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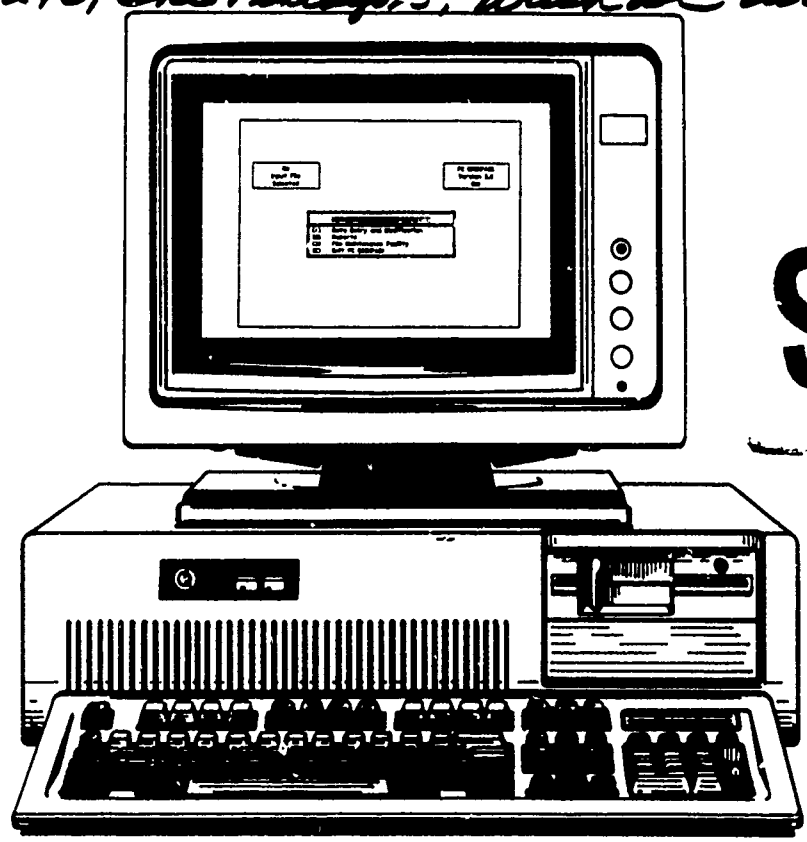

PC - ECONPACK

VERSION 3.0

USERS MANUAL

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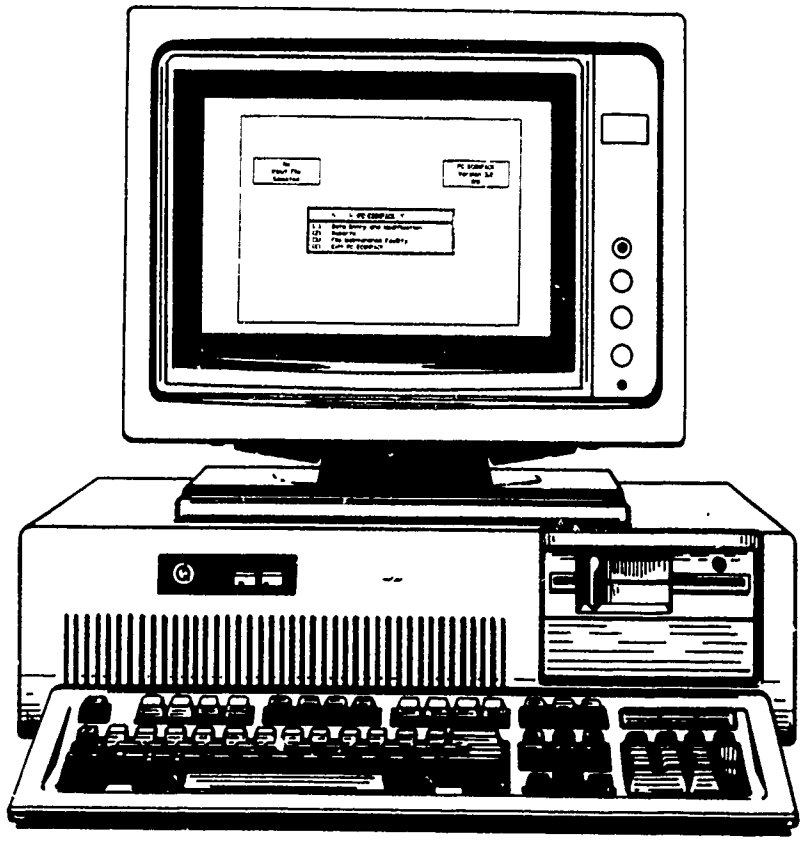

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The PC-ECONPACK Users Manual provides information on the use of the PC-ECONPACK Computer Program. Concepts include: accessing of PC-ECONPACK, creating input files, changing input files, generating report files, printing report files, maintaining all files, and batching the input file to and from the PAX Computer System.

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FOREWORD

The purpose of this manual is to provide you, as a user of PC-ECONPACK, with instructions for using the program. This manual is structured in a logical manner to facilitate and expedite your ability to properly access and utilize the various components. In that PC-ECONPACK is menu-driven, this manual provides a discussion of the function of each menu option. Appropriate examples of computer screens are included.

We sincerely hope you will find this manual to be a helpful and beneficial tool. Should you discover errors and/or omissions, please notify us. As always, your comments or suggestions for improving this document are greatly appreciated.

Further information about the system can be obtained from:

Mr. Dan Hill, HQUSACE (CEMP-P), 202-272-8919
Ms. Beth Begey, HQUSACE (CEMP-P), 202-272-8918
Mr. Bob Morgan, CEHND-ED-ES, COMM 205-955-5266, AV 645-5266
Mr. Bob Neathammer, CECER-FS, 217-373-7259.

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CHAPTER 1

OVERVIEW OF PC-ECONPACK

1.0 **INTRODUCTION**. PC-ECONPACK is a unique economic analysis computer package available to engineers, economists, master planners, accountants, and other personnel throughout the Department of Defense (DoD). PC-ECONPACK is a comprehensive program incorporating economic analysis calculations, documentation, and reporting capabilities.

It is structured so that it can be used by non-economists to prepare complete, properly documented economic analyses (EAs) in support of DoD funding requests. PC-ECONPACK is menu-driven and features interactive display screens which enable the user to select analysis parameters and specify functions.

PC-ECONPACK's analytic capabilities are generic, providing standardized economic analysis methodologies and calculations to evaluate a broad range of capital investment categories such as barracks, hospitals, family housing, information systems, utility plants, maintenance facilities, ranges, runways, commercially financed facilities, and equipment.

Two versions of the automated economic analysis package are available:

- ECONPACK - the mainframe application located on the Military Construction Programming, Administration, and Execution (PAX) computer system. The program supports the capability to upload/download files to/from the PC-ECONPACK system. This interchange capability enables analysts to develop EAs in PC-ECONPACK off-line and upload the EA input file to the mainframe for transmission to a DD Form 1391.

- PC-ECONPACK - available on diskettes.

1.1 **SUMMARY OF CAPABILITIES**. PC-ECONPACK and ECONPACK are used to develop EAs in support of MILCON and other funding programs including 801/802 leases, Commercially Financed Facilities, Productivity Investment Funding (PIF), Information Management, and Family Housing, as well as Military Construction. Both programs perform standardized life-cycle cost calculations such as net present value, equivalent uniform annual cost, savings-to-investment ratio, and discounted payback period. Cost sensitivity analysis and discount rate sensitivity analysis features and graphics capabilities are also provided by the

ECONPACK programs. Text entry is permitted for assumptions, alternative definitions, cost derivations, and results and recommendations. The output reports conform to current DoD guidance.

Advantages of using the PC-ECONPACK computer program for EA calculations include the ability to:

- do repetitions of calculations accurately and easily;
- perform sensitivity analyses (assess the impact of input variations); and
- generate standardized reporting formats accepted by OSD and Congress.

Additionally, PC-ECONPACK is structured so that:

- individuals having limited expertise in economic techniques can successfully produce EAs; and
- EAs can be added to a DD Form 1391 prepared via the PAX System's DD Form 1391 Processor System.

PC-ECONPACK contributes to the effectiveness and efficiency of EA preparation, submission, and review.

1.2 **SPONSORSHIP AND AVAILABILITY**. PC-ECONPACK was developed by the Construction Engineering Research Laboratory (USACERL) under the sponsorship of Headquarters, U.S. Army Corps of Engineers (HQUSACE). The Pacific Ocean and Huntsville Engineer Divisions assisted in the project.

PC-ECONPACK was originally distributed, upon request, beginning in November 1987. To obtain a copy of the PC version of ECONPACK, contact U.S. Army Huntsville Division (POC, Mr. Bob Morgan). Further information about the system can be obtained from:

Mr. Dan Hill, HQUSACE (CEMP-P), 202-272-8919
Ms. Beth Begey, HQUSACE (CEMP-P), 202-272-8918
Mr. Bob Morgan, CEHNDED-ES, COMM 205-955-5266, AV 645-5266
Mr. Bob Neathammer, CECER-FS, 217-373-7259.

All suggestions for improvement are welcome. The appropriate PAX System ID contacts are BIRD and ECON01.

1.3 **THE ECONOMIC ANALYSIS PROCESS**. Economic theory, concepts, techniques, and principles can be applied in a logical decision-making process. Economic analysis is such a process used to evaluate systematically the economic aspects of a situation to determine the economically optimal course of action.

Military funding request EAs typically address the question of which of two or more alternatives will best accomplish a given objective. The alternatives are mutually exclusive; whichever alternative is chosen will adequately accomplish the objective. The optimal (or economically best) solution is to select the alternative which provides the greatest net benefits (i.e., benefits minus costs). Two special cases are:

- o the alternatives have the same benefits but one alternative has less cost; and
- o one alternative has greater benefits but both alternatives have the same cost.

Both benefits and costs may vary among the alternatives under consideration. In practice, however, most military EAs take the form of a choice among mutually exclusive alternatives which produce equivalent benefits, but which have different costs. In a situation of this sort, the least costly alternative is the most economical. The design of PC-ECONPACK is oriented to this approach to EAs.

1.3.1 **The Seven Step Process**. A comprehensive EA process consists of seven basic steps:

1. Establish and state objective.
2. Identify alternatives.
3. Formulate assumptions.
4. Determine costs and benefits.
5. Compare alternatives.
6. Perform sensitivity analysis.
7. Report results and recommendations.

PC-ECONPACK incorporates each of these steps to ensure the development of complete EAs.

1.3.1.1 **Establishing and stating objective**. The objective is the result to be achieved; that is, the objective states what the alternatives are to accomplish. The statement of the objective should clearly define and quantify (to the extent possible) the function to be accomplished. The statement of the objective should not presume a specific means of achievement (i.e., course of action to bring about the desired result). If such a presumption is made, the statement of the objective undermines the analytical purpose of the EA by pre-judging the result. Compare, for example, the following statements of objectives:

- o to provide housing for 100 unaccompanied officers.
- o to construct a 100-person Unaccompanied Officers Quarters.

The first statement is preferred because it is not in the form of a solution. A quantitative statement of the objective is beneficial because it provides an explicit test of the adequacy of possible alternatives.

Establishment of the objective is often a policy matter which lies beyond the scope of the individual responsible for an EA. The "analyst," however, needs to recognize the significance of this step in the EA process.

1.3.1.2 **Identifying alternatives**. After the objective is established and properly stated, the next step is to consider all reasonable ways of satisfying that objective. Since the EA's basic purpose is to help the decision maker allocate resources efficiently, it is vital that careful attention be given to identification of all reasonable alternatives. The recommendation resulting from the EA will, after all, come from among options evaluated.

For a possible alternative to be considered reasonable, it should be consistent with regulations and legal requirements. It must also meet the actual goal or objective.

1.3.1.3 **Formulating assumptions**. EAs are future oriented in that they are focused on current decisions which have benefit and cost implications for future years. To the extent possible, EAs should be based on objective "facts." Since the future is not completely known with certainty, it is often necessary to make assumptions in order to proceed with an EA.

Examples of assumptions include: the functional life of an asset, the level or extent of future requirements for a particular function, and the usefulness of a facility after the present objective is fulfilled. It is often possible to base these assumptions (or "estimates") on historically or technically factual information.

1.3.1.4 **Determining costs and benefits**. This step is often the most difficult and time-consuming component of an EA. The analyst must decide what data are needed, how relevant data are to be collected and documented, and when the data in-hand are sufficiently reliable to be used in an EA.

The principal benefit to be derived from a military project is fulfillment of the stated objective. Since this is a benefit common to all viable alternatives, its inclusion in the EA calculations would not affect the ranking of alternatives. Consequently, dollar quantification of the major benefit is unnecessary. Emphasis is, therefore, placed on the costs of the alternatives. Dollar quantifiable benefits (other than meeting the stated objective) of each alternative are treated as cost offsets for that alternative.

Costs and benefits must be determined for the entire useful life of the project. This is known as life cycle costing. Timing is important in investment decision making as estimates are needed for the year in which a cost is to be incurred or a benefit is to be received. If actual dollar amounts are known, it should be realized that assumptions may be necessary with respect to timing.

The costs and benefits associated with each alternative under consideration should be quantified whenever possible, so they may be included in the EA calculations. When quantification is not possible, the analyst should still attempt to document significant (nonquantifiable) costs and benefits so that these may be considered when comparing alternative courses of action.

1.3.1.5 **Comparing alternatives**. The aim of an EA is to recommend the most economically attractive alternative. The comparison of the costs and benefits is the central focus of the EA process. The purpose of this step in the EA process is to establish a ranking of alternatives based on the costs of and benefits derived from each proposed alternative. The ECONPACK programs perform the tedious calculations and present the results to the user in an understandable, easy to read format.

1.3.1.6 **Performing sensitivity analyses**. A sensitivity analysis is performed when there are large uncertainties about costs, timing, or other impact data or when the result of the comparison step does not reveal a clearly superior alternative. A sensitivity analysis allows the analyst to engage in a "what if" process to determine how critical the particular assumptions used in the EA are to the EA results. In the sensitivity analysis, selected parameters or assumptions are allowed to vary to determine whether or not a change in costs is likely to lead to a change in ranking of alternatives.

Since the purpose of the sensitivity analysis is to test how sensitive the results are to variation in costs, it is especially important to vary expense items which are relatively large and uncertain. If small variations in expense items cause a change in alternative ranking, the analyst may be well-advised to re-evaluate the estimates and refine them in order to reduce the degree of uncertainty.

By including the results of the sensitivity analysis in the final EA presentation, the analyst assures the decision maker and reviewer that uncertainties have been considered.

1.3.1.7 **Reporting results and recommendations**. The EA report should be comprehensive and should include documentation of data sources. It should serve as a "stand-alone" document for the decision maker to use in deciding on the appropriate use of resources.

The structure of the report should begin with a summary of the analysis, including recommendations based on the content of the EA. The actual decision is based on non-economic as well as economic considerations. The EA recommendations are an important input into the final decision-making process.

It is important to consider nonquantifiable benefits and costs as well as the quantifiable ones which enter into the calculations. This is especially true in situations in which the quantitative results of two or more alternatives are equal (or almost equal). That is, the smaller the quantitative variation among alternatives, the greater the importance of other considerations.

Following the summary and recommendations, the EA report should provide a step-by-step explanation of the basis for the recommendations. This explanation should ideally follow the structure of the EA process itself. That is, it should include: statement of objective (requirement to be met); definition of alternatives; explanation of assumptions; cost and benefit data

and sources; comparative ranking of alternatives based on costs and benefits; and sensitivity analysis results.

1.4 **SUMMARY OF GOVERNING REGULATIONS**. The following regulations and guidance documents govern the use and preparation of economic analysis throughout the DoD for facilities investments:

Guidance on Discounting and Inflation:

OMB Circular A-104, Evaluating Leases of Capital Assets

OMB Circular A-94, Discount Rates to be Used in Evaluating Time-Distributed Costs and Benefits

Regulations governing the use of economic analysis:

DoD level:	DODI 7041.3, Economic Analysis and Program Evaluation for Resource Management
Army:	AR 11-18, The Cost and Economic Analysis Program
Air Force:	AFR 178-1, Economic Analysis and Program Evaluation for Resource Management
Navy:	SECNAVINST 7000.14, Economic Analysis and Program Evaluation for Resource Management

Detailed guidance for performing economic analysis:

DoD level:	DoD Pamphlet, Economic Analysis Handbook, 2nd Edition
Army:	CERL Technical Report P-89/09, Economic Analysis Concepts and Methods
Air Force:	TM-10411, Military Construction Program Economic Analysis Manual
Navy:	NAVFAC P-442, Economic Analysis Handbook

Applicability: All proposed construction projects submitted to headquarters for approval must be accompanied by an economic analysis or a statement justifying why an economic analysis was not performed.

PC-ECONPACK has been designed to satisfy all the requirements of the governing regulations.

To obtain a copy of OMB A-104, OMB A-94, AR 11-18, or CERL Technical Report P-89/09, contact HQ U.S. Army Corps of Engineers (CEMP-P), 20 Mass Ave., NW, WASH, DC 20314-1000, (202) 272-0574, AV 285-0574.

1.5 **TYPES OF ECONOMIC ANALYSIS**. ECONPACK categorizes EAs into two separate types: secondary economic analysis and primary economic analysis. The structure of the economic analysis is similar whether the EA being produced is secondary or primary; however, budgetary effects, report formats, and certain computations differ somewhat depending on analysis type.

1.5.1 **Secondary Economic Analysis**. A secondary economic analysis is used to determine which of two or more alternative courses of action would most economically fulfill an objective or requirement which is not currently being met. Since the objective is not already being satisfied in this case, there is no status quo alternative; all alternatives begin on an equal footing and each must be compared against each of the others. In the absence of a status quo alternative as a fixed standard of reference, the focus of this type of analysis is on net benefits (benefits minus costs) rather than on savings. In the common case of equivalent benefits for each of the alternatives under consideration (i.e., benefits or effects sufficient to meet the need specified in the objective), the problem is one of cost minimization. Present value of costs is calculated for each of the alternatives and then ranked; other things being equal, the least-cost alternative is preferred.

1.5.2 **Secondary Economic Analysis Report**. The secondary economic analysis report format presents the net present value (NPV) of the project costs for a given alternative. This format focuses upon calculation of costs separately for each alternative under consideration. The format is repeated for each of the alternatives. The secondary economic analysis report allows the analyst and the decision maker to compare directly the costs (in present value terms) of all alternatives. The alternative with the lowest NPV is the least-costly alternative.

This report format also shows an equivalent uniform annual cost (EUAC) for each alternative. The EUAC is the amount of money which, if paid in equal annual installments over the life of a project, would pay for the project. That is, the discounted value of this hypothetical uniform cost stream is equal to the actual estimated present value of project costs. The alternative with the lowest EUAC is the least-costly alternative. The EUAC is useful to the analyst and the decision maker when the economic lives of alternatives differ.

1.5.3 **Primary Economic Analysis**. A primary EA is designed to determine whether an existing situation or procedure should be changed in some way to take advantage of dollar savings available through some other situation or procedure. Direct comparison is made between new alternatives (new ways of meeting an existing requirement) and the status quo alternative (the way the requirement is currently being met). If two or more new alternatives are being considered, each is compared directly to the status quo alternative. The one with the lowest present value is economically the best solution.

The focus is on the net savings resulting from the new approach to meeting the requirement in place of the status quo approach. For example, consider an installation which currently purchases certain maintenance services from a local company. Continuation of this practice would represent the status quo alternative. If the same maintenance services could be obtained by employment of additional personnel at the installation, this would represent a new alternative. A primary EA would address the question of whether or not the services could be obtained at less cost if the new alternative (additional personnel) were instituted in place of the status quo alternative (purchase from a local company). If the new alternative turns out to be less costly and is adopted, the effect is to reduce budgetary outlays.

Some project alternatives, in either a secondary analysis or a primary analysis, may have significant benefits which need to be noted. Both secondary and primary economic analysis reports have "benefits" sections in which advantages of particular alternatives can be described. This allows for nonquantifiable and non-dollar quantifiable benefits, as well as dollar quantifiable benefits, to be communicated and documented.

1.5.4 **Primary Economic Analysis Report**. The primary economic analysis report format presents the net present value of the cost for the proposed change and the net present value of the savings estimated to result from the proposed change.

This report also includes the savings to investment ratio (SIR) and the discounted payback period (DPP) for each proposed alternative when compared to the status quo. Both of these measures are indicators of the attractiveness of implementing the proposed new alternative in place of the status quo alternative. The SIR is net savings divided by net investment (both in terms of present value). The DPP is the number of years from the time the project (alternative) is initiated to the time when the present value of savings is equal to the present value of investment costs. The larger the SIR (i.e., the greater savings are relative to the investment required to achieve them) and the smaller the DPP (i.e., the shorter the period required for savings to offset the investment costs which generate them), the more attractive is the alternative.

1.6 SELECTED CONCEPTS USED IN ECONOMIC ANALYSIS.

1.6.1 **Discounting**. Most military construction EAs are essentially cost-minimization problems, (i.e., analyses of how a given objective can be met for the least cost). However, the dollar costs are not completely comparable because they occur at different points in time. The discounting process adjusts dollar amounts so that costs incurred at different points in time can be directly and meaningfully compared. This adjustment reflects the fact that the significance attached to a particular dollar amount to be paid (or received) at a later date is less than the significance attached to the same dollar amount to be paid (or received) now.

The discounting process can most easily be understood by first examining its opposite, the compounding process. Assume that a loan of $1,000 is made at an annual interest rate of 10 percent. The $1,000 used to make the loan is money held now; it represents a present value (PV). If the loan is repaid after one year, the repayment amount is $1,100 of which $1,000 is principal and $100 is interest. This $1,100 to be received one year from now represents a future value (FV). Letting the subscript indicate the number of years until repayment, and "i" represent the interest rate, this relationship can be expressed as:

$$FV_1 = PV(1+i).$$

Substituting our assumed values for PV and i yields:

$$FV_1 = \$1,000(1+0.1)$$

$$= \$1,000(1.1)$$

$$= \$1,100$$

If, instead of receiving repayment at the end of one year, the loan is renewed for a second year, its future value at the end of two years is $1,210. The interest received for the second year of the loan is $110, or $10 more than the interest accrued during the first year. This represents interest accrued on both the $1,000 principal amount and the $100 interest accrued in the first year. The calculation is as follows:

$$FV_2 = FV_1(1+i)$$

$$= \$1,100(1+0.1)$$

$$= \$1,210$$

Since FV_1 is $PV(1+i)$, substitution reveals that:

$$FV_2 = PV(1+i)(1+i)$$

$$= \$1,000(1+0.1)^2$$

$$= \$1,000(1.1)^2$$

$$= \$1,000(1.21)$$

$$= \$1,210$$

Extending and generalizing this pattern leads to the following expression as the formula for calculation of future value for n years.

$$FV_n = PV(1+i)^n$$

Discounting is the opposite of compounding. Compounding is the process of converting present values to future values; discounting, on the other hand, is the process of converting future values to present values. The present value of a given future amount to be received at a specific future date is equal to the present amount that would accumulate to that future amount by that date given a particular interest rate. For example, the present value of $1,210 to be received two years from now is $1,000 if the interest rate is 10 percent. The formula for

calculation of present value (for the end-of-year convention) can easily be derived from the formula for future value calculation.

Since

$$FV_n = PV(1+i)^n,$$

it follows that

$$PV = (FV_n)(1/(1+i)^n)$$

The interest rate (i) in this formula is known as the "discount rate." The ratio $(1/(1+i)^n)$ is called the "discount factor."

Four discounting conventions are available: beginning-of-year (B-O-Y), the cost is expected to occur at the beginning of the year; end-of-year (E-O-Y), the cost is expected to occur at the end of the year; middle-of-year (M-O-Y), the cost is expected to occur at the midpoint of the year, or there is a continuous stream of identical costs (say, monthly) and their total amount is placed at the midpoint of the year, and the same discounting formula is used as in B-O-Y and E-O-Y; and continuous discounting (CONT) where costs occur as for M-O-Y above, but a continuous discounting formula is used.

The general formula for discounting a single cost occurring in the future (brining its future value back to the present) is:

$$PV = \frac{C}{(1 + i)^n}$$

where PV = present value of the cost
C = value of the cost occurring in year N
n = year of cost
i = discount factor

This is the formula to discount a cost, C, occurring at the End-of-Year n. The same formula is used for B-O-Y, only n is replaced by n-1. It is also used for M-O-Y where n is replaced by n-.5.

Example---discount a $10,000 cost occurring in year 8 with a discount rate of 10%.

B-O-Y discount factor = $1/(1.1)^{(8-1)} = .5132$

M-O-Y discount factor = $1/(1.1)^{7.5} = .4893$

E-O-Y discount factor = $1/(1.1)^{8} = .4665$

Notice that the discounting convention does make a difference. For a $100,000 cost occurring in year 8, the different discounting conventions give present values of $51,320, $48,930 and $46,650.

To get the total PV of a series of equal costs, the program calculates the PV for each year using the user specified convention and sums these over time.

Continuous discounting assumes that discounting uses an exponential function. The formula to calculate the factor for a year n is:

$$\text{CONT discount factor} = \frac{i}{(\ln(1+i))((1+i)^n)}$$

The CONT and M-O-Y factors are very similar. For the example above, i = 10% and n = 8.

$$\text{CONT discount factor} = \frac{i}{(\ln(1+1))((1+i)^8)} = .4895$$

For a $100,000 cost, the PV = $48,950 which is $20 different from the M-O-Y calculated value. There is some disagreement over which should be used. Current DoD regulations state the CONT convention should be used, although using the M-O-Y will give the same answer within round off of significant digits.

1.6.2 **Inflation and Differential Inflation**. The term "inflation" refers to a general rise in prices of goods in the economy. The general rise in prices is not applied in a constant dollar analysis. That is, if the expected inflation rate is judged to affect all costs of an EA equally, no special treatment is necessary. However, if certain types of costs are expected to experience a substantially different rate of inflation than the general economy, PC-ECONPACK has the capability to handle this situation with the inflation feature. Specifically, the user can apply a differential inflation factor to any expense item in the EA. Since the concept is "differential" inflation, the user would use a percentage factor representing the difference between the expected rate of inflation for the particular expense item and the expected general rate of inflation. For a current dollar analysis, the full effects of inflation should be applied to all cost items as appropriate.

1.6.2.1 **Current dollar analysis**. Current Dollar Analysis in accordance with OMB A-104 requires that the full amount of inflation be applied to every cost. The discount rate for this type analysis is based on U.S. treasury securities with a

maturity comparable to the term of the lease. Inflation indices and discount rate information can be obtained from the OCE Economic Briefs in the ECONPACK Module of the PAX System or by contacting HQUSACE (CEMP-P).

1.6.2.2 **Constant dollar analysis**. An EA is sometimes performed with all costs estimated in terms of a particular baseline year. In this case, the EA is termed a "Constant Dollar Analysis." A 10% discount rate applies in the case of constant dollar analysis in accordance with policy (OMB A-94, AR 11-18, and AR 415-15).

1.6.2.3 **Timing of Inflation**. PC-ECONPACK inflates according to the discount rate convention used. The point in time at which a cost is inflated must be the same as when it is discounted; i.e., it does not make sense to inflate a cost to the end of the year and then discount it M-O-Y. The program checks the discounting convention for a cost and inflates accordingly.

Example. A cost of $1000 will occur two years from now and inflate 5% over the next two years. What is its PV using the four conventions and a discount rate of 10%?

B-O-Y. The cost will inflate only over the first year as the discounting is at the beginning of year 2.

$$PV = \frac{\$1000(1.05)}{(1.1)^{2-1}} = \$955$$

M-O-Y. The cost will inflate over to the midpoint of year 2.

$$PV = \frac{\$1000(1.05)^{1.5}}{(1.1)^{2-.5}} = \$933$$

E-O-Y. The cost will inflate over the full two years.

$$PV = \frac{\$1000(1.05)^{2}}{(1.1)^{2}} = \$911$$

CONT. The cost will inflate to the midpoint of year 2.

$$PV = (\$1000(1.05)^{1.5}) \times \frac{.1}{(\ln(1.1))((1.1)^{2})}$$

$$= \$933$$

1.6.3 **Asset Value Over Time**. Most assets do not retain their full value over time because of physical deterioration and/or obsolescence. The estimated value of an asset at a future point in time may be entered in two ways: stating a salvage value or utilizing a residual schedule.

1.6.3.1 **Salvage value**. The way to depreciate an asset for most analyses is to specify a salvage value or "terminal value" which is placed in the last year of the analysis. PC-ECONPACK can then inflate (if user specified) this value to the last year of the analysis and discount this value according to the discounting convention specified. (Note that the discounting convention specified "locates" the salvage value as occurring at either the end, middle or beginning of the last year of the analysis.) (Note: Most military construction EAs should use the "Building Depreciation Schedule" described in 1.6.3.5 in absence of better information.)

1.6.3.2 **Straight line depreciation schedule**. In this method, the user selects the starting value for the facility, the period of time over which it has value, and the start year. The start year is normally the year that the facility is occupied or used. PC-ECONPACK then computes a yearly depreciation amount, (value)/(number of years). This amount is then subtracted from the starting value of each year, (e.g., $100,000 starting value, life of 20 years, start year of 1990). The yearly depreciation amount is $5,000. At the start of 1990, the value is $100,000; at the start of 1991, $95,000; at the start of 1992, $90,000; etc. These numbers can be calculated as either beginning or end-of-year inflation and discounting. For midyear or continuous, the average of the two years is calculated---midyear 1991 value would be $92,500---this value would then be inflated and discounted using midyear convention.

1.6.3.3 **Double declining balance depreciation**. This method is widely used and is a standard of calculating the value remaining at various times during the life of a facility. It is calculated by calculating 200%/number of years. This value expressed as a decimal is used to decrease the value of the asset from the beginning to the end of a year, (e.g., a building valued at $100,000 with a life of 20 years). The factor is 200%/20 = 10%/year or 1.00 - .10 = .90. Thus at the end of each year, the value has only 90% of the value at the beginning of the year. And, at the end of year 1, the value is $100,000 - .1 (100,000) or $90,000. At the end of year 2, the value is $90,000 - .1 ($90,000) = $81,000. At the end of year 3, $81,000 - .1 ($81,000) = $72,900. The same values can be obtained by using the formula $100,000 x $.9^n$ where n is the year to be calculated.

1.6.3.4 **User defined schedule**. User defined schedules can be entered in PC-ECONPACK. Normally, these would be taken from other sources, such as MACOM directives. A user defined

schedule, not based on higher level directives, must be clearly documented in either the assumptions or cost source and derivations sections of the report. Otherwise, it will certainly be questioned during the project review process. No start year is specified, so the user must locate the first factor in the proper year of the period of analysis. A decay/deterioration factor is entered for each year of the analysis period. For example, suppose the analysis start year is 1990 with a two year construction time and the first three factors in the residual schedule are .95, .90, .80. Then the user would enter .00 for 1990, .00 for 1991, .95 for 1992, .90 for 1993, and .85 for 1994.

1.6.3.5 **Building depreciation schedule**. This is a building depreciation schedule obtained from OMB Circular A-104 which represents a 1.7% declining balance. When this schedule is applied, the first factor is used in the start year that the user specifies. This should be the first year of occupancy.

Application of the factors to beginning or end-of-year is straight forward. The first value in the schedule, .983, is multiplied by the start value to give the value at the end of the start year. If midyear or continuous discounting is used, the value at midyear of the start year is calculated by multiplying the value at the beginning of the start year by the average of 1.000 and .983 or .996.

PC-ECONPACK provides three "canned" residual schedules as a part of the program features. The first schedule available for use is the building depreciation schedule which contains the following values:

.983	.966	.950	.934	.918	.902	.887	.872	.857	.842	.828	.814
.800	.787	.773	.760	.747	.734	.722	.710	.698	.686	.674	.663
.651	.640	.629	.619	.608	.598	.588	.578	.568	.558	.549	.539
.530	.521	.512	.504	.495	.487	.478	.470	.462	.454	.447	.439
.432	.424	.417	.410	.403	.396	.389	.383	.376	.370	.364	.357

1.6.3.6 **Land appreciation schedule**. This schedule is also obtained from OMB Circular A-104. Although the value of a facility is assumed to decline over time, the value of land is normally assumed to increase (appreciate). The OMB A-104 land appreciation schedule assumes an annual 1.5% appreciation rate. For this schedule, the A-104 land appreciation schedule, the first factor is used in the start year that the user specifies. This is normally the first year of the period of analysis, (i.e., the cost of land occurs at the beginning of the analysis). The factors are multiplied by the start value to get either beginning

or end of year values. For midyear or continuous discounting, the average of two years' factors is used, (e.g., start year 1990, start value $1,000,000 and midyear discounting used). Then in 1993, the value of the land is calculated by (1.061 + 1.046)/2 = 1.054, or $1,054,000. This is then inflated (if specified) and discounted using midyear conventions.

PC-ECONPACK provides the land appreciation schedule which contains the following values:

1.015 1.030 1.046 1.061 1.077 1.093 1.110 1.126 1.143 1.161
1.178 1.196 1.214 1.232 1.250 1.269 1.288 1.307 1.327 1.347
1.367 1.388 1.408 1.430 1.451 1.473 1.495 1.517 1.540 1.563
1.587 1.610 1.634 1.659 1.684 1.709 1.735 1.761 1.787 1.814
1.841 1.869 1.897 1.925 1.954 1.984 2.013 2.043 2.074 2.105
2.137 2.169 2.201 2.234 2.268 2.302 2.336 2.372 2.407 2.443

1.6.3.7 **Building depreciation - 801**. The OSD 801 Contract Army Family Housing Building Depreciation schedule is for use in 801 EAs. This schedule applies a straight line depreciation assuming a 45 year economic life. The first factor is used in the start year specified by the user. This is normally the year that the housing is occupied. It is used with respect to inflation, discounting, and timing the same as the OMB Building Depreciation Schedule.

PC-ECONPACK provides the following "canned" 801 building depreciation schedule:

.978 .956 .933 .911 .889 .867 .844 .822 .800 .778 .756 .733
.711 .689 .667 .644 .622 .600 .578 .556 .533 .511 .489 .467
.444 .422 .400 .378 .356 .333 .311 .289 .267 .244 .222 .200
.178 .156 .133 .111. 089 .067 .044 .022 .000 .000 .000 .000
.000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000

CHAPTER 2

INSTALLING PC-ECONPACK

2.0 **INTRODUCTION**. PC-ECONPACK is a menu-driven system which allows great flexibility and control over screen editing of data and documentation. PC-ECONPACK is designed to be used on IBM personal computers and IBM compatible hardware equipped with at least 5 million bytes of storage on one disk drive and 512K Random Access Memory (RAM). This requirement, for all practical purposes, makes a ten megabyte hard disk necessary for running PC-ECONPACK. The operating system needed to run PC-ECONPACK on a personal computer is Microsoft's Disk Operating System (DOS) version 2.2 or higher.

This chapter discusses the procedures for loading PC-ECONPACK. Data to be entered by the user during the install routine are underlined. The names of keys or single characters to be typed from the keyboard are enclosed in parentheses (e.g., (CR) means press the carriage return key).

2.1 **THE PC-ECONPACK INSTALL ROUTINE**. Accompanying the PC-ECONPACK Users Manual are three (3) diskettes: Disk 1 - Installation Disk and Disks 2 and 3 - Program Disks. These diskettes contain all the software needed to run PC-ECONPACK. These diskettes must be copied onto the hard disk drive on the personal computer (PC) before PC-ECONPACK can be used. PC-ECONPACK needs to be installed only one time.

To load PC-ECONPACK, the user must have the following:

IBM compatible personal computer

Color or monochrome monitor

512 K RAM system memory

Hard disk with at least 5 megabytes free disk space

2.2 or higher version of DOS

To copy PC-ECONPACK onto the hard disk drive, the user should execute the following procedure:

STEP 1: Turn on the system power and access the operating system.

STEP 2: PC-ECONPACK has an install routine which automatically creates the appropriate directories and files needed to run the program. Remove Disk 1 - Installation Disk from the disk sleeve and insert the diskette into drive A. At the DOS prompt (e.g., C:\>), type A:ECONLOAD A: C:(CR). If PC-ECONPACK is being loaded from a disk drive other than A, replace the A in the previous command with the appropriate disk drive specification. If PC-ECONPACK is being loaded to a disk drive other than C, replace the C in the previous command with the appropriate disk drive specification.

After the command is entered, the system displays a message which delineates program requirements and gives the user's current disk space status. The following is a sample message.

c:\>echo off
The PC-ECONPACK programs require 2,200,000 bytes of space, and the input, temporary, and report files generated by PC-ECONPACK will require another 1 to 3 MB (million bytes) of free disk space, for a total of 5 MB (million bytes) that are needed to be free to run PC-ECONPACK.
Currently, you have the following on your C: drive:

FREE Vers 1.0 - Sept. 1985 - by Art Merrill

31344640 bytes total disk space
16898048 bytes allocated
14446592 bytes available on disk

Do you wish to continue (Y/N)? Y
Also, to run PC-ECONPACK, approximately 500K free RAM is needed; you may need to temporarily remove from memory any TSRs you have running. If you need to verify the amount of free RAM you have, run CHKDSK (usually in the \DOS directory) after installing PC-ECONPACK.
Strike a key when ready ...

STEP 3: Proceed to follow the instructions as they appear on the screen. The user is directed to load each of the other 2 diskettes (Program Disks 2 and 3). When directed to do so, the user simply removes the loaded diskette from the disk drive, inserts the diskette specified, and repeats the procedure until all other diskettes have been loaded. The system does not allow diskettes to be loaded out of sequence. The user must

load Diskette 1, followed by 2, and then 3. Once the loading is finished, the system displays the user's equipment configuration status.

STEP 4: When all diskettes are loaded, the system shows what the CONFIG.SYS file should contain, then indicates what the current CONFIG.SYS file contains. The following is a sample CONFIG.SYS message:

Your CONFIG.SYS file should contain at least the following to run PC-ECONPACK:
FILES = 15 (or higher)
BUFFERS = 10 (or higher)

Your present CONFIG.SYS file looks like this:
DEVICE = ANSI.SYS
FILES = 20
BUFFERS = 20

If your present CONFIG.SYS file does not contain the minimum requirements for PC-ECONPACK, please update it. If you need assistance, call the Huntsville Division at (205) 955-5266, AUTOVON 645-5266.
Strike any key when ready ...

If the minimum requirements are not met, change them by entering the following commands:

COPY CON CONFIG.SYS (CR)
FILES = 15 (CR)
BUFFERS = 10 (CR)

Type F6.
System responds with ^Z.
(CR) and the file is saved.

PC-ECONPACK can now be used to prepare economic analyses. Instructions for accessing and using PC-ECONPACK are presented in Chapter 3 of this manual.

2.2 **GENERAL KEYBOARD INFORMATION**. The keyboard for IBM personal computers and their compatibles is divided into four main sections: 1) the typewriter keys, 2) the cursor-movement keys, 3) the function keys, and 4) the special purpose keys. Figure 2-1 shows a sample keyboard.

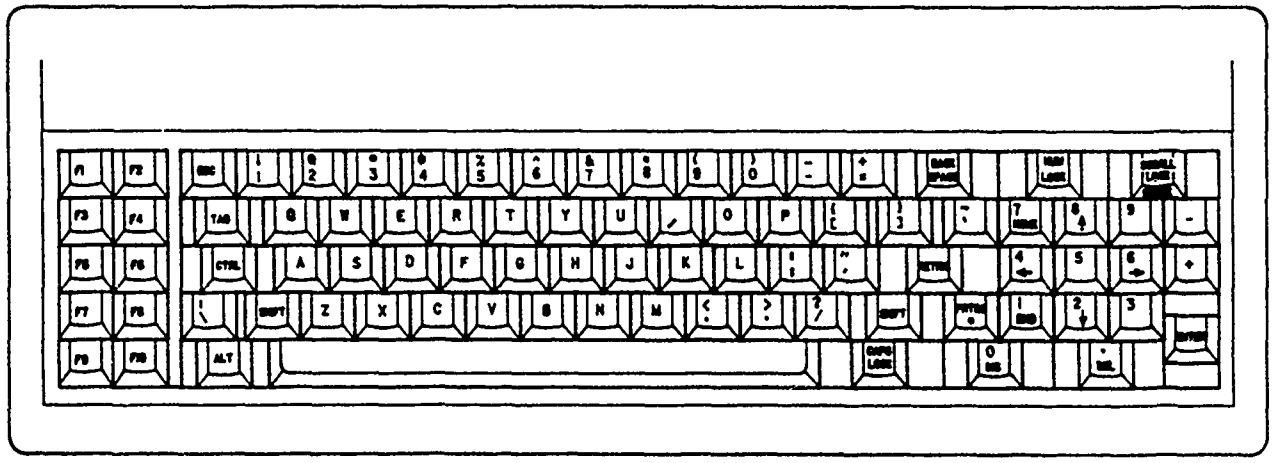


Figure 2-1. Typical keyboard for a personal computer

2.2.1 **Typewriter Keys**. The typewriter keys are usually located in the middle of the keyboard and include the alphabet and number keys. They perform the same function as the keys on any standard typewriter.

2.2.2 **Cursor-movement Keys**. The cursor-movement keys are marked Home, End, PgUp, PgDn, and with the four arrows pointing left, right, up, and down. The movement of the cursor takes two forms in PC-ECONPACK. When moving up and down the menu choices, the different options are highlighted. The up and down arrow keys are used for this "scrolling" action. During data entry, the cursor takes the form of a blinking character. The left and right arrow keys are used to move the cursor within a data field. The numbers associated with the cursor movement keys can be used by pressing the number lock key above the cursor movement keys. This activates the numbers which can be used exactly as the numbers on the typewriter section of the keyboard, but it disables them as scrolling keys. When using PC-ECONPACK, keep the number lock off!! When entering numbers, use the number keys from the regular number/alphabet section of the keyboard.

2.2.3 **Function Keys**. The function keys are located on the left side of the keyboard (on some keyboards they are located along the top) and are labelled F1, F2,.....,F10. These keys perform specific functions that vary for each personal computer software application. Their specific functions in PC-ECONPACK are explained in Chapter 3.

2.2.4 **Special Purpose Keys**. Special purpose keys are located at various places on the keyboard. They perform different functions related to the running of applications on personal computers.

There are several special purpose keys on the keyboard. The ones used most often are backspace, carriage return, tab, and caps lock. The backspace key erases the last character entered on the screen from the keyboard. The backspace key is located at the upper right of the typewriter keys.

Just below the backspace key is the carriage return key. This is one of the most important and most commonly used keys. It is used in many different contexts but it essentially has one meaning. When an entry is complete and the computer needs to respond, the user presses the carriage return key. The carriage return key is sometimes marked by a down-and-left pointing arrow and/or the word Enter or Return.

The tab and shift-tab (pressing the shift and tab keys simultaneously) keys are designed to move the cursor back and forth between data entry fields. The tab key moves the cursor forward to the next data field much the same as the carriage return key. The shift-tab keys move the cursor backward to the preceding data field. This allows the user to back up to a data field and make corrections or changes. [Note: The up and down arrow keys also allow the user to move the cursor back and forth between data fields.]

The caps lock key acts as a toggle switch for the letter keys on the typewriter section of the keyboard. When the caps lock key is pressed, the letters typed are in the uppercase mode and remain as such until the caps lock key is pressed again. When the caps lock is on, shift and an alphabetical character give a lowercase letter.

CHAPTER 3

ACCESSING/USING PC-ECONPACK

3.0 **INTRODUCTION**. This chapter presents procedures for accessing the PC-ECONPACK program and entering/modifying data. As a part of the explanation, the user is instructed to enter data for a secondary analysis entitled CASE STUDY ONE - UNACCOMPANIED PERSONNEL HOUSING. (The input file created in the case study is called SECONDY.)

Special notes and data for user entry in the case study example are enclosed in brackets. Within the brackets, the names of keys (other than function keys) or single characters from the keyboard are enclosed in parentheses, (e.g,, (CR) means the user should press the carriage return key). Screens are also depicted to assist the user in understanding how to use the program.

3.1 **ACCESSING PC-ECONPACK**. After PC-ECONPACK has been installed, the user can run the program by turning on the personal computer, accessing the operating system, and entering the command ECONPACK (e.g., C:\>ECONPACK (CR)). The PC-ECONPACK title screen is then displayed. Figure 3-1 provides an example of the title screen.

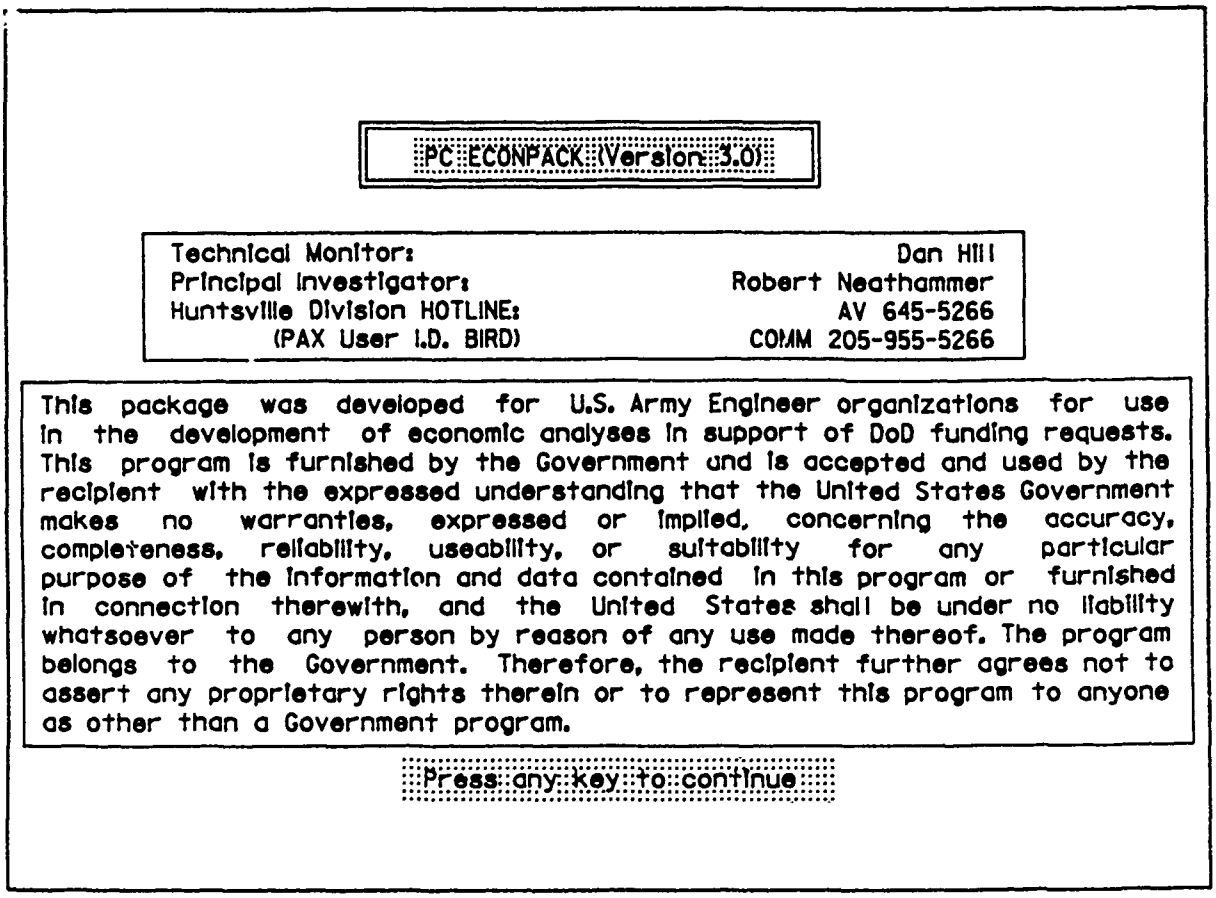


Figure 3-1. ECONPACK title screen

The user can press any key to move to the PC-ECONPACK main menu. The menu has four options. The filename of the last file used in the program appears in the upper-left of the screen as the current file. The first time the program is used, the Current File box says **No Input File Selected.** The name, date, and version number of the program appear in the upper-right.

3.2 **MOVING AROUND THE MENUS.** On a menu screen, the large block in the middle of the screen contains the menu options. The PC-ECONPACK menus are very simple. There is one main menu with four options (Figure 3-2). Figure 3-3 presents a flowchart delineating the components of the PC-ECONPACK System and the functions which may be accessed from each option on the main PC-ECONPACK menu.

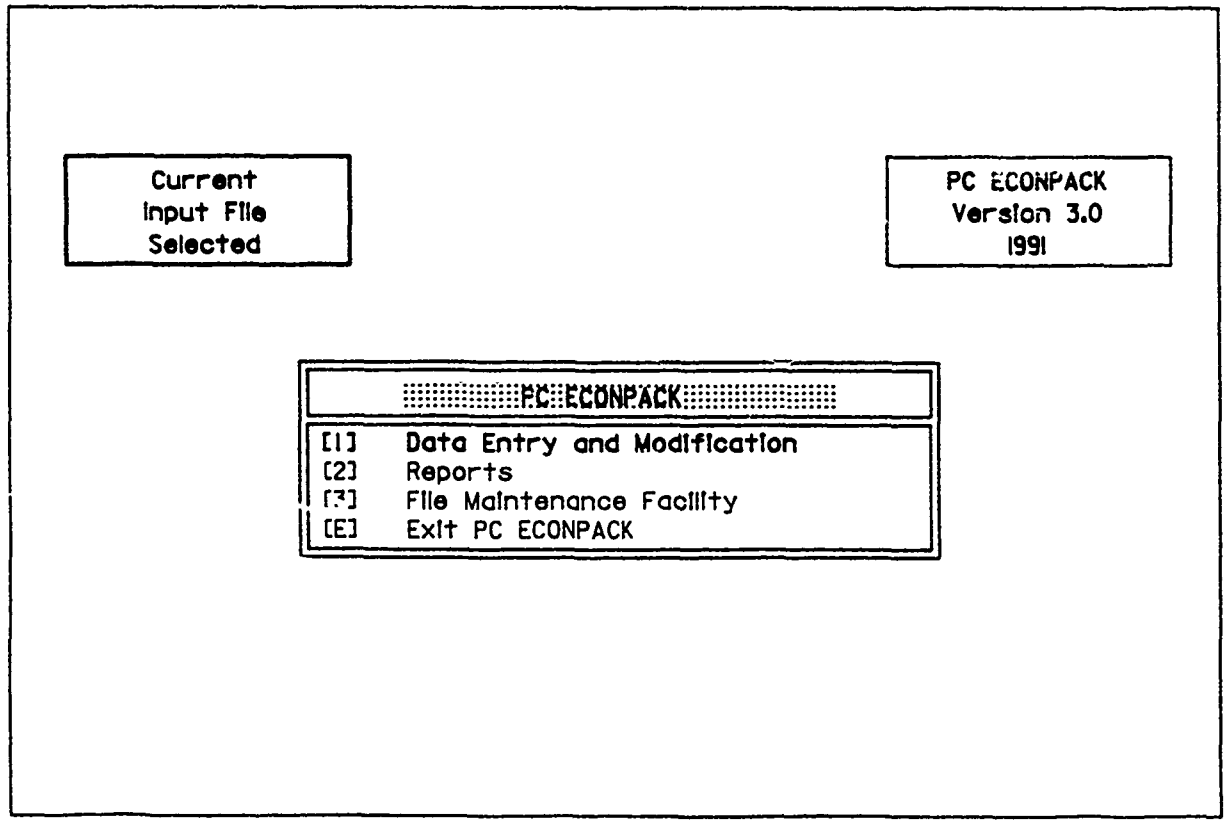


Figure 3-2. PC-ECONPACK main menu screen

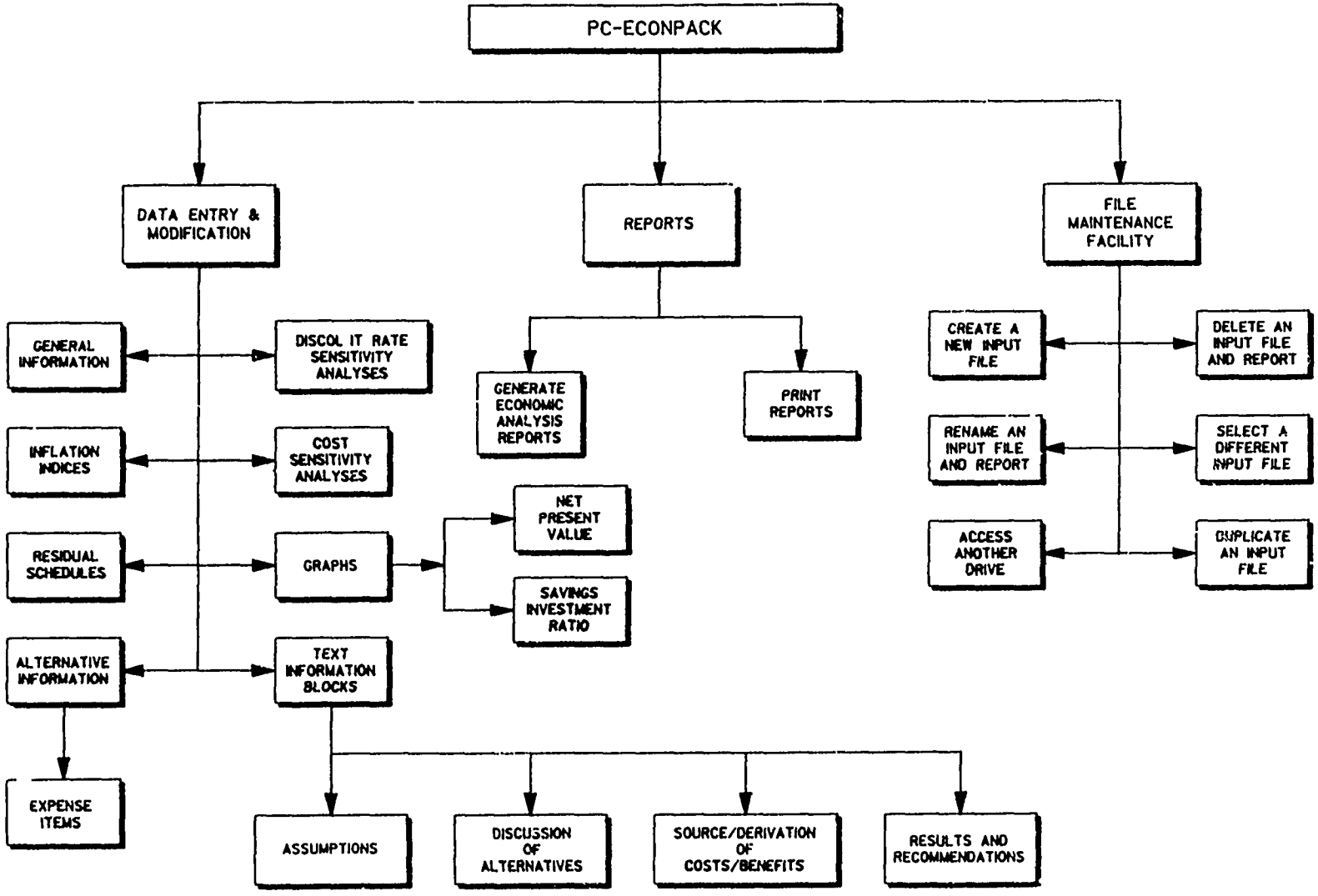


Figure 3-3. Components of the PC-ECONPACK System

The cursor-movement keys located on the right side of the keyboard allow movement up and down the menu choices. The up and down arrow keys (scrolling keys) are the only keys required for this action. When the up and down arrow keys are pressed, notice that the menu options are highlighted one at a time in sequence. When the desired option is highlighted, the user presses the carriage return key to execute that option.

Menu options can also be executed in another manner. Each menu option has a number assigned to it (all the exit options have the letter [E] assigned to them). The F10 Done key also exits the current menu. It is not necessary to move up and down the menu options with the scrolling keys in order to highlight a choice. Simply press the numbered key corresponding with the menu selection desired and that particular option is immediately accessed.

3.3 **FUNCTION KEYS IN PC-ECONPACK**. The function keys perform specific functions applicable only to PC-ECONPACK. There are ten function keys. At the bottom of each data screen, there is a horizontal menu of the function keys. Note that some keys have names and others do not. If the function key is displayed with a name, that key is operational on the current screen. If no name is specified for the key, it is not valid on the current screen. A Summary of Function Keys Quick Reference Guide is located in this chapter, section 3.3.11. The following is a discussion of the use of the various function keys.

3.3.1 **F1 HELP**. In PC-ECONPACK, the F1 key labeled Help accesses the HELP feature. When the user presses F1, the current screen disappears and a help message appears on the screen. Help messages can be obtained for some entire screens or for a specific data field. (See Figure 3-4 for a sample HELP screen.) A data field is any shaded area on a data screen. To get assistance for a specific data field, move the cursor to that field and press the F1 key. To return to the data screen, press the F10 Done key.

