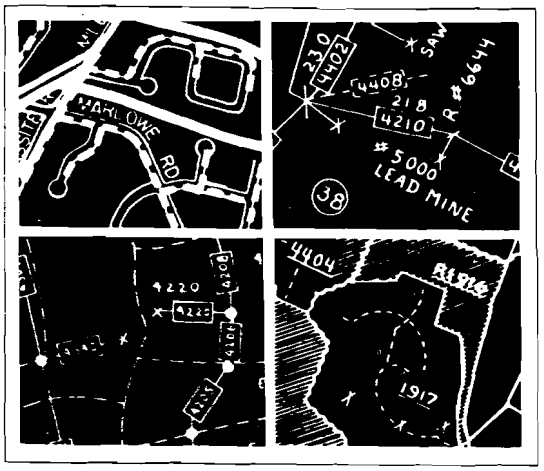
Bell
Communications
Research

Bellcore Practice
BR 936-410-110
Issue 3, December 1984



Loop Plant Improvement Evaluator 2 (LPIE2)

User Guide

This Bellcore Practice replaces OPA 1N347-01,
Issue 2, December 1982.

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Prepared by the Information Documentation Division,
District 80234, Bell Communications Research,
December 1984.

Printed in U.S.A

Bell Communications Research

LPIE2 User Guide, BR 936-410-110, Issue 3

This Bellcore Practice (BR 936-410-110, Issue 3) is a complete revision of the LPIE2 User Guide. This guide was last issued by Western Electric as OPA-1N347-01, Issue 2, dated 12/82. The main change for Issue 3 is the incorporation of information on three new optional inputs that are provided in LPIE2 Version 2.0: Cost Entry (CSTE), Status Quo Growth Rate (SQGR), and Status Quo Non-Discretionary (SQND) data. Other changes have been made also.

This issue is punched for insertion in a 3- or 4-hole loose-leaf binder, suggested 1-1/2-inch ring diameter (2-inch-wide spine), not supplied. Inserts for the front cover and spine of the binder are provided.

Loop Plant Improvement Evaluator 2 (LPIE2) User Guide

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FIGURES

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1 General Information

1.1 Who Needs This Guide?

The Loop Plant Improvement Evaluator 2 (LPIE2) User Guide is for engineering personnel having responsibilities in Distribution Service Design Centers (DSDCs) and Distribution Service Planning Centers (DSPCs) related to the Facility Analysis Plan (FAP). FAP is a method system for selectively rehabilitating the distribution plant; it concentrates on distribution areas (DAs) that are presently most costly to operate.

This guide assumes that DSDC engineers have developed solution alternatives for *entire* DAs according to BSP 917-601-110, ***Rehabilitation Guidelines for the Distribution Plant.*** Such rehabilitation plans are intended to eliminate troublesome plant conditions and facility changes resulting from congested plant, all of which contribute to high operating costs. LPIE2 can then be used as the economic analysis tool specially devised to evaluate solution alternatives for entire DAs. In particular, DSDC engineers will prepare rehabilitation, DA, and solution alternative input data to LPIE2; and DSPC engineers, with clerical assistance as needed, will run LPIE2 and use its output reports as decision tools in the FAP process.

This user guide provides complete information for DSDC and DSPC personnel using LPIE2, consistent with the processes described in BR 936-400-003, ***Responsibilities of the Facility Analysis Plan (FAP) Engineer.*** Also, this user guide contains complete information for company headquarters (HQ) staff engineers who, as LPIE2 Coordinators, are responsible for creating the general data files necessary for any district LPIE2 run. HQ staff engineers who need to run LPIE2 can do so using the procedures in this guide.

> **Note**
>
> All references to Bellcore Practices, pre-divestiture Bell System Practices (BSPs), and other documents are described further in the Related Documents listing in Appendix B of this guide.

1.2 What is LPIE2?

LPIE2 is an interactive program which enables the outside plant engineer to evaluate the economics of various facility rehabilitation alternatives on the basis of set standards embodied in the Capital Utilization Criteria (CUCRIT) program. The engineer enters information, in a standard format, which describes various alternatives. LPIE2 is a Bellcore engineering program which is accessed through the Generic Remote Data Entry System (RDES). Outputs consist mainly of standard LPIE2 reports (see Subsection 1.5), but CUCRIT reports can also be obtained as an option. As the mechanized economic evaluator supporting FAP, LPIE2 evaluates a set of solution alternatives for an entire DA, measuring the tradeoff between what each alternative investment would *cost* and how much it

would ***reduce*** operating costs. Each LPIE2 economic analysis run derives the following economic indicators: Present Worth of Expenditures (PWE), Long Term Economic Evaluator (LTEE), Net Present Value (NPV), and Incremental LTEE (ILTEE). The LTEE is a benefit-to-cost ratio (BCR).

Economic tradeoff is an important concept in LPIE2. Distribution plant improvement must yield satisfactory returns on investment dollars because in the FAP context such investments are ***discretionary.*** That is, a solution alternative represents an ***investment that does not have to be made to provide customer service,*** in contrast to a non-discretionary investment that ***must*** be made. LPIE2 is chiefly concerned with discretionary investments represented by solution alternatives. Such investments could benefit a company if money is available for plant improvement and if such investments would yield, with reasonable certainty, a "sufficient" return. In addition, LPIE2 ***can*** include ***nondiscretionary*** investments identified in the course of a rehabilitation study. These non-discretionary investments are considered on an overall DA basis and are included in every solution alternative. They are clearly labeled as such on LPIE2 reports.

Note

For routine maintenance and growth-related projects ***outside of FAP,*** use the Economic Alternative Selection for Outside Plant (EASOP) program to make economic evaluations. EASOP incorporates the CUCRIT program, as does LPIE2.

1.3 How Does LPIE2 Evaluate Solution Alternatives?

To understand the LPIE2 economic analysis, we first need to look more closely at the FAP process. FAP uses the Loop Activity Tracking Information System (LATIS) to study activities in Tracking Units (TUs); these TUs may be existing allocation areas (EAAs) or interfaced areas within EAAs. LATIS tracks 15 "standard" activities (listed in Table 1-1) that are considered to be crucial outside-plant problem indicators. Accumulating activity occurrences and using activity costs in calculations, LATIS ranks TUs in a Wire Center by operating cost per assigned pair so that costly TUs can be targeted for rehabilitation studies.

The Rehabilitation Guidelines method (BSP 917-601-110) is a systematic way of studying DAs having the greatest impact on TU operating costs. Using this method, DSDC engineers analyze facilities in a DA by cable section (cable leg including terminals) and propose treatments for those sections needing rehabilitation. Treatments—selected to counteract the plant conditions leading to activity occurrences—include renovations, reinforcements, replacements, interface placement, and various combinations that convert a DA to a Serving Area Concept (SAC) configuration. The proposed treatments for an entire DA can then be sorted into solution alternatives for LPIE2 economic analysis.

LPIE2 considers a maximum of six alternatives in any one run. For each solution alternative to be evaluated, the program can evaluate either a single investment or two investments (which are phased through time such that the first is clearly earlier than the second). This provision for two alternative-investments is compatible with gradual conversion to intermediate-design SAC. For example, an intermediate SAC alternative can be defined as follows: first investment includes

Table 1-1

Standard LATIS-Tracked Activities

Acronym/Code(s)	Name
Facility Modifications	
LST	Line and station transfer
WOL	Wired out of limits
BCT	Break connect through
CDP	Clear defective pair
BPC	Break permanent connection
CIR	Customer interconnection record (or Control point connection)
RTC	Reterminated connection
Miscellaneous Indicator	
RE	Referred to engineering
Assignment Changes	
SOD	Service order defective
ODF	Other defective
OAC	Other assignment change
Found Cable Troubles	
1-6	Sheath breaks coded 1 through 6
7A	Splicing trouble
7B	Terminating trouble
8-9	Core troubles coded 8 and 9

placing an interface now; second investment calls for upgrading the cable design to its ultimate configuration some years in the future.

To represent the degree of SAC conversion, LPIE2 requires as input the percent of living units on ultimately sized cable before and after the SAC improvement. Given these percents, LPIE2 can evaluate several intermediate SAC alternatives that may be proposed at one time as well as any of the other solution alternatives defined in the Rehabilitation Guidelines method (i.e., physical rehabilitation and ultimate design).

The LPIE2 economic evaluation begins by making sure that comparisons among alternatives are based on an equivalent standard. The program constructs a baseline STATUS QUO "alternative," equivalent to doing nothing now and postponing *discretionary* investments as long as possible. The plant is allowed to incur increasing operating costs until a major service-related investment *(non-discretionary)* must be made. (For LPIE2, this is when the DA exhausts—that is, when the distribution backbone cable must be relieved.) At that time, it is reasonable to make the most comprehensive discretionary investment, which in most cases is the ultimate design alternative.

Optionally, a non-discretionary investment, which is required only under the status quo plan, can also be examined during a rehabilitation study to determine the economic effects of that investment.

LPIE2 determines the extent of cost reduction according to models which derive reduction factors. Prior to the investment year, each alternative has operating costs identical to those for the STATUS QUO. The investment is assumed to eliminate or reduce some activities and hence reduce operating costs. Cost reduction factors vary according to activity, plant type (aerial, PIC, aerial lead, and buried PIC), and degree of ultimate design. For example, an alternative which contained only renovation might reduce the occurrence of found cable troubles and assignment changes but not facility modifications. Facility modifications, on the other hand, are reduced on an area basis by SAC interface placement (with varying degrees of cable reinforcement) and by backbone cable reinforcement (with or without conversion).

LPIE2 also considers certain additional savings that can result from stabilizing the plant. Plant stabilizing investments reduce the expected number of cable pair transfers (throws) required in normal operations. Since LATIS does not track individual cable throws, LPIE2 considers the reduction separately from the operating cost calculations. Stabilizing investments also result in improved feeder utilization so that feeder relief may be delayed. Placing an interface allows feeder cables to be worked economically to higher fills prior to relief and makes available the feeder pairs that were previously unusable because of defects in the distribution pairs to which they were connected.

After improvement, operating costs would at first drop, as described above, and then begin to increase at a rate slower than the original rate. LPIE2 projects post-improvement activity levels and annual activity growth, using mathematical models based on average data obtained from operating companies and on typical outside-plant configurations. (The user can override LPIE2 projections as discussed in Section 6, Reworking an LPIE2 Study.)

1.4 What Input Preparation Does LPIE2 Require?

To perform an economic analysis, LPIE2 requires specific data prepared on special input worksheets and then entered into the computer. There are two types of input files, called the HQ Data File and the Problem File.

The ***HQ Data File,*** the responsibility of the HQ staff, contains general economic data, aerial-plant and buried-plant data, and cost factors (unit costs) for the "standard" activities tracked in TUs. An HQ Data File suitable for each District or Area in the company is prepared on "HQ" worksheets, entered into the computer, and data-checked before District runs are made. Files are periodically reviewed and updated as needed. Note: The engineer can change the value of one or more cost factors on a run by run basis, using the cost entry override option.

The ***Problem File*** is the responsibility of District engineering. Each Problem File—unique for a given LPIE2 run—is prepared on "USER" worksheets, is data-checked, and is stored in the computer. One USER worksheet is of special interest: the Rehabilitation Guidelines & LPIE2 Worksheet. Using this worksheet during a DA study, the engineer can proceed smoothly from entering cable section treatment information to entering treatment costs, troubles eliminated, and solution alternative(s) applicable to each treatment. In this way, LPIE2 is closely linked to

the Rehabilitation Guidelines method at the input end. Data prepared on other USER worksheets include information about the DA and each solution alternative proposed for LPIE2 economic analysis.

An initial LPIE2 run provides a baseline evaluation of the solution alternatives developed for a DA; it may be the only LPIE2 run for the DA. Also, an initial LPIE2 run is made before DA facilities are tested or inspected. Subsequent LPIE2 run(s) for that DA may result from reworking the study, as described in Section 6. For example, a second investment for a solution alternative may be introduced in a subsequent LPIE2 run.

1.5 What Output Does LPIE2 Generate?

LPIE2 generates two kinds of output: intermediate output, and (final) output reports. The intermediate output consists of the Rehabilitation Input Summary and the Rehabilitation Calculated Cost Summary. This output is applicable where the Rehabilitation Guidelines & LPIE2 Worksheet is used to provide detailed treatment-by-treatment rehabilitation data. The Input Summary recapitulates the rehabilitation data on the Worksheet in a tabular format. The Calculated Cost Summary gives LPIE2-calculated cost totals for each solution alternative, which the user can inspect to see whether costs are reasonable. If costs are not reasonable, adjustments can be made in the Problem File, as discussed in Section 6.

There are four standard LPIE2 reports:

1. LPIE2 DA Input Summary,
2. LPIE2 Problem Analysis Summary,
3. Projection of Annual Activity Levels, and
4. LPIE2 User Overrides.

A detailed overview of LPIE2 output reports, with samples, is given in Section 5 of this guide.

There are five CUCRIT reports:

1. Report Summary;
2. Capital, Revenue, and Expense Summary;
3. Incremental Cash Flow Details;
4. Executive Summary; and
5. DPS (Discretionary Project Selection) Output.

A sample of each CUCRIT report is displayed in Section 5.

1.6 How is the LPIE2 User Guide Organized?

The general information in this first section provides an overview for both the HQ staff and District DSDC and DSPC engineers. Sections 2 through 8, as summarized below, contain specific information and are organized into subsections and procedural steps.

Section 2 describes the responsibilities of the LPIE2 Coordinator (an HQ staff member) in creating the HQ Files, and includes interpretations and examples of error messages that apply to these files.

Sections 3 through 6 describe the responsibilities of DSDC and DSPC engineers in performing routine LPIE2 studies:

- Preparing Problem File Input Data (Section 3)
- Running LPIE2 (Section 4)
- Interpreting LPIE2 Output Reports (Section 5)
- Reworking an LPIE2 Study (Section 6).

Section 7 gives a sample problem that illustrates District responsibilities.

Section 8 covers the analysis of user errors, giving interpretations and examples of error messages applying to a Problem File.

Section 50 summarizes the changes made for this issue of this user guide.

Appendices A through F provide further reference information and forms for LPIE2 as follows:

- Appendix A: input specification tables for LPIE2 files
- Appendix B: a list of documents related to LPIE2
- Appendix C: a glossary of acronyms, codes, and terms
- Appendix D: worksheet masters of all HQ and USER input worksheets, suitable for reproduction and use in input preparation
- Appendix E: a summary of RDES commands
- Appendix F: an index of topics covered in this User Guide.

2 Headquarters Responsibilities in Support of LPIE2

2.1 Introduction

As the LPIE2 Coordinator at company headquarters (HQ), you are responsible for creating and maintaining one or more general HQ Files, each of which consists of an Economic File paired with a Cost Factor File:

- Economic File data consist of general economic data, including rates for the use of capital, rates of inflation, and taxation factors for determining depreciation and investment tax credit allowances. These data come from area files (CUCRIT MFILE and ACCFILE), collectively called "area constant" files. However, LPIE2 requires certain modifications to be made in these files.
- Cost Factor File data consist of operational cost factors for 15 "standard" LATIS-tracked activities, for cable pair transfers, and for up to three special studies being investigated in the Wire Center. The data also include the value of a feeder pair.

In a multi-state or multi-area company, you should prepare distinct versions of an Economic File and a Cost Factor File to reflect state or area differences. Often one Economic File version can serve an entire company, but several distinct Cost Factor File versions may be required to reflect differences in labor rates. You must data-check each pair of Economic and Cost Factor Files simultaneously. After the pair of files successfully passes the Data Check for one set of economic and cost factor data, the files are merged into a single HQ File, which you must name (e.g., HQNOR). The appropriate HQ File must be stored in the computer before district engineers can run LPIE2 on any local Problem File. (A Problem File is a computer file specific to the Distribution Area being studied.) District engineers can read an HQ File, but cannot modify it. Once created, an HQ File should be periodically reviewed and updated as needed. Table 2-1 on the next page summarizes essential facts about the HQ File and its components.

Sample HQ1 and HQ2 worksheets are shown in the foldouts (Figures 2-1 and 2-2) at the end of this Introduction. Identifying information has been filled in on the sample worksheets for:

- The sample area (Tara)
- File name (respectively, ECONTARA and COSTARA)
- Preparer's initials (H.Q.E.)
- Preparation date (10/15/84).

This identifying information is intended to distinguish the versions you prepare. Do not enter it into the computer file.

Step-by-step procedures for preparing Economic File input on the HQ1 worksheet and Cost Factor File input on the HQ2 worksheet are under separate tabs (Subsections 2.2 and 2.3, respectively). Worksheet masters suitable for reproduction and use in preparing input data are in Appendix D of this guide.

Also under separate tabs is information on running the LPIE2 Data Check on the Economic and Cost Factor Files (Subsection 2.4, Running LPIE2) and interpreting error messages and warnings that may be generated by the LPIE2 Data Check (Subsection 2.5, HQ Error Analysis).

Table 2-1

HQ File Overview

File	File Name	Input Worksheet
Economic File (one version for each state or area as needed)	1 to 8 characters, e.g., ECONTARA	HQ1 (one worksheet per file version) — Figure 2-1
Cost Factor File (one version for each state or area as needed)	1 to 8 characters, e.g., COSTARA	HQ2 (one worksheet per file version) — Figure 2-2
HQ File (the merged Economic and Cost Factor File after Data Check)	1 to 8 characters, e.g., HQNOR	No worksheet required; the HQ File is generated by LPIE2

HQ1

ECONOMIC FILE INPUT

STATE/REGION TARA

FILE NAME ECONTARA

PREPARER'S REMARK (OPTIONAL)

(63 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)

ERMK:

ECONOMIC DATA - CUCRIT MFILE

	DEBT INTEREST RATE	DEBT RATIO	LABOR TREND RATE	INTEREST DURING CONSTRUCTION (OPTIONAL)	DIVISION OF REVENUE (OPTIONAL)	STATE INCOME TAX RATE	YEARS IN INCOME STATEMENT (OPTIONAL)	LIFE OPTION CODE	STATE INCOME TAX OPTION	COST OF MONEY	INVESTMENT TAX CREDIT RATE	FEDERAL INCOME TAX RATE	NORMALIZATION OPTION
ECON:	,	,	,	,	,	,	,	,	,	,	,	,	

SELECTED ACCOUNT DATA - CUCRIT ACCFILE

	ACCOUNT CODE	CAPITAL TREND RATE	ADR GUIDELINE LIFE	TAX / BOOK RATIO	AVERAGE SERVICE LIFE	AVERAGE GROSS SALVAGE	AVERAGE COST OF REMOVAL	ADR CLASS CODE (OPTIONAL)
AERL:	242-22	,	,	,	,	,	,	,
BURD:	242-45	,	,	,	,	,	,	,

LPIE2 INPUT WORKSHEET (10/81)

PREPARED BY H.Q.E.

DATE 10/15/84

Figure 2-1. The HQ1 input worksheet (reduced size), ECONOMIC FILE INPUT, with worksheet identification

HQ2

COST FACTOR FILE INPUT

STATE / REGION TARA

FILE NAME COSTARA

PREPARER'S REMARK (OPTIONAL)

(63 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)

CRMK:

OPERATIONAL COST FACTORS

	LINE AND STATION TRANSFER (LST)	WIRE OUT OF LIMITS (WOL)	BREAK CONNECT THROUGH (BCT)	CLEAR DEFECTIVE PAIR (CDP)	BREAK PERMANENT CONNECTION (BPC)	CHANGE INTERCONNECT RECORD (CIR)	REFERRAL TO ENGINEERING (RE)	RETERMINATE CONNECTION (RTC)
CST1:	,	,	,	,	,	,	,	

OPERATIONAL COST FACTORS (CONTINUED)

	SERVICE ORDER DEFECTIVE (SOD)	OTHER DEFECTIVE (ODF)	OTHER ASSIGNMENT CHANGE (OAC)	FOUND CABLE TROUBLE SHEATH BREAK (1–6)	FOUND CABLE TROUBLE SPLICING (7A)	FOUND CABLE TROUBLE TERMINATING (7B)	FOUND CABLE TROUBLE CORE (8–9)	CABLE PAIR TRANSFER (CPT)	VALUE OF A FEEDER PAIR (VFP)
CST2:	,	,	,	,	,	,	,	,	

SPECIAL STUDY DATA (OPTIONAL)

	SPECIAL STUDY 1		SPECIAL STUDY 2		SPECIAL STUDY 3	
	NAME	COST FACTOR	NAME	COST FACTOR	NAME	COST FACTOR
SPCL:	,	,	,	,	,	

LPIE2 INPUT WORKSHEET (IO/BI)

PREPARED BY H.Q.E. DATE 10/15/84

Figure 2-2. The HQ2 input worksheet (reduced size), COST FACTOR FILE INPUT, with worksheet identification

2.2 Preparing Economic File Input (HQ1 Worksheet)

Step 1. Obtain an exact copy of the CUCRIT MFILE and ACCFILE for each state or area in your company. From the headquarters CUCRIT Coordinator, obtain relevant data in the area constant files. Sample area constant files are shown in the foldout (Figure 2-3) at the end of this subsection.

You can use each MFILE (economic data file) as is, modifying it according to the procedure in Step 3 for the ECON data line. An ACCFILE (account code data), however, contains more accounts than you need. These accounts are standard CUCRIT classes of telephone-related property such as land and buildings, CO equipment, and outside plant facilities. Each account has a code and subcode. You need only the two accounts coded 242-22, for aerial cable (exchange), and 242-45, for buried cable (exchange). The data correspond respectively to the AERL data line (Step 4) and the BURD data line (Step 5).

> **Note**
>
> If you wish, you can edit an externally stored facsimile of relevant area constant data, using the HQ1 input worksheet and the procedures in this subsection as guides.

A sample HQ1 worksheet (foldout, Figure 2-4) shows entries of Economic File data. Unfold it for reference in Steps 2 through 5. (All sample data are for illustration only, and do not specify system standard values.)

Step 2. Fill in the Preparer's Remark—HQ1 worksheet, ERMK data line. On the HQ1 worksheet, fill in the data line coded ERMK to distinguish this Economic File version from others. The ERMK line is optional but its entry is recommended. Limit your remark to 63 or fewer characters, including punctuation and spaces between words. Avoid colons and commas since they are used to separate a line into fields. Your remark might include some of the following information in brief form (Figure 2-4):

- Economic File preparation date
- CUCRIT area constant files preparation date(s)
- State or area version, and file name
- Changes you make in CUCRIT data (for example, a different inflation rate).

Step 3. Fill in the Economic Data—HQ1 worksheet, ECON data line. On the HQ1 worksheet, fill in the data line coded ECON, using the relevant CUCRIT MFILE as your source. The ECON line is mandatory; its entry is required. There are thirteen ECON data fields (Figure 2-4). Fields 1, 2, 3, 6, 8, 9, 10, 11, 12, and 13 are mandatory; fields 4, 5, and 7 are not needed by LPIE2 but are included to make this LPIE2 input compatible with an MFILE facsimile stored on an external device. You must supply data for all mandatory fields, but you can leave fields 4, 5, and 7 blank. LPIE2 will accept most CUCRIT values. However, in field 8, the LPIE2 range is more restricted than the CUCRIT range; i.e., the CUCRIT Life Option Codes are 0, 1, or 2, but LPIE2 permits only code 2.

Field 1 **Debt interest rate**—For all new debt issues such as bank loans, the anticipated average long-term interest rate.

- Entry form: decimal, to 4 places
- Valid range: $0 \leqslant X \leqslant 0.25$
- Default value: none

Field 2 **Debt ratio**—The percentage of debt compared to capital. The debt ratio and debt interest rate (field 1) are used in calculating how much annual debt interest is tax deductible.

- Entry form: decimal, to 4 places
- Valid range: $0 \leqslant X \leqslant 1.00$
- Default value: none

Field 3 **Labor trend rate**—The inflation rate for labor-related expenses, such as outside plant maintenance costs.

- Entry form: decimal, to 4 places
- Valid range: $0 \leqslant X \leqslant 0.25$
- Default value: none

Field 4 **Interest during construction**—Not required by LPIE2; you can leave this field blank. If you are editing a facsimile of an MFILE that is stored on an external device, either delete the CUCRIT rate, entering a blank, or use the CUCRIT rate if it conforms to the following.

- Entry form: decimal, to 4 places
- Valid range: $0 \leqslant X \leqslant 0.25$
- Default value: 0 (zero)

Field 5 **Division of revenue**—Not required by LPIE2; you can leave this field blank. If you are editing a facsimile of an MFILE which is on an external storage device, either delete the CUCRIT rate, entering a blank, or use the CUCRIT rate if it conforms to the following.

- Entry form: decimal, to 4 places
- Valid range: $0 \leqslant X \leqslant 0.25$
- Default value: 0 (zero)

Field 6 **State income tax rate**—In most states, the entry for this field is the percentage tax rate prescribed by law. In some states, however, federal income taxes are deductible from state taxes; the entry for this field should then be the ***adjusted*** state income tax rate as given by

$$\left[\frac{1 - t_s}{1 - t_f t_s}\right] t_s$$

where t_s = state tax rate and t_f = federal tax rate.

- Entry form: decimal, to 4 places
- Valid range: $0 \leqslant X \leqslant 0.20$
- Default value: none

Field 7 **Years in income statement**—Not required by LPIE2; you can leave this field blank. If you enter a value, it will be ignored by LPIE2. If you are editing a facsimile of an MFILE which is on an external storage device, either delete the CUCRIT rate, entering a blank, or use the CUCRIT rate if it conforms to the following.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 10$
- Default value: 0 (zero)

Field 8 **Life option code**—Always 2, indicating that the Combination Life Option is to be used in calculating book and tax depreciation and investment tax credit (ITC).

- Entry form: whole number
- Valid range: 2 only (more restricted than CUCRIT)
- Default value: none

> **Note**
>
> Code 1, Accountant or Fixed Life Option, is not used in LPIE2. If you enter 1, which may be in the CUCRIT MFILE, the program generates an error message. Code 0, Economic Life Option, will no longer be used in CUCRIT.

Field 9 **State income tax option**—Either 0 or 1, designating the depreciation option to be used in calculating state income tax:

0—Straight-line Depreciation
1—Accelerated Depreciation.

- Entry form: whole number
- Valid range: 0 or 1
- Default value: none

Field 10 **Cost of money**—The rate of return to investors on money they invest in the company; such money may be used by the company to make capital investments. The cost of money (COM) reflects an overall anticipated inflation, and is the discount rate in all present worth calculations. To update, consult RL 81-04-071 (Cost of Capital for Economic Selection Studies) and its supplements.

- Entry form: decimal, to 4 places
- Valid range: $0 \leqslant X \leqslant 0.25$
- Default value: none

Caution: The cost of money must always be higher than the labor trend rate (field 3). If a lower value is entered, the program generates an error message.

Field 11 **Investment tax credit rate**—In calculating federal tax credit on eligible investments, the ***maximum*** percentage allowed by law.

- Entry form: decimal, to 4 places
- Valid range: $0 \leqslant X \leqslant 0.25$
- Default value: none

Field 12 **Federal income tax rate**—The rate applied to taxable income before investment tax credit (ITC).

- Entry form: decimal, to 4 places
- Valid range: $0 \leqslant X \leqslant 0.75$
- Default value: none

Field 13 **Normalization option**—always 0 (zero), indicating the method used to calculate deferred taxes due to accelerated depreciation methods.

- Entry form: whole number
- Valid range: 0 only
- Default value: none

Step 4. Fill in the Aerial Plant Account Data—HQ1 worksheet, AERL data line. On the HQ1 worksheet, fill in the data line coded AERL (Figure 2-4), using the CUCRIT ACCFILE, account 242-22, as the source. The AERL line is mandatory; its entry is required. Of the eight AERL fields, all are mandatory except for field 8. The LPIE2 ranges in fields 4 and 5 are more restricted than the corresponding CUCRIT ranges.

Field 1 **Account code**—Preprinted on the input worksheet. Code 242 refers to outside plant; subcode 22, to aerial cable (exchange). The data in fields 2 through 8 are linked to this account.

Field 2 **Capital trend rate**—For aerial cable, the predicted long-term inflation rate.

- Entry form: decimal, to 4 places
- Valid range: $0 \leqslant X \leqslant 0.25$
- Default value: none

Field 3 **ADR guideline life**—For aerial cable, the facility service life set by Asset Depreciation Range (ADR) system guidelines.

- Entry form: whole number
- Valid range: $3 \leqslant X \leqslant 45$
- Default value: none

Field 4 **Tax/book ratio**—For aerial cable, the percentage applied to capitalized first cost that is eligible for tax depreciation and investment tax credit.

- Entry form: decimal, to 4 places

- Valid range: 0.50 ⩽ X ⩽ 1.00 (more restricted than CUCRIT)
- Default value: none

Field 5 **Average service life**—For aerial cable, the standard service life, used as the economic life in LPIE2 analysis.

- Entry form: decimal, to 4 places
- Valid range: 0.0834 ⩽ X ⩽ 60.0000 (more restricted than CUCRIT); the value 0.0834 represents one month
- Default value: none

Field 6 **Average gross salvage**—For aerial cable, the decimal representation of the percentage applied to first cost that represents the salvage value of the cable when it is removed, regardless of the cost of removal (field 7). For example, if gross salvage is 3% of the first cost, enter .03.

- Entry form: decimal, to 2 places
- Valid range: 0 ⩽ X ⩽ 9.99
- Default value: none

Field 7 **Average cost of removal**—For aerial cable, the decimal representation of the percentage applied to first cost that represents the removal cost of the cable when it is replaced. The average gross salvage minus the average cost of removal is used to calculate average net salvage value. For example, if the cost of removal is 4% of the first cost, enter .04.

- Entry form: decimal, to 2 places
- Valid range: 0 ⩽ X ⩽ 9.99
- Default value: none

Field 8 **ADR class code**—Not required by LPIE2; you can leave this field blank. If you are editing a facsimile of an MFILE that is stored on an external device, either delete the CUCRIT rate (enter a blank) or use the CUCRIT rate if it conforms to the following.

- Entry form: whole number
- Valid range: 0 ⩽ X ⩽ 26
- Default value: 0 (zero)

Step 5. Fill in the Buried Plant Account Data—HQ1 worksheet, BURD data line. On the HQ1 worksheet, fill in the data line coded BURD (Figure 2-4), using the CUCRIT ACCFILE, account 242-45, as the source. The BURD data line is mandatory; its entry is required. Of the eight BURD fields, all are mandatory except for field 8.

Field 1 **Account code**—Preprinted on the input worksheet. Code 242 refers to outside plant; subcode 45, to buried cable (exchange). The data in fields 2 through 8 are linked to this account.

Field 2 **Capital trend rate**—For buried cable, the predicted long-term inflation rate.

- Entry form: decimal, to 4 places
- Valid range: $0 \leqslant X \leqslant 0.25$
- Default value: none

Field 3 **ADR guideline life**—For buried cable, facility service life set by Asset Depreciation Range (ADR) system guidelines.

- Entry form: whole number
- Valid range: $4 \leqslant X \leqslant 45$
- Default value: none

Field 4 **Tax/book ratio**—For buried cable, the percentage applied to capitalized first cost that is eligible for tax depreciation and investment tax credit.

- Entry form: decimal, to 4 places
- Valid range: $0.50 \leqslant X \leqslant 1.00$ (more restricted than CUCRIT)
- Default value: none

Field 5 **Average service life**—For buried cable, the standard service life, used as the economic life in LPIE2 analysis.

- Entry form: decimal, to 4 places
- Valid range: $0.0834 \leqslant X \leqslant 60.0000$ (more restricted than CUCRIT); the value 0.0834 represents one month
- Default value: none

Field 6 **Average gross salvage**—For buried cable, the decimal representation of the percentage applied to first cost that represents the salvage value of the cable when it is removed, independent of the cost of removal (field 7). For example, if gross salvage is 3% of the first cost, enter .03.

- Entry form: decimal, to 2 places
- Valid range: $0 \leqslant X \leqslant 9.99$
- Default value: none

Field 7 **Average cost of removal**—For buried cable, the decimal representation of the percentage applied to first cost that represents the removal cost of the cable when it is replaced. The average gross salvage minus the average cost of removal is used to calculate average net salvage value. For example, if cost of removal is 4% of the first cost, enter .04.

- Entry form: decimal, to 2 places
- Valid range: $0 \leqslant X \leqslant 9.99$
- Default value: none

Field 8 **ADR class code**—Not required by LPIE2; you can leave this field blank. If you are editing a facsimile of an MFILE that is stored on an external device, either delete the CUCRIT rate (enter a blank), or use the CUCRIT rate if it conforms to the following.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 26$
- Default value: 0 (zero)

```
   mfile cucrir

01 .09,.45,.10,0,0,.03,0,2,1,.145,.10,.47,0


   accfile cucrit

090 122     ,.00,0,1.0,0,0,0,0
100 211     ,.11,0,1.0,0,0,0,0
101 212-1   ,.11,45,.92,43,.129,.102,6
102 212-1Q  ,.11,45,.92,43,.129,.102,2
103 212-2   ,.11,0,.92,43,.129,.102,1
104 212-2Q  ,.11,0,.92,43,.129,.102,13
105 212-3Q  ,.11,10,.92,43,.129,.102,2
106 212-4   ,.11,20,.92,43,.129,.102,15
107 212-4Q  ,.11,20,.92,43,.129,.102,14
130 221     ,.08,20,.90,25,0,0,2
140 221-17  ,.16,20,.90,10,.034,.101,2
150 221-27  ,.06,20,.86,12,.039,.117,2
160 221-37  ,.15,20,.91,11,.096,.117,2
170 221-47  ,.16,20,.90,17,.087,.096,2
180 221-57  ,.08,20,.90,20,.066,.105,2
190 221-67  ,.10,20,.90,21,.066,.111,2
200 221-77  ,.08,20,.87,35,.094,.062,2
210 231-01  ,.08,10,.95,11,.023,.0,2
220 231-02  ,.08,10,.94,12,.023,.001,2
230 231-03  ,.09,10,.99,12,.02,0,2
240 232     ,.11,10,.85,7,0,.173,2
250 234     ,.09,10,.89,9,.153,.069,2
260 241     ,.13,35,.88,28,.109,.46,2
270 242-12  ,.10,35,.85,30,.237,.276,2
280 242-22  ,.09,23,1,23,0,0,0
285 242-2T  ,.09,35,.85,34,.57,.138,2
290 242-5   ,.09,35,.87,45,.501,.264,2
300 242-5T  ,.09,35,.87,44,.544,.138,2
310 242-45  ,.09,30,1,30,0,0,0
320 242-45T,.10,35,.88,43,.039,.028,2
330 242-6   ,.10,35,.86,25,.016,.019,2
340 242-6T  ,.10,35,.86,34,.016,.019,2
350 243     ,.10,35,.85,10,.145,.288,2
355 243-T   ,.10,35,.85,14,.145,.288,2
360 244-14  ,.12,35,.94,67,.017,.075,2
370 244-24  ,.12,35,.94,67,.017,.075,2
380 261-01  ,.06,10,.99,24,.048,.001,2
390 261-02  ,.06,10,.99,24,.048,.001,2
400 261-03  ,.06,6,.95,8,.085,.005,4
410 264-01  ,.10,4,.99,8,.127,.004,4
420 264-02  ,.10,11,.99,12,.152,.001,2
```

Figure 2-3. Sample CUCRIT MFILE and ACCFILE (area constant files)

HQ1

ECONOMIC FILE INPUT

STATE/REGION TARA
FILE NAME ECONTARA

PREPARER'S REMARK (OPTIONAL)

(63 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)

ERMK: XYZ COMPANY

ECONOMIC DATA - CUCRIT MFILE

	1 DEBT INTEREST RATE	2 DEBT RATIO	3 LABOR TREND RATE	4 INTEREST DURING CONSTRUCTION (OPTIONAL)	5 DIVISION OF REVENUE (OPTIONAL)	6 STATE INCOME TAX RATE	7 YEARS IN INCOME STATEMENT (OPTIONAL)	8 LIFE OPTION CODE	9 STATE INCOME TAX OPTION	10 COST OF MONEY	11 INVESTMENT TAX CREDIT RATE	12 FEDERAL INCOME TAX RATE	13 NORMALIZATION OPTION
ECON:	.09	.45	.10			.03		2	1	.145	.10	.47	0

SELECTED ACCOUNT DATA - CUCRIT ACCFILE

	1 ACCOUNT CODE	2 CAPITAL TREND RATE	3 ADR GUIDELINE LIFE	4 TAX/BOOK RATIO	5 AVERAGE SERVICE LIFE	6 AVERAGE GROSS SALVAGE	7 AVERAGE COST OF REMOVAL	8 ADR CLASS CODE (OPTIONAL)
AERL:	242-22	.09	23	1	23	0	0	0
BURD:	242-45	.09	30	1	30	0	0	0

LPIE2 INPUT WORKSHEET (10/81)

PREPARED BY H.Q.E. DATE 10/15/84

Figure 2-4. Sample HQ1 input worksheet (reduced size), ECONOMIC FILE INPUT, with worksheet identification and data entries

2.3 Preparing Cost Factor File Input (HQ2 worksheet)

Step 1. Obtain Data Sources. From the LATIS Coordinator, obtain a copy of the most recent Headquarters Processing Specification Summary (LATIS report H54A, Part B, Lost Hour and Cost Factor Summary) for each set of cost factors in your company (Step 3). There may be several sets, varying by loaded labor rates, each with a separate cost option number and name—for example, option 1: Standard. Also obtain a copy of the most recent Plant Services Cost Results Summary (form E-5300-201), the source for the value of a feeder pair (Step 5).

A sample HQ2 worksheet is on a foldout (Figure 2-5) to show entry of Cost Factor File data. Unfold it for reference in Steps 2 through 6. (All sample data are for illustration only, and do not specify system standard values.) Some sources of the data are shown on a separate foldout (Figure 2-6).

Step 2. Fill in the Preparer's Remark—HQ2 worksheet, CRMK data line. On the HQ2 worksheet, fill in the data line coded CRMK to distinguish this Cost Factor File version from others. The CRMK data line is optional, but its entry is recommended. Limit your remark to 63 or fewer characters, including spaces between words and punctuation. Don't use colons or commas. Your remark might include some of the following information in brief form (Figure 2-5):

- Cost Factor File preparation date
- LATIS option number and name
- State or Area version
- Cost Factor File name.

Step 3. Fill in Operational Cost Factors for the 15 Standard Activities—HQ2 worksheet, CST1 and CST2 data line. On the HQ2 worksheet, fill in the data lines coded CST1, fields 1 through 8, and CST2, fields 1 through 7. Use the Headquarters Processing Specification Summary, LATIS report H54A, Part B, as the source (Figure 2-6). Be sure that each cost factor conforms to the following:

- Entry form: decimal, to 2 places
- Valid range: $0 \leqslant X \leqslant 999.99$
- Default value: none

On CST1, fill in the entire data line (Figures 2-5 and 2-6). Fields 1 through 6 and field 8 refer to facility modifications—activities done in the course of supplying pairs where facilities are congested and no spares can be found. Field 7 (RE) is a miscellaneous activity (see Table 1-1 in Section 1, General Information).

Field 1 LST (line and station transfer)

Field 2 WOL (wired out of limits)

Field 3 BCT (break connect through)

Field 4 CDP (clear defective pair)

Field 5 BPC (break permanent connection)

Field 6 CIR (customer interconnection record, or control point connection)

Field 7 RE (referred to engineering)

Field 8 RTC (reterminated connection)

On CST2, fill in fields 1 through 7 (Figures 2-5 and 2-6). Fields 1 through 3 are assignment changes—assignments of new pairs on change tickets where defective pairs are found or errors exist in customer records.

Field 1 SOD (service order defective)

Field 2 ODF (other defective)

Field 3 OAC (other assignment change)

Fields 4 through 7 are found cable or terminal troubles—investigations and corrections of troubles both as routine activity and where service is affected. The found troubles are grouped by code into four categories.

Field 4 1-6 (sheath breaks coded 1 through 6)

Field 5 7A (splicing)

Field 6 7B (terminating)

Field 7 8-9 (core troubles coded 8 and 9)

Step 4. Determine the Cost Factor for a Cable Pair Transfer (CPT)—HQ2 worksheet, CST2 data line. Since this activity is not tracked by LATIS, you must make your own calculations. Consult IL 80-11-408 [Facility Analysis Plan (FAP) Cost Factors] and its supplements for guidelines on developing time study procedures and forms. Enter the cost factor on the CST2 data line, field 8 (Figures 2-5 and 2-6).

You may also obtain an approximation for the CPT cost factor by using the following formula:

CPT Cost Factor Approximation = .37 × Cost per Labor Hour

where

.37 is the average time (hours) associated with cable pair transfers (per pair) for all force groups (except Engineering).

and

Cost per Labor Hour is a ratio derived from the Plant Cost Results Summary, Form E-5300-141 and E-5300-341 (or their equivalents) as follows:

Step 1. On Form E-5300-141 (or equivalent), locate data line 13 (aerial cable, 2M), data line 14 (underground cable, 5M), and data line 15 (buried cable, 45M). Take the sum of their values in column L (TOT. COST).

Step 2. On Form E-5300-341 (or equivalent), locate data lines 13, 14, and 15. Take the sum of their values in column S (TOTAL HOURS) and

the sum of their values in column R (MEASURED CONTRACT EQUIVALENT). Subtract the column R sum from the column S sum.

Step 3. Divide the column L sum (Step 1) by the difference S minus R (Step 2). The ratio would be entered on the CST2 data line, field 8 (Figure 2-6).

For example, a Cost per Labor Hour can be derived from the sample Form E-5300-141 and E-5300-341 in Figure 2.6. The sum column L values for data lines 13, 14, and 15 is 20342816; the sum of column S values for the three data lines is 556892; the sum of column R values for the three data lines is 4165. The difference (S minus R) is 552727. Dividing 20342816 (L) by 552727 (S minus R) yields 36.80. This is the Cost per Labor Hour ratio. Plugging 36.80 into the formula yields

$$.37 \times 36.80 = 13.62 \text{ (rounded off)}.$$

- Entry form: decimal, to 2 places
- Valid range: $0 \leqslant X \leqslant 999.99$
- Default value: none

Step 5. Fill in the Value of a Feeder Pair (VFP)—HQ2 worksheet, CST2 data line. From the Plant Services Cost Results Summary, Form E-5300-201 (Figure 2-6), read the value under Unit Costs, column LC, data line 03, underground cable. Enter this value on the CST2 data line, field 9.

- Entry form: decimal to 2 places
- Valid range: $0 \leqslant X \leqslant 999.99$
- Default value: none

For a description of Form E-5300-201, consult the Plant Cost Results Plan, Mechanized Forecasting and Analysis Procedures, Part 603. Or use any source giving equivalent data, such as Form 1-A.

Step 6. Fill in Special Study Data—HQ2 worksheet, SPCL data line. On the HQ2 worksheet as needed, fill in up to three special study names and corresponding cost factors on the data line coded SPCL (Figure 2-5). The SPCL data line is optional. Use the Headquarters Processing Specification Summary (LATIS report H54A, Part B) as your source, or obtain the data from the LATIS Coordinator or the FAP Engineer.

Field 1 **Name**—Of the special study you list first, a unique 3-character name.

- Entry form: alphabetic
- Valid range: any 3-character name unique to the program
- Default value: none

Field 2 **Cost factor**—The value for the activity named in field 1.

- Entry form: for cost factors, decimal, to 2 places
- Valid range: $0 \leqslant X \leqslant 9999.99$
- Default value: 0 (zero)

Field 3 **Name**—A unique 3-character name for the special study you list second.

Field 4 **Cost factor**—The value for the activity named in field 3.

Field 5 **Name**—A unique 3-character name for the special study you list third and last.

Field 6 **Cost factor**—The value for the activity named in field 5.

HQ2

COST FACTOR FILE INPUT

STATE/REGION TARA

FILE NAME COSTARA

PREPARER'S REMARK (OPTIONAL)

(63 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)

CRMK: AREA 1

OPERATIONAL COST FACTORS

	1 LINE AND STATION TRANSFER (LST)	2 WIRE OUT OF LIMITS (WOL)	3 BREAK CONNECT THROUGH (BCT)	4 CLEAR DEFECTIVE PAIR (CDP)	5 BREAK PERMANENT CONNECTION (BPC)	6 CHANGE INTERCONNECT RECORD (CIR)	7 REFERRAL TO ENGINEERING (RE)	8 RETERMINATE CONNECTION (RTC)
CST1:	28.23	70.03	7.72	75.68	19.48	86.05	36.59	16.49

OPERATIONAL COST FACTORS (CONTINUED)

	1 SERVICE ORDER DEFECTIVE (SOD)	2 OTHER DEFECTIVE (ODF)	3 OTHER ASSIGNMENT CHANGE (OAC)	4 FOUND CABLE TROUBLE SHEATH BREAK (1–6)	5 FOUND CABLE TROUBLE SPLICING (7A)	6 FOUND CABLE TROUBLE TERMINATING (7B)	7 FOUND CABLE TROUBLE CORE (8–9)	8 CABLE PAIR TRANSFER (CPT)	9 VALUE OF A FEEDER PAIR (VFP)
CST2:	28.63	67.17	33.76	177.54	127.62	74.80	177.54	13.62	31.25

SPECIAL STUDY DATA (OPTIONAL)

	1 SPECIAL STUDY 1 NAME	2 SPECIAL STUDY 1 COST FACTOR	3 SPECIAL STUDY 2 NAME	4 SPECIAL STUDY 2 COST FACTOR	5 SPECIAL STUDY 3 NAME	6 SPECIAL STUDY 3 COST FACTOR
SPCL:	PCV	25.23				

LPIE2 INPUT WORKSHEET (10/81)

PREPARED BY H.Q.E. DATE 10/15/84

Figure 2-5. Sample HQ2 input worksheet (reduced size), COST FACTOR FILE INPUT, with worksheet identification and data entries

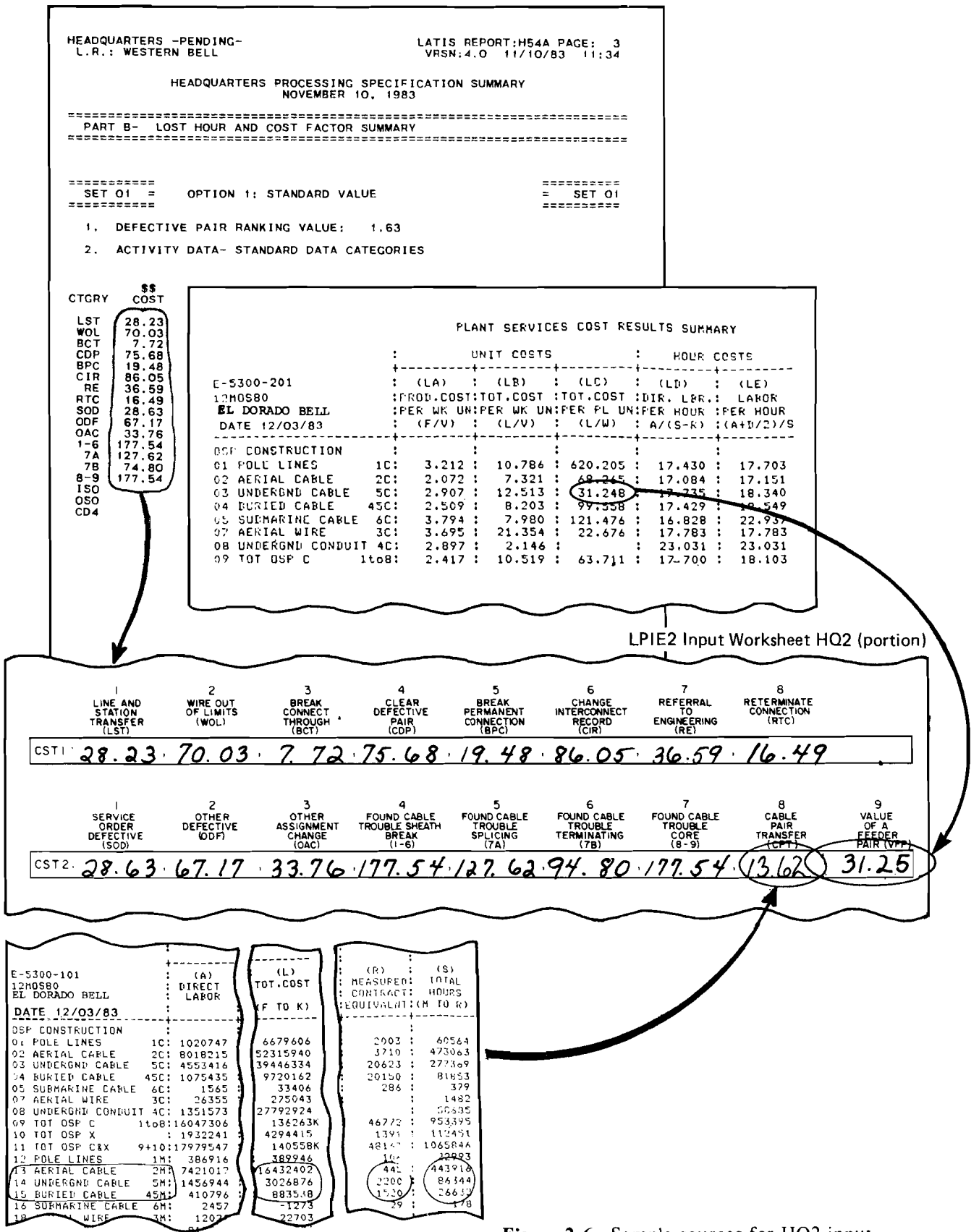

Figure 2-6. Sample sources for HQ2 input preparation on the CST1 and CST2 data line

2.4 Running LPIE2

A. Introduction

Once you have prepared Economic File and Cost Factor File input, you must run LPIE2 at the computer terminal (with clerical assistance as needed) to data-check each pair of files simultaneously. An LPIE2 terminal session includes the procedure for accessing the computer, creating data files as needed, accessing LPIE2, running the program, and disconnecting from the computer. To conduct a terminal session, use the Remote Data Entry System (RDES) as explained in OPA-2Y001-01, ***Generic Remote Data Entry System (RDES) User Guide.*** (For ordering information, contact your company's Documentation Coordinator.) You interact with RDES by typing "commands" on the computer terminal keyboard which are instructions for entering data, editing a file, and executing an LPIE2 program. RDES commands used with LPIE2 are summarized in Appendix E.

The Headquarters options for running LPIE2 are summarized in Table 2-2, with RDES commands, the short form of these commands, and the file name(s) that you must specify in the RDES interaction. Each option will be fully explained in the LPIE2 terminal procedure (Part B, Step 4, Select an LPIE2 Run Option).

Table 2-2

Headquarters Run Options for LPIE2

Run Option	RDES Command	Short Form	File Name(s)
LPIE2 HQ Data Check (mandatory)	DATACK	D	Economic File Cost Factor File HQ File
LPIE2 District User Data Check (mandatory)	DATACK	D	HQ File Problem File
LPIE2 Economic Study on a Problem File (as needed)	STUDY	S	Problem File
HQ File Formatted Listing (as needed)	HQLIST	H	HQ File
REHB Data Lines (USER 1A Worksheet) Formatted Listing (as needed)	REHBLIST	R	Problem File
Removing an HQ File from Computer Storage (as needed)	REMOVE	X	HQ File

B. Conducting an LPIE2 Terminal Session

Obtain from your local EPLANS Coordinator a schedule of computer operating hours and time share rates, telephone number(s) to dial up the computer, and the unique codes that identify you to the system, namely, HQ user identification (userid) and password(s).

Step 1. Access the Computer. Follow the specific instructions suitable to your terminal for connecting with the computer. Follow the RDES logon (or login) procedure for entering your userid, password, and accounting information (A/C INFO). You may be prompted for a second password, at the option of your company—check with your EPLANS Coordinator. If your userid and password(s) are valid, RDES responds with NEXT? which is followed on a separate line by the prompt symbol > indicating that RDES is waiting to process your command. Pertinent broadcast messages may be displayed or printed at the time of logon, before the first NEXT? prompt; see the note in Appendix E (RDES Summary) for further details.

Step 2. Create Economic and Cost Factor Files. Assemble HQ1 and HQ2 worksheets, in pairs, in file sequence. Enter HQ1 input as a separate file, then HQ2 input as another separate file. To enter data into the computer, type the command CREATE followed by the file name, consisting of no more than 8 characters (e.g., ECONTARA). The computer response (EDIT:) indicates that control of the terminal is now under the ***RDES Editor***, an interactive program with its own set of commands that you can use to input data lines. Apply also the following LPIE2 entry guidelines:

- **Data verification**. Before entering data into the computer, verify entries for completeness, correctness, and consistency against data sources and LPIE2 program constraints listed in this guide.
- **Line-by-line entry**. Enter each data line separately:
  - —Type the correct 4-character data line ID (e.g. CST1), followed by a colon (:), then the field entries. Separate the field entries with commas, ignoring spaces between entries on the input worksheets.
  - —End each data line by pressing the RETURN or CR (carriage return) key.
- **Data line sequence**. LPIE2 does not require you to enter data lines in worksheet order. However, it is to your advantage to keep the data lines you enter and the worksheets in the same order since this will help you in correcting errors.
- **Field sequence**. Enter the fields of any data line in strict sequence, as given on the input worksheet.
- **Mandatory fields**. Enter all mandatory fields.
- **Blanks for optional fields**. If you leave a field blank, you must still ***enter the comma*** to separate that blank field from the next field.
- **Character distinction**. Take care to distinguish decimal points from commas. Decimal points are characters within an entry; commas are used between entries to separate them. Thus ***omit commas within numbers*** (e.g., avoid

1,000, 21,000, and so on). Certain alphanumeric characters have similar shapes; to prevent error, carefully distinguish numeral 1 from letters i, l, and I, and numeral 0 (zero) from letters o, O, and Q.

> **Note**
>
> If you are using a facsimile of area-constant file data that are stored on an external device, edit the facsimile to agree with LPIE2 input specifications. The RDES command for reading the stored data into the computer is ASCII.

Use the command TYPE to display a file while in the RDES Editor. Proofread each file display against the input worksheets to catch omissions and typing errors. A sample display of an ***Economic File*** might appear as follows:

```
ERMK:EL DORADO BELL ECONTARA 10/2/84
ECON:.09,.45,.10,,,.03,,2,1,.145,.10,.47,0
AERL:242-22,.10,35,.85,31,.21,.26,2
BURD:242-45,.10,35,.88,33,.05,.08,2
```

A sample display of a ***Cost Factor File*** might appear as follows:

```
CRMK:EL DORADO BELL COSTARA 10/2/84
CST1:28.23,70.03,7.72,75.68,19.48,86.05,36.59,16.49
CST2:28.63,67.17,33.76,177.54,127.62,74.80,177.54,19.44,21.21
SPCL:SQB,190.32,PCR,82.90
```

If you are satisfied with a file as displayed, type FILE to store it in the computer. If you are ***not*** satisfied—or if you encounter difficulties when entering data—you can get out of the RDES Editor by typing QUIT. The computer will respond with NEXT? and you can enter RDES commands as needed.

Step 3. Access LPIE2. Type LPIE2 (or STUDY) to access the program. Be sure to wait for the prompt symbol (>) to appear at the beginning of a new data line before you enter your command. Enter the command immediately following the prompt symbol. End the data line by pressing the RETURN or CR (carriage return) key. RDES will then list the options shown in Table 2-2. The dialog for accessing LPIE2 is as follows:

Computer: NEXT?

You: >lpie2 (or study)

Computer: DATACK, STUDY, HQLIST, REHBLIST, OR REMOVE? (D, S, H, R, OR X)

Step 4. Select an LPIE2 Run Option from DATACK, STUDY, HQLIST, REHBLIST, and REMOVE. These options will now be discussed in that sequence.

4-1. DATACK (D)—LPIE2 data check, mandatory for all input files. If you select DATACK, type the letter d. Then you must specify either HQ or USER Data Check, by short form (enter either h or u). To Data-Check the Economic and Cost Factor File(s), you must specify h. The dialog is:

Computer: DATACK, STUDY, HQLIST, REHBLIST, OR REMOVE? (D, S, H, R, OR X)

You: >d

Computer: RUN HQ OR USER DATA CHECK? (H OR U)

You: >h

Then you must enter the file names of the Economic and Cost Factor File you are data-checking, entering them simultaneously as a pair. (Each file name must consist of no more than 8 characters.) The dialog is:

Computer: ENTER ECONOMIC AND COST FILE NAMES:

You: >[myecon mycost]

Be sure to enter the Economic File name first, followed by a space, then the Cost Factor File name; do not type a comma between the two file names.

Since the computer will merge the pair of Economic and Cost Factor Files into a single HQ File if they pass the Data Check, you are requested at this point to name the HQ File. Again, the file name must consist of no more than 8 characters.

Computer: ENTER NEW HQ FILE NAME:

You: >[myhq]

The computer will then run the LPIE2 Data Check, issuing a message to that effect, including the program version (e.g., 2.0), the run date (e.g. 10/15/84) and the hour, minute, and second (e.g., 14:30:20) when the program begins execution. (The time is always Eastern Standard Time.) A sample run message is:

NOW RUNNING LPIE2 DATA CHECK V2.0 10/15/84 14:30:20

After the run message, the computer will indicate the number of fatal errors (errors that must be corrected before the program will continue) and warnings (unusual conditions in the file that you may want to review and change as needed):

Computer:
* * *
YOU HAVE [number] FATAL ERROR(S)
YOU HAVE [number] WARNING(S)
* * *

The interaction now depends on the number of fatal errors detected by the Data Check; the number of warnings (if any) is not pertinent. There are two cases, as follows.

