Distr:
GENERAL
E/ESCWA/AGR/89/1/Rev.1
25 July 1990
ORIGINAL: ENGLISH

UNITED NATIONS
ECONOMIC AND SOCIAL
COMMISSION FOR
WESTERN ASIA

FOOD AND AGRICULTURE
ORGANIZATION OF
THE UNITED NATIONS

DASI

COMPUTER PROGRAM FOR AGRICULTURAL PROJECT ANALYSIS

USER GUIDE
NGAMO EXERCISES
D1

September 1989

PREFACE

The project data and simulation program (DASI) is a computer system developed by the Development Policy Studies and Training Service, Policy Analysis Division (ESPT) of the Food and Agriculture Organization of the United Nations (FAO). Its purpose is to reduce the computation time necessary for processing data required in agricultural project analysis and to facilitate analysis. For the use of the DASI computer program, different training materials have been prepared by FAO. The Joint ESCWA/FAO Agriculture Division, Baghdad, has revised and assembled some of these documents and added further sections to give users access to a complete set of training tools for the easy application of the DASI computer program. This version is presented in two parts. The first part, D1, contains a condensed version of the DASI user guide with a detailed new section on DASI computer environments. It also includes a set of NGAMO exercises. The second part, D2, gives the solution to the exercises and a new section on activity analysis. It is hoped that the revised version will facilitate the work of trainees and that it will allow the user to have easier access to the theoretical information required for the use of the DASI program and its application through exercises.

H. W. Hjort
Director
Policy Analysis Division
Food and Agriculture Organization of the
United Nations

CONTENTS

LIST OF TABLES

Introduction

The project data analysis and simulation program (DASI) is a computer system developed by the Food and Agriculture Organization of the United Nations (FAO), Development Policy Studies and Training Services, Policy Analysis Division (ESP). The program is designed to assist project analysts prepare and assess agricultural projects. DASI employs a standard methodology and facilitates the analysis of alternative scenarios for projects, while substantially reducing the computational time required to process data.

DASI is composed of FORTRAN programs and the menu is written in BASIC. The program requires the use of IBM and IBM-compatible computers and is currently available in two versions. Moreover, the program is quite "user friendly"; it can be used by analysts with limited computer experience.

A. Approach to project analysis

The program on project analysis used for training, as well as operation work, can be broadly classified into three categories. Each category differs with respect to data organization and their flexibility in adjusting to different methodologies used for project analysis. The main characteristic of each approach is briefly described below.1/

1. Data manipulation approach

The programs under this category treat the data used in project analysis in the form of "variables." A variable is a time series of values associated with each name.

Each variable represents an element of cost or benefit of the project, either in terms of physical quantities or values.

Calculations for a crop model, farm model or project are simply an algebraic sum of a certain number of these variables.

The computation of the model will require the building of formulae or predefined formulae. Analysis at each level of aggregation requires that operations be conducted on certain variables such as input data, and a new variable will be created as a result.

A program such as MANIP, developed by the Investment Centre of the FAO, is a good case in point. Analysts familiar with LOTUS can also use this approach to analyse small-to medium-size projects. Owing to its transparent nature, these programs constitute good training exercises.

1/ For a detailed description of each of the methodologies see M. Simeon, Using Data Processing Tools for Preparing Agricultural Development Projects, Food and Agriculture Organization of the United Nations, FAO Investment Centre Technical Paper 2 (Rome, 1985).

2. Detail structuring of the data

Program under this category emphasize the building of specific types of data for computer input.

The calculations are performed according to a set methodology and predefined programs.

The data for project should follow a hierarchical structure. At the lowest level crop budgets are prepared. Then crops are combined to build farm models and the farm models are then aggregated to represent a project.

Programs such as SAEPPA, prepared by the World Bank and Organization of American States, and COMPASS, prepared by the World Bank, can be classified under this category. COMPASS is a fairly large program which has been in use for operational purposes. Programs in these categories are rarely used as training tools.

3. General structuring of the data

Programs in this category follow a middle path with regard to the above approaches. The basic concepts used in this methodology are borrowed from the Multipurpose Agricultural Data System (MADS), which was developed by FAO (ESP and Investment Centre, DDC Division.

The program is based on the concepts of commodities, activities and plans.

Two program, DASI and MADS, are used based on this approach.

Both programs are very useful for training as well as operational work.

A detailed description of the concepts and methodology will be the subject of this manual.

B. Outputs generated by DASI

DASI program can analyse a whole range of cases, from single crops to a farm model and large agricultural projects. The main outputs generated by the program are as follows:

(a) Time series of commodities or groups of commodities produced and consumed by the project during its life, as, for example, all of the cereals produced by the project and the total volume of fertilizer used by small farms.

(b) Crop budget analysis which indicates in economic and financial terms the returns on each crop activity.

(c) A financial measurement of the earning capacity of the project at the farm level. To this end, DASI calculates the internal rate of return of farm investment (IRR), the cost-benefit ratio (C/B ratio) and the net present value (NPV).

(d) An Economic measurement of the earnings capacity of the project. DASI computes the same indicators as mentioned above, however the earnings capacity is calculated from the standpoint of the nation.

(e) A "sensitivity analysis" that repeats the calculations with different values for a single variable. It also computes switching values for all of the variables.

(f) Based on aggregates, the program calculates cash flow before and after financing. It also performs credit scheduling both at the farm and project level.

C. Organization of document D1

The Document D1 presupposes a basic understanding of project analysis on the part of the reader. It consists of five chapters.

The introduction and chapter I provide an introduction and the concepts used in DASI. This chapter presents the basic concepts of DASI, thus enabling the user to organize the project data into forms suitable for use in DASI.

Chapters II to V contain detailed NGAMO exercises on the use of DASI in project analysis and gives the user the opportunity to experiment with the program. They give step-by-step details of how to apply the program to a set of real project data and the different types of results which can be obtained.

They also provide the user with guidelines on how to run the program on his own, giving step-by-step details of the instructions to be given to the computer.

Chapter VI describes the installation of DASI using different kinds of hardware specifications. It also provides instructions on how to use some of the common DOS commands used in DASI.

Annex. This provides blank forms for data entry (step 2 in data formulation).

I. OVERVIEW OF DASI IN PROJECT ANALYSIS AND CONCEPTS USED

The procedures involved in using the DASI computer program for project analysis is described by the following four steps. Each of these steps will be described in greater detail in subsequent sections.

Step 1. Organization of the project data onto the forms required by DASI. All of the inputs and outputs of the project have to be defined in terms of the following four categories: 'commodities', 'investments', 'activities' and 'plans'.

Step 2. Filling in the blank formats provided with the project data. There are four different types of format, one for each of the four categories defined above. The data, which are now in the required form, are then fed into the coumputer.

Step 3. Obtain the first print-outs from the computer showing the following:

(a) The data bank;

(b) The total quantities of the different inputs/outputs consumed and produced;

(c) The total values of the different inputs/outputs consumed and produced.

Step 4. Defining any further calculations required, e.g. specific aggregations of commodities into new variables such as foreign exchange, total production, etc.., calculation of present values, switching values, IRRs, sensitivity tests, credit and tables.

A. Definitions of commodities, investments, activities and plans (step 1)

1. Commodities

Most inputs and all of the outputs consumed/produced by a project are defined as commodities. (Some inputs can be defined as investments.) Examples of commodities consumed include items like seeds, fertilizers, land tax, etc.. The items produced include the crop raised such as paddy, sunflower, sesame, etc..

For each commodity consumed/produced by a project, a price has to be defined for each year of the project life.

2. Investments

An investment is an input which lasts several years. It allows for distinction between investment and operating costs and provides additional calculations such as replacement costs, and other associated costs (contingency costs, maintenance costs, etc..).

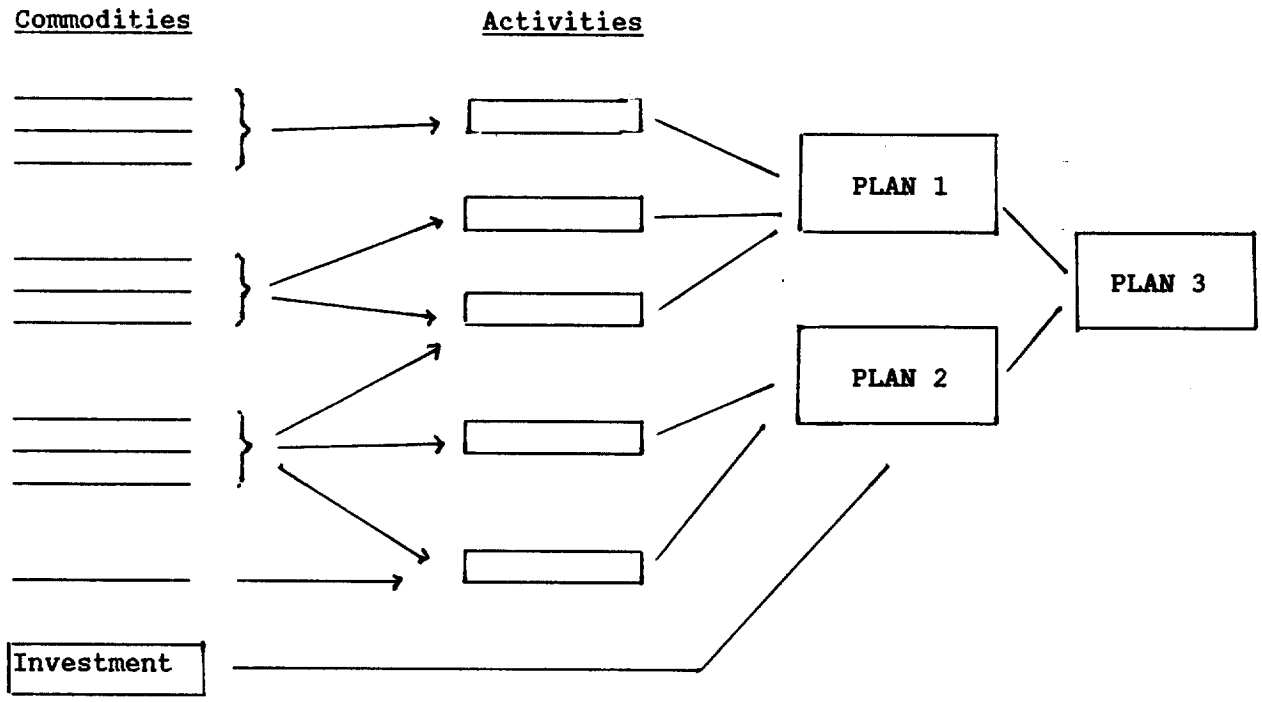
3. Activities

An activity is any operation that consumes or produces a commodity. It is the first level of aggregation of project data. A typical activity is a crop: one acre of paddy that produces grain and straw and consumes seeds, fertilizers, labour, irrigation tax, etc.. These quantities consumed and produced are on a per unit basis; in this case, per acre of land.

4. Plans

The plan is the basic level at which all calculations are performed. Various activities can be combined to create a new data structure called a plan. In a simple case, the combination of crops such as paddy, sunflower and sesame and other activities can represent a farm model called a plan. A plan can also be combined to make another plan. A good example would be combining different farm models and other activities to represent a project.

Data structure in DASI



B. Complete the data formats (step 2)

The project data are first classified into four categories, namely commodities, investments, activities and plans.

The next step in using DASI deals with the filling out of the standard input forms. There are four types of forms, one for each of the four categories defined above. The annex includes forms 1 to 4 to be filled out by the trainees.

1. Commodities (form 1A and 1B)

A commodity is defined by its name, unit, a letter "P" or "C", and by time series of the prices per unit. "P" is used when the commodity is produced while "C" when the commodity is consumed.

As noted in forms 1A and 1B, both the name and the unit of the commodity should have a maximum of 8 alphameric characters (A8), or less. The maximum length includes blanks.

The price per unit is also entered year after year. In cases where the price does not vary with time and is constant, form 1A is applicable. Form 1B is provided to record commodities that have variable prices with time. The price can be either the economic or financial price of the commodity depending on whether an economic or financial analysis is desired.

Commodities which are themselves expressed in monetary units (e.g. land tax) can be assigned a price of 1. In these cases, the actual amount will be defined by the relevant activity (or plan). For example, if a farm pays 90 francs per acre, we simply define a Commodity 'land tax' with a price of francs 1.0 and then specify the actual amount, i.e. 90 francs in the appropriate activity (or plan).

Normally, an annual specification of commodities is sufficient for agricultural projects. There are cases, however, where it is important for the project analyst to know how much of a certain commodity is produced or consumed over a period of time of less than one year in order to ensure that the supply of that commodity is sufficient to meet the needs (as for instance, with monthly water requirements, monthly labour requirements, etc..). In such cases it is necessary to define as many commodities as there are sub-periods which need to be analysed within a year (e.g. 'water 1' for water consumed in January, 'water 2' for water consumed in February, etc..).

2. Investments (form 2)

An investment is defined by its name, unit and the time series of the prices per unit. The following additional information has to be provided for each investment.

(a) The expected life duration of the item.

(b) The time lag, after which operation and maintenance (O and M) costs become effective. A time lag of zero denotes that O and M costs start in the year immediate after the investment has taken place. 1/

(c) Percentage O and M costs, as a percentage of the initial investment for annual O & M costs.

