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UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

LEATHER DEVELOPMENT CENTRE

US/KEN/84/163

KENYA

Technical report: Microcomputer application in the leather quality control laboratory at KIRDI*

Prepared for the Government of Kenya
by the United Nations Industrial Development Organization

Based on the work of Ferenc Schmel, Consultant in microcomputer applications in the leather and leather products industries

V.85 37039

Explanatory notes

References to dollars ($) are to United States dollars.

The monetary unit in Kenya is the Kenyan Shilling (Ksh). During the consultant's mission the official exchange rate was $US 1 = Ksh 17.10.

The point (.) to indicate decimals.

Two dots (..) indicate that data are not available or not separately reported.

Abbreviations:

CTA	Chief Technical Advisor
KIRDI	Kenya Industrial Research and Development Institute
R & D	Research and Development
UNIDO	United Nations Industrial Development Organization

All other abbreviations are either registered trade marks or used for program/system names.

Mention of firm names and commercial products does not imply the endorsement of UNIDO.

1. INTRODUCTION

The Government of Kenya gives high priority to development of the industry potential. Especially those sectors are preferred which use the country's natural resources. The leather industry of Kenya has increased its capacity fairly rapidly during the past years and managed to gain access to the international market. The immediate objective of the industrial policy is to increase the share of finished leather in export in order to achieve higher value added on these commodities.

An important role will be played in this strategy by local research and development institutions. The Kenya Industrial Research and Development Institute (KIRDI) has established with UNIDO assistance a leather control laboratory, which is to render services to the local manufacturers and Government Organizations.

1.1. Project background

The project "Establishment of a leather quality control laboratory" ([illegible]) was carried out for the Government of Kenya by the United Nations Industrial Development Organization (UNIDO) using the special purpose contribution offered by the Federal Republic of Germany. As the laboratory became operational it proved the expectations and was considered as a good ground for further development.

A new project proposal based on the recommendations of the Chief Technical Advisor of the previous project was submitted by the Government of Kenya to UNIDO in 1984 and FRG agreed to finance it as the second phase of an integral development of the local leather and leather products industry. It was decided that besides the technical assistance focused mainly on technological aspects of the subsector, an attempt should be made to upgrade the scientific background of the R & D activities of KIRDI. This objective was supposed to be realised through installation of a microcomputer and training local counterparts (the staff of the Leather Development Centre) to run special programs on it. The consultant was expected to assist in acheiving these goals (the Job Description is attached as Annex 1).

1.2. Activities

The consultant arrived in Kenya on 17 August 1985 for his one month mission (including briefing and debriefing at UNIDO Headquarters in Vienna as well as travel). The equipment required for the consultant's field work arrived earlier and was cleared by the CTA.

The microcomputer and its peripherals were taken to the Business Computers Systems (BCS) in Nairobi for general tests and a warranty certificate issued. The consultant spent the first week installing the operating system, and making backup copies of the software supplied together with the system.

A special program (written in BASIC) was developed for the KIRDI's laboratories to make advanced mathematical statistical computations - namely carry out correlation and regression analyses on test results. Following the other consultant's recommendations (dealing with the technical evaluation of the project) spreadsheets were prepared for monitoring the work of the local staff. The same MULTIPLAN worksheet was adapted to feasibility studies and a number of statistical data-banks were established for computerized processing. Using the file-management software supplied with the system data-bases were installed for staff, inventories, physical and chemical test results handling, library and standard (quality requirements and test methods) information.

Due to the short time available for the consultant's mission and the absence of personnel with at least minimum knowledge or experience in computer applications, as well as because of other assignment of local staff the training objectives could only be partly achieved. Nevertheless three engineers, a technologist and a secretary were introduced to running the programs and the initiated databases.

The consultant left his duty station on 8th September 1985.

2. RECOMMENDATIONS

2.1. To KIRDI

2.1.1. The **IBM-PC** microcomputer with 512 Kbytes operative memory, two floppy disk drives (360 Kbytes each) and monochrome display, connected to an **EPSON FX-100+** matrix printer (the precise specification is given in Annex 2) are installed in office No. 20. The space available and the conditions here are fairly good, the office is located centrally in the Institute's plant, the lighting and the power supply are satisfactory. A chart (see Annex 3) has also been hung on the wall giving quick reference for users on proper starting-up and closing down procedures. **It is, therefore, recommended to assign finally this offic_ for the computer applications.** If one of the small desks can be changed for a bigger table the place would be almost ideal for the purpose. All the software, manuals and accessories may as well stored here.

2.1.2. The whole system should be assigned to one person, **who will take all the responsibility** for its use and maintenance. That does NOT mean that other staff-members of KIRDI would not be admitted - but only with the responsible person's knowledge. The key of the computer room should also be trusted him, but at least one more key should to be locked away. Although none of the counterparts could obtain profound experience and/or information about the features and advantages of the computer configuration, the consultant - in an agreement with the CTA - recommends Mr. J. N. Kamau from the Leather Section to be selected as responsible for the system.

2.1.3. Full guarantee is provided for both the computer and the printer. In case of any kind of difficulties, which cannot be solved by using only software tools, Messrs. Business Computers Systems should be notified. **No attemt must be permitted to open any part of the system by others than the above company.**

2.1.4. One copy of each program (the original ones on diskettes) must be locked away; only the backup copies may be used. Special attention must be payed to the **MULTIPLAN** and the **pfs:FILE** dikettes: there are only two copies of each, since they were supplied protected, at the same time all the databases and databanks use them.

2.1.5. As at the moment KIRDI does not have personnel having some education related to computering, in order to take as much advantage from the system as possible, it is **higly desirable to:**

(i) employ (full or part time) a local expert or a person with computering experience;

(ii) to send at least one staff member from each section to courses [illegible] Nairobi to be trained in computer application and some [illegible]gramming (preferably BASIC).

2.1.5. The utility programs (the **SIDEKICK** and the **SUPERPACK** backup diskettes) have been installed by the consultant for the computer hardware configuration available. Two **DOS** diskettes are provided for everyday use: the one labelled DOS with memory allocation should be used (it loads automatically the utilities). Following this advice the printing will not take a long time from the computer (thanks to the 'spooler') and the services of the **SIDEKICK** (such as the calendar, notebook, calculator) will be on hand, and still more than 220 kbyte operative memory space remains for the application programs. (The 'RAM-disk' has not been installed as yet, since it would have required some resetting in the hardware and anyway its advantages could not be utilised at this stage.)

2.1.7. Some of the software supplied for the system (e.g. the UCSD p-System, the FORTRAN compiler), are meant for further extension of the configuration, and also for running firmware programs when they will be obtained. Nevertheless KIRDI staff picking up some knowledge may use them in the meantime.

2.1.8. The consultant prepared a number of databases to be run under the **pfs:FILE** file manager. For the Leather Section the following files have been initiated:

LEATHER on the diskette labelled Quality Control is for collecting and retrieving information on tests carried out for various clients. (The structure of the database is shown in Annex 4 (77 tests have been entered so far).

CHEMTEST on the diskette labelled Chemical tests to collect and retrieve information on tests of dyestuff, tannery liquors, effluent etc. (see Annex 5).

CAPAC on the diskette labelled Installed Capacities (see Annex 6).

EQUIP on the diskette labelled Inventory - Equipment - see Annex 7 (33 leather laboratory equipment has been entered).

BOOK1 on the diskette labelled Library - Books - see Annex 8 for the structure (15 items have been stored).

PERIOD on the diskette labelled Library - Periodicals - see Annex 9 (10 journals' data have been saved).

STANDARD on the diskette labelled Library - Standards - see Annex 10 (19 standards' data are stored).

STAFF on the diskette labelled Staff - data - see Annex 11 (the leather section staff data have been entered = 10 persons).

All these databases were tested by counterparts and they are aware of how to handle these. **It is recommended to fill up all the above files with data gradually and have complete and up-to-date databases not later than by April 1986.** The databases should be extended for the whole KIRDI where the structure would be the same - e.g. staff, library, inventory etc. (Annex 12 provides a brief instruction for the users.)

2.1.9. The consultant initiated a number of statistical databanks to be run under **MULTIPLAN** Electronic Worksheet (xy means the last two digits of the calendar year in question):

DISTRIB shows the monthly distribution of slaughtering and unit prices for raw hides and skins in the country - see Annex 13.

HIDESxy consists data on the raw material trade and balances for the local leather industry - see Annex 14.

LEATHxy leather production, import and export - see Annex 15.

PRODxy footwear, leather goods, gloves and other leather products statistics - see Annex 16.

All these databanks are ready to update with fresh information. **It is recommended to make all efforts to collect statistical data according to the above systems and gradually have those stored on diskettes.** (Annex 18 offers a short guide how to operate these databanks.)

2.1.10. The consultant developed a program, extremely easy to use for for to carry out thorough mathematical statistical data processing of test results (see Annex 19). **It is recommended to use this program as frequently as possible.**

2.1.11. Following the recommendations made by the evaluation consultant a computerized **Work Monitoring System KIRDI.** Sample outputs and detailed instructions for users are given in Annex 21.

2.1.12. Using the **MULTIPLAN** spreadsheet program the consultant elaborated a system for computing tables for feasibility studies - as it is explained by the UNIDO Guidelines for Preparation of Feasibility Studies. This package (see Annex 20) reduces the time used for computations by more than 100 times, at the same time it is 100 per cent reliable and easy to use.

2.2. To UNIDO:

2.2.1. Since the time factor during this mission was rather critical, not all the benefits offered by the computer were made available for the local counterparts. **It seems to be almost necessary to make a return mission to KIRDI in order to get feedback, to reinforce the achievements and to assist in widening the field of computer application.**

2.2.2. If funds permit it might be feasible to supply some more software for the system (e.g. a word processor or an integrated business package) for a total sum not exceeding $US 800.

UNITED NATIONS

Annex 1.(1)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO

11 March 1985

Request from the Government of the Republic of Kenya

JOB DESCRIPTION

US/KEN/84/163/11-51/31.7.D

Post title	Consultant in computer data processing
Duration	One month
Date required	June 1985
Duty station	Nairobi, with travel within the country as required
Purpose of project	To further strengthen the leather industry section of the Kenya Industrial Research and Development Institute (KIRDI) and create a well-functioning Leather Development Centre (LDC) comprising a quality control laboratory, a leather pilot plant, an R+D and extension services unit, a leather products design as well as an information and standards preparation unit.
Duties	The expert will be attached to the Ministry of Commerce and Industry and will work at KIRDI. He will specifically be expected to:

1. install and make operational a desk-top microcomputer of 128 K Byte RAM capacity with all accessories (monitor, printer, etc.);
2. prepare a few basic programmes for the LDC, such as storing and processing of results of leather quality control laboratory tests, leather processing experiments/formulae and application cost analysis;
3. train counterparts in operating the equipment installed, preparation of data and interpretation of results.

The expert will also be expected to prepare a technical report setting out the findings of his mission and recommendations to the Government on further action which might be taken.

...../..

Applications and communications regarding this Job Description should be sent to:

Project Personnel Recruitment Section, Industrial Operations Division
UNIDO, VIENNA INTERNATIONAL CENTRE, P.O. Box 300, Vienna, Austria

Qualifications

The consultant should have an in-depth knowledge of the leather and leather products industry and experience in practical application of microprocessors in this sector.

Language

English.

Background information

The strategy of the Government of Kenya aims at achieving the maximum added value which potentially exists in the raw hides and skins by complete processing of the materials into finished leather, footwear and other leather products. As one of the first steps in this direction a Leather Quality Control Laboratory was established with UNIDO assistance. The project US/KEN/78/204, Establishment of Leather Quality Control Laboratory, with a total UNIDO contribution of $ 420.059 was funded through a special purpose contribution from the Government of the Federal Republic of Germany and became operational in May 1981.

The Chief Technical Adviser completed his first mission in October 1983 and in his report he submitted "A feasibility study for the establishment of a complete pilot plant for leather processing at KIRDI".

