CHAPTER 1

PCA Instrument Commanding: User's Guide

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This document illustrates the use of the PCA Command Generation Software.

1.1 Introduction

This document describes the Proportional Counter Array (PCA) Command Generation Software and its operation. It is designed to allow the creation of a desired instrument configuration for the XTE Proportional Counter Array experiment. It will ultimately produce a command script that will be sent to the instrument via the spacecraft computer and will put the instrument in the desired configurations.

1.2 Related Documentation

The following documents are relevant for reference:

1. PCA Instrument Commanding: Architectural Design, Aileen Barry, Vikram Savkoor

2. PCA Commands - Types, Sequences, Use, Configurations, Screen Functions, Verification. SOC Interface, Barry Giles

3. Command Generation: Public Interfaces, Leon Herreid

1.3 Overview of Purpose and Function

The PCA Command Generation Subsystem allows a user to format a desired instrument configuration through an interactive window environment. The configuration can be saved to disk for subsequent scheduling and can later be translated into a series of commands that are formatted as packets. In order to build a desired configuration, the user steps through a series of menu screens. The screens have been divided into functional categories and display the various parameter settings for each function. Once the user steps through the screen and makes the applicable choices, the software will generate a command configuration consisting of a series of data parameter settings that will put the instrument in the desired configuration. The configuration is then named and saved to disk.

1.4 Installation and Initialization

The PCA Command Generation Software is a distinct and separate executable program. It is installed in *$SOCHOME/bin* directory, which could be installed anywhere on your system.

The programs startup command *PCAedit* may be invoked with two types of arguments on the command line: startup switch *[-res Res_Filename]* specifying the resource filename to start the editor, and *[Config_Filename]* specifying a named configuration file (with the full path name if it is not resident in the current directory).

1.5 Start-up and Termination

To start the PCA Command Generation Software, simply type:

```
PCAedit [pca_desired_config_filename] [-res resource_filename]
```

from the command line. It can be invoked with an additional parameter of a configuration file name but it is not necessary in normal operations. The program is then started and initializes internal data stores. A main menu will appear on the screen with the panel entitled "PCA Command Generation".

To quit the program, select "*Quit*" from the File menu. The program will clean up any allocated resources and exit to the command prompt.

1.6 Functions and their Operations

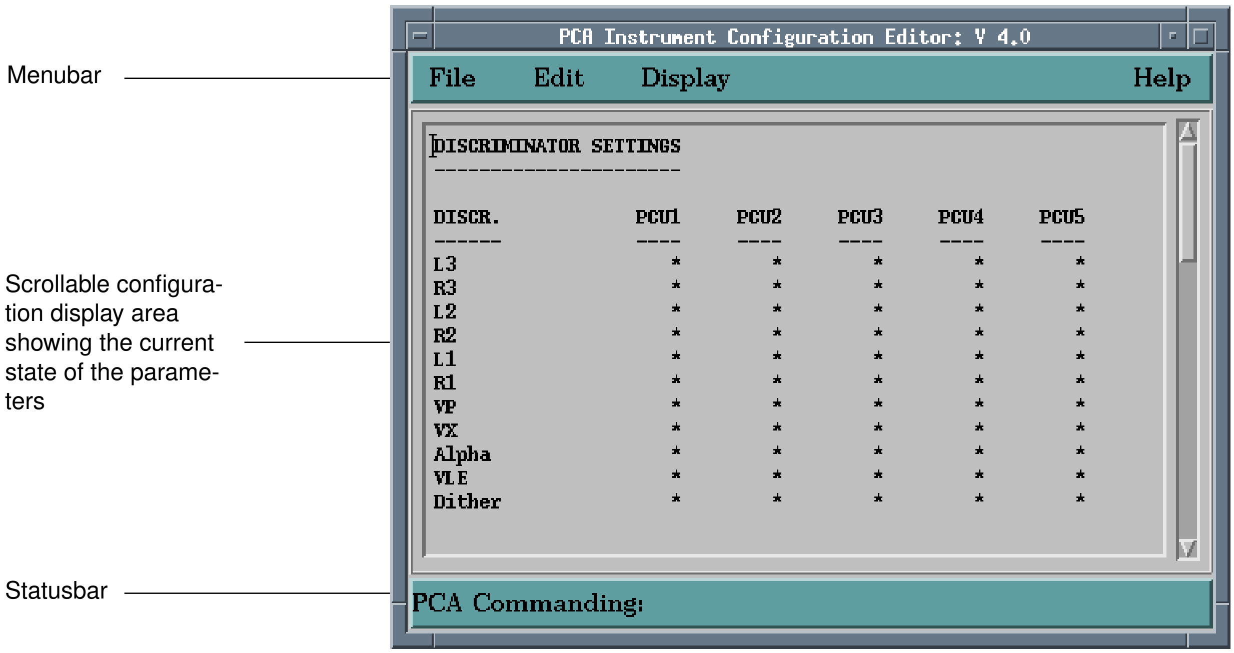
The PCA Command Generation Software (CGS) is ultimately responsible for creating a desired instrument configuration from user specifications and building a set of commands that will put the PCA instrument into that configuration. The Configuration Editor is the interface provided to the user by which instrument parameter settings may be changed and saved. It consists of a series of display screens that are grouped by functionality and are accessed via a main control panel. The format of the Main Panel is depicted in Figure 1 on page 8.

