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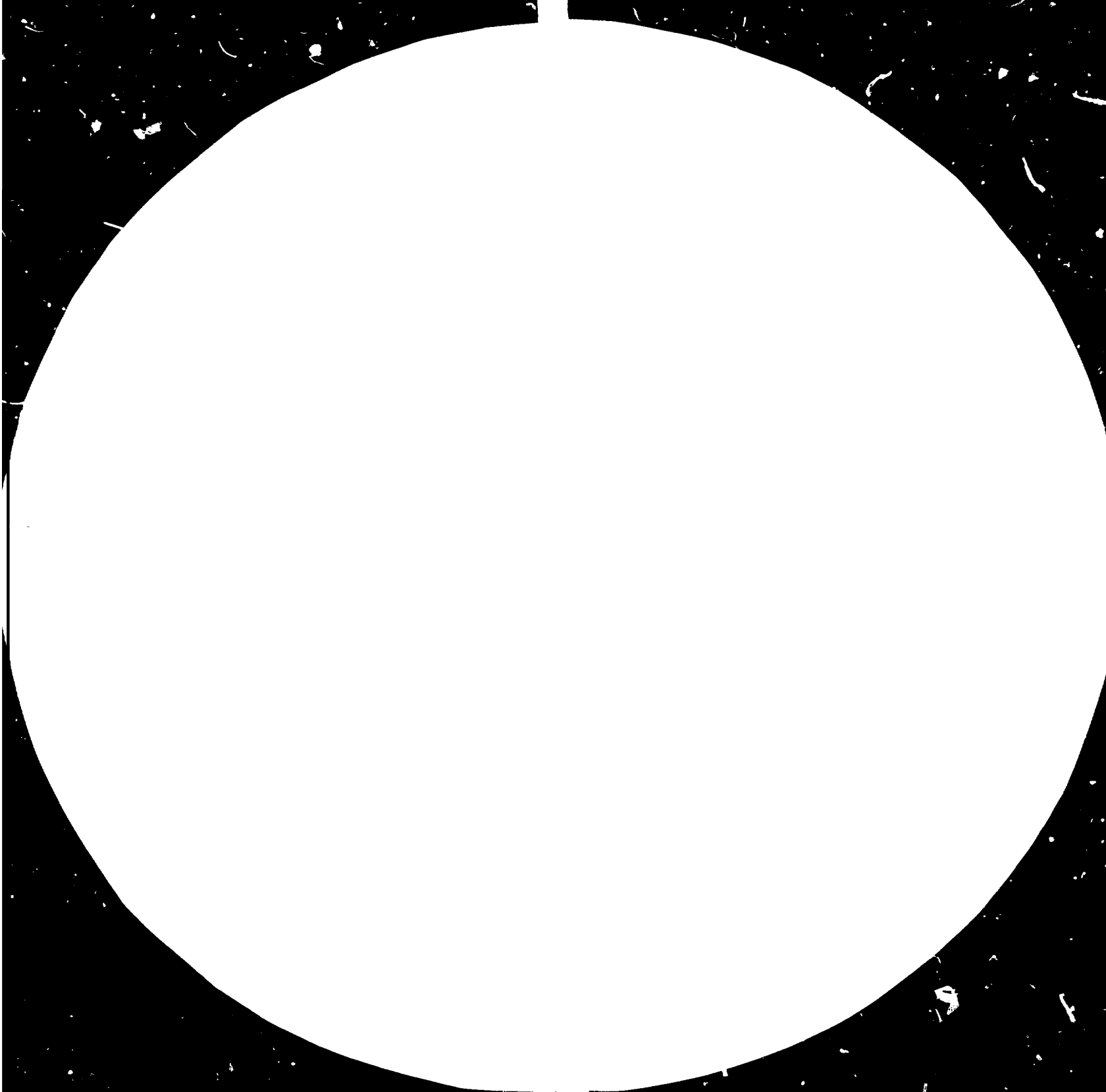

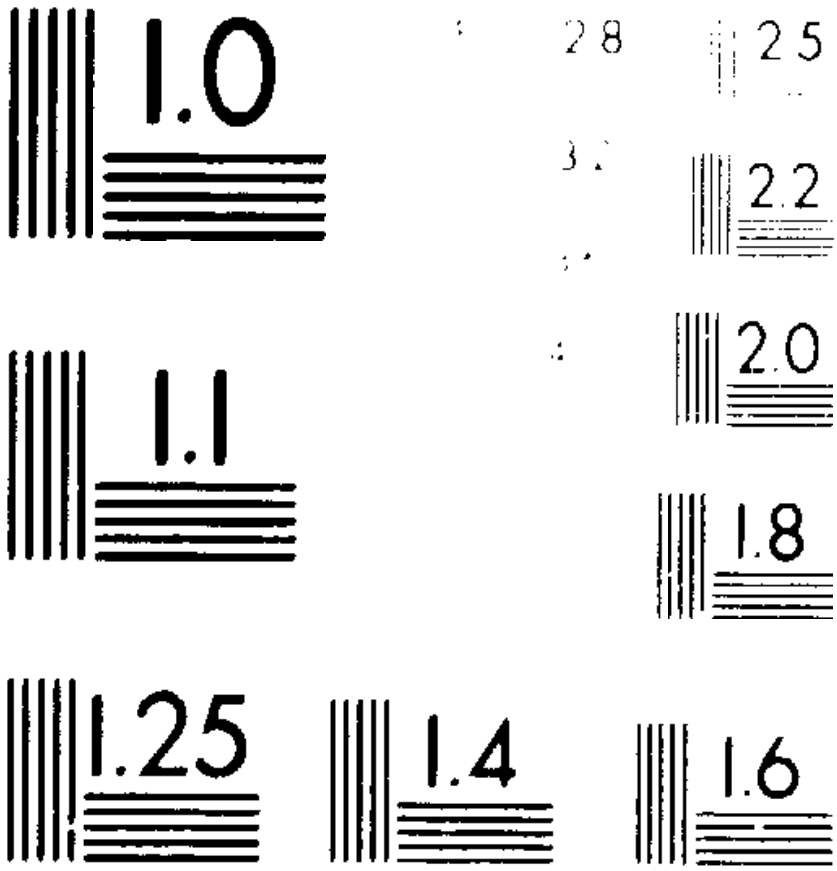

14211

Guyana.

Report

on Installation of
and
on Workshop in use of

UNIDO COMFAR

at

Institute for Applied Sciences and Technology IAST,
Georgetown, Guyana

GUY/86/801

Dr. [illegible]

by

Christian M. Nowak
Computer Expert

Christian M. Nowak

1984

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1. In[illegible]ion:

[illegible] carried out for the UNIDO Project GUY/[illegible]/81 [illegible] developed software COMFAR 1.1 at the Institute for applied sciences and technology (I[illegible]), Georgetown, Guyana. By introducing this software package for financial evaluation of [illegible] projects (feasibility studies) Guyanas national strengths and capabilities to [illegible] high [illegible] feasibility studies and to effectively evaluate industrial pro[illegible] during all [illegible] of their implementation [illegible] to be enforced.

At [illegible] time [illegible] introduction [illegible] COMFAR in Guyana is a further step in proposing the UNIDO [illegible] of [illegible] feasibility studies, according to the "Manual for the preparation of [illegible] Feasibility Studies".

