the benefits, in terms of savings in government expenditures, of having an active family planning program (BENEFP). The benefits incurred each year are then discounted to the first year of the projection, 1971, and divided by the government expenditures on the family planning program that are incurred each year (FPPEXP) which are also discounted to the first year of the projection (equation 31). Since the choice of the discount rate is sometimes a sensitive issue, the model allows the use of up to three different discount rates to be used in the calculation of the benefit-cost ratio.

The gross savings in expenditures on social services programs to the government, or the benefits (BENEFPC), were calculated in equation 30. The net savings to the government for expenditures in the social services sectors takes into account the government expenditures or cost of the family planning program and is the difference of the gross savings to the government due to the family planning program (BENEFPC) minus the government expenditures on the family planning program (FPPEXP) (equation 32).
(30) \[ \text{BENEFFPP}(t) = \text{TOTALEXP}(t,2) - \text{TOTALEXP}(t,1) \]

(31) \[ \text{BENECOST}(t) = \sum_{1971}^{t} \frac{\text{BENEFFPP}(t)}{(1+r)} / \sum_{1971}^{t} \frac{\text{FPPEXP}(t)}{(1+r)} \]

(32) \[ \text{NETSAV}(t) = \text{BENEFFPP}(t) - \text{FPPEXP}(t) \]

where:

- in the subscripts, or variable dimensions, 1 refers to the scenario of having a family planning program and 2 refers to the scenario of no family planning program.
- (should leave this definition broader for generation of sensitivity analyses)

and,

- \text{BENEFFPP}(t) = \text{Benefits, or savings in government expenditures on social services due to a family planning program}
- \text{TOTALEXP}(t,2) = \text{Total government expenditures in the social services sectors in the current year } t \text{ under the scenario of having no family planning program}
- \text{TOTALEXP}(t,1) = \text{Total government expenditures in the social services sectors in the current year } t \text{ under the scenario of having family planning program}
- \text{BENECOST}(t) = \text{Benefit-Cost Ratio}
- \text{FPPEXP}(t) = \text{Total family planning programs expenditures in year } t
- \text{r} = \text{Discount rate for the benefit-cost ratio}
- \text{NETSAV}(t,1) = \text{Net savings on social services programs to government due to family planning program in the current year } t

The internal rate of return is the discount rate which makes the difference of the sum of discounted gross benefits and the sum of discounted family planning program expenditures equal zero (equation 33).

(33) \[ \sum_{1971}^{t} \left[ \frac{\text{BENEFFPP}(t,1)}{(1+r)} - \frac{\text{FPPEXP}(t)}{(1+r)} \right] = 0 \]

2.3.4 Quality of Service Indexes

The quality of service indices are calculated in a similar manner for each of the social service sectors in the analysis. The index is a ratio of the total government expenditures in that sector to the population affected by the social sector. The quality of education index is a ratio of the total expenditure on education to the total number of students in all levels
of education in the analysis (equation 39, 40), but the quality of health and social services index is the ratio of total government expenditures in the respective sectors to the total population (equations 42, 44). The differences in the quality of the services are calculated from the quality of service indexes for each scenario (equations 41, 43, 45).

\[ \text{(39)} \quad \text{QUALEDUC}(t,2) = \frac{\text{TOTEDEX}(t,2)}{\text{STUDENT}(t,2)} \]
and
\[ \text{QUALEDUC}(t,1) = \frac{[\text{TOTEDEX}(t,2)+\text{EXPFP*PROPORTE}]}{\text{STUDENT}(t,1)} \]

where:

\[ \text{(40)} \quad \text{STUDENT}(t,s) = \text{PRSTUDENT}(t,s) + \text{JHSTUDENT}(t,s) + \text{SHSTUDENT}(t,s) \]

and,

\( s \), the scenario subscript, when set to 1 represents the scenario of no family planning program and when set to 2 represents the scenario with a family planning program.

and,

\( \text{QUALEDUC}(t,s) = \text{Quality of service in the education sector in each scenario s} \)

\( \text{STUDENT}(t,s) = \text{Total number of students in all education levels in each scenario s} \)

\( \text{PROPORTE} \quad = \text{Proportion of educational expenditure in total social services expenditure} \)

\[ \text{(41)} \quad \text{DIFQUAED}(t) = \text{QUALEDUC}(t,2) - \text{QUALEDUC}(t,1) \]

where:

\( \text{DIFQUAED}(t) = \text{Difference in the quality of service in education under the two scenarios} \)

Similarly,

\[ \text{(42)} \quad \text{QUALHEAL}(t,2) = \frac{\text{TOTHEEX}(t,2)}{\text{TOTALPOP}(t,2)} \]
and
\[ \text{QUALHEAL}(t,1) = \frac{[\text{TOTHEEX}(t,2)+\text{EXPFP*PROPORTH}]}{\text{TOTALPOP}(t,1)} \]

where:

\( \text{QUALHEAL}(t,s) = \text{quality of service in the health sector under the two scenarios} \)

\[ \text{(43)} \quad \text{DIFQUAHE}(t) = \text{QUALHEAL}(t,2) - \text{QUALHEAL}(t,1) \]
where:

\[ \text{DIFQUAED}(t) = \text{Difference in the quality of service in education under the two scenarios} \]

Also,

\[ (44) \quad \text{QUALSSER}(t,2) = \frac{\text{TOTSSEX}(t,2)}{\text{TOTALPOP}(t,2)} \]

and

\[ \text{QUALSSER}(t,1) = \frac{\text{TOTSSEX}(t,2) + \text{EXPFPP} \times \text{PROPORTS}}{\text{TOTALPOP}(t,1)} \]

where:

\[ \text{QUALSSER}(t,s) = \text{Quality of service in social welfare programs under the two scenarios} \]

\[ \text{TOTSSEX}(t,s) = \text{Total expenditure in the social welfare programs under the two scenarios} \]

\[ (45) \quad \text{DIFQUASS}(t) = \text{QUALSSER}(t,2) - \text{QUALSSER}(t,1) \]

where:

\[ \text{DIFQUASS}(t) = \text{Difference in the quality of service in social welfare programs under the two scenarios} \]
Chapter 3. Installing and Implementing FAMPLAN in Host

3.1 Introduction

To implement the model on a microcomputer, the methodology was translated into a computer program written in the Turbo-Pascal language for use under Host, a specially developed modelling environment software package.

The FPPIM may be implemented separately, but the BCAM requires input from the FPPIM. In managing and running either model, three basic tasks are necessary: data entering and editing, running the application or model and generating the results.

The Host system provides the environment for maintaining and implementing FAMPLAN. Host is a modeling environment much like Lotus 1-2-3, another popular microcomputer application software package, is an accounting environment.

Assumptions about the family planning program are represented by the values of the input data for variables in model. Several data sets representing different sets of assumptions about the family planning program may be compiled into separate data sets, which can be run through the model and the different results compared.

The two data files, FPP and NOFPP, initially supplied for the FPPIM software represent two sets of assumptions about the family planning program. FPP is a data file with data values that reflect the actual historical situation and the proposed directions of the family planning program. NOFPP is a data file with data values that reflect the hypothetical case of no family planning program having ever been implemented. This has been initially reflected in the data values by saying that there are no acceptors of contraceptives provided by the government's family planning program throughout the projection period.

There are two levels of operators of Host-based models, users and managers. This differentiation of operators is aimed at insuring the integrity of established programs and data bases. The instructions in the manual are oriented towards users of the FAMPLAN model. At the level of manager, changes to the program and variable definitions are possible. If programming changes are required, manager-level operators may refer to the two reference documents available for Host, the Host User Manual and the Programmer's Guide to Host.

Users may use predefined tables and graphs that allow browsing of results of previously run FPPIM and BCAM modules. Users may also edit data and rerun the application modules, FPPIM and BCAM, in order to generate sensitivity analyses on different levels of the impact of a family planning program. Users may also define additional tables and graphs and label formats for variables.
3.2 Hardware and Software Requirements

3.2.1 Required and Recommended Hardware

Host is designed to run on IBM PC or compatible microcomputers running version 2.0 or later of PC-DOS or MS-DOS operating system. Although these two operating systems are not identical, none of their differences affect the operation of Host. Both operating systems are referred to throughout the remainder of this document as simply DOS.

