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SPECIAL REPORT



PERS. 98

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G.V. KASS

AN ACCOUNTING PROGRAM FOR
THE NATIONAL INSTITUTE FOR PERSONNEL RESEARCH

NATIONAL INSTITUTE FOR PERSONNEL RESEARCH
COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

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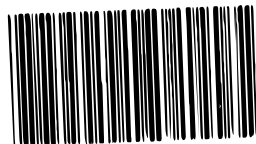
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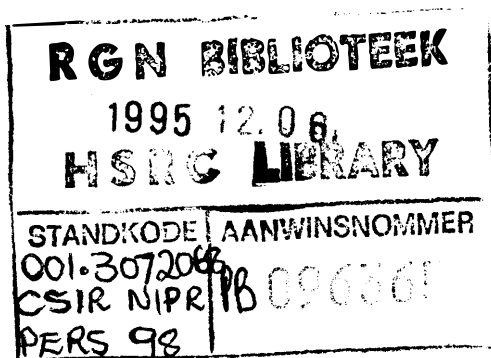
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Acknowledgements

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We would also like to thank Miss L. Myeza for typing the preliminary versions as well as this report.



Summary

A. As input is from a variety of documents via remote terminals free format is used. Each document is identified by a code number and has its own decoding and checking routine making use of tables and interspersed checksums. Instructions for updating tables are also placed in the input stream.

Input is written to the Monthly Expenditure file which contains a complete record of all input of whatever form during the month.

In the final stage the weekly Suppliers' Accounts returns are produced from the Monthly Expenditure file, but in the initial stages these returns form part of the input.

The Monthly Expenditure file and the previous Accumulated Expenditure file are the input for the Expenditure Accumulation program which produces the new Accumulated Expenditure file. The Expenditure Report Generator then uses the Accumulated Expenditure file for producing the Project Expenditure reports.

The Monthly Expenditure file is also the source of the Project Costing Schedule and the Capital Expenditure report, and the input for the Suppliers' Records program which updates the Suppliers' Records file from which in turn is produced the Suppliers' Records report.

The Monthly Expenditure file and the previous Accumulated Job Cards Times are the input to the Job Card Times Accumulation program from which the new Accumulated Job Card Times file is produced. This last is used for producing the Project Times reports.

B. The system will be introduced in three stages.

In Stage I. only the processing of the Job Cards Times data is to be programmed. This will test the proposed methods of input and operation on a small scale. Stage II will require an adaption of the input program to other forms of document and a second and more extensive accumulation program, although no new principles will be involved. Neither stage requires any change in Administration division returns or procedures, so that the program can be freely modified and improved without causing any disorganisation. Both stages should be in operation in time to produce the first reports of the financial year, viz. those for April, in July.

In Stage III the system will produce routine returns required for Headquarters, for the Director, or for the Administration division. Order forms and Invoices will replace Suppliers' Accounts returns as input. The Suppliers' Accounts returns will be produced weekly and the Project Costing Schedule and Capital Expenditure reports monthly. The monthly file will also be used for updating the Suppliers' Records file from which the Suppliers' Records will be printed. Stage III will be implemented in sections, but the whole should be completed by October.

Future extensions considered are an inventory of stationery requisites, equipment records, and an online enquiry system.

NIPR Costing System

I. Description of the Present System

Costing is by projects, which includes contracts and certain administrative functions, and cost headings are distinguished by "project" numbers which are a combination of a 4 figure divisional number and a 4 to 6 figure task number.

Before the start of the financial year, estimates for each project of the percentage of time to be spent by individual staff members and expenditure under broad headings such as Supplies and Services, S & T, Internal Services, General Expenses, etc. are obtained from divisions. These estimates after scrutiny and adjustment are formed into the Institute's budget with percentage times converted to rands. The consolidated budget is forwarded to Headquarters for approval.

During the year monthly returns of time spent on projects by staff members are received from divisions. Expenditure of money is recorded in various ways. That for supplies and services is initiated on Order Forms and is either "immediate", for which special Payment Orders are issued, or on "monthly accounts" depending on arrangements made with suppliers and is reported weekly to Headquarters on Suppliers' Accounts' schedules which show amounts committed, amounts for which invoices have been received, and cancellations. Commitments are cancelled when invoices are received and partial deliveries are handled by recommitting the balance. A local record of these amounts is kept in the Project Costing Schedule, and a list of the transactions with each supplier in the Suppliers' Records.

Payments for services rendered, S & T etc. for amounts of R10 or less are made from petty cash and a copy of the Petty Cash book is sent to Headquarters each week. Payments of over R10 are made by cheque for which Payment Orders are sent to Headquarters. Expenditure on CSIR transport is not costed locally, but vehicle logbooks are forwarded to Headquarters at the end of each month. Certain other accounts such as Internal Services and Levies are kept at Headquarters. A local record is kept of S & T expenditure by each staff member.

Expenditure is classified by Vote and Account heading. Six to eight weeks after the close of each month Project Cost Analyses are received from Headquarters listing expenditure during the month by vote and project.

The current system for reporting project expenditures to divisional heads, is based on the monthly returns of Job Card times and account subtotals within projects from the Project Cost Analyses. Accumulated expenditure is compared with budgeted for each of the main account headings. Much of the value of these reports is lost owing to the late arrival of the Project Cost Analyses.

II. Reasons for Introducing the Proposed System

The purposes of the system are:-, firstly, to provide divisional heads with information, within a week after the end of the month, on the manpower applied to and the financial position of projects under their control. The information will be only approximate as amounts recorded in the accounts kept at Headquarters will not be known until later, but for the purposes of project management early approximations are more useful than exact figures several weeks late.

Secondly, to reduce the amount of clerical work involved in consolidating and amending budgets, recording expenditure under various accounts, and preparing the regular returns required by Headquarters.

Thirdly, to provide information on the Institute's Accounts at any time as well as at regular intervals, so that decisions involving the reallocation of resources can be based on up to date information.

Fourthly, by providing divisional heads with more detailed and regular information on the time and money spent on projects they control, to create a fund of experience which will be of value in drawing up their annual budgets.

Fifthly, to give NIPR staff first hand experience in using a computerised cost control system and an opportunity for studying the psychological problems involved in adapting to and handling such systems.

III. General Description of the Computerised System

The system will be constructed in three stages.

Input media are remote consoles, output media are remote consoles or a printer. The special facilities offered by typewriter terminals for prompting responses are not made use of as high speed input by staff trained to type is envisaged.

Stage I: Production of a monthly report comparing staff time used on projects with budgeted times.

The information for this report consists of Job Card times for the current month and times accumulated over previous months.

The Accumulated Job Card Times file, which contains the accumulated hours and the number of hours in the current month staff members have worked on projects, is set up by copying the previous month's file, inserting current month figures to zero. A new Monthly Expenditure file is also created

Input for this stage is from Job Card times schedules (the "Blue Sheets") which show the hours worked on projects by staff members.

After checking from tables that division, rank, name, and project numbers are valid, and the sums of project times agree with totals, times are converted to rands and names and project numbers are replaced by codes. Records consisting of staff code, project number code, time and cost in rands are written to the output buffer, and from thence to the Input Well. When input is complete the Input Well is added to the Monthly Expenditure file a copy of which is saved on magnetic tape.

When all schedules have been received and entered the Accumulated Job Card Times file is updated from the Monthly Expenditure file. The proportion of the file updated decreases progressively as projects are completed, therefore an indexed sequential file is used. Provision will be made for adding new records as unforeseen projects are undertaken, or modifying budget and accumulated figures to correct mistakes or to reflect changes in the Institute's programme of work.

The Job Cards Times report showing how each staff member's time was distributed between projects during the current month, the accumulated times to date on each project and what was originally budgeted is then printed. Times are accumulated over staff members for divisional totals. Net balances (budgeted times less accumulated to date) are shown for budgeted projects and serious discrepancies are marked. Provision for unforeseen projects is transferred to balance the time actually spent.

Stage II: Production of a report comparing expenditure on projects with budgeted expenditure.

The information for this project is compiled from the weekly Suppliers' Accounts returns to Headquarters on the amounts committed or paid for supplies and services, also from Payment Instructions, Petty Cash Entries, statements of computer usage, vehicle mileages, and Job Card times converted to rands. As existing returns are used no modification of administrative procedures is involved. The Stage I input program is extended to handle these additional documents.

The Accumulated Expenditure file, which contains budgets, committed, accumulated, and current month expenditure under the headings Salaries, Computer, Supplies and Services, S & T, Internal Services, General Expenses, Capital Expenditure, Levies, and Income for each project is initialised by copying the previous month's file, inserting the current month in the label, and zeroing the current month fields. A new Expenditure file is also created

Input from Suppliers' Accounts returns contains the order number, vote, project number, and amounts committed or actual costs. The Payments returns also contain the Suppliers' code numbers and the serial numbers and amounts on invoices. Each line of the commitments, actual costs, and cancellations returns is written to the Monthly Expenditure file as a separate entry.

CSIR vehicle mileages charged to projects are obtained from vehicle logbooks. Each entry with its date, vehicle code, project number, mileage and the corresponding cost in rands is added to the Monthly Expenditure file.

Input from the Petty Cash Book, Payment Orders for items other than Suppliers' Accounts and Journal Entries for amending previous entries contain number, vote, project number, and amount and are also written to the Monthly Expenditure file.

Costs of computing are obtained from the monthly statements furnished by the University of the Witwatersrand Computing Centre. The NIPR's computing budget is treated as a suspense account. Entries are created debiting projects and crediting the Computer division (which was originally debited with $\frac{1}{12}$ of the annual contracted amount) and also for updating the project budget figures to balance accumulated expenditure.

Other input will be modifications to budget or accumulated totals to correct errors or to make the record correspond with the Project Cost Analyses received from Headquarters.

