CHAPTER 1

PCA Housekeeping - Text and Graphics Display Screens: User's Guide

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This document illustrates the usage of the PCA Housekeeping -Text and Graphics Display Screens Software

1.1 Introduction

This document describes how the Text and Graphics Display Screens software can be used for the housekeeping of the spacecraft. Health and Safety subsystem will be accessing this software for the housekeeping of PCA Instrument. This software can do dynamic display of real-time data or static display of data from an update period in the past.

1.2 Related Documentation

The following documents are relevant for reference:

1. PCA Housekeeping - Text and Graphics Screens: Ramesh Ponneganti

2. PCA Housekeeping - Status, Use, Screen Functions, Recall Modes, SOC Interface: Barry Giles

1.3 Overview of Purpose and Functions

The PCA Housekeeping subsystem allows the user to monitor the health and safety of the PCA instrument. Real-time telemetry data will be displayed in physical engineering or raw values. Text display screen allows the user to have a quick look at the values of the various parameters. User can also choose various parameters from the text screen for plotting them against time on a graphics screen to look at the trend of the incoming data. Screen dumps of text and graphics screens can be done onto a printer or disk.

1.4 Installation and Initialization

The PCA Housekeeping Display software is installed using a Makefile. The initialization files include limits and conversions files, a file containing the HV Look-up table data values, a TAE resource file, online help files, and an icon file. Environment variables SOCHOME, ARCH, and SOCOPS need to be set appropriately.

1.4.1 Makefile installation

The processes, initialization files, and documents are installed by typing "make install" in a directory which has the PCA Health&Safety RCS directory as a subdirectory. Typing this command will install the binaries in the $SOCHOME/bin/$ARCH directory, the start-up files in the $SOCHOME/etc and $SOCHOME/lib/app-defaults directories, the documents in the $SOCHOME/doc directory, and the man pages in the $SOCHOME/man/ directory.

1.5 Start-up and Termination

The PCA housekeeping display program can be run in three modes: real-time, history, and stored. By default the program will run in real-time unless otherwise specified.

```
PCAdisplay  [-stored </path/dir/>]

            [-history start <METseconds> end <METseconds> path]

            [-ancil]
```

1.5.1 Initialization of real-time process

The PCA housekeeping display program can be run with two types of real-time clients, (a) *pcaRtClient* - for displaying PCA housekeeping data (ApIds 90-94) only, and *(b) pcaAncil* - for displaying space craft data (ApIds 14-21) and PCU detector current and temperatures along with the housekeeping data.

The command lines used for real-time processing are as follows:

```
pcaRtClient -host <hostname> -name PCA-HK -display-client
PCAdisplay

pcaAncil -server <hostname> -h -mm <MMclient host> -display
PCAdisplay
```

`hostname` is the name of the server or host that is running the realtime ingest process.

1.5.2 Initialization in Stored and History modes

In Stored mode, previously stored partition lists are read from disk. The program reconstructs the five lists of partitions, one for each PCU, by reading the following files from the specified directory: *RingBuff0.soc, RingBuff1.soc, RingBuff2.soc, RingBuff3.soc,* and *RingBuff4.soc*. The command line used is

```
PCAdisplay -stored </path/directory/>
```

To run the program in History mode using telemetry packets from the SOC telemetry object database, the start and end times in MET seconds have to be specified. The program then restores all available partitions for the given time period. The start and end times can be obtained by using the *dmReport* program for any given ApId. The command line used is

```
PCAdisplay -history <start time> <end time> </path/directory/>
```

Limit values are initialized by reading the files: *slot_1_limits.dat, slot_2_limits.dat, slot_3_limits.dat, slot_4_limits.dat*, and *slot_5_limits.dat,* and the conversion parameters are initialized by reading the files: *slot_1_conv.dat, slot_2_conv.dat, slot_3_conv.dat, slot_4_conv.dat,* and *slot_5_conv.dat*. The HV Look-up table data values are read from *pcahv.dat*. If these files are not installed in the *$SOCHOME/etc/* directory, then the program will issue a message and terminate.

Upon successful initiation, a main panel will appear on the screen entitled “PCA Housekeeping Data Display”.

To quit the program, select Close from the File Menu. The program will clean up any allocated resource and exit to the command prompt.

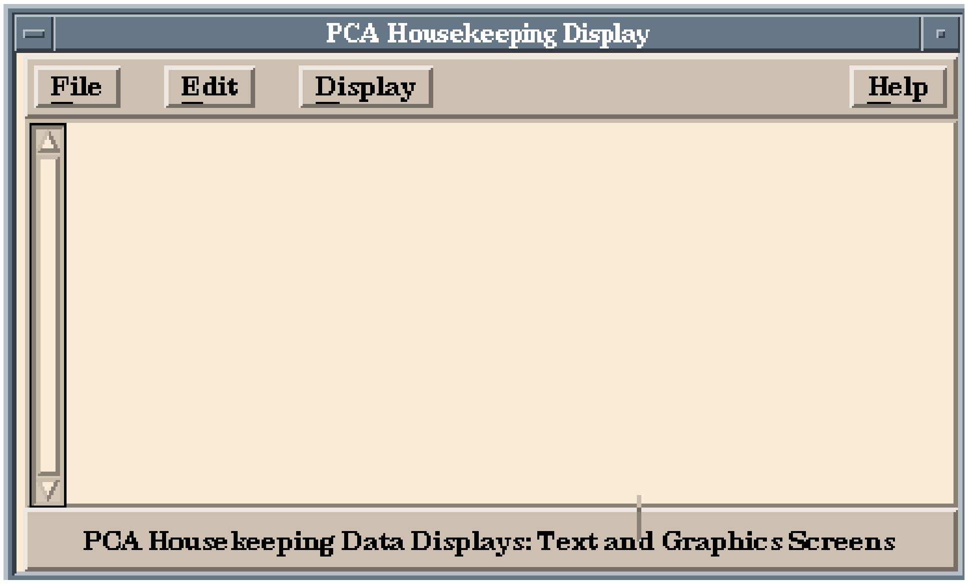
1.6 Functions and Their Operation

The PCA housekeeping data display software operates in two modes; text display and graphics display. In the text display mode, PCA housekeeping data is displayed either as physical engineering values or as raw values on various predetermined screens. The data is received from the real-time server and is updated on the screen every 8 seconds. In the graphics display mode, PCA housekeeping data is plotted against time on a graph as a strip chart. Various standard graphics screens are available which are considered to be active always and are readily available for viewing.