1/ The DASI computer program assumes that an investment takes place at the end of the year, hence there are no O and M costs in the year the investment has taken place.

(d) Percentage physical and price contingencies, as a percentage of the initial investments to be added on to the purchase years. It represents such items as spare parts, commissions, etc.. which while they constitute a part of the initial cost, they cannot be considered as an integral part of the investment when calculating the annual O and M costs.

(e) Percentage residual value, percentage of the original level of investment representing the residual (final or scrap value) of the investment at the end of its life time.

(f) Terminal value, which is computed at the end of the project life, in cases where the years of use of an investment are less than the standard (expected) life-time of the investment. This depends on the kind of investment the user will specify and on whether he would like to consider a terminal value in the analysis. By not considering any terminal value, i.e. by inserting an 'N' (no) in the last column of form 2, a rather conservative attitude is taken in the analysis of the project. This is the preferred approach.

The computer estimates the terminal value using the hypothesis of linear depreciation of capital precisely:

$$Tv = \frac{Vp - Ve}{Ls} * (Ls - L1) + Ve$$

where:

Tv = terminal value at the end of project;
Vp = purchased value of the investment (i.e. original value);
Ve = residual value of the investment at the end of its life;
Ls = standard life of the investment;
L1 = years of use of the last investment purchased in the project.

3. Activities (form 3)

An activity is defined by its name and by its unit and by the time series of input/output coefficients per unit of activity. Both the name and the unit of activity should not exceed eight alphameric characters (A8).

In the first column of the tables or of form 3, the name of the commodity is entered. It should have exactly the same orthography as in the commodities section (form 1A or 1B). It follows that the name of commodities should not be more than eight characters. In the second column of form 3, it should be stated whether the commodity is produced (P) or consumed (C) by the activity. If the commodity is both consumed and produced by the same activity, two lines must be used for the same commodity: one for consumption (C) and one for production (P). In the remaining columns the time series coefficients of the input/output of each commodity should be given.

4. Plans (form 4)

A plan is defined by its name and unit. Both should have a maximum of eight characters. For each plan the activities, investments, commodities and even other plans should be specified.

In the first column of form 4 an "N" or "F" is inserted depending on whether the normal (N) or phasing (F) mode of calculation is required. (The difference between these two modes is explained in the section on phasing. The name of the component of the plan is entered in the second column. It should have a maximum of eight characters. In the third column it should be indicated whether the component entered in column 2 is an activity (A), investment (I), commodity (C) or plan (P). Finally, the level at which these components are to be included in the plan for each year of the project life should be indicated.

C. Obtain print-outs: data bank, quantities of inputs/outputs, value of input/outputs (step 3)

Once the data have been fed into the computer, the user can request print-outs with the following information (procedures to enter data will be described in the user guide section):

The computer will print out all the data that have been fed in. This provides a useful check on the data bank. **PRTDATA**

For each plan, the computer will print the quantities of commodities produced and consumed over the life time of the project. **QUANTY**

For each plan, the computer will print the values of commodities produced and consumed over the life time of the project. **COMVAL**

From these print-outs it is possible to determine the technical parameters (such as total input requirements, total volume of production, etc..), and the total costs and benefits of the project for each year of the project life.

More specifically, at this stage the computer will calculate and print the following:

Data bank **PRTDATA**

Time series of quantities (for each plan):

Commodities/investments consumed per year **QUANTY**
Commodities produced per year

Time series of values (for each plan):

Values of individual commodities consumed per year
Total value of commodities consumed per year
Values of individual commodities produced per year
Total value of commodities produced per year
Values of individual investments **COMVAL**
Contingency, maintenance and residual values
Total cost of investments
Balance (total value of production minus total value of consumption and cost of investments).

A simple example of the calculations performed by DASI at this stage is given below.

Example showing main calculations performed by DASI at this stage

A farmer with 20 hectares of land plans to change his cultivation from wheat to maize. He also intends to buy a tractor in the first year of the project. Use DASI to calculate the quantities and values of inputs and outputs over a period of 13 years.

Steps 1 and 2: The project data have been organized into the form required by DASI as follows:

Commodity prices a/

Name	Unit	Price per unit in dollars
Labour	Days	0.8
Other inputs	$	1
Maize	Tons	50
Wheat	Tons	70

a/ Prices here are considered to be constant over the period of the project.

Investment	Tractor
Life duration	7
Time lag for operation and maintenance	1
Operation and maintenance (percentage)	15
Physical contingencies (percentage)	5
Residual value (percentage)	10
Terminal value	Y
Price of the tractor	$US 5,000

Activity 1

A. Maize

One hectare

Year	0	1	2	3	4	5	6-13
Labour (days)	30	35	35	35	35	35	35
Other inputs ($)	5	10	15	20	30	30	30
Yield/Maize (ton)	0.7	0.9	1.1	1.3	1.5	1.5	1.5

Activity 2

A. Wheat

One hectare

Year	0	1	2	3	4	5	6-13
Labour (days)	45	50	50	50	50	50	50
Other inputs ($)	7	10	20	20	20	20	20
Yield/Wheat (tons)	0.7	0.8	0.9	1.0	1.1	1.1	1.1

Year 0 represents the 'without project' situation.

Plan: One farm

Unit: Farm

Year	0	1	2	3	4	5-13
A. Wheat (ha)	15	10	5	2	2	2
A. Maize (ha)	5	10	15	18	18	18
Tractor N	0	1	0	0	0	0

At this stage, the data is introduced into the computer.

Step 3: For the plan 'one farmer', run the DASI program and obtain the following print-outs.

QUANTY: Time series of quantities of commodities produced/consumed, e.g. to calculate the total quantities of labour required, the computer takes the number of labour days required per hectare of maize/wheat, year by year (from the 'activity' data), and multiplies this by the number of hectares under each crop year by year (from the 'plan' data). The following tables give the computer's calculation of the quantities consumed and produced.

Year	0	1	2	3	4	5-13
LABOUR CONSUMPTION						
Maize	30 x 5	35 x 10	35 x 15	35 x 18	35 x 18	35 x 18
Wheat	45 x 15	50 x 10	50 x 5	50 x 2	50 x 2	50 x 2
Total	825	850	775	730	730	730
OTHER INPUTS CONSUMPTION						
Maize	5 x 5	10 x 10	15 x 15	20 x 18	30 x 18	30 x 18
Wheat	7 x 15	10 x 10	20 x 5	20 x 2	20 x 2	20 x 2
Total	130	200	325	400	580	580
MAIZE PRODUCTION						
Maize	0.7 x 5	0.9 x 10	1.1 x 15	1.3 x 18	1.5 x 18	1.5 x 18
Total	3.5	9.0	16.5	23.4	27.0	27.0
WHEAT PRODUCTION						
Wheat	0.7 x 15	0.8 x 10	0.9 x 5	1.0 x 2	1.1 x 2	1.1 x 2
Total	10.5	8.0	4.5	2.0	2.2	2.2

COMVAL: Time series of values of commodities produced/consumed. The computer then calculates the values of the commodities produced/consumed by multiplying the total quantities just calculated (QUANTY) by the appropriate prices (from the 'commodity' data). Thus the total costs and benefits of the project are obtained, year by year.

Calculations for time series of values of commodities produced and consumed :

Years	0	1	2	3	4-7	8	9-12	13
Costs								
1) Labour	825x.8	850x .8	775x.8	730x.8	730x.8	730x.8	730x.8	730x.8
	600	680	620	584	584	584	584	584
2) Other Inputs	130x1	200x1	325x1	400x1	580x1	580x1	580x1	580x1
	130	200	325	400	580	580	580	580
3) Total Inputs	790	880	945	984	1164	1164	1164	1164
Production Values								
4) Maize	3.5x50	9x50	16.5x50	23.4x50	27x50	27x50	27x50	27x50
	175	450	825	1170	1350	1350	1350	1350
5) Wheat	10.5x70	8x70	4.5x70	2x70	2.2x70	2.2x70	2.2x70	2.2x70
	735	560	315	140	154	154	154	154
6) Total Production	910	1010	1140	1310	1504	1504	1504	1504
7) Balance	910-790	1010-880	1140-945	1310-984	1504-1164	1504-1164	1504-1164	1504-1164
	120	130	205	308	332	332	332	332
Investments								
8) Tractors	-	5000	-	-	-	5000	-	-
9) Maintenance	-	-	750	750	750	-	750	750
10)Physical Contingency	-	250	-	-	-	250	-	-
11)Residual Value	-	-	-	-	-	-500	-	-1785 1/
12) Total Investment Cost	-	5250	750	750	750	4750	750	-1035

1/ By applying the formula of page 7 we have: (5000-500)/7*(7-5)= 1785
to which is assigned a negative value (not being a cost).

D. Specify: aggregations, credit, switching values, sensitivity tests and standard tables (step 4)

1. Overview

DASI gives the analyst the possibility of fully exploiting the information of the previous steps in order to produce several indicators which qualify the performance of the project. The features used to calculate these indicators are: aggregates, credit, switching values, sensitivity test and tables.

In order to process these steps, the user needs to fill in a file with the instructions requested with the help of an editor.

When this is done, the calculations are performed by a series of DASI programs.

2. Aggregations

Once the calculations of quantities and the values of commodities consumed and produced by a given plan have been performed, it is often useful to define the aggregations of specific commodities already held in the data bank. The aggregate can be expressed in value or in quantity terms. For instance, the user may wish to calculate the following:

The total value of production over the project life;
Total operating costs over the project life;
Total home consumption requirements over the project life;
Foreign exchange components of costs and benefits, etc..

DASI enables the computation of these and other similar aggregations through the use of the AGGREG program. This program creates new series of values by adding together specified variables (which themselves are already in the data bank). Mathematically, the program creates a new variable as a linear combination of other specified variables:

$$NV = a_1 V_1 + a_2 V_2 + .. + a_n V_n$$

where NV is the new variable;

a_i is the coefficient (positive or negative) by which the old variable V_i is multiplied before the addition.

The user therefore has to define the new variable required by:

Stating the type of aggregate: V for values or Q for quantities;

Stating the name of the new variable;

Specifying the components of this new variable, together with their appropriate weights.

For example, in order to calculate the total PRODUCT for a farm producing rice, maize and coffee, the user defines the new variable "PRODUCT" and its components (each with a weight of 1) rice, maize and coffee.

The computer will then add together the values of the items specified for each year of the project life.

```
V               PRODUCT
RICE              1.
MAIZE             1.
COFFEE            1.
ENDATA
```

The new variable HOMECONSUMPTION can similarly be defined as follows:

```
V               HOMEC
RICE H            1.
MAIZE H           1.
ENDATA
```

The user then requests the computer to calculate total SALES, by defining SALES as the value of the product, minus the value of home consumption.

```
V               SALES
PRODUCT           1.
HOMEC            -1.
ENDATA
```

3. Credit

DASI can provide the calculations requested for the most common types of CREDIT. Making direct use of the information on values of commodities, investments and aggregates stored in the computer, DASI computes the repayment schemes of short-and long-term loans, in particular, debt service (interest + principal repayment) and the outstanding loan. It allows for the consideration of a grace period and two different schemes of repayment, namely, constant capital and equal instalment.

The following table gives an example of DASI CREDIT facilities. A loan is given to finance the purchase of 100 per cent of the investments made in years two and three, and 90 per cent and 75 per cent of those made in years four and five of the project. The interest rate charge is 12 per cent and the repayment period is five years. A one year grace period is granted after the last year in which the loan is received. The interest paid during the grace period and the repayment is paid in equal instalments (the debt service is constant over the years).

Example of input instructions for credit

```
CREDIT          Credit for project investment on first four years
PAY             EQ
1.
5.
12.
INVESTM
0, 1, 1, 0.9, 0.75, 6 x 0/
ENDATA
```

4. Switching values and sensitivity tests

DASI can conduct two different types of sensitivity analysis: (a) to compute the switching value of the specified variables; and (b) to determine the effect on a project's earning capacity by changing one or several of its variables. The switching value of a variable is the percentage change that the value of a variable must reach before a project is no longer viable.

To compute the switching values, in this section all of the variables that contribute to the benefits and costs of the project must be specified. To calculate the net benefits, the discount rate must be given. In order then the variables that contribute to the benefit stream are assigned a plus weight (+1) and those that contributes to the negative stream are assigned a negative weight (-1). In this section the sensitivity test, that is what will happen to the indicators and net benefits when rice production decreases by 15 per cent, can also be specified. SENSITIVITY is specified after ENDATA and the variable PADDY is given a weight of -15.

This section also provides the possibility of carrying out a cash-flow analysis of a farm or project before financing and after financing. Two switch sections must be specified. In addition to the standard variable, the second section should also include two key words "REC.LOAN" to account for all the loans that have contributed to the benefits and "DEBT SER" to include all the payments made to pay the interest and principal.