Input is verified against checksums scattered through each entry and vote and project numbers are validated by looking up tables. Documents are identified by a code number and a sequence number, and written to the Monthly Expenditure file in order of entry. The program is also provided with the number of each kind of document to be entered and reports any discrepancies.

At the end of each month the Accumulated Expenditure file is updated. A copy of the Monthly Expenditure file is sorted into sequence of project number codes and account headings which are also the keys of corresponding records in the Accumulated Expenditure file. The items of each record of the Monthly file are then added to the corresponding record of the Accumulated file. If there is no corresponding record one is created.

When accumulation is complete, the Accumulated Expenditure file is edited i.e. records are deleted or keys are changed in accordance with instructions received from the Administration division for projects that have been cancelled, completed, or transferred between divisions.

On receipt of the Project Cost Analysis sheets from Headquarters, the Monthly Expenditure file is printed out with subtotals for account headings within projects. This output is reconciled visually with the Project Cost Analysis sheet and discrepancies are written to the Monthly Expenditure file as amendments to the Accumulated Expenditure file.

Stage III Extension of computer operations to producing routines for the Administration division.

In Stage II information on expenditure on supplies and services was obtained from the Suppliers' Accounts returns. In Stage III this information is obtained directly from source documents such as orders and invoices, and the Suppliers' Accounts returns are instead produced. The Suppliers' Records are also maintained from these entries. Compatibility with the files produced at Stage II is ensured by having the input format for orders and invoices the same as those for commitments and payments in the Suppliers' Accounts returns.

Orders, invoices and cancellation written to the Monthly Expenditure file are printed each week as Suppliers' Accounts returns of commitments, immediate and monthly payments, and cancellations and the Suppliers' Record file is updated.

The Monthly Expenditure file is also the source of the following additional returns:-

- (a) Project Costing Schedule, - a list of transactions by project and account headings.
- (b) Statement of project capital expenditure.
- (c) Other tabulations by vote and project.

Finally, Suppliers' Records are printed from the Suppliers' Record file as required.

Future Extensions

1. Special runs of the Monthly Expenditure file to report expenditure under particular votes.
2. Next year a Budget file will be created from divisional estimates, provisional budgets will be printed from the file and facilities will be provided for easily amending it. The initial Accumulated Expenditure file will be created from the Budget file.
3. An inventory system will be introduced for stationery requirements.
4. An Equipment Record will be created for office furniture and other capital equipment.
5. An enquiry system based on IBM 2260 Display terminals will be constructed for interrogating the Accumulated Expenditure or Accumulated Times files, the Monthly Expenditure file, the Inventory, Equipment files and Suppliers Records.

IV. Input

A. General Rules

Documents may be entered in any sequence and different documents may be interspersed. The type of document is indicated by a document code. Input from each document finishes with an End of Document marker and the optional last checksum for the whole document. The last document is followed by the End of Input marker which causes the program to terminate input and to continue with the next phase.

Markers

End of Field	, or /
End of Document	\$
End of Input	*

Data is entered in free format with fields separated by ",". Checksums are preceded by "=" instead of "," and may be placed anywhere, summation being from the last checksum except in the case of the end of document checksum which covers the whole document.

B. Layouts

(1) Divisional Job Cards Times

<u>Fields</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code : 01	2
2	Divisional number	4
3	Initials, name, and rank	varying : Max. = 30
4	Division and project number	8, 9, or 10
5	Hours worked, to 2-decimal places including point	3 to 6

4th and 5th fields are repeated for as many projects as the staff member has worked on, the last repeated field is followed by the total hours worked,

Fields 3 onwards are repeated for each staff member in the division.

After the last staff member of the division has been entered the document checksum followed by the end of document marker is given. Each division that follows repeats from field 2 after entering ", " to skip field 1.

(2) Order Form

or, Suppliers' Accounts - Commitments

or, Suppliers' Accounts - Cancellations

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code: 02, 10 or 8	2
2	Date of document, or serial no of return	6
3	Order number	6 or 7
4	Vote	3
5	Division and project number	8, 9, or 10
6	Estimated Cost	up to 7

Fields 4, 5, 6 may be repeated as often as necessary For Suppliers' Account-Commitments and Cancellation. fields 3 to 6 are repeated.

2nd last	Checksum	10
last	End of document marker: * \$	1

(3) Suppliers Invoice

or, Suppliers' Accounts-Payments

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code: 03	2
2	Date of invoice, or serial no. of return	6
3	Invoice number	up to 7
4	Supplier's code number	up to 5
5	Order number	6 or 7
6	Vote	3
7	Division and project number	8, 9 or 10
8	Invoiced amount for item	varying up to 9
9	Amount originally estimated	varying up to 7

Fields 6, 7, 8, 9 may be repeated as often as necessary.

2nd last	Checksum	up to 13
last	End of document marker: * \$	1

(4) Payment Order

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code: 04	2
2	Serial number of document	up to 7
3	Cheque number	5
4	Date of transaction	6
5	Order number	7
6	Vote	3
7	Division and project number	8, 9 or 10
8	Amount	varying up to 9

Fields 4, to 8 may be repeated as often as necessary

2nd last	Checksum	up to 12
last	End of document marker: \$	1

(5) Petty Cash Book Entries

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code: 05	2
2	Serial number of page	4
3	Reference number of item	6, 7 or 8
4	Order number	6, 7 or 8
5	Vote	3
6	Division and project number	8, 9 or 10
7	Amount	up to 9

Fields 3 to 7 may be repeated as often as necessary

2nd last	Checksum	up to 12
last	End of document marker: \$	1

(6) Computer Charges

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code: 06	2
2	Computer account number	up to 7
3	Division and project number	8, 9, or 10
4	Cost	up to 9

Fields 3 and 4 may be repeated as often as necessary

2nd last	Checksum	varying
last	End of document marker: \$	1

The next computer account number is regarded as a new document.
Input of document number can be skipped by entering ", "

(7) Vehicle Mileages

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code: 07	1
2	Vehicle code	2
3	Date of trip	6
4	Mileage	1 to 5
5	Division and project number	8 to 10

Fields 3, 4, 5 may be repeated as often as necessary

2nd last	Checksum	varying
last	End of document marker: \$	1

The logbook sheets for the next vehicle are regarded as another document but repetition of the document number may be skipped by entering ", "

(8) Journal Entries

<u>Fields</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code: 09	2
2	Serial number of document	6
3 4 5 6	Order or reference number	6 or 7
	Vote	3
	Division and project number	8, 9, or 10
	Amount	1 to 9

Fields 3 to 6 are repeated as often as necessary.

2nd last	Checksum	varying
last	End of document \$	1

(9) Suppliers' Accounts - Payments

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code: 11 or 12	2
2	Date of document	6
3 4 5 6 7 8 9 10	Order number	6, 7 or 8
	Vote	3
	Division and project number	8, 9 or 10
	Invoiced amount for item	up to 9
	Total amount on invoice	varying up to 9
	Supplier's code number	up to 5
	Invoice number	up to 7
	Amount originally estimated	up to 7

Fields 3 to 10 may be repeated as often as necessary

2nd last	Checksum	up to 13
last	End of document marker : \$	up to 13

Special entries for amending the tables or records in the Accumulated Job Cards Times or Expenditure files.

(10) Change information or insert new element in Staff table.

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code : 20	2
2	Old divisional number	4
3	Old Rank (abbreviation)	5
4	Old initials and name	25
5	New divisional number	4
6	New rank (abbreviation)	5
7	New initials and name	25
8	End of document: \$	1

If old staff code is blank the entry introduces a new item and all "new" fields must contain information otherwise an error will be reported. If old staff code is present when at least one "new" field must contain information. No checksum is provided for this document.

(11) Add to budget figures in the Accumulated Job Cards Times file.

(e.g. modifying or transferring amounts provided for unbudgeted projects).

Same layout as 1 (Job Cards Times)

Document code : 21

(12) Adjust accumulated time in the Accumulated Job Cards Times file without affecting the monthly figures

(e.g. correct an error in last month's file)

Same layout as 1 (Job Cards times)

Document code: 22

(13) Insert budget figures in the Accumulated Job Cards Times file

Same layout as 1 (Job Cards times)

Document code: 23

(14) To insert, delete or transfer a project in the Accumulated Expenditure file

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code : 30	2
2	Old division and project number 8 - 10) when coded this is the old record key.
3	New division and project number 8 - 10) when coded this is the new record key.
4	End of document marker: \$	1

Inserting or deleting an item is effected by leaving one of the old or new division project numbers blank. If the record is to be deleted it is read and rewritten with a special code in the first byte. If the record is to be transferred it is read, rewritten with the new key, and the old record is rewritten with the cancellation code in the first byte.

(15) Add to budget figures in the Accumulated Expenditure file

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code : 31	2
2	Division and project number 8 - 10) when coded this is the record key
3	Account heading	3
4	Amount	up to 8
5	Checksum	8
6	End of document marker: \$	1

- (16) Adjust accumulated expenditure without affecting current month's figures in the Accumulated Expenditure file
(e.g. make expenditure records corresponds with Project Analysis Schedule)

Similar to 31 but document code is 32

- (17) Insert budget figures in the Accumulated Expenditure file
Similar to 31 but document code is 33

- (18) Amend the Rank table

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code: 40	2
2	Rank - abbreviation	5
	Rank code	3
	Salary rate for this rank	3
5	End of document: \$	5

- (19) Amend the Vote table

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code: 41	2
2	Vote	3
	Account number	1, 2 or 3
4	End of document: \$	1

Deleting an item is effected by leaving the account number blank.