The program receives PCA housekeeping data in 5 packets, one for each PCU, every 8 seconds, and places them in 5 Ring buffers as they arrive. The Ring buffers, whose size can be varied (see *Resize* under *Edit Menu* in section 1.6), is saved to disk routinely in the $SOCOPS/tmp/ directory and can later be restored.

Format of the Main Panel is depicted in Figure 1 on page 5.

FIGURE 1 PCA Housekeeping Data Display: Main Panel



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

File Menu: Operations under this menu are:

Open: The Open choice under the File pulldown reads stored partition lists from the disk. Use the Open File selection dialog to browse and find the location of the directory containing the partition lists. The program then reconstructs the five lists, one for each PCU, by reading the following files from the specified directory: *RingBuff0.soc, RingBuff1.soc, RingBuff2.soc, RingBuff3.soc*, and *RingBuff4.soc*. The default directory used is $SOCOPS/tmp/.

Save: The Save choice under the File pulldown saves all five partition lists (Ring Buffers) to disk. It is useful for saving copies of the ring buffer and then restoring them for later analysis. Use the Save File selection dialog to browse and find the location of the directory where the five partition lists are to be saved. The program then saves the lists in the specified directory with the following file names, replacing any previously saved copy: *RingBuff0.soc, RingBuff1.soc, RingBuff2.soc, RingBuff3.soc*, and *RingBuff4.soc*. The default directory is $SOCOPS/tmp/.

Export: The Export Data choice under the File pulldown saves selected housekeeping and space craft parameters to disk in ascii format. For detailed information, see Section 1.6.7.3 on page 22.

Close: The Close choice under the File pulldown terminates the program operation and returns to the command prompt. If the program is run in real-time, the real-time client is also terminated.

Edit Menu: Operations under this menu are:

Hold Limits (Transcient Limits): This toggle activated feature would freeze all the current limit warnings on all the text screens until they are cleared globally or locally.

Clear Limits: This would clear all the current limits warnings on all the text screens.

No Limit Check (Limit Check): This toggle activated feature would first clear all the current limits warnings and then disable the limit checking on all the text screens.

Read Limits: This would re-read all Limits files from *$SOCHOME/etc/* directory and use the new values for future limit checking. This feature is useful in any event that limit values need to be changed or altered during the mission.

Freeze Data: This would disable the data flow on all the text screens. This operation is meaningful only when the program is running under real-time mode. In history mode the data display is under user control anyway.

Enable Duplication (Disable Duplication): This toggle activated feature would enable duplicate housekeeping telemetry packets to be received by the application. Duplicate packets are otherwise dropped and not processed.

Make Graph Combinations: This operation is for building graph combinations as per the user's choice. Under this operation, the user can go to various screens and click on several items to build them up together to make a combination and then save it on the disk. This combination can be re-called later and plotted. See Section 1.6.7.3 on page 22

Noon Logs: This toggle activated feature automatically saves a page of complete status (Full screen) of each PCU every day at 12:00 (noon) local time. The file name, which includes the date, will change each day and thus be unique names. These files are created in the *$SOCOPS/tmp/* directory. This series of files will form a simple record of the PCA status at daily intervals through the mission.

Resize: This operation is for altering the size of the ring buffer. By default the size of the ring buffer is 10,000 packets. On selection, a pop-up panel will appear requiring the user to enter the desired size. The current size of the buffer will be displayed in the keyin area.

Display Menu: Sub operations under this menu are:

Full PCU Display: This operation allows the user to select from a choice of available PCUs and then display the housekeeping data on a panel.

Combined PCU Display: This operation allows the user to select from a choice of available parameter combinations and then display the housekeeping data on a panel.

Graph Display: This operation allows the user to pick an available parameter combination for the graphics display and then display the graph combination on a panel.

Help Menu: Sub operations under this menu:

Info: Pops up a panel of information about the program.

HelpOnContext: This one is for providing the on-line help for each context on the main panel.