A menu bar appears at the top of the Main Panel. The operations found in each menu are:

- File Menu: Operations to load, save and delete configuration files, to save a file as a default configuration, to print the current configuration, and to quit the Editor.
- Edit Menu: Operations to change parameter values of the various configuration categories. The categories are: *Discriminator Settings*, *Test Pulse Generator* (TPG) *Settings*, *Remote Interface (*RIF*) Diagnostics*, *Constrained Command Settings,* and *Miscellaneous* commands. The *Master Reset* category is selected when it is necessary to put all PCUs into a default configuration. The defaults are specified in Appendix A.
- Display Menu: Operations to view all configuration settings. The Configuration *Summary* is a read only category that displays all settings for a given PCU. It is used to verify parameter selections that the user has made. If a selection looks wrong, it can be changed by going back to the edit category for that functional area and changing the parameter value.
- Help Menu: Used to invoke on-line help for the Main Panel.

The "*Open*", "*Save*", and "*Delete*" operations display a file selection dialog. See sections `1.6.1.5` and `1.6.1.6` for details on how to use these dialogs. You will see slight variations in the file dialogs used for the different operations.

FIGURE 1 PCA Commanding: Main Panel



1.6.1 Configuration Editing

The menubar in the Main Panel of the Configuration Editor provides the access to all configuration parameters. The settings are grouped logically into separate functional areas and are later used to generate instrument commands. Configuration parameters are grouped into the following categories: (1) Discriminator Settings (2) Test Pulse Generator Settings (3) Remote Interface Diagnostics and (4) Constrained Command Settings. The Master Reset and Configuration Summary categories are not considered true parameter categories. They are considered separately in the last two sections.

To change a parameter in one of the four categories, select the edit category from the Edit menu. The display panel for that category will then appear and changes to each applicable parameter in that category may be made. Parameter values are named and in each case, their current state is displayed. Changing a parameter via the menu changes its internal state. That state will later be used to generate a command set. Figures 2. through 5. show the display panels for the categories 1 through 4 respectively.

Each display panel of these edit categories has a menubar at the top, accelerator keys (provided as an alternate method of invoking the operation as indicated in the Pulldown) at the side, and configuration parameters, each with an option menu, above the status bar at the bottom of the panel. The Option Menu appears as an option button with the parameter title on the left. The option button shows the current selection followed by a dash to indicate that it is an Option Menu rather than a Push Button. When the option button is selected, a menu of choices appears. The menu is positioned with the current selection over the option button. The user may then make a selection from that list.