The following section provides an example.

```
SWITCH          12.     PROJECT INDICATORS BEFORE FINANCING
PADDY           +1.
IRR-PROD        +1.     BENEFIT
BULLOCK         -1.
TILLER          -1.                          NET BENEFIT
FERTIL          -1.     COSTS
OTH-COST        -1.
INVEST          -1.
ENDATA
SENSITIVITY
PADDY          -15.
ENDATA
SENSITIVITY
INVEST          20.
ENDATA
SWITCH          12.     PROJECT INDICATOR AFTER FINANCING
PADDY            1.
IRR-PRO          1.
REC.LOAN         1.
DEBT SER        -1.
BULLOCK         -1.
TILLER          -1.
FERTIL          -1.
OTH-COST        -1.
INVEST          -1.
ENDATA
```

5. Tables

DASI gives the user the option of asking computer to print pre-defined tables at the end of the calculations when all of the information is available in the memory of the computer.

The following items can be inserted into a table:

(a) Values of commodities produced or consumed by the project;
(b) Values of the investments of the project;
(c) Values of aggregates.

The variables generated by the CREDIT module are as follows:

REC.LOAN	Total loans received
DEBT SER	Total debt service paid
INTEREST	Total amount of interest
PRINC.RE	Total principal repayments
OUT.LOAN	Total outstanding loan(s)

The variables generated by the COMVAL module are as follows:

TOTAL.CC	Total value of commodities consumed by the project
TOTAL.CP	Total value of commodities produced by the project
TOTAL.I1	Total purchase cost of investments
MAINTEN.	Total maintenance cost of investments
CONTING.	Total contingency of investments
RES.VAL	Total residual value of investments (includes terminal value when computed)
TOTAL.I2	TOTAL.I1 + MAINTEN. + CONTING. + RES.VAL
BALANCE	TOTAL.CP - TOTAL.CC - TOTAL.I2

The choice of headers, entries, subtotals and totals of the table is determined by the user. The number of tables that can be produced is quite large, but the most commonly requested tables are as follows:

(i) Cash flows (before and after financing);

(ii) Production (benefits and costs);

(iii) Investments (initial, O and M);

(iv) Foreign exchange component of say investments;

(v) Local component of say investments.

E. Special features

1. The "normal" or "phased" modes of calculations

The DASI computer program allows the calculations of total production and consumption at the plan level to be carried out in two different ways: "Normal" or "Phased".

The normal mode assumes a uniform build-up of activities, etc.. contained in a plan.

The phased mode of calculations allows for the following:

Different groups of farmers entering the project in different years. Here, the build-up of yields, etc.. will affect different groups of farmers at different times. Those entering in year one of the project will have higher yields by year three than those who enter the project in year three.

The automatic calculation of the build-up of yields/inputs, etc.., where perennial activities like tree plantation, livestock production, etc.. are concerned, (i.e. where trees/animals, etc.. are introduced gradually into the project).

Where the normal mode is required, 'N' is placed in the first column of the plan format and the level of activities etc.. contained in the plan is given as the total number of units for each year.

Where the phased mode is required, the level of activity (or other plan component) is given in incremental terms, such as the incremental number of hectares under a perennial crop or the incremental number of farmers joining a project each year. This allows for different yields, etc.. to be calculated for components which enter the project in different years.

An example of the different calculations performed by the computer - according to whether the normal or phased mode is used - is given below.

Example 1:

The following compares two variants of a project where the objective is to increase the yield of rice on 100 farms:

Variant 1: 100 farmers join the project in year 1.

Variant 2: 50 farmers join the project in year 1.
30 farmers join the project in year 2.
20 farmers join the project in year 3.

The expected build-up in the yield of rice production per farm is given below (year 0 represents the 'without' project situation).

Rice production per farm

Years	0	1	2	3	4	5	...	10
Rice/yield (tons)	5	6	7	8	9	9		9
Area planted	10	10	10	10	10	10		10
Total production	50	60	70	80	90	90		90

Variant 1

The 'plan' for variant 1 is shown below:

Plan: Total production.
Unit: Project area.

Year 0	1	2	3	4	5	...		10
"N" rice farm	100	100	100	100	100	100	...	100

The computer will then perform the following calculations (to calculate total quantities of rice produced):

Year	0	1	2	3	4	5	...	10
Rice production	50x100	60x100	70x100	80x100	90x100	90x100	...	90x100
Total	5 000	6 000	7 000	8 000	9 000	9 000	...	9 000

Variant 2:

The 'plan' for variant 2 is shown below:

Plan: Total production.
Unit: Project area.

Year	0	1	2	3	4	5	...	10
"F" rice farm	0	50	30	20	0	0	...	0

It should be noted that in the above plan, the data are entered in terms of incremental levels, therefore the number of farmers undertaking the activity 'production of rice' will be 100 from year three onwards.

The computer will then perform the following calculations:

Total production of rice using the phasing mode

Group	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	...	Year 10
Group 1 (50 farms)	50x50	50x60	50x70	50x80	50x90	50x90	50x90	...	50x90
Group 2 (30 farms)	30x50	30x50	30x60	30x70	30x80	30x90	30x90	...	30x90
Group 3 (20 farms)	20x50	20x50	20x50	20x60	20x70	20x80	20x90	...	20x90
Total	5 000	5 500	6 300	7 300	8 300	8 800	9000	...	9 000

To understand the calculations performed by DASI when the phased mode is used, it is helpful to imagine that the farmers are divided into three groups:

Group 1 enters the project in year 1

Group 2 enters the project in year 2
Group 3 enters the project in year 3

Each group continues to produce the output of the 'without project' situation until it joins the project. (The first year in which each group joins the project is underlined in the table above.) The build-up of yields affects the three groups in different years, according to when they enter the project.

It is worth noting that full production is reached earlier when using the normal mode of calculation, and that the increase in total production is more gradual when using the phased mode.

F. Case of 'with' and 'without' project situations

An essential part of project analysis is the comparison of project alternatives in order to select the best one. Generally, the activities and plans for the most probable alternatives will be specified. Small variants of these main alternatives could then be analysed by adjusting the data and running the computer program again. This latter practice avoids the creation of too many activities and plans. When all of the costs and benefits are computed for each alternative of the project, the best proposal can be selected on the basis of indicators like IRR, PV, etc..

Among the most common alternatives to be considered in project analysis, are the so called "with" and "without project situations". The "without project" situation represents the most likely development of the project area if no project were to be undertaken. It is of particular importance as it is taken as the basis for comparing all the possible alternatives of a project: the incremental benefits of each alternative are obtained by subtracting the net benefits of the "without project" situation from those of the "with project" situation.

Where the without project situation is assumed to remain constant, the facility year zero can be used. The column 'year zero' of the data formats is filled in with data for the without project situation. In this instance, the program will calculate the incremental benefits on request by automatically subtracting the benefits of the without project situation from the project's yearly benefits.

Where the without project situation is assumed to change significantly in the near future, the activities and plans should be defined to describe these expected changes. Then the incremental costs and benefits of a given alternative are obtained by subtracting the plan of the without project situation from the plan of the project alternative. This is done by defining a new plan with the following components:

	Weight
PLAN 1	1.0
PLAN 2	-1.0

where plan 1 is the plan for the with project situation, and plan 2 is the plan for the without project situation.

II. NGAMO EXERCISES

A. Introduction to the problem

1. The project area

In the NGAMO area, about two hours from the major city, a development project will start. The project will provide a group of farmers with improved irrigation facilities and encourage on-farm investment through the purchase of tractors, as well as investment in infrastructure such as buildings and feeder roads.

At present the total cropped area covered by the project is about 134,000 acres. A typical farm model represent a farm size of 11 acres. There are two main cropping periods, first the rainy season which starts in May-June and ends in August-September, followed by a dry season that starts in October-November and ends in April-May. During the rainy season farmers grow paddy. During the dry season, sesame is the main crop with minor acreage devoted to sunflower. The cropping intensity at present stands at 120 per cent. With the introduction of irrigation facilities, the farmers expect to increase their cropped area from the current 13.4 acres to 15.5 acres at full development, thereby increasing their cropping intensity to 140 per cent. With the availability of more water the farmer is expected to increase the area under the high yield variety (HYV) of paddy and decrease the area under the traditional variety. During the dry season only part of the land is cultivated with sunflower and sesame.

B. NGAMO 1. EXERCISE

The NGAMO 1 excercise depicts a traditional farm model in the area. The farmer is mainly dependent on bullocks for the preparation of the land. The use of fertilizer is more balanced in crops such as HYV paddy and sunflower. All crops use pesticides other than the traditional variety. Owing to the lower level of inputs used, farmers' credit needs are not expected to increase significantly under traditional agriculture. The farmer currently meets his labour requirements from family labour. With the expected increase in cropping intensity, he might face labour shortages, especially in the peak season. Detailed farm data is presented in subsection 2.

1. Objectives

(a) To introduce the concepts used in the DASI program.

(b) To familiarize the user with the methods of data entry and basic calculation.

(c) To use the computed data for a technical and financial analysis at the farm level only.

2. Data on farm production

(a) Development of cropping patterns.
(b) Input-output data per acre by crop.
(c) Prices of inputs and products.
(d) Other farm costs.

(i) Development of the cropping pattern (11 acre farm)

Years of the project

Year	0[a/]	1-2	3	4	5	6-15
Crops (in acres)						
1. Wet season						
Paddy-HYV	7.7	7.7	7.8	7.9	8.0	8.1
Paddy-traditional	3.3	3.3	3.2	3.1	3.0	2.9
2. Dry season						
Sunflower	0.2	0.2	0.4	0.5	0.7	0.9
Sesame	2.2	2.2	2.5	2.9	3.3	3.6

a/ The cropping pattern in the "without project situation."

(ii) Input-output data per acre by crop

(inputs/outputs for year 0 are the same as for years 1 and 2)

Paddy-HYV

Seeds:	65 lb (years 1-2), 70 lb (years 3-15) francs/lbs.
Fertiliser:	
Urea	100 lb (years 1-2), 112 lb (years 3-15)
TSP	50 lb (years 1-2), 56 lb (years 3-15)
MOP	24 lb (years 1-2), 28 lb (years 3-15)
Manure:	.4 (years 1- 2), .5 (years 3-15) cart of farmyard manure.
Pesticide:	applied for a value of 2.1 francs (years 1-2) and 2.5 Francs (years 3-15)
Labour:	51 man-days/acre (years 1-2); 50 man-days/acre (years 3-15)
Pair of bullocks:	14 days (years 1-2) and 16 days (years 3-15)
Yields:	1.8 (years1-2);1.9 tons (years 3-4); 2.1 tons (years 5-15).

Paddy-traditional

Seed:	42 lb (years 1-2), 46 lb (years 3-15)
Fertiliser:	
Urea	24 lb (years 1-2), 28 lb (years 3-15)
Manure	0.4 cart of farmyard manure, (years 1-2), 0.5 (years 3-15)
Pesticide	applied for a value of 2.1 francs (years 1-2) and 2.5 (years 3-15)

Labour: 34 man-days/acre (years 1-2), 43 man-days/acre (years 3-15)
Pair of bullocks: 11 days (years 1-2); 13 days (years 3-15)
Yield: 1.0 tons (years 1-2); 1.1 tons (years 3-15).

Sunflower

Seed: 9 lb (years 1-2), 11 lb (years 3-15)
Fertiliser:
Urea 78 lb (years 1-2), 84 lb (years 3-15)
TSP 50 lb (years 1-2), 56 lb (years 3-15)
MOP 24 lb (years 1-2), 28 lb (years 3-15)
Pesticide: applied for a value of 2.1 francs/acre (years 1-2), 2.5 (years 3-15)
Labour: 16 man-days/acre (years 1-2); 25 man-days/acre (years 3-15).
Pair of bullocks : 6 days (years 1-2); 9 days (years 3-15)
Yields : 0.4 tons (years 1-2); 0.6 tons (years 3-15).

Sesame

Seed: 15 lb (years 1-2); 17 lb (years 3-15)
Fertiliser:
Urea 78 lb (years 1-2), 84 lb (years 3-15)
TSP 50 lb (years 1-2), 56 lb (years 3-15)
Pesticide: applied for a total of 8 francs/acre (years 1-2), 10 (years 3-15)
Labour: 21 man-days/acre (years 1-2); 33 man-days/acre (years 3-15)
Pair of bullocks: 8 days (years 1-2); 10 days (years 3-15).
Yield: 0.1 tons (years 1-2); 0.2 tons (years 3); 0.3 tons (years 4-15).

(iii) Prices of inputs and outputs

(Prices constant during project)

Paddy-HYV	441/ton
Paddy-traditional	662/ton
Sunflower	4,550/ton
Sesame	7,674/ton
Seed (paddy)	0.3/lb
Seed (sunflower)	3.0/lb
Seed (sesame)	5.2/lb
Urea	0.17/lb
TSP	0.57/lb
MOP	0.27/lb
Manure	15/cart
Pair of bullocks (hired)	30/day

(iv) Other farm costs

Land tax:		28 francs/year
Irrigation tax:		110 francs from year 3 onwards
Other costs:	year 1-2	90 francs/years
	year 3	120 francs/years
	year 4	136 francs/years
	year 5	152 francs/years
	year 6	169 francs/years
	years 7-15	185 francs/years

Four hundred and fifty man-days of family labour are available per year.