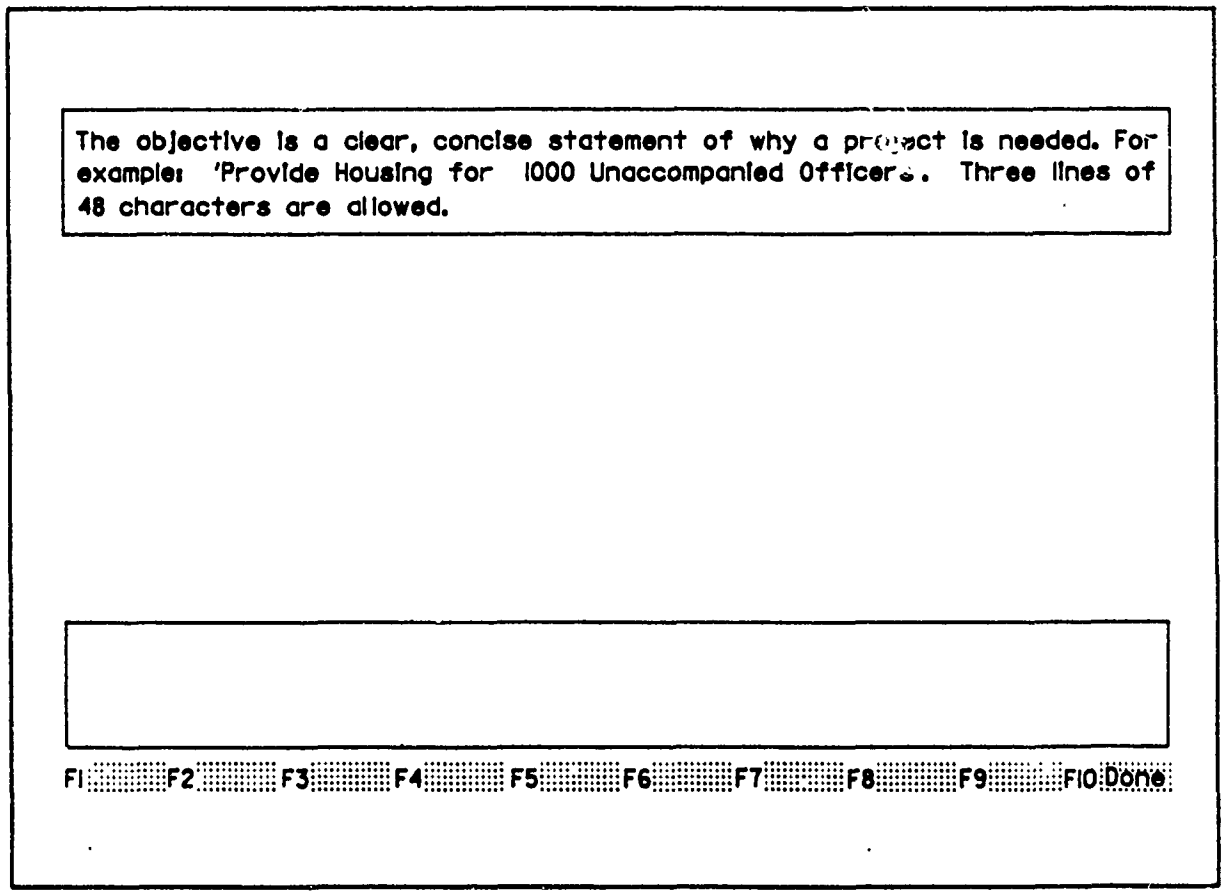


Figure 3-4. Example of a HELP screen
(Displayed from the Project Objective data field)

3.3.2 **F2 KEYS**. The F2 function labeled Keys is really another help key. It is different from the F1 Help key in that F2 is not associated with any particular data entry field or screen. F2 assistance applies only to the editing keys, scrolling keys, and cursor-movement keys. At any time during data entry or editing of data, the user may press the F2 key. The current data entry screen disappears and another screen appears (Figure 3-5) which shows the definition of the editing keys, scrolling keys, and cursor-movement keys.

To exit the Keys screen, simply press the F10 key and the system returns to the data entry screen where the user is currently working. The Keys screen is the same at all times. It assists the user in using the editing, scrolling, and cursor-movement keys available in PC-ECONPACK. Thus, it is not necessary to refer to the PC-ECONPACK Users Manual if the function of a particular key is forgotten.

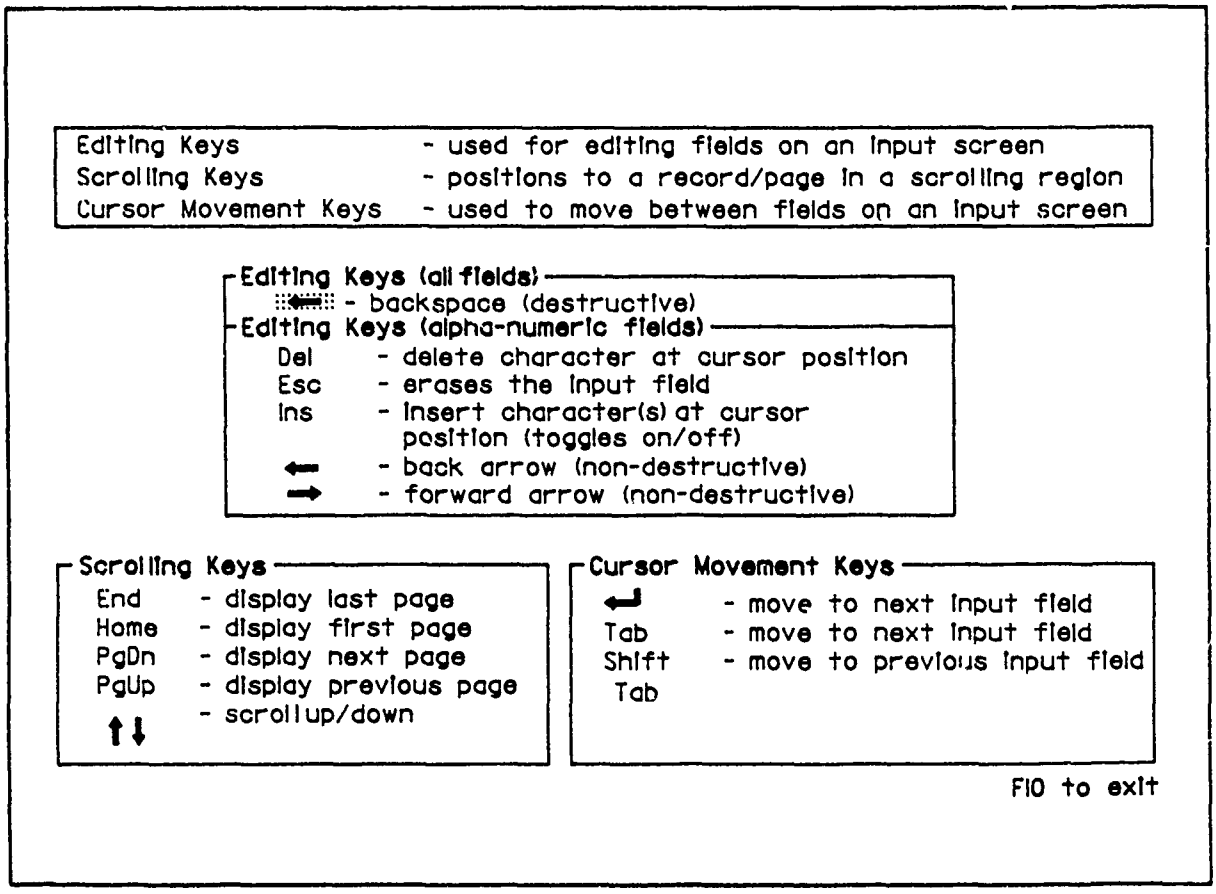


Figure 3-5. F2 KEYS screen

3.3.3 **F3 ADD**. The F3 Add function is the first of the data manipulation functions. It is used when the user wants to add data to a data entry screen. When working on a data entry screen for the first time, press F3 and the system prompts with a blinking cursor for data to be added in the first data entry field on the screen. F3 is also used to add more items such as alternatives, residual schedules, inflation indices, expense

items, graphs, and sensitivity analyses to existing data. For example, an economic analysis may originally have included just two expense items under Alternative 1. Upon later reflection, the user decides that three items are needed, not two. To make the addition, simply access the expense item data entry screen for Alternative 1 and press F3. PC-ECONPACK adds a third expense item (designated by a "3" in the left corner of the data entry screen). A blinking cursor prompts for data to be entered for this expense item.

When an item is complete, the user is prompted at the bottom of the screen with the [A] Accept, [M] Modify or [Q] Quit? prompt. Type the letter (A) to accept the data as entered, (M) to modify the data entered, or (Q) to quit and leave the data screen without saving the changes or data just entered. One of these three choices must be entered to continue. If the (M) is entered, the system goes into the edit mode similar to that initialized by the F5 Edit function key.

F3 FIND. One of the menu selections under DATA ENTRY AND MODIFICATION is Text Information Blocks. When the F5 Edit function key is pressed for either of the four text information blocks, a data entry screen is initialized. This data entry screen is text in nature. From this particular screen, the F3 key is the Find function key. It is used to locate a string of text within the text block.

F3 CREATE. File Maintenance Facility is an option from the PC-ECONPACK main menu. When the user selects this option, the system displays a Directory of Input and Report Files screen. From this screen, F3 Create allows the user to create a new PC-ECONPACK input file.

3.3.4 **F4 DELETE**. The F4 Delete function key is used to delete items that the user no longer wants included in the EA. Specifically, it erases all data associated with a designated alternative, graph, expense item, residual schedule, inflation index, or sensitivity analysis. It is also used to delete a line of text when the user is in the edit mode within the text information blocks. From the File Maintenance Facility Directory of Input and Report Files screen, F4 allows the user to delete the highlighted input and/or report file(s).

To use this function, simply position the cursor over the number of the item to be deleted. If, for instance, the user wants to entirely eliminate Alternative 3 from the analysis, simply

position the cursor over the number "3" in the left column of the Alternative Definition screen and press F4. When the F4 function key is pressed, the system flashes a warning message at the bottom of the screen above the function keys menu:

Warning!
Any reference to this alternative will be removed
Continue, yes [Y] or no [N]?

Enter a (Y) or (N) to indicate choice to continue or not.

This prompt is a built-in system protection so the user is less likely to inadvertently delete the wrong data. Always pay close attention when scrolling up and down the different items with the cursor to ensure that the correct item is highlighted before using the delete function.

3.3.5 **F5 EDIT**. Quite often the user needs to change data which have already been entered. To change one or more data entry fields, use the F5 key or the Edit function. This function works much the same way as the Add function. When the F5 key is pressed, the system exits the view mode and enters the edit mode; the existing data remain on the screen unchanged. The user is prompted for data changes by the blinking character cursor. If no change to a certain field on the screen is desired, press the carriage return or tab key and the cursor moves to the next data entry field for editing. When the cursor has passed through the entire screen, the bottom of the screen prompts the user again with: [A] Accept, [M] Modify, or [Q] Quit? Again, (A), (M), or (Q) must be entered to continue with the economic analysis.

F5 IMPORT. After the user chooses to edit a specific text information block, the system accesses the VDE full-screen editor. In this mode, F5 Import is used to enter a copy of a specified file onto the current screen as a part of the text. The data is entered before the line on which the cursor is located.

F5 RENAME. From the File Maintenance Facility Directory of Input and Report Files screen, F5 Rename allows the user to select a file and enter a new filename (first name) for the file. If the file has a matching report file, the name is changed on the input and report files.

3.3.6 **F6 E.I. (Expense Item)**. From the Alternative Information screen, F6 E.I. is used to access expense item data associated with alternative definitions. An alternative must be identified and defined before expense items can be entered. The alternatives are options for meeting the objective (i.e., new construction, lease, renovation). Expense items are the costs associated with each alternative (i.e., maintenance and repair, construction). The F6 E.I. key is only available for use after an alternative has been defined.

To enter an expense item for an existing alternative, the user presses F6 and the system displays an expense item data entry screen. After completing this data entry screen, the user sees the prompt: [A] Accept, [M] Modify or [Q] Quit? To accept the data, press the (A) key and the data is recorded as entered. If the F10 function key is pressed, the user is returned to the alternative definition data screen previously being edited. The user can then proceed to select another alternative by positioning the cursor to the desired alternative, pressing the F6 key, and beginning to enter or edit expense item data for that alternative.

F6 LIST. F6 List is valid from the Residual Schedules screen. When the user presses F6, the system shows a pop-up window which lists the available residual schedules.

F6 EXPORT. F6 Export is valid in the edit mode from the accessed text information block. It allows the user to copy the content of the current text file to a PC file. When the user presses F6, the system prompts for the name of the file to be assigned the PC file to which the content of the current file is to be duplicated. The name of the file should also include the drive specification, path, etc.

F6 SELECT. When the user accesses PC-ECONPACK, the system automatically loads the file accessed during the previous editing session. F6 Select from the File Maintenance Facility Directory of Input and Report Files screen allows the user to select another input file for loading into PC-ECONPACK as the current file.

3.3.7 **F7 FILL**. The F7 Fill key can only be used on certain data entry screens within PC-ECONPACK. The purpose of the Fill function is to assist in entering data for the individual years of the economic analysis. For example, it can be used when entering cost data for each year of an expense item when the costs are the same for all years of the alternative (i.e., operation and maintenance costs). The user may enter the same cost for each year of the alternative individually or use the F7 function key to do so simultaneously. When the system prompts for data in the field for the first year of the alternative, enter the cost and then if the costs are the same for all the remaining years, press the F7 or "Fill" key. **DO NOT ENTER A CARRIAGE RETURN.** The system automatically fills the rest of the data fields for each year with the same data entered in the first year of the analysis. The Fill function puts the number entered in the year (data field) where the cursor is currently positioned into all remaining years of the analysis. The Fill function can also be used when all years of the alternative do not have the same entry. If, for example, the costs varied in years 1 through 4 and the costs from year 5 onward were the same, the F7 key would be pressed after the cost for year 5 is entered.

The F7 Fill function is only available from the data entry screens that require data input for each individual year of the analysis (Inflation Indices, Residual Schedules, Expense Item Definition). This function is available during the ADD or EDIT mode and does not actually appear on the function keys menu at the bottom of the screen until the user is prompted to enter data into the field of the first year of the analysis.

F7 COPY. The F7 Copy key is valid from the Alternative Information screen and from the Expense Item Definition screen. From the Alternative Information screen, F7 allows the user to duplicate the currently highlighted or currently displayed alternative including the expense item(s). From the Expense Item Definition screen, F7 displays the available alternatives. The user highlights the name of the alternative which contains the expense item to be copied. Then the system displays the expense items for the selected alternative. The user then highlight the expense item to be duplicated. When F7 is entered, the system duplicates the specified alternative or expense item and enters it as the last entry on the screen. The cursor is then located at the new entry.

F7 DRIVE. The F7 Drive key is valid from the File Maintenance Facility Directory of Input and Report Files menu. When the user accesses PC-ECONPACK, the system defaults to the hard drive onto which the PC-ECONPACK program is loaded. F7 allows the user to select another drive and display the Directory of Input and Report Files from that drive.

3.3.8 **F8 REPEAT**. The F8 Repeat function key is used in much the same way as the Fill key. In fact, the F8 function key is available from the function key menu at the bottom of the data entry screens in tandem with the F7 key.

When a particular data entry screen requires the same entry for each year of the alternative, the user can use the F7 function. A common situation is one in which not all the years have the same data entry but several of the years in succession do. The Repeat function allows the user to enter in the next year, the same value as entered in the current year of the analysis. To use this feature, in the current data field (do not carriage return), press the F8 function key for each succeeding year for which the item is to be repeated.

F8 COPY. F8 Copy is valid from the File Maintenance Facility Directory of Input and Report files menu. When the user presses F8, the system prompts for the disk drive to which the duplicate copy of the selected file is to be stored and the filename to be assigned the new file. Do not enter an extension.

F8 LIST. F8 List is valid from the Alternative Information and Expense Item Definition screens. When the user presses F8, the system shows a pop-up window which lists the available inflation indices or residual schedules.

F8 DIR. F8 Dir is valid in the text information block edit mode. It allows the user to obtain a listing of PC files. When the user presses F8, the system prompts for the directory to be displayed. The default directory is the directory onto which PC-ECONPACK is loaded.

3.3.9 **F9 NEXT**. The F9 Next function allows the user to view the next screen when the user is editing data that fills more than one screen. An economic analysis of a particular project could range up to 60 years in length. The data entry screens that require input by year show only 15 years on the screen at one

time. To view the data element in year 40 of an analysis, for example, press the F9 key twice and the screen first displays the data elements in years 16 to 30 and then years 31 to 45. The user may then view the data in year 40 of the analysis.

Continue to press F9 and each 15 year segment of the analysis is displayed until years 1 to 15 return to the screen. As with F7 and F8, this function key only applies to the data entry screens that require data to be entered into the system for each individual year (i.e., Inflation Indices, Residual Schedules, and Expense Item Definitions).

3.3.10 **F10 DONE**. When data entry (or just viewing) of a screen is complete, press the F10 Done function key. The data entry screen disappears and the next higher level screen appears on the monitor. If the F10 key is pressed before completion of data entry or modification of a screen, the prompt [A] Accept, [M] Modify, or [Q] Quit? appears at the bottom of the screen. Type the letter (A), (M), or (Q) depending upon the desired choice. The F10 key can also be used instead of (E) to exit a menu. When F10 is used for this purpose, the system moves to the previous menu.

3.3.11 Summary of Function Keys Quick Reference Guide.

KEY	NAME	FUNCTION	OPERATION	SCREEN AVAILABILITY
F1	HELP	Provides help for individual data fields and/or screens.	Press F1 in the view mode or in the edit mode, move cursor to field for which help is needed, press F1.	All
F2	KEYS	Provides help for use of editing/ scrolling/cursor-movement keys.	Press F2 at any time.	All
F3	ADD	Allows the adding of a new alternative, expense item, etc.	Press F3 while in the viewing mode.	Inflation Indices, Residual Schedules, Alternative Information, Expense Item Definition, Graph Definition, Cost Sensitivity Analysis, Discount Rate Sensitivity Analysis, Reports
F3	FIND	Locates specified string of text.	Press F3 while in the text edit mode and specify the string to be located.	Text Information (Edit mode)
F3	CREATE	Allows the creation of a new input file.	Press F3 and enter filename to be assigned new input file.	File Maintenance

KEY	NAME	FUNCTION	OPERATION	SCREEN AVAILABILITY
F4	DELETE	Erases an existing alternative, expense item, line of text, etc.	Move the cursor in the viewing mode to item to be deleted, press F4.	Inflation Indices, Residual Schedules, Alternative Information, Expense Item Definition, File Maintenance, Text Information (Edit mode), Graph Definition, Cost Sensitivity Analysis, Discount Rate Sensitivity Analysis, Reports
F5	EDIT	Allows modifying of an existing alternative/ expense item/ benefit/etc.	Move cursor in the viewing mode to item to be modified, press F5.	General Information, Inflation Indices, Residual Schedules, Alternative Information, Expense Item Definition, Text Information Blocks, Graph Definition, Cost Sensitivity Analysis, Discount Sensitivity Analysis
F5	IMPORT	Allows transfer of text file from the PC data base into the current text block.	Press F5 and enter name of file to be imported.	Text Information (Edit mode)
F5	RENAME	Changes the old name of the file to the specified new name.	Highlight the filename to be changed. Press F5 and type in the new filename.	File Maintenance

KEY	NAME	FUNCTION	OPERATION	SCREEN AVAILABILITY
F6	LIST	Provides a delineation of all available residual schedules.	Press F6 while in the viewing mode. Highlight the desired schedules to be used and enter a carriage return at each one. Press F10 when all schedules have been selected.	Residual Schedules
F6	E..I (EXPENSE ITEM)	Moves from alternative screen to expense item screen.	Move cursor in alternative viewing mode to desired alternative, press F6.	Alternative Information
F6	EXPORT	Moves content of the current text block into the specified PC file.	Press F6 and type the filename to assign the text file to be exported.	Text Information (Edit mode)
F6	SELECT	Loads another input file as the current file.	Highlight the desired input file and press F6.	File Maintenance
F7	FILL	Fills all remaining years of analysis with same data as entered in current field.	Enter data to be repeated in remaining years, press F7.	Inflation Indices, Residual Schedules, Expense Item Definition (Add or Edit mode)

KEY	NAME	FUNCTION	OPERATION	SCREEN AVAILABILITY
F7	COPY	Duplicates the current alternative or expense item data.	Highlight the alternative to be duplicated and press F7 or press F7 and choose the alternative and expense item from which expense item data is to be duplicated.	Alternative Information, Expense Item Definition
F7	DRIVE	Changes the default drive to the user-specified drive and displays the appropriate directory.	Press F7 and type in the desired drive specification.	File Maintenance
F8	REPEAT	Enters in the next year the same data as entered in current year of analysis.	Press F8 after data to be duplicated has been typed in current year.	Inflation Indices, Residual Schedules, Expense Item Definition (Add or Edit mode)
F8	COPY	Duplicates the highlighted file.	Press F8 and specify the disk drive and filename for the duplicate file.	File Maintenance

KEY	NAME	FUNCTION	OPERATION	SCREEN AVAILABILITY
F8	LIST	Delineates available Inflation Indices or Residual Schedules.	Press F8 for pop-up window listing of available inflation indices or residual schedules.	Alternative Information (Inflation Index and Residual Schedule data fields), Expense Item Definition (Inflation Index data field)
F8	DIR	Provides a listing of PC files.	Press F8 and indicate directory to be displayed if other than the default directory is desired.	Text Information (Edit mode)
F9	NEXT	Allows the viewing of analysis data 15 years at a time.	Press F9 while in viewing or editing mode.	Inflation Indices, Residual Schedules, Expense Item Definition
F10	DONE	Indicates that entering or modifying data is finished or moves back to menu. Allows the user to exit from any menu.	Press F10 at any time.	All

3.4 **PC-ECONPACK DEFAULT CONDITIONS**. The PC-ECONPACK program has certain default conditions. These built-in defaults can be changed by the user. Specifically, PC-ECONPACK assumes:

- o a ten percent (10%) discount rate
- o middle-of-year discounting of costs
- o no inflation

PC-ECONPACK is structured to allow a discount rate of other than 10 percent to be used. Given a fixed expense stream for future years, use of a higher discount rate results in a lower present value of costs, whereas use of a lower discount rate results in a higher present value of costs.

Middle-of-year discounting assumes that costs for a given year are spread evenly throughout the course of the year. In some cases, however, the costs may occur at a particular point in time (e.g., at the end of the year). In this situation, use of the end-of-year discounting convention provides a truer measure of the present value of the costs. The user can specify use of a discounting convention other than that of middle-of-year discounting.

When inflation is used, PC-ECONPACK inflates costs using the same convention as the discounting convention for the cost. For instance, suppose mid-year discounting is used in an expense item. PC-ECONPACK uses a mid-year inflation method to inflate the cost. If the user changes discounting conventions, PC-ECONPACK automatically adjusts the inflation method to match the new discounting convention.

CHAPTER 4

CREATING/MODIFYING ECONPACK FILES

4.0 **INTRODUCTION**. Data entry and modification in PC-ECONPACK is very simple. The user chooses an option from a menu and types all relevant data into designated data fields on a full screen, one field at a time. Before beginning to enter data, the user should organize the information to facilitate ease of entry. The analyst normally lists the following data for reference when preparing to use PC-ECONPACK:

- Project Title
- Project Objective
- Organization Title
- Global Discounting Convention
- Period of Analysis
- Start Year
- Base Year
- Inflation Indices
- Residual Schedules
- Type Analysis (Secondary or Primary)
- For Each Alternative:
  - List of Expense Items and Yearly Costs
  - Inflation Index Numbers
  - Discounting Conventions
  - Salvage Value
  - Residual Schedule Numbers
  - Source of Data
- Quantifiable Benefits
- Non-Quantifiable Benefits
- Titles of Sensitivity Analyses
- Values of Change for Sensitivity Analyses

It is not necessary that all this data be entered before the economic analysis is generated. For example, the sensitivity analysis information and the results and recommendations text are normally added after the initial generation. General information, alternative definitions, and expense item definitions are required input.

4.1 **PC-ECONPACK FILES**. Within PC-ECONPACK, two types of files related to creating analyses are stored on the user's disk. They are input files and report files. The input file contains the information entered by the user for generating the economic analysis. When the input file is created, the system prompts the user to enter a filename. That filename which cannot contain more than eight characters becomes the first name of that file. The system assigns the input file a filetype which becomes the last name of the file. The filetype assigned an input file is always INP. (Note: In the mainframe version of ECONPACK, the

System-assigned filetype of all input files is FT75F001.) When the input file is used to generate an analysis, a corresponding report file is created. That report file has the same filename (first name) as the input file, and the system assigns the report file the filetype (last name) REP. (Note: In the mainframe version of ECONPACK, the System-assigned filetype of all report files is FT76F001.)

4.2 **CREATING/MODIFYING AN INPUT FILE**. The PC-ECONPACK input file basically has eight blocks of data:

1. The **General Information Block** includes the project title; the project objective; the name, title, and phone number of the action officer; organization title; global discounting convention; period of analysis; discount rate; start year; base year; analysis type; and the cost input method.

2. The **Inflation Indices Information Block** is used to enter the titles of specified inflation indices and the inflation values for each year of the analysis.

3. The **Residual Schedules Information Block** provides three "canned" residual schedules with appropriate values. The user may select to use these canned schedules and/or enter other schedules.

4. The **Alternative Information Block** includes all the cost data for all alternatives in the analysis.

5. The **Text Information Blocks** screen lists four separate text blocks:

   The **Assumptions text information block** allows the user to discuss all assumptions considered for fulfilling the objective of the project.

   The **Discussion of Alternatives text information block** allows the user to discuss all alternatives that were considered to fulfill this requirement and the reasons why some alternatives were considered infeasible for performing a life-cycle cost analysis.

The **Source/Derivation of Costs/Benefits text information block** allows the user to discuss the sources and derivations for the costs and benefits data used in the analysis. The user should also discuss what those benefits are and how important each benefit is for the fulfillment of the mission.

The **Results and Recommendations text information block** allows the user to discuss the findings of the EA.

6. The **Graphics Information Block** includes the numbers of the alternatives to be graphed.

7. The **Cost Sensitivity Analysis Information Block** includes (for each sensitivity analysis) which alternatives are considered in the sensitivity analysis, which expense items are to be changed, and the limits on the changes.

8. The **Discount Rate Sensitivity Analysis Information Block** includes the alternatives to be included in the analysis, the discount rate, and the limits of the change.

To create an input file, the user accesses PC-ECONPACK and moves to the main menu (Figure 4-1). If the program has never been used before, the block in the upper-left corner shows that there is currently no input file selected. Once the program has been used, the last file edited always loads as the current input file.

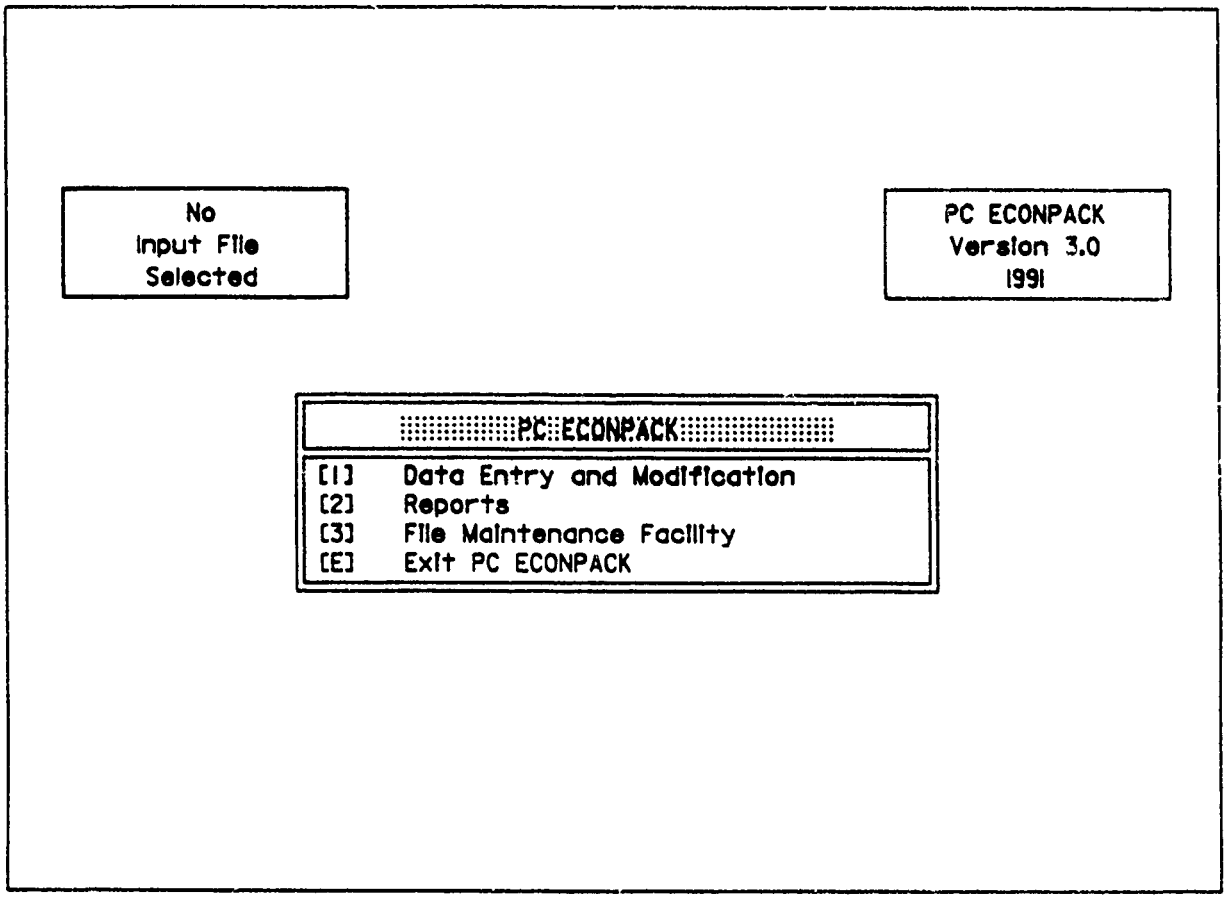


Figure 4-1. PC-ECONPACK main menu screen

From the PC-ECONPACK main menu, the user selects option 3 File Maintenance Facility by using the scrolling key to highlight that option followed by a carriage return or by typing the number 3. When the File Maintenance Facility option is accessed, a Directory of Input and Report files (Figure 4-2) appears on the screen. The PC-ECONPACK program contains two sample input and report files, one secondary analysis and one primary analysis.

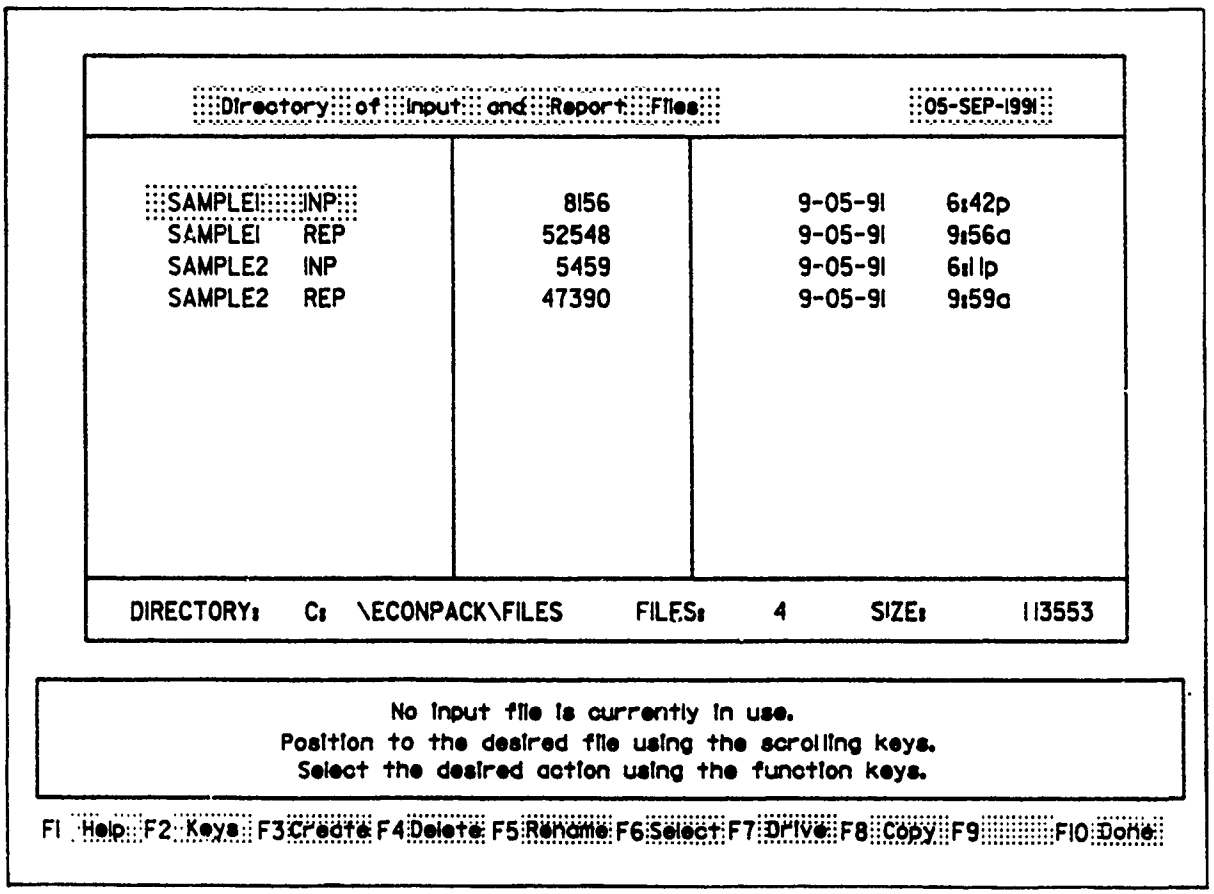


Figure 4-2. Directory of Input and Report Files screen (File Maintenance screen)

To create a new file, the user presses the F3 Create key. [Press F3.] The system prompts the user to enter a filename (Figure 4-3). Remember, the name cannot exceed eight characters.

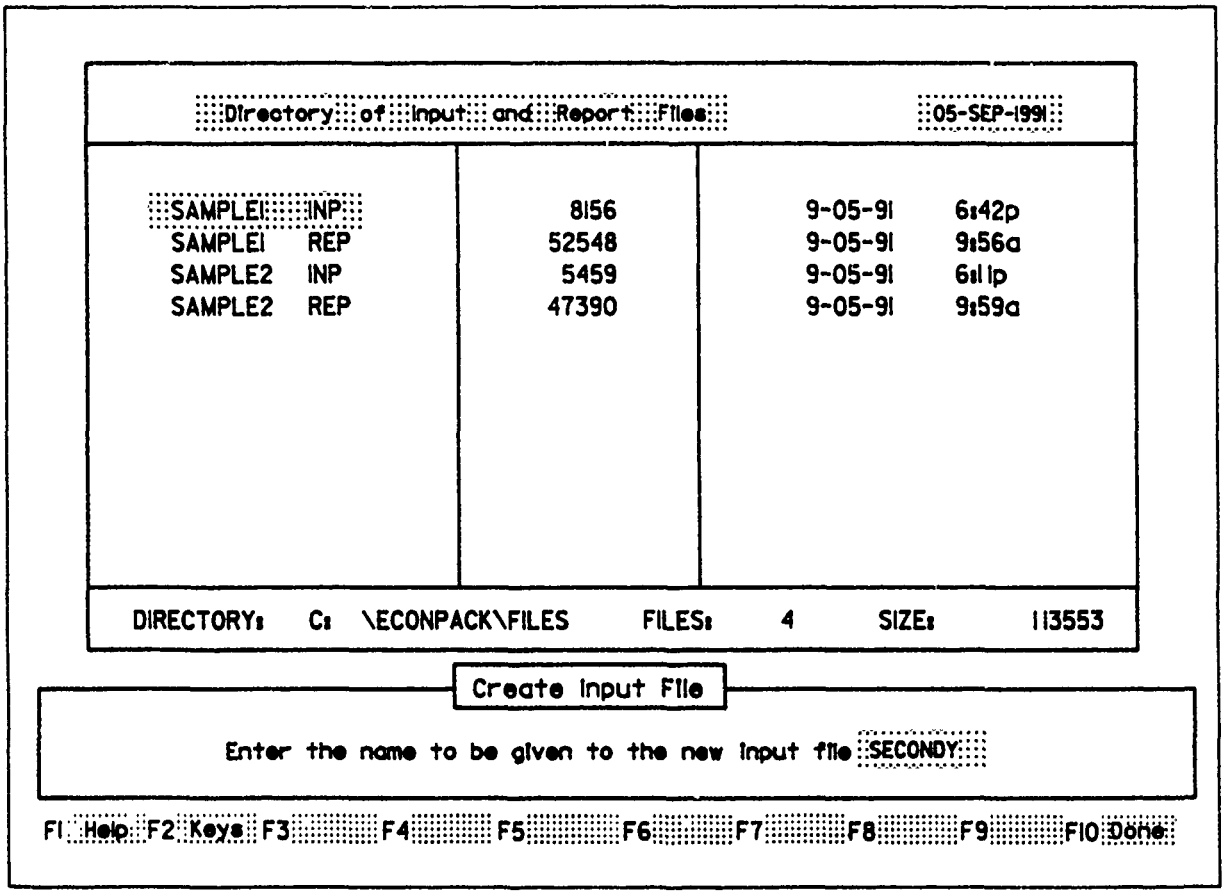


Figure 4-3. Creating an input file screen

The user types the desired filename (CR) in the space provided. If the filename has eight characters, the (CR) is not needed. [In this case study example, enter SECONDY as the filename.] The system indicates the file is being created and the Directory of Input and Report files screen disappears. The system displays the GENERAL INFORMATION data entry screen (Figure 4-4) and prompts the user to enter data in the first data field. This screen allows the user to enter data of a more general nature that affect the analysis overall.

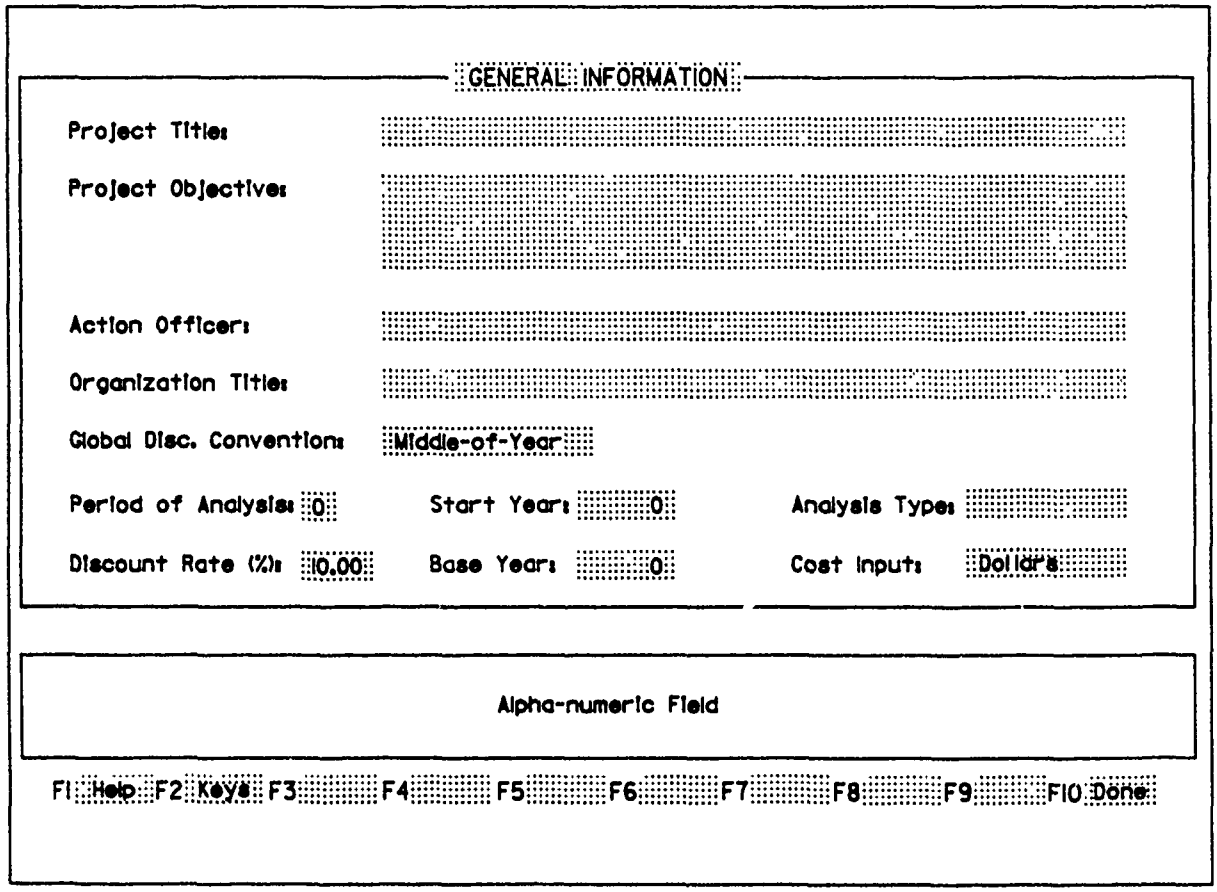


Figure 4-4. General Information data entry screen

Modifying an Existing Input File. Once PC-ECONPACK has been used to create a file, the system automatically loads the last accessed file when a user accesses PC-ECONPACK. If the file indicated in the Current Input file box is not the desired file, the user should access the File Maintenance Facility option from the PC-ECONPACK main menu, highlight the desired input file, and press the F6 Select key to load the file. The asterisk beside the name of the file on the Directory of Input and Report Files indicates the input file that is currently loaded. Once the file is loaded, the user presses the F10 Done key to return to the PC-ECONPACK main menu. From this menu, the user selects option 1 to access the DATA ENTRY AND MODIFICATION menu (Figure 4-5). From this menu, the various parts of the input file can be edited. The procedure for editing data is the same as the procedure for initial data entry.

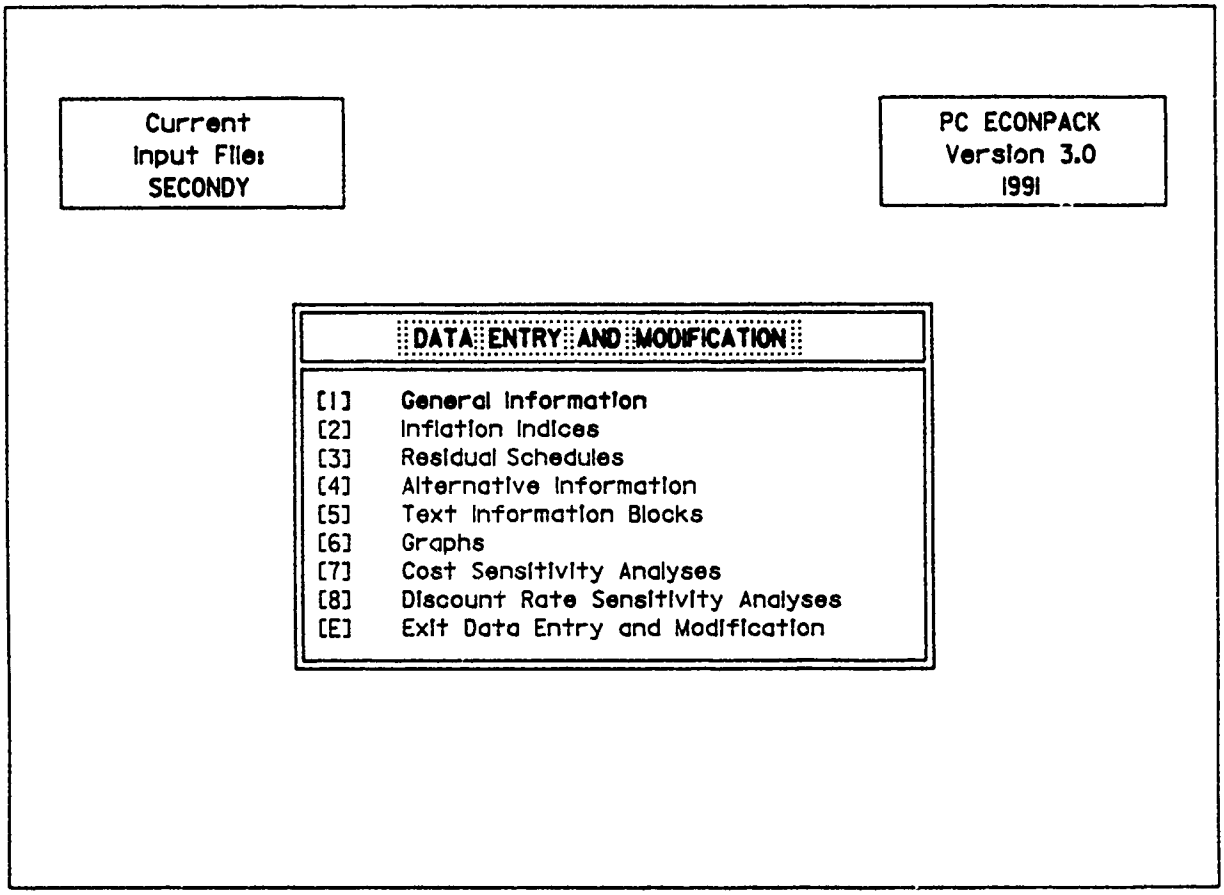


Figure 4-5. Data Entry and Modification menu screen

4.2.1 **Entering/Editing General Information Data**. The following is a description of the data required on the GENERAL INFORMATION screen.

Project Title is the title of the project being evaluated. The title may contain a maximum of 48 alpha-numeric characters. [For this SECONDY example, enter Unaccompanied Personnel Housing (CR).]

Project Objective is a clear, concise statement of why the project is needed. Three lines of 48 alpha-numeric characters per line are allowed. [Type Provide 160,000 SF of Unaccompanied Personnel Housing Space within a 15-mile radius of Fort Anywhere.]

Action Officer is a data field which should contain the name, job title, and phone number of the person to whom all questions about the analysis are to be addressed. A maximum of 48 alpha-numeric characters is allowed. [Type John Doe, Good Officer, (123) 456-7890 (CR).]

Organization Title is the name of the installation, agency, or Army organization initiating the economic analysis. This entry may contain a maximum of 48 alpha-numeric characters. [Type Fort Anywhere (CR).]

Global Discounting Convention allows the user to set the default discounting convention for all expense items in all alternatives. The user, at later prompts, is allowed to change individual discounting conventions. When the cursor is located at the global discounting convention data field, the system offers the following options:

Select the Global Discounting Convention to use:
1 = Beginning-of-Year **3 = End-of-Year**
2 = Middle-of-Year **4 = Continuous**

Default is to middle-of-year because many expenses occur throughout the year. [Press the carriage return to indicate middle-of-year discounting.]

Period of Analysis is the number of years over which the alternatives' costs are to be compared. The analysis period can be any length of time (in years) from one (1) to sixty (60). [Type 27 years for the period of analysis... two years lead time to allow for construction plus 25 years of occupancy.]

Discount Rate % is the percentage to be used for discounting future value. The discount rate should be entered as a percentage (for example: 12.00, 9.6, or 7.5). To default to the specified 10% discount rate, enter only a carriage return. [For this example, enter 9.00.]

Start Year and Base Year are four-digit data fields. These two entries will quite often be the same number, but they do not have the same meaning. The start year is the year in which the economic analysis is to begin or the first year costs are incurred. All costs are discounted to the base year. If a base year is not entered, the start year is used. The start year for

a construction and/or renovation analysis may be three years from today, but the analysis base year used for the purpose of comparing discounted present values may be the current year. Both of these entries are required. The start year entered is the default value for the base year. [In this example, enter 1993 for both the start and base years.]

Analysis Type is either secondary or primary. A secondary economic analysis compares two or more proposed alternatives for achieving a new requirement. A primary economic analysis compares a proposed alternative or alternatives with the status quo situation to decide whether the new alternative would result in a savings (Savings Investment Ratio (SIR) greater than unity). In a secondary analysis, several alternatives are compared and ranked from least to highest cost. The reason for doing a secondary analysis is that there is a new requirement -- such as provide maintenance facilities for 500 additional tanks. In a primary analysis, alternatives are compared to an existing situation with the objective of saving money over a period of time. Analysis type is a required data entry. There are only two possible entries, P for primary or S for secondary. [For this example, enter the letter (S).]

Cost Input allows the user to choose either [1] for dollars or [2] for thousands of dollars. In using this cost input method, the user should note that all dollar amounts entered into PC-ECONPACK should be consistent with the choice made in the Cost Input field on the GENERAL INFORMATION data entry screen. This field is a required entry to run PC-ECONPACK and requires only the input of the number (1) or (2). [For this example, type the number (1) to indicate that the cost input is to be in dollars.]

The user uses the up arrow, down arrow, and carriage return to move from data field to data field until the GENERAL INFORMATION screen is completed. As the user moves from field to field, the system displays a statement across the bottom of the screen (above the function keys menu) which gives instructions for completing the current field. If additional help is needed, the user can use the F1 key. If the user prompts through the last data field or presses the F10 key to indicate completion of data, the system prompts:

[A] Accept, [M] Modify or [Q] Quit?

(A) causes the system to file all data entered and allows the user to exit the Add or Edit function mode. The input file now

exists in PC-ECONPACK and data can be added to other screens. Since this file is the last file to be accessed on the system, it is the currently loaded file. (M) returns the system to the first data field on the screen so changes can be made. Changes are made following the same procedures as initial entry of data. (Q) causes the system to ignore all data entered during the current session and allows the user to exit the Add or Edit function mode. Figure 4-6 shows an example of a completed GENERAL INFORMATION data entry screen. Once the data is displayed in the "viewing mode," F10 Done can be used to exit the screen and access the DATA ENTRY AND MODIFICATION menu screen (Figure 4-5). This screen contains a nine option menu which has titles that basically match the blocks of information contained in an economic analysis. The user accesses an option from the menu by using the up and down arrow keys to highlight the option and entering a carriage return, or simply by typing the menu option number which matches the desired option. Anytime the user exits the DATA ENTRY AND MODIFICATION menu, the system automatically saves the newly entered accepted data and/or changes. [For this example, enter the letter (A) and then press F10. Since this is a newly created file, the system exits to the Directory of Input and Report Files screen. Press F10 to access the PC-ECONPACK main menu. Highlight the Data Entry and Modification option and press (CR).] The DATA ENTRY AND MODIFICATION menu now appears on the screen.

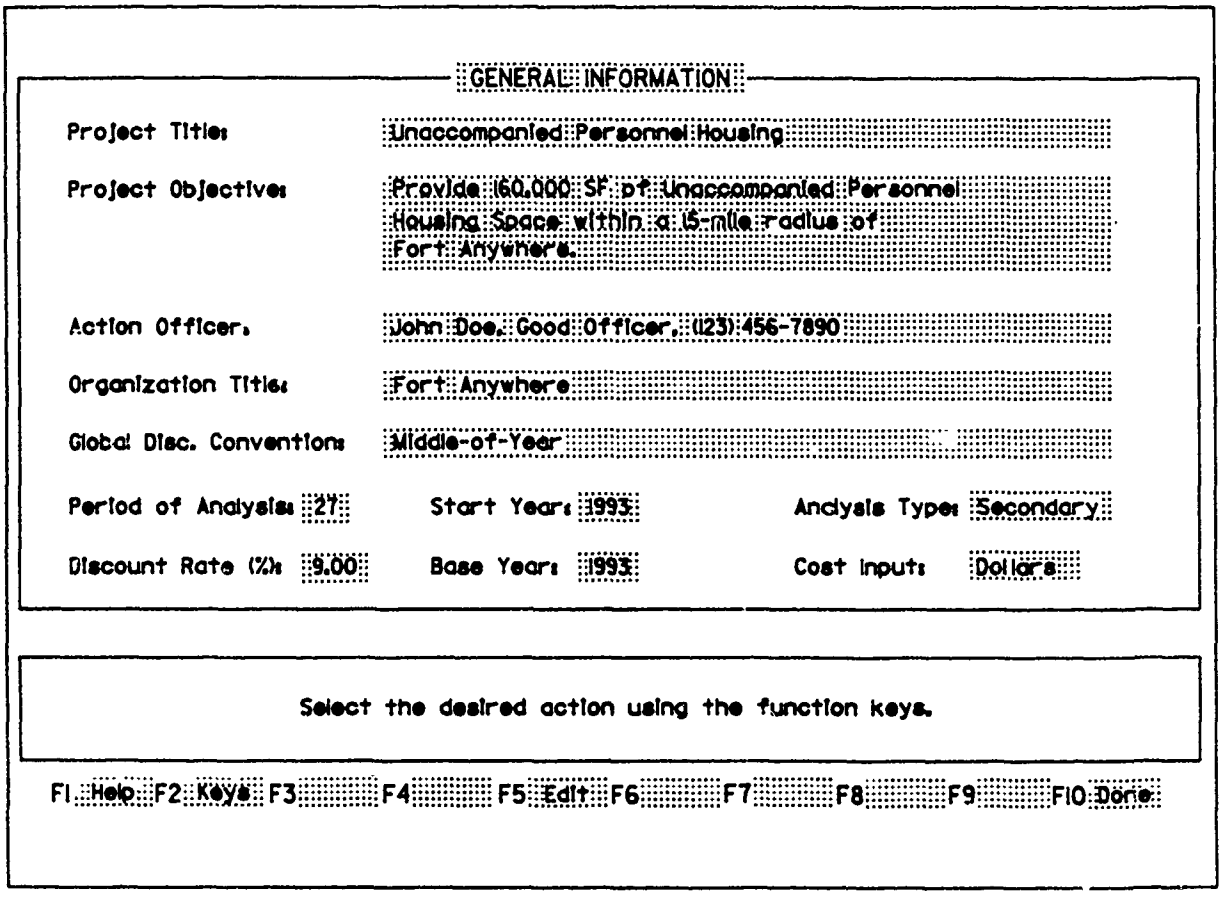


Figure 4-6. Completed General Information screen

4.2.2 **Entering an Inflation Index**. Inflation refers to the increase in price level for items used in the analysis. A current dollar analysis uses the inflation index to inflate all costs in the analysis according to increases in the general price level of expense items. When performing a constant dollar analysis, only differential inflation is included; that is, the increase or decrease in price level of an item relative to the general rate of inflation for the entire economy. [Use the scrolling keys to move the highlighted cursor on the DATA ENTRY AND MODIFICATION menu to the Inflation Indices menu option and press the carriage return key or press the number (2) to select the Inflation Indices menu option.] As shown in Figure 4-7, entering data for inflation indices consists of entering the index title and the percentage of inflation for each year for each cost type. A maximum of ten separate inflation indices may be entered for each PC-ECONPACK file. [In this example, two

inflation indices are used. Press F3 Add to enter an inflation index. The system enters the number and then prompts for the inflation index title.]

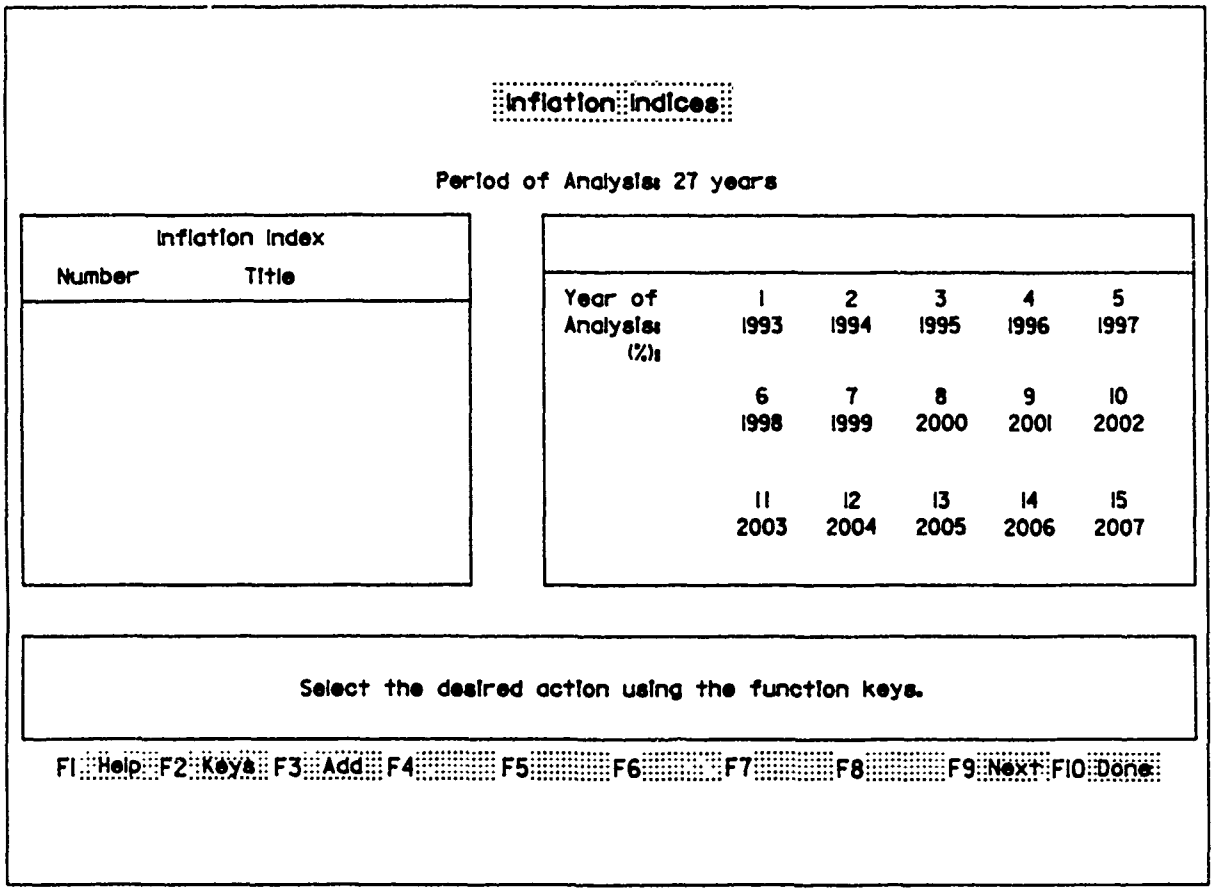


Figure 4-7. Inflation Indices data entry screen

Inflation Index Title is the name of a specific inflation index for which percentages are entered. The title may contain up to 20 alpha-numeric characters. The system allows for a maximum of 10 inflation indices. [For this example, type OSD PBC Memo (CR).]

Year of Analysis (%). The blinking character cursor now prompts for data entry of percentages for each year of the analysis. [Assume no inflation for 1993 so press the (CR) once. PC-ECONPACK enters 0 for the year 1993 and prompts for input for the year 1994. Type in 3.7 (CR) for 1994 and 3.6 (CR) for 1995.

(Note: The inflation index entry should always be in percentage form.) The cursor is now in the data field for 1996. Type in 3.5, but do not press the (CR) key. In this particular inflation index, the values for the remaining years of the analysis are the same. Since the remaining years of the analysis assume 3.5 percent inflation, press the F7 key. PC-ECONPACK automatically enters 3.5 in years 1997-2019. Press F9 Next to verify that values were correctly entered in the data fields for years 2008-2019. Press F9 Next again to return to the first screen which shows years 1993-2007.] Remember, each screen shows data for a maximum of fifteen years. Analyses which cover more than fifteen years require additional screens. PC-ECONPACK now prompts for acceptance of the data entered.

To edit this screen, type (M) at the Accept/Modify/Quit prompt. M causes the system to automatically prompt for the title again. If the title does not need changing, a carriage return moves to the entry for the first year of the analysis. Use the carriage return to move to the data field which needs to be changed. Simply type in the new percentage. F7 may be used to fill the remaining fields with the new value. [At the Accept/Modify/Quit prompt, enter (A) to accept the screen(s).] The inflation index just entered is saved and the system prompts for a second index.

This particular example has two inflation indices. [Follow the appropriate procedures and enter a second index with the title Local Lease. Enter zero (0) as the inflation percentage for 1993 and 1994. Enter 5.2 as the percentage for the remaining 25 years. Enter (A) to accept the data and press F10.] Figure 4-8 shows an example of a completed Inflation Indices screen. A list of the inflation indices appears on the left side of the screen. The user can view the details of each index by scrolling up and down the inflation index titles.