The [illegible] given [illegible] divided into following chapters, each one showing a different facet of the pr[illegible] work carried out:

2. Back[illegible] of the [illegible] COMFAR implementation: software version supplied, hardware con[illegible]
3. Time [illegible] and [illegible] carried out: chronological list of actions and problems of the implementation
4. Find[illegible]: Hints for further COMFAR implementations
5. Agen[illegible] workshop [illegible], demonstration materials, list of workshop participants

6. Furth[illegible] in [illegible] the COMFAR software: Considerations on slight program chan[illegible]
7. Comb[illegible] differen[illegible] on Apple III microcomputer

[illegible] chapters [illegible] of [illegible] for [illegible] governmental and UNIDO-linked counterparts in the [illegible], chapter [illegible] is for internal use of the software [illegible] only (UNIDO IO/FEAS) and sh[illegible] not be distributed for any other purpose than [illegible] update by the section.

Chapter 7 is a [illegible] annex [illegible] to additional research work carried out during the two day[illegible] for [illegible] equipment. This part of the mission report does not involve the COMFAR prog[illegible] could [illegible] be of interest for [illegible] in other developing countries.

chapt[illegible]

2. Background of the Guyanese Model Implementation

2.1 supplied COMFAR version:

After releasing version COMFAR 1.0 officially in mid 1987 the software has been implemented in countries like Ethiopia, Zambia, Malaysia, Indonesia etc. with great success. Based on the experiences made during the implementation work in the above countries UNIDO decided to completely update COMFAR during 1991. The newest version (COMFAR 1.1) so far has not been released officially, but has already been successfully used in the project reported herewith.

This decision, to implement a not completely tested and possible not in every aspect consistent draft version of COMFAR 1.1 instead of the already totally verified older version was based on several arguments, which are:

Dialog structure: COMFAR 1.1 is far easier to be used with its dialog structure even clearer than the one of its older sister-version. This will significantly reduce the time needed for pure operational training required for a COMFAR workshop and will therefore enable to improve training in methodological aspects of financial analysis work.

Extensions: COMFAR 1.1 incorporates some completely new features such as better and more detailed specification of the financial sources of a project (which indeed is necessary for banker's need) and most often activated adjustment of production cost figures. Furthermore COMFAR has been refined in detail for a clearer concept of the credible discounting ratios.

Speed: COMFAR 1.1 is much faster in all basic computer operations as are: loading and saving of data files on external storage devices, switching from one subsystem to another, calculation speed as well as display and output procedures.

However it is to be argued that the software supplied still may contain some major bugs (although it has been extensively tested during the last two month and a demonstrational version could impress Japanese, Chinese and Thai officials). To implement COMFAR 1.1 therefore is only possible when easy maintainance can be guaranteed.

Currently secure maintenance and fast update to the newest version of COMFAR doesn't seem to be a problem in Guyana considering that

- COMFAR 1.1 after two month of intensive testing work seems to be reasonable secure,
- the institute is headed by the GTZ R. Lee who himself is already familiar with the hardware and software handling of an APPLE III computer
- By using the diplomatic pouch facilities directly from London new software versions can easily be delivered within half a week. A workshop participant (member of IAST) was selected to be responsible for program update and has accordingly been instructed.

For UNIDO /PPD on the other side training on the software COMFAR 1.1 gives the increased chance to find hidden bugs with the help of eager workshop participants cross-checking their output for logical consistency.

2.2 IAST's use of APPLE III computers:

From 1988 IAST Georgetown has been internally using a microcomputer APPLE III for its office work. During this three year period they gained experience as microcomputer users and could

effectivly improve their office organisation. The institute was expressing its deep need for another (or possibly two more) microcomputers within the next few month (an according proposal has already been made for the 1985 budget) to be used for:

- word processing
- single calculations (budgeting etc.)
- calculate project data (COMFAR) for official and private organisations
- calculate quality analysis for a pottery pilot plant within the institute.

4 of the institut's employees had deeper experience in using the micro computer and some others expressed their interest for using such machines whenever additional hardware resources are available.

2.3 Configuration already installed when arriving:

At the begin of my consultancy IAST was using the following hardware configuration:

- 1 Apple III 128 K Euro version incl. amerikan keyboard and monochrome display
- 2 external disk drives (140 K), both ready for operation although one had recently been repaired by IAST staff
- 1 Apple daisywheel printer equipped for single sheet paper feed only
- 1 Apple graph plotter (4 colours)
- 1 Apple silentype printer (damaged printing head and therefore not ready for operation)

It is to be remarked that the existing computer equipment did not fit to the requirements of the UNIDO COMFAR software in respect to the following items:

- 5 MB Profile hard disk was missing
- Printer did not allow to feed endless fold paper (an additional tractor was not available)
- 128 K main memory instead of 256 K required for COMFAR (full driver configuration)
- 128 K RAM disk not available

Anyway COMFAR could have been updated for use on single sheet printers (requiring about one week of additional programming and testing work in the field) and the RAM disk could have been substituted by the much slower PROFILE disk (2 days of programming work) however purchase of memory extension (128 K) and hard disk were crucial. Information on how the existing hardware configuration was gradually extended during the mission can be found in chapter 3 of this report.

2.4 Configuration available at end of consultancy:

After purchasing additional equipment the institute was able to use following devices:

- 2 Apple III 256 K RAM, euro version with amerikan keyboard and monochrom display
- 2 external disk drives (an additional third one had not yet arrived)
- 1 RAM disk 128 K
- 1 Mannesmann Tally matrixprinter MT 180 incl. interface card
- 1 5MB Profile hard disk incl. interface card
- 1 spare 265 K main memory board (which I left after request by IAST for quick correction of any hardware deficency)
- Apple daisywheel printer
- 1 INTAB serial intelligent controller board (including an 8 channel multiplexer and a 12 bit A/D converter unit)
- Apple graphics plotter (4 colours)

The equipment had readily been installed for

- running COMFAR 1.1 (required are: 1 Apple III 256 K, 1 disk drive, profile disk, Ram disk, Matrix printer)
- office work (textprocessing, spreadsheet calculations) and controlling the serial controller board

It is to be remarked that COMFAR for the time being can only be used on one of the two micros (one PROFILE hard disk available, no second RAM disk). However the institute expressed its deep need for both computers to be available for project calculations.

3. Time schedule and work carried out

Thu 8/11 - Sun 11/11: travel to Georgetown

3.1 week 1: Checking hardware

Mon 12/11: Check of the hardware available at the institute results in following devices missing: 256 K main memory, 128 K RAM disk, hard disk 5MB. COMFAR 1.1 therefore cannot be implemented. A further test of the operatability of all existing devices is not possible, cause IAST is suffering from a severe power cut, that can only be coped with Wednesday afternoon. For immediate purchase of missing hardware parts contacts are established with A.V distributors, London to urgently send a purchase offer. A RAM disk is not ordered, decision is made to take the one (belonging to UNIDO/FEAS) I carried with me.