Case 1. No Fatal Errors Were Detected. The computer issues a message that the HQ File (as named) has been created (merged from the pair of Economic and Cost Factor Files). Then you must decide whether to continue.

Computer:
* * *
YOU HAVE 0 FATAL ERROR(S)

YOU HAVE 0 WARNING(S)
* * *
NEW HQ FILE 'MYHQ' CREATED.
CONTINUE (Y OR N)?

Enter "y" if another pair of HQ files requires data-checking or you want to select another run option. The computer then repeats the run option list:

Computer: CONTINUE (Y OR N)?

You: >y

Computer: DATACK, STUDY, HQLIST, REHBLIST, OR REMOVE? (D, S, H, R, OR X)

You: >d [or the appropriate letter]

Continue as before, making appropriate responses. When all files have been data-checked, corrected if needed, and the Data Check module rerun, enter "n":

Computer: CONTINUE (Y OR N)?

You: >n

Computer: NEXT?

You may end the terminal session at this point, as in Step 5.

Case 2. At Least 1 Fatal Error Was Detected. The computer prints out the error(s) and warning(s), issues a message that no HQ File was created, and asks you to correct errors and rerun the LPIE2 Data Check. The dialog is:

Computer:

* * *
YOU HAVE 1 FATAL ERROR(S)
YOU HAVE 0 WARNING(S)
* * *
[printout of error message(s) and warning(s)]
NO HQ FILE CREATED.
CORRECT ERRORS AND RUN AGAIN.
NEXT?
>

The prompt NEXT? indicates that you are back in RDES and can access the files in question and correct them using the RDES Editor. Use the Data Check printout in conjunction with Subsection 2.5, HQ Error Analysis, to interpret fatal errors and warnings. After making the necessary changes to the files, access LPIE2 and select the DATACK run option to data-check the corrected files.

Headquarters staff has the option of running the USER Data Check option in common with the District LPIE2 users. To run the USER Data Check, enter the letter d, then the letter u (at the next prompt) to designate USER Data Check, and then the appropriate Problem and HQ File names:

Computer: DATACK, STUDY, HQLIST, REHBLIST, OR REMOVE? (D, S, H, R, OR X)

You: >d

Computer: RUN HQ OR USER DATA CHECK? (H OR U)

You: >u

Computer: ENTER PROBLEM AND HQ FILE NAMES:

You: >[myprob myhq]

Computer: NOW RUNNING LPIE2 DATA CHECK V2.0 10/15/84 14:30:22

4-2. STUDY (S)—LPIE2 Economic Analysis on a Problem File. Headquarters has the STUDY run option in common with the District user. If you select STUDY, type the letter s. Then you must specify the Problem File name. The dialog is:

Computer: DATACK, STUDY, HQLIST, REHBLIST, OR REMOVE? (D, S, H, R, OR X)

You: >s

Computer: ENTER FILE NAME:

You: >[myprob]

Computer: NOW RUNNING LPIE2 STUDY V2.0 10/15/84 15:30:59

After the run message, the computer asks whether you want to see the Rehab Summaries. These refer to the Rehabilitation Input Summary and Rehabilitation Calculated Cost Summary, which are intermediate output of the program, available if REHB data lines (USER 1A input worksheet) are in a Problem File. (For further information, consult Section 5, Interpreting Output.) If you respond "y", the computer prints out the Rehab Summaries and asks whether you want to continue.

Computer: DO YOU WANT TO SEE THE REHAB SUMMARIES (Y OR N)?

You: >y

Computer: [printout, Rehab Summaries]
DO YOU WANT TO CONTINUE (Y OR N)?

The computer will wait for your response while you check the Rehab Summaries for correct entries and reasonable investment costs. If you are not satisfied, respond "n":

Computer: DO YOU WANT TO CONTINUE (Y OR N)?

You: >n

Computer: 10/15/84 STUDY FOR 'MYPROB' ENDED AT 15:45:20.
DO YOU WANT TO SAVE YOUR DATA CHECKED OUTPUT? (Y OR N)

You: >n

Computer: NEXT?

At this point, enter the appropriate RDES command to access the RDES Editor and make changes in the REHB data lines, guided by the USER 1A worksheet. Run the Data Check (Step 4-1) on the revised Problem File, and run

the LPIE2 economic analysis (Step 4-2). Review the Rehab Summaries for the revised Problem File; if you are satisfied, respond "y":

Computer: DO YOU WANT TO CONTINUE (Y OR N)?

You: >y

At this point the computer prints out the LPIE2 and/or CUCRIT output reports (described in Section 5). The computer states the date and time that the economic analysis ends and asks whether you want to save the data-checked output (i.e., the data-checked Problem file):

Computer: [printout, study output]
10/15/84 STUDY FOR 'MYPROB' ENDED AT 15:45:20.
DO YOU WANT TO SAVE YOUR DATA CHECKED OUTPUT?
(Y OR N)

You: >y

Computer: OUTPUT SAVED AS 'MYPROB DATA1' FILE.
NEXT?
>

If you do not want to save the data-checked Problem File (DATA1), respond "n." The computer will prompt you with NEXT?, and no other message will appear.

> **Note**
>
> To remove a DATA1 file (data-checked Problem File), use the RDES command PURGE, as described in the Generic RDES User Guide and in Appendix E.

4-3. HQLIST (H)—Formatted listing of an HQ File. Headquarters staff has the HQLIST run option in common with the District LPIE2 users. You can use this option to inspect any HQ File after it has been successfully created. A sample is in Figure 2-7 (foldout) at the end of this subsection. Type "h", and enter the HQ File name. The dialog is:

Computer: DATACK, STUDY, HQLIST, REHBLIST, OR REMOVE?
(D, S, H, R, OR X)

You: >h

Computer: ENTER HQ FILE NAME:

You: >[myhq]

Computer: [printout of the named HQ File in formatted listing]
CONTINUE (Y OR N)?
>

If you type "y", the computer will list run options; if "n", the computer will prompt with NEXT?.

4-4. REHBLIST (R)—Printout of the REHB data lines (USER 1A, DETAILED REHABILITATION INPUT). Headquarters staff has the REHBLIST run option in common with the District LPIE2 users. The printout takes the form of a Rehabilitation Input Summary, described in Section 5, District

Responsibilities in support of LPIE2—Interpreting Output. You can use this option to inspect the REHB data lines in a Problem File ***before*** data-checking the file. Type "r", and enter the Problem File name. The dialog is:

Computer: DATACK, STUDY, HQLIST, REHBLIST, OR REMOVE?
(D, S, H, R, OR X)

You: >r

Computer: ENTER PROBLEM FILE NAME:

You: >[myprob]

Computer: [printout of the Rehabilitation Input Summary]
CONTINUE (Y OR N)?
>

If you type "y", the computer will list run options; if "n", the computer will prompt with NEXT?.

4-5. REMOVE (X)—Erasure of an existing HQ File from storage. The REMOVE run option is ***not*** available to District LPIE2 users. You can use this option in conjunction with HQ File updating and maintenance procedures. Type "x", and enter the HQ File name. The dialog is:

Computer: DATACK, STUDY, HQLIST, REHBLIST, OR REMOVE?
(D, S, H, R, OR X)

You: >x

Computer: ENTER HQ FILE NAME:

You: >[myhq]

Computer: HQ FILE 'MYHQ' REMOVED.
CONTINUE (Y OR N)?
>

If no HQ File with the given file name can be found, the computer response is:

Computer: HQ FILE 'MYHQ' DOES NOT EXIST.
CONTINUE (Y OR N)?
>

You may repeat the REMOVE option with the correct file name or go back to RDES and obtain a listing of your files (RDES command FNAMES or FNAMES1) to check the file name.

Step 5. End the Terminal Session. Follow RDES logoff procedure and the specific instructions suitable to your terminal for disconnecting from the computer.

> **Note**
>
> Inform District FAP engineers of the relevant HQ File name which District Users need to run the USER Data Check.

```
XYZ COMPANY


  DEBT INTEREST RATE                =  .09
  DEBT RATIO                        =  .45
  LABOR TREND RATE                  =  .10
  INTEREST DURING CONSTRUCTION      =  0
  DIVISION OF REVENUE               =  0
  STATE INCOME TAX RATE             =  .03
  YEARS IN INCOME STATEMENT         =  0
  LIFE OPTION CODE                  =  2
  STATE INCOME TAX OPTION           =  1
  COST OF MONEY                     =  .145
  INVESTMENT TAX CREDIT RATE        =  .10
  FEDERAL INCOME TAX RATE           =  .47
  NORMALIZATION OPTION              =  0


  ACCOUNT CODE                        242-22          242-45


  CAPITAL TREND RATE                =  .09            .09
  ADR GUIDELINE LIFE                =  23             30
  TAX / BOOK  RATIO                 =  1              1
  AVERAGE SERVICE LIFE              =  23             30
  AVERAGE GROSS SALVAGE             =  0              0
  AVERAGE COST OF REMOVAL           =  0              0
  ADR CLASS CODE                    =  0              0



AREA 1


  LST = 28.23          RE  = 36.59          7A  =  127.62
  WOL = 70.03          RTC = 16.49          7B  =  74.80
  BCT =  7.72          SOD =  28.63         8-9 =  177.54
  CDP = 75.68          ODF =  67.17         CPT =  13.62
  BPC = 19.48          OAC =  33.76         VFP = 31.25
  CIR = 86.05          1-6 =  177.54


  SPECIAL STUDIES :


  PCV          =     25.23
```

Figure 2-7. Sample HQ File formatted listing

2.5 HQ Error Analysis

This analysis describes the Data Check output and lists error messages that apply to HQ files. Each message is interpreted and illustrated by a specific example to guide you in analyzing errors and taking corrective action.

A. Data Check Output

Data Check generates an appropriate message for each error it detects. Suppose a data line ID cannot be identified by Data Check because the ID is missing or wrong. This is an error. Data Check generates the error message

GEN-1F: UNRECOGNIZABLE LINE IDENTIFICATION

which consists of a code (GEN-1F:) and an error statement (UNRECOGNIZABLE LINE IDENTIFICATION). In the code, GEN refers to the General (GEN) Error Message List. GEN-1 is the first message in the list. As further explained below, the letter **F** indicates a **F**atal error in contrast to a **W**arning (letter **W**).

- ***Fatal error*** (F)—an error that stops the program. LPIE2 does not run a file containing a fatal error. If you incur a fatal error, you must correct it before a study can be run.
- ***Warning*** (W)—a non-fatal error. the program has detected some unusual condition, which does not stop the program. Nevertheless, you should determine if the error would impair an economic evaluation if it remains in the file; if it would, correct it.

A *colon* (:) ends the error message code and introduces the statement describing the error. In some messages, the statement specifies the data line ID, field number, or field entry to pinpoint the error or to relate fields—for example,

GEN-10F: REPEATED AERL LINE

The error in this case is that the AERL data line is repeated (but only one is allowed in an Economic File). If a BURD data line were repeated, then the message would be

GEN-10F: REPEATED BURD LINE

The error of a repeated data line can be expressed as

GEN-10F: REPEATED * LINE

where the asterisk is a place holder for any specific data line ID. In general, an asterisk is the place holder for a data line ID, field number, or field entry that would be specified in actual Data Check output.

Three *message lists* apply to HQ files:

- *General* (GEN) Error Message List - contains messages coded GEN-1, GEN-2, and so on, that may apply to erroneous entries in any of the three LPIE2 files. For example,

GEN-1F: UNRECOGNIZABLE LINE IDENTIFICATION

- *Economic* (ECO) File Error Message List - contains messages coded ECO-1, ECO-2, and so on, that may apply only to erroneous entries in an Economic File. For example,

ECO-1F: "LIFE OPTION CODE" INVALID FOR LPIE2 STUDY

- *Cost Factor File* (CFF) Error Message List - contains messages coded CFF-1, CFF-2, and so on, that may apply only to erroneous entries in a Cost Factor File. For example,

CFF-1W: SPECIAL STUDY FIELD * IS BLANK - ASSUMING ZERO COST FOR SPECIAL STUDY NAMED IN FIELD *

In Data Check output, a CFF-1 message will specify the particular field numbers applying in the given case.

The Data Check has another way of pinpointing errors other than specifying data line ID, field number, or entry. The output may include the entire data line containing error(s), with the line displayed exactly as you entered it. In some cases, a ***marker*** (a capital letter) is printed in two places—under the first character of the erroneous entry (either data line ID or field), and in front of the appropriate error message—in order to relate the two items, as in the following example.

```
AERL:242-12,.09,23,1,12,0,0
      A
-A- GEN-9F: INVALID ENTRY IN FIELD

REMK:EL DORADO BELL NORTH ECONO

*** GEN-1F: UNRECOGNIZABLE LINE
    IDENTIFICATION
```

The marker in front of the error message is set off with hyphens (-A-). Where no marker is used, the error message is preceded by three asterisks (***).

B. General (GEN) Error Message List

General error messages cover general deviations from program formats. These deviations concern data-line identification, number of data lines allowed, field count, mandatory entries, data form, entry size, and valid range of data values. The Data Check inspects each file, line by line, to detect deviations from program constraints. Failure to pass a check results in an error message or warning. General error messages are as follows.

GEN-1F: UNRECOGNIZABLE LINE IDENTIFICATION

Interpretation: This is a fatal error. The data-line identifier (line ID) cannot be identified as entered. It apparently doesn't match any valid LPIE2 data line ID in an Economic or Cost Factor file (AERL, BURD, CRMK, CST1, CST2, ECON, ERMK, or SPCL). Since field values cannot be identified, no processing can take place; the program stops.

Valid data-line IDs are preprinted on the HQ1 and HQ2 input worksheets, so the error probably occurred in copying or typing during the terminal session.

Example: BIRD: 242-45,.09,30,1,30,0,0

*** GEN-1F: UNRECOGNIZABLE LINE IDENTIFICATION

A casual slip turned BURD into BIRD. Avoid colon shifts resulting in errors like BUR:D, which Data Check cannot interpret.

GEN-2F: MANDATORY * LINE MISSING

Interpretation: This is a fatal error. The * would be replaced by a specific data-line ID in Data Check output. One of the following mandatory data lines is missing from an ECO or CFF file:

AERL, BURD, CST1, CST2, ECON

The data line may have been omitted when the file was entered, or misspelled during entry (also producing a GEN-1 error).

Example: MANDATORY CST2 LINE MISSING

The data line may have been passed over when typing since it looks like CST1 at first glance. Check input worksheets against file displays during the terminal session.

GEN-3F: LINE IDENTIFICATION WITHOUT FIELD(S)

Interpretation: This is a fatal error. The data line ID was entered without the field data.

Example: SPCL:

*** GEN-3F: LINE IDENTIFICATION WITHOUT FIELDS

Probably the empty data line was entered by mistake since it is optional. Another possibility is that the data-line ID was entered, the RETURN key was hit by mistake, the complete data line was correctly entered, and the empty data line was *not* deleted. If there were no data to enter, the data line ID should not have been entered. On the other hand, the data may have been inadvertently omitted on the worksheet.

GEN-4F: TOO MANY DATA FIELDS

Interpretation: This is a fatal error. More fields were entered than the program allows for in a given data line. Thus the Data Check field count doesn't agree with the number of fields read, and data values cannot be identified.

Example:
ECON: .09,.45,.10,,,,03,,0,1,.145,.10,.47,0

*** GEN-4F: TOO MANY DATA FIELDS

The decimal point in field 6—with correct value .03—was entered as a comma at the terminal. Data Check counted the comma as an extra field.

GEN-5F: MANDATORY FIELD MISSING ON LINE

Interpretation: This is a fatal error. In the displayed data line, the field check detected a missing data entry required by the program.

Example:
ECON: .09,.45,,.10,.03,,0,1,.145,.10,.47,0

*** GEN-5F: MANDATORY FIELD MISSING ON LINE

Fields 3 and 4 were reversed at the terminal. An entry in field 3 is mandatory but that field appears as a blank (indicated by the comma). Field 4 might be left blank since that value is not used by LPIE2.

GEN-6F: ENTRY HAS MORE CHARACTERS THAN THE FIELD SIZE ALLOWS

Interpretation: This is a fatal error, caused by exceeding the maximum field size (maximum number of characters per field). Don't confuse field size with valid range, which refers to data value.

Example:
CST2:28.63,67.17,33.76,177.539,127.620,74.802,177.539,19.44,21.21
A B C

-A- GEN-6F: ENTRY HAS MORE CHARACTERS THAN THE FIELD SIZE ALLOWS

-B- GEN-6F: ENTRY HAS MORE CHARACTERS THAN THE FIELD SIZE ALLOWS

-C- GEN-6F: ENTRY HAS MORE CHARACTERS THAN THE FIELD SIZE ALLOWS

The maximum field size on CST2 is 6, including the decimal point. The marked fields each contain 7 characters since the decimals were not rounded off to 2 places.

GEN-7F: NO DECIMAL ALLOWED IN A WHOLE NUMBER FIELD

Interpretation: This is a fatal error, caused by a wrong entry form. A decimal (real number) was entered in a field requiring a whole number (integer).

Example: AERL:242-22,.09,.23,1,.23,0,0
A B

-A- GEN-7F: NO DECIMAL ALLOWED IN
A WHOLE NUMBER FIELD

-B- GEN-7F: NO DECIMAL ALLOWED IN
A WHOLE NUMBER FIELD

While most entries in the HQ files are rates or cost factors expressed as decimal numbers, certain whole numbers are required in the Economic File, namely, life option code (ECON, field 8), state income tax option (ECON, 9), ADR guideline life (AERL, 3; BURD, 3), and average service life (AERL, 5; BURD, 5).

GEN-8F: INVALID CHARACTER IN A NUMBER FIELD

Interpretation: This is a fatal error. A character other than a numeral, decimal point, or minus sign was entered in a field requiring a whole number or a decimal.

Example: AERL: 242-22,.09,23,i,23,0,0
A

-A- GEN-8F: INVALID CHARACTER IN A NUMBER FIELD

The number 1 (one) was entered as the letter i. (Another common mistake is the letter O instead of the number zero.)

GEN-9F: INVALID ENTRY IN FIELD(S)

Interpretation: This is a fatal error. An entry of the wrong form was detected in one or more fields, particularly in a field requiring one of a specific set of characters (since numeric fields are covered by GEN-7 and GEN-8).

Example: AERL:242-12, .09,23,1,23,0,0
A

-A- GEN-9F: INVALID ENTRY IN FIELD

The account code for aerial plant must be 242-22; any other combination of characters is invalid.

GEN-10F: REPEATED * LINE

Interpretation: This is a fatal error. The data line with the given ID (*), first three digits, was entered more than once in the HQ file being checked. However, only one of each kind of data line is allowed in any Economic or Cost Factor File. It is an error even if the two data lines are identical in every respect.

Example:
AERL:242-22,0.09,23,1,23,0,0
AERL:242-45,.09,30,1,30,0,0

*** GEN-10F: REPEATED AERL LINE

The similarity and proximity of the AERL and BURD data lines probably caused this slip. (A GEN-2 message indicating a missing mandatory data line would also be generated for BURD.)

GEN-11F: LINE EXCEEDS 80 CHARACTERS

Interpretation: This is a fatal error. There are more characters in the data line (including spaces between words and punctuation) than the maximum 80 characters.

Example:
ERMK: EL DORADO BELL NORTHERN DISTRICT ECO FILE 10/18/84 CUCRIT UPDATE 10/15/84 PREPARED BY JJM

*** GEN-11F: LINE EXCEEDS 80 CHARACTERS

A preparer's remark on either the ERMK or CRMK data line should not be more than 63 characters. Brevity is best.

GEN-12F: ENTRY IN FIELD IS OUT OF RANGE

Interpretation: This is a fatal error. The value entered is not in the range (within the specified limits) for that field, as given by input specifications.

Example: AERL:242-22,0.9,32,1,23,0,0
A

-A- GEN-12F: ENTRY IN FIELD IS OUT OF RANGE

In field 2, the value should have been .09, but the zero and decimal point were transposed in typing. The specified range is 0 through .25.

C. Economic (ECO) File Error Message List

Economic File error messages apply to data lines and fields only in an Economic File. They cover particular fields and relationships between fields. Failure to pass a check results in an error message or warning. Economic File error messages are as follows.

ECO-1F: "LIFE OPTION CODE" INVALID FOR LPIE2 STUDY

Interpretation: This is a conditional fatal error, fatal *if* the code is 0 or 1. Life option code refers to field 8 on the ECON data line (HQ1 worksheet). LPIE2 restricts entries to only one valid code: 2. Code 1, which may be in the CUCRIT MFILE, is ***not*** valid in LPIE2. If you enter 1, the program will generate the ECO-1F error message. (If you enter a number other than 0, 1, or 2, you get the GEN-12 message.)

Example:
ECON: .09,.45,.10,,,.03,,1,1,.145,.10,.47,0
A

-A- ECO-1F: "LIFE OPTION CODE" INVALID FOR LPIE2 STUDY

ECO-2F: "CAPITAL TREND RATE" > "COST OF MONEY" IN FIELD 10

Interpretation: This is a fatal error. "Capital trend rate" refers to field 2 on either the AERL or BURD data line (HQ1 worksheet). Capital trend rate must never exceed the cost of money, field 10 on the ECON data line.

Example: Only the message is printed in this case (with *** prepended); no data line is printed.

ECO-3F: "LABOR TREND RATE" > "COST OF MONEY" IN FIELD 10

Interpretation: This is a fatal error, similar to ECO-2F. Labor trend rate (ECON data line, field 3) must never exceed the cost of money (ECON data line, field 10).

Example:
ECON: .09,.45,.16,,,.03,,0, 1,.145,.10,.47,0

-A- ECO-3F: "LABOR TREND RATE" > "COST OF MONEY" IN FIELD 10

The labor trend rate .16 (field 3) is greater than cost of money .145, an error that must be corrected. Be careful—both rates have the same range, 0 through .25.

ECO-4F: AVERAGE SERVICE LIFE OUT OF RANGE FOR LPIE2 STUDY

Interpretation: This is a fatal error. "Average service life" refers to field 5 on either the AERL or BURD data line, and is used as the economic life of the cables and terminals. The LPIE2 valid range (0.0834 through 60.0000) is more restricted than the CUCRIT range (0 through 99). Values outside the LPIE2 range, which may be in the CUCRIT ACCFILE, are *not* valid in LPIE2.

Example:
BURD:242-45,.225,45,.85,75,9.5,4.0,2
A

-A- ECO-4F: AVERAGE SERVICE LIFE OUT OF RANGE FOR LPIE2 STUDY

The average service life, 75, is outside the LPIE2 range but within the CUCRIT range.

ECO-5F: TAX/BOOK RATIO OUT OF RANGE FOR LPIE2 STUDY

Interpretation: This is a fatal error. Tax/book ratio refers to field 4 on either the AERL or BURD data line. The LPIE2 valid range (0.50 through 1.00) is more restricted than the CUCRIT range (0 through 1.00). Values lower than the LPIE2 range may be in the CUCRIT ACCFILE but are *not* valid in LPIE2.

Example: BURD:242-45,.09,32,.40,38,0,0
A

-A- ECO-5F: TAX/BOOK RATIO OUT OF RANGE FOR LPIE2 STUDY

ECO-6F: "NORMALIZATION CODE" INVALID FOR LPIE2 STUDY

Interpretation: This is a conditional fatal error, fatal *if* the number is anything but 0 (zero). "Normalization code" refers to field 13 on the ECON data line. LPIE2 restricts entry to 0 (in accord with CUCRIT).

Example:
ECON: .20,.50,.21,.20,,.06,5,0,1,.24,.14,.48,1

*** ECO-6F: "NORMALIZATION CODE" INVALID FOR LPIE2 STUDY

D. Cost Factor (CFF) File Error Message List

Cost Factor File error messages apply to data line and fields only in a Cost Factor File. They cover particular fields, and relationships between fields. Failure to pass a check results in an error message or warning. Cost Factor File error messages are as follows.

CFF-1W: SPECIAL STUDY FIELD * IS BLANK—ASSUMING ZERO COST FOR SPECIAL STUDY NAMED IN FIELD *

Interpretation: This is a warning referring to the SPCL data line (HQ2 worksheet). The blank field (the first *) refers to one of the three special study cost factor fields 2, 4, or 6. However, the corresponding special study *name* field 1, 3, or 5 (the second*) is not blank. The program assumes zero cost—that is, it defaults to 0 to supply the missing cost factor.

Example: SPCL:AAA,416.83,BBB
A

-A- CFF-1W: SPECIAL STUDY FIELD 4 is BLANK—ASSUMING ZERO COST FOR SPECIAL STUDY NAMED IN FIELD 3.

The warning gives you the opportunity to consider the effect of zero cost (i.e., no effect) for special study BBB, if there is such a study. Check the HQ2 worksheet and your sources.

CFF-2F: SPECIAL STUDY NAME FIELD * IS BLANK BUT COST IS PRESENT IN FIELD *

Interpretation: This is a fatal error, the reverse of the situation in CFF-1F. Here the cost factor is present but cannot be identified by special study name.

Example: SPCL:AAA,416.83,,28.62
A

-A- CFF-2F: SPECIAL STUDY NAME FIELD 3 IS BLANK BUT COST IS PRESENT IN FIELD 4

CFF-3F: CANNOT HAVE TWO SPECIAL STUDIES WITH THE SAME NAME. REPLACE OR ELIMINATE INCORRECT NAME.

Interpretation: This is a fatal error, a conflict in identifying two distinct cost factors.

Example: SPCL:AAA,416.83,AAA,334.09
A

-A- CCF-3F: CANNOT HAVE TWO SPECIAL STUDIES WITH THE SAME NAME. REPLACE OR ELIMINATE INCORRECT NAME.

3 District Responsibilities in Support of LPIE2—Preparing Problem File Input

3.1 Introduction

As the design engineer in a district DSDC, you are responsible first for developing solution alternatives for an entire DA and then for preparing input data so that LPIE2 can be run to evaluate those solution alternatives. Each LPIE2 run for a DA requires input data describing the solution alternatives and the DA; these data are assembled into a Problem File. You must prepare Problem File input data on a series of USER input worksheets and identify each worksheet by sheet number, DA, and Problem File name (1 to 8 characters long). The preparer's initials and preparation date can be included for reference. Table 3-1 gives an overview of the worksheets (USER 1A, USER 1B, USER 2, USER 2A, USER 3, and USER 4); illustrations of these worksheets are in Figures 3-1, 3-2, 3-3, 3-3A, 3-4, and 3-5 on the next few pages. In these figures, worksheet identification has been filled out for the sheet number where applicable (e.g., 1 of 1), the DA being studied (e.g., 2104), the Problem File name (e.g., LARUE4), the preparer's initials (e.g., U.S.E.), and the preparation date (e.g., 10/15/84).

All data lines and fields on ***all*** USER input worksheets, including optional ones, are described and illustrated in Subsections 3.2 through 3.6. Input procedures are organized into steps referring to a given data line and a field or group of related fields on that data line. Master copies of all USER input worksheets, suitable for reproduction and use in the Problem File input procedures, are given in Appendix D.

Table 3-1

Problem File Preparation Overview

Input Worksheet	Purpose
USER 1A - DETAILED REHABILITATION INPUT (Figure 3-1)	For use in describing rehabilitation data by cable section treatments
USER 1B - SUMMARY INPUT—OPTIONAL (Figure 3-2)	For use instead of USER 1A to describe rehabilitation costs by solution alternative, and where mechanized broad gauge programs are in effect
USER 2 - DISTRIBUTION AREA (DA) DATA (Figure 3-3)	For use in describing the DA and the study parameters
USER 2A - DISTRIBUTION AREA (DA) DATA —OPTIONAL (Figure 3-3A)	For use in overriding two types of standard data and entering Status Quo Non-Discretionary data
USER 3 - SOLUTION ALTERNATIVE DATA (Figure 3-4)	For use in describing the solution alternatives developed for the DA
USER 4 - POST-IMPROVEMENT OVERRIDES— OPTIONAL (Figure 3-5)	For use in overriding LPIE2 projections of post-improvement activity levels and annual activity growth, and in estimating special study activity level and annual growth

Note

To prepare input data for any Problem File, use USER 1A (or USER 1B), USER 2 and USER 3. USER 2A and USER 4 are optional.

DA STUDY WORKSHEET (OPTIONAL)

A	B	C	D	E	F	G	H	I	J	
TREATMENT	SEC #	FACILITY PLACED OR RENOVATED	QTY	FACILITY REMOVED	QTY	REMOVAL COST	SALVAGE VALUE	CABLE PAIR TRANS-FERS	CUT-OVER DROPS	USER REMARI (OPTIONAI 6 CHAR
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
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										REHB:

TOTAL NUMBER OF TROUBLES IN DA – TALLY BY CATEGORY				LPIE2 INPUT W
1 – 6	7A	7B	8 – 9	

NES & LPIE 2 WORKSHEET

USER 1A

DETAILED REHABILITATION INPUT

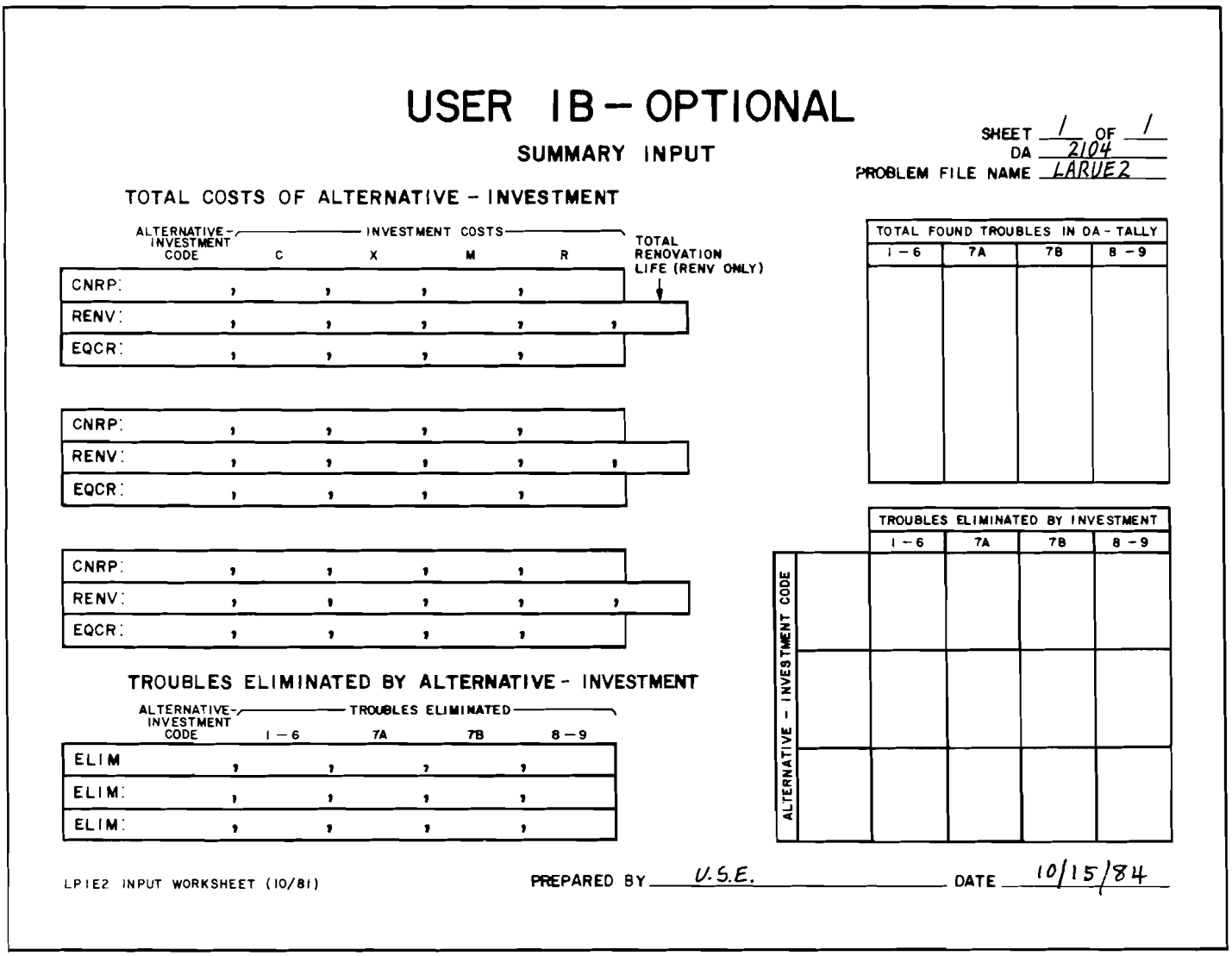
SHEET 1 OF 2
DA 2104
PROBLEM FILE NAME LARUE1

SEC #	REMAINING LIFE OR N	TREATMENT COSTS C	X	M	R	TROUBLES ELIMINATED 1-6	7A	7B	8-9	ALTERNATIVE-INVESTMENT CODE (S) APPLYING TO TREATMENT				

RKSHEET (10/81)

PREPARED BY U.S.E. DATE 10/15/84

Figure 3-1. The Rehabilitation Guidelines & LPIE2 Worksheet (reduced size) containing USER 1A input worksheet (on the right), DETAILED REHABILITATION INPUT. The DA STUDY WORKSHEET (on the left) is used in the Rehabilitation Guidelines method.



USER 1B – OPTIONAL

SUMMARY INPUT

SHEET 1 OF 1
DA 2104
PROBLEM FILE NAME LARVE2

TOTAL COSTS OF ALTERNATIVE - INVESTMENT

ALTERNATIVE-INVESTMENT CODE	INVESTMENT COSTS C	X	M	R	TOTAL RENOVATION LIFE (RENV ONLY)
CNRP:	,	,	,	,	
RENV:	,	,	,	,	,
EQCR:	,	,	,	,	
CNRP:	,	,	,	,	
RENV:	,	,	,	,	,
EQCR:	,	,	,	,	
CNRP:	,	,	,	,	
RENV:	,	,	,	,	,
EQCR:	,	,	,	,	

TROUBLES ELIMINATED BY ALTERNATIVE - INVESTMENT

ALTERNATIVE-INVESTMENT CODE	TROUBLES ELIMINATED 1 – 6	7A	7B	8 – 9
ELIM	,	,	,	,
ELIM:	,	,	,	,
ELIM:	,	,	,	,

TOTAL FOUND TROUBLES IN OA - TALLY			
1 – 6	7A	7B	8 – 9

ALTERNATIVE - INVESTMENT CODE	TROUBLES ELIMINATED BY INVESTMENT 1 – 6	7A	7B	8 – 9

LP1E2 INPUT WORKSHEET (10/81)

PREPARED BY U.S.E. DATE 10/15/84

Figure 3-2. The USER 1B input worksheet (reduced size), SUMMARY INPUT; it can be used optionally instead of USER 1A.

USER 2

DISTRIBUTION AREA (DA) DATA

DA 2104
PROBLEM FILE NAME LARVE4

PROBLEM IDENTIFICATION

(63 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)

IDEN :

AREA DATA

	WIRE CENTER (WC) (12 CHARACTERS MAXIMUM)	EXISTING ALLOCATION AREA (EAA) (12 CHARACTERS MAXIMUM)	DISTRIBUTION AREA (DA) (12 CHARACTERS MAXIMUM)
AREA:	,	,	

STUDY DATA

	STUDY YEAR	AD VALOREM TAX RATE	ANNUAL PAIR GROWTH	DISTRIBUTION PAIRS (AVAILABLE)	FEEDER PAIRS (AVAILABLE)	ASSIGNED PAIRS	DEFECTIVE PAIRS	INITIAL ULTIMATE PLANT (%)	DISTANCE TO WC (KF)	STRUCTURE TYPE (AER OR BUR)	INSULATION TYPE (PIC OR PULP)
STDY:	,	,	,	,	,	,	,	,	,	,	

CURRENT ACTIVITY LEVELS

	LST	WOL	BCT	CDP	BPC	CIR	RE	RTC	SOD	ODF	OAC	1-6	7A	7B	8-9
CURL:	,	,	,	,	,	,	,	,	,	,	,	,	,	,	

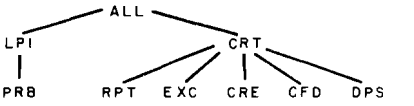
MISCELLANEOUS DATA (OPTIONAL)

	STUDY DURATION	NON-DISCRETIONARY C	X	M	R	SPECIAL STUDY 1 NAME	SPECIAL STUDY 1 ACTIVITY LEVEL	SPECIAL STUDY 2 NAME	SPECIAL STUDY 2 ACTIVITY LEVEL	SPECIAL STUDY 3 NAME	SPECIAL STUDY 3 ACTIVITY LEVEL
OPTN:	,	,	,	,	,	,	,	,	,	,	

PRINT CODES FOR OUTPUT REPORTS (OPTIONAL)

CHOOSE CODE(S) FROM: LPI, PRB, CRT, RPT, EXC, CRE, CFD, DPS, ALL

PRNT: , , , , ,



LPIE2 INPUT WORKSHEET (10/81) PREPARED BY H.Q.E. DATE 10/15/84

Figure 3-3. The USER 2 input worksheet (reduced size), DISTRIBUTION AREA (DA) DATA

USER 2A-OPTIONAL

DISTRIBUTION AREA (DA) DATA

SHEET 1 OF 1
DA 2104
PROBLEM FILE NAME LARUE4

STATUS QUO GROWTH RATE OVERRIDE (OPTIONAL)

	1-6	7A	7B	8-9	STUDY 1	STUDY 2	STUDY 3
SQGR:	,	,	,	,	,	,	,

STATUS QUO NON-DISCRETIONARY DATA (OPTIONAL)

	C$	X$	M$	R$	INVESTMENT MONTH (3 LETTERS)	INVESTMENT YEAR (4 DIGITS)
SQND:	,	,	,	,	,	

COST ENTRY DATA OVERRIDE (OPTIONAL)

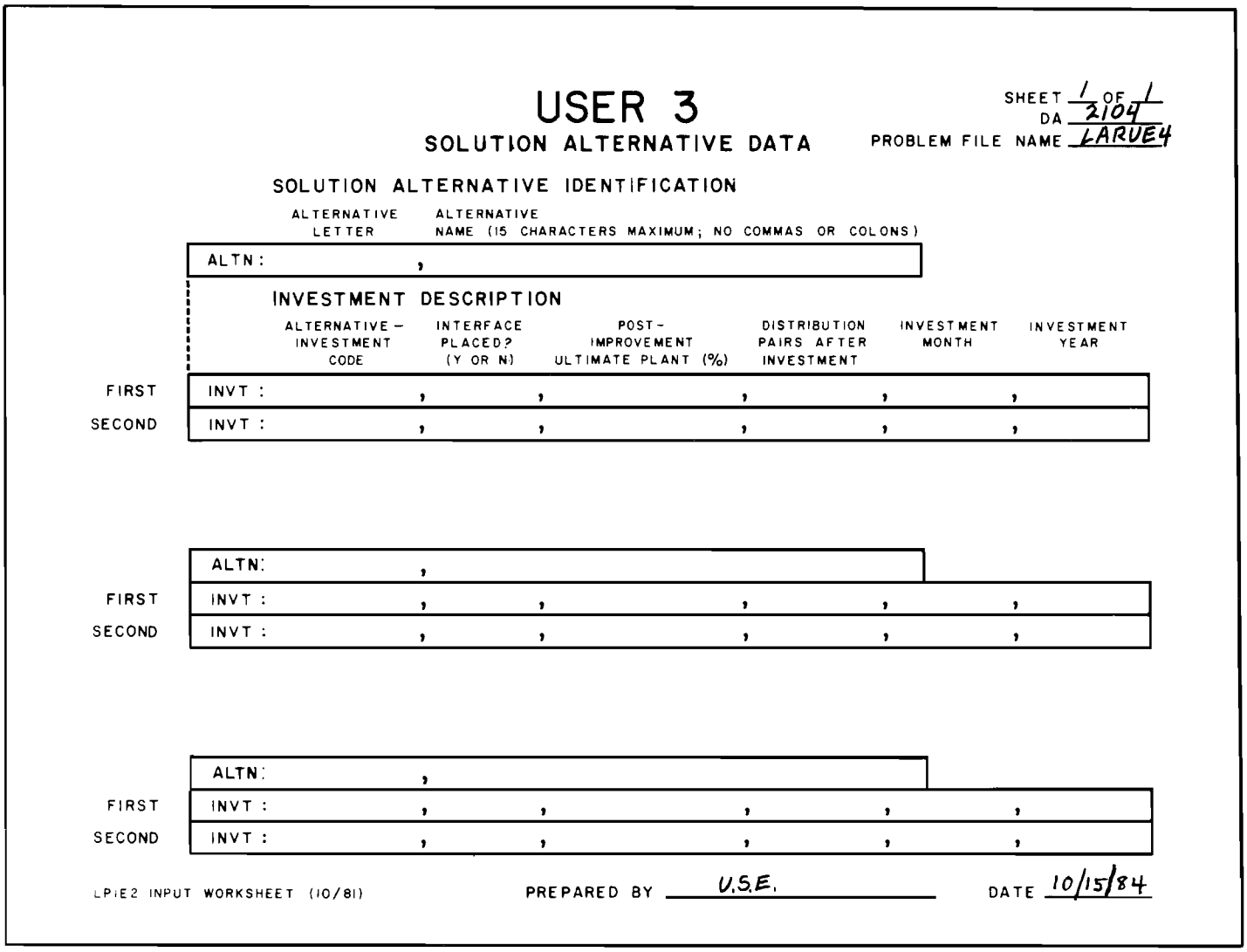
	ACTIVITY (3 CHARACTERS MAXIMUM)	COST (DECIMAL, 6 DIGITS MAXIMUM)
CSTE:		,
CSTE:		,
CSTE:		,
CSTE:		,
CSTE:		,
CSTE:		,

LPIE2 INPUT WORKSHEET (9/84)

PREPARED BY H.Q.E.

DATE 10/15/84

Figure 3-3A. The USER 2A input worksheet (reduced size), DISTRIBUTION AREA (DA) DATA OVERRIDES—OPTIONAL



USER 3

SOLUTION ALTERNATIVE DATA

SHEET 1 OF 1
DA 2104
PROBLEM FILE NAME LARUE4

SOLUTION ALTERNATIVE IDENTIFICATION

	ALTERNATIVE LETTER	ALTERNATIVE NAME (15 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)
ALTN:	,	

INVESTMENT DESCRIPTION

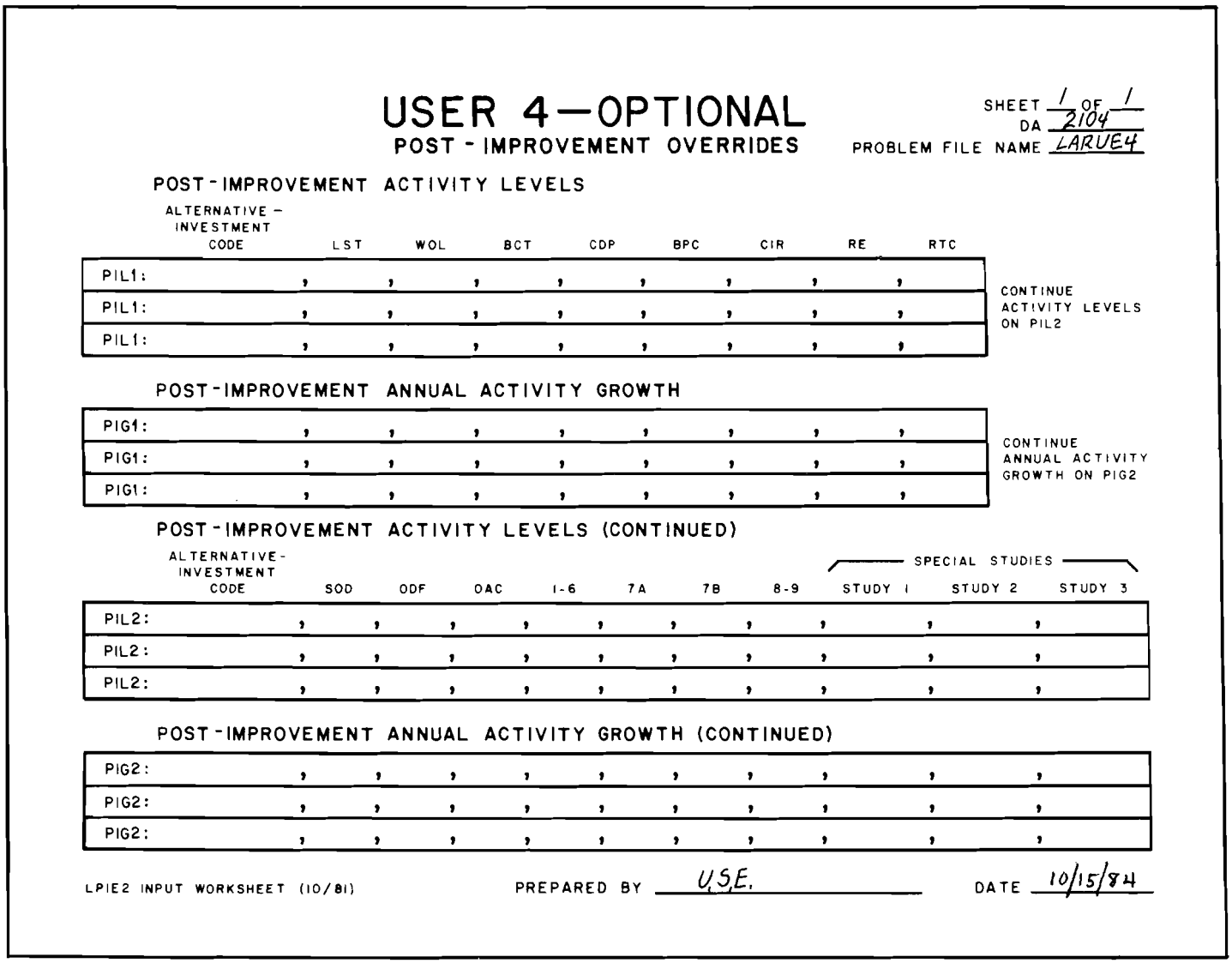
	ALTERNATIVE-INVESTMENT CODE	INTERFACE PLACED? (Y OR N)	POST-IMPROVEMENT ULTIMATE PLANT (%)	DISTRIBUTION PAIRS AFTER INVESTMENT	INVESTMENT MONTH	INVESTMENT YEAR
FIRST	INVT : ,	,	,	,	,	
SECOND	INVT : ,	,	,	,	,	

ALTN:	,					
FIRST	INVT : ,	,	,	,	,	
SECOND	INVT : ,	,	,	,	,	

ALTN:	,					
FIRST	INVT : ,	,	,	,	,	
SECOND	INVT : ,	,	,	,	,	

LPIE2 INPUT WORKSHEET (10/81) PREPARED BY U.S.E. DATE 10/15/84

Figure 3-4. The USER 3 input worksheet (reduced size), SOLUTION ALTERNATIVE DATA



USER 4—OPTIONAL

POST-IMPROVEMENT OVERRIDES

SHEET 1 OF 1
DA 2104
PROBLEM FILE NAME LARUE4

POST-IMPROVEMENT ACTIVITY LEVELS

ALTERNATIVE-INVESTMENT CODE	LST	WOL	BCT	CDP	BPC	CIR	RE	RTC
PIL1:	,	,	,	,	,	,	,	,
PIL1:	,	,	,	,	,	,	,	,
PIL1:	,	,	,	,	,	,	,	,

CONTINUE ACTIVITY LEVELS ON PIL2

POST-IMPROVEMENT ANNUAL ACTIVITY GROWTH

PIG1:	,	,	,	,	,	,	,	,
PIG1:	,	,	,	,	,	,	,	,
PIG1:	,	,	,	,	,	,	,	,

CONTINUE ANNUAL ACTIVITY GROWTH ON PIG2

POST-IMPROVEMENT ACTIVITY LEVELS (CONTINUED)

ALTERNATIVE-INVESTMENT CODE	SOD	ODF	OAC	1-6	7A	7B	8-9	SPECIAL STUDIES STUDY 1	STUDY 2	STUDY 3
PIL2:	,	,	,	,	,	,	,	,	,	,
PIL2:	,	,	,	,	,	,	,	,	,	,
PIL2:	,	,	,	,	,	,	,	,	,	,

POST-IMPROVEMENT ANNUAL ACTIVITY GROWTH (CONTINUED)

PIG2:	,	,	,	,	,	,	,	,	,	,
PIG2:	,	,	,	,	,	,	,	,	,	,
PIG2:	,	,	,	,	,	,	,	,	,	,

LPIE2 INPUT WORKSHEET (10/81) PREPARED BY U.S.E. DATE 10/15/84

Figure 3-5. The USER 4 input worksheet (reduced size), POST-IMPROVEMENT OVERRIDES—OPTIONAL.

3.2 The Rehabilitation Guidelines & LPIE2 Worksheet

It is reasonable that once you undertake a detailed DA study and develop solution alternatives, you would follow through to initiate the corresponding LPIE2 study. The information you gather and organize is precisely the data needed by LPIE2 to evaluate the alternatives. To make the most immediate and efficient use of rehabilitation information, the Rehabilitation Guidelines worksheet (DA STUDY WORKSHEET) and an LPIE2 input worksheet (USER 1A DETAILED REHABILITATION INPUT) have been combined into the Rehabilitation Guidelines & LPIE2 Worksheet. Unfold Figure 3-6 at the end of this subsection for use throughout the following discussion of the DA STUDY WORKSHEET (Part A) and USER 1A (Part B).

> **Note**
>
> The DA STUDY WORKSHEET, designed for use in the Rehabilitation Guidelines method, is described fully in BSP 917-601-110, ***Rehabilitation Guidelines for the Distribution Plant.*** You can use Part A to review the DA STUDY WORKSHEET as a source of data for deriving cable station rehabilitation details on USER 1A or go directly to the discussion of USER 1A in Part B. In any case, the information on the DA STUDY WORKSHEET is *not* entered into the computer; it is used only to derive data for the USER 1A input worksheet, which *is* entered into the computer as part of a Problem File.

A. Using the DA STUDY WORKSHEET (Left Side of the Form)

The DA STUDY WORKSHEET contains columns A through J for recording the results of a detailed (section-by-section) DA study. Each row specifies a distinct section treatment. Separate rows can be used to distinguish cable and terminals in a given section, as in the sample (Figure 3-6).

The rows of the form are common to both the DA STUDY WORKSHEET and USER 1A, so you can proceed smoothly from entering cable section treatment information (columns A through J) to entering treatment costs, troubles eliminated, and solution alternatives in the fields of the REHB data line. In fact, you can fill out the entire form during the detailed DA study, immediately using the detailed DA study results. Thus, at the end of the detailed DA study, you will have already completed an important portion of the Problem File, namely, the REHB data lines. To save space on the DA STUDY WORKSHEET (and hence on USER 1A), cable and terminal treatment(s) can be combined on one row, particularly if a DA contains numerous sections requiring rehabilitation.

Columns A through J are described as follows:

A **Treatment**—Name or abbreviation of the selected treatment: for example, renovate or REN, rebuild or REBLD, place or PL, replace or REP, reinforce or REINF.

> **Note**
>
> Terminal treatment for the initial LPIE2 run (before terminal inspection) should always be rebuilding. Inspection may indicate that some terminals can be refurbished or converted rather than rebuilt. Consider refurbishing and converting as ***renovations*** when you rerun LPIE2.

B Section number or interface—The cable section number, as shown on the rehabilitation alternative layout (or plant location record) or a designation for the proposed or existing interface, such as Xbox (Crossbox), FDI (Feeder/Distribution Interface), and SAI (Serving Area Interface). The number of each integral cable section must be unique. Repeat the section number on each data line containing a treatment for that section—for example, in cases where you propose a terminal treatment separate from a cable treatment.

C Facility placed or renovated—Name or cable identification code of the item of physical plant associated with the treatment (column B). The word PLACED in the column heading FACILITY PLACED OR RENOVATED refers to either a reinforcement or a replacement.

D QTY (quantity)—Cable footage, number of terminals, or interface size (pair capacity) of the facility (column C).

E Facility removed—The name of the facility to be removed if the treatment is a replacement.

F QTY (quantity)—Cable footage, number of terminals, or Xbox size (pair capacity), of the facility removed (Column E).

G Removal cost—Removal cost in whole dollars of the facility removed (column E).

H Salvage value—Salvage value in whole dollars of the facility removed (column E).

I Cable pair transfers—As needed, the number of total cable pair transfers required to implement a treatment (column A).

J Cutover drops—As needed, the total number of service wire cutovers required to implement a treatment (column A).

At the bottom of the DA STUDY WORKSHEET (Figure 3-6) is a scratch sheet you can use to tally the total number of found troubles in the DA by category (1-6, 7A, 7B, and 8-9). The tally will provide current activity levels for found trouble categories, which you can use as input to LPIE2.

B. Preparing DETAILED REHABILITATION INPUT (USER 1A, REHB Data Lines)

Fill out REHB data lines on USER 1A input worksheet(s) to describe rehabilitation treatments by cable section in the DA under study. LPIE2 allows a maximum of 100 REHB data lines in a Problem File. To list all cables section

treatments may require more than one copy of the Rehabilitation Guidelines & LPIE2 Worksheet containing USER 1A.

> **Note**
>
> If you prefer to describe rehabilitation costs by solution alternative (instead of by cable section treatment), or if you use mechanized broad gauge, fill out USER 1B instead, as described in Subsection 3.3.

Step 1. Specify Treatment and Section Number (USER 1A, REHB Data Line). This step refers to fields 1 and 2 on the REHB data line (Figure 3-6).

Field 1 **User remark (optional)**—Keyword of six characters or less for your reference. You can omit this entry, or you can repeat as many as six characters of the treatment name (column A). Some carefully chosen remark can help you retrieve a particular data line or related data lines scattered through the worksheet(s). For example, REBLD or INSPCT could be used as a keyword for terminal rebuilding.

- Entry form: alphanumeric
- Valid range: any group of six or fewer characters
- Default value: none

Field 2 **Section number**—Cable section number (from column B). The section number should be the same for all treatments on separate rows applying to the same section. Use 0 (zero) to indicate the interface and associated feeder laterals.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 9999$
- Default value: none

Step 2. Specify Remaining Life for Renovation (USER 1A, REHB Data Line). This step refers to field 3 on the REHB data line (Figure 3-6).

Field 3 **Remaining life or N**—The number of years after a renovation is implemented until the facility will have to be replaced, e.g. 15. For a treatment that is *not* a renovation (e.g. replacement, reinforcement), enter "n" as a signal for LPIE2 to use the average service life (for new plant) given in the HQ File. Enter "n" also for a rebuilt terminal, which is considered to have the same service life as new plant.

- Entry form: whole number or "n"
- Valid range: $1 \leqslant X \leqslant 99$ or N
- Default value: none

The following table (from the Rehabilitation Guidelines method) can be used to calculate remaining life if local guidelines are not available:

Table 3-2

Remaining Life of Renovation

Type of Renovation	Age at Renovation (in Years) (X = Current Age)	Remaining Life (in Years) for Renovated Facility
Reclaimed buried cable	Any	20
Rebuilt pedestals Converted pedestals Refurbished pedestals	Any X Any	30 30 − X or 15 5 to 7
Rebuilt aerial terminals Converted aerial terminals Refurbished aerial terminals	Any X Any	30 30 − X or 15 5 to 7
Aerial PIC cable (drained) Aerial PIC cable (dried)	X X	30 − X 30 − X
Serving area interfaces	0 to 5 5 < X < 15 X > 15	30 30 − X 5 to 7

Step 3. Enter Treatment Costs (USER 1A, REHB Data Line). This step refers to fields 4 through 7 on the REHB data line (Figure 3-6).

Field 4 **C Cost**—In whole dollars, the broad gauge labor and material cost of the treatment.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 999999$
- Default value: 0 (zero)

Field 5 **X Cost**—For a facility to be removed because of a replacement, the removal cost minus salvage value, in whole dollars. This will be negative only when salvage value exceeds removal cost.

- Entry form: integer
- Valid range: $-99999 \leqslant X \leqslant 99999$; use a minus sign only when salvage value is greater than cost of removal.
- Default value: 0 (zero)

Field 6 **M cost**—Total rearrangement cost of implementing the treatment, including cost of cable pair transfers and cutover drops.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 99999$
- Default value: 0 (zero)

Field 7 **R cost**—Total repair (or upkeep) cost associated with the treatment.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 99999$
- Default value: 0 (zero)

> **Caution**
>
> In fields 4 through 7, treatment costs, you may have reason to enter only one or two out of the four costs. Make sure, however, that at least one of these fields has an entry on each REHB data line. If no cost values have been entered in the cost fields, the Data Check generates an error message.

Step 4. Enter Found Troubles Eliminated by the Treatment (USER 1A, REHB Data Line). This step refers to fields 8 through 11 on the REHB data line (Figure 3-6).

Field 8 **1-6 eliminated**—The number of found cable troubles coded 1 through 6 (sheath breaks) that would be eliminated by implementing the proposed renovation or replacement.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 999$
- Default value: 0 (zero)

Field 9 **7A eliminated**—The number of 7A (splicing) troubles that would be eliminated by implementing the proposed renovation or replacement.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 999$
- Default value: 0 (zero)

Field 10 **7B eliminated**—The number of 7B (terminating) troubles that would be eliminated by implementing the proposed renovation or replacement.