Changes to the parameter settings may be done on an individual PCU basis or may be applied universally to all PCUs. To change the parameter settings for a specific PCU, set the numeric PCU identifier from the PCU option menu. Then change the desired parameter settings as normal. To facilitate setting similar parameters for multiple detectors, select the PCU identifier "*All*". The panel will then reflect the current settings with legitimate values if all five detectors have the same values for specific parameters. "*As Is*" is displayed otherwise. Any change now made to a parameter will be applied to all PCUs.

The following sections describe the menu operations and parameter settings in more detail.

NOTE: *The Status bar appearing at the bottom of each display panel indicates if there has been any change to the currently active configuration file that has not been saved.*

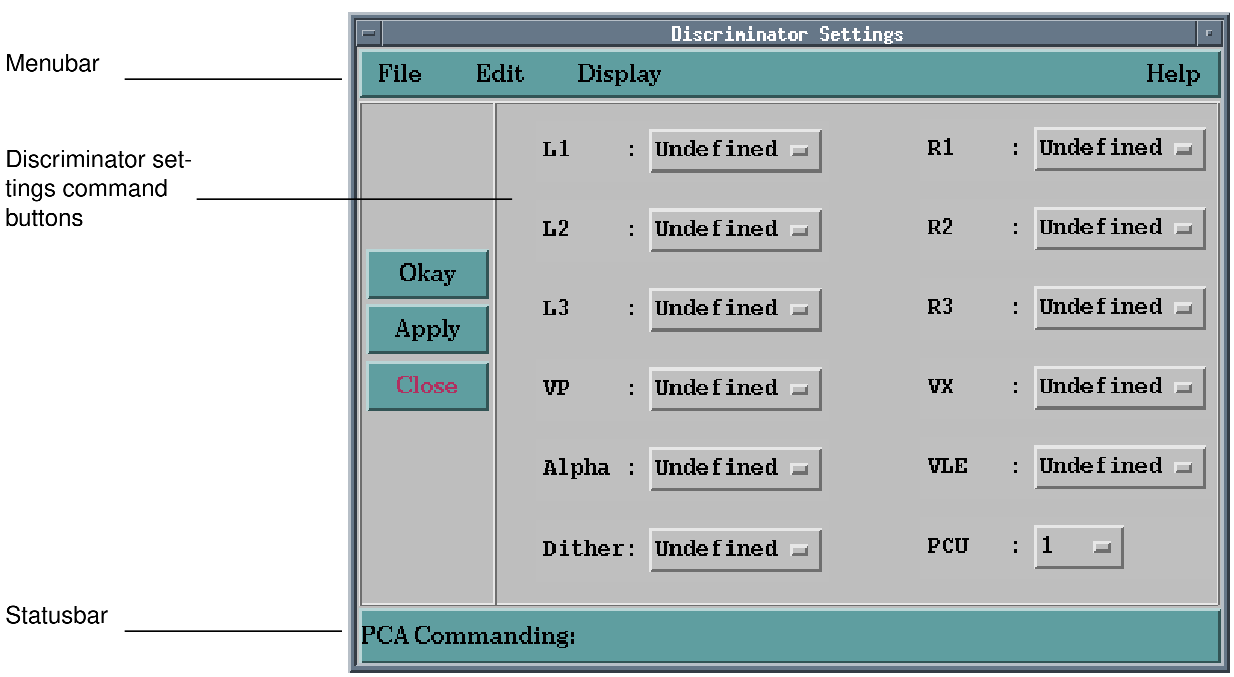
1.6.1.1 Discriminator Settings

Discriminator Settings are used to control the nine independent anode chains in each detector. Discriminator settings for the detectors are changed from the display menu in this edit category. Once the category has been selected from the main panel Edit menu, the discriminator settings display panel is brought up. It presents each discriminator along with its current value (usually initialized to "Undefined") and an Option Menu by its side.