Tue 13/11: Hard disk and memory extension are officially ordered from London. Vienna is advised to send Rosati (2nd COMFAR trainer) earlier to London to personally collect the equipment from A.V. distributors to overcome severe customs problems in Trinidad/Tobago. Furthermore to be absolutely secure Vienna is asked to care for another 256 K main memory board. Still there seem to be no major obstacles to start COMFAR workshop on next Mon. 17/11. For Friday 23/11 an official demonstration is planned, for which an introductory letter is prepared (see chapter 5).
It is determined that COMFAR (when implemented on the hardware available after the purchase) will have to be changed in regard of:

- restricting TABC printout to 80 characters only
- replacing all "form feed" commands by a dialog for feeding a new sheet
- system library must be changed to contain the institute's name
- startup diskettes have to be prepared for different printer
- printer configuration of REPORT subsystem must be adapted

Wed 14/11: For memory extension 256 K serial number of the computer (London) and serial number of currently used memory board (Vienna) is requested and immediatly replied. Power can be reestablished in the afternoon and a first hardware and software test is carried out.
When trying to compile a simple PASCAL program by using the standard UCSD-Pascal compiler the compiler software is interrupted by the Pascal interpreter giving the error message: "unimplemented instruction, S31/P35/I1126". This message cannot be avoided by neither changing the program text compiled nor changing compiler locations, name of source text file, driver configuration, booting different startup diskettes, Pascal system software a.s.o. Further error characteristics are: Leading commentaries are translated, compiler options are accepted, the occurance of the error described is not influenced, when the hard-software surroudings are change . diagnostics program determines no error.
Considering the nature of the error encountered following assertions can be given:

- It is no longer clear, if COMFAR will be running on the Apple III equipment available (COMFAR could invoke the same "unimplemented instruction" as the compiler software). A test to clarify the situation is not possible, cause at the moment no hard disk is available.

- COMFAR (even if running) cannot be changed according to the implementation needs of the institute, when no compilation is possible.

- The exact error location (insuffient hardware micro instruction code set or Pascal interpreter error) cannot be determined, cause further diagnostic tests would require a

working compiler.

Immediate contacts to Vienna fail cause of the terrible telephone connections to Europe.

Thu 15/11: Contacts with Vienna are established. It is agreed upon that the best solution for a secure workshop would be the purchase of a completely new computer equipment according to UNIDO's standards. IAEA agrees to this proposal taking into consideration that two additional Apple III computer equipments have already been proposed for the next year's budget line (see chapter 2). For the institute the urgent shipment of an additional equipment carries with it the advantage of quickly getting an Apple III computer, for which they otherwise would have to wait for one more half year and which at the same time is much cheaper than the devices listed in the budget proposal.
Luckily finance of the equipment is no severe problem for the project. Vienna tries to ship an Apple III computer (incl. disk drive, Ram disk and Mannesmann Tally printer) as fast as possible. The computer is expected to arrive early next week.

Fri 16/11: Vienna informs us, that the proposed schedule for Rosati cannot be fullfilled cause he has got to organize a visa in London for Guyana before travelling down. He is now expected to arrive Wed. 21/11 which forces us to postpone the workshop (and the demonstration) by one week. According informations are prepared and distributed. Another test with the computer equipment does not reveal new problems, however the "unimplemented instruction" error's nature still cannot be determined.

3.2. week 2: installing COMFAR

Mon-Tue 19/11-20/11: While waiting for the additional computer equipment a program for reading experimental results for heat up experiments with clay samples is prepared. For details of this program refer to chapter 7.
Dr. Lee of the institute decides to go to Trinidad for his own to push the forwarding procedures for the second computer equipment, shiped from Vienna Friday night.

Wed 21/11:Rosati arrives with hard disk and memory extensions. Test reveals that all devices delivered are working normally. Exchange of the Pascal interpreter software against a new version brought from Vienna also cures the "unimplemented instruction" error, which can now be determined as software error inside the Apple III UCSD-Pascal software copy I got in Vienna.
In general COMFAR is operatible now on the Apple III equipment available under the restriction that no printouts can be produced. It is decided not to rewrite COMFAR for single sheet use but to wait for the Viennese printer.

Thu-Fri 22/11-23/11: The second Apple III equipment has inspite of Dr.Lees investigations in Trinidad not arrived yet. Further trace gives:

- The equipment has already reached Guyana
- It can used after customs clearance Tue next week

Rosati and I jointly plan the workshop program for the rest two weeks (see chapter 3) and test the COMFAR version supplied for further bugs. Rosati also is briefed about the newest COMFAR 1.1 features.

3.3 week 3: COMFAR workshop:

Mon 26/11: Start of COMFAR workshop (9 participants - see list chapter 5)
Printer not available at the moment: Theoretical introduction in COMFAR, UNIDO methodology (cost side), utilities (incl. practical work: formatting, copying diskettes).

Tue 27/11: Full second equipment available now. Workshop continues with Utilities (file handling commands, theory and practice), hardware structure, use and treatment of hardware, UNIDO methodology (sales, working capital).
COMFAR CALCUL subsystem is adapted to changes carried out in Vienna as follow:

- For write out of TABC correct indices for Tabc lines !5 - .. are entered
- Cost adjustments are multiplied by corresponding multipliers
- Total costs after cost adjustments corrected
- Tax adjustment excluded from depreciation
- Depreciable allowances are deducted from gross income
- Tax adjustments added to income tax and deducted from net income
- interests added to total production costs

Wed 28/11: Workshop continued makes very fast progress: UNIDO methodology (cashflow discounting, ratios), COMFAR DAIEN subsystem theory and practical work.

Thu 29/11: Input table structure part 1. Repetition of hardware handling and software layer. Entering figures of first subtables (investment).

Fri 30/11: Input table structure continued (production cost, source of finance). Further operational training on COMFAR also using REPORT system for printing input tables.
Afternoon: COMFAR demonstration and official opening of the workshop by the deputy prime minister of Guyana.

Sat 1/12-Sun 2/12: Travel to Vienna. Rosati will continue COMFAR workshop for one more week according to the workshop time schedule.

4. Findings and recommendations:

- insufficient communications before workshop:While IAST had sent a list of all hardware parts available UNIDO replied by giving a list of all devices needed for COMFAR execution. it was never agreed upon, who would arrange for the supply of the missing hardware (hard disk, RAM disk, memory extension). While IAST was thinking that UNIDO would take care for hardware they were confirming to be during my briefing, that everything had already been arranged by the local staff in the field.
  I would like to propose for further installations in countries with already existing hardware to hire a computer expert well in advance to assist the communications before the actual mission.

- Memory extension: It is still not clearly determined under what circumstances COMFAR will need a main memory of 256 K. Since UCSD-Pascal Compilers on Apple III are only able to adress 64 K (heap) + 64 K (stack) 128 K should be sufficient, whenever the additionally used driver software is not to big. However COMFAR will definitely require 256 K memory, when all possible drivers (two printers, one silentype, Profile, Ram disk, Console) are loaded.
  I would propose to overcome further problems to restrict use of COMFAR to 256 K Apple III Computers only (these computers are the only ones available nowadays). Whenever a customer wants to use an old 128 K version, he should be forced to upgrade the system. For secure upgrading the serial number of the Apple III and its current memory board are necessary.

