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*****  
*  
* INTEGRATED FOOD DISTRIBUTION-SARTSE PROGRAM *  
*  
*****
```

USER'S GUIDE

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PART ONE

Program Setup in your PC

1. This package contains 3 diskettes. They include:

Diskette #1: Food distribution program
Lp83 linear program
Tmatrix program
Interface program

Diskette #2: Sartse2 program

Diskette #3: Sartse1 program

Please make sure the package you received has the above diskettes.

2. Use IBMPC DOS (version 3.0 or above for an AT) to create 3 different subdirectories. The name of the subdirectories is arbitrary. An example is shown below:

* Boot up your PC and locate the fixed (hard) drive. If you boot from the "A" drive, then type "c:" for the "C" drive or "d:" if you use the "D" drive:

A> c:

Your screen will show:

C>

* Create subdirectories by typing (after the "C" prompt):

C>md disk1

and continue with:

C>md disk2

and finally:

C>md disk3

* You have now created three separate subdirectories (named disk1, disk2, and disk3) on the "C" drive.

3. Now copy the programs from the diskettes to your "C" drive subdirectories. This is done as follows:

* Change the working directory to "disk1" by entering

```
C>cd\disk1
```

* Insert you diskette #1 in drive "A" and type:

```
C>copy a:*.*
```

Programs will now transfer from "A" to "C" in subdir. disk1. After finishing, repeat the same process again for diskettes #2 and #3

* Now remove diskette #1 from drive "A" and insert diskette #2, and type (after "C" prompt):

```
C>cd\disk2
```

```
C>copy a:*.*
```

Remove diskette #2 and insert diskette #3, and type:

```
C>cd\disk3
```

```
C>copy a:*.*
```

4. The installation procedure is now complete. You can check their files in each subdirectory with the DOS command "DIR". This will give a list of files in each subdirectory which you can compare to the following lists.

Floppy disk #1 must have the following files:

HSPAD	EXE	459716	5-07-86	10:30a
LP83	EXE	143856	4-08-86	5:00p
TMATRIX	EXE	36144	4-20-86	9:13p
INTERFAC	EXE	59850	4-17-87	12:21a
LP93	BAT	77	4-04-87	7:34p
ARCFLOW	DAT	29979	4-19-86	3:08p
DEFAULTS	DAT	342	4-22-86	2:23p
WHERE	DAT	22296	12-26-85	3:33p
LATLONG	DAT	77736	5-07-86	10:11a
HELP	DAT	9043	12-26-85	3:34p