Host has been verified to function correctly with the following microcomputers and operating systems:

<table>
<thead>
<tr>
<th>Microcomputer</th>
<th>Operating System</th>
<th>Version Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Personal Computer</td>
<td>IBM PC DOS</td>
<td>2.0 - 3.1</td>
</tr>
<tr>
<td>IBM Personal Computer XT</td>
<td>IBM PC DOS</td>
<td>2.0 - 3.1</td>
</tr>
<tr>
<td>IBM Personal Computer AT</td>
<td>IBM PC DOS</td>
<td>2.0 - 3.1</td>
</tr>
<tr>
<td>Compaq Portable</td>
<td>MS DOS</td>
<td>2.11</td>
</tr>
<tr>
<td>Compaq Portable</td>
<td>IBM PC DOS</td>
<td>2.0 - 3.1</td>
</tr>
<tr>
<td>Compaq Deskpro</td>
<td>MS DOS</td>
<td>2.11</td>
</tr>
<tr>
<td>Compaq Deskpro</td>
<td>IBM PC DOS</td>
<td>2.0 - 3.1</td>
</tr>
<tr>
<td>Wyse PC</td>
<td>MS DOS</td>
<td>2.11</td>
</tr>
<tr>
<td>Kaypro 2000</td>
<td>MS DOS</td>
<td>2.11</td>
</tr>
<tr>
<td>Kaypro 16</td>
<td>MS DOS</td>
<td>2.11</td>
</tr>
<tr>
<td>Sperry IT</td>
<td>MS DOS</td>
<td>3.1</td>
</tr>
<tr>
<td>Wang PC</td>
<td>IBM PC DOS</td>
<td>2.0 - 3.1</td>
</tr>
</tbody>
</table>

Note: when using Host with a Wang PC, an IBM emulation board must be present.

Host itself will operate in 256K of Random Access Memory with all of the machines and operating systems listed above. For the FAMPLAN model, we recommend at least 384K, and ideally 512K or more of Random Access Memory.

It is possible, but not practical, to run Host using only two 360K floppy disk drives, but because of the memory demands of the FAMPLAN database, Host and FAMPLAN must be installed on a hard disk, RAM disk, or high-speed cartridge disk system.

A numeric coprocessor (Intel 8087 or 80287) is also required.

3.2.2 Required Software

The software required for implementing the FAMPLAN model includes 1) the operating system software (DOS) required for the computer on which you are working, e.g. PC/DOS version 2.0 - 3.1, 2) the Host software, the modeling environment under which the model was developed, and 3) the FAMPLAN model
software which will be discussed in the most detail. Please refer to the
DOS manual or the Host user manual for more information on using these
software. A complete reference library for Host software is available
through RTI.

The FAMPLAN Model Software

There are four types of files included in the FAMPLAN Model Software:
data, module, library, instruction files.

The data files contain all the input and output variables and their
associated data values used in and generated by the two modules, FPPIM and
BCAM. The data file is composed of six related files. All six files have
the same filename, provided by the user, but different extensions, generated
by Host. The six files are treated by Host as one logical unit. The data
files supplied with the FAMPLAN model are labeled FPP and NOFPP for the
FPPIM and BCAD for the BCAM.

Module files represent the translation of the model methodology to a
computer program in the Turbo-Pascal language. These programs are also
called application modules. The program is originally written in source
code, the computer language such as turbo-pascal or basic or fortran, and
must be compiled into a language the computer will accept which is called
machine language or object code. Since the FAMPLAN model is composed of two
modules, the FPPIM and the BCAM, there are two sets of files for each
module. The fppim.pas and cbenefit.pas files are the source code and the
fppim.com and cbenefit.com are the object code or machine language for the
FPPIM and BCAM models, respectively.

Another type of file associated with the FPPIM module files have the
extension ".inc". Two of these types of files, interplt.inc and
calasfr5.inc, must be present if changes are made to these files or if the
fppim.pas source code file for the FPPIM needs to be compiled.

There are three types of Host-generated libraries, label, table and
graph. Two files are created by Host for each library created by the user.
The two files have the same file name, label, table or graph, and the
extensions ".idx" and ".lib". Label libraries contain variable label
formats created by the model operator. Label formats can be text labels
assigned to categories of a variable or used to aggregate categories of a
variable for the production of a graph or table. Table and graph libraries
contain the definitions of tables and graphs created by a user of a model in
Host.

Instruction files contain instructions for implementing tasks in Host
as well as implementing non-Host applications. These files provide a
convenient means of executing a series of operations without operator
intervention. These files have a user-given filename and the Host-generated
extension, .ins.

- 20 -
Miscellaneous files include the UN life tables required by the population projection model. The South Asia life table was used in the population projection. SOASIA.UN is the name of the file containing the this life table.

**TABLE OF FAMPLAN MODEL FILES ON DISTRIBUTION DISKETTES**

**DATA FILES: FPPIM**

FPP.DAT  
FPP.IDX  
FPP.VDX  
FPP.DDX  
FPP.VAR  
FPP.DIM  

NOFPP.DAT  
NOFPP.IDX  
NOFPP.VDX  
NOFPP.DDX  
NOFPP.VAR  
NOFPP.DIM

**DATA FILES: BCAM**

BCAD.DAT  
$BCAD.IDX  
BCAD.VDX  
BCAD.DDX  
BCAD.VAR  
BCAD.DIM

**MODULE FILES: FPPIM**

FPPIM.PAS  
FPPIM.COM  
INTERPLT.INC  
CALASFR5.INC

**MODULE FILES: BCAM**

BCAM.PAS  
BCAM.COM

**LIBRARY FILES: FPPIM and BCAM**

TABLE.IDX  
TABLE.LIB
3.3 Installing Host and FAMPLAN on Microcomputer

The DOS commands used in the installation process will be described followed by the steps for installing Host and FAMPLAN software.

It is beyond the scope of this manual to explain or review all the computer skills required to install and implement the FAMPLAN model. Therefore, the understanding of certain computer terms is taken for granted. For instance, the user should be familiar with what is meant by a disk drive, hard disk (or the equivalent RAM disk or cartridge), and (the) prompt. The user may refer to the DOS manual for the entire explanation and exact syntax of each command.

3.3.1 Review of DOS Commands to be used in the Installation Process

The version of DOS required to run Host and FAMPLAN for several computer systems was given in the above hardware requirements table. (To verify the version currently operating the computer use the DOS verify command. This is done by typing "verify" at the prompt. (Do not type the quotation marks, only what is between the marks.))

Subdirectory commands

Subdirectories are created on the hard disk, or root directory, to partition the memory of the hard disk into smaller directories. Subdirectories may be created within subdirectories. Commands to create and remove subdirectories and to move around between subdirectories are used during the installation process.

The make directory, "md", is used to create subdirectories.

The change directory, "cd", is used to move between subdirectories.

The remove directory, "rd", is used to remove empty subdirectories.

File Management

Two file management commands are required for the installation process: copy and restore.
The copy command is used to copy the software files from the diskettes containing the files for the Host and FAMPLAN software to a hard disk.

The restore command also copies files from a diskette to a hard disk but is used for the special case when a file, as in the case of the FAMPLAN data files, is too large to fit on one 360k diskette. The backup command is used to copy files, with memory requirements larger than the diskette to which they are being copied, from the hard disk to a diskette. A requirement to restoring files that have been backed-up from a hard disk is that the files must be restored to a subdirectory of the same name as the subdirectory from which the files were backed-up. Diskettes with backed-up files should be clearly marked with the subdirectory name from which it was copied.

System Management

The path command is used by the operating system, DOS, to access files in a subdirectory other than the one in which the desired file(s) is located. It may be implemented at a prompt and therefore only in effect for the time the computer is turned on. The path command may be also be included in an autoexec.bat file so the path command will be executed whenever your computer is turned on, or "booted up".

3.3.2 Installing Host and FAMPLAN software

Installing the Host/FAMPLAN system on your microcomputer requires that you do the following:

- Verify that your computer system has the recommended hardware as described above
- Copy the Host and FAMPLAN program disks to your hard disk or cartridge.
- Create or modify the file CONFIG.SYS.
- Tell DOS how to find Host.

Verify Hardware Requirements

The user should verify that the computer system has the recommended hardware as described in section 2.2.1.

Copy Host and FAMILAN Software to the Hard Disk

Creating Two Subdirectories on a Hard Disk

Almost 4 megabytes of memory is required to store the FAMILAN model and the Host software. The following set of instructions will assume that Host and FAMILAN software will be stored on the same hard disk. Before continuing, verify that 4 megabytes of memory are available on the hard disk.
Two subdirectories will be created on the hard disk: one for the Host software, which will be called Host, and the other for the FAMPLAN software, which will be called FAMILPLAN.

In the following set of instructions, the hard disk is assumed to be drive C. If this is not the case, simply replace the C in the following examples with the appropriate drive letter.

