FOR ELCAP INTERNAL USE

PROBLEM IDENTIFICATION

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PROBLEM IDENTIFICATION

1.0 Introduction

At some point in your analysis, you will find a problem in the ELCAP data base or will want to know about a problem that someone else has found in the data. The following section discusses the PIRCAR system used to track problems in the ELCAP data.

The PIRCAR system contains documentation of problems found in the ELCAP data base and what solutions were applied to those problems. The term "PIRCAR" comes from two acronyms- PIR and CAR. A PIR is a problem identification report. The PIR documents a problem that was found by site maintenance personnel, data processing, verifiers, or analysts. The PIR is typically submitted on a problem identification form, which immediately leads to another acronym, PIF. The terms "PIR" and "PIF" are used interchangeably. A CAR is a corrective action report. Any problem that has been identified on a PIR and fixed is documented on a CAR. CAR's are typically filed by site maintenance personnel, verifiers, and data processing staff. Analysts can suggest solutions to problems they encounter but are not allowed to file CAR's.

All PIR's and CAR's are stored in the CDB on the AVAX, with addtional PIR information in text file in the PIRCAR account on the AVAX. Every PIR or CAR is referenced to a particular site for a specific time period. For example, a PIR might be filed that says that a temperature sensor at a particular site is not working as of some date. Eventually, a CAR will be filed stating that the temperature sensor is now working. Every PIR and CAR is coded with a series of primary and secondary codes discussed below. This allow us to sort through various codes looking for trends in the problems. For example, it can be shown that the number of communications problems in the Residential Sector varies with the time of the year.

The main use of this system to an analyst is in tracking outstanding problems at sites you are interested in. As an example, assume that a verifier has noticed that a particular site has had a series of small power surges in the data. These would manifest themselves as apparent "spikes" in the usage of various devices. A PIR would be filed and entered into the system. Any analyst interested in that particular site could then access the data base and be warned that the data of interest would have some un-accounted for spikes. A post-processing macro could then be run by the analyst to eliminate any suspicious records. Alternatively, the analyst may decide that the spikes are indeed real and of great interest. It has been the policy of the ELCAP verification staff to alert analysts of suspected problems or oddities when making data available for analysis. Few attempts are made to deny access to data except in cases where we definitely know there is a problem.
Another use of the PIRCAR system is to keep track of analysis problems. Many times, the data will look perfectly normal in verification but a problem will show up in analysis. Maybe a temperature is constant for too long a time or an enduse load does not appear to be "normal". These problems are documented and filed for other analysts who may be interested in the same data. This keeps people from "re-inventing the wheel" each time a problem is discovered.

Any particular PIR may have a closed window of applicability or an open window of applicability. An open window means that the problem has not yet been fixed or is useful information to anyone interested in any data for that site. Analysts should check the system for problems any time they start to analyze a particular site.

The following sections describe how to get information out of PIRCAR and what the information might mean. The programs are available to all ELCAP users. One item of great importance is to note that most of the PIRCAR programs key off of the PX number of a particular logger rather than off of the site ID number. The PX number is a property control number associated with the actual data logger at a site. Essentially, there is a one-to-one correspondence between PX and site ID for residential sites. This is because there is one data logger for each site. In commercial site with multiple loggers, a variety of PX numbers are associated with each site ID. See the document entitled "Getting Started" in this users guide for a description of how PX and site are related.
2.0 PIR & CAR PROGRAMS

2.1 OPEN_PIFS

The OPEN_PIFS program produces an abbreviated listing of the PIR's that are currently open for given PX numbers. This is a listing of all PIR's that are currently affecting data that is just being collected. After logging on to the AVAX type:

$ OPEN_PIFS

You will then be prompted for a PX number. Enter the PX number (without the characters "PX"). You will be prompted for PX numbers until you type a blank [RETURN]. That will exit the program.

The output file from this program is called OPEN_PIFS.LIST. This will be located in your current directory.