ARCNAME	DAT	19687	12-26-85	3:35p
ARCS	DAT	133749	12-26-85	3:29p
NODES	DAT	20006	12-26-85	3:32p
PTHOUT	DAT	52977	4-22-87	1:42a
OUTPUT	DAT	17654	4-22-87	1:42a
ODNODE	DAT	530	4-22-87	1:41a
LOUT	DAT	0	12-21-86	2:50p
LLP83	MPS	2290	4-22-87	1:41a
LPOUT	DAT	4096	4-22-87	1:42a
TMATRIX	DAT	993	4-22-87	1:42a
ODSET	DAT	72	4-22-87	1:42a
ZONES	DAT	937	10-23-86	9:44a
LLP83	DAT	512	4-22-87	1:42a
23 File(s)		79360 bytes free		

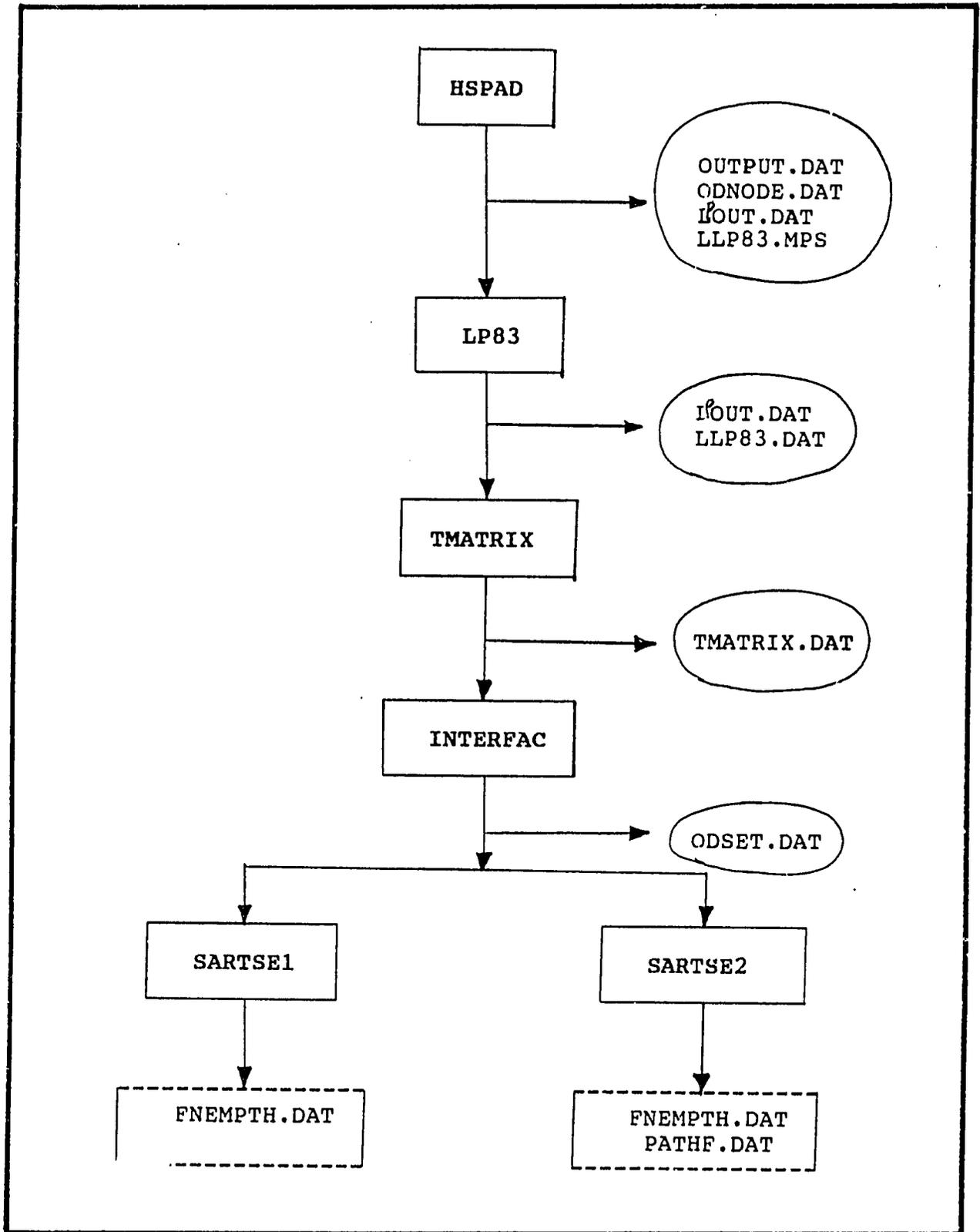
Floppy disk #2 must have the following files:

PRELOAD	DAT	9605	10-23-86	9:49a
HELP1	DAT	2560	11-28-86	4:40p
DEFAULT	DAT	407	12-21-86	6:09p
WHERE	DAT	8281	10-23-86	9:44a
NODES	DAT	7197	10-23-86	9:43a
SCNSET	DAT	6585	3-21-87	10:53p
ARCNAME	DAT	5832	10-23-86	9:43a
PRTCDE	DAT	21953	10-23-86	9:48a
ZONES	DAT	937	10-23-86	9:44a
PJTSET	DAT	60273	3-21-87	10:54p
HELP4	DAT	7040	11-28-86	4:41p
ARCS	DAT	34304	11-16-86	7:42p
SCNSETD	DAT	59987	4-22-87	2:14a
HELP2	DAT	2176	11-28-86	4:40p
HELP3	DAT	5376	11-28-86	4:40p
HELPU	DAT	1408	11-22-86	11:59p
HELPSA	DAT	1408	11-23-86	12:24a
HELP	DAT	11843	4-20-87	4:16p
HELP5	DAT	5991	4-20-87	4:05p
FNEMPTH	DAT	157605	4-22-87	2:12a
PATHF	DAT	32808	4-22-87	2:12a
SARTSE2	EXE	500684	4-20-87	1:04p
ODSET	DAT	72	4-22-87	1:42a
		23 File(s)	227328 bytes	free

Floppy disk #3 must have the following files:

SARTSE1	EXE	445998	4-20-87	1:40p
PRELOAD	DAT	9605	10-23-86	9:49a
FNEMPTH	DAT	47081	4-20-87	1:43p
HELP1	DAT	2560	11-28-86	4:40p
DEFAULT	DAT	407	12-21-86	6:09p
WHERE	DAT	8281	10-23-86	9:44a
ODSET	DAT	5632	10-01-86	8:48a
NCDES	DAT	7197	10-23-86	9:43a
SCNSET	DAT	6585	3-21-87	10:53p
ARCNAME	DAT	5832	10-23-86	9:43a
PRTCDE	DAT	21953	10-23-86	9:48a
ZONES	DAT	937	10-23-86	9:44a
PJTSET	DAT	60273	3-21-87	10:54p
HELP4	DAT	7040	11-28-86	4:41p
ARCS	DAT	34304	11-16-86	7:42p
SCNSETD	DAT	59987	3-21-87	10:46p
HELP2	DAT	2176	11-28-86	4:40p
HELP3	DAT	5376	11-28-86	4:40p
HELPU	DAT	1408	11-22-86	11:59p
HELPSA	DAT	1408	11-23-86	12:24a
HELP	DAT	11843	4-20-87	4:16p
HELP5	DAT	5991	4-20-87	4:05p
		22 File(s)	420352 bytes	free

Integrated SARTSE (version 1.0) has the following structure:



PART TWO

Executing programs from diskette #1

Diskette #1 contains a whole package of programs. To execute them from your fixed drive first change the current subdirectory to "disk1" by typing:

```
C>cd\disk1
```

and hitting return. You are now in subdir. "disk1" and ready to execute the first program. Type the following to execute the food distribution program (after "C" prompt):

```
C>HSPAD
```

After a few seconds, you will see

```
...Retrieving default data...
```

```
...Retrieving arcs data...
```

Then answer the following question by typing "N":

```
Is there a preload network in addition to the pload factor:0.10(Y/N)? N
```

```
...Retrieving nodes data...
```

After the program finishes reading all required data, the interactive menu will be shown:

Network Analysis System Main Menu

- 1) Review and/or set type of network assignmet problem
- 2) Review and/or set the solution to preload network
- 3) Review and/or set the type of commodity distribution
- 4) Review and/or set global parameters
- 5) Remove network arcs (damages are cumulative)
- 6) Review and/or specify current Origin-Destination (O-D) set
- 7) Execute Network Analysis for current O-D set
- 8) Terminate program

Input 1-8 to select Menu choice: 6

Important note: To run the integrated package, the origin and destination node names must be consistent with the names on the zones list. The zone list provided is a listing of zonal nodes or centroids of each designated region in Southern Africa. You MUST enter the origin(s) and destination(s) corresponding to all of the zonal node names on the list.

Since the default origins and destinations are not completely consistent, we need to change the default origin and destination node names in order to make the program perform its task successfully. First, pick option #6 on the menu and change the node names step by step, as shown below. Please read the following zonal node names first because we need to use them immediately:

LOBITO----Z
GABORONE--Z
BLANTYRE--Z
LILONGWE--Z
BEIRA-----Z
MAPUTO----Z
NACALA----Z
BETHLEHEM-Z
DARESSALA-Z
KABWE-----Z
LUSAKA----Z
NDOLA-----Z
BULAWAYO--Z
HARARE----Z
MUTARE----Z
SOEKMEKAARZ
LUBUMBASHIZ
CAPETOWN--Z
DURBAN-----Z
EASTLONDONZ
JOHANNESBUZ
KUITO-----Z
BALAKA----Z

Now, enter 6 in response to the menu and hit return:

The screen will show the following:

Input 1-8 to select Menu choice: 6

1) Current Origin 1: NODE LUANDA
Supply: 10000.00

2) Current Destination 1: NAME PORTELIZAB, SOUTH AFRICA
Demand: 5000.00

2) Current Destination 2: NODE CAPETOWN
Demand: 5000.00

3) Minimization option: COST

4) Selected best paths: 0 0 0 0 0

Type "1" to get help from the program, and the screen will show the following message. Slowly follow the steps and complete the changes. An example is shown below:

Enter O-D parameter number alone for help;
or parameter number and new value, separated by a comma;
or merely press SPACE BAR for Main Menu. End all input with RETURN.
1

Origins and destinations are specified in either of two formats:

1) 1- to 11-character node code. If less than full 11 characters are input, all node codes with the indicated prefix will be selected.

2) Node place name, i.e. city and country, 24-characters.

Enter in either of two formats:

NODE xxxxxxxxxxxx

NAME YYYYYYYYYYYYYYYYYYYYYYYY (program will pad trailing blanks)

Enter O-D parameter number alone for help;

or parameter number and new value, separated by a comma;

or merely press SPACE BAR for Main Menu. End all input with RETURN.

For example, let us decide to have one origin and two destinations.
The origin is the zonal node : MAPUTO (chosen from p.8)
The 1st destination zonal node: KUITO (" ")
The 2nd destination zonal node: NDOLA (" ")

The following shows the exact procedures for entering origin and destination:

Enter O-D parameter number alone for help;
or parameter number and new value, separated by a comma;
or merely press SPACE BAR for Main Menu. End all input with RETURN.
1,NODE MAPUTO

What is the supply of the origin node:
10000

Are there anymore origins in the O-D set? (Y,N): N

Enter O-D parameter number alone for help;
or parameter number and new value, separated by a comma;
or merely press SPACE BAR for Main Menu. End all input with RETURN.
2,NODE KUITO

What is the demand of the destination node:
5000

Are there anymore destinations in the O-D set? (Y,N):
Y

Input next destination:
2,NODE NDOLA

Error - origin or destination input must start with NODE or NAME.
Try again.

Input next destination:
NODE NDOLA

What is the demand of the destination node:
5000

Are there anymore destinations in the O-D set? (Y,N):
N

When you finish entering all origin and destination node names, hit return and the summary of the new origin-destination pairs will be shown with their supply and demand. Supply and demand at the origin and destination must be equal in total amount. Check the reported summary on screen after hitting the return key. If all information is correct, then hit return again to return to the menu and execute the program:

1) Current Origin 1: NODE MAPUTO
Supply: 10000.00

2) Current Destination 1: NODE KUITO
Demand: 5000.00

2) Current Destination 2: NODE NDOLA
Demand: 5000.00

3) Minimization option: COST

4) Selected best paths: 0 0 0 0 0

Enter O-D parameter number alone for help;
or parameter number and new value, separated by a comma;
or merely press SPACE BAR for Main Menu. End all input with RETURN.

Network Analysis System Main Menu

- 1) Review and/or set type of network assignment problem
- 2) Review and/or set the solution to preload network
- 3) Review and/or set the type of commodity distribution
- 4) Review and/or set global parameters
- 5) Remove network arcs (damages are cumulative)
- 6) Review and/or specify current Origin-Destination (O-D) set
- 7) Execute Network Analysis for current O-D set
- 8) Terminate program

Input 1-8 to select Menu choice: 7

Execution terminated : 0

This completes the 1st program and you can now proceed to the linear programming package (LP83). To activate LP83 use a batch file as follows:

C>LP93