The laboratory and the pilot plant for wet-blue leathers are fully operational and with the relatively modest inputs the project has been able to establish a well-functioning industry-orientated laboratory which is very much appreciated and utilized by the Kenyan leather and shoe industry. A short follow-up mission of the Chief Technical Adviser took place in the third quarter 1984 by utilizing the uncommitted balance of the funds from project US/KEN/78/204.

Before project US/KEN/78/204 was established, strong opinions were voiced that the Kenyan leather and leather products industry not only needs a quality control laboratory but rather a complete leather technology centre with pilot plants. At that time the UNIDO substantive section and the leather consultants involved in the project design were firmly of the opinion that the technical assistance should be provided in stages. The first step should be the establishment of the quality control laboratory and during the implementation of this project the needs of a complete leather technology centre should be examined.

The main justification for the leather technology centre and the role of the pilot plant were clearly defined by the Chief Technical Adviser in his report on the first mission and in the feasibility study, and can be summarized as follows:

The Kenyan leather and leather products industry is in a very active phase of development. The enterprises which are now in the process of establishing leather finishing departments and footwear and leather products factories lack, however, the

(3)

necessary know-how and would be very much assisted through a complete pilot plant and demonstration centre which would provide the enterprises with services in applied research, quality control, feasibility studies, factory planning and in training of technologists through seminars and demonstrations of new improved production methods. At the same time, no advanced quality control laboratory and national standards are in operation in the neighbouring countries, therefore, the Leather Development Centre may be utilized as a pilot plant for establishing similar units and services in the subregion.

Annex 2.

I N V E N T O R Y
of equipment and programs left with KIRDI

H A R D W A R E

IBM-PC Desk-top microcomputer with 512 Kbyte RAM (operative memory), two parallel (Centronics type) and one serial (RS-232c type) serial ports, two double sided, double density floppy disk drives (360 Kbytes capacity each), mains cable, Guide to Operation
Model: 5150, No. S/N 12288615150

ARMONIC Green (monochrome) monitor with cables to the microcomputer
Model: 5151002, No. 098544

Keyboard with 83 keys including decimal key pad
Part: 1501105, No. 515X-55-99252 P2C

EPSON FX-100+ matrix printer with mains cable, ink ribbon, two extra covers for cut sheet printing, Operating Manual
Model: P10FA, No. 021428

ADVANCE Power Conditioner
Model: GT 650, No. SN 001383

A C C E S S O R I E S

50 pcs **floppy disks** (double sided/double density)
10 pcs **ink ribbon for the printer**
5 boxes **fanfold paper** (241 mm)

S O F T W A R E

DIAGNOSTIC Computer Self-testing Program
PC-DOS Operating System (ver. 2.1) - two diskettes (DOS and supplementary programs), User's Guide, Operating Reference Manual with Quick Reference Guide.
SIDEKICK (ver. 1.5) Desktop Organizer - one diskette, Owner's Handbook
SUPERPACK (ver. 4.2) Program Package - one diskette, User's Manual
UCSD p-SYSTEM (ver.IV.0) Pascal Language Package - five diskettes, User's Guide
FORTRAN Compiler (ver. 2.00) - three diskettes, Reference Manual with Quick Reference Card
FORTRAN-77 for UCSD p-SYSTEM - one diskette, Reference Manual
pfs:FILE File Management Program - one diskette, User's Manual with Quick Reference Card
MULTIPLAN Electronic Worksheet - two diskettes (Program and Tutorial), User's Manual with Quick Reference Card
REGANAL Program for Regression Analyses - one diskette, Instruction for Users (Computer printout)
Various Databases to run with **pfs:FILE** and **MULTIPLAN** - diskettes and Instructions for Users (Computer printouts)

M A N U A L S

BASIC Reference Guide (ver. 2.0) - one book
BASIC Handbook General Programming Information - one book
BASIC Quick Reference - one booklet
Beginner's Guide for the UCSD p-System - one book
Assembler Reference for the UCSD p-System - one book
Internal Architecture Guide for UCSD p-System - one book

Annex 3.

I N S T R U C T I O N

STARTING AND TERMINATING THE IBM-PC MICROCOMPUTER OPERATION

To switch on:

1. Switch on the wall socket.
2. Make sure that the two switches on the adaptor (distributor) are ON.
3. Switch ON the EPSON FX-100+ printer (the switch is on the left side); the green lights beside POWER, READY and the ON LINE button must come ON the control panel. If the red light happens to be ON beside the PAPER OUT, the paper must be checked.
4. Insert a diskette having DOS on its label in disk drive A: (the one on the left).
5. Switch on the IBM-PC microcomputer (the red switch is on the right side).
6. After a few seconds the blinking cursor appears in the upper left corner of the screen.
7. After about 20 seconds later a number of messages will appear on the screen, at the same time some noise should come from the printer.
8. Follow precisely the instructions given by the screen.

To switch off:

1. Take out the diskettes from the drive. (Make sure that all the fresh information - if any - in the memory of the computer have previously been saved on diskette.)
2. Switch OFF the IBM-PC microcomputer (the screen becomes dark).
3. Switch OFF the EPSON FX-100+ printer (all the lights on the control panel go off).
4. Switch OFF the wall-socket (the low noise of the power conditioner disappears).
5. Cover the computer and the printer to protect against dust.

WARNING!!

1. NEVER OPEN ANY OF THE EQUIPMENT.
2. DO NOT SWITCH OFF THE SYSTEM WHILE THE COMPUTER OR THE PRINTER IS WORKING.
3. USE OF THE SYSTEM BY UNAUTHORIZED PERSONS IS STRICTLY PROHIBITED.
4. IN CASE OF DIFFICULTY CONSULT THE RESPECTIVE MANUALS AND/OR CALL AN EXPERT.

Annex 4.

Ref. No. :

Job No. :

Client :
Material :
Sample(s):
Date (yy/mm/dd) - rec. :

Tensile strenght (N/mm2) :
Elongation (%) - at tear :
. - after 1 h :
Lastometer - (mm) :
Flexing resistance :
Rub fastness (grade) :
Water - absorbtion - (%):
. - penetration - (%):
Humidity (%):
Permeability of leather
- water vapour (mg/cm2/h):

Contents (%) of - Cr2O3 :
. - salt :

Other parameters :

General evaluation:

Remarks:

No. of samples :
- tested :
Thickness (mm) :
Tearing load (N) :
- at 10 N/mm2 :
Stitch tear (N/cm):
- pressure (bar):
Temp. shrink. (C):
Finish adh. (N/cm):
- (mg/h/cm2):
- (min) :
Water resist. (s) :

- air (l/cm2/h) :

- fat :
- ash : pH :

Ref. No. :

Job No. :

Client :
Material :

Sample(s):
yy/mm/dd -- received:

No. of samples :
tested :

BOD (mg/l) :
Acid value (ml) :
pH :

COD (mg/l) :
Iodine value (mg) :
Moisture (%) :

CONTENTS OF -
Nitrogen - ammon. (mg/l) :
- Nitrite (mg/l):
Chrome (mg/l or %) :
Phosphate - ortho (mg/l) :
Sulphide (mg/l) :
Iron (mg/l or ppm) :
Chloride (ml/l) :
Tannin matters (%) :
Solid total (mg/l) :

- organic (mg/l) :
- Nitrate (mg/l) :
Acid with Cr (ml/l) :
- total (mg/l) :
Grease (%) :
Copper (mg/l or ppm):
Str. alkali (ml/l) :
Non-tannin (%) :
- dissolved (mg/l) :

Other parameters :

General evaluation:

Remarks:

COMPANY -- Name :

. -- Address:

Owner : No. of employees:

Products:

Capacity:

Output : Recorded in :

Brand names : Co-operation :

Erected/based: Reconstructed:

Technology:

Remarks :

Inventory No.: Updated :

Equipment :
Type: Mark: Subclass: Size:
Manufacturer :
Supplier : Country of origin:
Component No.: Machine No. :
Used with :
Accessories :

Volume (mm) - Width: Depth : Height:
Mass/Weight (kg) : Features:

Puchased (yy/mm/dd): Installed (yy/mm/dd):
Maintenace schedule - Check: Overhaul :
(yy/mm/dd) --> Last - Check: Overhaul :
Original price (Ksh) :
Depreciation (%): Present value (Ksh) :
Division/Section: Responsible:
Remarks :

Catalog No.: Inventory No.:

Author(s) :

TITLE - Original:

TITLE - English :

Volume : Language :

Publisher name/address:
Published in (city) : Country : Year:
ISBN : Pages :
Bibliography : Size (cm):

Price - Currency : Amount : Ksh :

Borrowed by: Section: Date:

Remarks :

Catalog No.:

TITLE - Original:

Language:

TITLE - English :

Publisher:
Country :

No. of issues/year :

First issue available - Year: Volume : No.:
Last issue received - Year: Volume : No.:
Missing issues :

Price - Prescription/year -- Curr. unit: Amount : Ksh:
- Single issue -- Curr. unit: Amount : Ksh:

Prescription renewed until: On :
Through:

Borrowed issues (yy/No.,person,section):

Remark:

Catalog No. :

Standard No.:
Class : Country :

TITLE - Original:

Language:

TITLE - English :

Prepared by :
Submitted by: Year :
Issued by : Year :

Replaces : Pages :

Media/source: Section :

Remarks :

Personal No.: Updated :

Surname : First name :
Other names :
Maiden name : Marital st. :
BIRTH - dd: mm: yy: Place:
Nationality : Sex :
Name of w/h.: No. children:
ADDRESS Str:
City: Country: Zip:

BENEFICIARY : Relationship:
Address :
NEXT OF KIN : Relationship:
Address :

SCHOOLS - Basic : Middle :
High : University:
Qualification :

Previous employer:

First employed - publ. serv. - dd: mm: yy: Post:
- to KIRDI - dd: mm: yy: Post:
Present designation - dd: mm: yy: Post:
Division: Section:
Left KIRDI - dd: mm: yy:

JOB group : SALARY (Ksh/month):
Next inkrement - Month : Amount (Ksh/month):

LEAVE (days) - Entitled: From last year: Taken:

Remarks :

Evaluation:

Evaluated by: Date:

I N S T R U C T I O N

System: **Automatic Filer System (AFS)**

Program: **FILE (on the pfs:FILE diskette)**

Databases: Diskettes with **FLR** signs on the label

Prerequsites: Fresh data on information stored earlier or new data to append (enrich) the database of that particular area.

GUIDE TO THE OPERATION:

1. Turn on the system (follow the instructions given on the wall chart) or if the computer is already on, make sure that the operating system is active (either **A>_** or **B>_** should be displayed on the screen with the cursor blinking).

2. Insert the pfs:FILE diskette for drive **A:** and type

   A>file

   and press ENTER. (The ENTER key is the one between the numeric and alphabetic keypads). Wait while the following picture (i.e. the main menu of the file manager program) appears on the screen:

```
                    PFS:FILE FUNCTION MENU
                    ----------------------

                1 DESIGN FILE          5 PRINT

                2 ADD                  6 REMOVE

                3 COPY                 7 EXIT PFS:FILE

                4 SEARCH/UPDATE

                    SELECTION NUMBER:

                    FILE NAME:

          (C) 1982 Software Publishing Corporation
          (C) 1982 International Business Machines Corporation
                                                  F10-Continue
```

   with the cursor blinking at **SELECTION NUMBER:**.

Remark: **Any time from now on, if you press a wrong key or start a wrong action, or just want to terminate the running function, you can return to this menu by pressing Esc located beside the F2.**

3. Remove the program diskette from drive **A:** and replace it by yours having the database to be updated on it.

4. Move the cursor to the next item (**FILENAME**) by pressing the **TAB** key (the one under the **Esc**). This key is used always during the program execution for moving the cursor from one item to the other. Note that further pressing the **TAB** returns the cursor to its initial position and starts to move from there.

5. Enter the name of the file on the diskette to be processed. When ready press **F10**. From now on until the termination of the database management, key **F10** used as tell to the computer to continue.

