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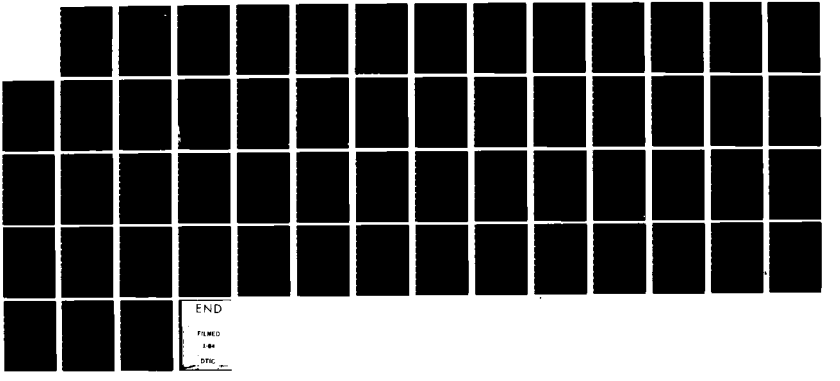

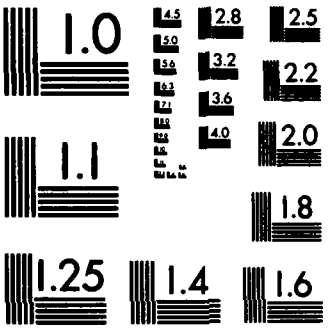

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DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER

Bethesda, Maryland 20084

DTNSRDC/CMLD-83/19

AD-A135 930

ECONOMIC ANALYSIS MODEL PROGRAM USER'S MANUAL (BURROUGHS VERSION)

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ECONOMIC ANALYSIS MODEL PROGRAM USER'S MANUAL (BURROUGHS VERSION)

by

Susan Becker

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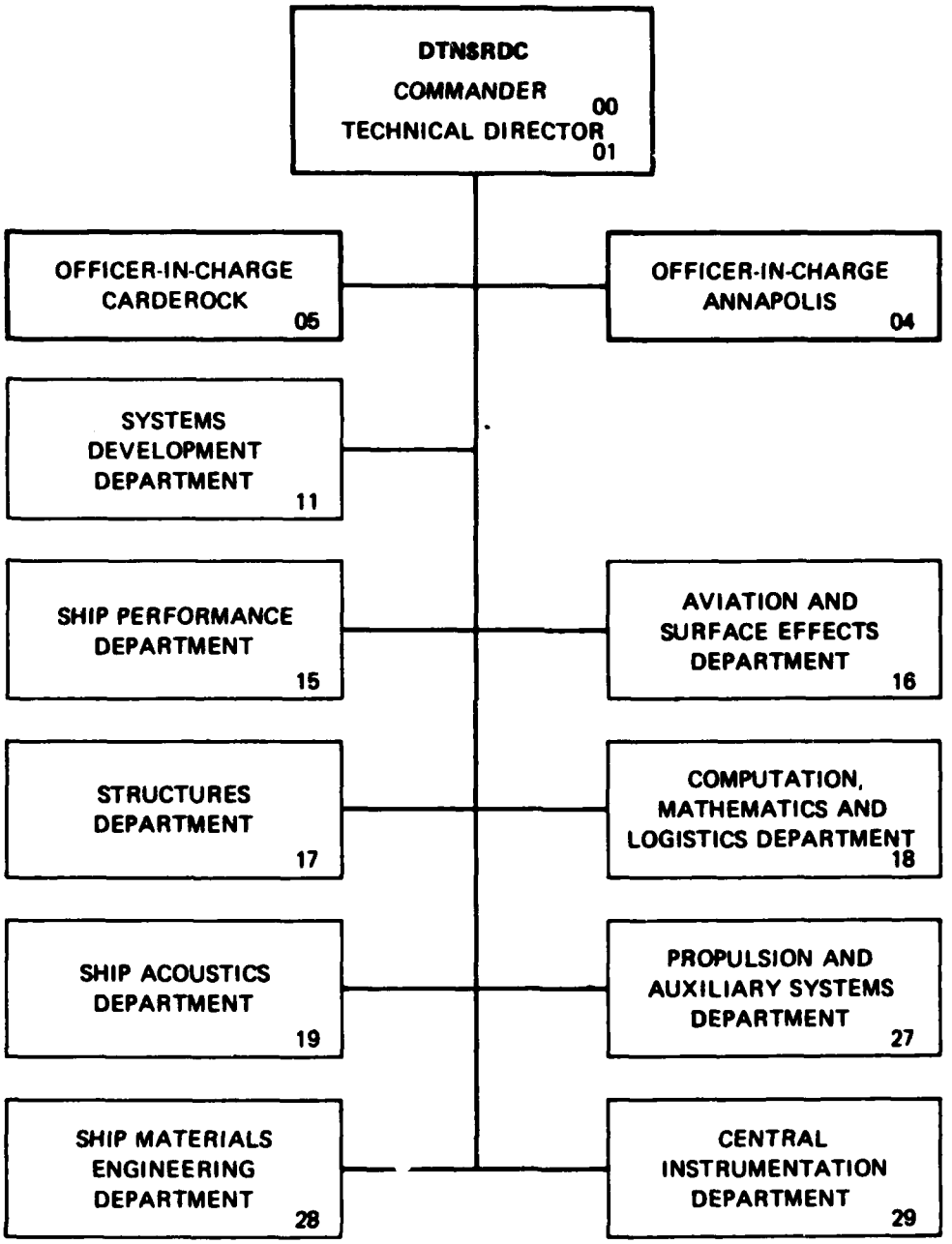
COMPUTATION, MATHEMATICS, AND LOGISTICS DEPARTMENT
DEPARTMENTAL REPORT

June 1983

DTNSRDC/CMLD-83/19

MAJOR DTNSRDC ORGANIZATIONAL COMPONENTS



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18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Economic Analysis	Break Even Point	Calcomp Plots
DISSPLA	Net Present Value	
FORTRAN	Savings to Investment Ratio	
Graphics	Equivalent Uniform Annual Cost	

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

An automated Economic Analysis Model computer program designed to aid equipment procurement decisions is described in this report. Net present value, equivalent uniform annual cost, break even points, and savings to investment ratio output are presented in graphical form. Sensitivity analyses presented include lease vs. procurement, varying recurring costs, and varying differential inflation rates. The program was originally developed in China Lake, California on a UNIVAC computer, but was converted by DTNSRDC to run on its Burroughs B7700 computer. Only the converted version is described in this report.

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Block 20 (Cont'd)

Included, are references to the documentation of the original UNIVAC version of the program. Although the program was originally designed for equipment procurement, it was successfully used for an economic analysis of an automated data processing system.

TABLE OF CONTENTS

ABSTRACT

An automated Economic Analysis Model computer program designed to aid equipment procurement decisions is described in this report. Net present value, equivalent uniform annual cost, break even points, and savings to investment ratio output are presented in graphical form. Sensitivity analyses presented include lease vs. procurement, varying recurring costs, and varying differential inflation rates. The program was originally developed in China Lake, California on a UNIVAC computer, but was converted by DTNSRDC to run on its Burroughs B7700 computer. Only the converted version is described in this report. Included, are references to the documentation of the original UNIVAC version of the program. Although the program was originally designed for equipment procurement, it was successfully used for an economic analysis of an automated data processing system.

1.0 INTRODUCTION

The Economic Analysis Model computer program, developed by the Naval Weapons Center (NWC) in China Lake, California on a UNIVAC computer, performs calculations (based on user specified costs) needed in the economic analysis process. The model was developed to address economic analyses related to equipment procurement. The output is mainly graphical and consists of net present value, equivalent uniform annual cost, break even analysis, and savings to investment ratio. A number of sensitivity analyses can be performed, including lease vs. procurement, varying recurring costs, and varying differential inflation rates. The program has been modified so that it can be run on the Burroughs computer at the David Taylor Naval Ship Research and Development Center (DTNSRDC). This report describes how to use the modified program.

2.0 PROGRAM DESCRIPTION

The Economic Analysis Program performs an economic analysis on data entered by the user. The program is at the working level and should not be used as the sole authority for action. The biggest advantage of the program is that it computes the results in a faster, and more efficient way than if the analysis was done by hand. This allows the user to enter several different approaches to the analysis without having to re-compute the costs each

time. The program will perform a regular analysis, perform a sensitivity analysis (nine different types), output plots of the results of the analysis, and output charts that show the computations of the net present values (NPVs), the equivalent uniform annual costs (EUACs), the savings to investment ratios (SIRs), and the break-even points.

In order to run the program the user must enter all the costs for each alternative (proposed project). No more than five alternatives are allowed for each analysis. The costs are entered in terms of non-recurring costs, recurring costs, and a terminal value. The recurring costs can be generated from curves built into the program. These curves are described in the NWC User's Guide for this program. The program also allows the user to enter a differential inflation rate.

After all the costs have been entered, the program will generate, for each alternative, a chart showing the input costs, the discounted costs, the net present value of these costs, the equivalent uniform annual cost, and, except for the status quo alternative, the savings-to-investment ratio. When all the charts have been completed, the program generates plots if requested. The first plot is a graph of the cumulative total cost of the status quo alternative, plotted against the cumulative total cost of the second alternative. Each alternative thereafter is plotted against the status quo. Next, the savings-to-investment ratio is plotted for every alternative except the status quo. The user has the option of saving this analysis in a file and should do so to avoid having to re-enter the costs if a sensitivity analysis is done. This completes the regular analysis.

The user may then want to perform a sensitivity analysis. This program supports nine types of sensitivity analysis:

1. Lease versus Procurement
2. Status Quo versus Procurement
3. Varying Start and/or Total Number of Years
4. Varying Recurring Costs
5. Varying Investment Costs
6. Varying Differential Inflation Rates
7. Varying Recurring Costs and Total Number of Years
8. Varying Investments and Recurring Costs
9. Varying Investments and Total Number of Years

These analyses are fairly easy to use and are further described in the NWC User's Guide, pages 10-15. Each sensitivity analysis provides its own set of charts and graphs.

3.0 BASIC ECONOMIC ANALYSIS CONCEPTS

Running the program requires some basic knowledge of the economic analysis process. This section briefly explains some basic concepts used in the model program.

3.1 DEFINITION OF ECONOMIC ANALYSIS

An Economic Analysis is defined in "Economic Analysis Procedures for ADP," Pub 15 7000, page E-3, as:

> "A systematic approach to quantifying, portraying, and evaluating the relative worth of proposed projects. Basically, it consists of six steps: stating the objective; listing assumptions; defining the alternatives; determining costs and benefits; comparing and ranking alternatives; and performing a sensitivity analysis."

An alternative is a proposed project. The status quo alternative is the system currently in use. The various alternatives are compared by their costs and by their non-monetary benefits. The Economic Analysis Model Program performs only cost analyses; it does not compare the non-monetary benefits of the alternatives. Any non-monetary benefits should be stated in the formal report of the analysis.

3.2 THE ECONOMIC ANALYSIS PROCESS

Every economic analysis involves several steps:

1. State the goal or objective of the analysis. This will help when considering what alternatives to use.
2. Decide what assumptions will be used. These assumptions are statements or descriptions of the present or future environment on which the economic analysis is based. They must be valid and as accurate as possible since the validity of the results of an economic analysis are only as valid as the input data.
3. Find all reasonable alternatives that will meet the goals stated in the first step.

4. Gather the costs and benefits associated with each alternative. These costs are either non-recurring (one-time), or recurring (annual). Also, decide whether there is a terminal value (a salvage or resale value).
5. Compare these costs and benefits. The several methods for comparison will be discussed in Section 5.3.
6. Perform a sensitivity analysis to show the outcome of major uncertainties. A sensitivity analysis is used to examine the effects of as many major uncertainties as possible, for example, "What if the system life is ten years instead of eight?"

Keep in mind that an economic analysis is only <u>one</u> factor in the decision making process and should not be the sole basis for a decision.

3.3 STARTING THE ECONOMIC ANALYSIS PROCESS

Determine the alternatives to be considered.

Determine the economic life for each alternative.

Determine the costs for each alternative.

These costs are broken down in the following manner:

1. Decide which costs are non-recurring (one-time), and which are recurring (annual). Also determine the terminal value (the resale or salvage value, if any).
2. Further break down the non-recurring costs into
   a) Building investments
   b) Equipment investments
3. Further break down the recurring costs into
   a) Maintenance costs
   b) Operations costs
   c) Direct costs
4. Decide whether these costs will inflate at a normal rate or require an inflation differential. If the latter, determine what that differential should be (e.g., 1% more than the normal rate, 1% less than the normal rate etc.).

These data can now be input to the program.