To change the value of a discriminator setting parameter, use the mouse to click on the option button. When the option button is selected, a menu of choices appears. The menu is positioned with the current selection over the option button. The user may then make a selection from the list. This change will be noted in the internal representation for the configuration and will also appear on the screen as the current default. In each case, the selection will be verified and an appropriate warning or error will be reported in the event the input has been entered erroneously.

After all parameter selections have been made, click on the "*Okay*" button to activate selections and return to the main panel. Click on the "*Apply*" button to activate the selections but remain in the display panel. Click on the "*Close*" button to return to the main panel ignoring any change made to the configuration.

FIGURE 2 PCA Commanding: Discriminator Settings

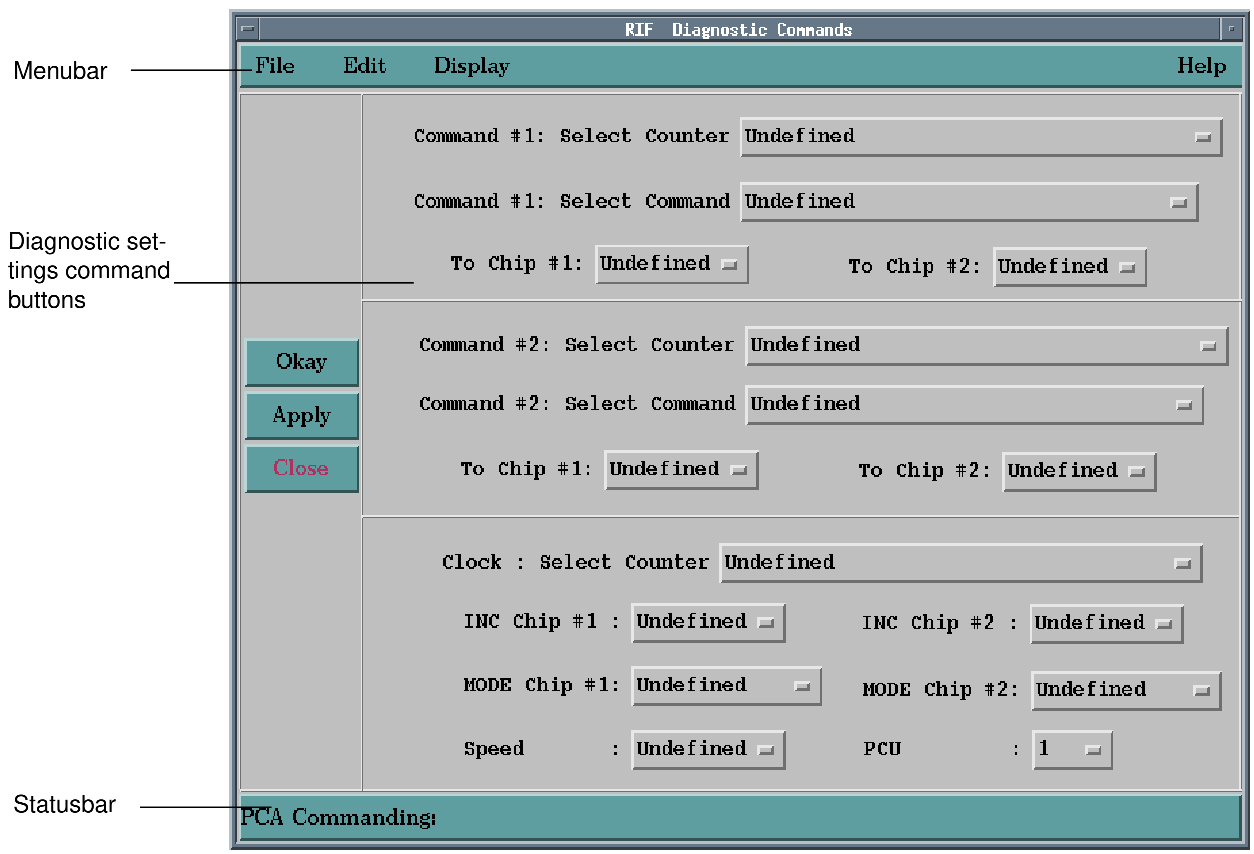


1.6.1.2 Remote Interface Diagnostics

The parameter settings for The Remote Interface Diagnostics controls the two rate counter chips in the RIF digital board. The diagnostic settings pertain to the functions involved in their use. To send commands in this edit category, click on the Remote Interface Diagnostics Settings from the main edit menu. A display will be brought up that shows each related parameter, its default setting (usually initialized to "Undefined") and possible settings or choices for new values. In most cases, to set the parameter to a new value, select one from the list of possibilities by clicking the mouse on the option menu. In each case, the selection will be verified and an appropriate warning or error will be reported in the event the input has been entered erroneously.