- Diskettes taken into the field: Although I have been carefully testing all my diskettes (both COMFAR versions, utilities, Pascal system) seperately they did not work in Georgetown when used together. Furthermore the damage that happened to my Pascal diskettes (errror "unimplemented instruction") was a pure software failure (possibly one bit skipped) that presumably happened during copying a working original program.
  For the next COMFAR implementations a complete software test of all software parts together (combined performance test) is an absolute necessity. However such an extensive test is very time consuming and will therefore need additional consultant's days in Vienna before the mission is started.

- Split missions: Although missions done by two experts are far more expensive this mission again demonstrated the need for two consultants (computer expert plus financial analyst) in the field, who are interleaving their missions for at least one week. Whenever split missions cannot be made for any reason whatsoever a complete hardware and software test in Vienna is strictly recommended.

- Fast support with additional hardware: Communication links between headquarter and the field project become crucial in cases of emergency, when fast response is needed. When telephone links are weak (as for Guyana) fast telex communications are necessary. As an expert in the field one sometimes cannot get rid of the feeling, that telex communication interchange with UNIDO looses its efficiency due to a burocratic overhead in Vienna.

- finance: It must be emphasized that the success of the mission is mainly due to :

  * the excellent financing conditions of the project (immidiate availability of funds)
  * The quick and decisious support by both the project and Vienna headquarters
  * The availability of computer experts in Vienna and good connections to the hardware supplier there

- Program adaptation: The non standard hardware used would have made necessary to change the COMFAR software directly in the field. Moreover COMFAR 1.1 has been further changed during

the mission in Vienna and changes have been reported to the field expert via telex. It should be remarked however, that changing the calculation rules of COMFAR as well as doing program adaptations to the hardware should be restricted.

- IBM and Apple version: As soon as the official IBM PC/XT version of COMFAR 1.1 is released an expert going into the field should take both IBM and Apple versions with him to increase chances of successfull implementations on either of these machines (Guyana for example could have provided an IBM computer for the duration of the workshop).

- Printer used: The mission reported on was the first COMFAR implementation using a Mannesmann Tally MT 180 dot matrix printer. Such a printer is much faster than the UNIDO propagated EPSON FX 100 however letter quality and readability is worse. Considering its speed the TALLY printer seems to be ideal for use during a COMFAR workshop, where success of the training suffers from time contraints (long waiting periods for result printouts).

The MANNESMANN TALLY printer MT 180 has to be initialised by the user for the following values:

Formlength	12 (11) inch	[depends on fanfold paper used]
		[standard length UNIDO 12 inch]
LPI	6	[lines per inch>72 (66) lines per page]
CPI	20	[characters per inch]
CR implies LF	no	
LF at full line	no (yes)	[does normally not influence COMFAR]
POPC	no	
LF implies CR	no	
Char set	USA	
Slash zero	no (yes)	
Aux code set	E-codes	[Epson interface Ascii code sequences]
Buffersize	min (max)	[sometimes Buffersize max looses characters]
interface type	parallel	

Additionally the COMFAR printer configuration block contains:

Graphix on:	27,75	[<escape> K]
Enlarge:	16	[shift out]
Restore enl.	20	[DC4]
all others:	undef.	

COMFAR

workshop on using UNIDO's Computer Model for feasibility analysis and reporting: preliminary time schedule

1. week: Introduction in to COMFAR, hardware and software handling, input data

	9.00 - 10.25	10.35 - 12.00	13.00 - 15.00
Monday	opening session Introduction into the course	Background infor- Information on COMFAR and on UNIDO	practical work with the Computer: basic operations
Tuesday	Computer equipment components, usage, basic terms	UNIDO methodology in preparing feasibility studies	Practical work: UTILITIES
Wednesday	Computer programs: software, limits, file organisation software handshake COMFAR	UNIDO methodology: financial analysis	Practical work: UTILITIES
Thursday	COMFAR data entry system (DATEN) Basic operations, inputtable	group A: Practical work with COMFAR group B: Input Table Investment, Production costs	group A: Input Table Investment, Production Costs group B: Practical work with COMFAR
Friday	group A: Practical work with COMFAR group B: Input Table Sales, working capital	group B: Practical work with COMFAR group A: Input table Sales, working capital	COMFAR demonstration

2. week: Financial Evaluation using COMFAR

Monday	COMFAR Input table: Sources of finance	COMFAR Calculation and Report systems	COMFAR: Output Tables
Tuesday	Output Tables cont.	Preparation of Data for UNIDO case	Preparation of Data for UNIDO case
Wednesday	Preparation of UNIDO case Data, calculation and reports by each group.		
Thursday	COMFAR advanced use: sensitivity break-even social cost benefit analysis	National case study A National study (VANCERAM) is offered, others can be calculated if necessary	National case study
Friday	National case studies: work on computer cont.	National case study: Summary and discussion Presentation by the workshop participants	Closing session: Final discussion Evaluation of workshop

5. Apendices

In this chapter a list of the workshop participants and some demonstrational materials prepared can be found. I would recommend that for further CONFAR workshops the dokumentational material given can be photocopied and taken into the field.

5.1 List of workshop participants:

Donna Harris,	project analyst ,	Guyana national engineering coorporation
D. Braithwaithe,	civil engineer,	state planning corporation
Jean Millington,	programmer/analyst,	department of international economic cooperation
Felix Girard,	economist,	office of the president
Calvin Reed,	project officer,	Guyana manufacturing and industrial agency (GUYMIDA)
Desmond Shakespeare,	Industrial engineer,	CARICOM
Anand Persaud,	research assistant,	IAST
Andre Mann,	industrial engineer,	IAST

Invitation letter for COMFAR demonstration on COMFAR background.

Historical background: In 1978 UNIDO issued the "Manual for the preparation of industrial feasibility studies" in an effort to standardize the methods of preparation of feasibility studies as well as to prepare a means for measuring the quality of such studies.

The fast increasing demand for the manual, that was actually thought of being a handbook for the project analyst preparing feasibility studies made it one of UNIDO's best selling publications with over 60000 copies printed. Till now it has been translated into 16 different languages. Studies prepared according to the "UNIDO methodology" have been acccepted as being of very high quality.

In 1981 UNIDO decided to prepare a computer program based on the UNIDO methodology that should assist the financial analyst in the preparation of the financial analysis of the project under consideration as described in chapter 10 of the "UNIDO Manual". The program aimed to support the expert in the often time consuming and erratic calculations of feasibility in order to get him free for deeper analysing the project's constraints.

A systems analysis for such a computational system was prepared in 1981 and after hardware selection (leading to a APPLE /// micro computer) a first draft version of COMFAR has been programmed.

After carefully testing the system COMFAR has officially been revealed mid 1983.

Till then several implementation together with training workshops for preparing feasibility studies have been made. Today COMFAR is extensively used by organisations dealing with industrial planning in countires such as Ethiopia, Zambia, Kongo, Turkey, Indonesia, Madagaskar etc. Furtner implementations in about ten different countries have already been confirmed and are planned for 1985.

The implementation of the Institute for Applied sciences and technology in Guyana in November 1984 will be the first implementation of COMFAR in the south american countries.