2.2 PIF_HISTORY

The PIF_HISTORY program produces an abbreviated listing of ALL PIR's for a given PX number and the OPEN/CLOSED status (including the CAR number which closed the problem, if applicable). After logging on to the VAX type:

$ PIF_HISTORY

You will then be prompted for a PX number. Enter the PX number (without the characters "PX"). You will be prompted for PX numbers until you type a blank [RETURN]. That will exit the program.

The output file from this program is called PIF_HISTORY.LIST. This will be located in your current directory.

2.3 PRINTPIF

The PRINTPIF program will produce PIFs from the Characteristics Database (CDB) in the same form as the PIF sheet which it was input from. This is only available in interactive mode.

To operate:

After logging on to the A-VAX, type:

$ PRINTPIF

Your screen will clear and a MENU will appear. You will be prompted for a one-letter choice. Type in the letter of the criterion you wish used in the selection of the PIFs you are printing, or a "?" for HELP. You can print all PIFs for a given PX, for a given PX and PIF number, for a given region, for a given study and region, or any combination of
the choices on the menu.

The prompt:

Enter choice(s) -->

AFTER TYPING A LETTER, DO NOT TYPE [RETURN] UNLESS ALL YOUR CRITERION HAS BEEN CHOSEN.

You may type as many selections as you wish, or EXIT by typing "X". Typing "R" will RESET your selections, and "?" will give you HELP.

After all your criterion has been chosen, type [RETURN].

You will now be prompted for specifics, relating to your choices. (Like the PX number, or the primary PIF code, etc.) Type [RETURN] after entering EACH one.

After your specific choices are entered, the program will present you with your choices and ask you if they are correct. Type "Y" or "N".

The program will take 1 to 5 minutes, and will created a file in your current directory titled "PIFS.LIST".

A complete listing of all recognized PIR and CAR codes is given below. The use of these codes can tell you what was found wrong at a site and how the site was repaired. The codes also indicate reasons for holes in the data (due to communication problems) and any oddities noted in the analysis or verification of the energy or characteristics data. For PIR filed against the energy data, the primary code is the general type of problem and the secondary code goes into more detail. For PIR's filed against the characteristics data, the primary code is the type of relation and the secondary code is the type of problem.
### 3.0 ENGINEERING DATA PIF CODES

<table>
<thead>
<tr>
<th>PRI</th>
<th>SEC</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM</td>
<td></td>
<td>Communication Problems</td>
</tr>
<tr>
<td>CPL</td>
<td></td>
<td>CPU won't respond, potential data loss</td>
</tr>
<tr>
<td>CDL</td>
<td></td>
<td>CPU won't respond, data lost</td>
</tr>
<tr>
<td>CPN</td>
<td></td>
<td>CPU won't respond, parms not output</td>
</tr>
<tr>
<td>RPL</td>
<td></td>
<td>Rings no answer, potential data lost</td>
</tr>
<tr>
<td>RDL</td>
<td></td>
<td>Rings no answer, data lost</td>
</tr>
<tr>
<td>RPN</td>
<td></td>
<td>Rings no answer, parms not output</td>
</tr>
<tr>
<td>APL</td>
<td></td>
<td>Answers but no connect, potential data loss</td>
</tr>
<tr>
<td>ADL</td>
<td></td>
<td>Answers but no connect, data lost</td>
</tr>
<tr>
<td>APN</td>
<td></td>
<td>Answers but no connect, parms not output</td>
</tr>
<tr>
<td>EXT</td>
<td></td>
<td>Noisy line (static, music, etc.)</td>
</tr>
<tr>
<td>BSY</td>
<td></td>
<td>Line busy</td>
</tr>
<tr>
<td>PNW</td>
<td></td>
<td>Phone line installed, but not working</td>
</tr>
<tr>
<td>PSD</td>
<td></td>
<td>Parameters scrambled (or lost), data lost.</td>
</tr>
<tr>
<td>BAU</td>
<td></td>
<td>Baud rate</td>
</tr>
<tr>
<td>GEN</td>
<td></td>
<td>GENERAL</td>
</tr>
</tbody>
</table>