1.6.1 Typical Text Display Screen

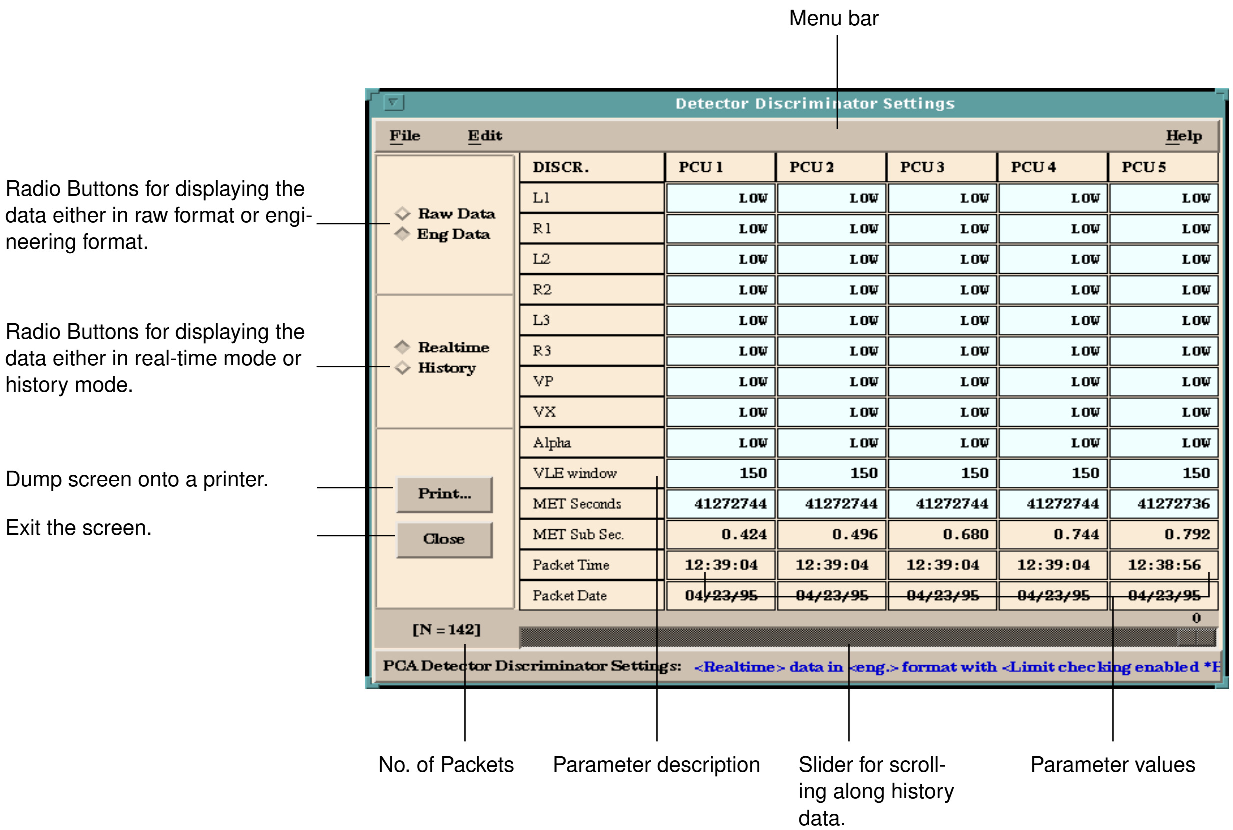
A typical text display screen has following areas and is depicted in Figure 2 on page 8.

Menu Bar: It includes menus for *File*, *Edit* and *Help*. The File menu has operations to *load* a datafile, *print* a text screen and *Close*. Edit menu has operations for setting the *properties* of the screen. The Help menu provides online help on-context.

Hot Buttons: These are the buttons that are placed on the left side of the window. These include radio buttons for choosing the data display format either as *raw* or *engineering*, radio buttons for choosing the data display mode either as *real-time* or *history*, push button for dumping the screen onto a printer and a push button for exiting the screen.

History Slider: This slider is found at the bottom of the window. It is used to scroll along the history data. Packet time is displayed on left side of the slider.

FIGURE 2 Typical Text Display Screen Layout



Parameter values: Here the values of parameters are displayed with different background colors. All the items here are clickable, meaning there would be a further action upon clicking on one these items. The kind of action depends on the context. An item can be selected by clicking on it in three different contexts:

(a) when the user is making combination graphs, a click will add the parameter to the graph combination list,

(b) when the user is exporting data, a click will add the parameter to the export combination list, and

(c) at all other times, a pop-up panel will appear giving more information about the parameter and the various operations that can be performed on this parameter.

1.6.2 Limit Checking

The background color of an item reflects the status of the parameter. For parameters that have limit checking performed, a RED background would indicate a Red limit violation.

A yellow background would indicate a YELLOW limit violation and the White background would mean that there is no violation.

Once a limit value is exceeded and the item is redrawn in the appropriate warning color, the item's background will remain in that color until the condition is reset by the user. The limit conditions can be individually reset on the parameter pop-up panel described below. Each of the text display screen's Edit menu has a screen limit condition reset option, which when selected will reset limit conditions for all parameters within the screen. A global limit reset is also available in the main selection panel's Edit menu, which will reset limit conditions for all text screens and display the current state of all parameters.

1.6.3 Parameter Popup Panel

This panel pops up when an item is clicked containing information and gives the user more operations that can be performed on the item. The panel displays a column of numbers with the measured value inserted in the appropriate position along with the limits and conversion values for the parameter, if applicable. A typical popup panel is depicted in figure.3.

Note: The panel will not appear when an item is clicked while selecting parameter combinations for exporting data or for the multiple parameter graphs. This panel will also not appear if clicked on an item in the spacecraft information screen. Since spacecraft parameters don't have limits and conversion values associated with it, a graph will directly appear instead.

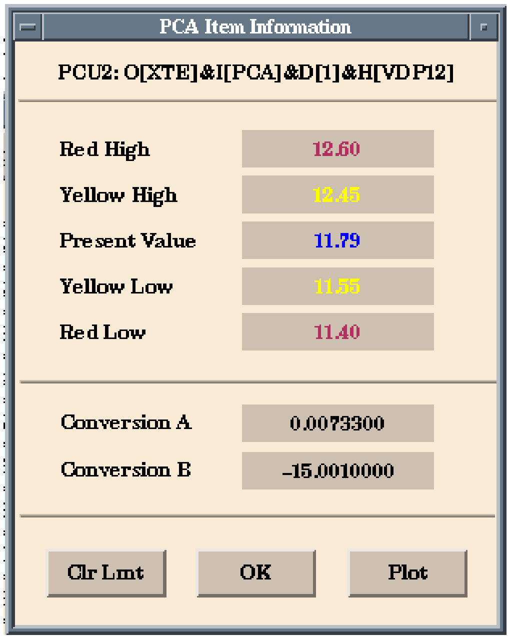
At the bottom of the panel are a set of buttons which can be used for:

(a) Plotting a single parameter graph (1 trace per plot), and

(b) Reset limit condition.