- Entry form: whole number
- Valid range: $0 \leqslant X$ 999

- Default value: 0 (zero)

Field 11 **8-9 eliminated**—The number of found cable troubles coded 8 and 9 (core troubles) that would be eliminated by implementing the proposed renovation or replacement.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 999$
- Default value: 0 (zero)

> **Caution**
>
> Be sure to check the entry in fields 8 through 11 (troubles eliminated). If each field contains a zero, you may not have had data to enter (e.g., the treatment is for undersized and troublefree cable). On the other hand, you may have neglected to enter data. Make sure also that the number of troubles eliminated in any category is ***not*** greater than the total number of found troubles in the DA, as tallied in the lower left corner of the Rehabilitation Guidelines & LPIE2 Worksheet (Figure 3-6).

Step 5. Enter Any Alternative-Investment Code(s) Applying to the Treatment (USER 1A, REHB Data Line). This step refers to fields 12 through 17 on the REHB data line (Figure 3-6). For LPIE2 input purposes, each solution alternative and alternative-investment (when a solution alternative is subdivided into two investments) must be coded. Choose any convenient letter. A letter code is arbitrary, and LPIE2 does not attach a special meaning to a given letter. Be consistent, however, in using the same letter for a given alternative throughout LPIE2 input preparation. Alternative-investment codes are used throughout the USER input forms to help track investment costs and other data. See Subsection 3.5, which discusses USER 3, SOLUTION ALTERNATIVE DATA.

Fields 12-17 **Alternative-investment code(s)**—One-character or two-character code(s) for alternative(s) to be evaluated by the program in this run. The code(s) represent the alternative(s) under which the treatment will take place. The distinction between one or two characters is:

- The one-character code represents an alternative, say P (physical rehab), in which all treatments would be implemented at the same time, and the costs lumped into a single investment. (Six alternatives per run is the program limit.) When you enter a one-character code, the program automatically appends the number 1 to the code (e.g., P1).
- The two-character code represents one investment of an alternative-investment pair, that is, one or the other investment where an alternative is split into two separate investments. The two alternative-investments are phased through time so that one investment is first and the other investment is clearly ***later***. (Two investments per

alternative is the program limit.) In the two-character code, the first character symbolizes the alternative. The second character must be either 1 or 2, with 2 reserved for the later investment. For example, alternative I (intermediate design) has two investments: place an interface now and upgrade the design three years from now. The alternative-investments codes should be I1 and I2, respectively. In the same way, for U (ultimate design), the possible alternative-investment codes would be U1 and U2.

When you enter fields 12 through 17 on the REHB data lines, keep the following points in mind:

- Only one solution-alternative code may be entered per field. Alternative-investment codes can be entered in any order in fields 12 through 17. Suppose, for example, you chose code R for physical rehabilitation, code I for intermediate design, and code U for ultimate design. For section 1, say, the treatment is a replacement, which is under alternative R, I, and U. Enter each code in one of the fields 12 through 17, say R in field 12, I in field 13, U in field 14. It makes no difference whether you enter I in field 12, U in field 13, and R in field 14. It may, however, be easier to check the REHB data lines if you maintain a given sequence of codes. It would be an error in any case if the combination such as RI or IUR were entered in any one field.
- At least one field must be entered per treatment; that is, there must be at least one solution alternative that applies to the treatment. The first (or only) entry must be in field 12, which is the first available field for an alternative-investment code. If all six fields (12 through 17) are left blank, an error message results since the treatment costs on that data line cannot be assigned to an alternative.
- You may enter all six fields, that is, up to six codes per treatment. One treatment may be included in more than one alternative—for example, an interface placed for both intermediate and ultimate design may have codes I1 and U1.
- Do not enter both alternative-investment codes referring to one alternative on the same REHB data line (e.g., a treatment belongs either to P1 or P2, but not to both).

Note

The relationship between columns and fields on the Rehabilitation Guidelines & LPIE2 Worksheet is diagramed in Figure 3-7.

REHABILITATION GUIDELINE

DA STUDY WORKSHEET (OPTIONAL)

DET

A	B	C	D	E	F	G	H	I	J	
TREATMENT	SEC #	FACILITY PLACED OR RENOVATED	QTY	FACILITY REMOVED	QTY	REMOVAL COST	SALVAGE VALUE	CABLE PAIR TRANSFERS	CUT-OVER DROPS	USER REMARK (OPTIONAL) 6 CHAR. SEC #
REPLC	4	BKTS-50	418	BKTA-25		103		25		REHB: REPLC, 4
PLACE	4	TERM	2						4	REHB: PLACE, 4
REINF	7	BKTA-100	344					100		REHB: REINF, 7
REPLC	8	BKTS-300	511	BKMA-150		126		100		REHB: REPLC, 8
PLACE	8	TERM	1						4	REHB: PLACE, 8
REPLC	9	BKTS-50	1049	26-26		325				REHB: REPLC, 9
PLACE	9	TERM	5						15	REHB: PLACE, 9
REBLD	10	TERM	2						12	REHB: REBLD, 10
REPLC	11	BKTS-50	261	BKTA-25		64				REHB: REPLC, 11
REINF	12	BKTA-25	266					25		REHB: REINF, 12
REPLC	13	BKTS-100	468	26-19		115		50		REHB: REPLC, 13
PLACE	13	TERM	2						6	REHB: PLACE, 13
REINF	14	BKTA-25	106					25		REHB: REINF, 14
REBLD	16	TERM	1						5	REHB: REBLD, 16
REPLC	17	BKTS-100	266	51-24		65		50		REHB: REPLC, 17
PLACE	17	TERM	1						4	REHB: PLACE, 17
REPLC	18	ALTW-25	358	BKTG-25	ABANDON					REHB: REPLC, 18
PLACE	18	TERM	3						10	REHB: PLACE, 18
REBLD	19	TERM	1						3	REHB: REBLD, 19
REPLC	20	BKTS-100	193	51-24		47		25		REHB: REPLC, 20
PLACE	20	TERM	1						2	REHB: PLACE, 20
REPLC	21	BKTS-25	358	BKTA-25		88				REHB: REPLC, 21
PLACE	21	TERM	2						7	REHB: PLACE, 21
REBLD	22	TERM	1						2	REHB: REBLD, 22
REINF	23	BKTS-100	261					25		REHB: REINF, 23

TOTAL NUMBER OF TROUBLES IN DA – TALLY BY CATEGORY

1 – 6	7A	7B	8 – 9

LPIE2 INPUT WORKS

ES & LPIE 2 WORKSHEET

USER 1A

AILED REHABILITATION INPUT

SHEET 1 OF 2
DA 2104
PROBLEM FILE NAME LARUE1

RE-MAINING LIFE OR N	TREATMENT COSTS C	X	M	R	TROUBLES ELIMINATED 1-6	7A	7B	8-9	ALTERNATIVE-INVESTMENT CODE (S) APPLYING TO TREATMENT				
N	543	103	275		2				P	I	U		
N	400		120						P	I	U		
N	516		1100						I	U			
N	1611	126	1100		1				I	U			
N	200		120						I	U			
N	1364	325			3			1	P	I	U		
N	1000		450						P	I	U		
21			960				2		P	I	U		
N	332	64							P	I	U		
N	226		275						U				
N	796	115	550						I	U			
N	400		180						I	U			
N	90		275						U				
17			450				2		P	I	U		
N	442	65	550						I	U			
N	200		120				1		I	U			
N	2703				3				P	I	U		
N	600		300				1		P	I	U		
17			390				2		P	I	U		
N	328	47	275						I	U			
N	200		60						I	U			
N	394	88						1	P	I	U		
N	400		210			1			P	I	U		
14			360			1	1		P	I	U		
N	444		275						I	U			

HEET (10/81)

PREPARED BY U.S.E. DATE 10/15/84

Figure 3-6. Sample Rehabilitation Guidelines & LPIE2 Worksheet (reduced size), with the DA STUDY WORKSHEET and USER 1A input worksheet filled in

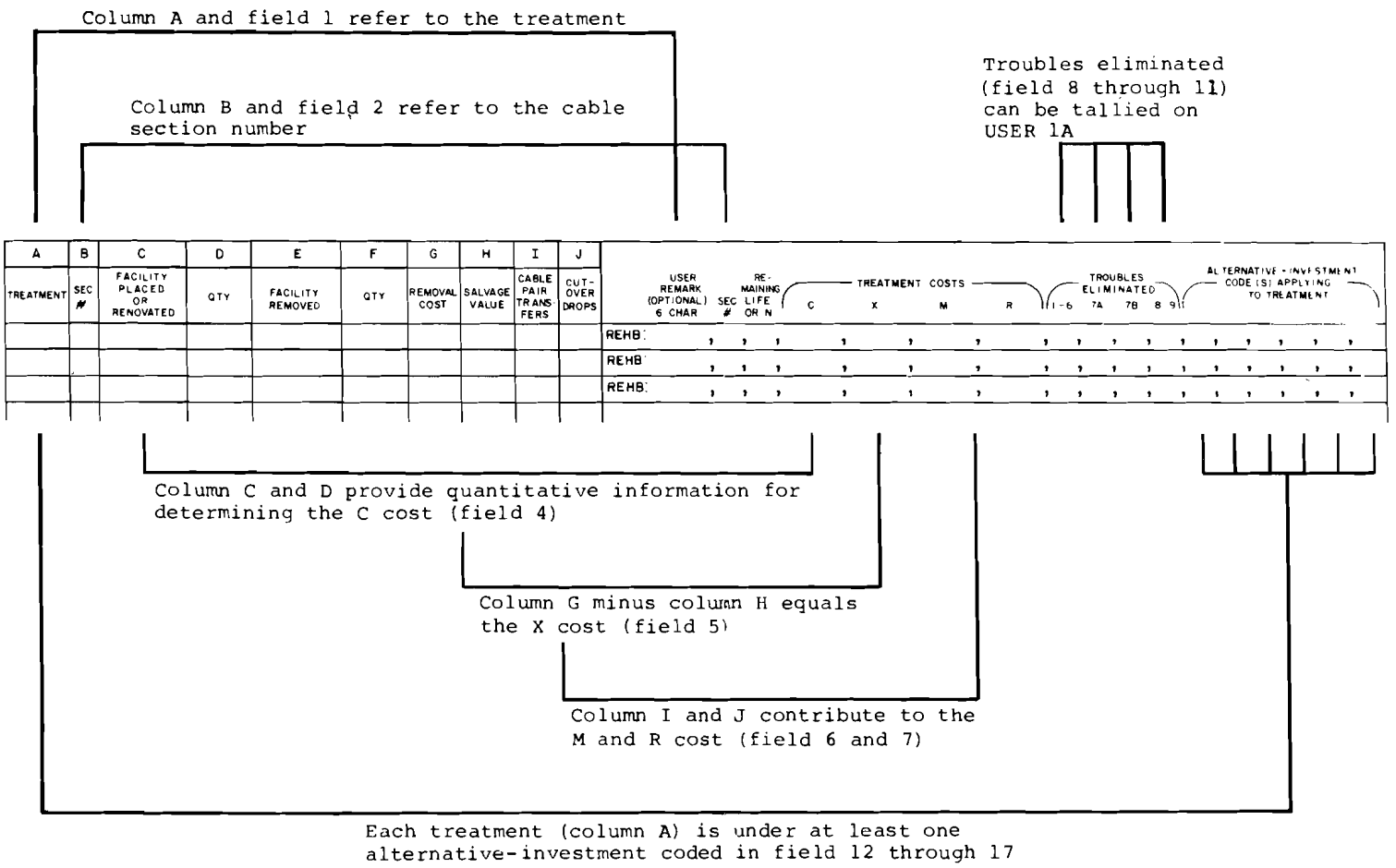


Figure 3-7. Relationship between the DA STUDY WORKSHEET columns and the REHB fields (USER 1A)

3.3 Preparing SUMMARY INPUT (Optional USER 1B; CNRP, RENV, EQCR, ELIM Data Lines)

Unfold Figure 3-8 at the end of this subsection for use throughout the following discussion of USER 1B. You have the option of preparing the USER 1B input worksheet instead of USER 1A (described in Subsection 3.2). There are several reasons for choosing USER 1B: you may prefer to describe rehabilitation costs by solution alternative (instead of by cable section treatment) or you may be using a mechanized broad gauge program to calculate treatment costs. In either case, you can enter cost totals on the USER 1B input worksheet.

If you select USER 1B, you ***cannot*** also enter data prepared on USER 1A into a Problem File. If USER 1A and 1B data lines are mixed in a Problem File, the LPIE2 Data Check will indicate this situation as a fatal error. You must then remove one or the other kind of data line from the Problem File before LPIE2 will perform an economic analysis.

The USER 1B data lines (CNRP, RENV, EQCR, ELIM) describe rehabilitation by alternative-investment (or by solution alternative if you do not subdivide investments). The data lines are called SUMMARY INPUT because total C, X, M, and R treatment costs are given for ***each alternative-investment*** instead of each cable section treatment. Similarly, total troubles eliminated (per trouble category) are given for each alternative-investment instead of each section treatment. If you select USER 1B, you must supply SUMMARY INPUT for all alternative-investments (or all solution alternatives) developed for a DA. Each USER 1B input worksheet (Figure 3-8) has enough data lines for three alternative-investments (or three solution alternatives).

SUMMARY INPUT (USER 1B) data lines are as follows:

- CNRP—Replacement and reinforcement costs (C, X, M, R) of the alternative-investment
- RENV—Renovation costs (C, X, M, R) of the alternative-investment
- EQCR—Equivalent replacement costs (C, X, M, R) for renovations of the alternative-investment
- ELIM—Found troubles (1-6, 1A, 1B, 8-9) eliminated by any replacements and renovations of the alternative-investment.

The four data lines are described respectively in the four steps on the next few pages. A given alternative-investment may not require all four data lines—see also Table 3-3 to help you decide which data lines would apply to a given alternative-investment.

Table 3-3

Decision Table for SUMMARY INPUT (USER 1B)

If one or more of the following cases applies to an alternative-investment (solution alternative):	Then enter data lines:
Replacement, reinforcement, and terminal rebuilding treatments are proposed	CNRP
Renovation treatments are proposed	RENV and EQCR
Replacement, renovation, and terminal rebuilding treatments would result in elimination of found troubles.	ELIM

Step 1. Enter Replacement Costs as Needed (USER 1B, CNRP Data Line). On the USER 1B worksheet (Figure 3-8), fill in one data line coded CNRP for each alternative-investment in the Problem File that proposes replacements, reinforcements, and terminal rebuilding.

Field 1 **Alternative-investment code**—The two-character code for the alternative-investment (corresponding to the appropriate INVT data line, field 1, USER 3), for example, P1, P2, I1, I2, U1, U2. Use this code for corresponding RENV, EQCR, and ELIM data lines if entered.

Fields 2-5 **Cost totals**—The C, X, M, and R costs for replacements, reinforcements, and terminal rebuilding.

- Entry form: integer
- Valid ranges: for C Cost, $0 \leqslant X \leqslant 999999$; for X Cost, $-99999 \leqslant X \leqslant 99999$ (use a minus sign only when salvage value is greater than cost of removal); for M or R Cost, $0 \leqslant X \leqslant 99999$
- Default value: 0 (zero) in each field

Step 2. Enter Renovation Costs and Total Remaining Life as Needed (USER 1B, RENV Data Line). On the USER 1B worksheet (Figure 3-8), fill in one data line coded RENV for each alternative-investment in the Problem File that proposes renovations, refurbishments, reclamations but not rebuilding terminals. If you enter a RENV data line, you must enter a corresponding EQCR data line.

Field 1 **Alternative-investment code**—The two-character code for the alternative-investment (corresponding to the appropriate INVT data line, field 1, USER 3).

Fields 2-5 **Cost totals**—The C, X, M, and R costs for renovations, refurbishments, reclamations (but not rebuilding terminals). Input specifications are the same as for the CNRP data line, fields 2 through 5.

Field 6 **Total remaining life**—A field for the RENV data line only, the average number of years after the renovations are implemented until the facilities will have to be replaced. Use Table 3-4 to calculate remaining life for individual renovations (if local guidelines are not available). Then take the mathematical average.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 99$
- Default value: 0 (zero)

Table 3-4

Remaining Life of Renovation

Type of Renovation	Age at Renovation (in Years) (X = Current Age)	Remaining Life (in Years) for Renovated Facility
Reclaimed buried cable	Any	20
Rebuilt pedestals Converted pedestals Refurbished pedestals	Any X Any	30 30 − X or 15 5 to 7
Rebuilt aerial terminals Converted aerial terminals Refurbished aerial terminals	Any X Any	30 30 − X or 15 5 to 7
Aerial PIC cable (drained) Aerial PIC cable (dried)	X X	30 − X 30 − X
Serving area interfaces	0 to 5 5 < X < 15 X > 15	30 30 − X 5 to 7

Step 3. Enter Equivalent Replacement Costs as Needed (USER 1B, EQCR Data Line). On the USER 1B worksheet (Figure 3-8), fill in one data line coded EQCR for each alternative-investment in the Problem File that proposes renovations (i.e., that requires a RENV data line). If you have entered a RENV data line, you must prepare an EQCR data line as well.

Field 1 **Alternative-investment code**—As in the corresponding RENV data line, field 1.

Fields 2-5 **Cost totals**—The C, X, M, and R replacement costs equivalent to the renovations proposed on the RENV data line; that is, the

costs that would have been incurred if replacement had been chosen instead of renovations. Input specifications are the same as for the CNRP data line, fields 2 through 5.

Step 4. Enter Troubles Eliminated by the Investment (USER 1B, ELIM Data Line). On the USER 1B worksheet (Figure 3-8), fill in one data line coded ELIM for each alternative-investment in the Problem File having treatments that eliminate found troubles, including renovations and replacements (on CNRP and/or RENV data lines) but not reinforcements.

Field 1 **Alternative-investment code**—The two-character code as on the corresponding CNRP or RENV data line.

Field 2 **1-6 activities eliminated**—Total found cable troubles coded 1 through 6 (sheath breaks) eliminated by treatments in this alternative.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 999$
- Default value: 0 (zero)

Field 3 **7A activities eliminated**—Total found cable troubles coded 7A (splicing) eliminated by treatments in this alternative. Input specifications are the same as for field 2.

Field 4 **7B activities eliminated**—Total found cable troubles coded 7B (terminating) eliminated by treatments in this alternative. Input specifications are the same as for field 2.

Field 5 **8-9 activities eliminated**—Total found cable troubles coded 8 and 9 (core) eliminated by treatments in this alternative. Input specifications are the same as for field 2.

On the right side of the USER 1B worksheet (Figure 3-8) are two scratch sheets. You can use one to tally the total number of found troubles in the DA, and the other to tally the troubles eliminated by each investment.

Caution

The number of troubles eliminated on the ELIM data line must not be greater than the total number of DA troubles as tallied per category on USER 1B (Figure 3-8).

USER 1B – OPTIONAL

SUMMARY INPUT

SHEET 1 OF 1
DA 2104
PROBLEM FILE NAME LARGE2

TOTAL COSTS OF ALTERNATIVE - INVESTMENT

1 ALTERNATIVE-INVESTMENT CODE	2 INVESTMENT COSTS C	3 X	4 M	5 R	6 TOTAL RENOVATION LIFE (RENV ONLY)
CNRP: P	7736	580	1355	0	
RENV: P	650	0	3030	0	11
EQCR: P	4720	176	1060	0	
CNRP: I	23197	1124	11485	0	
RENV: I	650	0	3030	0	11
EQCR: I	4720	176	1060	0	
CNRP: U	26986	1300	14195	0	
RENV: U	0	0	2610	0	17
EQCR: U	2711	0	275	0	

TROUBLES ELIMINATED BY ALTERNATIVE - INVESTMENT

1 ALTERNATIVE-INVESTMENT CODE	2 TROUBLES ELIMINATED 1 – 6	3 7A	4 7B	5 8 – 9
ELIM: P	10	3	11	2
ELIM: I	11	3	12	2
ELIM: U	11	3	12	2

TOTAL FOUND TROUBLES IN DA - TALLY

1 – 6	7A	7B	8 – 9

TROUBLES ELIMINATED BY INVESTMENT

ALTERNATIVE – INVESTMENT CODE	1 – 6	7A	7B	8 – 9

LPIE2 INPUT WORKSHEET (10/81)

PREPARED BY U.S.E. DATE 10/15/84

Figure 3-8. Sample USER 1B (reduced size), SUMMARY INPUT, with data lines filled in for three alternative-investments

3.4 Preparing DISTRIBUTION AREA (DA) DATA (USER 2; IDEN, AREA, STDY, CURL, OPTN, PRNT Data Lines)

Unfold Figure 3-9 at the end of this subsection for use throughout the following discussion of USER 2. The USER 2 procedure focuses on the DA as a whole. Data about the DA come from a variety of sources. The Rehabilitation Guidelines method should provide you with the following information:

- Predominant plant type at present, whether aerial PIC, aerial pulp, or buried PIC.
- Current activity levels, that is, the number of facility modifications, assignment changes, and found troubles that occurred in the DA during the preceding 12-month period.
- Non-discretionary project investments if any, in the form of C, X, M, and R cost totals.

Other data include fill information (number of available feeder pairs, available distribution pairs, assigned pairs, and defective pairs), the ad valorem tax rate applying to the DA, the DA assigned pair growth, the distance from the DA to the CO, and the names and activity levels of "special studies" conducted in the DA (i.e., activities other than the standard facility modifications, assignment changes, and found troubles). Data sources include the Feeder Administrator, LATIS Coordinator, FAP Engineer, and LROPP Planner.

Step 1. Identify the Problem (USER 2, IDEN Data Line). On the USER 2 worksheet (Figure 3-9), fill in the data line coded IDEN to distinguish this Problem File from others. (The IDEN data line is mandatory; you are required to enter it.) The problem identification is entered into the computer and will identify each output report resulting from this LPIE2 run. You may wish to include information such as file preparation date, Problem File name, SAC conversion plans, and changes in network administration. Limit your entry to 63 or fewer characters, including punctuation and spaces between words. Colons and commas are prohibited.

Step 2. Fill in the Area Data (USER 2, AREA Data Line). On the USER 2 worksheet (Figure 3-9), fill in the data line coded AREA. There are three fields, as follows.

Field 1 **Wire Center (WC)**—Wire center name or number, up to 12 characters, including spaces between words. Be consistent with LROPP base map, LATIS WC identifier definitions, or district designation.

- Entry form: alphanumeric
- Valid range: up to 12 characters
- Default value: none

Field 2 **Existing Allocation Area (EAA)**—EAA number, up to 12 characters. Be consistent with LROPP base map, LATIS reports (e.g., W05L, Tracking Unit Ranking), or district designation.

- Entry form: alphanumeric
- Valid range: up to 12 characters
- Default value: none

Field 3 **Distribution Area (DA)**—DA number(s), up to 12 characters. Be consistent with LROPP base map or district designation. If a DA is an interfaced area, enter the LATIS tracking unit (TU).

- Entry form: alphanumeric
- Valid range: up to 12 characters
- Default value: none

Note

On the USER 2 worksheet, fill in all fields in the data line coded STDY to give as accurate a profile of the DA as possible. Steps 3 through 9 cover the 11 fields of the STDY data line.

Step 3. Enter the Study Year (USER 2, STDY Data Line). This refers to field 1 of the STDY data line (Figure 3-9).

Field 1 **Study year**—The calendar year in which activity levels and costs are current. The program assumes that the study month is January. (Thus, if you make a study towards the end of a year, take the following calendar year as the study year.) The study year is the first year of the study period. It is used as the base year for present worth calculations and as the trend base date for inflation purposes.

- Entry form: whole number
- Valid range: $1975 \leqslant X \leqslant 2000$
- Default value: none

Step 4. Enter the Ad Valorem Tax Rate (USER 2, STDY Data Line). This refers to field 2 of the STDY data line (Figure 3-9).

Field 2 **Ad valorem tax rate**—The rate that applies to the DA; ad valorem tax is levied in proportion to the value of plant, and is usually in the form of property tax.

- Entry form: percent, to 1 place (e.g., an Ad Valorem tax rate of 2.5% should be entered as 2.5)
- Valid range: $0.0 \leqslant X \leqslant 99.9$
- Default value: none

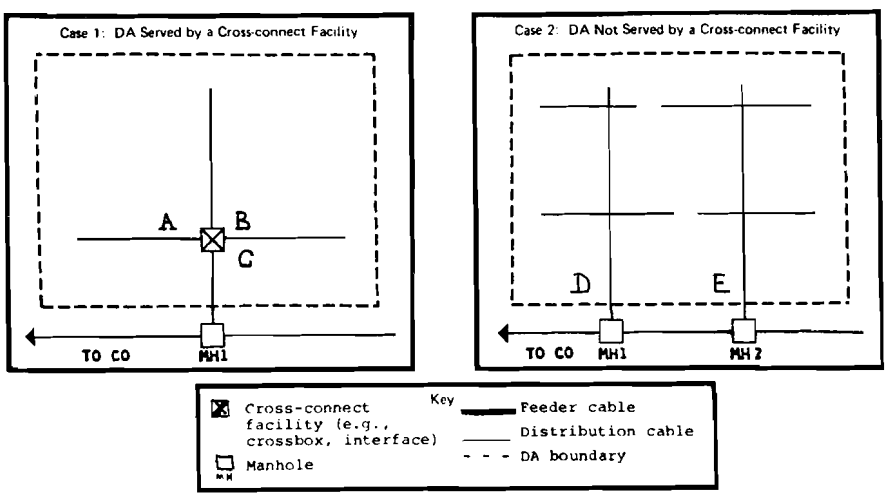
Step 5. Enter Annual Pair Growth (USER 2, STDY Data Line). This refers to field 3 of the STDY data line (Figure 3-9).

Field 3 **Annual Pair growth**—Anticipated average increase per year in the number of assigned pairs in the DA, beginning with the first year of the study (field 1) and covering at least 10 years. The sample data show a pair growth of 14; that is, the number of assigned pairs in that DA is expected to increase by 14 pairs a year. Given 199 assigned pairs (field 6) in 1980, there would be (on the average) 213 in 1981, 227 in 1982, and so on.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 9999$
- Default value: none

Step 6. Enter Fill Information (USER 2, STDY Data Line). This refers to fields 4 through 7 of the STDY data line (Figure 3-9).

Field 4 **Distribution pairs**—Number of available distribution pairs entering the DA either at the time the LPIE2 study begins or after non-discretionary relief has been made. There are two cases covering distribution pairs entering a DA, as illustrated in the following diagram. In **Case 1**, the DA is served by a cross-connect facility (e.g., crossbox interface). In this case, the number of distribution pairs equals the total number of pairs in cables leaving the facility, for example, A + B + C in the diagram, including any dead pairs. If pairs are simply stubbed out of a crossbox or interface, do not count them. In **Case 2**, the DA is *not* served by a cross-connect facility. In this case, the number of distribution pairs equals the total number of pairs in lateral cables entering the DA, for example, D + E in the diagram, including any dead pairs.



Entry specifications for field 4 are:

- Entry form: whole number
- Valid range: $1 \leqslant X \leqslant 99999$
- Default value: none

Field 5 **Feeder pairs**—Number of feeder pairs available or committed to serve customers in the DA, now or after non-discretionary feeder relief (to take place before any alternative) is implemented.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 99999$
- Default value: none

Field 6 **Assigned pairs**—Total number of assigned pairs (working, idle dedicated, idle connect-through), including additional lines.

- Entry form: whole number
- Valid range: $1 \leqslant X \leqslant 99999$
- Default value: none

Field 7 **Defective pairs**—Total number of defective pairs in complements serving the DA.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 99999$
- Default value: none
- *Caution*: The sum of assigned pairs (field 6) and defective pairs (field 7) must be less than or equal to the number of available distribution pairs (field 4). Otherwise, a fatal error results.

Note

The annual pair growth (field 3), available distribution pairs (field 4), assigned pairs (field 6), and defective pairs (field 7) are used by LPIE2 to calculate the time of distribution backbone cable exhaust. The number of feeder pairs (field 5) is used to calculate feeder utilization credits.

Step 7. Enter Initial Ultimate Plant Percent (USER 2, STDY Data Line). This refers to field 8 on the STDY data line (Figure 3-9).

Field 8 **Initial ultimate plant (%)**—Percent of living units already on ultimately sized cable at the time the detailed DA study is initiated. The *initial* percent should represent the pre-improvement (before rehabilitation) situation of the DA with regard to how much it satisfies ultimate pair requirements and

how much of the permanent plant configuration is achieved. In other words, how far along is the DA toward ultimate SAC before any alternative-investment would improve the plant?

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 100$
- Default value: none

Use Table 3-5 to determine the appropriate initial ultimate plant percent. There are three factors to consider:

- Existing Interface? Does the DA now have an interface? (No or Yes).
- Distribution Backbone Cable Ultimately Sized? Is the distribution backbone cable now ultimately sized? (No or Yes).
- Percent of Distribution Cable Legs Ultimately Sized. Choose from 0, 25, 50, 75, or 100%. If necessary, interpolate.

Table 3-5

Initial Ultimate Plant Percent

Existing Interface?	Distribution Backbone Cable Ultimately Sized?	Percent of Distribution Cable Legs Ultimately Sized?				
		0	25	50	75	100
No	No	0%	5%	10%	15%	20%
	Yes	0%	20%	40%	60%	80%
Yes	No	0%	15%	30%	45%	60%
	Yes	0%	25%	50%	75%	100%

For example, suppose a DA has no interface, the distribution backbone cable is not ultimately sized, and 50% of the cable legs are ultimately sized. Then the initial ultimate plant percent would be 10%. Enter 10 in field 8. If, however, the interface *does* exist and the distribution backbone cable *is* ultimately sized, then if 50% of the cable legs are ultimately sized, the initial ultimate plant percent would be 50%. Enter 50 in field 8.

Step 8. Enter Distance to Wire Center (USER 2, STDY Data Line). This refers to field 9 on the STDY data line (Figure 3-9).

Field 9 **Distance to WC**—Cable distance, in kilofeet (and fractions of kilofeet), from the CO to the point where distribution cable begins in the DA (or the theoretical point of interface).

- Entry form: decimal, to 1 place
- Valid range: $0.0 \leqslant X \leqslant 99.0$
- Default value: none

Step 9. Enter Plant Type (USER 2, STDY Data Line). This refers to fields 10 and 11 on the STDY data line (Figure 3-9).

Field 10 **Plant type—structure**—Predominant type of existing plant structure in the DA, particularly in those cable sections experiencing troubles, either AER (aerial) or BUR (buried).

- Entry form: alphabetic
- Valid range: *AER* or *BUR*
- Default value: AER

Field 11 **Plant type—insulation**—Predominant type of existing plant insulation in the DA, particularly in those cable sections experiencing troubles, either PIC (plastic insulated conductor) or PULP. Use PULP for lead sheath.

- Entry form: alphabetic
- Valid range: *PIC* or *PULP*
- Default value: PIC

Note

The combination BUR PULP is not valid in fields 10 and 11. If BUR PULP is entered, an error message is generated by Data Check.

Step 10. Fill in Current Activity Levels (USER 2, CURL Data Line). On the USER 2 worksheet, fill in the data line coded CURL to indicate current annual (i.e., for the preceding 12-month period) activity levels of the 15 standard activities tracked by LATIS. Where a given activity did not occur, leave the field blank or enter 0 (zero).

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 999$
- Default value: 0

Fields 1 through 6 and 8 refer to facility modifications. Enter current activity levels as you tallied them in the detailed DA study using the LATIS W02L report (Tracking Unit Detail).

Field 1	**LST**—line and station transfer level
Field 2	**WOL**—wired out of limits level
Field 3	**BCT**—break connect through level
Field 4	**CDP**—clear defective pair level
Field 5	**BPC**—break permanent connection level
Field 6	**CIR**—customer interconnection record (or control point connection) level
Field 8	**RTC**—reterminated connection level

Field 7 is a miscellaneous activity. Enter current activity level from the LATIS WO2L report.

Field 7	**RE**—referred to engineering level

Fields 9 through 11 refer to assignment changes. Enter current activity levels from the LATIS W02L report.

Field 9	**SOD**—service order defective level
Field 10	**ODF**—other defective level
Field 11	**OAC**—other assignment change level

Fields 12 through 15 refer to found cable and terminal troubles. Enter current activity levels in each category 1-6, 7A, 7B, 8-9 by summing the trouble counts on the facility trouble map.

Field 12	**1-6**—sheath breaks coded 1 through 6, total levels
Field 13	**7A**—splicing trouble level
Field 14	**7B**—terminating trouble level
Field 15	**8-9**—core troubles coded 8 and 9, total levels

Note

On the USER 2 worksheet, the data line coded OPTN is for optional use. Steps 11 through 13 describe input specifications. Information on user strategy is given in Section 6, Reworking an LPIE2 Study.

Step 11 (Optional). Enter Study Duration (USER 2, OPTN Data Line). This refers to field 1 on the OPTN data line (Figure 3-9).

Field 1 **Study duration**—The number of years until distribution backbone cable exhaust. This field can be used to override the LPIE2-calculated end-of-study year. For user strategy, see Section 6, Case 2.

- Entry form: whole number
- Valid range: 2 through 20
- Default value: LPIE2 calculated end-of-study year

Step 12 (Optional). Enter Non-discretionary Investment Costs (USER 2, OPTN Data Line). This refers to fields 2 through 5 on the OPTN data line (Figure 3-9). For user strategy, see Section 6, Case 3.

Field 2 **C**—Total C costs for non-discretionary investments recorded in the course of a detailed DA study. Enter in whole dollars the total broad gauge labor and material costs of replacing, reinforcing, or renovating one or more facilities.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 99999$
- Default value: 0 (zero)

Field 3 **X**—Total X costs for non-discretionary investments recorded in the course of a detailed DA study. Enter the difference between total removal costs of facilities to be replaced and total salvage value of those facilities.

- Entry form: integer
- Valid range: $-99999 \leqslant X \leqslant 99999$; use a minus sign only when salvage value is greater than cost of removal
- Default value: 0 (zero)

Field 4 **M**—Total M costs for non-discretionary investments recorded as in field 2. Enter in whole dollars the total broad gauge rearrangement costs of implementing the non-discretionary investments.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 99999$
- Default value: 0 (zero)

Field 5 **R**—Total R costs for non-discretionary investments recorded as in field 2. Enter in whole dollars the total broad gauge repair (or upkeep) costs associated with the investments in field 2.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 99999$
- Default value: 0 (zero)

Step 13 (Optional). Enter Special-Study Data (USER 2, OPTN Data Line). This refers to fields 6 through 11 on the OPTN data line (Figure 3-9). For user strategy, see Section 6, Case 4.

Field 6 **Special-study name**—Unique 3-character name (e.g., PCV) for a special-study activity (i.e., other than an activity on the CURL data line) tracked in the DA during the 12 months preceding the detailed DA study. There is no default value.

Field 7 **Special-study activity level**—Number of incidents of the activity named in field 6, during the 12 months preceding the detailed DA study.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 999$
- Default value: 0 (zero)

Field 8 **Special-study name**—Unique 3-character name for a second special-study activity; specifications as in field 6.

Field 9 **Special-study activity level**—Number of incidents of the activity named in field 8, during the 12 months preceding the detailed DA study; specifications as in field 7.

Field 10 **Special-study name**—Unique 3-character name for a third special-study activity; specifications as in field 6.

Field 11 **Special study activity level**—Number of the incidents of the activity named in field 10, during the 12 months preceding the detailed DA study; specifications as in field 7.

Note

Special-study names must agree with those on the SPCL data line in the HQ File appropriate to your district. See Section 4 for details about the HQLIST run option, which allows you to obtain a formatted listing of the HQ File. If you enter any special study on the OPTN data line, you must estimate post-improvement activity levels and annual activity growth on the USER 4 input worksheet, as discussed in Subsection 3.6.

Step 14. Specify Which Output Reports You Wish the Program to Print (USER 2, PRNT Data Line). On the USER 2 input worksheet, enter one or more 3-letter print code(s), one code to a field (Table 3-6). If you leave the PRNT data line blank, the program will print the LPIE2 output reports. Consult Section 5, ***Interpreting Output***, for descriptions of the LPIE2 and CUCRIT output reports.

Table 3-6

PRNT Line Codes for LPIE2 and CUCRIT Output Reports

Output Report Title	Codes		
	Single reports	Groups of reports	All reports
LPIE2 DA Input Summary	-	LP1	ALL
LPIE2 Problem Analysis Summary	PRB		
LPIE2 Projection of Annual Activity Levels	-		
LPIE2 Vs. User Estimated Improvements	-		
CUCRIT Report Summary	RPT	CRT	
CUCRIT Capital, Revenue, and Expense Summary	CRE		
CUCRIT Incremental Cash Flow Details	CFD		
CUCRIT Executive Summary	EXC		
CUCRIT Discretionary Project Selection Output	DPS		

Group report codes take precedence over single report codes, and ALL takes precedence over any other code. The result is that the program does not duplicate reports; for example, entering both LPI and PRB nets only one copy of the LPIE2 Problem Analysis Summary.

Caution

Entering code ALL will result in a large quantity of output, including six CUCRIT reports for each solution alternative: two Capital, Revenue, and Expense Summaries (one for the alternative and one for the STATUS QUO) and one each of the other four CUCRIT reports.

3.4A Preparing DISTRIBUTION AREA (DA) DATA—OPTIONAL (USER 2A; SQGR, SQND, CSTE Data Lines)

Unfold Figure 3-9A at the end of this subsection for use throughout the following discussion of USER 2A.

The engineer can use either of two data overrides to change certain data temporarily for a selected DA on a run by run basis. He or she can also enter data to analyze a non-discretionary investment under status quo conditions. These entries are discussed as options, not steps, because each is independent and not sequential.

Option 1. Status Quo Growth Rate override (USER 2A, SQGR Data Line). If you want to change the growth factor (%) temporarily for one or more activities under the Status Quo plan, on the USER 2A worksheet (Figure 3-9A), fill in the data line coded SQGR. There are seven fields, as follows:

Field 1	1-6 (sheath breaks coded 1 through 6)
Field 2	7A (splicing)
Field 3	7B (termination)
Field 4	8-9 (core troubles coded 8 and 9)

Specifications for activity-level growth override values are:

- Entry form: whole number
- Valid range: blank or $0 \leqslant X \leqslant 999$
- Default value: LPIE2-calculated projection

On the SQGR data line, fields 5 through 7 refer to special studies. If you entered data in one or more of these Special Study fields, there must be a name and activity level on the OPTN line (USER 2) for each corresponding Special Study.

Field 5	Study 1—Activity level estimate for the special study named in the OPTN data line, field 6.
Field 6	Study 2—Activity level estimate for the special study named in the OPTN data line, field 8.
Field 7	Study 3—Activity level estimate for the special study named in the OPTN data line, field 10.

Specifications for special-study activity level overrides are:

- Entry form: whole number
- Valid range: blank or $0 \leqslant X \leqslant 999$
- Default value: 0 (zero)

Option 2. Status Quo Non-Discretionary Data entry (USER 2A, SQND Data Line). If in a rehabilitation study you want to consider the economic effects of a non-discretionary investment which is only required under the Status Quo plan, use this procedure. On the USER 2A worksheet (Figure 3-9A), fill in the data line coded SQND. There are six fields, as follows:

Field 1 **C$**—Total C costs for non-discretionary investments recorded in the course of a detailed DA study. Enter in whole dollars the total broad gauge labor and material costs of replacing, reinforcing, or renovating one or more facilities.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 99999$
- Default value: none

Field 2 **X$**—Total X costs for non-discretionary investments recorded in the course of a detailed DA study. Enter the difference between total removal costs of facilities to be replaced and total salvage value of those facilities.

- Entry form: integer
- Valid range: $-99999 \leqslant X \leqslant 99999$; use a minus sign only when salvage value is greater than cost of removal
- Default value: none

Field 3 **M$**—Total M costs for non-discretionary investments recorded as in field 2. Enter in whole dollars the total broad gauge rearrangement costs of implementing the non-discretionary investments.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 99999$
- Default value: none

Field 4 **R$**—Total R costs for non-discretionary investments recorded as in field 2. Enter in whole dollars the total broad gauge repair (or upkeep) costs associated with the investments in field 2.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 99999$
- Default value: none

Field 5 **Investment date, month**—Projected in-service month of the investment, abbreviated to the first three letters of the month name: JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC.

- Entry form: alphabetic
- Valid range: 3-letter month abbreviations (as given above)
- Default value: none

Field 6 **Investment date, year**—Projected in-service calendar year of the investment.

- Entry form: whole number
- Valid range: $1981 \leqslant X \leqslant 3000$
- Default value: none

> **Note**
>
> If a user enters anything on an SQND data line, he or she *must* enter a month and year on that line.

Option 3. Cost Entry Data override (USER 2A, CSTE Data Line). If you want to change temporarily (for one run) the operational cost factor for any one activity, fill in the data line coded CSTE on the USER 2A worksheet (Figure 3-9A). There are two fields, as follows:

Field 1 Activity name—either (1) the name of a standard activity, consisting of a two- or three-letter identifier as found on either the CST1 or CST2 line of the HQ2 input to the Cost Factor File or (2) the name of one of the special studies as entered on the SPCL line of the HQ2 input for that area.

- Entry form: alphanumeric, 2 or 3 characters
- Valid range: 3 characters maximum
- Default value: none

Field 2 Activity cost—the cost that the engineer wishes to use for the specified activity instead of the cost that has been specified by Headquarters in the Cost Factor File.

- Entry form: decimal, to 2 places
- Valid range: $0 \leqslant X \leqslant 9999.99$
- Default value: none

> **Note**
>
> A user may enter up to 18 CSTE lines—that is, one for each of the 15 activities and one for each of the three possible special studies.

USER 2

DISTRIBUTION AREA (DA) DATA

DA 2104
PROBLEM FILE NAME LARUE4

PROBLEM IDENTIFICATION
(63 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)

IDEN : LARUE WIRE CENTER - DA 2104

AREA DATA

	1 WIRE CENTER (WC) (12 CHARACTERS MAXIMUM)	2 EXISTING ALLOCATION AREA (EAA) (12 CHARACTERS MAXIMUM)	3 DISTRIBUTION AREA (DA) (12 CHARACTERS MAXIMUM)
AREA:	LARUE	2110	2104

STUDY DATA

	1 STUDY YEAR	2 AD VALOREM TAX RATE	3 ANNUAL PAIR GROWTH	4 DISTRIBUTION PAIRS (AVAILABLE)	5 FEEDER PAIRS (AVAILABLE)	6 ASSIGNED PAIRS	7 DEFECTIVE PAIRS	8 INITIAL ULTIMATE PLANT (%)	9 DISTANCE TO WC (KF)	10 STRUCTURE TYPE (AER OR BUR)	11 INSULATION TYPE (PIC OR PULP)
STDY:	1981	1.5	28	500	600	346	12	0	.1	AER	PULP

CURRENT ACTIVITY LEVELS

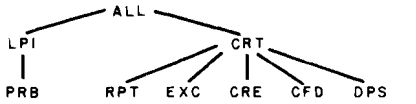
	1 LST	2 WOL	3 BCT	4 CDP	5 BPC	6 CIR	7 RE	8 RTC	9 SOD	10 ODF	11 OAC	12 I-6	13 7A	14 7B	15 8-9
CURL:	9	1	5	5	0	0	4	10	4	4	3	12	4	12	3

MISCELLANEOUS DATA (OPTIONAL)

	1 STUDY DURATION	2 NON DISCRETIONARY C	X	M	R	5 6 SPECIAL STUDY 1 NAME	ACTIVITY LEVEL	7 8 SPECIAL STUDY 2 NAME	ACTIVITY LEVEL	9 10 SPECIAL STUDY 3 NAME	ACTIVITY LEVEL	11
OPTN:												

PRINT CODES FOR OUTPUT REPORTS (OPTIONAL)
CHOOSE CODE(S) FROM: LPI, PRB, CRT, RPT, EXC, CRE, CFD, DPS, ALL

PRNT: ALL



LPIE2 INPUT WORKSHEET (10/81) PREPARED BY H.Q.E. DATE 10/15/84

Figure 3-9. Sample USER 2 (reduced size), DISTRIBUTION AREA (DA) DATA, with data lines filled in for the sample DA

USER 2A-OPTIONAL

DISTRIBUTION AREA (DA) DATA

SHEET 1 OF 1
DA 2104
PROBLEM FILE NAME LARUE4

STATUS QUO GROWTH RATE OVERRIDE (OPTIONAL)

	1-6	7A	7B	8-9	STUDY 1	STUDY 2	STUDY 3
SQGR:	18						

STATUS QUO NON-DISCRETIONARY DATA (OPTIONAL)

	C$	X$	M$	R$	INVESTMENT MONTH (3 LETTERS)	INVESTMENT YEAR (4 DIGITS)
SQND:		350			MAR	1985

COST ENTRY DATA OVERRIDE (OPTIONAL)

	ACTIVITY (3 CHARACTERS MAXIMUM)	COST (DECIMAL, 6 DIGITS MAXIMUM)
CSTE:	1-6	200
CSTE:	LST	325
CSTE:		
CSTE:		
CSTE:		
CSTE:		

LPIE2 INPUT WORKSHEET (9 84)

PREPARED BY H.Q.E. DATE 10/15/84

Figure 3-9A. Sample USER 2A (reduced size), DISTRIBUTION AREA (DA) DATA OVERRIDES—OPTIONAL, with data lines filled in for the sample DA

3.5 Preparing SOLUTION ALTERNATIVE DATA (USER 3; ALTN, INVT data lines)

Unfold Figure 3-10 at the end of this subsection for use throughout the following discussion of USER 3. The USER 3 input procedure focuses on the solution alternative(s) to be evaluated by LPIE2. Each solution alternative must be separately profiled through a set of data lines identifying it and defining the investment(s) in terms of interface placement, investment date, and percent of living units on ultimately sized cable ***after implementation*** (post-improvement ultimate plant). Since investment data lines are identified by an appropriate alternative-investment code, they can be matched with applicable treatment costs (similarly coded on REHB data lines, USER 1A or on CNRP, RENV, EQCR, and ELIM data lines, USER 1B) to derive total C, X, M, and R project costs.

A maximum of six solution alternatives can be evaluated in one LPIE2 run. On the USER 3 worksheet (Figure 3-10), for each alternative to be evaluated, fill out one Alternative (ALTN) data line and one Investment (INVT) data line. If you propose a second investment for any alternative, you must fill out a second INVT data line to provide data about the second investment. Each USER 3 worksheet contains enough data lines for three solution alternatives, that is, three ALTN data lines, each of which is grouped with two INVT data lines.

Step 1. Identify an alternative to be evaluated by LPIE2 (USER 3, ALTN data line). On the USER 3 worksheet, fill in a data line coded ALTN to distinguish this alternative from others. There are two fields (Figure 3-10).

Field 1 **Alternative symbol**—The single letter identifying the alternative; for example, I (Intermediate Design).

- Entry form: alphanumeric
- Valid range: 1 character
- Default value: none

Field 2 **Alternative name**—Up to 15 characters (including word spaces) describing the alternative in field 1, for example, "Rehab and SAC C." Colons and commas are prohibited in this field.

- Entry form: alphanumeric
- Valid range: 15 characters (maximum)
- Default value: none

Step 2. Supply investment information (USER 3, INVT data line). On the USER 3 worksheet, fill out one data line coded INVT for each alternative-investment to be evaluated by LPIE2. There are five fields (Figure 3-10).

Field 1 **Alternative-investment code**—The alternative letter (from ALTN, field 1) and investment number, for example, P1, P2, I1, I2, U1, U2. (There must be no space between the letter and number.)

- Entry form: alphanumeric; second character numeric

- Valid range: 2 characters; second character either 1 or 2
- Default value: 1 for the second character if only one character is entered

Field 2 **Interface placed?**—Either "y" (yes, the investment adds an interface) or "n" (no, the investment does not add an interface). If an interface already exists, enter "n." An interface may be a crossbox, a feeder/distribution interface (FDI), a serving area interface (SAI), or a similar cross-connect facility.

- Entry form: alphabetic
- Valid range: "y" or "n"
- Default value: none

Field 3 **Post-improvement ultimate plant (%)** —Percent of living units projected to be on ultimately sized cable ***after*** implementation of the investment on this line. Compare this field with "initial ultimate plant," STDY data line, field 8 (USER 2). The post-improvement ultimate plant percent must be greater than or equal to the initial ultimate plant percent.

- Entry form: whole number
- Valid range: $0 \leqslant X \leqslant 100$
- Default value: the value in STDY data line, field 8 (USER 2)

Use Table 3-7 (equivalent to Table 3-5 in Subsection 3.4, USER 2) to determine the appropriate post-improvement ultimate plant percent for the alternative-investment on this INVT data line. There are three factors to consider:

- Interface? Will an interface exist after the investment is completed? No or Yes.
- Distribution backbone Cable Ultimately Sized? Does the investment on this line upgrade the backbone so that it will be ultimately sized? No or Yes.
- Percent of Distribution Cable Legs Ultimately Sized. After the investment takes effect, what percent of cable legs will be ultimately sized? Choose from 0, 25, 50, 75, or 100%. Interpolate if necessary.

For example, suppose that alternative P (physical rehabilitation with undivided investment) results in 75% of distribution cable legs ultimately sized but doesn't place an interface or upgrade the backbone. The post-improvement ultimate plant percent is 15%. Enter 15 in field 3. On the other hand, for I (intermediate design), the first investment, I1, places an interface but doesn't upgrade the backbone or cable legs. (Initially, the cable legs are 50% ultimately sized.) The post-improvement ultimate plant percent is 30%. Enter 30 in field 3. Investment I2 upgrades the backbone and the cable legs—both to the ultimate. (The percent of cable legs ultimately sized is 100%.) The post-improvement ultimate plant percent is 100%. Enter 100 in field 3.

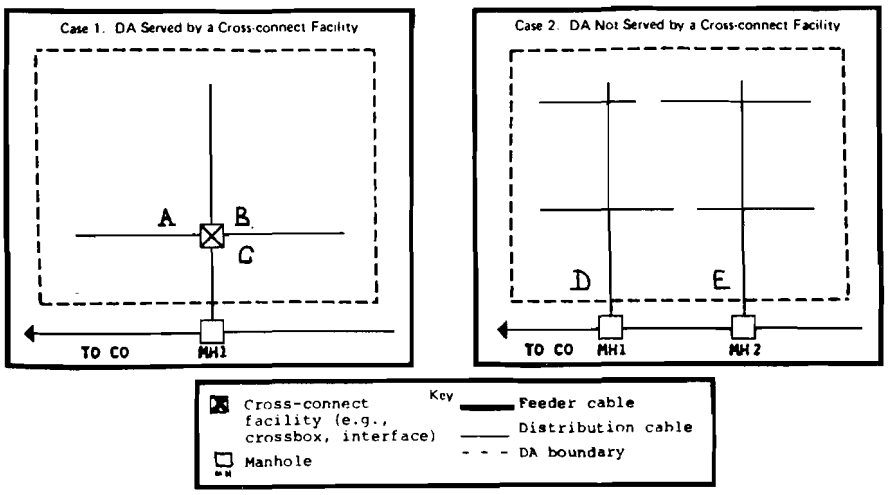
Table 3-7

Post-Improvement Ultimate Plant Percent

Existing Interface?	Distribution Backbone Cable Ultimately Sized?	Percent of Distribution Cable Legs Ultimately Sized?				
		0	25	50	75	100
No	No	0%	5%	10%	15%	20%
	Yes	0%	20%	40%	60%	80%
Yes	No	0%	15%	30%	45%	60%
	Yes	0%	25%	50%	75%	100%

Field 4 **Distribution pairs**—The number of pairs entering the DA *after* the investment is made. To determine the number of pairs entering the DA, consider two cases, illustrated in the following diagram. In Case 1, the DA is served by a cross-connect facility (e.g., crossbox, interface). The number of distribution pairs equals the total number of pairs in cables leaving the facility (for example, A + B + C in the following diagram), including any dead pairs. If pairs are simply stubbed out of an interface or crossbox, do not count them.

In Case 2, the DA is *not* served by a cross-connect facility. The number of distribution pairs equals the total number of pairs in lateral cables entering the DA (for example, D + E in the following diagram), including any dead pairs.



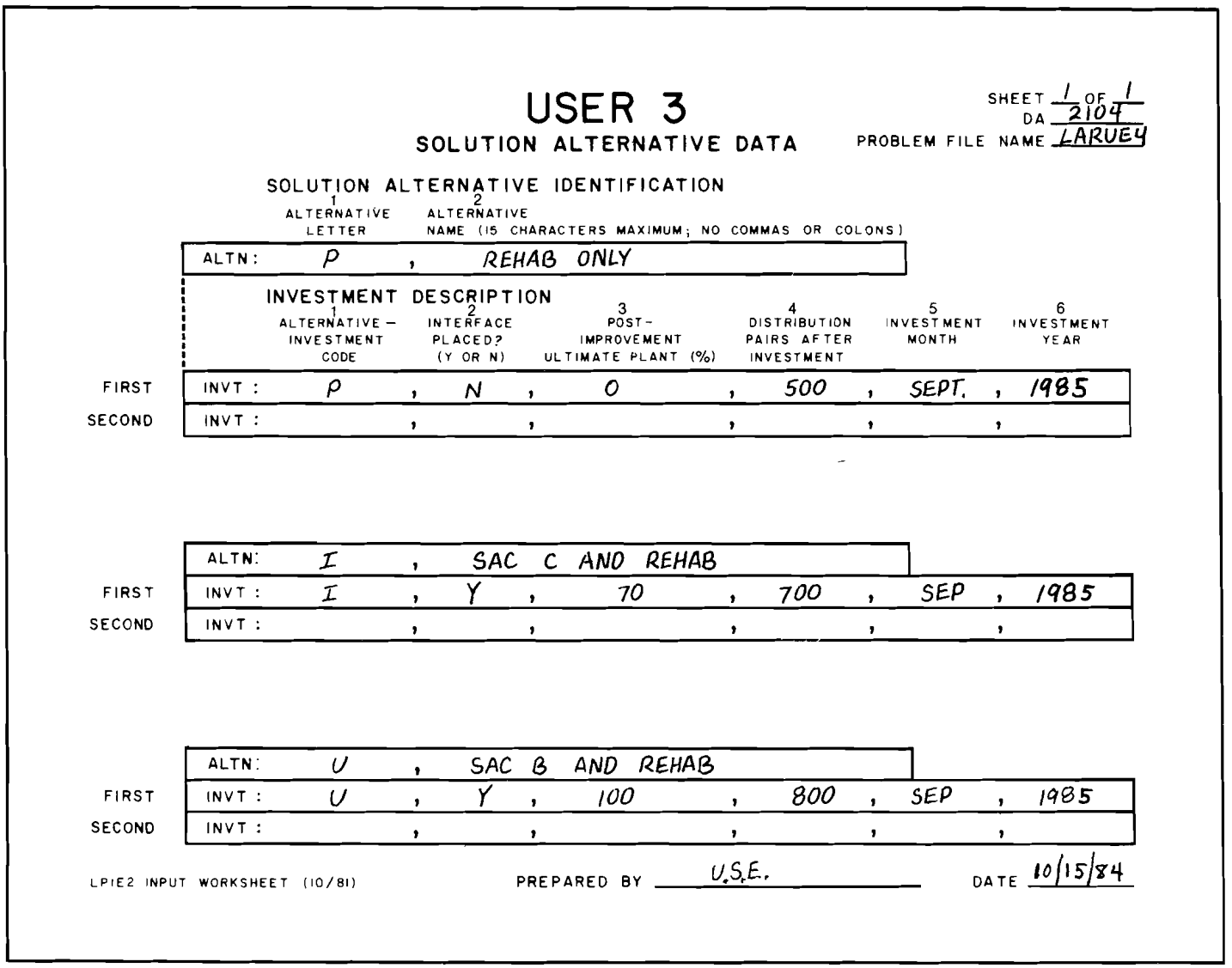
- Entry form: whole number
- Valid range: $1 \leqslant X \leqslant 99999$
- Default value: STDY data line, field 4 (USER 2).

Field 5 **Investment date, month**—Projected in-service month of the investment, abbreviated to the first three letters of the month name: JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC.

- Entry form: alphabetic
- Valid range: 3-letter month abbreviations as given
- Default value: JAN

Field 6 **Investment date, year**—Projected in-service calendar year of the investment.

- Entry form: whole number
- Valid range: $1981 \leqslant X \leqslant 3000$
- Default value: none



USER 3

SOLUTION ALTERNATIVE DATA

SHEET 1 OF 1
DA 2104
PROBLEM FILE NAME LARUEY

SOLUTION ALTERNATIVE IDENTIFICATION

	1 ALTERNATIVE LETTER	2 ALTERNATIVE NAME (15 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)
ALTN:	P	REHAB ONLY

INVESTMENT DESCRIPTION

		1 ALTERNATIVE – INVESTMENT CODE	2 INTERFACE PLACED? (Y OR N)	3 POST-IMPROVEMENT ULTIMATE PLANT (%)	4 DISTRIBUTION PAIRS AFTER INVESTMENT	5 INVESTMENT MONTH	6 INVESTMENT YEAR
FIRST	INVT:	P	N	0	500	SEPT.	1985
SECOND	INVT:						

	ALTN:	I	SAC C AND REHAB				
FIRST	INVT:	I	Y	70	700	SEP	1985
SECOND	INVT:						

	ALTN:	U	SAC B AND REHAB				
FIRST	INVT:	U	Y	100	800	SEP	1985
SECOND	INVT:						

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Figure 3-10. Sample USER 3 (reduced size), SOLUTION ALTERNATIVE DATA, with data lines filled in for three alternatives

3.6 Preparing POST-IMPROVEMENT OVERRIDES (Optional USER 4; PIL1, PIL2, PIG1, PIG2 data lines)

Unfold Figure 3-11 at the end of this subsection for use throughout the following discussion of USER 4. The USER 4 procedure focuses on ***user*** estimates of activity levels and annual activity growth in the DA, after implementation of a given alternative-investment. You can use this procedure optionally to override LPIE2 projections for one or more standard activities for any alternative-investment described in the Problem File. However, if you enter current activity levels for any special study (OPTN data line, fields 6 through 11, USER 2), you ***must*** estimate post-improvement activity levels and annual activity growth for each alternative-investment described in the Problem File. User strategy is discussed in Section 6, Reworking an LPIE2 Study, Case 6.