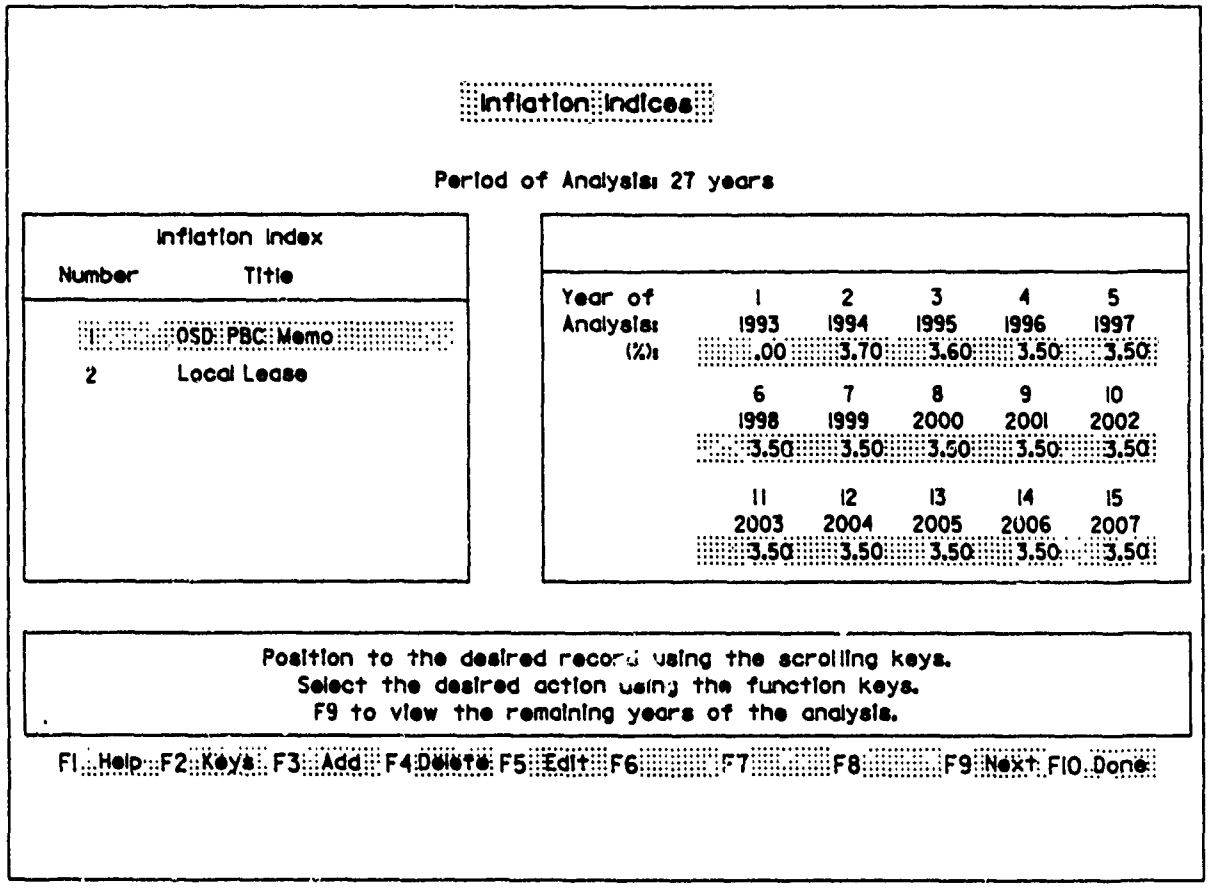


Figure 4-8. Completed Inflation Indices data entry screen

Note the valid function keys indicated across the bottom of the Inflation Indices screen: F1 Help, F2 Keys, F3 Add, F4 Delete, F5 Edit, F9 Next, and F10 Done. F3 allows the user to add another inflation index. F4 allows the user to delete the highlighted index. F5 allows the user to edit the highlighted index. F9 displays the next screen of values entered for the current index. [Press F10 to indicate inflation index entry is completed and return to the DATA ENTRY AND MODIFICATION menu.]

4.2.3 **Entering a Residual Schedule.** A residual schedule is a schedule of factors which when multiplied by the original value of the facility gives the estimated depreciated value of the facility for each year of its useful life. There can be a maximum of ten schedules in the analysis. The user may choose

from among five options when using the residual value method in an alternative. These options include a straight line depreciation schedule, a double declining balance schedule, and a user-specified schedule. The first two methods do not require use of the Residual Schedules menu option as they are easily defined within the Alternative Information. Use of the Residual Schedules option applies to user-defined schedules in which every year of the analysis must be individually entered. When the user selects option 3 - Residual Schedules from the DATA ENTRY AND MODIFICATION menu, the system displays the Residual Schedules screen (Figure 4-9).

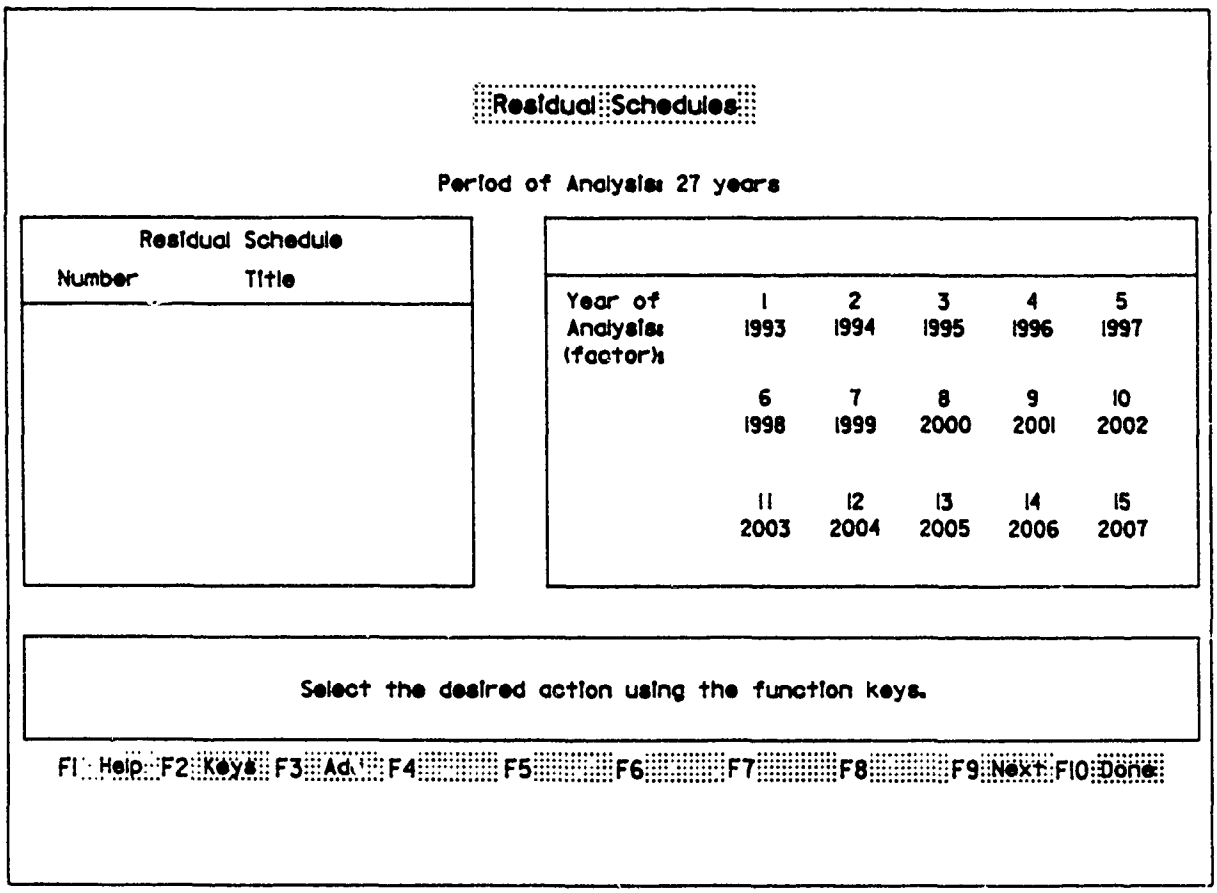


Figure 4-9. Residual Schedules data entry screen

There are three "canned" schedules available for user selection in PC-ECONPACK. The first is the Building Depreciation schedule from OMB Circular A-104 Evaluating Leases of Capital Assets. The

second schedule is the Land Appreciation schedule from A-104. The third schedule is a Housing Depreciation schedule mandated by OSD for use in 801 Build to Lease (Army Family Housing) EAs. To use one of these canned schedules as a part of the EA, the user presses the F6 List key. The system displays a pop-up window which lists the available schedules (Figure 4-10).

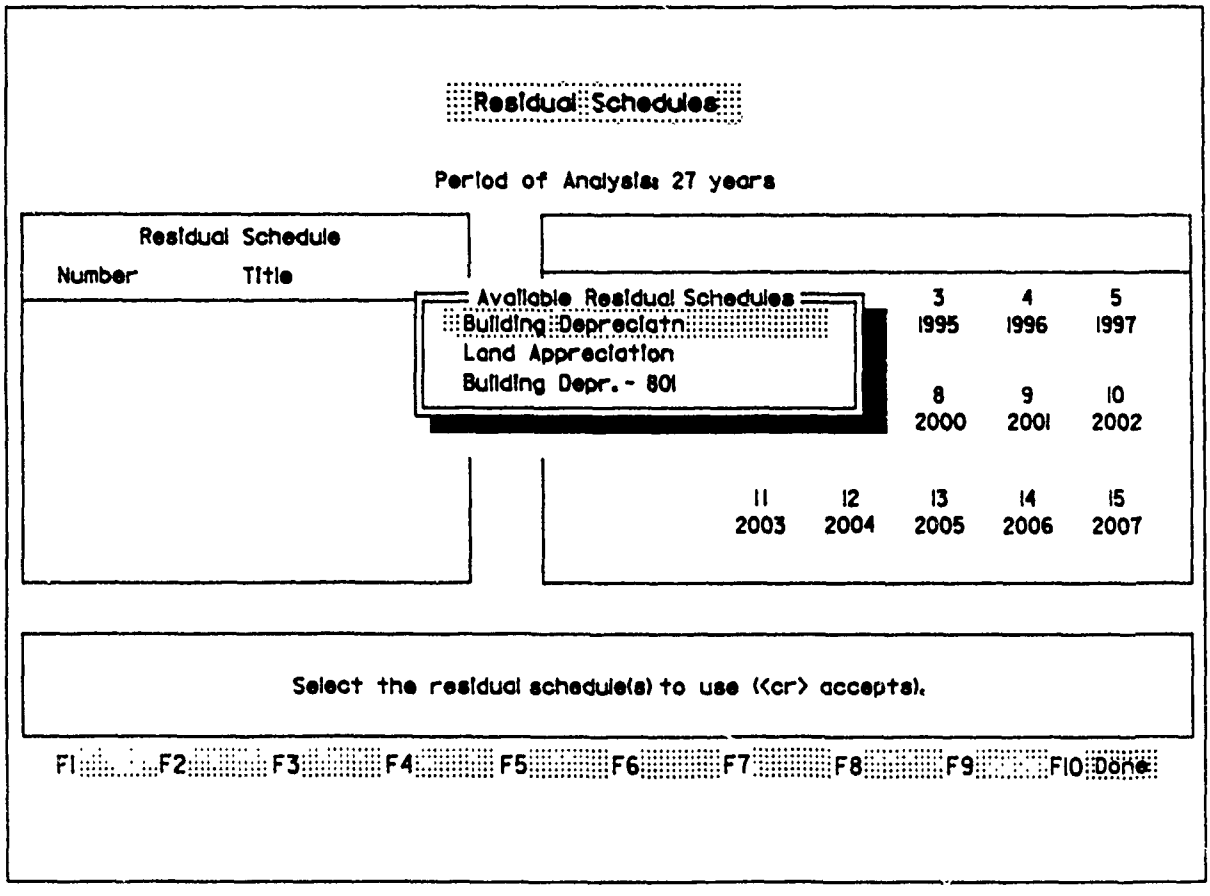


Figure 4-10. Screen showing "Canned" residual schedules

To use one of them, the user highlights the desired schedule and presses the carriage return to enter the selected data onto the Residual Schedules screen. A check mark appears beside those schedules selected to be a part of the EA file. While the cursor is located at the checked schedule, a second carriage return removes the check mark. F10 returns the user to the Residual Schedules screen.

F3 Add allows the entry of a user-defined residual schedule. The left box on the screen contains the Residual Schedule Number (entered by the system) and the title (entered by the user). The right box provides data fields for entry of schedule values for each year. Use the up and down scrolling keys or the carriage return to move from field to field. [For the SECONDY file, press F6.]

Residual Schedule Title is the name of a specific residual schedule for which values are to be entered. The title may be up to 20 alpha-numeric characters long. [For this example, press (CR) and then F10 to select the Building Depreciation schedule provided by the system.]

Year of Analysis (Factor). When the user defines a schedule, the system allows for entry of a title and a residual factor for each year. To enter values, the user simply moves the cursor to the appropriate data field and types in the value. Residual values are to be entered as decimal numbers. For example: .98 .96 .94 .92 for a four year residual schedule. A residual value must be entered for each year in the period of the analysis.

The F7 Fill key is used to fill the remaining years in the analysis with the same value which appears in the current data field. F8 Repeat is used to duplicate the current data field value in the next data field and move the cursor to that field. When values have been entered for each year in the period of analysis, the system displays the [A] Accept, [M] Modify, or [Q] Quit prompt. If an error has been made, enter (M) to exit the screen. (Q) discards newly entered data and (A) accepts the data as a part of the input file.

When (A) is pressed, a blank Residual Schedules data entry screen appears and the system prompts for another Residual Schedule. In this example, only the canned Building Depreciation schedule is being used. Again, as with the Inflation Indices menu option, the screen displays all the residual schedule numbers and titles in the left box allowing the user to scroll up and down the different residual schedule titles. Figure 4-11 shows a completed Residual Schedules data entry screen.

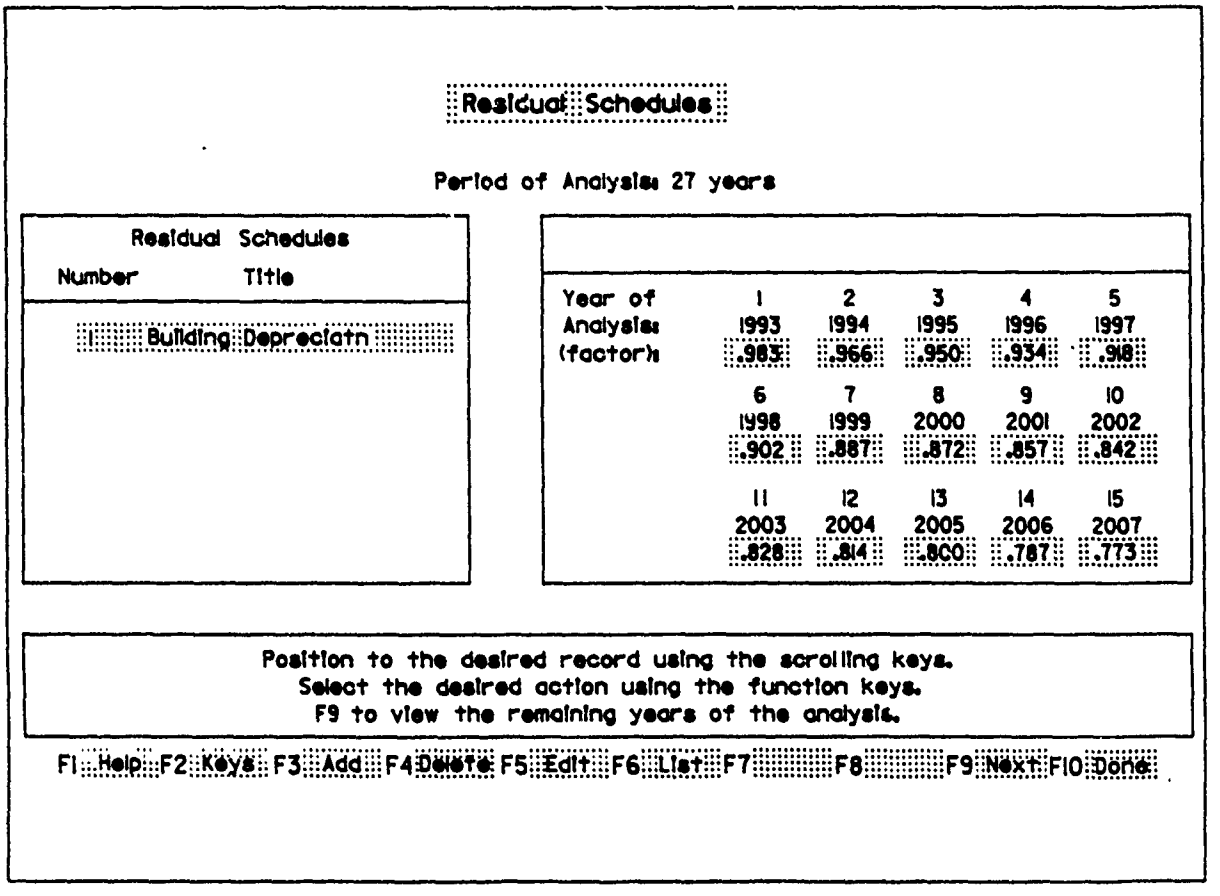
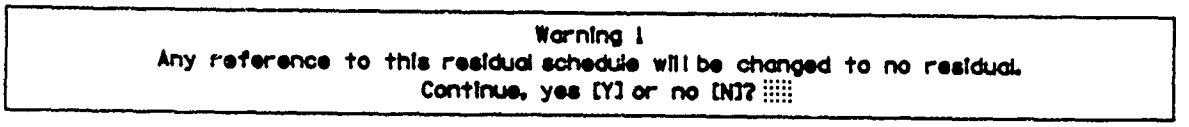


Figure 4-11. Completed Residual Schedules data entry screen

F4 Delete may be pressed to delete an existing residual schedule. When F4 is initiated, the system displays the following warning message at the bottom of the screen:



[Press F10 again to return to the DATA ENTRY AND MODIFICATION menu.]

4.2.4 **Defining Alternatives.** The fourth option on the DATA ENTRY AND MODIFICATION menu is Alternative Information. [To define alternatives, type the number (4) or highlight option 4 and press the carriage return.] The Alternative Information data entry screen appears (Figure 4-12). A maximum of thirty alternatives may be defined.

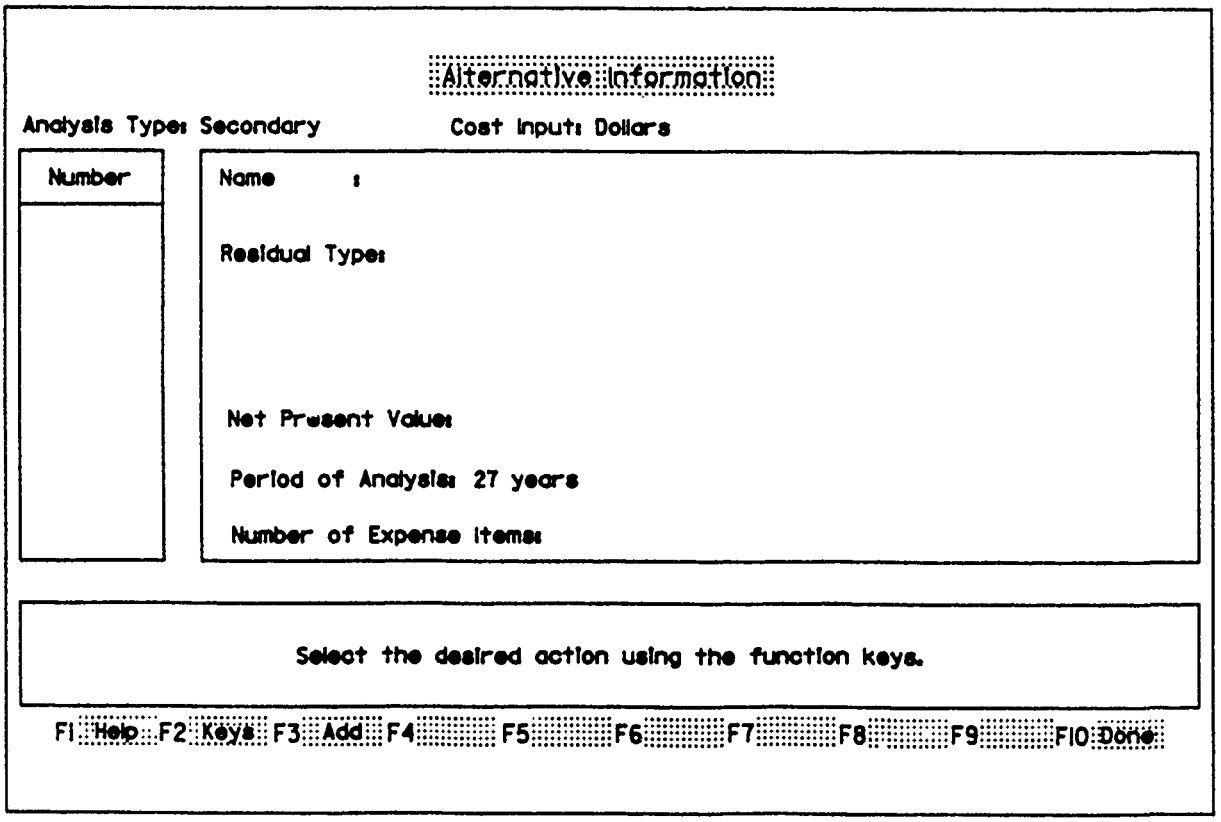


Figure 4-12. Alternative Information data entry screen

To add an alternative, use the F3 Add key. [Press F3 and the system enters the number 1 as the alternative number and the blinking cursor appears in the Name: data field, prompting for input.]

Alternative Name is the short descriptive name of the specific economic analysis alternative in which corresponding expense items are to be entered. It may contain up to 48 alpha-numeric characters. In a primary analysis, Alternative 1 is always the

status quo alternative and subsequent alternatives are the proposed alternatives. PC-ECONPACK automatically labels the first alternative as the status quo alternative when a primary analysis is being entered. [Continuing the SECONDY example, type New Construction (CR).]

Residual Type refers to the type of depreciation schedule to be used for the facility defined by this alternative. A salvage or residual value is the value of the alternative at some point in time, usually at the end of the period of analysis. If it is a cost (requiring an expenditure to remove), enter it as a negative value. After the user enters the name of the alternative, the cursor moves to the Residual Type field. The **"Do you wish to include a residual (salvage) value (Y/N)?"** prompt appears at the bottom of the screen. [Enter (Y) for yes.] The following prompt appears at the bottom of the screen notifying the user of available options:

```
Select Residual Type: 1
1= One time salvage value, 2 = Straight Line, 3 = Double Declining Balance,
4 = Your own schedule, or 5 = Building/Land
```

Option 1 is selected if the user wishes the facility to have a salvage value in the last year of the period of analysis and is not concerned about the decreased value at any time during its economic life. Options 2 and 3, straight line and double declining balance, are methods to create a schedule by the use of a simple algorithm. Option 4 is used to select a user-defined residual type which must be created through the Residual Schedules option from the DATA ENTRY AND MODIFICATION menu. (Note: In the preceding section as a part of the SECONDY file, the "canned" Building Depreciation schedule was entered as a part of the sample input file.) Option 5 allows the user to treat the building and land as two separate residual calculations. (Note: The value of a facility is assumed to depreciate over time whereas the value of land is assumed to appreciate.)

Residual type 1, 2, 3, 4, or 5 may be selected. Additional data fields appear on the screen based upon the residual type selected (Figures 4-13 through 4-17).

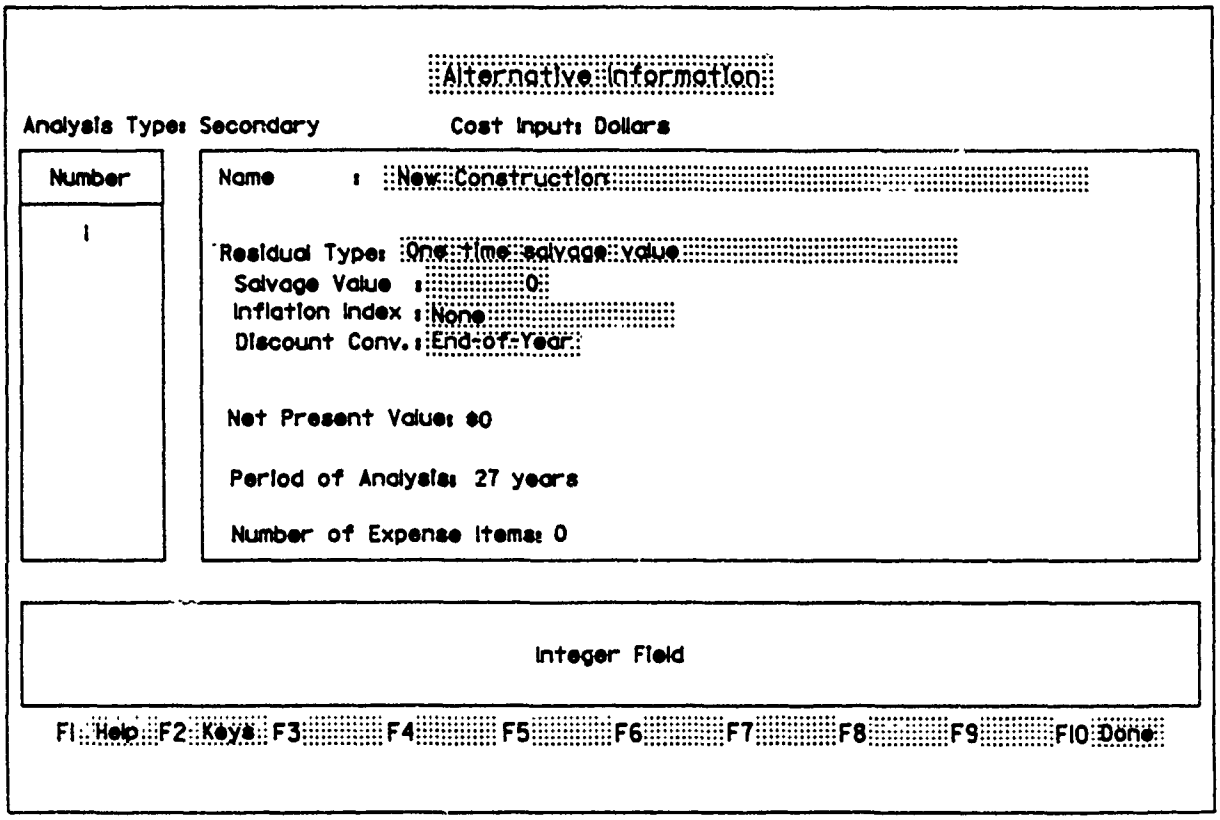


Figure 4-13. Data screen for Residual Type 1 - One Time Salvage Value

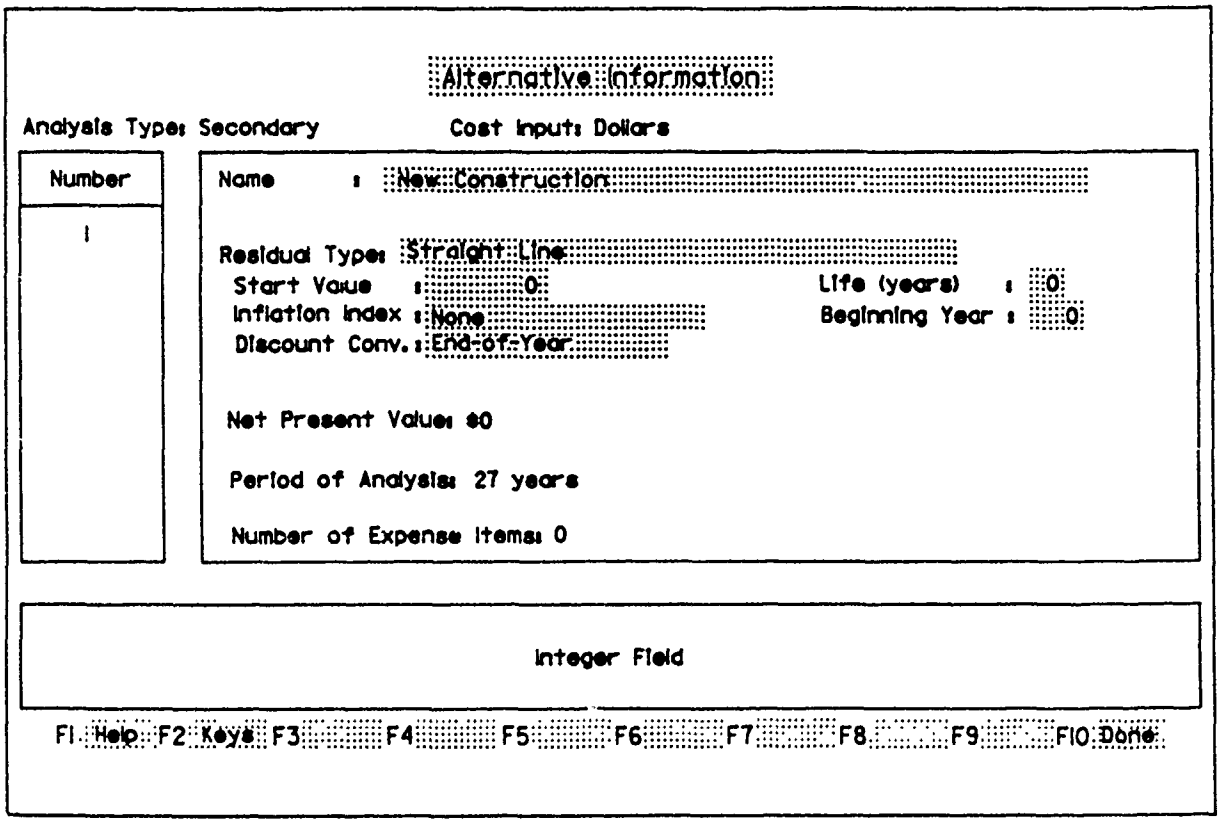


Figure 4-14. Data screen for Residual Type 2 - Straight Line

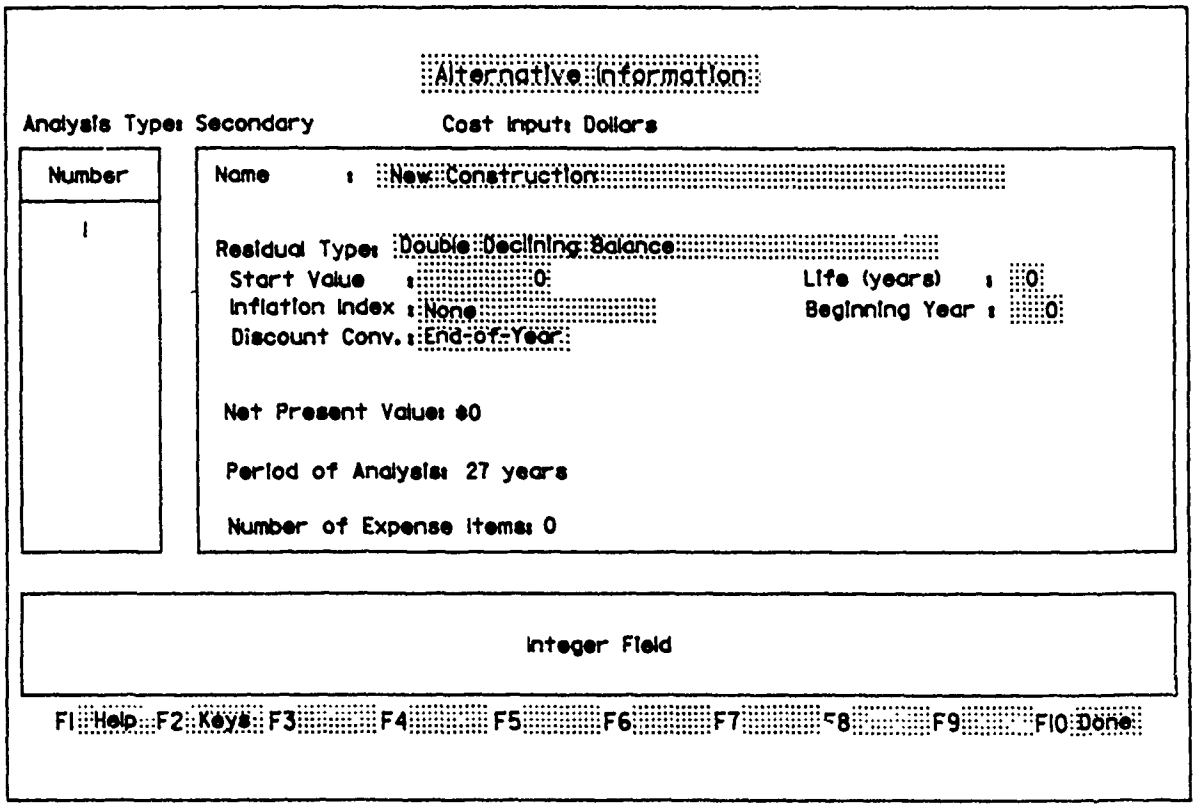


Figure 4-15. Data screen for Residual Type 3- Double Declining Balance

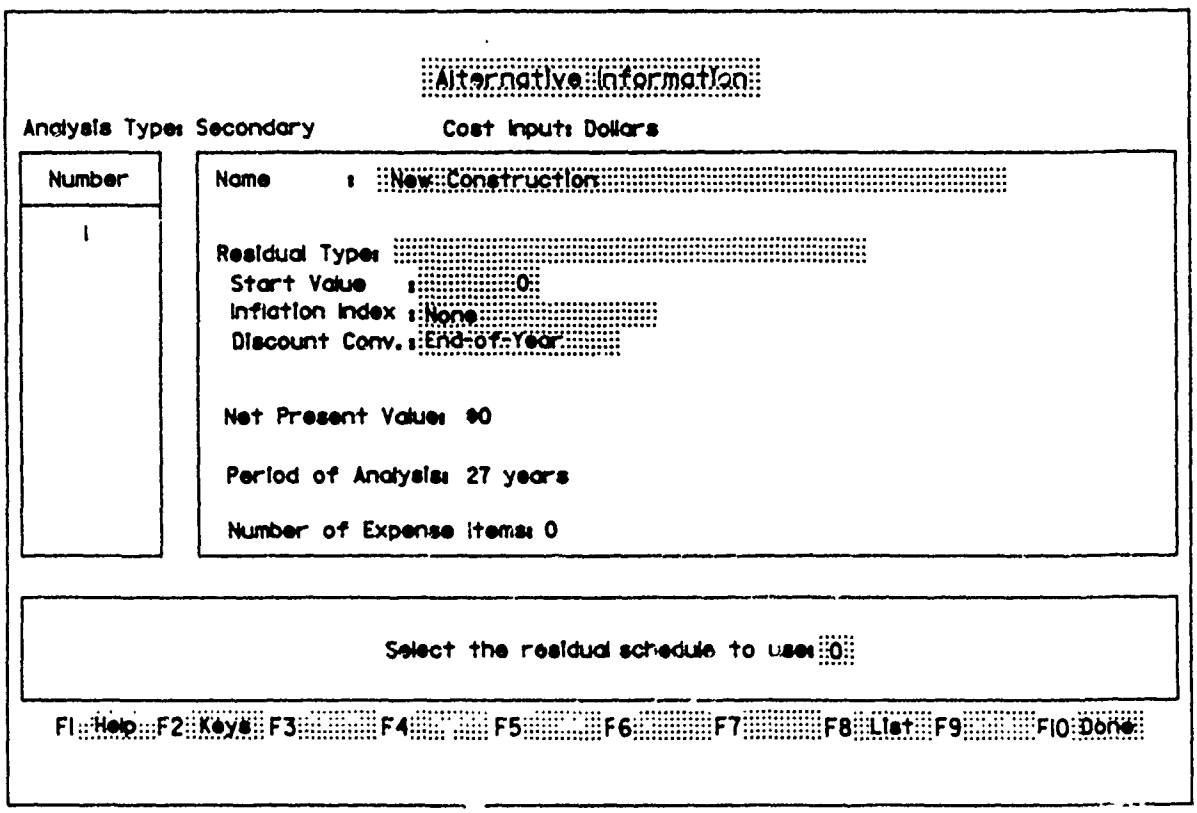


Figure 4-16. Data screen for Residual Type 4 - Your Own Schedule

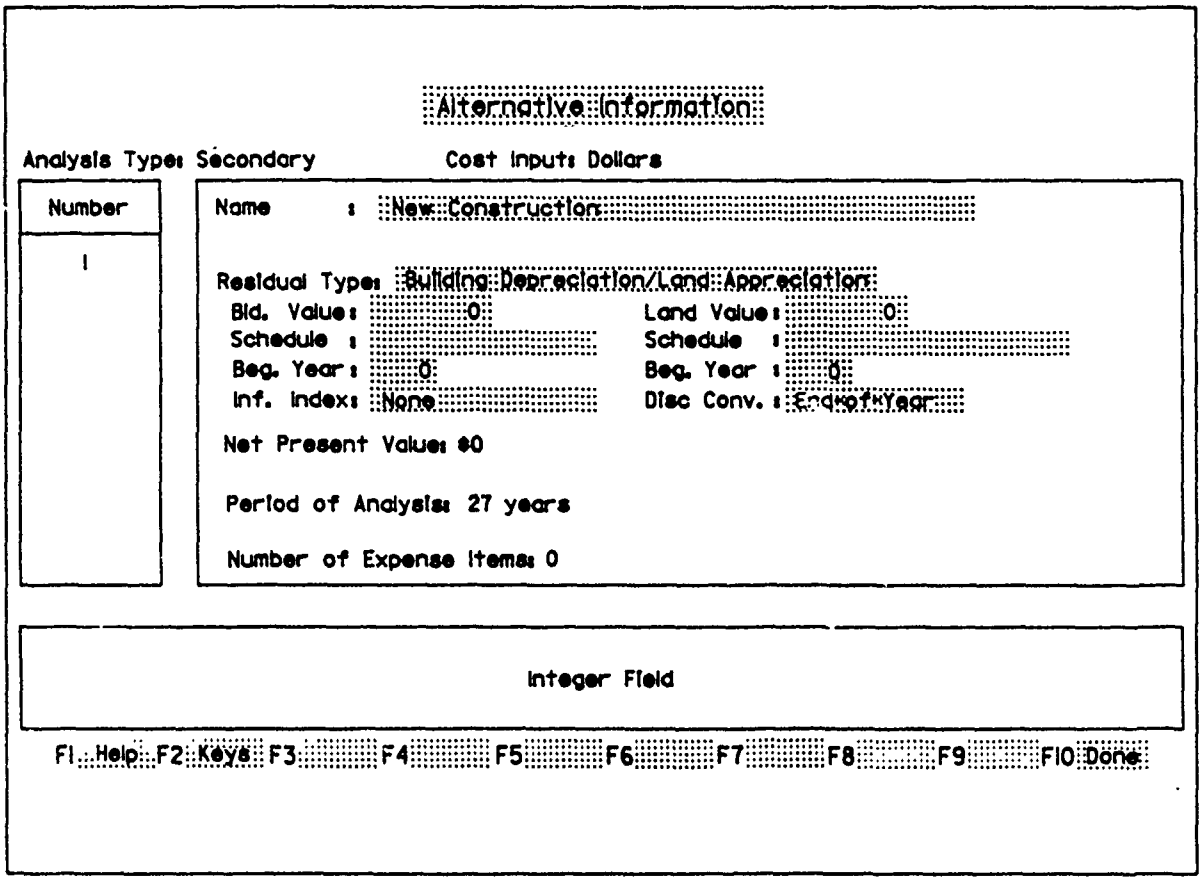


Figure 4-17. Data Screen for Residual Type 5 - Building Depreciation/Land Appreciation

Instructions for completing various Residual Type data fields:

Salvage Value. Enter the salvage value of the alternative. For a value occurring at the end of the analysis period, the salvage value is the same as the terminal value.

Inflation Index. Indicate the inflation index to be applied if a residual value is to have an inflation index other than no inflation. F8 is used to obtain a listing of the available indices.

Discounting Convention. Select the discounting convention to use: 1 = Beginning-of-Year, 2 = Middle-of-Year, 3 = End-of-Year, or 4 = Continuous. The system defaults to the end-of-year because residuals normally occur at the end of the year.

Start Value. Enter the value of the assets to be depreciated. This is often the construction cost.

Life (Years). Enter the number of years the residual schedule will depreciate the worth of the facility. This is usually the period of analysis unless specified by statute or public law.

Beginning Year. Enter the first year the residual calculations will begin. This normally corresponds to the year the construction is completed.

Building Value. Enter the value of the building to be depreciated. This is often the construction cost.

Schedule. Enter the number of the residual schedule to be used.

Land Value. Enter the value of the land to be appreciated.

[Since this example uses a user-specified residual schedule, type (4).]

The system now prompts the user to:

Select the residual schedule to use:

Across the bottom of the screen, the F8 key is now labeled List. [To obtain a listing of the available schedules, press the F8 key (Figure 4-18).] In this example, only one schedule has been defined. To enter a schedule from the list, highlight the desired schedule and carriage return. Schedules can also be selected by typing in the schedule number at the Select the residual schedule to use prompt.

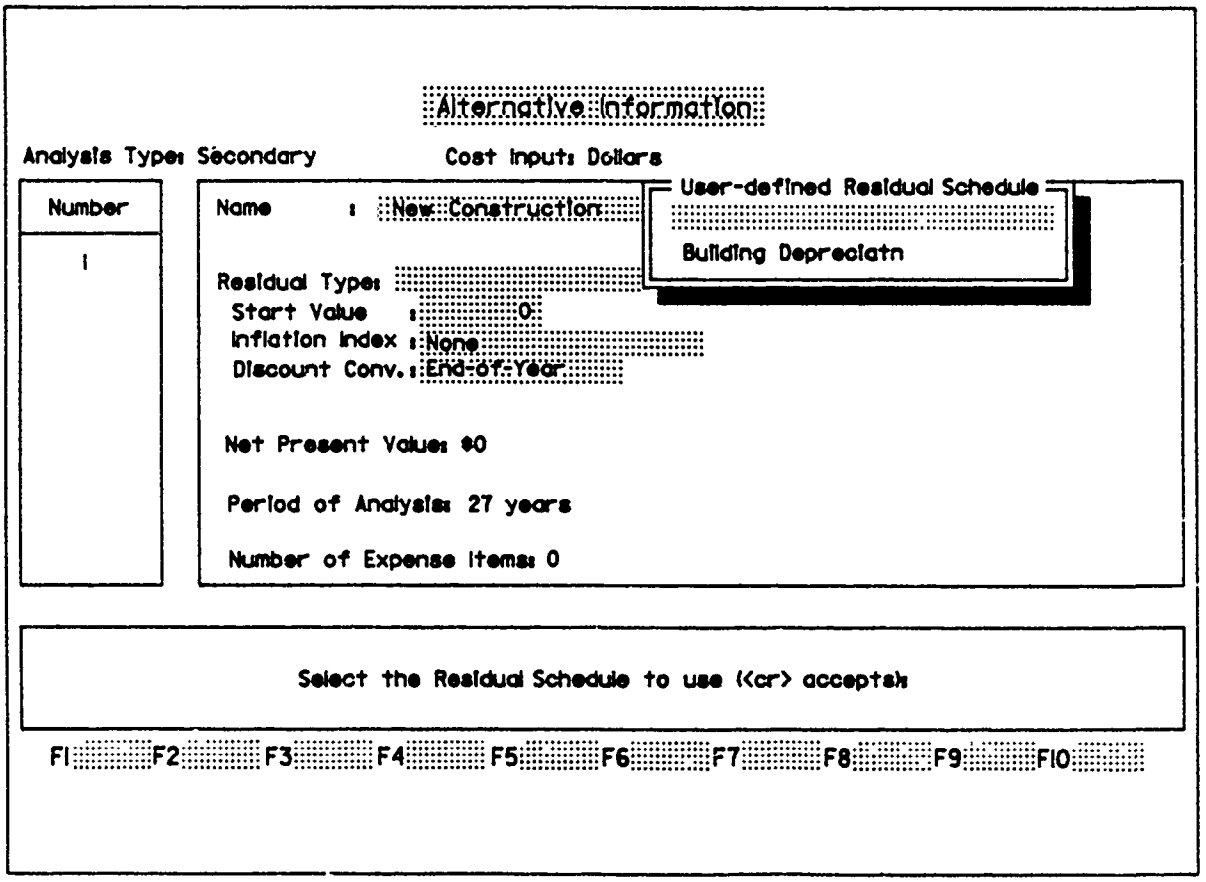


Figure 4-18. Listing of available Residual Schedules

[Highlight the Building Depreciation schedule and carriage return. Enter 33000000 (CR) as the start value.] The system now prompts the user to select an inflation index. If the schedule number is known, type it in followed by a carriage return. F8 List is used to obtain a listing of the available inflation indices. When F8 is pressed, the system displays the None option and all user-defined indices (Figure 4-19).

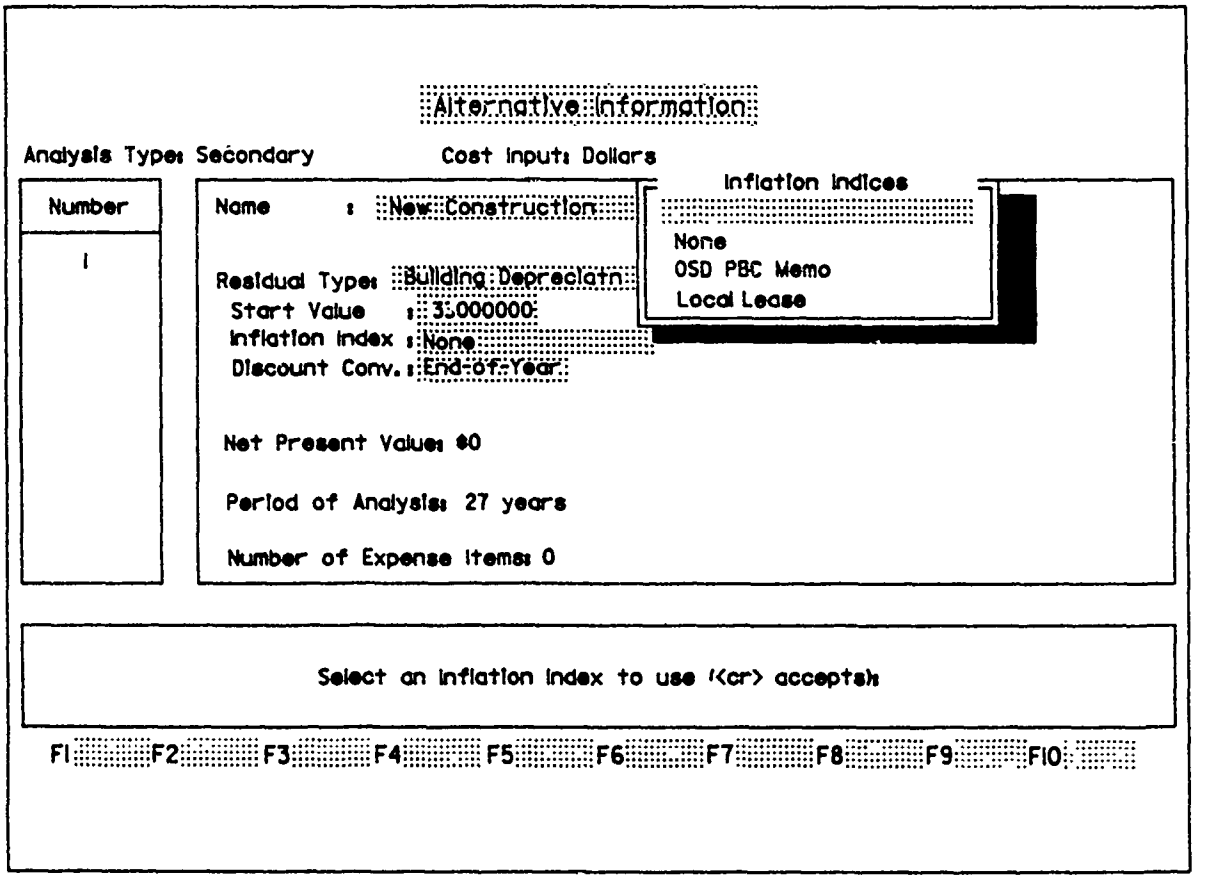


Figure 4-19. Listing of available Inflation Indices

[For the SECONDY file, Press F8, highlight OSD PBC Memo, and press (CR). Type 3 or carriage return to select End-of-Year as the discounting convention.]

At this point, entry of all data concerning the definition of this alternative is complete. The Accept/Modify/Quit prompt appears at the bottom of the screen. [Press (A) for acceptance of the data.]

The system now prompts:

Do you wish to define expense items for this alternative (Y/N)?

Type (Y) to enter the expense item data or type (N) to bypass entering expense items. Normally, expense items are entered for the alternative. [Since expense items will be discussed in the

next section of this manual, enter (N).] The system prompts for information for the next alternative. [Press F10 Done to terminate the entry of alternative information.] Figure 4-20 is an example of a completed Alternative Information screen. After several alternatives have been defined, the up and down scrolling keys are used to view the data for the desired alternative. Note: The system generates the data for completion of the data fields entitled: Net Present Value, Period of Analysis, and Number of Expense Items.

Note that the Net Present Value of Alternative 1 in Figure 4-20 is a negative number. This is due to the fact that, at this point, none of the expense items have been entered, but the salvage value of the building as determined by the residual schedule has been defined. The salvage value represents a savings or a negative dollar value.

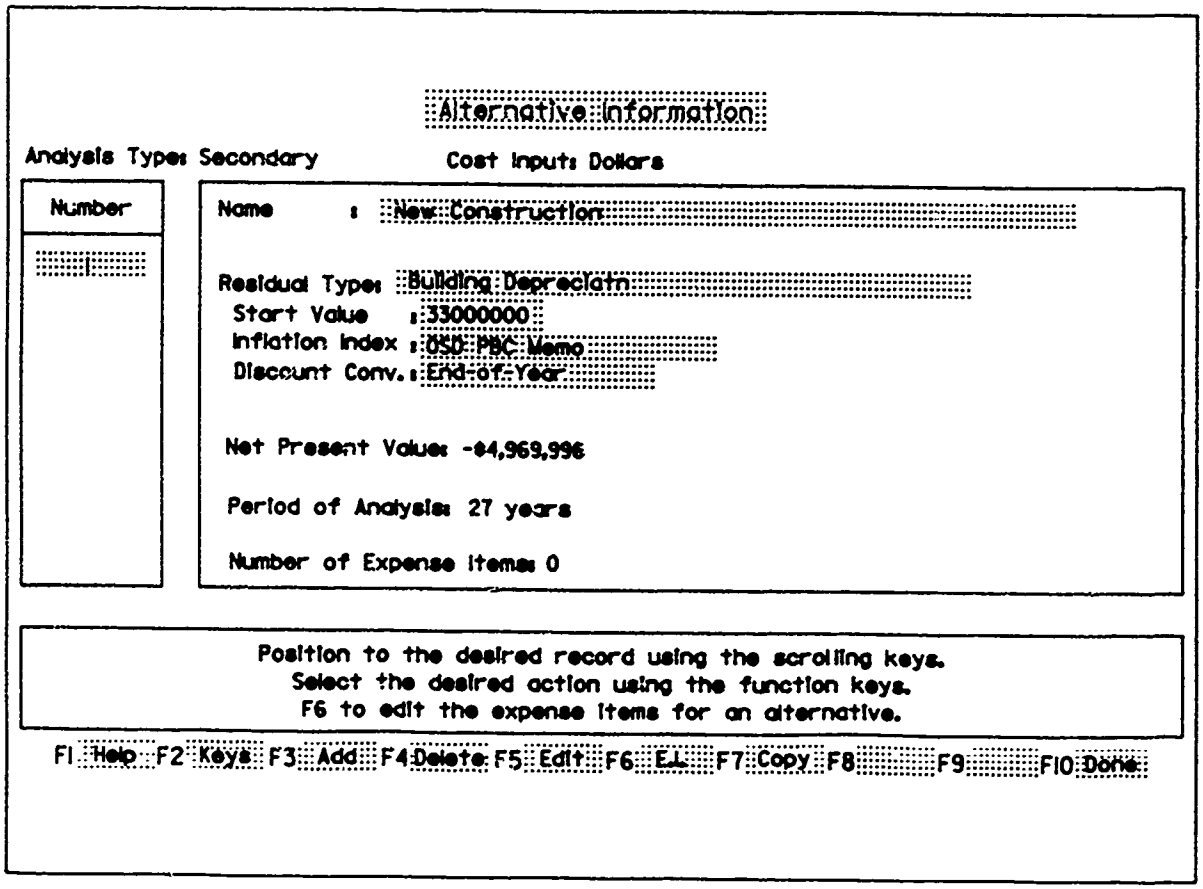


Figure 4-20. Completed Alternative Information data entry screen

At this point, F1 Help provides a definition of alternative information; F2 Keys lists the various key functions; F3 Add allows the user to add data for a new alternative definition; F4 Delete erases the highlighted alternative; F5 Edit allows the user to modify or change the current screen data; F6 E.I. allows the user to define expense items for the current alternative; and F7 Copy allows the user to create a new alternative which is a duplicate copy of the currently highlighted alternative. The duplicate becomes the last alternative listed on the screen and it also becomes the currently displayed screen of data. F10 Done allows the user to exit to the DATA ENTRY AND MODIFICATION MENU.

4.2.5 **Delineating Expense Items**. Expense items can be delineated once the information for the corresponding alternative has been entered. Once the user completes the Alternative Information data fields, the system prompts the user to indicate if expense items are to be defined. (Y) causes the system to display the Expense Item Definition screen and the user proceeds to enter the desired data. In the previous narrative when the program prompted for expense items, a negative response was entered. Expense items can only be entered through the Alternative Information option from the DATA ENTRY AND MODIFICATION menu. [Move the cursor to the Alternative Information option and press the (CR) key or type the number (4).] The Alternative Information data entry screen appears.

The F6 key labeled E.I. for Expense Items allows the user to access the expense items for a specific alternative either to add, edit, or delete an expense item. [Move the cursor to highlight the alternative for which expense items are to be added and press F6. Expense items are to be entered for Alternative 1.] The alternative number, name, and the period of analysis should appear beneath the title of the Expense Item Definition screen (see Figure 4-21).

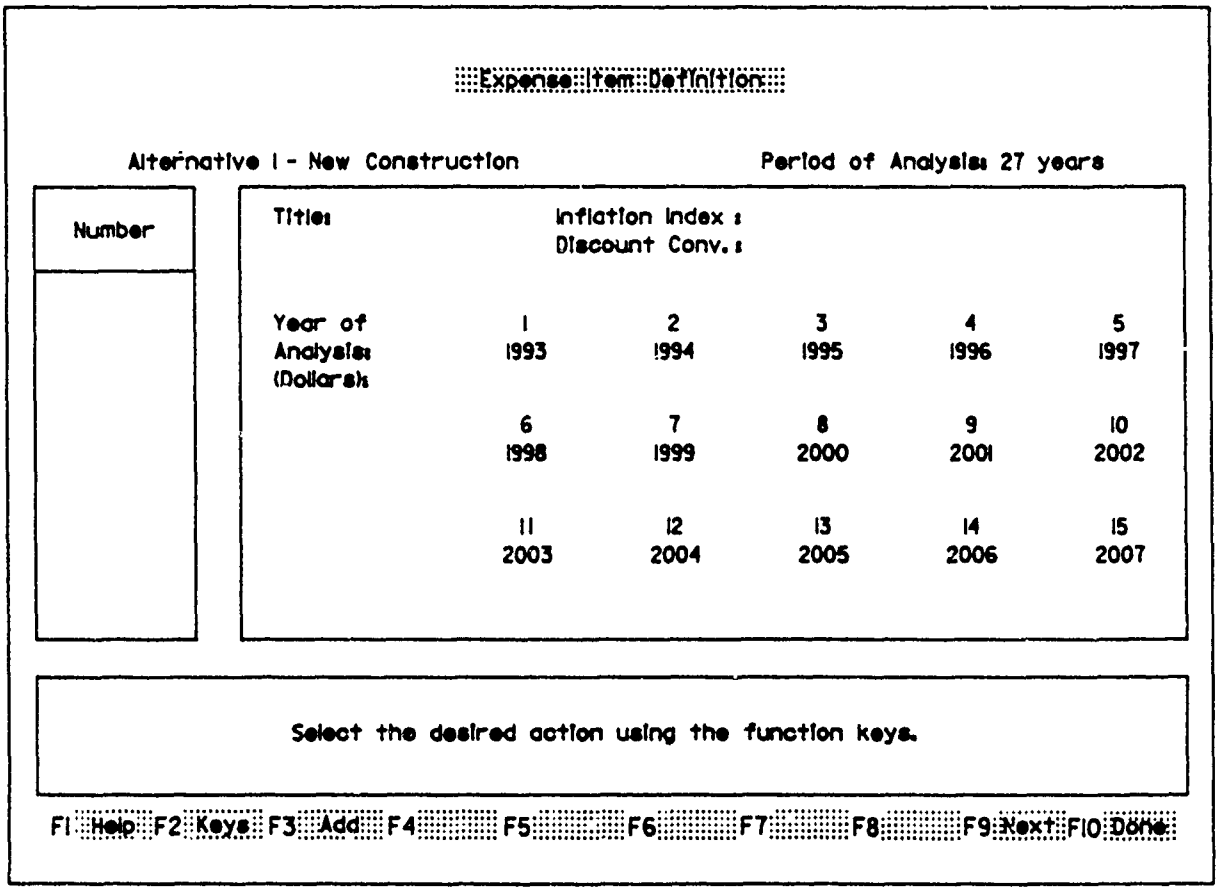


Figure 4-21. Expense Item Definition data entry screen

Once the Expense Item Definition data entry screen for the correct alternative is displayed, the user can begin entering expense items one at a time. Thirty (30) expense items may be entered for each alternative. [Begin entering expense items for Alternative 1 by pressing the F3 Add key.] PC-ECONPACK prompts with the blinking cursor for the title of the first expense item for Alternative 1.

Expense Item Title is the name of the specific expense item in which the numeric costs are to be entered. Three lines of 12 alpha-numeric characters per line are allowed for the title. [For this first expense item type in:

Initial (CR)
Construction
Cost (CR)

The last (CR) moved the cursor to the next data field.]