6. Follow precisely the instructions for each function given in the **pfs:FILE User's Manual.**

WARNING: NEVER TAKE OUT YOUR DISKETTE FROM THE DRIVE BEFORE RETURNING TO THE MAIN MENU EITHER USING THE Esc OR THE F10.

DISTRIBUTION OF RAW HIDES AND SKINS PRODUCTION AND PRICES

1983

	Unit	January	February	March	Apryl	May	June	July	August	September	October	November	December	TOTAL	Mean	Range	Varian. %
Cattle	to.	470.9	460.4	428.2	473.1	475.0	475.9	490.2	490.7	525.0	483.4	473.9	517.1	5771.8	480.98	96.00	5.11
	Ksh/kg	11.60	10.45	10.10	11.25	12.30	13.25	12.30	12.20	11.85	12.25	12.50	13.15		11.93	3.15	8.04
Goat	to.	128.1	134.3	130.9	126.7	117.6	127.3	127.4	112.4	126.5	124.3	130.2	134.7	1520.4	126.70	22.30	5.03
	Ksh/kg	10.75	9.85	10.55	10.70	11.65	12.55	11.95	11.95	11.40	11.90	12.40	12.80		11.54	2.95	7.84
Sheep	to.	106.9	93.7	100.4	100.6	99.1	91.6	96.7	92.2	93.6	93.2	94.2	102.5	1164.7	97.06	15.30	4.95
	Ksh/kg	5.75	5.20	5.75	5.80	6.35	7.00	6.35	6.40	6.15	6.30	6.60	6.80		6.20	1.80	8.16
TOTAL	to.	604.8	607.9	564.9	605.6	599.8	610.2	624.0	609.5	657.7	614.0	610.7	658.6	7366.7	613.89	93.75	4.07

1984

	Unit	January	February	March	Apryl	May	June	July	August	September	October	November	December	TOTAL	Mean	Range	Varian. %
Cattle	to.	510.7	545.1	550.2	606.1	601.2	846.1	875.7	885.3	597.1	843.8	667.5	729.6	8566.4	713.87	386.40	20.87
	Ksh/kg	13.85	14.65	16.20	16.30	17.95	17.10	17.00	17.90	19.00	15.30	11.55	12.30		15.76	7.45	14.63
Goat	to.	140.6	158.3	142.4	154.4	164.9	159.1	183.3	195.1	213.3	252.8	174.6	195.2	2134.0	177.83	112.20	18.27
	Ksh/kg	12.70	12.80	12.85	13.20	12.95	12.75	12.30	12.45	12.30	10.20	9.95	9.70		11.94	4.15	11.93
Sheep	to.	106.2	113.3	109.5	118.7	112.3	112.1	184.5	147.1	146.9	149.5	137.1	141.6	1578.8	131.57	78.30	17.91
	Ksh/kg	8.00	7.15	7.50	7.50	7.95	7.65	7.70	7.75	8.25	7.40	6.90	7.40		7.66	1.90	6.54
TOTAL	to.	660.1	716.6	708.1	768.0	774.1	1012.9	1066.7	1088.2	1118.7	1104.0	849.0	932.2	10792.4	899.36	458.55	19.33

1985

	Unit	January	February	March	Apryl	May	June	July	August	September	October	November	December	TOTAL	Mean	Range	Varian. %
Cattle	to.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	#DIV/0!
	Ksh/kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	#DIV/0!
Goat	to.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	#DIV/0!
	Ksh/kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	#DIV/0!
Sheep	to.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	#DIV/0!
	Ksh/kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	#DIV/0!
TOTAL	to.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	#DIV/0!

R A W H I D E S A N D S K I N S

Year: 1984

$ 1 = Ksh 12.5000

	Unit	Hides Cow/kips	Buffalo	Camel	Subtotal	Skins Sheep/Lamb	Goat/kid	Game	Reptile	Other miscell.	TOTAL
Livestock	'000 heads				0.0						0.0
Slaughter	'000 heads				0.0						0.0
Off-take rate	%	..	..	..	..	..	..	..	..	..	
Production	'000 pcs	119.1	1530.9		1650.0	1565.2	2126.9				5342.1
	to.				0.0	1578.7	2134.0				3712.7
	'000 Ksh				0.0						0.0
	kg/pc	..	..	..	..	1.01	1.00	..	..	..	0.69
	Ksh/pc	..	..	..	..	..	..	..	..	..	..
	Ksh/kg	..	..	..	..	..	..	..	..	..	..
Export	'000 pcs	15.9	160.1		176.0	30.7	113.5				320.2
	to.	95.5	1422.2		1517.7	21.5	56.7				1595.9
	'000 Ksh	2095.7	11226.6		13322.3	335.6	908.1				14566.0
	kg/pc	6.01	8.88	..	8.62	0.70	0.50	..	..	..	4.98
	Ksh/pc	131.81	70.12	..	75.69	10.93	8.00	..	..	..	4.98
	Ksh/kg	21.94	7.89	..	8.78	15.61	16.02	..	..	..	9.13
Import	'000 pcs				0.0						0.0
	to.				0.0						0.0
	'000 Ksh				0.0						0.0
	kg/pc	..	..	..	..	..	..	..	..	..	..
	Ksh/pc	..	..	..	..	..	..	..	..	..	..
	Ksh/kg	..	..	..	..	..	..	..	..	..	..
Apparent availability	'000 pcs				0.0						0.0
	to.				0.0						0.0
	'000 Ksh				0.0						0.0
	kg/pc	..	..	..	..	..	..	..	..	..	..
	Ksh/pc	..	..	..	..	..	..	..	..	..	..
	Ksh/kg	..	..	..	..	..	..	..	..	..	..

Export markets:

Import sources:

.. no data available

LEATHER PRODUCTION

Year: 1984

$ 1 = Ksh 12.5000

	Unit	Bovine	Camel	Split	Sheep	Goat	Reptile	Others	TOTAL
SEMIFINISHED									
Pickled	to.								0.00
	'000 Ksh								0.00
	Ksh/kg	..	..	..	..	..	..	..	..
Wet-blue	to.								0.00
	'000 Ksh					25040.00			25040.00
	Ksh/kg	..	..	..	..	..	..	..	..
Crust	to.								0.00
	'000 Ksh	38517.00							38517.00
	Ksh/kg	..	..	..	..	..	..	..	..
Semi-finished	to.	..	..	..	..	..	..	..	..
TOTAL	'000 Ksh	38517.00	..	..	..	25040.00	..	..	63557.00
	Ksh/kg	..	..	..	..	..	..	..	..
FINISHED LEATHER									
Shoe upper	'000 m2	151.29		144.51					295.80
	'000 Ksh	54331.00		2184.52					56515.52
	Ksh/m2	359.12	..	15.12	..	..	..	..	191.06
Lining	'000 m2	5.17							5.17
	'000 Ksh	202.74							202.74
	Ksh/m2	39.21	..	..	..	..	..	..	39.21
Garment	'000 m2	8.94				46.99			55.93
	'000 Ksh	418.77				2356.00			2774.77
	Ksh/m2	46.84	..	..	..	50.14	..	..	49.61
Others	'000 m2								0.00
	'000 Ksh								0.00
	Ksh/m2	..	..	..	..	..	..	..	..
Finished	'000 m2	165.40	..	144.51	..	46.99	..	..	356.90
TOTAL	'000 Ksh	54952.51	..	2184.52	..	2356.00	..	..	59493.03
	Ksh/m2	332.24	..	15.12	..	50.14	..	..	166.69
VEGETABLE TANNED LEATHER									
For footwear	to.	183.36							183.36
	'000 Ksh	2785.75							2785.75
	Ksh/kg	15.19	..	..	..	..	..	..	15.19
Others	to.								0.00
	'000 Ksh								0.00
	Ksh/kg	..	..	..	..	..	..	..	..
Veg. tanned	to.	2785.75	..	..	..	..	..	..	2785.75
TOTAL	'000 Ksh	15.19	..	..	..	..	..	..	15.19
	Ksh/kg	0.01	..	..	..	..	..	..	0.01
TOTAL PRODUCTION	'000 Ksh	93484.70	..	..	..	..	..	..	123065.22

.. = data are not available

LEATHER EXPORT

Year: 1984

$ 1 = Ksh 12.5000

	Unit	Bovine	Camel	Split	Sheep	Goat	Reptile	Others	TOTAL
SEMIFINISHED									
Pickled	to.	14.60			11.83	22.84			49.27
	'000 Ksh	77.50			351.34	456.91			885.75
	Ksh/kg	5.31	..	..	29.70	20.00	..	..	17.98
Wet-blue	to.	4828.50			725.00	1768.05			7321.55
	'000 Ksh	65301.72			15953.00	34962.82			116217.54
	Ksh/kg	13.52	..	..	22.00	19.77	..	..	15.87
Crust	to.	569.90							569.90
	'000 Ksh	42033.00							42033.00
	Ksh/kg	73.76	..	..	..	..	..	..	73.76
Semi-finished	to.	5413.00	..	..	736.83	1790.89	..	..	7940.72
TOTAL	'000 Ksh	107412.22	..	..	16304.34	35419.73	..	..	159136.29
	Ksh/kg	19.84	..	..	22.13	19.78	..	..	20.04
FINISHED LEATHER									
Shoe upper	'000 m2								0.00
	'000 Ksh								0.00
	Ksh/m2	..	..	..	..	..	..	..	..
Lining	'000 m2								0.00
	'000 Ksh								0.00
	Ksh/m2	..	..	..	..	..	..	..	..
Garment	'000 m2								0.00
	'000 Ksh								0.00
	Ksh/m2	..	..	..	..	..	..	..	..
Others	'000 m2								0.00
	'000 Ksh								0.00
	Ksh/m2	..	..	..	..	..	..	..	..
Finished	'000 m2	..	..	..	..	..	..	..	..
TOTAL	'000 Ksh	..	..	..	..	..	..	..	..
	Ksh/m2	..	..	..	..	..	..	..	..
VEGETABLE TANNED LEATHER									
For footwear	to.								0.00
	'000 Ksh								0.00
	Ksh/kg	..	..	..	..	..	..	..	..
Others	to.								0.00
	'000 Ksh								0.00
	Ksh/kg	..	..	..	..	..	..	..	..
Veg. tanned	to.	..	..	..	..	..	..	..	..
TOTAL	'000 Ksh	..	..	..	..	..	..	..	..
	Ksh/kg	..	..	..	..	..	..	..	..
TOTAL EXPORT	'000 Ksh	..	..	..	..	..	..	..	..

.. = data are not available

(2)

LEATHER IMPORT

Year: 1984

$ 1 = Ksh 12.5000

	Unit	Bovine	Camel	Split	Sheep	Goat	Reptile	Others	TOTAL
SEMIFINISHED									
Pickled	to.								0.00
	'000 Ksh								0.00
	Ksh/kg	..	..	..	..	..	..	..	..
Wet-blue	to.								0.00
	'000 Ksh								0.00
	Ksh/kg	..	..	..	..	..	..	..	..
Crust	to.								0.00
	'000 Ksh								0.00
	Ksh/kg	..	..	..	..	..	..	..	..
Semi-finished	to.	..	..	..	..	..	..	..	..
TOTAL	'000 Ksh	..	..	..	..	..	..	..	..
	Ksh/kg	..	..	..	..	..	..	..	..
FINISHED LEATHER									
Shoe upper	'000 m2								0.00
	'000 Ksh								0.00
	Ksh/m2	..	..	..	..	..	..	..	..
Lining	'000 m2								0.00
	'000 Ksh								0.00
	Ksh/m2	..	..	..	..	..	..	..	..
Garment	'000 m2								0.00
	'000 Ksh								0.00
	Ksh/m2	..	..	..	..	..	..	..	..
Others	'000 m2								0.00
	'000 Ksh								0.00
	Ksh/m2	..	..	..	..	..	..	..	..
Finished	'000 m2	..	..	..	..	..	..	..	..
TOTAL	'000 Ksh	..		..	..	..	..	..	..
	Ksh/m2	..		..	..	..	..	..	..
VEGETABLE TANNED LEATHER									
For footwear	to.								0.00
	'000 Ksh								0.00
	Ksh/kg	..	..	..	..	..	..	..	..
Others	to.								0.00
	'000 Ksh								0.00
	Ksh/kg	..	..	..	..	..	..	..	..
Veg. tanned	to.	..	..	..	..	..	..	..	..
TOTAL	'000 Ksh	..	..	..	..	..	..	..	..
	Ksh/kg	..	..	..	..	..	..	..	..
TOTAL IMPORT	'000 Ksh	..	..	..	..	..	..	..	..