After all parameter selections have been made, click on the "*Okay*" button to activate selections and return to the main panel. Click on the "*Apply*" button to activate the selections but remain in the display panel. Click on the "*Close*" button to return to the main panel ignoring any change made to the configuration.

FIGURE 3 PCA Commanding: Remote Interface Diagnostics



1.6.1.3 Test Pulse Generator Settings

Test Pulse Generator commands affect the TPG that is built in to each detector. The TPG can operate in ramp or mono (multi-line) mode and its output can be directed into any one of the nine independent anode chains. To set a command that programs a particular TPG click on the Test Pulse Generator edit category from the main panel Edit menu. A display will appear that shows the parameters for TPG settings, their current value (usually Undefined). To select a new value for a parameter for a particular detector, click on the option button to the right of the parameter and make a selection from the list of choices that appear. The internal representation of the value will change along with the default value displayed.

After all parameter selections have been made, click on the "*Okay*" button to activate selections and return to the main panel. Click on the "*Apply*" button to activate the selections but remain in the display panel. Click on the "*Close*" button to return to the main panel ignoring any change made to the configuration.

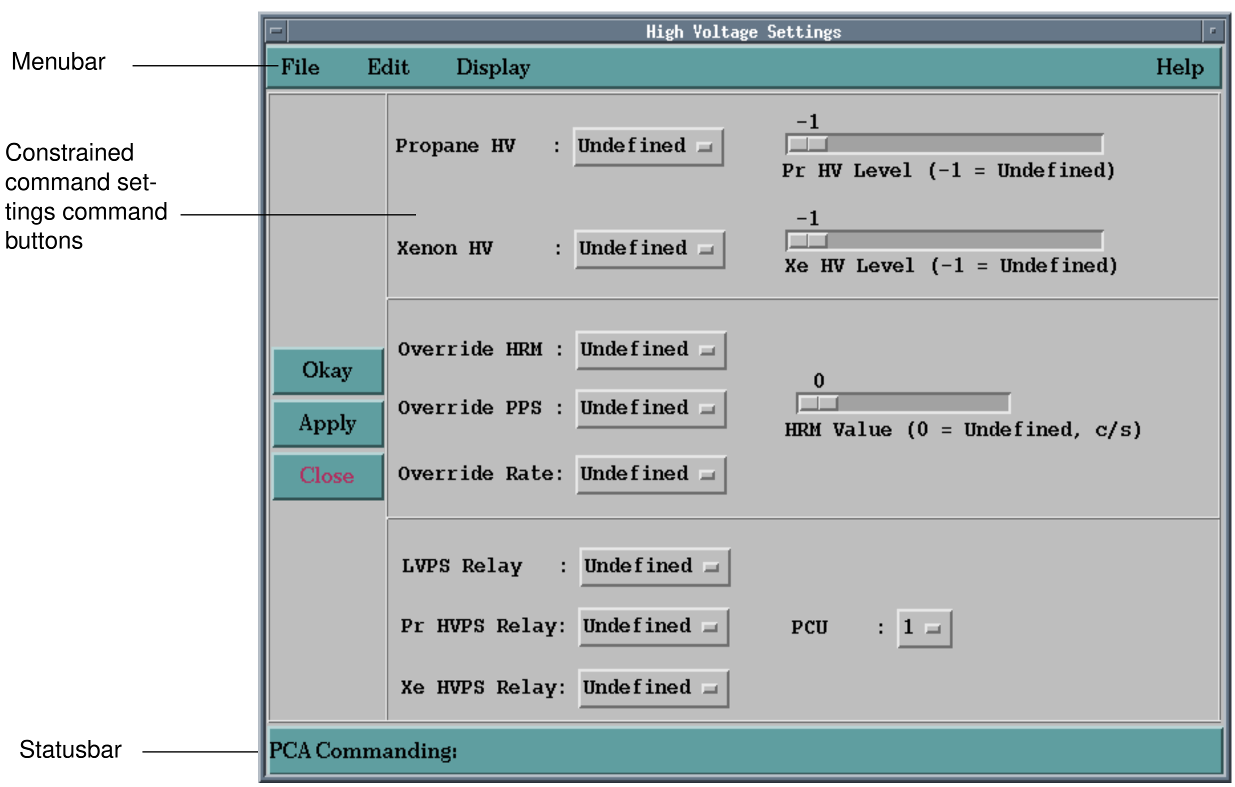
FIGURE 4 PCA Commanding: Test Pulse Generator Settings