Plotting graphs is discussed in more detail in Section 1.6.7 on page 19.

FIGURE 3 Popup panel for an item



1.6.4 Individual Detector Information.

Under this category, all five individual PCUs are available as submenu items. Selecting any of these items would invoke the corresponding screen. Typical screen for the full detector information is depicted in Figure 4 on page 11. This detector screen will provide a complete summary 'snap shot' of the state of an individual detector.

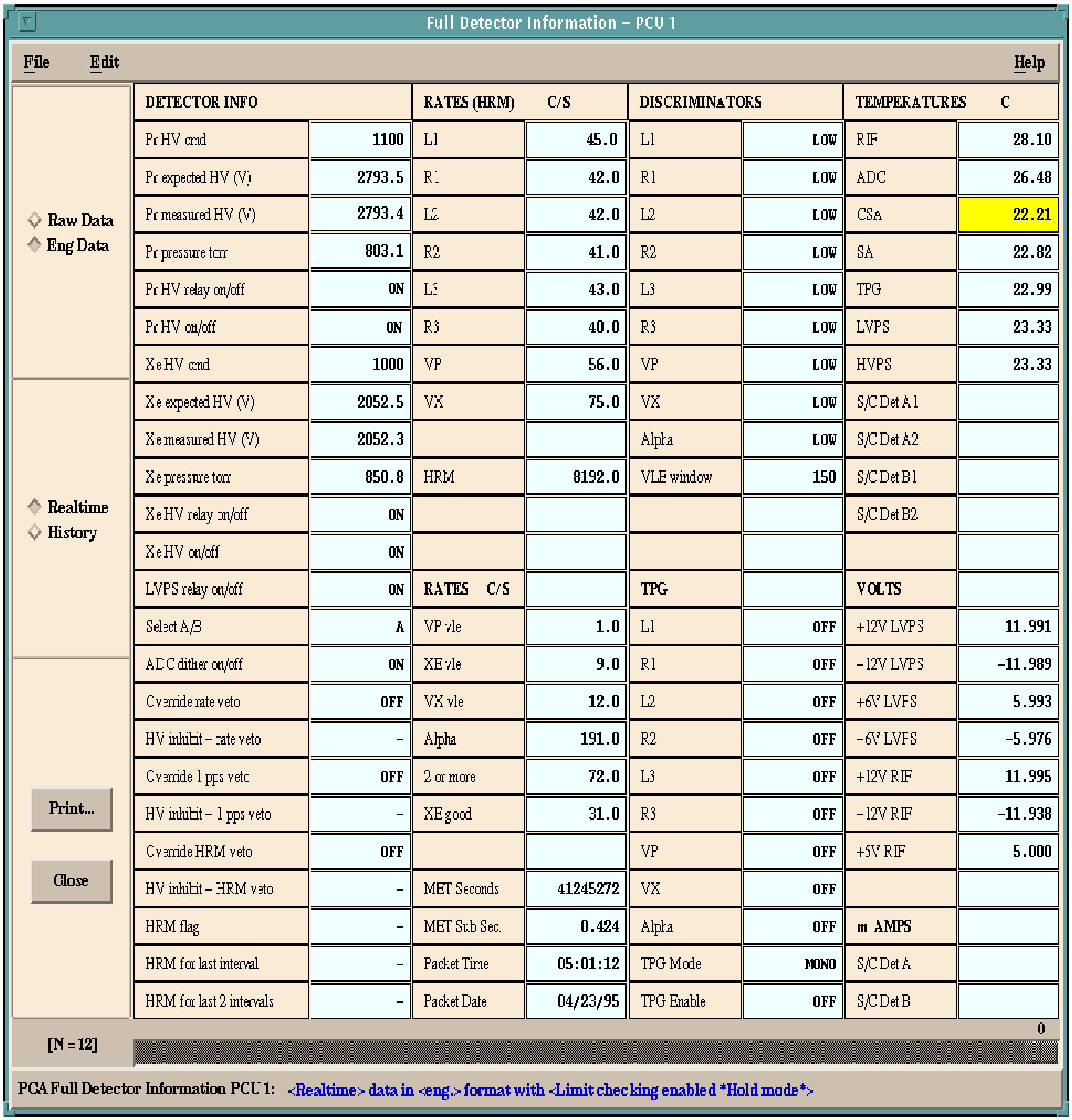
1.6.5 Combined Detector Information

Under this category, seven different screens are available as submenu items. These combined text screens allow easy comparison of selected groups of parameters between all 5 PCUs at the same time. All these screens are depicted in later pages.

1.6.6 Spacecraft Information

Spacecraft parameters are displayed under two categories displaying Orbital and Attitude information. To obtain the spacecraft information the real-time client *pcaAncil* (See Section 1.5.1 on page 2) should be used as the interface between the real-time server and the display client.