Begin by creating the Host subdirectory, which will store the Host software, by typing "md.host" at the C prompt and then hitting the enter key. This set of instructions is illustrated on the following line:

```
C>md host[Enter]
```

where, C> is the C prompt on the screen. The characters after the prompt are typed in by the user: "md" is the DOS command to make a subdirectory, "host" is the name of the subdirectory, and [Enter] is the symbol for hitting the enter key.

Create the subdirectory to store the FAMPLAN software by typing "md famplan[enter]" at the C prompt.

```
C>md famplan[enter]
```

Copying Host and FAMILPLAN Software to a Hard Disk or Cartridge Disk

Host is normally distributed on 6, 360K double-sided diskettes (Host is also available on a 10Mb IOMEGA Bernoulli Box cartridge upon request). All of the files on these diskettes must be copied to your hard disk or cartridge. First, verify that sufficient disk space is available. Approximately 1.3 megabytes is required to store all of the files on the distribution diskettes. The files actually required to run Host require about 1.0 megabytes (1,048,576 bytes).

The files from each Host distribution diskette can now be copied into the new directory by first placing the diskette in drive A, then issuing the following command:

```
C>copy a:.* c:\host[Enter]
```

FAMILPLAN is also distributed on 360K double-density diskettes. The data files for the FPPIM are too large to be stored in their entirety on one of these diskettes. Therefore, they have been copied from a hard disk to three 360K diskettes using the backup command. These diskettes should be clearly marked with the name of the subdirectory to which they must be restored. The other files have been copied to the diskettes using the DOS copy command and may be copied to the hard disk using the same procedure as copying the Host software files.
Since restore is an external DOS command the operator must give the path
to the location of the restore.com file. See the DOS manual for the exact
syntax of the use of this command. The following example assumes that two
disk drives and a hard disk are being used. The DOS program diskette is
inserted in drive a:, the backed-up diskette in b: and famplan to be the
name of the target subdirectory on the hard disk, C.

```
c>a:restore b: c:\famplan\*.*[Enter]
```

If DOS has been copied to another subdirectory named DOS on the hard
disk the appropriate syntax may look like the following.

```
c>c:1-DEC-87 11:00:00os\restore b: c:\famplan\*.*[Enter]
```

The diskettes with files that have not been copied to them using the
backup command may be copied to the hard disk by using the DOS command copy.
If the distribution diskette is placed in drive a: the command to copy the
FAMPLAN files will be:

```
c>copy a:*.* c:\famplan[Enter]
```

Creating or Modifying a CONFIG.SYS File

Host requires that certain operating system parameters be set through
the use of the CONFIG.SYS file. The purpose and usage of the operating
system configuration file CONFIG.SYS is explained in detail in your PC DOS
or MS DOS manual. Basically, CONFIG.SYS may contain certain commands which
modify the way DOS functions or make it recognize certain foreign hardware
devices. DOS searches the root directory of the boot disk for this file
upon start-up. If found, its contents are interpreted by the operating
system, otherwise DOS operates using default configuration values.

Host requires that the maximum number of concurrently opened files
permitted by DOS be at least 16. If a CONFIG.SYS file is already present on
your DOS boot disk, you need to add the following statement to the file
before executing Host:

```
files = 16
```

Using a number larger than 16 will not affect Host, but the memory
required by the resident portion of DOS increases by 48 bytes for each
additional file above the default value of 8. The performance of Host will
be greatly improved if the following statement is also added to CONFIG.SYS:

```
buffers=24
```

This sets the number of sector buffers to 24, thereby providing some
additional temporary storage space to DOS, and reducing the number of disk
accesses required for many operations. You may request DOS to use between 1
and 99 buffers, but each buffer above the default value of 2 (3 for the IBM
Personal Computer AT) requires 528 additional bytes.
If the file CONFIG.SYS is not on your DOS boot disk, you can easily create it by instructing the DOS COPY command to accept input from the console. The following example illustrates this technique, assuming your DOS boot disk is the root directory, C:

```
C>copy con config.sys[Enter]
files=16[Enter]
buffers=24[Enter]
^Z[Enter]
```

The symbol "^Z" is the DOS screen representation of the key combination [Ctrl]+[Z].

**Telling DOS How to Find Host**

In order to execute Host from a directory other than the one which contains it, you must tell DOS the path to the file HOST.COM. This file is found in the previously created subdirectory Host. The simplest method is to enter the following command directly from the DOS prompt as shown below:

```
C>path c:\host[Enter]
```

This will work for the current session, but will not be in effect the next time you boot your microcomputer. It is better to include this line in your AUTOEXEC.BAT file. The purpose and usage of the AUTOEXEC.BAT file is explained in detail in your PC/MS DOS manual. Basically, the AUTOEXEC.BAT file may contain any standard DOS commands which you wish to be executed when DOS is started. DOS searches the root directory of the boot disk for this file upon start-up. If found, the commands in the file are executed in sequence. If an AUTOEXEC.BAT file is already present on your boot disk, you must add the following line to the file:

```
path c:\host
```

If a path command is already in the file, the path to the HOST.COM file may be added to the paths already listed. The resulting path command might appear as follows:

```
path c:\1-DEC-87 11:00:00os;c:\util\norton;c:\host
```

If the file AUTOEXEC.BAT is not already on your boot disk, you may easily create it by instructing the DOS COPY command to accept input from the console. This is the same technique used above to create the CONFIG.SYS file. In the following example, your DOS boot disk is assumed to be drive C:

```
C>copy con autoexec.bat[Enter]
path c:\host[Enter]
^Z[Enter]
```
3.4 Using Host to Implement the FAMPLAN Model

Once the Host and FAMPLAN software have been installed onto the hard-disk of the computer and the system configured to the Host software specification, the FAMPLAN model may be accessed under Host. The following section will describe the Host system and the operations that the user needs to implement the model and explain how the user may access the FAMPLAN model and

How Host is Used with FAMPLAN

As you have seen, FAMPLAN consists of two separate, but related modules. In managing and running any model, three basic tasks are necessary: data entering and editing, model execution, and display of results. The Host system provides an easy-to-use and flexible environment in which FAMplan can be maintained and run. This section describes how Host can be used for carrying out the three fundamental modeling tasks necessary for Famplan. A more complete Host manual is available from RTI.

What Host is and What it Does

Host is a specialized database management system designed to facilitate the implementation and utilization of all types of models. Host provides a framework supporting all stages of model implementation from program design through result presentation.

Host includes many of the characteristics common to most database management system (DBMS) software, including facilities for data definition, data labeling, full screen data editing, table generation and application program development. Host has been written in the Turbo Pascal language. Since Turbo Pascal is a widely used, general purpose, high-level language, this allows Host users to take immediate advantage of an immense body of existing Turbo Pascal literature and enhancement products.

Host uses a multidimensional spreadsheet-like editor to allow users to access data. Data displayed in the editor can be clearly and meaningfully labeled using Host's labeling facility. Investigation, and comparisons of alternative modeling scenarios is made possible by the ability to set values for a base or reference run, and then use that as the basis for comparison of alternative sets of values. Tables produced by Host include built-in comparison calculations so that differences between runs may be readily identified. Host also allows the display of data using a graph facility.

3.4.1 Accessing FAMPLAN

The FAMPLAN model is accessed through Host by typing "host" at the appropriate subdirectory prompt. "Host" may be typed at the prompt of the subdirectory that contains the Host software files or at the prompt of the subdirectory that contains the Famplan model files. The following
instruction is an example of accessing Famplan by invoking Host from the Famplan subdirectory.

    c:\famplan\host[Enter]

The introductory screen of the Host program will come on the screen. Press any key to proceed, then select the appropriate operator status when requested by the Access Menu. You should choose the status "User" by pressing [Enter] unless you are developing projection modules or defining data structures.

After selecting the User status, you will be presented with Host's Main Menu.

3.4.2 Using Host to Implement Famplan

3.4.2.1 General Characteristics of Host

How Host Uses Cursors

A cursor is a special symbol, color or shape used to show position on the display screen. Host uses several types of cursors. When you select a command from a horizontal menu or an item from a vertical list, Host indicates the current selection by placing it within a highlighted block. This type of cursor is also used to show position when editing data values in the Host Data Editor.

When entering data a character at a time, Host uses a blinking rectangle or square to indicate the character currently being entered. A blinking rectangular cursor indicates overwrite mode, while a blinking square cursor indicates insert mode.

Host occasionally combines the above cursor types to indicate both line and character position on the screen.