This batch file(called LP93) will automatically activate the linear programming package. You will see the following:

C>LP83 LLP83.MPS MAXIMIZE NO ACTIVITY LLP83.DAT OUTPUT LPOUT.DAT ALTERNATE

A few seconds later, an iteration message appears:

iter 4 In C005 OUT C004

C>

At this point, the iteration is complete and the output files have been stored. You can tell when this step is completed because the "C" prompt appears on screen. You are now ready to run the third program called TMATRIX. This is done as follows:

C>TMATRIX

After a few minutes, the termination message will appear:

Execution terminated : 0

This means the TMATRIX program completed its task and generated a TMATRIX output table for the 4th program which can be linked to the evaluation programs on diskettes #2 and #3. An example of our TMATRIX output(TMATRIX.DAT) would look like this:

TRAVEL DEMAND FOR FREIGHT ASSIGNMENT
WITH SYSTEM OPTIMIZATION
SOUTH AFRICA VERSION

NODE CODE		NODE NAME		O-D DEMAND
ORIGIN	DESTINATION	ORIGIN	DESTINATION	
405	638	MAPUTO----H	KUITO----H	0.00
405	639	MAPUTO----H	KUITO----R	0.00
405	95	MAPUTO----H	NDOLA----H	0.00
405	96	MAPUTO----H	NDOLA----R	0.00
406	638	MAPUTO----R	KUITO----H	0.00
406	639	MAPUTO----R	KUITO----R	5000.00
406	95	MAPUTO----R	NDOLA----H	0.00
406	96	MAPUTO----R	NDOLA----R	5000.00

Note: If any of the previous steps are not completed successfully The TMATRIX program will not be able to find its input data and the message will be printed:

LLP83.OUT not found

Important message:

***** If you finish up to this step, and you plan on re-running the programs with entirely different sets of origin and destination zone names(see p.8 for other choices on zonal node name), you must rename the first output. If you don't, it will be overwritten by the output of the subsequent program entries. Here we rename the first TMATRIX output called TMATRIX.DAT to TDATA.1

C>rename TMATRIX.DAT TDATA.1

If you repeat the above procedures for 6 different origin and destination pairs for 6 different commodities, you must rename each TMATRIX.DAT (Suggestion for renaming the TMATRIX output immediately after each complete run are shown below).

For 2nd commodity type

* Rerun program HSPAD with 2nd set of OD pairs:
from KUITO to EASTLONDON and CAPETOWN

* Run LP93

* Run TMATRIX then

* Type the following line to rename:

C>rename TMATRIX.DAT TDATA.2

TRAVEL DEMAND FOR FREIGHT ASSIGNMENT
WITH SYSTEM OPTIMIZATION
SOUTH AFRICA VERSION

NODE CODE		NODE NAME		O-D DEMAND
ORIGIN	DESTINATION	ORIGIN	DESTINATION	
638	600	KUITO-----H	EASTLONDONH	0.00
638	601	KUITO-----H	EASTLONDONR	0.00
638	90	KUITO-----H	CAPETOWN--H	0.00
638	91	KUITO-----H	CAPETOWN--R	0.00
639	600	KUITO-----R	EASTLONDONH	0.00
639	601	KUITO-----R	EASTLONDONR	1500.00
639	90	KUITO-----R	CAPETOWN--H	0.00
639	91	KUITO-----R	CAPETOWN--R	5600.00

For the 3rd commodity type
 * Rerun program HSPAD with 3rd set of OD pairs:
 from HARARE to EASTLONDON and CAPETOWN
 * Run LP93
 * Run TMATRIX then
 * Type the following line to rename:
 C>rename TMATRIX.DAT TDATA.3

TRAVEL DEMAND FOR FREIGHT ASSIGNMENT
 WITH SYSTEM OPTIMIZATION
 SOUTH AFRICA VERSION

NODE CODE		NODE NAME		O-D DEMAND
ORIGIN	DESTINATION	ORIGIN	DESTINATION	
303	600	HARARE----	H EASTLONDONH	0.00
303	601	HARARE----	H EASTLONDONR	0.00
303	90	HARARE----	H CAPETOWN--H	0.00
303	91	HARARE----	H CAPETOWN--R	0.00
304	600	HARARE----	R EASTLONDONH	0.00
304	601	HARARE----	R EASTLONDONR	5000.00
304	90	HARARE----	R CAPETOWN--H	0.00
304	91	HARARE----	R CAPETOWN--R	5000.00

For the 4th commodity type
 * Rerun program HSPAD with 4th set of OD pairs:
 from DAR to EASTLONDON and CAPETOWN
 * Run LP93
 * Run TMATRIX then
 * Type the following line to rename:
 C>rename TMATRIX.DAT TDATA.4

TRAVEL DEMAND FOR FREIGHT ASSIGNMENT
 WITH SYSTEM OPTIMIZATION
 SOUTH AFRICA VERSION

NODE CODE		NODE NAME		O-D DEMAND
ORIGIN	DESTINATION	ORIGIN	DESTINATION	
95	600	DAR-----	H EASTLONDONH	0.00
95	601	DAR-----	H EASTLONDONR	0.00
95	90	DAR-----	H CAPETOWN--H	0.00
95	91	DAR-----	H CAPETOWN--R	0.00
96	600	DAR-----	R EASTLONDONH	0.00
96	601	DAR-----	R EASTLONDONR	3500.00
96	90	DAR-----	R CAPETOWN--H	0.00
96	91	DAR-----	R CAPETOWN--R	2500.00

For the 5th commodity type
 * Rerun program HSPAD with 5th set of OD pairs:
 from LOBITO to EASTLONDON and CAPETOWN
 * Run LP93
 * Run TMATRIX then
 * Type the following line to rename:
 C>rename TMATRIX.DAT TDATA.5

TRAVEL DEMAND FOR FREIGHT ASSIGNMENT
 WITH SYSTEM OPTIMIZATION
 SOUTH AFRICA VERSION

NODE CODE		NODE NAME		O-D DEMAND
ORIGIN	DESTINATION	ORIGIN	DESTINATION	
205	600	LOBITO----H	EASTLONDONH	0.00
205	601	LOBITO----H	EASTLONDONR	0.00
205	90	LOBITO----H	CAPETOWN--H	0.00
205	91	LOBITO----H	CAPETOWN--R	0.00
206	600	LOBITO----R	EASTLONDONH	0.00
206	601	LOBITO----R	EASTLONDONR	1500.00
206	90	LOBITO----R	CAPETOWN--H	0.00
206	91	LOBITO----R	CAPETOWN--R	5600.00

For the 6th commodity type
 * Rerun program HSPAD with 6th set of OD pairs:
 from NACALA to KUITO and CAPETOWN
 * Run LP93
 * Run TMATRIX then
 * Type the following line to rename:
 C>rename TMATRIX.DAT TDATA.6

TRAVEL DEMAND FOR FREIGHT ASSIGNMENT
 WITH SYSTEM OPTIMIZATION
 SOUTH AFRICA VERSION

NODE CODE		NODE NAME		O-D DEMAND
ORIGIN	DESTINATION	ORIGIN	DESTINATION	
105	638	NACALA----H	KUITO----H	0.00
105	639	NACALA----H	KUITO----R	0.00
105	95	NACALA----H	CAPETOWN--H	0.00
105	96	NACALA----H	CAPETOWN--R	0.00
106	638	NACALA----R	KUITO----H	0.00
106	639	NACALA----R	KUITO----R	1400.00
106	95	NACALA----R	CAPETOWN--H	0.00
106	96	NACALA----R	CAPETOWN--R	3400.00

We have now created 6 TMATRIX output files and called them TDATA.1 to TDATA.6. So we are now ready to send them to the 4th program in this subdir. This program is called INTERFAC. Let us see how it runs, and generate an output called ODSET.DAT for the project evaluation programs on diskette 2 and 3. The actual screens for this process follows:

C>INTERFAC

PLEASE INPUT DATA SET NAME. TDATA.1

PLEASE ENTER NO. OF COMMODITY TYPE:

1. FOOD
2. MANUFACTURE
3. AGRICULTURAL RAW MATERIAL
4. ORES
5. FUELS