4.0 RUNNING THE PROGRAM

Since the program is interactive, all the needed input figures should be on hand before starting the program (see Section 5.0 of this report and Appendix A). To run the program sign on to the Burroughs CANDE from either a Tektronix terminal or a regular terminal (one without graphics capabilities). If the terminal is not capable of displaying graphics, the user can either route the plots to the central site, or request that no plots be given. To run the program type:

RUN (CASB)ECON; MAXPROCTIME=300;

and return. The program will start directly afterwards. The "MAXPROCTIME=300" option is not required for smaller analyses (those whose economic lives are under 15 years), but it is recommended that this option always be used.

4.1 USING THE TEKTRONIX TERMINAL

The Tektronix terminals are located in the 6400 room in Building 91 at DTNSRDC. Turn on the terminal and, before connecting with the Burroughs, initialize it as follows:

1 - Flip the "line/local" switch to "local."

2 - Press the "RESET PAGE" button.

3 - Press the "SHIFT" button and hold it down while pressing the "CTRL" button, hold both buttons down and press "P". Then release all three buttons simultaneously.

4 - Flip the "line/local" switch back to "line."

5 - Dial the Burroughs number and sign on.

6 - After signing on press the "ESC" button followed by the ";" (semicolon). The cursor should appear very small, if it is not already.

If this procedure does not work, repeat the process, but in step #2:

- Press the "SHIFT" button and hold it down while pressing the "RESET PAGE" button. Release both buttons simultaneously.

The rest of the steps are done as before.

4.1.1 Character Sizes

The Burroughs system does not have the capability to set the character sizes (on the Tektronix terminal) from within a computer program. The

character size can be set from the terminal by pressing the "ESC" key followed by either "8", "9", ":", or ";" to obtain the desired size. The user should use "ESC ;" for this program so that the "Reset Page/Copy" prompt will appear at the proper place on the CRT screen.

4.2 OUTPUT TO THE CENTRAL SITE

When the user specifies the central site as the output location, the program stores all the plots in a plotfile which is kept in the user's files. Only one plotfile is allowed in the user's files, so every time this program is run with the central site option, any previous plotfile is removed (DESTROYED!!) and replaced with the current plotfile. The user should obt ı hard copies of all important plotfiles before running the program again. look at the plotfile before putting it on a Calcomp plotter, enter the following command from a Tektronix terminal:

```
RUN *DISPOST/TEK300; MAXPROCTIME=300;
```

The "MAXPROCTIME=300" command is optional, but it is needed for plotfiles which contain a large number of plots, and therefore it is always advisable to use it. After this command has been entered, the terminal will respond with:

```
ENTER SPECIAL REQUESTS
?
```

Press the space bar a few times and return. The screen will go blank and the first plot will appear.

When the first plot is complete, the terminal will beep. If a hard copy is desired, press the copy button and return. The next plot will then appear. When all the plots have been plotted, the screen will respond with:

```
**********END POST PROCESSOR**********
```

If Calcomp plots are desired, obtain a 9-track tape and put it in a slot at the Burroughs site. Then enter the following commands replacing all words inside "< >"'s with the correct information (These commands are executed interactively from CANDE):

```
START *JOB/MOUNT ("<TAPENAME>","RING")
RUN *DISPOST/CAL1051;FILE  FILE10(TITLE=PLOTFILE,SERIALNO=("<TAPENAME>"));
```

After a small delay (the operator is mounting the tape), the response will be:

```
ENTER SPECIAL REQUESTS
?
```

Press the return button. After a series of messages the terminal will display "n plots processed" (n = number of plots). At this point the plots are on the tape. Retrieve the tape and submit it, along with a Calcomp request (see Figure 1), to the operator at the CDC site.

4.3 OUTPUT TO THE TERMINAL

Graphs can be plotted directly to the terminal only when the program is run from a Tektronix terminal. The graphs will be plotted after the charts are completed. When the plotting is finished, the terminal will beep. To obtain a copy of the plot, press the copy button. Then press the return button and the next plot will appear or, if the plotting is finished, the program will continue with further instructions.

4.4 FILES

The user can save the input data in a file so that the data need not be re-entered if a secondary analysis is done. In order to read data from a file, the file must have been created by this program. The user must supply a name for each file. The name must be no longer than twelve characters (letters, numbers, or a slash) and must end with a period. The period, which is not part of the file name, merely indicates the end of the file name. The program will check to make sure the file name is legal. Requesting a file name that is <u>not</u> one of the files created by this program, will abo.t the program. If the user writes to a file that already exists, the program will write over the file, destroying the original copy. The user is advised to save the data in a file so that it need not be re-entered if the same analysis is used again, especially if sensitivity analyses are to be done.

5.0 REGULAR ANALYSIS

Before running the Economic Analysis Program the user should have all input costs on hand (unless they are in a file). The program allows up to five alternatives. The first alternative is always the status quo. No investment costs (non-recurring) can be entered for the status quo alternative.

Five types of costs may be entered and should be known before running the program:

Building Investments - Nonrecurring, not allowed for status quo

CMLD CALCOMP / COM REQUEST SECRET CONFIDENTIAL PRIVATE OFFICAL USE

DATE	JOB ORDER #	USER NAME	USER ID	CODE	EXT
<11/11/83>	<0-0000-000-00>	<Your Name>	<CAXX>	<0000>	<00000>

SYSTEM	TAPE ID	DENSITY	TRACKS	LABELLED	DATE RUN
CDC (B7700)	<TAPE NAME>	200 556 800 (1600)	7 (9)	YES (NO)	<11/11/83>

CALCOMP			COM	TOTAL TIME
STD SETUP (YES) NO	PAPER #	ORIGIN X Ø Y Ø	COM PROCEDURE NAME	TOTAL FIC /FRMS
START BLOCK	STOP BLOCK	NO BLOCKS/FILES	FORM FLASH STD NONE _____	OPERATOR/COMMENTS
PEN (1) 2 3 COLOR Black Pentrel		EST TIME	NO OF FILES NO OF FICHE _____ _____	

SPECIAL INSTRUCTIONS

Figure 1 - Calcomp requests

Equipment Investments - Nonrecurring, not allowed for status quo

Maintenance Costs - Recurring

Operations Costs - Recurring

Direct Costs - Recurring

The recurring costs (Maintenance, Operations, and Direct) may be entered in one of two ways: key each cost in individually, or select the curve (see the NWC user's manual, pages 6-8) that best fits the direction of the costs and use that curve to input the costs. This procedure is explained in detail in the NWC User's Manual.

The user is also required to input a terminal value, also known as a resale value or a restoration value. If no such value exists, enter 0.0. Don't forget the decimal point. For a resale value enter that number (it should be positive). For a restoration value, enter the value with a negative sign preceding it. The program subtracts the terminal value from the total, so a restoration value it gets added to the total costs, because of its negative sign. After all the costs have been entered, the program will display the results (NPV, EUAC, and SIR) in a chart. When the chart is complete, the terminal will display:

END OF PAGE. IF YOU WANT A COPY PRESS THE COPY BUTTON*

HIT THE RESET BUTTON, ***AND RETURN.

At this point the user should obtain a hard copy of the results by pressing the "COPY" button (if the output is routed to the terminal and a hard copy is not obtained, the program must be re-run to obtain a hard copy). Then press the "RESET PAGE" button. When the screen is clear, press the "RETURN" button. The heading will appear, and the program will continue.

5.1 SIR WARNING

If the the total investment cost equals zero, following message will appear:

ERROR THE SIR is in ERROR because Investment=0.

ALL SIR FIGURES AND GRAPHS WILL BE INCORRECT!!

The economic analysis will continue, but the SIR figure will be set to zero, and the "TOTAL INVESTMENT VS TOTAL SAVINGS" graph will be incorrect. These graphs and figures cannot be used in the analysis, although the other figures and graphs can.

5.2 EUAC WARNING

If the computed discount rates are zero, the program will give the following warning message:

WARNING THE EUAC IS IN ERROR

ALL EUAC FIGURES AND GRAPHS WILL BE INCORRECT!!

This situation rarely occurs and is usually due to a typing error in the start years or total years. Check the input figures for mistakes and re-enter the data if necessary. As with the SIR warning, no EUAC figures or graphs should be used in comparing the alternatives.

5.3 EVALUATION OF OUTPUT

When the final charts and graphs have been obtained the user must know which methods for comparing alternatives are applicable to the specific analysis. The model program outputs results for four different methods.

Net Present Value Analysis (NPV) - This type of analysis, which gives the costs in terms of their present values, is used only when the economic lives of all the alternatives are equal. If the lives are not equal, the program will still compute a Present Value, but it cannot be used as a factor in comparing alternatives.

Equivalent Uniform Annual Cost (EUAC) - This type of analysis is used when the economic lives of the alternatives are not equal. It gives the costs in terms of average annual expenditures. This method can be used for any analysis regardless of the length of the economic lives of the alternatives.

Savings to Investment Ratio (SIR) - This method measures the financial benefit obtained from an alternative as compared to the status quo. A SIR greater than 1.0 is considered economically sound.

Break Even Analysis (BE) - This type of analysis is used to study the relationship among alternative cost patterns. It gives the Break-Even point, i.e., the point at which the costs of all the alternatives are equal.

6.0 CONCLUSION

Although this program was originally designed for analyses of equipment procurement it was successfully used for economic analysis of an automated data processing system.

ACKNOWLEDGEMENTS

The author would like to thank Stan Wilner of User Services for his help in debugging the modified program, and Jim O'Donnell for his help in understanding the economic analysis process.

APPENDIX A

SAMPLE RUN - REGULAR ANALYSIS

```
RUN ECON;  MAXPROCTIME=300;

$SCHD 8786
$RUNNING 8786
$$$ END OF PAGE    IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$.   $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN
$?
```

```
NAVAL WEAPONS CENTER ECONOMIC ANALYSIS MODEL - MAY 1981          (DODINST 7041.3)          PAGE:  1

OUTPUT TO TERMINAL-0, OR CENTRAL-SITE-1?
0
IS THIS A REGULAR ANALYSIS (0),
OR A SENSITIVITY ANALYSIS (1)?
ENTER 0 OR 1
0
DO YOU WISH PLOTS? 1-YES, 0-NO
1
DO YOU WISH TO ENTER THE DATA (0), OR DOES IT
EXIST IN A FILE (1).  ENTER 0 OR 1
0
PRIMARY (0) OR SECONDARY (1) ANALYSIS
ENTER 0 OR 1
0
ENTER FY DOLLAR YEAR OF INPUT COSTS, AND
FY DOLLAR YEAR OF OUTPUT COSTS - EG 78,79
82,83
INPUT COSTS IN THOUSANDS (K) OR MILLIONS (M) OF $
ENTER K OR M
K
ENTER STARTING (BASE) FY - EG 1979
1982

IF NO DATA FOR A PARTICULAR TYPE OF COST (EG MAINT),
ENTER 0,0 (NO DECIMAL POINTS) WHEN NO. OF YEARS AND
START YEAR ARE REQUESTED FOR THAT TYPE.

A MAXIMUM OF -45- YEARS FROM THE BASE YEAR IS ALLOWED.

ALL COSTS ENTERED MUST INCLUDE DECIMAL POINTS -
AND IF MORE THAN ONE ARE ENTERED AT A TIME - THEY
MUST BE SEPARATED BY COMMAS.

ENTER NUMBER OF ALTERNATIVES -
INCLUDING STATUS QUO!  MAXIMUM OF 5
3
THE FOLLOWING DATA REQUESTS WILL BE REPEATED FOR EACH
ALTERNATIVE - STATUS QUO -MUST- BE ENTERED FIRST!

ENTER TITLE OF THIS ALTERNATIVE
STATUS QUO - EXAMPLE
ENTER NO. OF YEARS & START YEAR
FOR MAINTENANCE - EG 10,1979
13,1982
DO YOU WISH TO ENTER THE COSTS FOR ALL YEARS (0) OR
HAVE THE PROGRAM GENERATE THEM(1)?  ENTER 0 OR 1
0
ENTER MAINTENANCE COSTS FOR EACH YEAR WHERE COSTS EXIST
132.18,371.4,403.12,454.01,507.7,585.0,614.9,642.3,766.2,
775.8,812.5,827.9,904.6
### END OF PAGE   IF YOU WANT A COPY PRESS THE
COPY BUTTON ###.  ### HIT THE RESET BUTTON ###,### AND RETURN
```

```
ENTER NO. OF YEARS & START YEAR
FOR OPERATIONS - EG 10,1979
13,1982
DO YOU WISH TO ENTER THE COSTS FOR ALL YEARS (0) OR
HAVE THE PROGRAM GENERATE THEM(1)?  ENTER 0 OR 1
1
ENTER FISCAL YEAR IN WHICH COST OCCURS, COST
(WITH DECIMAL POINT), NO. OF THE CURVE DESIRED,
AND FISCAL YEAR IN WHICH THE CURVE BEGINS.
EG  1977,40.,12,1978
1983,27.8,23,1982    1
ENTER NO. OF YEARS & START YEAR
FOR DIRECT COSTS - EG 10,1978
13,1982
DO YOU WISH TO ENTER THE COSTS FOR ALL YEARS (0) OR
HAVE THE PROGRAM GENERATE THEM(1)?  ENTER 0 OR 1
0
ENTER DIRECT COSTS FOR EACH YEAR WHERE COSTS EXIST
1001.1,0.,0.,0.,1009.3,0.,0.,0.,1016.4,0.,0.,0.,1033.3
ENTER TERMINAL OR RESALE VALUE, IF ANY
IF ENTERING A RESTORATION COST - DOLLAR
VALUE MUST BE NEGATIVE. EG -3.2
0.
ENTER INFLATION DIFFERENTIAL FOR EACH OF THE
FOLLOWING - IN THE ORDER SPECIFIED:
BUILD INVEST, EQUIP INVEST, MAINTENANCE, OPERATIONS,
DIRECT COSTS, TERMINAL VALUE.  NO DECIMAL POINTS -
BUT THEY MUST BE SEPARATED BY COMMAS.  -6- VALUES
MUST BE ENTERED - EG 3,3,-2,0,0,3
0,0,0,0,0,0
DO YOU WISH A LISTING OF THE INPUTS
FOR THIS ALTERNATIVE? Y-YES, N-NO
Y
$$$ END OF PAGE   IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$.  $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN
```