### INS | Instrumentation/Installation |
| ML | Missing leg |
| MNM | Mains not monitored |
| MPH | Mixed phasing |
| RCT | Reversed CT |
| MCT | Multiple wire CT, one or main wires reversed |
| SEU | Underscaling apparent in data/power surge |
| SEC | Channels could be scaled closer at panel |
| NCD | Negative checksum difference |
| PCD | Positive checksum difference |
| MEU | Mixed enduses/won't meet enduse needs (terminals) |
| CAL | Calibration errors |
| ICR | Invalid channel rescale needed (channel sensitivity) |
| MGD | Monitored power generating device |
| SER | Wrong scaling resistor installed |
| SCT | Wrong scaling CT installed |
| ONL | Owner added new load |
| ORL | Owner removed load |
| ORT | Owner reversed CT |
| NTS | Installation not to standards |
| GEN | GENERAL |
DOC

Documentation Errors

WPN  Wrong phone number
MPE  Measurement plan error
QL   Questionable load(s)
ILT  Incomplete load test
IEI  Insufficient enduse identification
IMP  Incomplete measurement plan
IED  Incomplete enduse disaggregation
NTS  Documentation not to standards
GEN  GENERAL

HF

Hardware Failures

PS   Power supply
CLK  Logger clock problems
MEM  Memory problem/failure
FVR  Five volt reference problem/failure
WHB  Watt hour board failure
MAX  Channels read maximum value
HZ   All channels read hard zero
OV   All channels read offset values only
UCM  Unspecified channel malfunction
CPU  CPU problem/failure
GEN  GENERAL

MET

MET Station or MET Channel Problems/Failures

IAT  Indoor sensor problems
OAT  Outdoor sensor problems
WST  Woodstove sensor problems
WSP  Windspeed sensor problems
PYR  Pyranometer sensor problems
HUM  Humidity sensor problems
MRV  Five volt MET reference problems
WDR  Wind direction sensor problems
TOW  MET tower not installed
GEN  GENERAL

RFI

Radio Frequency Interference

INT  Internal RFI (affecting logger)
EXT  External RFI (affecting resident)
GEN  GENERAL
<table>
<thead>
<tr>
<th>SW</th>
<th>Software Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAS</td>
<td>Data acquisition software problems</td>
</tr>
<tr>
<td>REF</td>
<td>REFORMAT program problems</td>
</tr>
<tr>
<td>APP</td>
<td>APPEND program problems</td>
</tr>
<tr>
<td>VER</td>
<td>Verification program problems</td>
</tr>
<tr>
<td>ANL</td>
<td>Analysis program problems</td>
</tr>
<tr>
<td>CDB</td>
<td>Characteristics Database problems</td>
</tr>
<tr>
<td>110</td>
<td>HP 110 software problems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUR</th>
<th>Survey Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLL</td>
<td>Capacity less than load</td>
</tr>
<tr>
<td>ICL</td>
<td>Incomplete connected load survey</td>
</tr>
<tr>
<td>IAC</td>
<td>Inadequate HVAC description</td>
</tr>
<tr>
<td>WBZ</td>
<td>Wrong or improper BUZ codes</td>
</tr>
<tr>
<td>TEN</td>
<td>Tenant information missing</td>
</tr>
<tr>
<td>ECP</td>
<td>Equipment code problems</td>
</tr>
<tr>
<td>TSI</td>
<td>Temperature sensor information inadequate</td>
</tr>
<tr>
<td>GEN</td>
<td>General</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEN</th>
<th>Tenant Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNS</td>
<td>Tenant unsatisfied</td>
</tr>
<tr>
<td>AGR</td>
<td>Needs agreement</td>
</tr>
<tr>
<td>VAC</td>
<td>Site is unoccupied</td>
</tr>
<tr>
<td>GEN</td>
<td>GENERAL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ANL</th>
<th>Analysis Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAT</td>
<td>Problems with data (Bad data)</td>
</tr>
<tr>
<td>MDA</td>
<td>Missing data/Hole in data</td>
</tr>
<tr>
<td>GEN</td>
<td>GENERAL</td>
</tr>
</tbody>
</table>
### 4.0 CHARACTERISTICS DATA PIF CODES