What can COMFAR be used for ?

a) Preparation of feasibility studies: COMFAR is a tool for quick evaluation of projects under considerations after the basic project data have been collected. Due to its computational power it enables quick analysis of different project alternatives and analysis of a project under different financial conditions (sensitivity analysis).

b) project appraisals: Already prepared studies for projects can easily be double checked by means of the computer. COMFAR therefore is a powerful tool for determining weaknesses of already prepared studies.

c) Project accompanying tool: COMFAR allows recalculations of a project already under construction, whenever unforseen conditions arise. COMFAR herewith subsidizes the project decision maker when projects are delayed or market situations change.

What are the features of COMFAR ?

COMFAR is the only powerful feasibility study system available on a transportable micro computer. So far comparable computer systems have only been prepared for main frame computers, which makes them very unhandy for developing countries or for use directly in the field.

COMFAR has especially been designed for financial analysts with no knowledge about computers. When using COMFAR the financial analyst is guided through the operations by a concise English dialogue. Use of COMFAR can therefore easily be learned.

COMFAR offers (according to the UNIDO methodology) some features that are not common with other available feasibility study systems: Foreign and local cashflows within a project can be analyzed seperately thus giving a quick impression of the foreign influence and local outcome of the project planned. Furthermore COMFAR is a cashflow oriented model.

COMFAR (c)

workshop on using UNIDO's Computer Model for feasibility analysis and reporting: system demonstration

Input data accepted by COMFAR:

	foreign	local
Investment during construction		
Investment during production	- " -	- " -
Production costs	- " -	- " -
additional cost adjustments	- " -	- " -
Production and sales programme	- " -	- " -
Working capital requirements	- " -	- " -
Source of finance	- " -	- " -
Income, tax conditions, cashflow	- " -	- " -

COMFAR accepts up to 4000 project data figures but can run base cases with approx. 20-50 data figures too.

Output data produced by COMFAR:

standardised schedules (according to UNIDO's Manual for the preparation of industrial feasibility studies)

- Total initial/current investment
- Cashflow tables construction/production
- Cashflow discounting ratios (NPV,FVAL,IRR)
- Total production costs
- Projected balance sheet constr./prod.
- Net income statement
- Source of finance
- Net working capital

Additionally COMFAR offers a detailed output table (including a working capital table and production cost tables for each product) for further analysis.

COMFAR (c)

workshop on using UNIDO's Computer Model for feasibility analysis and reporting: system demonstration

Hardware and software requirements:

Currently COMFAR (c) can be used on Apple /// and on IBM/PC personal microcomputers. Furthermore the software can be used on all fully IBM/MS-DOS compatible microcomputers (as are offered by WANG, Phillips, HP etc.).

Basic hardware configuration:

Apple ///: 256 K RAM, monochrome monitor incl. 1 external disk drive
128 K RAM disk interface card
Profile winchester disk 5 MB
Printer (seriell or parallel with appropriate interface)

IBM PC/XT: 256 K RAM, monochrome display incl. 1 internal disk drive and 10 MB IBM hard disk
Printer (seriell or parallel with appropriate interface)

Basic software requirements:

Apple ///: COMFAR is running under the UCSD-Pascal system supported by the SOS operating system.

IBM PC/XT: COMFAR is offered as program running under the MS-DOS operating system.

COMFAR can be purchased as integrated hard- and software package or as software (coded version) only under software license agreement. For details please contact UNIDO Vienna, Division of Industrial operations, Feasibility Study Section.

6. Further steps in improving the COMFAR software

Based on the experiences made and on some helpfull hints by workshop participants I would like to recommend following changes in the COMFAR system version 1.1 before the official release.

6.1: Depreciation type: Altough already COMFAR 1.0 (first specified version) included the potential use of different types of depreciation calculations (such as linear, increasing, decreasing depr.) COMFAR 1.1 still offers only the most primitive (linear) depreciation type for calculations. To improve applicability of the COMFAR model including further depreciation types is necessary. Calculation rules for these amendments are simple and can be found in any book about basic accounting methods.

6.2. Dialog: The dialog structure of the updated COMFAR version is a big improvement in comparison to COMFAR 1.0 however it is sometimes still slightly inconsistent.

a) Mount diskette menu:

Instead of asking

```
**************************************************************************
*                                                                        *
*    Mount distette to contain ..... [name  ]                            *
*                                                                        *
*    Done, enter 0 ?? _                                                  *
*                                                                        *
**************************************************************************
```

a better question is: Done , press 0: _
or even: When ready press <return>: _

b) Your choice: After a menu offering several ways of continuation in the program COMFAR asks for the user's choice by giving a list of all possible commands. The list should be written according to the same format in all such menues.

6.3 Print/display during DATEN modul: Confusion is caused by the fact, that the COMFAR DATEN subsystem does not allow to have a look onto the contents of a subtable just entered. To get an overview over the changes performed the user must relay on the time consuming procedure containing the step sequence: [quit DATEN subsystem, save table on disk, call REPORT subsystem, select input table print/display, display/print input table contents, quit REPORT subsystem, call DATEN subsystem, choose update mode, continue input/update].

It would be of big help when DATEN directly would offer a simple printout/ display option that allows to see all data of a certain subtable of the currently input/changed input table. Such a output option could relatively easy be implemented in the DATEN main menu and could by standard always show the last subtable used (looked at or changed).

6.4 Number of production years: COMFAR as it is does not allow variable lengths of the production phase. To cut off production before year 15 the user himself is forced to add all fixed production costs as negative adjustments after the project's lifetime. Depreciation can be cut off by explicitely using depreciation allowances. I would like to propose to enter the length of the production phase into the general variables as is already done with the construction phase of the project and to calculate only for the years (columns) specified. Since this change is a rather severe change of the software it should be included in the next COMFAR update (version 1.2).

6.5 Minimum days coverage (mdc), coefficient of turnover (coto): COMPAR as is does not allow to specify cost items with mdc=0. It will always correct this input against 1 day (coto=360) and will therefore calculate working capital requirements for all cost items (even if not specified). I would propose a slight program change according to following statement list:

current calculation:

```
for all cost items do
begin (do)
get mdc of cost item;
if mdc = 0
   then begin (then)
        correct mdc = 1
        give warning
        end   (then);
coto = 360/mdc;
calculate working capital requ.
    for mdc given;
end (do);
```

changed calculation

```
for all cost items do
begin (do)
get mdc of cost item
if mdc() 0 then coto = 360/mdc
          else coto = 0;
calculate working cap. requ for
   mdc given;
end (do);
```

Default values in DATEN subsystem for mdc (currently = 1) shall not be changed in accordance with the UNIDO methodology. The REPORT system shall be changed for schedule NWC (net working capital) by including the statement:

for Coto=0 write "None".

6.6 Net present value: To show a NPV at a given discount rate does not allow to analyse certain NPV characteristics such as dependency from discounting rate (d_I/d_NPV). This additional information could be easily given by calculating the NPV for a intervall (I-5,I+5) in 1% steps.

6.7 Table descriptions: Column descriptions for line 66 (input table) are wrong: instead of "disbursements" they should be the same description as used for line 64 ("quantity", "variator").

7. Combining a differential temperature analyser and an Apple III microcomputer:

IAST Georgetown is heavily involved in an experimental plant for producing clay and pottery. To cary out these tasks IAST includes a small clay factory and a small group of craftsmen (working with the clay for manual quality control). Also included is a small chemical and physical laboratory for analysing the clay quality.