.. = data are not available

(3)

LOCAL LEATHER CONSUMPTION Year: 1984

$ 1 = Ksh 12.5000

	Unit	Bovine	Camel	Split	Sheep	Goat	Reptile	Others	TOTAL
SEMIFINISHED									
Pickled	to.	-14.60	0.00	0.00	-11.83	-22.84	0.00	0.00	-49.27
Wet-blue	to.	-4828.50	0.00	0.00	-725.00	-1768.05	0.00	0.00	-7321.55
Crust	to.	-569.90	0.00	0.00	0.00	0.00	0.00	0.00	-569.90
Total	to.	-5413.00	0.00	0.00	-736.83	-1790.89	0.00	0.00	-7940.72
FINISHED LEATHER									
Shoe upper	'000 m2	151.29	0.00	144.51	0.00	0.00	0.00	0.00	295.80
Lining	'000 m2	5.17	0.00	0.00	0.00	0.00	0.00	0.00	5.17
Garment	'000 m2	8.94	0.00	0.00	0.00	46.99	0.00	0.00	55.93
Others	'000 m2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	'000 m2	165.40	0.00	144.51	0.00	46.99	0.00	0.00	356.90
VEGETABLE TANNED LEATHER									
For footwear	to.	183.36	0.00	0.00	0.00	0.00	0.00	0.00	183.36
Others	to.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	to.	183.36	0.00	0.00	0.00	0.00	0.00	0.00	183.36

.. = data are not available

Annex 17.

LEATHER PRODUCTS

Year:

$ 1 = Ksh

Item	Subgroup	Production '000 units	Production '000 Ksh	Production Ksh/unit	Export '000 units	Export '000 Ksh	Export Ksh/unit	Import '000 units	Import '000 Ksh	Import Ksh/unit	App. consumption '000 units	App. consumption '000 Ksh
FOOTWEAR												
Casual/street	leather			..			..			..	0	0
	substitute			..			..			..	0	0
	canvas			..			..			..	0	0
Sportshoes	leather			..			..			..	0	0
	other			..			..			..	0	0
Sandals				..			..			..	0	0
Prot. footwear				..			..			..	0	0
Trad. subtotal		0	0	..	0	0	..	0	0	..	0	0
										..	0	0
Housshoes/slippers				..			..			..	0	0
Rubber/plastic				..			..			..	0	0
Other				..			..			..	0	0
							..			..	0	0
Footwear total		0	0	..	0	0	..	0	0	..	0	0
LEATHERGOODS				..			..			..	0	0
Suitcases/travel	leather			..			..			..	0	0
	substitute			..			..			..	0	0
Bags	leather			..			..			..	0	0
	substitute			..			..			..	0	0
Small items	leather			..			..			..	0	0
	substitute			..			..			..	0	0
Others				..			..			..	0	0
L.goods total		0	0	..	0	0	..	0	0	..	0	0
GLOVES	casual			..			..			..	0	0
	sports			..			..			..	0	0
	protective			..			..			..	0	0
Gloves total		0	0	..	0	0	..	0	0	..	0	0
LEATHER GARMENT	leather			..			..			..	0	0
	substitute			..			..			..	0	0
Garment total		0	0	..		0	..	0	0	..	0	0
SPORTS GOODS				..			..			..	0	0
OTHER LEATHER PROD				..			..			..	0	0

Blank or .. = no data available

(1)

I N S T R U C T I O N

System: **Leather Industry Database (L.I.D)**

Program: **MP80 (on the MULTIPLAN diskette)**

Databases: Diskettes with **MLP** signs on the label

Prerequisites: Newly obtained and verified statistics [illegible] hides and skins, leather and leather products [illegible] [illegible] related [illegible] automatically [illegible]

Start of the operation:

1. Turn on the [illegible] (follow the instructions given on the wall chart) or if the computer is already on, then make sure that the operating system is active (either A>_ or B>_ should be displayed on the screen with the cursor blinking).

2. Insert the MULTIPLAN diskette into drive **A:** and type

   A> mp80

   and press ENTER. Wait while the following picture (i.e. an empty spreadsheet) appears on the screen:

```
#1     1       2       3       4       5       6       7
 1
 2
 3
 4
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20
COMMAND: Alpha Blank Copy Delete Edit Format Goto Help Insert Lock Move
        Name Options Print Quit Sort Transfer Value Window Xternal
Select option or type command letter
```

[illegible] cell pointer [illegible] rectangle [illegible]

Remark: Any time from now on if you press a wrong key or start a wrong action, you can recover the command menu (i.e. to a screen which has the commands at the bottom just like on the above screen copy).

3. Remove the program diskette from drive **A:** and replace it by yours having statistical databank(s) stored in spreadsheet format on it.

4. Press **T** for "Transfer", than **L** for "Load" and hit one of the arrow keys on the numeric keypad. (Note that **NL** in the last screen row should not be present - if it is there, then press once the grey key with **Num Lock**.) You will see the screen showing the names of databases, which are on the diskette in drive **A:** with the pointer on the first one. Move the pointer on the one you would like to work with (update, look-up or printing) by using the arrow keys, then press ENTER. The loading process takes a few seconds.

5. When loading is completed the upper left corner of the database appears on the screen. For example in the case of raw hides and skins statistics it is like this:

```
#1          1               2   #2    5        6        7        8
  1 R A W   H I D E S   A N D                          Year:   1984
  2
  3 ---------------------------    -------------------------------------
  4                     Unit            e    s          S      k      i
  5                                    Camel  Subtotal Sheep/Lamb Goat/Kid
  6 ===========================    =====================================
#4                                 #3
  7 Livestock        '000 heads                0.0
  8 Sleaughter       '000 heads                0.0
  9 Off-take rate        %               ..     ..       ..       ..
 10 ---------------------------    -------------------------------------
 11 Production        '000 pcs              1650.0   1565.2   2126.9
 12                     to.                    0.0   1579.7   2134.0
 13                   '000 Ksh                 0.0
 14                    kg/pc             ..     ..     1.01     1.00
 15                    Ksh/pc            ..     ..       ..       ..
 16                    Ksh/kg            ..     ..       ..       ..
 17 ---------------------------    -------------------------------------
 18 Export            '000 pcs               176.0     30.7    113.5
 19                     to.                 1517.7     21.5     56.7
COMMAND: Alpha Blank Copy Delete Edit Format Goto Help Insert Lock Move
        Name Options Print Quit Sort Transfer Value Window Xternal
Select option or type command letter
```

The cell pointer indicates the item (read the headings in the row and the column.

c. Press **O** for "Options" and you will see the bottom of the screen like this:

```
OPTIONS recalc: Yes No       aute: Yes(No)
        iteration: Yes(No)   completion test at:
Select option
```

with a reverse (green) pointer either on "Yes" or on "No". In any case press **N** for "No" then ENTER - the command menu will return. (By this the recalculation is switched OFF, which speeds up the data input.)

7. It is recommended to release the **Num Lock** key, i.e. the **NL** should not be present in the last row of the screen. Now you can move the cell-pointer to the desired position using the arrow keys. After the location of the data to be entered has been found input data **using the upper row of the alphabetic keypad.** When the contents of a cell is changed or the data is keyed in, move the cell-pointer from that cell: the new figure appears in the cell.

8. If you make mistakes (that happens to everybody) and if you realize BEFORE pressing **F2**, then you can correct the entry (seen still in the lower left corner of the screen) by pressing the "backspace" key (i.e. the grey one just over the ENTER) several times and entering the right value). If you realize your mistake AFTER the **F2** has been pressed, then move back the cell-pointer and repeat the data correctly.

9. When the data input are finished (the cell pointer returns to the first cell of the spreadsheet), press **F4** for recalculation of the table. It will take less than half a minute; but you can follow the decreasing number of equations to be computed by the computer.

10. Press the **Esc** key, to return to the command menu. Now you may wish to study the results by using the arrow keys for moving the cell pointer to the desired position (make sure that the **NL** is not seen in the last screen row if, it is, then press the **Num Lock** key once).

11. Press **T** for "Transport", then **S** for "Save" - you will see the bottom of the screen like this:

```
TRANSFER SAVE filename: XXXXX

Enter a filename
```

where "XXXXX" is the name of the datafile you called into the computer's memory when loaded (see paragraph 5). Press ENTER, then **Y** for "Yes" to verify that the old database on your diskette may be overwritten. The saving takes a few seconds, but it might happen that the computer recalculates the whole spreadsheet before saving.

12. Make sure that the printer head is at the top of the next page (if necessary, make adjustment according to the printer's Manual). Press **P** for "Print" and you receive the message on the screen bottom:

```
PRINT: Printer File Margins Options
```

with the pointer resting on **Printer:** accept it by pressing either **P** again or pressing ENTER. The raw hides statistical distribution table need wider paper, while all other databases may be printed on the narrower sheets.

Remark: **In the case of distribution statistics make sure that wide paper is in the printer; if NOT, you may select before printing the option Margins and change the "print width in the list from 230 to 120:**

```
PRINT MARGINS: left: 3    top: 0    print width: 230  print length: 55
               page length: 66
Enter a number
```

Move the pointer with the "Tab" key (the one is under the Esc.)

13. When finished press **Q** for "Quit" and after having the message:

```
QUIT:

Enter Y to confirm
```

press **Y** for confirmation to terminate the program execution. You will get a message:

```
Insert COMMAND.COM disk in drive A
and strike any key when ready
```

so you have to insert the DOS diskette for drive **A:** and hit any key on the keyboard - **A>_** should appear on the screen with cursor blinking.

14. **It is STRONGLY RECOMMENDED to make a copy of the newly updated diskette by using the diskcopy command (see the DOS User's Manual).**

Sample tables of statistical databanks are enclosed in Appendices 14 to 17.

Annex 19.(1)

I N S T R U C T I O N S

for using the program for regression analysis

1. Turn ON the printer and the computer (follow the instructions given on the wall behind the monitor or those given in the IBM Guide to Operations). If the computer is already ON, then make sure that the operating system is active (the **A>_** is on the screen with the cursor blinking.

2. Insert the program diskette labelled BASIC Programs for drive **A:** (the one on the left. Now type in

   A>basic

   and press ENTER (the large key with the broken arrow pointing to left). After a few seconds you will see the following message on the screen:

   ```
   The IBM Personal Computer Basic
   Version D2.10 Copyright IBM Corp. 1981, 1982, 1983
   61327 Bytes free

   Ok
   ```

   and a number of explanations in the lower edge of the screen.

3. Press **F3** and you will see **LOAD"** appearing on the screen (or you may wish to type the same characters).

4. Type in

   LOAD"reganal

   and press ENTER. In a few second the message **Ok** will be seen.

5. Press **F2** (or type in **run** and press ENTER). The screen clears, than the following questions have to be answered:

   ```
   The printing format for numeric data is:
            Whole part:   6          decimals:   3
      i. e. the maximum (absoulute value) may be   999999.999
            the minimum (absoulute value) may be   000000.001

                        Ok? (Yes/No)
   ```

   If you satisfied with the offered format press **Y** for "Yes". If not, then you will be provided with an opportunity to select other printing/displaying format (both for input data and computation results).