3. Questions to be answered

Above an example of the problems considered in the feasibility and financial analysis, which you should be able to answer with the output of DASI:

(a) Determine the labour requirements and verify that family labour is enough;

(b) Determine the draft animal requirements and make suggestions if there appears to be a potential constraint;

(c) On the basis of the farm input and output, check the storage and transport capacity available at the farm level;

(d) Compare the benefit/land and benefit/labour ratios at the beginning of the project with the one at full development;

(e) What is the evolution of costs and receipts?

(f) Based an activity analysis, determine the profitability of each crop over the project life and establish it ranking;

(g) Determine the short-term credit needs of farmers to purchase seeds and fertilizer.

C. Enter data on the computer:

Once the user is familiar with the concepts used in DASI program, as discussed in the chapter I, the next step would be to apply these concepts on the NGAMO exercises presented above. Before we start the computer work two steps have to be completed.

(a) Identify from the information given in Chapter I, the possible commodities produced and consumed, the activities to considered and plans to be made.

(b) Fill out the forms on commodities, activities, and plans (form 1, 3 and 4) according to the instructions given in chapter I.

Once these two items are completed you are ready for entering data on the computer.

1. The DASI program: getting started

The DASI program is available in two versions; a standard one which is distributed in three different languages (English, French and Spanish, and a 1988 version available in English and French which includes some improvements, but which requires a larger memory and hard disk.) (For details on installation and operation, see annex II.) In the example, the new version of DASI and a computer with a hard disk will be used. Follow the following steps to invoke the program:

(i) Switch on the computer;
(ii) The screen might ask for the date and time to be indicated; if it does;
(iv) Enter date and time or escape;
(v) The screen will show:

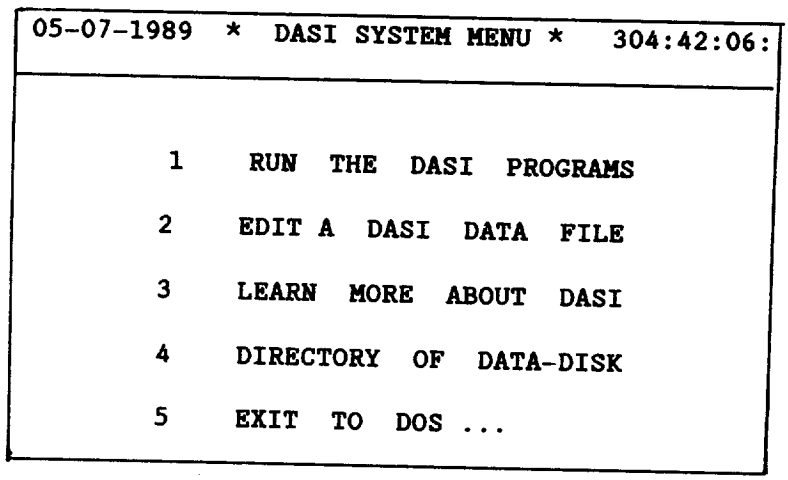
C>

(vi) Type DASI

C>DASI

(vii) The screen will show the DASI system menu.

The Wordstar program is used to enter the data in the computer. Wordstar allows data files that are needed to run DASI to be created and edited.



Press ↑ & ↓ to change your choice and RETURN to start or type directly the number;

(viii) To select an option either type the number directly or use the arrow keys to move the lighted bar;

(ix) To enter the data select the second option or "EDIT A DASI DATA FILE", and press return (the key marked ENTER);

(x) The bottom of the screen will show:

NAME OF FILE TO EDIT ?

(xi) If a DASI file already exists, type the name of the file (file name with a maximum of eight characters and an extension with three characters.) Any name can be selected. The name given here is NGAMO1.DAT; it should be typed as below. Press RETURN.

NAME OF FILE TO EDIT ? NGAMO1.DAT

(xii) The screen will show an empty space for the creation of the first data file. The top of the file will display the name of the file and user information on column and lines. The bottom part provides a permanent menu for some of the most commonly applied commands for preparing the file. (Details on this are provided in chapter VI together with other information on Wordstar and DOS commands.)

2. Free format input

In the exercises free format input is used. Each coefficient is separated from the others by a coma (,). The decimal point is not mandatory but it is better to enter it so that coefficients are properly identified.

If the same figure is to be repeated, a multiplier can be used. This means that if in any part of the stream 34 has to be repeated three times, it can be entered either as 34., 34., 34., or 3*34.

When free format is used, DASI does not repeat the last figure. This means that the user must check that each time series actually contains a number of coefficients exactly equal to the life of the project.

If the without project situation is included, the first figure of the stream is assigned to year 0, the second to year 1, and so on. In this case, the stream must contain as many coefficients as the project life, plus one. The end of the time series must be marked with a back slash (/). Using free format, the first example is entered as follows:

5., 10., 20., 30., 30., 35., 35., 35., 35., 35., 53., 35/

It can also be entered using multipliers:

5., 10., 20., 2*30., 5*35/

The second example, using multipliers is quite simple:

12*25/

but becomes very long without them:

25., 25.., 25., 25., 25., 25., 25., 25., 25., 25., 25., 25/

Any combination of single and repeated figures can be entered:

25., 3*25., 2*25., 25., 4*25., 25/

However, check that the correct number of coefficients has been entered!

From now on it will only be specified that "here a time series is to be entered specifying ...", assuming that it is entered according to the format specified in the header and to the outlines given here.

The data must be entered according to the specific format contained in one of the following five sections. Other than first section on HEADINGS, each section starts with TITLE and closes with ENDATA. All data must be entered in capital letters (uppercase).

(i) HEADINGS

(ii) COMMODITIES

(iii) INVESTMENTS

(iv) ACTIVITIES

(v) PLANS

For the sections applicable to your exercise, enter the data according to the instructions given in the coding forms in the table 1 to 4.

D. Create the data bank and print the data

Once a complete set of data has been entered and stored in NGAM01.DAT file, verify that the data entry is correct.

(a) Select the option "RUN THE DASI PROGRAMS" in the main DASI MENU. The program will take you to the following first sub-menu called the DASI PROGRAM MENU.

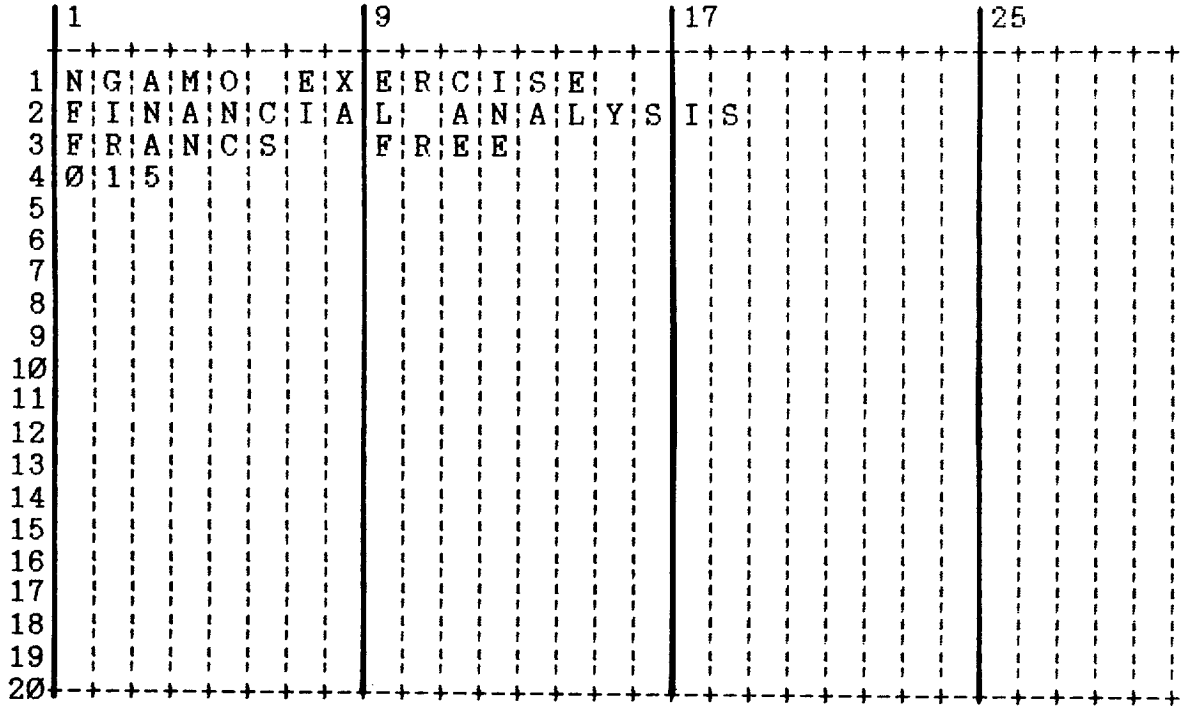
```
05-07-1989 * DASI PROGRAM MENU  *   04:38:47

        1     CREATE  THE  DATA  BANK
        2     COMPUTE  THE  QUANTITIES
        3     COMPUTE  THE  VALUES
        4     PROJECT  INDICATORS
        5     PRINT  THE  DATA  BANK
        6     PRINT  THE  QUANTITIES
        7     PRINT  THE  VALUES
        8     VERTICAL  PRINTINGS
        9     EXIT  TO  MAIN  MENU
```

Press ↑ & ↓ to change your choice and RETURN to start or type the number directly.

TABLE 1. DASI DATA ENTRY ON COMPUTER: HEADING

FORMAT : HEADING **NAME OF THE FILE** : NGAMO.DAT



LINES	COLUMNS	REMARKS
1	1	..... Name of the project (A48).
2	1	..... Title (A16).
3	1-8	..... Monetary Unit.
3	9	..... Write keyword "FREE" (indicates free format used).
4	1	..... Write"Ø" or "1" Ø : Without project situation (year Ø) considered. 1 : Without project situation (year Ø) not considered.
4	2-3	..... Two digits, indicating the lifespan of the project.

TABLE 2. DASI DATA ENTRY ON COMPUTER: COMMODITIES

FORMAT : COMMODITIES **NAME OF THE FILE** : NGAMO.DAT

	1								9								17								25					
1	C	O	M	M	O	D	I	T	I	E	S																			
2	P	A	D	-	H	Y	V		T	O	N						P													
3	1	6	*	4	4	1	/																							
4	P	A	D	-	T	R	D		T	O	N						P													
5	1	6	*	6	6	2	/																							
6	S	U	N	F	L				T	O	N						P													
7	1	6	*	4	5	5	Ø	/																						
8	S	E	S	A	M	E			T	O	N						P													
9	1	6	*	7	6	7	4	/																						
1Ø	S	-	P	A	D	D	Y		L	B							C													
11	1	6	*	Ø	.	3	/																							
12	M	A	N	U	R	E			C	A	R	T					C													
13	1	6	*	1	5	/																								
14	L	A	N	D	-	T	A	X	F	R	A	N	C				C													
15	1	6	*	1	/																									
16	L	A	B	O	U	R			M	/	D						C													
17	1	6	*	Ø	/																									
18	E	N	D	A	T	A																								
19																														
2Ø																														

LINES	COLUMNS		REMARKS
1	1	.....	Write the keyword "COMMODITIES".
2	1-8	.....	Name of the commodity.
2	9-16	.....	Unit of commodity.
2	17	.....	"P" for commodities produced; "C" for commodities consumed.
3	1	.....	Specify timeseries of prices. (entries are according to the free format described in section 2, subsection 3(a).
		.....	Follow the steps in line 2 and 3 for each of the commodities to be entered.
		.....	Close section with "ENDATA".

TABLE 3. DASI DATA ENTRY ON COMPUTER: ACTIVITIES

FORMAT: ACTIVITIES **NAME OF THE FILE** : NGAMO.DAT

	1	9	17	25
1	ACTIVITIES	ES		
2	CUL-HYV	1-ACRE		
3	PAD-HYV	P		
4	3*1.8,2*	1.9,11*2	.1/	
5	S-PADDY	C		
6	3*65,13*	70/		
7	UREA	C		
8	3*100,13*	*112/		
9	TSP	C		
10	3*50,13*	56/		
11	MOP			
12	3*24,13*	28/		
13	MANURE	C		
14	3*.4,13*	.5/		
15	PESTICS	C		
16	3*2.1,13	*2.5/		
17	BULLOCK	C		
18	3*14,13*	16/		
19	LABOUR	C		
20	3*51,13*	50/		
21	CUL-TRD	1-ACRE		
22				
23	ENDATA			
24				

LINES	COLUMNS	REMARKS
1	1	.... Write the keyword "ACTIVITIES"
2	1-8	.... Name of activities.
2	9-16	.... Unit of activity.
3	1-8	.... Name of commodity.
3	9	.... "P" for commodity produced; "C" for commodity consumed.
4	1	.... Timeseries of input/output coefficients. Close last entry by (/).
		.... Repeat steps in line 3 to 4 for all of the commodities consumed or produced under this activity.
		.... Repeat steps in line 2 to 4 for each activity.
		.... Close the section with "ENDATA".