NAVAL WEAPONS CENTER ECONOMIC ANALYSIS MODEL - MAY 1981 (DODINST 7041.3) PAGE: 3

OPTION 1 - STATUS QUO - EXAMPLE
COSTS IN FY82 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
MAINTENANCE	132.8	371.4	403.1	454.0	507.7	585.0	614.9	642.3	766.2	775.8	812.5	827.0	0.0
OPERATIONS	27.8	38.0	36.8	42.3	48.7	56.0	64.4	74.1	85.3	98.1	112.8	129.8	149.3
DIRECT COSTS	1001.1	0.0	0.0	0.0	1009.3	0.0	0.0	0.0	1016.4	0.0	0.0	0.0	1033.3
TERM. VALUE	0.0												

*** END OF PAGE IF YOU WANT A COPY PRESS THE
COPY BUTTON ***. *** HIT THE RESET BUTTON ***,*** AND RETURN

```
IF YOU WISH TO CORRECT ANY OF THE INPUTS FOR
THIS ALTERNATIVE - ENTER 1 FOR BUILD INVEST,
2 FOR EQUIP INVEST, 3 FOR MAINT, 4 FOR OPERS,
5 FOR DIRECT, 6 FOR TERM VALUE, 7 FOR INFLAT DIF.
IF NO CORRECTIONS OR CORRECTIONS COMPLETE, ENTER 0
0
DO YOU WISH A LISTING OF THE INPUTS
FOR THIS ALTERNATIVE? Y-YES, N-NO
N

ENTER TITLE OF THIS ALTERNATIVE
ALTERNATIVE 1 - EXAMPLE
ENTER NO. OF YEARS & START YEAR
FOR BUILDING INVESTMENT - EG 3,1978
13,1982
ENTER BUILDING INVESTMENT COSTS FOR EACH YEAR
WHERE COSTS EXIST
160.6,281.8,403.1,524.3,645.6,766.8,888.1,1009.1,
1130.63,1251.8,1373.1,1494.4,1615.6
ENTER NO. OF YEARS & START YEAR
FOR EQUIPTMENT INVESTMENT - EG 3,1978
0,0
ENTER NO. OF YEARS & START YEAR
FOR MAINTENANCE - EG 10,1979
13,1982
DO YOU WISH TO ENTER THE COSTS FOR ALL YEARS (0) OR
HAVE THE PROGRAM GENERATE THEM(1)?  ENTER 0 OR 1
1
ENTER FISCAL YEAR IN WHICH COST OCCURS, COST
(WITH DECIMAL POINT), NO. OF THE CURVE DESIRED,
AND FISCAL YEAR IN WHICH THE CURVE BEGINS.
EG  1977,40.,12,1978
1983,25.4,2,1982
ENTER NO. OF YEARS & START YEAR
FOR OPERATIONS - EG 10,1979
13,1982
DO YOU WISH TO ENTER THE COSTS FOR ALL YEARS (0) OR
HAVE THE PROGRAM GENERATE THEM(1)?  ENTER 0 OR 1
0
ENTER OPERATIONS COSTS FOR EACH YEAR WHERE COSTS EXIST
132.18,164.37,196.55,228.7,260.9,293.1,325.3,357.4,
389.6,421.8,454.0,486.2,518.3
ENTER NO. OF YEARS & START YEAR
FOR DIRECT COSTS - EG 10,1978
0,0
ENTER TERMINAL OR RESALE VALUE, IF ANY
IF ENTERING A RESTORATION COST - DOLLAR
VALUE MUST BE NEGATIVE. EG -3.2
22.7
ENTER INFLATION DIFFERENTIAL FOR EACH OF THE
FOLLOWING - IN THE ORDER SPECIFIED:
BUILD INVEST, EQUIP INVEST, MAINTENANCE, OPERATIONS,
DIRECT COSTS, TERMINAL VALUE.  NO DECIMAL POINTS -
BUT THEY MUST BE SEPARATED BY COMMAS.  -6- VALUES
MUST BE ENTERED - EG 3,3,-2,0,0,3
0,0,0,0,0,0
DO YOU WISH A LISTING OF THE INPUTS
FOR THIS ALTERNATIVE? Y-YES, N-NO
Y
$$$ END OF PAGE   IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$.  $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN
```

NAVAL WEAPONS CENTER ECONOMIC ANALYSIS MODEL - MAY 1981 (DODINST 7041.3) PAGE: 5

OPTION 2 - ALTERNATIVE 1 - EXAMPLE
COSTS IN FY82 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
INVEST BUILD	160.6	281.8	403.1	524.3	645.6	766.8	888.1	1009.1	1130.6	1251.8	1373.1	1494.4	1615.5
MAINTENANCE	25.4	25.7	25.8	26.2	26.4	26.7	26.9	27.2	27.4	27.7	27.9	28.2	28.4
OPERATIONS	132.2	164.4	196.6	228.7	260.9	293.1	325.3	357.4	389.6	421.8	454.0	486.2	518.3
DIRECT COSTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TERM. VALUE	22.7												

$$$ END OF PAGE IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$. $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN

```
IF YOU WISH TO CORRECT ANY OF THE INPUTS FOR
THIS ALTERNATIVE - ENTER 1 FOR BUILD INVEST,
2 FOR EQUIP INVEST, 3 FOR MAINT, 4 FOR OPERS,
5 FOR DIRECT, 6 FOR TERM VALUE, 7 FOR INFLAT DIF.
IF NO CORRECTIONS OR CORRECTIONS COMPLETE, ENTER 0
0
DO YOU WISH A LISTING OF THE INPUTS
FOR THIS ALTERNATIVE? Y-YES, N-NO
N

ENTER TITLE OF THIS ALTERNATIVE
ALTERNATIVE 2 - EXAMPLE
ENTER NO. OF YEARS & START YEAR
FOR BUILDING INVESTMENT - EG 3,1978
0,0
ENTER NO. OF YEARS & START YEAR
FOR EQUIPTMENT INVESTMENT - EG 3,1978
13,1982
ENTER EQUIPTMENT INVESTMENT COSTS FOR EACH YEAR
WHERE COSTS EXIST
1606.,221.2,281.8,342.5,403.1,463.7,524.3,585.,645.3,706.2,
0.,0.,0.
ENTER NO. OF YEARS & START YEAR
FOR MAINTENANCE - EG 10,1979
13,1982
DO YOU WISH TO ENTER THE COSTS FOR ALL YEARS (0) OR
HAVE THE PROGRAM GENERATE THEM(1)? ENTER 0 OR 1
1
ENTER FISCAL YEAR IN WHICH COST OCCURS, COST
(WITH DECIMAL POINT), NO. OF THE CURVE DESIRED,
AND FISCAL YEAR IN WHICH THE CURVE BEGINS.
EG 1977,40.,12,1978
1982,27.8,23,1982
ENTER NO. OF YEARS & START YEAR
FOR OPERATIONS - EG 10,1979
13,1982
DO YOU WISH TO ENTER THE COSTS FOR ALL YEARS (0) OR
HAVE THE PROGRAM GENERATE THEM(1)? ENTER 0 OR 1
0
ENTER OPERATIONS COSTS FOR EACH YEAR WHERE COSTS EXIST
1606.,221.2,281.8,342.5,403.1,463.7,524.3,585.,645.6,
706.2,766.8,827.5,888.1,
ENTER NO. OF YEARS & START YEAR
FOR DIRECT COSTS - EG 10,1978
0,0
ENTER TERMINAL OR RESALE VALUE, IF ANY
IF ENTERING A RESTORATION COST - DOLLAR
VALUE MUST BE NEGATIVE. EG -3.2
57.7
ENTER INFLATION DIFFERENTIAL FOR EACH OF THE
FOLLOWING - IN THE ORDER SPECIFIED:
BUILD INVEST, EQUIP INVEST, MAINTENANCE, OPERATIONS,
DIRECT COSTS, TERMINAL VALUE. NO DECIMAL POINTS -
BUT THEY MUST BE SEPARATED BY COMMAS. -6- VALUES
MUST BE ENTERED - EG 3,3,-2,0,0,3
0,0,0,0,0,0
DO YOU WISH A LISTING OF THE INPUTS
FOR THIS ALTERNATIVE? Y-YES, N-NO
Y
$$$ END OF PAGE  IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$.  $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN
```

OPTION 3 - ALTERNATIVE 2 - EXAMPLE
COSTS IN FY82 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
INVEST EQUIP	1606.0	221.2	281.8	342.5	403.1	463.7	524.3	585.0	645.3	706.2	0.0	0.0	0.0
MAINTENANCE	32.0	36.8	42.3	48.7	56.0	64.4	74.1	85.3	98.1	112.8	129.8	149.3	171.8
OPERATIONS	160.6	221.2	281.8	342.5	403.1	463.7	524.3	585.0	645.6	706.2	766.8	827.5	888.1
DIRECT COSTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TERM. VALUE	57.7												

END OF PAGE IF YOU WANT A COPY PRESS THE COPY BUTTON ###. ### HIT THE RESET BUTTON ###,### AND RETURN

```
NAVAL WEAPONS CENTER ECONOMIC ANALYSIS MODEL - MAY 1981          (DODINST 7041.3)          PAGE:  8

IF YOU WISH TO CORRECT ANY OF THE INPUTS FOR
THIS ALTERNATIVE - ENTER 1 FOR BUILD INVEST,
2 FOR EQUIP INVEST, 3 FOR MAINT, 4 FOR OPERS,
5 FOR DIRECT, 6 FOR TERM VALUE, 7 FOR INFLAT DIF.
IF NO CORRECTIONS OR CORRECTIONS COMPLETE, ENTER 0
2
ENTER NO. OF YEARS & START YEAR
FOR EQUIPTMENT INVESTMENT - EG 3,1978
13,1982
ENTER EQUIPTMENT INVESTMENT COSTS FOR EACH YEAR
WHERE COSTS EXIST
1333.0,0..0..0..117.9,0..,0..,0.,778.6,0..,0..,0.,405.3
NEXT CHANGE
0
DO YOU WISH A LISTING OF THE INPUTS
FOR THIS ALTERNATIVE? Y-YES, N-NO
Y
$$$ END OF PAGE   IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$.  $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN
```

OPTION 3 - ALTERNATIVE 2 - EXAMPLE
COSTS IN FY82 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
INVEST EQUIP	1333.0	0.0	0.0	0.0	117.9	0.0	0.0	0.0	778.6	0.0	0.0	0.0	405.3
MAINTENANCE	32.0	36.8	42.3	48.7	56.0	64.4	74.1	85.3	98.1	112.8	129.8	149.3	171.8
OPERATIONS	160.6	221.2	281.8	342.5	403.1	463.7	524.3	585.0	645.6	706.2	766.8	827.5	888.1
DIRECT COSTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TERM. VALUE	57.7												

*** END OF PAGE *** IF YOU WANT A COPY PRESS THE COPY BUTTON ***. *** HIT THE RESET BUTTON ***,*** AND RETURN

NAVAL WEAPONS CENTER ECONOMIC ANALYSIS MODEL - MAY 1981 (DODINST 7041.3) PAGE: 10

ANY MORE CHANGES? 1-YES, 0-NO
0

OPTION 1 - STATUS QUO - EXAMPLE
INPUT COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
MAINTENANCE	141.8	398.5	432.5	487.2	544.8	627.7	659.8	689.2	822.1	832.4	871.8	887.4	9.7	7404.9
OPERATIONS	29.8	34.3	39.5	45.4	52.2	60.1	69.1	79.5	91.5	105.3	121.1	139.3	160.2	1027.4
DIRECT COSTS	1074.2	0.0	0.0	0.0	1083.0	0.0	0.0	0.0	1090.6	0.0	0.0	0.0	1108.7	4356.5
TOTAL	1245.8	432.8	472.0	532.6	1680.0	687.8	728.9	768.7	2004.2	937.7	992.9	1026.7	1278.6	12788.8