1.6.1.4 Constrained Command Settings

The Constrained Command Settings deal with commands that affect the high voltage power supply for each PCU. Since the high voltage commands directly affect the internal electronics for the detector, they are handled a bit differently than the other categories. Command parameters are set in the same way as with the other categories but parameters can be set for each PCU on an individual basis only thus there is no mechanism to propagate changes automatically to other PCUs (as by using the "All" selector for the previous categories). In addition, after each change, a confirm message will appear to prompt for verification before changing the parameter setting. This helps to insure that commands will not be sent erroneously.

The format for the Constrained Command Settings menu is shown in Figure 5 on page 13.

FIGURE 5 PCA Commanding: Constrained Command Settings



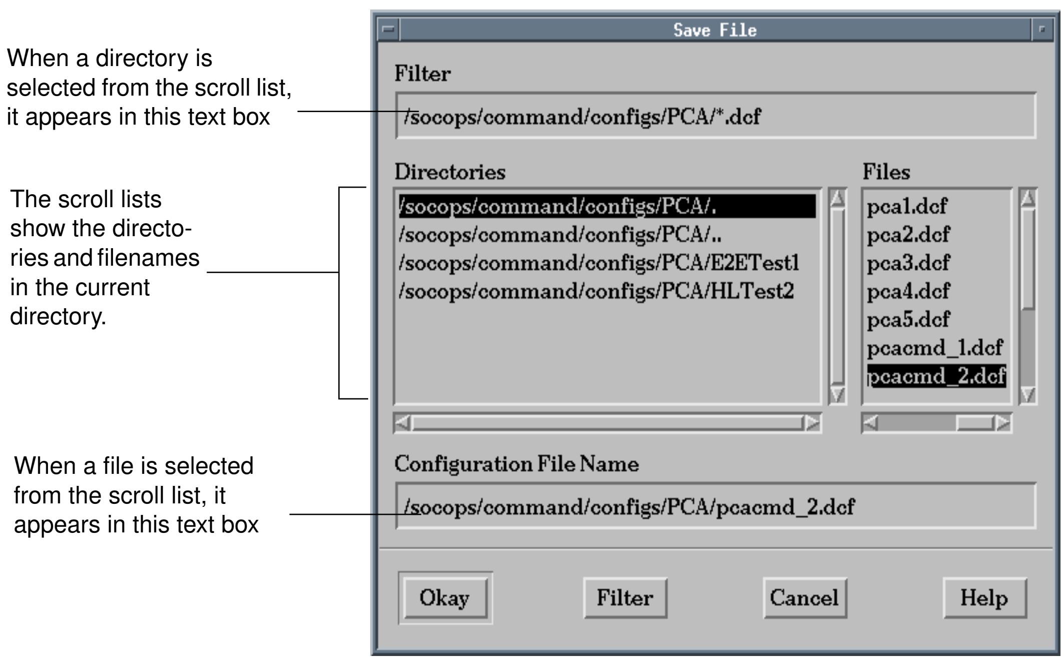
After all parameter selections have been made, click on the "*Okay*" button to activate selections and return to the main panel. Click on the "*Apply*" button to activate the selections but remain in the display panel. Click on the "*Close*" button to return to the main panel ignoring any change made to the configuration.