TABLE 4. DASI DATA ENTRY ON COMPUTER: PLANS

FORMAT : PLANS **NAME OF THE FILE** : NGAMO.DAT

	1							9							17							25				
1	P	L	A	N	S																					
2	A	N	-	F	A	R	M	1	-	F	A	R	M													
3	C	U	L	-	H	Y	V	N																		
4	3	*	7	.	7	,	7	.	8	,	7	.	9	,	8	,	1	Ø	*	8	.	1	/				
5	C	U	L	-	T	R	D	N																		
6	3	*	3	.	3	,	3	.	2	,	3	.	1	,	3	,	1	Ø	*	2	.	9	/				
7	C	U	L	-	S	U	N	F	N																	
8	3	*	.	2	,	.	4	,	.	5	,	.	7	,	1	Ø	*	.	9	/							
9	C	U	L	-	S	E	S		N																	
1Ø	3	*	2	.	2	,	2	.	5	,	2	.	9	,	3	.	3	,	1	Ø	*	3	.	6	/			
11	L	A	N	D	-	T	A	X	N																	
12	1	6	*	2	8	/																				
13	I	R	R	-	T	A	X		N																	
14	3	*	Ø	,	1	3	*	1	1	Ø	/															
15	O	T	H	E	R	-	E	X	N																	
16	3	*	9	Ø	,	1	2	Ø	,	1	3	6	,	1	5	2	,	1	6	9	,	9	*	1	8	5	/
17	E	N	D	A	T	A																				
18																										
19																										
2Ø																										

LINES	COLUMNS	REMARKS
1	1	.... Write keyword "PLANS."
2	1-8	.... Name of the plan.
2	9-16	.... Unit of plan.
3	1-8	.... Name of the component.
3	9	.... "N" for normal mode or; "F" for phasing mode.
4	1	.... Time series of coefficients (levels at which either activities, investments, commodities or plans enter the plan).
		.... Repeat steps in lines 3 and 4 for every component that enters the plan.
		.... Repeat steps in lines 2 to 4 for each new plan included.
		.... Close the section with "ENDATA".
		(Type "ENTER" to position the cursor at the beginning of next line)

(ii) Select option 1 or "CREATE THE DATA BANK". The screen will read for

ENTER INPUT DATA FILENAME:

(iii) Enter the name of the data file "NGAM01.DAT" and press return. The program will scan through the data. If it finds a mistake in entering the data according to the precise format, it will stop at that point. If the program stops, make a note of that item and get out of the program by pressing any key, which will bring you back to the main menu. Select edit option (2) and correct the mistake.

(iv) Repeat this same procedure if there is a mistake further down the file. Once your file is free of error, it will indicate at the end;

***** TOTAL ITEMS PROCESSED:
DONE:
STRIKE ANY KEY WHEN READY.....

(v) Option 5 or "PRINT THE DATA BANK" can be used to print the data bank. The screen will show:

OUTPUT ("S" = SCREEN/"P" = PRINTER)

(vi) Type "S" to see the data on the screen or "P" to send the output to the printer.a/

(vii) The screen will ask the following questions:

PRINT COMMODITIES (Y/N)?

(viii) If yes, the computer will ask:

YEARS TO BE PRINTED:

(iv) The user has the choice of printing data of years less than the project life.

STANDARD FORMAT..... (Y/N)

By pressing "N" the user can change the standard format that prints the data with seven columns and each column with a width of nine characters.

The screen will ask similar questions for printing the data bank for investment, activities and plans.

---

a/ One can also store the data as a text file. Instead of writing "P" type the name of the file with an extension "PRN" and press return.

E. Compute and print quantities and values

Once the data bank has been created, it is possible to compute and then print the quantities and values of a single activity or plan. It is first necessary to compute the quantities and then the values.

1. Compute quantities and values

(i) On the main DASI menu select option 1 or "RUN THE DASI PROGRAM". The screen will display the first sub-menu.

(ii) Select option 2 or "COMPUTE THE QUANTITIES". The program will prompt you to select one of the list of activities and plans defined:

(iii) Enter the number of the selected item and press RETURN. The computer will ask:

LIFE DURATION OF PLAN:

(iv) Enter the number or press return to record the full life of the project. The computer will calculate the quantities consumed and produced by that activity or plan.

(v) Then select option 3 or "COMPUTE THE VALUES" to compute the value for the same activity or plan.

2. Print quantities and values

(i) Select option 6 "PRINT THE QUANTITIES". The computer will ask one or more of these questions.

OUTPUT ("S" = SCREEN / "P" = PRINTER):

(ii) Type S or P depending on whether you want to see the output on the screen or send it for printing.

YEARS TO BE PRINTED:

You have the option of printing years less than the life of the project. Enter the desired number, or by pressing RETURN it will print the maximum number of years.

STANDARD FORMAT (Y/N):

You have the option of changing the standard format under which seven columns, each nine characters wide and with one decimal figure is displayed and printed.

COMPRESS MODE (Y/N):

The prompt appears only when you select the print option. It prints the output in a compressed style.

ENTER SCALE FACTOR (1.):

You have the option of changing the scale factor. Pressing RETURN keeps the default figure 1.

INCREMENTAL QUANTITIES (Y/N)?

If you want incremental quantities type "Y", otherwise press RETURN for no or N.

(iii) Select option 7 "PRINT THE VALUES" to print the values of commodities produced and consumed by the selected activity or plan.

Follow the exact procedure as given above for printing the values.

F. Enter aggregate into the computer

In the previous steps, the project data has been entered into the data bank and the quantities and values of a selected activity or plan have been computed. These results can be used to develop the analysis further. This will require the preparation of another file called the aggregate file, which is given the name NGAMO1.AGR. Follow the same procedure to open the new file as mentioned in section C.

In this new file, each section of aggregates, credit, switching values, sensitivity tests and tables is specified. Tables 5 and 6 provide instructions on each coding sheet about the exact format required for data entry in the sections on aggregates and switching values.

1 Compute aggregates and project indicators

Using option 4 or "PROJECT INDICATORS" in the second sub-menu called DASI INDICATORS, the program has the following menu:

```
05-07-1989    * DASI  INDICATORS *    04:40:32

        1  AGGREGATES

        2  CREDIT

        3  I.R.R. & OTHER INDICATORS

        4  TABLES

        5  EXIT TO MAIN MENU
```

Press ↑ & ↓ to change your choice and RETURN to start, or type the number directly.

TABLE 5. DASI DATA ENTRY ON COMPUTER: AGGREGATES

FORMAT : AGGREGATES **NAME OF THE FILE** : NGAMO.AGR

	1								9								17								25				
1	A	G	G	R	E	G	A	T	E	S																			
2	V								P	A	D	D	Y																
3	P	A	D	-	H	Y	V		1	.																			
4	P	A	D	-	T	R	D		1	.																			
5	E	N	D	A	T	A																							
6	V								1	R	R	-	P	R	O	D													
7	S	U	N	F	L				1	.																			
8	S	E	S	A	M	E			1	.																			
9	E	N	D	A	T	A																							
10	V								T	O	T	-	P	R	O	D													
11	P	A	D	D	Y				1	.																			
12	I	R	R	-	P	R	O	D	1	.																			
13	E	N	D	A	T	A																							
14	V								I	N	V	E	S	T															
15	T	O	T	A	L	-	I	2	1	.																			
16	E	N	D	A	T	A																							
17																													
18																													
19																													
20																													

LINES	COLUMNS		REMARKS
1	1	....	Write keyword "AGGREGATES":
2	1-8	....	"Q" to aggregate quantities; "V" to aggregate values.
2	9-16	....	Name of new variables.
N	1-8	....	Use separate line for each component of new variable
N	9-16	....	Use separate line to place a weight for each component followed by "." (dot).
N	1	....	Each aggregate is terminated by "ENDATA".
		....	Repeat steps in line 2 to N for each of the aggregate included in the file.

TABLE 6. DASI DATA ENTRY ON COMPUTER: SWITCH AND SENS

FORMAT : SWITCH & SENS. **NAME OF THE FILE** : NGAMO.AGR

	1	9	17	25
1	SWITCH	12.	BEFORE	
2	PADDY	1.		
3	IRR-PROD	1.		
4	BULLOCK	-1.		
5	TILLER	-1.		
6	FERTIL	-1.		
7	OTH-COST	-1.		
8	INVEST	-1.		
9	ENDATA			
10	SENSITIV	ITY		
11	IRR-PROD	-10.		
12	ENDATA			
13	SWITCH	12	AFTER	
14	PADDY	1.		
15	IRR-PROD	1.		
16	REC.LOAN	1.		
17	DEBT SER	-1.		
18	BULLOCK	-1.		
19	TILLER	-1.		
20	OTH-COST	-1.		
21	INVEST	-1.		
22	ENDATA			

LINES	COLUNMS		REMARKS
1	1	....	Write the keyword "SWITCH".
1	9-16	....	Discount rate or opportunity cost of the capital.
1	17	....	Title for switch section.
2-N	1-8	....	Separate line for each variable for which switching values are to be computed.
2-N	9-16	....	Separate line for weight attached to each variable (+) for variables contributing to benefits and (-) for those contributing to costs.
		....	Close section with "ENDATA".
	1	....	Write "SENSITIVITY"(keyword) after "ENDATA".
N	1	....	Name of variables for testing sensitivity.
N	9-17	....	Percentage change either plus (+) or minus (-).
N	1	....	Close section with "ENDATA".

The user has to start with 1 or AGGREGATES, and the program will ask for the aggregate file. Enter the name of the aggregate file, NGAM01.AGR. This name will be used in the modules on credit, project indicators and tables, as specified. In each of these sections, the computer will ask one or more of the following questions.

OUTPUT ("S" = SCREEN / "P" = PRINTER):

Type S or P depending on whether the user wants to see output on the screen or send it to the printer.

ENTER SCALE FACTOR (1.):

This allows the user to change the scale factor. The ENTER key will retain the default figure 1.

INCREMENTAL QUANTITIES (Y/N)?

If incremental quantities are required type "Y", otherwise pressing the RETURN key will be taken as No or N.

YEARS TO BE PRINTED:

There is an option of printing years less than the life of the project. Enter the desired number or press RETURN print the number of maximum years.

STANDARD FORMAT (Y/N):

There is an option to changing the standard format under which the program prints and displays seven columns, each nine characters wide with one decimal point.

COMPRESS MODE (Y/N):

This prompt appears only when the user selects the print option. It prints the output in a compressed style.

In the section on project indicator, it should be noted that in order to compute the cashflow after financing, it is necessary to run the credit module first.

G. Vertical printing

"VERTICAL PRINTING" can be used to print the data bank, quantities of inputs and outputs, values of inputs and outputs and aggregates in a column-wise setting. The program also allows selected variables to be printed in each of the above sections.

Select option 8 to initiate vertical printing. The program will take you to the following sub-menu called "DASI VERTICAL PRINTING".

07-19-19893* DASI VERTICAL PRINT * 303:43:21	
1	DATABANK
2	QUANTITIES
3	VALUES
4	VALUES & AGGREG.
5	EXIT TO MAIN MENU

Select any one of the first four options to print vertical data. For example option 1 or "DATA BANK' can be used to print the data bank on prices, activities and plans.

The screen will show the following:

OUTPUT ("S" = screen/"P" printer):
Select S or P
PRINT PRICES (N/Y)?

If you select Y the screen will show a list of items on commodities and investment, with their appropriate codes, and at the bottom the computer will ask you to enter the item codes to select the desired number. For example, we are interested in the following items:

Code	Item	Code	Item
1	PAD-HYV	5	S-PADDY
8	URRA	9	TSP

Enter the codes on the computer as follows:

1, 5, 8, 9/

Press enter, the computer will ask the standard questions on (1) years to be printed (2) format specification and (3) compressed mode (only the options on printing the data bank are selected) and once these questions are answered, the tables can either be seen on the screen (S option) or sent as an output to the printer (P option).

The screen will then ask for any further price data to be printed. Type N to go to the sections on activities and plans. Follow the same instruction for activities and plans.

For options 2 to 4 on "QUANTITIES", "VALUES" and "VALUES AND AGGREG", follow the same procedure. In addition, the computer will ask standard questions the "scale factor" and incremental value.

III. NGAMO 2 EXERCISE

A. Objectives

1. Formulation of a mechanized farm model.

2. Analysis of the feasibility and profitability of the mechanization proposal.

B. Proposal of investments

Under exercise NGAMO 1, the AN-FARM has been analysed and, among other things, the draft power needed to work the land has been calculated. The analysis indicated that there would be an increased need for animal power, induced by the proposed cropping pattern; the experts foresee a shortage of draft animals at peak periods. This can upset farmers' plans in the implementation of the project.

Therefore, the specialists propose the purchase of a power tiller among a number of farmers. Using DASI, this exercise will analyse the implications of this investment and draw conclusions about its profitability.

C. Data entry forms

With respect to the formats filled in for the NGAMO Exercise 1, the following information should be to added in order to have both farm models in the computer.1/

1. Commodities

(a) Introduce the commodity TILLER at the price of two francs per hour of use.

(b) Enter HIR-LAB at the price of seven francs per day, since labour requirements exceed the available family labour.

2. Investments

Using the proper format, specify the characteristics of the tiller purchased: life-time, price, etc.. it is called TILLER-I to differentiate from the commodity "TILLER". To complete the investment form, use format (2) and enter data according to the instructions given in table 7.