- (20) Amend the vehicle table

<u>Field</u>	<u>Contents</u>	<u>Length in bytes</u>
1	Document code : 42	2
2	Vehicle code	3
	Tarif	3
4	End of document : \$	1

IV. Input

B. Volumes

(a) Budgets - Irregularly: December to March

12 schedules, of 70 entries each = 840 entries

(b) Job Card Times (Blue sheets) - monthly

120 staff names: average of 9 per division (range 1-26)

average of 4 entries per staff name
(range 1 - 11)

90 projects: average of 7 per division (range 5-17)

average of 4 entries per project
(range 1 - 13)

430 per month: average of 33 per division

(range 5 - 75)

Sizes: project numbers - 9 characters

staff rank, and names - range 10 - 26 characters

entries - 5 characters

(c) Suppliers' Accounts: Commitments - weekly

30 entries per week

27 characters per entry

(d) Suppliers' Accounts: Payments - weekly

30 entries per week

43 characters per entry

(e) Suppliers' Accounts: Cancellations - weekly

3 entries per week

20 characters per entry

- (f) Vehicle Logbooks - monthly
 - 100 entries for 4 vehicles per month
 - 11 characters per entry

- (g) Computer Charges - monthly
 - 20 entries per month
 - 41 characters per entry

- (h) Order Forms
 - 50 documents per month
 - 42 characters per entry

- (i) Invoices
 - 50 documents per month
 - 65 characters per entry

- (j) Payment Orders
 - 30 entries per month
 - 47 characters per entry

- (k) Petty Cash Book
 - 90 entries per month
 - 47 characters per entry

- (l) Journal Entries
 - 6 documents per month
 - 20 entries per month
 - 39 characters per entry

(m) Analysis of Project Costs (Yellow sheets) - monthly

(i) All items

400 entries per month

360 characters per entry

(ii) Subtotals

70 entries per month

18 characters per entry

(n) Suppliers' Records

Number of Suppliers: Monthly account = 140

Immediate payments = 260

total 400

Number of entries per supplier per year: 1 to 10

(o) Library Orders

The above figures for Orders, Invoices Suppliers' Accounts and Suppliers' Records do not include 300 - 400 library orders per year.

V. File Structure

(1) Monthly Expenditure File

Input during a run of the input program forms a sub-block. Each sub-block is preceded by the time and date of the run and within a sub-block records are in order of entry.

Organisation: Sequential, blocked variable length records

Blocksize = 3600 characters

Length : Approximately 20,000 characters in 6 blocks = 6 tracks

Label Record: Monthly Expenditure for (current month and year)

Sub-block Label Record: Data and time of input run and (later) of additional to Job Cards Times and Accumulated Expenditure files.

Record Structure:

There are various document records with different structures.

(a) Job Card times record

bytes	1	Document code: (1)
	2 - 3	Entry number
	4 - 5	Division-project code
	6 - 7	Vote code
	8 - 10	Time spent (xxx.xx implied decimal point)
	11	Account Code
	12 - 16	Staff Code (includes division)
	17 - 21	Time converted to rands (xxxxx.xx implied decimal point)

(b) Order Form or Commitment from Committed List or Item from Cancellation List.

bytes	1	Document code: (2 , 10 or 8)
	2 - 3	Entry number
	4 - 5	Division-project code
	6 - 7	Vote code
	8 - 11	Order number
	12 - 15	Date or serial number of document
	16 - 19	Estimated cost
	20	Account code

(c) Suppliers Invoice Item or Payment Item from Immediate or Monthly Payment List

bytes	1	Document code: (3, 11, 12)
	2 - 3	Entry number
	4 - 5	Division-project code
	6 - 7	Vote code
	8 - 11	Order number
	12 - 15	Date of invoice
	16 - 18	Supplier's code
	19	Account code
	20 - 24	Invoiced amount for item
	25 - 28	Original estimated cost
	29 - 32	Invoice number
	33 - 37	Total amount on invoice

(d) Petty Cash Book Item

Document code : 5 See (e) below

(e) Journal Entry

bytes	1	Document code: (5, 9)
	2 - 3	Entry number
	4 - 5	Division-project code
	6 - 7	Vote code
	8 - 11	Order number
	12 - 15	Serial number of document
	16	Account code
	17 - 21	Amount
	22 - 24	Reference number (Petty Cash Book only)

(f) Vehicle Logbook

bytes	1	Document code (7)
	2 - 3	Entry number
	4 - 5	Division-project code
	6 - 7	Vote code
	8 - 10	Mileage
	11	Account code (S & T.)
	12 - 15	Date of trip
	16 - 20	Cost
	21	Vehicle code

(g) Computer Charges

bytes	1	Document code (6)
	2 - 3	Entry number
	4 - 5	Division-project code
	6 - 7	Vote code
	8	Account code (Computer)
	9 - 11	Unused
	12 - 15	Date (month of computer charge)
	16 - 20	Cost

(h) Payment Order Item

bytes	1	Document code (4)
	2 - 3	Entry number
	4 - 5	Division-project code
	6 - 7	Vote code
	8 - 11	Order number
	12 - 15	Serial number
	16	Account code
	17 - 21	Amount
	22 - 24	Cheque number
	25 - 28	Date

Records created from instructions for amending the Table
the Accumulated Job Cards Times file or Expenditure file

(j) Change information or insert new element in Staff table

bytes	1	Document code: (20)
	2 - 3	Entry number
	4 - 8	Old staff code
	9 - 13	New staff code

(k) Adjust budget figures in Accumulated Job Cards Times file

Same layout as Job Cards Times records.

Document code: (21)

(l) Adjust accumulated time in the Accumulated Job Cards Times
file without affecting the monthly figures

Same layout as Job Cards Times record

Document code: (22)

(m) Insert budget figures in Accumulated Job Cards Times file

Same layout as Job Cards Times record

Document code: (23)

(n) Insert, delete or transfer a project in the Accumulated
Expenditure file

bytes	1	Document code: (30)
	2 - 3	Entry number
	4 - 5	Old division and project code
	6 - 7	New division and project code

(o) Adjust budget figures in the Accumulated Expenditure file

bytes	1	Document code: (31)
	2 - 3	Entry number
	4 - 5	Division and project code
	6 - 10	Amount
	11	Account code

(p) Adjust accumulated expenditure without affecting current month's figures in the Accumulated Expenditure file

Layout is the same as in (o) above.

Document code: (32)

(q) Insert budget figures in the Accumulated Expenditure file

Same layout as in (o) above.

Document code: (33)

(r) Amend the Rank table

bytes	1	Document code: (40)
	2 - 3	Entry number
	4 - 8	Rank
	9	New rank code
	10 - 11	New salary

(s) Amend the Vote table

bytes	1	Document code: (41)
	2 - 3	Entry number
	4 - 5	Vote
	6	Vote code

(t) Amend the Vehicle table

bytes	1	Document code: (42)
	2 - 3	Entry number
	4	Vehicle code
	5 - 6	Tariff

(2) Accumulated Job Cards Time File

Organisation : Indexed Sequential, blocked fixed length
(records 120 records per block, blocksize 3600.)

Key : 7 bytes; 12 - 18

Length: 700 records in 8 tracks
i.e. 1 cylinder

Record Structure:

bytes	1 - 3	Budgeted time (xxx., implied point)	
	4 - 7	Accumulated time spent (xxxxx.xx")	
	8 - 11	Current month time spent x(xxx.xx,")	
	12 - 16	Staff member code) key
	17 - 18	Division and project code	

For each staff member there is a record for each project worked on. Staff members are grouped in order of rank within divisions, and at the end of each division there are records containing the divisional total for each project.

Total records differ from the above only in that a special code is used for the Staff member code.

(3) Accumulated Expenditure File

Organisation: Indexed Sequential, blocked fixed length
records 92 records per block, blocksize 3588

Key: 3 bytes: 19 - 21
Length: 1200 records in 16 tracks.
i.e. 2 cylinders

Label Record: Accumulated Expenditure for (date of last accumulation

Record Structure:

bytes	1	-	4	Budget (xxxxxxx., implied point)
	5	-	8	Committed (xxxxxxx., implied point)
	9	-	13	Accumulated (xxxxxxx.xx, implied point)
	14	-	18	Current month (xxxxxxx.xx, implied point)
	19	-	20	Division and project code
	21			Code for account
				(a) Salaries
				(b) S & S
				(c) S & T
				(d) Internal Sc. Services
				(e) General Expenses
				(f) Computer
				(g) Capital
				(h) Other
				(i) Income
				(j) Total

There is a record for each account within each project.
Records are grouped by projects within divisions and at
the end of each division is a set of records containing
the divisional total for each account.

(6) Tables

The tables are kept in 2 data sets.

The tables of staff Names and of Projects share an indexed sequential data set. Length : 1 cylinder.

The rest of the tables share a sequential data set of 3 records Length: 1 track.