Inflation Index is the assignment of a user-specified inflation index created from the Inflation Indices option on the DATA ENTRY AND MODIFICATION menu to a specific expense item within an alternative. When the cursor is moved to the Inflation Index data field, a prompt appears at the bottom of the screen:

Select an inflation index (0 = none):

Enter the inflation index number that applies to the expense item in question. F8 List is used to obtain a listing of the available inflation indices. From the list, the user can highlight the desired index for inclusion in the file. [None is the default value and since no inflation is assumed for initial construction costs in the SECONDY file, press (CR) to indicate there is no applicable inflation index.]

Discount Convention is the assignment of one of the system-defined discounting conventions to a specific expense item. When the cursor moves to the Discount Convention data entry field, a prompt appears at the bottom of the screen:

Select the Discounting Convention to use:
1 = Beginning-of-Year 3 = End-of-Year
2 = Middle-of-Year 4 = Continuous

Enter the number of the discounting convention which applies to this expense item. The global discounting convention is the default discounting convention which was entered on the General Information screen. [For this first expense item in the SECONDY file, the default value of 2 applies. Press (CR) to indicate Middle-of-Year.]

Cost Category is the assignment of the expense item to the type of cost in the analysis. For this example, which is a "secondary analysis," cost category does not apply and there is, therefore, no Cost Category data field on the screen. However, if this example had been a "primary analysis," depending on whether the expense item were for the status quo alternative or proposed alternative, one of two different prompts would have appeared on the screen; either (for the status quo alternative):

Required Field
Select the Cost Category of this expense item:
1 = Recurring or 2 = Refurbishment

or (for a proposed alternative):

Required Field
Select the Cost Category of this expense item:
1 = Recurring, 2 = Investment, 3 = Inherited, or 4 = Replaced

Recurring costs refer to items such as annual utility costs or annual operation and maintenance costs. Refurbishment refers to the one-time renovation costs of an existing facility. Investment cost is usually the construction cost for the proposed alternative. Inherited cost occurs when use of the existing facility results in a cash outlay by the government on some other project. Replaced asset value is a negative cost or benefit. It pertains to assets for which the current need is eliminated by the proposed alternative and thus can be used for other requirements.

Year of Analysis. Expense item costs for each year are entered one year at a time. The blinking cursor should be at the data field for the year 1993 prompting for input. Just as in the Inflation Indices and Residual Schedules screens, each expense item must have an entry for each individual year of the analysis. [For expense item 1 in this alternative, enter 16500000 dollars for 1993. Since the value uses all the available character positions in the data field, the system automatically advances to the next year, 1994. Use the up arrow scroll key and move to the previous data field 1993. Press F8 to repeat 16500000 in the data field for 1994.] Remember when entering expense item costs, do not use commas or dollar signs. Always use the same cost input convention for all expense item cost data as noted under the "Year of Analysis" heading on the expense item data entry screen.

[The cursor now blinks at the 1994 data entry field; press (CR).] The construction of Alternative 1 (Initial Construction Cost) is assumed to take two years so the cost is split equally between the years 1993 and 1994. The cursor now stands at the year 1995. For this particular expense item, there are no other associated costs. [Press F7 to fill the remaining 20 years of the analysis with zero or press F10 to indicate data entry is complete.] Figure 4-22 shows how the completed data entry screen for expense item 1 for alternative number 1 should look. The bottom of the data entry screen prompts with:

[A] Accept, [M] Modify, or [Q] Quit?

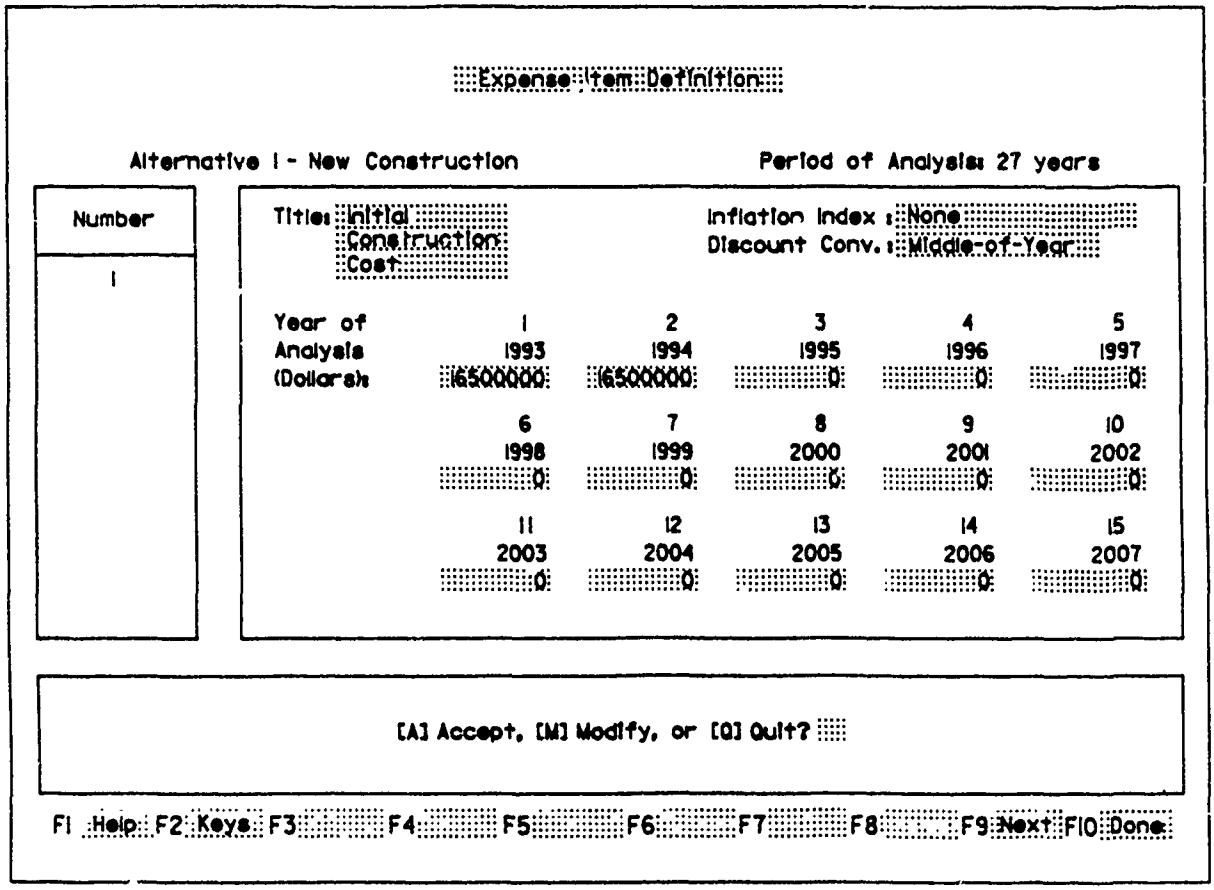


Figure 4-22. Completed Expense Item Definition data entry screen for Alternative 1

[If the data have been entered correctly, press (A) to accept the data entered for the expense item.] PC-ECONPACK displays a blank expense item data entry screen and prompts the user to begin entering the title for expense item 2 for this alternative.

The second expense item in the first alternative is operation and maintenance. [Enter the title for expense item number 2 as follows:

O&M (CR) (CR) (CR)

Type the number (1) to indicate the inflation index created previously is to apply to this expense item. Press (CR). Remember F8 can be used to list the available inflation indices.

There is no special discounting convention for expense item 3 so press (CR) to indicate the default value of Middle-of-Year.]

The system is now ready to accept the costs by year for the operation and maintenance of Alternative 1. [Press (CR) once to enter zero for the year 1993 as the construction of the building is still taking place and, therefore, there are no operation and maintenance costs for that year. 1994 is the first-year operation and maintenance costs will be incurred. Type 868747 for year 1994 and press (CR). For 1995, type 1737494, but DO NOT PRESS (CR). Touch F8 ten times to enter 1737494 in years 1995 through 2005. Press (CR) and enter 2129963 in year 2006; DO NOT PRESS (CR). The rest of the years of this expense item will be the same as 2006. Press F7 to Fill the rest of the years of this expense item with 2129963. Press the F9 Next key to view the years 16 through 27 to ensure all the remaining years have been entered correctly. Type (A) at the Accept/Modify/Quit prompt if all the operation and maintenance costs are entered correctly.]

The user is prompted to enter the title for expense item 3 of Alternative 1. Alternative 1 has only two expense items. [End this session by pressing F10 indicating completion of expense items for this alternative.] PC-ECONPACK shows the details of expense item 1 on the screen. Figure 4-23 shows a completed Expense Item Identification screen. The user can scroll down to display the details of expense item 2.

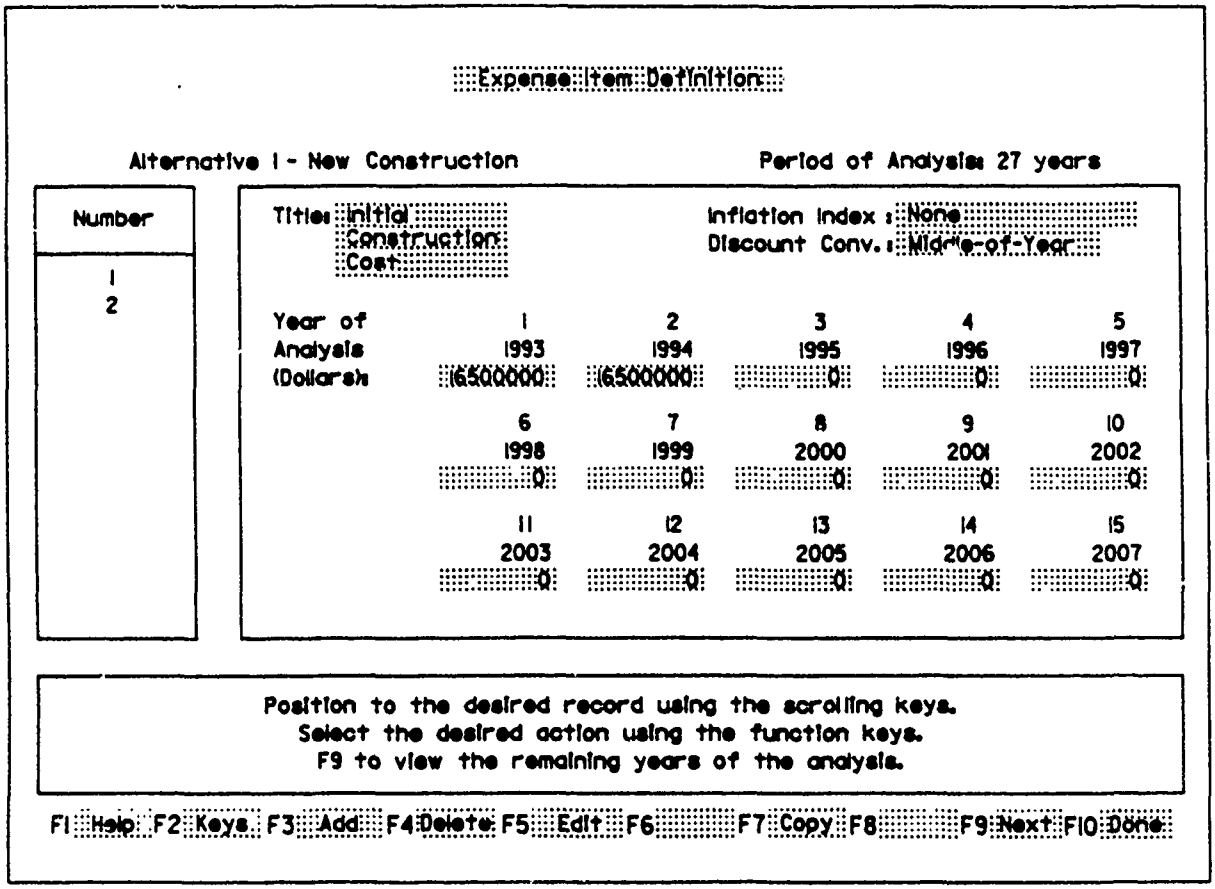


Figure 4-23. Completed Expense Item Definition screen

From the view mode of an Expense Item Definition screen, F3 Add is used to add another expense item for the current alternative; F4 Delete erases the highlighted expense item; and F5 Edit allows changes to be made to the displayed expense item data. If the user selects F7 Copy, the system displays a pop-up window which lists the defined alternatives. The user highlights the alternative which contains the expense item to be copied and then enters a carriage return. The system displays the expense items for the specified alternative. The user can then highlight the expense item to be duplicated and enter a carriage return. The system adds the specified expense item to the current alternative and displays that expense item data in the edit mode. The user

then modifies the data and follows the exiting procedures. F9 Next from the Expense Item Definition screen displays the next screen of data.

[Press F10 to exit to the Alternative Information screen.]

[For the SECONDY file, the user should enter data and expense items for two more alternatives. Follow the procedures for defining alternatives and expense items and enter the provided data. The asterisk is used to help abbreviate data; that is, 2*0 means 2 years at zero costs; 25*2000000 means 25 years at 2000000 dollars per year.

Alternative 2

Name: Lease Off-Post

Expense Item 1
Annual Rent - 2*0 25*3502673
Inflation Index 2
Middle-of-Year discounting convention

Expense Item 2
O&M - 1*0 1*868747 10*1000000 15*1500000
Inflation Index 1
Middle-of-Year discounting convention

Alternative 3

Name: Mobile Homes

Expense Item 1
Purchase Price - 2*0 1*6000000 7*0 1*6000000 7*0 1*6000000 8*0
Inflation Index 1
Middle-of-Year discounting convention

Expense Item 2
O&M - 1*0 1*868747 25*2000000
Inflation Index 1
Middle-of-Year discounting convention

Expense Item 3
Security 2*0 25*120000
Inflation Index 1
Middle-of-Year discounting convention

Remember, from the Alternative Information screen, use F3 to add a new alternative. From a completed Alternative Information screen, F10 exits to the DATA ENTRY AND MODIFICATION menu.]

4.2.6 **Entering Text**. Option 5 from the DATA ENTRY AND MODIFICATION menu allows the user to access the Text Information Blocks menu. An input file has four text blocks: Assumptions, Discussion of Alternatives, Source/Derivation of Costs/Benefits, and Results and Recommendations. These four individual text information blocks provide reviewers with information essential for informed decision making. The Assumptions text information block allows the user to enter any information concerning the assumptions for the economic analysis, such as the functional life of an asset, the usefulness of a facility after the present objective is fulfilled, etc. In the Discussion of Alternatives text information block, the user should enter a listing and description of each considered option, and a discussion of the feasibility of each. Even infeasible options must be listed and described, followed by reasons why the alternative is not feasible. The Source/Derivation of Costs/Benefits text information block should be used to document sources for the costs and benefits that will be realized for the alternatives. The last text information block is called Results and Recommendations. This block is utilized after the economic analysis has been completed. Here, the analyst provides a commentary on the outcome of the economic analysis and makes an appropriate recommendation based on that outcome.

Figure 4-24 shows the options on the Text Information Blocks menu. The user may use the cursor keys to highlight the option which designates the block of text to be accessed.

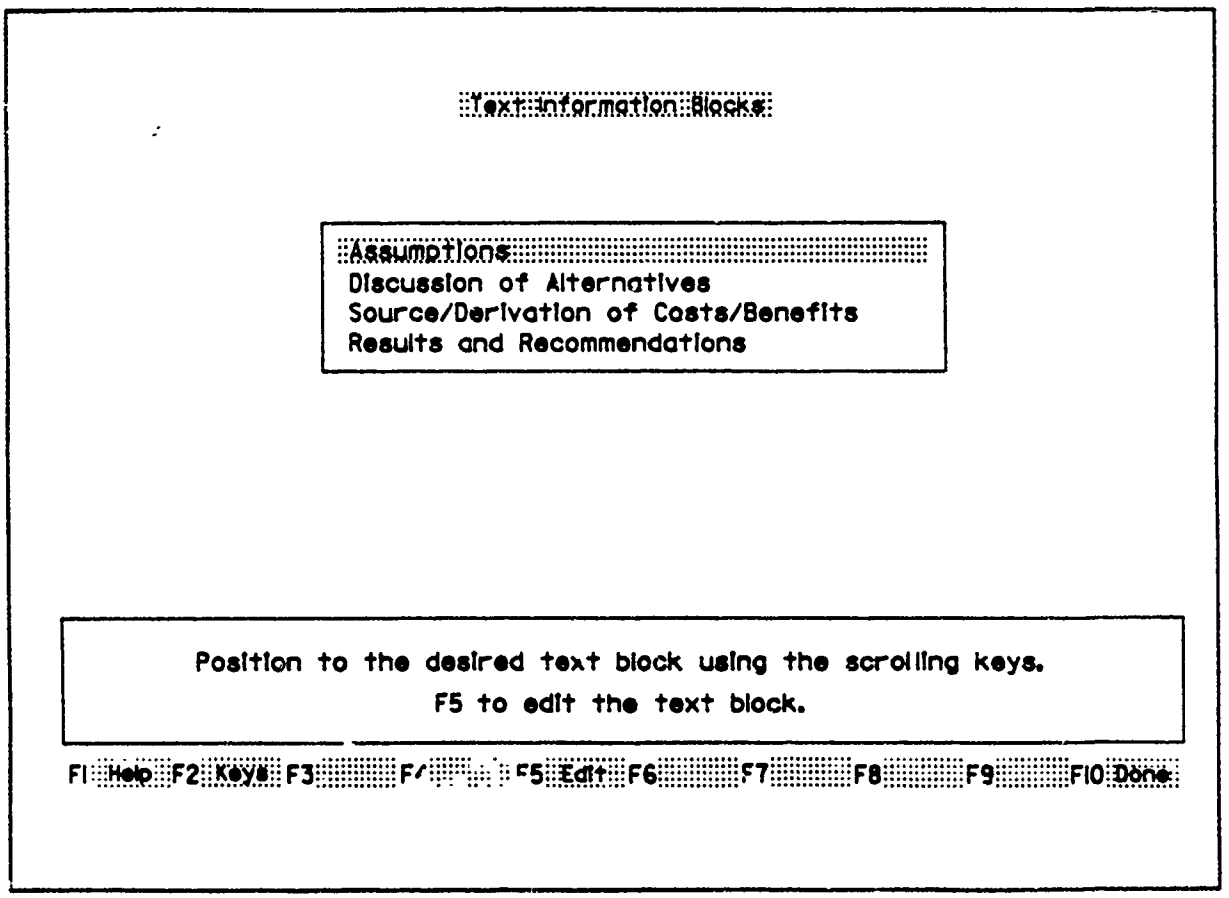


Figure 4-24. Text Information Blocks menu screen

To facilitate text entry, PC-ECONPACK uses a modified version of Video Display Editor (VDE), Version 1.6.1. VDE is a small, fast, powerful text editor, as well as an efficient word processor. It is extremely versatile in that its files are in pure ASCII format. VDE has many features but this section of the manual only addresses the main functions and commonly used editing features. It is anticipated that most users will enter text through their own word processing package and only use VDE to import and export PC files. However, more detailed VDE documentation is provided in file MANUAL.VDE included in the \ECONPACK subdirectory. Follow these steps to print the VDE document:

1. Exit the PC-ECONPACK program.

2. Type the command PRINT\ECONPACK\MANUAL.VDE or print the file MANUAL.VDE any way preferred.
(e.g., C:\>PRINT\ECONPACK\MANUAL.VDE (CR))

When the user highlights the desired text option and presses F5 Edit, the system displays the appropriate text data entry screen. Figure 4-25 depicts a blank Assumptions text data entry screen.

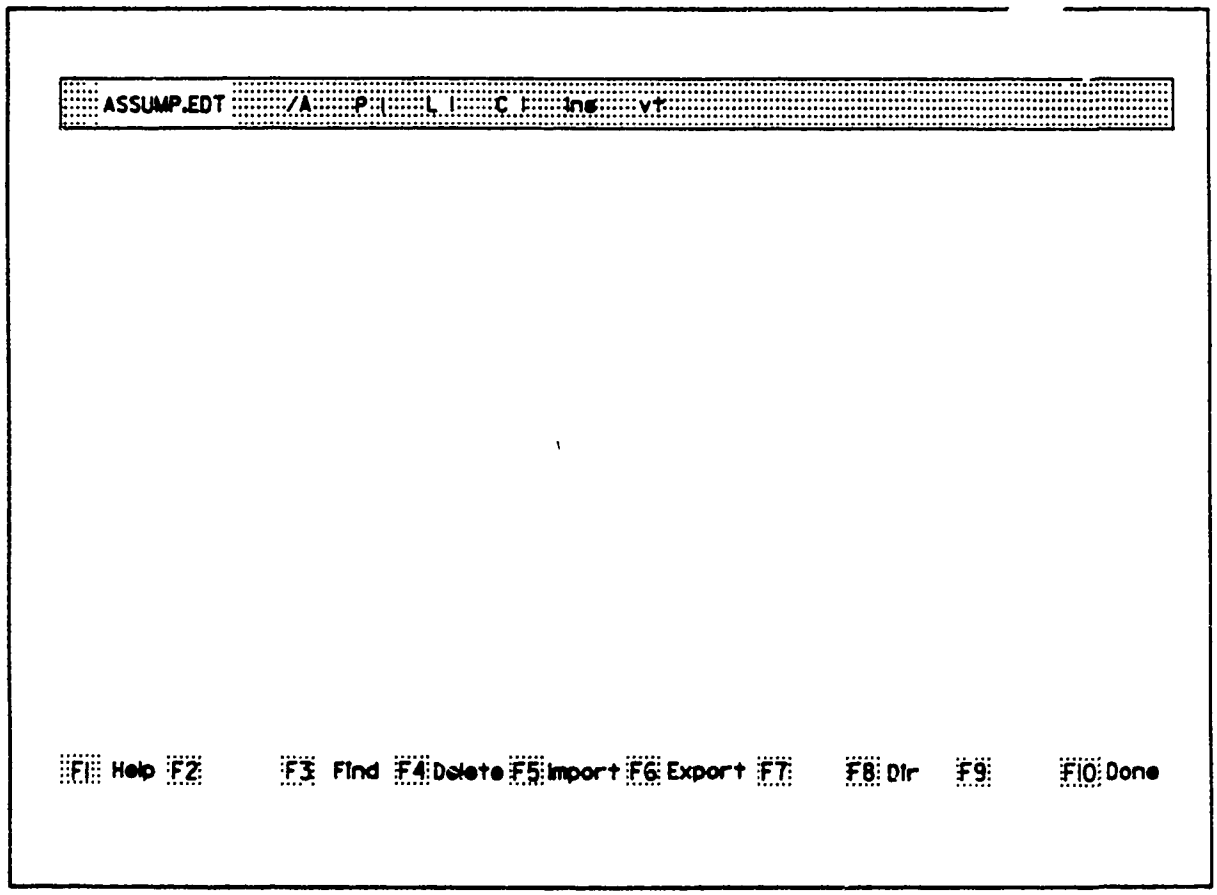


Figure 4-25. Assumptions text data entry screen

The full screen editor is now available for text entry. The text screen file name appears in the shaded box in the upper left corner of the screen. The text screen file name that appears depends upon the text block being edited.

TEXT BLOCK	TEXT SCREEN FILE NAME
Assumptions	ASSUMP.EDT
Discussion of Alternatives	DISCUS.EDT
Source/Derivation of Costs/Benefits	SDC.EDT
Results and Recommendations	RESULT.EDT

The subject line also includes some other characters as defined below:

- **/A -** indicates this is an ASCII file.
- **P_ -** indicates the current page number.
- **L_ -** indicates the current line number.
- **C_ -** indicates the current character position.
- **Ins -** indicates the insert mode is activated so characters can be entered on a line prior to the cursor. When Ins does not appear, the system is in the strikeover mode. Insert can be activated or deactivated using the Insert (Ins) key which has a toggle function.
- **vt -** indicates variable tab mode is on. In the variable tab mode (the default for documents), the Tab key moves to the next tab stop set. No character appears in the text. [Note: The other tab mode is the hard tab mode. In this mode, use of the Tab key produces an actual ^I. ^OV toggles between the two modes.]

Across the bottom of the screen is a function menu with several keys labeled:

- **F1 Help -** Provides a chart of keys to use for various editing tasks (Figure 4-26). From this mode, the letters A, E, J, K, O, P, and Q may be pressed for additional editing features. Press the escape key (Esc) to return to the edit mode.

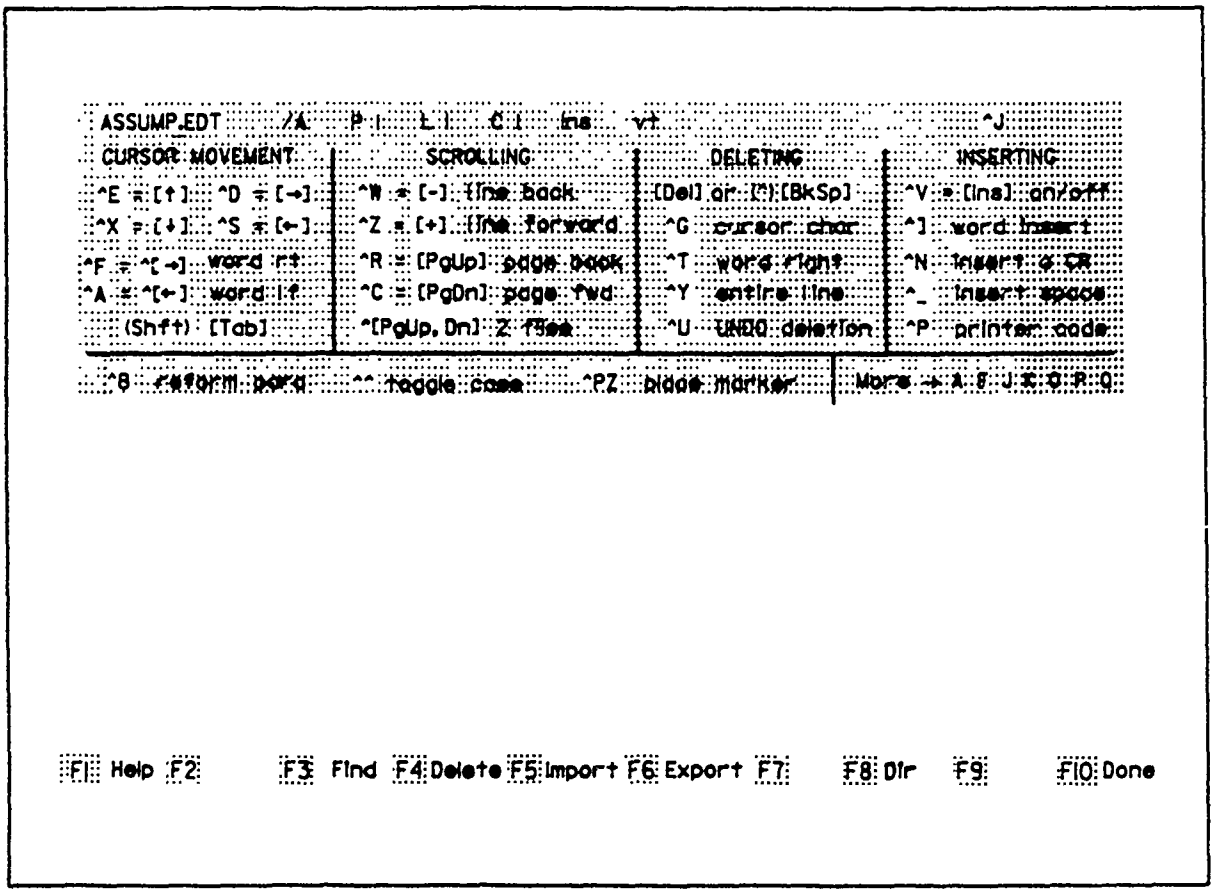


Figure 4-26. F1 Help display screen

F3 Find - **Searches the file for the specified string. The complete string must appear on the same line of text. When the user presses the F3 Find key, the system prompts for the text string (Figure 4-27). The string should be entered followed by a carriage return. After the string is entered, the system prompts the user to indicate if the search is to be a backward, uppercase, or global search. The system then indicates that the string is not found or moves the cursor to the line which contains the first occurrence of the specified string.**

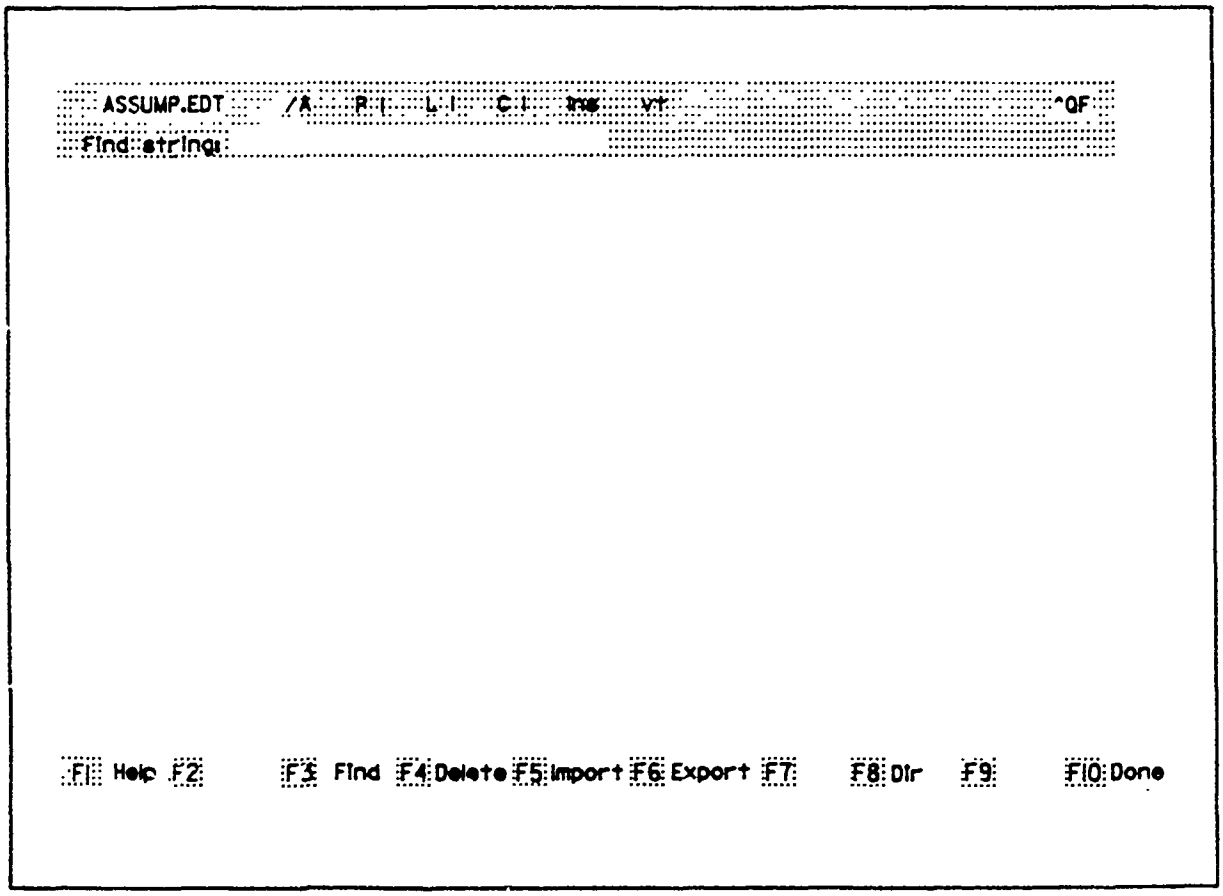


Figure 4-27. F3 Find Screen

F4 Delete - Erases the current line.

F5 Import - Allows the user to copy a PC file into the current text information block. The user must be specific in defining the location and path of the file to be imported. When the user presses F5, the system prompts for the filename with a Read in file: prompt (Figure 4-28). If the file is accurately specified, the system enters the file and displays it to the screen. The imported data is entered above the current line.

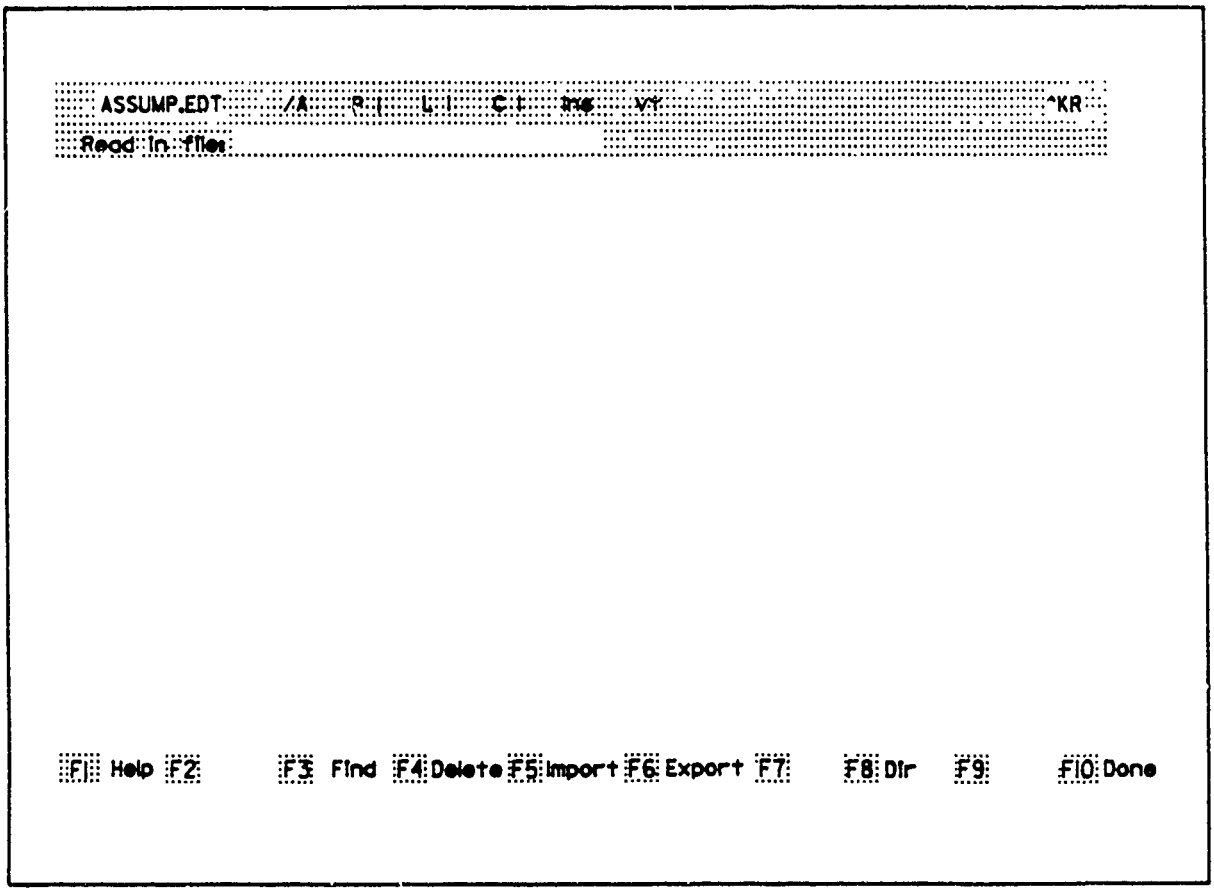


Figure 4-28. F5 Import screen

F6 Export - Copies the current text information block to the specified file location. When the user presses F6, the system prompts for the filename to assign the file to be exported (Figure 4-29). The user should enter the filename at the Rename Work: prompt.

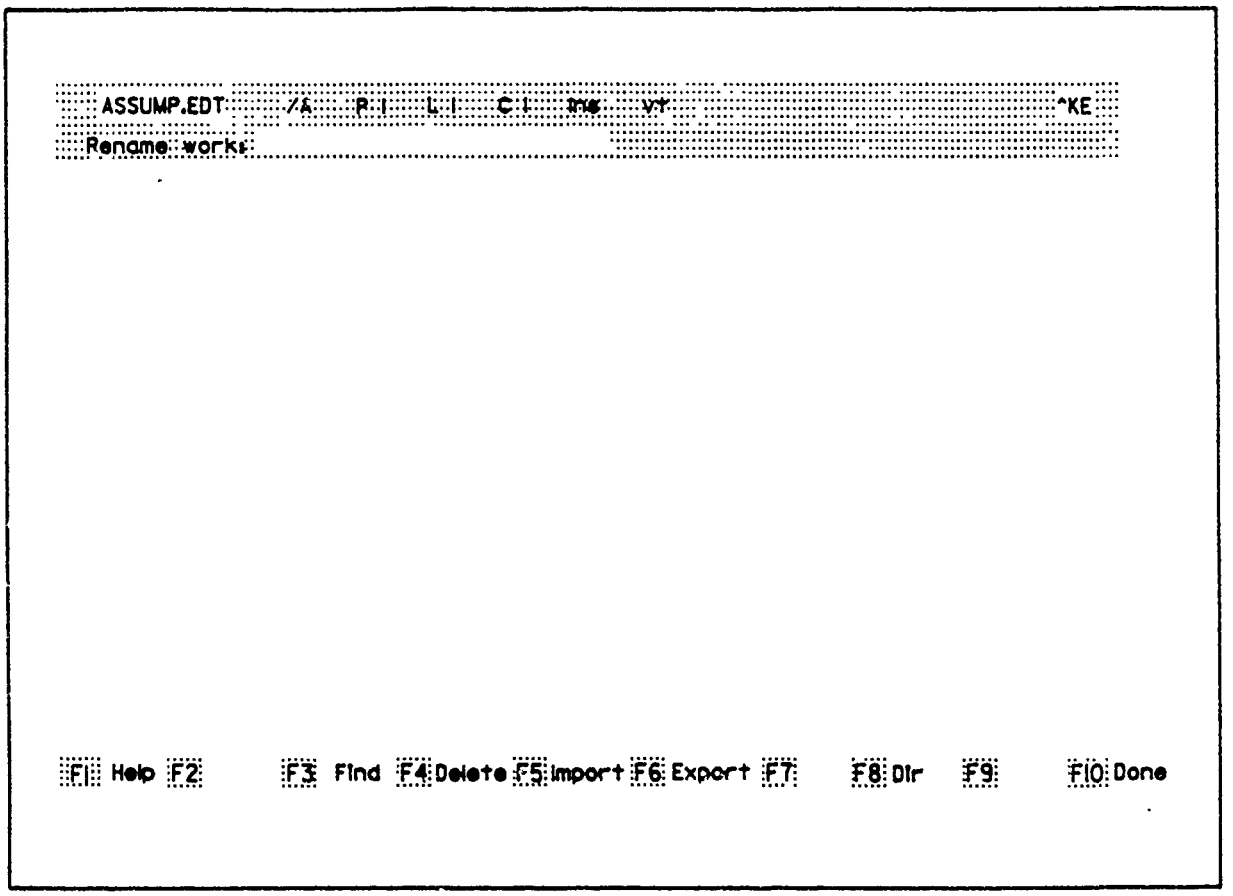


Figure 4-29. F6 Export display screen

F8 DIR - **Allows the user to obtain a listing of PC files. The default directory is the directory into which PC-ECONPACK is loaded, but the user can type in the appropriate directory label; i.e., A: or B:, etc. In the example (Figure 4-30), the system displays a list of the files in the A: directory. Refer to the VDE documentation for procedures for manipulating files from the directory command menu bar.**

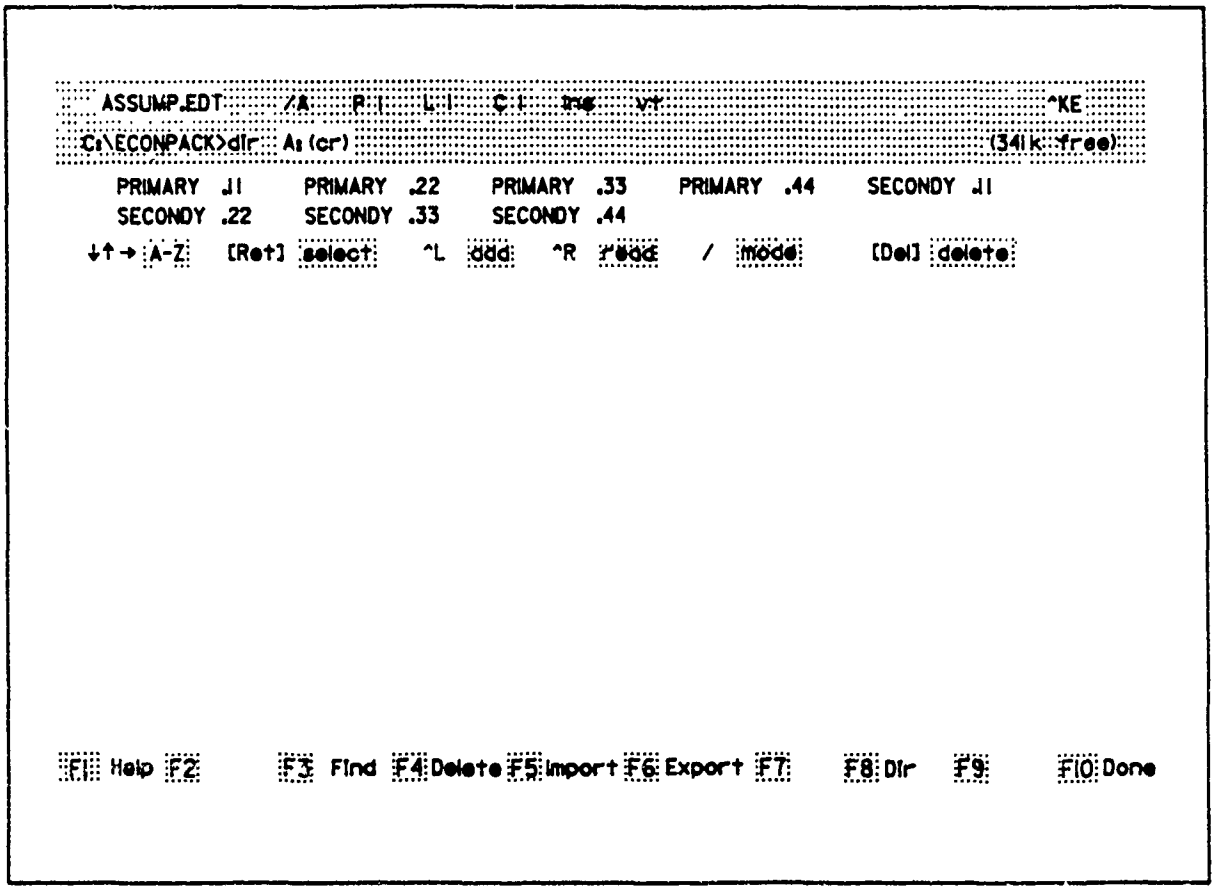


Figure 4-30. F8 DIR sample directory

F10 Done - Allows the user to access a menu for exiting the current file (Figure 4-31). The user can enter (S) to save the file to disk as a PC-ECONPACK text file without exiting the file, (X) to exit saving the newly entered data as a text file in PC-ECONPACK, or (Q) to exit without saving the newly entered data. The F10 menu bar also allows the user to enter (R) to execute DOS level commands without exiting VDE.

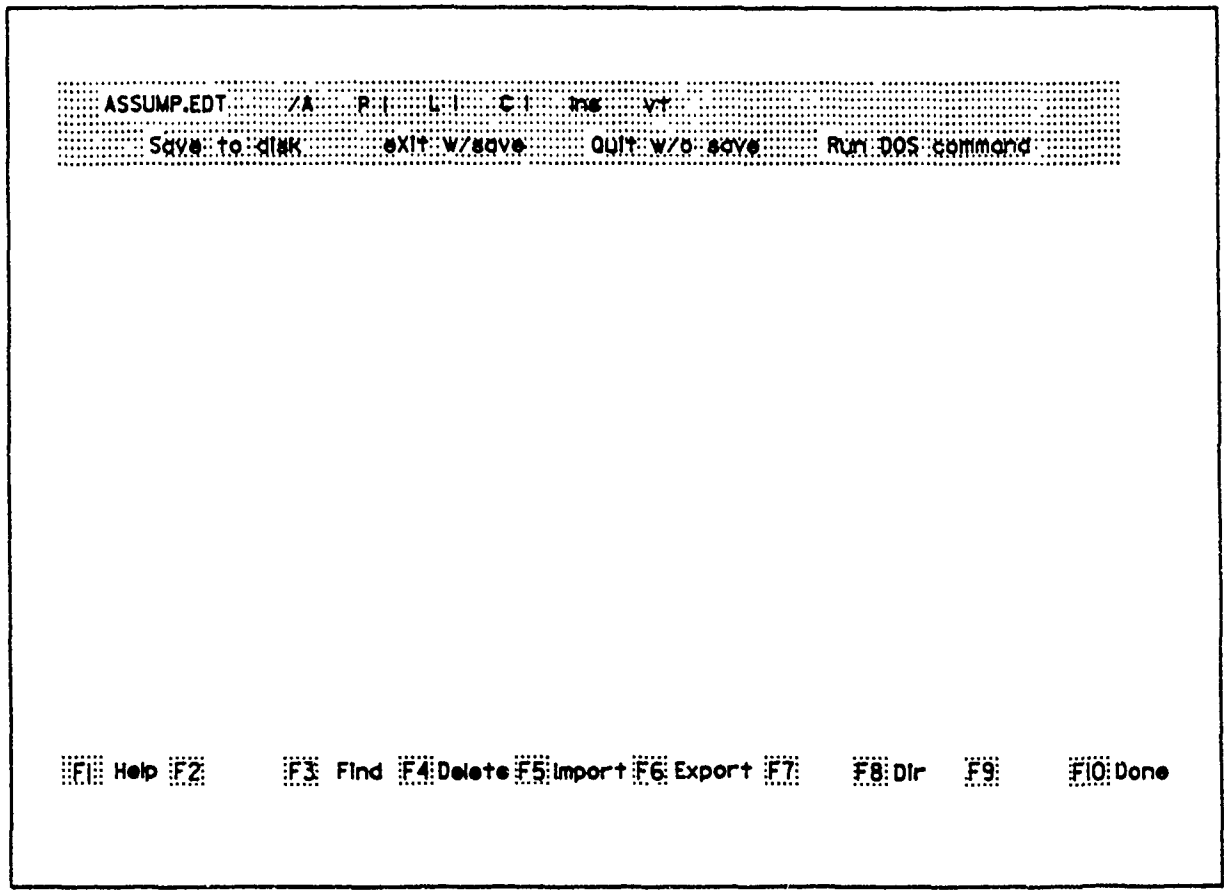


Figure 4-31. F10 Done display screen

The user can exit or abort most function or command requests by pressing the carriage return (CR) or escape (ESC) key.

The user enters data to the text screen in a word-processing manner. All of the text screens are identical, except for the text screen file name. When the user presses F5 Edit to access the desired text block, the blinking cursor appears in the upper left corner of the screen. VDE has word wrapping capability which enters approximately seventy (70) characters per line. Fifty-six (56) lines of text compose a page.

As text is being entered, many keys and control characters are valid. Only the commonly used ones are listed in this section.

Backspace	-	erases character preceding cursor position.
Del	-	erases character at cursor position.
Enter or Carriage Return	-	advances from line to line.
Right or Left Arrow key	-	moves from character to character.
Up or Down Arrow key	-	moves from line to line.
Tab	-	moves to next tab stop.
Shift/Tab	-	moves to previous tab stop.
Ins	-	allows characters to be inserted at cursor position (toggles on and off).
PgUp	-	scrolls back one screen.
PgDn	-	scrolls forward one screen.
Home	-	moves cursor to beginning of current line.
End	-	moves cursor to end of current line.
^Home	-	moves cursor to top of file.
^End	-	moves cursor to end of file.
^F	-	moves cursor to start of next word.
^A	-	moves cursor to start of previous word.
^Y	-	deletes current line.
^T	-	deletes current word beginning at cursor position.
^U	-	restores previous deletion (character, word, line, or block).

Remember, to enter data in a particular text block, select the Text Information Blocks option from the DATA ENTRY AND

MODIFICATION menu. Highlight the desired block and press F5 Edit to access the block. All VDE commands, functions, and keys are then valid. Follow the appropriate procedure for entering text by typing to the screen or importing a previously prepared file. After the text has been entered, press F10 Done and type (S) to save the entered text to disk as a part of the PC-ECONPACK input file without exiting the current text block; (X) to exit and save the newly entered data as part of the PC-ECONPACK input file; or (Q) tc exit without saving the newly entered data. While the exiting instructions are displayed on the screen, the user can press the (Esc) key to access the VDE command mode for more advanced text movement. Refer to the VDE documentation for detailed instructions. Once the user enters the desired exiting response, the system processes the request and exits to the Text Information Blocks menu. Text is entered in exactly the same manner on all four text information blocks.

[For the SECONDY file, follow the procedure for entering text, and enter the following text data in the appropriate text information block. Text may be entered using the desired word processing package and imported into the appropriate text information block).

ASSUMPTIONS

1. All costs except salvage value occur throughout the year and will be discounted by a "middle-of-year" discount figure.

2. Beneficial Occupancy Date (BOD) will be 1995 for each alternative.

3. The discount rate used for this OMB Circular A-104 analysis is 9.0 percent. All costs are in current (inflated) dollars.

4. Physical life of the new facility is 60 years and will depreciate on a declining balance schedule (1.7 percent per year, per OMB A-104).

5. Mobile homes will be replaced every 8 years, no salvage value.

6. O&M. Engineering services (M account) and minor construction repairs (L account) are included in the annual lease. Therefore, O&M for the lease option is less than that for the other two options.

7. Due to the nature of mobile homes, extra security measures (fencing and an attended guard gate into the mobile home area) will be required.

ALTERNATIVES

The following alternatives were considered in this economic analysis:

New Construction:

Construction of an unaccompanied personnel housing facility. This alternative provides adequate space, both in quantity and quality for the stated requirement. Soldiers will not receive BAQ/VHA.

Lease Off-post:

Lease existing facilities off-post. Several commercial properties will be leased to provide the necessary housing for soldiers. Transportation and meals will not be provided in this alternative. Soldiers will not receive BAQ/VHA.

Mobile Homes:

Mobile home units will be purchased and installed on-post. Soldiers will share units in accordance with allowances for space based on grade. Added security will be provided. Soldiers will forfeit BAQ/VHA. Mobile homes are expected to be replaced continually, but on an 8-year rotational schedule.

The following alternatives were considered, but rejected as infeasible, and were not considered in this economic analysis:

Do Nothing:

Current facilities do not exist for this new requirement. This requirement represents a new mission, all soldiers are new to the installation and have been transferred from other installations in accordance with the Base Realignment and Closure Act.

BAQ/VHA:

Providing Basic Allowance for Quarters (BAQ)/Variable Housing Allowance (VHA) is not possible based on the latest segmented housing market analysis (SHMA). Adequate off-post housing units (according to the SHMA) are those that can be obtained at BAQ/VHA

plus 15 percent. Based on the BAQ/VHA rates for this soldier group, adequate housing does not exist in sufficient quantity off-post.

Use of other DoD installations:

The nearest DoD installation is 220 miles away -- this is too far for soldiers to commute and presents an unacceptable command and control situation.

SOURCE AND DERIVATION OF COSTS AND BENEFITS

1. NEW CONSTRUCTION.

a. Construction Cost. This estimate is based on a standard design for UPH facilities approved by the Corps of Engineers, Gotham City District.

Primary Facility	SF	160,000	154.42	24,707,200
Supporting Facility (20%)				4,941,440
Subtotal				29,648,640
Contingency (5%)				1,482,432
Total Contract Cost				31,131,072
SIOH (6%)				1,867,864
Total Request				32,998,936
Total Request (rounded)				33,000,000

Source: DD 1391 Processor System

b. Operations and Maintenance. Includes Utilities, Maintenance and Repair, Minor Construction (replacement), and Engineering Services.

$10.859338/SF x 160,000 SF = $1,737,494/yr

Source: Redbook, and Maintenance Resource Prediction Model (MRPM).

2. LEASING OFF-POST.

a. Annual Rent. Based on lease estimates provided by local real estate companies for blocks of 2-bedroom apartments within a 10-mile radius of the installation. Price includes engineering services and all major repairs/replacements; does not include utilities or general, day to day maintenance.

Soldiers to be accommodated: 800

Apartments required: 400 (for double occupancy)

Lease estimate, per apartment: $729.72/month

400 apartments x $729.72/month x 12 months = $3,502,673/yr

b. Operations and Maintenance. Includes utilities and general maintenance and repair.

$208.33/apt/month x 12 months x 400 apts = $1,000,000/yr

Source: Redbook, and Maintenance Resource Prediction Model (MRPM).

3. MOBILE HOMES.

a. Purchase Price. Price to purchase, transport, and install 400, two bedroom mobile homes.

400 units x $15,000 per unit = $6,000,000

Source: Mobile Home Association Annual Catalog of Dealer Prices, 1991.

b. Operations and Maintenance. Includes Utilities, Maintenance and Repair, Minor Construction (replacement), and Engineering Services.

$416.67/unit/month x 12 months x 400 units = $2,000,000/year

Source: Mobile Home Association Annual Summary of Operations and Maintenance Costs.

c. Security. Includes installation of fencing and gates to enclose mobile home area, construction of a guard gate, and one person attending the guard gate on a 24-hour basis.

Estimate: $120,000/yr

Source: Average of 4 local security vendor's estimates.

RESULTS AND RECOMMENDATIONS

Costs and benefits of each option were analyzed over a 27-year period. Annual costs were discounted at a 9.0 percent rate, and then totalled to arrive at a net present value (NPV). The NPV results show the construction ($49.3 M) and lease options ($64.6 M) to be approximately $11.8 M and $27.1 M more than the mobile home option ($37.5 M), respectively. Thus, the government would need $11.8 M more (in present value terms, invested at 9.0 percent) to meet all the costs associated with the construction option than it would need to finance the mobile home option; and $27.1 M more to finance the leasing option rather than the mobile home option. The equivalent uniform annual cost (EUAC) shows that mobile homes are approximately $1.1 M less expensive per year (present value terms) than construction, and $2.5 M less than leasing per year.

Based on the NPV and EUAC results, purchasing mobile homes is determined to be the least cost option to meet this requirement and is recommended for funding. This is true even though there are perceived to be obvious morale and welfare benefits associated with construction of an unaccompanied personnel housing facility. However, the mobile home option would provide unit integrity since all the troops would be located in the same area, and would be just as safe as permanent structures since extra security measures are provided.

4.2.7 **Entering Data for Graph Definitions**. Option 6 - Graphs can be utilized to produce two different types of graphs. The first graph, titled "Cumulative Net Present Value," displays the cost of each alternative over time. The second, titled "SIR vs. Years," (only available when doing a primary analysis) displays the savings to investment ratio (SIR) for proposed alternatives over time. A maximum of six alternatives can be plotted on one graph and a maximum of five NPV graphs can be plotted for each secondary economic analysis. Five NPV graphs and five SIR graphs can be plotted for each primary analysis. [Type 6 from the DATA ENTRY AND MODIFICATION menu to select the Graphs option or highlight the Graphs option followed by a (CR).] For a secondary analysis, the Graph Definition screen (Figure 4-32) appears on the monitor. This screen allows the user to define (by number) which alternatives are to be included in each graph. For a primary analysis, a GRAPHS menu screen (Figure 4-33) appears on the monitor. After the user selects from the menu, either the NPV Graph Definition screen or the SIR Graph Definition screen (Figure 4-34) appears.