6. USER SPECIFIED

THE COMMODITY TYPE IS: 1

PLEASE WAIT ...

DO YOU HAVE ANY OTHER COMMODITY DATA WOULD BE
TRANSFERED FROM TMATRIX TO SARTSE ODSET?

PLEASE TYPE "Y" FOR YES and "N" FOR NO

Y

PLEASE INPUT DATA SET NAME: TDATA.2

PLEASE ENTER NO. OF COMMODITY TYPE:

1. FOOD
2. MANUFACTURE
3. AGRICULTURAL RAW MATERIAL
4. ORES
5. FUELS
6. USER SPECIFIED

THE COMMODITY TYPE IS: 2

PLEASE WAIT ...

DO YOU HAVE ANY OTHER COMMODITY DATA WOULD BE
TRANSFERED FROM TMATRIX TO SARTSE CDSET?

PLEASE TYPE "Y" FOR YES and "N" FOR NO

Y

PLEASE INPUT DATA SET NAME: TDATA.3

PLEASE ENTER NO. OF COMMODITY TYPE:

1. FOOD
2. MANUFACTURE
3. AGRICULTURAL RAW MATERIAL
4. ORES
5. FUELS
6. USER SPECIFIED

THE COMMODITY TYPE IS: 3

PLEASE WAIT ...

DO YOU HAVE ANY OTHER COMMODITY DATA WOULD BE
TRANSFERED FROM TMATRIX TO SARTSE ODSET?

PLEASE TYPE "Y" FOR YES and "N" FOR NO

Y

PLEASE INPUT DATA SET NAME: TDATA.4

PLEASE ENTER NO. OF COMMODITY TYPE:

1. FOOD
2. MANUFACTURE
3. AGRICULTURAL RAW MATERIAL
4. ORES
5. FUELS
6. USER SPECIFIED

THE COMMODITY TYPE IS: 4

PLEASE WAIT ...

DO YOU HAVE ANY OTHER COMMODITY DATA WOULD BE
TRANSFERED FROM TMATRIX TO SARTSE ODSET?

PLEASE TYPE "Y" FOR YES and "N" FOR NO

Y

PLEASE INPUT DATA SET NAME: TDATA.5

PLEASE ENTER NO. OF COMMODITY TYPE:

1. FOOD
2. MANUFACTURE
3. AGRICULTURAL RAW MATERIAL
4. ORES
5. FUELS
6. USER SPECIFIED

THE COMMODITY TYPE IS: 5

PLEASE WAIT ...

DO YOU HAVE ANY OTHER COMMODITY DATA WOULD BE
TRANSFERED FROM TMATRIX TO SARTSE ODSET?

PLEASE TYPE "Y" FOR YES and "N" FOR NO

Y

PLEASE INPUT DATA SET NAME: TDATA.65

PLEASE ENTER NO. OF COMMODITY TYPE:

1. FOOD
2. MANUFACTURE
3. AGRICULTURAL RAW MATERIAL
4. ORES
5. FUELS
6. USER SPECIFIED

THE COMMODITY TYPE IS: 6

PLEASE WAIT ...

DO YOU HAVE ANY OTHER COMMODITY DATA WOULD BE
TRANSFERED FROM TMATRIX TO SARTSE ODSET?

PLEASE TYPE "Y" FOR YES and "N" FOR NO

N

SEE YOU LATER,BYE!

Execution terminated : 0

The INTERFAC program now generates an output file called ODSET.DAT. This data file is very important (it is linked to the other programs such as SARTSE1 and SARTSE2 on the other two subdir). The following data can be interpreted as follows:

* Read the first 3 lines

The first number is the commodity type no. which is now commodity #1;

The second number is the origin zonal node number representing the origin name(MAPUTO) you sent in the HSPAD food distribution program, here the origin # is 17;

The third number is the destination node no., #24 is KUITO and #22 is NDOLA (you can check this in the first TMATRIX.DAT output on P.8);

The fourth number is the demand quantities, 5000 metric ton from node #17 to node # 24, and another 5000 metric ton from node #17 to node #22.

* The third line is a dummy line to indicate the end of the 1st commodity O-D flow. Remember it is required to insert this line in this file even though you do not have any O-D flow data for commodity #1.

ODSET.DAT:a sample output of INTERFAC

1	17	24	5000	
1	17	22	5000	
1	0	0	0	<-----dummy line
2	26	24	1500	
2	26	22	5600	
2	0	0	0	<-----dummy line
3	17	24	5000	
3	17	22	5000	
3	0	0	0	<-----dummy line
4	12	24	3500	
4	12	22	2500	
4	0	0	0	<-----dummy line
5	2	24	1500	
5	2	22	5600	
5	0	0	0	<-----dummy line
6	10	26	1400	
6	10	22	3400	
6	0	0	0	<-----dummy line

ODSET.DAT is one of the input files for SARTSE1 or SARTSE2. There are three ways to set up ODSET.DAT. The first one is to run sequentially HSPAD, LP83, TMATRIX, and INTERFAC. The second is to modify origin, destination, and transportation demand within the user interactive screen mode. The third is to make up ODSET.DAT by using any kind of word processing program, if you know origin-destination pair and transportation demand by commodity. The format for ODSET.DAT is as follows:

Column	Format	Variable
2-3	I2	Commodity
4-7	I4	Origin zone number
8-11	I4	Destination zone number
12-22	I11	Transportation demand (metric tons per year)

If you just sent the three commodity datasets to the INTERFAC program, you obtained the following ODSET.DAT:

ODSET.DAT:ouput of INTERFAC

1	17	24	5000
1	17	22	5000
1	0	0	0
2	26	24	1500
2	26	22	5600
2	0	0	0
3	17	24	5000
3	17	22	5000
3	0	0	0

IMPORTANT NOTE: You MUST use an editor(e.g. edlin, edix, or wordstar in non-document mode) to add in these dummy lines in ODSET.DAT file. See the example shown below:

ODSET.DAT:ouput of INTERFAC

1	17	24	5000	
1	17	22	5000	
1	0	0	0	
2	26	24	1500	
2	26	22	5600	
2	0	0	0	
3	17	24	5000	
3	17	22	5000	
3	0	0	0	
4	0	0	0	<-----added dummy line
5	0	0	0	<-----added dummy line
6	0	0	0	<-----added dummy line

When you complete all the above tasks, you are done with the "disk1" programs. You are now ready for the evaluation program.

We provide two versions of the evaluation program SARTSE:

1. SARTSE1.EXE on diskette #3 and subdir.#3
(can include more OD pairs in ODSET.DAT but no path flow report)
2. SARTSE2.EXE on diskette #2 and subdir.#2
(can only run very limited no. of OD pairs(10) but can generate a pathflow report).

We suggest you first try to run SARTSE1. First, copy your ODSET.DAT from subdir. DISK1 to subdir. DISK2:

IMPORTANT MESSAGES

1. You just created ODSET.DAT for running SARTSE1 or SARTSE2. ODSET.DAT is one of the input files for SARTSE1 and SARTSE2. A special instruction of how to set up ODSET.DAT manually is given in APPENDIX.
2. Disk #2 contains SARTSE1 and disk #3 contains SARTSE2. SARTSE2 is different from SARTSE1 because SARTSE2 can generate the detailed path information. However, SARTSE2 cannot have more than 10 origin-destination pairs.
3. Depending on your decision, you need to copy ODSET.DAT, which was created from the previous steps, on the subdirectory that you want to use.

Step E-1 : Copy ODSET.DAT on the subdirectory containing either SARTSE1 or SARTSE2.

Step F-1 : Type SARTSE1 or SARTSE2 and

[note] You will be in user interactive screen mode immediately. Please follow the instructions step by step.

* Assuming that you are still in subdir. DISK1, type