A. The Indexed Sequential Tables.

(a) Table of Staff Names

Record Structure

1 - 5	Dummy
6	Staff division code
7	Staff rank code
8 - 32	Staff member's name
33 - 37	Staff member's code

(b) Table of Projects

Record Structure

1 - 5	Packed division and project
6	Dummy (Hex 00).
7 - 8	Project code.
9 - 37	Description of project

B. The Sequential File

(a) Record 1: Not yet defined; will contain vehicle codes

(b) Record 2:

Record Structure:

1 - 999	Vote codes
1,000 - 1,127	Program usage
1,128	Record identifier (V)

(c) Record 3:

Record Structure:

1 - 4	No. of ranks
5 - 514	Salary scale table
515 - 1,126	Rank-Code table
1,127	Dummy
1,128	Record identifier (R)

VI. Output

A. Reports to be produced

Nature of Report	Period	Source of information
(1) Distribution of staff time between projects (staff members, project number, times)	Monthly	Job Cards Time Schedules
(2) Project expenditure (project number, account headings)	Monthly	<u>Stage II:</u> Suppliers' Accounts returns: Commitments Immediate payments Monthly payments Cancellations <u>Stage III:</u> Order forms Invoices <u>Both Stages</u> Petty Cash Book Payment Orders (other than Suppliers Accounts) Computer Charges Vehicle Logbooks Journal Entries
(3) <u>Suppliers' Records</u> (date order number, commitments, invoiced amounts, number and date of invoice).	Monthly	Order Forms Invoices
(4) Suppliers' Accounts Returns: Commitments Payments Cancellations (order number, vote, project number, details of invoices)	Weekly	Order Forms Invoices

Nature of Record	Period	Source of informationn
(5) Project Cost Schedules (order number, vote, amount committed or paid under account headings)	Monthly	Order Forms Invoices
(6) Reconciliation with Analysis of Project Cost. origin, voucher no. order no. vote, project no., amount committed or paid).	Monthly	Similar to Stage III of Project Expenditure.
(7) Records of S & T and other expenditure by staff members. (date, type of expense amount, net balance, tax certificate, PAYE, serial number, voucher number.	Monthly	Petty Cash Book Payment Order Tax certificates (This may require special input).

Note: With the exception of items 1. and 2., reports will follow the layouts prescribed for the corresponding administrative returns.

VI. Output

B. Volumes

- (a) Monthly Statement of Project Expenditure.

40 pages

- (b) Monthly Statement of Hours Worked

40 pages

- (c) Suppliers' Accounts: Commitments - weekly

30 lines on 1 page per week

24 characters per line

- (d) Suppliers' Accounts: Monthly Payments - weekly

20 lines on 1 page per week

40 characters per line

- (e) Suppliers' Accounts: Immediate Payments - weekly

10 lines on 1 page per week

40 characters per line

- (f) Suppliers' Accounts: Cancellations - weekly

3 lines on 1 page per week

10 characters per line

- (g) Project Costing Schedule - monthly

1 page per project

30 characters per line

- (h) Suppliers' Records - monthly

Total of 400 suppliers, 35 active in any one month

Average of 2 lines per supplier

- (i) Capital Expenditure Report - monthly

lines per month

characters per line

- (j) Project Cost Analysis Reconciliation - monthly

70 lines on 2 pages per month

18 characters per line.

VII. Operation of Programs.

All programs are written in COBOL or Report Program Generator (RPG) (Small service subroutines are coded in Assembler and Fortran where it is inconvenient or impossible to use COBOL or RPG.)

(1) General Input.

All input takes the form of documents entered from a remote console.

The document is presented line-by-line:-

Line 1: Document no. and other document identifying information.

Lines 2,3.....: item 1, item 2, etc. on the document.

Last line : 'End of document' marker (See below).

Special characters used by program.

- (a) Comma (,) or slash (/) are used to delimit individual entries
- (b) Equals(=) is used to denote that a checksum follows
(the checksum is a total of all entries since the last checksum or the beginning of input).
- (c) Question mark (?) used just before a carriage return means that the line just entered should be ignored.
- (d) Carriage return (CR) is used to delimit a line and return control to the program.
- (e) Dollar sign (\$) is used to delimit a document.
- (f) Hash (#) is used after a warning message has been given to signify that the previous entry should be ignored.

Note: If rejection of all entries since last checksum is required, this can be forced by the use of a dummy incorrect checksum.

Other characters used by prog.am.

For numbers, the following characters are used:

- (i) The digits (0, 1, 2,, 9)
- (ii) The decimal point (.)
- (iii) The signs (+, -)
- (iv) A blank (b) which is ignored whether it be a leading trailing or embedded blank.

For character strings (used for passwords, staff names, project descriptions etc.) :-

All characters are available except the comma (,) and the slash (/). Care should be taken when using the other "special characters used by program" (see above) where ambiguity may ensue. (e.g. a password ending in '?' could not be used as the line would be automatically ignored).

Rules for the processing of numbers.

- (i) Each entry consists of the digits 0 - 9 and may optionally have a sign (+ or -) and/or a decimal point.
- (ii) No more than two (2) figures may appear after the decimal point.
- (iii) No number may have more than eleven (11) figures before the decimal point (or its assumed position).
- (iv) The default sign is plus (+)
- (v) The default decimal point is at the right hand side of the number.
- (vi) The default digit (if none are given) is zero (0)
- (vii) All blanks are ignored.

Rules for the processing of character strings.

- (i) Leading and trailing blanks are not considered part of the string.
- (ii) Embedded blanks are reduced to one blank where two or more blanks occur together.
(e.g. 'THIS IS A WORD' is taken to be the string 'THIS IS A WORD')

Note that blanks are not added where they should be to make sense, and thus if an original string had an embedded blank, the blanks must be retained when reentering the string).

- (iii) Lower case alphabet is converted to upper case.

General action of the program.

This is a schematic of the action of the program.

Step 1. Initialization.

Step 2. Obtain a password and ascertain its level.

Step 3. Obtain the current week and month of the documents to be entered.

Step 4. Obtain the document code and other document information.
If the document code is the "last entry" code, go to step 15.

Step 5. If the document is a privileged entry, check the level of the password and if necessary obtain a new password.
(i) If the new password is not of correct level, go to step 4.
(ii) If the new password is of correct level, continue with step 6.

Step 6. If a checksum is given, check it.
(i) If it is incorrect, report error and go to step 4.
(ii) If it is correct, continue with step 7.

Step 7. Obtain the item entry.

Step 8. If this was an end of document marker, go to step 13.

Step 9. Test if array in core is full.
(i) If it is full and no checksum has been given, demand a checksum and go to step 7.
(ii) If it is not full continue with step 10.

Step 10. Move the item to an array in core.

Step 11. Test if a checksum has been given.

- (i) If no checksum has been given, go to step 7.
- (ii) If a checksum has been given, continue with step 12.

Step 12. Test if checksum is correct.

- (i) If checksum is incorrect, report error and go to step 4.
- (ii) If checksum is correct, empty the array of items into the output well, update the tables and go to step 7.

Step 13. If items on the document have not yet been checksummed, report this and go to step 7 to obtain checksum. (i.e. reject the end of document marker).

Step 14. If there is an overall checksum for the document, check it, report the result and go to step 4.

(Note that the overall checksum is for the user's information only. No program action is taken on this checksum, as the 'individual' checksum together with the other checks are considered sufficient to prove the validity of the data).

Step 15. At the end, or after terminal errors (e.g. records are found that do not contain the proper codes, or the program detects an impossible condition), close all files that are open.

Checking and editing.

After each line has been entered (which corresponds to Steps 2, 3, 4, 5, 7) the following editing and checking is done, if required. If any of the checks should fail, the error is reported, and the user has the option of repeating the line. (Note that the checks are not necessarily done in the order in which they are presented here.)

- (i) Transmission error - line must be repeated.
- (ii) '?' at end of a line - line must be repeated.
- (iii) Backspace elimination done.
- (iv) Lower case alphabet converted to upper case.
- (v) Blanks removed as necessary.
- (vi) Numeric fields checked for numeric validity.
- (vii) Number of decimal places checked and corrected.
(e.g. If none are given and two are required - correct.
If two are given and none are required - error).
- (viii) Reasonableness of size of number checked.
- (ix) Document number checked and code assigned.
- (x) Division checked and division code assigned.
- (xi) Rank checked and rank code assigned.
- (xii) Staff name checked and staff code assigned.
- (xiii) Vote checked and vote code assigned.
- (xiv) Vehicle number checked and vehicle code assigned.
- (xv) Project checked and division/project code assigned.
- (xvi) Password checked and level number assigned.
- (xvii) Number of entries on the line checked.
(this varies with the document).

Data Set usage by program

Four data sets are used by the program. They are:-

- (i) A remote terminal (Input)
- (ii) Output well (Input-Output).
- (iii) Sequential tables (Input, Input-Output).
- (iv) Indexed sequential table (Sequential Input, Random Input)
Random Input-Output).

The remote terminal is opened at the start.

The other data sets are only opened as and when they are needed. When the output well is opened, it is scanned to find where the next entry should be placed. The last entry entered (if it exists) is named by entry number to facilitate restart of a run.

The table files are only opened as Input-Output when updating is to take place.

Documents accepted by the program

The document codes accepted by the program are listed in Appendix C.

Note:

- (i) Documents 50 and 52 are solicited by the program at the beginning of the run. No other documents may be entered prior to these two.
- (ii) Document 50 can be considered a psuedo-document as it can only be entered when solicited by the program. (However, such a request can be generated by the use of a privileged document number).

Recovery procedure

Reload the Input program, and continue entering items from after the last item written to the Well.

If a bomb-out occurs during the updating of a data set, it may be necessary to restore the data set from tape.

Program maintenance.

The following should be carried out after the Input program has been run several times (or after each time if a large number of documents have been entered).

I. Add entries from the Well to the end of the monthly expenditure file.

II. If the tables have been amended;

(i) 'Shake-up' index sequential tables.

(ii) Copy sequential data set tables to tape.

(iii) Copy indexed sequential tables to tape.

III. Recovery for I & II: Repeat until successful.

(2) Accumulating Job Cards Times:

Step 1.

Check the label records of the Monthly and Accumulated Job Cards Times files.

Step 2.

Scan the Monthly Expenditure file for the marker record to locate the next record to be accumulated. Insert the current date into the marker record at the reserved space.

Step 3.

Read the next record and report the entry number and time.

Locate and read in the corresponding record in the Accumulated Job Cards Times file and add the time for the staff-member on the project to the corresponding Current Month Time and Accumulated Time fields, or the appropriate field if an amending instruction. Rewrite the record.

If there is no record for the time spent by a staff member on a project, a new record is created.