DISCOUNTED COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
MAINTENANCE	135.3	345.6	341.0	348.1	354.9	371.8	355.2	337.3	365.8	336.7	320.6	296.7	2.9	3912.9
OPERATIONS	28.5	29.8	31.1	32.5	34.0	35.6	37.2	38.9	40.7	42.6	44.5	46.6	48.7	490.7
DIRECT COSTS	1024.6	0.0	0.0	0.0	705.5	0.0	0.0	0.0	485.3	0.0	0.0	0.0	337.0	2552.4
PRESNT VALUE	1188.3	375.3	372.1	381.6	1094.5	407.4	392.5	376.3	891.8	379.3	365.1	343.2	388.6	6956.0

EQUIV. UNIFORM ANNUAL COST = 933.3
DIFFER INFLAT RATES BUILD = 0, EQUIP = 0, MAINT = 0, OPERS = 0, DIRCT = 0, TERM VALUE = 0
END OF PAGE IF YOU WANT A COPY PRESS THE
COPY BUTTON ###. ### HIT THE RESET BUTTON ###,### AND RETURN

OPTION 2 - ALTERNATIVE 1 - EXAMPLE
INPUT COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
INVEST BUILD	172.3	302.4	432.6	562.6	692.7	822.8	952.9	1082.8	1213.2	1343.2	1473.3	1603.5	1733.4	12387.6
MAINTENANCE	27.3	27.5	27.8	28.1	28.3	28.6	28.9	29.1	29.4	29.7	30.0	30.2	30.5	375.4
OPERATIONS	141.8	176.4	210.9	245.4	279.9	314.5	349.0	383.5	418.0	452.6	487.1	521.7	556.1	4537.1
TERM. VALUE														24.4
TOTAL	341.4	506.3	671.2	836.0	1001.0	1165.9	1330.9	1495.4	1660.6	1825.5	1990.4	2155.4	2320.1	17275.7

DISCOUNTED COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
INVEST BUILD	164.4	262.2	341.8	403.2	451.3	487.3	513.1	530.0	539.8	543.3	541.8	536.1	526.8	5840.1
MAINTENANCE	26.0	23.9	21.9	20.1	18.5	16.9	15.5	14.3	13.1	12.0	11.0	10.1	9.3	212.6
OPERATIONS	135.3	152.9	166.2	175.9	182.4	186.3	187.9	187.7	186.0	183.1	179.1	174.4	169.0	2266.2
TERM. VALUE														7.4
PRESNT VALUE	325.6	439.0	529.1	599.1	652.1	690.5	716.5	731.9	738.9	738.4	732.0	720.6	705.1	8311.5
SAVINGS - PV	1027.0	198.5	183.9	185.7	893.6	204.2	189.0	174.3	698.7	184.2	175.0	158.7	210.3	4477.1

SIR = 0.8
BREAKEVEN POINT = 19.48
THE BREAKEVEN POINT FOR THE ABOVE PROCUREMENT DID NOT
OCCUR WITHIN THE ANALYSIS PERIOD. -BE- MAY BE ERRONEOUS!
EQUIV. UNIFORM ANNUAL COST = 1115.2
DIFFER INFLAT RATES BUILD = 0, EQUIP = 0, MAINT = 0, OPERS = 0, DIRCT = 0, TERM VALUE = 0
$$$ END OF PAGE IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$. $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN

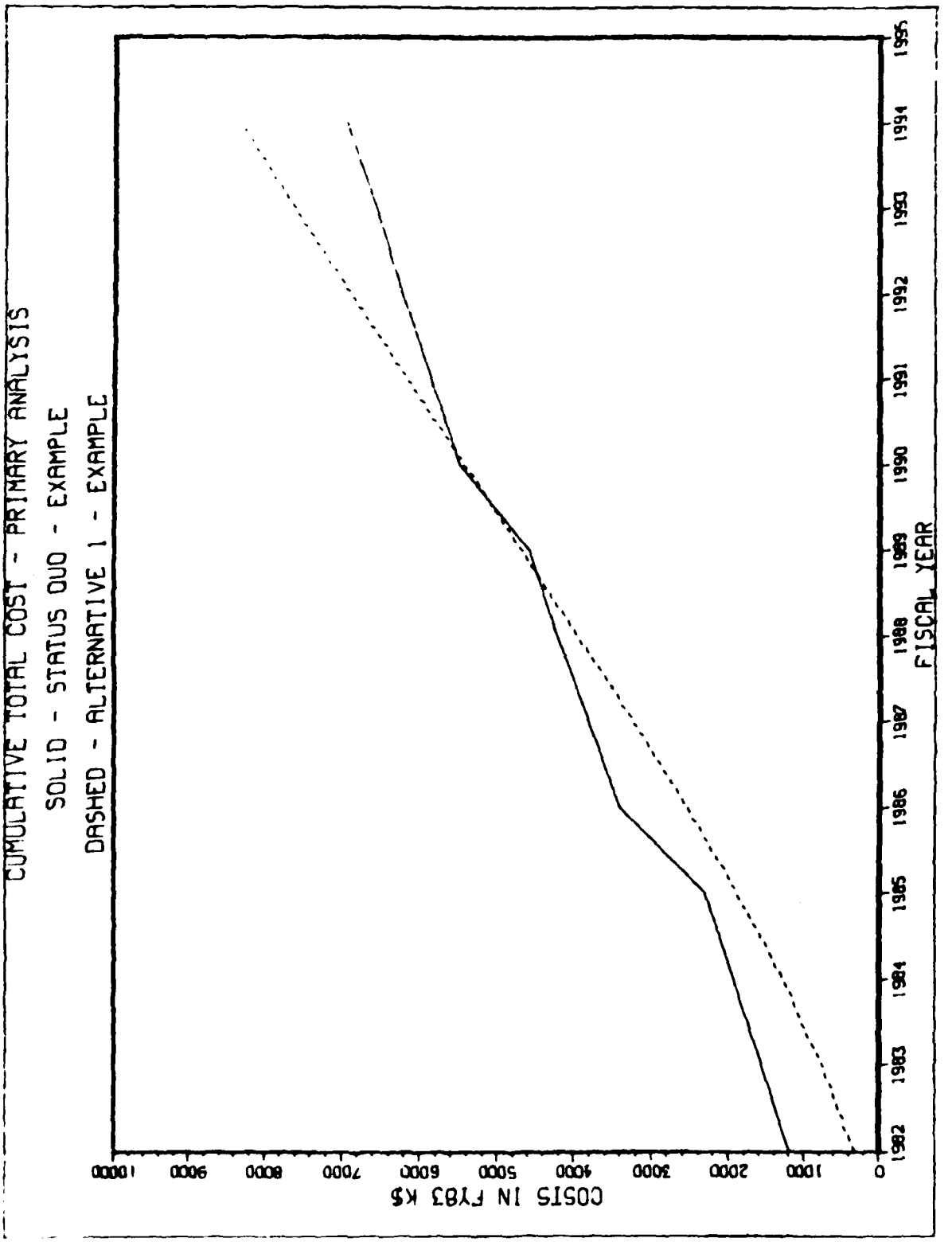
OPTION 3 - ALTERNATIVE 2 - EXAMPLE
INPUT COSTS IN FY83 K$

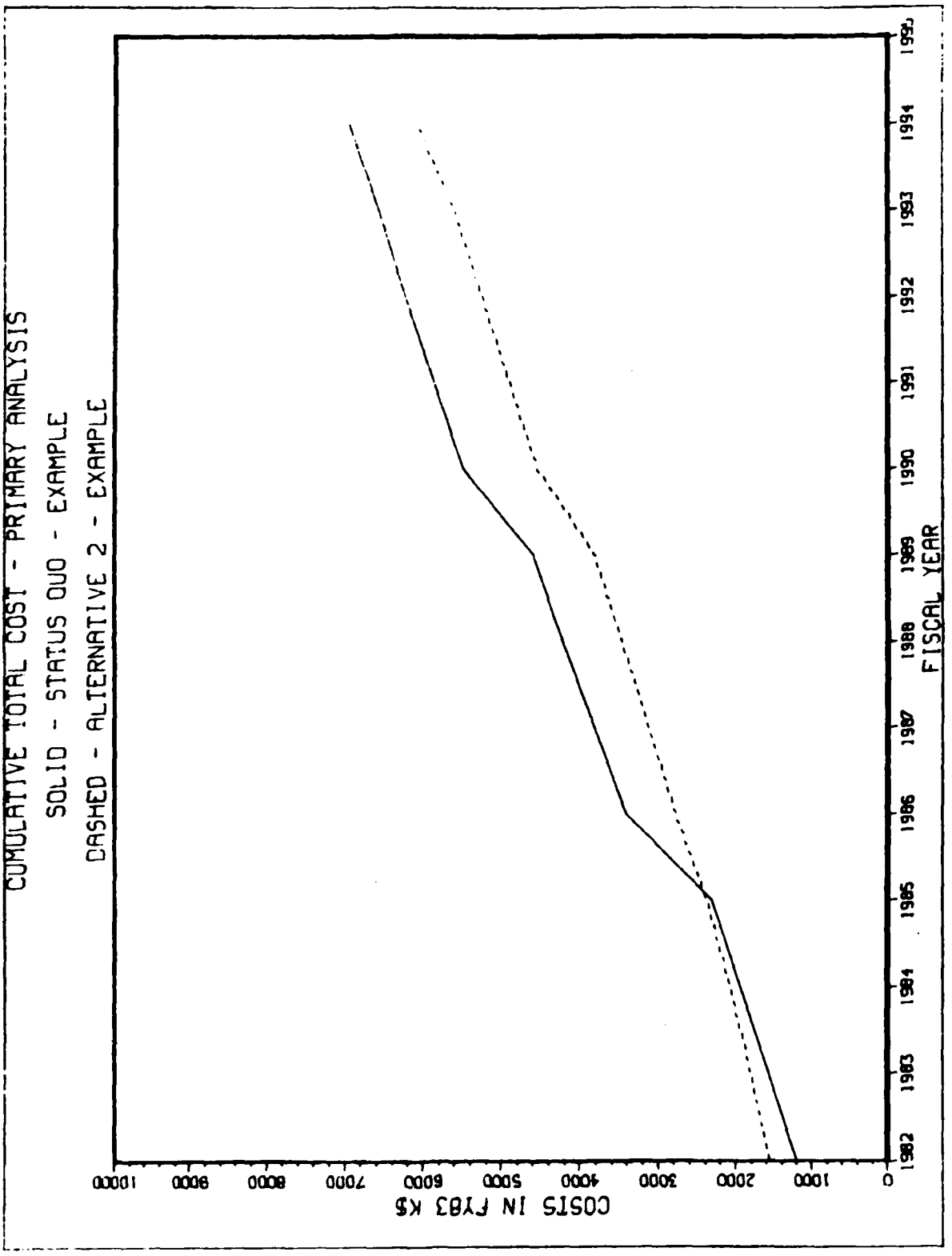
FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
INVEST EQUIP	1430.3	0.0	0.0	0.0	126.5	0.0	0.0	0.0	835.4	0.0	0.0	0.0	434.9	2827.1
MAINTENANCE	34.3	39.5	45.4	52.2	60.1	69.1	79.5	91.5	105.3	121.1	139.3	160.2	184.3	1181.9
OPERATIONS	178.3	237.3	302.4	367.5	432.5	497.6	562.6	627.7	692.7	757.8	822.8	887.9	952.9	7314.0
TERM. VALUE														61.9
TOTAL	1636.9	276.8	347.8	419.7	619.1	566.7	642.1	719.2	1633.4	878.8	962.1	1048.2	1572.2	11261.2