A basic means of testing the clay components (chemical structure) and its behaviour during the burning process is to heat up a clay sample and to measure the clay body temperature in comparison with the surrounding (heater, furnace) temperature. For such heat up experiments IAST is currently using a PERKIN ELMER system (high temperature differential thermal analyser DTA 1700 + system 4 microprocessor controller 417 0017). Temperatures are measured by using a voltmeter unit scaling the temperatures in mV and by reading the measurements in fixed time intervalls.

It is to be understood, that measuring the temperatures in this way does not allow to deeply analyse the test results (as is allowed by studying the temperature graphs for both furnace temperature over time and differential temperature as function of furnace temperature).

IAST has therefore decided to purchase an A/D converter unit (intelligent serial controller card INLAB by Digital Design and development, London) for coupling the thermal analyser via a multiplexer (8 channel) and a 12 bit A/D converter directly to the Apple III computer. A program shall be prepared that is reading both temperatures (as described above) ,stores all significant data values (changes and peaks) and allows further analysis of the experimental results by drawing graphs or by postprocessing the stored temperature profile.

During the second week of my mission while I was waiting for the supplement equipment to arrive I was asked by the institute to test the possibility of a program connection between A/D converter and Apple III computer.

The result of my investigations is the following basic program (Pascal could not be used on the machine at this time) that enables:

- reading furnace and differential temperature linearily amplified into a voltage range of [-15V,+15V] via the RS 232 interface using the INLAB controller card
- storing significant data changes and peak values (ascent switches) onto a diskette data file
- producing graphical drawings of the required graphs for chemical analysis of the clay sample

Unfortunately neither the INLAB control card nor the Apple III computer where equipped with a clock to standardize time intervalls between measurements. It is therefore recommended to install a clock and to change the attached program in regard to assign the correct time to the variable t to enable exact analysis of temperature profiles.

Furthermore the program could never be tested for reading real experimental outcome, cause the amplifier connection needed could not be provided during the two days investigation works.

```
REM  ***********************************************************************
REM  program will read furnace and differential temperatures and
REM  printout output drawings of results
REM  ***********************************************************************
REM
REM  following subprograms available:
REM       - plot data from file
REM       - measure temperature and produce file of data
REM
GOTO 5000:REM start of program
REM
REM*************************************************************************
REM program for opening all devices
REM
OPEN#4,".thinklab":OUTPUT#4:REM          open thinklab for outputstrings
OPEN#3 AS INPUT,".thinklab":REM          open thinklab for inputstrings
OPEN#1 AS INPUT,".console":REM          normal input from console
OPEN#2,".console":OUTPUT#2:REM          normal output on screen
RETURN
REM
REM*************************************************************************
REM program for closing all devices
CLOSE#1:CLOSE#2:CLOSE#3:CLOSE#4
RETURN
REM*************************************************************************
REM startmenu determines value of i
REM
PRINT#2;"*********************************** main menu *
*************"
PRINT#2
PRINT#2;"please select:          p..plot file data"
PRINT#2;"                        t..temperature file to prepare"
PRINT#2
PRINT#2;"                           or q to quit program"
PRINT#2
INPUT"your command is: ",command$
i=0
IF command$="p" THEN i=1
IF command$="P" THEN i=1
IF command$="t" THEN i=2
IF command$="T" THEN i=2
IF command$="q" THEN i=3
IF command$="Q" THEN i=3
RETURN
REM *************************************************************************
REM get string from thinklab
REM string is str$
INPUT#3;str$
INPUT#1;OUT$(0)
RETURN
REM *************************************************************************
REM put string to thinklab
REM string is str$
OUTPUT#4
PRINT;str$
OUTPUT#2
RETURN
```

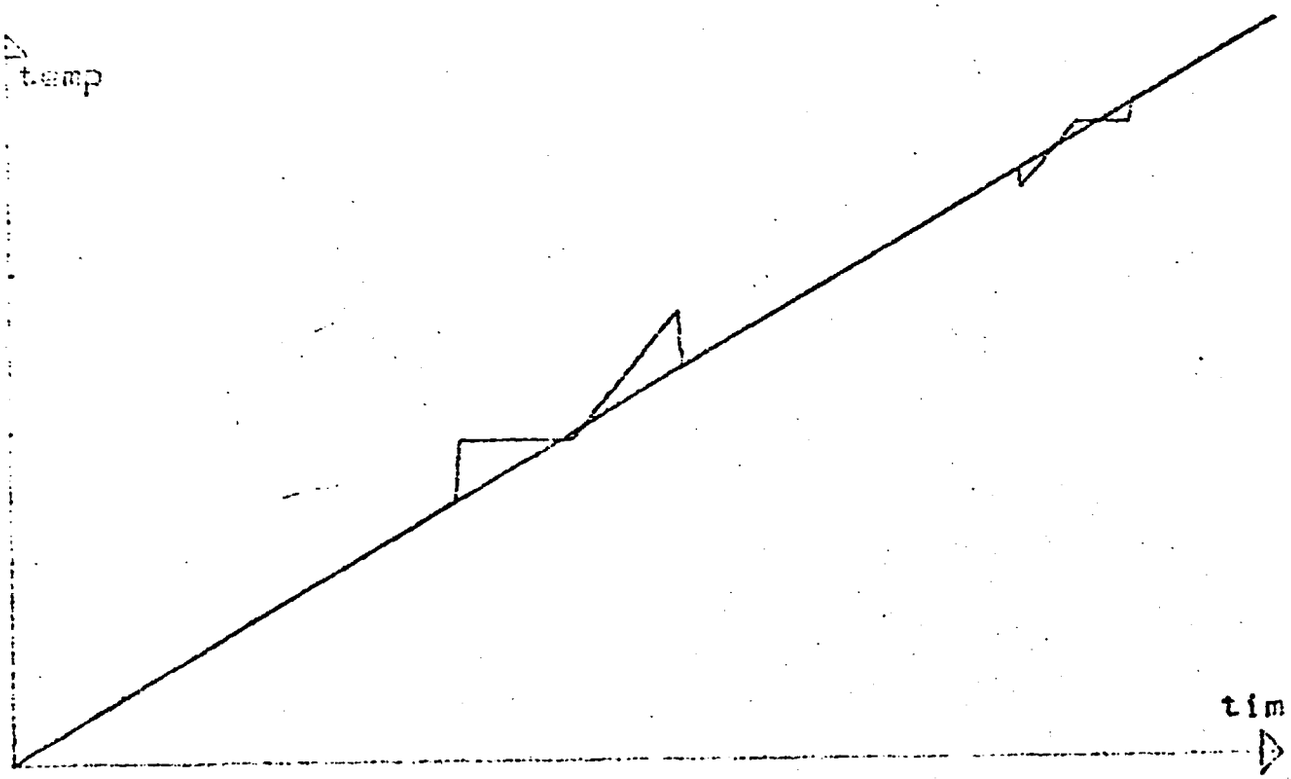
```
REM plot subroutine
GOSUB 700:REM open plotter
GOSUB 600:REM open file to be plotted
GOSUB 900:REM plot file contents
GOSUB 1000:REM close plot file
RETURN:REM from plot subroutine
REM ********************************** plotting sub
utine **********************:RETURN
REM ********************************** open plotter ****
CLOSE#3:CLOSE#4:REM must close thinklab first
GOSUB 560:PRINT#2:PRINT#2;"please disconnect THINKLAB and connect plotte
r"
PRINT#2:INPUT"press <return> when ready:",command$
OPEN#4,".rs232":REM plotter now opened
RETURN
REM ********************************************open data file
GOSUB 560
PRINT#2
IF name$<>"" THEN GOTO 818
INPUT"Enter name of dataset:",name$
GOTO 810
PRINT#2;"Current dataset is:",name$
PRINT#2:INPUT"Press <return> to accept or new name:",command$
IF command$="" THEN GOTO 828
name$=command$:GOTO 810
ok=1
ON ERR GOSUB 1999
path$=name$+".len"
INPUT"before opening .len file",command$
OPEN#5 AS INPUT,path$
INPUT"now before reading length",command$
IF ok=0 THEN GOTO 810
INPUT#5;anzput:INPUT#5;tmax:INPUT#5;mxx:INPUT#5;mnx:INPUT#5;mxdx
INPUT#5;mndx:INPUT#5;mxplus:INPUT#5;mnplus
IF ok=0 THEN GOTO 810
CLOSE#5
ok=1
path$=name$+".dat"
OPEN#5 AS INPUT,path$
INPUT"data file .dat opened",command$
IF ok=0 THEN GOTO 810
OFF ERR
RETURN
```