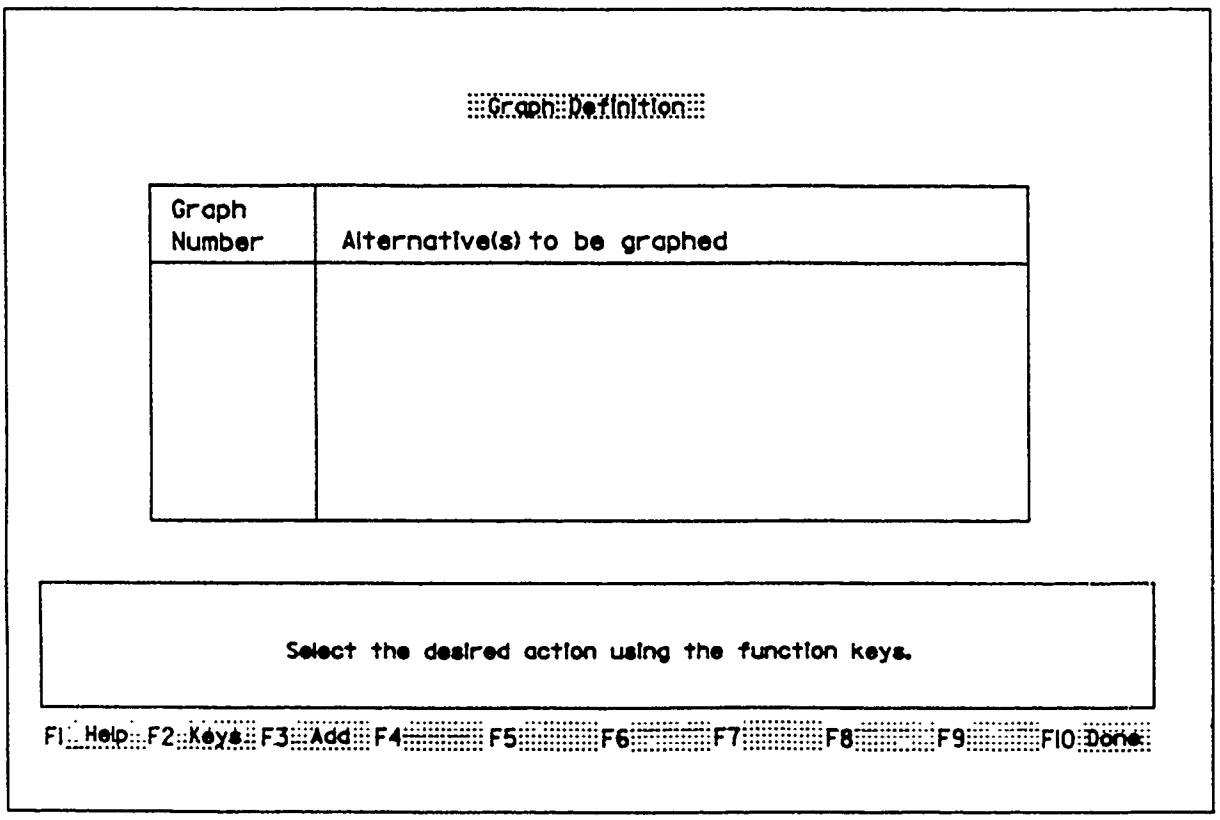


Figure 4-32. Graph Definition data entry screen

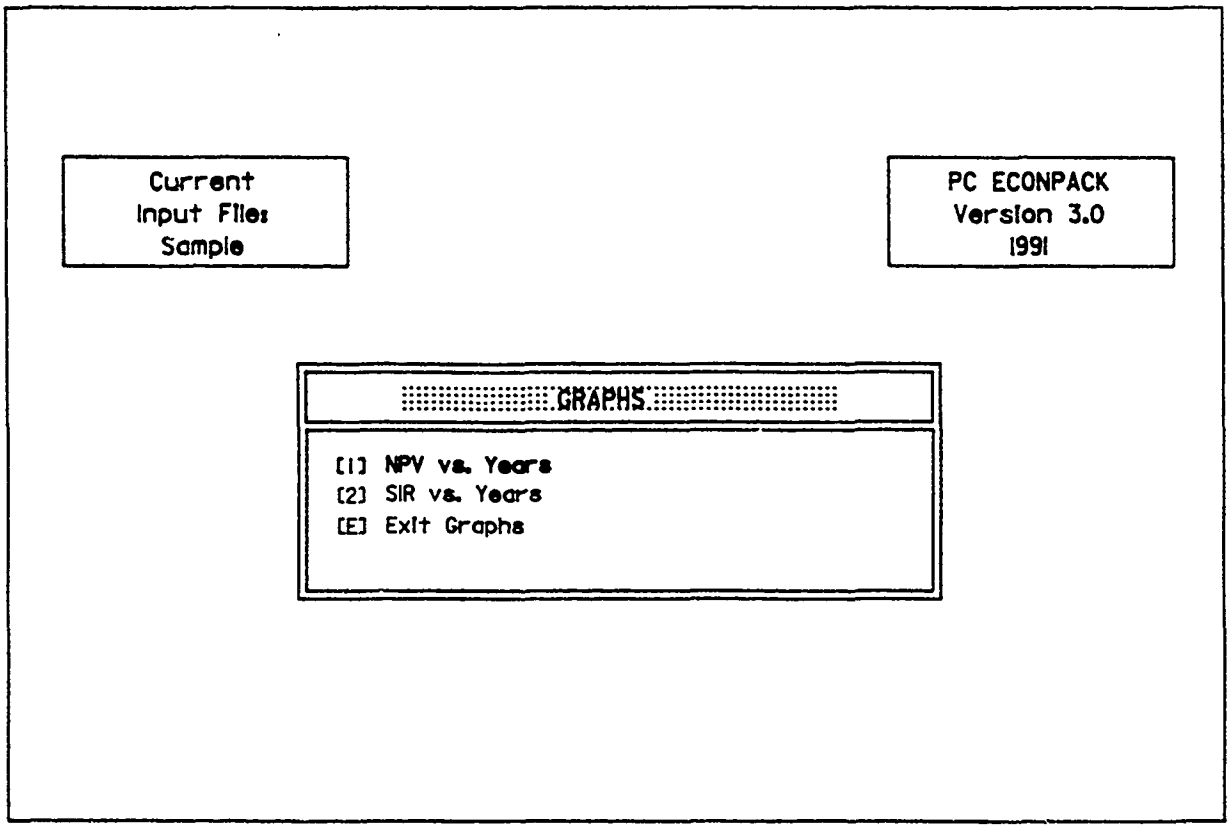


Figure 4-33. GRAPHS menu screen for primary analysis

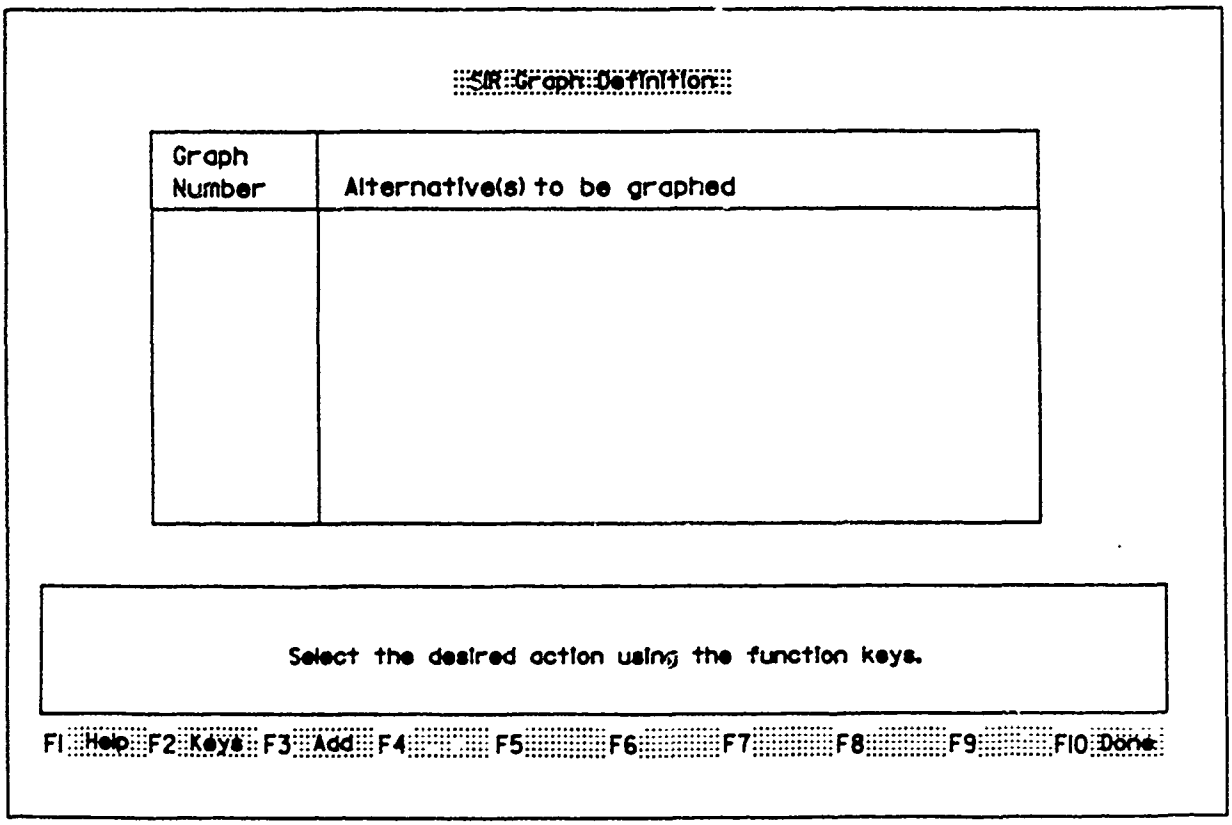


Figure 4-34. SIR Graph Definition screen

[For the SECONDY file, press F3 to add a graph. Notice that three alternatives are displayed on the screen with Alternative 1 highlighted. Use the up and down scrolling keys followed by a carriage return to highlight the alternatives to be included in the graph.] PC-ECONPACK signals the user that the alternative is included in the graph by entering a check mark beside the alternative. While the option is highlighted, another carriage return erases the check mark.

[Follow the procedure to indicate that Alternatives 1, 2, and 3 are to be graphed.] Figure 4-35 shows an example of alternatives selected to be graphed. [Press F10 to indicate graph data has been entered.] The system then prompts the user to Accept, Modify, or Quit. Enter (A) to save the entered data, (M) to edit the data, or (Q) to discard the newly entered data. [Accept the data.]

A graph definition screen for graph number two now displays on the screen. Enter the desired data. When all data has been entered, press F10. [The SECONDY file has only one graph so press F10 to exit.] Figure 4-35 shows a completed Graph Definition screen.

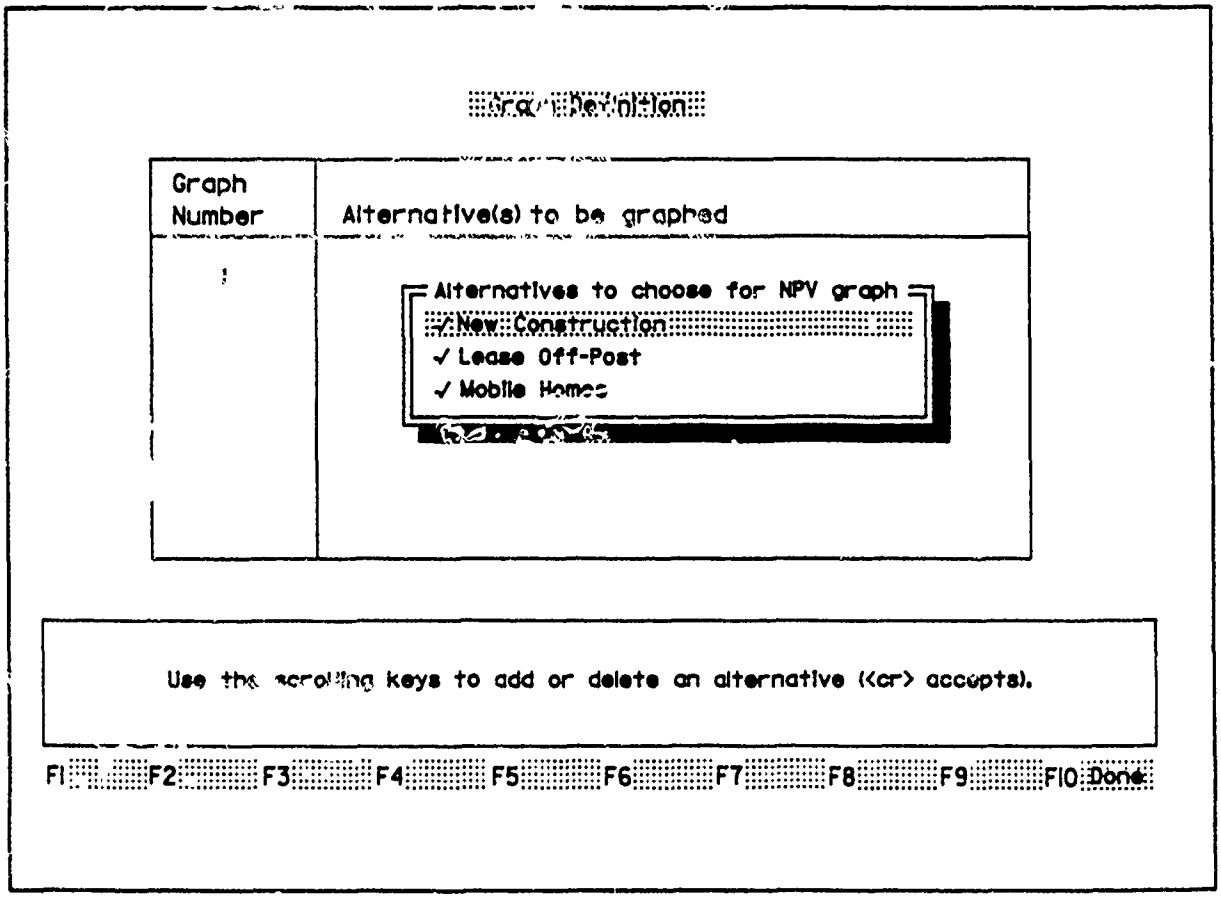


Figure 4-35. Alternatives selected to be graphed

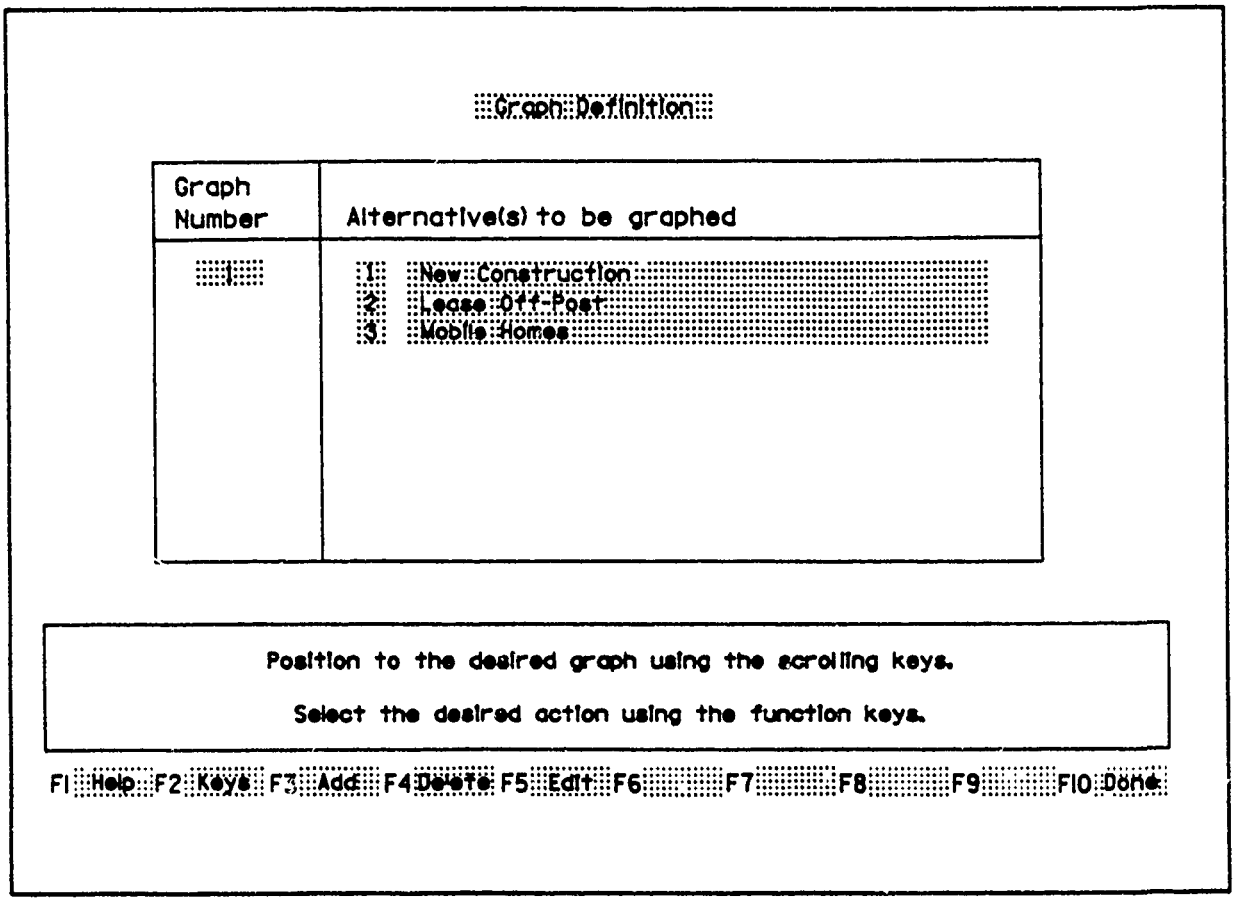


Figure 4-36. Completed Graph Definition screen

The function menu on the completed Graph Definition data entry screen shows six labeled keys. F1 Help indicates the number of graphs which may be defined. F2 Keys displays the functions of various keys. F3 Add allows additional graphs to be defined. F4 Delete allows a defined graph to be erased. F5 Edit allows the user to change the current graph specifications. F10 Done allows the user to indicate completion of graph data entry and exit to the DATA ENTRY AND MODIFICATION menu (secondary) or the GRAPHS menu (primary). [Press F10 DONE to return to DATA ENTRY AND MODIFICATION.]

4.2.8 **Entering Cost Sensitivity Analyses Data**. Cost estimates (expense items) are critical elements of any economic analysis. Some estimates of expense items have a higher level of accuracy than other expense items. A cost sensitivity analysis allows the

user to vary one or more expense items of any two alternatives by a preset percentage to determine whether the present value ranking of the two alternatives changes. If the present value ranking changes, the alternatives are said to be sensitive to the particular expense item(s) that was varied. If the present value ranking does not change, the alternatives are said to be insensitive to changes in the selected expense item(s).

A maximum of thirty (30) cost sensitivity analyses may be defined. In the SECONDY example, one cost sensitivity analysis is defined. From the alternative definition screen, note that the NPV of Alternative 1 is $49,322,625, Alternative 2 is $64,602,368, and Alternative 3 is $37,454,473. Alternative 3 is the least cost alternative and the objective of the sensitivity analysis is to determine if changes in expense items will result in another alternative becoming least cost. [Move the cursor on the DATA ENTRY AND MODIFICATION menu to Cost Sensitivity Analyses and press (CR) or type the number 7.] A screen appears on the monitor as shown in Figure 4-37. [Press F3 Add to begin defining the first cost sensitivity analysis.]

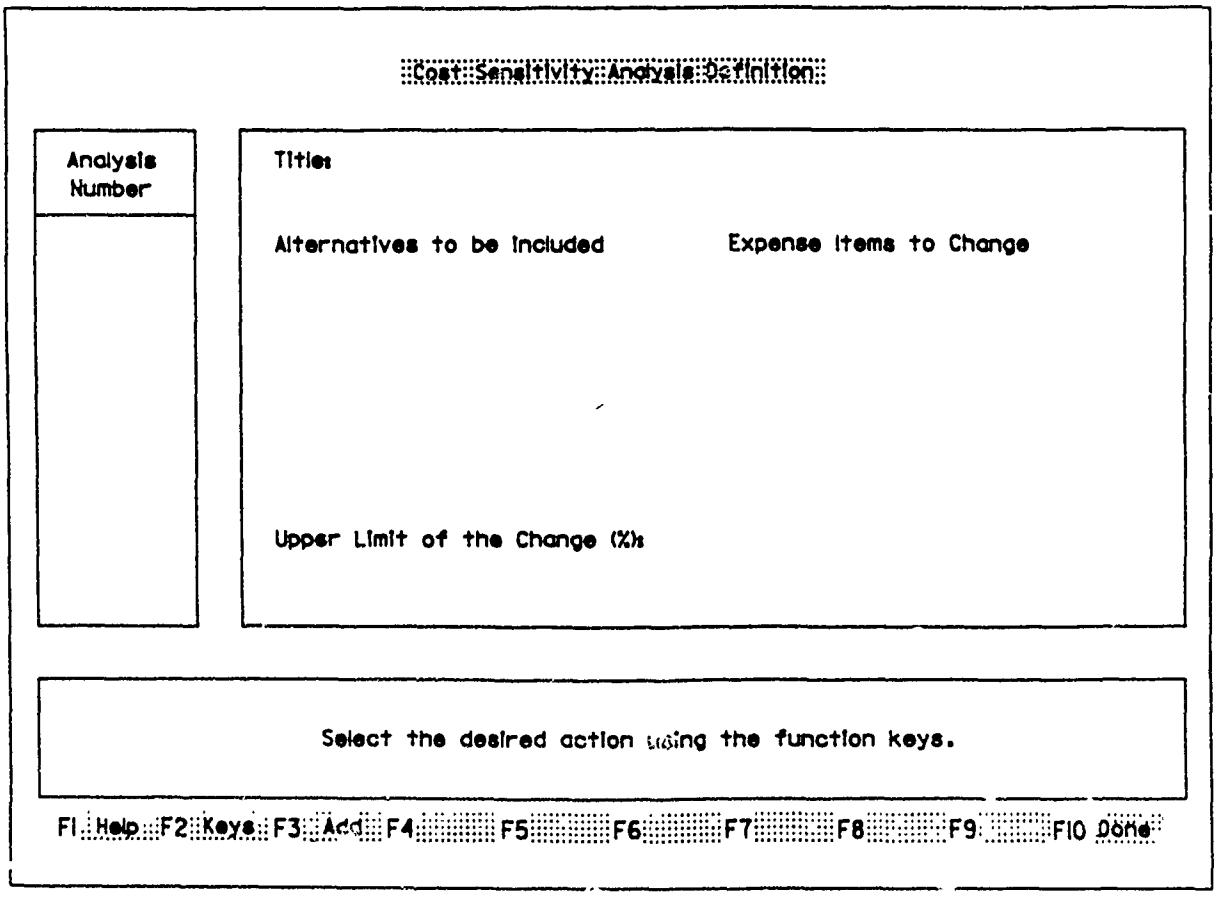


Figure 4-37. Cost Sensitivity Analysis data entry screen

Title is the name given to the cost sensitivity analysis currently being defined. The title may include up to 60 characters in length. [For the cost sensitivity analysis, type **Test Annual Rent** and press (CR) twice to move to the next data entry field.]

Alternatives to be included. PC-ECONPACK prompts the user to select the alternatives to be included in the cost sensitivity analysis. Only two alternatives can be included in each sensitivity analysis. The system displays a pop-up window containing a list of the previously defined alternatives (Figure 4-38). Use the up and down scrolling keys to highlight the first alternative to be included, and press (CR). [Highlight Alternative 1 New Construction and press (CR).]

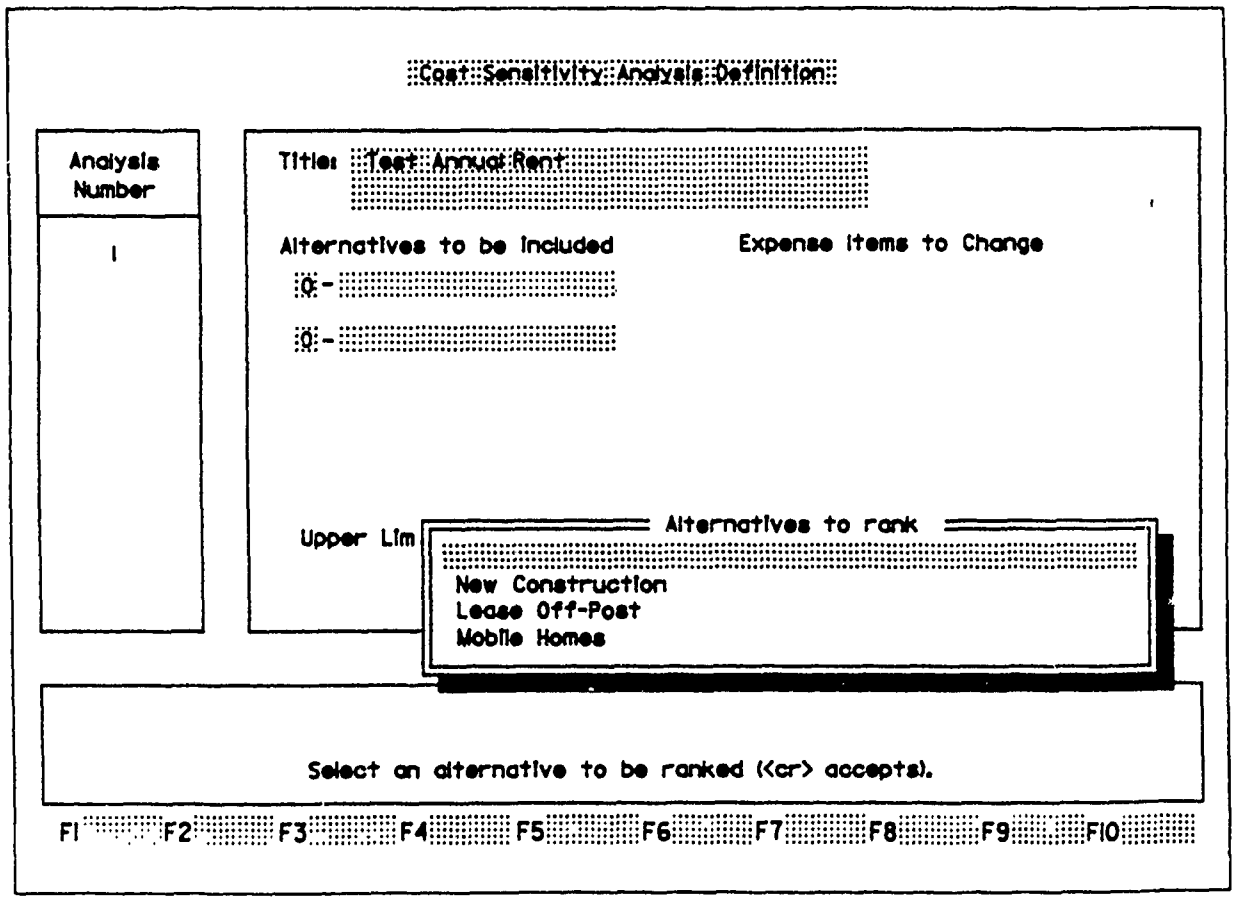


Figure 4-38. List of alternatives available for cost sensitivity analysis

When the user highlights the alternative to be included and enters a carriage return, the system displays a pop-up window listing the previously defined expense items (Figure 4-39).

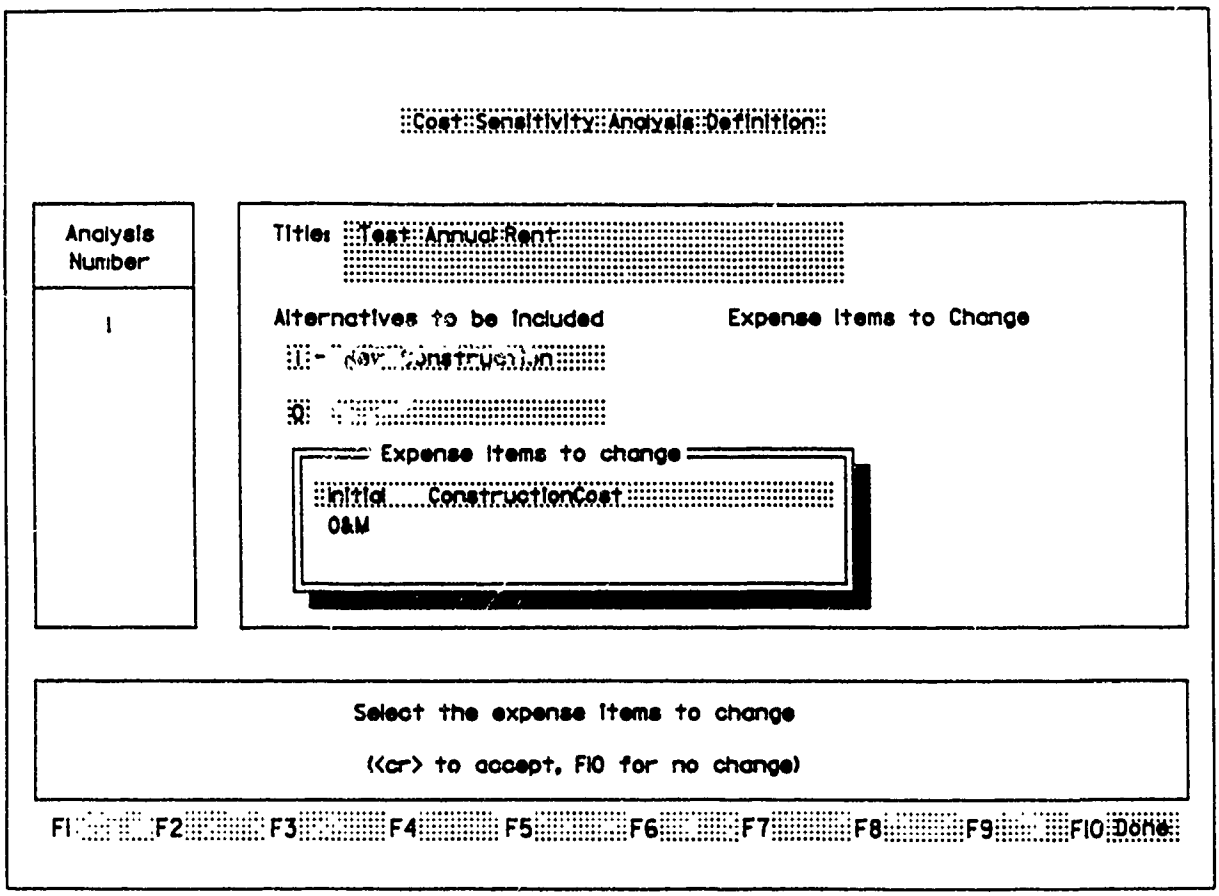


Figure 4-39. List of expense items available for inclusion in cost sensitivity analysis

[Press F10 to indicate no change is to be entered for expense items for Alternative 1.] The system then allows the user to select another alternative. [Highlight Alternative 2 and press (CR). Highlight expense item 1, Annual Rent and press (CR)]. The system enters a check mark to indicate the expense item has been selected to be varied in the analysis (Figure 4-40). While the checked item is highlighted, another carriage return removes the check mark. [Press F10 to enter the selected data]. The cursor is now in the Upper Limit of the Change (%) data field.

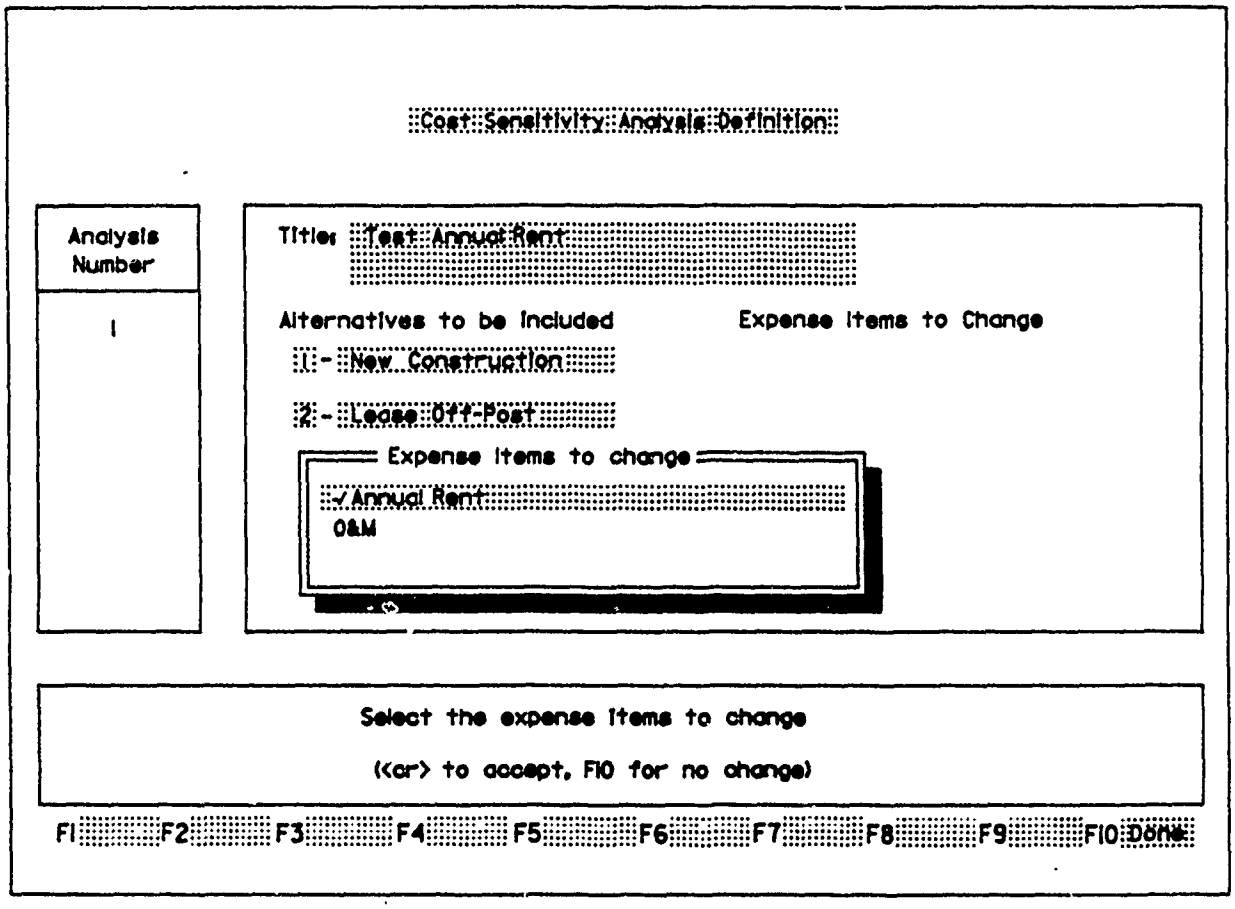


Figure 4-40. Expense items marked for inclusion in cost sensitivity analysis

Upper Limit of the Change (%). PC-ECONPACK varies all the stipulated expense items both in an upward direction and in a downward direction. The limit in the downward direction is a maximum of 100% (equivalent to eliminating the expense item completely). The upper limit is specified for each cost sensitivity analysis and applies to all the expense items that are to be varied. [For this cost sensitivity analysis, type 40 as the upper limit and press (CR).]

Since the user may only subject two alternatives to a cost sensitivity analysis at a time, the program automatically tries to make the alternative with the highest net present value as least cost.

The Accept/Modify/Quit prompt appears at the bottom of the screen. [Enter (A) to accept the data.]

The user is prompted to begin entering data for cost sensitivity analysis number 2.

The SECONDY file provides for only one cost sensitivity analysis. [Press F10 to indicate all data has been entered.] The system displays the data for cost sensitivity analysis 1. Figure 4-41 shows a completed Cost Sensitivity Analysis Definition screen.

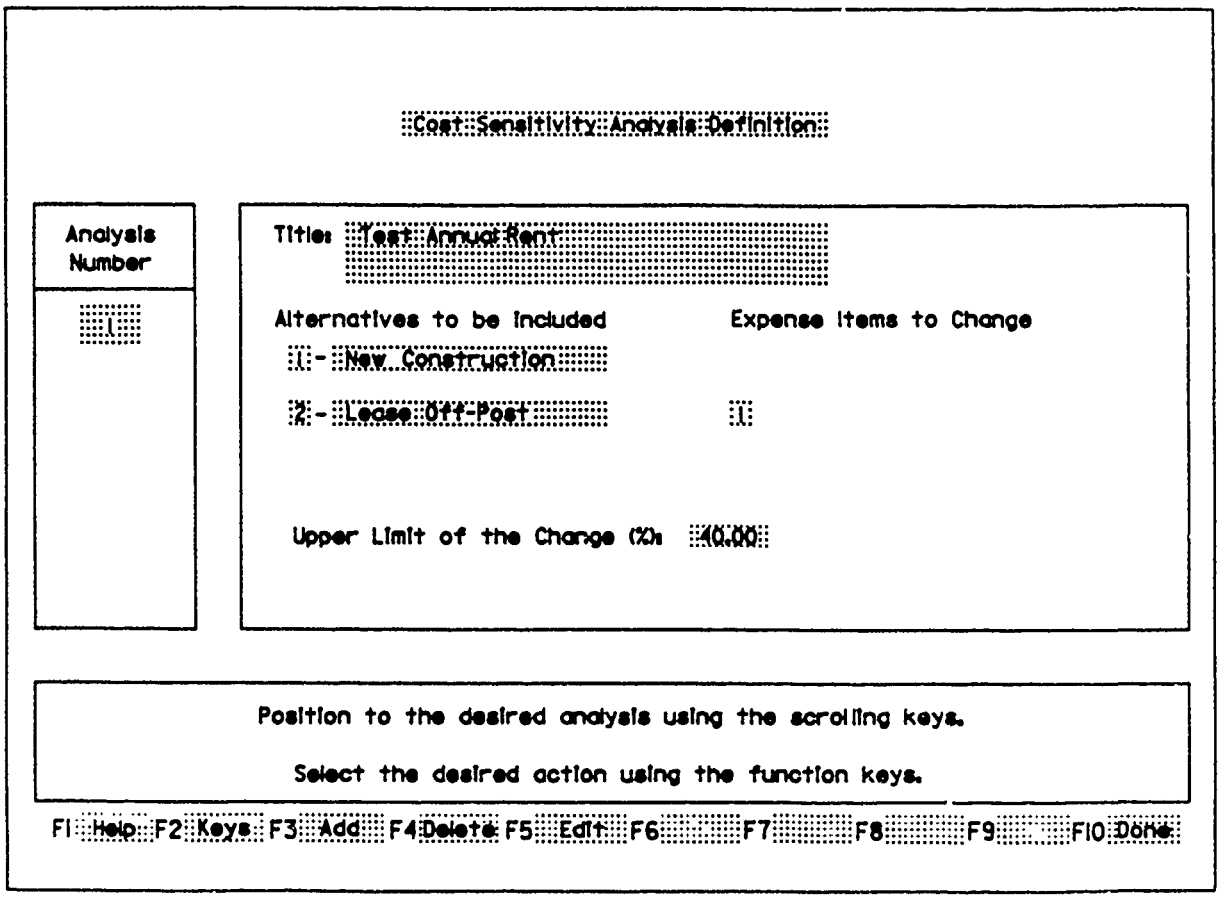


Figure 4-41. Completed Cost Sensitivity Analysis Definition data entry screen

Several keys are labeled on the completed Cost Sensitivity Analysis Definition screen. F1 Help indicates the number of cost sensitivity analyses that may be entered. F2 Keys provides the functions of various keys. F3 Add allows the user to add data for an additional cost sensitivity analysis. F4 Delete erases the data for the highlighted analysis number. F5 Edit allows the user to change data entered for the highlighted analysis number. [Press F10 Done to exit to the DATA ENTRY AND MODIFICATION menu.]

4.2.9 **Entering Discount Rate Sensitivity Analyses Data**. This feature of PC-ECONPACK allows the user to enter the upper and lower limits of the discount rate to be tested. A maximum of five (5) discount rate sensitivity analyses may be defined. Each discount rate sensitivity analysis can have a maximum of six (6) alternatives. The system recomputes the entire EA for each possible value of the discount rate between the limits, up to 60 values. This can be time consuming, requiring up to 15 minutes for EAs with three analyses, depending upon the speed of the PC and whether a math co-processor is on the PC. The report is in three parts: a graph depicting changes in NPV over the range of discount rates specified, a summary table which can be scanned to see if changes in the discount rate changed the original ranking of NPVs, and a detailed report listing the NPVs for each discount rate value used in the analysis.

In analyses which have a lease as an alternative, it is required that a discount rate sensitivity analysis be performed which tests the effect of varying the discount rate by +25%. [Access the DATA ENTRY AND MODIFICATION menu. Highlight Discount Rate Sensitivity Analyses and press (CR) or type 8.] The system displays the Discount Rate Sensitivity Analysis Definition screen. Figure 4-42 is an example of the screen onto which discount rate sensitivity analysis data is entered.

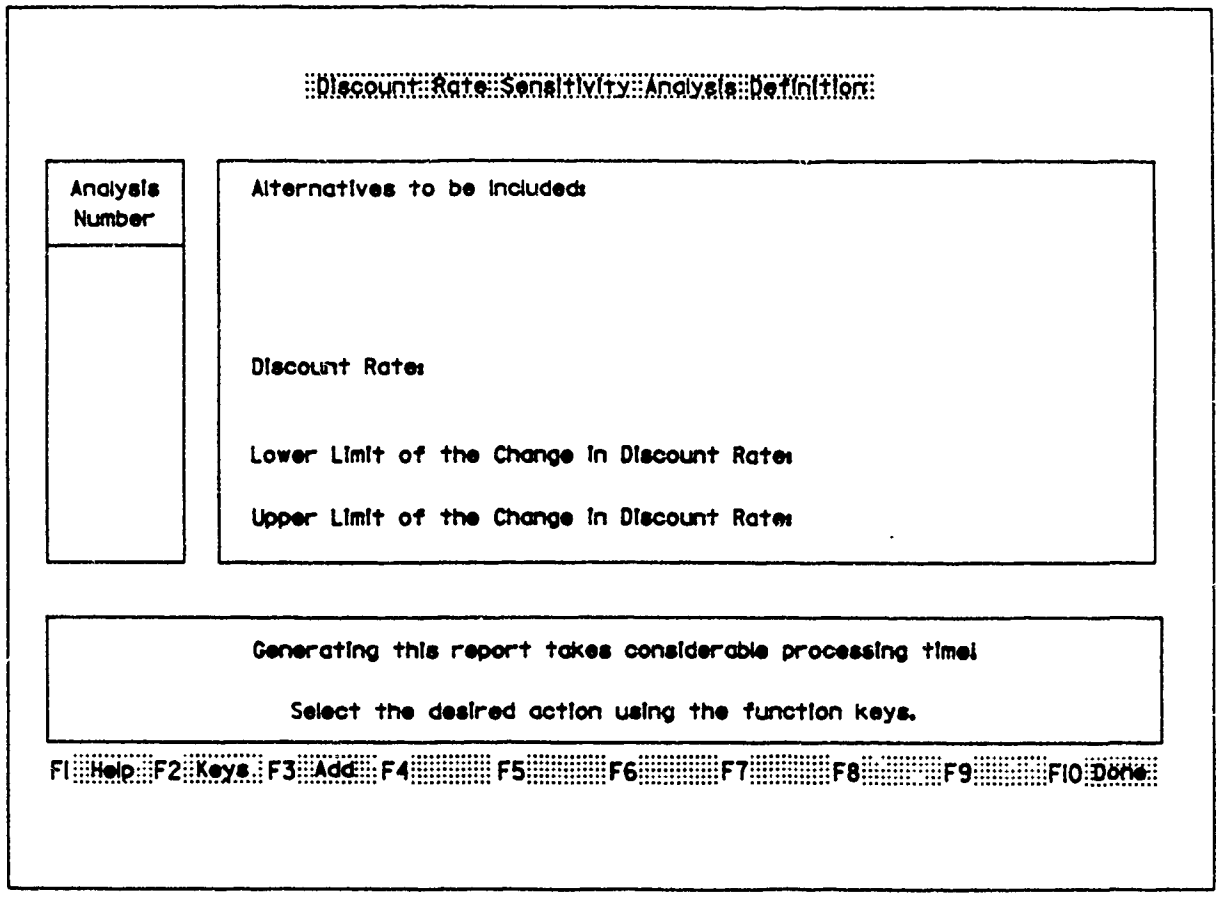


Figure 4-42. Discount Rate Sensitivity Analysis Definition data entry screen

[Press F3 Add to begin defining the first discount rate sensitivity analysis.] PC-ECONPACK prompts the user to select the alternatives to be included in the analysis by displaying a list of the previously defined alternatives (Figure 4-43). Use the up and down scrolling keys to highlight the alternatives to be included, and press (CR). [Highlight Alternative 1, press (CR) and highlight Alternative 2, press (CR).] The system enters a check mark to indicate the alternatives selected for inclusion in the analysis (Figure 4-44). While an alternative is highlighted, another carriage return removes the check mark.

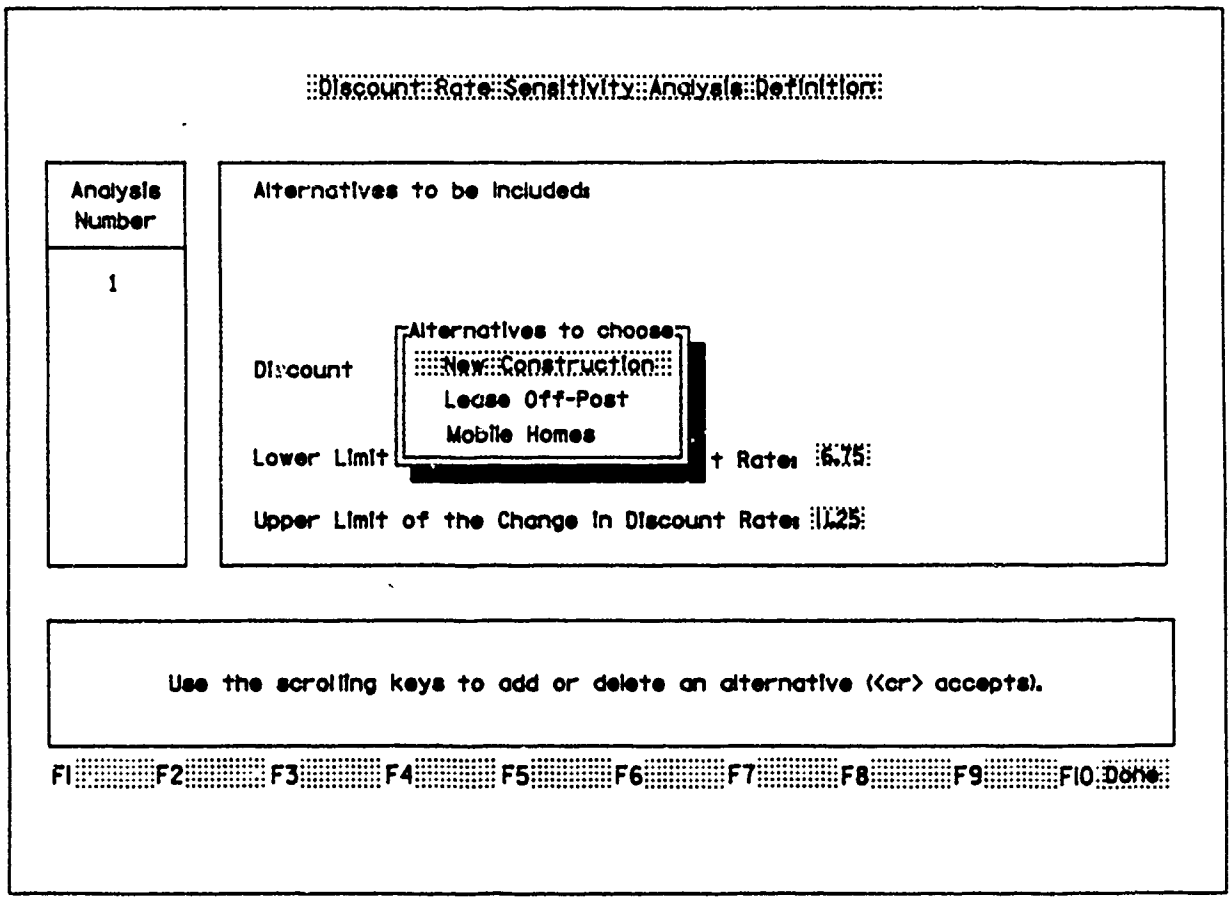


Figure 4-43. List of alternatives available for inclusion in discount rate sensitivity analysis

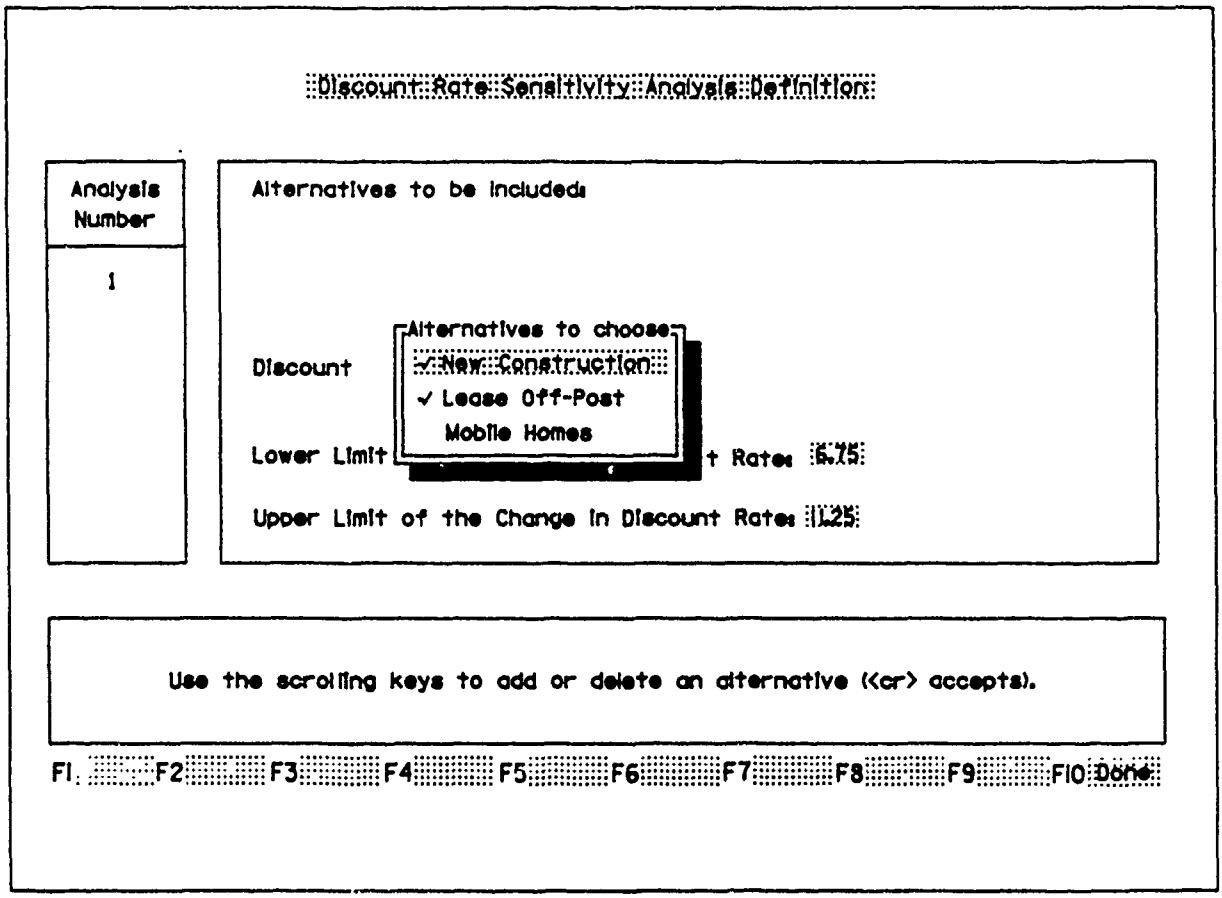


Figure 4-44. List of alternatives marked for inclusion in discount rate sensitivity analysis

[Press F10 Done and the system prompts for the next data field. Enter 9 (CR) as the lower limit percentage of change and 11 (CR) as the upper limit percentage of change.] The system now prompts the user to Accept, Modify, or Quit. [Enter (A) to accept the data.] (A) enters the data to the file and prompts for the defining of a second discount rate sensitivity analysis. Repeat the procedure until all data is entered. [The SECONDY file contains only one discount rate sensitivity analysis so press F10 Done to exit the input mode and display the completed Discount Rate Sensitivity Analysis Definition screen (Figure 4-45).] Several keys are labeled on the completed Discount Rate Sensitivity Analysis Definition screen. F1 Help indicates the number of discount rate sensitivity analyses that may be entered and the maximum number of alternatives for each one. F2 Keys provides the functions of

various keys. F3 Add allows the user to add data for an additional discount rate sensitivity analysis. F4 Delete erases the data for the highlighted analysis number. F5 Edit allows the user to change data for the highlighted analysis number. [Press F10 Done to exit to the DATA ENTRY AND MODIFICATION menu.]

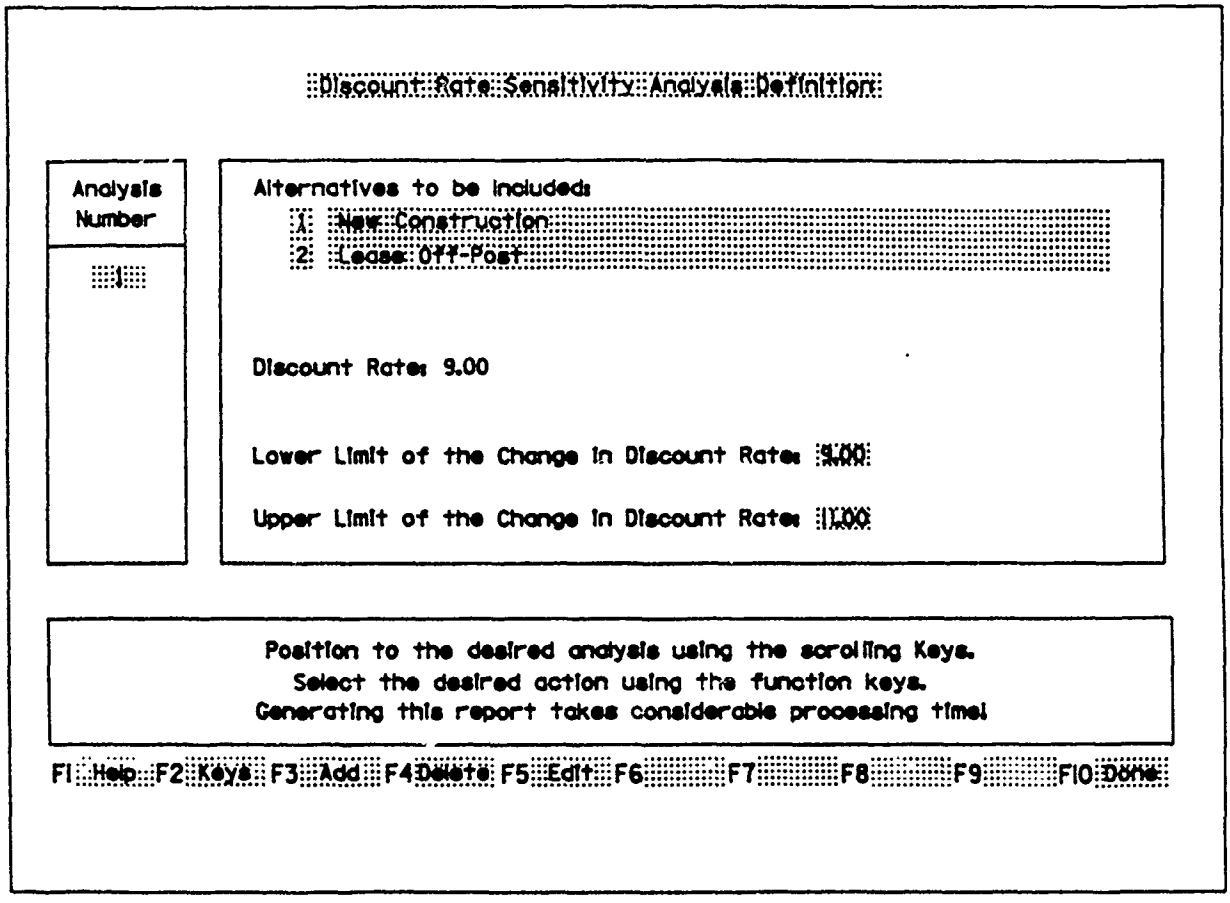


Figure 4-45. Completed Discount Rate Sensitivity Analysis Definition screen

The Discount Rate Sensitivity Analysis is the last option on the DATA ENTRY AND MODIFICATION menu, so all data for the SECONDY example input file is entered. File data can be modified by choosing the appropriate option from the DATA ENTRY AND MODIFICATION menu. Once a screen has been accessed, the procedure for changing or adding data is basically the same as the procedure for entering data. Remember, all valid function keys are labeled at the bottom of each screen. Now that the data is entered, the

user is ready to generate an economic analysis report. [At the DATA ENTRY AND MODIFICATION menu, move the highlighted cursor to the EXIT option and press (CR), or type (E) or press F10 to return to the PC-ECONPACK main menu. Remember, the system automatically saves all accepted data each time the user exits the DATA ENTRY AND MODIFICATION menu.

The system now displays the PC-ECONPACK main menu.

CHAPTER 5

THE ECONOMIC ANALYSIS REPORT (UNDERSTANDING/GENERATING/PRINTING)

5.0 **INTRODUCTION**. Economic Analysis Reports are obtained through option 2 - Reports from the PC-ECONPACK main menu. After completion of data entry and/or modification, the next step is to generate the reports. PC-ECONPACK reports are generated in standardized formats. These standardized reports summarize the essential components of a comprehensive economic analysis. Sample reports are included in Appendix B - Case Studies.

5.1 **THE EA REPORT FILE**. The PC-ECONPACK report file is divided into six standard reports: Executive Summary, Graphs (NPV and/or SIR), Life Cycle Cost Comparison, Cost Sensitivity Analysis, Discount Rate Sensitivity Analysis, and the Input Listing. The entire report file (all reports) can be printed at one time or individual reports may be selected. The following sections describe each of the available reports.

5.1.1 **Executive Summary of Analysis**. The first report generated by PC-ECONPACK is the Executive Summary Report. This report contains most of the information from the text blocks and general information, plus the NPVs and EUACs for each alternative in the analysis. The Executive Summary allows a reviewer to get a quick understanding of the entire analysis by summarizing all the important information in an easy to read format.

There are essentially four sections in the Executive Summary Report. The first section contains general project information: Project Title, Discount Rate, Period of Analysis, Start Year, Base Year, and Project Objective. The second section states the alternatives considered for the analysis as entered in the Discussion of Alternatives text information block. The third section contains the Assumptions as stated in the Assumptions text information block. This section is used to discuss why certain alternatives were selected for inclusion in the analysis and why others were not considered.

The fourth section is called Results and Recommendations. This information is taken from the text entered in the Results and Recommendations text information block which summarizes the findings of the analysis. This section also lists the Net Present Value (NPV) and the Equivalent Uniform Annual Cost (EUAC) for each alternative for a comparison of the numerical results of

the economic analysis. If the analysis is a primary analysis, two additional values are printed for each alternative: the Savings/Investment Ratio (SIR) and the Discounted Payback Period (DPP).

5.1.2 **Graphs**. The second and third reports are graphical representations of economic information. A maximum of six alternatives may be defined on one graph. The graph is, perhaps, the quickest way to get a feel for the results of the analysis.

THE NPV GRAPH

The NPV graph is a graphical representation of the cumulative net present value of the alternatives. The horizontal axis of the graph represents the years of the analysis. The vertical axis represents the dollar values of the alternatives. The dollar values can be in dollars, thousands of dollars, or millions of dollars, depending on the magnitude of the NPVs. The graph for each alternative plots the cumulative net present value against the corresponding year. Each value for each year for all alternatives is plotted in this manner.

SIR GRAPH

The SIR graph is the third PC-ECONPACK report when a primary analysis is performed, but is not available when a secondary analysis is performed. It is a graphical representation of the savings to investment ratio (SIR) information over time, for proposed alternatives. The horizontal axis of the graph represents the year of the analysis. The vertical axis represents numerical values for the SIR of proposed alternatives. The graph for each alternative plots the SIR with the corresponding year. The dashed horizontal line has a numerical value (vertical axis) of 1.0 and represents the point where accumulated savings are equal to the investment. When an alternative crosses this line, it begins to show a net savings (total savings is greater than investment) over the present method.

5.1.3 **Life Cycle Cost Comparison Report.** The Life Cycle Cost Report provides an overview of all the detailed costs associated with a particular alternative on a year-by-year basis. There is a separate Life Cycle Cost Report for each alternative. The pages of each report contain the names of the entered expense items as column headings across the top of the table and all the years of the analysis listed as row headings vertically down the

table. The data contained in the table are the individual costs of each expense item for each year. The user can see every expense item entered in every year in this table.

In referring to Case Study One (example of secondary analysis) in Appendix B, the Life Cycle Cost Report for Alternative 1, the user will notice there are four to nine additional columns of data besides the three columns containing the expense item costs for each year of the analysis.

The column labeled TOTAL ANNUAL OUTLAYS sums all the different expense item costs for each year of the analysis.

The next column displays represent the discounting convention specified for the expense item. There can be one, two, three, or four columns (Beginning-of-Year, Middle-of-Year, End-of-Year, and/or Continuous Discount Factors). The next column titled PRESENT VALUE takes the numbers in the preceding cost columns and applies the discount factors for each year. The next column on page two of the report labeled CUMULATIVE PRESENT VALUE is simply a running total of the discounted present values of all preceding years. The next column labeled PRESENT VALUE RESIDUAL applies the residual schedule factors to the total annual costs and the resultant values are then discounted to present value for each year. The last column titled CUMULATIVE NET PRESENT VALUE is simply the difference between the preceding two columns (CUMULATIVE PRESENT VALUE and PRESENT VALUE RESIDUAL).