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR</td>
<td>Fundamental Relations, problems with data (Bad data), missing data, general</td>
</tr>
<tr>
<td>RI</td>
<td>Residential Building Characteristics on-site inspection</td>
</tr>
<tr>
<td>CI</td>
<td>Commercial Survey Instrument</td>
</tr>
<tr>
<td>DAV</td>
<td>Data Acquisition and Verification Relations, problems with data (Bad data),</td>
</tr>
<tr>
<td>UTL</td>
<td>Utility data</td>
</tr>
<tr>
<td>ROS</td>
<td>Residential Occupant mail and telephone surveys, problems with data (Bad data),</td>
</tr>
<tr>
<td>HR</td>
<td>Hood River data</td>
</tr>
<tr>
<td>PC</td>
<td>Pif/Car data</td>
</tr>
</tbody>
</table>


SENSITIVE DATA

DAT
MDA
GEN

Problems with data (Bad data).
Missing data.
General

The list below details which specific relations are considered to correspond to the various primary characteristics codes.

FUNDAMENTAL RELATIONS (FR)

CUCC
CURC
PARTICIPANT
PXTOLOG
STUDY_CODES
STUDY_FLAGS

RESIDENTIAL BUILDING CHARACTERISTICS ON-SITE INSPECTION (RI)

RES_AIR_VENT
RES_APPLIANCES
RES_ATTIC_VENTILATION
RES_CEILING_ROOF
RES_CRAWL_SPACE
RES_CRAWL_SPACE_DESCRIPTIONS
RES_CRAWL_SPACE_VENTS
RES_DISHWASHERS
RES_DOORS
RES_FLOORS
RES_FOUNDATION
RES_HOT_WATER_HEATER
RES_HVAC_DISTRIBUTION
RES_HVAC_SYSTEMS
RES_INTRÓ
RES_MOD_ADD
RES_OCCUPIED
RES_OTHER
RES_OTHER_CODES
RES_REFRIG_FREEZERS
RES_ROOMS
RES_STATUS
RES_WALLS
RES_WATER_RUN_OFF
RES_WINDOWS

COMMERCIAL SURVEY INSTRUMENT (CI)

ADDITIONAL_CENTRAL_SYSTEMS
BUILDING_COMPONENTS
BUILDING_INFO
BUILDING_USE_ZONE_CODES
COMM_STATUS
CONN_LOAD
CONSTRUCTION_TYPE_CODES
ENVELOPE
EQUIPMENT_CODES
EQUIPMENT_CONTROL_CODES
FUEL_TYPE_CODES
HVAC_DIST
HVAC_DISTRIBUTION_CODES
HVAC_SYSTEM_TYPE
MOD_ADD
OTHER_FUEL_CODES
SECONDARY_SITEID
TEMP_SENSOR_INFO
TENANT
TENANT_OCCUP
ZONE_INFO

DATA ACQUISITION AND VERIFICATION (DAV)

CHANNEL
ENDUSES
LOGGER_HISTORY
STATUS_CODES
VERIFY

UTILITY (UTL)

UTILITY_BILLING
UTILITY_RATES

RESIDENTIAL OCCUPANT MAIL/TELEPHONE SURVEYS (ROS)

ROS86
ROSM85
ROST85

HOOD RIVER (HR)

HRLINK
HRPNWRES

PIF/CAR (PC)

CAR
CAR_PARTS
PIF
SENSITIVE (SEN)

BASE CASE S
BUILDING_INFO_S
CRC_SURVEY85
RES_INFO_S
RSDP_S
SITEREL
TENANT_S
5.0 CAR CODES

The CAR codes are somewhat simpler in nature because there are few ways to fix a problem than there are potential problems. The primary code is essentially a statement of what action was taken and the secondary is a statement of what item that action was taken against. For characteristics PIR, the primary code is the same as those for characteristics PIR's, with a secondary code as indicated below.