Using the Keyboard

No attempt is made in this Guide to familiarize you with the standard IBM PC keyboard arrangement. This information is included in the Guide to Operations manual provided with all IBM microcomputers and most IBM compatible microcomputers.

Host has been designed to make effective use of the standard IBM PC keyboard. Most special cursor movement and editing keys operate in standard ways. In addition, Host understands many Wordstar commands for cursor and for editing commands.
Using the Menus

Most of the functions in Host are selected from "Lotus-style" horizontal menus. These menus are displayed at the top of the screen (called the Menu space). Whenever the Menu Space is used to display other information, a menu of available commands can be displayed by pressing [/] or [Esc]. The top line of the Menu Space is used to display a list of available commands. One of these commands is within a highlighted block called the menu cursor. The bottom line of the Menu Space is used to display a short explanation of the highlighted command. Often this explanation will include a list of commands which become accessible if the highlighted command is selected. There are two methods of selecting commands from these menus: cursor selection and key selection.

Cursor Selection. To select a command from the menu using the menu cursor, use the cursor movement keys to move the cursor to the desired selection. As the cursor moves, the explanation below the command list changes to correspond with the highlighted command. When the menu cursor is on the desired command, press [Enter].

Key Selection. Normally, each command in the command list will begin with a unique letter. To select any command on the menu, just press the key which corresponds to the first letter of the command. Using this method, it is not necessary to move the menu cursor to the desired selection. Key Selection is faster than cursor selection. It is designed to improve the efficiency of users familiar with the program. Some menu command lists, however, are composed of file names over which the program has little control. Such lists often contain commands which begin with the same letter. In this case, Key Selection will scan from left to right to select the first command which begins with the letter entered. Cursor Selection is the safest method in this situation.

When there are more commands in a menu than can be displayed across the Menu Space, an arrowhead will be displayed at one or both ends of the command list. These arrowheads indicate that additional commands are available in the indicated direction, and can be accessed by moving the cursor beyond the last command currently displayed at that end of the Menu Space.

User Versus Manager Access

Host is designed to support two different categories of operators: those who use only the presently available projection modules, and those who develop and install new projection modules. Host labels the first category User and the second category Manager.

User or Manager access must be selected whenever Host is executed from the operating system. Once within Host, the access level may be changed at any time by selecting Access from the Main Menu. To set your access status
to Manager, you must enter a password. This password may be changed once Manager access is granted. Operator access may be changed from Manager to User without a password.

User. Operators in this category are permitted access to all commands and data values except those which are closely interconnected and which could disrupt operation of Host if incorrectly modified. The essential structural core of a Data File and associated program modules are protected from this type of accidental modification. This allows users the maximum level of flexibility while reducing their concerns about any possible unintentional damage. Users are also prevented from changing any values which restrict data entry.

Manager. Operators in this category are permitted access to all Host commands and all data values which are not reserved for use by Host. Managers are permitted to define dimensions and variables, delete existing dimensions and variables, and establish data entry restrictions for Users. After completing restricted operations, a Manager may change status back to User to provide a greater level of system protection.

Using the Query Field Facility

There are many places in Host where you are asked to enter the name of some item. The particular item may be a label format, dimension, variable, table or file. In any of these cases, it may be difficult to remember the desired name. Pressing [?] in this situation will display a list containing the names and descriptions, if available, of all possible entries. Host prompts with this feature are called Query Fields and are always followed by a blank, or field, to be filled in, preceded by an inverse video "?". When the item to be selected is a file, the list is presented as a horizontal "Lotus-style" menu in the Menu Space. Otherwise, the list is displayed vertically in the Work Space. A cursor is provided and all the normal cursor, scrolling and paging functions are implemented to allow positioning of the cursor on any item in the list.

A special search feature is available to aid in finding a particular name from any vertically displayed list. The search feature is invoked by pressing [Alt]+[S]. A complete or partial name can then be entered and the page of the list containing that name will be displayed. Pressing [Enter] will select the item indicated by the cursor. Pressing [/] or [Esc] will not select any item, but will return you to the previous step.

Using the Toggle Field Facility

Often you will be prompted to make decisions in Host that require a limited number of possible responses. In these situations, Host uses a feature called Toggle Fields. Toggle fields are easily identified by the inverse video "+" displayed next to the prompt. Some toggle fields have only two possible responses, such as YES or NO, while others present several choices such as selecting the Console, the Printer, or a Plotter as the
destination for a graph. In all toggle field prompts, you will be shown the current setting, which you may leave unchanged or change to any of the other possible settings. If you wish to change a toggle field, several methods are available. You may use the [+] key or the [Space] bar to display the next choice, you may use the [-] key to display the previous choice, or you may type in any selection appropriate to the current toggle field. The toggle field will "wrap" around to the next choice whether you are scanning in a forward or reverse direction. Therefore, you can easily review all the choices, several times if desired, by repeatedly pressing the same toggle key. If you manually type in the selection and make an invalid entry, you will receive a message at the bottom of the screen, listing all the keystrokes or entries available to you for that field.

3.4.2.2 The Basic Modelling Tasks: Editing data, Running an Application, Viewing Results, and Managing Files

Editing Data (E)

Host's Data Editor can be used to enter new data values into a Data File, to edit existing data or to simply view Application Module input and output data. You can access the Data Editor by choosing the Edit selection on Host's Main Menu. The Editor begins by prompting for the name of the data file by presenting a horizontal menu of available data files. You can confirm the default entry by pressing [Enter], or you can enter the name of any Data File in your system. If you press [Esc] at this point, you will return to the Main Menu.

Selecting a Variable

Next, you are prompted for which variable in the selected Data File you wish to work with. Since this is a Query Field, a list of available variables can be displayed by pressing [?]. You may also select a different Data File or return to the Main Menu from this point by pressing [/] or [Esc] to raise a menu with the selections Resume, File and Quit.

The Data Entry Cursor

The Editor uses an inverse or colored video cursor to indicate your current row and column position within the data matrix. This is combined with a small rectangular or square blinking cursor to indicate the current character position within the current entry.

If Data are not Found in the Data File

If data for the selected variable or current period of the selected variable can not be found in the projection file, the Editor provides appropriate default values and displays the following message at the top of the screen:

Data not found in file; default values have been supplied.
For numeric variables, the default value is zero. For character and character string variables, the default value is the ASCII NUL character (\x00 or decimal 0) which is displayed on the screen as a blank space. In any case, you may change these values at any time using the Editor.

Changing Editor Supplied Default Values

When you first change one of these default values for a variable (or period of a periodic variable), you will notice that the above informational message will disappear from the top of the Editor display. This indicates that the Editor has sensed the change and will therefore save the data to the Data File if so directed.

Saving Editor Supplied Default Values

For nonperiodic variables, Editor supplied default values will always be saved to the Data File when Save is selected from the Edit Menu. For periodic variables, the Editor will not save a period of data to the Data File unless at least one of these default values has been changed in that period, or unless that period of data is the one currently displayed by the Editor. This means that if you wish to save an entire period of Editor supplied default values to the Data File, that period must be the one currently displayed when you issue a Save command to the Editor. This feature is designed to minimize the amount of disk space occupied by unnecessary zero or NULL values.

Variables With One or More Dimensions

Since a screen display is a two dimensional space, only a two dimensional section of a multidimensional variable's data can be displayed. The names of these two dimensions are displayed on the left side. All other dimensions are displayed on the line directly above the data.

When a multidimensional variable is selected for editing, the Editor chooses the dimension having the largest current number of levels for the Row Dimension and the one having the next largest number of dimensions for the Column Dimension. This ensures that the largest two-dimensional slice of data will be the one displayed in the Work Space. All other dimensions are By-Dimensions and will appear on the Dimension Line. If the variable is periodic, the time dimension PERIOD will be the first By-dimension on the Dimension Line.

Changing the Levels of the Row and Column Dimensions

The current level of the Row and Column Dimensions can be changed simply by using the cursor movement commands to change the row and column position of the cursor. Commands for moving through the levels of the row and column positions of the data matrix are identical to those of Lotus 1-2-3.
If there is more data in the two dimensional slice than can be displayed in the Work Space, you may display other portions of the slice using the paging and scrolling commands. End Mode is implemented as in Lotus 1-2-3 and is provided as a fast, convenient way to move around within the two dimensional slice of data. Scroll-Lock is also implemented as in Lotus 1-2-3 should you want to use it.