The next to last row of the Life Cycle Cost Report is labeled % NPV. The numbers in this row represent the percentage share of the total Cumulative Present Value for each expense item in the alternative. The last row shows the discounting convention (Beginning-of-Year (B-O-Y); Middle-of-Year (M-O-Y); End-of-Year (E-O-Y); or Continuous (CONT)) used for each expense item and the residual.

At the bottom of the Life Cycle Cost Report is an EQUIVALENT UNIFORM ANNUAL COST value. This allows the user to compare the alternatives based on an average annualized expenditure basis. The report also states in parentheses what discount rate was used in the calculations and the number of years for the period of analysis. If inflation indices (other than no inflation) are specified for any of the expense items within the current alternative, this information is printed last. If the analysis is a Primary Analysis, additional data is printed.

Differences between the reports of a "secondary" and "primary" analysis include an additional page of information in the Life Cycle Cost report for each proposed new alternative that is compared against the status quo alternative. Appendix B contains

an example of a primary analysis (Case Study 2 - Consolidated Maintenance Facility).

The primary analysis information is presented in tabular form with the total annual costs of each year for both the present (status quo) alternative and the proposed (new) alternative listed in the first two columns. The third column contains the cost differential of the total annual costs of the two alternatives. The fourth and fifth columns in the table contain the present value (discount) factor and the present value of the cost differential for each year of the analysis.

At the bottom of the primary analysis page, additional information is printed. The most important number is the Savings/Investment Ratio. If this ratio is greater than 1, then the proposed alternative's savings will exceed its investment costs.

The last page of the Life Cycle Cost Report is labeled SOURCE AND DERIVATION OF COSTS AND BENEFITS. This is information that was entered in the Source/Derivation of Costs/Benefits text information block and states how the costs were obtained and what the benefits of each alternative are expected to be.

5.1.4 **Cost Sensitivity Analysis**. A cost sensitivity analysis allows the user to change one or more of the expense items of an alternative to determine whether or not the alternatives are sensitive to changes in these expense items. In Appendix B - Case Study One, there are pages titled COST SENSITIVITY ANALYSIS. This is the Cost Sensitivity Analysis Report. The first part of each cost sensitivity analysis gives the data entered when initially defining the analysis. The next part of each report gives the Initial Ranking of the alternatives and their respective net discounted present values before varying any of the expense items.

In sensitivity analysis number 1, "Test Annual Rent," only one expense item is varied - the Annual Rent cost for Alternative 2. The last line of the cost sensitivity analysis gives the results of varying the costs. The Annual Rent cost of Alternative 2 must be reduced by approximately 31% to make Alternative 2 the least cost alternative.

5.1.5 **Discount Rate Sensitivity Analysis**. In analyses which have a lease as an alternative, it is required that a discount sensitivity analysis be performed which tests the effect of varying the discount rate by +25%. This feature of PC-ECONPACK allows the user to enter the upper and lower limits of the discount rate to be tested. The program recomputes the entire EA

for each possible value of the discount rate between the limits, up to 60 values. The report is in three parts: a NPV vs. Discount Rate graph, a summary table which can be scanned to see if changes in the discount rate changed the original ranking of NPVs, and a detailed report listing the NPVs for each discount rate value used in the analysis. See Appendix B, Case Study One for an example of an EA containing a discount rate sensitivity analysis.

5.1.6 **Input Listing**. The Input Listing is a line-by-line listing of all the data entered into a particular application of PC-ECONPACK. It covers all the items entered starting with the General Information data entry screen to the Discount Rate Sensitivity Analysis Definition data entry screen. This listing allows the user to examine, in detail, all the data that were entered in developing the analysis and compare it to the results of the economic analysis reports.

5.2 **GENERATING THE ECONOMIC ANALYSIS REPORTS**. To generate reports, make sure that the PC-ECONPACK main menu is on the screen (Figure 5-1). [Scroll the cursor to menu option 2 labeled Reports and press (CR) or type the number 2.] PC-ECONPACK then displays the REPORTS menu (Figure 5-2).

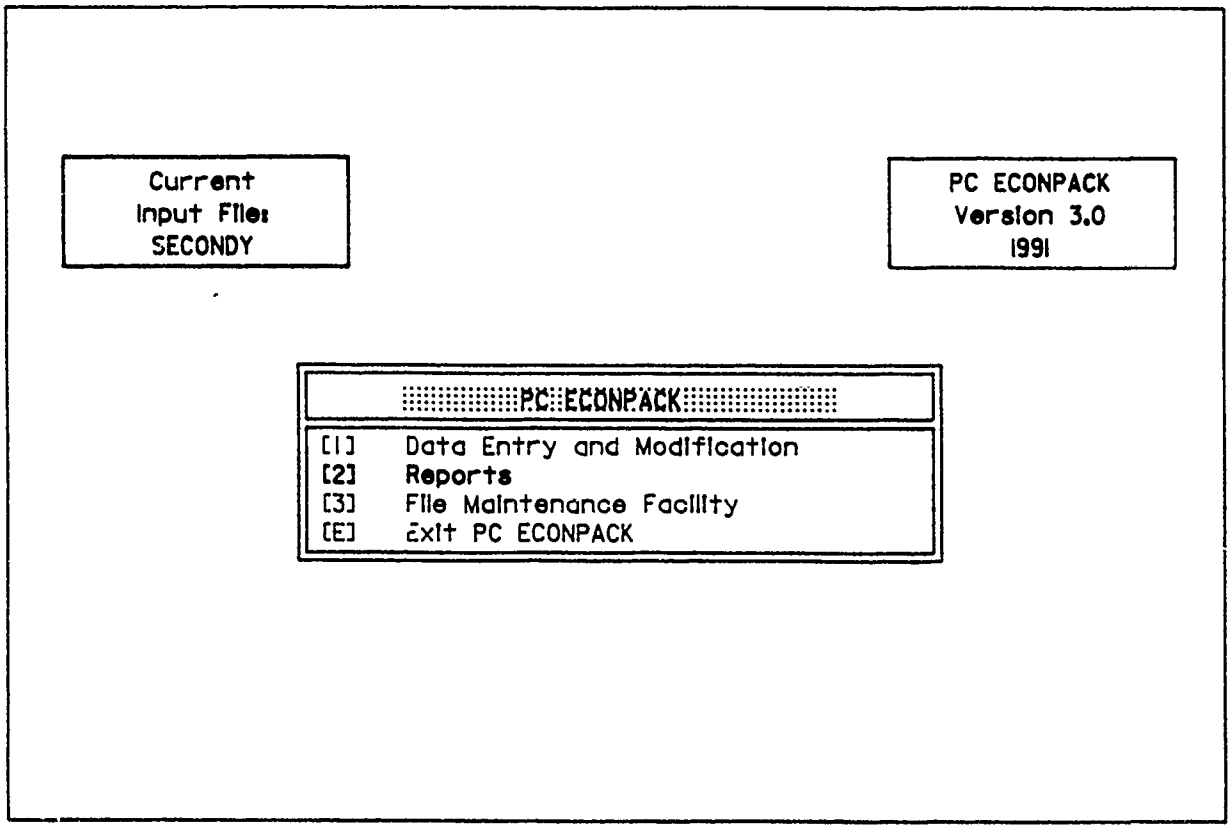


Figure 5-1. Reports Option - PC-ECONPACK main menu

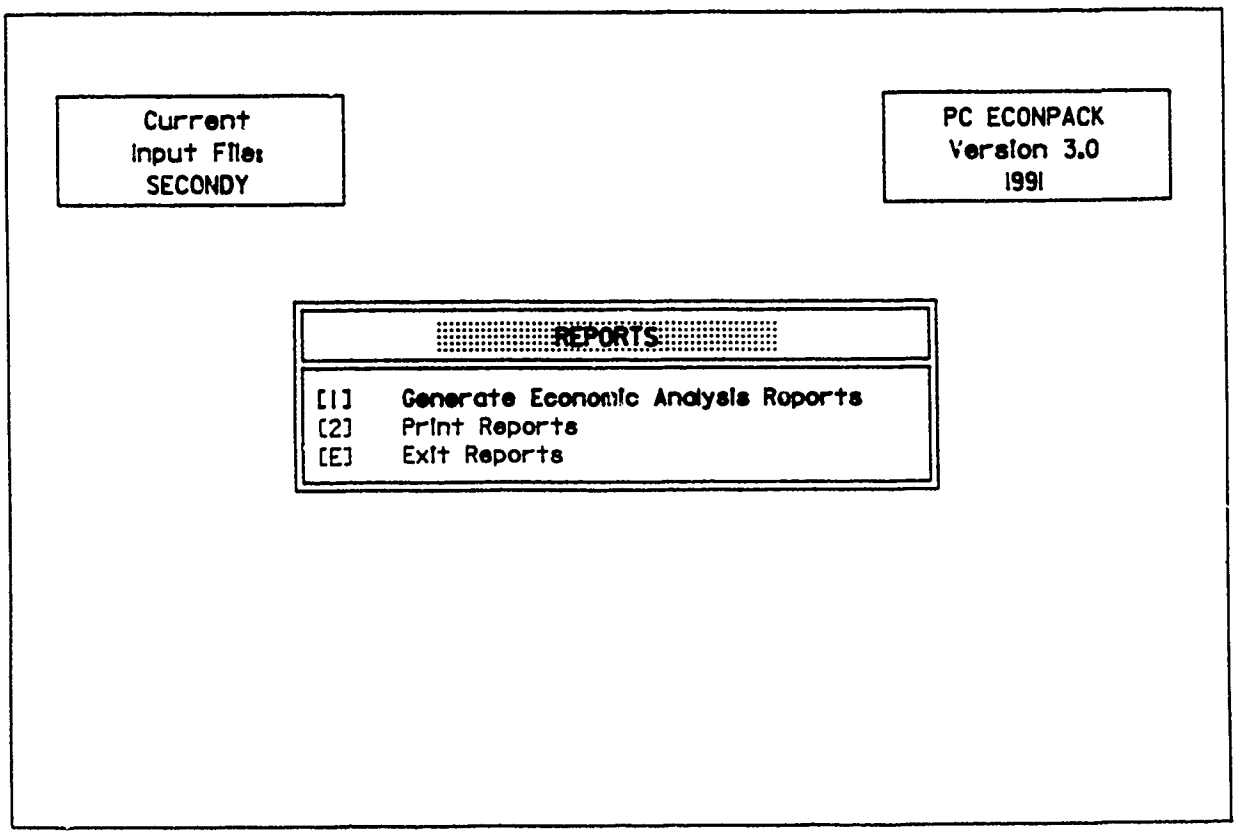


Figure 5-2. REPORTS menu screen

THE ECONOMIC ANALYSIS REPORT (Cont.)

Generating reports in PC-ECONPACK is a very simple process. The first menu option shown in Figure 5-2 is called Generate Economic Analysis Reports. Before PC-ECONPACK can print any reports for a particular economic analysis, option 1 must be executed. The generate report option tells PC-ECONPACK to perform all the calculations on the entered data and save them in a separate file from the data input. This new file has the same filename as the input file, but has a file extension (filetype) called REP. After the reports have been generated, the user can then request PC-ECONPACK to print one or more of the available reports. **If at any time <u>after</u> the reports are generated, the user modifies any of the data input, the report generation process must be repeated.** The system warns the user when a report has been changed and not regenerated.

[Now, continue with the SECONDY example. (NOTE: the current input file name in the upper left corner box on the screen should be SECONDY. If not, refer to Chapter 6, section 6.6 -"Selecting a different input file.") Move the cursor to the first menu option Generate Economic Analysis Reports and press the (CR) key.] The REPORTS menu disappears from the screen and a box appears at the bottom of the screen. Contained in the box are the words:

Performing Calculations ...

After a few seconds, another message appears:

Building Report ... Executive Summary Report

The preceding message changes the name of the report every few seconds to reflect the "Building" of each of the PC-ECONPACK reports. PC-ECONPACK is performing the calculations necessary to print all reports. If the user selects to generate a report and the input file has not been changed, the system displays the following message:

Note: The input file has not changed since this report was generated.

Do you wish to generate the economic analysis reports?

followed by a blinking cursor. PC-ECONPACK requires a (Y) or (N) response to this prompt. (NOTE: If insufficient data is available for generating the report, the system notifies the user and returns to the REPORTS menu.) (N) returns the user to the REPORTS menu. (Y) proceeds with the reports calculations.

After a few more seconds and calculations are finished, PC-ECONPACK shows the Display ECONPACK Reports screen which contains the Available Reports menu. (Note: The SECONDY file is a secondary analysis so the menu only lists the NPV Graph. The Available Reports menu for a primary analysis contains the NPV Graph option and the SIR Graph option. The user can select the reports to be viewed or printed.)

5.3 **PRINTING THE ECONOMIC ANALYSIS REPORT**. After the user generates the report, PC-ECONPACK displays the Available Reports menu (Figure 5-3). This menu is also displayed when the user selects the Print Reports option from the REPORTS menu screen. From the Display ECONPACK Reports screen which contains the Available Reports menu, use the up and down arrow keys and position the cursor to the report(s) to be printed. Pressing F3 Add for each desired report places an "X" next to the report and includes it in the printout. [Select all reports for printing. To do this, press F3 at the first menu option and press A to accept.]

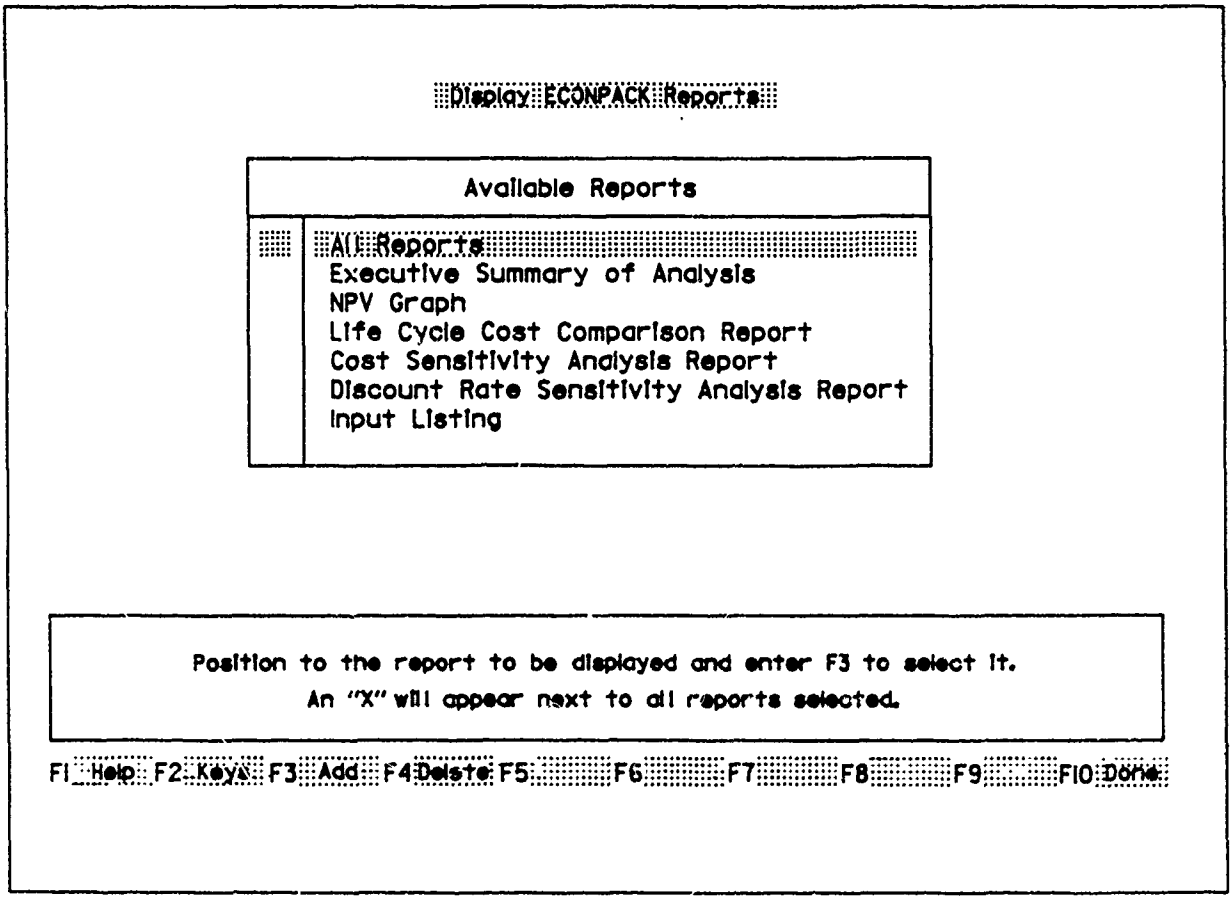


Figure 5-3. Display ECONPACK Reports

THE ECONOMIC ANALYSIS REPORT (Cont.)

The System prompts the user to indicate where the report file is to be sent (Figure 5-4).

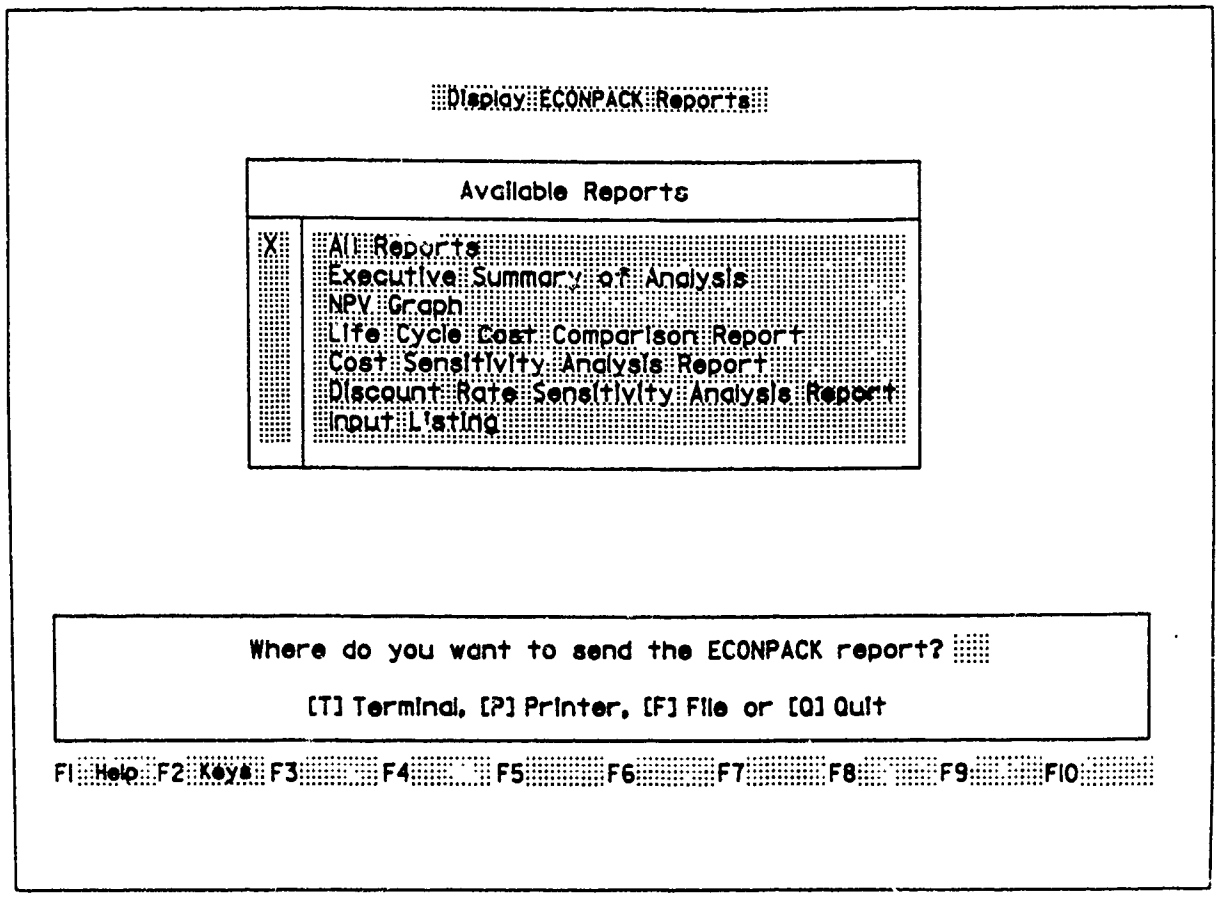


Figure 5-4. Example of report destination screen

The user may indicate where the economic analysis reports are to be sent by typing one of the four letters in brackets. Typing (T) allows viewing of all the economic analysis reports to the monitor. Typing (F) prompts for a twelve-character file name which includes the extension (filename.ext) and sends all the reports to a PC file with the stipulated name, but does not display them on the screen. Typing (P) sends all reports selected to the printer for a paper copy. Entering (Q) ends the whole process and returns to the Available Reports menu; however, the report file just created remains in existence.

[Type (T) and the beginning of the first report is displayed on the screen. This is the Executive Summary. Press the down arrow key and line by line scroll through all the different reports.] The up and down arrow scrolling keys can be used to move line by line through the reports on the monitor. The reports shown on the screen look exactly as they look when printed in hard copy including titles, page numbers, etc. The user may also use the PgDn and PgUp keys to move through the reports sixteen (16) lines at a time. The Home and End keys move to the top and bottom of the report, respectively. At any time while viewing the reports on the monitor or when the last report (the input listing) is finished, the user may end the viewing session by pressing F10. This causes PC-ECONPACK to prompt for an indication of where reports are to be sent. [Press (Q) to end this session of report generation and return to the Available Reports menu.]

At this point, the user is able to print one or more of the individual reports. To obtain a hard copy of one or more of the economic analysis reports, scroll the cursor to the desired report. [Highlight the first option to obtain a hard copy of all the reports and press F3.] To choose the second option, the Executive Summary of Analysis, scroll the cursor to option 2, and press F3. The Accept/Modify/Quit prompt appears. [Press (A) to Accept.] A message appears in the box at the bottom of the screen:

Searching for Requested Reports ...

After a few seconds, the user is prompted to type (T), (P), (F), or (Q). Be sure the printer is properly connected to the terminal and has paper set up for multiple page printing. [Type P and press (CR).] PC-ECONPACK proceeds to send the print command to the printer. The user is prompted to turn on printer, position paper, and touch any key to print the report. F10 cancels the print report. After printing is completed, the user can check the printout of the report with the corresponding hard copy of the SECONDY report for Case Study One in Appendix B of this manual. If the reports are not identical, there is a difference in the input file data that has been entered. Repeat the above described process of displaying reports to the monitor. Check each line of the Input Listing on the monitor with each line of the Case Study One Input Listing in Appendix B. When the differences in the data input are located, return to the DATA ENTRY AND MODIFICATION menu, make the changes to the data

required, and generate another report file. The report printed will be identical to the corresponding report (SECONDY) in Appendix B, if the input files are the same. The monitor should be showing the Terminal/Printer/File/Quit prompt. Type (Q) and PC-ECONPACK returns to the Available Reports menu and the user may select other reports for viewing or printing. F10 returns to the REPORTS menu. F10 or (E) exits the REPORTS menu and returns to the PC-ECONPACK main menu. In addition to Case Study One, Appendix B contains examples of one other economic analysis, Case Study Two which was performed using PC-ECONPACK. Case Study One is a secondary analysis and Case Study Two is a primary analysis.

CHAPTER 6

PC-ECONPACK FILE MAINTENANCE

6.0 **INTRODUCTION**. PC-ECONPACK is programmed to facilitate ease in deleting, renaming, duplicating, importing, and exporting files. Option 3 from the PC-ECONPACK main menu allows the user to perform various manipulations of the input and report files stored on the PC system. When the user moves the cursor to highlight option 3 and presses the carriage return key or simply types (3), PC-ECONPACK displays the Directory of Input and Report Files screen (Figure 6-1).

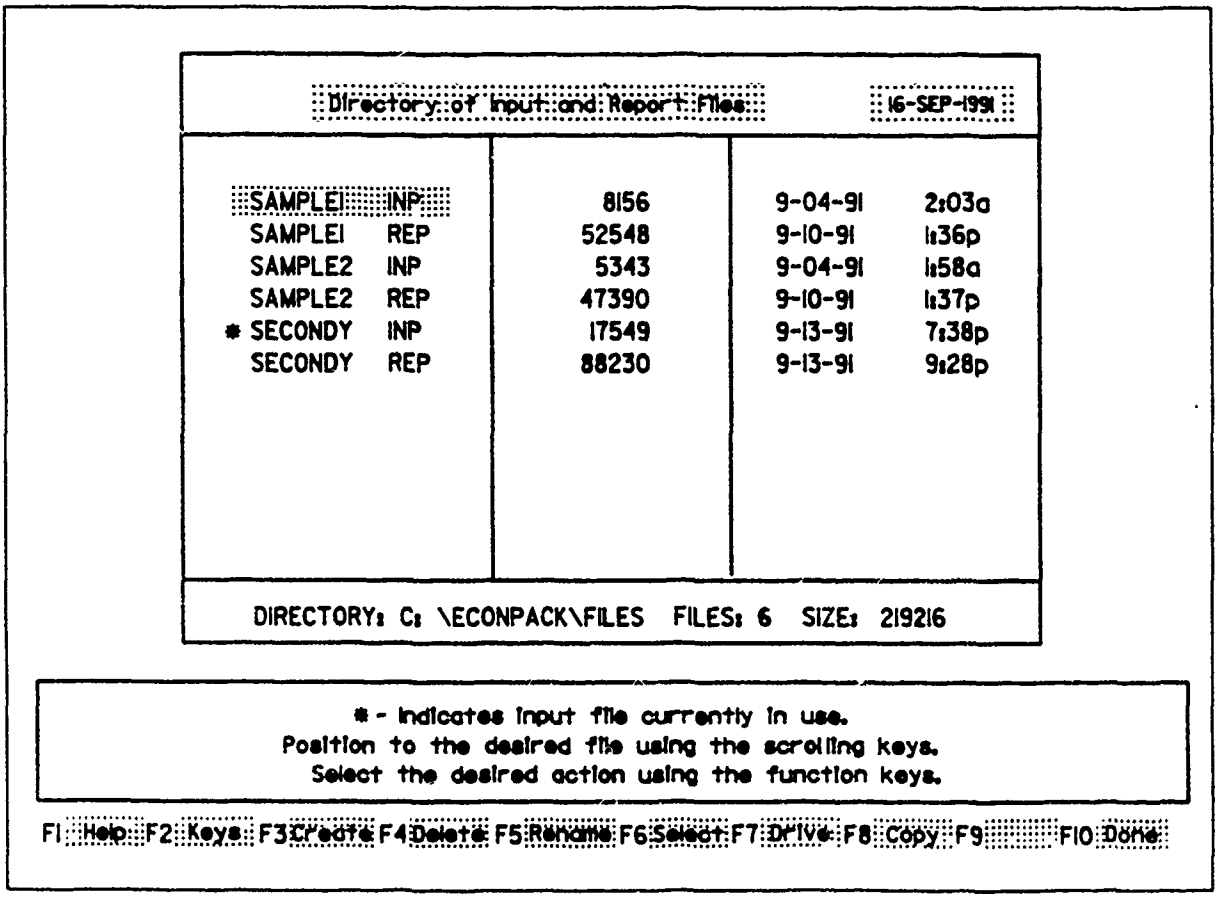


Figure 6-1. File Maintenance directory

The file maintenance Directory of Input and Report Files shows the current date in the upper right corner. The screen has three vertical columns of data: name of file, size of file, and the date and time the file was last modified. The names of files are listed alphabetically. Beneath the file listing is a line of data which identifies the current PC drive and path, the number of PC-ECONPACK files listed, and the total size of all the listed files. The larger box at the bottom of the screen gives instructions for manipulating the desired files. The labeled keys are valid and allow users to manipulate the listed files.

6.1 **OBTAINING HELP**. F1 Help provides instructions for performing file maintenance functions.

6.2 **OBTAINING KEY FUNCTIONS**. F2 Keys produces the Keys screen which defines the function of various keys in the PC-ECONPACK program.

6.3 **CREATING AN INPUT FILE**. F3 Create allows the user to create a new input file. Press F3 and a Create Input File box appears at the bottom of the screen, prompting the user to enter the name to be assigned the new input file (Figure 6-2). Files can be created on the default drive only.

The filename is limited to eight alpha-numeric characters. When the filename is entered, press (CR) (if less than eight characters) to indicate the filename has been entered. PC-ECONPACK displays the message:

Creating the requested input file.

To start an input file, the computer puts the user into the General Information screen. The user follows the procedure for entering data on the General Information screen. (Refer to Chapter 4.) When the screen is complete, the user accepts the data and F10 returns the cursor to the Directory of Input and Report Files screen. Note that the name of the new file appears on the directory.

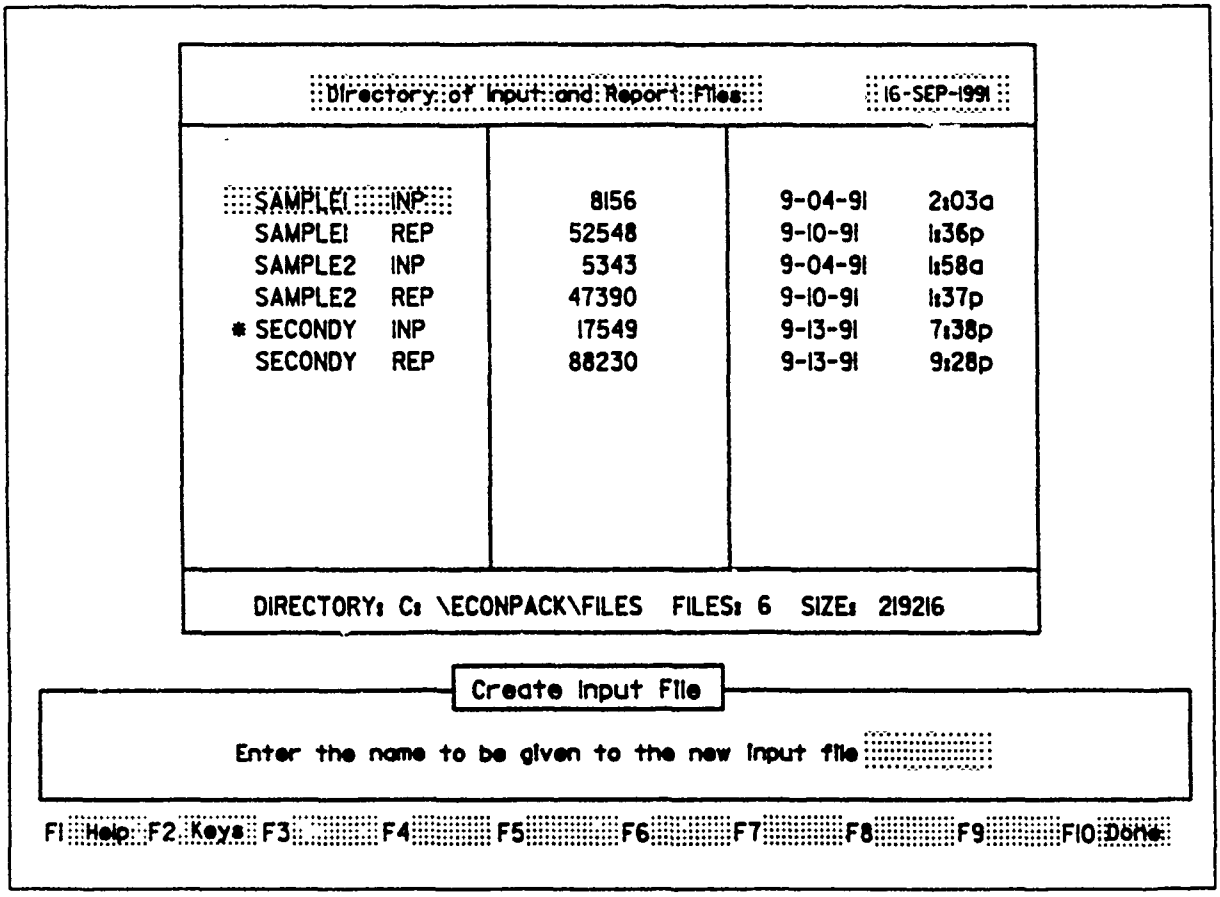


Figure 6-2. Create iput file screen

6.4 **DELETING AN INPUT FILE AND/OR A REPORT FILE**. F4 Delete allows the user to erase existing files. Files may need to be erased for several reasons. After the user works on an analysis for awhile, the parameters of the economic analysis may have changed so much that it may be simpler to start all over again. Files may also need to be erased because of disk storage capacity. Disk storage space may be freed by copying files to a floppy disk and then erasing them from the hard disk.

To delete a file, highlight (on the directory listing) the name of the file to be deleted and press F4 (Figure 6-3).

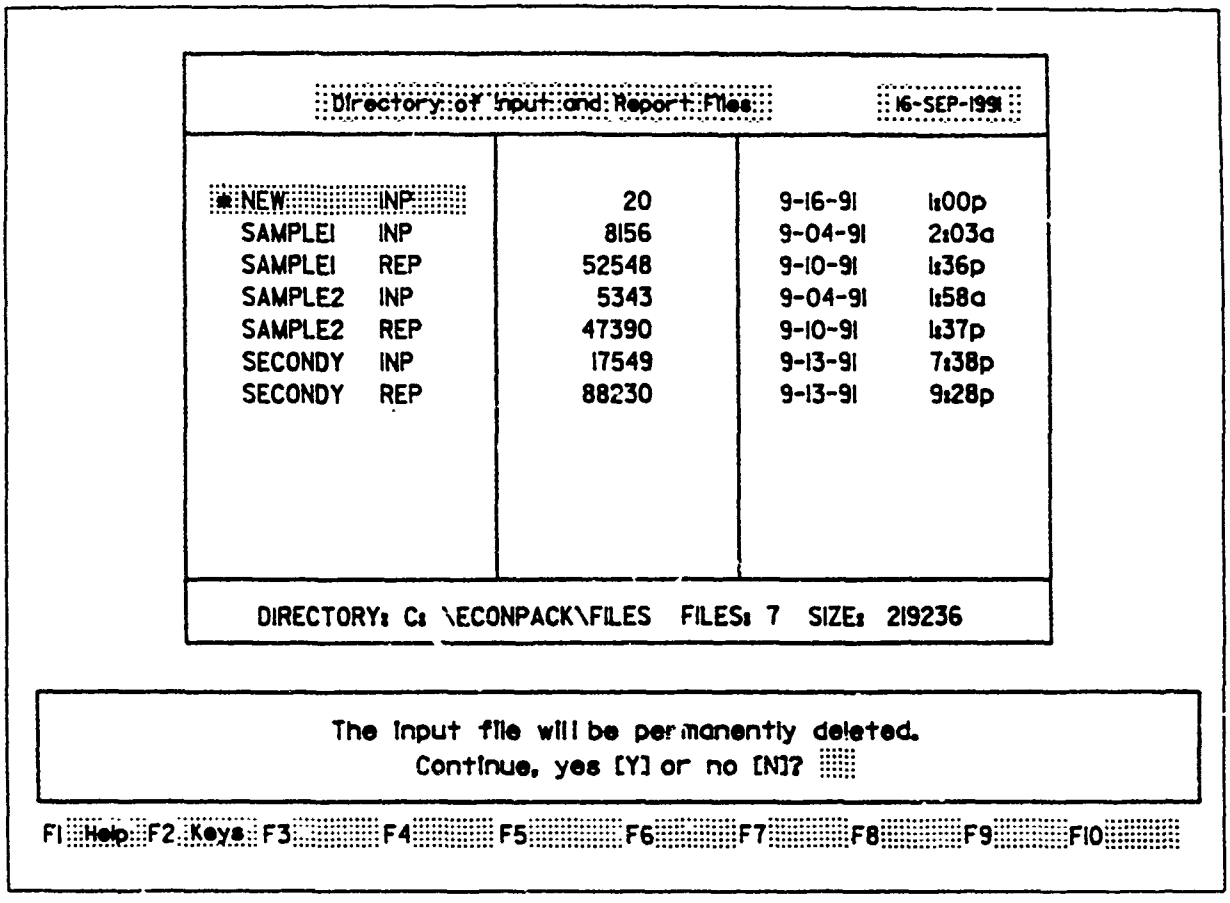


Figure 6-3. Delete file(s) screen

If the filename specified exists only as an input file, PC-ECONPACK displays the following prompt:

The input file will be permanently deleted.
Continue, yes [Y] or no [N]?

If the filename specified exists as an input file with a corresponding report file, PC-ECONPACK displays the following prompt:

Select [R] Report only or [B] Both input file and report:

A report file cannot exist without a corresponding input file, so a report file can be erased, leaving the corresponding input file; but if the input file is erased, the corresponding report file is also erased.

The user confirms the deletion request and the system executes the removal of the specified file(s). This extra confirmation prompt is a safety precaution to allow the user to reconsider deleting the file(s). (N) allows the file(s) to remain and (Y) causes the file(s) to be erased. Check the Directory of Input and Report Files to verify execution of the deletion request.

6.5 **RENAMING AN INPUT FILE AND REPORT FILE.** F5 Rename allows the user to rename an existing file on the default drive only. This process may be necessary to assign a more meaningful name or to allow for the modification of the file for the execution of a new economic analysis. Highlight the name of the file to be renamed and press F5. The Rename Input File and Report box appears on the bottom of the screen prompting the user to specify the new filename to be assigned the selected file (Figure 6-4). PC-ECONPACK automatically changes the name as specified. The name is changed on the input file and the report file (if one exists).

After a few seconds of processing, the change appears on the Directory of Input and Report Files.

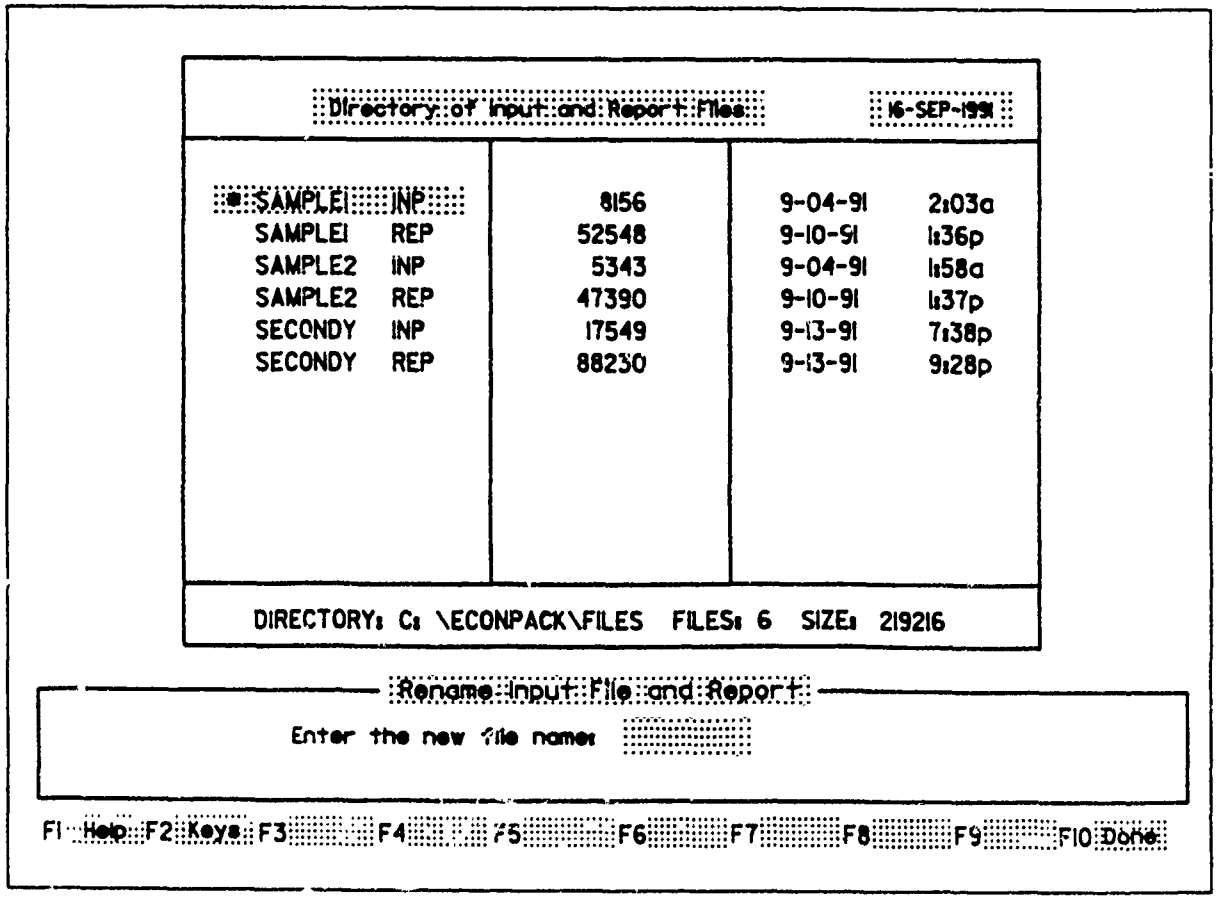


Figure 6-4. Rename file(s) screen

6.6 **SELECTING A DIFFERENT INPUT FILE.** F6 Select allows the user to select an input file to be loaded as the current file. When a user accesses PC-ECONPACK, the last file previously edited is loaded as the current input file. To select a different input file for editing, the user selects the FILE MAINTENANCE FACILITY option from the PC-ECONPACK main menu, accesses the Directory of Input and Report Files, moves the cursor to highlight the desired input file, and presses F6 (Figure 6-5).

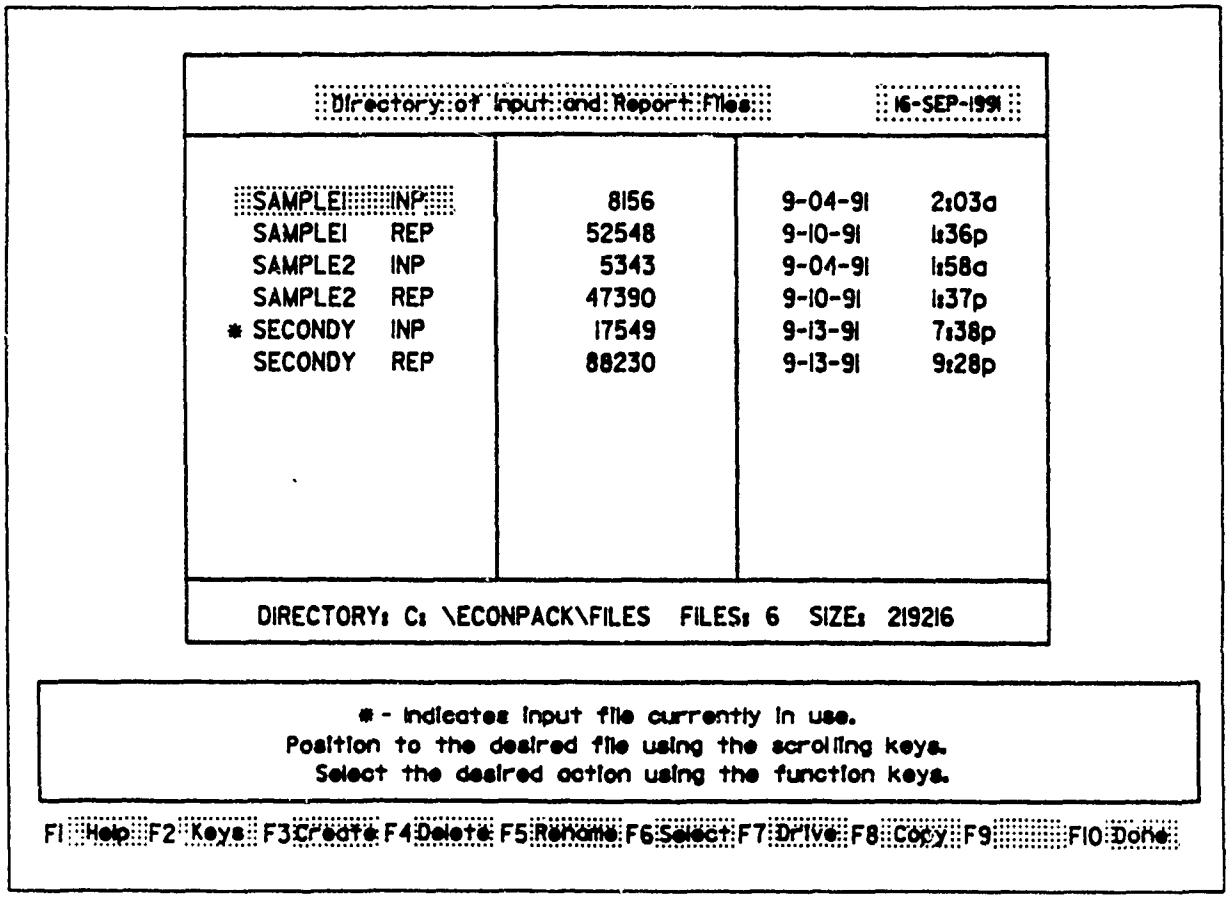


Figure 6-5. Select a different input file screen

After a few seconds, PC-ECONPACK displays a blinking message at the bottom of the screen.

Loading the requested input file.

When the message disappears, the Directory of Input and Report Files remains on the screen. The asterisk which indicates the input file currently in use is now located in front of the input

file that was requested to be loaded. When the user exits File Maintenance, the name of the selected file also appears in the Current Input File box.

6.7 **SELECTING A DIFFERENT DISK DRIVE**. F7 Drive allows the user to use the File Maintenance option to obtain a listing of ECONPACK input and report files from a different disk drive. When the user selects the File Maintenance option from the PC-ECONPACK main menu, the system defaults to a Directory of Input and Reports File screen which lists files from the current hard drive onto which the PC-ECONPACK program is loaded. To obtain a directory of input and report files from another disk drive, the user presses F7 from the Directory of Input and Report Files screen. The system prompts for the letter which specifies the desired drive (Figure 6-6).

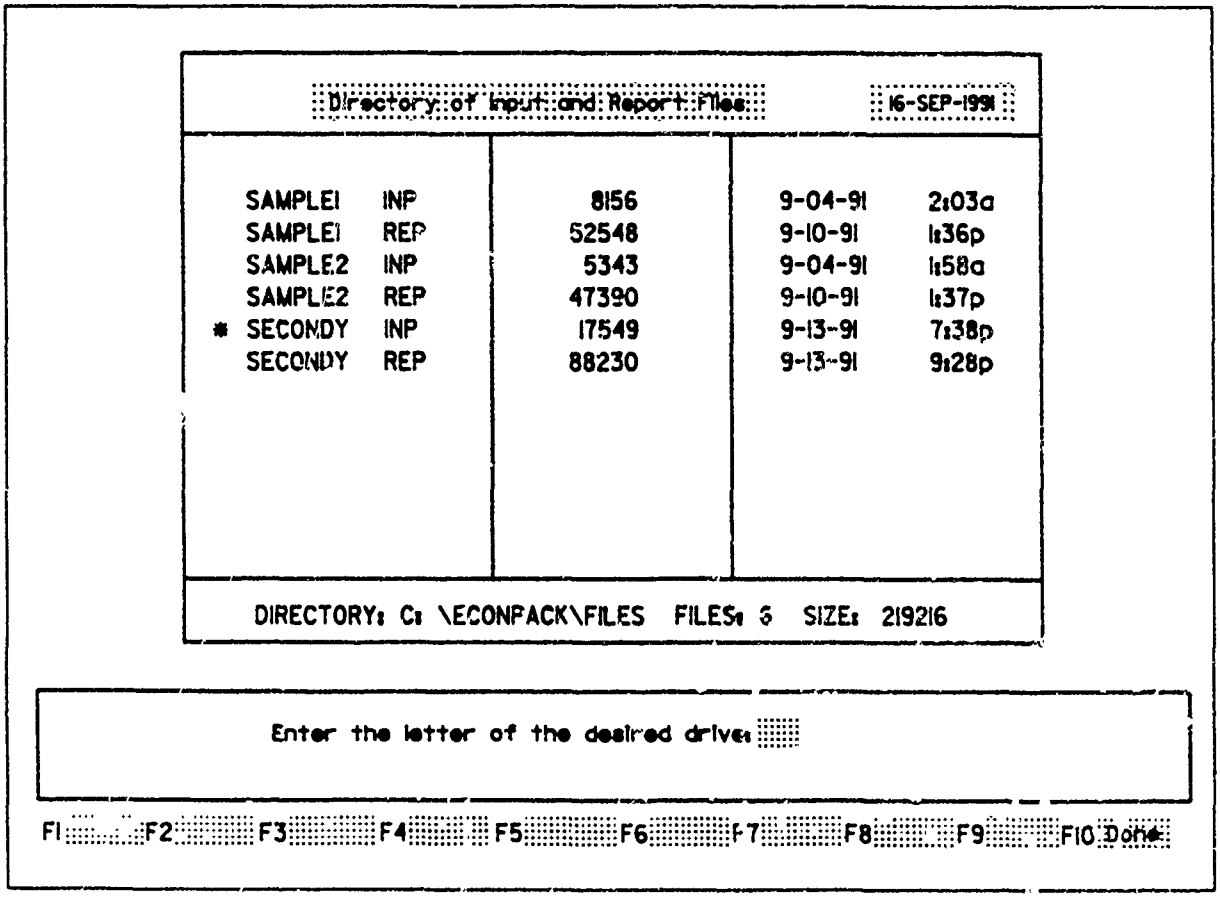


Figure 6-6. Drive specification screen

The user enters the desired drive specification (e.g., A) and after a few seconds of processing, the requested directory appears (Figure 6-7).

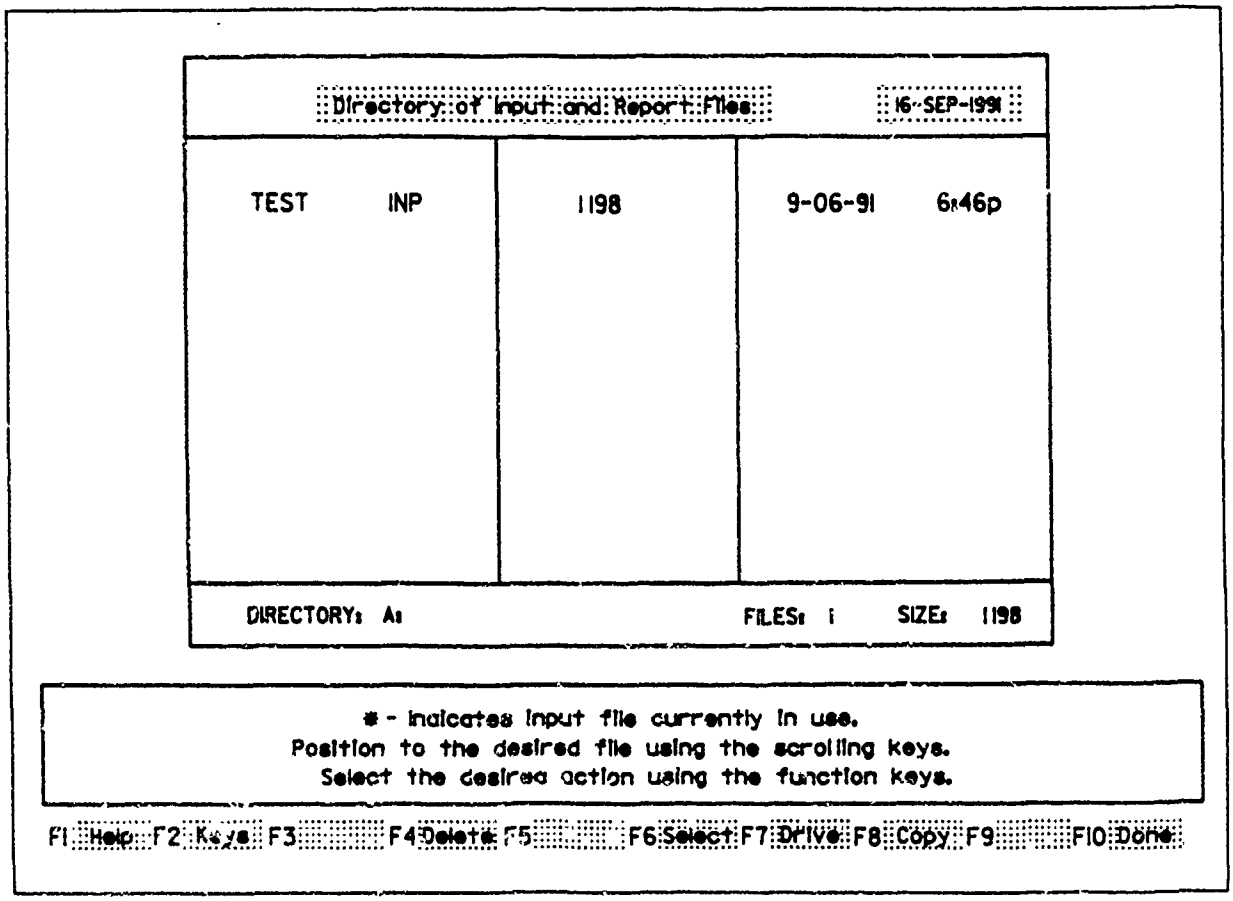


Figure 6-7. Listing of Drive A: files

6.8 **DUPLICATING AN INPUT FILE.** F8 Copy allows the user to create a new input file by duplicating and renaming an existing input file. This option is particularly useful when the analyst wishes to manipulate variables in determining "what if." It could also be helpful when input files are needed for several similar analyses. The original input file remains intact and the user does not have to retype the data from scratch.

To duplicate an input file, highlight the name of the file to be duplicated from the File Maintenance Directory of Input and Report Files screen, and press F8.

The system displays the Duplicate Input File box at the bottom of the screen and prompts the user to enter the filename to be assigned the new file (Figure 6-8).

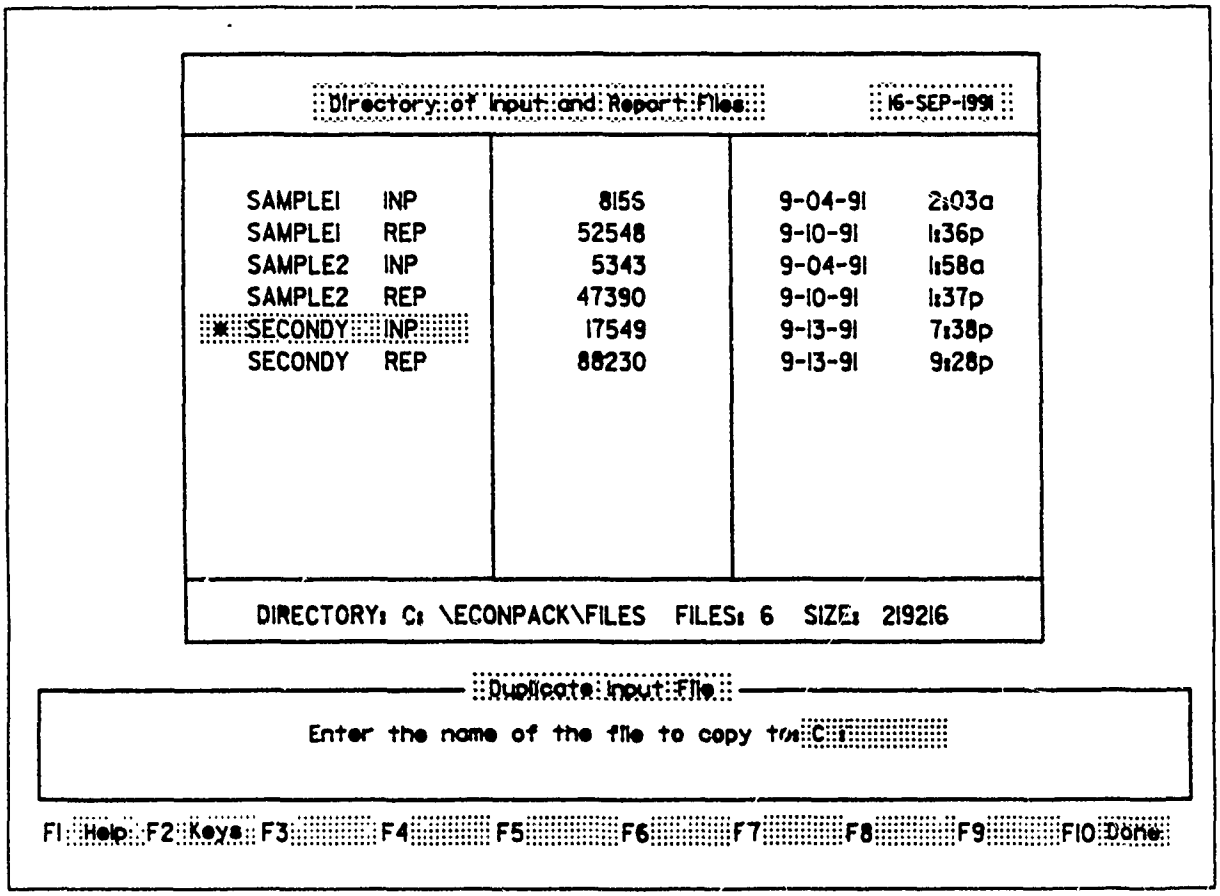


Figure 6-8. Duplicate input file screen

In entering the filename of the file, the user must also specify the disk drive to indicate the storage area to which the new file is to be entered. If the file is to be copied to the hard disk (C), the user accepts C, the default disk specification, and then enters the filename of the file to be duplicated followed by a (CR). Eight character filenames do not require that a carriage return be entered.

PC-ECONPACK proceeds to duplicate the existing input file and to assign it the specified new filename. If copied to the default drive, the new file is now a part of the PC-ECONPACK system.

Copying Input Files to Floppy Diskette

F8 Copy also allows the user to copy an input file to a floppy disk. When the user presses F8 from the File Maintenance Directory of Input and Report Files screen, the system prompts for the name of the file which must include a disk drive specification. As the disk drive specification, the user enters the identification of the drive which contains the floppy to which the file is to be stored. The procedure is then the same as storing to the hard disk.

Copying Report Files to Floppy Diskette

PC-ECONPACK report files can only be copied to a floppy from the PC-ECONPACK main menu Reports option. After a user selects the reports to be printed, the system allows the user to print to the terminal, a printer, or a file. If File is selected, the user must specify a name to be assigned the file which includes a disk specification.

The user enters the name of the disk drive which contains the floppy onto which the report file is to be stored.

It is recommended that files be stored to floppy disks to reduce the amount of hard storage consumed by PC-ECONPACK. [Note: Report files can be deleted to save space as long as the corresponding input file is kept so that the report file may be generated when necessary.]

6.9 **EXITING FILE MAINTENANCE.** F10 Done allows the user to exit the File Maintenance Directory of Input and Report Files screen and return to the PC-ECONPACK main menu.