FIGURE 4 Typical Text Display Screen for Full Detector Information



Full Detector Information – PCU 1

File Edit Help

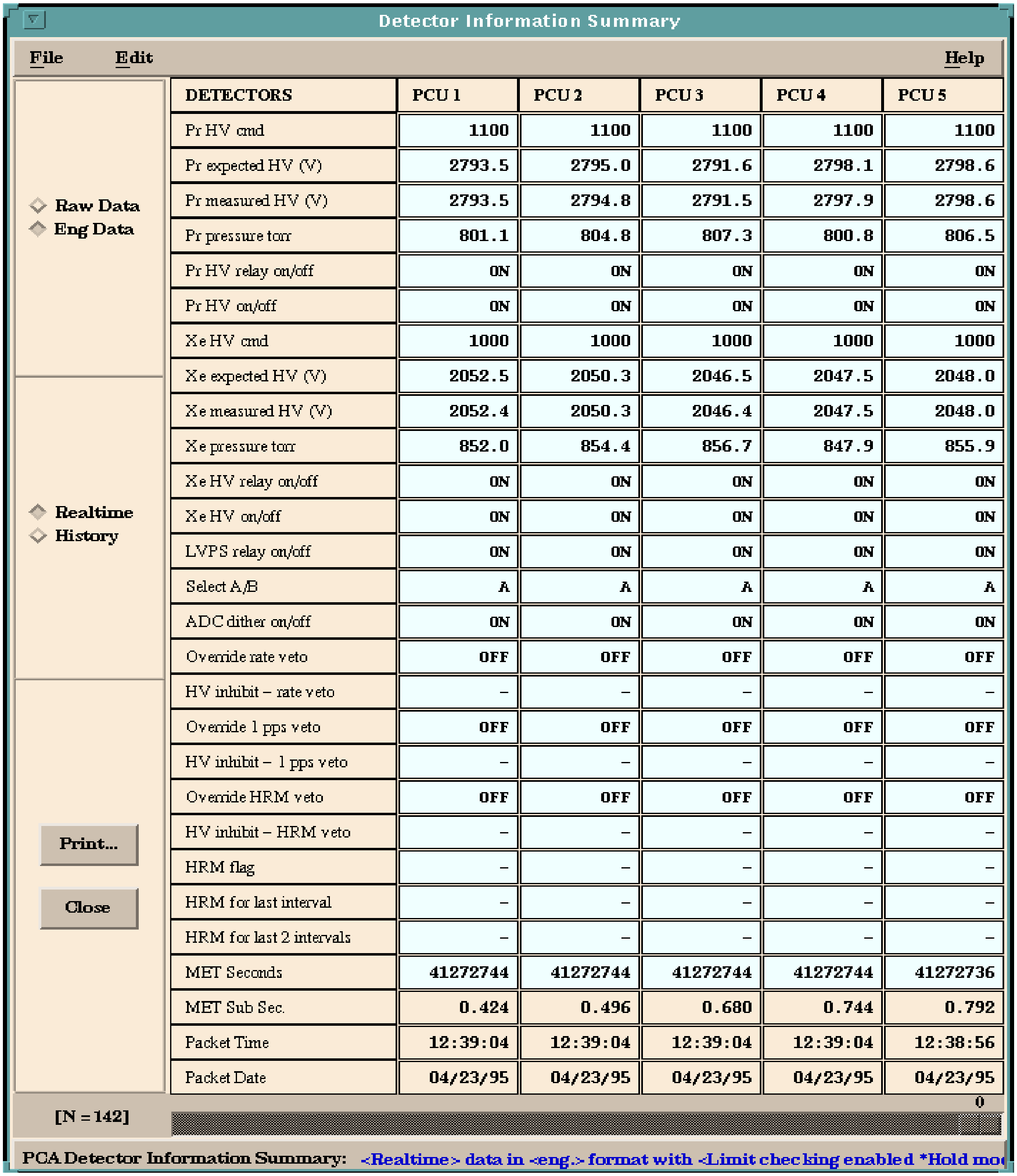
Raw Data
Eng Data
Realtime
History
Print...
Close
[N = 12]

DETECTOR INFO		RATES (HRM) C/S		DISCRIMINATORS		TEMPERATURES C	
Pr HV cmd	1100	L1	45.0	L1	LOW	RIF	28.10
Pr expected HV (V)	2793.5	R1	42.0	R1	LOW	ADC	26.48
Pr measured HV (V)	2793.4	L2	42.0	L2	LOW	CSA	22.21
Pr pressure torr	803.1	R2	41.0	R2	LOW	SA	22.82
Pr HV relay on/off	ON	L3	43.0	L3	LOW	TPG	22.99
Pr HV on/off	ON	R3	40.0	R3	LOW	LVPS	23.33
Xe HV cmd	1000	VP	56.0	VP	LOW	HVPS	23.33
Xe expected HV (V)	2052.5	VX	75.0	VX	LOW	S/C Det A1	
Xe measured HV (V)	2052.3			Alpha	LOW	S/C Det A2	
Xe pressure torr	850.8	HRM	8192.0	VLE window	150	S/C Det B1	
Xe HV relay on/off	ON					S/C Det B2	
Xe HV on/off	ON						
LVPS relay on/off	ON	**RATES C/S**		**TPG**		**VOLTS**	
Select A/B	A	VP vle	1.0	L1	OFF	+12V LVPS	11.991
ADC dither on/off	ON	XE vle	9.0	R1	OFF	-12V LVPS	-11.989
Override rate veto	OFF	VX vle	12.0	L2	OFF	+6V LVPS	5.993
HV inhibit – rate veto	-	Alpha	191.0	R2	OFF	-6V LVPS	-5.976
Override 1 pps veto	OFF	2 or more	72.0	L3	OFF	+12V RIF	11.995
HV inhibit – 1 pps veto	-	XE good	31.0	R3	OFF	-12V RIF	-11.938
Override HRM veto	OFF			VP	OFF	+5V RIF	5.000
HV inhibit – HRM veto	-	MET Seconds	41245272	VX	OFF		
HRM flag	-	MET Sub Sec.	0.424	Alpha	OFF	**m AMPS**	
HRM for last interval	-	Packet Time	05:01:12	TPG Mode	MONO	S/C Det A	
HRM for last 2 intervals	-	Packet Date	04/23/95	TPG Enable	OFF	S/C Det B	