Repeat for all Job Cards Times entries in the Monthly Expenditure file until the next marker record, or end of file.

If the end of file is found, proceed to step 4, otherwise return to step 2.

Step 4.

Close both files.

Step 5.

Save a copy of the Accumulated Job Card Times file on magnetic tape.

Recovery Procedure

Copy the last saved version of the Accumulated Job Cards Times file and repeat from step 1.

(5) Reporting Expenditure on Projects:

This program uses the Report Writer feature of COBOL to print out the Accumulated Expenditure file, decoding division and project codes and account codes from the Projects and Votes tables.

For each project: committed, accumulated, and current month expenditure is shown under:-

- (a) Salaries,
- (b) Supplies and Services,
- (c) S & T,
- (d) Internal Services
- (e) Computer
- (f) Capital Expenditure
- (g) General Expenses
- (h) Levies
- (i) Income

Budgeted figures, if the project was originally budgeted for, and the difference between budgeted and accumulated are shown under the same headings. Large excesses of accumulated over budgeted figures are marked by asterisks.

Project figures are accumulated over divisions to produce divisional totals.

Recovery procedure

None. Repeat from beginning

(6) Weekly Suppliers' Accounts returns

Step 1.

Copy the Monthly Expenditure file selecting orders, invoices, and returns from preceding week's input.

Step 2.

Sort copied part of the file into sequence of order numbers within documents.

Step 3.

Using a Report Generator program list the vote, division and project number, and amount by order number.

(7) Updating Suppliers' Records and Project Costing files

Step 1.

Open the Monthly Expenditure file and check that the label record corresponds with the Monthly entries by the operator.

Step 2.

Copy the Monthly Expenditure file selecting on document code for orders, invoices, and cancellations.

Step 3.

Sort the copied file into the sequence of order numbers.

Step 4.

Open the Suppliers' Record file.

Step 5.

Read the first record of the sorted section of the Monthly Expenditure file, and get the corresponding record of the Suppliers' Record file and update it.

Step 6.

Repeat Step 5 until all records from the copied section of the Monthly Expenditure file have been processed.

Step 7.

Close Suppliers' Record file and delete the sorted copy of the Monthly Expenditure file reporting both actions.

(8) Suppliers' Record and Project Costing reports

Step 1.

Copy the Suppliers' record file.

Step 2.

Sort the Suppliers' record into sequence of

- (a) Suppliers' code for the Suppliers' Records report
- (b) Division and Project codes for the Project Costing report.

Step 3.

Using a Report Generator Program list the Suppliers' Records or the Project Costing Schedules.

(9) Project Cost Analysis Reconciliation

Step 1.

Copy the Monthly Expenditure file dropping records for salaries or for amending tables or Accumulated files

Step 2.

Sort the file into sequence of accounts within projects.

Step 3.

List the file using a Report Generator program subtotalling on account headings and project numbers and decoding the division - project and account codes from the Project and Votes tables.

IX. Retention of Past Records

1. Details of entries

The Monthly Expenditure file is written to magnetic tape immediately before the sort prior to the month end report.

This file contains a complete record of all input such as orders, payments, journal entries, adjustments due to previous months but which are not reflected in the "current month" figures, adjustments to budgets, and changes in the tables of staff-members, ranks, or project numbers. A copy of each month's file is kept until the end of the financial year.

A copy of the Tables used for the file is written to magnetic tape at the same time

2. The state of the accounts at points in time

The Accumulated Job Cards Times and the Accumulated Expenditure files are stored on magnetic tape immediately before printing the corresponding report.

These files show budget figures and the accumulated quantities to date at the end of each month. Two copies, last month and the month before, of these files are kept. Together with the corresponding Month Expenditure file they permit the accounts for the current or previous month to be reconstructed if accidentally destroyed.

3. Other records

- (a) Project Costing file
- (b) Suppliers' Records:

A copy of each of the above is made immediately after the final updating run each month.

4. Storage

The Tables and Monthly Expenditure files for all preceding months are kept on one pair of magnetic tape, all other files on a second pair.

Each month the current month's figures are copied on to the tape containing the next but last month's figures. Thus there is always data for two successive months on tape.

X. Security

Devices are included to make difficult the unauthorised reading of the files of the system, and unauthorised use of the system programs.

Appendix A: Documents

List of Documents

1. Job Card Times (Blue sheet).
2. Order Form.
3. Suppliers' Accounts - Commitment List.
4. Suppliers' Accounts - Payments List.
5. Suppliers' Accounts - Cancellations List
6. Payment Instruction.
7. Vehicle Logbook.
8. Petty Cash Book.
9. Suppliers' Record.
10. Project Costing Schedule.
11. Project Cost Analyses (Yellow sheet).
12. Journal Entry. .
13. S & T and Other Expenditure Ledger

Appendix B:Vote Codes and their allocation to Account HeadingsSupplies and Services (110 - 129)

110	CSIR Stores
111	Outside firms
112/3/4	Central and Branch Workshops
115	Electro-technical Instrumentation Unit
116	Estates
117	Printing, Photos and Duplicating
118	Stationery and Minor Office Requisites
119	Books and Journals - not for CSIR
120	Equipment - not for CSIR
121	Non-Capital Structures
122	Tools
123/4/5/6	Rent, Electricity, Water, Rates Sewage and Rubbish Removal
127	Licences
128	Hiring of Equipment
129	Services by Private Individuals

Subsistence and Transport (130 - 139)

130	CSIR Vehicles
131	Public Transport
132	Private Vehicles
135	Subsistence
138/9	S & T for Non-CSIR Staff attending meetings

Internal Services (140 - 149)

143/4	CSIR Computers
145	Translation
146	Research Services
148	Administrative Services

General Expenses (150 - 184)

150	Loss/Gain on Standard Price Stores and Services
153	Recoverable Expenses
154	Grants from CSIR funds
155	Entertainment expenses
156	Honoraria etc.
157	Refunds of Training Expenses
158	Transportation of Goods
159	Sundry
160/1	Staff: Advertising, X-rays and Testing
162	Overseas Tours
163	Staff: Other Costs
164	Periodicals, Pamphlets and Minor Publications
165	Subscriptions to Unions and Societies
166	Structural Alterations to Hired Buildings
167	Vacation - Students
168	Advertising: Legal and General
170/1/2	Bank Charges, Postage, Telephones, Telegrams and Cables
173	Audit Fees
174	Ex Gratia Payments
175	Bad Debts
176/7	Insurance
180/3/4	Grants and Subsidies

Levies (185 - 189)

185/9	Levies for Supporting Services and Depreciation
-------	---

Internal Income (190 - 199)

190/199	Income for Services to other CSIR Units.
---------	--

Current Capital Expenditure § (304-393)

304	Books and Journals including binding
311/4/5	Furniture and Office Equipment costing less than R1000, more than R1000, or purchased from funds provided by outside bodies.
320/337	Standard Stock Account and Other Stores
363/4/5	Prefabricated Structures costing less than R1000, more than R1000, or purchased from funds provided by outside bodies.
370/4/5	Laboratory and Workshop Equipment.

Assets and Liabilities (400 - 499)Running Income (600-660)

600/10/12	Parliamentary Grants, Donations, and Contributions towards cost of research
620/2	Investigations, Tests, Services: Major and Minor jobs.
626/7/8	Earned Income; State Departments, Research Units Sponsors etc.
630/4	Sale of Publications, Subscriptions etc.
650/7	Rents, Interest, Sundry, Claims, Commission.
658	Sale of Animals or Materials.
660	N.A.S.A. Contribution.

Capital Income (670-699)Financial Ledger Codes (700-999)

Appendix C:Source Document Codes

01. Job Cards Times
02. Order Form
03. Invoice
04. Payment Instruction
05. Petty Cash Book
06. Computer Charge
07. Vehicle Mileage
08. Cancellation
09. Journal Entry
10. Committed Item from Committed List
11. Payment Item from Immediate Payments List
12. Payment Item from Monthly Payments List
20. Amend Staff table
21. Add to budget figures in Accumulated Job Card Times file
22. Add to accumulated times in the Accumulated Job Cards Times file without affecting current month times
23. Insert budget figures in Accumulated Job Cards Times file
30. Amend Division and project table
31. Add to budget figures in the Accumulated Expenditure file
32. Adjust accumulated expenditure without affecting current month figures in the Accumulated Expenditure file
33. Insert budget figures in Accumulated Expenditure file
40. Amend the Rank Table
41. Amend the Vote Table
42. Amend the Vehicle Table
50. Entering Password (only when required by program)
51. Change the passwords
52. Week-Month document (To say that the documents that follow refer to transactions in the given week and month)

Appendix D:List of Abbreviations for Ranks.

(Note: These are the ranks and codes used at the NIPR

		<u>Program Code</u>
DIR	DIR	8
SCRO	SHNB	16
CRO	HNB	24
SRO	SNB	32
RO	NB	40
SO	WB	48
ARO	ANB	56
CTO	HTB	64
TO	TB	72
ATO	ATB	80
TECH	TEG	88
STECH	STEG	96
AT	AT	104
ISGRI		112
SAO	SAB	120
AO	AB	128
CTYP2	HTIK2	136
STYP	STIK	144
TYP	TIK	152
CLOR1	KLGR1	160
CLOR2	KLGR2	168
NERO	NBNB	176
NETO	NBTB	184
NEATO	NBATB	192
NLA1	NLA1	200
NLA2	NLA2	208
MSSGR	BODE	216
CLNRS	SKMRS	224
SENCL	SENKL	232

NOTE: Inside the program each of the above is associated with a number between 1 and 255 with spaces left for inserting fresh ranks.

E1.