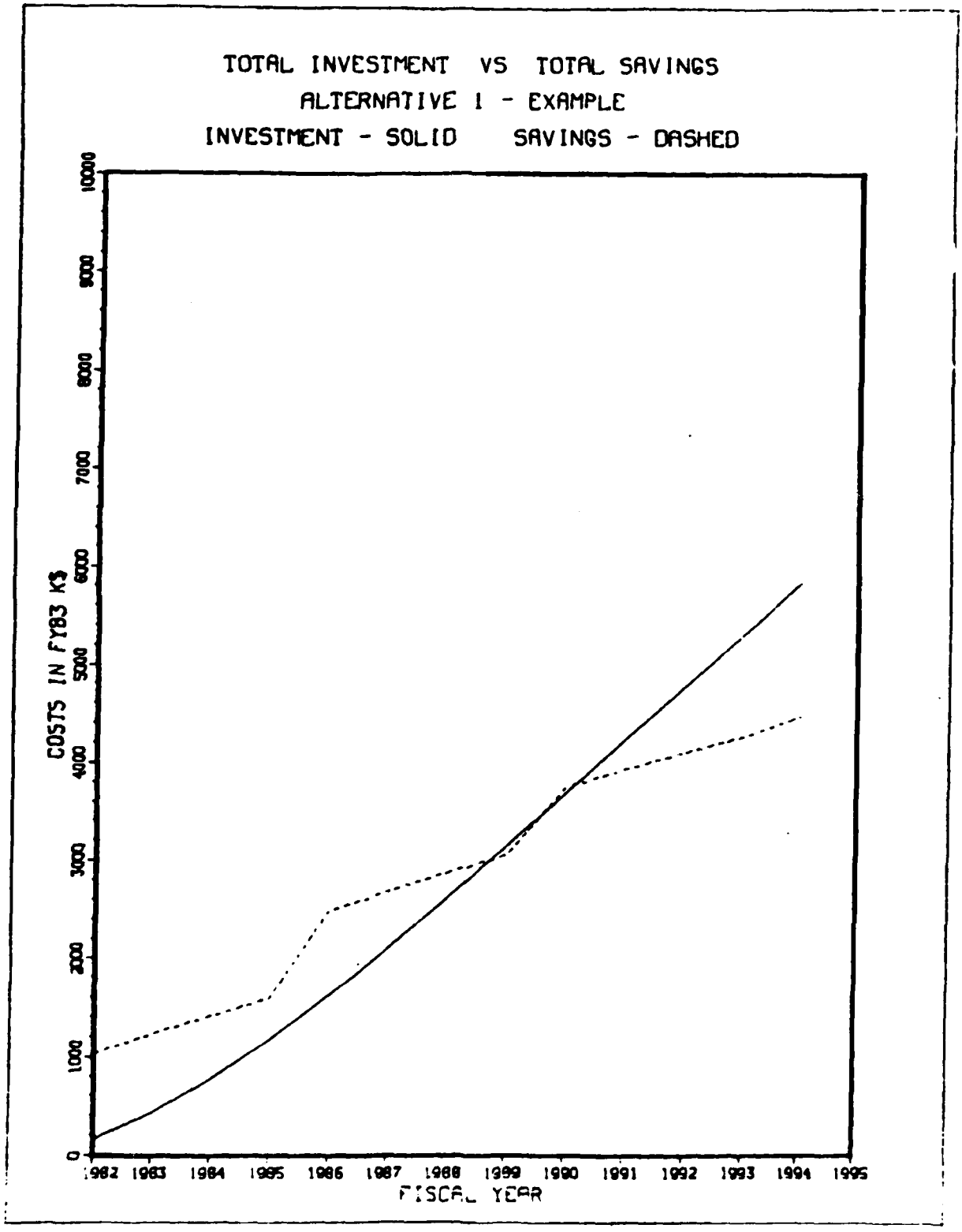
DISCOUNTED COSTS IN FY83 K$

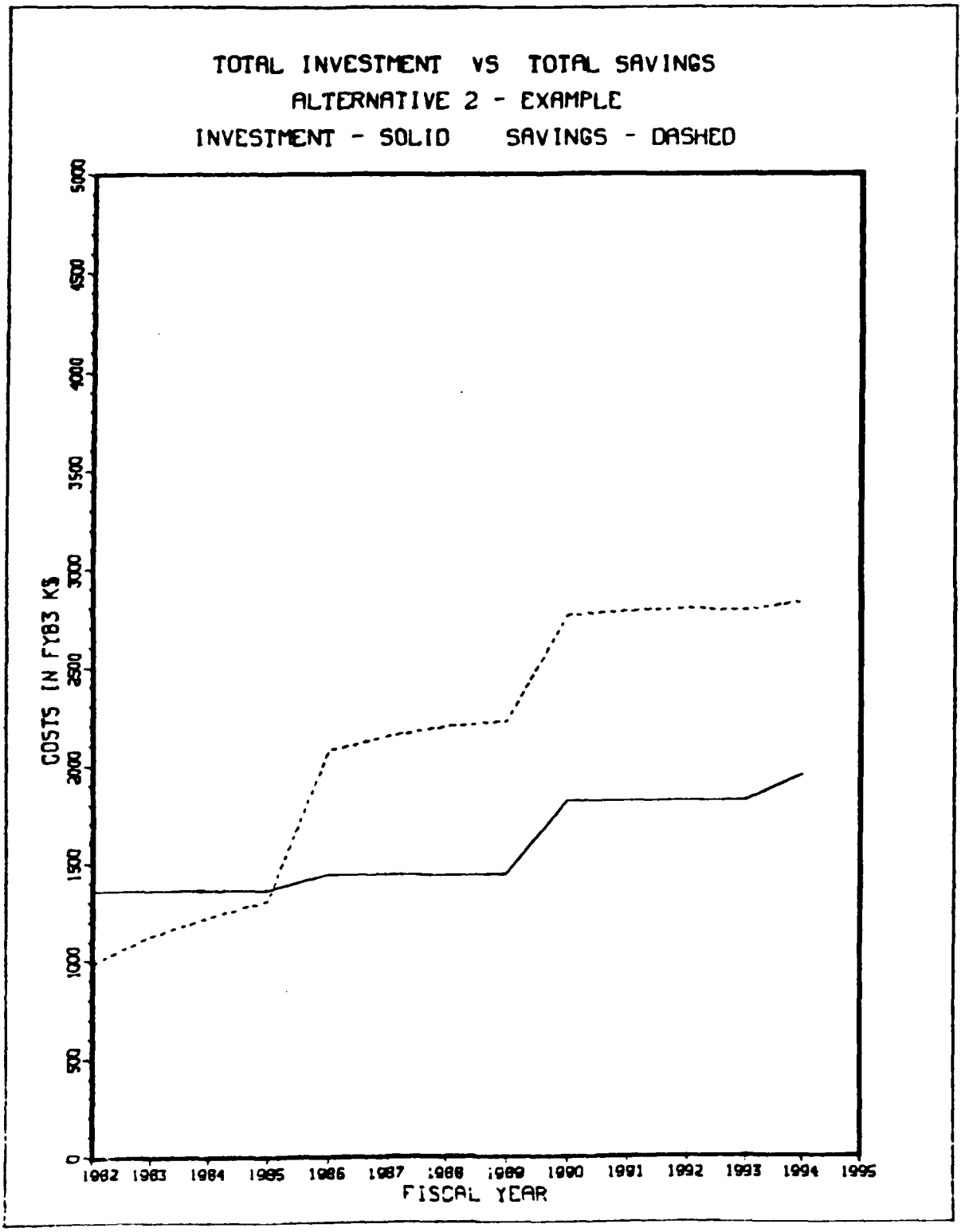
FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
INVEST EQUIP	1364.3	0.0	0.0	0.0	82.4	0.0	0.0	0.0	371.7	0.0	0.0	0.0	132.2	1950.6
MAINTENANCE	32.7	34.2	35.8	37.4	39.2	40.9	42.8	44.8	46.8	49.0	51.2	53.6	56.0	564.5
OPERATIONS	164.4	205.8	238.4	263.4	281.8	294.7	302.9	307.2	308.2	306.5	302.6	296.8	289.6	3562.3
TERM. VALUE														18.8
PRESNT VALUE	1561.4	240.0	274.2	300.8	403.3	335.6	345.7	352.0	726.8	355.5	353.8	350.4	477.8	6058.6
SAVINGS - PV	991.2	135.3	97.9	80.8	773.5	71.7	46.7	24.2	536.7	23.8	11.3	-7.2	43.0	2829.2

SIR = 1.5
BREAKEVEN POINT = 4.83
EQUIV. UNIFORM ANNUAL COST = 812.9
DIFFER INFLAT RATES BUILD = 0, EQUIP = 0, MAINT = 0, OPERS = 0, DIRCT = 0, TERM VALUE = 0
$$$ END OF PAGE IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$. $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN


CUMULATIVE TOTAL COST - PRIMARY ANALYSIS
SOLID - STATUS QUO - EXAMPLE
DASHED - ALTERNATIVE 1 - EXAMPLE
COSTS IN FY83 K$
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
FISCAL YEAR


CUMULATIVE TOTAL COST - PRIMARY ANALYSIS
SOLID - STATUS QUO - EXAMPLE
DASHED - ALTERNATIVE 2 - EXAMPLE
COSTS IN FY83 K$
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
FISCAL YEAR


TOTAL INVESTMENT VS TOTAL SAVINGS
ALTERNATIVE 1 - EXAMPLE
INVESTMENT - SOLID SAVINGS - DASHED
COSTS IN FY83 K$
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995
FISCAL YEAR


TOTAL INVESTMENT VS TOTAL SAVINGS
ALTERNATIVE 2 - EXAMPLE
INVESTMENT - SOLID SAVINGS - DASHED
COSTS IN FY83 K$
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995
FISCAL YEAR

```
DO YOU WISH TO SAVE THIS DATA ON A FILE?
1-YES, 0-NO
1
ENTER THE NAME OF THE FILE .  THE FILE NAME
UST BE ALL LETTERS AND IT $$$MUST$$$ END WITH A PERIOD .

ENTER FILE NAME - UP TO 6 CHARACTERS INCLUDING PERIOD'
EXAMP.
DO YOU WISH TO CHANGE ONE OF THE
ALTERNATIVES? 1-YES, 0-NO
0
ANOTHER ANALYSIS? Y-YES, N-NO
N


END OF DISSPLA 8.2 --     8645 VECTORS GENERATED IN     4 PLOT FRAMES.
-ISSCO-  4186 SORRENTO VALLEY BLVD.,SAN DIEGO CALIF. 92121

DISSPLA IS A CONFIDENTIAL PROPRIETARY PRODUCT OF ISSCO AND ITS USE
   IS SUBJECT TO A NONDISSEMINATION AND NONDISCLOSURE AGREEMENT.

SET=36:42.6 PT=17.6 IO=0.8
```

APPENDIX B

SAMPLE RUN - SENSITIVITY ANALYSIS

```
NAVAL WEAPONS CENTER ECONOMIC ANALYSIS MODEL - MAY 1981          (BOBIMST 7041.3)          08/23/82    PAGE:   1

OUTPUT TO TERMINAL-0, OR CENTRAL-SITE-1?
1
IN ORDER TO OUTPUT TO CENTRAL SITE SUBMIT A TAPE
AND RUN THE FOLLOWING BATCH JOB AFTER THIS PROGRAM IS FINISHED.

SEE THE BURROUGHS MANUAL PAGE 10-10 FOR REFERENCE.

(I)BEGIN JOB JOBNAME;
USER=(USERCODE)/(PASSWORD);
CHARGE=(CHARGECODE);
RESOURCE=(PETAPE=1);
FETCH='MOUNT PETAPE SLOTXX=(TAPENAME) RING';
RUN SYSTEM/DUMPALL
   ('DSKRTP (PLOTFILE) (TAPENAME)/XXXX(TAPENAME)');
(I)END JOB

IF YOU WANT TO SEE THE PLOTS BEFORE PUTTING THEM ON THE CALCOMP
PLOTTER. ENTER THE FOLLOWING COMMAND FROM A TEKTRONIX TERMINAL

    RUN $DISPOST/TEK300

WHEN A PLOT IS DONE HIT THE RETURN BUTTON TO GET THE NEXT ONE

$$$ END OF PAGE   IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$.  $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN
```

```
NAVAL WEAPONS CENTER ECONOMIC ANALYSIS MODEL - MAY 1981          (DODINST 7041.3)          08/23/82    PAGE:  2

IS THIS A REGULAR ANALYSIS (0),
OR A SENSITIVITY ANALYSIS (1)?
ENTER 0 OR 1
1
DO YOU WISH PLOTS? 1-YES, 0-NO
1
DO YOU WISH TO ENTER THE DATA (0), OR DOES IT
EXIST IN A FILE (1).  ENTER 0 OR 1
1
ENTER THE NAME OF THE FILE .  THE FILE NAME
AN BE ALPHA OR NUMERIC BUT IT $$$MUST$$$ END WITH A PERIOD .

THE FILE NAME ENTERED FOR INPUT
$MUST$ EXIST AND CONTAIN DATA'

ENTER FILE NAME - UP TO 12 CHARACTERS INCLUDING PERIOD!
EXAMP
SPECIFIED FILE DOES NOT EXIST.  DO YOU WISH TO
ENTER ANOTHER FILE (0), ENTER THE DATA YOURSELF (1),
OR TERMINATE (2)?  ENTER 0, 1, OR 2
0
ENTER FILE NAME - UP TO 12 CHARACTERS INCLUDING PERIOD!
EXAMP.
DO YOU WISH TO CHANGE THE FY DOLLAR YEAR
OF THE OUTPUT COSTS?  PRESENTLY SET AT 83
1-YES, 0-NO
0
$$$ END OF PAGE    IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$.  $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN
```