0

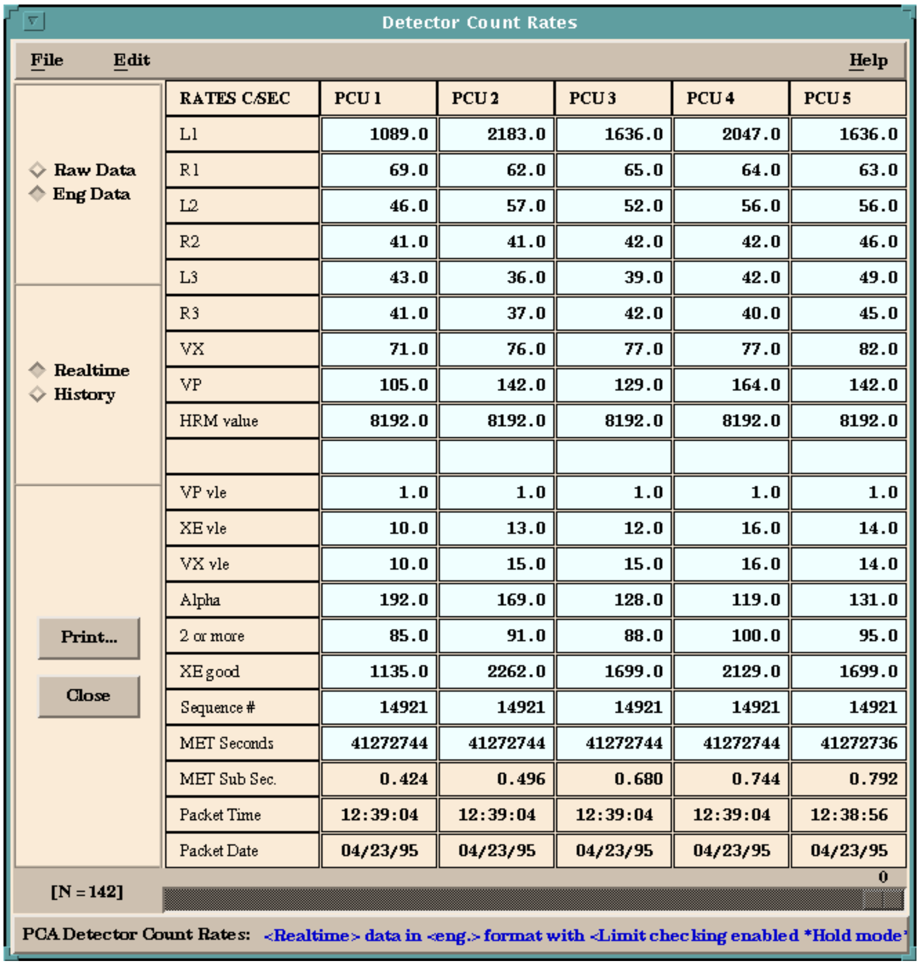
PCA Full Detector Information PCU 1: <Realtime> data in <eng.> format with <Limit checking enabled *Hold mode*>

FIGURE 5 Detector Information Summary



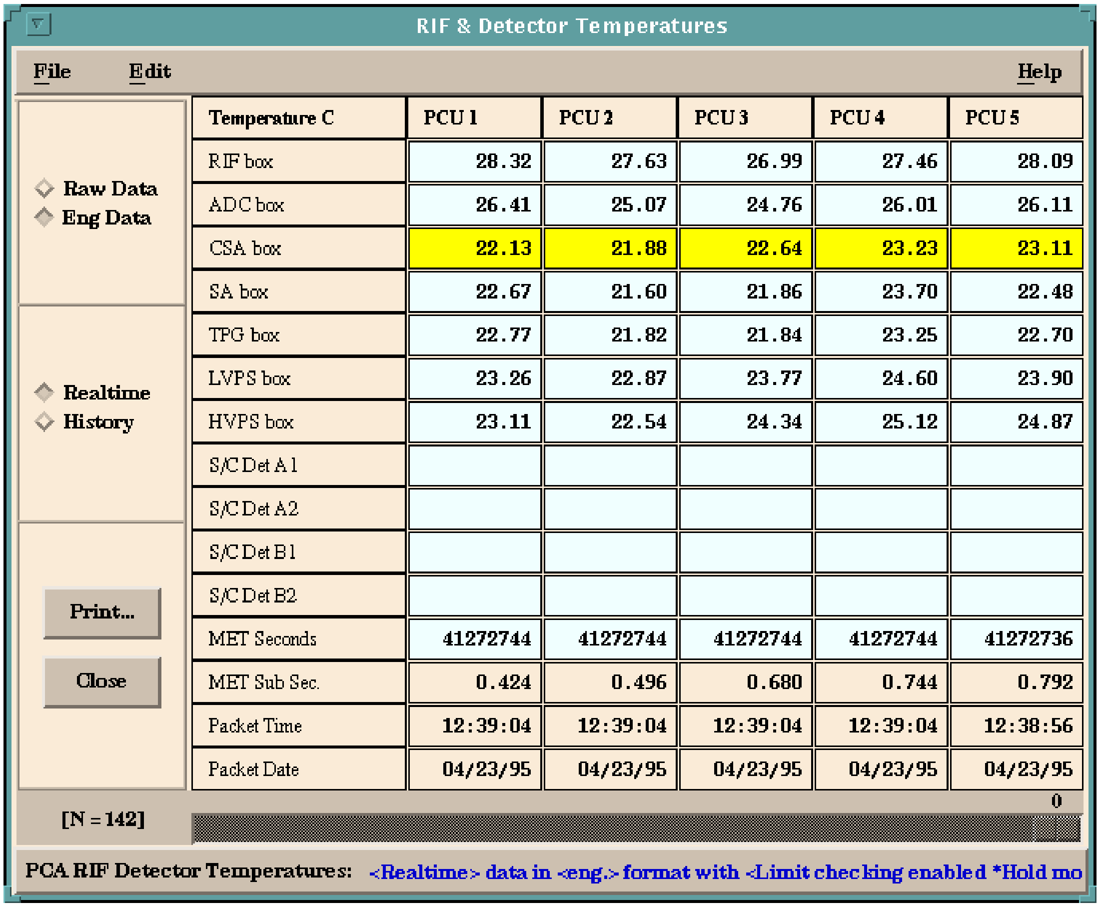
DETECTORS	PCU 1	PCU 2	PCU 3	PCU 4	PCU 5
Pr HV cmd	1100	1100	1100	1100	1100
Pr expected HV (V)	2793.5	2795.0	2791.6	2798.1	2798.6
Pr measured HV (V)	2793.5	2794.8	2791.5	2797.9	2798.6
Pr pressure torr	801.1	804.8	807.3	800.8	806.5
Pr HV relay on/off	ON	ON	ON	ON	ON
Pr HV on/off	ON	ON	ON	ON	ON
Xe HV cmd	1000	1000	1000	1000	1000
Xe expected HV (V)	2052.5	2050.3	2046.5	2047.5	2048.0
Xe measured HV (V)	2052.4	2050.3	2046.4	2047.5	2048.0
Xe pressure torr	852.0	854.4	856.7	847.9	855.9
Xe HV relay on/off	ON	ON	ON	ON	ON
Xe HV on/off	ON	ON	ON	ON	ON
LVPS relay on/off	ON	ON	ON	ON	ON
Select A/B	A	A	A	A	A
ADC dither on/off	ON	ON	ON	ON	ON
Override rate veto	OFF	OFF	OFF	OFF	OFF
HV inhibit – rate veto	–	–	–	–	–
Override 1 pps veto	OFF	OFF	OFF	OFF	OFF
HV inhibit – 1 pps veto	–	–	–	–	–
Override HRM veto	OFF	OFF	OFF	OFF	OFF
HV inhibit – HRM veto	–	–	–	–	–
HRM flag	–	–	–	–	–
HRM for last interval	–	–	–	–	–
HRM for last 2 intervals	–	–	–	–	–
MET Seconds	41272744	41272744	41272744	41272744	41272736
MET Sub Sec.	0.424	0.496	0.680	0.744	0.792
Packet Time	12:39:04	12:39:04	12:39:04	12:39:04	12:38:56
Packet Date	04/23/95	04/23/95	04/23/95	04/23/95	04/23/95