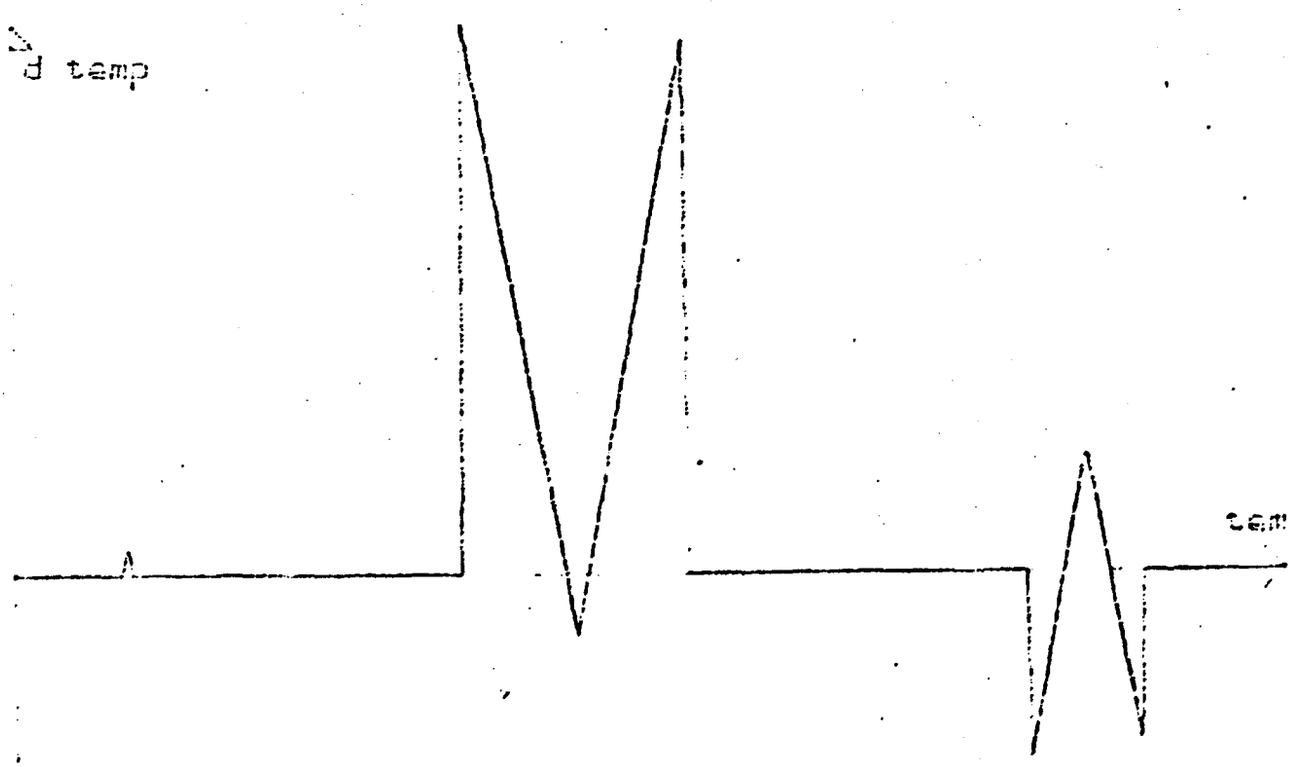
```
900  GOSUB 500
910  GOSUB 1100:REM read data
915  ox=1000:oy=0:lx=1759:ly=1000
916  ymax=mplus:ymin=mnplus:xmax=tmax:xmin=0
920  xdach=t:ydach=x:GOSUB 1150:REM real coordinates of data point
925  GOSUB 1200:REM move to these coordinates
930  FOR j=2 TO [illegible]
935    GOSUB 1100
940    xdach=t:ydach=x:GOSUB 1150
945    GOSUB 1230:REM draw line to coordinates
950    NEXT j
955  CLOSE#5:path$=name$+".dat":OPEN#5 AS INPUT,path$
956  xax$="time":yax$="temp":GOSUB 1300
959  GOSUB [illegible]
960  GOSUB 1100:REM read data
965  [illegible]
966  ymax=[illegible]:ymin=[illegible]:xmax=[illegible]:xmin=[illegible]
970  xdach=x:ydach=dx:GOSUB 1150
975  GOSUB 1200:REM move to coordinates
980  FOR j=2 TO [illegible]
982    GOSUB 1100
984    xdach=x:ydach=dx:GOSUB 1150
986    GOSUB 1230:REM draw line to position
988    NEXT j
990  xax$="temp":yax$="d temp":GOSUB 1300
999  RETURN
1000  REM ********************************************* close plotter ***
1001  REM must open thinklab now
1005  CLOSE#5:REM close data file .dat
1010  [illegible]
1011  GOSUB 550:PRINT#2:PRINT#2;"Please connect Thinklab again"
1012  PRINT#2:INPUT"Press <return> when ready",command$
1020  OPEN#3 AS INPUT,".thinklab"
1030  OPEN#4,".thinklab"
1040  GOSUB 560
1050  PRINT#2:INPUT"Plot finished, press <return> to continue",command$
1095  RETURN
1100  REM ************** read t,x,dx from file #5
1110  INPUT#5;t:INPUT#5;x:INPUT#5;dx:RETURN
1150  REM ************* convert to coordinates
1151  REM xdach,ydach ==> coordx,coordy
1160  coordx=ox-CONVX(ly*(ydach-ymin)/(ymax-ymin))
1170  coordy=oy+CONVX(lx*(xdach-xmin)/(xmax-xmin))
1180  RETURN
1200  REM ************ move pen to coordx,coordy
1210  PRINT#4;"MA ",coordx,",",coordy
1220  RETURN
1230  REM ************** draw line to abs coordx,coordy
1240  PRINT#4;"DA ",coordx,",",coordy
1250  RETURN
```

```
1300  REM ************** draw coordinate lines
1310  xdach=xmi:ydach=0:GOSUB 1150
1320  GOSUB 1200
1330  xdach=xmax:GOSUB 1150
1340  GOSUB 1230
1342  PRINT#4;"DR -30,-30,60,0,-30,30"
1344  PRINT#4;"MR -50,-500"
1346  PRINT#4;"LR 90"
1348  PRINT#4;"PL",xax$,CHR$(3)
1350  xdach=0:ydach=ymin:GOSUB 1150
1360  GOSUB 1200
1370  ydach=ymax:GOSUB 1150
1380  GOSUB 1230
1382  PRINT#4;"DR 30,-30,0,60,-30,-30"
1384  PRINT#4;"MR 70,-400"
1386  PRINT#4;"LR 90"
1388  PRINT#4;"PL",yax$,CHR$(3)
1390  RETURN
1410  GOSUB 1100
1415  xdach=t
1420  ydach=x+dx
1430  GOSUB 1150
1440  GOSUB 1200
1450  FOR j=  TO anzpur
1455    GOSUB 1100
1460    xdach=t:ydach=x+dx:GOSUB 1150
1470    GOSUB 1230
1480    NEXT j
1490  CLOSE#5:path$=name$+".dat"
1491  OPEN#5 AS INPUT,path$
1500  IF x>mxx THEN mxx=x
1510  IF x<mnx THEN mnx=x
1520  IF dx>mxdx THEN mxdx=dx
1530  IF dx<mndx THEN mndx=dx
1540  IF(x+dx)>mxplus THEN mxplus=(x+dx)
1550  IF(x+dx)<mnplus THEN mnplus=(x+dx)
 60   RETURN:REM from determining max and min values
 99   ok=0:RETURN:REM set wrong file access condition
 00   REM************************************************************
 01   REM measure subroutine
 10   GOSUB 4500:REM home and head
 20   PRINT#2
 30   PRINT#2;"please make sure: * thinklab correctly connected"
 31   PRINT#2;"                  * power on and reset"
 32   PRINT#2;"                  * all connections to temperature ok"
 33   PRINT#2:PRINT#2;" there is no way for the program to test connections"
 34   PRINT#2:INPUT" please press <return> when ready:",command$
  0   GOSUB 3000:REM initializing system
  0   GOSUB 4500:REM home and head
  0   PRINT#2:PRINT#2;"system initialized, connections established"