Each USER 4 worksheet has enough data lines for three investments. For a given investment, fill in activity levels on PIL1 and PIL2 data lines. Fill in annual activity growth on PIG1 and PIG2 data lines. You have the option of either using "PIL" data lines without "PIG" data lines or "PIG" without "PIL."

Step 1. Enter activity level estimates (USER 4, PIL1, PIL2 data lines). On the USER 4 input worksheet, fill in field 1 on the PIL1 and/or PIL2 data line, and other fields on the data line(s) as needed. Leave an activity field blank where you do not estimate; the program will default to the level calculated by LPIE2 for that activity. Estimate activity levels for the first year after the investment year (appropriate INVT data line, field 6, USER 3).

On PIL1 and PIL2, the first field is the same:

Field 1 **Alternative-investment code**—The two-character code from the appropriate INVT data line, field 1 (USER 3).

Remaining fields on PIL1 and PIL2 are associated with the investment as coded in field 1. On PIL1, fields 2 through 7 and 9 refer to facility modifications. Field 8 (RE) is a miscellaneous activity.

Field 2 LST (line and station transfer)

Field 3 WOL (wired out of limits)

Field 4 BCT (break connect through)

Field 5 CDP (clear defective pair)

Field 6 BPC (break permanent connection)

Field 7 CIR (customer interconnection record, or control point connection)

Field 8 RE (referred to engineering)

Field 9 RTC (reterminated connection)

On PIL2, fields 2 through 4 refer to assignment changes.

Field 2 SOD (service order defective)

Field 3 ODF (other defective)

Field 4 OAC (other assignment change)

Fields 5 through 8 refer to found troubles.

Field 5 1-6 (sheath breaks coded 1 through 6)

Field 6 7A (splicing)

Field 7 7B (termination)

Field 8 8-9 (core troubles coded 8 and 9)

Specifications for standard activity level estimates are:

- Entry form: whole number
- Valid range: blank or $0 \leqslant X \leqslant 999$
- Default value: LPIE2 calculated projection

On PIL2, fields 9 through 11 refer to special studies. If you entered any special studies on the OPTN data line (USER 2), you must estimate activity level(s) for each alternative-investment in the Problem File.

Field 9 Study 1—Activity level estimate for the special study named in OPTN data line, field 6.

Field 10 Study 2—Activity level estimate for the special study named in OPTN data line, field 8.

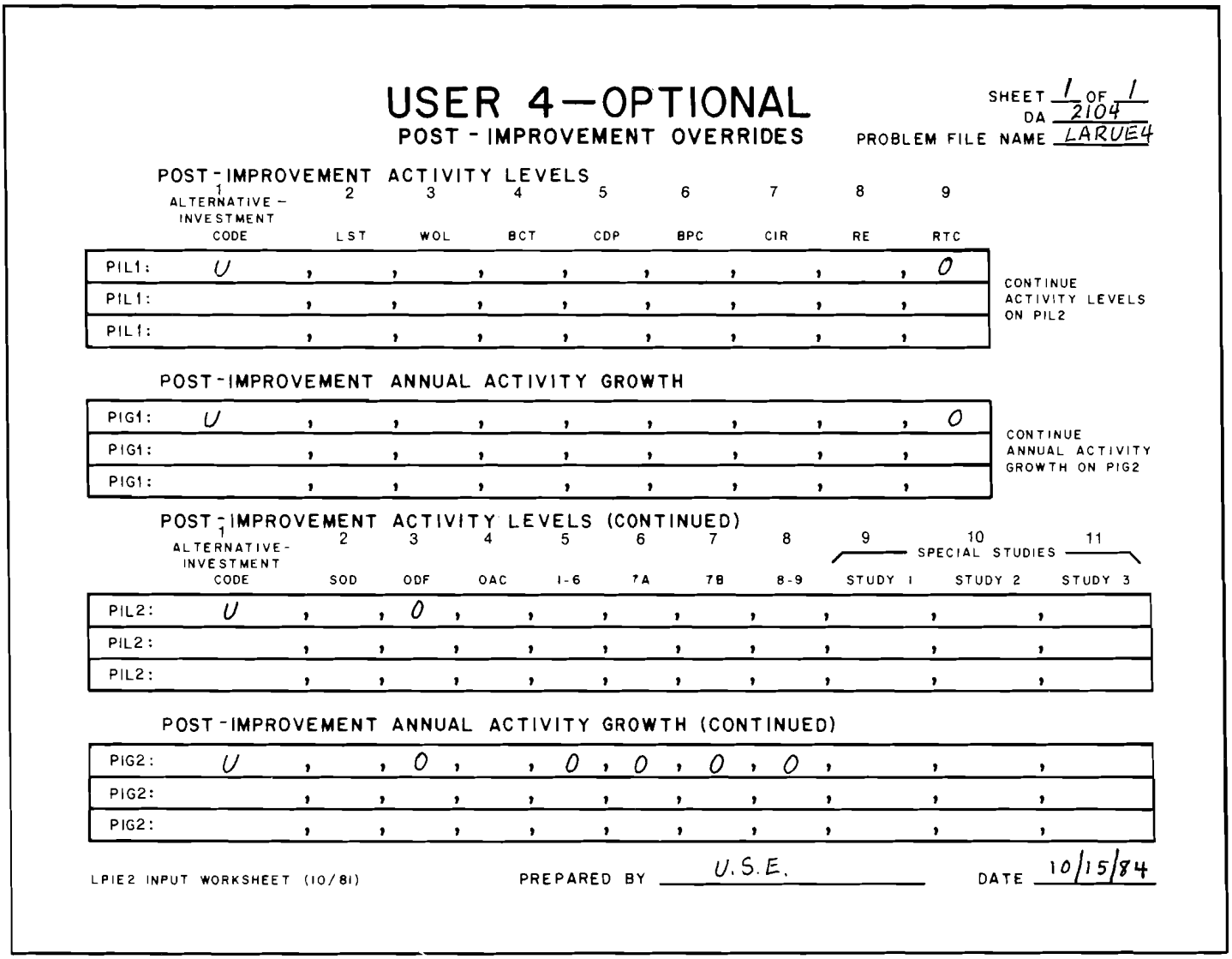
Field 11 Study 3—Activity level estimate for the special study named in OPTN data line, field 10.

Specifications for special-study activity level estimates are as follows:

- Entry form: whole number
- Valid range: blank or $0 \leqslant X \leqslant 999$
- Default value: 0 (zero)

Step 2. Enter annual activity growth estimates (USER 4, PIG1, PIG2 data lines). On the USER 4 input worksheet, fill in field 1 on the PIG1 and/or PIG2 data line, and other fields on the data line(s) as needed. Leave an activity field blank where you do not estimate; the program will default to the LPIE2-calculated growth for that activity. Estimate annual activity growth as the number of activities added each year to the activity level, beginning the second year after the investment is made. For example, if the activity level of LST in the year after the investment for P1 (alternative P, investment number 1) is 4, and you override the growth by entering 2, then the activity level in the second year after the investment will be 6; in the third year, 8; in the fourth year, 10; and so on until the end-of-study year.

The fields on PIG1 and PIG2 data lines correspond exactly in name and position to those on PIL1 and PIL2, respectively. The annual activity growth estimates have the same specifications as the activity level estimates have. If you entered any special studies on the OPTN data line (USER 2), you must estimate annual activity growth for each alternative-investment in the Problem file.



USER 4—OPTIONAL

POST-IMPROVEMENT OVERRIDES

SHEET 1 OF 1
DA 2104
PROBLEM FILE NAME LARUE4

POST-IMPROVEMENT ACTIVITY LEVELS

	1 ALTERNATIVE-INVESTMENT CODE	2 LST	3 WOL	4 BCT	5 CDP	6 BPC	7 CIR	8 RE	9 RTC
PIL1:	U								0
PIL1:									
PIL1:									

CONTINUE ACTIVITY LEVELS ON PIL2

POST-IMPROVEMENT ANNUAL ACTIVITY GROWTH

PIG1:	U								0
PIG1:									
PIG1:									

CONTINUE ANNUAL ACTIVITY GROWTH ON PIG2

POST-IMPROVEMENT ACTIVITY LEVELS (CONTINUED)

	1 ALTERNATIVE-INVESTMENT CODE	2 SOD	3 ODF	4 OAC	5 I-6	6 7A	7 7B	8 8-9	9 SPECIAL STUDIES STUDY 1	10 STUDY 2	11 STUDY 3
PIL2:	U		0								
PIL2:											
PIL2:											

POST-IMPROVEMENT ANNUAL ACTIVITY GROWTH (CONTINUED)

PIG2:	U		0		0	0	0	0			
PIG2:											
PIG2:											

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Figure 3-11. Sample USER 4 (reduced size), POST-IMPROVEMENT OVERRIDES

4 District Responsibilities in Support of LPIE2—Running LPIE2

4.1 Introduction

Once you have prepared Problem File input, you must run LPIE2 at the computer terminal (with clerical assistance as needed) to data-check the file. An LPIE2 terminal session includes the procedure for accessing the computer, creating data files as needed, accessing LPIE2, running the program, and disengaging from the computer. To conduct a terminal session, use the Generic Remote Data Entry System (RDES), explained in OPA-2Y000-01, ***Generic RDES User Guide***. (See Appendix E for ordering information.) You interact with RDES by typing "commands" on the computer terminal keyboard—that is, instructions for entering data, editing a file, and executing an LPIE2 program. A summary of RDES commands for use with LPIE2 is provided in Appendix E.

The user options for running LPIE2 are summarized in Table 4-1. This table gives the RDES commands, the short form of these commands, and the file name(s) you must specify in the RDES interaction. Each option will be fully explained in the LPIE2 terminal procedure (Subsection 4.2, Select an LPIE2 Run Option).

Table 4-1

User Run Options for LPIE2

Run Option	RDES Command	Short Form	File Name(s)
LPIE2 District User Data Check (mandatory)	DATACK	D	HQ File Problem File
LPIE2 Economic Study on a Problem File (as needed)	STUDY	S	Problem File
HQ File Formatted Listing (as needed)	HQLIST	H	HQ File
REHB Data Lines (USER 1A Worksheet) Formatted Listing (as needed)	REHBLIST	R	Problem File

4.2 Conducting an LPIE2 Terminal Session

Obtain from your local EPLANS Coordinator a schedule of computer operating hours and the LPIE2 price schedule, telephone number(s) to dial up the

computer, and two unique codes that identify you to the system, namely, District user identification (userid) and password.

Step 1. Access the Computer. Follow the instructions for your terminal to connect with the computer. Follow the RDES logon (or login) procedure for entering your userid, password, and A/C INFO (accounting information). You may be prompted for a second password, at the option of your company—check with your EPLANS Coordinator. If your userid and password(s) are valid, RDES responds with NEXT? followed on a separate line by the prompt symbol > indicating that RDES is waiting to process your command. Note that pertinent broadcast messages may be displayed for you upon logon, before the initial NEXT? prompt. See Appendix E (RDES Commands) for more details.

Step 2. Create the Problem File. Assemble all USER input worksheets. To enter data into the computer, type the command CREATE followed by the file name, 8 characters or fewer (e.g., LARUE1). The computer response (EDIT:) indicates that the terminal is now controlled by the ***RDES Editor***, an interactive program with its own set of commands that you can use to input data lines. Apply also the following LPIE2 entry guidelines:

- **Data verification**. Before entering data into the computer, verify entries for completeness, correctness, and consistency against data sources and LPIE2 program constraints listed in this guide.
- **Line-by-line entry**. Enter each data line separately:
  - Type the correct 4-character data line ID followed by a colon (:), then the field entries. Separate the field entries with commas, ignoring spaces between entries on the input worksheets.
  - End each data line by pressing the RETURN or CR (carriage return) key.
- **Data line sequence**. LPIE2 does not require you to enter data lines in worksheet order. However, it is to your advantage to keep the data lines you enter and the worksheets in the same order since this will help you in correcting errors.
- **Field sequence**. Enter the fields of any data line in strict sequence, as given on the input worksheet.
- **Mandatory fields**. Enter all mandatory fields.
- **Blanks for optional fields**. If you leave a field blank, you must still enter the comma separating that blank field from the next field.
- **Character distinction**. Take care to distinguish decimal points from commas. Decimal points are characters within an entry; commas are used between entries to separate them. Thus ***omit commas within numbers*** (e.g., avoid 1,000, 21,000, and so on). Also note that certain alphanumeric characters have similar shapes; to prevent error, distinguish numeral 1 from letters i, l, and I, and numeral 0 (zero) from letters o, O, and Q.

Use the command TYPE to display a file while in the RDES Editor. Proofread each file display against the input worksheets to catch omissions and typing errors. A sample display of a Problem File might appear as follows:

```
IDEN:LARUE WIRE CENTER - DA 2104
AREA:LARUE,2110,2104
STDY:1984,1.5,28,500,600,346,12,12,.1,AER,PULP
CURL:9,1,5,5,0,0,4,10,4,4,3,12,4,12,3
ALTN:P,REHAB ONLY
INVT:P,N,15,500,SEP,1985
ALTN:I,SAC C AND REHAB
INVT:I,Y,50,700,SEP,1985
ALTN:U,SAC B AND REHAB
INVT:U,Y,100,800,SEP,1985
PRNT:LPI
SQGR:18,,,,,,,
CSTE:1-6,500
SQND:,,,500,JUN,1984
REHB:REPLC,4,N,543,103,275,,2,,,,P,I,U
REHB:PLACE,4,N,400,,120,,,,,,P,I,U
REHB:REINF,7,N,516,,1100,,,,,,I,U
REHB:REPLC,8,N,1611,126,1100,,1,,,,I,U
REHB:PLACE,8,N,200,,120,,,,,,I,U
REHB:REPLC,9,N,1364,325,,,3,,,1,P,I,U
REHB:PLACE,9,N,1000,,450,,,,,,P,I,U
REHB:REBLD,10,21,,,960,,,,2,,P,I,U
REHB:REPLC,11,N,332,64,,,,,,,P,I,U
REHB:REINF,12,N,226,,275,,,,,,U
REHB:REPLC,13,N,796,115,550,,,,,,I,U
REHB:PLACE,13,N,400,,180,,,,,,I,U
REHB:REINF,14,N,90,,275,,,,,,U
REHB:REBLD,16,17,,,450,,,,2,,P,I,U
REHB:REPLC,17,N,442,65,550,,,,,,I,U
REHB:PLACE,17,N,200,,120,,,,1,,I,U
REHB:REPLC,18,N,2703,,,,3,,,,P,I,U
REHB:PLACE,18,N,600,,300,,,,1,,P,I,U
REHB:REBLD,19,17,,,390,,,,2,,P,I,U
REHB:REPLC,20,N,328,47,275,,,,,,I,U
REHB:PLACE,20,N,200,,60,,,,,,I,U
REHB:REPLC,21,N,394,88,,,,,1,P,I,U
REHB:PLACE,21,N,400,,210,,,1,,,P,I,U
REHB:REBLD,22,14,,,360,,,1,1,,P,I,U
REHB:REINF,23,N,444,,275,,,,,,I,U
REHB:REBLD,24,14,,,450,,,1,2,,P,I,U
REHB:REINF,24,N,213,,275,,,,,,U
REHB:STUBS,25,7,650,,,,2,,,,P,I
REHB:REBLD,25,7,,,420,,,,1,,P,I
REHB:REPLC,25,N,1209,176,275,,2,,,,U
REHB:PLACE,25,N,800,,510,,,1,,,U
REHB:REPLC,26,N,2499,191,1100,,,,,,I,U
REHB:PLACE,26,N,800,,240,,,,,,I,U
REHB:REINF,29,N,1251,,1100,,,,,,U
REHB:REINF,30,N,1330,,,,,,,,I,U
REHB:PLACE,30,N,145,,,,,,,,I,U
REHB:PLACE,30,N,200,,60,,,,,,I,U
REHB:INT,0,N,1800,,4400,,,,,,I,U
REHB:STUBS,0,N,3550,,,,,,,,I,U
```

If you are satisfied with a file as displayed, type the command FILE to store it in the computer. If you are *not* satisfied—or if you encounter difficulties when inputting data—you can get out of the RDES Editor by typing QUIT. The computer will respond with NEXT?, and you can enter RDES commands as needed.

Step 3. Access LPIE2. Type LPIE2 to access the program. Be sure to wait for the prompt symbol (>) to appear at the beginning of a new line before you enter your command. Enter the command immediately following the prompt symbol. End the line by pressing the RETURN or CR (carriage return) key. RDES will then list the options shown in Table 4-1. The dialog for accessing LPIE2 is as follows:

Computer: NEXT?

You: >lpie2

Computer: DATACK, STUDY, HQLIST, OR REHBLIST? (D, S, H, OR R)

Step 4. Select an LPIE2 Run Option from DATACK, STUDY, HQLIST, and REHBLIST. These options will now be discussed in that sequence.

4-1. DATACK (D)—LPIE2 data check, mandatory for each Problem File. If you select DATACK, type the letter d. The dialog is:

Computer: DATACK, STUDY, HQLIST, OR REHBLIST? (D, S, H, OR R)

You: >d

Then you must enter the Problem File and HQ name. (The file name must be 8 characters or fewer.) The dialog is:

Computer: ENTER PROBLEM AND HQ FILE NAMES:

You: >[myprob myhq]

Be sure to enter the Problem File name first, followed by a space, then the HQ File name; do not type a comma between the two file names.

The computer will then run the LPIE2 Data Check, issuing a message to that effect, including the program version (e.g., 2.0), the run date (e.g. 08/15/84) and the hour, minute, and second (e.g., 14:30:20) when the program begins execution. (The time is always Eastern Standard Time.) A sample run message is:

NOW RUNNING LPIE2 DATA CHECK V2.0 08/15/84 14:30:20

After the run message, the computer will indicate the number of fatal errors (errors that must be corrected before the program will continue) and warnings (unusual conditions in the file that you may want to review and change as needed):

Computer:
* * *
YOU HAVE [number] FATAL ERROR(S)
YOU HAVE [number] WARNING(S)
* * *

The interaction now depends on the number of fatal errors detected by the Data Check; the number of warnings (if any) is not pertinent. There are two cases:

Case 1. No fatal errors were detected. The computer asks whether you want to continue.

Computer:
```
        * * *
YOU HAVE 0 FATAL ERROR(S)
YOU HAVE 0 WARNING(S)
        * * *
CONTINUE (Y OR N)?
```

Enter "y" if you want to select another run option. The computer then repeats the run option list.

Computer: CONTINUE (Y OR N)?

You: >y

Computer: DATACK, STUDY, HQLIST, OR REHBLIST? (D, S, H, OR R)

You: > [the appropriate letter]

If you do not want to continue, enter the letter n:

Computer: CONTINUE (Y OR N)?

You: >n

Computer: NEXT?

You may end the terminal session at this point, as in Step 5 (given at the end of this section).

Case 2. At least one fatal error was detected. The computer prints out the error(s) and warning(s), and asks you to correct errors and rerun the LPIE2 Data Check. The dialog is:

Computer:
```
        * * *
YOU HAVE 1 FATAL ERROR(S)
YOU HAVE 0 WARNING(S)
        * * *
[printout of error message(s) and warning(s)]
CORRECT ERRORS AND RUN AGAIN.
NEXT?
>
```

The prompt NEXT? indicates that you are back in RDES and can access the files in question and correct them using the RDES Editor. Use the Data Check printout in conjunction with Section 8, District User Error Analysis, to interpret fatal errors and warnings. After making the necessary changes to the files, access LPIE2, and select the DATACK run option to data-check the corrected files.

4-2. STUDY (S)—LPIE2 Economic Analysis on a Problem File. If you select STUDY, type the letter s. Then you must specify the Problem File name. The dialog is:

Computer: DATACK, STUDY, HQLIST, OR REHBLIST? (D, S, H, OR R)

You: >s

Computer: ENTER FILE NAME:

You: >[myprob]

Computer: NOW RUNNING LPIE2 STUDY V2.0 08/15/84 15:30:59

After the run message, the computer asks whether you want to see the Rehab Summaries. These refer to the Rehabilitation Input Summary and Rehabilitation Calculated Cost Summary, which are intermediate outputs of the program, available if REHB data lines (USER 1A input worksheet) are in a Problem File. (For further information, consult Section 5, Interpreting Output.) If you respond "y", the computer prints out the Rehab Summaries and asks whether you want to continue.

Computer: DO YOU WANT TO SEE THE REHAB SUMMARIES (Y OR N)?

You: >y

Computer: [printout of Rehabilitation Input Summary and Rehabilitation Calculated Cost Summary]

Computer: DO YOU WANT TO CONTINUE (Y OR N)?

The computer will wait for your response while you check the Rehab Summaries for correct entries and reasonable investment costs. If you are ***not*** satisfied, respond "n":

Computer: DO YOU WANT TO CONTINUE (Y OR N)?

You: >n

Computer: 08/15/84 STUDY FOR 'MYPROB' ENDED AT 15:45:20.
DO YOU WANT TO SAVE YOUR DATA CHECKED OUTPUT? (Y OR N)

You: >n

Computer: NEXT?

At this point, enter the appropriate RDES command to access the RDES Editor and make changes in the REHB data lines, guided by the USER 1A worksheet. Run the Data Check (Step 4-1) on the revised Problem File, and run the LPIE2 economic analysis (Step 4-2). Review the Rehab Summaries for the revised Problem File. If you are satisfied, respond "y":

Computer: DO YOU WANT TO CONTINUE (Y OR N)?

You: >y

At this point the computer prints out the LPIE2 and/or CUCRIT output reports (see Section 5). The computer states the date and time that the study ends and asks whether you want to save the data-checked output (i.e., the data-checked Problem File). The term DATA-CHECKED OUTPUT does not refer to LPIE2 or CUCRIT output reports but to the data-checked Problem File, as already suggested. You *cannot* save LPIE2 or CUCRIT reports in an "output" file. However, you ***can*** save the data-checked Problem File (the input file on which an LPIE2 study is run). This allows you to rerun LPIE2 on that file without repeating the Data Check, and is useful, for example, in obtaining further copies of the

output reports specified in that file on the PRNT data line (USER 2). If you save the data-checked Problem File, then LPIE2 automatically appends the file type DATA1 to the file name (e.g., MYPROB DATA1, LARUE1 DATA1). You cannot access any of these DATA1 files; you cannot change them. To change the Problem File in any way, you must go back to the original file (e.g., MYPROB, LARUE1), edit it, and run the Data Check on it.

Computer: [PRINT OUT STUDY OUTPUT] 08/15/84 STUDY FOR 'MYPROB' ENDED AT 15:45:20.
DO YOU WANT TO SAVE YOUR DATA CHECKED OUTPUT? (Y OR N)

You: >y

Computer: OUTPUT SAVED AS 'MYPROB DATA1' FILE.
NEXT?
>

If you do not want to save the data-checked Problem File (DATA1), respond "n". The computer will prompt you with NEXT?, and no other message will appear.

> **Note**
>
> To remove a DATA1 file (data-checked Problem File), use the RDES command PURGE, as described in the Generic RDES User Guide and summarized in Appendix E.

4-3. HQLIST (H)—Formatted listing of an HQ File. You can use this option to inspect any HQ File after it has been successfully created at Headquarters. A sample is in Section 5 (Figure 5-1). Type the letter h, and enter the HQ File name. The dialog is:

Computer: DATACK, STUDY, HQLIST, OR REHBLIST? (D, S, H, OR R)

You: >h

Computer: ENTER HQ FILE NAME:

You: >[myhq]

Computer: [printout of the named HQ File in formatted listing]
CONTINUE (Y OR N)?
>

If you type "y", the computer will list run options; if "n", the computer will prompt with NEXT?.

4-4. REHBLIST (R)—Printout of the REHB data lines (USER 1A, DETAILED REHABILITATION INPUT). The printout takes the form of a Rehabilitation Input Summary, described in Section 5. You can use this option to inspect the REHB data lines in a Problem File *before* data-checking the file. Type the letter r, and enter the Problem File name. The dialog is:

Computer: DATACK, STUDY, HQLIST, OR REHBLIST? (D, S, H, OR R)

You: >r

Computer: ENTER PROBLEM FILE NAME:

You: >[myprob]

Computer: [printout of the Rehabilitation Input Summary]
CONTINUE (Y OR N)?
>

If you type "y", the computer will list run options; if "n", the computer will prompt with NEXT?.

Step 5. End the Terminal Session. Follow the RDES logoff procedure and the specific instructions suitable to your terminal for disconnecting from the computer.

5 District Responsibilities in Support of LPIE2—Interpreting Output

This section provides an overview of the output generated by LPIE2. Subsection 5.1 describes LPIE2 *"intermediate" output:* (A) HQ File Formatted Listing, (B) Rehabilitation Input Summary, and (C) Rehabilitation Calculated Cost Summary. Subsection 5.2 describes LPIE2 ***final output*** reports: (A) LPIE2 DA Input Summary, (B) LPIE2 Problem Analysis Summary, (C) Projection of Annual Activity Levels, and (D) LPIE2 User Overrides. Subsection 5.3 illustrates the ***Capital Utilization Criteria (CUCRIT) reports*** applicable to LPIE2: (A) Report Summary, (B) Capital, Revenue, and Expense Summary, (C) Incremental Cash Flow Details, (D) Executive Summary, and (E) Discretionary Project Selection (DPS) Output. The LPIE2 ***Data Check Output*** is discussed in Section 2 for Headquarters and Section 8 for District.

5.1 Intermediate Output

A. HQ File Formatted Listing

Unfold Figure 5-1 at the end of this section for reference throughout the following discussion of the HQ File Formatted Listing. HQ Files originate as follows. LPIE2 requires general economic and activity cost factor information appropriate to each District for economic analysis of Problem File data. This information is provided by Headquarters staff who prepare Economic File and Cost Factor File input (on the HQ1 and HQ2 worksheets, respectively), create the files, and run the HQ Data Check (as discussed in Section 2). Once the associated Economic and Cost Factor Files have successfully passed the Data Check, they are merged into an HQ File. The file name is made known to the relevant District for use in running the USER Data Check on a Problem File and in obtaining the HQ File Formatted Listing (Figure 5-1) using the HQLIST run option (as discussed in Section 4). The listing can be used as a reference and can be useful, for example, in checking special-study names given in the HQ File.

The HQ File Formatted Listing (Figure 5-1) reproduces in a clear, descriptive format the following information:

- Economic File Identification—The preparer's remark, from the ERMK data line on the HQ1 form, which heads the original Economic File—e.g., the XYZ COMPANY portion of the following data line:

  ERMK:XYZ COMPANY

- Economic Data—General economic data (from CUCRIT sources) as entered on the ECON data line, e.g.,

  ECON:.09,.45,.10,0,0,.03,0,2,1,.145,.10,.47,0

  The field names (e.g., DEBT INTEREST RATE) and field entries (e.g., .09) are given in the listing.

- Account Data—Outside plant economic data (from CUCRIT sources) from two data lines: AERL and BURD.

  The AERL data represent the aerial plant account, code 242-22—e.g.,

  AERL:.09,23,1,23,0,0,0

  The BURD data represent the buried plant account, code 242-45—e.g.,

  BURD:.09,30,1,30,0,0,0

  The field names (e.g., CAPITAL TREND RATE) are the same on the AERL and BURD data lines. The field entries are listed under the respective account code.

- Cost Factor File Identification—The preparer's remark (from the CRMK data line on the HQ2 form) which heads the original Cost Factor File—e.g.,

  CRMK:AREA 1

- Cost Factors—Seventeen outside plant activities considered by LPIE2, with their unit cost, from the CST1 and CST2 data lines, e.g.,

  CST1:28.23,70.03,7.72,75.68,19.48,86.05,36.59,16.49

  CST2:28.63,67.17,33.76,177.54,127.62,74.80,177.54,13.62,31.25

  The first 15 activities (LST through 8-9) are tracked by LATIS; these include facility modifications, assignment changes, and found troubles. The cost factors are used by LPIE2 to calculate activity costs in the DA—the initial costs and the reduced costs resulting from solution alternative plant improvements. (The activity levels are taken from the CURL data line, prepared on the USER 2 input worksheet.) The two remaining factors are cable pair throw (CPT) and value of a feeder pair (VFP), used by LPIE2 to calculate certain credits resulting from solution alternative improvements. Problem file override data (CSTE and SQGR) are not shown on the HQ File Formatted Listing.

- Special Studies—The name and cost factor of any special study (maximum 3) investigated in the District, from the SPCL data line, e.g.,

  SPCL:PCV,25.23

  The user can override cost data for one or more special studies by entering data from one or more CSTE lines on the USER 2A worksheet.

B. Rehabilitation Input Summary

Unfold Figure 5-2 at the end of this section for reference throughout the following discussion of the Rehabilitation Input Summary. This is a formatted listing of REHB data lines in a Problem File, the DETAILED REHABILITATION INPUT, prepared on the USER 1A input worksheet. The format is convenient for reviewing USER 1A entries and locating particular items.

You can obtain the Rehabilitation Input Summary ***before*** the Problem File is data-checked by using the REHBLIST run option (as discussed in Section 4). In this case, you can stop the program to revise the file without being charged for running the economic analysis (STUDY run option). The notation NOT DATA CHECKED will be printed under the title. If an entry is larger than field size (because of comma omission or other error), asterisks will be printed in place of the entry.

You can also obtain the Rehabilitation Input Summary interactively when running the economic analysis (STUDY run option), ***after*** the Problem File is data-checked. The computer asks, DO YOU WANT TO SEE THE REHAB SUMMARIES (Y OR N)? Respond "y" and you will get the Rehabilitation Input Summary as well as the Rehabilitation Calculated Cost Summary (discussed next in Part C).

When the Rehabilitation Input Summary is printed, the LPIE logo— that is, the asterisk formation spelling out "LPIE" and the words LOOP PLANT IMPROVEMENT EVALUATOR— appears above the title. The columns of the summary are as follows (Figure 5-2):

- REMARK—Optional user remark (REHB, field 1).
- SEC #—Cable section number (REHB, field 2).
- LIFE—Remaining life (years) associated with a renovation treatment or N where remaining life is not applicable, e.g., with a replacement or reinforcement (REHB, field 3).
- $C—The C cost of the given treatment (REHB, field 4).
- $X—The X cost of the given treatment (REHB, field 5).
- $M—The M cost of the given treatment (REHB, field 6).
- $R—The R cost of the given treatment (REHB, field 7).
- 1-6—The number of 1-6 troubles eliminated by the treatment (REHB, field 8).
- 7A—The number of 7A troubles eliminated by the treatment (REHB, field 9).
- 7B—The number of 7B troubles eliminated by the treatment (REHB, field 10).
- 8-9—The number of 8-9 troubles eliminated by the treatment (REHB, field 11).
- CODES—The alternative-investment codes applying to the treatment (REHB, fields 12 through 17, as applicable).

C. Rehabilitation Calculated Cost Summary

Unfold Figure 5-3 at the end of this section for reference throughout the following discussion of the Rehabilitation Calculated Cost Summary. This is an analysis of the REHB data lines (USER 1A) in the Problem File. It is a companion to the Rehabilitation Input Summary, previously discussed, and is obtained together with it under the STUDY run option (LPIE2 economic analysis).

If the "y" response is given to the computer's question DO YOU WANT TO SEE THE REHAB SUMMARIES (Y OR N)?, both summaries are printed. The

Rehabilitation Calculated Cost Summary is not available separately or in any other way.

The Rehabilitation Calculated Cost Summary (Figure 5-3) is derived from LPIE2 calculations of total treatment costs and the total number of cable troubles eliminated by treatments. These totals are broken down by alternative-investment (CODE column). For each alternative-investment in the Problem File, total treatment costs are further broken down into two investment categories: (1) REINFORCE, REPLACE, OR REBUILD INVESTMENT COSTS and (2) RENOVATION COSTS. Under RENOVATION COSTS, the total remaining life (LIFE column) is also given. Investments are further broken down into C, X, M, and R dollars. The format of the information in these two categories is similar respectively to the format of the CNRP and RENV data lines on the USER 1B worksheet, SUMMARY INPUT. Also, the total of troubles eliminated (CABLE TROUBLES ELIMINATED) for each alternative-investment is broken down by trouble category: 1-6, 7A, 7B, and 8-9. This format is similar to the ELIM data line format (USER 1B).

The note at the bottom of the Rehabilitation Calculated Cost Summary (Figure 5-3) indicates how you can derive the total investment cost of an alternative-investment. Take the sum of reinforcements, replacements, and/or rebuilding plus renovations. For example, the REINFORCE REPLACE OR REBUILD INVESTMENT COSTS of physical rehabilitation (code P1) as given in the Summary are 7736 (C) plus 580 (X) plus 1355 (M); the RENOVATION COSTS are 650 (C) plus 3030 (M); the total investment cost of P1 is 13351. Similarly, the total cost of intermediate design (code I1) is 39486, and the total cost of ultimate design (code U1) is 45091.

You can use the Rehabilitation Calculated Cost Summary to check whether investment costs are reasonable. If they are not, use the companion Rehabilitation Input Summary to locate errors or discrepancies in individual treatment costs, in alternative-investment code entries, and so on. Then revise the Problem File. If you are satisfied with investments costs, continue with the LPIE2 economic analysis (STUDY run option), as discussed in Section 4. The LPIE2 and CUCRIT reports resulting from the LPIE2 economic analysis are discussed in the following subsections (5.2 and 5.3 respectively).

5.2 LPIE2 Output Reports

A. LPIE2 DA Input Summary

Unfold Figure 5-4 at the end of this section for reference throughout the following discussion of the LPIE2 DA Input Summary. This report contains data about the DA and activity cost factors and current activity levels; these data are the basic inputs to the LPIE2 program. In the following description, the numbers refer to the main features on Figure 5-4 (labeled with corresponding numbers). Details are described under each feature.

1. Report number (1) and title (LPIE2 DA INPUT SUMMARY). This first LPIE2 report is preceded by the LPIE logo, that is, the asterisk formation spelling out "LPIE" and the words LOOP PLANT IMPROVEMENT EVALUATOR.

2. Standard LPIE2 format, identical for all LPIE2 reports generated in the same run:
   - Run date—the month, day, year when the LPIE2 economic evaluation is performed
   - Problem identification—complete problem identification from the IDEN data line (USER 2)
   - Area information—from the AREA data line (USER 2)
     - Wire Center (WC) name
     - Existing Allocation Area (EAA) number
     - Distribution Area (DA) number
   - STUDY BEGINS: The study period begins in January (assumed by the program) of the study year (STDY data line, field 1, USER 2).
   - File names of
     - the HQ File (entered interactively)
     - the Problem (PROB) File (entered interactively).
3. PROBLEM DATA SUMMARY—distribution area data (STDY data line, USER 2)
   - AVAIL FDR PAIRS—available feeder pairs (field 5)
   - DIST. TO C.O.—distance to the CO, i.e., WC (field 9)
   - PLANT TYPE—plant structure and insulation, whether AER PIC (aerial, plastic insulated conductor), BUR (buried) PIC, or AER PULP (field 10 and 11)
   - % ULT—initial ultimate plant percent (in decimal form), i.e., percent of living units on ultimately sized cables before improvement (field 8)
   - PAIR GROWTH—annual pair growth (assigned pairs) in the DA (field 3)
   - DIST PAIRS—available distribution pairs (field 4)
   - ASGN PAIRS—assigned pairs (field 6)
   - DEF PAIRS—defective pairs (field 7).
4. ACTIVITY SUMMARY—table listing the 15 standard activities and any special studies (ACTIVITY column), activity cost factors (HEADQUARTERS ESTIMATED COST and USER ESTIMATED COST columns), and current activity levels (CURRENT LEVEL column).
   - ACTIVITY—facility modifications (LST, WOL, BCT, CDP, BPC, CIR), miscellaneous indicators (RE, RTC), assignment changes (SOD, ODF, OAC), and found cable troubles (1-6, 7A, 7B, 8-9) and any special-study names (HQ File)
   - HEADQUARTERS ESTIMATED COST—cost factors provided by headquarters for items in the ACTIVITY column (HQ File)
   - USER ESTIMATED COST—cost factor(s) provided by the engineer for one or more items in the ACTIVITY column (USER 2A, CSTE data

line). The user-estimated cost for each specified activity will override the Headquarters-estimated cost for that activity.

- CURRENT LEVEL—number of occurrences within the previous 12-month period of standard activities (CURL data line, USER 2) and any special studies (OPTN data line, USER 2).

B. LPIE2 Problem Analysis Summary

Unfold Figure 5-5 at the end of this section for reference throughout the following discussion of the LPIE2 Problem Analysis Summary.

> **Note**
> The LPIE2 Problem Analysis Summary is the only LPIE2 report that can be obtained individually via the PRNT data line (USER 2), by entering report designation code PRB.

The Problem Analysis Summary gives the results of the economic analysis performed by LPIE2 using the Problem File data. For each alternative evaluated by the program, it lists the calculated economic evaluators: PWE (Present Worth of Expenditures), NPV (Net Present Value), and LTEE (Long Term Economic Evaluator). The LTEE is a benefit-to-cost ratio (BCR). The report also shows discretionary, non-discretionary, and status quo non-discretionary expenditures. Thus the Problem Analysis Summary is a key tool for the FAP Engineer and District Steering Committee, who must decide which alternative (if any) to implement. For detailed information on using the Problem Analysis Summary in the FAP process, consult BR 936-400-003, ***Responsibilities of the Facility Analysis Plan (FAP) Engineer.*** In the following description, the numbers refer to the main features on Figure 5-5 (labeled with corresponding numbers). Details are given under each feature.

1. Report number (2) and title (LPIE2 PROBLEM ANALYSIS SUMMARY).
2. Standard LPIE2 format (see LPIE2 DA Input Summary, feature 2, in Subsection 5.2, Part A).
3. ECONOMIC EVALUATORS—table listing all the alternatives (ALTERNATIVE column), sources of post-improvement estimates (ESTIMATES column), and values of the economic evaluators (PWE, LTEE, and NPV columns):
   - ALTERNATIVE—solution alternative names (ALTN data lines, field 2, USER 3) and the STATUS QUO (constructed by LPIE2)
   - ESTIMATES—for each alternative (except the STATUS QUO), either LPIE (estimates were made automatically by the program and not overridden by any user estimate) or USER (estimates were entered by the user on PIL1, PIL2, PIG1, or PIG2 data lines, USER 4)
   - PWE—the Present Worth of Expenditures (PWE) value calculated by LPIE2 for each alternative, including the STATUS QUO. (Note: PWE is not incremental to the STATUS QUO.) The PWE value of an alternative is the sum of the present worth of the capital expenditures minus the present worth of the net salvage, plus the present worth of

operating costs and maintenance expenses plus the present worth of income taxes. In general, the ***lower*** the PWE, the more cost-effective the alternative.

- LTEE—the Long Term Economic Evaluator (LTEE) value calculated by LPIE2 for each solution alternative as compared with the STATUS QUO. The STATUS QUO LTEE is automatically equal to 1.00. The LTEE is a benefit-to-cost ratio measuring overall project cost-effectiveness. If a solution alternative LTEE is greater than 1 (i.e, greater than the STATUS QUO LTEE), it is generating more than enough money to recover the investment and satisfy investors at the cost of money (investment rate). In general the ***higher*** the LTEE, the more cost-effective the alternative. If a company has established a minimum LTEE, any LTEE value lower than that would not be acceptable.
- NPV—the Net Present Value (NPV) calculated by LPIE2 for each alternative as compared with the STATUS QUO. The STATUS QUO NPV is automatically equal to 0 (zero). If a solution alternative NPV is greater than zero (i.e., greater than the STATUS QUO NPV), it has a long-range rate of return higher than the cost of money. In general, the ***higher*** the NPV, the more cost-effective the alternative. Alternatives are listed in the ECONOMIC EVALUATORS table, in sequence from highest NPV to lowest; in case of a tie, the alternative with the higher LTEE is listed first.

4. DISCRETIONARY EXPENDITURES—table listing solution alternatives (excluding the STATUS QUO), total installed first costs, and incremental LTEE (ILTEE):
   - ALTERNATIVE—solution alternative names (excluding the STATUS QUO)
   - TOTAL INSTALLED FIRST COST—the C, X, M, and R costs (directly from the Problem File) needed to implement the alternative (combining first and second investment costs if subdivided), given in study year dollars (not inflated)
   - INCREMENTAL LTEE—the additional benefit to be gained by implementing the alternative listed on one line instead of the alternative listed on the line above it. (The first ILTEE is relative to the STATUS QUO.) Alternatives are listed from the highest ILTEE to the lowest; in case of a tie, the alternative with the higher NPV is listed first.
5. NONDISCRETIONARY EXPENDITURES—the C, X, M, and R costs of non-discretionary expenditures you may have identified in the rehabilitation study and entered on USER 2 (OPTN data line, fields 2 through 5).
6. STATUS QUO NONDISCRETIONARY EXPENDITURES (optional)— if this option is invoked, this entry lists any C, X, M, and R costs of status quo non-discretionary expenditures you want to consider in the rehabilitation study and have entered on USER 2A (SQND data line, fields 1 through 4).
7. END-OF-STUDY YEAR—calendar year ending the study period, either as calculated by LPIE2 or as overridden by the user (OPTN data line, USER 2, field 1). In the second case, the word USER ESTIMATED is printed under this item. The end-of-study year represents the time that the STATUS QUO plan takes place; LPIE2 automatically brings all solution alternative plans up

to the level of the most comprehensive plan. The LPIE2-calculated end-of-study year is restricted to between 5 and 20 years after the study year (STDY data line, USER 2, field 1), so that the output is not overly sensitive to the STATUS QUO assumption.

If the USER 1B worksheet was prepared (instead of USER 1A) and the SUMMARY DATA lines were entered in the Problem File, the notation SUMMARY INPUT USED is printed on this report to the right of the END-OF-STUDY YEAR.

8. OPERATING COST FOR ONE OR MORE ACTIVITIES IN THIS STUDY PROVIDED BY USER—an indication that the engineer has optionally changed one or more of the operational cost factors by entering the change(s) on the CSTE data line(s) of the USER 2A worksheet. (The actual user-estimated cost is given on report number 1, LPIE2 DA Input Summary.)
9. USER PROVIDED ACTIVITY GROWTH LEVELS USED FOR STATUS QUO AND PRE-IMPROVEMENT—an indication that the engineer has overridden the LPIE2-estimated growth rate in the status quo plan for one or more activities (found cable troubles or special studies).

Interpreting LPIE2 Economic Evaluators

An LPIE2 economic analysis derives the values of certain economic evaluators. These evaluators can be interpreted to indicate how efficiently an alternative (from a set of solution alternatives) uses money. The LPIE2 economic evaluators are: the Present Worth of Expenditures (PWE), the Long Term Economic Evaluator (LTEE), the Net Present Value (NPV), and the Incremental LTEE (ILTEE). (The LTEE is a benefit-to-cost ratio, BCR.) The values of these evaluators for the alternatives in a Problem File (including some values for the STATUS QUO) are displayed in the ECONOMIC EVALUATORS and DISCRETIONARY EXPENDITURES tables on the LPIE2 Problem Analysis Summary report (Figure 5-5).

The PWE and the NPV are both cost comparison techniques for selecting the most attractive alternative from a set of competing alternatives (i.e., choosing one alternative rules out the others). The attractiveness of an alternative has to do with efficient use of money. The PWE and NPV measure efficiency from different viewpoints relating to conditions imposed on project money by its sources, investors and customers. Investors in a company seek the highest rate of return on their money; the investment rate, called the "cost of money" (COM), is an important factor in the LPIE2 economic analysis.

Customers of a company seek the best service at the lowest possible revenue rate. All investment project money is subject to Federal and State income taxation. The PWE technique is concerned with minimizing plant expenditures, operating costs, and taxes and still maintaining good customer service. It evaluates an alternative in terms of total expenditures needed to implement it. Thus the PWE of an alternative is all-inclusive. It is the sum of the present worth of the capital expenditures minus the present worth of the net salvage, plus the present worth of operating costs and maintenance expenses plus the present worth of income taxes, including the effects of depreciation. *The PWE decision rule says that the most economical alternative of a set of competing alternatives is the one with the*

lowest PWE value at the current COM. By choosing the alternative with lowest PWE, a company can provide customer service at the least possible cost and still satisfy investors.

The NPV represents the opposite viewpoint—that is, it judges the efficient use of money in terms of maximizing the return to investors. The NPV of an alternative is the difference between the PWE of the STATUS QUO and the alternative, multiplied by 1 minus the composite tax rate. That is, the NPV for an alternative is the after-tax benefit of doing the alternative instead of doing nothing now (maintaining the STATUS QUO). A ***zero NPV*** indicates that the alternative has a long-range rate of return (the rate of operating cost reduction) equal to that for the STATUS QUO. A ***positive NPV*** indicates that the alternative has a long-range rate of return greater than that for the STATUS QUO; a ***negative NPV*** indicates that the alternative has a long-range rate of return less than that for the STATUS QUO. ***The NPV decision rule says that the most economical alternative of a set of competing alternatives is the one with the highest NPV at the COM.*** By choosing the alternative with the highest NPV, a company can satisfy investors and still provide good customer service. The PWE and NPV are therefore opposite sides of the same coin. They are related economically; in fact, the alternative with the highest positive NPV turns out to be the alternative with the lowest PWE.

The LTEE measures overall efficiency by providing LPIE2 users with a benefit-to-cost ratio derived from the net cash flows of each alternative. It does not show how much benefit may be obtained from implementing the alternative or how much the project would actually cost. The theoretical definition of LTEE is as follows. The LTEE is the ratio of the present worth of positive net cash flows to the present worth of negative net cash flows. Positive net cash flows result when, for a given point in time, the cash flow for the alternative is less than that for the STATUS QUO. Negative net cash flows result when the cash flow for the alternative is greater than that for the STATUS QUO. Thus the LTEE for each alternative is relative to the STATUS QUO. The STATUS QUO LTEE is automatically made equal to 1. If an alternative LTEE is greater than 1, the alternative is generating more than enough money to recover the investment and satisfy investors at the COM. ***The higher the LTEE ratio, the more efficient the project***; that is, the dollar benefits are significantly higher than the dollar costs. A company may establish ***a minimum benefit-to-cost ratio, using the Rehabilitation Budgeting (REBUD) program,*** a headquarters top-down budgeting program for maximizing the use of rehabilitation money. (The benefit-to-cost ratio in REBUD is the same as the CUCRIT LTEE.) An LTEE lower than the company minimum is not acceptable.

The Incremental LTEE (ILTEE) of an alternative indicates the additional benefit of implementing one alternative over another alternative. The ILTEE can be used to make an ordered list of various solution alternatives from different DAs that are competing for limited discretionary project money.

The various uses of the economic indicators in FAP decision making depend on whether the rehabilitation money is unlimited or limited. (See BR 936-400-003, ***Responsibilities of the Facility Analysis Plan (FAP) Engineer.***) In the case of ***unlimited funds,*** the alternative with the lowest PWE value and an acceptable LTEE would be considered the most cost-effective of the alternatives evaluated in a given LPIE2 run. If the STATUS QUO has the lowest PWE, then postponing rehabilitation (doing nothing now) would be the most cost-effective plan. In the

case of ***limited funds,*** the installed first cost and ILTEE value for given DAs in the district would be compared to select projects that would use the limited rehabilitation funds in the most effective way. The installed first cost and ILTEE are given in the DISCRETIONARY EXPENDITURES table on the LPIE2 Problem Analysis Summary (Figure 5-5).

C. Projection of Annual Activity Levels

Unfold Figure 5-6 at the end of this section for reference throughout the following discussion of the Projection of Annual Activity Levels report. This report provides data for tracking rehabilitated areas and identifying where actual post-improvement activity levels vary widely from projected levels. Thus it can be useful in FAP follow-up procedures. One version of the report is generated per run for each solution alternative in the Problem File. In the following description, the item numbers refer to the main features on Figure 5-6. (The features are labeled with corresponding numbers). Details are described under each feature.

1. Report number (3) and title (PROJECTION OF ANNUAL ACTIVITY LEVELS).
2. Standard LPIE2 format (see LPIE2 DA Input Summary, feature 2).
3. ALTERNATIVE—for the alternative named in the heading line, the following data:
   - ACTIVITY—a list of only those activities that actually occurred in the DA during the 12-month period preceding the study
   - CURRENT LEVEL—current activity levels (from the CURL data line, USER 2)
   - PROJECTED ANNUAL LEVELS OF ACTIVITIES—for the first five years of the study period, the estimated activity level per year, including post-improvement activity levels after the investment year (see IN-SERVICE DATE, feature 4, below)
   - ANNUAL OPERATING COST/PAIR—for the DA, as calculated by LPIE2, the annual operating cost per pair for the 12-month "current" period and for the first 5 years of the study period
   - TOTAL DA OPERATING COST—total costs of operating the DA, for the 12-month "current" period and for each of the first 5 years of the study period
   - SOURCE OF IMPROVEMENT ESTIMATES—either LPIE or USER (see LPIE2 Problem Analysis Summary, feature 3, ESTIMATES).
4. SUMMARY OF ALTERNATIVE—investment breakdown of the alternative, as follows:
   - INVESTMENT—the notation FIRST (and SECOND, when applicable), according to the INVT data line, USER 3
   - IN-SERVICE DATE—investment month and year (INVT data line, USER 3, fields 5 and 6)
   - COSTS—the C, X, M, and R costs of the investment.

D. LPIE2 User Overrides

Unfold Figure 5-7 at the end of this section for reference throughout the following discussion of the LPIE2 User Overrides. This report compares user estimates with those made by LPIE2. One version of the report is generated per run for each ***investment*** having user estimates on appropriate PIL1, PIL2, PIG1, and/or PIG2 data lines, USER 4. In the following description, the sequential item numbers refer to the main features on Figure 5-7, which are labeled with corresponding numbers. Details are described under each feature.

1. Report number (4) and title (LPIE2 USER OVERRIDES).
2. Standard LPIE2 format (see LPIE2 DA Input Summary, feature 2).
3. ALTERNATIVE—for the investment alternative named on this heading line, the ACTIVITY LEVELS AFTER [FIRST OR SECOND] INVESTMENT table contains the following:
   - ACTIVITY—a list of only the activities that actually occurred in the DA during the 12-month period preceding the study and were overridden by user estimates on USER 4
   - CURRENT LEVEL—current activity levels (CURL data line, USER 2)
   - USER ESTIMATED LEVEL—user estimates (PIL1 and PIL2 fields, USER 4)
   - LPIE ESTIMATED LEVEL—LPIE2 estimates, rounded to the nearest integer
   - USER ESTIMATED GROWTH—user estimates of the number of activities increasing per year (PIG1 and PIG2 fields, USER 4); a blank column indicates that no user estimates were entered. If a user estimate is entered, its value and the corresponding LPIE2-estimated value will be repeated under the STATUS QUO ACTIVITY LEVEL OVERRIDES (POST-IMPROVEMENT) heading at the bottom of the report.
   - LPIE ESTIMATED GROWTH—LPIE2 estimates, rounded to the nearest integer
   - ESTIMATE FOR YEAR—calendar year of the first year after the investment year.
4. STATUS QUO ACTIVITY LEVEL OVERRIDES—a table that appears only if a user has entered a growth rate override (on USER 2A, SQGR line) for one or more activities (found cable troubles or special studies only). If present, this table gives the pre-improvement and post-improvement values of the user-estimated and LPIE2-estimated growth for the user-selected activity or activities.

5.3 CUCRIT Reports Applicable to LPIE2

The CUCRIT reports applicable to LPIE2 will be generated according to the codes entered on the PRNT data line (USER 2). They are optional, intended mainly for those who prefer the CUCRIT format. A sample of each report is shown on the following pages, as listed here:

- CUCRIT Report Summary (Figure 5-8)
- CUCRIT Capital, Revenue and Expense Summary (Figures 5-9 and 5-10)
- CUCRIT Incremental Cash Flow Details (Figure 5-11)
- CUCRIT Executive Summary (Figure 5-12)
- CUCRIT DPS (Discretionary Project Selection) Output (Figure 5-13).

For further information on CUCRIT output, consult the latest issue of the *CUCRIT User Guide.*

```
XYZ COMPANY


  DEBT INTEREST RATE              =  .09
  DEBT RATIO                      =  .45
  LABOR TREND RATE                =  .10
  INTEREST DURING CONSTRUCTION    =  0
  DIVISION OF REVENUE             =  0
  STATE INCOME TAX RATE           =  .03
  YEARS IN INCOME STATEMENT       =  0
  LIFE OPTION CODE                =  2
  STATE INCOME TAX OPTION         =  1
  COST OF MONEY                   =  .145
  INVESTMENT TAX CREDIT RATE      =  .10
  FEDERAL INCOME TAX RATE         =  .47
  NORMALIZATION OPTION            =  0


  ACCOUNT CODE                      242-22          242-45


  CAPITAL TREND RATE              =  .09            .09
  ADR GUIDELINE LIFE              =  23             30
  TAX / BOOK  RATIO               =  1              1
  AVERAGE SERVICE LIFE            =  23             30
  AVERAGE GROSS SALVAGE           =  0              0
  AVERAGE COST OF REMOVAL         =  0              0
  ADR CLASS CODE                  =  0              0



AREA 1


  LST = 28.23          RE  = 36.59          7A  =  127.62
  WOL = 70.03          RTC = 16.49          7B  =  74.80
  BCT =  7.72          SOD =  28.63         8-9 =  177.54
  CDP = 75.68          ODF =  67.17         CPT =  13.62
  BPC = 19.48          OAC =  33.76         VFP = 31.25
  CIR = 86.05          1-6 =  177.54


  SPECIAL STUDIES :


  PCV        =    25.23
```

Figure 5-1. Sample HQ File Formatted Listing

```
*
*
*    ****   *   ***
*    *   *  *   **      LOOP PLANT IMPROVEMENT EVALUATOR
********   *   ***
     *
     *
```

****
* REHABILITATION INPUT SUMMARY *
****

REMARK	SEC#	LIFE	$C	$X	$M	$R	1-6	7A	7B	8-9	CODES
REHB:PLACE	4	N	400	0	120	0	0	0	0	0	P1 I1 U1
REHB:REINF	7	N	516	0	1100	0	0	0	0	0	I1 U1
REHB:REPLC	8	N	1611	126	1100	0	1	0	0	0	I1 U1
REHB:PLACE	8	N	200	0	120	0	0	0	0	0	I1 U1
REHB:REPLC	9	N	1364	325	0	0	3	0	0	1	P1 I1 U1
REHB:PLACE	9	N	1000	0	450	0	0	0	0	0	P1 I1 U1
REHB:REBLD	10	21	0	0	960	0	0	0	2	0	P1 I1 U1
REHB:REPLC	11	N	332	64	0	0	0	0	0	0	P1 I1 U1
REHB:REINF	12	N	226	0	275	0	0	0	0	0	U1
REHB:REPLC	13	N	796	115	550	0	0	0	0	0	I1 U1
REHB:PLACE	13	N	400	0	180	0	0	0	0	0	I1 U1
REHB:REINF	14	N	90	0	275	0	0	0	0	0	U1
REHB:REBLD	16	17	0	0	450	0	0	0	2	0	P1 I1 U1
REHB:REPLC	17	N	442	65	550	0	0	0	0	0	I1 U1
REHB:PLACE	17	N	200	0	120	0	0	0	1	0	I1 U1
REHB:REPLC	18	N	2703	0	0	0	3	0	0	0	P1 I1 U1
REHB:PLACE	18	N	600	0	300	0	0	0	1	0	P1 I1 U1
REHB:REBLD	19	17	0	0	390	0	0	0	2	0	P1 I1 U1
REHB:REPLC	20	N	328	47	275	0	0	0	0	0	I1 U1
REHB:REPLC	20	N	328	47	275	0	0	0	0	0	I1 U1
RRHB:REPLC	21	N	394	88	0	0	0	0	0	1	P1 I1 U1
REHB:PLACE	21	N	400	0	210	0	0	1	0	0	P1 I1 U1
REHB:REBLD	22	14	0	0	360	0	0	1	1	0	P1 I1 U1
REHB:REINF	23	N	444	0	275	0	0	0	0	0	I1 U1
REHB:REBLD	24	14	0	0	450	0	0	1	2	0	P1 I1 U1
REHB:REINF	24	N	213	0	275	0	0	0	0	0	U1
REHB:STUBS	25	7	650	0	0	0	2	0	0	0	P1 I1
REHB:REBLD	25	7	0	0	420	0	0	0	1	0	P1 I1
REHB:REPLC	25	N	1209	176	275	0	2	0	0	0	U1
REHB:PLACE	25	N	800	0	510	0	0	1	0	0	U1
REHB:REPLC	26	N	2499	191	1100	0	0	0	0	0	I1 U1
REHB:PLACE	26	N	800	0	240	0	0	0	0	0	I1 U1
REHB:REINF	29	N	1251	0	1100	0	0	0	0	0	U1
REHB:REINF	30	N	1330	0	0	0	0	0	0	0	I1 U1
REHB:PLACE	30	N	145	0	0	0	0	0	0	0	I1 U1
REHB:PLACE	30	N	200	0	60	0	0	0	0	0	I1 U1
REHB:INT	0	N	1800	0	4400	0	0	0	0	0	I1 U1
REHB:STUBS	0	N	3550	0	0	0	0	0	0	0	I1 U1

Figure 5-2. Sample Rehabilitation Input Summary

****
* REHABILITATION CALCULATED COST SUMMARY *
****

REINFORCE REPLACE OR REBUILD INVESTMENT COSTS

CODE	C	X	M	R
P1	7736	580	1355	0
I1	23197	1124	11485	0
U1	26986	1300	14195	0

RENOVATION COSTS

CODE	C	X	M	R	LIFE
P1	650	0	3030	0	11
I1	650	0	3030	0	11
U1	0	0	2610	0	17

CABLE TROUBLES ELIMINATED

CODE	1-6	7A	7B	8-9
P1	10	3	11	2
I1	11	3	12	2
U1	11	4	11	2

NOTE: TOTAL INVESTMENT COST IS THE SUM OF REINFORCE, REPLACE, OR REBUILD COST PLUS RENOVATION COST.