Appendix E:

Staff Codes

Staff codes are 5 bytes constructed as follows:-

bytes	1	divisional number in code
	2	rank code as in appendix D
	3 - 4	first 2 letters of Staff member's surname
	5	residual position number

A List of Programs and their Storage RequirementsAppendix F.

	<u>Estimated storage required</u>
1. Input	50K
2. Accumulating Job Cards Times	10K
3. Reporting Job Cards Times	15K
4. Accumulating Expenditure	10K
5. Reporting Expenditure	8K
6. Reconciling with Project Cost Analyses	5K
7. Editing the Accumulated Job Cards Times file	5K
8. Editing the Accumulated Expenditure file	5K
9. Suppliers' Accounts weekly returns	5K
10. Updating the Suppliers' Records and Project Costing file	10K
11. Reporting Suppliers' Records	5K
12. Reporting Project Costing file	5K

A List of Files and their Storage RequirementsAppendix G.Estimated Storage Required

	<u>Active files</u>	<u>Saved files</u>	
		<u>Appr. Length</u>	<u>Number</u>
1. Input program output well	6 tracks	-	-
2. Tables	11 tracks	60'	(12)
3. Monthly Expenditure files	7 tracks	50'	(12)
4. Accumulated Job Cards Times file	1 cylinder	5'	(2)
5. Accumulated Expenditure file	2 cylinders	10'	(2)
6. Suppliers' Records file	1 cylinder	4'	(1)
7. Project Costing file	1 cylinder	2'	(1)
8. Temporary files for sorting	7 tracks	4'	(1)

Magnetic tape storage is calculated at 800 b.p.i.

the Tables and Monthly Expenditure files require on pair of 200' reels, the other files a second pair.

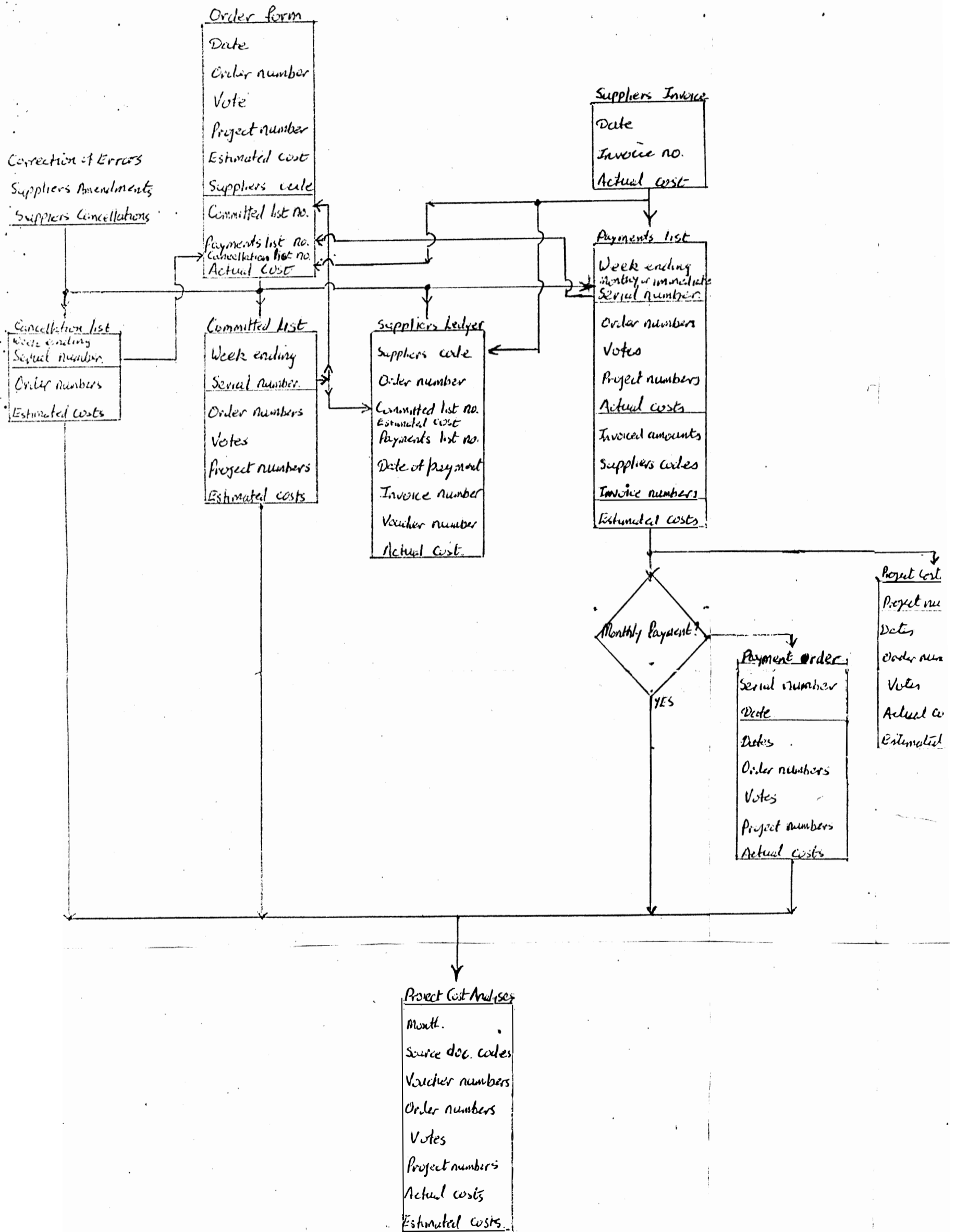
Appendix H. Presents limitations and sizes imposed by the files and the input program.

1. Passwords may not be longer than 30 characters.
2. All vehicle identification numbers must lie between 1 and 254.
3. The vehicle tariff/mile must be between .1 and 99.9 cents (can be negative).
4. All votes must be between 1 and 999.
5. No more than 254 different account headings for the project expenditure tables may be presented.
6. The present length of the table file allows for only 102 ranks.
7. No more than 254 rank codes may be presented.
8. The salary/hour set rate for any rank, must lie between 0.00 and 9.99 rand (can be negative).
9. All division identification numbers must be between 7000 and 7199.
10. No more than 254 different divisions may be presented.
11. Staff names may not be longer than 25 characters.
12. No more than 254 staff members may have the first 2 letters of their names the same if they have the same rank and belong to the same division (and hence to the same institute).
(Extra program restriction: In the program, each person's code is made of a division code, rank code, the 1st two letters of the name, and a 1 byte extra code. This extra code allows for the 254 variations of people with the same first 2 letters, rank and division. However the program as it stands, assigns these codes so that the person's code should have the same collating sequence as the name. To do this, whenever a new name is encountered, its code is assigned so that it is midway in the collating sequence, between the next lower and the next higher name. As a result, only 8 staff members can be guaranteed to be dealt with by the program if they have their first 2 letters of their names, their ranks and divisions the same.)

13. Projects may not have more than 7 digits.
14. No more than 254 projects may be presented under 1 division.
15. A project description may not be longer than 29 characters.
16. Serial numbers may not be longer than 7 digits.
17. Order numbers may not be longer than 7 digits.
18. Invoice numbers may not be longer than 7 digits.
19. Suppliers code numbers may not be longer than 5 digits.
20. Estimated cost amounts must be between 0 and 9,999,999 rand (can be negative).
21. Actual cost amounts must be between 0.00 and 9,999,999.99 rand (can be negative).
22. Estimated staff times must be between 0 and 99,999 hours (can be negative).
23. Staff times spent must be between 0.00 and 999.99 hours (can be negative).
24. Vehicle mileages must be between 0 and 99,999 miles (can be negative).
25. Cheque numbers must be between 0 and 99,999 (can be negative).
26. All checksums must be between 0.00 and 9,999,999,999.99 (can be negative).
27. For program efficiency the number of different division/projects should not exceed 350. (This is because the program uses a scatter storage technique in a table of size 401.)
28. An input "line" may not exceed 244 characters (including backspacing and carriage returns).
29. No line may contain more than 30 numeric entries. (excluding a checksum).
30. The program buffer length for unchecksummed data is 800 bytes. (After a checksum has been given, this buffer is emptied)
31. The input-well buffer length is 260 bytes.
32. Valid document codes must be between 1 and 100.

Flowchart of NIPR Accounting Operations

Offices and Services authorised by an Order Form.



Flowchart of NIPR Accounting Operations

Other Suppliers and Services and Expenses.

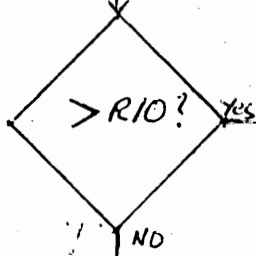
Supporting Documents

- Services Rendered
- S&T Advance
- Out of Pocket Expenses
- S&T Claim
- Transport (Private Vehicle)

NIPR Transport

Staff

Date
Project number
Amount



<u>Petty Cash Book</u>	
Page serial number	
Date	
Voucher number	
Order number	
Votes	
Project number	
Payments	
Receipts	