PRIMARY CODES FOR ENERGY DATA CARS

---------------
SW = SOFTWARE
REP = REPLACED/CHANGED
COR = CORRECTED/FIXED
INS = INSTALLED/PICKED UP
RST = RESET
F = FAILED ATTEMPT (THE CORRECTION DIDN'T WORK OR WAS NOT POSSIBLE)
V = VERIFICATION CHANGE
O = DEALT WITH OWNER
N = NO PROBLEM
DOC = DOCUMENTATION (SERIAL NUMBERS, MP CORRECTIONS, etc.)
TOT = TOTAL REWORK
DIS = DISCONNECTED/REMOVED/WITHDRAW

SECONDARY CODES FOR ENERGY DATA CARS

---------------
A/D = ANALOG TO DIGITAL CONVERTER
WIR = WIRES
CPU = CPU
CT = CT
BP = BACKPLANE
WHB = WATT-HOUR BOARD/WATT-METER CARD
PS = POWER SUPPLY
RES = RESISTOR
FUS = FUSE
FVR = FIVE VOLT REFERENCE
LGB = LOGGER BOARD
MET = MET BOARD, TOWER, OR CHANNELS
RIB = RIBBON CABLE
SL = SECOND LEGS
MNS = MAINS
LOA = LOAD
CHN = OTHER CHANNEL (BESIDES MAINS)
ALL = COMPLETE FDAS

MOD = MODEM
RFI = RFI
BAU = BAUD RATE
PHJ = PHONE JACK

12
PL = PHONE LINE
PC = PHONE CABLE

MP = MEASUREMENT PLAN
CAL = WATT METER CARD CALIBRATIONS
PIR = PROBLEM IDENTIFICATION REPORT

PHA = PHASING
END = ENDUSE(S)
OFF = OFFSETS

110 = HP 110 SOFTWARE
REF = REFORMAT SOFTWARE
APP = APPEND SOFTWARE
DAS = DATA AQUISITION SOFTWARE
VS = VERIFICATION SOFTWARE
ANS = ANALYSIS SOFTWARE
CDB = CHARACTERISTICS DATABASE SOFTWARE

AGR = OWNER AGREEMENT
DRP = DROPPED FROM STUDY

GEN = GENERAL

SECONDARY CODES FOR CHARACTERISTICS DATA CARS

N = NO PROBLEM
PF = PROBLEM FIXED
PCF = PROBLEM CAN'T BE FIXED
MF = MISSING DATA FILLED IN
MCF = MISSING DATA CAN'T BE FILLED IN
CDN = CODE DEFINITION CHANGED - DATA MODIFIED USING CURRENT VERSION
6.0 FILING ANALYSIS PIFS

At some time during your analysis work, you will find a problem or a series of problems with the data. The overall quality of the data is extremely high but it is not perfect. The people in charge of the data base would be extremely happy to hear from you as to the problems you have found. They will either fix the problem for you, explain to you why it is not a problem or will arrange things so that no other analysts come across the same problem. None of this can be done without your input.

The general process for filing a PIF is to fill out a Problem Identification Report. A sample form is attached. The essential information for you as an analyst to supply is the site id number (shown as d1 # on the PIR), your name, the time frame of the data that has the apparent problem (in either ELCAP or calendar dates), a brief description of the problem (less than 60 characters), and your guess as to the appropriate PIR code (taken from the list above). A space for expansion of the problems found is provided at the bottom of the form.

Please fill out one form for each site. If you find multiple problems at a site, feel free to list all the problems for that site on one form. All PIR's should be given to one of the sector verification coordinators or any other member of the ELCAP operations staff. See the list in the "Getting Started" section of this User's Guide for a list of appropriate names and addresses.
NEW / MOD

PROBLEM IDENTIFICATION REPORT

DI# __________
P# ________
REG# ________
PI# ________
CASE STUDY ___

Filed by: ______________________(____) initials

Date written: ______________________

Applicable window of data: from_________ to__________ (DD-MMM-YY)

from_________ to__________ (DD-MMM-YY)

(For more than five problems, use an additional PIR sheet, and attach.)

PROBLEM# DESCRIPTION (60 char. for each Problem #)

CODES

1. PRI ---- SEC

2. 

3. 

4. 

5. 

EXPANSION on above problems, if desired. List the appropriate problem# (May use back)

Corrective Action Decided:

Assigned to: ____________________________