6. The next screen presents the main menu for function selection:

Main menu:

0 - Exit

1 - Data input
2 - Data check/change
3 - Mean/standard deviation
4 - Regression analysis
5 - Change print format
6 - Print data
7 - Save data

Your choice: (0-7)

You may choose a function just by pressing the corresponding number key. **From now on follow the instructions given on the display and answer the questions either pressing a key as requester or entering data (in the last case you have to press ENTER after each input).**

7. The normal procedure starts with entering data (1) from the keyboard and checking them (2). At each of these stages you have the possibility to save data on diskette - or you may invoke saving from the main menu (7).

   Remarks: (i) place your working diskette in one of the drives (you may by now remove the program diskette from drive **A:** if you wish);
   (ii) give a name for your datafile (you will use it when recalling the same data for further analysis - if you use th disk drive **B:**, then start the file name with b:).

8. You may print out (6) the data, whereas the mean and the standard deviation for each sample will be printed automatically (see Appendix 19.1).

9. Next you select the Regression analysis (4). The first thing you are promted to do is to select the dependable variable, then the type of correlation and regression to test:

Which parameter should be the dependent variable?

1 --> Weight (lbs.)
2 --> Height (inch)
3 --> Age (year)

Your choice: ? 1

Type of correlation/regression:

0 - Return to the main menu

1 - Linear between two parameters
2 - Geometric between two parameters
3 - Mth order between two parameters
4 - Multiple linear

Your choice:

In case of higher order equation you have to specify the degree of the function.

1. For example selecting linear regression and the chosing age as independent variable, the following result will be displayed for this sample:

```
 LINEAR CORRELATION:
TEST: Antropometric test

  Correlation and regression parameters:
Dependent variable:        Y = Weight (lbs.)
Independent variable:      X = Age (year)

Coefficient of correlation:                        0.79571
Coefficients of the regression equation:
            a =    10.935
            b =     6.726

The equation is:           Y = a + b * X

Print? (Yes/No)
```

Using the same data and parameters the geometric regression will look like:

```
 GEOMETRIC CORRELATION:
TEST: Antropometric test

  Correlation and regression parameters:
Dependent variable:        Y = Weight (lbs.)
Independent variable:      X = Age (year)

Coefficient of correlation:                        0.79296
Coefficients of the regression equation:
            a =    12.609
            b =     0.762

The equation is:           Y = a * X ^ b

Print? (Yes/No)
```

The 4th order correlation:

```
 4th ORDER CORRELATION:
TEST: Antropometric test

  Correlation and regression parameters:
Dependent variable:        Y = Weight (lbs.)
Independent variable:      X = Age (year)

Coefficient of correlation:                        0.84718
Coefficients of the regression equation:
            for the  1 . degree:      C1 =   243.128
            for the  2 . degree:      C2 =   -33.499
            for the  3 . degree:      C3 =     1.722
            for the  4 . degree:      C4 =    -0.017
            The constant              C0 =  -552.564

The equation is:           Y = C0 + Σ Ci * X ^ i      where i=1,. 4

Print? (Yes/No)
```

(4)

Finally the multiple linear regression:

```
 MULTIPLE LINEAR CORRELATION:
TEST: Antropometric test

  Correlation and regression parameters:
Dependent variable:        Y = Weight (lbs.)
Independent variables:
                           X2 = Age (year)
                           X3 = Height (inch)

Coefficient of correlation:                          0.94599
Coefficients of the regression equation:
            for Age (year)          C2 =     3.681
            for Height (inch)       C3 =     0.943
            The constant            C0 =   -15.702

The equation is:          Y = C0 + Σ Ci * Xi      where i=1.. 2

Print? (Yes/No)
```

11. You may interpolate data using the equation displayed by only entering the independent variable. For example in case of 4th order regression we obtain:

```
 Enter variable parameters:                          (r = 0.94718)

Age (year)    ? 13          Weight (lbs.)          242.136
Age (year)    ? 14          Weight (lbs.)          354.296
Age (year)    ? 15          Weight (lbs.)          503.855
Age (year)    ? 11.5        Weight (lbs.)          133.429
                                More? (Yes/No)
```

12. The rest of the options provided by the menu makes it even more comfortable to run the program.

13. The maximum number of parallel observations (parameters tested) may be 10, the maximum number of samples is 80, the highest possible degree of equation is 8th.

14. Terminate the analysis by entering 0 (zero) and after getting **Ok** type **system** - the operating system returned to the console.

Appendix 19.1

BASIC DATA

Test:

Date: *09-06-1985* **Time:** *13:22:51*

Sample No.	Weight (lbs.)	Height (inch)	Age (year)
1.	59.000	48.000	8.000
2.	55.000	49.000	9.000
3.	50.000	44.000	6.000
4.	80.000	59.000	10.000
5.	61.000	55.000	8.000
6.	75.000	51.000	9.000
7.	67.000	55.000	9.000
8.	58.000	50.000	7.000
Mean:	63.125	51.375	8.250
St.dev.	10.190	4.749	1.282

I N S T R U C T I O N

System: **Feasibility Study Computation (FSC)**

Program: **MP80 (on the MULTIPLAN diskette)**

Databases: **FEASIB**

Prerequsites: Basic data for feasibilty studies - according to the UNIDO Guidelines

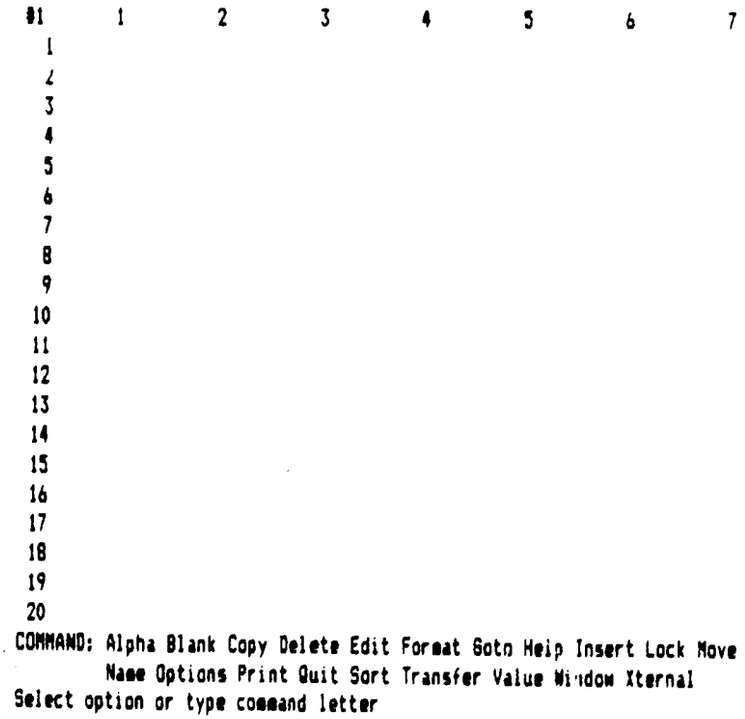
GUIDE TO THE OPERATION:

1. Turn on the system (follow the instructions given on the wall chart) or if the computer is already on, then make sure that the operating system is active (either **A>_** or **B>_** should be displayed on the screen with the cursor blinking).

2. Insert the MULTIPLAN diskette for drive **A:** and type

   A>mp80

   and press ENTER. (The ENTER key is the grey one just left from 7 and 4 on the numeric keypad, above the one marked as 'PrtSc'.) Wait while the following picture (i. e. an empty spreadsheet appears on the screen:



(2)

with the cell-pointer (a green rectangle block) resting in row 1 - column 1.

> **Remark:** Any time from now on if you press a wrong key or start a wrong action, then you can recover the command menu (i.e. to a screen which has the commands in the bottom lines just like on the above screen copy.

3. Remove the program diskette from drive **A:** and replace it by the one labelled as Feasibility or by your diskette containing some previously entered data.

4. Press **T** for "Transfer", then **L** for "Load" and hit one of the arrow keys on the numeric keypad. (Note that **NL** in the last screen row should not be present - if it is there, then press once the grey key with **Num Lock**.) You will see the screen showing the names of databases, which are on the diskette in drive **A:** with the pointer on the first one. Move the pointer on the name **FEAS** using the arrow keys, then press ENTER. The loading process takes about half a minute.

5. When loading is completed the following screen will be seen if the **FEAS** was to be loaded:

```
#1          1       #2      2       3                   5       6
 1 Project:
 2
 3 INPUT DATA:
 4 Starting year              0
 5 Working days/year          0
 6 Monetary unit (Ksh)        0
 7 Total investment           0
 8 Equity capital             0
 9 Total Loan                 0
10 Interest on loan (%)       0
11 Repay in (years)           0
12 Grace period (year)        0
13 Corporate tax (%)          0
14 Sales tax (%)              0
15 Divid. on equity (%)       0
16 Disc. factor (%)           0
17
18 PRODUCTION PROGRAMME    AND MATERIALS
19 --------------------    ----------------------------------------------
20                         Quantity  Unit price
COMMAND: Alpha Blank Copy Delete Edit Format Goto Help Insert Lock Move
         Name Options Print Quit Sort Transfer Value Window Xternal
Select option or type command letter
```

The (upper) cell pointer is resting in row 1 column 2, while the Command pointer is over **Alpha**. (If you loaded a spreadsheet consisting data from a previous computation, then you will see those instead of the zeros (0).

6. Press **O** for "Options" and you will see the bottom of the screen like this:

```
OPTIONS recalc: Yes No      aute: Yes(No)
        iteration: Yes(No)  completion test at:
Select option
```

with a reverse (green) pointer either on "Yes" or on "No". In any case press **N** for "No" then ENTER - the command menu will return. (By this the recalculation is switched OFF, which speeds up the data input.)

7. It is recommended to press once the **Num Lock** key (notice that **NL** appears in the last row on the screen); now you can use the numeric keypad for data input - but you can NOT use the arrow keys to move the cell-pointer. Actually, you will not need it, since you may arrange your data in advance according to the input sequence.

8. Press **A** for "Alpha", then enter the short name of the project. When ready, press **F2**, which advances the cell-pointer to the next place in the table where input is expected. The inputs are echoed in the line **ALPHA/VALUE:**, which changes the instant you enter the first character for that cell. If that character is a letter, then the title of the command row changes for **ALPHA:**, otherwise it changes for **VALUE:** and the entered letter or number appears next. By pressing **F2** the entered text or data appears in the cell where the pointer has been resting, at the same time the command row shows **ALPHA/VALUE:** with no data after and the cell-pointer jumps to the next input item. If any of the input data happens to be 0 (zero), or no text to be entered to the cell under the pointer, just press the **F2** without entering any numbers or characters - the pointer will skip that cell and leave its contents unchanged.

Remark: **The pointer seems to move rather slowly, nevertheless you may enter data as fast as you can - the computer will remember every keystroke.**

9. If you make mistakes (that happens to everybody) and if you realize BEFORE pressing **F2**, then you can correct the entry (seen still in the lower left corner of the screen) by pressing the "backspace" key (i.e. the grey one just over the ENTER) several times and entering the right value). If you realize your mistake AFTER the **F2** has been pressed, then you
   - either proceed to enter the following data AND making note on the error (e.g. on the source document), and you return to this cell after the whole spreadsheet has been filled in,
   - or you return to this cell by keeping depressed the **F2** key while it arrives again here,
   - or you release the **Num Lock** (the **NL** disappears from the last screen row), then by using the arrow keys you move the cell-pointer to the desired position and after entering the correct data you move it to the next cell to be input (do not forget to press again the **Num Lock** if you intend to use the numeric keypad for data entries).

Remarks: (i) the first option is recommended;
(ii) never use comma (,) for separation of thousands.
(iii) you may use only the upper row of the alphabetic keypad - in this case you may have the arrow keys available any tame for moving the cell pointer, provided the **Num Lock** is released (the **NL** is not seen on the screen).

10. When the data inputs are finished (the cell pointer returns to the first cell of the spreadsheet), press **F4** for recalculation of the table. It will take about one minute, while you can see the decreasing number of equations to be computed by the computer.