FIGURE 6 Detector Count Rates



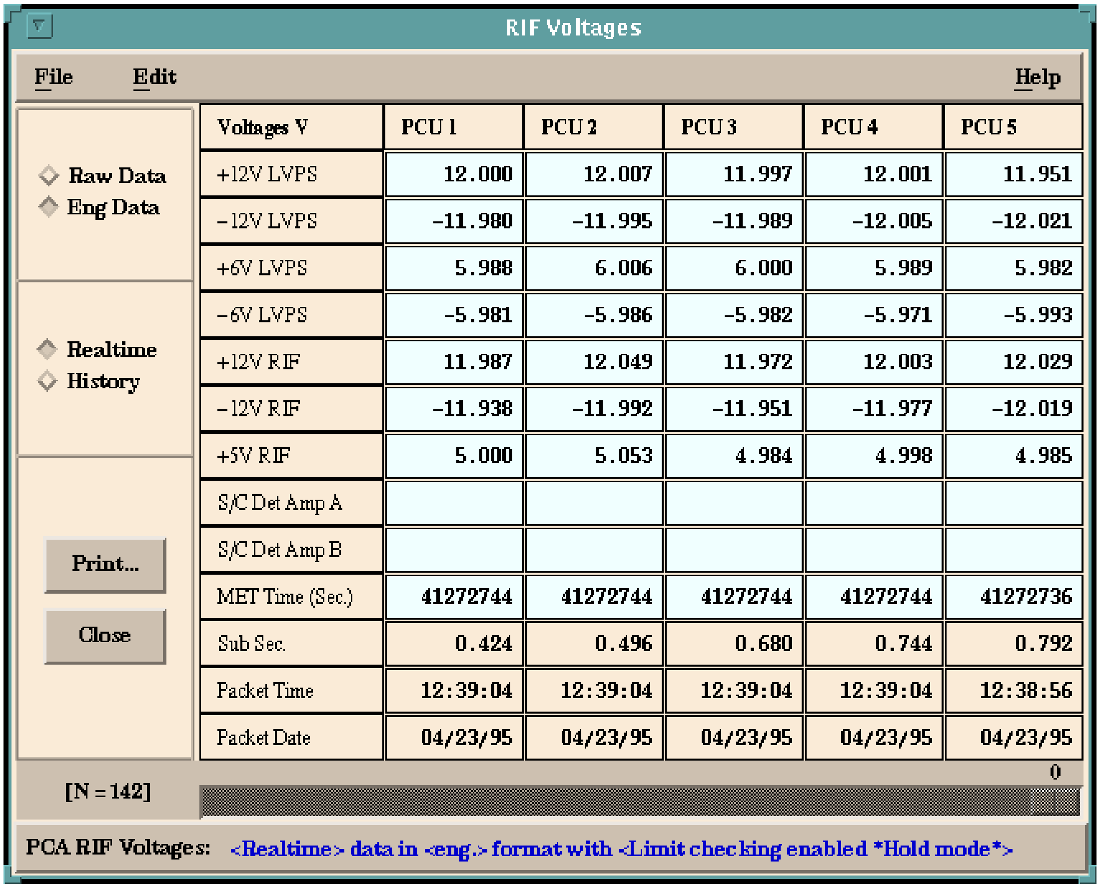
RATES C/SEC	PCU 1	PCU 2	PCU 3	PCU 4	PCU 5
L1	1089.0	2183.0	1636.0	2047.0	1636.0
R1	69.0	62.0	65.0	64.0	63.0
L2	46.0	57.0	52.0	56.0	56.0
R2	41.0	41.0	42.0	42.0	46.0
L3	43.0	36.0	39.0	42.0	49.0
R3	41.0	37.0	42.0	40.0	45.0
VX	71.0	76.0	77.0	77.0	82.0
VP	105.0	142.0	129.0	164.0	142.0
HRM value	8192.0	8192.0	8192.0	8192.0	8192.0
VP vle	1.0	1.0	1.0	1.0	1.0
XE vle	10.0	13.0	12.0	16.0	14.0
VX vle	10.0	15.0	15.0	16.0	14.0
Alpha	192.0	169.0	128.0	119.0	131.0
2 or more	85.0	91.0	88.0	100.0	95.0
XE good	1135.0	2262.0	1699.0	2129.0	1699.0
Sequence #	14921	14921	14921	14921	14921
MET Seconds	41272744	41272744	41272744	41272744	41272736
MET Sub Sec.	0.424	0.496	0.680	0.744	0.792
Packet Time	12:39:04	12:39:04	12:39:04	12:39:04	12:38:56
Packet Date	04/23/95	04/23/95	04/23/95	04/23/95	04/23/95