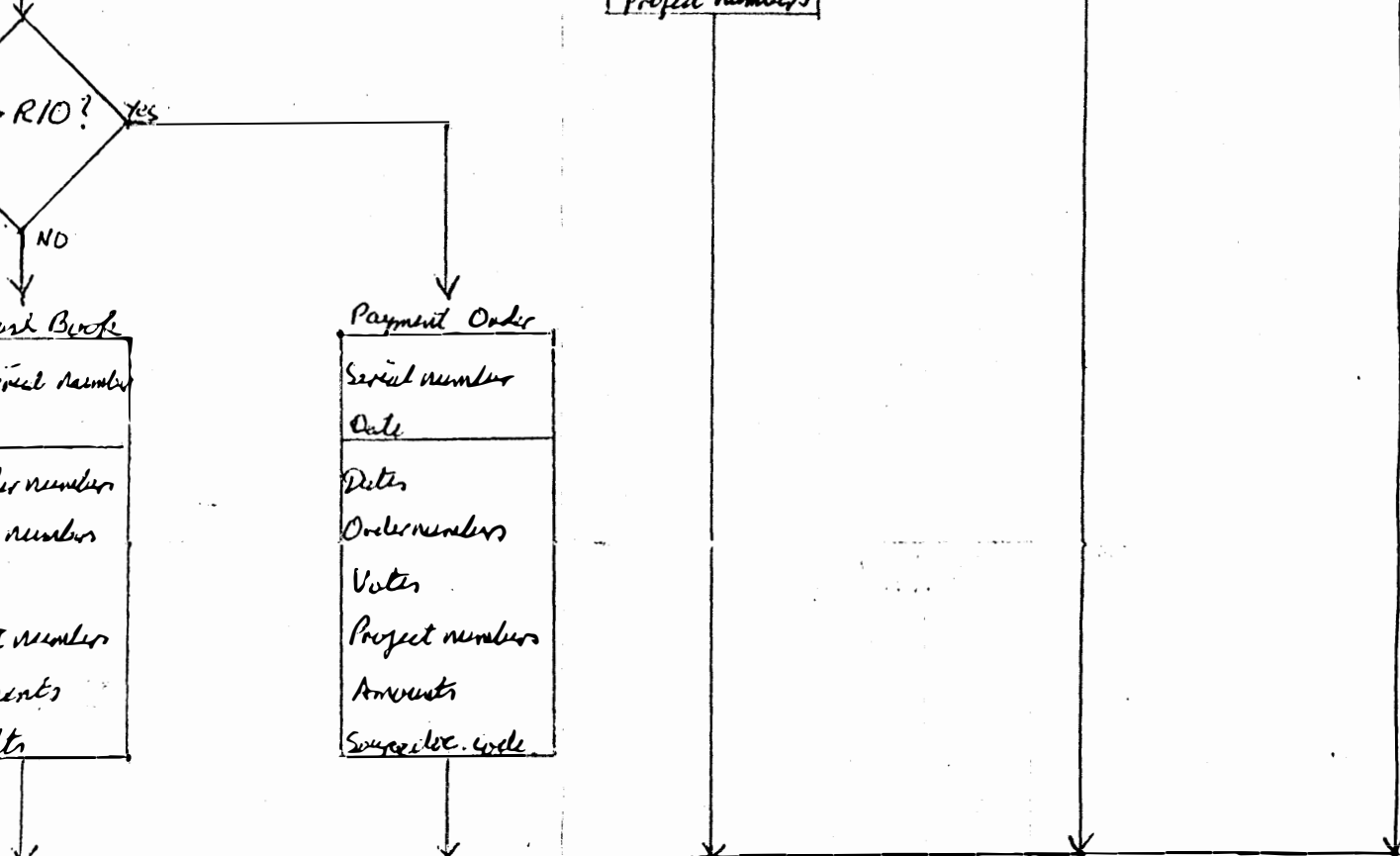
<u>Payment Order</u>	
Serial number	
Date	
Date	
Order number	
Votes	
Project number	
Amounts	
Source doc. code	

<u>Log book</u>	
Vehicle	
Month	
Date	
Mileage	
Project number	

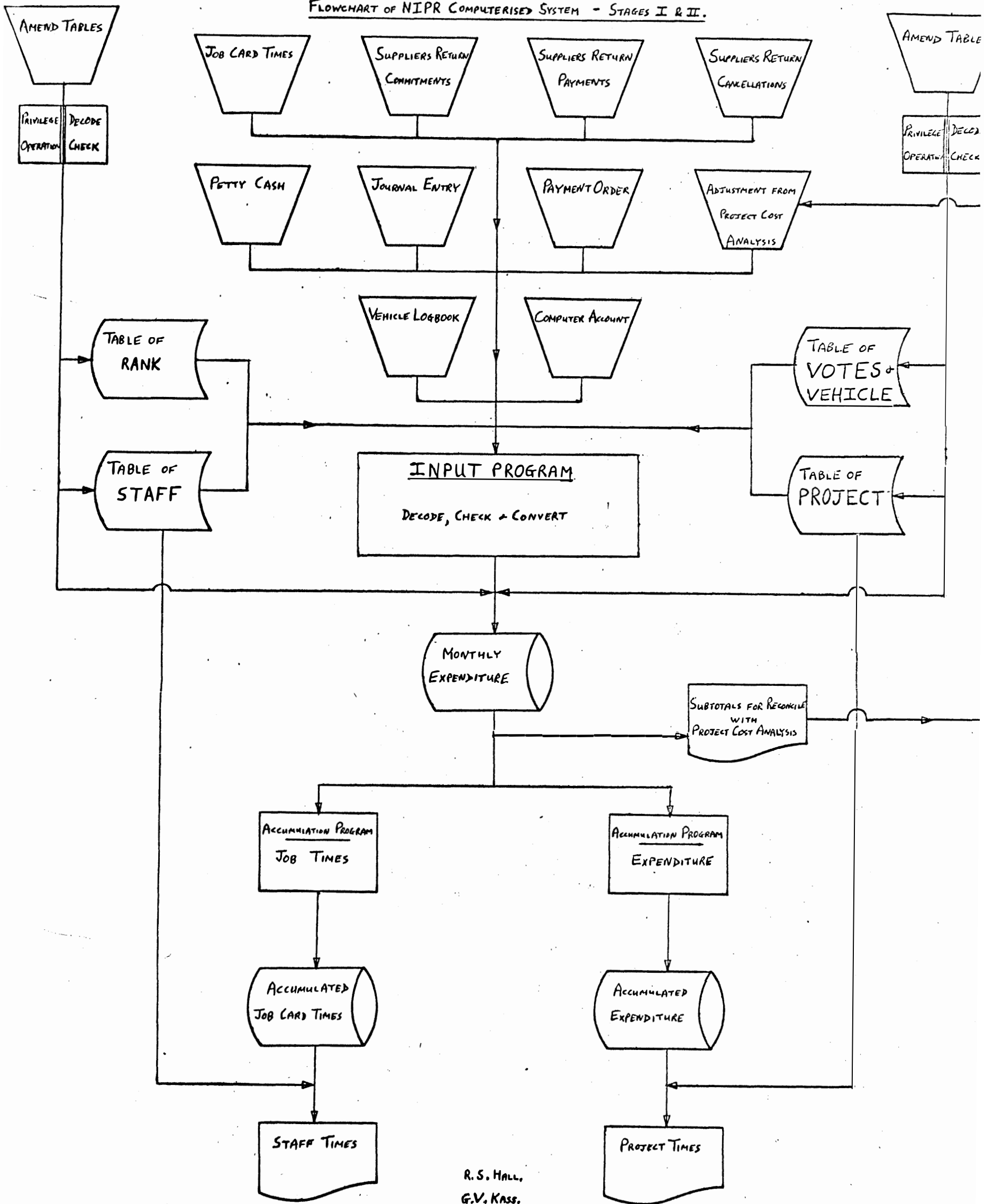
<u>Staff Changes</u>	
Date	
Name	
Remd	

<u>Native Labor</u>	
Date	
Name	
Project number	
Wage	

<u>Project Cost Analysis</u>	
Month	
Source doc. codes	
Voucher number	
Order number	
Votes	
Project number	
Actual costs	
Estimated costs	



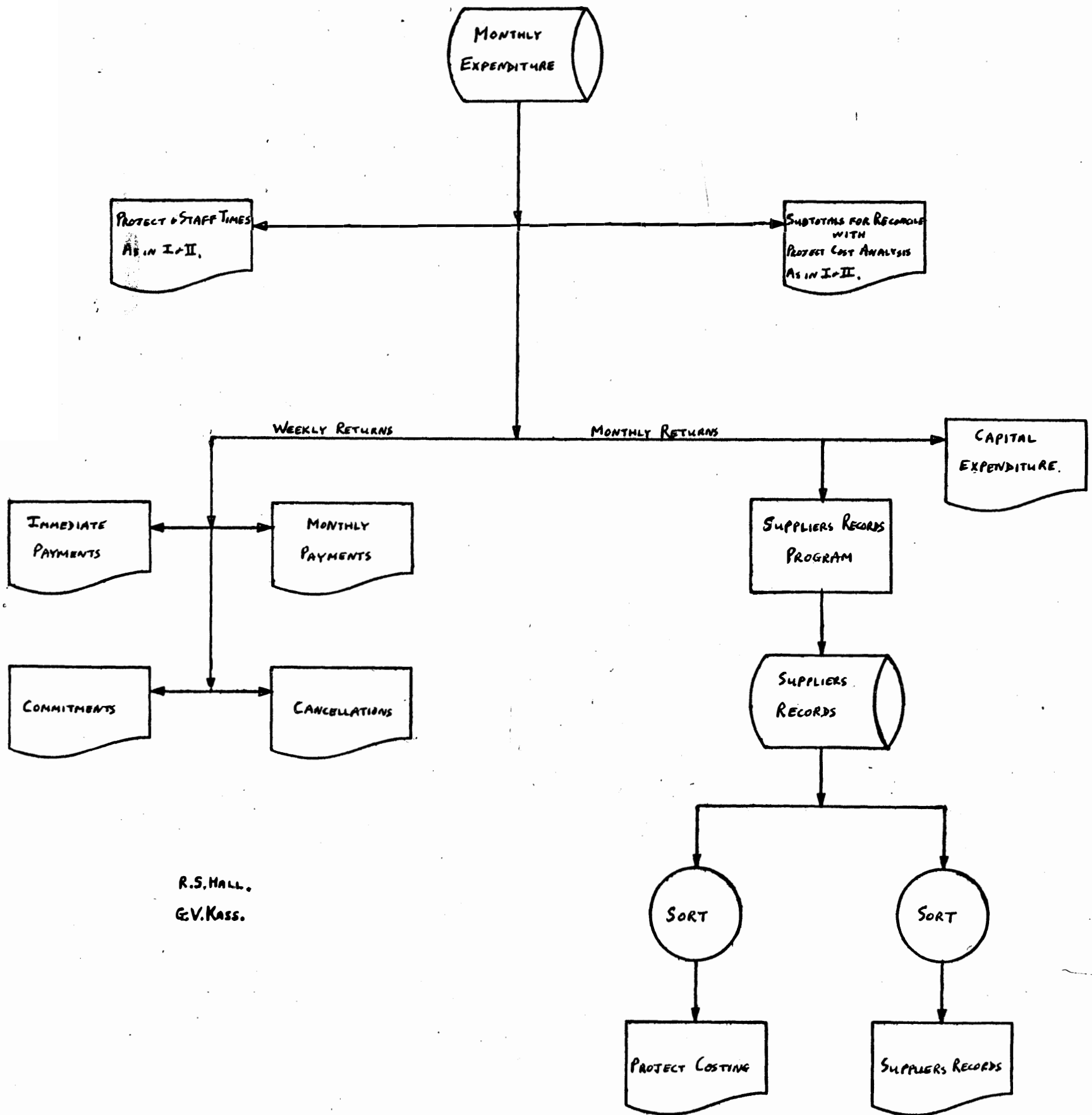
FLOWCHART OF NIPR COMPUTERISED SYSTEM - STAGES I & II.