11. Press the **Esc** key to resume to the command menu. Now you may wish to study the results by using the arrow keys for moving the cell pointer to the desired position (make sure that the **NL** is not seen in the last screen row (if it is, then press the **Num Lock** key once).

12. Now you may wish to change one or some of the input data to try their impact on the feasibility of the project (e.g. changing the equity/loan ratio, using longer or shorter loans with modified interest rates accordingly, etc.). Do NOT forget to press **F4** after modifying the data to recompute the sheet. All the interesting variants may be saved on diskette or printed out (see below).

13. For saving a variant or the final results for further references press **T** for "Transport", than **S** for "Save" - you will see the bottom of the screen like this:

TRANSFER SAVE filename: XXXXX

Enter a filename

Where "XXXXX" is the file name you used for loading the starting table, you may press ENTER than "Y" for "Yes" to verify that the old database on the diskette may be overwritten by the updated spreadsheets. The other option is to change the filename and save the new variant(s) separatelly - probably this will happen more frequently. The saving takes a few seconds, but it might turn out that the computer recalculates the spreadsheet before saving it.

Remarks: (i) be careful to have sufficient space on your diskette for new variants;
(ii) the file name must begin with a letter and may not be longer than 8 characters.

14. If you do NOT need printout at this moment (i.e. printed tables of saved sheets can be produced any time after loading it as explained above) then GO TO 15.

15. Make sure that the printer head is at the top of the next page (if necessary, make adjustment according to the printer's manual). Press **P** for "Print" and you receive the message on the screen bottom:

```
PRINT: Printer File Margins Options
```

with the pointer resting on **Printer:** accept it by pressing either **P** again or pressing ENTER. The computer prints out the tables as shown as examples in Appendices 20.1 to 20.4.

Remark: Make sure that wide paper is in the printer: if NOT, you may select before **Printer** the **Margins** and change the "print width" in the submenue from 230 to 120:

```
PRINT MARGINS: left: 3    top: 3    print width: 230  print length: 55
               page length: 66
Enter a number
```

Move the pointer with the "Tab" key (the one is under the **Esc**).

16. When the command menu reappears on the screen (it will be much earlier than the printer completes the tables, IF you started up the computer with the DOS with memory allocation and the SIDEKICK), press **Q** for "Quit" and you will be promted:

```
QUIT:

Enter Y to confirm
```

Press **Y** for comfirmation to terminate the program execution. You will get a message:

```
Insert COMMAND.COM disk in drive A
and strike any key when ready
```

so you have to insert the DOS diskette for drive **A:** and hit any key on the keyboard - **A>_** shold appear on the screen with blinking cursor.

17. It is STRONGLY RECOMMENDED to make a copy of the newly updated **diskette** by using the **diskcopy** command (see the DOS User's Manual). Store the two copies separately!

An example of the outputs is attached in Appendices 20.1 to 20.4.

Project: SIFTED MAIZE FLOUR MILLING

INPUT DATA:

Starting year	1986
Working days/year	345
Monetary unit (Ksh)	1000
Total investment	1692.9
Equity capital	892.9
Total Loan	800
Interest on loan (%)	15
Repay in (years)	8
Grace period (year)	0
Corporate tax (%)	45
Sales tax (%)	0
Divid. on equity (%)	0
Disc. factor (%)	15

PRODUCTION PROGRAMME AND MATERIALS

	Quantity 100% cap.	Unit price (Ksh)	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Capacity:			50.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Materials:												
Maize	79872.0	200.00	7987.2	11182.1	11182.1	11182.1	11182.1	11182.1	11182.1	11182.1	11182.1	11182.1
	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auxiliary materials	1139.6	1000.00	569.8	797.7	797.7	797.7	797.7	797.7	797.7	797.7	797.7	797.7
TOTAL:			8557.0	11979.8	11979.8	11979.8	11979.8	11979.8	11979.8	11979.8	11979.8	11979.8
Products:												
Unisoal	8794.7	2000.00	8794.7	12312.6	12312.6	12312.6	12312.6	12312.6	12312.6	12312.6	12312.6	12312.6
Maize Bran	403.2	2000.00	403.2	564.5	564.5	564.5	564.5	564.5	564.5	564.5	564.5	564.5
	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL:			9197.9	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1

PROJECTED PRODUCTION ACCOUNT

	100%	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Materials	17114.0	8557.0	11979.8	11979.8	11979.8	11979.8	11979.8	11979.8	11979.8	11979.8	11979.8
Labour	305.4	152.7	213.8	213.8	213.8	213.8	213.8	213.8	213.8	213.8	213.8
Electricity	96.0	48.0	67.2	67.2	67.2	67.2	67.2	67.2	67.2	67.2	67.2
Fuel	60.0	30.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0
Repair & Maintenance	40.8	20.4	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6
Other costs	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
OPERATING COSTS:	17626.2	8818.1	12341.3	12341.3	12341.3	12341.3	12341.3	12341.3	12341.3	12341.3	12341.3
Interest		120.0	105.0	90.0	75.0	60.0	45.0	30.0	15.0	0.0	0.0
Depreciation		116.2	106.0	102.3	99.0	96.1	93.5	91.3	89.3	87.5	86.0
Amortisation		35.8	35.8	35.8	35.8	35.8	35.8	0.0	0.0	0.0	0.0
PRODUCTION COSTS:		9084.1	12588.1	12569.4	12551.1	12533.2	12515.7	12462.6	12445.6	12428.9	12427.3

PROJECTED PROFIT AND LOSS ACCOUNT

	1002	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Revenue	18395.8	9197.9	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1
Operating costs	17626.2	8818.1	12341.3	12341.3	12341.3	12341.3	12341.3	12341.3	12341.3	12341.3	12341.3
OPERATING PROFIT	769.6	379.8	535.7	535.7	535.7	535.7	535.7	535.7	535.7	535.7	535.7
Interest		120.0	105.0	90.0	75.0	60.0	45.0	30.0	15.0	0.0	0.0
Depreciation		110.2	106.0	102.3	99.0	96.1	93.5	91.3	89.3	87.5	86.0
Amortisation		35.8	35.8	35.8	35.8	35.8	35.8	0.0	0.0	0.0	0.0
NET PROFIT BEF. TAX		113.8	288.9	307.7	326.0	343.8	361.4	414.5	431.4	448.2	449.7
Corporate tax		51.2	130.0	138.4	146.7	154.7	162.6	186.5	194.1	201.7	202.4
Sales tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NET PROFIT AFTER TAX		62.6	158.9	169.2	179.3	189.1	198.8	227.9	237.3	246.5	247.4
Dividends on equity		35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7
Undistributed profit		26.8	123.2	133.5	143.6	153.4	163.1	192.2	201.6	210.8	211.6
Acc. undist. profits		26.8	150.0	283.5	427.1	580.5	743.5	935.8	1137.4	1348.1	1559.8

FUNDS FLOW STATEMENT

	Const.	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
A. CASH INFLOW											
1. Financ. resources	1692.9	23.2	10.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. Sales revenue		9197.9	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1
TOTAL	1692.9	9221.1	12887.2	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1	12877.1
B. CASH OUTFLOW											
1. Total assets	-1150.9	-353.6	-74.3	15.1	15.0	15.0	-335.0	15.0	15.0	15.0	0.0
2. Operating costs		-8818.1	-12341.3	-12341.3	-12341.3	-12341.3	-12341.3	-12341.3	-12341.3	-12341.3	-12341.3
3. Dept services											
Repayment		-100.0	-100.0	-100.0	-100.0	-100.0	-100.0	-100.0	-100.0	0.0	0.0
Interest		-120.0	-105.0	-90.0	-75.0	-60.0	-45.0	-30.0	-15.0	0.0	0.0
4. Corporate tax		-51.2	-130.0	-138.4	-146.7	-154.7	-162.6	-186.5	-194.1	-201.7	-202.4
5. Sales tax		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. Dividends		-35.7	-35.7	-35.7	-35.7	-35.7	-35.7	-35.7	-35.7	-35.7	-35.7
TOTAL	-1150.9	-9478.6	-12784.4	-12690.4	-12683.7	-12676.8	-13019.7	-12678.6	-12671.2	-12563.7	-12579.4
Surpl.(+)/Def.(-)	542.0	-255.5	100.8	186.6	193.3	200.3	-142.6	198.5	205.9	313.3	297.6
Cum. Cash Balance	542.0	286.5	387.2	573.8	767.2	967.4	824.8	1023.3	1229.2	1542.5	1840.1
Loan balance	-800.0	-700.0	-600.0	-500.0	-400.0	-300.0	-200.0	-100.0	0.0	0.0	0.0

CASH IN HAND

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Production costs	9484.1	12588.1	12569.4	12551.1	12533.2	12515.7	12462.6	12445.6	12428.9	12427.3
Less:										
Raw materials	-8557.0	-11979.8	-11979.8	-11979.8	-11979.8	-11979.8	-11979.8	-11979.8	-11979.8	-11979.8
Utilities	-78.0	-109.2	-109.2	-109.2	-109.2	-109.2	-109.2	-109.2	-109.2	-109.2
Depreciation	-110.2	-106.0	-102.3	-99.0	-96.1	-93.5	-91.3	-89.3	-87.5	-86.0
Amortisation	-35.8	-35.8	-35.8	-35.8	-35.8	-35.8	0.0	0.0	0.0	0.0
Total	-8781.0	-12230.8	-12227.1	-12223.8	-12220.9	-12218.3	-12180.3	-12178.3	-12176.5	-12175.0
Cash-in-hand	303.1	357.3	342.3	327.3	312.3	297.3	282.3	267.3	252.3	252.3

WORKING CAPITAL

	Days	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
A. CURRENT ASSETS											
1. Account receiv.	2	50.5	70.6	70.6	70.6	70.6	70.6	70.6	70.6	70.6	70.6
2. Inventories											
Basic mater.	2	43.8	61.3	61.3	61.3	61.3	61.3	61.3	61.3	61.3	61.3
Aux. mater.	7	10.9	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
Finished goods	2	50.4	70.6	70.6	70.6	70.6	70.6	70.6	70.6	70.6	70.6
Spare-parts		2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Subtotal		107.2	149.2	149.2	149.2	149.2	149.2	149.2	149.2	149.2	149.2
3. Cash-in-hand		303.1	357.3	342.3	327.3	312.3	297.3	282.3	267.3	252.3	252.3
TOTAL		353.6	428.0	412.9	397.9	382.9	367.9	352.9	337.9	322.9	322.9
B. CURR. LIABILITIES											
Account payable	1	-25.2	-35.3	-35.3	-35.3	-35.3	-35.3	-35.3	-35.3	-35.3	-35.3
NET WORKING CAPITAL		328.4	392.7	377.6	362.6	347.6	332.6	317.6	302.6	287.6	287.6
Increment		328.4	64.2	-15.1	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	0.0

DEPRECIATION SCHEDULE

	%	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Building & civil											
Principal val.		312.4	304.6	297.0	289.6	282.3	275.3	268.4	261.7	255.1	248.7
Replacement		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depreciation	2.5	7.8	7.6	7.4	7.2	7.1	6.9	6.7	6.5	6.4	6.2
Balance		304.6	297.0	289.6	282.3	275.3	268.4	261.7	255.1	248.7	242.5
Plant & Equipo.											
Principal val.		214.5	187.7	164.2	143.7	125.7	110.0	96.3	84.2	73.7	64.5
Replacement		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depreciation	12.5	26.8	23.5	20.5	18.0	15.7	13.8	12.0	10.5	9.2	8.1
Balance		187.7	164.2	143.7	125.7	110.0	96.3	84.2	73.7	64.5	56.4
Furniture											
Principal val.		45.0	39.4	34.5	30.1	26.4	23.1	20.2	17.7	15.5	13.5
Replacement		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depreciation	12.5	5.6	4.9	4.3	3.8	3.3	2.9	2.5	2.2	1.9	1.7
Balance		39.4	34.5	30.1	26.4	23.1	20.2	17.7	15.5	13.5	11.8
Motor vechicles											
Principal val.		350.0	280.0	210.0	140.0	70.0	0.0	280.0	210.0	140.0	70.0
Replacement		0.0	0.0	0.0	0.0	0.0	350.0	0.0	0.0	0.0	0.0
Depreciation	20.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Balance		280.0	210.0	140.0	70.0	0.0	280.0	210.0	140.0	70.0	0.0
DEPRECIATION		110.2	106.0	102.3	99.0	96.1	93.5	91.3	89.3	87.5	86.0
Cumm. deprec.		110.2	216.2	318.5	417.5	513.5	607.1	698.3	787.6	875.1	961.1