Changing the Levels of the By-dimensions (Dimension)

To change the level of any of the By-dimensions, display the Edit Menu by pressing [/], then to choose the selection Dimension. The cursor will immediately be placed on the current level of the first By-dimension in the Dimension Space. If the current variable is periodic, this will be the implied time dimension PERIOD. You can move the cursor to other By-dimension fields using [Right], [Left], [Home], [End], [Ctrl]+[Right] or [Ctrl]+[Left] the same way you would in a horizontal Lotus-style menu.

Since the current level of each By-dimension is a Toggle Field, there are several ways to change this value: you can use [+], [Space] or [-] to "toggle" through the list of available levels, or you can directly enter the desired level. For example, if the current level of a By-dimension is "Urban", you can change it to Rural by simply entering "rural" (upper or lower case is not important) or by toggling the entry until it is "Rural". You may change the current level of more than one By-dimension at a time.

When you are satisfied with the level settings you have chosen, simply press [Enter] to display the data slice corresponding to the new level settings and to return the cursor to the Work Space. If you do not wish to retain the changes you have made in the By-dimension levels, press [Esc] or [/] for an opportunity to cancel or retain the changes.

Using Function Keys to Change the Period

For periodic variables, you will most likely want to change the easy as possible, function keys have been assigned to display the next period, previous period, first period and last period of data.

Function keys used in the Data Editor for Periodic variables.

<table>
<thead>
<tr>
<th>IBM PC Command</th>
<th>Function Key in Data Editor</th>
</tr>
</thead>
<tbody>
<tr>
<td>[F3]</td>
<td>Display next period of data.</td>
</tr>
<tr>
<td>[F4]</td>
<td>Display previous period of data.</td>
</tr>
<tr>
<td>[F5]</td>
<td>Display first period of data.</td>
</tr>
<tr>
<td>[F6]</td>
<td>Display last period of data.</td>
</tr>
</tbody>
</table>

The "Last Period" of data is the last period of data in the current Data File which contains data for any variable, not just the current variable. Pressing any of these keys immediately displays the data for the indicated
period. When editing a periodic variable, a function key status line will be displayed at the bottom of the Work Space to remind you that these commands are available.

The Edit Menu

If the Edit Menu is not displayed at the top of the screen, it can be displayed by pressing [/] or [Esc]. The Edit Menu offers the selections Resume, Area, Period, Interpolate, Save, Dimension, Variable, File and Quit. The selections Resume, Save, Dimension, Variable, File and Quit will be discussed in the following sections. The advanced functions Area, Period and Interpolate are not yet completed and will therefore not be discussed.

Resume. The Resume selection on the Edit Menu returns to the EDIT DATA mode, placing the Data Entry Cursor in its previous row-column position. Area, Period, Interpolate. The Area, Period, Interpolate selections of the Edit Menu have not been completed. Attempting to choose any of these message:

Sorry, that selection is not active on this menu.

Save. To save any changes you have made to the data of the current variable, select Save from the Edit Menu. You will be prompted as follows:

Save Variable as: (current variable name)

If you have been granted Manager Access, you may request that the data be saved to the Data File under a new name. If you choose to do this, several things can happen. If a variable of the specified name already exists, but has a different structure than the current variable, the save will not take place and you will be given an opportunity to specify a different name. If a variable of the specified name exists having the same structure as the current variable, you will be asked whether you want to proceed to overwrite any data which may exist for that variable with the data of the current variable. If you answer "No", the save will not take place and you will be given an opportunity to specify a different name. Otherwise, the data will be saved under the specified name, replacing any data which might have existed for that variable. If no variable of the specified name exists, a definition matching that of the current variable will be added to the Data File under the new variable name and the data will be saved under that name. If you have been granted User access, you may not save the data under a new name, and should simply press [Enter] to save the data to the Data File, or [Esc] to return to editing the data.

Dimension. The purpose of the Dimension selection is discussed above in the section on Changing the Levels of the By-dimensions.

Variable. To edit a different variable, choose the Variable selection on the Edit Menu. If you have made any changes to the data of the current variable, you will be asked whether or not you wish to save those changes...
before continuing. You will be prompted to enter a variable name. This field is a Query Field, so enter [?] to select from a list of available variables. This is a "no return" selection, i.e. you can not return to your previous state within the editor except by again selecting the same variable you were editing. This is because some of the memory space used when editing a variable must reallocated when attempting to select a new variable.

File. To select a different Data File to edit, choose the File selection from the Edit Menu. If you have made any changes to the data of the current variable, you will be asked whether or not you wish to save those changes before continuing. In the current version of Host, you are presented with a menu of Data Files.

Quit. To end the editing session and return to Host's Main Menu, select Quit from The Edit Menu. If you have made any changes to the data of the current variable, you will be asked whether or not you wish to save those changes before continuing.

Running an Application (R)

To execute any Application Module from within Host, select Run from Host's Main Menu.

After selecting Run, you will be prompted for the name of the Application Module you want to execute. You may enter a module name or, using the query feature, you may select from a list of modules.

Once a module is selected, the default settings for executing the module are displayed. You may choose to accept settings before executing the module. The settings are: Data File, Starting Period, and Number of Periods. These settings are discussed in the following sections.

Specifying the Data File

The default Data File, but this may be changed by the operator to any Data File in the user's system. The variables and dimensions required by the selected module must match existing variables and dimensions in the chosen Data File or the module will abort.

Specifying the Starting Period

This sets the starting time period for the projection. The default value of this setting is 1. Some modules may not function correctly if you choose a starting period other than 1; this depends upon the function and implementation of the module. You should consult any documentation provided with the module you intend to execute before changing this value. The maximum value of this field is 1023, but starting period and number of periods to project are interrelated such that starting period + number of periods must not exceed 1024.
Specifying the Number of Periods

This is the number of periods for which you wish the module to project. The default value of this field is 1. Normally you will want to change this setting. Some modules may yield nonsensical results if asked to project a purpose and implementation of the module. You should consult any documentation provided with the module you intend to execute before entering a very large value into this field. The maximum value of this field is 1023, but starting period and number of periods to project are interrelated such that starting period + number of periods must not exceed 1024.

Executing the Application Module

Once you are satisfied with these settings, you can display the Run Menu by pressing [/] or [Esc]. You may then select Go to execute the module with the current settings, Edit to further edit the settings or Quit to return to Host's Main Menu.

If you execute the selected module by choosing Go, Host will proceed to pass the current values of the displayed settings, then control of the microcomputer over to the Application Module.

Once the Application Module is in control, it may do whatever it has been programmed to do, including prompting you for information, manipulation of data in the selected Data File and displaying information. A module may even take over the entire screen to display graphics images. While the module is in control of the microcomputer, you will see the Mode Indicator displaying the name of the module.

When the Application Module has completed its task, it should return control to Host. Host will then ask if you wish to execute another Application Module. If you respond "Yes", you will see the same projection settings that were established in the prior run displayed. You may edit these settings to re-execute the same module, or to begin execution of other Application Modules.

Viewing Results: Generating Pre-defined Tables (T) and Graphs (G)

The results of running a module may be viewed by generating pre-defined tables and graphs. To generate tables and graphs from within Host, select the Tabulate or Graph command from the Host Main Menu. See the complete Host User Manual for more information on defining tables and graphs.

After selecting Tabulate, you will be prompted to enter a table name. If you select Graph you must first choose Definition, rather than Image, and then you will prompted for the name of a graph. You may use the query feature to display a list of all currently defined tables and graphs. Move the cursor to the desired table or graph and press [Enter]. Once you have selected a table or graph, the default values will be displayed, and you may
choose to accept them and generate the table or graph immediately (Go), or
to Edit the parameters before producing the table or graph. The parameters
are: Data File, Comparison File, Output File and Period List. Each will be
explained in the following sections.

Specifying the Data File

The default Data File may be changed by the operator to any Data File in
the user's system. The variables and dimensions stored in the table
definition must match existing variables and dimensions in the chosen Data
File or the table or graph will not be produced. The Data File is assumed
to be in the Data Directory specified in the Configuration File unless an
explicit path is specified.

Specifying the Comparison File

The default Comparison File is the file specified in the Configuration
File, but this may be changed by the operator to any Data File in the user's
system. If there is an entry in the table or graph definition that does not
have a corresponding entry in the selected Data File, an error message will
appear on the screen, and the Table generation will abort. If a Comparison
File is specified but there are no comparison variables in the tables or
graphs, the file is ignored.