Figure 5-3. Sample Rehabilitation Calculated Cost Summary

```
1                  *
                   *
                   *    ****   *   ***
                   *    *  *   *   **      LOOP PLANT IMPROVEMENT EVALUATOR
                   ********   *   ***
                        *
                        *


                   ****************************
                   *1. LPIE2 DA INPUT SUMMARY *
                   ****************************

2                            OCT 10,  1984

      LARUE WIRE CENTER - DA 2104

              WC: LARUE                    STUDY BEGINS: JAN,  1984
             EAA: 2110                     HQ   FILE   : HQFILE1
              DA: 2104                     PROB FILE   : LARUE1

3                        PROBLEM DATA SUMMARY
                         --------------------

        AVAIL FDR PAIRS =      600     PAIR GROWTH =       28
        DIST. TO C.O.   =     0.10     DIST PAIRS  =      500
        PLANT TYPE      = AER PULP     ASGN PAIRS  =      346
        % ULT           =       12     DEF PAIRS   =       12

4                        ACTIVITY SUMMARY
                         ----------------

                    HEADQUARTERS      USER
          ACTIVITY    ESTIMATED    ESTIMATED     CURRENT
                         COST         COST       LEVEL

             LST         28.23                      9
             WOL         70.03                      1
             BCT          7.72                      5
             CDP         75.68                      5
             BPC         19.48                      0
             CIR         86.05                      0
              RE         36.59                      4
             RTC         16.49                     10
             SOD         28.63                      4
             ODF         67.17                      4
             OAC         33.76                      3
             1-6        177.54          500.00     12
              7A        127.62                      4
              7B         74.80                     12
             8-9        177.54                      3
```

Figure 5-4. Sample LPIE2 DA Input Summary

1

```
**************************************
*2. LPIE2 PROBLEM ANALYSIS SUMMARY *
**************************************
```

OCT 10, 1984

2

LARUE WIRE CENTER - DA 2104

WC: LARUE
EAA: 2110
DA: 2104

STUDY BEGINS: JAN, 1984
HQ FILE : HQFILE1
PROB FILE : LARUE1

3

ECONOMIC EVALUATORS

ALTERNATIVE	ESTIMATES	PWE	LTEE (RELATIVE TO STATUS QUO)	NPV (RELATIVE TO STATUS QUO)
SAC C AND REHAB	LPIE	88234.	1.32	13640.
SAC B AND REHAB	LPIE	88291.	1.29	13611.
REHAB ONLY	LPIE	90278.	1.75	12589.
STATUS QUO		114766.	1.00	0.

4

DISCRETIONARY EXPENDITURES

ALTERNATIVE	TOTAL INSTALLED FIRST COST (IN 1984 DOLLARS) C	X	M	R	INCREMENTAL LTEE
REHAB ONLY	8386.	580.	4385.	0.	1.75
SAC C AND REHAB	23847.	1124.	14515.	0.	1.04
SAC B AND REHAB	26986.	1300.	16805.	0.	0.0

5

NONDISCRETIONARY EXPENDITURES

C	X	M	R
0	0	0	0

6

JUN 1984
STATUS QUO NONDISCRETIONARY EXPENDITURES

C	X	M	R
0	0	0	500

7

END OF STUDY YEAR 1989

8

-- OPERATING COST FOR ONE OR MORE ACTIVITIES
IN THIS STUDY PROVIDED BY USER --

9

USER PROVIDED ACTIVITY GROWTH LEVELS USED
FOR STATUS QUO AND PRE-IMPROVEMENT

Figure 5-5. Sample LPIE2 Problem Analysis Summary

1

```
*****************************************
*3. PROJECTION OF ANNUAL ACTIVITY LEVELS *
*****************************************
```

2

OCT 10, 1984

LARUE WIRE CENTER - DA 2104

WC: LARUE
EAA: 2110
DA: 2104

STUDY BEGINS: JAN, 1984
HQ FILE : HQFILE1
PROB FILE : LARUE1

3

ALTERNATIVE : SAC B AND REHAB

ACTIVITY	CURRENT LEVEL	PROJECTED ANNUAL LEVELS OF ACTIVITIES 1984	1985	1986	1987	1988
LST	9	10.	8.	0.	0.	0.
WOL	1	1.	1.	0.	0.	0.
BCT	5	5.	4.	0.	0.	0.
CDP	5	5.	4.	0.	0.	0.
RE	4	4.	4.	0.	0.	0.
RTC	10	11.	9.	0.	0.	0.
SOD	4	4.	3.	0.	0.	0.
ODF	4	4.	4.	0.	0.	0.
OAC	3	3.	3.	0.	0.	0.
1-6	12	14.	13.	2.	2.	2.
7A	4	4.	4.	0.	0.	0.
7B	12	13.	11.	1.	1.	1.
8-9	3	3.	3.	1.	1.	2.
ANNUAL OPERATING COST/PAIR	$ 27.39	28.98	23.56	3.00	2.90	2.80
TOTAL DA OPERATING COST	$ 9478.	10839.	9473.	1290.	1327.	1363.

SOURCE OF IMPROVEMENT ESTIMATES : USER

4

SUMMARY OF ALTERNATIVE

INVESTMENT	IN-SERVICE DATE	COSTS C	X	M	R
FIRST	SEP 1985	26986.	1300.	16805.	0.

Figure 5-6. Sample Projection of Annual Activity Levels

1

```
**************************
*4. LPIE2 USER OVERRIDES *
**************************

                OCT 10,  1984
```

2

```
LARUE WIRE CENTER - DA 2104

        WC: LARUE                STUDY BEGINS: JAN,  1984
       EAA: 2110                 HQ   FILE   : HQFILE1
        DA: 2104                 PROB FILE   : LARUE1
```

3

ALTERNATIVE: SAC B AND REHAB
ACTIVITY LEVELS AFTER FIRST INVESTMENT

ACTIVITY	CURRENT LEVEL	USER ESTIMATED LEVEL	LPIE ESTIMATED LEVEL	USER ESTIMATED GROWTH (ACTIVITY/YR)	LPIE ESTIMATED GROWTH (ACTIVITY/YR)
RTC	10	0	1.	0	0.04
SOD	4	0	0.		0.17
ODF	4		0.	0	0.17
1-6	12		2.	1.14	0.55
7A	4		0.	0	0.17
7B	12		1.	0	0.04

```
ESTIMATE FOR YEAR;   1986
```

4

* STATUS QUO ACTIVITY LEVEL OVERRIDES *

	(PRE-IMPROVEMENT)		(POST-IMPROVEMENT)	
ACTIVITY	USER ESTIMATED GROWTH (ACTVTY/YR)	LPIE2 ESTIMATED GROWTH (ACTVTY/YR)	USER ESTIMATED GROWTH (ACTVTY/YR)	LPIE2 ESTIMATED GROWTH (ACTVTY/YR)
1-6	1.52	0.93	1.14	0.55

Figure 5-7. Sample LPIE2 User Overrides

```
10/18/84  11:40 ET     CAPITAL UTILIZATION CRITERIA   VERSION 3.4013  PAGE 1
                       ------- ----------- --------

      LPIE2 STUDY

                              ********************
                              * REPORT SUMMARY *
                              ********************

STUDY:                    LARUE WIRE CENTER - DA 2104

PLAN:                     SAC B AND REHAB VS. LPIE2 STATUS QUO

                          REHAB ONLY       ($000)    LPIE2 STATUS QUO ($000)
                          ----------------------     ----------------------
     PW FC                          38564.6                      36306.5
     PW EXP                         39995.4                      70412.4
     PW REV                             0.0                          0.0

     PW END OF STUDY EFFECT           289.8                        458.1

     NPV                           -44681.7                     -59001.3
     NPWE                           86912.4                     114766.1


               INCREMENTAL CASH FLOW LONG TERM EVALUATORS

     LONG TERM RATE OF RETURN                                      28.8%
                                                              FOR 11 YEARS ***
     NPV ($000)                                                  14319.6
     NPWE ($000)                                                -27853.7
     DPP (YRS)                                                      4.0
     LTEE                                                           1.305

                              STUDY PARAMETERS


     PRESENT WORTH YEAR      1984          TREND BASE DATE        1/1984
     LENGTH OF STUDY         60 YEARS      COST OF MONEY          14.50%
     LIFE OPTION             COMBINATION

*** FOR THE YEARS THAT THE STUDY DOES NOT EARN ITS
 MODIFIED RATE OF RETURN, IT WAS ASSUMED TO BE A SOURCE OF
 FUNDS TO THE CORPORATION AND THOSE FUNDS WERE SUPPLIED
 AT A 14.50% COST OF MONEY.
```

Figure 5-8. Sample CUCRIT Report Summary

```
10/18/84    09:50 ET      CAPITAL UTILIZATION CRITERIA    VERSION 3.4013  PAGE  1
                          ------- ----------- --------

      LPIE2 STUDY

                     ****************************************
                     * CAPITAL, REVENUE AND EXPENSE SUMMARY *
                     ****************************************

STUDY:                    LARUE WIRE CENTER - DA 2104

PLAN:                           SAC B AND REHAB

                                 NON-DISCOUNTED

       YEAR             CAPITAL             EXPENSES             REVENUES
       ----             -------             --------             --------

       1984                                  10623.8
       1985             32629.1              28698.8
       1986                                   1052.4
       1987                                   1170.8
       1988                                   1302.3
        *
       2002             13544.1               1529.0
        *
       2008            236813.6             139815.2
        *
       2025             98300.0              13690.6
        *
       2031           1718736.0            1251932.0
        *
```

Figure 5-9. Sample CUCRIT Capital, Revenue, and Expense Summary (for an alternative)

```
10/18/84    09:50 ET      CAPITAL UTILIZATION CRITERIA    VERSION 3.4013  PAGE  1
                          ------- ----------- --------

     LPIE2 STUDY

                    ****************************************
                    * CAPITAL, REVENUE AND EXPENSE SUMMARY *
                    ****************************************

STUDY:                    LARUE WIRE CENTER - DA 2104

PLAN:                          LPIE2 STATUS QUO

                                NON-DISCOUNTED

      YEAR            CAPITAL            EXPENSES            REVENUES
      ----            -------            --------            --------

      1984                                11123.8
      1985                                13154.0
      1986                                16084.1
      1987                                19468.5
      1988            43754.7             44554.5
        *
      2011           317560.6            189698.9
        *
      2034          2304778.0           1698601.0
        *
```

Figure 5-10. Sample CUCRIT Capital, Revenue, and Expense Summary (for the STATUS QUO)

10/18/84 10:00 ET CAPITAL UTILIZATION CRITERIA VERSION 3.4013 PAGE 1

LPIE2 STUDY

****
* INCREMENTAL CASH FLOW DETAILS *
****

STUDY: LARUE WIRE CENTER - DA 2104

PLAN: SAC B AND REHAB VS. LPIE2 STATUS QUO

TIME POINT	TOT. REV.	CASH FLOW EXP.	FIT PAID	OTHER TAXES	NET SALVAGE	FIRST COST	NET CASH FLOW
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	-500.0	227.9	15.0	0.0	29812.7	-29555.6
2	0.0	15544.8	-11472.8	-54.7	0.0	0.0	-4017.3
3	0.0	-15031.6	4671.9	836.7	0.0	0.0	9523.0
4	0.0	-18297.7	6319.9	992.7	0.0	-43754.7	54739.8
5	0.0	-43252.3	23981.6	1919.0	0.0	0.0	17351.6
6	0.0	0.0	1173.8	77.2	0.0	0.0	-1251.0
7	0.0	0.0	962.5	63.3	0.0	0.0	-1025.9
8	0.0	0.0	896.3	59.0	0.0	0.0	-955.3
9	0.0	0.0	689.8	45.4	0.0	0.0	-735.2
10	0.0	0.0	676.4	44.5	0.0	0.0	-721.0
11	0.0	0.0	473.6	31.2	0.0	0.0	-504.8
[illegible]	0.0	[illegible]	[illegible]	30.5	[illegible]	[illegible]	[illegible] 5
56	[illegible]	0.0	32686.7	2150.9	0.0	0.0	[illegible]
57	0.0	0.0	24641.5	1621.5	0.0	0.0	-26263.0
58	0.0	0.0	24170.2	1590.5	0.0	0.0	-25760.6
59	0.0	0.0	23698.7	1559.5	0.0	0.0	-25258.2
60	0.0	0.0	23227.5	1528.5	-568012.9	0.0	-592768.2

TIME PT. 0 CORRESPONDS TO 1/1/1984.

*NET SALVAGE CONTAINS AN END OF STUDY EFFECT OF -568012.9

CUMULATIVE DISCOUNTED NET CASH FLOW

TIME POINT	0	1	2	3	4	5
CASH FLOW	0.0	-25812.8	-28877.0	-22533.1	9314.9	18131.7
TIME POINT	6	7	8	9	10	11
CASH FLOW	17576.5	17178.9	16855.6	16638.2	16452.1	16338.2
TIME POINT	12	13	14	15	16	17
CASH FLOW	16240.8	16157.5	16086.3	16025.5	15973.5	15838.7
TIME POINT	18	19	20	21	22	23
CASH FLOW	14641.9	14617.1	14670.9	14713.5	14746.9	14772.8

Figure 5-11. Sample CUCRIT Incremental Cash Flow Details (portion)

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LPIE2 STUDY

****
* EXECUTIVE SUMMARY *
****

STUDY: LARUE WIRE CENTER - DA 2104

PLAN: SAC B AND REHAB VS. LPIE2 STATUS QUO

NET PW EXPENDITURES

SAC B AND REHAB	86912.4
LPIE2 STATUS QUO	114766.1

NON-DISCOUNTED INPUT SUMMARY

	SAC B AND REHAB	LPIE2 STATUS QUO
CAPITAL REQTS.	2100022.0	2666093.0
EXPENSE REQTS.	1449814.0	1992684.0
CO. REVENUES	0.0	0.0

INCREMENTAL INCOME AND CAPITAL SHORT TERM EVALUATORS

YEAR	NET INCOME	NET AVG. INVEST.	RETURN ON NET AVG. INVEST. (%)
1984	257.1	0.0	++ 0.0
1985	-8559.4	10190.7	-79.8
1986	6240.0	27450.9	26.9
1987	7939.0	25398.1	35.5
1988	22966.6	-16929.6	++ 0.0

INCREMENTAL CASH FLOW LONG TERM & RISK EVALUATORS

LONG TERM RATE OF RETURN	28.8% FOR 11 YEARS ***
NET PRESENT VALUE ($000)	14319.6
NET PW EXPENDITURES ($000)	-27853.7
DISCOUNTED PAYBACK (YRS.)	4.0
LONG TERM ECONOMIC EVALUATOR	1.305

PRESENT WORTH YEAR	1984	TREND BASE DATE	1/1984
STUDY PERIOD	60 YEARS	END OF STUDY	YES
LIFE OPTION	COMBINATION	COST OF MONEY	14.50%

CUCRIT IS NORMALLY USED TO PERFORM AN EVALUATION BASED UPON THE CAPITAL, EXPENSE AND REVENUE DIFFERENCES BETWEEN TWO PLANS. IN SUCH A CASE, THE EVALUATORS WHICH THE PROGRAM GENERATES DESCRIBE ONLY THE ECONOMIC WORTH OF THE DIFFERENCES IN CAPITAL, EXPENSE AND/OR REVENUES BETWEEN THE PLANS, AND ARE NOT ATTRIBUTABLE TO EITHER PLAN INDIVIDUALLY.

** FOR THE YEARS THAT THE STUDY DOES NOT EARN ITS MODIFIED RATE OF RETURN, IT WAS ASSUMED TO BE A SOURCE OF FUNDS TO THE CORPORATION AND THOSE FUNDS WERE SUPPLIED AT A 14.50% COST OF MONEY.

++ THE RETURN ON NET AVERAGE CAPITAL INVESTMENT IS NOT SHOWN SINCE THE NET AVERAGE INVESTMENT IS LESS THAN OR EQUAL TO ZERO.

Figure 5-12. Sample CUCRIT Executive Summary

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LPIE2 STUDY

****
* DPS OUTPUT *
****

STUDY: LARUE WIRE CENTER - DA 2104

PLAN: SAC B AND REHAB VS. LPIE2 STATUS QUO

FINANCIAL DATA ($000)
(INCREMENTAL TO THE BASE PLAN)

YEAR	1984	1985	1986	1987	1988
TOTAL REVENUE	0.0	0.0	0.0	0.0	0.0
RECURRING EXP	-500.0	15544.8	-15031.6	-18297.7	-43252.3
ONE TIME EXP	0.0	0.0	0.0	0.0	0.0
DEPRECIATION	0.0	472.9	1418.7	1418.7	-483.7
TOTAL TAXES	242.9	-7886.2	6218.1	7871.4	21552.8
TOTAL INCOME	257.1	-8131.5	7394.9	9007.6	22183.2
DEBT INTEREST	0.0	427.9	1154.9	1068.7	-783.5
NET INCOME	257.1	-8559.4	6240.0	7939.0	22966.6
NET AVG. INV.	0.0	10190.7	27450.9	25398.1	-16929.6
DISCR CAPITAL	0.0	32629.1	0.0	0.0	-43754.7
TOTAL CAPITAL	0.0	32629.1	0.0	0.0	0.0

ECONOMIC DATA
(INCREMENTAL TO THE BASE PLAN)

TIME POINT ZERO IS	1984
NET PRESENT VALUE ($000)	14319.6
PRESENT WORTH NET CASH COSTS ($000)	46936.1
LONG TERM ECONOMIC EVALUATOR	1.305

NET CASH FLOWS ($000)
(INCREMENTAL TO THE BASE PLAN)

TP	0	1	2	3	4	5	6
CF	0.0	-29555.6	-4017.3	9523.0	54739.8	17351.5	-1251.0
TP	7	8	9	10	11	12	13
CF	-1025.9	-955.3	-735.2	-721.0	-504.8	-494.5	-484.3
TP	14	15	16	17	18	19	20
CF	-474.1	-463.8	-453.6	-1347.1	-13694.1	-323.7	807.0

Figure 5-13. Sample CUCRIT Discretionary Project Selection (DPS) Output

6 Reworking an LPIE2 Study

You may find it productive for a variety of reasons to rework a study and rerun LPIE2. You may have decided to defer optional input until after the initial run. You may have questions about the DA data such as "What if my growth rate is other than I've indicated?" and wish to make a sensitivity analysis. (A sensitivity analysis is the process of examining the effect of different annual pair growth rates and investment timing on the DA exhaust time and the end-of-study year.) You may not be satisfied with the initial output reports and wish to refine the solution alternatives. For these and other reasons, the initial LPIE2 run may be regarded as a ***trial*** run, not necessarily conclusive. This section presents some general guidelines for reworking an LPIE2 study and discusses some common cases as illustrations. To resolve the question of whether reworking a particular study is necessary, you will have to use your best judgment.

6.1 Guidelines for Reworking a Study

Reworking a study requires alteration of the original Problem File in the computer after the initial run. You can work out additions, deletions, and changes on a new set of input worksheets, or you can edit the original set. Rehabilitation data can be revised by eliminating or upgrading treatments on the REHB data lines (USER 1A) or adjusting alternative-investment costs on the SUMMARY INPUT (USER 1B). Distribution area data (USER 2) can be augmented by adding special-study and non-discretionary investment data to the file. You can override the LPIE2-calculated end-of-study year if necessary. The optional OPTN data line is the vehicle for these data.

You can also use USER 2A inputs to make any of three changes: to override the LPIE2-estimated Status Quo activity level growth rate for found cable troubles and special studies (SQGR data line), to override the cost of one or more operational cost factors (CSTE data line), or to examine the effects of a Status Quo non-discretionary investment in a rehabilitation study (SQND data line).

Alternative data (USER 3) can be revised by redistributing treatments to develop new alternatives or by subdividing existing alternatives into two phased investments. Investment timing may also be changed. You may want to override LPIE2 and enter your own post-improvement estimates of activity levels and activity growth (USER 4).

Rerunning LPIE2 follows the same procedure given in Section 4, including accessing the computer through RDES and running the user Data Check on a reworked Problem File. If you are making relatively few changes and additions to a file, you can copy the original (or previous) file and edit the duplicate, using RDES Editor commands. You will need to give the edited file a file name different from that of the original (or previous) file. If, however, you are making major changes and additions, it may be easier to enter a completely new file. You will also want to revise the problem identification (IDEN data line, USER 2) to reflect the reworked study.

6.2 Illustrative Cases

Case 1. Facility Testing and Inspection Follow-Up

The Rehabilitation Guidelines method requires cables that are not replaced to be tested after the initial LPIE2 run. Testing may reveal that some buried air core cables, presumed to be "good," contain water. These cables should be either reclaimed (renovated) or replaced, whichever is more economical. Terminals that are renovated should also be inspected after the initial run; for the initial run, all proposed terminal treatments are limited to rebuilding. Inspection may reveal some terminals in fair or good condition so that treatments more suitable than rebuilding, either converting or refurbishing, may be considered. In addition, Maintenance Center analysis may point to sections of cable or to terminals with high not-found trouble counts that should be inspected. Thus the results of testing and inspection may change the rehabilitation data in the study.

Additional cable treatments require new REHB data lines (USER 1A) to be entered in the Problem File. Follow the input procedures described in Subsection 3.2. Lesser terminal treatments (other than rebuilding) require revision of existing REHB data lines where applicable. Use RDES Editor commands, as described in the *Generic RDES User Guide*. In reworking a Problem File, keep in mind that the sequence of LPIE2 data lines is not crucial. Thus you can add new REHB data lines at the end of the file. You can check the accuracy of data on the REHB data lines by obtaining a formatted listing through the REHBLIST option, as discussed in Section 4, Step 4-4. You can also review rehabilitation costs by requesting a Rehabilitation Calculated Cost Summary under the STUDY run option (Section 4, Step 4-2).

On the output, revised rehabilitation costs will be reflected on the LPIE2 Problem Analysis Summary report, in the ECONOMIC EVALUATORS and DISCRETIONARY EXPENDITURES tables.

Case 2. End-of-Study Year Calculations

The following discussion amplifies the input procedure for the optional "study duration" entry (Subsection 3.4, step 11—USER 2, OPTN data line, field 1.) This entry can be used to override the LPIE2 calculation of the end-of-study year. Unfold Figure 6-1 for reference throughout the following discussion.

The LPIE2 study period begins in January of the "study year" and runs through the end-of-study year; the maximum is 20 years. The "study year" is a mandatory entry, specified by the user within the range 1975 through 2000 on the STDY data line, field 1 (USER 2). The sample STDY data line (Figure 6-1) gives 1984 as the study year. On all LPIE2 output reports, the study year is given in the standard format below the report title as STUDY BEGINS, e.g., JAN, 1984. The study year is used to calculate the end-of-study year, whether LPIE2 calculates it or the user overrides LPIE2.

LPIE2-Calculated End-of-Study Year

LPIE2 automatically calculates the end-of-study year as study year plus DA exhaust time (the number of years until the backbone distribution cable is

exhausted). The calculation uses fill data on the STDY data line—specifically, the number of available distribution pairs (field 4), of assigned pairs (field 6), of defective pairs (field 7), and the annual pair growth (field 3). DA exhaust time (in years) is the number of distribution pairs minus the sum of assigned and defective pairs, divided by the annual pair growth. The DA exhaust time (call it T years) added to the study year gives the end-of-study year as calculated by LPIE2:

End-of-study year = Study year + T

On the output, the end-of-study year is the last item on the LPIE2 Problem Analysis Summary, unless CSTE or SQGR override data have been entered. If either or both of these types of data have been entered, notations follow the END OF STUDY YEAR item.

For example (Figure 6-1, top), the STDY data line specifies 1984 as the study year (field 1), 500 distribution pairs (field 4), 346 assigned pairs (field 6), 12 defective pairs (field 7), and an annual pair growth of 28 pairs (field 3). The DA exhaust time (T) would be calculated as 500 minus 358, divided by 28, producing 5.07, which is rounded to 5. The end-of-study year would be 1984 plus 5, or 1989, as shown.

User-Estimated End-of-Study Year

The user can override the LPIE2-calculated end-of-study year by entering the OPTN data line (USER 2) in the Problem File, with some value in the "study duration" field (field 1). The study duration is the number of years until DA exhaust, estimated by the user. Given an OPTN data line in the file, the end-of-study year would be calculated as study year plus study duration:

End-of-study year (user estimated) = Study year + Study duration

On the output, the end-of-study year is again the last item on the LPIE2 Problem Analysis Summary unless followed by CSTE or SQGR data notations; however, it is marked USER ESTIMATED.

For example (Figure 6-1, bottom), the STDY data line is as before, and the OPTN data line has a study duration entry of 10 years (field 1). The end-of-study year is now calculated as 1984 plus 10, or 1994, which overrides 1989. The end-of-study year on the LPIE2 Problem Analysis Summary is 1994 (USER ESTIMATED).

When would you override the LPIE2-calculated end-of-study year? Ordinarily, you would not need to use the OPTN data line override since the LPIE2 calculation, based on fill data, adequately reflects the DA being studied. You may need to use the override, however, if the backbone distribution cable consists of two or three legs, one of which is expected to exhaust before the other(s).

A strong need to override the LPIE2-calculated end-of-study year can arise in the following way. You may have entered an investment year (INVT data line, field 6, USER 3) *later* than the end-of-study year. Since LPIE2 assumes that an investment must be made during the study period (i.e., between the study year and the end-of-study year), you will get a fatal-error message. To correct the error, you can move the investment year forward (if the discretionary investment cannot be

held off past the LPIE2 end-of-study date) or move the end-of-study year back (if the investments can be delayed). To move the investment year, change the entry on the INVT data line. To move the end-of-study year, override it on the OPTN data line as described above.

Note

The annual pair growth (STDY data line, field 3, USER 2) is used by LPIE2 to calculate DA exhaust time (T), hence the end-of-study year, as explained above. A smaller growth factor may lengthen T, or a larger growth factor may shorten T, given constant values for the other fill data. If you question the annual pair growth value as entered in a Problem File, you may want to rerun LPIE2 with a smaller (or larger) value, for a sensitivity analysis. Also, you can override growth rates for selected found cable troubles and/or special studies to obtain more data for analysis (SQGR data line, USER 2A).

Case 3. Non-Discretionary Investments

Non-discretionary investments may be included in a Problem File, as part of the DA data (USER 2). These data are optional, and all except SQND data are best deferred until after the initial run. (SQND data would most likely be entered for the initial run.) Unfold Figure 6-2 for reference during this discussion of Case 3.

Enter the OPTN data line with total C, X, M, and R costs (as applicable) over all non-discretionary projects, fields 2 through 5 respectively. The input specifications are given in Subsection 3.4, Step 12. The LPIE2 Problem Analysis Summary always includes a NONDISCRETIONARY EXPENDITURES table. The table will show all zeros if the OPTN data line is not in the file (or if fields 2 through 5 are blank), as in Figure 6-2 (top portion).

If non-discretionary investments ***are*** included in a Problem File, they will be indicated on the NONDISCRETIONARY EXPENDITURES table, e.g., 2000 (C cost), 100 (M cost), and 150 (R cost). (See Figure 6-2, bottom portion.) Given such values, LPIE2 makes the non-discretionary investments for the STATUS QUO and for each solution alternative in the first year of the study. If optional SQND data have been entered, a similar output will be given in a STATUS QUO NONDISCRETIONARY EXPENDITURES table, along with the date of the expenditures. The economic effects are shown in the ECONOMIC EVALUATORS table on the LPIE2 Problem Analysis Summary (Figure 6-2, bottom). The increase in total cost due to non-discretionary investment would increase the PWE for all solution alternatives ***and*** the STATUS QUO; however, the increase in total cost due to an SQND input would increase the PWE for the STATUS QUO only. (The PWE is not incremental to the STATUS QUO.) The inclusion of any non-discretionary investments (other than SQND) has no effect on the NPV, LTEE, and ILTEE.

Case 4. Special Studies

Special-study data may be included in a Problem File as part of the DA data (USER 2 input form). These data are optional, and are best deferred until after the initial run. Unfold Figure 6-3 for reference throughout the following discussion. Note that Figure 6-3 has two examples for comparison: one without a special study (left side of foldout) and one with a special study (right side of foldout).

Enter data for up to three special studies on the OPTN data line (USER 2): the special-study name (fields 6, 8, and 10) and current activity level (fields 7, 9, and 11). The input specifications are given in Subsection 3.4, Step 13. Any special-study name you enter must agree with a name in the HQ File (which also gives its unit cost, i.e., cost factor). You can review the HQ File Formatted Listing by using the HQLIST run option as described in Section 4. (An example of an HQ File Formatted Listing is given in Section 5; see Figure 5-1.)

For example (Figure 6-3), your District is investigating how many installer visits are made in certain areas. The special-study name and cost factor should already be in the HQ File. On the OPTN data line, you need to enter both the name (PCV) and the current activity level (10). You must also enter post-improvement activity levels and annual activity growth (USER 4). If you wish, you can override the activity level for a particular special study by entering data on the SQGR data line (USER 2A).

On the output, special-study data will appear in the LPIE2 DA Input Summary and in the Projection of Annual Activity Levels report for each solution alternative. On the LPIE2 DA Input Summary, the special-study activity name, Headquarters-estimated cost (cost factor), user-estimated cost, and current level of activity are shown at the end of the ACTIVITY SUMMARY table (Figure 6-3, top). On each Projection of Annual Activity Levels report, the ALTERNATIVE table (Figure 6-3, bottom) lists the special-study name (ACTIVITY column) and its current level. The projected annual levels of activities are taken from the post-improvement overrides you entered on USER 4. (Since LPIE2 has no models for special-study activities, you must provide post-improvement activity levels and annual activity growth on USER 4 if you include special activity data on the OPTN data line.) The operating costs on each Projection of Annual Activity Levels report will reflect special-study data in the Problem File. The current level of the annual operating cost per pair and of the total DA operating cost will be higher than on the initial run. The projected annual operating costs will vary according to your post-improvement estimates.

Case 5. Making Second Investments

One way to refine a solution alternative after the initial run is to subdivide it into two alternative-investments such that the second investment is clearly later than the first and a given treatment is part of one (and only one) of the two investments. For example, a first investment might call for placing an interface now (e.g., 1985); the second investment might call for upgrading the cable legs later (e.g., 1986).

The solution alternative data (USER 3, discussed in Subsection 3.5) must be changed to reflect the subdivision of investment, in particular the INVT data line. The existing INVT data line must be edited to describe the first investment (rather

than the entire alternative). The second INVT data line (USER 3) must be filled out and entered in the file to describe the second investment. (The existing ALTN data line describing the solution alternative can be left as is.) On the INVT data lines, each field must be carefully specified to distinguish the two alternative-investments (LARUE1 and LARUE3, Figure 6-4). Examples of the INVT fields are given at the top of Figure 6-4; a general discussion of each field for the two investments is given below.

- Field 1, Alternative-investment code. For the first investment, the code should end in 1 (e.g., P1, I1, U1). For the second investment, the code should end in 2 (e.g., P2, I2, U2).
- Field 2, Interface placed? (Y or N). The interface can be placed as part of one and only one of the two investments. (It need not be the first investment.)
- Field 3, Post-improvement ultimate plant (%). Use Table 3-7 (Subsection 3.5, District USER 3 Input) to assign a percent. In using the table, consider whether an interface will exist after the investment is completed, that is, after the plant is improved under this investment. The issue is not whether this investment includes an interface—an interface may already exist or may be placed by the other investment.
- Field 4, Distribution pairs after investment. Refer to the input specifications in Subsection 3.5. The number of distribution pairs may be the same for both investments.
- Fields 5 and 6, Investment month and investment year. Investment timing is a critical issue. The second investment must be later than the first, as already discussed. Consider also the investment timing in relation to the study year. If the first investment year is "much later" than the study year, the plant may incur increasingly higher-than-current operating costs for several years before either improvement can take effect. On the other hand, early placement of an interface, for example, can stabilize the plant so that upgrading the cable legs (second investment) can be postponed longer than originally anticipated. (In fact, you may want to rerun LPIE2 to make a sensitivity analysis of investment timing.)

On the output, the first and second investments will be distinguished on the Projection of Annual Activity Levels report in the SUMMARY OF ALTERNATIVE (Figure 6-4). In the ALTERNATIVE table, the full effect of investments on reducing operating costs will be seen after the second investment year. The effect may be later than on the initial run, when the entire investment is made at once.

Case 6. Post-Improvement Estimates

Estimates of post-improvement activity levels and annual activity growth may be entered in a Problem File as overrides prepared on the USER 4 input worksheet as described in Subsection 3.6, and on the USER 2A input worksheet (SQGR data line) as described in Subsection 3.4A. Such estimates are best deferred until after the initial run, when you can review the PROJECTED ANNUAL LEVELS OF ACTIVITIES on the Projection of Annual Activity Levels report. The LPIE2 projections are generated for the first 5 years of the study, for each solution alternative. In each case, "LPIE" will appear on the Projection report as the SOURCE OF IMPROVEMENT ESTIMATES, and will also appear on the

LPIE2 Problem Analysis Summary, in the ECONOMIC EVALUATORS table, ESTIMATES column. Figure 6-5A shows LPIE2 projections for the SAC B and Rehab alternative.

LPIE2 calculates post-improvement activity levels using reduction factors that vary according to activity, plant type, and degree of ultimate design. If the DAs you are studying are not typical, you may want to override LPIE2 with your own estimates, guided by engineering judgment. Keep in mind how physical and design rehabilitation differ in affecting DA activity levels. Consider also what special events and conditions characterize a given DA as not typical—for example, a boundary violation or inadequate feeder.

Your estimates are always in terms of some alternative-investment(s). On the USER 4 input worksheet, enter the alternative-investment code in field 1 of any PIL1 and PIL2 data line (activity level) and PIG1 and PIG2 data line (annual activity growth) as needed. You are not obliged to estimate each activity. However, if you have entered special-study current levels on the OPTN data line (Case 4), you ***must*** enter post-improvement activity levels and annual activity growth. If you enter estimates, the word USER will appear (instead of LPIE) in the ESTIMATES column of the ECONOMIC EVALUATORS table on the LPIE2 Problem Analysis Summary report, and as the "source" on the Projection of Annual Activity report. Also, an LPIE2 User Overrides report will be generated for each solution alternative you estimate. You can compare your estimates with LPIE2-calculated estimates, using these reports. Figure 6-5B shows ***user*** estimates for the SAC B and Rehab alternative, which can be compared to the LPIE2 projections in Figure 6-5A. For example, the user decided to override the LPIE2 projection for RTC by entering a zero in the RTC field (field 9) on the PIL1 data line (USER 4). Thus, on the Projections report, the RTC level in year 1986 (after the investment is made) is zero (instead of 1). Since the user entered zero growth for RTC on the PIG1 data line (field 9), there is no increase in RTC level in the years 1987 and 1988.

LPIE2 Calculated End-of-Study Year

1 STUDY YEAR	2 AD VALOREM TAX RATE	3 ANNUAL PAIR GROWTH	4 DISTRIBUTION PAIRS (AVAILABLE)	5 FEEDER PAIRS (AVAILABLE)	6 ASSIGNED PAIRS	7 DEFECTIVE PAIRS	8 INITIAL ULTIMATE PLANT (%)	9 DISTANCE TO WC (KF)	10 STRUCTURE TYPE (AER OR BUR)	11 INSULATION TYPE (PIC OR PULP)
STDY: 1984		28	500		346	12				

****
*2. LPIE2 PROBLEM ANALYSIS SUMMARY *
****

OCT 10, 1984

LARUE WIRE CENTER - DA 2104

WC: LARUE
EAA: 2110
DA: 2104

STUDY BEGINS: JAN, 1984
HQ FILE : HQFILE1
PROB FILE : LARUE1

NONDISCRETIONARY EXPENDITURES

C	X	M	R
0	0	0	0

END OF STUDY YEAR 1989

User Estimated End-of-Study Year

1 STUDY YEAR	2 AD VALOREM TAX RATE	3 ANNUAL PAIR GROWTH	4 DISTRIBUTION PAIRS (AVAILABLE)	5 FEEDER PAIRS (AVAILABLE)	6 ASSIGNED PAIRS	7 DEFECTIVE PAIRS	8 INITIAL ULTIMATE PLANT (%)	9 DISTANCE TO WC (KF)	10 STRUCTURE TYPE (AER OR BUR)	11 INSULATION TYPE (PIC OR PULP)
STDY: 1984		28	500		346	12				

1	2	3	4	5	6	7	8	9	10	11
	NON-DISCRETIONARY				SPECIAL STUDY 1		SPECIAL STUDY 2		SPECIAL STUDY 3	
STUDY DURATION	C	X	M	R	NAME	ACTIVITY LEVEL	NAME	ACTIVITY LEVEL	NAME	ACTIVITY LEVEL
OPTN: 10										

****
*2. LPIE2 PROBLEM ANALYSIS SUMMARY *
****

OCT 10, 1984

LARUE WIRE CENTER - DA 2104

WC: LARUE
EAA: 2110
DA: 2104

STUDY BEGINS: JAN, 1984
HQ FILE : HQFILE1
PROB FILE : LARUE4

NONDISCRETIONARY EXPENDITURES

C	X	M	R
2000	0	100	150

END OF STUDY YEAR 1994
(USER ESTIMATED)

Figure 6-1. Examples for Case 2

Without Non-Discretionary Investments

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**********************************
*2. LPIE2 PROBLEM ANALYSIS SUMMARY *
**********************************

                    ECONOMIC  EVALUATORS
                    --------------------

                                                LTEE          NPV
                                          (RELATIVE TO  (RELATIVE TO
  ALTERNATIVE     ESTIMATES      PWE      STATUS QUO)   STATUS QUO)
SAC C AND REHAB     LPIE        75508.        1.10          4981.
SAC B AND REHAB     LPIE        76043.        1.09          4706.
REHAB ONLY          LPIE        76209.        1.24          4621.
STATUS QUO                      85198.        1.00             0.

                  DISCRETIONARY EXPENDITURES
                  --------------------------
                  TOTAL INSTALLED FIRST COST      INCREMENTAL
  ALTERNATIVE           ( IN 1984 DOLLARS)          LTEE
                    C       X       M       R
REHAB ONLY         8386.    580.   4385.    0.        1.24
SAC C AND REHAB   23847.   1124.  14515.    0.        1.01
SAC B AND REHAB   26986.   1300.  16805.    0.        0.0

                NONDISCRETIONARY EXPENDITURES
                -----------------------------
                C       X       M       R
                0       0       0       0

  END OF STUDY YEAR 1989
```

With Non-Discretionary Investments

STUDY DURATION	NON-DISCRETIONARY C	NON-DISCRETIONARY X	NON-DISCRETIONARY M	NON-DISCRETIONARY R	SPECIAL STUDY 1 NAME	SPECIAL STUDY 1 ACTIVITY LEVEL	SPECIAL STUDY 2 NAME	SPECIAL STUDY 2 ACTIVITY LEVEL	SPECIAL STUDY 3 NAME	SPECIAL STUDY 3 ACTIVITY LEVEL
OPTN:	2000		100	150						

```
**********************************
*2. LPIE2 PROBLEM ANALYSIS SUMMARY *
**********************************

                    ECONOMIC  EVALUATORS
                    --------------------

                                                LTEE          NPV
                                          (RELATIVE TO  (RELATIVE TO
  ALTERNATIVE     ESTIMATES      PWE      STATUS QUO)   STATUS QUO)
SAC C AND REHAB     LPIE        88234.        1.32         13640.
SAC B AND REHAB     LPIE        88291.        1.29         13611.
REHAB ONLY          LPIE        90278.        1.75         12589.
STATUS QUO                     114766.        1.00             0.

                  DISCRETIONARY EXPENDITURES
                  --------------------------
                  TOTAL INSTALLED FIRST COST      INCREMENTAL
  ALTERNATIVE           ( IN 1984 DOLLARS)          LTEE
                    C       X       M       R
REHAB ONLY         8386.    580.   4385.    0.        1.75
SAC C AND REHAB   23847.   1124.  14515.    0.        1.04
SAC B AND REHAB   26986.   1300.  16805.    0.        0.0

                NONDISCRETIONARY EXPENDITURES
                -----------------------------
                C       X       M       R
             2000       0     100     150

  END OF STUDY YEAR 1989
       (USER ESTIMATED)
```

Figure 6-2. Examples for Case 3

Without Special Study

****
*3. PROJECTION OF ANNUAL ACTIVITY LEVELS *
****

ALTERNATIVE : SAC C AND REHAB

ACTIVITY	CURRENT LEVEL	PROJECTED ANNUAL LEVELS OF ACTIVITIES 1984	1985	1986	1987	1988
LST	9	10.	8.	0.	0.	1.
WOL	1	1.	1.	0.	0.	0.
BCT	5	5.	4.	0.	0.	0.
CDP	5	5.	4.	0.	0.	0.
RE	4	4.	4.	0.	0.	0.
RTC	10	11.	9.	1.	1.	1.
SOD	4	4.	4.	0.	0.	0.
ODF	4	4.	4.	0.	0.	1.
OAC	3	3.	3.	0.	0.	0.
1-6	12	13.	11.	1.	1.	2.
7A	4	4.	4.	0.	1.	1.
7B	12	13.	11.	1.	1.	1.
8-9	3	3.	3.	1.	1.	2.
ANNUAL OPERATING COST/PAIR	$ 16.21	16.21	12.52	1.36	1.64	1.89
TOTAL DA OPERATING COST	$ 5608.01	6061.84	5032.48	582.91	749.60	916.29

SOURCE OF IMPROVEMENT ESTIMATES : LPIE

With Special Study

	STUDY DURATION	NON-DISCRETIONARY C	X	M	R	SPECIAL STUDY 1 NAME	ACTIVITY LEVEL	SPECIAL STUDY 2 NAME	ACTIVITY LEVEL	SPECIAL STUDY 3 NAME	ACTIVITY LEVEL
OPTN:	,	,	,	,	,	PCV ,	10	,	,	,	,

```
*******************************
*1. LPIE2 DA INPUT SUMMARY *
*******************************
```

ACTIVITY SUMMARY

ACTIVITY	HEADQUARTERS ESTIMATED COST	USER ESTIMATED COST	CURRENT LEVEL
LST	28.23		9
WOL	70.03		1
BCT	7.72		5
CDP	75.68		5
BPC	19.48		0
CIR	86.05		0
RE	36.59		4
RTC	16.49		10
SOD	28.63		4
ODF	67.17		4
OAC	33.76		3
1-6	177.54	500.00	12
7A	127.62		4
7B	74.80		12
8-9	177.54		3
PCV	25.23		10

```
*******************************************
*3. PROJECTION OF ANNUAL ACTIVITY LEVELS *
*******************************************
```

ALTERNATIVE : SAC C AND REHAB

ACTIVITY	CURRENT LEVEL	PROJECTED ANNUAL LEVELS OF ACTIVITIES 1984	1985	1986	1987	1988
LST	9	10.	8.	0.	0.	1.
WOL	1	1.	1.	0.	0.	0.
BCT	5	5.	4.	0.	0.	0.
CDP	5	5.	4.	0.	0.	0.
RE	4	4.	4.	0.	0.	0.
RTC	10	11.	9.	1.	1.	1.
SOD	4	4.	4.	0.	0.	0.
ODF	4	4.	4.	0.	0.	1.
OAC	3	3.	3.	0.	0.	0.
1-6	12	13.	11.	1.	1.	2.
7A	4	4.	4.	0.	1.	1.
7B	12	13.	11.	1.	1.	1.
8-9	3	3.	3.	1.	1.	2.
PCV	10	11.	9.	3.	4.	5.
ANNUAL OPERATING COST/PAIR	$ 16.94	16.94	13.11	1.53	1.86	2.14
TOTAL DA OPERATING COST	$ 5860.31	6334.55	5271.25	658.60	850.52	1042.44

SOURCE OF IMPROVEMENT ESTIMATES : USER

Figure 6-3. Examples for Case 4

Alternative I Undivided

****
*3. PROJECTION OF ANNUAL ACTIVITY LEVELS *
****

OCT 10, 1984

LARUE WIRE CENTER - DA 2104

WC: LARUE
EAA: 2110
DA: 2104

STUDY BEGINS: JAN, 1984
HQ FILE : HQFILE
PROB FILE : LARUE1

ALTERNATIVE : SAC C AND REHAB

ACTIVITY	CURRENT LEVEL	PROJECTED ANNUAL LEVELS OF ACTIVITIES 1984	1985	1986	1987	1988
LST	9	10.	8.	0.	0.	1.
WOL	1	1.	1.	0.	0.	0.
BCT	5	5.	4.	0.	0.	0.
CDP	5	5.	4.	0.	0.	0.
RE	4	4.	4.	0.	0.	0.
RTC	10	11.	9.	1.	1.	1.
SOD	4	4.	4.	0.	0.	0.
ODF	4	4.	4.	0.	0.	0.
OAC	3	3.	3.	0.	0.	0.
1-6	12	13.	11.	1.	1.	2.
7A	4	4.	4.	0.	1.	1.
7B	12	13.	11.	1.	1.	1.
8-9	3	3.	3.	1.	1.	2.
ANNUAL OPERATING COST/PAIR	$ 16.21	16.21	12.52	1.36	1.64	1.89
TOTAL DA OPERATING COST	$ 5608.01	6061.84	5032.48	582.91	749.60	916.29

SOURCE OF IMPROVEMENT ESTIMATES : LPIE

SUMMARY OF ALTERNATIVE

INVESTMENT	IN-SERVICE DATE	COSTS C	X	M	R
FIRST	SEP 1985	23847.	1124.	14515.	0.

Alternative I with Two Investments

SOLUTION ALTERNATIVE IDENTIFICATION

[1] ALTERNATIVE LETTER	[2] ALTERNATIVE NAME (15 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)
I	SAC C AND REHAB

INVESTMENT DESCRIPTION

	[1] ALTERNATIVE – INVESTMENT CODE	[2] INTERFACE PLACED? (Y OR N)	[3] POST-IMPROVEMENT ULTIMATE PLANT (%)	[4] DISTRIBUTION PAIRS AFTER INVESTMENT	[5] INVESTMENT MONTH	[6] INVESTMENT YEAR
FIRST	I1	Y	58	700	SEP	1985
SECOND	I2	N	70	700	DEC	1986

```
*****************************************
*3. PROJECTION OF ANNUAL ACTIVITY LEVELS *
*****************************************

                    OCT 10,  1984

LARUE WIRE CENTER - DA 2104

      WC: LARUE                  STUDY BEGINS: JAN,  1984
     EAA: 2110                   HQ   FILE   : HQFILE
      DA: 2104                   PROB FILE   : LARUE3

                ALTERNATIVE : SAC C AND REHAB
                ----------

                CURRENT   PROJECTED ANNUAL LEVELS OF ACTIVITIES
ACTIVITY        LEVEL     1984      1985      1986      1987      1988
  LST             9       10.        8.        1.        0.        0.
  WOL             1        1.        1.        0.        0.        0.
  BCT             5        5.        4.        0.        0.        0.
  CDP             5        5.        4.        0.        0.        0.
   RE             4        4.        4.        0.        0.        0.
  RTC            10       11.        9.        1.        1.        1.
  SOD             4        4.        4.        0.        0.        0.
  ODF             4        4.        4.        1.        1.        1.
  OAC             3        3.        3.        1.        0.        0.
  1-6            12       13.       12.        4.        2.        3.
   7A             4        4.        4.        0.        0.        1.
   7B            12       13.       11.        3.        2.        2.
  8-9             3        3.        3.        2.        2.        2.

 ANNUAL
OPERATING $    16.21     16.21     13.15      3.71      2.23      2.48
COST/PAIR

TOTAL DA
OPERATING $5608.01     6061.84   5285.34   1594.33   1021.80   1203.99
   COST

          SOURCE OF IMPROVEMENT ESTIMATES : LPIE

                SUMMARY OF ALTERNATIVE
                ----------------------

                IN-SERVICE                    COSTS
INVESTMENT        DATE          C        X        M        R
FIRST           SEP 1985     16685.     391.    9660.      0.

SECOND          DEC 1986      7162.     733.    4855.      0.
```


Figure 6-4. Examples for Case 5

****
*2. LPIE2 PROBLEM ANALYSIS SUMMARY *
****

OCT 10, 1984

LARUE WIRE CENTER - DA 2104

WC: LARUE
EAA: 2110
DA: 2104

STUDY BEGINS: JAN, 1984
HQ FILE : HQFILE1
PROB FILE : LARUE5

ECONOMIC EVALUATORS

ALTERNATIVE	ESTIMATES	PWE	LTEE (RELATIVE TO STATUS QUO)	NPV (RELATIVE TO STATUS QUO)
SAC C AND REHAB	LPIE	75508.	1.10	4981.
SAC B AND REHAB	LPIE	76043.	1.09	4706.
REHAB ONLY	LPIE	76209.	1.24	4621.
STATUS QUO		85198.	1.00	0.

****
*3. PROJECTION OF ANNUAL ACTIVITY LEVELS *
****

OCT 10, 1984

LARUE WIRE CENTER - DA 2104

WC: LARUE
EAA: 2110
DA: 2104

STUDY BEGINS: JAN, 1984
HQ FILE : HQFILE
PROB FILE : LARUE1

ALTERNATIVE : SAC B AND REHAB

ACTIVITY	CURRENT LEVEL	PROJECTED ANNUAL LEVELS OF ACTIVITIES 1984	1985	1986	1987	1988
LST	9	10.	8.	0.	0.	0.
WOL	1	1.	1.	0.	0.	0.
BCT	5	5.	4.	0.	0.	0.
CDP	5	5.	4.	0.	0.	0.
RE	4	4.	4.	0.	0.	0.
RTC	10	11.	9.	1.	1.	1.
SOD	4	4.	4.	0.	0.	0.
ODF	4	4.	4.	0.	0.	1.
OAC	3	3.	3.	0.	0.	0.
1-6	12	13.	11.	1.	1.	2.
7A	4	4.	4.	0.	1.	1.
7B	12	13.	11.	1.	1.	1.
8-9	3	3.	3.	1.	1.	2.
ANNUAL OPERATING COST/PAIR	$ 16.21	16.21	12.50	1.30	1.58	1.83
TOTAL DA OPERATING COST	$5608.01	6061.84	5026.21	557.82	723.03	888.24

SOURCE OF IMPROVEMENT ESTIMATES : LPIE

SUMMARY OF ALTERNATIVE

INVESTMENT	IN-SERVICE DATE	COSTS C	X	M	R
FIRST	SEP 1985	26986.	1300.	16805.	0.

ALTERNATIVE

REHAB ONLY
SAC C AND REHAB
SAC B AND REHAB

END OF STUDY YEAR

Figure 6-5A. Examples for Case 6 (LPIE2)

****
*2. LPIE2 PROBLEM ANALYSIS SUMMARY *
****

OCT 10, 1984

LARUE WIRE CENTER - DA 2104

WC: LARUE
EAA: 2110
DA: 2104

STUDY BEGINS: JAN, 1984
HQ FILE : HQFILE
PROB FILE : LARUE4

ECONOMIC EVALUATORS

ALTERNATIVE	ESTIMATES	PWE	LTEE (RELATIVE TO STATUS QUO)	NPV (RELATIVE TO STATUS QUO)
SAC C AND REHAB	LPIE	75508.	1.10	4981.
SAC B AND REHAB	USER	75620.	1.10	4924.
REHAB ONLY	LPIE	76209.	1.24	4621.
STATUS QUO		85198.	1.00	0.

DISCRETIONARY EXPENDITURES

ALTERNATIVE	TOTAL INSTALLED FIRST COST (IN 1984 DOLLARS) C	X	M	R	INCREMENTAL LTEE
REHAB ONLY	8386.	580.	4385.	0.	1.24
SAC C AND REHAB	23847.	1124.	14515.	0.	1.01
SAC B AND REHAB	26986.	1300.	16805.	0.	0.0

NONDISCRETIONARY EXPENDITURES

C	X	M	R
0	0	0	0

END OF STUDY YEAR 1989

****
*4. LPIE2 USER OVERRIDES *
****

OCT 10, 1984

LARUE WIRE CENTER - DA 2104

WC: LARUE
EAA: 2110
DA: 2104

STUDY BEGINS: JAN, 1984
HQ FILE : HQFILE
PROB FILE : LARUE4

ALTERNATIVE: SAC B AND REHAB
ACTIVITY LEVELS AFTER FIRST INVESTMENT

ACTIVITY	CURRENT LEVEL	USER ESTIMATED LEVEL	LPIE ESTIMATED LEVEL	USER ESTIMATED GROWTH (ACTIVITY/YR)	LPIE ESTIMATED GROWTH (ACTIVITY/YR)
RTC	10	0	1.	0	0.04
ODF	4	0	0.	0	0.17
1-6	12		1.	0	0.51
7A	4		0.	0	0.17
7B	12		1.	0	0.04
8-9	3		1.	0	0.16

ESTIMATE FOR YEAR; 1986

USER 4—OPTIONAL

POST - IMPROVEMENT OVERRIDES

SHEET ___ OF ___
DA _____
PROBLEM FILE NAME _____

POST-IMPROVEMENT ACTIVITY LEVELS

	ALTERNATIVE - INVESTMENT CODE	LST	WOL	BCT	CDP	BPC	CIR	RE	8 RTC
PIL1:	I	,	,	,	,	,	,	,	0
PIL1:		,	,	,	,	,	,	,	
PIL1:		,	,	,	,	,	,	,	

CONTINUE ACTIVITY LEVELS ON PIL2

POST-IMPROVEMENT ANNUAL ACTIVITY GROWTH

PIG1:	I	,	,	,	,	,	,	,	0
PIG1:		,	,	,	,	,	,	,	
PIG1:		,	,	,	,	,	,	,	

CONTINUE ANNUAL ACTIVITY GROWTH ON PIG2

POST-IMPROVEMENT ACTIVITY LEVELS (CONTINUED)

	ALTERNATIVE - INVESTMENT CODE	SOD	3 ODF	OAC	5 1-6	6 7A	7 7B	8 8-9	SPECIAL STUDIES STUDY 1	STUDY 2	STUDY 3
PIL2:	I	,	0 ,	,	,	,	,	,	,	,	,
PIL2:		,	,	,	,	,	,	,	,	,	,
PIL2:		,	,	,	,	,	,	,	,	,	,

POST-IMPROVEMENT ANNUAL ACTIVITY GROWTH (CONTINUED)

PIG2:	I	,	0 ,	,	0 ,	0 ,	0 ,	0 ,	,	,	,
PIG2:		,	,	,	,	,	,	,	,	,	,
PIG2:		,	,	,	,	,	,	,	,	,	,

LPIE2 INPUT WORKSHEET (10/81) PREPARED BY _____ DATE _____

****
*3. PROJECTION OF ANNUAL ACTIVITY LEVELS *
****

ALTERNATIVE : SAC B AND REHAB

ACTIVITY	CURRENT LEVEL	PROJECTED ANNUAL LEVELS OF ACTIVITIES 1984	1985	1986	1987	1988
LST	9	10.	8.	0.	0.	0.
WOL	1	1.	1.	0.	0.	0.
BCT	5	5.	4.	0.	0.	0.
CDP	5	5.	4.	0.	0.	0.
RE	4	4.	4.	0.	0.	0.
RTC	10	11.	9.	0.	0.	0.
SOD	4	4.	4.	0.	0.	0.
ODF	4	4.	3.	0.	0.	0.
OAC	3	3.	3.	0.	0.	0.
1-6	12	13.	11.	1.	1.	1.
7A	4	4.	4.	0.	0.	0.
7B	12	13.	11.	1.	1.	1.
8-9	3	3.	3.	1.	1.	1.
ANNUAL OPERATING COST/PAIR	$ 16.21	16.21	12.48	1.23	1.17	1.12
TOTAL DA OPERATING COST	$5608.01	6061.84	5018.83	528.31	535.65	542.99

SOURCE OF IMPROVEMENT ESTIMATES : USER

SUMMARY OF ALTERNATIVE

INVESTMENT	IN-SERVICE DATE	COSTS C	X	M	R
FIRST	SEP 1985	26986.	1300.	16805.	0.

Figure 6-5B. Examples for Case 6 (USER)

7 LPIE2 Sample Problem

The LPIE2 sample problem is taken from the fictitious Salem District of El Dorado Bell, Hilldale Wire Center. It describes the basic LPIE2 economic study of DA 1818—the initial run. The input procedure is described in Subsection 7.1; sample input worksheets are included. All sample problem data are for illustration only, and so do not specify system standard values. The terminal session is outlined in Subsection 7.2; sample intermediate output is included. The LPIE2 output reports (excluding the CUCRIT reports) are examined in Subsection 7.3. Thus the Hilldale Wire Center sample problem provides a review of Sections 3, 4, and 5 of this user guide.

Distribution area 1818 is one of four DAs in EAA 1820, which had been tracked by LATIS throughout 1983 and ranked high enough to be selected early in 1984 for rehabilitation study. The total EAA operating cost was then about $8000. The District engineer assigned to EAA 1820 decided to concentrate on DA 1818 (Figure 7-1) since it accounted for about 70% of the total EAA operating cost. The plant in DA 1818 consisted predominantly of aerial pulp cable, some of it more than 20 years old. The initial ultimate plant percent was less than 10%. The DA had high activity levels of BCTs, OACs, 1-6 and 7B troubles, as well as incidents of other activities.

The engineer planned to replace the old pulp cable (since renovation was clearly not economical), rebuild certain terminals, place an interface, and convert to SAC with two competing plans for upgrading the DA—a lesser plan (an intermediate design alternative called SAC C) against an extensive plan (the ultimate design alternative called SAC B). A physical rehabilitation alternative (called physical rehab) was also included. For LPIE2 purposes, the engineer chose alternative-investment codes P (for Physical rehab), I for Intermediate design (SAC C), and U for Ultimate design (SAC B).

7.1 Input for DA 1818

The Problem File for DA 1818 was named HILL2. The engineer had used the Rehabilitation Guidelines & LPIE2 Worksheet during the detailed DA study, and prepared REHB data lines (USER 1A) for the initial LPIE2 run, as shown in Figure 7-2. Examples of REHB data line input procedure are as follows:

- In cable section 1, the treatment was to rebuild (REBLD) six terminals (TERMS) at $300 apiece and reconnect seven drops at $30 apiece. On the REHB data line, the treatment designation REBLD was carried over as the user remark (field 1), as was the section number (field 2). Since rebuilding terminals is not considered a renovation, "remaining life" did not apply, so N was entered (field 3). The cost of rebuilding six terminals and reconnecting seven drops came to $2010, which was all R cost (field 7). Fields 4, 5, and 6 (C, X, and M cost) were left blank. The treatment was expected to eliminate five terminating troubles in Section 1, hence 5 was entered under 7B (field 10). Fields 8, 9, and 11 (1-6, 7A, and 8-9 troubles) were left blank. Since the treatment represented an investment under each of the three solution alternatives, the alternative-investment codes P, I, and U were entered in fields 12, 13, and 14, respectively; fields 15, 16, and 17 were left blank.

- In cable section 2, the decision was to do nothing now; thus data for section 2 do not appear on the Rehabilitation Guidelines & LPIE2 Worksheet.
- In cable section 3, four data lines were used to describe terminal rebuilding, cable replacement, cable reinforcement, and terminal placement, respectively.

The distribution-area data for DA 1818 were prepared for the initial run on data lines IDEN, AREA, STDY, CURL, and PRNT (USER 2), as well as SQND and CSTE (USER 2A), as shown in Figures 7-3 and 7-3A.

In July of the study year, a severe thunderstorm hit areas of the Hilldale Wire Center, damaging several poles so that they were considered to be unsafe. On the optional SQND data line, the engineer entered a repair cost of $500 for the damage. Through experience, the engineer also knew that the headquarters cost of 177.54 for 1-6 cable troubles was inaccurate for his DA, so he used the optional CSTE data line to override this cost with a more accurate $100 cost.

The optional OPTN and SQGR data lines were not entered on the initial run for the following reasons:

- there was no need at the time to override the LPIE2-calculated end-of-study year or activity growth levels,
- the non-discretionary investments were deferred until after the initial run, and
- there were no special study data to enter.

The STDY data line deserves some careful examination. The study year (field 1) was 1984, the year immediately following the 12-month LATIS tracking period (1983) and in which activity levels were current. The determination of annual pair growth on the STDY data line (field 3) involved averaging over a five-year period, using data in the fill boxes (Figure 7-1). For the three cable branches in DA 1818, total existing lines were found to be 263, the total 2-year pair requirements were 315, and the total ultimate requirements were 630. Annual growth over the 2-year period was 26, calculated as 315 (2-year requirement) minus 263 (existing lines), divided by 2. For the next three years, annual growth was 37, calculated on a 10-year basis: 630 (ultimate growth) minus 263 (existing lines), divided by 10. Then the five-year average was taken:

$$(26 + 26 + 37 + 37 + 37) / 5 = 33.$$

To determine the initial ultimate plant percent on the STDY data line (field 8), the engineer used Table 7-1 (the same as Figure 3-5 in Subsection 3.4) in conjunction with the locally devised checklist reproduced here above the table. The checklist summarizes the engineer's inquiry about each cable leg in DA 1818 before improvement (initial plant): Is the cable ultimately sized? (YES or NO). As the checklist shows, 4 out of 10 legs (40%) were ultimately sized. This was one piece of information needed to use Table 7-1. The two other pieces of information were that the backbone cable was not ultimately sized and that no interface was in place. Given no interface, no ultimately sized backbone cable, and that 40 percent of the legs were ultimately sized, inspection of Table 7-1 yielded an initial ultimate plant percent between 5% and 10%. By interpolation, the engineer obtained 8% and entered the number 8 on the STDY data line, field 8 (Figure 7-3).

DA 1818 (INITIAL PLANT)
IS THE CABLE LEG ULTIMATELY SIZED?

CABLE SECTION	INITIAL PLANT YES	NO
1	✓	
2	✓	
3		✓
4		✓
5	✓	
6		✓
7		✓
8	✓	
9		✓
10		✓

% LEGS ULTIMATELY SIZED 40
BACKBONE ULTIMATELY SIZED? NO
INTERFACE IN PLACE? NO
% ULTIMATE 8%

Table 7-1

Initial Ultimate Plant Percent

Existing Interface?	Distribution Backbone Cable Ultimately Sized?	Percent of Distribution Cable Legs Ultimately Sized?				
		0	25	50	75	100
No	No	0%	5%	10%	15%	20%
	Yes	0%	20%	40%	60%	80%
Yes	No	0%	15%	30%	45%	60%
	Yes	0%	25%	50%	75%	100%

The solution alternative data for DA 1818 was prepared for the initial run on an ALTN and INVT data line (USER 3) for each alternative, as shown in Figure 7-4. Since each alternative represented an entire investment (i.e., none was subdivided into two alternative-investments), only the "FIRST" INVT data line was used in each case. The alternative-investment codes would be P, I, and U, respectively. Physical rehab did not include placing an interface. Hence N was entered on the INVT data line, field 2. To determine the post-improvement ultimate plant percent, Table 7-2 (the same as Table 3-7 in Subsection 3.5) was used in conjunction with the checklist above the table. No interface would exist after the physical rehab improvement, the backbone cable ***would*** be ultimately sized as a result, and the percent of cable legs ultimately sized would be 50. The post-improvement ultimate plant percent, taken directly from Table 7-2, was 40%, entered as 40 on the INVT data line, field 3.

Both SAC C and SAC B place an interface (Y in field 2). After SAC C and SAC B, the interface would exist and the backbone cable would be ultimately sized. Since SAC C would yield 60% cable legs ultimately sized, the post-improvement ultimate plant percent was found (by interpolation) to be 60%, entered as 60 on the INVT data line, field 3. SAC B would yield 100% cable legs ultimately sized, hence 100 in field 3.

For each alternative, the distribution pairs after the improvement is made would be 875 (field 4), and the investment was made in February (FEB in field 5) of 1985 (field 6).

No post-improvement overrides (USER 4) were included in the initial run. The engineer decided to wait and see the LPIE2 projections.

7.2 The terminal Session for DA 1818

The engineer (or engineering clerk) running LPIE2 for DA 1818 accessed the computer, using the logon procedures in the ***Generic RDES User Guide*** (OPA-2Y000-01). The RDES command CREATE with the filename HILL2 was typed to invoke the RDES Editor in order to create the HILL2 Problem File. Various RDES Editor commands were used in the process of creating the file—for example, INPUT for entering HILL2 data lines, TYPE for displaying the file (as in Figure 7-5), and FILE for storing the data as the HILL2 Problem File. The command FILE returned the user to RDES; this action was signaled by the prompt NEXT? The engineer or clerk then accessed LPIE2 and engaged in the following interaction to run LPIE2:

```
NEXT?
> lpie2
LPIE2
DATACK, STUDY, HQLIST, OR REHBLIST?  ( D, S, H, OR R )
> r
ENTER PROBLEM FILE NAME:
> hill2

[printout of Rehabilitation Input Summary]
CONTINUE? ( Y OR N )
> y
DATACK, STUDY, HQLIST, OR REHBLIST? (D, S, H, OR R)
```

DA 1818 (POST IMPROVEMENT)
IS THE CABLE LEG ULTIMATELY SIZED?

CABLE SECTION	(P) PHYSICAL REHAB		(I) SAC C		(V) SAC B	
	YES	NO	YES	NO	YES	NO
1	✓		✓		✓	
2	✓		✓		✓	
3		✓		✓	✓	
4		✓		✓	✓	
5	✓		✓		✓	
6		✓	✓		✓	
7		✓		✓	✓	
8	✓		✓		✓	
9		✓		✓	✓	
10	✓		✓		✓	
% LEGS ULT. SIZED	50		60		100	
BACKBONE ULT. SIZED ?	YES		YES		YES	
INTERFACE IN PLAN ?	NO		YES		YES	
% ULTIMATE	40%		60%		100%	

Table 7-2

Post-Improvement Ultimate Plant Percent

Existing Interface?	Distribution Backbone Cable Ultimately Sized?	Percent of Distribution Cable Legs Ultimately Sized?				
		0	25	50	75	100
No	No	0%	5%	10%	15%	20%
	Yes	0%	20%	40%	60%	80%
Yes	No	0%	15%	30%	45%	60%
	Yes	0%	25%	50%	75%	100%

```
> d
PLEASE ENTER PROBLEM AND HQ FILE NAMES:
> hill2 hqfile
    NOW RUNNING LPIE2 DATA CHECK V2.00 10/01/84 11:30:02
                    *  *  *

                YOU HAVE 0 FATAL ERROR(S).
                YOU HAVE 0 WARNING(S).

                    *  *  *
CONTINUE? ( Y OR N )
> y
DATACK, STUDY, HQLIST, OR REHBLIST ? ( D, S, H, OR R )
> s
ENTER FILE NAME:
> hill2
    NOW RUNNING LPIE2 STUDY V2.00 10/01/84 11:30:21
DO YOU WANT TO SEE THE REHAB SUMMARIES? (Y OR N)
> y

[printout of Rehabilitation Input Summary and Rehabilitation Calculated
Cost Summary]
DO YOU WANT TO CONTINUE? (Y OR N)
> y

[printout of the LPIE2 output reports]
10/01/84 STUDY for ' HILL2 ' ENDED AT 11:32:26 .
DO YOU WANT TO SAVE YOUR DATA CHECKED OUTPUT? ( Y OR N )
> y
OUTPUT SAVED AS ' HILL2 DATA1 ' FILE.

NEXT?
> logout
```

After accessing LPIE2 (by typing "LPIE2"), the engineer decided to examine the REHB data lines (USER 1A) before data checking the problem File. Thus the REHBLIST run option was chosen, and "r" was typed at the terminal. The result was a printout of the Rehabilitation Input Summary (Figure 7-6) marked NOT DATA CHECKED and with the column entries aligned at the left. The engineer checked the entries and found them satisfactory.

Then the LPIE2 Data Check was run on the Problem File using the DATACK run option; "d" was typed at the terminal. In response to the computer request, the Problem File name (HILL2) and HQ File name (HQFILE) were entered in that order, with a space between file names. The computer run message then appeared, followed by the error message count. In this initial run, no errors were detected by the Data Check.

The engineer continued and ran the economic analysis (STUDY), using the STUDY run option; "s" was typed at the terminal. In response to the computer request, the Problem File name (HILL2) was entered. The engineer decided to see the Rehab Summaries to check investment costs on the Rehabilitation Calculated Cost Summary (Figure 7-7). The accompanying Rehabilitation Input Summary

(after the Data Check) had the column entries aligned at the right (Figure 7-7). The investment costs appeared reasonable, so the engineer decided to continue and obtain the output reports. The code LPI was entered on the PRNT data line (USER 2, Figure 7-3), so only the LPIE2 output reports were printed (i.e., no CUCRIT reports were printed on this LPIE2 run). The engineer wanted to examine the output reports away from the terminal, and thus he/she saved the "data-checked output" (i.e., the data checked HILL2 Problem File) and logged off the system.

The data-checked output, called "HILL2 DATA1", can be used to rerun HILL2, but cannot in any way be altered to rework the study; only the original HILL2 Problem File is available for editing. Interpretation of the output is discussed in the next subsection.

7.3 Output for DA 1818

After running the LPIE2 study, the engineer examined the LPIE2 output reports. LPIE2 output report 1, the LPIE2 DA Input Summary (Figure 7-8), provided a reference listing of input data about the DA, as entered on the USER 2 worksheet. Also included were the unit costs (cost factors) of the standard LATIS-tracked activities, taken from the Headquarters File and/or the cost override supplied by the user from the CSTE line of the Problem File (USER 2A).

LPIE2 output report 2, the LPIE2 Problem Analysis Summary (Figure 7-9), provides additional information to the engineer. The ECONOMIC EVALUATORS table shows that SAC C is the alternative with the lowest PWE; its LTEE (2.15) was well over the El Dorado Company's minimum LTEE. In the case of unlimited rehabilitation funds, SAC C would probably be considered the most cost-effective for the DA. However, Rehabilitation funds in the district are limited, and DA 1818 would probably compete with other DAs that also need rehabilitation. In that case, the installed first cost and the Incremental LTEE would be compared as the FAP methodology stipulates.

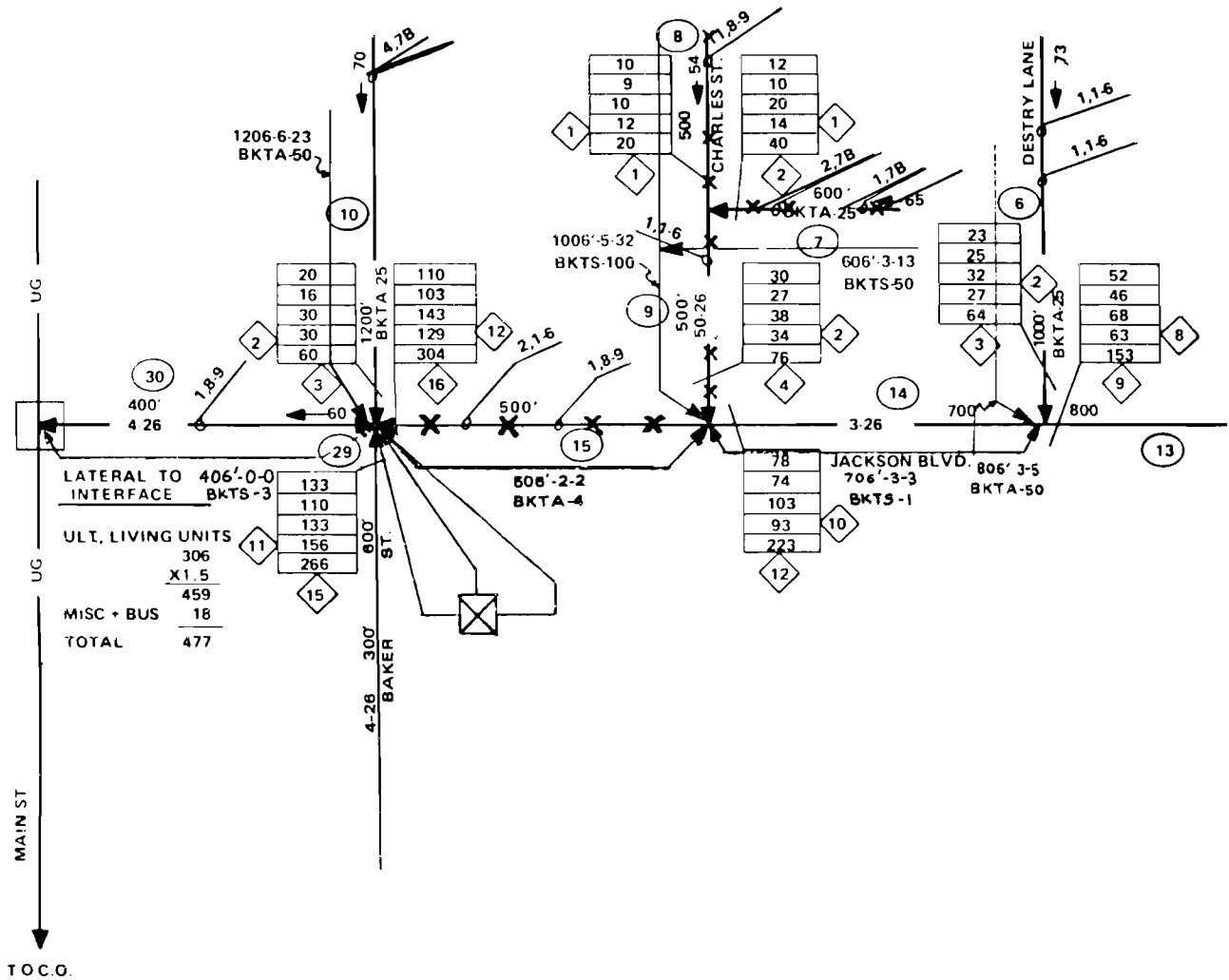
The next LPIE2 report, the Projection of Annual Activity Levels, gives one version for each solution alternative (Figures 7-10, 7-11, and 7-12). These reports can be compared to determine which alternative, as estimated by LPIE2, would reduce operating costs the most. With any of the three alternatives, operating costs would decline first in the investment year (i.e. 1985) and again in the following year, after which the costs would gradually increase each year.

In this example, physical rehab produced the least reduction in operating costs. Both SAC alternatives showed a sharper reduction in the operating costs, including the effect the interface placement would have on facility modifications in particular, and on all activities in general. The operating cost with SAC B was approximately $1.40 less per pair than with SAC C. The important concern in LPIE2 economic evaluation, however, is the tradeoff—i.e., the end result vs. the cost to achieve it.

When the investment costs on the respective Projection of Annual Activity Levels reports (the SUMMARY OF ALTERNATIVE table) are compared, it is seen that to save almost $1.40 per pair with SAC B, the user would invest nearly $14000 more than with SAC C. This situation is reflected on the LPIE2 Problem Analysis Summary (Figure 7-9) by the lower PWE for SAC C.

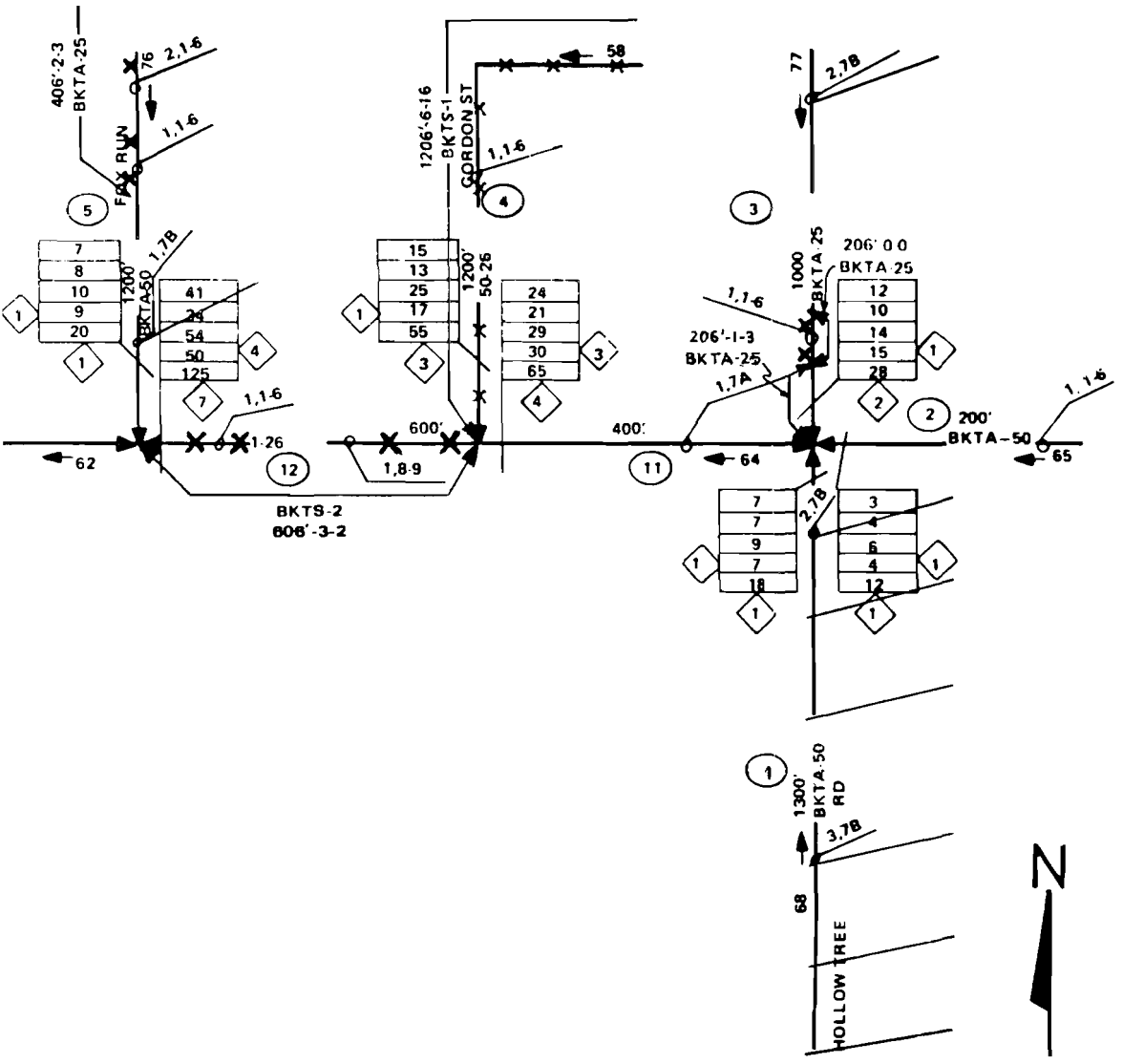
On the initial HILL2 run, the LPIE2 output report 4, LPIE2 User Overrides, given one per alternative, was not generated because no overrides of activity levels

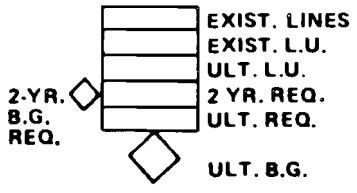
or annual activity growth (USER 4) or any Status Quo activity level growth overrides (USER 2A) were entered in the Problem File.



ASSUMPTIONS:

1. EACH SPAN IS 200 FEET
2. TERMINAL EVERY 200 FEET
3. NOT IN SEVERE PIC CRACKING AREA





HILLDALE WIRE CENTER
DISTRIBUTION AREA 1818

Figure 7-1. Rehabilitation Alternative Layout for DA 1818

REHABILITATION GUIDELIN

DA STUDY WORKSHEET (OPTIONAL)

DE

A	B	C	D	E	F	G	H	I	J	
TREATMENT	SEC #	FACILITY PLACED OR RENOVATED	QTY	FACILITY REMOVED	QTY	REMOVAL COST	SALVAGE VALUE	CABLE PAIR TRANS-FERS	CUT-OVER DROPS	USER REMARK (OPTIONAL) 6 CHAR.
REBLD	1	TERMS	6						7	REHB: REBLD,
REBLD	3	TERM	1						3	REHB: REBLD,
REPLC	3	BKTA-25	206'	BKTA-25				25		REHB: REPLC,
REINF	3	BKTA-25	206'					50		REHB: REINF,
PLACE	3	TERM	1						3	REHB: PLACE,
REPLC	4	BKTS-100	1206'	50-26						REHB: REPLC,
PLACE	4	TERMS	6						16	REHB: PLACE,
REPLC	5	BKTA-25	406'	BKTA-50				50		REHB: REPLC,
PLACE	5	TERMS	2						3	REHB: PLACE,
REBLD	5	TERM	1							REHB: REBLD,
REINF	6	BKTA-50	806'							REHB: REINF,
PLACE	6	TERMS	3						5	REHB: PLACE,
REBLD	7	TERMS	3						13	REHB: REBLD,
REPLC	7	BKTS-50	606'	BKTA-25				50		REHB: REPLC,
PLACE	7	TERMS	3						13	REHB: PLACE,
REPLC	8-9	BKTS-100	1006'	50-26				100		REHB: REPLC,
PLACE	8-9	TERMS	5						32	REHB: PLACE,
REPLC	10									REHB: REPLC,
REINF	10									REHB: REINF,
PLACE	10									REHB: PLACE,
REPLC	12	BKTS-2	606'	1-26						REHB: REPLC,
PLACE	12	TERMS	3						2	REHB: PLACE,
REINF	14	BKTS-100	706'							REHB: REINF,
PLACE	14	TERMS	3						3	REHB: PLACE,
REPLC	15		506'							REHB: REPLC,

TOTAL NUMBER OF TROUBLES IN DA – TALLY BY CATEGORY				LPIE2 INPUT WORI
1 – 6	7A	7B	8 – 9	

ES & LPIE 2 WORKSHEET

USER 1A

:TAILED REHABILITATION INPUT

SHEET 1 OF 2
DA 1818
PROBLEM FILE NAME HILL2

SEC #	RE-MAINING LIFE OR N	TREATMENT COSTS C	X	M	R	TROUBLES ELIMINATED 1-6	7A	7B	8-9	ALTERNATIVE-INVESTMENT CODE (S) APPLYING TO TREATMENT				
1	N				2010			5		P	I	U		
3	N				390			2		P	I	U		
3	N	175		250			1			P	I	U		
3	N	175		500						U				
3	N	200		90						U				
4	N	2050				1				U				
4	N	1200		480						U				
5	N	345		500		3				P	I	U		
5	N	400		90						P	I	U		
5	N				300			1		P	I	U		
6	N	926								I	U			
6	N	600		150						I	U			
7	N				1290			3		P	I			
7	N	788		500						U				
7	N	600		390				3		U				
8-9	N	1710		1000		1			1	U				
8-9	N	1000		960						U				
10	N	200		180				4		P				
10	N	1712		250						I	U			
10	N	1200		690				4		I	U			
12	N	1515							1	P	I	U		
12	N	600		60						P	I	U		
14	N	1610								U				
14	N	600		90						U				
15	N	1973		1000		2			1	P	I	U		

(SHEET (10/81)

PREPARED BY JERRY K. DATE 10/15/84

Figure 7-2. Detailed Rehabilitation Input (USER 1A) for DA 1818

REHABILITATION GUIDELIN

DA STUDY WORKSHEET (OPTIONAL)

D

A	B	C	D	E	F	G	H	I	J	
TREATMENT	SEC #	FACILITY PLACED OR RENOVATED	QTY	FACILITY REMOVED	QTY	REMOVAL COST	SALVAGE VALUE	CABLE PAIR TRANSFERS	CUT-OVER DROPS	USER REMARK (OPTIONAL) 6 CHAR.
PLACE	15	TERMS	2						2	REHB: PLACE
REINF	30	BKTS-300	406'							REHB: REINF
INT	0	INTERFACE	1800							REHB: INT
STUBS	0	STUBS								REHB: STUBS
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:
										REHB:

TOTAL NUMBER OF TROUBLES IN DA – TALLY BY CATEGORY			
1 – 6	7A	7B	8 – 9

LPIE2 INPUT WO

IES & LPIE 2 WORKSHEET

USER 1A

SHEET 2 OF 2
DA 1818
PROBLEM FILE NAME HILL2

ETAILED REHABILITATION INPUT

SEC #	RE-MAINING LIFE OR N	TREATMENT COSTS C	X	M	R	TROUBLES ELIMINATED 1-6	7A	7B	8-9	ALTERNATIVE-INVESTMENT CODE (S) APPLYING TO TREATMENT
15	N	400		60						P, I, U
30	N	1320								U
50	N	1800								I, U
0	N	3500								I, U

KSHEET (10/81)

PREPARED BY JERRY K. DATE 10/15/84

Figure 7-2 (continued). Detailed Rehabilitation Input (USER 1A) for DA 1818

USER 2

DISTRIBUTION AREA (DA) DATA

DA 1818
PROBLEM FILE NAME HILL2

PROBLEM IDENTIFICATION

(63 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)

IDEN : HILLDALE WIRE CENTER

AREA DATA

	WIRE CENTER (WC) (12 CHARACTERS MAXIMUM)	EXISTING ALLOCATION AREA (EAA) (12 CHARACTERS MAXIMUM)	DISTRIBUTION AREA (DA) (12 CHARACTERS MAXIMUM)
AREA:	HILLDALE	1820	1818

STUDY DATA

	STUDY YEAR	AD VALOREM TAX RATE	ANNUAL PAIR GROWTH	DISTRIBUTION PAIRS (AVAILABLE)	FEEDER PAIRS (AVAILABLE)	ASSIGNED PAIRS	DEFECTIVE PAIRS	INITIAL ULTIMATE PLANT (%)	DISTANCE TO WC (KF)	STRUCTURE TYPE (AER OR BUR)	INSULATION TYPE (PIC OR PULP)
STDY:	1984	1	33	725	400	263	28	8	10.1	AER	PULP

CURRENT ACTIVITY LEVELS

	LST	WOL	BCT	CDP	BPC	CIR	RE	RTC	SOD	ODF	OAC	1-6	7A	7B	8-9
CURL:	4	3	12	3				4	3	7	9	13	1	15	4

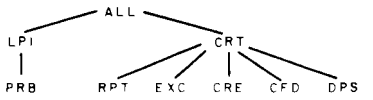
MISCELLANEOUS DATA (OPTIONAL)

	STUDY DURATION	NON-DISCRETIONARY X	NON-DISCRETIONARY M	NON-DISCRETIONARY R	SPECIAL STUDY 1 NAME	SPECIAL STUDY 1 ACTIVITY LEVEL	SPECIAL STUDY 2 NAME	SPECIAL STUDY 2 ACTIVITY LEVEL	SPECIAL STUDY 3 NAME	SPECIAL STUDY 3 ACTIVITY LEVEL
OPTN:										

PRINT CODES FOR OUTPUT REPORTS (OPTIONAL)

CHOOSE CODE(S) FROM: LPI, PRB, CRT, RPT, EXC, CRE, CFD, DPS, ALL

PRNT: LPI



LPIE2 INPUT WORKSHEET (10/81) PREPARED BY JERRY K. DATE 10/01/84

Figure 7-3. Distribution Area (DA) Data (USER 2) for DA 1818

USER 2A-OPTIONAL

DISTRIBUTION AREA (DA) DATA

SHEET 1 OF 1
DA 1818
PROBLEM FILE NAME HILL2

STATUS QUO GROWTH RATE OVERRIDE (OPTIONAL)

	1 6	7A	7B	8 9	STUDY 1	STUDY 2	STUDY 3
SQGR:	,	,	,	,	,	,	,

STATUS QUO NON-DISCRETIONARY DATA (OPTIONAL)

	C$	X$	M$	R$	INVESTMENT MONTH (3 LETTERS)	INVESTMENT YEAR (4 DIGITS)
SQND:	,	,	,	500 ,	JUN ,	1984

COST ENTRY DATA OVERRIDE (OPTIONAL)

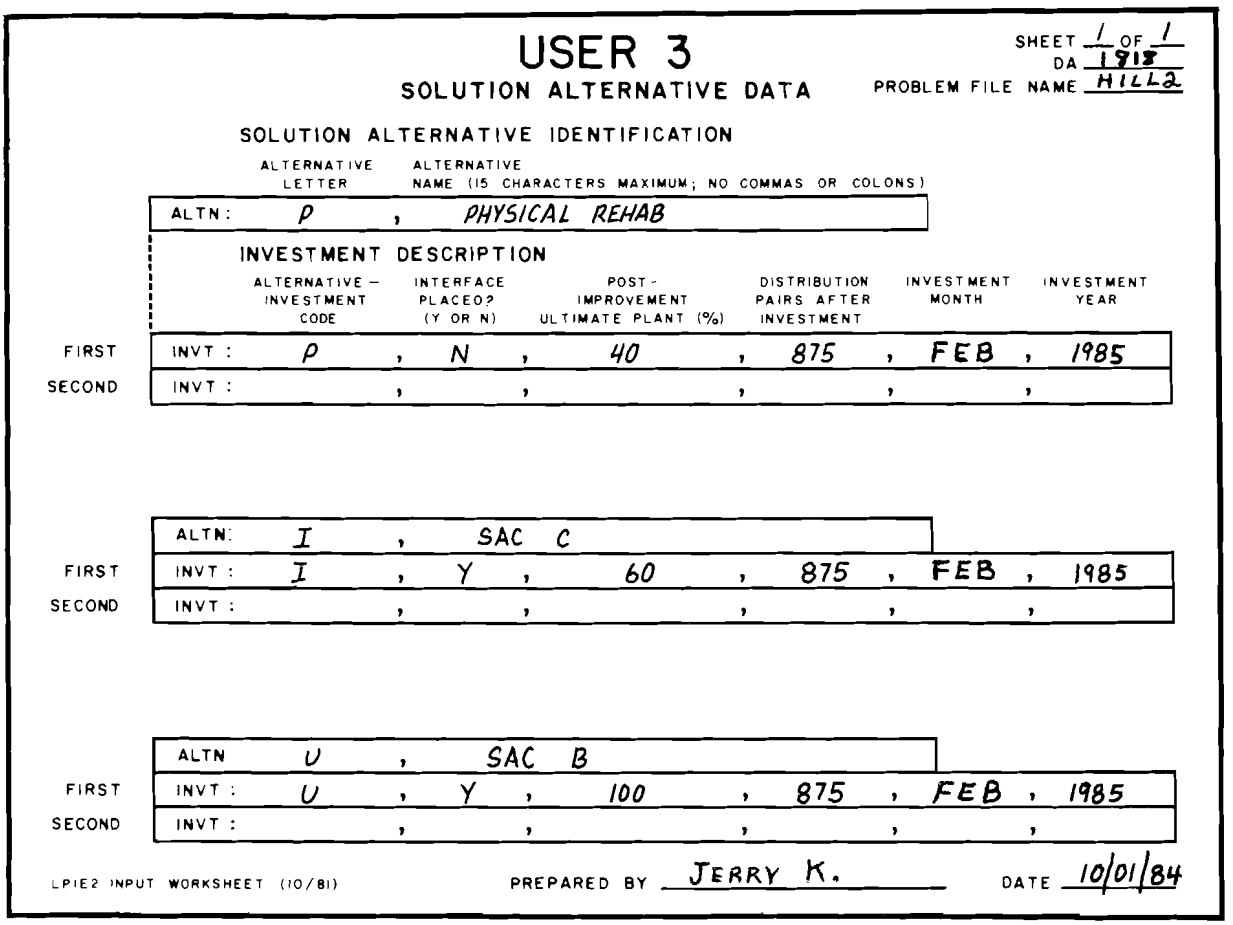
	ACTIVITY (3 CHARACTERS MAXIMUM)	COST (DECIMAL, 6 DIGITS MAXIMUM)
CSTE:	1-6 ,	100
CSTE:	,	
CSTE:	,	
CSTE:	,	
CSTE:	,	
CSTE:	,	

LPIE2 INPUT WORKSHEET (9/84)

PREPARED BY Jerry K.

DATE 10/01/84

Figure 7-3A. Distribution Area (DA) Data (USER 2A—OPTIONAL) for DA 1818



USER 3

SOLUTION ALTERNATIVE DATA

SHEET 1 OF 1
DA 1818
PROBLEM FILE NAME HILL2

SOLUTION ALTERNATIVE IDENTIFICATION

	ALTERNATIVE LETTER	ALTERNATIVE NAME (15 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)
ALTN:	P	PHYSICAL REHAB

INVESTMENT DESCRIPTION

		ALTERNATIVE – INVESTMENT CODE	INTERFACE PLACED? (Y OR N)	POST-IMPROVEMENT ULTIMATE PLANT (%)	DISTRIBUTION PAIRS AFTER INVESTMENT	INVESTMENT MONTH	INVESTMENT YEAR
FIRST	INVT:	P	N	40	875	FEB	1985
SECOND	INVT:						

	ALTN:	I	SAC C				
FIRST	INVT:	I	Y	60	875	FEB	1985
SECOND	INVT:						

	ALTN	U	SAC B				
FIRST	INVT:	U	Y	100	875	FEB	1985
SECOND	INVT:						

LPIE2 INPUT WORKSHEET (10/81) PREPARED BY JERRY K. DATE 10/01/84

Figure 7-4. Solution Alternative Data (USER 3) for DA 1818

```
REHB:REBLD,1,N,,,0,2010,,,5,,P,I,U
REHB:REBLD,3,N,,,0,390,,,2,,P,I,U
REHB:REPLC,3,N,175,,250,0,1,,,,P,I,U
REHB:REINF,3,N,175,,500,0,,,,,U
REHB:PLACE,3,N,200,,90,0,,,,,U
REHB:REPLC,4,N,2050,,,,1,,,,U
REHB:PLACE,4,N,1200,,480,0,,,,,U
REHB:REPLC,5,N,345,,500,0,3,,,,P,I,U
REHB:PLACE,4,N,400,,90,0,,,,,P,I,U
REHB:REBLD,5,N,,,0,300,,,1,,P,I,U
REHB:REINF,6,N,926,,,,,,,,I,U
REHB:PLACE,6,N,600,,150,0,,,,,I,U
REHB:REBLD,7,N,,,0,1290,,,3,,P,I
REHB:REPLC,7,N,788,,500,0,,,,,U
REHB:PLACE,7,N,600,,390,0,,,3,,U
REHB:REPLC,89,N,1710,,1000,0,1,,,1,U
REHB:PLACE,89,N,1000,,960,0,,,,,U
REHB:REPLC,10,N,200,,180,0,,,4,,P
REHB:REINF,10,N,1712,,250,0,,,,,I,U
REHB:PLACE,10,N,1200,,690,0,,,4,,I,U
REHB:REPLC,12,N,1515,,,,,,1,P,I,U
REHB:PLACE,12,N,600,,60,0,,,,,P,I,U
REHB:REINF,14,N,1610,,,,,,,,U
REHB:PLACE,14,N,600,,90,0,,,,,U
REHB:REPLC,15,N,1973,,1000,0,2,,,1,P,I,U
REHB:PLACE,15,N,400,,60,0,,,,,P,I,U
REHB:REINF,30,N,1320,,,,,,,,U
REHB:INT,0,N,1800,,,,,,,,I,U
REHB:STUBS,0,N,3500,,,,,,,,I,U
IDEN:HILLDALE WIRE CENTER
AREA:HILLDALE,1820,1818
STDY:1984,1,33,725,400,263,28,8,10.1,AER,PULP
CURL:4,3,12,3,,,,4,3,7,9,13,1,15,4
ALTN:P, PHYSICAL REHAB
INVT:P,N,40,875,FEB,1985
ALTN:I,SAC C
INVT:I,Y,60,875,FEB,1985
ALTN:U,SAC B
INVT:U,Y,100,875,FEB,1985
PRNT:LPI
SQND:,,,500,JUN,1984
CSTE:1-6,100
```

Figure 7-5. Problem File (HILL2) display for DA 1818

```
                *
                *    ****   *   ***
                *    *   *  *   **      LOOP PLANT IMPROVEMENT EVALUATOR
                ********    *   ***
                     *
                     *


                  **********************************
                  * REHABILITATION INPUT SUMMARY *
                  **********************************
                          NOT DATA CHECKED
```

REMARK	SEC#	LIFE	$C	$X	$M	$R	1-6	7A	7B	8-9	CODES		
REHB:REBLD	1	N			0	2010			5		P	I	U
REHB:REBLD	3	N			0	390			2		P	I	U
REHB:REPLC	3	N	175		250	0	1				P	I	U
REHB:REINF	3	N	175		500	0					U		
REHB:PLACE	3	N	200		90	0					U		
REHB:REPLC	4	N	2050				1				U		
REHB:PLACE	4	N	1200		480	0					U		
REHB:REPLC	5	N	345		500	0	3				P	I	U
REHB:PLACE	5	N	400		90	0					P	I	U
REHB:REBLD	5	N			0	300			1		P	I	U
REHB:REBLD	5	N			0	300			1		P	I	U
REHB:PLACE	5	N	400		90	0					P	I	U
REHB:REBLD	5	N			0	300			1		P	I	U
REHB:REINF	6	N	926								I	U	
REHB:PLACE	6	N	600		150	0					I	U	
REHB:REBLD	7	N			0	1290			3		P	I	
REHB:REPLC	7	N	788		500	0					U		
REHB:PLACE	7	N	600		390	0			3		U		
REHB:REPLC	89	N	1710		1000	0	1			1	U		
REHB:PLACE	89	N	1000		960	0					U		
REHB:REPLC	10	N	200		180	0			4		P		
REHB:REINF	10	N	1712		250	0					I	U	
REHB:PLACE	10	N	1200		690	0			4		I	U	
REHB:REPLC	12	N	1515							1	P	I	U
REHB:PLACE	12	N	600		60	0					P	I	U
REHB:REINF	14	N	1610								U		
REHB:PLACE	14	N	600		90	0					U		
REHB:REPLC	15	N	1973		1000	0	2			1	P	I	U
REHB:PLACE	15	N	400		60	0					P	I	U
REHB:REINF	30	N	1320								U		
REHB:INT	0	N	1800								I	U	
REHB:STUBS	0	N	3500								I	U	

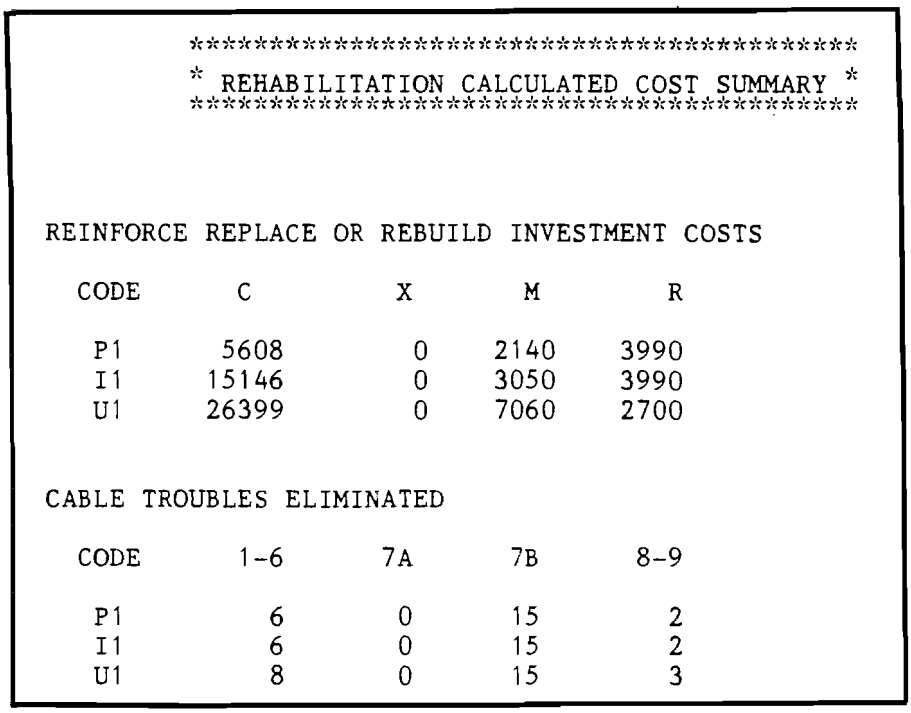
Figure 7-6. Rehabilitation Input Summary (Not Data Checked) for DA 1818

```
*
*
*    ****   *   ***
*    *   *  *   **
********   *   ***
     *
     *
```

LOOP PLANT IMPROVEMENT EVALUATOR

****
* REHABILITATION INPUT SUMMARY *
****

REMARK	SEC#	LIFE	$C	$X	$M	$R	1-6	7A	7B	8-9	CODES
REHB:REBLD	1	N	0	0	0	2010	0	0	5	0	P1 I1 U1
REHB:REBLD	3	N	0	0	0	390	0	0	2	0	P1 I1 U1
REHB:REPLC	3	N	175	0	250	0	1	0	0	0	P1 I1 U1
REHB:REINF	3	N	175	0	500	0	0	0	0	0	U1
REHB:PLACE	3	N	200	0	90	0	0	0	0	0	U1
REHB:REPLC	4	N	2050	0	0	0	1	0	0	0	U1
REHB:PLACE	4	N	1200	0	480	0	0	0	0	0	U1
REHB:REPLC	5	N	345	0	500	0	3	0	0	0	P1 I1 U1
REHB:PLACE	5	N	400	0	90	0	0	0	0	0	P1 I1 U1
REHB:REBLD	5	N	0	0	0	300	0	0	1	0	P1 I1 U1
REHB:REINF	6	N	926	0	0	0	0	0	0	0	I1 U1
REHB:PLACE	6	N	600	0	150	0	0	0	0	0	I1 U1
REHB:REBLD	7	N	0	0	0	1290	0	0	3	0	P1 I1
REHB:REPLC	7	N	788	0	500	0	0	0	0	0	U1
REHB:PLACE	7	N	600	0	390	0	0	0	3	0	U1
REHB:REPLC	89	N	1710	0	1000	0	1	0	0	1	U1
REHB:PLACE	89	N	1000	0	960	0	0	0	0	0	U1
REHB:REPLC	10	N	200	0	180	0	0	0	4	0	P1
REHB:REINF	10	N	1712	0	250	0	0	0	0	0	I1 U1
REHB:PLACE	10	N	1200	0	690	0	0	0	4	0	I1 U1
REHB:REPLC	12	N	1515	0	0	0	0	0	0	1	P1 I1 U1
REHB:PLACE	12	N	600	0	60	0	0	0	0	0	P1 I1 U1
REHB:REINF	14	N	1610	0	0	0	0	0	0	0	U1
REHB:PLACE	14	N	600	0	90	0	0	0	0	0	U1
REHB:REPLC	15	N	1973	0	1000	0	2	0	0	1	P1 I1 U1
REHB:PLACE	15	N	400	0	60	0	0	0	0	0	P1 I1 U1
REHB:REINF	30	N	1320	0	0	0	0	0	0	0	U1
REHB:INT	0	N	1800	0	0	0	0	0	0	0	I1 U1
REHB:STUBS	0	N	3500	0	0	0	0	0	0	0	I1 U1



```
**********************************************
* REHABILITATION CALCULATED COST SUMMARY *
**********************************************


REINFORCE REPLACE OR REBUILD INVESTMENT COSTS

  CODE       C          X        M         R

   P1      5608          0     2140      3990
   I1     15146          0     3050      3990
   U1     26399          0     7060      2700


CABLE TROUBLES ELIMINATED

  CODE      1-6         7A        7B        8-9

   P1         6          0        15         2
   I1         6          0        15         2
   U1         8          0        15         3
```

Figure 7-7. Rehabilitation Input Summary and Rehabilitation Calculated Cost Summary for DA 1818

```
          *
          *
          *   ****  *  ***
          *   *  *  *  **      LOOP PLANT IMPROVEMENT EVALUATOR
          ********  *  ***
               *
               *


          ****************************
          *1. LPIE2 DA INPUT SUMMARY *
          ****************************

                    OCT 01,  1984

HILLDALE WIRE CENTER

        WC: HILLDALE              STUDY BEGINS: JAN,  1984
       EAA: 1820                  HQ   FILE   : HQFILE
        DA: 1818                  PROB FILE   : HILL2

                  PROBLEM DATA SUMMARY
                  --------------------

AVAIL FDR PAIRS =      400     PAIR GROWTH =       33
DIST. TO C.O.   =    10.10     DIST PAIRS  =      725
PLANT TYPE      = AER PULP     ASGN PAIRS  =      263
% ULT           =        8     DEF PAIRS   =       28

                    ACTIVITY SUMMARY
                    ----------------

                HEADQUARTERS      USER
   ACTIVITY      ESTIMATED      ESTIMATED     CURRENT
                   COST           COST        LEVEL

      LST          28.23                        4
      WOL          70.03                        3
      BCT           7.72                       12
      CDP          75.68                        3
      BPC          19.48                        0
      CIR          86.05                        0
       RE          36.59                        0
      RTC          16.49                        4
      SOD          28.63                        3
      ODF          67.17                        7
      OAC          33.76                        9
      1-6         177.54         100.00        13
       7A         127.62                        1
       7B          74.80                       15
      8-9         177.54                        4
```

Figure 7-8. LPIE2 DA Input Summary for DA 1818

```
**********************************
*2. LPIE2 PROBLEM ANALYSIS SUMMARY *
**********************************

                OCT 01,  1984

HILLDALE WIRE CENTER

        WC: HILLDALE              STUDY BEGINS: JAN,  1984
       EAA: 1820                  HQ   FILE   : HQFILE
        DA: 1818                  PROB FILE   : HILL2

                      ECONOMIC  EVALUATORS
                      --------------------

                                                LTEE          NPV
                                            (RELATIVE TO  (RELATIVE TO
   ALTERNATIVE     ESTIMATES      PWE       STATUS QUO)   STATUS QUO)
SAC C                LPIE        60906.       2.15          25425.
SAC B                LPIE        61301.       1.64          25222.
PHYSICAL REHAB       LPIE        77479.       2.66          16905.
STATUS QUO                      110361.       1.00              0.

                   DISCRETIONARY EXPENDITURES
                   --------------------------
                   TOTAL INSTALLED FIRST COST      INCREMENTAL
   ALTERNATIVE          ( IN 1984 DOLLARS)            LTEE
                C        X        M        R
PHYSICAL REHAB   5608.     0.    2140.    3990.        2.66
SAC C           15146.     0.    3050.    3990.        1.72
SAC B           26399.     0.    7060.    2700.        0.0

                NONDISCRETIONARY EXPENDITURES
                -----------------------------
                C        X        M        R
                0        0        0        0

                          JUN 1984
              STATUS QUO NONDISCRETIONARY EXPENDITURES
              ----------------------------------------
                C        X        M        R
                0        0        0      500

   END OF STUDY YEAR 1997

          -- OPERATING COST FOR ONE OR MORE ACTIVITIES
               IN THIS STUDY PROVIDED BY USER --
```

Figure 7-9. LPIE2 Problem Analysis Summary for DA 1818

****
*3. PROJECTION OF ANNUAL ACTIVITY LEVELS *
****

OCT 01, 1984

HILLDALE WIRE CENTER

WC: HILLDALE
EAA: 1820
DA: 1818

STUDY BEGINS: JAN, 1984
HQ FILE : HQFILE
PROB FILE : HILL2

ALTERNATIVE : PHYSICAL REHAB

ACTIVITY	CURRENT LEVEL	PROJECTED ANNUAL LEVELS OF ACTIVITIES 1984	1985	1986	1987	1988
LST	4	5.	5.	5.	5.	6.
WOL	3	3.	4.	4.	4.	4.
BCT	12	14.	15.	15.	16.	18.
CDP	3	3.	4.	4.	4.	4.
RTC	4	5.	5.	5.	5.	6.
SOD	3	3.	2.	1.	2.	2.
ODF	7	8.	4.	3.	4.	4.
OAC	9	10.	5.	4.	4.	4.
1-6	13	15.	10.	9.	10.	12.
7A	1	1.	1.	1.	1.	1.
7B	15	17.	4.	1.	1.	1.
8-9	4	5.	3.	3.	3.	3.
ANNUAL OPERATING COST/PAIR	$ 18.36	18.36	10.30	7.90	8.12	8.31
TOTAL DA OPERATING COST	$4828.34	5434.18	3389.47	2859.36	3208.16	3556.95

SOURCE OF IMPROVEMENT ESTIMATES : LPIE

SUMMARY OF ALTERNATIVE

INVESTMENT	IN-SERVICE DATE	COSTS C	X	M	R
FIRST	FEB 1985	5608.	0.	2140.	3990.

Figure 7-10. Projection of Annual Activity Levels—Physical Rehab (DA 1818)

```
**********************************************
*3. PROJECTION OF ANNUAL ACTIVITY LEVELS *
**********************************************

                    OCT 01,  1984

HILLDALE WIRE CENTER

        WC: HILLDALE              STUDY BEGINS: JAN,  1984
       EAA: 1820                  HQ   FILE   : HQFILE
        DA: 1818                  PROB FILE   : HILL2

                  ALTERNATIVE : SAC C
                  -------------

              CURRENT   PROJECTED ANNUAL LEVELS OF ACTIVITIES
ACTIVITY      LEVEL     1984      1985      1986      1987      1988
  LST           4        5.        1.        1.        1.        1.
  WOL           3        3.        1.        0.        0.        0.
  BCT          12       14.        4.        2.        2.        3.
  CDP           3        3.        1.        0.        0.        1.
  RTC           4        5.        1.        1.        1.        1.
  SOD           3        3.        1.        0.        0.        1.
  ODF           7        8.        3.        1.        2.        2.
  OAC           9       10.        3.        2.        2.        2.
  1-6          13       15.       10.        9.       10.       11.
   7A           1        1.        1.        1.        1.        1.
   7B          15       17.        3.        0.        0.        0.
  8-9           4        5.        3.        3.        3.        3.

 ANNUAL
OPERATING $  18.36     18.36      7.32      4.64      4.90      5.11
COST/PAIR

TOTAL DA
OPERATING $4828.34  5434.18   2407.74   1681.29   1934.72   2188.14
   COST

          SOURCE OF IMPROVEMENT ESTIMATES : LPIE


                  SUMMARY OF ALTERNATIVE
                  ----------------------

                IN-SERVICE                    COSTS
  INVESTMENT      DATE          C        X        M        R
  FIRST         FEB 1985     15146.      0.     3050.    3990.
```

Figure 7-11. Projection of Annual Activity Levels—SAC C (DA 1818)

```
*****************************************
*3. PROJECTION OF ANNUAL ACTIVITY LEVELS *
*****************************************

                    OCT 01,  1984

HILLDALE WIRE CENTER

        WC: HILLDALE              STUDY BEGINS: JAN,  1984
       EAA: 1820                  HQ   FILE   : HQFILE
        DA: 1818                  PROB FILE   : HILL2

                  ALTERNATIVE : SAC B
                  -------------

             CURRENT   PROJECTED ANNUAL LEVELS OF ACTIVITIES
ACTIVITY     LEVEL     1984      1985      1986      1987      1988
  LST            4       5.        1.        0.        0.        0.
  WOL            3       3.        1.        0.        0.        0.
  BCT           12      14.        4.        2.        2.        2.
  CDP            3       3.        1.        0.        0.        0.
  RTC            4       5.        1.        1.        1.        1.
  SOD            3       3.        1.        0.        0.        1.
  ODF            7       8.        2.        1.        1.        2.
  OAC            9      10.        3.        1.        1.        1.
  1-6           13      15.        8.        6.        7.        8.
   7A            1       1.        1.        1.        1.        1.
   7B           15      17.        3.        0.        0.        0.
  8-9            4       5.        2.        1.        2.        2.

 ANNUAL
OPERATING $  18.36    18.36      5.93      3.13      3.44      3.71
COST/PAIR

TOTAL DA
OPERATING $4828.34  5434.18   1951.99   1134.39   1360.53   1586.68
   COST

              SOURCE OF IMPROVEMENT ESTIMATES : LPIE


                    SUMMARY OF ALTERNATIVE
                    ----------------------

                  IN-SERVICE                    COSTS
   INVESTMENT       DATE          C        X        M        R
   FIRST         FEB 1985      26399.       0.    7060.    2700.
```

Figure 7-12. Projection of Annual Activity Levels—SAC B (DA 1818)

8 District User Error Analysis

This analysis describes Data Check output and lists error messages applying to every Problem File. Each message is interpreted and illustrated by a specific example to guide you in analyzing errors and taking corrective action.

8.1 Data Check Output

The Data Check module generates an appropriate message for each error it detects. For example, suppose a line ID cannot be identified by Data Check because the ID has been misspelled or omitted. This is an error, for which Data Check generates the error message

GEN-1F: UNRECOGNIZABLE LINE IDENTIFICATION

The message consists of a code (GEN-1F:) and an error statement (UNRECOGNIZABLE LINE IDENTIFICATION). In the code, GEN refers to the General (GEN) Error Message List. GEN-1 is the first message in the list. The letter F indicates a fatal error, one of the two types of errors:

- Fatal error (F)—an error that stops the program; LPIE2 does not run a file containing a fatal error. If you incur a fatal error, you must correct it before you can proceed with the program.
- Warning (W)—a non-fatal error; the program detects some unusual condition, which does not stop the program. Nevertheless, you should investigate whether the error would impair an economic evaluation if it remains in the file. If it would impair an evaluation, correct it.

A colon (:) ends the error message code and introduces the statement describing the error. In some messages, the statement specifies the line ID, field number, or field entry to pinpoint the error or to relate fields; for example,

GEN-10F: REPEATED STDY LINE

The error in this case is that the STDY line is repeated (but only one is allowed in a Problem File). If a CURL line were repeated, then the message would be

GEN-10F: REPEATED CURL LINE

In general, the error of a repeated line can be expressed

GEN-10F: REPEATED * LINE

using an asterisk as place holder for any specific line ID. In all messages lists, then, an asterisk is the place holder for a line ID, field number, or field entry that would be specified in actual Data Check output.

Two message lists apply to the Problem File:

- General (GEN) Error Message List—contains messages, coded GEN-1, GEN-2, and so on, that may apply to erroneous entries in any of the three LPIE2 files, for example,

  GEN-1F: UNRECOGNIZABLE LINE IDENTIFICATION

- Problem (PRB) File Error Message List—contains messages, coded PRB-1, PRB-2, and so on, that may apply only to erroneous entries in a PRB file. For example,

  PRB-14F: UNRECOGNIZABLE ALTERNATIVE INVESTMENT *

  In Data Check output, a PRB-14 message will specify the particular alternative-investment code applying in the given case.

The Data Check has another way of pinpointing errors other than specifying line ID, field number, or entry. The output may include the entire data line containing error(s), displayed exactly as you entered it. In some cases, a marker (a capital letter) is printed under the first character of the erroneous entry (either line ID or field) and also in front of the appropriate error message.