NAVAL WEAPONS CENTER ECONOMIC ANALYSIS MODEL - MAY 1981 (DODINST 7041.3) 08/23/82 PAGE: 3

OPTION 1 - STATUS QUO - EXAMPLE
INPUT COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
MAINTENANCE	141.8	398.5	432.5	487.2	544.8	627.7	659.8	689.2	822.1	832.4	871.8	887.4	9.7	7404.8
OPERATIONS	29.8	34.3	39.5	45.4	52.2	60.1	69.1	79.5	91.5	105.3	121.1	139.3	160.2	1027.4
DIRECT COSTS	1074.2	0.0	0.0	0.0	1083.0	0.0	0.0	0.0	1090.6	0.0	0.0	0.0	1108.7	4356.6
83661 (CASB)PLOTFILE REMOVED ON DTNSRDC PK69.														
TOTAL	1245.8	432.8	472.0	532.6	1680.0	687.8	728.9	768.7	2004.2	937.7	992.9	1026.7	1278.6	12788.8

DISCOUNTED COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
MAINTENANCE	135.3	345.6	341.0	349.1	354.9	371.8	355.2	337.3	365.8	336.7	320.6	296.7	2.9	3912.9
OPERATIONS	28.5	29.8	31.1	32.5	34.0	35.6	37.2	38.9	40.7	42.6	44.5	46.6	48.7	490.7
DIRECT COSTS	1024.6	0.0	0.0	0.0	705.5	0.0	0.0	0.0	485.3	0.0	0.0	0.0	337.0	2552.4
PRESNT VALUE	1188.3	375.3	372.1	381.6	1094.5	407.4	392.5	376.3	891.8	379.3	366.1	343.2	388.6	6956.0

EQUIV. UNIFORM ANNUAL COST = 933.3
DIFFER INFLAT RATES BUILD = 0, EQUIP = 0, MAINT = 0, OPERS = 0, DIRCT = 0, TERM VALUE = 0
$$$ END OF PAGE IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$. $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN

OPTION 2 - ALTERNATIVE 1 - EXAMPLE
INPUT COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
INVEST BUILD	172.3	302.4	432.5	562.6	692.7	822.8	952.9	1082.8	1213.2	1343.2	1473.3	1603.5	1733.4	12387.6
MAINTENANCE	27.3	27.5	27.8	28.1	28.3	28.6	28.9	29.1	29.4	29.7	30.0	30.2	30.5	375.4
OPERATIONS	141.8	176.4	210.9	245.4	279.9	314.5	349.0	383.5	418.0	452.6	487.1	521.7	556.1	4537.1
TERM. VALUE														84.4
TOTAL	341.4	506.3	671.2	836.0	1001.0	1165.9	1330.9	1495.4	1660.6	1825.5	1990.4	2155.4	2320.1	17875.7

DISCOUNTED COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
INVEST BUILD	164.4	262.2	341.0	403.2	451.3	487.3	513.1	530.0	539.8	543.3	541.8	536.1	526.8	5840.1
MAINTENANCE	26.0	23.9	21.9	20.1	18.5	16.9	15.5	14.3	13.1	12.0	11.0	10.1	9.3	212.6
OPERATIONS	135.3	152.9	166.2	175.9	182.4	186.3	187.9	187.7	186.0	183.1	179.1	174.4	169.0	2266.2
TERM. VALUE														7.4
PRESNT VALUE	325.6	439.0	529.1	599.1	652.1	690.5	716.5	731.9	738.9	738.4	732.0	720.6	705.1	8311.5
SAVINGS - PV	1027.0	198.5	183.9	185.7	893.6	204.2	189.0	174.3	692.7	184.2	175.0	158.7	210.3	4477.1

SIR = 0.8
BREAKEVEN POINT = 19.48
THE BREAKEVEN POINT FOR THE ABOVE PROCUREMENT DID NOT
OCCUR WITHIN THE ANALYSIS PERIOD. -BE- MAY BE ERRONEOUS!
EQUIV. UNIFORM ANNUAL COST = 1115.2
DIFFER INFLAT RATES BUILD = 0, EQUIP = 0, MAINT = 0, OPERS = 0, DIRCT = 0, TERM VALUE = 0
$$$ END OF PAGE IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$. $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN

OPTION 3 - ALTERNATIVE 2 - EXAMPLE
INPUT COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
INVEST EQUIP	1430.3	0.0	0.0	0.0	126.5	0.0	0.0	0.0	835.4	0.0	0.0	0.0	434.9	2827.1
MAINTENANCE	34.8	39.5	45.4	52.2	60.1	69.1	79.5	91.5	105.3	121.1	139.3	160.2	184.3	1181.9
OPERATIONS	172.3	237.3	302.4	367.5	432.5	497.6	562.6	627.7	692.7	757.8	822.8	887.9	952.9	7314.0
TERM. VALUE														61.9
TOTAL	1636.9	276.8	347.8	419.7	619.1	566.7	642.1	719.2	1633.4	878.8	962.1	1048.2	1572.2	11261.2

DISCOUNTED COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
INVEST EQUIP	1364.3	0.0	0.0	0.0	82.4	0.0	0.0	0.0	371.7	0.0	0.0	0.0	132.2	1950.6
MAINTENANCE	32.7	34.2	35.8	37.4	39.2	40.9	42.8	44.8	46.8	49.0	51.2	53.6	56.0	564.5
OPERATIONS	164.4	205.8	238.4	263.4	281.8	294.7	302.9	307.2	308.2	306.5	302.6	296.8	289.6	3562.3
TERM. VALUE														18.8
PRESNT VALUE	1561.4	240.0	274.2	300.8	403.3	335.6	345.7	352.0	726.8	355.5	353.8	350.4	477.8	6058.6
SAVINGS - PV	991.2	135.3	97.9	80.8	773.5	71.7	46.7	24.2	536.7	23.8	11.3	-7.2	43.0	2829.2

SIR = 1.5
BREAKEVEN POINT = 4.83
EQUIV. UNIFORM ANNUAL COST = 812.9
DIFFER INFLAT RATES BUILD = 0, EQUIP = 0, MAINT = 0, OPERS = 0, DIRCT = 0, TERM VALUE = 0
$$$ END OF PAGE IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$. $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN

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```
TYPES OF SENSITIVITY ANALYSIS:
1 - LEASE VS PROCUREMENT
2 - STATUS QUO VS PROCUREMENT
3 - VARY START &/OR TOTAL NO. OF YEARS
4 - VARY RECURRING COSTS
5 - VARY INVESTMENT COST
6 - VARY DIFFERENTIAL INFLATION RATES
7 - VARY RECURRING COSTS & TOTAL NO. OF YEARS
8 - VARY INVESTMENT & RECURRING COSTS
9 - VARY INVESTMENT & TOTAL NO. OF YEARS

ENTER TYPE (1-9)
1
ENTER YEARS IN INTERVAL, NO. OF INTERVALS
(MAXIMUM OF 10) AND START YEAR.  EG  5,4,1985
(THIS WILL START IN 1985, THEN 4 SERIES OF NPVS
WILL BE CALCULATED AT 5-YEAR INTERVALS - TO 20TH
YEAR - 2005).  TOTAL MUST NOT EXTEND PAST 44TH YEAR
FROM THE BASE YEAR'
3,4,1982
### END OF PAGE   IF YOU WANT A COPY PRESS THE
COPY BUTTON ###.  ### HIT THE RESET BUTTON ###,### AND RETURN
```

SENSITIVITY ANALYSIS - LEASE VS PROCUREMENT

LEASE FOR 1 YEARS (1982)
STATUS QUO - EXAMPLE NPV = 1188.3

PROCUREMENT FOR 1 YEARS (1982)
ALTERNATIVE 1 - EXAMPLE NPV = 302.4
ALTERNATIVE 2 - EXAMPLE NPV = 1502.3

LEASE FOR 4 YEARS (1985)
STATUS QUO - EXAMPLE NPV = 2317.4

PROCUREMENT FOR 4 YEARS (1985)
ALTERNATIVE 1 - EXAMPLE NPV = 1875.4
ALTERNATIVE 2 - EXAMPLE NPV = 2332.0

LEASE FOR 7 YEARS (1988)
STATUS QUO - EXAMPLE NPV = 4211.6

PROCUREMENT FOR 7 YEARS (1988)
ALTERNATIVE 1 - EXAMPLE NPV = 3938.9
ALTERNATIVE 2 - EXAMPLE NPV = 3427.7

LEASE FOR 10 YEARS (1991)
STATUS QUO - EXAMPLE NPV = 5859.0

PROCUREMENT FOR 10 YEARS (1991)
ALTERNATIVE 1 - EXAMPLE NPV = 6151.5
ALTERNATIVE 2 - EXAMPLE NPV = 4870.3

BREAKEVEN POINTS

STATUS QUO - EXAMPLE VS
ALTERNATIVE 1 - EXAMPLE BE = 19.48
THE BREAKEVEN POINT FOR THE ABOVE PROCUREMENT DID NOT
OCCUR WITHIN THE ANALYSIS PERIOD. -BE- MAY BE ERRONEOUS!
ALTERNATIVE 2 - EXAMPLE BE = 4.83
$$$ END OF PAGE IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$. $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN

THE PLOT IS CURRENTLY BEING PUT ON THE PLOTFILE
PLEASE WAIT FOR FURTHER INSTRUCTIONS BEFORE CONTINUING.
$$$ END OF PAGE IF YOU WANT A COPY PRESS THE
COPY BUTTON $$$. $$$ HIT THE RESET BUTTON $$$,$$$ AND RETURN

```
ANOTHER SET OF INTERVALS FOR LEASE VS PROCURE
1-YES, 0-NO
0
IF YOU WISH ANOTHER TYPE OF SENSITIVITY ANALYSIS,
ENTER TYPE NO.,  IF NOT - ENTER 0
0
DO YOU WISH TO SAVE THIS DATA ON A FILE?
1-YES, 0-NO
0
ANOTHER ANALYSIS? Y-YES, N-NO
N
SET-11:41.7 PT-2:06.5 IO-1.4
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OPTION 1 - STATUS QUO - EXAMPLE
INPUT COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
MAINTENANCE	141.8	398.5	432.5	487.2	544.8	627.7	659.8	689.2	822.1	832.4	871.8	887.4	9.7	7404.9
OPERATIONS	29.8	34.3	39.5	45.4	52.2	60.1	69.1	79.5	91.5	105.3	121.1	139.3	160.2	1027.4
DIRECT COSTS	1074.2	0.0	0.0	0.0	1083.0	0.0	0.0	0.0	1090.6	0.0	0.0	0.0	1108.7	4356.5
TOTAL	1245.8	432.8	472.0	532.6	1680.0	687.8	728.9	768.7	2004.2	937.7	992.9	1026.7	1278.6	12788.8

DISCOUNTED COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
MAINTENANCE	135.3	345.6	341.0	349.1	354.9	371.8	355.2	337.3	305.8	336.7	320.6	296.7	2.9	3912.9
OPERATIONS	28.5	29.8	31.1	32.5	34.0	35.6	37.2	38.9	40.7	42.6	44.5	46.6	48.7	490.7
DIRECT COSTS	1024.5	0.0	0.0	0.0	705.5	0.0	0.0	0.0	485.3	0.0	0.0	0.0	337.0	2552.4
PRESNT VALUE	1188.3	375.3	372.1	381.6	1094.5	407.4	392.5	376.3	891.8	379.3	365.1	343.2	388.6	6950.0

EQUIV. UNIFORM ANNUAL COST = 933.2
DIFFER INFLAT RATES BUILD = 0, EQUIP = 0, MAINT = 0, OPERS = 0, DIRCT = 0, TERM. VALUE = 0

OPTION 2 - ALTERNATIVE 1 - EXAMPLE
INPUT COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
INVEST BUILD	172.3	302.4	432.5	562.6	692.7	822.8	952.9	1082.8	1213.2	1343.2	1473.3	1603.5	1733.4	12387.6
MAINTENANCE	27.3	27.5	27.8	28.1	28.3	28.6	28.9	29.1	29.4	29.7	30.0	30.2	30.5	375.4
OPERATIONS	141.8	176.4	210.9	245.4	279.9	314.5	349.0	383.5	418.0	452.6	487.1	521.7	556.1	4537.1
TERM. VALUE			24.4											
TOTAL	341.4	506.3	671.2	836.0	1001.0	1165.9	1330.9	1495.4	1660.6	1825.5	1990.4	2155.4	2320.1	17275.7