APPENDIX A

GLOSSARY

A.1 ABBREVIATIONS.

ADP
automated data processing

AR
Army Regulation

BOD
beneficial occupancy date

DA
Department of the Army

DEH
Directorate of Engineering and Housing

DoD
Department of Defense

DPP
discounted payback period

EA
economic analysis

ECONPACK
Economic Analysis computer program

EUAC
equivalent uniform annual cost

HQDA
Headquarters, Department of the Army

MCA
Military Construction, Army
(Also called MILCON--Military Construction)

MILCON
Military Construction

NPV
net present value

O&M
operation and maintenance

OMB
Office of Management and Budget

OSD
Office of the Secretary of Defense

PAX
Programming, Administration, and Execution System

PC-ECONPACK

Personal computer version of Economic Analysis computer program

SIR
savings/investment ratio

USACE
U.S. Army Corps of Engineers

A.2 **TERMS.**

ACQUISITION COST: The amount paid to obtain an asset.

ALTERNATIVE: A course of action, means, or methods by which an objective may be achieved.

ALTERNATIVE RANKING: The end result of an economic analysis; the rating of options from lowest to highest in terms of a dollar value or another indicator.

ANALYSIS: A systematic approach to problem solving. Complex problems are made simpler by separating them into more understandable elements. Involves identification of purposes and facts, statement of assumptions, and derivation of conclusions. Analyses normally use quantitative methods and are concerned with decision-making processes.

ASSETS: Real and personal property and other items of monetary value.

ASSUMPTION: An explicit statement describing present and/or future circumstances which may affect the outcome of an analysis.

BASE YEAR: The reference year for all present value calculations (costs are converted to present value amounts as of the beginning of the base year).

BENEFIT: Outputs or effectiveness expected to be received or achieved over time as a result of implementing an alternative. These can be quantifiable in terms of dollar value or some other measure of productivity, or nonquantifiable as in the case of intangible effects such as increased morale.

COMMERCIALLY FINANCED FACILITIES (CFF): Facilities financed by the private sector as an alternative funding method for DoD to procure certain types of service facilities. Different types of construction programs (MILCON, AFH, Energy) derive authority to pursue CFF from separate laws.

COMPOUND INTEREST: Interest which is computed on both the original principal and its accrued interest.

CONSTANT YEAR DOLLARS: Estimate in which costs reflect the level of prices of a base year. Cost estimates expressed in constant dollars imply the purchasing power of the dollar remains unchanged over the analysis period.

COST: A resource input to a project, program, or activity expressed in dollar terms.

COST ELEMENT: Basic unit of cost, such as labor or material. Related basic units are accumulated to form the total cost of each cost kind. (See cost kind.)

CUMULATIVE NET PRESENT VALUE: The total of the discounted annual cost for the year in question and all preceding years of the project.

CURRENT DOLLARS: Convention used to show purchasing power in the year spent. Prior costs stated in current dollars are the actual amounts paid out. Future costs stated in current dollars are the actual amounts expected to be paid, including amounts caused by future price changes (inflation).

DATA: Numerical information of any kind.

DEPRECIATION: A reduction in the value of an asset estimated to have accrued during an accounting period due to age, wear, usage, obsolescence, or the effects of natural elements such as decay and corrosion.

DIFFERENTIAL INFLATION: The difference in inflation between the rate for the overall economy and the rate for a particular cost which is either greater or less than the general inflation rate.

DISCOUNT FACTOR: The multiplier calculated using the present value formula and a discount rate. Used to convert a future cost into its present value.

DISCOUNT RATE: The interest rate used to relate present and future dollars. Expressed as a percentage and is used to reduce the value of future dollars in relation to present dollars to account for the time value of money.

DISCOUNTING: Technique for converting various cash flows occurring over a period of time to equivalent amounts at a common point in time, considering the time value of money, to allow valid comparisons.

DISCOUNTING CONVENTION: Method of discounting costs, either at beginning-of-year, mid-year, end-of-year, or continuous.

DISCOUNTED PAYBACK PERIOD (DPP): Time required for the accumulated present value of savings of a proposed alternative to equal the total present value of its investment costs.

ECONOMIC ANALYSIS (EA): A systematic method for quantifying the costs and/or benefits of alternative solutions for achieving an objective in order to find the most efficient (economical) solution. Structured method to identify, analyze, and compare costs and benefits of the alternatives.

ECONOMIC LIFE: Period of time over which the benefits from an alternative are expected to accrue. The economic life of an alternative starts in the year it begins producing benefits. The economic life is not necessarily the same as physical life or technological life.

EQUIVALENT UNIFORM ANNUAL COST (EUAC): The amount of money which, if paid in equal annual installments over the life of a project, would pay for the project. That is, the discounted value of this hypothetical uniform cost stream is equal to the actual estimated present value of project costs. The alternative with the lowest uniform annual equivalent amount is the least costly alternative.

INFLATION: A persistent rise in the general level of prices over time which results in a decline in the purchasing power of money. Measured by changes in price indices relative to some base year.

INHERITED ASSET: An existing asset that will be used in an alternative. If the asset could be used for some other purpose or sold, its value is included as a cost in the alternative. If it has no use or value except in the alternative, no cost is included.

INTEREST: A price (or rent) charged for the use of money.

INVESTMENT COSTS: Costs associated with acquisition of real property, nonrecurring services, nonrecurring operation, and maintenance (start-up) costs. These are usually one-time costs, although they may be spread over more than 1 year (such as construction costs).

LEAD TIME: The period between initial funding or decision and commencement of the economic life.

LEAST-COST ALTERNATIVE: The option producing, at less cost, the same or greater quantity of a given output than another alternative.

LIFE-CYCLE COST: The total cost of an item over its life cycle. Includes initial investment, maintenance and repair, operations, utilities and, where applicable, disposal.

MAINTENANCE AND REPAIR COST: Costs incurred to keep buildings and equipment in normal operating condition.

NET PRESENT VALUE (NPV): The cumulative discounted amount that also includes the discount value of the residual amount.

NONRECURRING COST: Cost that occurs on a one-time basis as compared to annually recurring costs.

OBJECTIVE: The result to be achieved by the project being studied. It must be stated in an unbiased manner.

OPERATIONS COSTS: Utilities, custodial and other routine costs incurred in operating a facility, not including maintenance and repair.

PERIOD OF ANALYSIS: Time span over which an EA takes place; that is, the time over which costs and benefits of alternatives are compared.

PRESENT VALUE (PV): Monetary expenditure (or savings) multiplied by the discount factor. The resulting figure represents the worth of the future amount in base year dollars.

PRESENT WORTH: See present value.

PRICE: Dollar amount for which a good or service is bought or sold.

PRIMARY ANALYSIS: An economic analysis performed when the objective is to change the status quo (present method of operation) in order to achieve a financial savings to the Government.

PROJECT: A major mission-oriented endeavor that fulfills statutory or executive requirements, and that is defined in terms of the principal action required to achieve a significant objective.

RECURRING COSTS: Expenses for personnel, material consumed, operating overhead, support services, maintenance and other items that are charged annually or repetitively in the execution of a given program or work effort.

REFURBISHMENT COSTS: The cost of renovation, rehabilitation, or similar items under the status quo method of operation which is avoided by the use of an alternative in a primary analysis.

REPLACED ASSET: An asset substituted with an alternative. It is made available for other use by the Army or is advertised for sale. Its value is subtracted from the NPV of the alternative.

RESIDUAL VALUE: The remaining monetary value, if any, of an alternative at a specified point in time.

RESOURCES: Facilities, personnel, equipment, supplies and other items required for an alternative. Once resources are determined, their value in dollars can then be estimated.

SALVAGE VALUE: The remaining monetary value, if any, of an alternative at the end of the period of analysis. The value may be negative (it may cost money to remove the item).

SAVINGS: Reduction in costs achieved without reduction in performance. Always computed with respect to the existing course of action or status quo in an economic analysis.

SAVINGS TO INVESTMENT RATIO (SIR): Ratio of discounted future cost savings (or avoidance) to the discounted investment cost necessary to effect those savings. An SIR of 1 indicates that the present value of savings is equal to the present value of investment.

SECONDARY ANALYSIS: An economic analysis performed when there is a new requirement to be met or the existing facility is not adequate.

SENSITIVITY ANALYSIS: An examination of how the EA results may change with respect to changes in the costs or timing of costs in an alternative(s). As a minimum, the effect of changes in high-cost elements and questionable assumptions will be studied.

START YEAR: The first year in which costs are incurred--often the first year of the period of analysis.

TERMINAL VALUE: Same as salvage value or residual value at the end of the project.

TIME VALUE OF MONEY: The concept that use of money costs money; a dollar today is worth more than a dollar tomorrow because of the interest costs.

TOTAL ANNUAL OUTLAYS: The sum of all costs for a given year.

UNCERTAINTY: The state of knowledge about outcomes in a decision which is such that it is not possible to assign probabilities in advance. Doubt or ignorance about the magnitude of costs/ benefits or their timing. A technique for assessing the effect of uncertainty on EA results is the sensitivity analysis.

UNIFORM ANNUAL COST: See equivalent uniform annual cost.

APPENDIX B

CASE STUDIES

B.0 **CASE STUDY DESCRIPTION**. This appendix contains two examples which provide a listing of the data gathered by the analyst and a sample of the reports generated by PC-ECONPACK based on that data. Case Study One is an example of a secondary analysis (it is the SECONDY example used in the manual for illustrative purposes); Case Study Two provides an example of a primary analysis.

B.1 **CASE STUDY ONE - UNACCOMPANIED PERSONNEL HOUSING**. The analyst lists the following information for easy reference when using PC-ECONPACK.

NOTE: * is used for abbreviated data; i.e., 11*1737494 means 11 years at 1737494 dollars per year. If there are two expense items and inflation factors are written 1*0 and 1*1, that means the first expense item uses no inflation and expense item two uses the index defined as inflation index number 1. If the discount factors are abbreviated as 2*2, that means that both expense items use middle-of-year discounting.

Project Title - Unaccompanied Personnel Housing

Project Objective - Provide 160,000 SF of Unaccompanied Personnel Housing Space within a 15-mile radius of Fort Anywhere.

Action Officer - John Doe, Good Officer, (123) 456-7890

Organization Title - Fort Anywhere

Global Discounting Convention - Middle-of-Year

Period of Analysis - 27 years

Discount Rate - 9%

Start Year - 1993

Base Year - 1993

Analysis Type - Secondary

Cost Input - Entered in actual dollars

Inflation Index 1 - OSD PBC Memo

Values for Inflation Index 1 - 1*0 1*3.7 1*3.6 24*3.5

Inflation Index 2 - Local Lease

Values for Inflation Index 2 - 2*0 25*5.2

Alternative 1 - New Construction

Initial Construction Cost - 2*16500000 25*0

O&M - 1*0 1*868747 11*1737494 14*2129963

Inflation Factors = 1*0 1*1

Discounting Convention Factors - 2*2

Residual Type - Building Depreciation

Residual Start Value - 33000000

Residual Inflation Index - 1

Residual Discounting Convention - End-of-Year

Alternative 2 - Lease Off-Post

Annual Rent - 2*0 25*3502673

O&M - 1*0 1*868747 10*1000000 15*1500000

Inflation Factors - 1*2 1*1

Discounting Convention Factors - 2*2

Alternative 3 - Mobile Homes

Purchase Price - 2*0 1*6000000 7*0 1*6000000 7*0 1*6000000 8*0

O&M - 1*0 1*868747 25*2000000

Security - 2*0 25*120000

Inflation Factors - 3*1

Discounting Convention Factors - 3*2

NPV Graph - Graph Alternatives 1, 2, and 3.

Cost Sensitivity Analysis

Use Alternatives 1 and 2.

Vary Expense Item 1 for Alternative 2.

Upper limit - 40%

Discount Rate Sensitivity Analysis

Use Alternatives 1 and 2.

Lower Limit - 9.0%

Upper Limit - 11.0%

Refer to pages B-4 through B-25 for a sample of the reports generated from this case study input.

E X E C U T I V E S U M M A R Y R E P O R T PAGE 001

PROJECT TITLE : Unaccompanied Personnel Housing
DISCOUNT RATE : 9.00%
PERIOD OF ANALYSIS: 27 YEARS
START YEAR : 1993
BASE YEAR : 1993

PROJECT OBJECTIVE : Provide 160,000 SF of Unaccompanied Personnel Housing Space within a 15-mile radius of Fort Anywhere.

ALTERNATIVES CONSIDERED FOR THIS ANALYSIS:

The following alternatives were considered in this economic analysis:

New Construction:

Construction of a unaccompanied personnel housing facility. This alternative provides adequate space, both in quantity and quality for the stated requirement. Soldiers will not receive BAQ/VHA.

Lease Off-post:

Lease existing facilities off-post. Several commercial properties will be leased to provide the necessary housing for soldiers. Transportation and meals will not be provided in this alternative. Soldiers will not receive BAQ/VHA.

Mobile Homes:

Mobile home units will be purchased, and installed on-post. Soldiers will share units in accordance with allowances for space based on grade. Added security will be provided. Soldiers will forfeit BAQ/VHA. Mobile homes are expected to be replaced continually, but on an 8-year rotational schedule.

The following alternatives were considered, but rejected as infeasible, and were not considered in this economic analysis:

Do Nothing:

Current facilities do not exist for this new requirement. This requirement represents a new mission, all soldiers are new to the installation and have been transferred from other installations in accordance with the Base Realignment and Closure Act.

BAQ/VHA:

Providing Basic Allowance for Quarters (BAQ)/Variable Housing Allowance (VHA) is not possible based on the latest segmented

ALTERNATIVES CONSIDERED FOR THIS ANALYSIS (cont.):
housing market analysis (SHMA). Adequate off-post housing units (according to the SHMA) are those that can be obtained at BAQ/VHA plus 15 percent. Based on the BAQ/VHA rates for this soldier group, adequate housing does not exist in sufficient quantity off-post.

Use of other DoD installations:

The nearest DoD installation is only 220 miles away -- this is too far for soldiers to commute and presents an unacceptable command and control situation.

ASSUMPTIONS OF THE ANALYSIS:

1. All costs except salvage value occur throughout the year and will be discounted by a "middle-of-year" discount figure.

2. Beneficial Occupancy Date (BOD) will be 1995 for each alternative.

3. The discount rate used for this OMB Circular A-104 analysis is 9.0 percent. All costs are in current (inflated) dollars.

4. Physical life of the new facility is 60 years and will depreciate on a declining balance schedule (1.7 percent per year, per OMB A-104).

5. Mobile homes will be replaced every 8 years, no salvage value.

6. O&M. Engineering services (M account) and minor construction repairs (L account) are included in the annual lease. Therefore, O&M for the lease option is less than that for the other two options.

7. Due to the nature of mobile homes, extra security measures (fencing and an attended guard gate into the mobile home area) will be required.

RESULTS AND RECOMMENDATIONS:

ALTERNATIVE NAME	NPV	EUAC
1 New Construction	$49,322,625	$4,711,726
2 Lease Off-Post	$64,602,366	$6,171,380
3 Mobile Homes	$37,454,473	$3,577,977

DISCUSSION:

Costs and benefits of each option were analyzed over a 27-year period. Annual costs were discounted at a 9.0 percent rate, and then totalled to arrive at a net present value (NPV). The NPV results show the construction ($49.3 M) and lease options ($64.6 M) to be approximately $12.6 M and $27.9 M more than the mobile home option ($36.7 M), respectively. Thus, the government would need $12.9 M more (in present value terms, invested at 9.0 percent) to

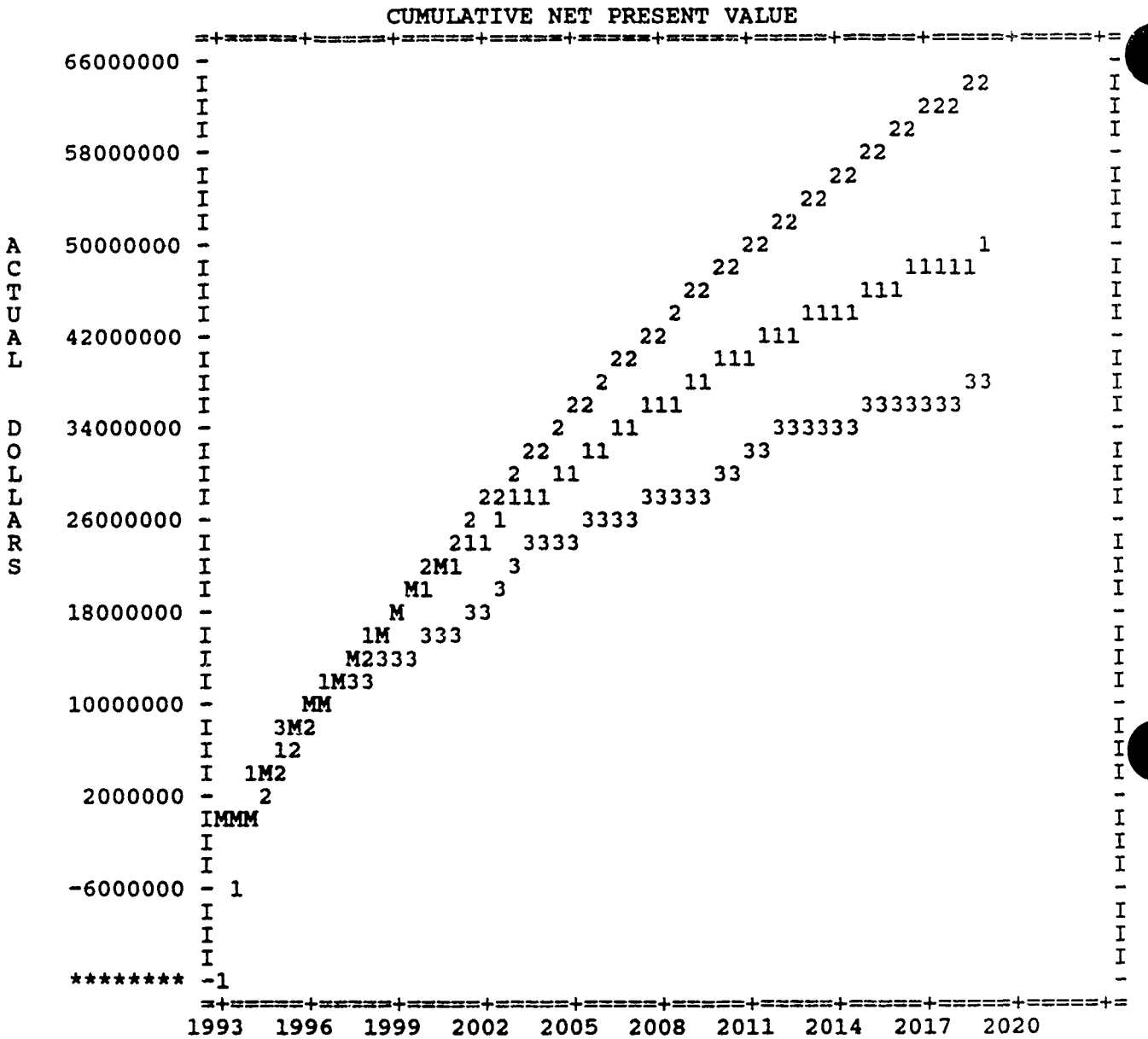
DISCUSSION (cont.):
meet all the costs associated with the construction option than it would need to finance the mobile home option; and $27.9 M more to finance the leasing option rather than the mobile home option. The equivalent uniform annual cost (EUAC) shows that mobile homes are approximately $1.2 M less expensive per year (present value terms) than construction, and $2.7 M less than leasing per year.

Based on the NPV and EUAC results, purchasing mobile homes is determined to be the least cost option to meet this requirement and is recommended for funding. This is true even though there are perceived to be obvious morale and welfare benefits associated with construction of an unaccompanied personnel housing facility.

However, the mobile home option would provide unit integrity since all the troops would be located in the same area, and would be just as safe as permanent structures since extra security measures are provided.

ACTION OFFICER: John Doe, Good Officer, (123) 456-7890
ORGANIZATION : Fort Anywhere

E C O N O M I C A N A L Y S I S G R A P H 1



LEGEND	DESCRIPTION
1	New Construction
2	Lease Off-Post
3	Mobile Homes
M	MERGING DATA

PROJECT/PROGRAM COSTS

ALTERNATIVE 1: New Construction

YEAR	Initial Construction Cost (01)	O&M (02)	TOTAL ANNUAL OUTLAYS	MIDDLE OF YEAR DISCOUNT FACTORS	PRESENT VALUE
1993	$16,500,000	$0	$16,500,000	0.958	$15,804,133
1994	$16,500,000	$884,672	$17,384,672	0.879	$15,276,602
1995	$0	$1,833,926	$1,833,926	0.806	$1,478,480
1996	$0	$1,899,030	$1,899,030	0.740	$1,404,556
1997	$0	$1,965,496	$1,965,496	0.679	$1,333,684
1998	$0	$2,034,289	$2,034,289	0.623	$1,266,388
1999	$0	$2,105,489	$2,105,489	0.571	$1,202,488
2000	$0	$2,179,181	$2,179,181	0.524	$1,141,812
2001	$0	$2,255,452	$2,255,452	0.481	$1,084,197
2002	$0	$2,334,393	$2,334,393	0.441	$1,029,490
2003	$0	$2,416,097	$2,416,097	0.405	$977,543
2004	$0	$2,500,660	$2,500,660	0.371	$928,218
2005	$0	$2,588,183	$2,588,183	0.341	$881,381
2006	$0	$3,283,857	$3,283,857	0.312	$1,025,950
2007	$0	$3,398,791	$3,398,791	0.287	$974,182
2008	$0	$3,517,749	$3,517,749	0.263	$925,026
2009	$0	$3,640,870	$3,640,870	0.241	$878,350
2010	$0	$3,768,301	$3,768,301	0.221	$834,030
2011	$0	$3,900,192	$3,900,192	0.203	$791,946
2012	$0	$4,036,698	$4,036,698	0.186	$751,985
2013	$0	$4,177,983	$4,177,983	0.171	$714,041
2014	$0	$4,324,212	$4,324,212	0.157	$678,011
2015	$0	$4,475,560	$4,475,560	0.144	$643,800
2016	$0	$4,632,204	$4,632,204	0.132	$611,314
2017	$0	$4,794,331	$4,794,331	0.121	$580,468
2018	$0	$4,962,133	$4,962,133	0.111	$551,179
2019	$0	$5,135,808	$5,135,808	0.102	$523,367
%NPV	61.44	48.64			
	$30,303,338	$23,989,283			
DISCOUNTING CONVENTION	M-O-Y	M-O-Y			

PROJECT/PROGRAM COSTS

ALTERNATIVE 1: New Construction

YEAR	CUMULATIVE PRESENT VALUE	PRESENT VALUE RESIDUAL	CUMULATIVE NET PRESENT VALUE
1993	$15,804,133	$29,760,550	-$13,956,417
1994	$31,080,735	$27,823,824	$3,256,911
1995	$32,559,215	$26,007,377	$6,551,838
1996	$33,963,771	$24,279,161	$9,684,610
1997	$35,297,455	$22,659,135	$12,638,320
1998	$36,563,843	$21,140,782	$15,423,061
1999	$37,766,331	$19,740,220	$18,026,111
2000	$38,908,143	$18,427,172	$20,480,971
2001	$39,992,340	$17,196,373	$22,795,967
2002	$41,021,830	$16,042,867	$24,978,963
2003	$41,999,373	$14,980,079	$27,019,294
2004	$42,927,591	$13,983,697	$28,943,894
2005	$43,808,972	$13,049,728	$30,759,244
2006	$44,834,922	$12,189,897	$32,645,025
2007	$45,809,104	$11,368,905	$34,440,199
2008	$46,734,130	$10,613,695	$36,120,435
2009	$47,612,480	$9,905,752	$37,706,728
2010	$48,446,510	$9,242,230	$39,204,280
2011	$49,238,456	$8,632,404	$40,606,052
2012	$49,990,441	$8,060,589	$41,929,852
2013	$50,704,482	$7,524,501	$43,179,981
2014	$51,382,493	$7,021,990	$44,360,503
2015	$52,026,293	$6,551,034	$45,475,259
2016	$52,637,607	$6,118,956	$46,518,651
2017	$53,218,075	$5,705,039	$47,513,036
2018	$53,769,254	$5,325,636	$48,443,618
2019	$54,292,621	$4,969,996	$49,322,625
%NPV		-10.08	
		$4,969,996	
DISCOUNTING CONVENTION		E-O-Y	

EQUIVALENT UNIFORM ANNUAL COST = $4,711,726 (9.00% DISCOUNT RATE, 27 YEARS)

EXPENSE ITEM 2 USED INFLATION INDEX 1 - OSD PBC Memo.

PROJECT/PROGRAM COSTS

ALTERNATIVE 2: Lease Off-Post

YEAR	Annual Rent (01)	O&M (02)	TOTAL ANNUAL OUTLAYS	MIDDLE OF YEAR DISCOUNT FACTORS	PRESENT VALUE
1993	$0	$0	$0	0.958	$0
1994	$0	$884,672	$884,672	0.879	$777,397
1995	$3,592,588	$1,055,501	$4,648,089	0.806	$3,747,211
1996	$3,779,403	$1,092,971	$4,872,374	0.740	$3,603,693
1997	$3,975,932	$1,131,225	$5,107,157	0.679	$3,465,451
1998	$4,182,680	$1,170,817	$5,353,497	0.623	$3,332,666
1999	$4,400,179	$1,211,796	$5,611,975	0.571	$3,205,113
2000	$4,628,989	$1,254,209	$5,883,198	0.524	$3,082,582
2001	$4,869,696	$1,298,106	$6,167,802	0.481	$2,964,866
2002	$5,122,920	$1,343,540	$6,466,460	0.441	$2,851,772
2003	$5,389,312	$1,390,564	$6,779,876	0.405	$2,743,112
2004	$5,669,556	$1,439,234	$7,108,790	0.371	$2,638,705
2005	$5,964,374	$2,234,411	$8,198,785	0.341	$2,792,017
2006	$6,274,521	$2,312,615	$8,587,136	0.312	$2,682,814
2007	$6,600,796	$2,393,557	$8,994,353	0.287	$2,578,015
2008	$6,944,038	$2,477,331	$9,421,369	0.263	$2,477,440
2009	$7,305,127	$2,564,038	$9,869,165	0.241	$2,380,910
2010	$7,684,994	$2,653,779	$10,338,773	0.221	$2,288,259
2011	$8,084,614	$2,746,661	$10,831,275	0.203	$2,199,324
2012	$8,505,014	$2,842,795	$11,347,809	0.186	$2,113,952
2013	$8,947,274	$2,942,292	$11,889,566	0.171	$2,031,995
2014	$9,412,533	$3,045,272	$12,457,805	0.157	$1,953,312
2015	$9,901,984	$3,151,857	$13,053,841	0.144	$1,877,768
2016	$10,416,888	$3,262,172	$13,679,060	0.132	$1,805,233
2017	$10,958,566	$3,376,348	$14,334,914	0.121	$1,735,584
2018	$11,528,411	$3,494,520	$15,022,931	0.111	$1,668,702
2019	$12,127,889	$3,616,829	$15,744,718	0.102	$1,604,473
%NPV	75.64	24.36			
	$48,862,729	$15,739,637			
DISCOUNTING CONVENTION	M-O-Y	M-O-Y			

PROJECT/PROGRAM COSTS

ALTERNATIVE 2: Lease Off-Post

YEAR	CUMULATIVE NET PRESENT VALUE
1993	$0
1994	$777,397
1995	$4,524,608
1996	$8,128,301
1997	$11,593,752
1998	$14,926,418
1999	$18,131,531
2000	$21,214,113
2001	$24,178,979
2002	$27,030,751
2003	$29,773,863
2004	$32,412,568
2005	$35,204,585
2006	$37,887,399
2007	$40,465,414
2008	$42,942,854
2009	$45,323,764
2010	$47,612,023
2011	$49,811,347
2012	$51,925,299
2013	$53,957,294
2014	$55,910,606
2015	$57,788,374
2016	$59,593,607
2017	$61,329,191
2018	$62,997,893
2019	$64,602,366

EQUIVALENT UNIFORM ANNUAL COST = $6,171,380 (9.00% DISCOUNT RATE, 27 YEARS)

EXPENSE ITEM 2 USED INFLATION INDEX 1 - OSD PBC Memo.
EXPENSE ITEM 1 USED INFLATION INDEX 2 - Local Lease.

PROJECT/PROGRAM COSTS

ALTERNATIVE 3: Mobile Homes

YEAR	Purchase Price (01)	O&M (02)	Security (03)	TOTAL ANNUAL OUTLAYS	MIDDLE OF YEAR DISCOUNT FACTORS
1993	$0	$0	$0	$0	0.958
1994	$0	$884,672	$0	$884,672	0.879
1995	$6,333,006	$2,111,002	$126,660	$8,570,668	0.806
1996	$0	$2,185,942	$131,156	$2,317,098	0.740
1997	$0	$2,262,450	$135,747	$2,398,197	0.679
1998	$0	$2,341,635	$140,498	$2,482,133	0.623
1999	$0	$2,423,593	$145,415	$2,569,008	0.571
2000	$0	$2,508,418	$150,505	$2,658,923	0.524
2001	$0	$2,596,213	$155,772	$2,751,985	0.481
2002	$0	$2,687,081	$161,224	$2,848,305	0.441
2003	$8,343,386	$2,781,128	$166,867	$11,291,381	0.405
2004	$0	$2,878,468	$172,708	$3,051,176	0.371
2005	$0	$2,979,214	$178,752	$3,157,966	0.341
2006	$0	$3,083,487	$185,009	$3,268,496	0.312
2007	$0	$3,191,409	$191,484	$3,382,893	0.287
2008	$0	$3,303,108	$198,186	$3,501,294	0.263
2009	$0	$3,418,717	$205,123	$3,623,840	0.241
2010	$0	$3,538,372	$212,302	$3,750,674	0.221
2011	$10,986,647	$3,662,215	$219,732	$14,868,594	0.203
2012	$0	$3,790,393	$227,423	$4,017,816	0.186
2013	$0	$3,923,057	$235,383	$4,158,440	0.171
2014	$0	$4,060,363	$243,621	$4,303,984	0.157
2015	$0	$4,202,476	$252,148	$4,454,624	0.144
2016	$0	$4,349,563	$260,973	$4,610,536	0.132
2017	$0	$4,501,798	$270,107	$4,771,905	0.121
2018	$0	$4,659,361	$279,561	$4,938,922	0.111
2019	$0	$4,822,438	$289,346	$5,111,784	0.102
%NPV	28.60	67.48	3.92		
	$10,712,138	$25,272,631	$1,469,704		
DISCOUNTING CONVENTION	M-O-Y	M-O-Y	M-O-Y		

PROJECT/PROGRAM COSTS

ALTERNATIVE 3: Mobile Homes

YEAR	PRESENT VALUE	CUMULATIVE NET PRESENT VALUE
1993	$0	$0
1994	$777,397	$777,397
1995	$6,909,528	$7,686,925
1996	$1,713,766	$9,400,691
1997	$1,627,291	$11,027,982
1998	$1,545,181	$12,573,163
1999	$1,467,212	$14,040,375
2000	$1,393,179	$15,433,554
2001	$1,322,881	$16,756,435
2002	$1,256,130	$18,012,565
2003	$4,568,450	$22,581,015
2004	$1,132,563	$23,713,578
2005	$1,075,415	$24,788,993
2006	$1,021,151	$25,810,144
2007	$969,625	$26,779,769
2008	$920,699	$27,700,468
2009	$874,242	$28,574,710
2010	$830,128	$29,404,838
2011	$3,019,114	$32,423,952
2012	$748,468	$33,172,420
2013	$710,701	$33,883,121
2014	$674,839	$34,557,960
2015	$640,788	$35,198,748
2016	$608,454	$35,807,202
2017	$577,753	$36,384,955
2018	$548,600	$36,933,555
2019	$520,918	$37,454,473

EQUIVALENT UNIFORM ANNUAL COST = $3,577,977 (9.00% DISCOUNT RATE, 27 YEARS)

EXPENSE ITEMS 1, 2 AND 3 USED INFLATION INDEX 1 - OSD PBC Memo.

SOURCE AND DERIVATION OF COSTS AND BENEFITS:

1. NEW CONSTRUCTION.

a. Construction Cost. This estimate is based on a standard design for UPH facilities approved by the Corps of Engineers, Gotham City District.

Primary Facility	SF	160,000	154.42	24,707,200
Supporting Facility (20%)				4,941,440
Subtotal				29,648,640
Contingency (5%)				1,482,432
Total Contract Cost				31,131,072
SIOH (6%)				1,867,864
Total Request				32,998,936
Total Request (rounded)				33,000,000

Source: DD 1391 Processor System

b. Operations and Maintenance. Includes Utilities, Maintenance and repair, Minor Construction (replacement), and Engineering services.

$10.859338/SF x 160,000 SF = $1,737,494/yr

Source: Redbook, and Maintenance Resource Prediction Model (MRPM).

2. LEASING OFF-POST.

a. Annual Rent. Based on lease estimates provided by local real estate companies for blocks of 2-bedroom apartments within a 10-mile radius of the installation. Price includes engineering services and all major repairs/replacements; does not include utilities or general, day to day maintenance.

Soldiers to be accommodated: 800

Apartments required: 400 (for double occupancy)

Lease estimate, per apartment: $729.72/month

400 apartments x $729.72/month x 12 months = $3,502,673/yr

SOURCE AND DERIVATION OF COSTS AND BENEFITS (cont.):

b. Operations and Maintenance. Includes Utilities, and general maintenance and repair.

$208.33/apt/month x 12 months x 400 apts = $1,000,000/yr

Source: Redbook, and Maintenance Resource Prediction Model (MRPM).

3. MOBILE HOMES.

a. Purchase Price. Price to purchase, transport, and install 400, two bedroom mobile homes.

400 units x $15,000 per unit = $6,000,000

Source: Mobile Home Association Annual Catalog of Dealer Prices, 1991.

b. Operations and Maintenance. Includes Utilities, Maintenance and repair, Minor Construction (replacement), and Engineering services.

$416.67/unit/month x 12 months x 400 units = $2,000,000/year

Source: Mobile Home Association Annual Summary of Operations and Maintenance Costs.

c. Security. Includes installation of fencing and gates to enclose mobile home area, construction of a guard gate, and one person attending the guard gate on a 24-hour basis.

Estimate: $120,000/yr

Source: Average of 4 local security vendor's estimates.

COST SENSITIVITY ANALYSIS NUMBER 01
TITLE ..... Test Annual Rent

ALLOWABLE CHANGE ..... 40.00 PERCENT

This sensitivity analysis checks for alternative 2 to be ranked least cost as a result of changes in the expense item(s) listed below:

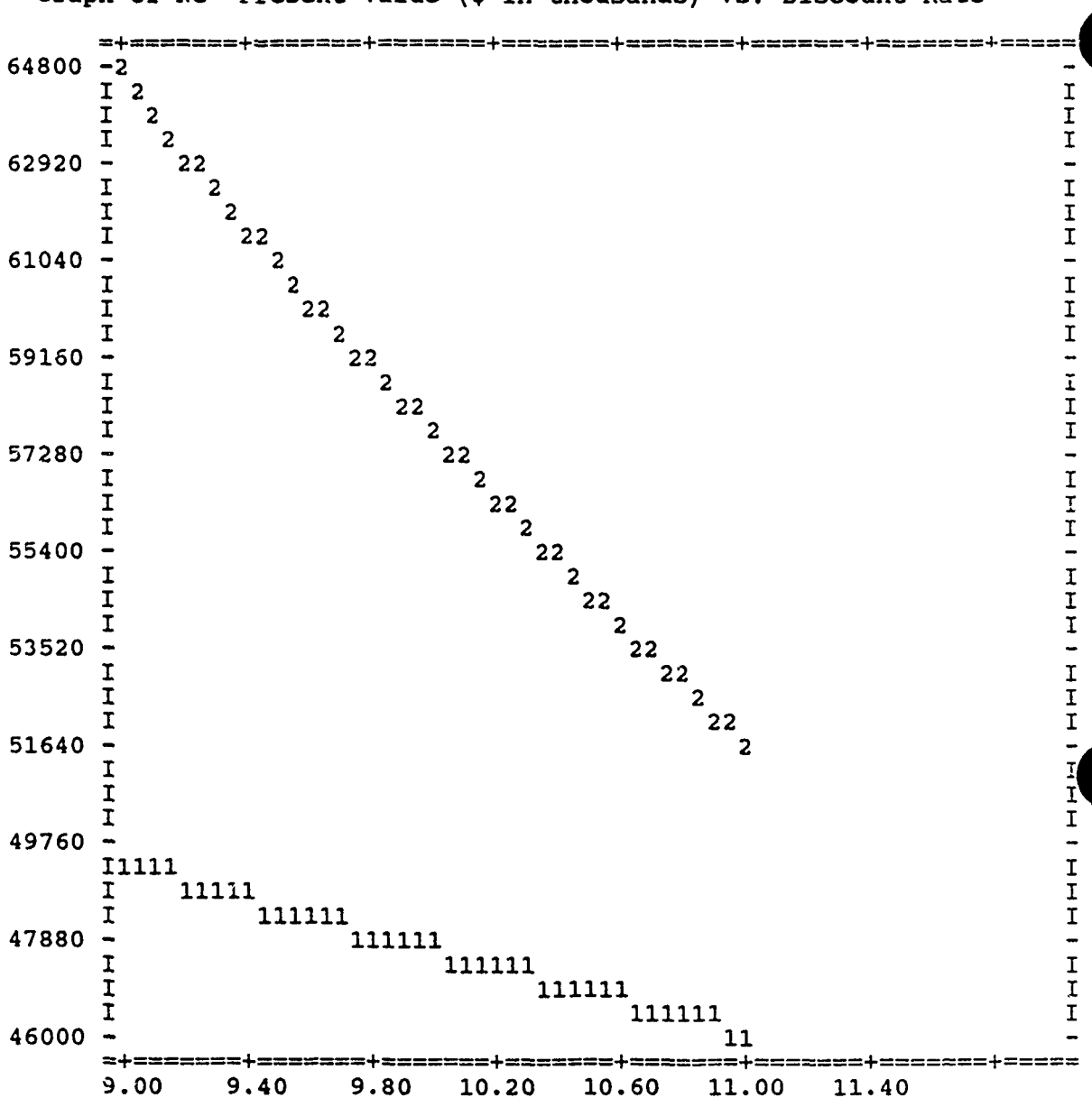
ALTERNATIVE	EXPENSE ITEM(S)
1 - New Construction	** NOTHING CHANGED **
2 - Lease Off-Post	1 - Annual Rent

The selected expense items are allowed to vary from a value of 100% less than their input value to 40.00% more than their input value.

ALTERNATIVE	NET PRESENT VALUE
1 - New Construction	$49,322,625
2 - Lease Off-Post	$64,602,366

For alternative 2 to be ranked least cost, reduce the selected expense item(s) by more than 31.27%.

Graph of Net Present Value ($ in thousands) vs. Discount Rate



LEGEND	DESCRIPTION
1	New Construction
2	Lease Off-Post

Summary of Alternative Rankings by Discount Rate

Discount Rate: 9.00 Lower Limit: 9.00 Upper Limit: 11.00

Discount Rate (%)	Alternative Ranking
9.00	1 2
9.10	1 2
9.20	1 2
9.30	1 2
9.40	1 2
9.50	1 2
9.60	1 2
9.70	1 2
9.80	1 2
9.90	1 2
10.00	1 2
10.10	1 2
10.20	1 2
10.30	1 2
10.40	1 2
10.50	1 2
10.60	1 2
10.70	1 2
10.80	1 2
10.90	1 2
11.00	1 2

* indicates a change in the alternative ranking occurred.

Table of Net Present Value for each Discount Rate

Discount Rate = 9.00% Alt	NPV	Discount Rate = 9.10% Alt	NPV	Discount Rate = 9.20% Alt	NPV
1 -	$49,322,625	1 -	$49,152,131	1 -	$48,982,783
2 -	$64,602,368	2 -	$63,859,290	2 -	$63,128,122
Discount Rate = 9.30%		**Discount Rate = 9.40%**		**Discount Rate = 9.50%**	
Alt	NPV	Alt	NPV	Alt	NPV
1 -	$48,814,591	1 -	$48,647,554	1 -	$48,481,673
2 -	$62,408,621	2 -	$61,700,572	2 -	$61,003,760
Discount Rate = 9.60%		**Discount Rate = 9.70%**		**Discount Rate = 9.80%**	
Alt	NPV	Alt	NPV	Alt	NPV
1 -	$48,316,944	1 -	$48,153,372	1 -	$47,990,953
2 -	$60,317,971	2 -	$59,642,990	2 -	$58,978,619
Discount Rate = 9.90%		**Discount Rate = 10.00%**		**Discount Rate = 10.10%**	
Alt	NPV	Alt	NPV	Alt	NPV
1 -	$47,829,689	1 -	$47,669,571	1 -	$47,510,605
2 -	$58,324,661	2 -	$57,680,916	2 -	$57,047,192
Discount Rate = 10.20%		**Discount Rate = 10.30%**		**Discount Rate = 10.40%**	
Alt	NPV	Alt	NPV	Alt	NPV
1 -	$47,352,789	1 -	$47,196,119	1 -	$47,040,583
2 -	$56,423,306	2 -	$55,809,074	2 -	$55,204,311
Discount Rate = 10.50%		**Discount Rate = 10.60%**		**Discount Rate = 10.70%**	
Alt	NPV	Alt	NPV	Alt	NPV
1 -	$46,886,195	1 -	$46,732,940	1 -	$46,580,816
2 -	$54,608,848	2 -	$54,022,510	2 -	$53,445,130
Discount Rate = 10.80%		**Discount Rate = 10.90%**		**Discount Rate = 11.00%**	
Alt	NPV	Alt	NPV	Alt	NPV
1 -	$46,429,821	1 -	$46,279,949	1 -	$46,131,196
2 -	$52,876,542	2 -	$52,316,586	2 -	$51,765,090

```
0001: * VERSION 3.0
0002: PROJECT TITLE IS 'Unaccompanied Personnel Housing'
0003: ACTION OFFICER IS 'John Doe, Good Officer, (123) 456-7890'
0004: ORGANIZATION IS 'Fort Anywhere'
0005: OBJECTIVE IS &
0006: 'Provide 160,000 SF of Unaccompanied Personnel'&
0007: 'Housing Space within a 15-mile radius of'&
0008: 'Fort Anywhere.'
0009: *
0010: BEGIN ASSUMPTIONS
0011:
0012: 1.  All costs except salvage value occur throughout the year and
0013: will be discounted by a "middle-of-year" discount figure.
0014:
0015: 2.  Beneficial Occupancy Date (BOD) will be 1995 for each
0016: alternative.
0017:
0018: 3.  The discount rate used for this OMB Circular A-104 analysis is
0019: 9.0 percent.  All costs are in current (inflated) dollars.
0020:
0021: 4.  Physical life of the new facility is 60 years and will
0022: depreciate on a declining balance schedule (1.7 percent per year,
0023: per OMB A-104).
0024:
0025: 5.  Mobile homes will be replaced every 8 years, no salvage value.
0026:
0027: 6.  O&M.  Engineering services (M account) and minor construction
0028: repairs (L account) are included in the annual lease.  Therefore,
0029: O&M for the lease option is less than that for the other two
0030: options.
0031:
0032: 7.  Due to the nature of mobile homes, extra security measures
0033: (fencing and an attended guard gate into the mobile home area) will
0034: be required.
0035: END ASSUMPTIONS
0036: *
0037: BEGIN DISCUSSION OF ALTERNATIVES
0038:
0039: The following alternatives were considered in this economic
0040: analysis:
0041:
0042: New Construction:
0043:
0044:   Construction of a unaccompanied personnel housing facility.  This
0045: alternative provides adequate space, both in quantity and quality
0046: for the stated requirement.  Soldiers will not receive BAQ/VHA.
0047:
0048: Lease Off-post:
0049:
0050:   Lease existing facilities off-post.  Several commercial
```

properties will be leased to provide the necessary housing for soldiers. Transportation and meals will not be provided in this alternative. Soldiers will not receive BAQ/VHA.

Mobile Homes:

  Mobile home units will be purchased, and installed on-post. Soldiers will share units in accordance with allowances for space based on grade. Added security will be provided. Soldiers will forfeit BAQ/VHA. Mobile homes are expected to be replaced continually, but on an 8-year rotational schedule.

The following alternatives were considered, but rejected as infeasible, and were not considered in this economic analysis:

Do Nothing:

  Current facilities do not exist for this new requirement. This requirement represents a new mission, all soldiers are new to the installation and have been transferred from other installations in accordance with the Base Realignment and Closure Act.

BAQ/VHA:

  Providing Basic Allowance for Quarters (BAQ)/Variable Housing Allowance (VHA) is not possible based on the latest segmented housing market analysis (SHMA). Adequate off-post housing units (according to the SHMA) are those that can be obtained at BAQ/VHA plus 15 percent. Based on the BAQ/VHA rates for this soldier group, adequate housing does not exist in sufficient quantity off-post.

Use of other DoD installations:

  The nearest DoD installation is only 220 miles away -- this is too far for soldiers to commute and presents an unacceptable command and control situation.

END DISCUSSION OF ALTERNATIVES
*
BEGIN DATA
PERIOD OF ANALYSIS IS 27 YEARS
START YEAR IS 1993
BASE YEAR IS 1993
DISCOUNT RATE IS 9.00
GLOBAL DISCOUNTING CONVENTION IS 2
INFLATION INDEX 1 IS 'OSD PBC Memo' &
1*0.00 1*0.037 1*0.036 24*0.035 33*0.00
INFLATION INDEX 2 IS 'Local Lease' &
2*0.00 25*0.052 33*0.00

```
0101: RESIDUAL SCHEDULE  1 IS 'Building Depreciatn' &
0102: 1*0.983 1*0.966 1*0.95 1*0.934 1*0.918 1*0.902 1*0.887 1*0.872 1*0.857 &
0103: 1*0.842 1*0.828 1*0.814 1*0.80 1*0.787 1*0.773 1*0.76 1*0.747 1*0.734 &
0104: 1*0.722 1*0.71 1*0.698 1*0.686 1*0.674 1*0.663 1*0.651 1*0.64 1*0.629 &
0105: 1*0.619 1*0.608 1*0.598 1*0.588 1*0.578 1*0.568 1*0.558 1*0.549 1*0.539
0106: 1*0.53 1*0.521 1*0.512 1*0.504 1*0.495 1*0.487 1*0.478 1*0.47 1*0.462 &
0107: 1*0.454 1*0.447 1*0.439 1*0.432 1*0.424 1*0.417 1*0.41 1*0.403 1*0.396 &
0108: 1*0.389 1*0.383 1*0.376 1*0.37 1*0.364 1*0.357
0109: SECONDARY ANALYSIS
0110: COST STORED IN 'ACTUAL' DOLLARS
0111: END DATA
0112: *
0113: BEGIN ALTERNATIVE  1
0114: ALTERNATIVE NAME IS &
0115: 'New Construction'
0116: EXPENSE ITEM  1 IS 'Initial:Construction:Cost' &
0117: 2*16500000 25*0
0118: EXPENSE ITEM  2 IS 'O&M: : ' &
0119: 1*0 1*868747 11*1737494 14*2129963
0120: INFLATION FACTORS ARE &
0121: 1*0 1*1
0122: DISCOUNT FACTORS ARE &
0123: 2*2
0124: RESIDUAL TYPE IS  1
0125: RESIDUAL START VALUE IS 33000000
0126: RESIDUAL INFLATION INDEX IS  1
0127: RESIDUAL DISCOUNTING CONVENTION IS 3
0128: END ALTERNATIVE  1
0129: *
0130: BEGIN ALTERNATIVE  2
0131: ALTERNATIVE NAME IS &
0132: 'Lease Off-Post'
0133: EXPENSE ITEM  1 IS 'Annual:Rent: ' &
0134: 2*0 25*3502673
0135: EXPENSE ITEM  2 IS 'O&M: : ' &
0136: 1*0 1*868747 10*1000000 15*1500000
0137: INFLATION FACTORS ARE &
0138: 1*2 1*1
0139: DISCOUNT FACTORS ARE &
0140: 2*2
0141: END ALTERNATIVE  2
0142: *
0143: BEGIN ALTERNATIVE  3
0144: ALTERNATIVE NAME IS &
0145: 'Mobile Homes'
0146: EXPENSE ITEM  1 IS 'Purchase:Price: ' &
0147: 2*0 1*6000000 7*0 1*6000000 7*0 1*6000000 8*0
0148: EXPENSE ITEM  2 IS 'O&M: : ' &
0149: 1*0 1*868747 25*2000000
0150: EXPENSE ITEM  3 IS 'Security: : ' &
```

```
0151: 2*0 25*120000
0152: INFLATION FACTORS ARE &
0153: 3*1
0154: DISCOUNT FACTORS ARE &
0155: 3*2
0156: END ALTERNATIVE  3
0157: *
0158: BEGIN SOURCE/DERIVATION
0159:
0160: 1.  NEW CONSTRUCTION.
0161:
0162:   a.  Construction Cost.  This estimate is based on a standard
0163: design for UPH facilities approved by the Corps of Engineers,
0164: Gotham City District.
0165:
0166: Primary Facility        SF          160,000    154.42   24,707,200
0167:
0168: Supporting Facility (20%)                                 4,941,440
0169:
0170:  Subtotal                                                29,648,640
0171:
0172: Contingency (5%)                                          1,482,432
0173:
0174:  Total Contract Cost                                      31,131,072
0175:
0176: SIOH (6%)                                                 1,867,864
0177:
0178:  Total Request                                           32,998,936
0179:
0180:  Total Request (rounded)                                 33,000,000
0181:
0182:  Source:  DD 1391 Processor System
0183:
0184:   b.  Operations and Maintenance.  Includes Utilities, Maintenance
0185: and repair, Minor Construction (replacement), and Engineering
0186: services.
0187:
0188:       $10.859338/SF x 160,000 SF = $1,737,494/yr
0189:
0190:       Source:  Redbcok, and Maintenance Resource Prediction Model
0191: (MRPM).
0192:
0193:
0194: 2.  LEASING OFF-POST.
0195:
0196:   a.  Annual Rent.  Based on lease estimates provided by local real
0197: estate companies for blocks of 2-bedroom apartments within a 10-
0198: mile radius of the installation.  Price includes engineering
0199: services and all major repairs/replacements; does not include
0200: utilities or general, day to day maintenance.
```

```
0201:
0202:       Soldiers to be accommodated:  800
0203:
0204:       Apartments required:  400 (for double occupancy)
0205:
0206:       Lease estimate, per apartment: $729.72/month
0207:
0208:       400 apartments x $729.72/month x 12 months = $3,502,673/y
0209:
0210:   b.  Operations and Maintenance.  Includes Utilities, and general
0211: maintenance and repair.
0212:
0213:       $208.33/apt/month x 12 months x 400 apts = $1,000,000/yr
0214:
0215:       Source:  Redbook, and Maintenance Resource Prediction Model
0216: (MRPM).
0217:
0218: 3.  MOBILE HOMES.
0219:
0220:   a.  Purchase Price.  Price to purchase, transport, and install
0221: 400, two bedroom mobile homes.
0222:
0223:       400 units x $15,000 per unit = $6,000,000
0224:
0225:       Source:  Mobile Home Association Annual Catalog of Dealer
0226: Prices, 1991.
0227:
0228:   b.  Operations and Maintenance.  Includes Utilities, Maintenance
0229: and repair, Minor Construction (replacement), and Engineering
0230: services.
0231:
0232:       $416.67/unit/month x 12 months x 400 units = $2,000,000/year
0233:
0234:       Source:  Mobile Home Association Annual Summary of Operations
0235: and Maintenance Costs.
0236:
0237:   c.  Security.  Includes installation of fencing and gates to
0238: enclose mobile home area, construction of a guard gate, and one
0239: person attending the guard gate on a 24-hour basis.
0240:
0241:       Estimate:  $120,000/yr
0242:
0243:       Source:  Average of 4 local security vendor's estimates.
0244: END SOURCE/DERIVATION
0245: *
0246: BEGIN GRAPHICS 1
0247: PLOT ALTERNATIVES 1 2 3
0248: END GRAPHICS 1
0249: *
0250: BEGIN COST SENSITIVITY ANALYSIS  1
```

```
0251: TITLE IS 'Test Annual Rent'
0252: ALTERNATIVES ARE  1  2
0253: CHANGE  2 1
0254: LIMIT IS 40.00
0255: END COST SENSITIVITY ANALYSIS  1
0256: *
0257: BEGIN RATE SENSITIVITY ANALYSIS  1
0258: ALTERNATIVES ARE 1 2
0259: LOWER LIMIT IS   9.00
0260: UPPER LIMIT IS  11.00
0261: END RATE SENSITIVITY ANALYSIS  1
0262: *
0263: BEGIN RESULTS
0264:
0265:   Costs and benefits of each option were analyzed over a 27-year
0266: period.  Annual costs were discounted at a 9.0 percent rate, and
0267: then totalled to arrive at a net present value (NPV).  The NPV
0268: results show the construction ($49.3 M) and lease options ($64.6 M)
0269: to be approximately $12.6 M and $27.9 M more than the mobile home
0270: option ($36.7 M), respectively.  Thus, the government would need
0271: $12.9 M more (in present value terms, invested at 9.0 percent) to
0272: meet all the costs associated with the construction option than it
0273: would need to finance the mobile home option; and $27.9 M more to
0274: finance the leasing option rather than the mobile home option. The
0275: equivalent uniform annual cost (EUAC) shows that mobile homes are
0276: approximately $1.2 M less expensive per year (present value terms)
0277: than construction, and $2.7 M less than leasing per year.
0278:
0279:   Based on the NPV and EUAC results, purchasing mobile homes is
0280: determined to be the least cost option to meet this requirement and
0281: is recommended for funding.  This is true even though there are
0282: perceived to be obvious morale and welfare benefits associated with
0283: construction of an unaccompanied personnel housing facility.
0284:
0285:   However, the mobile home option would provide unit integrity since
0286: all the troops would be located in the same area, and would be just
0287: as safe as permanent structures since extra security measures are
0288: provided.
0289:
0290:
0291: END RESULTS
0292: *
0293: STOP RUN
```

B.2 **CASE STUDY TWO - CONSOLIDATED MAINTENANCE FACILITY.** The analyst lists the following information for easy reference when using PC-ECONPACK.

NOTE: * is used for abbreviated data; i.e., 11*1737494 means 11 years at 1737494 dollars per year. If there are two expense items and inflation factors are written 1*0 and 1*1, that means the first expense item uses no inflation and expense item two uses the index defined as inflation index number 1. If the discount factors are abbreviated as 2*2, that means that both expense items use middle-of-year discounting.

Project Title - Consolidated Maintenance Facility

Project Objective - Provide 210,000 SF of maintenance shops

Action Officer - John Doe, Good Officer, (123) 456-7890

Organization Title - Fort Anywhere

Global Discounting Convention - Middle-of-Year

Period of Analysis - 25 years

Discount Rate - 8.5%

Start Year - 1992

Base Year - 1992

Analysis Type - Primary

Cost Input - Entered in actual dollars

Inflation Index 1 - OSD PBC Memo

Values for Inflation Index 1 - 25*3.5

Inflation Index 2 - Fuel-MHE

Value for Inflation Index 2 - 5*9.5 20*5.5

Alternative 1 (Status Quo) - Upgrade Status Quo

Initial Upgrade - 2*4800000 23*0

Equipment - 1*3540684 10*0 1*3540684 13*0

Annual M&R - 4*62960 21*275100

Annual Utilities - 25*193100

Personnel Cost - 25*4300000

MHE Fuel - 25*5000

Inflation Factors - 2*0 3*1 1*2

Discounting Convention Factors - 6*2

Residual Type - Straight Line

Residual Start Value - 4823675

Residual Inflation Index - 1

Residual Discounting Convention - End-of-Year

Residual Life - 40 years

Residual Beginning Year - 1994

The first two expense items are refurbishment costs; the remaining expense items are recurring costs.

Alternative 2 (Proposed) - New Construction

Initial Construction Cost - 3*9000000 22*0

Equipment = 1*0 2*3123275 10*0 2*3123275 10*0

Annual M&R - 3*62960 22*235200

Annual Utilities - 3*178012 22*241500

Personnel Cost - 3*4300000 22*2000000

MHE Fuel - 3*5000 22*1800

Inflation Factors - 2*0 3*1 1*2

Discounting Convention Factors - 6*2

Residual Type - Double Declining Balance

Residual Start Value - 27000000

Residual Inflation Index - 1

Residual Discounting Convention - End-of-Year

Residual Life - 60 years

Residual Beginning Year - 1995

The first two expense items are investment costs; the remaining expense items are recurring costs.

NPV Graph - Graph Alternatives 1 and 2.

SIR Graph - Graph Alternative 2.

Cost Sensitivity Analysis

Use Alternatives 1 and 2.

Vary Expense Item 2 for Alternative 1.

Vary Expense Item 1 for Alternative 2.

Upper limit - 50%

Refer to pages B-29 through B-53 for a sample of the reports generated from this case study input.

E X E C U T I V E S U M M A R Y R E P O R T PAGE 001

PROJECT TITLE : Consolidated Maintenance Facility
DISCOUNT RATE : 8.50%
PERIOD OF ANALYSIS: 25 YEARS
START YEAR : 1992
BASE YEAR : 1992

PROJECT OBJECTIVE : Provide 210,000 SF of maintenance shops

ALTERNATIVES CONSIDERED FOR THIS ANALYSIS:

The following alternatives were considered in this economic analysis:

New Construction:

Construction of a consolidated maintenance facility. This alternative replaces the existing vintage temporary buildings and provides the necessary 210,000 SF of maintenance space.

Status Quo (Upgrade):

Upgrade the existing facilities. Currently, 28 separate, dispersed facilities exist, spread over a 5-mile radius. These facilities will be modified to provide the necessary maintenance space.

The following alternatives were considered, but rejected as infeasible, and were not considered in this economic analysis:

Do Nothing:

Current facilities do not meet fire and safety codes and cannot provide maintenance for 3 battalions.

Lease or Contract:

No facilities or services for this type of function exist within a 100-mile radius. (Chamber of Commerce was consulted for possibilities.)

Use of other DoD installations:

The nearest DoD installation is only 4 miles away, but has no capability (facilities or infrastructure) to meet this type of requirement. (DEH was contacted) The nearest installation with facilities of this type available is over 800 miles distant. This option is not feasible.

ASSUMPTIONS OF THE ANALYSIS:

1. All costs except salvage value occur throughout the year and will be discounted by a "middle-of-year" discount figure.

2. New Construction will require 3 years; beneficial occupancy date will be 1995. Interim vehicle maintenance will be performed in the existing facilities.