```
C>copy odset.dat c:\disk2
```

```
C>SARTSE1
```

This executes the SARTSE1 project evaluation program. Now simply follow step by step instructions that appear on the screen as follows.

Southern Africa Regional Transport Strategy Evaluator

Developed

For The

United States Agency for International Development
Regional Development Office, Harare, Zimbabwe

under

Contract No. 690-0206.90-C-00-6013-00

by

Louis Berger International Inc.(USA)
incorporating proprietary software
licensed from Matrix Group, Inc.(USA)

Note: software license restrictions apply

Press ENTER to continue

Southern Africa Regional Transport Strategy Evaluator

USAID Contract No. 690-0206.90-C-00-6013-00 February 1, 1986

INTRODUCTION

Southern Africa Regional Transport Strategy Evaluator (SARTSE) was designed for USAID/HRE in response to the need for rapid analysis of SADCC Area Transportation projects by technical and non-technical personnel. Complementing the traditional transport analysis methodology is the ability to define demand scenarios and their associated probabilities. The user has full control over the selection of projects, scenarios and probabilities. In addition to selecting projects and scenarios from existing data files, the user can modify scenarios and projects and design new scenarios. As part of project evaluation, the user can define a multiple objective analysis using nine objectives - eight predesignated and one user specified. The relative weightings for these criteria are also under user control.

Press ENTER to continue

The overall advantage of SARTSE is its ability to accept, and incorporate into transportation investment analysis, the more subjective factors with which a decision maker struggles ... and permit each new decision maker to change easily and quickly.

Further details on the SARTSE model are available through:

Louis Berger International, Inc.
1918 H St. NW
Washington, DC 20006 USA
Attn: Eastern and Southern Africa Division (FA231)
Telex: 292079 LBU UR
Telephone: (202) 331-7775
Telefax: (202) 293-0787

Note: software license restrictions apply -- see next screen

Press ENTER to continue

*****RESTRICTIONS ON USE*****

The Network Equilibrium Subroutines used in this model, which are the basis of calculating transportation investment impacts, were licensed from the MATRIX Group, Inc. These routines, collectively known as AFNET were developed independently by the MATRIX Group, Inc. and licensed to Louis Berger International, Inc., solely for their use and the use of USAID in evaluating the traffic network of the SADCC countries. Uses outside this application require specific license. Further details on AFNET and its use in other applications are available through:

MATRIX Group, Inc.
2310 King Place, N.W.
Washington, DC 20007 USA
Telephone: (202) 342-1023

*****RESTRICTIONS ON USE*****

Press ENTER to continue