DISCOUNTED COSTS IN FY83 K$

FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
INVEST BUILD	164.4	262.2	341.0	403.2	451.3	487.3	513.1	530.0	539.8	543.3	541.8	536.1	526.8	5840.1
MAINTENANCE	26.0	23.9	21.9	20.1	18.5	16.9	15.5	14.3	13.1	12.0	11.0	10.1	9.3	212.6
OPERATIONS	135.3	152.9	166.2	175.9	182.4	186.3	187.9	187.7	186.0	183.1	179.1	174.4	169.0	2266.2
TERM. VALUE			7.4											
PRESNT VALUE	325.6	439.0	529.1	599.1	652.1	690.5	716.5	731.9	738.9	738.4	732.0	720.6	705.1	8311.5
SAVINGS - PV	1027.0	198.5	183.9	185.7	893.6	204.2	189.0	174.3	692.7	184.2	175.0	158.7	210.3	4477.1

SIR = 0.8
BREAKEVEN POINT = 19.68
THE BREAKEVEN POINT FOR THE ABOVE PROCUREMENT DID NOT
OCCUR WITHIN THE ANALYSIS PERIOD. -BE- MAY BE ERRONEOUS!!
EQUIV. UNIFORM ANNUAL COST = 1115.2
DIFFER INFLAT RATES BUILD = 0, EQUIP = 0, MAINT = 0, OPERS = 0, DIRCT = 0, TERM. VALUE = 0

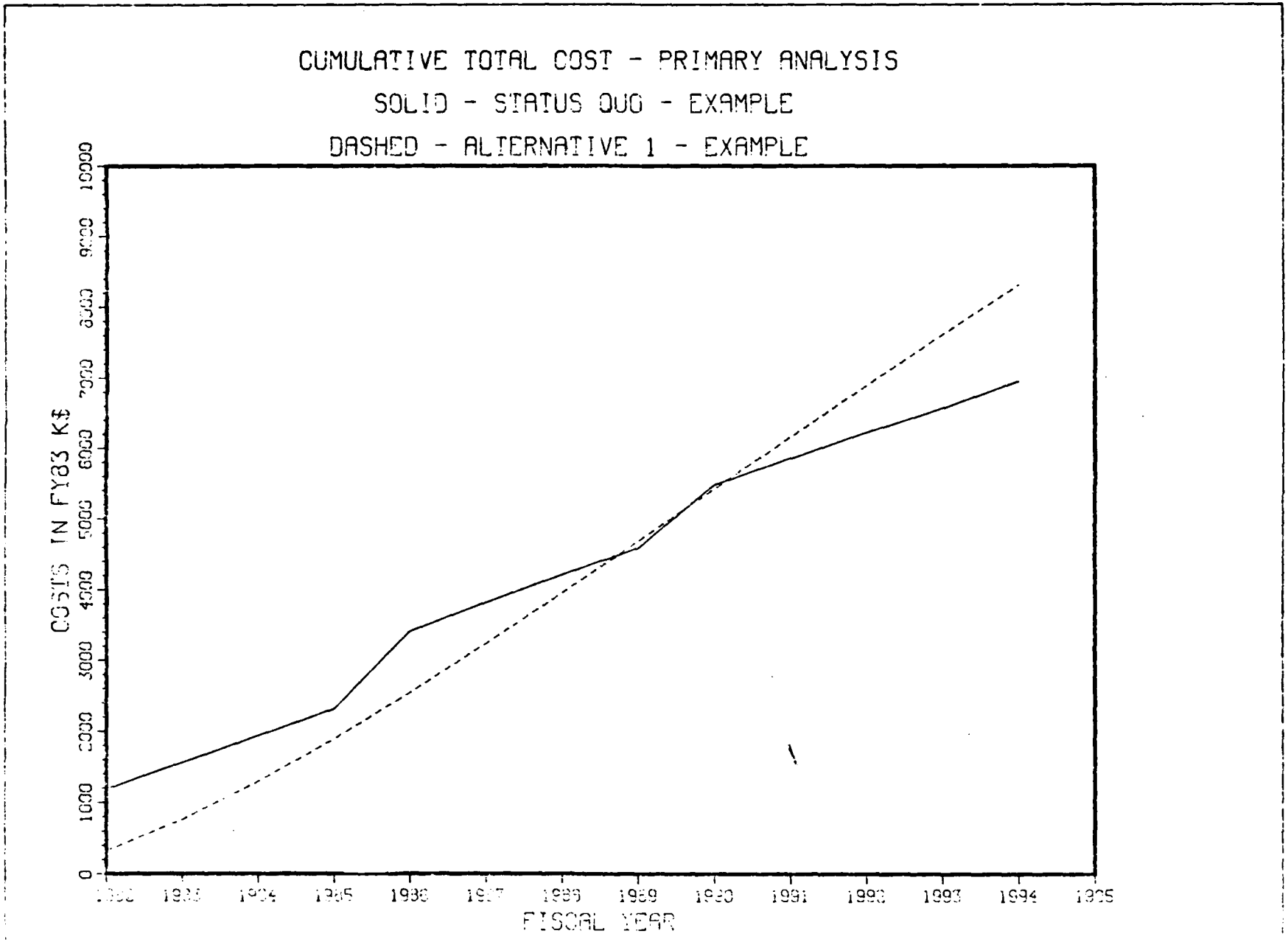
OPTION 3 - ALTERNATIVE 2 - EXAMPLE
INPUT COSTS IN FY83 K$

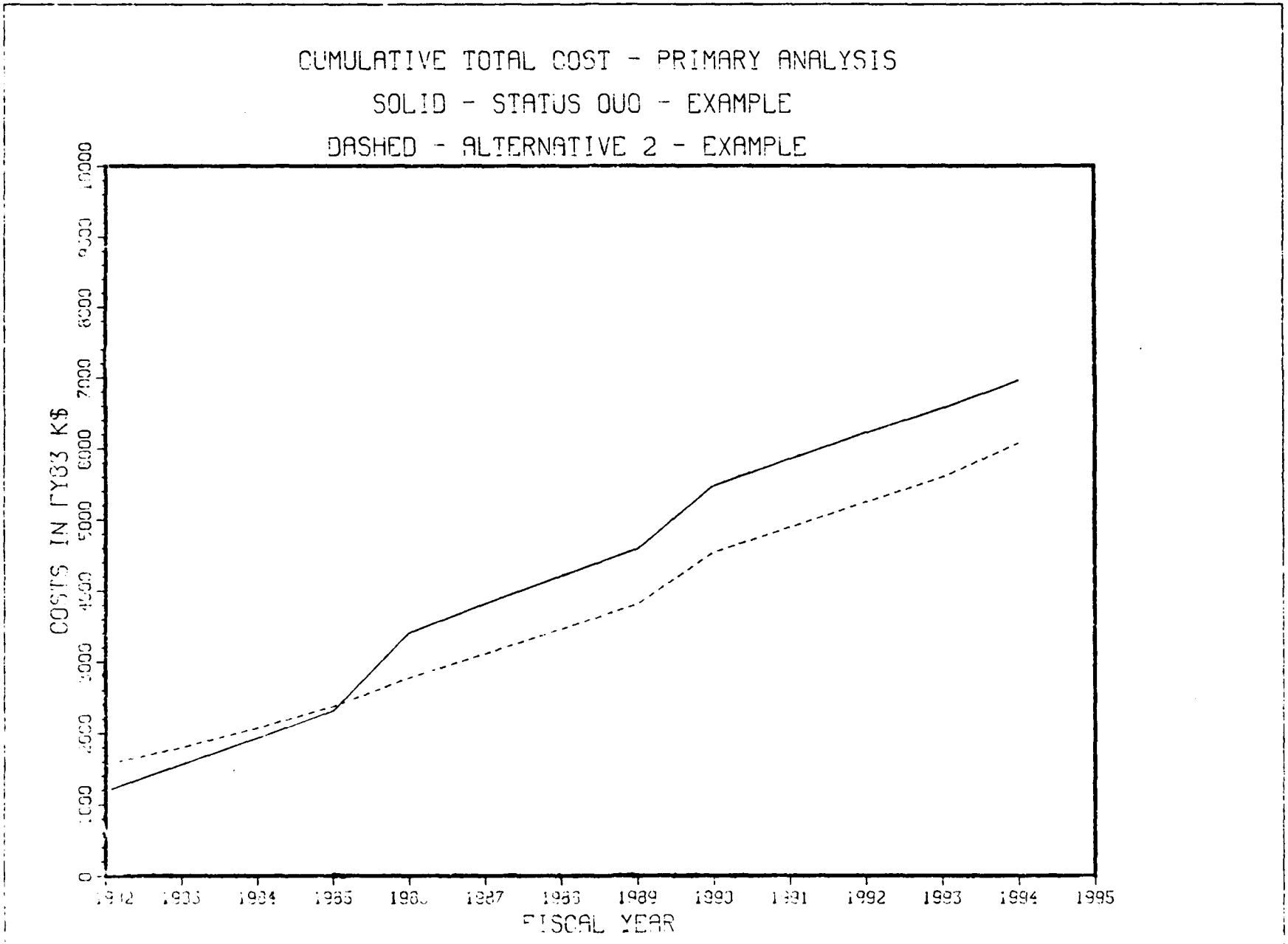
FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
INVEST EQUIP	1430.3	0.0	0.0	0.0	126.5	0.0	0.0	0.0	835.4	0.0	0.0	0.0	434.9	2827.1
MAINTENANCE	34.3	39.5	45.4	52.2	60.1	69.1	79.5	91.5	105.3	121.1	139.3	160.2	184.3	1181.9
OPERATIONS	172.3	237.3	302.4	367.5	432.5	497.6	562.6	627.7	692.7	757.8	822.8	887.9	952.9	7314.0
TERM. VALUE			61.9											
TOTAL	1636.9	276.8	347.8	419.7	619.1	566.7	642.1	719.2	1633.4	878.8	962.1	1048.2	1572.2	11261.2