3. Activities

The four activities defined in NGAMO exercise 1 for the farm model based on animal traction should be modified for the farm model which will make use of the tiller. Therefore, there will be a total of eight activities, four using bullocks and four using the tiller. Their names have to be modified accordingly.

1/ Since the bulk of the data is unchanged in NGAMO exercise 2, it is possible to copy NGAMO exercise 1 and insert the additional data.

4. Plans

Under the section on plans, two plans are now specified, corresponding to the two farm models. The AN-FARM model has been modified to include hired labour, while the MEC-FARM has been built with the four traditional activities for year 0 (without project), the four mechanized activities from year 1, in addition to the provision of a level of investment to cover the need for hired labour on a similar assumption to that of the AN-FARM.

5. Aggregates, switching values and net present value

In this section, some changes have to be made in order to take into account the new farm model. To the aggregate on OTH.COST, TILLER and HIR.LAB are added and the investment costs are introduced by defining the aggregate INVEST as TOTAL-12 so as to take into account such costs as contingency, maintenance, etc.. Finally, investments costs have to be subtracted from the calculation of net benefits (INVEST with -1 as coefficient in the NET BEN aggregate).

Another switch section can be added to provide project indicators after financing. This section will be similar to the one above, except that on the benefits side it will include the amount of the loan received (specified by REC.LOAN) with a +1 coefficient, and a coefficient of 0 on the cost side (specified by DEBT SER).

6. Credit

In order to finance the purchase of the tractor, credit is introduced. Follow the instructions given in table 8. Ninety-five per cent of the tiller is financed by the credit allocated.

(a) Characteristics of the credit

(i) Five-year repayment period;

(ii) Interest rate of 10 per cent;

(iii) Grace period of 1 year;

(iv) Interest paid during the grace period;

(v) Constant capital reimbursement.

7. Tables

To summarize the minor components of the cash-flow of the farm, a TABLE is requested. After specifying the title and subtitle, the income flows of the farm (aggregate product) and the outflows represented by INVEST and OP-COST are given. The result will be the cash-flow before financing (subtitle). To obtain the cash-flow after financing, the key variables issued from credit (REC.LOAN and DEBT SER) are added. The first has a coefficient of 1, and the second one -1. The instruction for data entry as the computer are given in table 9.

D. Questions to be answered

With the help of the computer print-out, try to answer the following questions:

(i) Is the purchase of the tiller profitable?

(ii) Consider the evolution of the cash-flow.

(iii) Compare the financial results of the two models analysed: AN-FARM and MEC-FARM.

E. Characteristics of the investment in a power tiller

The power tiller has the following characteristics:

(i) A working life of eight years;

(ii) Investment cost of 20,000 francs;

(iii) 10 per cent scrap value;

(iv) Repair and maintenance costs 10 per cent of the purchase value;

(v) 5 per cent physical contingencies;

(vi) The purchase takes place in year 1.

It is assumed that the power tiller will take over all of the work initially carried out by bullocks, at a cost of 2 francs per hour (in addition to the investment in power tiller, a commodity "TILLER" with a price of 2 francs can be defined).

Tiller requirements per acre

	Hours a/		
Year of the project	0	1-2	3-15
PADDY HYV	0	30	32
PADDY TRA	0	22	26
SUNFLOWER	0	12	18
SESAME	0	18	20

a/ Labour requirements in man-days are assumed to remain unchanged with the introduction of mechanization.

The hired labour is introduced as a commodity at a price of 7 francs per man-day

TABLE 7. DASI DATA ENTRY ON COMPUTER: INVESTMENTS

FORMAT : INVESTMENT **NAME OF THE FILE** : NAGAMO.DAT

	1								9								17								25				
1	I	N	V	E	S	T	M	E	N	T	S																		
2	T	I	L	L	E	R	-	I	O	N	E						Y												
3	8	,	Ø	,	1	Ø	,	5	,	1	Ø	/																	
4	1	6	*	2	Ø	Ø	Ø	Ø	/																				
5	E	N	D	A	T	A																							
6																													
7																													
8																													
9																													
10																													
11																													
12																													
13																													
14																													
15																													

LINES	COLUMNS		REMARKS
1	1	.....	Write key word "INVESTMENTS".
2	1-8	.....	Name of investment (A8).
2	9-16	.....	Unit (A8).
2	17	.....	"Y" to calculate the terminal value; "N" without terminal value.
3	1-N	.....	Line containing following coefficients each separated by comma (,) last one ends with a backslash (/). - life of investment - lag period of investment - O&M cost as percentage of initial investment - contingency cost as percentage of initial investment - residual value as percentage of initial investment
4	1	....	Time series of prices for investment.
		....	Repeat steps in line 2 to 4 for each of the investments included.
		....	Close the section with "ENDATA".

TABLE 8. DASI DATA ENTRY ON COMPUTER: CREDIT

FORMAT : CREDIT **NAME OF THE FILE** : NGAMO.AGR

	1							9								17								25				
1	C	R	E	D	I	T																						
2	S	E	A	S	O	N	A	L																				
3	Ø	.																										
4	1	.																										
5	1	Ø	.																									
6	O	P	-	C	O	S	T																					
7	Ø	.	,	2	*	.	8	Ø	,	1	3	*	Ø	/														
8	E	N	D	A	T	A																						
9	C	R	E	D	I	T																						
1Ø	P	A	Y					C	O	N	C	A	P															
11	1	.																										
12	5	.																										
13	1	Ø																										
14	T	I	L	L	E	R	-	I																				
15	Ø	.	,	Ø	.	9	5	,	1	4	*	Ø	/															
16	E	N	D	A	T	A																						
17																												

LINES	COLUMNS		REMARKS
1	1	....	Write keyword "CREDIT".
1	9	....	Title for credit.
2	1-8	....	Depending on type of credit select one of the following.
			"SEASONAL" for short term credit.
			"PAY" for interest payment during grace period.
			"NO PAY" for interest capitalized during grace period.
2	9-16	....	"CONCAP" for constant capital reimbursements.
			"EQ" for equal instalments.
3	1-8	....	Grace period (number of years).
4	1-8	....	Repayment period (number of years).
5	1-8	....	Interest rate as a percentage.
6	1-8	....	Name of component to be financed.
7	N	....	Weight (.95) indicates that 95 per cent of tiller investment should be financed in year one.
		....	Close section with "ENDATA".
		....	For each block of credit, repeat steps in line 1 to 7.

TABLE 9. DASI DATA ENTRY ON COMPUTER: TABLES

FORMAT : TABLES **NAME OF THE FILE** : NGAMO.AGR

```
   |1               |9               |17              |25
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 1 |T|A|B|L|E|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
 2 |T|I|T|L|E|     |     |C|A|S|H|     |F|L|O|W|     |     |     |     |     |     |     |     |     |     |     |     |     |
 3 |S|U|B|T|I|T|L|E|     |C|A|S|H|F|L|O|W|     |B|E|F|O|R|E|     |F|I|N|A|     |     |     |     |     |     |
 4 |E|N|T|R|Y|     |     |T|O|T|-|P|R|O|D|1|.|     |     |     |     |     |     |V|     |     |     |     |     |
 5 |E|N|T|R|Y|     |     |O|P|-|C|O|S|T|     |1|.|     |     |     |     |     |     |V|     |     |     |     |     |
 6 |S|U|B|T|O|T|A|L|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
 7 |S|U|B|T|I|T|L|E|     |C|A|S|H|F|L|O|W|     |A|F|T|E|R|     |F|I|N|A|N|     |     |     |     |     |     |
 8 |E|N|T|R|Y|     |     |R|E|C|.|L|O|A|N|1|.|     |     |     |     |     |     |V|     |     |     |     |     |
 9 |E|N|T|R|Y|     |     |D|E|B|T|     |S|E|R|-|1|.|     |     |     |     |     |     |V|     |     |     |     |     |
10 |S|U|B|T|O|T|A|L|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
11 |T|O|T|A|L|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
12 |E|N|D|A|T|A|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

LINES	COLUMNS	REMARKS
1	1	.... Write the keyword "TABLE".
2	1	.... Write optional keyword "TITLE".
2	9	.... Header of the Table (A48).
3	1	.... Write optional keyword "SUBTITLE".
3	9	.... Header of the Table, specifies a paragraph title (A48).
4	1	.... Write keyword "ENTRY". Following item on same line identifies an entry.
4	9-16	.... Name of item to be included.
4	17-25	.... Weight indicating items. produced (+1) and consumed (-1).
4	25	.... "V" or "Q" specifying type of entry.
4	33	.... Optional name to indicate output (A16).
		.... Follow step 4 for each entry.
		.... Enter at appropriate place keyword "SUBTOTAL".
		.... Enter at appropriate place key word "TOTAL".
		.... Close section with "ENDATA".
		.... Follow steps in line 1 to 4 for each Table you plan to enter.

F. Steps required to complete the exercise

1. Introduce the hired labour as a commodity and compute its requirements for the AN-FARM plan.

2. Fill in the data form "investments" according to the information given in section E above.

3. Introduce the mechanized activities where bullocks are substituted by the use of the tiller, as indicated in section E.

4. Define the MEC-FARM plan, which assumes the same hired labour requirements as an AN-FARM.

IV. NGAMO 3 EXERCISE*

A. Objectives

1. Definition of the project.

2. With and without project situation.

3. Computation of incremental quantities and values.

4. Economic analysis of the project.

5. Computation of the credit repayment schedule for the project.

6. Computation of the total project cost in foreign currency.

B. Definition of the project

In the previous exercise, an analysis was made at micro-level on two farm models. The benefits and costs realized on individual farms (model farms) in an agricultural project are aggregated in order to obtain the values for the project as a whole. It has to be decided how many pattern farms (in this case an AN-FARM and a MECH-FARM) will be included in the project. In many projects allowance must be made for the phasing of participating farmers in the project. Not all of the farmers can be expected to joint the project in the first year. (Phasing is dealt with in NGAMO exercise 4).

In the DASI format, the project needs to be defined by the creation of a new "PLAN", called the project or total area. The main features of the project are as follows:

(a) 600 farms with animal traction starting with the project in year 1.

(b) 400 mechanized farms starting in year 1.

Investments at the project level include the following:

(a) The construction of a building in year 1 and year 3 at a unit cost of 10 million francs;

(b) The construction of a road in the first year at a cost of 30 million francs.

1. With and without project situation

In order to evaluate the net present value of the project correctly, the analyst will need to compare the with and without project situation.

---

* This exercise should be conducted using the DASI data files shown at the end of NGAMO 2 exercise.

It is assumed here that the without project situation will remain constant during the project life, therefore year zero is used to represent the without project situation .

It may occasionally be necessary to assume that the without project situation will develop. This can be done by defining it by a new plan called "plan 1". Another plan will represent a development pattern with project, called "plan 2". The economic analysis has to be carried out on a third "plan", which shows the difference between the with project and without project "plans", i.e. plan 1 and plan 2.

2. Computation of incremental quantities and values

It is assumed that the without project situation to remains constant and equal to the before project situation (year 0). The analysis can be carried out using the DASI facility of "computing incremental quantities and values."

3. Economic analysis of the project

The same file of "aggregates" prepared for the NGAMO 2 exercise can be used, provided that detailed investments at the farm and project levels are taken into account in the computation of the net present value, and adjustments are made to taxes. Taxes should be treated as transfer payments. This can be done by putting a price of zero in the commodities entry for items on irrigation and land tax.

4. Computation of the credit repayment schedule for the project

The project is to be financed by a loan with the following characteristics:

(i) The credit period is 15 years, including a grace period of five years;

(ii) No interest will be paid during the grace period;

(iii) Reimbursement is at constant capital;

(iv) Interest rate of 3 per cent;

(v) The building and roads are entirely financed by credit.

5. Computation of the total project cost in foreign currency

Two "tables" can be defined to compute the total cost of the project (investment cost at the project level) and the cost of foreign currency (40 per cent of the building cost and 20 per cent of the road cost, indicating expenditure on imported commodities and services).

Characteristics of the project investment

	Building	Road
Price (in francs)	10 000 000	30 000 000
Life duration (in years)	30	50
Operating and maintenance costs (as a percentage of the price)	5	2
Time-lag without operating costs (in years)	4	5
Physical contingencies (as a percentage of the price)	1	0.5
Residual value (as a percentage of the price)	30	60

IV. NGAMO 4 EXERCISE

A. Perennial crops

It is assumed that the farmer, who has one acre in the uplands, decides to plant this land with coffee over the next three years.

In the first year he will plant 0.2 acres, in the second 0.3 acres and in the third 0.5 acres.

1. Objectives of the exercise

(a) Fill in the formats to calculate the inputs and outputs that the farmer expects each year from this area of coffee. (An activity for one acre of coffee and a plan, taking into account the progressive planning of the area can be created).

(b) Compute by hand the labour requirements (man-days) for each year of the project.

(c) Check the results with the computer outputs.

2. Input/output coefficients per acre of coffee

Year	1	2	3	4	5	6-15
Coffee (tons)	0	0	0	0.075	0.125	0.200
Seedlings (units)	400	0	0	0	0	0
Fertilizer (15-15-15)	80	160	250	250	320	400
Labour (man-days)	41	32	26	34	40	46

3. Price

Coffee (per ton)	10 000 francs
Fertilizer 15-15-15 (per lb)	0.8 francs
Seedlings (per unit)	1 franc
Labour (per man-days)	7 francs

B. Farmer's participation in the coffee planting scheme

The District Agricultural Officer who organized the coffee planning scheme needs to assess the requirements of fertilizer and seedlings as well as the transport facilities required to market the coffee.

After a survey in the project area, and on the basis of the availability of extension services, the Officer estimates that around 500 farmers will join the coffee project on the following basis:

(a) 100 farmers will enter the project during the first year;

(b) 200 farmers will enter during the second year;

(c) 200 farmers will enter during the third year.

1. Objective of exercise

(a) Fill in a global PLAN to calculate the fertilizer and seedlings requirements of the coffee planting scheme, as well as total expected production;

(b) Calculate physical quantities manually;

(c) Compare the results with the computer.

VI. DASI ENVIRONMENTS

A. DASI program: installation on your micro-computer

1. Introduction

DASI software is distributed on two or three floppy diskettes depending on the type of computer on which it is intended to install the program. Before using the DASI software on a micro, an initial installation procedure has to be carried out. The only exception concerns microcomputers with only two drives for diskettes of 360 K, for which DASI is distributed on diskettes that are ready to be used without the need to follow installation procedure.

2. DASI versions

DASI is available in two versions: a standard one which is distributed in three different languages (English, French and Spanish) and the 1988 version, available in English and French only. The latter includes some improvements, but it requires a larger memory and hard disk on the micro on which it is operated. (See the note on the 1988 DASI version for more information.)

3. Use of DASI with the menu program

DASI software is normally used through a menu program which facilitates the use of the different modules of DASI. This menu program is written in BASIC and has the function of calling up the program the user selects to run. Since the menu is not compiled, it needs BASIC to run. For this purpose the BASICA.COM file is found on DASI diskettes. However, BASIC only works on IBM computers. For IBM compatibles, the file BASICA.COM must be replaced with the compatible's own BASIC (normally GWBASIC), and it should be renamed BASICA.

Example of replacing BASICA.COM by GWBASIC.EXE:

1. Put the DASI diskette with BASICA.COM file into drive A.
2. Del BASICA.COM file.
3. Copy the GWBASIC.EXE file from your system B.