```
*****  
*                                     *  
*                                     *  
*                                     *  
* Please wait -- SARTSE is loading *  
*                                     *  
*                                     *  
*                                     *  
*****
```

Please enter password: DENIS

IMPORTANT MESSAGES

The following instructions will show how to enter parameters and modify the default parameters. More details can be obtained from HELP menu by selecting option #1. The manual will show every screen corresponding to each main option.

Step F-2 : Type DENIS for password after SARTSE is loaded.

Step F-3 : You will see the user main menu and select an option that you want.

Southern Africa Regional Transport Strategy Evaluator - 0.0

User Main Menu

- 1) Introduction to SARTSE
- 2) Review, change, or enter new scenario data
- 3) Review or change project data
- 4) Evaluate projects
- 5) Exit SARTSE

Enter a number from 1-5: 2

If you select option #2, you will see the following screens:

Scenario Selection Menu

Do you want to:

- 1) Select the Default Scenario Set
- 2) Select a Scenario Set already on File
- 3) Create a New Scenario Set
- 4) Return to Main Menu

Enter a number from 1-4: 1

Do you want to:

- 1) List O-D Trip Table on the Screen
- 2) List O-D Trip Table to the Printer
- 3) Return to Scenario Selection Menu (2.0)

Enter a number from 1-3: 1

Southern Africa Regional Transport Strategy Evaluator - 2.2.1B

Scenario Set Name: BASE CASE

Scenario Review: Scenario #1

Scenario Name : Most Probable

O-D FLOW TABLE IN 1985 FOR Minerals & Coal (Active)

Origin	Destination	Tons/YR
1) ZONE,MAPUTO	ZONE,KUITO	5000.
2) ZONE,MAPUTO	ZONE,LUSAKA	5000.

To change Scenario data:

Press A for active or I for inactive and press ENTER

Press N, the new scenario name and press ENTER

Type O-D number, the new flow (in tons) and press ENTER

Separate all inputs with a comma

To review other scenario data in this set:

Press SPACE BAR, a scenario number (1-5), the time period

(1985, 1990, 1995, or 2000), and commodity number (1-6) then ENTER

To return to Scenario Selection Menu (2.0) just press Enter

If you select option #3, you will see the following:

Project Selection Menu

Do you want to :

- 1) Review and/or change a specific project characteristics
- 2) Return to Main Menu

Enter a number from 1-2: 1

Do you want to:

- 1) List All Projects on the Screen
- 2) List All Projects to the Printer
- 3) Select A Project
- 4) Return to Project Selection Menu

Enter a number from 1-4: 3

Type in the project number : 120

Southern Africa Regional Transport Strategy Evaluator - 3.1.1

LIST OF CHARACTERISTICS FOR PROJECT # 120

1) Name: Project 120	2) Link Type: Highway
3) Begin Node: SALIMA, MAL	4) End Node: JC113Y/116, MAL
YEAR INVESTMENT COST	YEAR INVESTMENT COST
5) 1987 8000000.	6) 1988 0.
7) 1989 0.	8) 1990 0.
9) 1991 0.	10) 1992 0.
11) 1993 0.	12) 1994 0.
13) 1995 0.	14) 1996 0.

15) After Project Condition: GOOD Existing Condition: POOR
Existing Length (Km): 5

16) New Capacity: 4950000. Existing Capacity: 4950000.
17) New link Cost Code: 2 Existing Cost Code: 2

Based on the following elements:
Surface: Unpaved Terrain: level

To add or change project cost or capacity data:
Type line number, the new data, then press ENTER
To change project characteristics and cost code: press 17 then ENTER
To change Condition: type line number, POOR or GOOD, then ENTER
Separate all inputs with a comma
Press ENTER to return to the Project Selection Menu (3.0).

If you select option #4, you will see the following:

Project Evaluation Selection

To evaluate a project set the user must specify which demand scenario set he would like to use (and scenario probabilities), the project set name, a set of projects, the starting year of project, the project life, and the weights of up to 9 criteria to be used for project comparison.

Do you want to:

- 1) Continue Project Evaluation
- 2) Return to Main Menu

Enter a number from 1-2: 1

Please read and give information below:

Project set is a collection of project(s), which include any improvements to link capacities or other link characteristics, and which belong to a single group separated from other groups. In other words, the designation of project sets provides a division of projects into different groups of projects which are interrelated and evaluated collectively. The user is allowed to define up to ten these different groups or "sets" in the process of project evaluation.

Note that there are presently a total of 205 projects specified internally to SARTSE and from which the user must build project sets.

With the above information in mind, please proceed by providing the following information:

Give the number of project sets (a maximum total of 10) you want to evaluate at this time: 1

Give the number of projects you want to evaluate for project set # 1: 1

Give the SARTSE project number (1-205) for project # 1 of project set # 1: 120

Give a name for project set # 1: MAPUTO BRIDGE

Give the opening year (first year of planning horizon) of evaluation for project set # 1: 1986

Give the time period or project life for project set # 1: 2

Southern Africa Regional Transport Strategy Evaluator - 4.1.3

SUMMARY TABLE FOR PROJECT SET # 1

Project Set Name :MAPUTO BRIDGE Opening Year: 1986

Project Set Life: 2

Number of projects in the set: 1

Numbers of Project(s) are number(s):
120

Do you want to:

- 1) Modify the Current Project Set
- 2) Continue to Specify other Project Evaluation Parameters
- 3) Return to Project Evaluation Menu (4.0)
- 4) Return to Main Menu

Enter a number from 1-4: 2

The present demand scenario set in memory is: BASE CASE

Do you want to:

- 1) Use this Scenario Set
- 2) Use a Scenario Set with Growth Rate for Each Time Period
- 3) Use a Scenario Set with Commodity Flows for Each Time Period

Enter a number from 1-3: 1

Southern Africa Regional Transport Strategy Evaluator - 4.4.1

What is the probability that you give to each scenario:

Scenario	Name	Probability
1.	Most Probable	0.25
2.	SADCC	0.25
3.	Maximum Growth	0.25
4.	South Africa Cut Off	0.25
5.	Other (User defined)	0.00
	Total	1.00

To change the scenario probability:

Type the scenario number, its new probability and press ENTER

Separate all inputs with a comma

Press ENTER to continue Project Evaluation.

Southern Africa Regional Transport Strategy Evaluator - 4.4.1

What is the probability that you give to each scenario:

Scenario	Name	Probability
1.	Most Probable	0.25
2.	SADCC	0.25
3.	Maximum Growth	0.25
4.	South Africa Cut Off	0.25
5.	Other (User defined)	0.00
	Total	1.00

To change the scenario probability:

Type the scenario number, its new probability and press ENTER

Separate all inputs with a comma

Press ENTER to continue Project Evaluation.

1,0.0

Southern Africa Regional Transport Strategy Evaluator - 4.4.1

What is the probability that you give to each scenario:

Scenario	Name	Probability
1.	Most Probable	0.00
2.	SADCC	0.25
3.	Maximum Growth	0.25
4.	South Africa Cut Off	0.25
5.	Other (User defined)	0.00
	Total	0.75

To change the scenario probability:

Type the scenario number, its new probability and press ENTER

Separate all inputs with a comma

Press ENTER to continue Project Evaluation.

2,1.0

Southern Africa Regional Transport Strategy Evaluator - 4.4.1

What is the probability that you give to each scenario:

Scenario	Name	Probability
1.	Most Probable	0.00
2.	SADCC	1.00
3.	Maximum Growth	0.25
4.	South Africa Cut Off	0.25
5.	Other (User defined)	0.00
	Total	1.50

To change the scenario probability:

Type the scenario number, its new probability and press ENTER

Separate all inputs with a comma

Press ENTER to continue Project Evaluation.

3,0.0

Southern Africa Regional Transport Strategy Evaluator - 4.4.1

What is the probability that you give to each scenario:

Scenario	Name	Probability
1.	Most Probable	0.00
2.	SADCC	1.00
3.	Maximum Growth	0.00
4.	South Africa Cut Off	0.25
5.	Other (User defined)	0.00
	Total	1.25

To change the scenario probability:

Type the scenario number, its new probability and press ENTER

Separate all inputs with a comma

Press ENTER to continue Project Evaluation.

4,0.0

Southern Africa Regional Transport Strategy Evaluator - 4.4.1

What is the probability that you give to each scenario:

Scenario	Name	Probability
1.	Most Probable	0.00
2.	SADCC	1.00
3.	Maximum Growth	0.00
4.	South Africa Cut Off	0.00
5.	Other (User defined)	0.00
	Total	1.00

To change the scenario probability:

Type the scenario number, its new probability and press ENTER

Separate all inputs with a comma

Press ENTER to continue Project Evaluation.

The present Discount Rate is: 7.00%
Do you want to change this parameter (Y/N)? N

The present economic/financial ratio for rail is: 1.0200
Do you want to change this parameter (Y/N)? N

The present economic/financial ratio for highway is: 1.0680
Do you want to change this parameter (Y/N)? N

The present Local Traffic Growth Rate is: 3.00%
Do you want to change this parameter (Y/N)? N

The present O-D Trip Growth Rate after year 2000
for the fixed O-D trip table for each scenario is: 3.00%
Do you want to change this parameter (Y/N)? N

The present Condition Factor is: 1.50
Do you want to change this parameter (Y/N)? N

Do you want to:

- 1) Evaluate all the Project Sets
- 2) Return to Probability Table
- 3) Return to Discount Rate
- 4) Return to Economic/Financial Ratio
- 5) Return to Local Traffic Growth Rate
- 6) Return to O-D Trip Growth Rate, if you are using a group A for
- 7) Return to Project Evaluation Menu (4.0)
- 8) Return to Main Menu

Enter a number from 1-8: 1