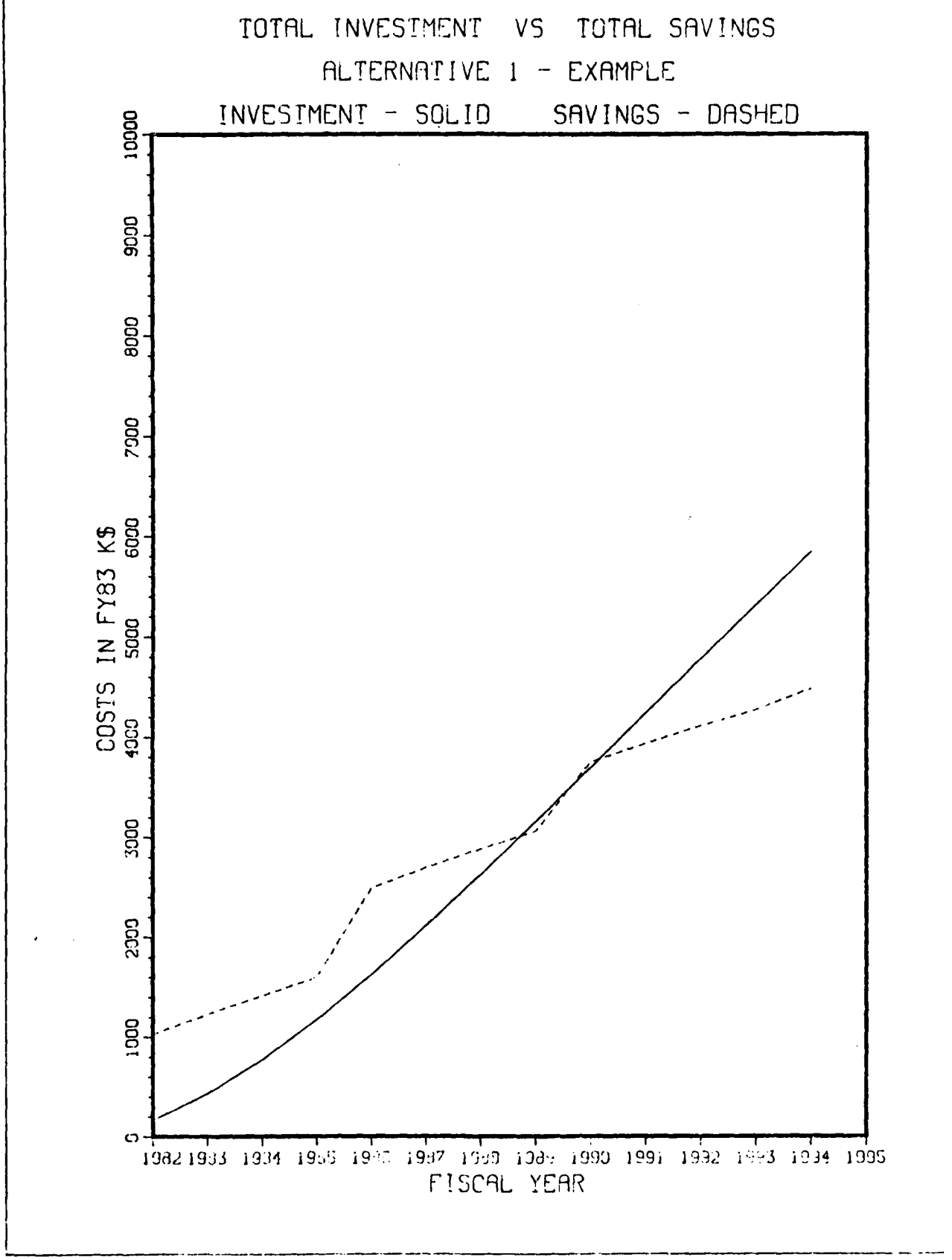
DISCOUNTED COSTS IN FY83 K$

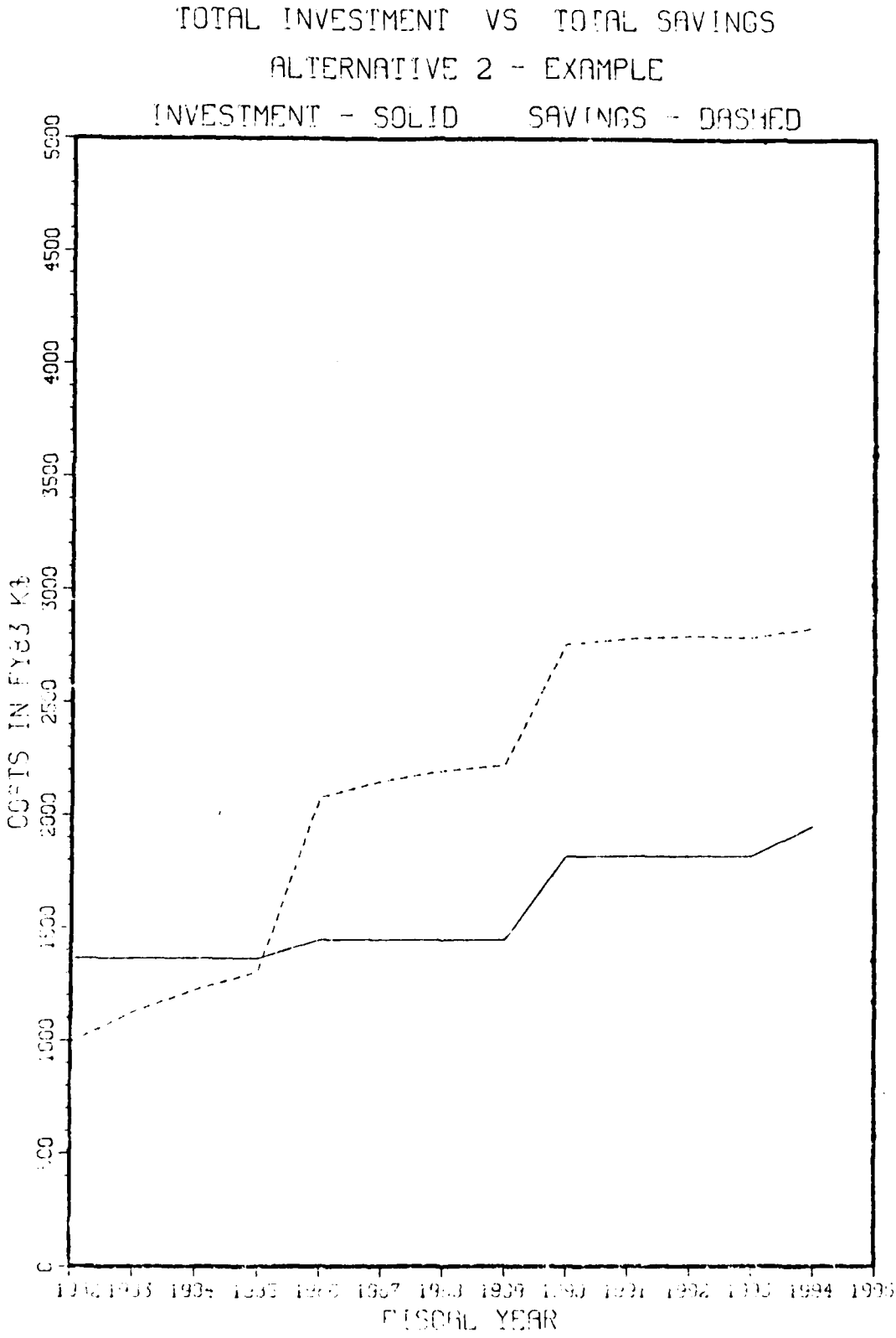
FISCAL YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
INVEST EQUIP	1364.3	0.0	0.0	0.0	82.4	0.0	0.0	0.0	371.7	0.0	0.0	0.0	132.2	1950.6
MAINTENANCE	32.7	34.2	35.8	37.4	39.2	40.9	42.8	44.8	46.8	49.0	51.2	53.6	56.0	564.5
OPERATIONS	164.4	205.8	238.4	263.4	281.8	294.7	302.9	307.2	308.2	306.5	302.6	296.8	289.6	3562.3
TERM. VALUE			18.8											
PRESNT VALUE	1561.4	240.0	274.2	300.8	403.3	335.6	345.7	352.0	726.8	355.5	353.8	350.4	477.8	6058.6
SAVINGS - PV	991.2	135.3	97.9	-80.8	773.5	71.7	96.7	24.2	536.7	23.8	11.3	-7.2	43.0	2829.2

SIR = 1.5
BREAKEVEN POINT = 4.83
EQUIV. UNIFORM ANNUAL COST = 812.9
DIFFER INFLAT RATES BUILD = 0, EQUIP = 0, MAINT = 3, OPERS = 0, DIRCT = 0, TERM. VALUE = 0


CUMULATIVE TOTAL COST - PRIMARY ANALYSIS
SOLID - STATUS QUO - EXAMPLE
DASHED - ALTERNATIVE 1 - EXAMPLE
COSTS IN FY83 K$
0
1000
FISCAL YEAR


CUMULATIVE TOTAL COST - PRIMARY ANALYSIS
SOLID - STATUS QUO - EXAMPLE
DASHED - ALTERNATIVE 2 - EXAMPLE
COSTS IN FY83 K$
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
FISCAL YEAR


TOTAL INVESTMENT VS TOTAL SAVINGS
ALTERNATIVE 1 - EXAMPLE
INVESTMENT - SOLID SAVINGS - DASHED
COSTS IN FY83 K$
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
1990
1991
1992
1995
FISCAL YEAR


TOTAL INVESTMENT VS TOTAL SAVINGS
ALTERNATIVE 2 - EXAMPLE
INVESTMENT - SOLID SAVINGS - DASHED
COSTS IN FY83 K$
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1994
1995
FISCAL YEAR

SENSITIVITY ANALYSIS - LEASE VS PROCUREMENT

LEASE FOR 1 YEARS (1982)
STATUS QUO - EXAMPLE NPV = 1188.3

PROCUREMENT FOR 1 YEARS (1982)
ALTERNATIVE 1 - EXAMPLE NPV = 302.4
ALTERNATIVE 2 - EXAMPLE NPV = 1502.3

LEASE FOR 4 YEARS (1985)
STATUS QUO - EXAMPLE NPV = 2317.4

PROCUREMENT FOR 4 YEARS (1985)
ALTERNATIVE 1 - EXAMPLE NPV = 1875.4
ALTERNATIVE 2 - EXAMPLE NPV = 2332.0

LEASE FOR 7 YEARS (1988)
STATUS QUO - EXAMPLE NPV = 4211.6

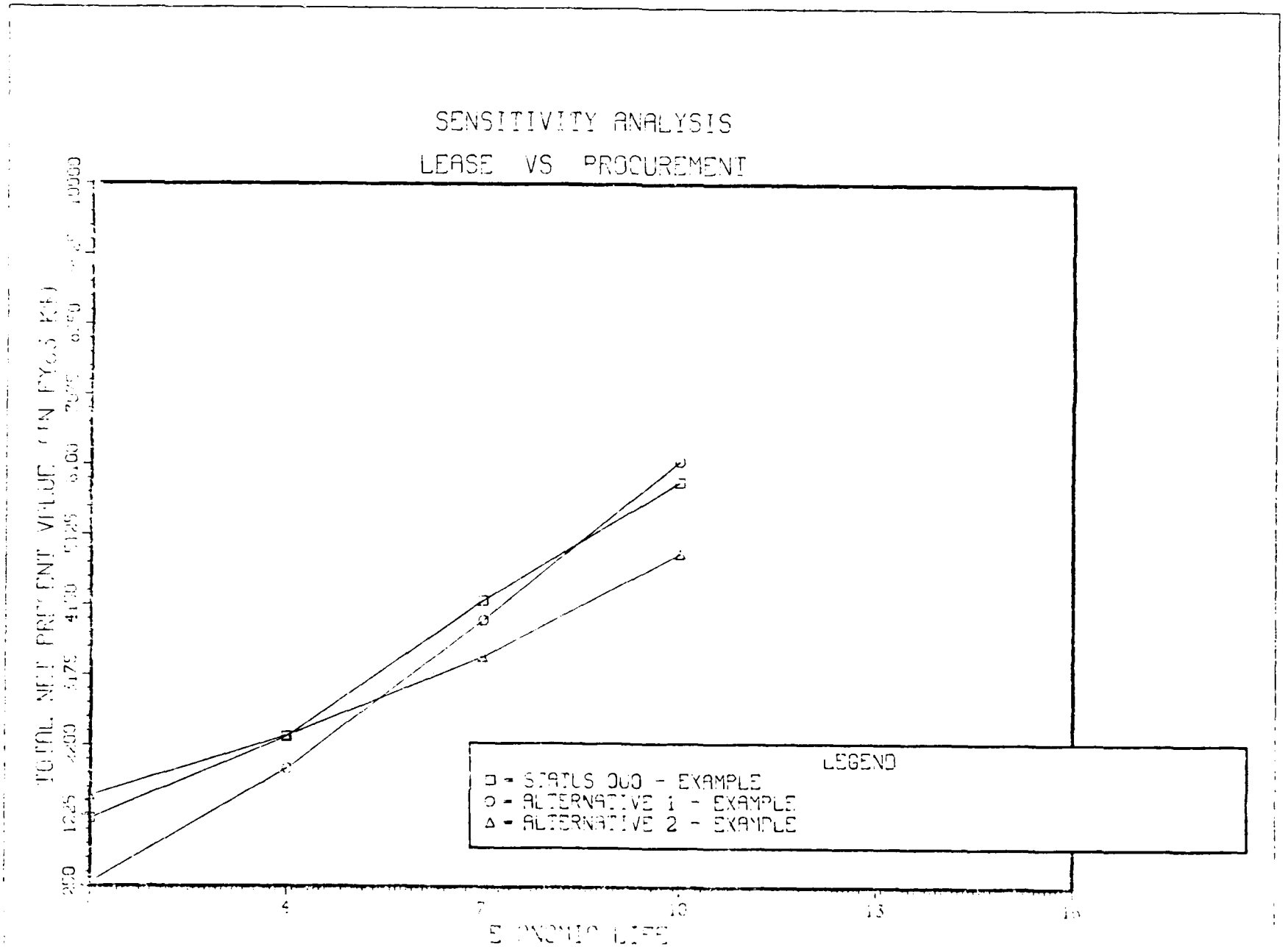
PROCUREMENT FOR 7 YEARS (1988)
ALTERNATIVE 1 - EXAMPLE NPV = 3938.9
ALTERNATIVE 2 - EXAMPLE NPV = 3427.7

LEASE FOR 10 YEARS (1991)
STATUS QUO - EXAMPLE NPV = 5859.0

PROCUREMENT FOR 10 YEARS (1991)
ALTERNATIVE 1 - EXAMPLE NPV = 6151.5
ALTERNATIVE 2 - EXAMPLE NPV = 4870.3

BREAKEVEN POINTS

STATUS QUO - EXAMPLE VS
ALTERNATIVE 1 - EXAMPLE BE = 19.48
THE BREAKEVEN POINT FOR THE ABOVE PROCUREMENT DID NOT OCCUR WITHIN THE ANALYSIS PERIOD. -BE- MAY BE ERRONEOUS!
ALTERNATIVE 2 - EXAMPLE BE = 4.83


SENSITIVITY ANALYSIS
LEASE VS PROCUREMENT
LEGEND
□ = STATUS QUO - EXAMPLE
○ = ALTERNATIVE 1 - EXAMPLE
△ = ALTERNATIVE 2 - EXAMPLE

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