Specifying the Output File

The default output file is the default device specified in the
Configuration File, and thus is either "CON" (console or display screen) or
"PRN" (printer). If PRN is chosen and a printer is NOT connected to the
computer, the system will "lock up" and the computer may have to be re­
booted. For tables, the operator may change the output device or may specify
output to a Lotus-Import File or to a print-ready file. To specify a Lotus­
Import File, simply choose any valid file name and use the extension "PRN".
Any other valid file name and extension specifies a print-ready file.
Output is directed to the Data Directory specified in the Configuration File
unless an explicit path is given with the Output File.

Specifying the Period List

The period list specifies the periods of data to be included in the
table. This only makes sense for tables made up of periodic variables. A
period list is the word "ALL", or a list of integer period values and period
intervals separated by commas. A period value is an integer from 1 to 1024
inclusive. A period interval has the form

first-last

where first and last are period levels, and specifies the use of all periods
from first to last inclusive. If first is omitted, all periods up to and
including last are included; if last is omitted, all periods are included,
thus "-" is a synonym for ALL. Overlaps in groups are ignored, so each period specified is included in the table only once. The following table shows some valid period list entries and, for each entry, the periods which would appear in the output table or graph.

<table>
<thead>
<tr>
<th>Period List Entry</th>
<th>Periods included by the List</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2-5,3-7,10</td>
<td>1,2,3,4,5,6,7,10</td>
</tr>
<tr>
<td>1,1,1,3,4</td>
<td>1,3,4</td>
</tr>
<tr>
<td>-</td>
<td>All periods</td>
</tr>
<tr>
<td>-5, 8-10</td>
<td>1,2,3,4,5,8,9,10</td>
</tr>
<tr>
<td>1-3,5,-</td>
<td>All periods except 4</td>
</tr>
</tbody>
</table>

Generating the Table or Graph

Once you are satisfied with the settings described in the above sections, you can display the Tabulate or Graph Menu by pressing [/] or [Esc]. You may then select Go to tell Host to generate the table or graph using the current settings, Edit to further edit the settings or Quit to return to Host's Main Menu. If you choose to generate the table, by choosing Go, Host will proceed to pass the current values of the displayed settings, and then generate the table. At the top of the screen, in the Menu Space, Host will display the Host Instruction which would have achieved the same purpose as this interactive procedure had it been encountered in an Instruction File or entered at the DOS prompt.

When the table or graph is completed, Host will ask if you wish to generate another table or graph. If you respond "Yes", you will see the same tabulation or graphing settings that were established in the prior generation displayed in the Work Space.

Managing Files (M)

Host provides a wide variety of file management capabilities and utilities for working with files. These facilities are accessed by selecting the Manage (M) option on the Host Main Menu. From the Manage Menu you can then choose to manage Data Files (Data), manage Library Files (Library), or to access the utilities (Utility). As with all the Host menus, Quit or [Esc] returns you to the previous menu. In this document we only describe the most common Manage functions which you may need in using STEP. For further information, please see the more complete Host User's Guide available from RTI.
Managing Data Files

File management functions available for Data Files include:

Create
Rename
Backup
Delete
Verify
Pack

We shall discuss only Rename, Backup, and Delete. All three of these functions can be performed also from DOS, but it is easier to do so from Host.

Renaming a Data File. Data Files can have the name modified to better fit your application naming conventions. Simply choose the Rename option on the Manage Data Menu and select a Data File from the file menu. You will then be prompted for the new Data File name. If a Data File with the specified name already exists, you will be warned by Host and asked if you wish to overwrite the existing file.

Backing up a Data File. It is important to create and keep backup copies of your Data Files. The Backup option on the Manage Data Menu provides a quick means of making copies of your important Data Files. After selecting a Data File from the file menu, you are prompted for the name of the target file. If a Data File by the specified name already exists in the target directory you will be warned by Host and asked if you wish to overwrite the existing file. You may not copy a file to itself. Host verifies that sufficient disk space remains for the file copy before attempting the backup. If there is not enough room you will get an error message stating the problem and you will be re-prompted for the name of the file copy. In this case, simply specify a file on another drive where more space is available, or insert a new diskette or cartridge with sufficient space for the file and retry the copy.

Deleting a Data File. Old Data Files can be removed when no longer needed. This is done by choosing the Delete option on the Manage Data Menu and selecting a Data File from the file menu. To prevent accidental erasure of files, you will be given a chance to confirm your delete selection before the actual deletion takes place.
Appendix A to Chapter 3: Configuring Host (C)

Host can be configured to best meet your equipment and modeling needs. You can use the default configuration or tailor any of the settings to your requirements. The system-wide configuration settings are stored in a Configuration File on disk named SYSTEM.ENV. This file includes the names of certain files, output devices for tables and graphs, printer settings, and screen display type. These settings are kept in the SYSTEM.ENV file so that you do not need to re-configure Host every time it is used. These files and other settings will be used by Host whenever they are required for an operation, unless a different file, subdirectory or other setting is explicitly specified.

When you select the Configure from the Main Menu, you are presented with a work screen that displays all the current settings. If the file containing the configuration settings is missing, Host creates one containing the standard initial settings. If there are settings that you wish to change, you can select that choice on the Configure Menu and make the modification. When you make a selection from the Configuration Menu, the cursor will move to the corresponding field in the screen work space. Each of the possible configuration choices will be discussed below.

When running Host from different subdirectories, it is necessary to have a SYSTEM.ENV file in each subdirectory from which you intend to execute Host.

Default Files

Host uses several types of files for storing different kinds of information (see The Host File System, p. 3-9 of the complete Host User's Guide, available from RTI). Three of these file types, Data, Comparison, and Instruction Files, are assigned names by a Host user when they are created. File extensions for these files are supplied by Host. Host requires the name of a specific file before it can perform any operations with files of these types. To prevent manual entry of file names with each Host operation, the Configuration setup allows default names for these files to be used throughout Host until changed, or until other files are explicitly entered for use in a given execution of an operation.

Data File. This is a file containing input data for performing projections and output data resulting from projections. When Host requires a Data File for an operation, the file selected in the Configuration setup will be the one used unless another Data File is explicitly specified.

Comparison File. This is a Data File which is designed to be used as a "base-run" for comparison purposes in certain tables and graphs. When data from a Comparison File is called for in a table or graph, data from this file will be used unless a different Comparison File is explicitly specified.
Instruction File. This is a file containing instructions to Host for executing projection modules, tables and graphs in a certain sequence. When Host requires the name of a specific Instruction File to perform some operation, this is the file which will be used unless a different Instruction File is explicitly specified.

Default Output Devices

This selection allows you to set the destination for Tables and Graphs. The Configuration settings allow you to specify printer, console, or plotter output. Table and graph output may also be sent to a file, although this cannot be predetermined in the Configuration File. If file output is desired the name file must be specified when the table or graph is generated.

Table Output Device. Initially the cursor will move to the Table setting, and you may choose output to the Printer or to the Console (screen). You can toggle between these two choices using the [+] and [-] keys.

Graph Output Device. You may also determine the output device for Graphs. Graphs may be displayed on three types of devices: the Printer, the Console, or a Plotter. The device type can be toggled between these choices with the [+] and [-] keys.

Default Directories

You can inform Host of the directory or directories where you will keep various Host-related files. This allows you the flexibility of structuring your subdirectories in the manner which is most convenient and useful for your purposes. Initially the current subdirectory is set as the default for all Host files. You may, however, wish to keep certain file types on different disk drives, or isolate specific groups of files in special subdirectories.

A Directory name can be configured for Data files, Module files, Library files and Instruction files. If you wish to modify the default settings for any of these file types simply move the cursor to the desired file type and enter the drive letter (if it will differ from the drive which is the Host default drive), and the hierarchical subdirectory name. If you are not certain how to specify subdirectory names, please refer to the IBM User's Manual, or to the PC-DOS or MS-DOS manual chapters on File Management and Tree-Structured Directories. The three directories which may be specified are presented below with the files which belong in each category.

Data Directory. A directory location may be specified for all Host data files. Unless is explicitly entered for a given operation, Host will try to find necessary data files in this directory.
Module Directory. A directory location may be specified for all Host Application Modules. Unless another directory is explicitly entered for a given projection, Host will try to find run locate the necessary module in this directory.

Library Directory. A directory location may be specified for all Host Library files. These include Label Format and Table Definition files. Unless another directory is explicitly entered for a given operation, Host will try to find necessary Table and Label library file necessary data files in this directory.

Instruction Directory. A directory location may be specified for all Host Instruction files. Unless another directory is explicitly entered for a given operation, Host will try to find necessary instruction library file necessary data files in this directory.

Default Printer Settings

You may select the printer settings which are most appropriate for your printer and for the types of reports that you wish to produce. The configuration settings allow you to specify margins and page lengths for reports. The configure file also allows you to specify general printer options for the use of Page ejects (or Form Feeds) and a Setup string. The page layout can be arranged to suit your desired report formats.