```
*****
*                               *
*           SARTSE - 4.1.4       *
*                               *
*           EVALUATION OF       *
*                               *
* Project set # 1           Name: MAPUTO BRIDGE *
* Opening year:1986       Project life: 2 years *
* This includes the following projects: 120    *
*                               *
* Please take a tea break while SARTSE evaluates *
* the project set. This will take 10-15 minutes *
* per each active scenario and commodity, and  *
* project set used          *
*                               *
*****
```

When SARSE execution is finished, you will see the following:

Southern Africa Regional Transport Strategy Evaluator - 4.0

Do you want to:

- 1) Review project evaluation results under each scenario
- 2) Review import/export quantities by country
- 3) Compare project set results
- 4) Review critical links
- 5) Return to Main Menu

Enter a number from 1-5: 1

Southern Africa Regional Transport Strategy Evaluator - 4.1.5

PROJECT EVALUATION RESULTS FOR PROJECT SET # 1 UNDER SCENARIO 1
Project Set Name:MAPUTO BRIDGE Project Set Life: 2 years
Opening year: 1986 Discount Rate: 7.00%

Characteristics	Without project	With project
Total Network Cost	(000)	(000)
1986	12617.	12617.
1988	11665.	11665.
Total Discounted Over Project Life	35423.	35423.

Internal Rate of Return: -100.00% Net Present Value(000): -7391.

If IRR=+100 means there are net cost savings in all periods.
If IRR=-100 means there are no net cost savings in any period.

WARNING: If NPV is negative check shall be made to see
if project links have no trivial flow

Press ENTER to continue.

Do you want to:

- 1) Save project evaluation results on the disk
- 2) Print project evaluation results on the printer
- 3) Review project evaluation results under other scenario in this set
- 4) Evaluate another project set using the same scenario set
- 5) Go to Import/Export Evaluation Table
- 6) Go to Project Comparison Table
- 7) Go to Critical Links List
- 8) Return to Main Menu

Enter a number from 1-8: 1

Do you want to:

- 1) Evaluate other sets of projects by using the current Scenario Set, Network Configuration, Discount Rate, Origin-Destination Commodity Flows, Probability Set, Global Parameters; and return to Main Menu.
- 2) Evaluate other sets of projects by creating and/or modifying any of the current Scenario Set, Network Configuration, Discount Rate, Origin-Destination Commodity Flows, Probability Set, Global Parameters; and return to Main Menu.
(WARNING -- this option will erase all the previous project evaluation results and recalculate the base case results.)

3) Exit SARTSE

Enter number from 1-3: 3

This is the end of SARTSE1 or SARTSE2.
The output file names are FNEPTH.DAT and PATHF.DAT.

APPENDIX 1

INTRODUCTION TO SARTSE

...4/a

INTRODUCTION TO SARTSE 1.0

Southern Africa Regional Transport Strategy Evaluator (SARTSE) was designed for USAID/HRE in response to the need for rapid analysis of SADCC Area Transportation projects by technical and non-technical personnel. Complementing the traditional transport analysis methodology is the ability to define demand scenarios and their associated probabilities. The user has full control over the selection of projects, scenarios and probabilities. In addition to selecting projects and scenarios from existing data files, the user can modify scenarios and projects and design new scenarios. As part of project evaluation, the user can define a multiple objective analysis using nine objectives - eight predesignated and one user specified. The relative weightings for these criteria are also under user control.

The overall advantage of SARTSE is its ability to accept, and incorporate into transportation investment analysis, the more subjective factors with which a decision maker struggles ... and permit each new decision maker to change easily and quickly.

The Network Equilibrium Subroutines used in this model, which are the basis of calculating transportation investment impacts, were licensed from the MATRIX Group, Inc. These routines, collectively known as AFNET were developed independently by the MATRIX Group, Inc. and licensed to Louis Berger International, Inc., solely for their use and the use of USAID in evaluating the traffic network of the SADCC countries. Uses outside this application require specific license.

Southern Africa Regional Transportation Strategy Evaluator (SARTSE) was designed for USAID/Harare in response to the need for rapid analysis of transport policies and programs in the Southern Africa Region. This program is designed for use by both technical and non-technical personnel in identifying and evaluating sets of improvements to the southern Africa transport network (projects) which are selected by the user. These projects are evaluated using demand forecasts and evaluation criteria either created by the user, or drawn from the data set stored in the computer's memory.

In order to use this program effectively, there are a number of important terms that the user must understand. These fit into three categories:

1. Transportation Demand (scenario) Terms
2. Project and Link Characteristics
3. Project Evaluation Terms

1. Transportation Demand (scenario) Definitions

- a) Transportation demand = flows of freight on the transportation network between an origin and a destination. (Passenger flows are included in local traffic which is specified for each link separately.)
- b) Scenario = one transportation demand forecast, which flows from a specific theme (e.g. most probable, maximum growth, etc.). A SARTSE scenario is specified in terms of freight flow between all origins and destinations for each major commodity group for four key forecast years (1985,1990,1995,2000).
- c) Origin or destination = city or other location where major flows either start or end their trip. (30 origins or destinations are specified in SATRSE - see map of Southern Africa Regional Transportation Network supplied by Louis Berger International dated April 3, 1986).
- d) Commodity group = a group of goods which have similar transportation characteristics (e.g. minerals, food crops, petroleum products, etc.)
- e) Default scenario set = a set of forecasts (scenarios) which was developed for SARTSE and which is stored permanently in memory for use by SARTSE users. Four scenarios are provided and one is available to be defined by the user as part of a five-scenario set. The four default scenarios are:
 - 1. Most Probable (i.e. trend growth with no change in RSA)
 - 2. SATCC (i.e. forecasts prepared by SATCC in 1984)
 - 3. Maximum growth (i.e. growth pattern which maximises flows)
 - 4. South Africa cut off (i.e. probable flow pattern if RSA transport network is not available to southern Africa countries)

The freight flows associated with these scenarios are listed in SARTSE Systems Documentation Report (Louis Berger International, Inc. 1986), by origin/destination, commodity group and key forecast year.

- f) Active or inactive = a term which specifies whether or not a particular commodity group is to be used in a user-selected forecast.

3. Project Evaluation Definitions

- a) Project = any improvement to the transportation system. Road, rail, river/lake, or port improvements can be specified. In SARTSE 1.0 only projects which change link capacities or which change other link characteristics to produce cost savings, can be evaluated.
- b) Transportation system = the Southern Africa Regional Transportation System as defined on the map supplied with SARTSE by Louis Berger International dated April 3, 1986. This includes all major international links connecting the countries of Angola, Botswana, Malawi, Mozambique, Namibia Republic of South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe.
- c) Evaluation = a comparison between projects or between project conditions and base case conditions which allows a decision-maker to judge the desirability of a given project or set of projects. SARTSE allows the evaluation of projects in terms of nine criteria, including economic criteria and other criteria to be defined by the user.
- d) Project starting year = the first year in which the project is in operation This is normally the first year after construction or implementation.
- e) Project life = the number of years a project is expected to perform its economic function, or the period of economic evaluation. This normally varies from 5 years for equipment to 30 years for major infrastructure. Road projects are normally evaluated over 15-20 years, rail projects for 30 years and port projects for 30-50 years.
- f) Discount rate = the annual rate at which future costs or benefits are discounted to arrive at a present value, for purposes of project comparison. This rate is normally in the range 8% to 15%.
- g) Financial costs = the total costs incurred by a transportation user or builder, including taxes, interest and overhead costs. SARTSE calculates total financial costs to users of the southern Africa transportation network on all modes in each key forecast year.
- h) Economic costs = net costs to the economy of a country or region. These costs normally exclude taxes, but include the economic costs of wear and tear on the infrastructure (e.g. marginal road maintenance costs). They may also include shadow costs, which vary from country to country.
- i) Economic/financial cost ratio = this ratio converts financial costs to economic costs for project evaluation. SARTSE uses the Zimbabwe ratios as default values.
- j) Internal Rate of Return(IRR) = an economic measure of net value to the economy of a given project, specified in terms of a percent. SARTSE calculates the IRR of each project based on total network economic costs, with and without the project, including construction, operation and maintenance costs over the project life. Normally an IRR of 8-12% is considered marginal, higher is a good project and lower is a bad project.

- k) Base case = the transportation system, including flows and costs over the forecast period, in its present condition without any projects.
- l) Criteria = specific measures of project performance. These measures are quantified by the SARTSE computer program in three cases (IRR, import/export link constraint, and foreign exchange costs). Other criteria can be specified by the user to reflect subjective judgement. SARTSE suggests the criteria: SATCC priority, security, reliability, economic growth impact, operation and maintenance capability. One more criterion can be defined by the user.
- m) Value (of a criterion) = the measurement of the project according to the natural units of the criterion. (e.g. % for IRR, US\$ for foreign exchange costs, number for number of links, high/med./low for security risk, etc.) All projects can be compared on these values, but the values themselves cannot be compared unless they are converted to the same scale.
- n) Scale (of a criterion) = the position of a criterion value on a common scale (usually 1 to 10), specified by the user. For example, an IRR of 15% might have a scale value of 5 in the projects being compared, while a project with an IRR greater than 50% would be scaled at 10, and an IRR of 2% would be 1. Similarly a high security risk project could be scaled at 0, while medium risk would be 5 and low risk would be 10.
- o) Weight (of a criterion) = the relative weight the user places on a given criterion compared to the other criteria used in project evaluation. The sum of these weights for all criteria are equal to 1.00 (For example four criteria with equal weight would each have a weight of .25