PROJECTED BALANCE SHEET AT 31st December

	Constr.	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
A. ASSETS											
1. Current Assets											
a) Cash balance	542.0	286.5	387.2	573.8	767.2	967.4	824.8	1023.3	1229.2	1542.5	1840.1
b) Current assets		353.6	428.0	412.9	397.9	382.9	367.9	352.9	337.9	322.9	322.9
2. Fixed assets	1150.9	1004.9	863.1	725.0	590.2	458.4	679.0	587.8	498.5	411.0	325.0
Total assets	1692.9	1644.9	1678.2	1711.7	1755.3	1808.7	1871.7	1964.0	2065.6	2276.3	2488.0
B. LIABILITIES											
1. Current liab.		25.2	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3
2. Loan	800.0	700.0	600.0	500.0	400.0	300.0	200.0	100.0	0.0	0.0	0.0
3. Equity	892.9	892.9	892.9	892.9	892.9	892.9	892.9	892.9	892.9	892.9	892.9
4. Reserves		26.8	150.0	283.5	427.1	580.5	743.5	935.8	1137.4	1348.1	1559.8
Total liab.	1692.9	1644.9	1678.2	1711.7	1755.3	1808.7	1871.7	1964.0	2065.5	2276.3	2488.0

CASH-FLOW TABLE FOR CALCULATIION OF PRESENT VALUE

	Constr.	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	Salv. val.
A. CASH INFLOW:												
Revenue		9197.9	12077.1	12077.1	12077.1	12077.1	12077.1	12077.1	12077.1	12077.1	12077.1	
B. CASH OUTFLOW												
1. Total investments	-1692.9	0.0	0.0	0.0	0.0	0.0	-350.0	0.0	0.0	0.0	0.0	867.0
2. Operating costs		-8818.1	-12341.3	-12341.3	-12341.3	-12341.3	-12341.3	-12341.3	-12341.3	-12341.3	-12341.3	
3. Corporate tax		-51.2	-130.0	-138.4	-146.7	-154.7	-162.6	-186.5	-194.1	-201.7	-202.4	
4. Sales tax		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total outflow	-1692.9	-8869.3	-12471.4	-12479.8	-12488.0	-12496.1	-12854.0	-12527.8	-12535.5	-12543.0	-12543.7	867.0
C. NET CASH FLOW	-1692.9	328.6	405.7	397.3	389.0	381.0	23.1	349.2	341.6	334.0	333.3	867.0
D. PRESENT VALUE	-1692.9	285.7	306.8	261.2	222.4	189.4	10.0	131.3	111.7	95.0	82.4	214.3

NET PRESENT VALUE 217.3

INTERNAL RATE OF RETURN

	I	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	Total
Net cash flow		328.6	405.7	397.3	389.0	381.0	23.1	349.2	341.6	334.0	1200.3	
Present value	17.0	280.9	296.4	248.0	207.6	173.8	9.0	116.4	97.3	81.3	249.7	67.4
	20.0	273.8	281.7	229.9	187.6	153.1	7.7	97.5	79.4	64.7	193.9	-123.5
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Annex 21.(1)

I N S T R U C T I O N

System: **KIRDI Work Monitoring System (WMS)**

Program: **MP80 (on the MULTIPLAN diskette)**

Databases: **MONITx** and **CHARTx**
where is x is a number in the range of 1...12 - according to the month of the year.

Prerequisites: Each section of the Institute has to submit its summary sheet (see Appendix 21.1) of their time utilization in the past month not later then 5th of every month.

GUIDE TO THE OPERATION:

1. Turn on the system (follow the instructions given on the wall chart) or if the computer is already on, make sure that the operating system is active (either **A>_** or **B>_** should be displayed on the screen with the cursor blinking).

2. If it NOT **January** to be processed then GO TO 4.,
e l s e make copies of the two diskettes labelled **WMS-STARTING-01** and **WMS-STARTING-2** using the **diskcopy** command (see DOS User's Manual). For this purpose you may use the two diskettes used in the previous year or you may wish to keep those for further references, so you use two new diskettes.

3. Label (or correct the old label) on the new year's diskettes 19..-WMS/1 and 19..-WMS/2 respectively, whereas .. should be the last two digits of the subject year. GO TO 5.

4. If it is NOT **July** then GO TO 5.,
e l s e insert your 19xy-WMS/1 diskette for drive A:
and your 19xy-WMS/2 for drive **B:** and type

A>copy a:monit6 b:

and press ENTER. (**The ENTER key is the large grey one left from 7 and 4.**) When ready remove the diskettes from drives.

5. Insert the MULTIPLAN diskette for drive **A:** and type

A mp80

and press ENTER. Wait while the following picture (i.e. an empty spreadsheet) appears on the screen (see overleaf):

(2)

```
A1      1       2       3       4       5       6       7
 1
 2
 3
 4
 5
 6
 7
 8
 9
10
11
12
13
14
15
16
17
18
19
20
COMMAND: Alpha Blank Copy Delete Edit Format Goto Help Insert Lock Move
         Name Options Print Quit Sort Transfer Value Window Xternal
Select option or type command letter
```

with the cell-pointer (a green rectangle block) resting in row 1 - column 1.

Remark: Any time from now on if you press a wrong key or start a wrong action, you can recover the command menu (i.e. to a screen which has the commands on the bottom just like on the above screen copy.

6. Remove the program diskette from drive **A:** and replace it by 19xy-WMS/1 if the month to be processed is in the first half of the calendar year, or by 19xy-WMS/2 otherwise.

7. Press **T** for "Transfer", than **L** for "Load" and hit one of the arrow keys on the numeric keypad. (Note that **NL** in the last screen row should not be present - if it is there, then press once the grey key with **Num Lock**.) You will see the screen showing the names of databases, which are on the diskette in drive **A:** with the pointer on the first one. Move the pointer on the name **MONITx** using the arrow keys, then press ENTER. The loading process for January takes a few seconds, while for all the other month it is about 4 minutes.

8. When loading is completed the following screen (for March 1986) is seen (see overleaf):

(3)

```
#1        1        #2       2         3         4         5
 1     K  I  R  D  I  -  Work Monitoring System
 2 March                Year: 1986
 3 Unit of measurement:      man-hours
 4                              A c t i v e          W o r
 5 Division/section        Privat cl.  Government   Internal   Ext. Serv.
 6 --------------------    ----------------------------------------------
#4                    #3
 7 Administr. & Finance
 8     Accounts                  0          0          0          0
 9     Administration            0          0          0          0
10     Supplies                  0          0          0          0
11     Library & Inf.            0          0          0          0
12         SUBTOTAL              0          0          0          0
13 Project Stud. & Dev.
14     Proj. Feas.               0          0          0          0
15     Market Stud.              0          0          0          0
16     Econ. Feas.               0          0          0          0
17     Ext. Serv.                0          0          0          0
18         SUBTOTAL              0          0          0          0
19 Process & Prod. Dev.
COMMAND: Alpha Blank Copy Delete Edit Format Goto Help Insert Lock Move
         Name Options Print Quit Sort Transfer Value Window Xternal
Select option or type command letter
```

The cell pointer is resting in January just next **Year:**, and in row 7 (Accounts) column 2 (Privat) in all other months.

9. Press **O** for "Options" and you will see the bottom of the screen like this:

```
OPTIONS recalc: Yes No       aute: Yes(No)
        iteration: Yes(No)   completion test at:
Select option
```

with a reverse (green) pointer either on "Yes" or on "No". For any case press **N** for "No" than ENTER - the command menue will return. (By this the recalculation is switched OFF, wich speeds up the data input.)

10. It is recommended to press once the **Num Lock** key (notice the **NL** appears in the last row on the screen); now you can use the numeric keypad for data input - but you can NOT use the arrow keys to move the cell-pointer. Actually you will not need it, since you may enter data from the summary sheets (last row) submitted by each section of the Institute continuously by pressing **F2** after each entry. The pointer moves automatically to the next cell to be entered. If any of the input data happen to be 0 (zero), just press the **F2** without entering any numbers - the pointer skips that cell.

Remark: **The pointer seems to move rather slowly, nevertheless you may enter data as fast as you can - the computer will remember every keystroke.**

11. If you make mistakes (that happens to everybody) and if you realize BEFORE pressing **F2**, then you can correct the entry (seen still in the lower left corner of the screen) by pressing the "backspace" key (i. e. the grey one just over the ENTER) several times and entering the right value). If you realize your mistake AFTER the **F2** has been pressed, then you
    - either proceed to enter the following data AND making note on the error (e.g. on the source document), and you return to this cell after the whole spreadsheet has been filled in,
    - or you return to this cell by keeping depressed the **F2** key while it arrives again here,
    - or you release the **Num Lock** (the **NL** disappears from the last screen row), then by using the arrow keys you move the cell-pointer to the desired position and after entering the correct data you move it to the next cell to be input (do not forget to press again the **Num Lock** if you intend to use the numeric keypad for data entries).

    Remark: **(i) the first option is recommended;**
    (ii) never use comma (,) for separation of thousands.
    (iii) you may use only the upper row of the alphabetic keypad - in this case you may have the arrow keys available any time for moving the cell pointer, provided the Num Lock is released (the NL is not seen on the screen).

12. When the data inputs are finished (the cell pointer returns to the first cell of the spreadsheet), press **F4** for recalculation of the table. It will take about half minute, while you can see the decreasing number of equations to be computed by the computer.

13. Press the **Esc** key to resume to the command menu. Now you may wish to study the results by using the arrow keys for moving the cell pointer to the desired position (make sure that the **NL** is not seen in the last screen; now if it is, then press the **Num Lock** key ones). It is a good opportunity to compare the totals of each row computed by the sections and those produced by the computer. If they are equal, then the data input was carried correctly. If not, then either one of the data in the respective row was entered with a mistake, or the computation made by the section is wrong.

14. Press **T** for "Transport", than **S** for "Save" - you will see the bottom of the screen like this (e. g. for March):

    TRANSFER SAVE filename: MONIT3

    Enter a filename

    Press ENTER then **Y** for "Yes" to verify that the old database on the diskette may be overwritten by the newly entered and recalculated table. The saving takes a few seconds, but it might be that the computer recalculates the spreadsheet before saving it.

15. Make sure that the printer head is at the top of the next page (if necessary make adjustment according to the printer's Manual). Press **P** for "Print" and you receive the message on the screen bottom:

```
PRINT: Printer File Margins Options
```

with the pointer resting on **Printer:** accept it by pressing either **P** again or pressing ENTER. The computer prints out one table for January, and two tables for all other months.

Remark: **Make sure that wide paper is in the printer: if NOT, you may select before Printer the Margins and change the "print width" in the submenu from 230 to 120:**

```
PRINT MARGINS: left: 3    top: 0    print width: 230  print length: 55
               page length: 66
Enter a number
```

Move the pointer with the "Tab" key (the one is under the Esc.

An example of the outputs produced by this program enclosed as Appendix 21.2.

16. When the command menu reappears on the screen (it will be much earlier than the printer completes the tables, IF you started up the computer with the DOS with memory allocation and the SIDEKICK), press **T** for "Transfer", than **C** for "Clear". You will be prompted:

```
TRANSFER CLEAR:

Enter Y to confirm
```

Now press **Y** for "Yes" and you get an empty spreadsheet, like in pargraph 5.