R.S. HALL,
G.V. KASS.

FLOW OF NIPR COMPUTERISED SYSTEM - STAGE III.

INPUT AS IN STAGES I & II EXCEPT:
 SUPPLIERS RETURNS COMMITMENTS → ORDER FORM.
 SUPPLIERS RETURNS PAYMENTS → INVOICE.



R.S.HALL.
 G.V.KASS.

Kansellasië/wysiging van verbindings.
Cancellation/amendment of commitments.

Week/jaar geëindig

Week/year ended /..... /.....
(27-30)

Volg/serial

No. /.....
(14-19)

Bestel Order No.	UIT. EXT. No.	Bedrag verbind Amount commit.	Bestel Order No.	UIT. EXT. No.	Bedrag verbind. Amount commit.
31-36	37	R	31-36	37	R
O/d.-Cf.			TOTAAL TOTAL		

37 d82 * 46

Opgestel/prepared

Goedgekeur/approved

Nagesien/checked

INSTITUUTREKENMEESTER
INSTITUTE ACCOUNTANT

LEWERANSIERREKENINGE / SUPPLIER ACCOUNTS

Kansellasië/wysiging van verbindings.
Cancellation/amendment of commitments.

Week/jaar geëindig

Week/year ended /..... /.....
(27-30)

Volg/serial

No. /.....
(14-19)

Bestel Order No.	UIT. EXT. No.	Bedrag verbind Amount commit.	Bestel Order No.	UIT. EXT. No.	Bedrag verbind. Amount commit.
31-36	37	R	31-36	37	R
O/d.-Cf.			TOTAAL TOTAL		

37 d82 * 46

Opgestel/prepared

Goedgekeur/approved

UNIVERSITY OF CALIFORNIA - BERKELEY

COURSE NO.	COURSE PRON	UNIFORM NO. NUMBER	UNIFORM NO. VOLUME	DATE ISSUED	DEPT	PROJECT NUMBER	DEPT NUMBER	CHECKED NUMBER
54	700305	94018		129	7121	4750	224 53	ST
							9 00	T
							9 00	ST
53	700372	93116		167	7121	4780	14 40	T
							14 40	ST
54	700352	94236		132	7121	4790	19 42	T
46	700045	1410		135	7121	4790	125 71	T
							145 13	ST
							145 13	ST

TIME SPENT FOR STAFF IN DIVISION 7023 TILL MONTH AUGUST

		TIME BUDGETED (HOURS)	TIME TILL END OF LAST MONTH (HOURS)	TIME SPENT THIS MONTH (HOURS)	TIME SPENT TILL NOW (HOURS)	BALANCE NOT BUDGETED (HOURS)	BALANCE BUDGETED (HOURS)	
CRO	VAN DER MERWE.G							
	7023/4345	400.00	100.00	150.00	250.00		150.00	
	7023/4412	1,000.00	36.00	0.00	36.00		964.00	
	7023/4417	400.00	450.00	0.00	450.00		-50.00	**
	7028/4190	0.00	14.00	0.00	14.00	-14.00	0.00	
	TOTAL	1,800.00	600.00	150.00	750.00		1,050.00	
SRO	WAMBA.A.S.F.							
	7023/4412	1,500.00	150.00	150.00	300.00		1,200.00	
	7023/4417	300.00	450.00	0.00	450.00		-150.00	**
	TOTAL	1,800.00	600.00	150.00	750.00		1,050.00	
ARD	FEATHERSTONEHAUGH.R.							
	7023/4412	1,200.00	50.00	140.00	190.00		1,010.00	
	7023/4417	600.00	550.00	0.00	550.00		50.00	
	7027/4512	0.00	0.00	10.00	10.00	-10.00	0.00	
	TOTAL	1,800.00	600.00	150.00	750.00		1,050.00	
ATC	BOIS-GUILBERT.K.							
	7023/4345	1,040.00	196.00	150.00	346.00		694.00	
	7023/4412	620.00	54.00	0.00	54.00		566.00	
	7023/4417	140.00	350.00	0.00	350.00		-210.00	***
	TOTAL	1,800.00	600.00	150.00	750.00		1,050.00	
	DIVISIONAL TOTAL.							
	7023/4345	1,440.00	296.00	300.00	596.00		844.00	
	7023/4412	4,320.00	290.00	290.00	580.00		3,740.00	
	7023/4417	1,440.00	1,800.00	0.00	1,800.00		-360.00	**
	7027/4512	0.00	-90.00	100.00	10.00	-10.00	0.00	
	7028/4190	0.00	14.00	0.00	14.00	-14.00	0.00	
	TOTAL	7,200.00	2,400.00	600.00	3,000.00		4,200.00	

PROJECT	BUDGET (RAND)	COMMITTED EXPENDITURE	ACCOUNT FOR THIS MONTH (RAND)	ACCOUNT TILL NOV (RAND)	BALANCE	
					NOT BUDGETED (RAND)	BUDGETED (RAND)
PROJECT 7023/4345	EEG KWASHIDROR					
SALARIES	10,000.00	2,000.00	3,000.00	5,000.00		5,000.00
COMPUTER COSTS	500.00	0.00	50.00	50.00		450.00
SUPPLIES + SERVICES	2,000.00	1,000.00	500.00	1,500.00		500.00
SUBSISTENCE + TRANS	12,000.00	1,900.00	3,900.00	5,800.00		6,200.00
INTERNAL SC SERVICE	200.00	20.00	0.00	20.00		180.00
GENERAL EXPENSES	0.00	0.00	0.00	0.00		0.00
LEVIES	600.00	50.00	50.00	100.00		500.00
INCOME	0.00	0.00	0.00	0.00		0.00
TOTAL	25,300.00	4,970.00	7,500.00	12,470.00		12,830.00
PROJECT 7023/4412	P.P.-63 TILTING CHAIR					
SALARIES	0.00	2,000.00	1,000.00	3,000.00	-3,000.00	
COMPUTER COSTS	0.00	0.00	100.00	100.00	-100.00	
SUPPLIES + SERVICES	0.00	0.00	0.00	0.00	0.00	
SUBSISTENCE + TRANS	0.00	100.00	100.00	200.00	-200.00	
INTERNAL SC SERVICE	0.00	0.00	0.00	0.00	0.00	
GENERAL EXPENSES	0.00	210.00	50.00	260.00	-260.00	
LEVIES	0.00	50.00	0.00	50.00	-50.00	
INCOME	0.00	-500.00	-500.00	-1,000.00	1,000.00	
TOTAL	0.00	1,860.00	750.00	2,610.00		-2,610.00
PROJECT 7023/4417	CONTINUOUS LETTER CHECKING					
SALARIES	10,000.00	12,000.00	0.00	12,000.00		-2,000.00
COMPUTER COSTS	500.00	500.00	0.00	500.00		0.00
SUPPLIES + SERVICES	2,000.00	2,000.00	0.00	2,000.00		0.00
SUBSISTENCE + TRANS	12,500.00	13,000.00	0.00	13,000.00		-500.00
INTERNAL SC SERVICE	0.00	0.00	0.00	0.00		0.00
GENERAL EXPENSES	200.00	190.00	0.00	190.00		10.00
LEVIES	100.00	100.00	0.00	100.00		0.00
INCOME	0.00	0.00	0.00	0.00		0.00
TOTAL	25,300.00	27,790.00	0.00	27,790.00		-2,490.00
DIVISIONAL TOTAL						
SALARIES	20,000.00	16,000.00	4,000.00	20,000.00		0.00
COMPUTER COSTS	1,500.00	500.00	150.00	650.00		350.00
SUPPLIES + SERVICES	4,000.00	3,000.00	500.00	3,500.00		500.00
SUBSISTENCE + TRANS	24,500.00	15,000.00	4,000.00	19,000.00		5,500.00
INTERNAL SC SERVICE	200.00	20.00	0.00	20.00		180.00
GENERAL EXPENSES	200.00	400.00	50.00	450.00		-250.00
LEVIES	700.00	200.00	50.00	250.00		450.00
INCOME	0.00	-500.00	-500.00	-1,000.00		1,000.00
TOTAL	50,600.00	34,620.00	8,250.00	42,870.00		7,730.00
						-21,706.67

W N N R
C S I R