```
COPY B:GWBASIC.EXE A:BASICA.EXE
```

To start the DASI program, once the installation procedure has been completed, the user has to execute the batch file DASI.BAT. This file varies according to the type of computer on which DASI is installed (here the batch file is only given for a PC with two drives of 360 K). The file provides the path and the designates disk b, where the data are located, as the default disk unit. Finally, it starts the execution of the set-up, bat file, which is given below:

DASI.BAT

```
echo off
path = a:\;b:\;
b:
setup
```

SETUP.BAT

```
ECHO OFF
basica dasimenu
RUNIT
```

The role the of setup batch file is to execute the DASI menu program and to start the run it batch file produced by the DASI menu program. If the user has chosen to run the CREATE program, the content of the file will be as follows:

RUNIT.BAT

```
CREATE
setup
```

After the execution of the CREATE program, the setup batch file should be called and the above procedure should be repeated.

4. DASI on personal computer (PC) with two drives and no hard disk

If the PC has two drives supporting floppy diskettes of 360 K, only the standard version of DASI is available. The DASI software comes on three diskettes ready for use and no installation is required.

If the PC is provided with 720 K two drives, as is the case with many portable computers, the DASI program is distributed on a single diskette (the standard version). Before starting the DASI operation, the data diskette on drive b needs to be initialized. This operation, which is equivalent to the installation procedure, is performed by typing NEWDISK. The NEWDISK batch file is reproduced below.

NEWDISK.BAT

```
copy a:ws*.* b:
copy a:*.dat b:
copy a:*.agr b:
copy a:printer.par b:
copy a:dasimenu.bas b:
copy a:dasihelp.* b:
```

When operating with two disk drives, the DOS file COMMAND.COM is available on one of the two disks actually inserted in the two drives in order to avoid the continuous use of the DOS diskette. DASI is distributed with the COMMAND.COM of DOS ver.3, therefore, if the user is using a different DOS version, this COMMAND.COM should be replaced by one that is compatible with the user's DOS.

5. DASI on a PC with a hard disk

Normal XT and AT computers are provided with a hard disk and a disk drive for a 360K floppy diskette. Both versions of DASI are available: the standard one on two diskettes and the version 1988 on three diskettes. In both cases it is necessary to make the preliminary installation of the DASI software on the hard disk. The installation transfers the DASI programs to a subdirectory called DASI, and the data and editor to a subdirectory called DATA (see the batch file NEWDISK in the previous paragraph for a detailed list of files transferred to the DATA subdirectory). Once the installation has been made by executing the batch file INSTALL, the DASI program is called by typing DASI.

When a micro is provided with a hard disk and a drive for floppies of 720 K or 1.44 Mb, as in the case of the most recent PCs, the DASI program (1988 version) is distributed on two or one floppy diskette and, in this case, the DASI is transferred onto the hard disk by the INSTALL procedure, which creates two new subdirectories DASI and DATA. DASI is executed done by typing DASI.

6. Use of DASI from a DOS environment

DASI software is composed of a number of FORTRAN programs and a menu for the BASIC program, which has the role of facilitating the use of DASI. However, is sometimes useful to operate DASI directly by typing the program names from DOS. Operating DASI in this way may sometimes be convenient for expert DOS users as it is quicker and, because of peculiar computer configurations, the BASIC menu program occasionally fails to work. The DOS commands required to execute the DASI programs for the standard and 1988 versions of DASI are given below.

Example of use of the standard version of DASI from DOS:

```
B>a:CREATE
B>a:QUANTY
B>a:COMVAL
B>a:ASIS
B>a:CRETAB
B>a:PRTDATA
B>a:PRTQUA
B>a:PRTVAL
```

Example of use of the versions 1988 of DASI from DOS:

```
B>a:CREATE
B>a:QUANTY
B>a:COMVAL
B>a:AGGREG
B>a:SWITCH
B>a:CREDIT
B>a:TABLES
B>a:PRTDATA
B>a:VERDAT
B>a:VERQUA
B>a:VERVAL
B>a:VERAGR
```

It is important to note that in both cases the programs should be invoked from drive A while the user is on drive B. This is because DASI programs, which usually occupy more than one single floppy disk, are always placed on drive A, while the user's data files with the editor are placed on drive B. The advantage of this disposition of programs and data is that, during the operation of DASI, the floppy disk with the data is always kept on the same drive. The floppy disks with the DASI programs are eventually changed in drive A when it is not possible to fit all the DASI Programs on a single floppy.

When operating with two disks drives, the user has to make sure that the DOS file COMMAND.COM is available on one of the two disks actually inserted in the two drives in order to avoid the continuous use of the DOS diskette. DASI is distributed with the COMMAND.COM of DOS VER. 3, therefore, if the user is using a different version of DOS, this COMMAND.COM should be replaced by the one compatible with the DOS of the user.

If the user has a micro with a hard disk, he can choose from a number of different options, namely:

(i) To keep the DASI programs on the floppy and the data with the editor on a subdirectory of the hard disk;

(ii) To keep the data with the editor on the floppy and the DASI programs on a subdirectory of the hard disk;

(iii) To put the DASI programs and the data with the editor on two subdirectories of the hard disk.

In all cases the user has to operate from the subdirectory or from the floppy disk where the data are located. From there he has to call the DASI programs, as was explained in the case of two floppy diskettes.

A practical way of avoiding having to indicate, every time a DASI program is called, the floppy or the subdirectory where the DASI programs have to be found, is to use one of the DOS command PATHs as follows:

```
PATH = A:\;B:\;  (for a PC without hard disk)
PATH = C: DASI;C: DOS;C: ;A: ;
```

The first command PATH should be used for micros equipped with two floppy disk drives using a DOS VER.3, while the second one should be used for micros equipped with a hard disk.

Where a hard disk is employed, the use of two subdirectories on the hard disk, rather than one single subdirectory containing programs and data files, facilitates the search of the data files, since they are not mixed with the DASI programs. On the other hand, the use of a single subdirectory and a floppy disk might be a convenient solution when the user does not want to overload the hard disk and wants keep data on a floppy.

B. WORDSTAR program (editor used in DASI)

This is a wordprocessing package developed by the Micropro International Corporation. WORDSTAR allows the creation and editing of the data files needed to run DASI. It also handles most of the basic DOS commands such as directory listing, deleting, coping, renaming and printing a file.

WORDSTAR can be easily accessed through the "DASI SYSTEM MENU". The DASI system menu, a copy of which is shown in the following subsection appears on the computer screen as soon as the PC is switched on. (A menu allows the user to select one item from a list of options.) By pressing the arrow key, as instructed at the bottom of the screen, the choice changes from 'RUN THE DASI PROGRAMS' to 'EDIT A DASI DATA FILE'. WORDSTAR can be found in this option. (Note that the option selected is highlighted in a different colour.)

```
05-07-1989  *  DASI SYSTEM MENU *   304:42:06:

        1       RUN  THE  DASI  PROGRAMS

        2       EDIT A  DASI  DATA  FILE

        3       LEARN  MORE  ABOUT  DASI

        4       DIRECTORY  OF  DATA-DISK

        5       EXIT  TO  DOS ...
```

Press & to change your choice and return to start or type N.

1. The DASI system menu

By pressing the RETURN(*) key to the left of the cursor (**) which is at the bottom of the screen, the prompt "NAME OF FILE TO EDIT?" appears. Write the name of the file, say figures (which should have eight characters, with an optional extension of three characters) and press RETURN to start NGAMO 1.DAT.

```
05-07-1989  *  DASI SYSTEM MENU *   304:42:06:

        1       RUN  THE  DASI  PROGRAMS

        2       EDIT A  DASI  DATA  FILE

        3       LEARN  MORE  ABOUT  DASI

        4       DIRECTORY  OF  DATA-DISK

        5       EXIT  TO  DOS ...
```

NAME OF FILE TO EDIT? NGAMO1.DAT

2. Defining the file to be edited

If NGAMO1.DAT is a new file the package denotes this by printing NEW FILE on the screen. The empty space for the creation of the new file is then exhibited. If the NGAMO1.DAT file already exists, the first 23 lines of the file are exhibited on the screen for editing. In either case the first line on the top of the screen, known as the status line, and the last line at the bottom of the screen shown in boxes are the same in both cases.

```
NGAMO1.DAT:     FC=1 FL=1 COL 01
                Empty Space
                for the creation
                of the new file
                NGAMO I.DAT