3. Upgrade to existing facilities will require 2 years; vehicle maintenance will continue during upgrade.

4. Physical life of the upgraded facilities is 40 years; 60 years for the new facilities.

5. Straight line depreciation will be used to calculate the status quo salvage value; double declining balance method will be used to calculate the salvage value for the new facility.

6. Equipment life is 12 years.

7. Personnel costs will be slightly less than half of personnel costs for the status quo. (Based on comparison of current staffing needs for the 28 scattered facilities and projected staffing for a consolidated, state-of-the-art facility.)

8. Existing facilities will be demolished if the new facility is built.

9. The discount rate used for this OMB Circular A-104 analysis is 8.5 percent. All costs are in current (inflated) dollars.

RESULTS AND RECOMMENDATIONS:

ALTERNATIVE NAME	NPV	EUAC	SIR	DPP
1 Upgrade Status Quo	$82,330,420	$7,723,104		
2 New Construction	$69,486,507	$6,518,265	1.47	11.9 YEARS

DISCUSSION:

Costs and benefits of both options were analyzed over a 25-year period. Annual costs were discounted at an 8.5 percent rate, and then totalled to arrive at a net present value (NPV). The NPV results show the status quo option ($82 M) to be approximately $12 M more than new construction ($69.5 M). Thus, the government would need $12 M more (in present value terms, invested at 8.5 percent) to meet all the costs associated with the status quo option than it would need to finance the new construction option. The equivalent uniform annual cost (EUAC) shows that new construction is approximately $1.2 M less expensive per year (present value terms) than the status quo.

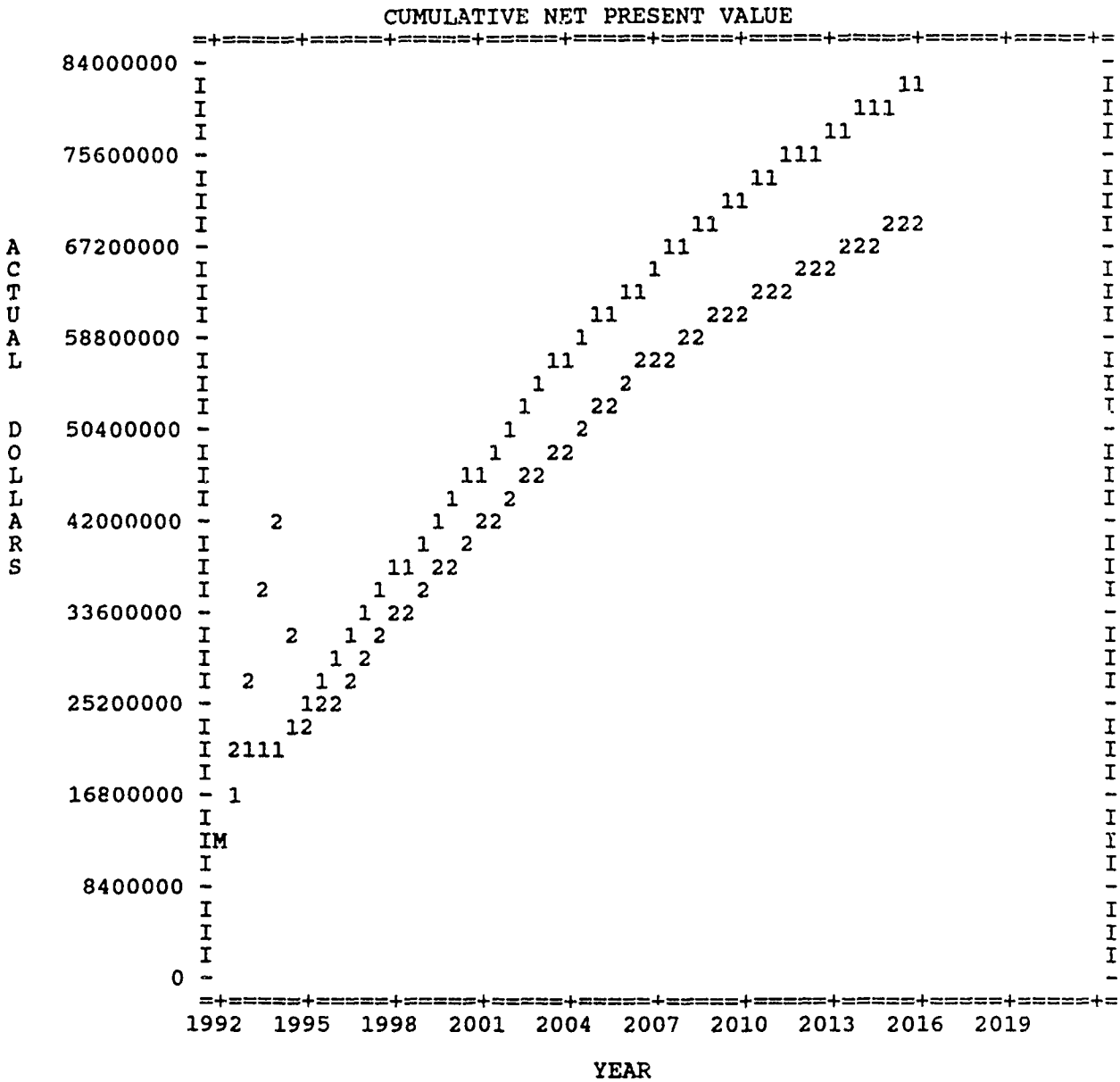
The comparison also shows a savings to investment ratio (SIR) of 1.47. That is, for every dollar invested in new construction,

DISCUSSION (cont.):
$1.47 in savings (over the status quo) will result. The discounted payback period (DPP) figure above indicates that the full investment in the new construction option will be repaid through savings in less than 12 years.

Based on the NPV, EUAC, SIR, and DPP results, new construction is determined to be the least cost option to meet this requirement and is recommended for funding.

ACTION OFFICER: John Doe, Good Officer, (123) 456-7890
ORGANIZATION : Fort Anywhere

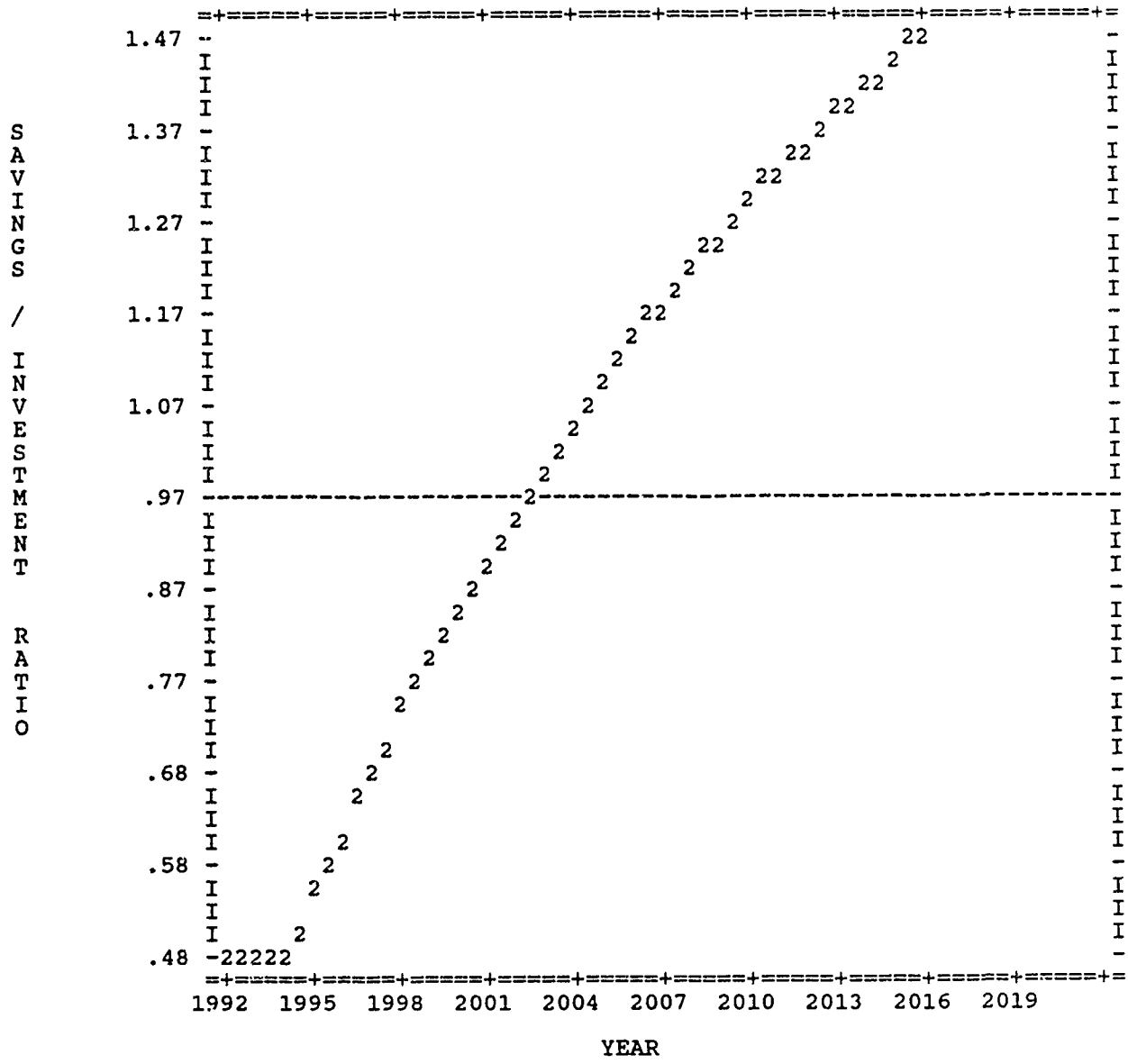
E C O N O M I C A N A L Y S I S G R A P H 1



LEGEND	DESCRIPTION
1	Upgrade Status Quo
2	New Construction
M	MERGING DATA

S I R E C O N O M I C A N A L Y S I S G R A P H 1

SIR VS. YEARS



LEGEND	DESCRIPTION
2	New Construction

PROJECT/PROGRAM COSTS

ALTERNATIVE 1: Upgrade Status Quo

YEAR	Initial Upgrade (01)	Equipment (02)	Annual M&R (03)	Annual Utilities (04)	Personnel Cost (05)
1992	$4,800,000	$3,540,684	$64,052	$196,450	$4,374,602
1993	$4,800,000	$0	$66,294	$203,325	$4,527,713
1994	$0	$0	$68,614	$210,442	$4,686,183
1995	$0	$0	$71,015	$217,807	$4,850,200
1996	$0	$0	$321,160	$225,431	$5,019,957
1997	$0	$0	$332,401	$233,321	$5,195,656
1998	$0	$0	$344,035	$241,487	$5,377,503
1999	$0	$0	$356,076	$249,939	$5,565,716
2000	$0	$0	$368,539	$258,687	$5,760,516
2001	$0	$0	$381,437	$267,741	$5,962,134
2002	$0	$0	$394,788	$277,112	$6,170,809
2003	$0	$3,540,684	$408,605	$286,811	$6,386,787
2004	$0	$0	$422,907	$296,849	$6,610,325
2005	$0	$0	$437,708	$307,239	$6,841,686
2006	$0	$0	$453,028	$317,992	$7,081,145
2007	$0	$0	$468,884	$329,122	$7,328,985
2008	$0	$0	$485,295	$340,641	$7,585,500
2009	$0	$0	$502,280	$352,564	$7,850,992
2010	$0	$0	$519,860	$364,904	$8,125,777
2011	$0	$0	$538,055	$377,675	$8,410,179
2012	$0	$0	$556,887	$390,894	$8,704,536
2013	$0	$0	$576,378	$404,575	$9,009,194
2014	$0	$0	$596,552	$418,735	$9,324,516
2015	$0	$0	$617,431	$433,391	$9,650,874
2016	$0	$0	$639,041	$448,560	$9,988,655
%NPV	10.76	5.81	3.97	3.44	76.66
	$8,855,287	$4,784,788	$3,264,709	$2,834,334	$63,115,878
DISCOUNTING CONVENTION	M-O-Y	M-O-Y	M-O-Y	M-O-Y	M-O-Y

PROJECT/PROGRAM COSTS

ALTERNATIVE 1: Upgrade Status Quo

YEAR	MHE Fuel (06)	TOTAL ANNUAL OUTLAYS	MIDDLE OF YEAR DISCOUNT FACTORS	PRESENT VALUE	CUMULATIVE PRESENT VALUE
1992	$5,232	$12,981,020	0.960	$12,462,177	$12,462,177
1993	$5,729	$9,603,061	0.885	$8,496,989	$20,959,166
1994	$6,273	$4,971,512	0.816	$4,054,284	$25,013,450
1995	$6,869	$5,145,891	0.752	$3,867,733	$28,881,183
1996	$7,522	$5,574,070	0.693	$3,861,343	$32,742,526
1997	$8,084	$5,769,462	0.638	$3,683,593	$36,426,119
1998	$8,529	$5,971,554	0.588	$3,513,938	$39,940,057
1999	$8,998	$6,180,729	0.542	$3,352,096	$43,292,153
2000	$9,493	$6,397,235	0.500	$3,19 ,713	$46,489,866
2001	$10,015	$6,621,327	0.461	$3,050,440	$49,540,306
2002	$10,566	$6,853,275	0.425	$2,909,952	$52,450,258
2003	$11,147	$10,634,034	0.391	$4,161,558	$56,611,816
2004	$11,760	$7,341,841	0.361	$2,648,092	$59,259,908
2005	$12,407	$7,599,040	0.332	$2,526,138	$61,786,046
2006	$13,089	$7,865,254	0.306	$2,409,802	$64,195,848
2007	$13,809	$8,140,800	0.282	$2,298,825	$66,494,673
2008	$14,569	$8,426,005	0.260	$2,192,959	$68,687,632
2009	$15,370	$8,721,206	0.240	$2,091,973	$70,779,605
2010	$16,216	$9,026,757	0.221	$1,995,636	$72,775,241
2011	$17,108	$9,343,017	0.204	$1,903,736	$74,678,977
2012	$18,049	$9,670,366	0.188	$1,816,072	$76,495,049
2013	$19,041	$10,009,188	0.173	$1,732,443	$78,227,492
2014	$20,089	$10,359,892	0.160	$1,652,668	$79,880,160
2015	$21,193	$10,722,889	0.147	$1,576,567	$81,456,727
2016	$22,359	$11,098,615	0.136	$1,503,971	$82,960,698
%NPV	0.13				
	$105,702				

DISCOUNTING CONVENTION M-O-Y

PROJECT/PROGRAM COSTS

ALTERNATIVE 1: Upgrade Status Quo

YEAR	PRESENT VALUE RESIDUAL	CUMULATIVE NET PRESENT VALUE
1992	$0	$12,462,177
1993	$0	$20,959,166
1994	$4,082,390	$20,931,060
1995	$3,794,408	$25,086,775
1996	$3,524,299	$29,218,227
1997	$3,271,027	$33,155,092
1998	$3,033,614	$36,906,443
1999	$2,811,135	$40,481,018
2000	$2,602,720	$43,887,146
2001	$2,407,543	$47,132,763
2002	$2,224,828	$50,225,430
2003	$2,053,840	$54,557,976
2004	$1,893,886	$57,366,022
2005	$1,744,313	$60,041,733
2006	$1,604,504	$62,591,344
2007	$1,473,876	$65,020,797
2008	$1,351,881	$67,335,751
2009	$1,237,999	$69,541,606
2010	$1,131,742	$71,643,499
2011	$1,032,649	$73,646,328
2012	$940,286	$75,554,763
2013	$854,243	$77,373,249
2014	$774,133	$79,106,027
2015	$699,592	$80,757,135
2016	$630,278	$82,330,420
%NPV	-0.77	
	$630,278	
DISCOUNTING CONVENTION	E-O-Y	

EQUIVALENT UNIFORM ANNUAL COST = $7,723,104 (8.50% DISCOUNT RATE, 25 YEARS)

EXPENSE ITEMS 3, 4 AND 5 USED INFLATION INDEX 1 - OSD PBC Memo.
EXPENSE ITEM 6 USED INFLATION INDEX 2 - Fuel - MHE.

PROJECT/PROGRAM COSTS

ALTERNATIVE 2: New Construction

YEAR	Initial Construction Cost (01)	Equipment (02)	Annual M&R (03)	Annual Utilities (04)	Personnel Cost (05)
1992	$9,000,000	$0	$64,052	$181,100	$4,374,602
1993	$9,000,000	$3,123,275	$66,294	$187,438	$4,527,713
1994	$9,000,000	$3,123,275	$68,614	$193,999	$4,686,183
1995	$0	$0	$265,294	$272,400	$2,255,907
1996	$0	$0	$274,579	$281,934	$2,334,863
1997	$0	$0	$284,190	$291,802	$2,416,584
1998	$0	$0	$294,136	$302,015	$2,501,164
1999	$0	$0	$304,431	$312,586	$2,588,705
2000	$0	$0	$315,086	$323,526	$2,679,310
2001	$0	$0	$326,114	$334,850	$2,773,085
2002	$0	$0	$337,528	$346,569	$2,870,143
2003	$0	$0	$349,342	$358,699	$2,970,598
2004	$0	$0	$361,569	$371,254	$3,074,569
2005	$0	$3,123,275	$374,224	$384,248	$3,182,179
2006	$0	$3,123,275	$387,322	$397,696	$3,293,556
2007	$0	$0	$400,878	$411,616	$3,408,830
2008	$0	$0	$414,909	$426,022	$3,528,139
2009	$0	$0	$429,431	$440,933	$3,651,624
2010	$0	$0	$444,461	$456,366	$3,779,431
2011	$0	$0	$460,017	$472,339	$3,911,711
2012	$0	$0	$476,117	$488,871	$4,048,621
2013	$0	$0	$492,782	$505,981	$4,190,323
2014	$0	$0	$510,029	$523,690	$4,336,984
2015	$0	$0	$527,880	$542,020	$4,488,779
2016	$0	$0	$546,356	$560,990	$4,645,886
%NPV	34.46	10.51	4.27	4.85	51.51
	$23,943,192	$7,305,772	$2,970,504	$3,367,169	$35,789,564
DISCOUNTING CONVENTION	M-O-Y	M-O-Y	M-O-Y	M-O-Y	M-O-Y

PROJECT/PROGRAM COSTS

ALTERNATIVE 2: New Construction

YEAR	MHE Fuel (06)	TOTAL ANNUAL OUTLAYS	MIDDLE OF YEAR DISCOUNT FACTORS	PRESENT VALUE	CUMULATIVE PRESENT VALUE
1992	$5,232	$13,624,986	0.960	$13,080,404	$13,080,404
1993	$5,729	$16,910,449	0.885	$14,962,718	$28,043,122
1994	$6,273	$17,078,344	0.816	$13,927,443	$41,970,565
1995	$2,472	$2,796,073	0.752	$2,101,572	$44,072,137
1996	$2,707	$2,894,083	0.693	$2,004,828	$46,076,965
1997	$2,910	$2,995,486	0.638	$1,912,510	$47,989,475
1998	$3,070	$3,100,385	0.588	$1,824,408	$49,813,883
1999	$3,239	$3,208,961	0.542	$1,740,368	$51,554,251
2000	$3,417	$3,321,339	0.500	$1,660,199	$53,214,450
2001	$3,605	$3,437,654	0.461	$1,583,724	$54,798,174
2002	$3,803	$3,558,043	0.425	$1,510,772	$56,308,946
2003	$4,013	$3,682,652	0.391	$1,441,180	$57,750,126
2004	$4,233	$3,811,625	0.361	$1,374,795	$59,124,921
2005	$4,466	$7,068,392	0.332	$2,349,734	$61,474,655
2006	$4,712	$7,206,561	0.306	$2,207,987	$63,682,642
2007	$4,971	$4,226,295	0.282	$1,193,433	$64,876,075
2008	$5,245	$4,374,315	0.260	$1,138,463	$66,014,538
2009	$5,533	$4,527,521	0.240	$1,086,024	$67,100,562
2010	$5,837	$4,686,095	0.221	$1,036,001	$68,136,563
2011	$6,158	$4,850,225	0.204	$988,283	$69,124,846
2012	$6,497	$5,020,106	0.188	$942,762	$70,067,608
2013	$6,855	$5,195,941	0.173	$899,341	$70,966,949
2014	$7,232	$5,377,935	0.160	$857,917	$71,824,866
2015	$7,629	$5,566,308	0.147	$818,403	$72,643,269
2016	$8,049	$5,761,191	0.136	$780,709	$73,423,978
%NPV	0.07				
	$47,777				
DISCOUNTING CONVENTION	M-O-Y				

PROJECT/PROGRAM COSTS

ALTERNATIVE 2: New Construction

YEAR	PRESENT VALUE RESIDUAL	CUMULATIVE NET PRESENT VALUE
1992	$0	$13,080,404
1993	$0	$28,043,122
1994	$0	$41,970,565
1995	$21,611,402	$22,460,735
1996	$19,928,302	$26,148,663
1997	$18,376,282	$29,613,193
1998	$16,945,134	$32,868,749
1999	$15,625,443	$35,928,808
2000	$14,408,532	$38,805,918
2001	$13,286,393	$41,511,781
2002	$12,251,645	$44,057,301
2003	$11,297,485	$46,452,641
2004	$10,417,635	$48,707,286
2005	$9,606,307	$51,868,348
2006	$8,858,166	$54,824,476
2007	$8,168,290	$56,707,785
2008	$7,532,143	$58,482,395
2009	$6,945,538	$60,155,024
2010	$6,404,618	$61,731,945
2011	$5,905,825	$63,219,021
2012	$5,445,879	$64,621,729
2013	$5,021,752	$65,945,197
2014	$4,630,657	$67,194,209
2015	$4,270,021	$68,373,248
2016	$3,937,471	$69,486,507
%NPV	-5.67	
	$3,937,471	
DISCOUNTING CONVENTION	E-O-Y	

EQUIVALENT UNIFORM ANNUAL COST = $6,518,265 (8.50% DISCOUNT RATE, 25 YEARS)

EXPENSE ITEMS 3, 4 AND 5 USED INFLATION INDEX 1 - OSD PBC Memo.
EXPENSE ITEM 6 USED INFLATION INDEX 2 - Fuel - MHE.

PRIMARY ECONOMIC ANALYSIS

Present Alternative: Upgrade Status Quo
Proposed Alternative: New Construction

Project Year(s)	Recurring Annual Operating Costs Present Alternative	Recurring Annual Operating Costs Proposed Alternative	Differential Cost	Present Value Factor	Present Value of Differential Cost
1992	$4,640,336	$4,624,986	$15,350	0.960	$14,737
1993	$4,803,061	$4,787,174	$15,887	0.885	$14,058
1994	$4,971,512	$4,955,069	$16,443	0.816	$13,409
1995	$5,145,891	$2,796,073	$2,349,818	0.752	$1,766,161
1996	$5,574,070	$2,894,083	$2,679,987	0.693	$1,856,515
1997	$5,769,462	$2,995,486	$2,773,976	0.638	$1,771,083
1998	$5,971,554	$3,100,385	$2,871,169	0.588	$1,689,530
1999	$6,180,729	$3,208,961	$2.971,768	0.542	$1,611,728
2000	$6,397,235	$3,321,339	$3,075,896	0.500	$1,537,514
2001	$6,621,327	$3,437,654	$3,183,673	0.461	$1,466,716
2002	$6,853,275	$3,558,043	$3,295,232	0.425	$1,399,180
2003	$7,093,350	$3,682,652	$3,410,698	0.391	$1,334,755
2004	$7,341,841	$3,811,625	$3,530,216	0.361	$1,273,297
2005	$7,599,040	$3,945,117	$3,653,923	0.332	$1,214,670
2006	$7,865,254	$4,083,286	$3,781,968	0.306	$1,158,742
2007	$8,140,800	$4,226,295	$3,914,505	0.282	$1,105,392
2008	$8,426,005	$4,374,315	$4,051,690	0.260	$1,054,496
2009	$8,721,206	$4,527,521	$4,193,685	0.240	$1,005,949
2010	$9,026,757	$4,686,095	$4,340,662	0.221	$959,635
2011	$9,343,017	$4,850,225	$4,492,792	0.204	$915,453
2012	$9,670,366	$5,020,106	$4,650,260	0.188	$873,310
2013	$10,009,188	$5,195,941	$4,813,247	0.173	$833,102
2014	$10,359,892	$5,377,935	$4,981,957	0.160	$794,751
2015	$10,722,889	$5,566,308	$5,156,581	0.147	$758,164
2016	$11,098,615	$5,761,281	$5,337,334	0.136	$723,262
Totals	$188,346,672	$104,787,955	$83,558,717		$27,145,609

PRIMARY ECONOMIC ANALYSIS

Total present value of investment	$31,248,964
Plus: present value of existing assets to be used	$0
Less: present value of existing assets replaced	$0
Less: present value of terminal value of alternative	$3,937,471
Total present value of net investment	$27,311,493
Total present value of differential costs	$27,145,609
Plus: present value of cost of refurbishment or modification eliminated	$13,640,075
Less: status quo salvage value	$630,278
Total present value of savings	$40,155,406
Savings/Investment ratio	1.47
Discounted Payback Period	11.9 years

For Status Quo

Recurring Costs - Expense Item(s) 3 4 5 6
Refurbishment Costs - Expense Item(s) 1 2

For Proposed Alternative

Recurring Costs - Expense Item(s) 3 4 5 6
Investment Costs - Expense Item(s) 1 2

SOURCE AND DERIVATION OF COSTS AND BENEFITS:

1. STATUS QUO.

a. Initial Upgrade. This includes all necessary repair and replacement items to bring the facilities to standard, and to provide the necessary space for performing the maintenance mission.

Primary Facility	SF	210,000	32.67	6,860,700
Supporting Facility (20 %)				1,372,140
Subtotal				8,232,840
Contingency (10 %)				823,284
Total Contract Cost				9,056,124
SIOH (6%)				543,317
Total Request				9,599,491
Total Request (rounded)				9,600,000

Source: DD 1391 Processor System

b. Equipment - $3,540,684

Material Handling Equipment - 15 at $50,000 = $750,000

9 Overhead Cranes at $310,076 = $2,790,684

Total = $3,540,684

Source: Directorate of Logistics

c. Annual M&R. Includes day to day maintenance, exclusive of engineering services. (Major repair is included in maintenance cost from 1995 and beyond).

until 1995: $0.34/SF x 185,176 SF = $62,960

after 1995: $1.31/SF x 210,000 = $275,000

Source: until 1995, "Redbook"
after 1995, "Maintenance Resource Prediction Model (MRPM)"

d. Annual Utilities. Although the SF will be different after 1995, it is assumed that utilities cost for the upgraded facilities

SOURCE AND DERIVATION OF COSTS AND BENEFITS (cont.):
will remain constant:

$0.9195/SF x 210,000 SF = $193,095, rounded to $193,100

Source: "Redbook"

e. Personnel. Average grade employee is GS 6 step 4; 150 employees.

$20,476/yr x 1.40 (benefits) = $28,667/yr x 150 = $4,300,000/yr.

Source: Directorate of Resource Management.

f. MHE fuel. Maintenance of MHE is included under general M&R above.

15 MHE x 20 hrs per week x 50 weeks x $0.33/hr fuel = $5,000/yr

Source: Directorate of Logistics.

2. NEW CONSTRUCTION.

a. Construction Cost. $27 M per front page DD Form 1391.

b. Equipment - $6,246,550 over two years, again after 12 years.

Material Handling Equipment - 5 at $50,000 = $250,000

10 Overhead Cranes at $599,655 = $5,996,550

Total = $6,246,550 / 2 years = $3,123,275/yr

Source: Directorate of Logistics

c. Annual M&R. Includes day to day maintenance, exclusive of engineering services. (Major repair is included in maintenance cost from 1995 and beyond).

until 1995: $0.34/SF x 185,176 SF = $62,960

after 1995: $1.12/SF x 210,000 = $235,200

Source: until 1995, "Redbook"
after 1995, "Maintenance Resource Prediction Model (MRPM)"

d. Annual Utilities. Although the SF will be different after 1995, it is assumed that utilities cost for the upgraded facilities will remain constant:

SOURCE AND DERIVATION OF COSTS AND BENEFITS (cont.):

$1.15/SF x 210,000 SF = $241,500.

Source: Based on historical records at DEH for recently built maintenance facilities.

e. Personnel. Same as status quo until 1995, then: average grade employee is GS 5 step 4; 75 employees.

$19,047/yr x 1.40 (benefits) = $26,667/yr x 75 = $2,000,000/yr.

Source: Directorate of Resource Management.

f. MHE fuel. Maintenance of MHE is included under general M&R above.

5 MHE x 21.8 hrs per week x 50 weeks x $0.33/hr fuel = $1,800/yr

Source: Directorate of Logistics.

COST SENSITIVITY ANALYSIS NUMBER 01
TITLE ..... Test Equipment & Construction

ALLOWABLE CHANGE ..... 50.00 PERCENT

This sensitivity analysis checks for alternative 1 to be ranked least cost as a result of changes in the expense item(s) listed below:

ALTERNATIVE	EXPENSE ITEM(S)
1 - Upgrade Status Quo	2 - Equipment
2 - New Construction	1 - Initial Construction

The selected expense items are allowed to vary from a value of 100% less than their input value to 50.00% more than their input value.

ALTERNATIVE	NET PRESENT VALUE
2 - New Construction	$69,486,507
1 - Upgrade Status Quo	$82,330,420

TABLE OF PERCENT CHANGES WHERE ALTERNATIVES' NPVs ARE EQUAL

% CHANGE OF COST ITEMS FOR ALTERNATIVE 2 (INITIALLY LEAST COST)	% CHANGE OF COST ITEMS FOR ALTERNATIVE 1 (INITIALLY HIGHER COST)	NET PRESENT VALUE
33.66	-100.00	$77,545,632
34.66	-95.00	$77,785,064
35.66	-89.99	$78,024,496
36.66	-84.99	$78,263,928
37.66	-79.98	$78,503,360
38.66	-74.98	$78,742,792
39.66	-69.98	$78,982,224
40.66	-64.97	$79,221,655
41.66	-59.97	$79,461,087
42.66	-54.96	$79,700,519
43.66	-49.96	$79,939,951
44.66	-44.96	$80,179,383
45.66	-39.95	$80,418,815
46.66	-34.95	$80,658,247
47.66	-29.94	$80,897,679
48.66	-24.94	$81,137,111
49.66	-19.94	$81,376,543
50.00	-18.23	$81,458,103

EXPLANATION OF TABLE USE: FOR ANY NUMBER IN THE FIRST COLUMN, RANKING REVERSAL WILL OCCUR IF THE CHANGE IN EXPENSE ITEM(S) FOR THE OTHER ALTERNATIVE FALLS IN THE RANGE OF -100% TO THE CORRESPONDING NUMBER IN THE SECOND COLUMN. FOR EXAMPLE: FOR A CHANGE OF 42.66% IN THE SELECTED EXPENSE ITEMS OF ALTERNATIVE 2, ANY % CHANGE IN THE SELECTED EXPENSE ITEMS OF ALTERNATIVE 1 IN THE RANGE OF -100% TO -54.96% WILL RESULT IN ALTERNATIVE 1 HAVING A NPV LESS THAN THAT OF ALTERNATIVE 2.

```
0001: * VERSION 3.0
0002: PROJECT TITLE IS 'Consolidated Maintenance Facility'
0003: ACTION OFFICER IS 'John Doe, Good Officer, (123) 456-7890'
0004: ORGANIZATION IS 'Fort Anywhere'
0005: OBJECTIVE IS &
0006: 'Provide 210,000 SF of maintenance shops'&
0007: ' '&
0008: ' '
0009: *
0010: BEGIN ASSUMPTIONS
0011:
0012: 1.  All costs except salvage value occur throughout the year and
0013: will be discounted by a "middle-of-year" discount figure.
0014:
0015: 2.  New Construction will require 3 years; beneficial occupancy
0016: date will be 1995.  Interim vehicle maintenance will be performed
0017: in the existing facilities.
0018:
0019: 3.  Upgrade to existing facilities will require 2 years; vehicle
0020: maintenance will continue during upgrade.
0021:
0022: 4.  Physical life of the upgraded facilities is 40 years; 60 years
0023: for the new facilities.
0024:
0025: 5.  Straight line depreciation will be used to calculate the status
0026: quo salvage value; double declining balance method will be used to
0027: calculate the salvage value for the new facility.
0028:
0029: 6.  Equipment life is 12 years.
0030:
0031: 7.  Personnel costs will be slightly less than half of personnel
0032: costs for the status quo.  (Based on comparison of current staffing
0033: needs for the 28 scattered facilities and projected staffing for a
0034: consolidated, state-of-the-art facility.)
0035:
0036: 8.  Existing facilities will be demolished if the new facility is
0037: built.
0038:
0039: 9.  The discount rate used for this OMB Circular A-104 analysis is
0040: 8.5 percent.  All costs are in current (inflated) dollars.
0041:
0042: END ASSUMPTIONS
0043: *
0044: BEGIN DISCUSSION OF ALTERNATIVES
0045:
0046: The following alternatives were considered in this economic
0047: analysis:
0048:
0049: New Construction:
0050:
```

```
0051:   Construction of a consolidated maintenance facility.  This
0052: alternative replaces the existing vintage temporary buildings and
0053: provides the necessary 210,000 SF of maintenance space.
0054:
0055: Status Quo (Upgrade):
0056:
0057:   Upgrade the existing facilities.  Currently, 28 separate,
0058: dispersed facilities exist, spread over a 5-mile radius.  These
0059: facilities will be modified to provide the necessary maintenance
0060: space.
0061:
0062: The following alternatives were considered, but rejected as
0063: infeasible, and were not considered in this economic analysis:
0064:
0065: Do Nothing:
0066:
0067:   Current facilities do not meet fire and safety codes and cannot
0068: provide maintenance for 3 battalions.
0069:
0070: Lease or Contract:
0071:
0072:   No facilities or services for this type of function exist within
0073: a 100-mile radius.  (Chamber of Commerce was consulted for
0074: possibilities.)
0075:
0076: Use of other DoD installations:
0077:
0078:   The nearest DoD installation is only 4 miles away, but has no
0079: capability (facilities or infrastructure) to meet this type of
0080: requirement.  (DEH was contacted)  The nearest installation with
0081: facilities of this type available is over 800 miles distant.  This
0082: option is not feasible.
0083: END DISCUSSION OF ALTERNATIVES
0084: *
0085: BEGIN DATA
0086: PERIOD OF ANALYSIS IS 25 YEARS
0087: START YEAR IS 1992
0088: BASE YEAR IS 1992
0089: DISCOUNT RATE IS 8.50
0090: GLOBAL DISCOUNTING CONVENTION IS 2
0091: INFLATION INDEX  1 IS 'OSD PBC Memo' &
0092: 25*0.035 35*0.00
0093: INFLATION INDEX  2 IS 'Fuel - MHE' &.
0094: 5*0.095 20*0.055 35*0.00
0095: RESIDUAL SCHEDULE  1 IS 'Building Depreciatn' &
0096: 1*0.983 1*0.966 1*0.95 1*0.934 1*0.918 1*0.902 1*0.887 1*0.872 1*0.857 &
0097: 1*0.842 1*0.828 1*0.814 1*0.80 1*0.787 1*0.773 1*0.76 1*0.747 1*0.734 &
0098: 1*0.722 1*0.71 1*0.698 1*0.686 1*0.674 1*0.663 1*0.651 1*0.64 1*0.629 &
0099: 1*0.619 1*0.608 1*0.598 1*0.588 1*0.578 1*0.568 1*0.558 1*0.549 1*0.539
0100: 1*0.53 1*0.521 1*0.512 1*0.504 1*0.495 1*0.487 1*0.478 1*0.47 1*0.462 &
```

```
0101: 1*0.454 1*0.447 1*0.439 1*0.432 1*0.424 1*0.417 1*0.41 1*0.403 1*0.396 &
0102: 1*0.389 1*0.383 1*0.376 1*0.37 1*0.364 1*0.357
0103: PRIMARY ANALYSIS
0104: COST STORED IN 'ACTUAL' DOLLARS
0105: END DATA
0106: *
0107: BEGIN ALTERNATIVE  1
0108: ALTERNATIVE NAME IS &
0109: 'Upgrade Status Quo'
0110: EXPENSE ITEM  1 IS 'Initial:Upgrade: ' &
0111: 2*4800000 23*0
0112: EXPENSE ITEM  2 IS 'Equipment: : ' &
0113: 1*3540684 10*0 1*3540684 13*0
0114: EXPENSE ITEM  3 IS 'Annual M&R: : ' &
0115: 4*62960 21*275100
0116: EXPENSE ITEM  4 IS 'Annual:Utilities: ' &
0117: 25*193100
0118: EXPENSE ITEM  5 IS 'Personnel:Cost: ' &
0119: 25*4300000
0120: EXPENSE ITEM  6 IS 'MHE Fuel: : ' &
0121: 25*5000
0122: INFLATION FACTORS ARE &
0123: 2*0 3*1 1*2
0124: DISCOUNT FACTORS ARE &
0125: 6*2
0126: RESIDUAL TYPE IS SL
0127: RESIDUAL START VALUE IS 4823675
0128: RESIDUAL LIFE IS 40 YEARS
0129: RESIDUAL BEGINS IN 1994
0130: RESIDUAL INFLATION INDEX IS  1
0131: RESIDUAL DISCOUNTING CONVENTION IS 3
0132: RECURRING COSTS ARE &
0133: 3 4 5 6
0134: REFURBISHMENT COSTS ARE &
0135: 1 2
0136: END ALTERNATIVE  1
0137: *
0138: BEGIN ALTERNATIVE  2
0139: ALTERNATIVE NAME IS &
0140: 'New Construction'
0141: EXPENSE ITEM  1 IS 'Initial:Construction:Cost' &
0142: 3*9000000 22*0
0143: EXPENSE ITEM  2 IS 'Equipment: : ' &
0144: 1*0 2*3123275 10*0 2*3123275 10*0
0145: EXPENSE ITEM  3 IS 'Annual:M&R: ' &
0146: 3*62960 22*235200
0147: EXPENSE ITEM  4 IS 'Annual:Utilities: ' &
0148: 3*178012 22*241500
0149: EXPENSE ITEM  5 IS 'Personnel:Cost: ' &
0150: 3*4300000 22*2000000
```

```
0151: EXPENSE ITEM  6 IS 'MHE Fuel: : ' &
0152: 3*5000 22*1800
0153: INFLATION FACTORS ARE &
0154: 2*0 3*1 1*2
0155: DISCOUNT FACTORS ARE &
0156: 6*2
0157: RESIDUAL TYPE IS DB
0158: RESIDUAL START VALUE IS 27000000
0159: RESIDUAL LIFE IS 60 YEARS
0160: RESIDUAL BEGINS IN 1995
0161: RESIDUAL INFLATION INDEX IS  1
0162: RESIDUAL DISCOUNTING CONVENTION IS 3
0163: RECURRING COSTS ARE &
0164: 3 4 5 6
0165: INVESTMENT COSTS ARE &
0166: 1 2
0167: END ALTERNATIVE  2
0168: *
0169: BEGIN SOURCE/DERIVATION
0170:
0171: 1.  STATUS QUO.
0172:
0173:   a.  Initial Upgrade.  This includes all necessary repair and
0174: replacement items to bring the facilities to standard, and to
0175: provide the necessary space for performing the maintenance mission.
0176:
0177:
0178: Primary Facility        SF         210,000    32.67     6,860,700
0179:
0180: Supporting Facility (20 %)                              1,372,140
0181:
0182:  Subtotal                                               8,232,840
0183:
0184: Contingency (10 %)                                       823,284
0185:
0186:  Total Contract Cost                                    9,056,124
0187:
0188: SIOH (6%)                                               543,317
0189:
0190:   Total Request                                        9,599,491
0191:
0192:   Total Request (rounded)                              9,600,000
0193:
0194:   Source:  DD 1391 Processor System
0195:
0196:
0197:   b.  Equipment - $3,540,684
0198:
0199:     Material Handling Equipment - 15 at $50,000 = $750,000
0200:
```

9 Overhead Cranes at $310,076 = $2,790,684

Total = $3,540,684

Source: Directorate of Logistics

c. Annual M&R. Includes day to day maintenance, exclusive of engineering services. (Major repair is included in maintenance cost from 1995 and beyond).

until 1995: $0.34/SF x 185,176 SF = $62,960

after 1995: $1.31/SF x 210,000 = $275,000

Source: until 1995, "Redbook"
after 1995, "Maintenance Resource Prediction Model (MRPM)"

d. Annual Utilities. Although the SF will be different after 1995, it is assumed that utilities cost for the upgraded facilities will remain constant:

$0.9195/SF x 210,000 SF = $193,095, rounded to $193,100

Source: "Redbook"

e. Personnel. Average grade employee is GS 6 step 4; 150 employees.

$20,476/yr x 1.40 (benefits) = $28,667/yr x 150 = $4,300,000/yr.

Source: Directorate of Resource Management.

f. MHE fuel. Maintenance of MHE is included under general M&R above.

15 MHE x 20 hrs per week x 50 weeks x $0.33/hr fuel = $5,000/yr

Source: Directorate of Logistics.

2. NEW CONSTRUCTION.

a. Construction Cost. $27 M per front page DD Form 1391.

b. Equipment - $6,246,550 over two years, again after 12 years.

Material Handling Equipment - 5 at $50,000 = $250,000

10 Overhead Cranes at $599,655 = $5,996,550

```
0251:
0252:     Total = $6,246,550 / 2 years = $3,123,275/yr
0253:
0254:     Source:  Directorate of Logistics
0255:
0256:   c.  Annual M&R.  Includes day to day maintenance, exclusive of
0257: engineering services.  (Major repair is included in maintenance
0258: cost from 1995 and beyond).
0259:
0260:     until 1995:  $0.34/SF x 185,176 SF = $62,960
0261:
0262:     after 1995:  $1.12/SF x 210,000 = $235,200
0263:
0264:     Source:  until 1995, "Redbook"
0265:       after 1995, "Maintenance Resource Prediction Model (MRPM)"
0266:
0267:   d.  Annual Utilities.  Although the SF will be different after
0268: 1995, it is assumed that utilities cost for the upgraded facilities
0269: will remain constant:
0270:
0271:     $1.15/SF x 210,000 SF = $241,500.
0272:
0273:     Source:  Based on historical records at DEH for recently built
0274: maintenance facilities.
0275:
0276:   e.  Personnel.  Same as status quo until 1995, then: average
0277: grade employee is GS 5 step 4; 75 employees.
0278:
0279:     $19,047/yr x 1.40 (benefits) = $26,667/yr x 75 = $2,000,000/yr.
0280:
0281:     Source:  Directorate of Resource Management.
0282:
0283:   f.  MHE fuel.  Maintenance of MHE is included under general M&R
0284: above.
0285:
0286:     5 MHE x 21.8 hrs per week x 50 weeks x $0.33/hr fuel = $1,800/yr
0287:
0288:     Source:  Directorate of Logistics.
0289:
0290: END SOURCE/DERIVATION
0291: *
0292: BEGIN GRAPHICS 1
0293: PLOT ALTERNATIVES 1 2
0294: END GRAPHICS 1
0295: *
0296: BEGIN SIR GRAPHICS 1
0297: PLOT ALTERNATIVES 2
0298: END SIR GRAPHICS 1
0299: *
0300: BEGIN COST SENSITIVITY ANALYSIS  1
```

```
0301: TITLE IS 'Test Equipment & Construction'
0302: ALTERNATIVES ARE  1  2
0303: CHANGE  1 2
0304: CHANGE  2 1
0305: LIMIT IS 50.00
0306: END COST SENSITIVITY ANAL/SIS  1
0307: *
0308: BEGIN RESULTS
0309:
0310:   Costs and benefits of both options were analyzed over a 25-year
0311: period.  Annual costs were discounted at an 8.5 percent rate, and
0312: then totalled to arrive at a net present value (NPV).  The NPV
0313: results show the status quo option ($82 M) to be approximately
0314: $12 M more than new construction ($69.5 M).  Thus, the government
0315: would need $12 M more (in present value terms, invested at 8.5
0316: percent) to meet all the costs associated with the status quo
0317: option than it would need to finance the new construction option.
0318: The equivalent uniform annual cost (EUAC) shows that new
0319: construction is approximately $1.2 M less expensive per year
0320: (present value terms) than the status quo.
0321:
0322:   The comparison also shows a savings to investment ratio (SIR) of
0323: 1.47.  That is, for every dollar invested in new construction,
0324: $1.47 in savings (over the status quo) will result.  The discounted
0325: payback period (DPP) figure above indicates that the full
0326: investment in the new construction option will be repaid through
0327: savings in less than 12 years.
0328:
0329:   Based on the NPV, EUAC, SIR, and DPP results, new construction is
0330: determined to be the least cost option to meet this requirement and
0331: is recommended for funding.
0332: END RESULTS
0333: *
0334: STOP RUN
```

APPENDIX C

UPLOADING/DOWNLOADING ECONPACK FILES

C.0 **INTRODUCTION**. Economic analysis data on the automated DD1391 Form is stored in Section 11 entitled ECONOMIC ANALYSIS. The System allows the user to transmit an economic analysis report from the PC-ECONPACK system to the mainframe ECONPACK module. Additionally, blocks are provided for user entry of appropriate text related to the economic justification and/or the consideration of alternatives. The economic analysis report is uploaded into Section 11, Block 11E. On the previous automated DD1391 Form, the economic analysis report was transferred into Special Requirements Paragraph 1 (SRP1). The DD1391 Processor System also allows for transferring of ECONPACK files from the mainframe to the PC system. Appendix C, Section C.1 of this manual describes the procedure for transferring an economic analysis report into a DD1391 Form. Appendix C, Section C.2 describes the procedure for downloading an economic analysis input ECONPACK file to the PC.

C.1 **TRANSMITTING AN ECONOMIC ANALYSIS REPORT INTO A DD1391 FORM**. The DD1391 Processor System allows the user to transfer an economic analysis report into the automated DD1391 Form from either the mainframe ECONPACK module or from the PC-ECONPACK system. The procedure varies dependent upon the user's communications package. The following sections provide an explanation of the various procedures.

C.1.1 **Uploading an economic analysis report file using the TYMCOMM communications package**.

Follow the steps for logging onto the DD1391 Processor System. At the DD1391 PROCESSOR SYSTEM MAIN MENU, select the option number which corresponds to the DD1391 Module. If applicable, select the appropriate Activity level. At the DD1391 MODULE MENU prompt, select the FORM PREPARE/RECALL option number. Select the RECALL FORM option number and enter the form number to be accessed. At the next prompt, type 11 (CR) to indicate Section 11-ECONOMIC ANALYSIS is to be accessed. The first time the section is accessed, the System prompts for the name, organization, and phone number of the revisor. Subsequent recalls require verification of the revisor information. The System displays the revision date. This example begins at the DD1391 FORM PREPARE/RECALL MENU.

EXAMPLE:

DD1391 FORM PREPARE/RECALL MENU

10/11/91
13:55:49

1. PREPARE FORMS (PREPARE)
2. RECALL FORMS (RECALL)

ENTER MENU OPTION NUMBER, A COMMAND, QUIT, OR LOG
>2 (CR)

Option 2 allows the user to recall an existing form.

FORM NUMBER
>[Enter form number.] (CR)

Enter the form number of the form into which the economic analysis report is to be transferred.

ENTER SECTION NUMBER
>11 (CR)

Section 11 is reserved for economic analysis data.

REVISOR NAME = _____ (CR)
REVISOR ORG = _____ (CR)
REVISOR PHONE = _____ (CR)
REVISION DATE = _____ (CR)

Respond appropriately to provide revisor information.

DO YOU WISH TO CHANGE REVISOR INFO.?
>N (CR)

11A IS PROJECT EXEMPT FROM ECONOMIC ANALYSIS (Y/N)? = N
>N (CR)

If Y is entered, the user should enter a precise and concise statement of the facts justifying the exemption in Block 11D. Block 11E allows additional justification.

11B. RETRIEVE DATA FROM ECONPACK (Y/N)? = Y
>Y (CR)

Y for YES allows the user to retrieve an economic analysis report from PC-ECONPACK or from the mainframe ECONPACK module.

Enter ECONPACK Filename
>[Enter the filename assigned the economic analysis file.] (CR)

Enter only the first name (filename) of the desired file. Do not include filetype or extension. The System first checks the mainframe permanent disk storage area for the specified file. If the filename is located, the transfer is executed. If the filename is not located, the System assumes the file is a PC file and prompts for the PC directory specification.

ENTER THE PC DIRECTORY WHERE YOUR ECONPACK FILE RESIDES (<CR> TO DEFAULT TO \ECONPACK\FILES):
>[Enter the appropriate directory path.] (CR)

Report files can only be transferred from the PC-ECONPACK program or the mainframe ECONPACK module. Do not enter a disk specification. Enter only the directory path information. The default is \ECONPACK\FILES.

Which communications program are you using now?
1) Tymcomm 2) Vistacom 3) V52 4) Other 0) QUIT?
>1 (CR)
Transferring C:\ECONPACK\FILES\F12345.INP

Enter 1 to indicate Tymcomm is the communications software being used. The System executes the transfer and informs the user of the action. The input file is stored to the common directory and is not a part of the data entered in Block 11E.

At this point, the economic analysis report is transferred into Section 11, Block 11E. The data is available for display only, but can be deleted or replaced. To display the data, use the /VIEW command (/VIEW or /VIEW 11E). When the user executes the /SAVE command, the System saves the data entered in Section 11 to the permanent copy of the form, stores a copy of the input file to the ECONPACK common directory with the form number as a filename, and exits the section to the previously accessed menu.

EXAMPLE:

11D ECONOMIC JUSTIFICATION SUMMARY
Enter a form command or EDIT to create or modify text.
>/SAVE (CR)

/SAVE causes the data to be entered to the permanent copy of the form. If /QUIT or /QQUIT is executed, the data is not stored to the form and the input file does not become a part of the common directory.

DD1391 FORM PREPARE/RECALL MENU

10/11/91
14:05:27

1. PREPARE FORMS (PREPARE)
2. RECALL FORMS (RECALL)

ENTER MENU OPTION NUMBER, A COMMAND, QUIT, OR LOG

>

The user now follows the procedures for logging off the System or executing other tasks.

C.1.2. Using a communications package other than Tymcomm to upload an economic analysis report.

Follow the steps for logging onto the DD1391 Processor System. At the DD1391 PROCESSOR SYSTEM MAIN MENU, select the option number which corresponds to the DD1391 Module. If applicable, select the appropriate Activity level. At the DD1391 MODULE MENU prompt, select the FORM PREPARE/RECALL option number. Select the RECALL FORM option number and enter the form number to be accessed. At the next prompt, type 11 (CR) to indicate Section 11-ECONOMIC ANALYSIS is to be accessed. The first time the section is accessed, the System prompts for the name, organization, and phone number of the revisor. Subsequent recalls require verification of the revisor information. The System displays the revision date. This example begins at the DD1391 FORM PREPARE/RECALL MENU.

EXAMPLE:

DD1391 FORM PREPARE/RECALL MENU

10/11/91
13:55:49

1. PREPARE FORMS (PREPARE)
2. RECALL FORMS (RECALL)

ENTER MENU OPTION NUMBER, A COMMAND, QUIT, OR LOG

>2 (CR)

Option 2 allows the user to recall an existing form.

FORM NUMBER

>[Enter form number.] (CR)

Enter the form number of the form into which the economic analysis report is to be transferred.

ENTER SECTION NUMBER
>11 (CR)

Section 11 is reserved for economic analysis data.

REVISOR NAME = _____ **(CR)**
REVISOR ORG = _____ **(CR)**
REVISOR PHONE = _____ **(CR)**
REVISION DATE = _____ **(CR)**

Respond appropriately to provide revisor information.

DO YOU WISH TO CHANGE REVISOR INFO.?
>N (CR)

11A IS PROJECT EXEMPT FROM ECONOMIC ANALYSIS (Y/N)? = N
>N (CR)

If Y is entered, the user should enter a precise and concise statement of the facts justifying the exemption in Block 11D. Block 11E allows additional justification.

11B RETRIEVE DATA FROM ECONPACK (Y/N)? = Y
>Y (CR)

Y for YES allows the user to retrieve an economic analysis report from PC-ECONPACK or from the mainframe ECONPACK module.

Enter ECONPACK Filename
>Enter the filename assigned the economic analysis file.]

Enter only the first name (filename) of the desired file. Do not include filetype or extension. The System first checks the mainframe permanent disk storage area for the specified file. If the file is located, the

transfer is executed. If the filename is not located, the System assumes the file is a PC file and prompts for the directory specification.

ENTER THE PC DIRECTORY WHERE YOUR ECONPACK FILE RESIDES (<CR> TO DEFAULT TO \ECONPACK\FILES):
>[Enter the appropriate directory path.] (CR)

Report files can only be transferred from the PC-ECONPACK program or the mainframe ECONPACK module. Do not enter a disk specification. Enter only the directory path information. The default is \ECONPACK\FILES.

Which communications program are you using now?
1) Tymcomm 2) Vistacom 3) V52 4) Other 0) QUIT?
>4 (CR)

Enter the number which indicates the communications software being used.

Prompts vary dependent upon the package, but the System gives an execution message similar to the following:

Transferring C:\ECONPACK\FILES\F12345.INP
==> Please upload C:\ECONPACK\FILES\F12345.INP using XMODEM
Initializing ...
Ready to receive in XMODEM protocol (press ESC to cancel)

The user should now initialize the communications package using XMODEM protocol. Refer to the communications software manual for instructions for this procedure and for uploading files. Upon completion, the System notifies the user of the transfer.

At this point, the economic analysis report is transferred into Section 11, Block 11E. The data is available for display only, but can be deleted or replaced. To display the data, use the /VIEW command (/VIEW or /VIEW 11E). When the user executes the

/SAVE command, the System saves the data entered in Section 11 to the permanent copy of the form, stores a copy of the input file to the ECONPACK common directory with the form number as a filename, and exits the section to the previously accessed menu.

EXAMPLE:

```
 11D  ECONOMIC JUSTIFICATION SUMMARY
      Enter a form command or EDIT to create or modify text.
>/SAVE (CR)
```

/SAVE causes the data to be entered to the permanent copy of the form. If /QUIT or /QQUIT is executed, the data is not stored to the form and the input file does not become a part of the common directory.

```
DD1391 FORM PREPARE/RECALL MENU
                                                        10/11/91
 1.  PREPARE FORMS                    (PREPARE)         14:05:27
 2.  RECALL FORMS                     (RECALL)

     ENTER MENU OPTION NUMBER, A COMMAND, QUIT, OR LOG
>
```

The user now follows the procedures for logging off the System or executing other tasks.

C.2 **DOWNLOADING AN ECONOMIC ANALYSIS INPUT FILE TO THE PC.** The mainframe ECONPACK module supports the transferring of files between the mainframe and the PC. This capability is available from the FILE MAINTENANCE MENU in the ECONPACK module. Follow the steps for logging onto the PAX System or the DD1391 Processor System and access the ECONPACK module. From the MAIN ECONPACK MENU, select the FILE MAINTENANCE option and provide the appropriate information. The following data provide an explanation of the various prompts.

EXAMPLE:

***** MAIN ECONPACK MENU *****

1. DATA ENTRY/REPORTS
2. FILE MAINTENANCE
3. HELP FACILITY
4. EXIT TO DD1391 PROCESSOR SYSTEM

ENTER DESIRED OPTION:
>2 (CR)

Select the FILE MAINTENANCE option number.

***** FILE MAINTENANCE MENU *****

1. PRINT DIRECTORY OF FILES
2. DUPLICATE INPUT FILE
3. RETRIEVE INPUT FILE FROM A DD1391 FORM
4. RENAME INPUT (AND REPORT) FILE(S)
5. ERASE INPUT FILE AND/OR REPORTS
6. TRANSMIT INPUT FILE TO ANOTHER USER
7. RECEIVE INPUT FILE FROM ANOTHER USER
8. TRANSFER AN INPUT FILE TO/FROM THE PC
9. RETURN TO MAIN ECONPACK MENU

ENTER DESIRED OPTION:
>8 (CR)

Option 8 allows the downloading of a file to the PC or the uploading of a file from the PC.

ENTER FILE NAME OF INPUT FILE TO BE TRANSFERRED (<CR> TO EXIT):
>[Enter the appropriate filename.] (CR)

Specify the first name (filename) of the file to be transferred. Do not enter any other information.

DO YOU WISH TO UPLOAD (GET) OR DOWNLOAD (SEND) A FILE? (<CR> TO EXIT):
>SEND (CR)

GET allows the user to upload a file from the PC. SEND allows the downloading of a file. A carriage return aborts the process.

ENTER THE FULL DESTINATION (<CR> TO DEFAULT TO \ECONPACK\FILES):
>[Enter the appropriate destination.] (CR)

Files can be transferred to any drive and/or directory. The user must be specific in defining the destination. A carriage return automatically stores the data to PC-ECONPACK to the \ECONPACK\FILES directory.

Which communications program are you using now?
1) Tymcomm 2) Vistacom 3) V52 4) Other 0) QUIT?
>1 (CR)

Select option 1 if the Tymcomm communications package is being used. Procedures vary for other packages. Refer to the communications package users manual for procedures for downloading files.

If Tymcomm is the communications package, the transfer is automatic. Other packages may result in the following prompt:

==> Please upload DRIVE:\PATH\FILENAME.INP using XMODEM
Initializing ...
Ready to receive (or transmit) in XMODEM protocol (press ESC to cancel)

Be sure to wait for the Ready to receive ... message before beginning the transfer procedure. This procedure requires that the file transfer utilities be appropriately initialized. XMODEM must be used to facilitate this transfer process.

Upon completion (using either package), the System executes the input file transfer, notifies the user of the action, and prompts for another file to be transferred. The user can enter another filename or carriage return and follow the procedures for exiting the ECONPACK module and the PAX System.

SUPPLEMENTARY

INFORMATION

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COMMAND, CONTROL, COMMUNICATION AND INTELLIGENCE

1 1994

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MEMORANDUM FOR DEFENSE TECHNICAL INFORMATION CENTER
ATTN: DATA BASE SUPPORT, WILLIAM BUSH

SUBJECT: Corporate Information Management Bibliography Limitations

We have reviewed the documents under our purview and currently limited for distribution through DTIC. We have determined that the limitations on the following documents can be changed to Catagory A, Approved for Public Release, Distribution Unlimited:

151, 20/14 Targets Req'd

ACCESSION NUMBER:	
	M200225
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	M200149
	M200146L — Duplicate of Item No. 3, above
	M200107L
	B164404
	B166990L
	M200140

The following documents will remain under the current Category E distribution limitations:

ACCESSION NUMBER:	
	B174459L
	M200175L
	M200176L

for Connie Leonard
Michael S. Yoemans
Director, Functional Process Improvement

cc: Frank FitzMaurice, DTIC

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