1.6.1.5 Saving a Configuration

The *"Save"* option in the File menu is used to save the desired configuration to a named disk file. To save a configuration to disk, use the *"Save"* file selection dialog to type in the name of the new desired configuration file into the *Selection* field or use the scroll list to select a filename (see fig. 6 below). Then press the *"OK"* button to save the configuration and return to the main edit menu. The *"Cancel"* button will cancel the save operation and return to the main menu without saving the configuration to disk.

NOTE: *The files created will be of Read-Only type and cannot be overwritten. If the named file exists, it will create a new version of the configuration file with the version number at the end of the filename. If not, the file is created without any version number.*

FIGURE 6 PCA Commanding: Save *File*



1.6.1.6 Inheriting from a Configuration

The *“Open”* option in the File menu is used to load a configuration from a file. The *Open* feature is necessary when the desired configuration is based on a measured, predicted or simply a previously saved desired configuration. The difference between the three is distinct. A desired configuration can be named and saved to disk using the configuration editor alone. It is representative of some future state of the instrument. A desired configuration becomes a predicted configuration once it has been scheduled on the mission monitoring time line. The measured configuration comes from the last known state transmitted in the telemetry downlink via the housekeeping data. The latter two have different formats for how the data is stored.

To load a configuration from disk, use the *“Open”* file selection dialog to browse and find the name of the file or simply type the name of the file into the *Selection* field (see fig. 7 below). Then click on the desired *Configuration* type *(Desired, Predicted, Measured)*, and press the *“OK”* button. The configuration file will be opened, replacing the configuration currently being edited.

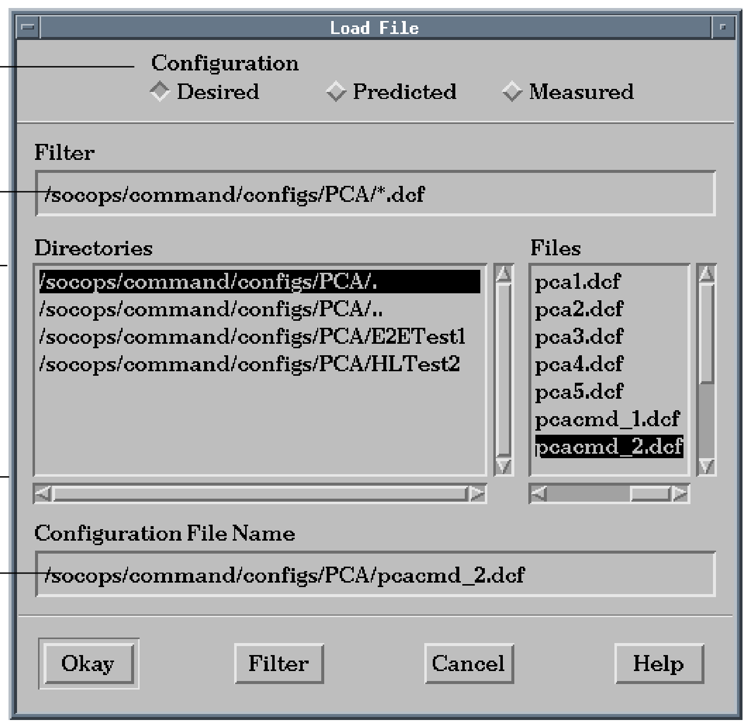
FIGURE 7 PCA Commanding: Open *File*

When the configuration type is selected, corresponding files appear in the `Files` scroll list

When a directory is selected from the scroll list, it appears in this text box

The scroll lists show the directories and filenames in the current directory.