```
REHB:REN,16,300,560,,,,1,2,,,R1
              A
-A- GEN-12F:  ENTRY IN FIELD IS OUT OF RANGE

REHAB:REN,16,30,560,,,,1,2,,,R1

*** GEN-1F:  UNRECOGNIZABLE LINE IDENTIFICATION
```

The marker in front of the error message is set off with hyphens (-A-). Where no marker is used, the error message is preceded by three asterisks (***).

8.2 General (GEN) Error Message List

General error messages cover general deviations from program formats concerning line identification, number of lines allowed, field count, mandatory entries, data form, entry size, and valid range of data values. The Data Check inspects the Problem File, line by line, to detect deviations from program constraints. Failure to pass a check results in an error message or warning. General error messages are as follows.

GEN-1F: UNRECOGNIZABLE LINE IDENTIFICATION

Interpretation: This is a fatal error. The line identifier (line ID) cannot be identified as entered. It apparently doesn't match any valid LPIE2 line ID in the Problem File, namely (in alphabetical order), ALTN, AREA, CNRP, CURL, ELIM, EQCR, IDEN, INVT, PIG1, PIG2, PIL1, PIL2, OPTN, PRNT, REHB, RENV, STDY. Since field values cannot be identified, no processing can take place; the program stops. Valid line IDs are preprinted on the input worksheets, so the error probably occurred in copying or typing during the terminal session.

Example:
REHAB: REPLC,7,Y,4640,,,,,,,U1

*** GEN-1F: UNRECOGNIZABLE LINE IDENTIFICATION

A casual slip turned REHB into REHAB. Be sure to avoid colon shifts resulting in errors like REH:B, which Data Check cannot interpret.

GEN-2F: MANDATORY * LINE MISSING

Interpretation: This is a fatal error. The * would be replaced by a specific line ID in Data Check output. One of the following mandatory data lines is missing from a Problem File: ALTN, AREA, IDEN, INVT, STDY. The line may have been omitted when the file was entered or misspelled during entry (also producing a GEN-1 error).

Example: MANDATORY INFO LINE MISSING

The line may have been passed over when typing. Check input worksheets against file displays at the terminal.

GEN-3F: LINE IDENTIFICATION WITHOUT FIELD(S)

Interpretation: This is a fatal error. The line ID was entered without the field data.

Example: OPTN:

*** GEN-3F: LINE IDENTIFICATION WITHOUT FIELDS

Probably the empty line was entered by mistake since it is optional. Another possibility is that the line ID was entered, the RETURN key was hit by mistake, the complete line was correctly entered, and the empty line was *not* deleted. If there were no data to enter, the line ID should not have been entered. On the other hand, the data may have been inadvertently omitted on the worksheet.

GEN-4F: TOO MANY DATA FIELDS

Interpretation: This is a fatal error. More fields were entered than the program allows for a given data line. Thus the Data Check field count doesn't agree with the number of fields read, and data values cannot be identified.

Example:
STDY: 1980,.013,14,500,400,199,53,54,7,5, BUR, PIC

*** GEN-4F: TOO MANY DATA FIELDS

The decimal point in field 9—with correct value 7.5—was entered at the terminal as a comma. Data Check counted the comma as an extra field.

GEN-5F: MANDATORY FIELD MISSING ON LINE

Interpretation: This is a fatal error. In the displayed line, the field check shows a missing data entry required by the program.

Example: ALTN: R

*** GEN-5F: MANDATORY FIELD MISSING ON LINE

The alternative name (field 2) was omitted. A missing mandatory field may result in more than the single GEN-5 message. See Subsection 8.3, Multiple Error Messages.

GEN-6F: ENTRY HAS MORE CHARACTERS THAN THE FIELD SIZE ALLOWS

Interpretation: This is a fatal error caused by exceeding the maximum field size (maximum number of characters per field). (Don't confuse field size with valid range, which refers to data value.)

Example: STDY: 1980,1.317,14,500,199,53,54,7.5,BUR,PIC
A

-A- GEN-6F: ENTRY HAS MORE CHARACTERS
THAN THE FIELD SIZE ALLOWS

The maximum field size of field 2 (ad valorem tax rate) is 4, including decimal point. The marked field contains 5 characters since the decimal was not rounded off to 1 place.

GEN-7F: NO DECIMAL ALLOWED IN A WHOLE NUMBER FIELD

Interpretation: This is a fatal error caused by a wrong entry form. A decimal (real number) was entered in a field requiring a whole number (integer).

Example:
STDY: 1980,1.3,14.6,500,400,199,53,54,7.5,BUR,PIC
A

-A- GEN-7F: NO DECIMAL ALLOWED IN
A WHOLE NUMBER FIELD

The decimal 14.6 is wrong because only a whole number is allowed in field 3 (pair growth). Growth should be expressed as a number of pairs, ***not a rate.***

GEN-8F: INVALID CHARACTER IN A NUMBER FIELD

Interpretation: This is a fatal error. A character other than a numeral, decimal point, or minus sign was entered in a field requiring a whole number or a decimal.

Example: PIL2:U1,0,2,2,i,2,,1
A

-A- GEN-8F: INVALID CHARACTER IN A NUMBER FIELD

The number 1 (one) was entered as the letter i. (Another common mistake is the letter O instead of the number zero.)

GEN-9F: INVALID ENTRY IN FIELD(S)

Interpretation: This is a fatal error. An entry of the wrong form was detected in one or more fields, particularly in a field requiring one of a specific set of characters (numeric fields are covered by GEN-7 and GEN-8).

Example: INVT: C1,Y,64,600,JUNE,1982
A

-A- GEN-9F: INVALID ENTRY IN FIELD

Month names must be the 3-character abbreviations listed in the input specifications for USER 3, hence JUN instead of JUNE.

GEN-10F: REPEATED * LINE

Interpretation: This is a fatal error. Identical data lines with the given ID (*) were entered in the Problem File.

Example: CURL: 10,0,0,0,0,0,13,0,4,32,0,37,0,2,13
CURL: 10,0,0,0,0,0,13,0,4,32,0,37,0,2,13

*** GEN-10F: REPEATED CURL LINE

Two CURL lines may have been entered by mistake; only one is needed in a Problem File.

GEN-11F: LINE EXCEEDS 80 CHARACTERS

Interpretation: This is a fatal error. There are more characters in the line (including spaces between words and punctuation) than the maximum 80 characters.

Example: IDEN: EL DORADO BELL NORTHERN DISTRICT+
PROBLEM 6/18/81 UPDATE FOR+
ESTIMATES BY RJJ 6/25/81

GEN-11F: LINE EXCEEDS 80 CHARACTERS

The problem identification on the IDEN line (USER 2) should not be more than 63 characters. Brevity is best. The problem identification could be stated briefly as PROFILE W/ESTIMATES BY RJJ, using the Problem File name. The run date is automatically printed on output, so reruns are thus distinguished.

GEN-12F: ENTRY IN FIELD IS OUT OF RANGE

Interpretation: This is a fatal error. The value entered is not in the range (within the specified limit) for that field.

Example:
REHB:REN,16,300,560,,,,1,2,,,R1
A

-A- GEN-12F: ENTRY IN FIELD IS OUT OF RANGE

In field 4 (remaining life), the value should have been 30, but an extra zero was entered in typing. (The range is 0 through 99.)

8.3 Problem (PRB) File Error Message List

Problem File error messages apply to data lines and fields only in a Problem File. They cover particular fields on Problem File data lines and relationships between fields. Failure to pass a check results in an error message or warning. Problem File error messages are as follows.

PRB-1F: ASSIGNED PAIRS (FIELD 6) PLUS DEFECTIVE PAIRS (FIELD 7) MUST BE < = DISTRIBUTION PAIRS (FIELD 4)

Interpretation: On the STDY line (USER 2), it is a fatal error if the sum of the assigned pairs plus defective pairs is greater than (>) the number of available distribution pairs.

Example: STDY:1980,.012,14,500,400,199,553,54,7.5,BUR,PIC
A

-A- PRB-1F: ASSIGNED PAIRS (FIELD 6) PLUS DEFECTIVE PAIRS (FIELD 7) MUST BE <= DISTRIBUTION PAIRS (FIELD 4)

The relation 199 + 553 > 500 is invalid. Check the worksheet entries.

PRB-2W: PLANT TYPE FIELD 10 IS BLANK. AERIAL CABLE IS ASSUMED.

PRB-3W: PLANT TYPE FIELD 11 IS BLANK. PIC INSULATION IS ASSUMED.

Interpretation: On the STDY line (USER 2), if either field 10 or 11 is missing, a warning is generated. The default value, noted in the warning, is assumed by the program. If the default value does not accurately represent the DA being studied, then enter the suitable value.

Example: STDY:1980,.012,14,500,400,100,53,54, 7.5

*** PRB-2W: PLANT TYPE FIELD 10 IS BLANK.
AERIAL CABLE IS ASSUMED.
*** PRB-3W: PLANT TYPE FIELD 11 IS BLANK.
PIC INSULATION IS ASSUMED

Note: The combination BUR PULP is erroneous; see PRB-26F.

PRB-4W: CURL LINE MISSING. ASSUMING ZERO INITIAL ACTIVITY LEVELS

Interpretation: This warning is to remind you that the CURL line (USER 2) is normally entered to provide baseline (current) activity levels. Since the default values assumed by the program are zero in each field, the economic evaluation would be distorted. Take this opportunity to enter the CURL line with the current levels of activities that occurred in the DA.

PRB-5F: SPECIAL STUDY NAME ON OPTN FIELD * MUST BE THE SAME AS ONE OF THE NAMES ON THE SPCL LINE OF THE HQ FILE

Interpretation: On the OPTN line (USER 2), it is a fatal error if a special study name in field 6 or 8 or 10 (*) does not match any special study name in the HQ File, SPCL line, field 1, 3, or 5.

Example: No data line is displayed.

*** PRB-5F: SPECIAL STUDY NAME ON OPTN FIELD 6 MUST
BE THE SAME AS ONE OF THE NAMES
ON THE SPCL LINE OF THE HQ FILE

To correct the error, first check the USER 2 worksheet; the name may have been incorrectly entered into the computer. You may have to check the formatted HQ File listing (HQLIST run option) to obtain the exact name.

PRB-6F: SINCE SPECIAL STUDY ACTIVITY LEVEL FIELD * HAS A VALUE, YOU MUST PROVIDE A NAME IN SPECIAL STUDY NAME FIELD *

Interpretation: On the OPTN line (USER 2), it is a fatal error if an activity level was entered in field 7 or 9 or 11 (first *) but the study name is missing on corresponding field 6 or 8 or 10 (second *). The activity number needs a name to identify it.

Example: OPTN:,2287,39,,,,18
A

-A- PRB-6F: SINCE SPECIAL STUDY ACTIVITY LEVEL FIELD 7
HAS A VALUE, YOU MUST PROVIDE
A NAME IN SPECIAL STUDY NAME
FIELD 6.

Check as in PRB-5F.

PRB-7F: SINCE SPECIAL STUDY NAME FIELD * IS PRESENT YOU MUST PROVIDE A VALUE IN SPECIAL STUDY ACTIVITY LEVEL FIELD *

Interpretation: This is a fatal error on the OPTN line (USER 2), the opposite of PRB-6F.

Example: OPTN:,2287,39,,,SLC
A

-A- PRB-7F: SINCE SPECIAL STUDY NAME FIELD 6 IS PRESENT YOU MUST PROVIDE A VALUE IN SPECIAL STUDY ACTIVITY LEVEL FIELD 7.

PRB-8F: SINCE POST IMPROVEMENT LEVEL DATA ARE PROVIDED IN PIL2 FIELD * YOU MUST PROVIDE A VALUE IN SPECIAL STUDY ACTIVITY LEVEL (OPTN FIELD *)

Interpretation: This is a fatal error on the OPTN line (USER 2). An estimate is present on the PIL2 line (USER 4), field 9 or 10 or 11 (first *) but the current activity level is missing on the OPTN line, field 7 or 9 or 11 (second *). Fields correspond according to study number (e.g., Study 1 = PIL2, field 9, and OPTN, field 7).

Example: No data line is displayed. Suppose the following lines were in the file:

PIL2:C1,1,2,2,1,2,,1,1
OPTN:,2287,39

The error message would be:

*** PRB-8F: SINCE POST IMPROVEMENT LEVEL DATA ARE PROVIDED IN PIL2 YOU MUST PROVIDE A VALUE IN SPECIAL STUDY ACTIVITY LEVEL (OPTN FIELD 7).

PRB-9F: SINCE POST IMPROVEMENT GROWTH DATA ARE PROVIDED IN PIG2 FIELD * , YOU MUST PROVIDE A VALUE IN SPECIAL STUDY ACTIVITY LEVEL (OPTN FIELD *)

Interpretation: This is a fatal error on the OPTN line (USER 2), similar to PRB-8F, but referring to an estimate on a PIG2 line (USER 4).

Example:
No data line is displayed. Suppose the following lines were in the file:

PIG2:C1,,,,,,,2
OPTN:,2289,39

The error message would be:

***PRB-9F: SINCE POST IMPROVEMENT GROWTH DATA
ARE PROVIDED IN PIG2 FIELD 9,
YOU MUST PROVIDE A VALUE IN
SPECIAL STUDY ACTIVITY LEVEL
(OPTN FIELD 7).

PRB-10W: PRNT LINE IS MISSING. ALL LPIE2 REPORTS WILL BE PRINTED.

Interpretation: This warning is to remind you that the PRNT line (USER 2) is normally entered to select among LPIE2 and CUCRIT reports. If you omit the PRNT line, only LPIE2 reports will be printed (by default).

PRB-11F: YOU HAVE ENTERED MORE THAN THE MAXIMUM (6) ALTN LINES. CHECK FOR ACCIDENTAL REPETITION AND REDUCE NUMBER OF ALTN LINES TO < = 6.

Interpretation: This is a fatal error. The program limit is 6 solution alternatives in one Problem File, hence six ALTN lines.

PRB-12F: ALTERNATIVE IS DUPLICATED ON ALTN LINE. CHANGE OR ELIMINATE THE INCORRECT CODE.

Interpretation: This fatal error refers to two identical ALTN lines (USER 3) for one alternative. The error may be accidental or may be due to the mistaken idea that since a second investment requires a second INVT line, it must require a second ALTN line as well. It doesn't; one ALTN line is good for both investments.

Example: ALTN:S,SAC AND REHAB
A

-A- PRB-12F: ALTERNATIVE IS DUPLICATED ON ALTN LINE.
CHANGE OR ELIMINATE THE INCORRECT CODE.

PRB-13F: ALTERNATIVE INVESTMENT IS DUPLICATED. CHANGE OR ELIMINATE THE INCORRECT CODE.

Interpretation: This fatal error refers to two series of ALTN and INVT lines, of CNRP, EQCR, RENV, and ELIM lines, and of PIL1, PIL2, PIG1, and PIG2 lines, with the same alternative symbol.

Example: CNRP:S,68003,705,5706
A

-A- PRB-13F: ALTERNATIVE INVESTMENT IS DUPLICATED.
CHANGE OR ELIMINATE THE INCORRECT CODE.

PRB-14F: UNRECOGNIZABLE ALTERNATIVE INVESTMENT *

Interpretation: This fatal error can occur on a REHB, INVT, CRNP, RENV, EQCR, ELIM, PIL1, PIL2, PIG1, or PIG2 line, where the given alternative-investment (*) does not match an alternative ***symbol*** on any ALTN line in the file. For example, if the alternative symbols were P, I, and U, but one of the lines specified above contained R1 (in field 1), then this message would be generated.

Example: CNRP: R1, 68003,705,5706
A

-A- PRB-14F: UNRECOGNIZABLE ALTERNATIVE INVESTMENT R1

Check corresponding lines to trace the error. Compare with USER 1A, 1B, 3, and 4 worksheets.

PRB-15W: BOTH FIRST AND SECOND INVESTMENTS FOR ALTERNATIVE * INCLUDE INTERFACE PLACEMENT.

Interpretation: This warning is to remind you that interface placement should go in one or the other investment, but not both. Check the two INVT lines (USER 3) for the given alternative (*) and consider whether a second investment is needed at all or whether one of the investments should be revised.

PRB-16W: INVT FIELD 3 POST IMPROVEMENT % OF ULTIMATE, FOR ALTERNATIVE INVESTMENT * , IS BLANK. THE VALUE WILL BE ASSUMED TO EQUAL PRE-IMPROVEMENT % OF ULTIMATE, *.

Interpretation: This warning indicates that the given item is missing on the INVT line (USER 3) for the given alternative-investment (first *). The post-improvement ultimate plant % is normally entered to define the level of conversion in an alternative. Since the field was left blank, the default value is assumed, namely, the initial % on the STDY line, field 8 (USER 2), given in the message (second *). In general, alternatives with only renovation will not change the percent of customers on ultimately sized cable. If that is the case, the blank field is a reasonable omission. If the alternative ***does*** increase the percent on ultimately sized cable, edit the file to indicate the percent on the INVT line, field 3.

PRB-17F: POST-IMPROVEMENT % ULTIMATE ON INVT FIELD 3 FOR ALTERNATIVE INVESTMENT * MUST BE > PRE-IMPROVEMENT % ULTIMATE ON STDY FIELD 8

Interpretation: It is a fatal error if the post-improvement ultimate plant % (INVT, field 3, USER 3) for the given alternative-investment (*) is less than or equal to (<=) instead of greater than (>) the initial ultimate plant % (STDY, field 8, USER 2). (The treatment should not ***reduce*** the number of customers on ultimately sized cable.)

Example: No data line is printed. Suppose the following lines were in the file:

INVT:U1,Y,46,600,MAR,1982
STDY:1980,.012,14,500,400,199,53,54,7.5

The error message would be:

*** PRB-17F: POST IMPROVEMENT % ULTIMATE ON INVT
FIELD 3 FOR ALTERNATIVE INVESTMENT
U1 MUST BE > PRE-IMPROVEMENT %
ULTIMATE ON STDY FIELD 8

Compare the USER 3 worksheet containing the C1 INVT line with the USER 2. The number may have been incorrectly entered in the computer.

INVT :	U1	,	Y	,	64	,	600	,	MAR	,	1982	
INVT :		,		,		,		,		,		

PRB-18F: YEAR OF INVESTMENT FOR ALTERNATIVE INVESTMENT * MUST OCCUR IN THE SAME YEAR OR A LATER YEAR THAN THE STUDY YEAR, STDY FIELD 1

Interpretation: This is a fatal error on the INVT line (USER 3) for the given alternative-investment (*), where the investment year as entered (field 6) is earlier than the study year.

Example: No data line is printed. Suppose the following lines were in the file:

INVT: U1,Y,46,600,MAR,1981
STDY:1982,.012,14,500,400,199,53,54,7.5

The error message would be:

*** PRB-18F: YEAR OF INVESTMENT FOR ALTERNATIVE
INVESTMENT U1 MUST OCCUR IN
THE SAME YEAR, OR A LATER YEAR
THAN THE STUDY YEAR, STDY
FIELD 1

Check the USER 3 worksheet for U1. The investment year should have been 1987, but the "seven" was read as "one."

INVT :	U1	,	Y	,	46	,	600	,	MAR	,	1987	
INVT :		,		,		,		,		,		

PRB-19F: INVESTMENT YEAR FOR ALTERNATIVE INVESTMENT * MUST OCCUR BEFORE END OF STUDY YEAR, *

PRB-20F: INVESTMENT YEAR FOR ALTERNATIVE INVESTMENT * MUST OCCUR BEFORE LPIE2 CALCULATED END OF STUDY, *

Interpretation: Either is a fatal error on the INVT line (USER 3) for the given alternative-investment (first *), where the investment as entered (field 6) falls later than the given end-of-study year (second *). The two messages correspond to two cases of deriving the end-of-study year. In PRB-19F, the user overrode the normal LPIE2- calculated end-of-study year (by entering a number in the OPTN line, field 1, USER 2). In PRB-20F, there was no override. In either case, there are two courses open: change the investment year to be earlier than the given end-of-study, or override the end-of-study year by correcting the entry in OPTN, field 1 (PRB-19F). (See Section 6, Case 2.)

Example: No data line is printed. Suppose the following lines were in the file.

```
INVT:U1,Y,64,600,MAR,2000
STDY:1980,.012,14,500,400,199,53,54,7.5
OPTN:18
```

The error message would be:

```
*** PRB-19F: INVESTMENT YEAR FOR ALTERNATIVE
             INVESTMENT U1 MUST OCCUR
             BEFORE END-OF-STUDY YEAR, 1998
```

PRB-21F: THE SECOND INVESTMENT OF ALTERNATIVE INVESTMENT * MUST OCCUR IN A LATER YEAR THAN THE FIRST INVESTMENT

Interpretation: It is a fatal error on the INVT line (USER 3) for the two alternative-investments belonging to the given alternative (*).

Example: No data line is printed. Suppose the following lines were in the file:

```
INVT:U1,Y,64,600,MAR,1982
INVT:U2,N,,500,MAR,1981
```

The error message would be:

PRB-21F: THE SECOND INVESTMENT OF ALTERNATIVE INVESTMENT U MUST OCCUR IN THE LATER YEAR THAN THE FIRST INVESTMENT.

Possible causes of error include: the dates were switched; 1981 was intended to be 1984; the second investment was intended to be made later than 1982 in view of the first investment, but the correction was never made.

PRB-22F: EITHER REHB LINES MUST BE SUPPLIED FOR ALL ALTERNATIVES, OR CNRP, RENV, EQCR, AND ELIM LINES SUPPLIED FOR EACH ALTERNATIVE. DO NOT USE BOTH.

Interpretation: This is a fatal error. A Problem File cannot contain both REHB lines (USER 1A) and SUMMARY INPUT (i.e., CNRP, RENV, EQCR, ELIM on USER 1B). Choose one or the other, and delete the lines you reject.

PRB-23F: IN REHB FIELD 3, SPECIFY EITHER A RENOVATION LIFE OR AN "N" WHEN NOT APPLICABLE.

Interpretation: On any REHB line, field 3 (USER 1A), the entry is either the number of years (remaining life for renovation) or N.

Example:
REHB:REPLACE,7,,4640,,,,,,,U1

*** PRB-23F: IN REHB FIELD 3, SPECIFY EITHER
A RENOVATION LIFE OR AN "N" WHEN
NOT APPLICABLE.

PRB-24F: MUST HAVE AT LEAST ONE ENTRY FOR C, X, M, OR R (FIELDS 4,5,6,7)

Interpretation: It is a fatal error on a REHB line (USER 1A) if no cost is entered in the allotted fields. There must be some cost (a positive dollar value). Not all fields need be entered—the treatment dictates the cost(s)—but at least one.

Example: REHB: REPLACE,7,N,,,,,,,,,U1

*** PRB-24F: MUST HAVE AT LEAST ONE ENTRY FOR C, X,
M, OR R (FIELDS 4,5,6,7)

PRB-25F: CANNOT HAVE TWO ALTERNATIVE INVESTMENT CODES WITH THE SAME ALTERNATIVE IDENTIFICATION ON ONE LINE. REPLACE OR ELIMINATE INCORRECT CODE.

Interpretation: This is a fatal error on a REHB line (USER 1A), fields 12 through 17, where both investments under an alternative are entered. The treatment on this REHB line must belong to one or the other but not both.

Example: REHB:REP,7,N,4640,,,,,,,U1,U2
A

-A- PRB-25F: CANNOT HAVE TWO ALTERNATIVE INVEST-
MENT CODES WITH THE SAME
ALTERNATIVE IDENTIFICATION ON ONE LINE.
REPLACE OR ELIMINATE INCORRECT CODE.

PRB-26F WHEN BURIED CABLE IS INDICATED IN STDY FIELD 10, PIC INSULATION IS REQUIRED IN STDY FIELD 11.

Interpretation: This is a fatal error. The combination BUR PULP does not exist. Valid combinations are AER PIC, BUR PIC, and AER PULP.

PRB-27F: ACTIVITIES ELIMINATED FOR ALTERNATIVE INVESTMENT * CANNOT BE GREATER THAN THE ORIGINAL NUMBER OF ACTIVITIES ON CURL LINE

Interpretation: This is a fatal error. It may concern activities summed by LPIE2 from all REHB lines (USER 1A) involved in alternative-investment (*) or the summary activities directly entered by the user on the ELIM line (USER 1B) for that alternative. You cannot eliminate more activities than currently occur (CURL line, fields 12 through 15, USER 2), so reduce the activities eliminated on the ELIM or REHB line(s).

Example: No data line is printed. Suppose the following lines were in the file:

CURL:7,,11,7,,,,,9,19,12,4,25,,6
ELIM:U1,4,25,,16

The error message would be:

*** PRB-27F: ACTIVITIES ELIMINATED FOR ALTERNATIVE INVESTMENT U1 CANNOT BE GREATER THAN THE ORIGINAL NUMBER OF ACTIVITIES ON CURL LINE

The relevant CURL fields show 4,25,,6. The number of 8-9 troubles eliminated is in error on the ELIM line due to a typing slip.

PRB-28F: SUPPLY MISSING ALTERNATIVE INVESTMENT CODE

Interpretation: The lines describing an alternative must be identified with that alternative-investment code. This fatal error refers to a blank field 1 on any of the lines CNRP, RENV, EQCR, ELIM (USER 1B), PIL1, PIL2, PIG1, PIG2 (USER 4), or a blank field 12 on a REHB line (USER 1A).

Example: ELIM:,4,25,,6

*** PRB-28F: SUPPLY MISSING ALTERNATIVE INVESTMENT CODE

PRB-29F: SINCE AN RENV LINE IS PRESENT FOR ALTERNATIVE INVESTMENT * , YOU MUST SUPPLY AN EQCR LINE WITH NONZERO VALUES

Interpretation: It is a fatal error if the RENV line (USER 1B) for the given alternative-investment (*) is in the file, but the corresponding EQCR line (USER 1B) is not. For renovations on a RENV line, LPIE2 requires some equivalent replacement costs (EQCR, fields 2 through 5) that are not zero. This means that C, M, or R costs could be greater than zero or that X costs could be either less than or greater than zero, or all of the above.

PRB-30F: RENV LINE PRESENT MUST HAVE > 0 VALUE FOR RENOVATION LIFE (FIELD 6)

Interpretation: It is a fatal error if a RENV line (USER 1B) in the file does not indicate a positive remaining life; that is, the file cannot have a zero in field 6, or the field missing. The implication is that the renovations are extremely short-lived or the facilities got worse rather than better; a more effective mode of rehabilitation (e.g., replacement) should have been chosen. An economic evaluation of the alternative would be distorted.

Example: RENV:R1,57,462,,3800

*** PRB-30F: RENV LINE PRESENT MUST HAVE > 0 VALUE FOR RENOVATION LIFE (FIELD 6)

PRB-31F: SINCE AN EQCR LINE IS PRESENT FOR ALTERNATIVE INVESTMENT * , YOU MUST SUPPLY AN RENV LINE WITH NONZERO VALUES

Interpretation: It is a fatal error if the EQCR line (USER 1B) for the given alternative-investment (*) is in the file but the corresponding RENV line (USER 1B) is not. For an alternative-investment containing renovations, RENV and EQCR must both be in the file. Values are as in PRB-29F.

PRB-32F: SINCE SPECIAL STUDY FIELD * ON OPTN LINE IS PRESENT, YOU MUST PROVIDE POST-IMPROVEMENT LEVEL DATA FOR PIL2 FIELD *

PRB-33F: SINCE SPECIAL STUDY FIELD * ON OPTN LINE IS PRESENT, YOU MUST PROVIDE POST-IMPROVEMENT GROWTH DATA FOR PIG2 FIELD *

Interpretation: It is a fatal error if post-improvement estimates for activity level and annual activity growth are missing in the file where a special study has been identified and has current activity level entered on the OPTN line, field 7, 9, or 11 (first *). Check USER 2 and USER 4 worksheets, and provide the appropriate activity estimates on the given PIL2 or PIG2 fields (second *).

PRB-34F: ALTERNATIVE INVESTMENT * MUST APPEAR ON A REHB LINE

Interpretation: It is a fatal error if the given alternative-investment (*)—identified in the file by ALTN and INVT, lines (USER 3)—is entirely missing from REHB lines (USER 1A), fields 12 through 17. The implication is that no treatments apply to the alternative-investment. The omission may be accidental.

PRB-35F: ALTERNATIVE INVESTMENT * REQUIRES CORRESPONDING * LINE

Interpretation: This fatal error refers to the given alternative-investment (first *), which has been identified on an ALTN line

(USER 3). The corresponding INVT line (second *) is missing, and must be entered into the file.

PRB-36F: YOU HAVE ENTERED MORE THAN THE MAXIMUM (100) REHB LINES. CHECK FOR REPETITIONS AND REDUCE NUMBER OF REHB LINES TO < = 100

Interpretation: This is a fatal error. The program limit is 100 REHB lines (USER 1A) in one Problem File. If you have separated cable treatments from terminal treatments, REHB lines tend to be numerous. You can reduce the number of REHB lines by incorporating cable and terminal treatments for a section on one REHB line, combining costs and troubles eliminated, and allowing that treatment to apply to as many alternatives (fields 12 through 17) as needed.

PRB-37F: NO COST DATA HAS BEEN PROVIDED. YOU MUST PROVIDE EITHER REHB LINES FOR ALL ALTERNATIVES OR CNRP, RENV, EQCR, AND ELIM LINES FOR EACH ALTERNATIVE

Interpretation: There can be no economic analysis without cost data. These data are supplied by either set of lines mentioned in the message. This is a fatal error to have neither REHB lines (USER 1A) nor SUMMARY DATA (CNRP, RENV, EQCR, ELIM), USER 1B. Choose one kind or the other.

PRB-38F: SECOND INVESTMENT IS INDICATED IN ALTERNATIVE INVESTMENT *. MUST SPECIFY FIRST INVESTMENT FOR THIS ALTERNATIVE.

Interpretation: This is a fatal error. The given alternative-investment (*) is recognized as the second investment (code ends with 2), but the corresponding first investment is missing in the file (its INVT line is missing). Review the situation: is this really the second investment, i.e., are there *two* investments? or is the code in error? Either supply the missing INVT line or correct the code.

PRB-39F: CANNOT HAVE TWO SPECIAL STUDIES WITH THE SAME NAME. REPLACE OR ELIMINATE INCORRECT NAME.

Interpretation: This is a fatal error on the OPTN line (USER 2) if two of the three fields 6, 8, and 10 contain the same 3-letter special-study name. Check sources.

Example: OPTN:,2287,39,,,AAA,17,AAA,32
A

-A- PRB-39F: CANNOT HAVE TWO SPECIAL STUDIES WITH
THE SAME NAME. REPLACE OR
ELIMINATE INCORRECT NAME.

PRB-40F: TOTAL C COST FOR LPIE2 COMPUTED REINFORCE, REPLACE, OR REBUILD FOR ALTERNATIVE-INVESTMENT * IS * WHICH EXCEEDS VALID RANGE

PRB-41F: TOTAL X COST FOR LPIE2 COMPUTED REINFORCE, REPLACE, OR REBUILD FOR ALTERNATIVE-INVESTMENT * IS * WHICH EXCEEDS VALID RANGE.

PRB-42F: TOTAL M COST FOR LPIE2 COMPUTED REINFORCE, REPLACE, OR REBUILD FOR ALTERNATIVE-INVESTMENT * IS * WHICH EXCEEDS VALID RANGE.

PRB-43F: TOTAL R COST FOR LPIE2 COMPUTED REINFORCE, REPLACE, OR REBUILD FOR ALTERNATIVE-INVESTMENT * IS * WHICH EXCEEDS VALID RANGE.

Interpretation: The *total* C or X or M or R cost for the given alternative-investment (first *) is some value (second *) that is out of range. Such an error may come as a surprise since ***individually*** the REHB lines (USER 1A) in the file have passed Data Check. You could assume that each C, X, M, and R treatment cost was in range. The error, however, is ***cumulative***. There are too ***many*** values or too many ***large*** values (in the upper half of the range, for example). You must adjust the data by checking the relevant entries in the REHB lines that pertain to the alternative-investment— field 4 for C costs, field 5 for X costs, field 6 for M costs, and field 7 for R costs. Too many large values may indicate errors in calculating broad-gauge costs or in typing. In the second case, consider the cumulative effect of transposing numerals or typing an extra numeral (e.g., the cost 1896 mistakenly typed as 8196 or 18960). Individual treatment costs tend to have a normal range smaller than the LPIE2 range. Thus, for example, many 5 and 6-digit C costs would be suspicious. Check the REHB lines, and correct them where you find errors.

PRB-44F: TOTAL C COST FOR LPIE2 COMPUTED RENOVATION FOR ALTERNATIVE-INVESTMENT * IS * WHICH EXCEEDS VALID RANGE.

PRB-45F: TOTAL X COST FOR LPIE2 COMPUTED RENOVATION FOR ALTERNATIVE-INVESTMENT * IS * WHICH EXCEEDS VALID RANGE.

PRB-46F: TOTAL M COST FOR LPIE2 COMPUTED RENOVATION FOR ALTERNATIVE-INVESTMENT * IS * WHICH EXCEEDS VALID RANGE.

PRB-47F: TOTAL R COST FOR LPIE2 COMPUTED RENOVATION FOR ALTERNATIVE-INVESTMENT * IS * WHICH EXCEEDS VALID RANGE.

Interpretation: Similar to that for PRB-40F through 43F.

PRB-48F: THE SUM OF 1-6 ACTIVITIES ELIMINATED BY ALTERNATIVE-INVESTMENT * IS * WHICH EXCEEDS ORIGINAL LEVEL OF CURL[12].

PRB-49F: THE SUM OF 7A ACTIVITIES ELIMINATED BY ALTERNATIVE-INVESTMENT * IS * WHICH EXCEEDS ORIGINAL LEVEL OF CURL[13].

PRB-50F: THE SUM OF 7B ACTIVITIES ELIMINATED BY ALTERNATIVE-INVESTMENT * IS * WHICH EXCEEDS ORIGINAL LEVEL OF CURL[14].

PRB-51F: THE SUM OF 8-9 ACTIVITIES ELIMINATED BY ALTERNATIVE-INVESTMENT * IS * WHICH EXCEEDS ORIGINAL LEVEL OF CURL[15].

Interpretation: The total 1-6, 7A, 7B, or 8-9 troubles eliminated by the given alternative-investment (first *) is some value (second *) that is greater than the corresponding current activity level on the CURL line (USER 2). The error is similar to PRB-27F—you cannot eliminate more troubles than currently occur—but it is ***cumulative*** for all REHB lines (USER 1A) pertaining to the alternative-investment. You must check the relevant entries respectively in REHB fields 8 through 11, and adjust the data. Check for typing errors and make sure that credit for eliminating troubles is properly assigned, e.g., reinforcements do not eliminate found troubles in existing cables.

PRB-52W: ASSIGNED PAIRS (FIELD 6) PLUS DEFECTIVE PAIRS (FIELD 7) ARE > FEEDER PAIRS (FIELD 5).

Interpretation: The number of feeder pairs (entered in problem file line stdy field 5) generally should not be less than the sum of assigned pairs (line stdy field 6) plus defective pairs (line stdy field 7). Although this situation (i.e. assigned pairs + defective pairs > feeder pairs) will not cause the LPIE2 Study Program to abort, in extreme cases it may result in negative PWEs on the LPIE2 Problem Analysis Summary Report, and the above warning message will appear. There are instances where it is valid for the assigned pairs plus defective pairs to be greater than the number of feeder pairs available, but they are few and far between. An example would be an instance where there are significantly more defective pairs on the distribution side of an existing interface than on the feeder side. Remember that your are to input your assigned and defective information based on the distribution backbone. This might cause a slightly larger number of assigned plus defective pairs than feeder pairs available. However, if this occurs, you should strongly consider the possibility that in order to solve the activities in the area you are studying, you may be more in need of feeder facilities than design rehabilitation.

PRB-53F: STATUS QUO NONDISCRETIONARY INVESTMENT MUST OCCUR IN THE SAME YEAR OR A LATER YEAR THAN THE STUDY YEAR, STDY FIELD 1.

Interpretation: This is a fatal error on the SQND data line (USER 2A) for a Status Quo Non-Discretionary investment entry where the year entered (field 6) is earlier than the study year that was entered on the USER 2 form (STDY data line, field 1). The user must change the investment year to one that is the same as or later than the study year.

PRB-54F: STATUS QUO NONDISCRETIONARY INVESTMENT MUST OCCUR BEFORE END OF STUDY YEAR XXXX.

Interpretation: This is a fatal error on the SQND data line (USER 2A) for a Status Quo Non-Discretionary investment entry where the year entered (field 6) is later than the end-of-study year. In this case, the user overrode the normal LPIE2-calculated end-of-study year (by entering a number in the OPTN line, field 1, of the USER 2 form). The user must either change the investment year to be earlier than the end-of-study year or override the end-of-study year by correcting the OPTN line, field 1, USER 2.

PRB-55F: STATUS QUO NONDISCRETIONARY INVESTMENT MUST OCCUR BEFORE LPIE2-CALCULATED END OF STUDY, XXXX.

Interpretation: This is a fatal error on the SQND data line (USER 2A) for a Status Quo Non-Discretionary investment entry where the year entered (field 6) is later than the end-of-study year. In this case, the normal LPIE2-calculated end-of-study year was used (the user did not override it). The user must either change the investment year to be earlier than the end-of-study year or override the end-of-study year by correcting the OPTN line, field 1, USER 2.

PRB-56F: ERROR - ONLY ONE COST OVERRIDE PER XXX ACTIVITY IS PERMITTED.

Interpretation: This is a fatal error on the CSTE data line. The cost of a particular activity (LST, BCT, etc.) can only be overridden once. Therefore, up to 18 CSTE lines may be entered, but only one line per activity.

PRB-57F: NUMBER OF SPECIAL STUDY ACTIVITY LEVEL GROWTH OVERRIDES (SQGR LINE) CANNOT EXCEED NUMBER OF SPECIAL STUDIES ENTERED ON OPTN LINE.

Interpretation: This is a fatal error on the SQGR data line. The user can override only those special studies that are entered on the OPTN line (fields 6, 8, and 10); therefore, the number of overrides on the SQGR line (fields 5, 6, and 7) cannot exceed those on the OPTN line.

PRB-58F: FOR THE SQGR LINE, SEVEN (7) COMMAS ARE MANDATORY.

Interpretation: This is a fatal error on the SQGR data line. Even if there are no entries in the seven fields, seven commas are necessary when the optional SQGR line is present.

8.4 Multiple Error Messages

A single error does not always necessarily result in a single error message and may, in fact, produce multiple error messages in a baffling pattern. The case of a missing mandatory field (GEN-5F) is an instructive example. Suppose that on the STDY line (USER 2), the ad valorem tax rate (field 2) was omitted. The comma separating fields 2 and 3 may or may not be entered. If the data were missing but the comma was present, the following, for example, would be generated by the Data Check:

STDY:1980,,14,500,400,199,53,54,7.5,BUR,PIC

*** GEN-5F: MANDATORY FIELD MISSING ON LINE

In this case, a single error generates a single message. Suppose, however, ***both*** the data and the comma were missing. Then, for example, the following would be generated by the Data Check:

```
STDY:1980,14,500,400,199,53,54,7.5,BUR,PIC
                                A  B   C

-A- GEN-7F: NO DECIMAL ALLOWED IN A WHOLE NUMBER FIELD

-B- GEN-8F: INVALID CHARACTER IN A NUMBER FIELD

-C- GEN-9F: INVALID ENTRY IN FIELD

*** PRB-3W: PLANT TYPE FIELD 11 IS BLANK.
                          PIC INSULATION IS ASSUMED

*** GEN-5F: MANDATORY FIELD MISSING ON LINE
```

You may be tempted to begin at the top of the error message list and correct the fields one at a time. Hold off. First scan the list. Clearly, PIC is entered. What happened? The cause of the error appears at the bottom of the list—the omission of both data and comma for field 2 shifted all remaining fields to the left, and those fields were read by the Data Check as the error messages indicate. By inserting the missing ad valorem tax rate, you can correct all the errors at once. (The GEN-5 message appears so late because of the way the Data Check is set up: messages with markers appear in field order before messages with the three-asterisk symbol.)

50 Reason for Reissue

50.1 Changes

The previous issue of this User Guide (OPA-1N347-01, Issue 2, December 1982) has been extensively revised and reformatted for this issue. The main changes are:

- Changed document number from Western Electric OSDD designation OPA-1N347-01 to Bellcore Practice number BR 936-410-110, reflecting the new organizational responsibility for the document.
- Changed the cover inserts and title page to conform to Bellcore requirements.
- Added the proprietary restriction notice at the bottom of every page as required by Bellcore for loose-leaf documents.
- Made extensive changes in text and figures to reflect enhancements provided in LPIE2 Version 2.0. The most extensive changes involved the addition of information for three new options, and a new data entry form (USER 2A). The new options are:
  - Cost Entry (CSTE)
  - Status Quo Growth Rate (SQGR)
  - Status Quo Non-Discretionary (SQND).

Appendix A. Review of Input Specifications by File

The LPIE2 input specifications are listed in tabular format for the Economic File (Table A-1), the Cost Factor File (Table A-2), and the Problem File (Table A-3). The column headings (abbreviated in the actual tables) are:

- **Line ID**—the four-character data line identifier
- **Field**—the field number, in sequential order
- **Description**—the field name, as on the input worksheet
- **M/O**—status of the field entry, whether mandatory (m) or optional (o). "Mandatory" indicates that the field must be entered or the program will not run (and a fatal error message is generated). "Optional" indicates that the program will run if the field is not entered since a default value is automatically supplied by the program. However, "optional" does not necessarily grant the user a "free" choice (i.e., without serious consequences). For example, the CURL (current activity level) data line is optional, but ***should*** be entered to provide key data for the study. On the other hand, PIL1, PIL2 (post-improvement activity levels) and PIG1, PIG2 (post-improvement annual activity growth) are optional and ***may*** be entered if the user wishes (USER 4).
- **Length**—the maximum number of characters allowed for the field entry
- **Type**—entry form; whether the entry must be alphanumeric (a), a real (r) number, i.e., a decimal number, or an integer (i), i.e., a whole number
- **Range**—the range of character values that LPIE2 accepts for each field
- **Default**—the default value assigned by the program to the field and assumed if the field is left blank by the user. The symbol 0 indicates that the value is zero; the term "none" indicates that ***no default value*** has been assigned.

Table A-1

Economic File Input Specifications

Id	Fld	Descrptn	M/O	Lth	Tp	Rnge	Deflt
ermk	1-63	economic remark line	o	63	a	anything	none
econ	1	dir-debt interest rate	m	5	r	0<=x<=.25	none
	2	dr-debt ratio	m	5	r	0<=x<=1.0	none
	3	ltr-labor trend rate	m	5	r	0<=x<=.25	none
	4	idc-interest during construction rate	o	5	r	0<=x<=.25	0
	5	dor-division of revenue	o	5	r	0<=x<=.25	0
	6	sit-state income tax rate	m	5	r	0<=x<=.20	none
	7	yrs-years in income statement	o	2	i	0<=x<=10	0
	8	lifeop-life option	m	1	i	*x=0,1,2 x=2	none
	9	sitop-state income tax option	m	1	i	x=0,1	none
	10	com-cost of money	m	5	r	0<=x<=.25	none
	11	itc-investment tax credit rate	m	5	r	0<=x<=.25	none
	12	fit-federal income tax rate	m	5	r	0<=x<=.75	none
	13	nor-normalization option	m	1	i	x=0,1	none
aer1	1	account code 22 aer	m	7	a	242-22x	none
	2	ctr-capital trend rate	m	5	r	0<=x<=.25	none
	3	adr-guideline life	m	2	i	3<=x<=45	none
	4	t/b-tax/book ratio	m	5	r	*0.<=x<=1. .5<=x<=1.	none
	5	asl-average service life	m	7	r	*0<=x<=99. .0834<=x<=60.	none
	6	%ags-average gross salvage percent	m	5	r	0<=x<=9.99	none
	7	%acor-average cost of removal percent	m	5	r	0<x<=9.99	none
	8	adr class code	o	2	i	0<=x<=26	none
burd	1	account code 45 bur	m	7	a	242-45x	none
	2	ctr-capital trend rate	m	5	r	0<=x<=.25	
	3	adr-guideline life	m	2	i	4<=x<=45	none
	4	t/b-tax/book ratio	m	5	r	*0<=x<=1. .5<=x<=1.	none
	5	asl-average service life	m	7	r	*0<=x<=99. .0834<=x<=60.	none
	6	%ags-average gross salvage percent	m	5	r	0<=x<=9.99	none
	7	%acor-average cost of removal percent	m	5	r	0<=x<=9.99	none
	8	adr class code	o	2	i	0<=x<=26	none

* This bound is further restricted by the CUCRIT Subsystem.

Table A-2

Cost Factor File Input Specifications

Id	Fld	Descrptn	M/O	Lth	Tp	Rnge	Deflt
crmk	1-63	cost data remark line	o	63	a	anything	none
cst1	1	lst-line and station transfer cost	m	6	r	0<=x<=999.99	none
	2	wol-wire out of limits operating cost	m	6	r	0<=x<=999.99	none
	3	bct-break connect through	m	6	r	0<=x<=999.99	none
	4	cdp-clear defective pair	m	6	r	0<=x<=999.99	none
	5	bpc-break permanent connection	m	6	r	0<=x<=999.99	none
	6	cir-change inter-connect record	m	6	r	0<=x<=999.99	none
	7	re-referral to engineering	m	6	r	0<=x<=999.99	none
	8	rtc-reterminate connection	m	6	r	0<=x<=999.99	none
cst2	1	sod-service order defective	m	6	r	0<=x<=999.99	none
	2	odf-other defective	m	6	r	0<=x<=999.99	none
	3	oac-other assignment change	m	6	r	0<=x<=999.99	none
	4	1-6-found cable trouble sheath break	m	6	r	0<=x<=999.99	none
	5	7a-found cable trouble splicing	m	6	r	0<=x<=999.99	none
	6	7b-found cable trouble terminating	m	6	r	0<=x<=999.99	none
	7	8-9-found cable trouble core	m	6	r	0<=x<=999.99	none
	8	cpt-cable pair transfer throw	m	6	r	0<=x<=999.99	none
	9	vfp-value of a feeder pair	m	6	r	0<=x<=999.99	none
spc1	1	special study name	o	3	a	any 3 letters	none
	2	special study cost	o	7	r	0<=x<=9999.99	0
	3	special study name	o	3	a	any 3 letters	none
	4	special study cost	o	7	r	0<=x<=9999.99	0
	5	special study name	o	3	a	any 3 letters	none
	6	special study cost	o	7	r	0<=x<=9999.99	0

Table A-3

Problem File Input Specifications

Id	Fld	Descrptn	M/O	Lth	Tp	Rnge	Deflt
iden	1-63	identification	m	63	a	anything	none
area	1	wc-wire center name	m	12	a	anything	none
	2	eaa-existing aa	m	12	a	anything	none
	3	da-distribution area	m	12	a	anything	none
stdy	1	study year	m	4	i	1975<=x<=2000	none
	2	avt rate	m	4	r	0<=x<=99.9	none
	3	pair growth	m	4	i	0<x<=9999	none
	4	distribution pairs	m	5	i	1<x<=99999	none
	5	available pairs	m	5	i	0<=x<=99999	none
	6	assigned pairs	m	5	i	1<=x<=99999	none
	7	defective pairs	m	5	i	0<=x<=99999	none
	8	% ultimate before	m	3	i	0<=x<=100	none
	9	distance to wc	m	4	r	0<=x<=99.0	none
	10	plant type (structure)	o	3	a	bur/aer	aer
	11	plant type (insulation)	o	4	a	pic/pulp	pic
curl	1	1st level	o	3	i	0<=x<=999	0
	2	wol level	o	3	i	0<=x<=999	0
	3	bct level	o	3	i	0<=x<=999	0
	4	cdp level	o	3	i	0<=x<=999	0
	5	bpc level	o	3	i	0<=x<=999	0
	6	cir level	o	3	i	0<=x<=999	0
	7	re level	o	3	i	0<=x<=999	0
	8	rtc level	o	3	i	0<=x<=999	0
	9	sod level	o	3	i	0<=x<=999	0
	10	odf level	o	3	i	0<=x<=999	0
	11	oac level	o	3	i	0<=x<=999	0
	12	1-6 level	o	3	i	0<=x<=999	0
	13	7a level	o	3	i	0<=x<=999	0
	14	7b level	o	3	i	0<=x<=999	0
	15	8-9 level	o	3	i	0<=x<=999	0
optn	1	study duration	o	2	a	2<=x<=20	LPIE2
	2	c cost	o	5	i	0<=x<=99999	0
	3	x cost	o	6	i	-99999<=x<=99999	0
	4	m cost	o	5	i	0<=x<=99999	0
	5	r cost	o	5	i	0<=x<=99999	0
	6	special name	o	3	a	anything	none
	7	ss level	o	3	i	0<=x<=999	0
	8	special name	o	3	a	anything	none
	9	ss level	o	3	i	0<=x<=999	0
	10	special name	o	3	a	anything	none
	11	ss level	o	3	i	0<=x<=999	0
prnt	1	print codes	o	3	a	any of following all,crt,lpi prb,rpt,exc cre,cfd,dps	lpi
altn	1	alternative id	m	1	a	anything	none
	2-16	alternative descr	m	15	a	anything	none

Table A-3 (Continued)

Problem File Input Specifications

Id	Fld	Descrptn	M/O	Lth	Tp	Rnge	Deflt
invt	1	altn-invest id	m	2	a	any,1 or 2	none/1
	2	interface?	m	1	a	y/n	none
	3	%ultimate after	o	3	i	0<=x<=100	stdy(8)
	4	distribution pairs if interface placed	o	5	i	1<x<=99999	stdy(4)
	5	month completed	o	3	a	jan,feb,mar apr,may,jun jul,aug,sep oct,nov,dec	jan
	6	yr completed	m	4	i	1981<=x<=3000	none
cnrp	1	altn-invest id	o	2	a	any,1 or 2	none/1
	2	c-construction $	o	6	i	0<=x<=999999	0
	3	x-removal $	o	6	i	-99999<=x<=99999	0
	4	m-rearrangement $	o	5	i	0<=x<=99999	0
	5	r-repair $	o	5	i	0<=x<=99999	0
renv	1	altn-invest id	o	2	a	any,1 or 2	none/1
	2	c	o	6	i	0<=x<=999999	0
	3	x	o	6	i	-99999<=x<=99999	0
	4	m	o	5	i	0<=x<=99999	0
	5	r	o	5	i	0<=x<=99999	0
	6	life	o	2	i	0<=x<=99	0
eqcr	1	altn-invest id	o	2	a	any,1 or 2	none/1
	2	c	o	6	i	0<=x<=999999	0
	3	x	o	6	i	-99999<=x<=99999	0
	4	m	o	5	i	0<=x<=99999	0
	5	r	o	5	i	0<=x<=99999	0
elim	1	altn-invest id	o	2	a	any,1 or 2	none/1
	2	1-6 activities eliminated by rehab	o	3	i	0<=x<=999	0
	3	7a activities eliminated by rehab	o	3	i	0<=x<=999	0
	4	7b activities eliminated by rehab	o	3	i	0<=x<=999	0
	5	8-9 activities eliminated by rehab	o	3	i	0<=x<=999	0
pill	1	altn-invest id	o	2	a	any,1 or 2	none/1
	2	1st post level	o	3	i	0<=x<=999	LPIE2
	3	wol post level	o	3	i	0<=x<=999	LPIE2
	4	bct post level	o	3	i	0<=x<=999	LPIE2
	5	cdp post level	o	3	i	0<=x<=999	LPIE2
	6	bpc post level	o	3	i	0<=x<=999	LPIE2
	7	cir post level	o	3	i	0<=x<=999	LPIE2
	8	re post level	o	3	i	0<=x<=999	LPIE2
	9	rtc post level	o	3	i	0<=x<=999	LPIE2

Table A-3 (Continued)

Problem File Input Specifications

Id	Fld	Descrptn	M/O	Lth	Tp	Rnge	Deflt
pil2	1	altn-invest id	o	2	a	any,1 or 2	none/1
	2	sod post level	o	3	i	0<=x<=999	LPIE2
	3	odf post level	o	3	i	0<=x<=999	LPIE2
	4	oac post level	o	3	i	0<=x<=999	LPIE2
	5	1-6 post level	o	3	i	0<=x<=999	LPIE2
	6	7a post level	o	3	i	0<=x<=999	LPIE2
	7	7b post level	o	3	i	0<=x<=999	LPIE2
	8	8-9 post level	o	3	i	0<=x<=999	LPIE2
	9	ss1 post level	o	3	i	0<=x<=999	0
	10	ss2 post level	o	3	i	0<=x<=999	0
	11	ss3 post level	o	3	i	0<=x<=999	0
pig1	1	altn-invest id	o	2	a	any,1 or 2	none/1
	2	1st post growth	o	3	i	0<=x<=999	LPIE2
	3	wo1 post growth	o	3	i	0<=x<=999	LPIE2
	4	bct post growth	o	3	i	0<=x<=999	LPIE2
	5	cdp post growth	o	3	i	0<=x<=999	LPIE2
	6	bpc post growth	o	3	i	0<=x<=999	LPIE2
	7	cir post growth	o	3	i	0<=x<=999	LPIE2
	8	re post growth	o	3	i	0<=x<=999	LPIE2
	9	rtc post growth	o	3	i	0<=x<=999	LPIE2
pig2	1	altn-invest id	o	2	a	any,1 or 2	none/1
	2	sod post growth	o	3	i	0<=x<=999	LPIE2
	3	odf post growth	o	3	i	0<=x<=999	LPIE2
	4	oac post growth	o	3	i	0<=x<=999	LPIE2
	5	1-6 post growth	o	3	i	0<=x<=999	LPIE2
	6	7a post growth	o	3	i	0<=x<=999	LPIE2
	7	7b post growth	o	3	i	0<=x<=999	LPIE2
	8	8-9 post growth	o	3	i	0<=x<=999	LPIE2
	9	ss1 post growth	o	3	i	0<=x<=999	0
	10	ss2 post growth	o	3	i	0<=x<=999	0
	11	ss3 post growth	o	3	i	0<=x<=999	0
rehb	1	comment	o	7	a	anything	none
	2	plant item no.	m	4	i	0<=x<=9999	none
	3	life/not applic	m	2	a	1<=x<=99,N	none
	4	C cost	o	6	i	0<=x<=999999	0
	5	X cost	o	6	i	-99999<=x<=99999	0
	6	M cost	o	5	i	0<=x<=99999	0
	7	R cost	o	5	i	0<=x<=99999	0
	8	1-6 activities elim	o	3	i	0<=x<=999	0
	9	7A activities elim	o	3	i	0<=x<=999	0
	10	7B activities elim	o	3	i	0<=x<=999	0
	11	8-9 activities elim	o	3	i	0<=x<=999	0
	12	alternative	m	1	a	anything	none
		investment iden	o	1	i	1,2	1
	13-17	alternative	o	1	a	anything	none
		investment iden	o	1	i	1,2	1

Appendix B. Related Documents Listing

Companion Documents

Loop Plant Improvement Evaluator 2 (LPIE2) System Description, OPD-1N347-01*. An executive overview of LPIE2 for company, district and TNOP center management.

Rehabilitation Guidelines for the Distribution Plant, BSP 917-601-110*. The FAP procedure for performing a detailed DA study and developing solution alternatives, prior to evaluating alternatives with LPIE2.

Information Support

Generic Remote Data Entry System (RDES) User Guide, OPA-2Y000-01*. Procedures for using RDES commands to enter file data, edit files, and activate LPIE2.

CUCRIT User's Guide. Description of CUCRIT economic analysis, input procedures, and output reports. See also GL 77-09-081*.

Plant Cost Results Plan, Form E-5300-201. The source for the value of a feeder pair, a necessary LPIE2 item required for the Cost Factor File.

Rehabilitation Budgeting (REBUD) User Guide. Attached to GL 78-06-043A*.

Facility Analysis Plan (FAP) Cost Factors, IL 80-11-408*. Transmits the results of a System Cost Factor Study made during 1978-1980, for use in the costing and economic evaluation phases of the Facility Analysis Plan (FAP).

Cost of Capital for Economic Selection Studies, RL 81-04-071*. Recommends an increased cost of capital and correlated inflation treatment in economic selection studies.

Economic Alternative Selection for Outside Plant (EASOP) User Guide, PA-1N200*. An economic study tool for outside plant engineering, using the CUCRIT Subsystem to calculate PWE for alternative plans reflecting plant changes, including removals, rearrangements, installations, and maintenance activities.

Method System Background

Long Range Outside Plant Plan (LROPP)—Overview, BSP 900-350-200*. The basic method system, including wire center sectionalization.

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* These are pre-divestiture documents that provide currently useful information (latest available information).

Facility Analysis Plan (FAP)—Overview, BR 936-400-001. General background information for relating LATIS, the Rehabilitation Guidelines method, LPIE2, and FAP decision making using LPIE2 output.

Responsibilities of the Facility Analysis Plan (FAP) Engineer, BR 936-400-003. Detailed use of the LPIE2 Problem Analysis Report (containing economic evaluators) and Projections report (in FAP follow up procedures).

Responsibilities of the Facility Analysis Plan (FAP) Steering Committee, BR 936-400-002. The role of the District Steering Committee in FAP investment decision making.

Loop Activity Tracking Information System (LATIS) Overview, BR 901-660-100. Information on LATIS tracking processes.

LATIS Output User Guide, BR 901-660-104. Information on LATIS output reports.

Distribution Design and Planning

Detailed Distribution Area Planning (DDAP), BSP 901-350-250*. Contains information supplementing the Rehabilitation Guidelines method.

Outside Plant Design—Serving Area Concept (SAC)—General, BSP 915-251-100*; *Outside Plant Engineering— Serving Area Concept (SAC) Design—Implementing SAC In Newly Developing Areas,* BR 915-251-300. Information about SAC configurations.

Total Network Operations Plan (TNOP) Centers

Distribution Service Design Center (DSDC) Description, OCD-N7010-01*. Describes DSDC functions, interfaces, methods, and organization needed to meet the growth, modernization, and replacement demands of the outside plant network. The DSDC selects the designs, materials, and methods used to construct the network.

Distribution Service Planning Center (DSPC) Description, OCD-N7020-01*. Describes DSPC functions, interfaces, methods, and organization needed to develop and maintain the long range outside plant plans and current planning functions for the subscriber loop network, including sectionalization, recommended changes, loop electronics applications, and development of relief and rehabilitation strategies. The DSPC also prepares and administers the construction budget.

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* These are pre-divestiture documents that provide currently useful information (latest available information).

Appendix C. LPIE2 Glossary

- A -

ACCFILE—The CUCRIT plant account file containing data on standard accounts (classes of telephone-related property) by code (e.g., 224-22 for the aerial plant account, 242-45 for the buried plant account), a source of LPIE2 economic data (HQ1).

Activity (or problem indicator)—A category of work done in the outside plant to furnish or restore customer service; one of the "standard" activities (LST, WOL, BCT, CDP, BPC, CIR, RE, RTC, SOD, ODF, OAC, and 1-6, 7A, 7B, 8-9 found troubles) or a special study activity.

Adjusted state income tax rate—In states where federal income tax is deductible from pre-tax income (HQ File, ECON 6, HQ1), the state tax rate must be adjusted before entry into LPIE2.

ADR—See Asset Depreciation Range

Ad valorem tax (AVT) rate—The rate of the tax levied in proportion to the value of the plant, usually in the form of property tax (Problem File, STDY 2, USER 2).

AER—The entry designating aerial cable as the predominant DA plant structure type (Problem File, STDY 10, USER 2).

AERL—The data line containing aerial plant data (HQ File, HQ1).

ALL—The code indicating that *all* LPIE2 and applicable CUCRIT output reports are to be printed (Problem File, PRNT, USER 2).

ALTN—The data line identifying a solution alternative (Problem File, USER 3).

Alternative-investment—An investment belonging to a subdivided solution alternative, one of the two (maximum) allowed by LPIE2 for the alternative.

Alternative-investment code—A one- or two-character code designating an alternative-investment, e.g., P1, I1, I2, U1, U2.

Annual activity growth—The estimated yearly average increase in the number of activities (with respect to an alternative-investment) beginning in the year after the investment date (Problem File, PIG1, PIG2, USER 4).

Annual pair growth—The anticipated average increase per year in the number of assigned pairs in the DA (Problem File, STDY 3, USER 2).

AREA—The data line identifying WC, EAA, and DA (Problem File, USER 2).

Area constant file—The inclusive term for the CUCRIT general economic file (MFILE) and plant account file (ACCFILE), both of which are data sources for the HQ File.

ASCII—RDES command for reading data from a paper tape, cassette, or disk into the computer.

Asset Depreciation Range—The name of a tax depreciation procedure specified by the IRS which was used until 1981. It was then replaced by the Accelerated Cost Recovery System (ACRS), which is used by CUCRIT.

Assigned pairs—The total number of pairs assigned for customer service, whether working, idle dedicated, or idle connect-through.

Assignment changes—The activities performed in making assignments of new pairs on change tickets where defective pairs are found or errors exist in customer records, namely, service order defectives (SOD), other defectives (ODF), and other assignment changes (OAC).

Available pairs—The total number of wire pairs existing in a section of plant, including working, spare, and defective.

Average service life—The standard life expectancy of a new facility; it is used as the economic life in LPIE2 analysis (HQ File, AERL 5, BURD 5, HQ1).

AVT—See Ad valorem tax rate.

- B -

Backbone cable—A distribution cable connecting smaller distribution cables to the interface, cross-connecting terminal, or lateral cable; it may also supply service wires directly to customers.

BCR—Benefit-to-Cost Ratio. See Long Term Economic Evaluator (LTEE).

BCT—See Break connect-through.

BPC—See Break permanent connection.

Break connect-through (BCT)—The LATIS-tracked activity (facility modification) in which an idle connect-through pair, regardless of age, is broken to provide facilities for a service order or related line-and-station transfer.

Break permanent connection (BPC)—The LATIS-tracked activity (facility modification) in which a dedicated permanent connection (working or idle assigned) is broken to provide facilities for a service order or related line-and-station transfer.

BUR—The entry designating buried cable as the predominant DA plant structure type (Problem File, STDY 10, USER 2).

BURD—The data line containing buried plant data (HQ File, HQ1).

- C -

C cost—The broad gauge cost representing capital investment in plant for relief, rehabilitation, or new technology cutover.

Cable pair transfer (CPT)—A subscriber line rearrangement in which a cable pair is severed and the field end is respliced to a different pair located toward the CO.

Cable section—Portion of cable (including existing terminals) between splice points, between the interface and a new splice point, or between a splice point and a cable end; "cable section" is equivalent to the usual meaning of "cable leg" (Problem File, REHB 2, USER 1A).

Calculated Cost Summary—See Rehabilitation Calculated Cost Summary.

Capital, Revenue, and Expense Summary—A CUCRIT report generated by LPIE2 (PRNT code CRE).

Capital Utilization Criteria (CUCRIT) program—A general-purpose economic study tool for evaluating the economic and financial effects of mutually exclusive construction alternatives.

Capital trend rate—A predicted long-term inflation rate (HQ File, AERL 2, BURD 2, HQ1).

Cash Flow Details—A CUCRIT report generated by LPIE2 (PRNT code CFD).

CDP—See Clear defective pair.

CFD—PRNT code (Problem File, USER 2) indicating that the CUCRIT Cash Flow Details report is to be printed.

CFF—The code for an error message referring to Cost Factor File Input.

CIR—See Control point interconnection record.

Clear defective pair (CDP)—The LATIS-tracked activity (facility modification) that requires the repair of a defective pair for a specific service order or a related line and station transfer.

CNRP—The summary data line containing conversion and replacement cost data for an alternative-investment (Problem File, USER 1B).

COM—See Cost of money.

Combination life option—Option in which economic life is used to calculate book and book/tax depreciation and a fixed plant life is used to calculate tax depreciation and investment tax credit (HQ File, ECON 8, HQ1).

Comma delimited—The term describing unformatted data items separated by commas in a data line.

Control-point interconnection record (CIR)—The LATIS-tracked activity (facility modification) that requires connecting an additional feeder pair at a control point, as in dedicated outside plant administration.

Converting—Either the process of cutting over to a Serving Area Concept (SAC) configuration from non-interfaced plant or the terminal renovation that is less extensive than rebuilding and more extensive than refurbishing.

Cost factor—Unit cost of a standard or special study activity.

Cost Factor File—Organization of unit costs on HQ2 into an LPIE2 input file, which becomes part of an HQ File after passing the Data Check.

Cost of money (COM) or Investment Rate—The rate of return to investors on money invested in a company; it reflects an overall anticipated inflation, and is the discount rate in all present worth calculations (HQ File, ECON 10, HQ1).

CPT—See Cable pair transfer.

CRE—PRNT code (Problem File, USER 2) indicating that the CUCRIT Capital, Revenue, and Expense Summary report is to be printed.

CRMK—The data line containing the Cost Factor File preparer's remark that distinguishes the file (HQ File, HQ2).

Crossbox (Xbox)—An item of outside plant hardware in which short "jumper" wires are used to connect feeder pairs to other feeder pairs or to subscriber (distribution) pairs; the usual term for a feeder/distribution interface in multiple outside plant.

Cross-connect facility—An enclosure designed for a cross-connection—i.e., a means of semipermanently connecting cable pairs from one group to cable pairs of another (e.g., crossbox, serving area interface, feeder/distribution interface).

CRT—PRNT code (Problem File, USER 2) indicating that all applicable CUCRIT reports are to be printed.

CSTE—CoST Entry. The data line containing a cost that the user wishes to use instead of the cost in the area's cost file.

CST1, CST2—The data line(s) containing cost factors (unit costs) of standard activities (HQ File, HQ2).

CUCRIT—See Capital Utilization Criteria program.

CURL—The data line containing current activity level of standard activities (Problem File, USER 2).

Current activity level—The total number of occurrences of an activity for a 12-month period preceding an LPIE2 study, as on the CURL data line (USER 2).

Customer Interconnection Record (CIR)—See Control point interconnection record.

Cutover drop—Customer service wire; the wire connecting the customer's premises to a distribution cable.

- D -

D—See DATACK (D).

DA—See Distribution Area.

DA Input Summary—See LPIE2 DA Input Summary.

DA Study Worksheet (Optional)—The worksheet used in the Rehabilitation Guidelines method, combined with USER 1A input worksheet on the Rehabilitation Guidelines & LPIE2 Worksheet.

Data Check—That portion of the LPIE2 program that validates input files by comparing data values with allowable ranges and checking related data entries for consistency.

DATA1 File—A data-checked Problem File.

DATACK (D)—RDES command used in the LPIE2 Data Check run option, for either HQ or USER.

Dead pair—A cable pair that extends over some portion of a route but is not connected to a main distribution frame.

Debt interest rate—For new debt issues such as bank loans, the anticipated long-term interest rate (HQ File, ECON 1, HQ1).

Debt ratio—The percentage of debt compared to capital (HQ File, ECON 2, HQ1).

DEF—See Defective (DEF) pairs.

Default value—A value that may be assigned by the program to a field and then assumed if the field is left blank by the user. In LPIE2 specifications, the expression "0 (zero)" indicates the number 0 is the default value; the term "none" means that *no* default value has been assigned by the program, and the user must supply a value or else the program will not run.

Defective (DEF) pairs—Cable pairs unavailable for service because of cable troubles (Problem File, STDY 7, USER 2).

Detailed DA Study—In the Rehabilitation Guidelines method, the analysis and treatment phases leading to the development of solution alternatives, for a DA.

DETAILED REHABILITATION INPUT—The USER 1A input worksheet, referring to rehabilitation data described by treatment on REHB data lines.

Discretionary—Referring to projects that would provide economic benefits to a company but can be indefinitely deferred (e.g., rehabilitation), in distinction to non-discretionary projects that are customer-service related or growth related, and cannot be deferred.

Distribution area (DA)—A unit of the distribution plant that is a geographic area with a defined boundary containing 200 to 600 ultimate living units (or business lines). It may be an interfaced area and may be administered under Serving Area Concept (SAC) principles as dedicated outside plant or as multiple outside plant.

DISTRIBUTION AREA (DA) DATA—The USER 2 input worksheet, referring to data about the DA and the study.

Distribution Service Design Center (DSDC); Distribution Service Planning Center (DSPC)—The TNOP functional entities applicable to LPIE2 operations.

DPS—PRNT code (Problem File, USER 2) indicating that the CUCRIT Discretionary Project Selection output report is to be printed.

Drop—See Cutover drop.

DSDC—See Distribution Service Design Center.

DSPC—Distribution Service Planning Center.

- E -

EAA—See Existing Allocation Area.

EASOP—Economic Alternative Selection for Outside Plant, an economic study program for computing PWE for alternative sequences of actions, including installations, removals, rearrangements, and maintenance activities.

ECO—The code for an error message referring to Economic File Input.

ECON—The data line containing general economic data for a company entity (HQ File, HQ1).

Economic evaluators—In LPIE2, the indicators of relative project cost effectiveness, namely, PWE, LTEE, NPV, and incremental LTEE (LPIE2 Problem Analysis Summary report).

Economic File—Organization of economic data on HQ1 into an LPIE2 input file, which becomes part of an HQ File after passing the Data Check.

Economic life—Service life estimated for a specific facility that may differ from average service life of the facility account class.

EDIT:—Computer response indicating that the RDES Editor is controlling the terminal.

ELIM—The data line containing the number(s) of found troubles eliminated by an alternative-investment (Problem File, USER 1B).

End-of-study year—Calendar year representing the time that the SQ plan takes place and all alternative plans are automatically brought up to the level of the most comprehensive plan (LPIE2 Problem Analysis Summary).

EPLANS—Engineering Planning and Analysis Systems, a set of support systems offered by Bell Communications Research, Inc. (Bellcore), including LPIE2, EASOP, and LATIS.

EQCR—The data line containing replacement costs equivalent to the renovation costs on the corresponding RENV data line (Problem File, USER 1B).

ERMK—The data line containing the Economic File preparer's remark that distinguishes the file (HQ File, HQ1).

Error message—A Data Check output item describing an error or inconsistency in the input. See Fatal error; Warning.

Estimates—In LPIE2, projected values of activity levels and annual activity growth made by the user to override LPIE2 projections of the same.

EXC—PRNT code (Problem File, USER 2) indicating that the CUCRIT Executive Summary report is to be printed.

Executive Summary—A CUCRIT report generated by LPIE2 (PRNT code EXC).

Exhaust time—The number of years until not enough spare pairs remain in the distribution backbone cable for another month of growth.

Existing Allocation Area (EAA)—A subdivision of a wire center (resulting from LROPP sectionalization) showing what the plant looks like now in comparison to the planner's proposed ideal network configuration, as represented by the corresponding ultimate allocation area (UAA). In the FAP process, EAAs are tracked by LATIS to determine operating costs and ranked in order of operating cost per assigned pair. One or more EAAs in a wire center may be selected for rehabilitation.

- F -

Facility Analysis Plan (FAP)—A method system that provides procedures for identifying operating costs incurred because of troublesome or inadequate facilities and for developing a cost-effective program that will improve the outside plant network.

Facility modifications—Activities required to rearrange existing plant in supplying service when no spare facilities are available, including LST, WOL, BCT, CDP, BPC, and CIR.

FAP—See Facility Analysis Plan.

Fatal error—An input error that prevents any program function beyond the Data Check from running until the error is corrected.

FDI—Feeder/distribution interface.

Feeder Administration (FA)—The method system that supplies an economic procedure for designing and administering the feeder network.

File name—File identification; in LPIE2, a descriptive name composed of from 1 to 8 characters.

Found troubles or Found cable troubles—Activities required to investigate and correct cable and terminal troubles either as a routine procedure or where service is affected, including sheath breaks 1 through 6, splicing 7A, terminating 7B, and core troubles 8 and 9.

- G -

GEN—The code for an error message in the General Error Message List.

Growth—See Annual activity growth; Annual pair growth.

- H -

H—In the LPIE2 Data Check interaction (DATACK run option), the choice of the HQ Data Check in distinction to the USER (U) Data Check. See also HQLIST (H).

HELP—RDES command for interactively obtaining a list of RDES commands. HELP can be used with various arguments to obtain a variety of information on RDES commands (e.g., HELP HELP, HELP COMMAND, HELP EDIT). See Appendix E for explanation of the HELP command.

HQ File—The Headquarters file merged by LPIE2 from Economic and Cost Factor File input that has passed the Data Check.

HQ1—Headquarters worksheet for preparing Economic File Input.

HQ2—Headquarters worksheet for preparing Cost Factor File Input.

HQLIST (H)—RDES command used in the LPIE2 run option for obtaining an HQ File Formatted Listing.

- I -

IBCR—Incremental Benefit-to-Cost Ratio. See Incremental LTEE.

ID—Identification. See Line ID; Userid.

IDEN—The data line identifying an LPIE2 study and run (Problem File, USER 2).

ILTEE—See Incremental LTEE.

Incremental LTEE (ILTEE)—An LPIE2 economic evaluator (LPIE2 Problem Analysis Summary) that can be used to make an ordered list of various solution

alternatives from different DAs competing for discretionary project money, given a limited budget; the ILTEE indicates the additional benefit to be gained by implementing that alternative instead of the one listed above it.

Interest rate—See Cost of money.

Investment—See Alternative-investment.

Investment Tax Credit (ITC)—In calculating federal tax credit on eligible investments, the maximum percentage allowed by law (HQ File, ECON 11, HQ1).

INVT—The data line containing investment information about an alternative-investment (Problem File, USER 3).

ITC—See Investment Tax Credit.

- L -

Labor trend rate—The inflation rate for labor-related expenses (HQ File, ECON 3, HQ1).

Lateral cable—A physical section of cable extending from the feeder into the distribution network.

LATIS—See Loop Activity Tracking Information System.

Leg—See Cable section.

Life option—In LPIE2, must be 2, indicating that the Combination Life Option is to be used in calculating book and tax depreciation and ITC (HQ File, ECON 8, HQ1).

Line and station transfer (LST)—The LATIS-tracked activity (facility modification) that requires an existing service to be changed to another facility to allow a new service on the former facility.

Line ID—Data line identification; in LPIE2, the 4-character code heading a data line, followed by a colon (:).

Long Range Outside Plant Plan (LROPP)—A formal record of the plan for orderly, economic development of a wire center from its existing state to an ultimate, optimal network. The plan is used by the feeder and design engineers to maintain and add to the outside plant as it grows to the ultimate configuration shown in the plan.

Long term economic evaluator (LTEE)—An LPIE2 economic evaluator (Problem Analysis Summary), a benefit-to-cost ratio measuring overall project cost effectiveness.

Loop Activity Tracking Information System (LATIS)—A computer tool that collects, analyzes, and ranks trouble data for FAP and other purposes.

LPI—PRNT code (Problem File, USER 2) indicating that all LPIE2 reports are to be printed (but not CUCRIT reports).

LPIE2—Loop Plant Improvement Evaluator 2.

LPIE2 DA Input Summary—The LPIE2 output report containing data about the DA and activity cost factors and current activity levels.

LPIE2 Problem Analysis Summary—The LPIE2 output report containing results of the economic analysis on a Problem File, including economic evaluators.

LPIE2 Vs. User Estimated Improvements—The LPIE2 output report that compares user estimates of activity levels and annual activity growth with those of LPIE2.

LROPP—See Long Range Outside Plant Planning.

LST—See Line and station transfer.

LTEE—See Long Term Economic Evaluator.

- M -

M cost—Maintenance cost—the broad-gauge cost of rearrangements or changes necessary to implement a project.

Marker—A letter that marks the erroneous field in certain Data Check outputs.

MFILE—The CUCRIT economic data file, part of the area constant file, a source of LPIE2 economic data (HQ1).

- N -

Net present value (NPV)—An LPIE2 economic evaluator (Problem Analysis Summary), the after-tax benefit of doing an alternative instead of doing nothing (the STATUS QUO).

Net salvage value—Gross salvage value minus cost of removal.

NEXT?—RDES prompt for the user's next command.

Non-discretionary—Referring to projects that are customer-service or growth related, hence cannot be deferred, in distinction to discretionary projects (e.g., rehabilitation).

NPV—See Net Present Value.

- O -

OAC—See Other assignment change.

ODF—See Other defective.

Operating cost—In FAP, the cost of operating the outside plant, calculated from labor rates and labor group hours, and expressed in LATIS as operating cost per assigned pair ($$/ASGN).

OPTN—The data line containing miscellaneous data, which can be entered optionally (Problem File, USER 2).

Other assignment change (OAC)—The LATIS-tracked activity (assignment change) of finding a defective pair due to independent, not CO-related, causes.

Other defective (ODF)—The LATIS-tracked activity (assignment change) of

finding a defective pair during a cable throw reconcentration or maintenance work.

- P -

Pair growth—See Annual Pair Growth.

Password—A unique code (for security purposes) that identifies a user to the system.

PIC—Plastic insulated conductor; the entry designating PIC as the predominant insulation type (Problem File, STDY 11, USER 2).

PIG1, PIG2—Post-Improvement Growth: the data lines containing user-estimated post-improvement annual activity growth data (Problem File, USER 4).

PIL1, PIL2—Post-Improvement Levels: the data lines containing user-estimated post-improvement annual activity levels (Problem File, USER 4).

POST-IMPROVEMENT OVERRIDES—The USER 4 input worksheet, referring to user estimated activity levels (PIL1, PIL2 data lines) and annual activity growth (PIG1, PIG2 data lines).

PRB—The code for an error message referring to Problem File Input; the PRNT code (Problem File, USER 2) indicating that the LPIE2 Problem Analysis Summary output report is to be printed.

Present Worth of expenditures (PWE)—An LPIE2 economic evaluator (Problem Analysis Summary), the sum of the present worth of the capital expenditures minus the present worth of the net salvage, plus the present worth of operating costs and maintenance expenses plus the present worth of income taxes.

PRNT—The data line (USER 2) containing codes indicating which output reports (LPIE2 and/or CUCRIT) should be printed.

PROB FILE—See Problem File.

Problem Analysis Summary—See LPIE2 Problem Analysis Summary.

Problem File—The LPIE2 input file containing rehabilitation, distribution area, solution alternative data, and (optionally) post-improvement overrides, prepared respectively on USER 1A (or USER 1B), USER 2, USER 3, and USER 4 worksheets.

Problem indicator—See Activity.

Projection of Annual Activity Levels—The LPIE2 output report containing LPIE2 estimated activity levels and operating costs (for the first five years of the study period).

PULP—The entry designating paper-insulated conductor cable as the predominant insulation type (Problem File, STDY 10, USER 2).

PURGE—RDES command for removing a DATA1 file from computer storage.

PWE—See Present Worth of Expenditures.

- R -

R cost—The broad-gauge repair costs associated with an investment. Indicates repair work performed to clear reported troubles or for preventive maintenance. See also REHBLIST (R).

RDES—Remote Data Entry System, including the RDES Editor. Documented in the *Generic Remote Data Entry System (RDES) User Guide*, OPA-2Y000-01.

RE—See Referred to Engineering.

REBUD—See Rehabilitation Budgeting Program.

Rebuilding—The most extensive terminal treatment.

Referred to engineering (RE)—A LATIS-tracked activity involving a request to engineering when no facilities are available for assignment.

Reclaiming—Renovating cable by pumping water out of it.

Refurbishing—The minimal treatment for terminal renovation or the physical rehabilitation of an existing interface.

Rehabilitation Alternative Layout—The map used in the Rehabilitation Guidelines method, based on the DA plant location records, showing cable sections by number and proposed treatments by color code.

Rehabilitation Budgeting Program—A time-shared computer program which (1) estimates the maximum outside plant rehabilitation program that is economic or feasible in an operating company and its subordinate parts, (2) estimates the savings in operating costs and hours which would result from the estimated program, (3) allocates the program to subordinate entities to maximize the overall profitability, and (4) estimates what level of profitability should be achieved in the individual jobs.

Rehabilitation Calculated Cost Summary—The LPIE2 intermediate output containing investment costs for each alternative-investment in the Problem File, as well as total cable troubles eliminated.

Rehabilitation Guidelines & LPIE2 Worksheet—The combination of DA Study Worksheet (from the Rehabilitation Guidelines method) and USER 1A input worksheet.

Rehabilitation Guidelines method—The method of selective rehabilitation under FAP, based on BSP 917-601-110, ***Rehabilitation Guidelines for the Distribution Plant***. It requires an analysis of DA facilities by cable section and the development of cable section treatments, and it leads to a set of solution alternatives for the DA.

Rehabilitation Input Summary—The LPIE2 intermediate output containing a formatted listing of REHB data lines (USER 1A) in a Problem File.

REHB—The data line containing detailed rehabilitation data by treatment (Problem File, USER 1A).

REHBLIST (R)—RDES command used in the LPIE2 run option for obtaining a formatted listing of the REHB data lines (USER 1A) in a Problem File before the Data Check.

Remaining life—The remaining service life of a renovated facility (Problem File, REHB 4, RENV 6).

Remote Data Entry System (RDES)—The Bell Communications Research computer accessing and file editing system for EPLANS programs.

REMOVE (X)—RDES command used in the LPIE2 run option for erasing an existing HQ File from storage.

Renovation—Treatment of an existing facility that is to remain in plant (e.g., refurbishing, reclaiming) in distinction to replacing or reinforcing the facility as in the physical rehabilitation alternative.

RENV—The summary data line containing renovation cost data for an alternative-investment (Problem File, USER 1B).

Reterminated connection (RTC)—The LATIS-tracked activity involving the reterminating of an existing but previously idle pair, or the placing of a connection at an interconnection point, to reestablish service to a previously served address.

Reworking an LPIE2 study—The inclusive term for refining solution alternatives, making sensitivity analyses, overriding LPIE2 projections, and otherwise revising a Problem File after the initial run for a rerun of LPIE2.

RPT—PRNT code (Problem File, USER 2) indicating that the CUCRIT Report Summary output is to be printed.

RTC—See Reterminated Connection.

- S -

S—See STUDY (S).

SA—Serving Area.

SAC—See Serving Area Concept.

SAI—Serving Area Interface.

Sensitivity analysis—The process of examining the effect of different annual pair growth rates and investment timing on the DA exhaust time and the end-of-study year.

Service order defective (SOD)—The LATIS-tracked activity (assignment change) involving the finding of a defective pair during service- order work.

Serving Area Concept (SAC)—A technique, introduced in the early 1970s, of administering outside plant. It is also referred to as interface design, because it features interface units (also called *serving area interface*) between the distribution plant and the feeder plant. Serving Area Concept (SAC) requires that the wire center be divided into serving areas of from 200 to 600 *housing units,* each served from *a serving area interface.* The area served from the interface becomes the *distribution area.* In SAC, each living unit is usually assigned at least two pairs of wires in the distribution plant and the feeder plant provides an average of 1 1/2 pairs per living unit back to the central office. SAC reduces plant-operating costs and improves utilization of feeder pairs.

SOD—See Service Order Defective.

Solution alternative—A rehabilitation plan, one of a set of plans developed for a DA and intended to be evaluated by LPIE2. A solution alternative represents a discretionary investment in itself or may be subdivided into two alternative-investments.

SPCL—The data line containing special study data (HQ File, HQ2).

Special study—An outside plant activity or condition, outside of the "standard" activities, that is being investigated in the district.

SQ—See STATUS QUO.

SQGR—Status Quo Growth Rate. The data line containing the factor that the user wishes to use as the growth factor (%) for one or more activities under the status quo plan instead of using the LPIE2-estimated growth.

SQND—Status Quo Non Discretionary. The data line containing costs and dates that allow the user to consider, in a rehabilitation study, the economic effects of a nondiscretionary investment which is required only under the status quo plan. (A status-quo-only investment has the effect of increasing the PWE of the status quo plan, and therefore increasing the NPV of the various rehabilitation plans.)

Stabilization—With reference to the outside plant, the process of decreasing the number of facility modifications by placing feeder/distribution interfaces, adding facilities to upgrade to ultimate design, or dedicating at least one pair to each existing living unit.

Standard (LATIS) data categories—The fifteen activities modeled by LPIE2 (LST, WOL, BCT, CDP, BPC, CIR, RE, RTC, SOD, ODF, OAC, 1-6, 7A, 7B, 8-9) and also ISOs, OSOs, and code 4s.

STATUS QUO (SQ)—The "alternative" constructed by LPIE2 equivalent to doing nothing now and postponing rehabilitation investments indefinitely. It is used in LPIE2 to compare solution alternatives on an equivalent standard.

STDY—The data line containing information about the DA under study (Problem File, USER 2).

STUDY (S)—RDES command used in the LPIE2 run option for initiating the economic analysis of a Problem File.

STUDY BEGINS—The beginning date of the study period (January of the study year) included on all LPIE2 output reports.

Study duration—The number of years estimated by the user that it takes the DA backbone cable to exhaust, which can be used optionally to override the LPIE2 calculation of the end-of-study year (Problem File, OPTN 1, USER 2).

Study period—In LPIE2, the period of years (maximum 20) from the study year through the end-of-study year.

Study year—The calendar year in which activity levels and costs are current (Problem File, STDY 1, USER 2).

SUMMARY DATA—The USER 1B input worksheet, referring to alternative-investment costs by rehabilitation category and to troubles eliminated by alternative-investment.

- T -

Throw—See Cable Pair Transfer.

TNOP—Total Network Operations Plan.

Tracking unit (TU)—In LATIS, the term for either an EAA or a sub-EAA unit (part of an EAA) that is non-multipled (e.g., a SAC area).

Treatment—In the Rehabilitation Guidelines method and LPIE2, the proposed rehabilitation for troublesome or inadequate facilities in a cable section (e.g., renovation, replacement, reinforcement).

Treatment costs—The C, X, M, and/or R costs of a treatment (Problem File, REHB data lines, USER 1A).

Troubles eliminated—The found cable troubles eliminated by a cable section treatment (renovation or replacement, but not reinforcement), by trouble category (1-6, 7A, 7B, 8-9).

TU—See Tracking Unit.

- U -

U—In the LPIE2 Data Check interaction (DATACK run option), the choice of the USER Data Check in distinction to the HQ (H) Data Check.

Ultimate plant percent (%)—Either the percent of living units already on ultimately sized cable at the time the detailed DA study is initiated, or the percent of living units projected to be on ultimately sized cable after implementation of the given investment. The ultimate plant percent in existence is called "initial ultimate plant" (Problem File, STDY 8, USER 2); the ultimate plant percent projected is called "post improvement ultimate plant" (Problem File, INVT 3, USER 3).

Unit cost—Cost factor for an activity.

User, USER—In LPIE2, the district design or planning engineer who prepares input for a Problem File and runs the program. The term is used to characterize the Problem File Data Check in distinction to the HQ Data Check, to distinguish engineering estimates from LPIE2 calculations, and to label input worksheets for the Problem File, i.e., USER 1A, USER 1B, USER 2, USER 3, and USER 4.

Userid—Unique code that identifies a user to the system.

Warning—A non-fatal error indicating that the program has detected some unusual condition.

Wired out of limits (WOL)—The LATIS-tracked activity (assignment change) that requires running service wires to terminals other than the one designated for the customer's address.

WOL—See Wired out of limits.

- X -

X—See REMOVE (X).

X cost—The cost of removing a facility (that is to be replaced) minus its salvage value.

Xbox—See Crossbox.

Appendix D. Worksheet Masters

Each master is a full-size blank worksheet that can be used to make copies needed in LPIE2 data input tasks. The worksheet masters are in the following order:

- Rehabilitation Guidelines & LPIE2 Worksheet, including USER 1A—DETAILED REHABILITATION INPUT (Problem File) and the DA Study Worksheet (Optional)
- USER 1B (Optional)—SUMMARY INPUT (Problem File)
- USER 2—DISTRIBUTION AREA (DA) DATA (Problem File)
- USER 2A (Optional)—DISTRIBUTION AREA (DA) DATA
- USER 3—SOLUTION ALTERNATIVE DATA (Problem File)
- USER 4 (Optional)—POST-IMPROVEMENT OVERRIDES (Problem File)
- HQ1—ECONOMIC FILE INPUT
- HQ2—COST FACTOR FILE INPUT.

DA STUDY WORKSHEET (OPTIONAL)

A	B	C	D	E	F	G	H	I	J	
TREATMENT	SEC #	FACILITY PLACED OR RENOVATED	QTY	FACILITY REMOVED	QTY	REMOVAL COST	SALVAGE VALUE	CABLE PAIR TRANS-FERS	CUT-OVER DROPS	US REM (OPTIO 6 CH
										REHB:
										REHB:
										REHB:
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TOTAL NUMBER OF TROUBLES IN DA – TALLY BY CATEGORY				LPIE2 INPUT
1 – 6	7A	7B	8 – 9	

ES & LPIE 2 WORKSHEET

IA

SHEET _____ OF _____
DA __________
PROBLEM FILE NAME __________

DETAILED REHABILITATION INPUT

ER RK AL) AR.	SEC #	REMAINING LIFE OR N	TREATMENT COSTS				TROUBLES ELIMINATED				ALTERNATIVE - INVESTMENT CODE (S) APPLYING TO TREATMENT				
			C	X	M	R	1-6	7A	7B	8-9					
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WORKSHEET (10/81)

PREPARED BY ____________________ DATE __________

USER 1B – OPTIONAL

SUMMARY INPUT

SHEET ____ OF ____
DA ____
PROBLEM FILE NAME ____

TOTAL COSTS OF ALTERNATIVE – INVESTMENT

ALTERNATIVE-INVESTMENT CODE	INVESTMENT COSTS C	X	M	R	TOTAL RENOVATION LIFE (RENV ONLY)
CNRP:	,	,	,	,	
RENV:	,	,	,	,	,
EQCR:	,	,	,	,	
CNRP:	,	,	,	,	
RENV:	,	,	,	,	,
EQCR:	,	,	,	,	
CNRP:	,	,	,	,	
RENV:	,	,	,	,	,
EQCR:	,	,	,	,	

TOTAL FOUND TROUBLES IN DA – TALLY			
1 – 6	7A	7B	8 – 9

TROUBLES ELIMINATED BY ALTERNATIVE – INVESTMENT

ALTERNATIVE-INVESTMENT CODE	TROUBLES ELIMINATED 1 – 6	7A	7B	8 – 9
ELIM:	,	,	,	,
ELIM:	,	,	,	,
ELIM:	,	,	,	,

ALTERNATIVE – INVESTMENT CODE	TROUBLES ELIMINATED BY INVESTMENT 1 – 6	7A	7B	8 – 9

LP1E2 INPUT WORKSHEET (10/81)

PREPARED BY ____ DATE ____

USER 2

DISTRIBUTION AREA (DA) DATA

DA _____

PROBLEM FILE NAME _____

PROBLEM IDENTIFICATION

(63 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)

IDEN :

AREA DATA

	WIRE CENTER (WC) (12 CHARACTERS MAXIMUM)	EXISTING ALLOCATION AREA (EAA) (12 CHARACTERS MAXIMUM)	DISTRIBUTION AREA (DA) (12 CHARACTERS MAXIMUM)
AREA:	,	,	

STUDY DATA

	STUDY YEAR	AD VALOREM TAX RATE	ANNUAL PAIR GROWTH	DISTRIBUTION PAIRS (AVAILABLE)	FEEDER PAIRS (AVAILABLE)	ASSIGNED PAIRS	DEFECTIVE PAIRS	INITIAL ULTIMATE PLANT (%)	DISTANCE TO WC (KF)	STRUCTURE TYPE (AER OR BUR)	INSULATION TYPE (PIC OR PULP)
STDY:	,	,	,	,	,	,	,	,	,	,	

CURRENT ACTIVITY LEVELS

	LST	WOL	BCT	CDP	BPC	CIR	RE	RTC	SOD	ODF	OAC	1-6	7A	7B	8-9
CURL:	,	,	,	,	,	,	,	,	,	,	,	,	,	,	

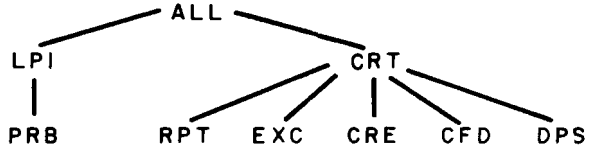
MISCELLANEOUS DATA (OPTIONAL)

		NON-DISCRETIONARY			SPECIAL STUDY 1		SPECIAL STUDY 2		SPECIAL STUDY 3	
	STUDY DURATION	C	X	M	R	NAME	ACTIVITY LEVEL	NAME	ACTIVITY LEVEL	NAME	ACTIVITY LEVEL
OPTN:	,	,	,	,	,	,	,	,	,	,	,

PRINT CODES FOR OUTPUT REPORTS (OPTIONAL)

CHOOSE CODE(S) FROM: LPI, PRB, CRT, RPT, EXC, CRE, CFD, DPS, ALL

PRNT: , , , , ,



LPIE2 INPUT WORKSHEET (10/81)

PREPARED BY _____ DATE _____

USER 2A-OPTIONAL

DISTRIBUTION AREA (DA) DATA

SHEET ____ OF ____
DA _____
PROBLEM FILE NAME _____

STATUS QUO GROWTH RATE OVERRIDE (OPTIONAL)

	1-6	7A	7B	8-9	STUDY 1	STUDY 2	STUDY 3
SQGR:	,	,	,	,	,	,	,

STATUS QUO NON-DISCRETIONARY DATA (OPTIONAL)

	C$	X$	M$	R$	INVESTMENT MONTH (3 LETTERS)	INVESTMENT YEAR (4 DIGITS)
SQND:	,	,	,	,	,	

COST ENTRY DATA OVERRIDE (OPTIONAL)

	ACTIVITY (3 CHARACTERS MAXIMUM)	COST (DECIMAL, 6 DIGITS MAXIMUM)
CSTE:		,
CSTE:		,
CSTE:		,
CSTE:		,
CSTE:		,
CSTE:		,

PREPARED BY _____ DATE _____

USER 3

SOLUTION ALTERNATIVE DATA

SHEET ___ OF ___
DA _____
PROBLEM FILE NAME _____

SOLUTION ALTERNATIVE IDENTIFICATION

	ALTERNATIVE LETTER	ALTERNATIVE NAME (15 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)
ALTN:	,	

INVESTMENT DESCRIPTION

	ALTERNATIVE – INVESTMENT CODE	INTERFACE PLACED? (Y OR N)	POST-IMPROVEMENT ULTIMATE PLANT (%)	DISTRIBUTION PAIRS AFTER INVESTMENT	INVESTMENT MONTH	INVESTMENT YEAR
FIRST	INVT : ,	,	,	,	,	
SECOND	INVT : ,	,	,	,	,	

ALTN:	,					
FIRST	INVT : ,	,	,	,	,	
SECOND	INVT : ,	,	,	,	,	

ALTN:	,					
FIRST	INVT : ,	,	,	,	,	
SECOND	INVT : ,	,	,	,	,	

PREPARED BY _____ DATE _____

USER 4—OPTIONAL
POST-IMPROVEMENT OVERRIDES

SHEET ___ OF ___
DA _____
PROBLEM FILE NAME _____

POST-IMPROVEMENT ACTIVITY LEVELS

ALTERNATIVE-INVESTMENT CODE	LST	WOL	BCT	CDP	BPC	CIR	RE	RTC
PIL1:	,	,	,	,	,	,	,	,
PIL1:	,	,	,	,	,	,	,	,
PIL1:	,	,	,	,	,	,	,	,

CONTINUE ACTIVITY LEVELS ON PIL2

POST-IMPROVEMENT ANNUAL ACTIVITY GROWTH

PIG1:	,	,	,	,	,	,	,	,
PIG1:	,	,	,	,	,	,	,	,
PIG1:	,	,	,	,	,	,	,	,

CONTINUE ANNUAL ACTIVITY GROWTH ON PIG2

POST-IMPROVEMENT ACTIVITY LEVELS (CONTINUED)

ALTERNATIVE-INVESTMENT CODE	SOD	ODF	OAC	1-6	7A	7B	8-9	SPECIAL STUDIES STUDY 1	STUDY 2	STUDY 3
PIL2:	,	,	,	,	,	,	,	,	,	,
PIL2:	,	,	,	,	,	,	,	,	,	,
PIL2:	,	,	,	,	,	,	,	,	,	,

POST-IMPROVEMENT ANNUAL ACTIVITY GROWTH (CONTINUED)

PIG2:	,	,	,	,	,	,	,	,	,	,
PIG2:	,	,	,	,	,	,	,	,	,	,
PIG2:	,	,	,	,	,	,	,	,	,	,

PREPARED BY _____ DATE _____

HQ I

ECONOMIC FILE INPUT

STATE/REGION _____

FILE NAME _____

PREPARER'S REMARK (OPTIONAL)

(63 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)

ERMK:

ECONOMIC DATA - CUCRIT MFILE

	DEBT INTEREST RATE	DEBT RATIO	LABOR TREND RATE	INTEREST DURING CONSTRUCTION (OPTIONAL)	DIVISION OF REVENUE (OPTIONAL)	STATE INCOME TAX RATE	YEARS IN INCOME STATEMENT (OPTIONAL)	LIFE OPTION CODE	STATE INCOME TAX OPTION	COST OF MONEY	INVESTMENT TAX CREDIT RATE	FEDERAL INCOME TAX RATE	NORMAL-IZATION OPTION
ECON:	,	,	,	,	,	,	,	,	,	,	,	,	

SELECTED ACCOUNT DATA - CUCRIT ACCFILE

	ACCOUNT CODE	CAPITAL TREND RATE	ADR GUIDELINE LIFE	TAX / BOOK RATIO	AVERAGE SERVICE LIFE	AVERAGE GROSS SALVAGE	AVERAGE COST OF REMOVAL	ADR CLASS CODE (OPTIONAL)
AERL:	242-22	,	,	,	,	,	,	,
BURD:	242-45	,	,	,	,	,	,	,

LPIE2 INPUT WORKSHEET (10/81)

PREPARED BY _____ DATE _____

HQ2

COST FACTOR FILE INPUT

STATE/REGION _____

FILE NAME _____

PREPARER'S REMARK (OPTIONAL)

(63 CHARACTERS MAXIMUM; NO COMMAS OR COLONS)

CRMK:

OPERATIONAL COST FACTORS

	LINE AND STATION TRANSFER (LST)	WIRE OUT OF LIMITS (WOL)	BREAK CONNECT THROUGH (BCT)	CLEAR DEFECTIVE PAIR (CDP)	BREAK PERMANENT CONNECTION (BPC)	CHANGE INTERCONNECT RECORD (CIR)	REFERRAL TO ENGINEERING (RE)	RETERMINATE CONNECTION (RTC)
CST1:	,	,	,	,	,	,	,	

OPERATIONAL COST FACTORS (CONTINUED)

	SERVICE ORDER DEFECTIVE (SOD)	OTHER DEFECTIVE (ODF)	OTHER ASSIGNMENT CHANGE (OAC)	FOUND CABLE TROUBLE SHEATH BREAK (1—6)	FOUND CABLE TROUBLE SPLICING (7A)	FOUND CABLE TROUBLE TERMINATING (7B)	FOUND CABLE TROUBLE CORE (8—9)	CABLE PAIR TRANSFER (CPT)	VALUE OF A FEEDER PAIR (VFP)
CST2:	,	,	,	,	,	,	,	,	

SPECIAL STUDY DATA (OPTIONAL)

	SPECIAL STUDY 1		SPECIAL STUDY 2		SPECIAL STUDY 3	
	NAME	COST FACTOR	NAME	COST FACTOR	NAME	COST FACTOR
SPCL:	,	,	,	,	,	

PREPARED BY _____ DATE _____

Appendix E. Remote Data Entry System (RDES) Commands

The information on RDES commands in this appendix is provided as a convenient aid to the LPIE2 user. Note that the definitive reference source for RDES commands is the ***Generic RDES User Guide*** (OPA-2Y000-01).

To complement the documentation, RDES can also provide information during an LPIE2 terminal session. The procedure involves the HELP command, which will be discussed in this appendix. In the following discussion, keep in mind the distinction between the RDES "level" and the EDITOR (RDES Editor) "level." The RDES level is accessed immediately after logging on to the system. It has the characteristic NEXT? prompt and will execute a given set of commands. The EDITOR level can be reached only through the RDES commands CREATE or ACCESS. The computer response EDIT: indicates that the RDES Editor is in control of the terminal and will accept and execute a set of commands; these commands are distinct from those of the RDES level.

During an LPIE2 terminal session, you can obtain information about RDES-level commands by entering the HELP command in response to NEXT?. Doing so obtains a list of valid LPIE2 commands and useful procedures for obtaining further information, as shown in Figure E-1. You can use the HELP command with the option HELP (i.e., HELP HELP) to obtain a somewhat more detailed listing, as in Figure E-2, including a brief description of each command. A similar listing is obtained by entering HELP, COMMANDS, and ?.

You can obtain detailed information on each command listed in Figure E-2 by entering HELP with the command name as option (for example, HELP ACCESS, HELP ACTAPE). Illustrations of this procedure are in Figures E-3 through E-6, respectively, for HELP ASCII, HELP DUPE, HELP PURGE, and HELP TILT.

For information at the RDES level about EDITOR-level commands, you can use HELP EDIT to obtain a *list* of EDITOR-level commands, as in Figure E-7. To obtain information on individual EDITOR commands, use HELP EDIT with the command name (for example, HELP EDIT AGAIN, HELP EDIT ALTER). You can request information for up to four commands at a time (for example, HELP EDIT AGAIN ALTER AUTOSAVE BACKWARD). HELP EDIT * will generate information on all the RDES Editor commands in a sorted order.

While in the EDITOR level, however, use $HELP with the command name to obtain information about an EDITOR-level command, e.g., $HELP AGAIN, $HELP ALTER. Again, you can request information for up to four commands at a time, e.g., $HELP AGAIN ALTER AUTOSAVE BACKWARD. $HELP * will generate information on all the RDES Editor commands in a sorted order.

Note

Pertinent broadcast messages may be typed at the time of logon, before the initial NEXT? prompt. Broadcast messages may be directed to any of five user categories: 1) all RDES users; 2) users of a particular EPLANS under RDES; 3) only district users linked to a particular headquarters ID; 4) users from a specific telephone company on a particular EPLANS system; or 5) one particular user.

```
NEXT?
>help

VALID LPIE2 COMMANDS ARE:
     ACCESS              NEWS
     ACTAPE              NWPROB
     ADDRESS             PEOPLE
     ASCII               PHONES
     COMBINE             PURGE
     COMMANDS            RENAME
     CREATE              STATUS
     DUPE                STUDY (OR LPIE2)
     ERASE               TERMDEF
     FNAMES              TILT
     FNAMES1             TIMES
     HELP                TRANSFER
     LIST                ?
     LOGOFF              $HELP (ONLY FROM THE EDITOR)
     LOGOUT

TO GET GENERAL INFORMATION ON ABOVE COMMANDS, ENTER:

  HELP XXXX

    WHERE XXXX IS THE NAME OF THE COMMAND.

NOTE: ' HELP HELP ' WILL GIVE A LIST AND A SHORT DESCRIPTION OF
      EACH RDES COMMAND. ALSO, ' HELP EDIT ' WILL GIVE A LIST
      AND A SHORT DESCRIPTION OF EACH EDITOR COMMAND.
      ' $HELP ' MAY BE REQUESTED ONLY FROM WITHIN THE EDITOR (SEE 'HELP EDIT').


NEXT?
>
```

Figure E-1. RDES "HELP" listing

```
NEXT?
>help help

THE HELP COMMAND IS USED TO OBTAIN HELPFUL INFORMATION PERTAINING
TO THE RDES SYSTEM.  THE USER MUST SUPPLY AN OPTION.  THE SEQUENCE
FOR USING THE COMMAND IS:

       NEXT?
       > HELP XXXX

WHERE 'XXXX' IS ONE OF THE FOLLOWING OPTIONS LISTED IN THE LEFT COLUMN:

 ACCESS    - DESCRIBES HOW TO EDIT AN EXISTING FILE.
 ACTAPE    - DESCRIBES HOW TO PUNCH A FILE TO PAPER TAPE.
 ADDRESS   - DESCRIBES HOW TO CHANGE THE MAILING ADDRESS OF THE USER.
 ASCII     - DESCRIBES HOW TO TRANSFER A FILE FROM PAPER TAPE.
 COMBINE   - DESCRIBES HOW TO APPEND MULTIPLE FILES (MAX. 5) INTO ONE.
 COMMANDS  - GIVES YOU THIS LISTING ( YOU ARE LOOKING AT IT ).
 CREATE    - DESCRIBES HOW TO ENTER DATA INTO A NEW FILE.
 DELQUE    - DESCRIBES HOW TO WITHDRAW JOBS FROM THE BATCH QUEUES.
 DUPE      - DESCRIBES HOW TO MAKE A COPY OF A FILE.
 EDIT      - DESCRIBES HOW TO GET A LIST OF EDITOR COMMANDS PLUS INFORMATION
             ON HOW TO OBTAIN DESCRIPTION ON THE EDITOR COMMANDS.
 ERASE     - DESCRIBES HOW TO ERASE AN EXISTING FILE.
 FNAMES    - DESCRIBES HOW TO LIST ALL FILES IN USER STORAGE AREA.
 FNAMES1   - DESCRIBES HOW TO LIST ALL FILES IN USER STORAGE AREA (MORE INFO).
 HELP      - GIVES YOU THIS LISTING ( YOU ARE LOOKING AT IT ).
 JOBSTAT   - DESCRIBES THE STATUS OF ALL BATCH JOBS SUBMITTED FROM THE USERID.
 LIST      - DESCRIBES HOW TO PRINT AN EXISTING FILE.
 LISTQ     - DESCRIBES HOW TO FIND OUT WHICH BATCH JOBS ARE AWAITING EXECUTION.
 LOGOFF    - DESCRIBES HOW TO SIGN OFF THE SYSTEM.
 LOGOUT    - DESCRIBES HOW TO SIGN OFF THE SYSTEM.
 MERGE     - DESCRIBES HOW TO CONCATENATE SPECIAL EFRAP FILES.
 NEWS      - DESCRIBES HOW TO GET PERTINENT SYSTEM INFORMATION.
 NWPROB    - DESCRIBES HOW TO LOG OFF THE SYSTEM WHILE RETAINING THE PHONE LINE.
 PHONES    - LISTS SYSTEM ACCESS PHONE NUMBERS.
 PEOPLE    - LISTS PHONE NUMBERS OF SSE'S (USER SUPPORT PERSONNEL).
 PURGE     - DESCRIBES HOW TO ERASE DATA1 FILES.
 RENAME    - DESCRIBES HOW TO CHANGE THE NAME OF A FILE.
 STATUS    - DESCRIBES HOW TO SEE HOW MUCH DISK STORAGE SPACE IS BEING USED.
 'STUDY'   - YOUR EPLANS PROGRAM.
 TERMDEF   - DESCRIBES HOW TO SET SPECIAL TERMINAL CAPABILITIES.
 TILT      - DESCRIBES HOW TO RETURN TO RDES -  'NEXT?'.
 TIMES     - DESCRIBES THE SYSTEM OPERATING HOURS.
 TRANSFER  - DESCRIBES HOW TO OBTAIN A DATA FILE FROM ANOTHER USER.
 VERSION   - DESCRIBES HOW TO INVOKE AN OLD, A PRESENT, OR A NEW VERSION
             OF RDES, AND/OR YOUR EPLANS.
 ?         - GIVES YOU THIS LISTING ( YOU ARE LOOKING AT IT ).

 NOTE: ALL OF THE ABOVE OPTIONS MAY NOT BE AVAILABLE FOR YOUR PARTICULAR EPLANS.
       ' EDIT ' IS NOT AN RDES COMMAND, HOWEVER IT IS A VALID OPTION
      TO THE RDES ' HELP ' COMMAND.

NEXT?
>
```

Figure E-2. RDES "HELP HELP" listing

```
NEXT?
>help ascii

THE ASCII COMMAND IS USED TO ENTER A FILE FROM ASCII PAPER TAPE,
DATA CASSETTE, OR FLOPPY DISK.  THE USER MUST SPECIFY A FILE
NAME UNDER WHICH THE DATA WILL BE STORED.  THIS FILE MUST NOT
ALREADY EXIST.  THE SEQUENCE IS:

     NEXT?
     > ASCII
     FILENAME ?
     > ABC
     SET UP PAPER TAPE, CASSETTE, OR DISK DEVICE . . . HIT MANUAL START
     .

OR, ALTERNATIVELY,

     NEXT?
     > ASCII ABC
     SET UP PAPER TAPE, CASSETTE, OR DISK DEVICE . . . HIT MANUAL START
     .

AFTER THE SET UP MESSAGE AND THE PROMPT (.), THE USER SHOULD TURN ON
THE STORAGE DEVICE AND RDES WILL BEGIN READING INFORMATION.  WHEN
ALL DATA FROM THE STORAGE DEVICE HAVE BEEN READ INTO THE FILE (IN THIS
CASE, FILE 'ABC'), RDES RETURNS TO 'NEXT?'.

IN THE ABOVE SEQUENCE, IF FILE 'ABC' HAD PREVIOUSLY EXISTED, THE SYSTEM
WOULD RESPOND WITH:

     RDAS003W - FILE 'ABC   ' ALREADY EXISTS
     NEXT?
     >

AND THE USER SHOULD REISSUE THE COMMAND USING A VALID FILENAME.


IF, FOR SOME MECHANICAL REASON, RDES CANNOT READ INFORMATION FROM THE
STORAGE DEVICE (E. G.  IF THE DEVICE IS NOT CONNECTED PROPERLY), THEN
THE SYSTEM RESPONDS WITH:

      RDAS009E - ERROR READING DATA - CONTACT EPLANS COORDINATOR.
     NEXT?
     >


NEXT?
>
```

Figure E-3. RDES "HELP ASCII" listing

```
NEXT?
>help dupe

THE DUPE COMMAND MAKES A COPY OF AN EXISTING DATA FILE AND STORES THE
COPY UNDER A NEW NAME.  THE DATA FILE THAT IS BEING COPIED IS NOT
ALTERED.  THE USER MUST SPECIFY, FIRST, THE OLD FILENAME, AND THEN
THE NEW FILE NAME.  THE SEQUENCE IS AS FOLLOWS:

     NEXT?
     > DUPE MYFILE NEWFILE
     RDDP005I - FILE ' NEWFILE ' CREATED
     NEXT?


OR, ALTERNATIVELY,

     NEXT?
     > DUPE
     OLD FILE NAME?
     > MYFILE
     NEW FILE NAME?
     > NEWFILE
     RDDP005I - FILE ' NEWFILE ' CREATED
     NEXT?
     >

THE EFFECT OF EITHER OF THESE SEQUENCES IS TO CREATE A NEW FILE NAMED
FILE, 'MYFILE'.  IN THE CASE WHERE 'MYFILE' DID NOT PREVIOUSLY EXIST,
RDES RESPONDS WITH:

     RDDP001W -FILE ' MYFILE ' NOT FOUND
     NEXT?
     >

ALSO, IN THE CASE WHERE THE NEW FILE NAME ALREADY EXISTS, RDES
RESPONDS WITH:

     RDDP003W - FILE 'NEWFILE ' ALREADY EXISTS.
     NEXT?
     >

NEXT?
>
```

Figure E-4. RDES "HELP DUPE" listing

```
NEXT?
>help purge

THE PURGE COMMAND IS USED TO ERASE DATA FILES THAT HAVE A TYPE OF

     NEXT?
     > PURGE
     D/C OUTPUT FILE NAME?
     > ABC
     RDPG008I - FILE: ' ABC ' PURGED.
     NEXT?
     >

OR, ALTERNATIVELY,

     NEXT?
     > PURGE ABC
     RDPG008I - FILE: ' ABC ' PURGED.
     NEXT?
     >


IF FILE 'ABC DATA1' DID NOT EXIST, RDES WOULD RESPOND WITH:

     RDPG001W - FILE: ' ABC ' NOT FOUND.

NEXT?
>
```

Figure E-5. RDES "HELP PURGE" listing

```
NEXT?
>help tilt

THE TILT COMMAND, WHICH DOES NOTHING BUT FORCE RDES BACK TO 'NEXT?',
IS HANDY WHEN THE USER ENTERS AN ERRONEOUS LINE.  FOR INSTANCE, IF
THE USER ENTERS:

     NEXT?
     > COMBINE
     HOW MANY FILES? (LIMIT OF 5)
     > 4
     ENTER 4 FILE NAMES
     >

AND THEN REALIZES THAT HE ONLY WANTS TO COMBINE 3 FILES (INSTEAD OF 4),
HE CAN ENTER 'TILT' AFTER THE SYSTEM PROMPT (>), AND RDES WILL RETURN
TO 'NEXT?':

     HOW MANY FILES? (LIMIT OF 5)
     > 4
     ENTER 4 FILE NAMES
     >TILT
     NEXT?
     >

THE USER CAN NOW REISSUE THE 'COMBINE' COMMAND USING THE CORRECT
NUMBER OF FILES.

(IF POSSIBLE, USE OF THE CHARACTER DELETE OR LINE DELETE SYMBOL IS
ADVISED.)

NEXT?
>
```

Figure E-6. RDES "HELP TILT" listing

```
NEXT?
>help edit

  FOLLOWING ARE THE AVAILABLE EDITOR COMMANDS :

        AGAIN          GOTO           SAVE
        ALTER          INPUT          TABSET
        AUTOSAVE       LINEMODE       TOP
        BACKWARD       LINENO         TYPE
        BOTTOM         LOCATE         UP
        CHANGE         NEXT           $GET
        DELETE         NNNNN          $HELP
        DOWN           QUIT           $PUT
        FILE           REPLACE        ?
        FNAME          REUSE          =
        FORWARD


  THIS HELP FACILITY MAY BE USED TO OBTAIN A BRIEF DESCRIPTION
  ON ANY OF THE ABOVE COMMANDS.  IT CAN BE EXECUTED BY TWO
  DIFFERENT METHODS:

  1.  FROM RDES (NEXT?) LEVEL:

      NEXT?
      >HELP EDIT editor-command


  2.  FROM EDITOR LEVEL:
      (NOTE: YOU ARE PLACED IN THE EDITOR AFTER ISSUING
             THE 'CREATE' OR 'ACCESS' COMMAND).
      EDIT:
      >$HELP editor-command


  DESCRIPTION ON UP TO FOUR EDITOR COMMANDS MAY BE REQUESTED
  AT A TIME. TO OBTAIN DESCRIPTION ON ALL THE EDITOR
  COMMANDS, ENTER AN ASTERISK (*) FOR THE editor-command.
    e.g.  help edit change next reuse lineno
          help edit *
          $help autosave tabset
          $help *

NEXT?
>
```

Figure E-7. RDES "HELP EDIT" listing

Appendix F. Index

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