1Begin  2End  3FIND  4CHANGE  5REPEAT  6SAV7RT  7BegBlk  8EndBlk  9COPBLK 10
Exit
```

An explanation of the listings and commands of these lines follows starting with the status line

C: NGAMO1.DAT	States that you are in drive C: editing/creating the file named NGAMO1.DAT.
FC =1	The cursor is currently in line 1.
FC 01	The cursor is currently in column 1.
FC=1	The cursor is in the first character space of the file. (This is an indicator of the total number of spaces covered from the very beginning of the file up to the point here the cursor is currently situated.)

The commands of the last line can be also executed by pressing a combination of a number of keys. For faster and easier operation, these commands have been programed on the function keys at the left-hand side of or top the keyboard . Thus:

1 BEGIN — Command ^QR is activated.
The cursor moves to the beginning of the file, i.e., FL=1, FC 01

2 END — Command ^QC is activated.
The cursor moves to the end of the file, i.e, the first character of the line following the last line of text.

3 FIND — Command ^QF is activated.
WORDSTAR writes FIND? You type the parameter to be found, then press RETURN.

WORDSTAR writes OPTIONS? (FOR INFO) press RETURN.
WORDSTAR searches through the file, starting from the current cursor position. If it finds the specified word/number it stops. The user can then edit or delete this word/number. To proceed to the next occurrence of this word/number, press F5 which is the same as command ^L. F5 (^L). This repeats the previous command, which in this case is F3 (^QF).
When the search reaches the end of the file, WORDSTAR will print NOT FOUND message and instruct you to press the ESCAPE key to continue editing. (The ESCAPE key is abbreviated as Esc and is usually found on the keyboard, above the Ctrl key.)
Needless to say, in order to search the whole file, the cursor should be first brought to the beginning of the file i.e. by pressing F1.

4 CHANGE — Activated the command ^QA.
Wordstar writes FIND? You type the parameter to be found, then press RETURN.
Wordstar responds REPLACE WITH? Type the new word/number. Press RETURN.
WORDSTAR writes OPTIONS? (? FOR INFO) Press RETURN.
WORDSTAR searches through the file, starting from the current cursor position. If it finds the specified word/number it stops. The question REPLACE (Y/N?): then appears in the status line. You answer by typing Y(Yes) for replacement or N(No) for no replacement.
Press F5 (^L) to repeat the above procedure.

5 REPEAT — Activates command ^L, i.e., find/replace again. This function was described in functions F3 and F4 above.

6 SAV &RT — Activates command ^KS, i.e., save and re-edit the file. This command saves and stores on the hard disk all that you have entered in the RAM MEMORY OF THE COMPUTER. WORDSTAR returns you to the document file at the same position where the cursor was when you pressed F6 to continue editing. You should make a habit to press F6 every 15 to 20 minutes so that if there is a power failure or other mishap you will not loose all your work.

7 BEGBLK — Activates the command ^KB, i.e. mark block beginning. To copy a block of data from one place in the file to another, do the following.

Press F7 at the beginning of the block you want to copy. The symbols <B> appear at the left side of the first character of the block. The line has moved 3 characters to the right giving space to three symbols <B>. The status line, however, shows that the first character of this line is still in column 1.

8 ENDBLK — Activates the command ^KK, i.e. mark block end.

You move the cursor to the end of the block you want to copy and press F8. The symbols <K> appear at the right side of the last character of the block. You have now marked the block you want to copy. This block is shown as dimmer text and the <B> and <K> characters are no longer displayed.

9 COPBLK — Activates the command ^KC, i.e. copy a block. Move the cursor to the place you want to copy the block. Take the cursor to the end of the text of the line that is to be situated above the space the block will hold.
Make sure the "INSERT ON" command appears on the upper right had corner of the screen. If not press the INSERT (Ins) key, which is usually found at the bottom of the keyboard to the right. Now press ENTER. A blank line has been formed and the cursor is now in column 1 of this line. Press F9. The block is copied.

10 EXIT Activates command ^KX, i.e. save the file and exit from WORDSTAR. This command is similar to that of 6 SAV&RT. The difference is that, in this case, after the file is saved there is no re-editing and the command takes you to the "DASI SYSTEM MENU".
Naturally, you use this command only when you finish editing or creating a file.

Other useful Wordstar commands are tabulated below.

Additional WORDSTAR commands

Command	Function	Description/comments
	CURSOR MOVEMENTS	
	(^E) Moves 1 line up	The cursor does not move in virgin area. A virgin area is defined as that area not yet covered by either a keyboard symbol or the space bar.
	(^X) Moves 1 line down	
	(^S) Moves 1 space to left	
	(^D) Moves 1 space to right	
PgUp	(^R) Moves 1 page up	
PgDn	(^C) Moves 1 page down	
	DELETE COMMANDS	
	^G Delete a character	The character on which the cursor is situated is deleted.
	^Y Delete a line	The line in which the cursor is situated is deleted. The cursor can be at any point in the line to be deleted.
	^T Delete a word	The word to the right of the cursor is deleted.
	FILE COMMANDS	
	^KQ Abandon edit	The file being edited is abandoned. The old version of the file remains untouched.
	^KD Done edit	File is saved.
After ^KQ, or ^KD the <<< OPENING MENU >>> appears on the screen.		
	COMMANDS executable only via the OPENING MENU	
	E Rename a file	The old name of the file is substituted with the new name.
	O Copy a file	An old file is copied and a new name is given to the new file. The Contents of both files are the same.
	Y Delete a file	A file is deleted from the directory.
	P Print a file	The file is printed on the printer.
	^U Cancel a command	WORDSTAR responds with XXXINTERRUPTEDXXX press ESCAPE KEY.
	^V or Insert on/off	The effects of INSERT ON are explained below.

INS Key

When insert is on INSERT ON (see upper right-hand corner of screen):

(a) By pressing the SPACE bar a space of one character is created to the left of the cursor;

(b) By pressing the RETURN key, while the cursor is at the end of the line then a new blank line is created just after the line.

Note:

1. A Dot "." appears at the right side of the screen in column 80 when a line of a file is completely empty. When the RETURN key is pressed at the end of entering data in an empty line than, dot "." is replaced with the character "<". A line that is to be read by the DASI program must have the symbol "<" in column 80, so do not forget to press the RETURN key at the end of every line of your data;

2. By pressing ^KS (F6) or^KX (F10) or^KD, the existing file is given the extension. BAK and the new file get the old extension. In both cases the files have the same file name. In this way the user has two versions of the file. The old one and the new edited version.

C. Disk operating system (DOS)

An operating system is software (a program) that controls the operations of the PC hardware. There are several operating systems, but the most widely used are the PC-DOS sold by IBM and the MS-DOS sold by the MicroSoft Corporation.

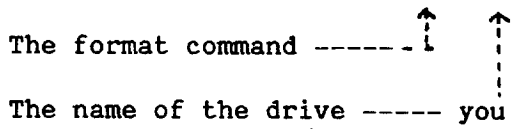
1. DOS commands

The DOS commands that you may need to edit the DASI files are listed and explained.

(a) To format a new disk:

(i) Place a BLANK disk in drive A.

(ii) Enter on one line: C> Format A:



You cannot use a new disk until it has been formatted.
Formatting will erase any files on a disk.

(b) The current drive:

(i) To view a list of files on the current drive:

C>dir A>dir

(ii) To view a list of files on the other drive, include the drive location in the command:

C>dir a: A>dir c:

(iii) To view the contents of a file on the current drive:

C>type filename.ext A>type filename.ext

(iv) To view the contents of a file on the other drive, include the drive location in the command:

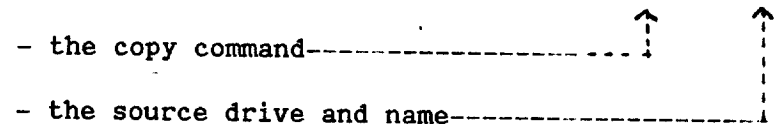
C>type a:filename.ext A>type c:filename.ext

(c) Copying files:

(i) To copy files from a floppy disk to a hard disk:

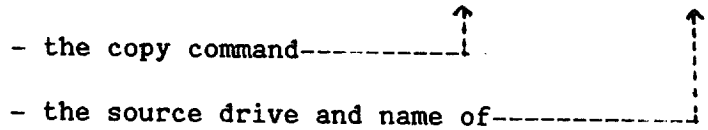
a. Put the disk containing the files in drive A.

b. Enter on one line: C>copy a:filename.ext c:



(ii) To copy files from a hard disk to a floppy disk:

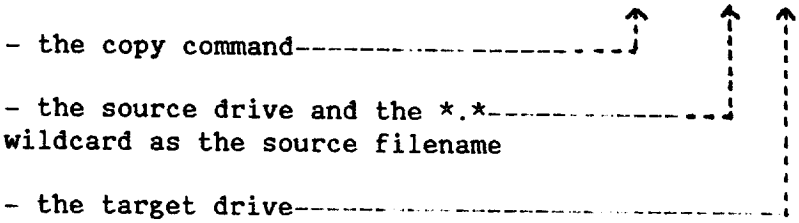
a. Place a formatted disk in drive A.
b. Enter on one line: C>copy c:filename.ext a:



(iii) To copy all the files from a floppy disk to your hard disk in one step:

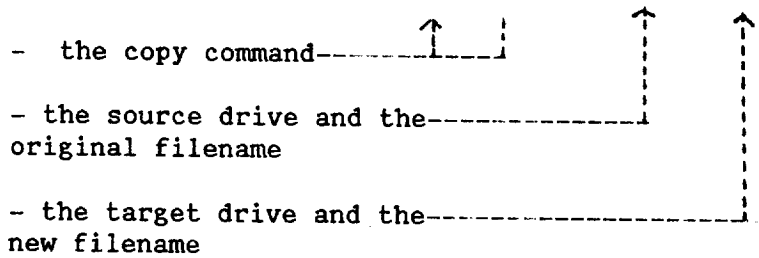
a. Put the disk containing the files in drive A.

b. Enter on one line: C>copy a:*.* c:



(iv) To copy and rename a file at the same time:

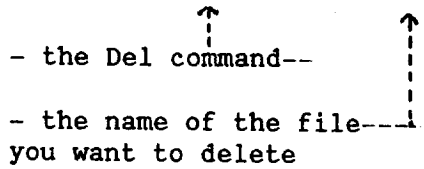
a. Put the disk containing the file in drive A.
b. Enter on one line:C>copy a:old name C:re-name



(d) Deleting files:

(i) To delete a file stored on the current drive:

Enter on one line:C>del filename.ext



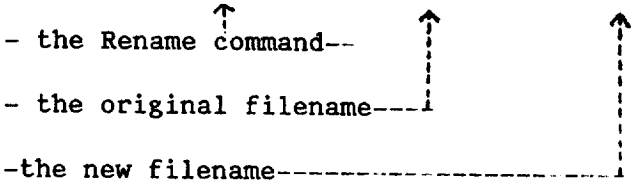
(ii) To delete a file on another drive, include that drive name:

C>del a:filename.ext
A>del c:filename.ext

(e) Rename a file:

To rename a file on the current drive:

Enter on one line:C>rename old name.ext re-name.ext



APPENDIX
BLANK FORMS FOR DATA ENTRY

DATA ENTRY FORMAT FOR

- COMMODITIES FORMS 1(A)
- INVESTMENTS FORMS 2
- ACTIVITIES FORMS 3
- PLANS FORMS 4

FORMAT-1(A) COMMODITIES: Constant Prices Page No.

Name of the Project :

Project Life (in years): Currency:

Commodities			Prices per Unit of Commodity		
Name	Unit	P/C	Financial prices	Economic prices	Observations

Cols. 1 and 2: the length of the name may not exceed 8 characters
Col. 3: indicate "P" for commodity produced
"C" for commodity consumed

FORMAT-1(A) COMMODITIES: Constant Prices Page No.

Name of the Project :

Project Life (in years): Currency:

Commodities			Prices per Unit of Commodity		
Name	Unit	P/C	Financial prices	Economic prices	Observations

Cols. 1 and 2: the length of the name may not exceed 8 characters
Col. 3: indicate "P" for commodity produced
"C" for commodity consumed

FORMAT-(2)

Page No:

INVESTMENT CATEGORIES

Name of Project :

Project Life (in years):

Prices: financial/economic Currency:

Name	Unit	Life Duration	Time Lag O. Costs	% O. & M. Costs	% Physical Contingencies	% Residual Value	Terminal Value (Y/N)	Observations

Time Series of Prices per Unit

Name	1	2	3									Observations

FORMAT-(2)

Page No:

INVESTMENT CATEGORIES

Name of Project :

Project Life (in years):

Prices: financial/economic Currency:

Name	Unit	Life Duration	Time Lag O. Costs	% O. & M. Costs	% Physical Contingencies	% Residual Value	Terminal Value (Y/N)	Observations

Time Series of Prices per Unit

Name	1	2	3									Observations

FORMAT-(3)

Page No.

ACTIVITIES

NAME:

UNIT:

Name of the Project :

Project Life (in years) :

Name	P/C	Time Series of Quantities Consumed/Produced per Unit of Activity																						Observations
		0	1	2	3	4	5																	

Col. 1: enter name of commodity.

Col. 2: indicate production "P" or consumption "C", if both are applicable take two lines for same commodity; one production, one consumption.

FORMAT-(3)

Page No.

ACTIVITIES

NAME:

UNIT:

Name of the Project :

Project Life (in years) :

Name	P/C	Time Series of Quantities Consumed/Produced per Unit of Activity																							Observations
		0	1	2	3	4	5																		

Col. 1: enter name of commodity.

Col. 2: indicate production "P" or consumption "C", if both are applicable take two lines for same commodity; one production, one consumption.

FORMAT-(3)

ACTIVITIES

NAME:

UNIT:

Name of the Project :

Project Life (in years) :

Name	P/C	Time Series of Quantities Consumed/Produced per Unit of Activity																						Observations
		0	1	2	3	4	5																	

Col. 1: enter name of commodity.

Col. 2: indicate production "P" or consumption "C", if both are applicable take two lines for same commodity; one production, one consumption.

FORMAT-(3)

ACTIVITIES

NAME:

UNIT:

Name of the Project :

Project Life (in years) :

Name	P/C	Time Series of Quantities Consumed/Produced per Unit of Activity																				Observations
		0	1	2	3	4	5															

Col. 1: enter name of commodity.

Col. 2: indicate production "P" or consumption "C", if both are applicable take two lines for same commodity; one production, one consumption.

FORMAT-(3)

Page No.

ACTIVITIES

NAME:

UNIT:

Name of the Project :

Project Life (in years) :

Name	P/C	Time Series of Quantities Consumed/Produced per Unit of Activity																				Observations
		0	1	2	3	4	5															

Col. 1: enter name of commodity.

Col. 2: indicate production "P" or consumption "C", if both are applicable take two lines for same commodity; one production, one consumption.

FORMAT-(4)

Page No:

PLANS

NAME:

UNIT:

Name of Project :

Project Life (in years):

N/F	Name	Type	Time Series Levels of Each Component																Observations
			0	1	2	3	4	5	6	7	8	9	10						

Col. 1: enter type of calculation normal "N" or phasing "F".
Col. 2: name of component.
Col. 3: enter type of component; Activity "A", Investment "I", Plan "P", Commodity "C".
Col. 4 → 20: enter level of component, a negative sign indicates consumption or subtraction.

FORMAT-(4)

Page No:

PLANS

NAME:

UNIT:

Name of Project :

Project Life (in years):

N/F	Name	Type	Time Series Levels of Each Component																Observations
			0	1	2	3	4	5	6	7	8	9	10						

Col. 1: enter type of calculation normal "N" or phasing "F".
Col. 2: name of component.
Col. 3: enter type of component; Activity "A", Investment "I", Plan "P", Commodity "C".
Col. 4 → 20: enter level of component, a negative sign indicates consumption or subtraction.