Each of the printer settings will be discussed briefly in the following section. The initial default settings assume standard (8 1/2 X 11 inch) paper, 10 characters per inch, and 6 lines per inch.

Left Margin. The left margin setting establishes the amount of blank space that is left on the left side of each page. The default setting of 10 spaces will result in a one inch left characters per inch. This can be set to any reasonable value to provide a more pleasing page layout.

Top Margin. This sets the number of blank lines above the first printed material on a page. The default setting is 6 lines.

Bottom Margin. The bottom margin sets the number of blank lines following the last line of text on a page. The default setting is 6 lines.

Page Length. The page length setting establishes the paper size that you use. Standard paper, (8 1/2 by 11 inches), uses the default setting of 66 lines. If you are using legal size, or any other non-standard size paper, then this should be adjusted accordingly.

Line Length. This value sets the length of the printed portion of a line. For a standard page with a left margin of 10, the default setting of 65 characters should be appropriate. This value will need to be adjusted if you use wide paper, or if you will be using a font type or print pitch that
will affect the number of characters that will fit on a line. For example, if you will normally use a compressed print for your printouts you will be typically be able to fit 100 to 120 characters on a line.

Page Eject. Setting the page eject setting to "Yes" causes Host to format printouts to fit on a printed page. If Page Eject is not desired, then the printouts will not be formatted, and will print continuously across page boundaries, and without page numbers or headers. This may be useful to save paper, and to decrease printing time for draft printouts.

Setup String. This is a "String" of characters that is sent to the printer when Host first attempts to print. For most printers, the setup string is optional for normal printing. Establishing a setup string can be useful, however, for setting the printer to use special features, such as particular print sizes or font settings that you wish to use as the standard mode for Host printouts.

Each printer uses its own printer control codes, so if you use this feature, you will need to refer to your printer manual to determine the appropriate characters to put into Host's Setup String. Host's method indicating characters and Control Characters for the setup string is the same as the method used by Lotus-1-2-3. If you have installed a setup string in Lotus for your printer, you can use the exact same string in Host.

The string, if used, should contain the letters or numbers in your printer manual indicated for the printer feature desired. The "ASCII" codes from 0 to 32 are called Control Characters and must be entered in a special way. These characters must be entered into the Setup String by entering a \ (backslash) followed by the three digit code for the character. For example, the [Ctrl]+[G] character, sometimes written "^G" has the ASCII value seven, and would be entered:

```
.7
```

Characters with ASCII values above 32 may be entered in the same manner, or may be entered directly as the character associated with the value. For example, the capital letter "Q" has the value 81, so it may be entered as "Q", or as "1.1.1.1.1.1.11". When follow the printer manual exactly. When forming the Setup String, simply enter each of the characters or backslash-digit combinations without intervening spaces or commas unless separators are indicated in the printer manual.

Default Color Setting

You may select a monitor setting for the type of screen display that use. The two possible settings are presented as a Yes/No toggle field. If you have a monochrome Monitor, then set the Monochrome setting to Yes. If you have a color display, then set the Monochrome setting to No.
Saving the Configuration Settings

When you have adjusted these options to meet your requirements, select Save from the Configuration Menu, and the settings will be saved in the Configuration File (SYSTEM.ENV) in the current directory and it will be used as the new default settings for Host.

Returning to the Main Menu

If the configuration displayed is appropriate for your equipment and modeling plans, simply enter the Quit option and return to the Main Menu. If you have made changes which have not been saved to the Configuration File, you will be asked if you want to save them before returning to Host's Main Menu.
Chapter 4. Summary of Steps for Implementing the Famplan Model

4.1 Introduction

This section briefly reviews the steps previously discussed for implementing the Famplan model under Host.

The most important section of this chapter is the list of input variables for the two modules in the Famplan model. The input data for each of the input variables must be verified and may be altered to suit the needs of the user.

4.2 Steps for Implementing the Famplan Model

4.2.1 Install the Host and Famplan software and access the model under Host: see Installing and Accessing Famplan in section 3.4. This will bring you to the main menu of the Host software. From that menu the options described below may be invoked: Configure, Edit, Run, Tabulate, Graph, and Manage. Choose the appropriate option by moving the cursor with the arrow keys and hitting the enter key or by typing the first letter of the particular option, e.g., C for configure or E for edit.

4.2.2 Configure the system to the specific environment under which you will be working: see appendix to chapter 3. This procedure indicates to Host the directories of the different types of model files and the default settings for data files, output, printer settings and the screen display. By following the instructions under installing and accessing Famplan, the directories for the different types of files are automatically set to the famplan subdirectory which is where all the files have been copied.

4.2.3 To verify, edit, or update data values and operation settings for the variables in the application modules the operator invokes the edit option from the main menu. The data file to work on is selected and the user is prompted for the name of the variable to be edited. You can either enter the name of the variable or type a question mark to bring up a list of the variables in the specific data file and use the arrow keys to highlight the specific variable to be edited. See 3.4.2.2, the section on editing data.

4.2.4 Once the data is entered and verified the applications may be run by choosing the Run option of the main menu. See section 3.2.2 on Running an application.

4.2.5 The results may be viewed in the predefined tables or graphs. See section 3.4.2.2: Viewing results: Table and graphs

4.2.6 To make sensitivity analyses, comparative data files which represent differences from a base run, must be created and used to run the application module then the results of the two data files may be compared. To create a new data, an existing or the base run data files may be copied.
to a new data file and giving the new data file a new data file name. New values for data variables representing the assumptions for the sensitivity analysis are entered and the application module run with the new data file. See section 3.2.2 on managing files.

4.3 Input Variables in Famplan Model

There are two types of input variables in each of the modules in the Famplan model. Some variables were created to provide options for the running of the application modules. These are operation variables. The other type of input variables require data values for the assumptions of the application module.

The following is a list of the variables in each module. All variables should have the appropriate operation option or data for each run or sensitivity analysis of the application module. Use the edit function of the main menu to input the appropriate values for each variable.

**FAMILY PLANNING PROGRAM IMPACT MODEL**

**OPERATION VARIABLES:**

**ASCIOPT:** Options for calculating the index of post partum infecundability. The options for calculating the index is by using the duration of post partum infecundability or the duration of breast feeding. A zero (0) value indicates that the duration of post partum infecundability will be used and a value of one (1) indicates that the duration of breast feeding will be used to calculate the index of post partum infecundability.

**FEMINDEX:** Indicates in sex specific population data the position of female specific values. For instance in the population data required by the model the female values are in the second column in the spreadsheet so a two (2) would be entered for this variable value.

**FERTAGES:** Indicates the range of fertile ages. The first age or youngest fertile age and the last age or oldest fertile age are entered in the appropriate spaces.

**LTFILES:** Is simply a list of the available life tables provided with the program. Only the UN South Asia life table is provided with the famplan model.

**MORTOPT:** Indicates the life table that should be used in the FPPIM population projection.

**DATA INPUT VARIABLES:**

**ACPT(m,T):** Contraceptive acceptors by method and year of acceptance for each year of the analysis.
AGEDIST(m,j,T): Proportion of each fertile age group using each contraceptive method in year their year of acceptance for each year of the analysis

ASPROPMA(j,t): Proportion of women married in each fertile age group for each year of the analysis

POSTINFE(t): Duration of postpartum infecundability in each year of the analysis

ASPREVA(j,1970): Age-specific contraceptive prevalence rates are set equal to zero in 1970, the year before the impact of the family planning program is analyzed

ASFR(j,1970): Age-specific fertility rates in 1970, the year before the impact of the family planning program is analyzed.