When a file is selected from the scroll list, it appears in this text box



[NOTE: *All Desired configuration files have a* `.dcf` *filename extension, Predicted config files have* `.pcf`*, and Measured config files have a* `.mcf` *extension*.]

1.6.1.7 Configuration Reset

The *"Master Reset"* option in the Edit menu sets the configuration parameters of each detector to a predetermined state. It is intended to be used to set the instrument into a known configuration in the event that the measured configuration gets out of synchronization with the predicted configuration. It can also be used to set the configuration to the known setting before changing other parameters. To set the default state of all the detector parameters to a known state, select the *"Master Reset"* option from the Edit menu. A pulldown menu will appear that will allow the user to select one of three distinct values:

- Default: Sets all detector settings to Undefined or Don't Care values.
- Power Up: Sets all detectors to related default conditions after Power On.
- Stored: Sets all detectors to a predetermined state.

See Appendix A. for default settings.

To save a configuration as a default file, select *Store Reset* from the *File* pull-down menu. The configuration is given a default filename and saved to disk and can be loaded at a later stage through the *Master Reset* option.

1.6.1.8 Configuration Review

The *Configuration Summary* category is a read-only mechanism used to review the current state of the parameters. All parameters for a given detector are displayed on a single menu page so that they may be viewed simultaneously for correctness. To view the current parameters for any detector, select the Configuration Summary option from the Display Menu. For more description on edit categories and their parameters, refer to the document "*PCA Commands - Types, Sequences, Use, Configurations, Screen Functions, Verification. SOC Interface"* by Barry Giles.

1.6.1.9 Browse Mode

A browse only feature has been provided to allow the user to operate the Editor in a Browse only mode. This will allow the examination of the actual settings of the selected Desired Configuration. To enter the Browse only mode, select the *"Browse Mode"* option in the Edit Menu. All Editor selection buttons, excepting *Open, Print, Configuration Summary, Help,* and the *Quit* button, become input sensitive and appear dimmed.

To return back to the Edit mode, select the *"Browse Mode"* option.

1.6.1.10 On-line Help

The Editor is provided with extensive on-line help. To get help, click on the *"Help"* button on any Editor panel and use the *"?"* cursor to select the item or panel for which you want help. A panel with help information appears, allowing you to scroll through the information as you require. When you are done with the *Help* panel, close it by pressing its *Close* button.

1.7 Error and Warning Messages

There are a number of commands to each PCA detector that are governed by some kind of constraint. Often the same or similar commands will be repeated at the same time to all five detectors in the PCA. In the event of an erroneous selection being made, Warnings and Constraint messages will be displayed, requiring a confirm to continue response, to warn against potentially hazardous or meaningless instrument conditions.

Warnings are defined to have three levels, Yellow, Red and RED, with RED being more important. The details can be found in the PCA Team document referenced earlier.

1.8 Recovery Steps

TBD

1.9 Abbreviations and Acronyms

PCA - Proportional Counter Array

CGS - Command Generation Software

TPG - Test Pulse Generator

RIF - Remote Interface

PCU - Proportional Counter Unit

1.10 Glossary

1.11 Notes

1.12 Appendices

1.12.1 Master Reset Default Values

Refer to *"PCA Commands - Types, Sequences, Use, Configurations, Screen Functions, Verification. SOC Interface, Barry Giles"* for a summary of all PCA Commands and Defaults.