17. **Press T** for "Transfer", than **L** for "Load" and hit one of the arrow keys on the numeric keypad. (Note that **NL** in the last screen row should not be present - if it is there, then press once the grey key with **Num Lock**.) You will see the screen showing the names of databases, which are on the diskette in drive, **A:** with the pointer on the first one. Move the pointer on the name ART* using the arrow keys, then press ENTER. The loading process for takes about one minute for all months of the year.

18. When loading is completed the following screen (e. g. for March 1986) is seen (see overleaf):

```
#1      1        2              3               4     5     6
 1 March                                  Year: E 1986
 2 ---------------------------------------------------------------
 3 DIVISIONS                                           %
 4 ---------------------------------------------------------------
 5 Admin. & Finan. : #############################     :   24.40  :
 6 Project Studies : ####                              :    3.36  :
 7 Process & Prod. : #############################     :   24.29  :
 8 Engineering     : ####################################  30.28  :
 9 Anal. & Test.   : #####################             :   17.67  :
10 ---------------------------------------------------------------
11 SECTIONS                                            %
12 ---------------------------------------------------------------
13 Admin. & Finan. :                                   :          :
14     Accounts    : ##############                    :    6.73  :
15     Administr.  : #################                 :    8.41  :
16     Supplies    : ###########                       :    5.05  :
17     Libr. & Inf : ########                          :    4.21  :
18        SUBTOTAL :                                   :          :
19 Project Studies :                                   :          :
20     Proj. Feas. : ##                                :    0.84  :
COMMAND: Alpha Blank Copy Delete Edit Format Goto Help Insert Lock Move
         Name Options Print Quit Sort Transfer Value Window Xternal
Select option or type command letter
```

It is a barchart represening the most important data on the capacity and time utilization by divisions and sections of KIRDI.

19. You may study the barchart by moving the cell-pointer down and up, but you can NOT change any of its data.

20. Press **T** TWICE and you will get a printout of the barchart. Before printing make sure that the printer head is at the top of the next page. In this case printing on both the narrow (A/4) and the large paper is done by the same printing margins. (You may repeat the printing to get more copies of the barchart.) A sample output is enclosed as Appendix 20.3.

21. When finished press **Q** for "Quit" and after having the message:

```
QUIT:

Enter Y to confirm
```

press **Y** for confirmation to terminate the program execution. You will get a message:

```
Insert COMMAND.COM disk in drive A
and strike any key when ready
```

so you have to insert the DOS diskette for drive **A:** and hit any key on the keyboard - **A>_** should appear on the screen with blinking cursor.

22. It is STRONGLY R[illegible]MENDED to make a copy of the newly updated diskette by using [illegible] **diskcopy** command (see the DOS User's Manual).

Appendix 21.1

K I R D I - Work Monitoring System

Month: ______________ Year: ____.   Division: ______________________ Section: __________________

Unit of measurement: man-hours

	Active Work										Absenties		
Name	Privat cl.	Government	Internal	Ext. Serv.	Travel	Training	Library	Administ.	Meetings	Idle	Ann. leave	Sick leave	Absent
													GRAND TOTAL:
TOTAL:													

K I R D I - Work Monitoring System

February Year: 1986

Division/section	Active Work: Privat cl.	Government	Internal	Ext. Serv.	SUBTOTAL	Travel	Training	Library	Administ.	Meetings	Idle	Absences: Ann. leave	Sick leave	Absent	SUBTOTAL		%
Administr. & Finance																	
Accounts			800	200	1000		100	20		60		60	20	20	100	1280	6.73
Administration	200	200	600	50	1050	20	100	30	150	130		80	30	10	120	1600	8.41
Supplies		200	600		600	100	30	30		20	10	70	50	50	170	960	5.05
Library & Inf.	50	50	50		150		200	350	20			50	20	10	80	800	4.21
SUBTOTAL	250	450	1850	250	2800	120	430	430	170	210	10	260	120	90	470	4640	24.40
Project Stud. & Dev.																	
Proj. Feas.	50	10	10	5	75	20	5	10	5	15		20	10		30	160	0.84
Market Stud.	40		10	5	55	40	5	10		20		20	10		30	160	0.84
Econ. Feas.	50	10	10	5	75	20	5	10	5	15		20	10		30	160	0.84
Est. Serv.	30			60	90	20	5	10	5	5	5	10	10		20	160	0.84
SUBTOTAL	170	20	30	75	295	100	20	40	15	55	5	70	40	0	110	640	3.36
Process & Prod. Dev.																	
Food Tech.	100	20	300	250	670	70	20	20	10	65	5	75	15	10	100	960	5.05
Ceramics	150	10	30	200	710	100	50	50	20	50	20	20	20	80	120	1120	5.89
Textiles & Fib.	200	10	300	150	660		5	5		10		60	30	10	100	780	4.10
Chem. Tech.	150	25	225	160	560	50	50	10	10	10	10	70	25	5	100	800	4.21
Leather Tech.	200	30	300	100	630	150	30	20	10	20		70	25	5	100	960	5.05
SUBTOTAL	800	95	1475	860	3230	370	155	105	50	155	35	295	115	110	520	4620	24.29
Eng. Design & Manf.																	
Workshop	50	250	1800	200	2300	100	50	50	100	100	20	250	100	50	400	3200	16.82
Electric. Eng.	40	40	500	200	800	100	60	40	50	50	5	100	50	25	175	1280	6.73
Mech. Eng.	50	50	400	150	650	10	10	10	10	10		80	10	10	100	800	4.21
Chem. Eng.	40	40	100	100	280	50	20	20	20	10	5	60	10	5	75	480	2.52
Civil Eng.					0										0	0	0.00
SUBTOTAL	180	400	2800	650	4030	260	140	120	180	250	30	490	170	90	750	5760	30.28
Analytical & Testing																	
Anal. Chem.	360	200	400	100	1060	100	100	50	50	50	10	180	50	30	180	1600	8.41
Biol. & Org. Ch.					0										0	0	0.00
Physic. Chem.	300	50	250		600	100	30	30		20	10	90	60	20	170	960	5.05
Material Test.	200	50	200	50	500	75	25	20	15	15		85	40	25	150	800	4.21
SUBTOTAL	860	300	850	150	2160	275	155	100	65	85	20	275	150	75	500	3360	17.67
GRAND TOTAL:	2260	1265	7005	1985	12515	1125	900	795	480	755	100	1390	595	365	2350	19020	100.00
Percentage:	11.88	6.65	36.83	10.44	65.80	5.91	4.73	4.18	2.52	3.97	0.53	7.31	3.13	1.92	12.36	100.00	

TOTAL from JANUARY to FEBRUARY 1986

Division/section	Active Work: Privat cl.	Governmeat	Internal	Ext. Serv.	SUBTOTAL	Travel	Training	Library	Administ.	Meetings	Idle	Absentia: Ann. leave	Sick leave	Absent	SUBTOTAL	TOTAL	Percent. I
Administr. & Finance																	
Accounts	0	20	1600	240	1860	40	200	30	110	120	0	120	30	50	200	2560	6.68
Administration	420	250	1500	110	2280	30	140	90	160	230	0	170	50	50	270	3200	8.35
Supplies	0	400	800	0	1200	200	60	60	0	40	20	140	100	100	340	1920	5.01
Library & Inf.	100	130	350	20	600	20	320	365	30	15	20	90	130	30	250	1620	4.23
SUBTOTAL	520	800	4250	370	5940	290	720	545	300	405	40	520	310	230	1060	9300	24.27
Project Stud. & Dev.																	
Proj. Feas.	100	20	20	10	150	40	10	20	10	30	0	40	20	0	60	320	0.84
Market Stud.	60	32	20	13	125	55	15	40	5	20	2	30	16	4	50	320	0.84
Econ. Feas.	60	50	15	20	145	41	15	30	15	15	5	30	14	10	54	320	0.84
Ext. Serv.	35	20	40	75	170	34	13	20	11	7	12	30	18	5	53	320	0.84
SUBTOTAL	255	122	95	118	590	170	53	110	41	80	19	130	68	19	217	1280	3.34
Process & Prod. Dev.																	
Food Tech.	200	30	400	470	1100	80	35	60	150	215	35	85	35	55	175	1850	4.83
Ceramics	300	20	450	420	1190	160	75	65	40	60	70	85	30	115	230	1890	4.93
Textiles & Fib.	290	25	350	175	840	70	80	50	120	110	140	85	80	75	240	1650	4.31
Chem. Tech.	350	55	295	210	910	80	140	60	100	46	33	150	51	30	231	1600	4.18
Leather Tech.	600	55	332	133	1120	640	50	25	60	110	15	170	95	45	310	2330	6.08
SUBTOTAL	1740	185	1827	1408	5160	1030	380	260	470	541	293	575	291	320	1186	9320	24.32
Eng. Design & Manf.																	
Workshop	50	450	1860	1800	4160	500	90	250	120	280	590	280	120	90	490	6400	16.70
Electric. Eng.	60	120	580	400	1160	400	80	245	67	58	65	180	300	45	525	2600	6.78
Mech. Eng.	90	150	450	310	1000	110	70	100	16	25	80	124	50	25	199	1600	4.18
Chem. Eng.	50	90	190	250	580	100	50	65	40	29	35	80	20	11	111	1010	2.64
Civil Eng.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
SUBTOTAL	250	810	3080	2760	6900	1110	290	660	243	312	770	664	490	171	1325	11610	30.30
Analytical & Testing																	
Anal. Chem.	580	250	1300	160	2290	110	140	110	60	150	10	190	70	70	330	3200	8.35
Biol. & Org. Ch.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Physic. Chem.	450	55	345	220	1070	120	60	180	10	50	30	140	180	100	420	1940	5.06
Material Test.	290	65	250	75	680	145	100	65	135	115	140	110	90	90	290	1670	4.36
SUBTOTAL	1320	370	1895	455	4040	375	300	355	205	315	180	440	340	260	1040	6810	17.77
GRAND TOTALs	4085	2287	11147	5111	22630	2975	1743	1930	1259	1653	1302	2329	1499	1000	4828	38320	100.00
Percentage:	10.66	5.97	29.09	13.34	59.06	7.76	4.55	5.04	3.29	4.31	3.40	6.08	3.91	2.61	12.60	100.00	

January - February Year: Appendix 21.3

DIVISIONS		%
Admin. & Finan.	**********	24.40
Project Studies	****	3.36
Process & Prod.	**********	24.29
Engineering	##########	30.28
Anal. & Test.	**********	17.67

SECTIONS		%
Admin. & Finan.		
Accounts	**********	6.73
Administr.	**********	8.41
Supplies	**********	5.05
Libr. & Inf	**********	4.21
SUBTOTAL		
Project Studies		
Proj. Feas.	**	0.84
Market St.	**	0.84
Econ. Feas.	**	0.84
Ext. Serv.	**	0.84
SUBTOTAL		
Process & Prod.		
Food	**********	5.05
Ceramics	**********	5.89
Textiles	**********	4.10
Chem. Tech.	**********	4.21
Leather	**********	5.05
SUBTOTAL		
Engineering		
Workshop	##########	16.82
Electrical	**********	6.73
Mechanical	**********	4.21
Chemical	*****	2.52
Civil		0.00
SUBTOTAL		
Anal. & Test.		
Anal. Chem.	**********	8.41
Biological		0.00
Phys. Chem.	**********	5.05
Mat. Test.	**********	4.21
SUBTOTAL		

ACTIVITIES		%
Privat cl.	******	11.88
Government	***	6.65
Internal	**********	36.83
Ext. serv.	*****	10.44
Act. Work Subt.	##########	65.80
Travel	**********	5.91
Training	**********	4.73
Library	**********	4.18
Administ.	**********	2.52
Meetings	**********	3.97
Idle	*	0.53
Ann. leave	**********	7.31
Sick leave	**********	3.13
Absent	*****	1.92
Absenties Subt.	##########	12.36