ALPHA(m,j): Parameter values for the decay functions for each contraceptive method for each fertile age group at time of acceptance

BETA(m,j): Parameter values for the decay functions for each contraceptive method for each fertile age group at time of acceptance

EFFECT(m): Parameter values for use-effectiveness of each contraceptive method

STERCOEF(j): Sterility adjustment coefficients for each fertile age group

LEXP(t): Life expectancy at birth for each year of the analysis

SEXRATIO(t): Sex Ratio, number of boys per number of girls for each year of the analysis

POP(t): Population by single year age, 1971

EMR(t): External migration rate, by year

MIGRATE(t): Internal migration rate, by year
<table>
<thead>
<tr>
<th>VARIABLE (dimensions)</th>
<th>REQRM'TS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACPT ((m,T))</td>
<td>1971 - 2001</td>
</tr>
<tr>
<td>AGEDIST ((m,j,T))</td>
<td>1971 - 2001</td>
</tr>
<tr>
<td>ASPROPMA((j,t))</td>
<td>1971 - 2001</td>
</tr>
<tr>
<td>POSTINFE((t))</td>
<td>1971 - 2001</td>
</tr>
<tr>
<td>ASPREVA((j,1970))</td>
<td>1970</td>
</tr>
<tr>
<td>ASFR((j,1970))</td>
<td>1970</td>
</tr>
<tr>
<td>ALPHA((m,j))</td>
<td>PARAMETER</td>
</tr>
<tr>
<td>BETA((m,j))</td>
<td>PARAMETER</td>
</tr>
<tr>
<td>EFFECT((m))</td>
<td>PARAMETER</td>
</tr>
<tr>
<td>STERCOEF((j))</td>
<td>PARAMETER</td>
</tr>
<tr>
<td>LEXP((s,t))</td>
<td>1971-2001</td>
</tr>
<tr>
<td>SEXRATIO((t))</td>
<td>PARAMETER</td>
</tr>
<tr>
<td>POP((t))</td>
<td>1971</td>
</tr>
<tr>
<td>EXT Mig((t))</td>
<td>1971-2001</td>
</tr>
<tr>
<td>MIGRATE((t))</td>
<td>1971-2001</td>
</tr>
</tbody>
</table>

- **t**: current year  
- **T**: year of acceptance of modern family planning contraceptive method  
- **j**: five-year age group  
- **m**: modern family planning contraceptive method
BENEFIT-COST ANALYSIS MODEL

OPERATION VARIABLES:

RUNMODE: Indicates batch or interactive method of implementing the model. However, at this time only the batch mode is operable. Therefore, the value should be set to zero (0).

ENROLAGE: Indicates the age groups for the different levels of education. The lower and upper age limits for each level must be specified.

DATFILES: Indicates the data files from which the population data, generated in the FPPIM, will be used in the benefit cost analysis module. The FPPIM data files must be stored in the same subdirectory as the benefit-cost analysis data files. The names of the appropriate data files, two comparative data files, are entered.

DATA INPUT VARIABLES:

BIRTH(t): Number of births for each year of the analysis

POP510(t): Primary school aged population in each year of the analysis

POP1115(t): Middle school aged population in each year of the analysis

POP1617(t): Secondary school aged population in each year of the analysis

The values for the previous three variables are automatically brought into the analysis through the specifications in the DATFILES variable.

PRENROLL(t): Primary school enrollment rate for each year of the analysis

JHENROLL(t): Junior high school enrollment rate for each year of the analysis

SHENROLL(t): Senior high school enrollment rate for each year of the analysis

PRCURPE(t): Primary school per student current expenditures for each year of the analysis

JRCURPE(t): Juniors high school per student current expenditures for each year of the analysis

SHCURPE(t): Senior high school per student current expenditures for each year of the analysis

HECURPE(t): Health per capita current expenditure for each year of the analysis
SSCURPE(t): Social services per capita current expenditure for each year of the analysis

FDCURPE(t): Food subsidy per recipient for each year of the analysis

PRCAPPE(t): Primary school per student capital expenditures for each year of the analysis

JHCAPPE(t): Junior high per student capital expenditures for each year of the analysis

SHCAPPE(t): Senior high per student capital expenditures for each year of the analysis

HECAPPE(t): Health per capita capital expenditures for each year of the analysis

SSCAPPE(t): Social services per capita capital expenditure for each year of the analysis

FOODAID(t): Proportion of population receiving food subsidies for each year of the analysis

FPPEXP(t): Total family planning programs expenditures for each year of the analysis

r: Discount rate for the analysis

<table>
<thead>
<tr>
<th>INPUT VARIABLE (dimensions)</th>
<th>REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIRTH(t)</td>
<td>1971 - 2001</td>
</tr>
<tr>
<td>POP510(t)</td>
<td>&quot;</td>
</tr>
<tr>
<td>POP115(t)</td>
<td>&quot;</td>
</tr>
<tr>
<td>POP1617(t)</td>
<td>&quot;</td>
</tr>
<tr>
<td>PRENROLL(t)</td>
<td>1971 - 2001</td>
</tr>
<tr>
<td>JHENROLL(t)</td>
<td>&quot;</td>
</tr>
<tr>
<td>SHENROLL(t)</td>
<td>&quot;</td>
</tr>
<tr>
<td>PRCURPE(t)</td>
<td>&quot;</td>
</tr>
<tr>
<td>JRCURPE(t)</td>
<td>&quot;</td>
</tr>
</tbody>
</table>
4.4 Output Variables in Famplan Models

The primary outputs, and their respective variable names, of this model are listed in the following table.

<table>
<thead>
<tr>
<th>FAMILY PLANNING PROGRAM IMPACT MODEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTPUT VARIABLES:</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>ASACPT(m,j,T): acceptors, by five-year age groups, of each method in year of acceptance</td>
</tr>
<tr>
<td>CONACPT(m,j,T,t): continuing users, by five-year age groups, of each method who started in year T for each year of the analysis</td>
</tr>
<tr>
<td>CONSIN(m,h,T,t): continuing users of each method for each year of the analysis by single age, h, at time of acceptance in the year of acceptance</td>
</tr>
<tr>
<td>CONUSER(m,k,t): number of users of each method at users' current age for each year of the analysis</td>
</tr>
<tr>
<td>AMUSER(m,j,t): number of users by each method, by five-year age groups for each year of the analysis</td>
</tr>
<tr>
<td>MSUSER(m,t): number of users by each method</td>
</tr>
</tbody>
</table>

SHCURPE(t)  | " |
HECURPE(t)  | " |
SSCURPE(t)  | " |
FDCURPE(t)  | " |
PRCAPPE(t)  | " |
JHCAPPE(t)  | " |
SHCAPPE(t)  | " |
HECAPPE(t)  | " |
SSCAPPE(t)  | " |
FPPEXP(t)   | " |
R           | " |
ASUSER(j,t): number of users by five-year age group
ASWOMEN(j,t): age-group-specific number of women (output from Population Projection, POPULATE)
ASMAWOMEN(j,t): age-group-specific number of married women
ASPREVA(j,t): age-group-specific contraceptive prevalence rates for each year of the analysis
PREVALEN(t): contraceptive prevalence rate for each year of the analysis
ASMDIST(m,j,t): Age-group-specific proportion of users by method for each year of the analysis
ASAVEF(j,t): Age-group-specific overall contraceptive effectiveness in year t
ASCC(j,t): Index of Contraception for each year of the projection
ASCI(j,t): Index of Postpartum Infecundability
ASFR(j,t): Age-group-specific fertility rates

BENEFIT-COST ANALYSIS MODEL

OUTPUT VARIABLES:
PRSTUDENT(t): Primary school students for each year of the analysis
PREDEXPE(t): Primary school educational expenditures for each year of the analysis
JHSTUDENT(t): Junior high school students for each year of the analysis
JHEDEXPE(t): Junior high school educational expenditures for each year of the analysis
SHSTUDENT(t): Senior high school students for each year of the analysis
SHEDEXPE(t): Senior high school educational expenditures for each year of the analysis
TOTEDEX(t): Total education expenditure for each year of the analysis
TOTHEEX(t): Total health expenditures for each year of the analysis
TOTSSEX(t): Total social services expenditures for each year of the analysis
FDRECIPI(t): Number of food subsidy recipients for each year of the analysis
TOTFDEX(t): Total food subsidy expenditures for each year of the analysis
TOTALEXP(t): Total expenditures for each year of the analysis
BIRTHAVT(t,1): Births averted for each year of the analysis
PERCBIAV(t,1): Births averted as percentages of total birth with no FPP for each year of the analysis
PERCTFR(t,1): Percentage of reduction in total fertility rates as the result of the FPP for each year of the analysis
PERCASFR(j,t,1): Percentage of reduction in age-specific fertility rates as the result of the FPP for each year of the analysis
BENEFFPP(t,1): Savings to government on total expenditures in sectors due to family planning program for each year of the analysis
BENECOST(t): Benefit-Cost Ratio for each year of the analysis
IRR(t): Internal Rate of Return for each year of the analysis
NETSAV(t,l): Savings of total expenditures to government, net of family planning program expenditures for each year of the analysis
QUALEDUC(t,s): Quality of service in education sector for each year of the analysis
QUALHEAL(t,s): Quality of service in health sector for each year of the analysis
QUALSSER(t,s): Quality of service in social welfare programs for each year of the analysis