  0   PRINT#2:INPUT"please enter pathname for data file",name$
  )   GOSUB 4000:REM opening data file
  )   GOSUB 4500:REM home and head
  )   PRINT#2:PRINT#2"File is ready for recieving data"
  )   PRINT#2:INPUT"Press <return> to start >",command$
      GOSUB 4500:REM home and head
      PRINT#2:PRINT#2;"system is reading temperatures"
      PRINT#2:PRINT#2;"to stop data transfer (close file) press <return>"
      GOSUB 3500:REM recieve data and store them
      GOSUB 4600:REM close data file and bye thinklab
      RETURN
```

```
000   REM******************************************* system initialized
010   str$="config 1 = local":GOSUB 380
020   str$="config 2 = tmux8":GOSUB 380
030   RETURN:REM from system initialize
040   REM******************************************* read temp, x,dx
041   t=t+1
045   str$="adsum 0-1":GOSUB 380
050   GOSUB 310:REM read furnace temperature at time t
055   x=VAL(RIGHT$(str$,LEN(str$)-2))
060   GOSUB 310:REM read temperature difference at time t
065   dx=VAL(RIGHT$(str$,LEN(str$)-2))
100   RETURN:REM from read temp, x, dx
300   REM******************************************* store t,x,dx
310   OUTPUT#5:PRINT t:PRINT x:PRINT dx
315   anaput=anaput+1
317   tx=t
320   OUTPUT#2
321   GOSUB 4500
325   GOSUB [illegible]
326   PRINT#2;"t=",t
327   PRINT#2;"x=",x
327   PRINT#2;"dx=",dx
328   PRINT#2;"ana=",anaput
400   RETURN:REM from store t,x,dx
500   REM******************************************* recieve data and store
501   REM until user presses key
502   mx=0:mn=0:mxdx=0:mndx=0:mxplus=0:mnplus=0
505   t=-1
510   GOSUB 3040
511   maxx=c1:minx=c2:maxdx=c3:mindx=c4
512   xupo=0:dxupo=0:xo=x:dxo=dx
513   xxxx=2.73:dxdx=2.73:REM changes of 0.01 Volt dedected
515   anaput=0
520   GOSUB 3300
530   leave=0
535   IF [illegible] GOSUB 3999
540   IF leave=1 THEN GOTO 3070
550   GOSUB 3040
560   xup=SGN(x-xo)
570   dxup=SGN(dx-dxo)
580   IF xup<>xupo THEN GOTO 3630
590   IF dxup<>dxupo THEN GOTO 3640
600   IF ABS(x-xo)>mxx THEN GOTO 3645
610   IF ABS(dx-dxo)>mdx THEN GOTO 3645
620   GOTO 3140
630   xupo=xup
640   dxupo=dxup
645   xo=x:dxo=dx
650   GOSUB 3300
660   GOTO 3140
670   IF(tx<>t) THEN GOSUB 3300
680   RETURN:REM recieve and store data if necessary
3999  leave=1:RETURN:REM set leave loop condition

4000  REM******************************************* open data file
4001  REM name is name$
4010  ON ERR GOSUB 4300
4015  ok=1
4017  path$=name$+".dat"
4020  OPEN#5 AS OUTPUT,path$
4030  IF ok=0 GOTO 4015
4039  OFF ERR
4040  RETURN:REM from opening file
4300  GOSUB 4500
4310  PRINT#2:INPUT"enter correct pathname for file:",name$
4311  ok=0
4315  RETURN
4500  HOME:PRINT#2;"******************************************* tempstore measurement *****"
4501  RETURN
4600  REM******************************************* close datafile and bye
4610  CLOSE#5
4615  namelen$=name$+".len"
4620  OPEN#5 AS OUTPUT,namelen$
4630  PRINT#5;anaput:PRINT#5;t
4631  PRINT#5;mxx:PRINT#5;mnx:PRINT#5;mxdx:PRINT#5;mndx:PRINT#5;mxplus:PRINT#5;mnplus
4640  CLOSE#5
4650  OUTPUT#2
4660  GOSUB 4500
4665  PRINT#2:PRINT#2;"after ",t," value ",anaput,"stored"
4670  PRINT#2:INPUT"Data on file saved, press <return> to continue",command$
4680  RETURN:REM from close data file
5000  GOSUB 100
5007  c1=4096:c2=-4096:c3=c1:c4=c2
5008  name$=""
5009  i=0:REM i=0:repeat,=1:plot,=2:measure,=3:quit
5010  GOSUB 190:REM go to startmenu
5020  IF i=1 THEN GOSUB 500
5021  IF i=2 THEN GOSUB 3000
5030  ON i GOTO 5009,5009,29999
5040  GOTO 5009
29999  GOSUB 160
30000  END
```


temp
tim


d temp
tem