FIGURE 7 RIF and Detector Temperatures



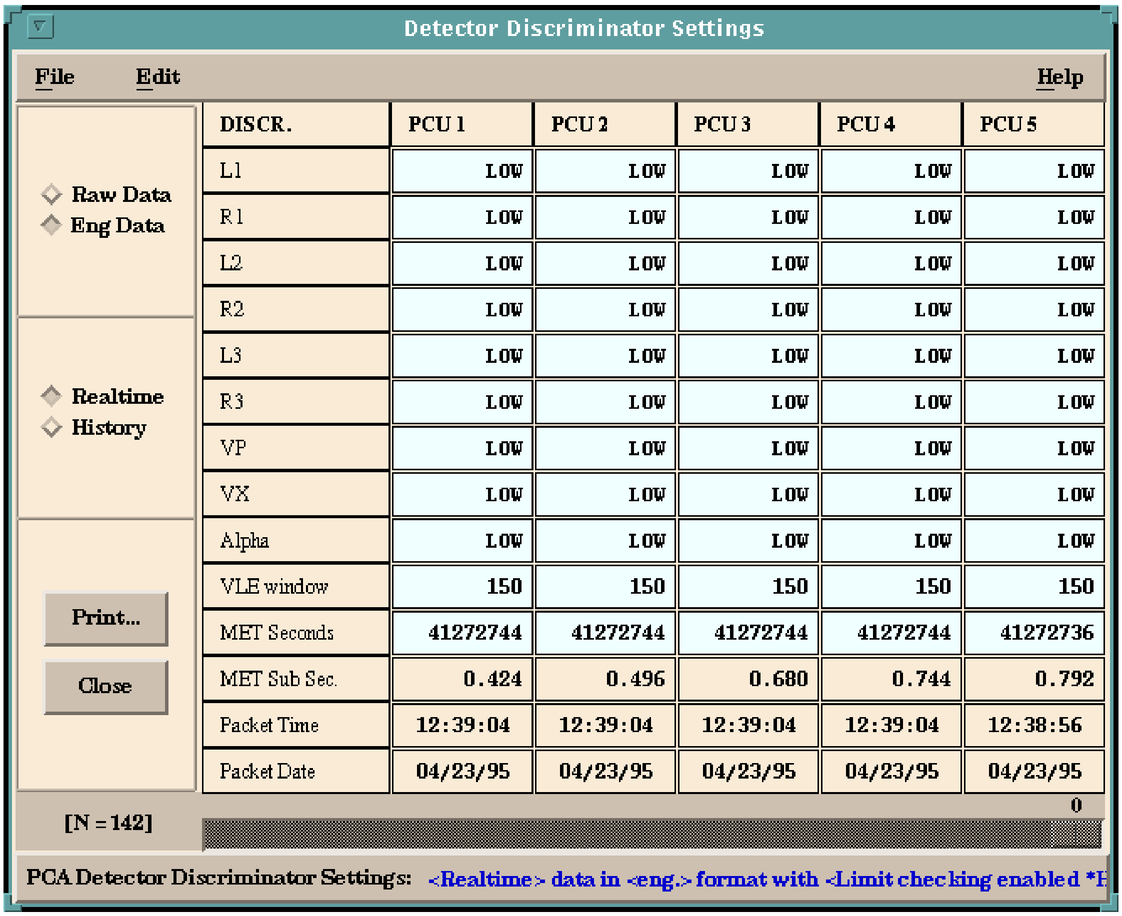
Temperature C	PCU 1	PCU 2	PCU 3	PCU 4	PCU 5
RIF box	28.32	27.63	26.99	27.46	28.09
ADC box	26.41	25.07	24.76	26.01	26.11
CSA box	22.13	21.88	22.64	23.23	23.11
SA box	22.67	21.60	21.86	23.70	22.48
TPG box	22.77	21.82	21.84	23.25	22.70
LVPS box	23.26	22.87	23.77	24.60	23.90
HVPS box	23.11	22.54	24.34	25.12	24.87
S/C Det A1					
S/C Det A2					
S/C Det B1					
S/C Det B2					
MET Seconds	41272744	41272744	41272744	41272744	41272736
MET Sub Sec.	0.424	0.496	0.680	0.744	0.792
Packet Time	12:39:04	12:39:04	12:39:04	12:39:04	12:38:56
Packet Date	04/23/95	04/23/95	04/23/95	04/23/95	04/23/95

FIGURE 8 RIF Voltages



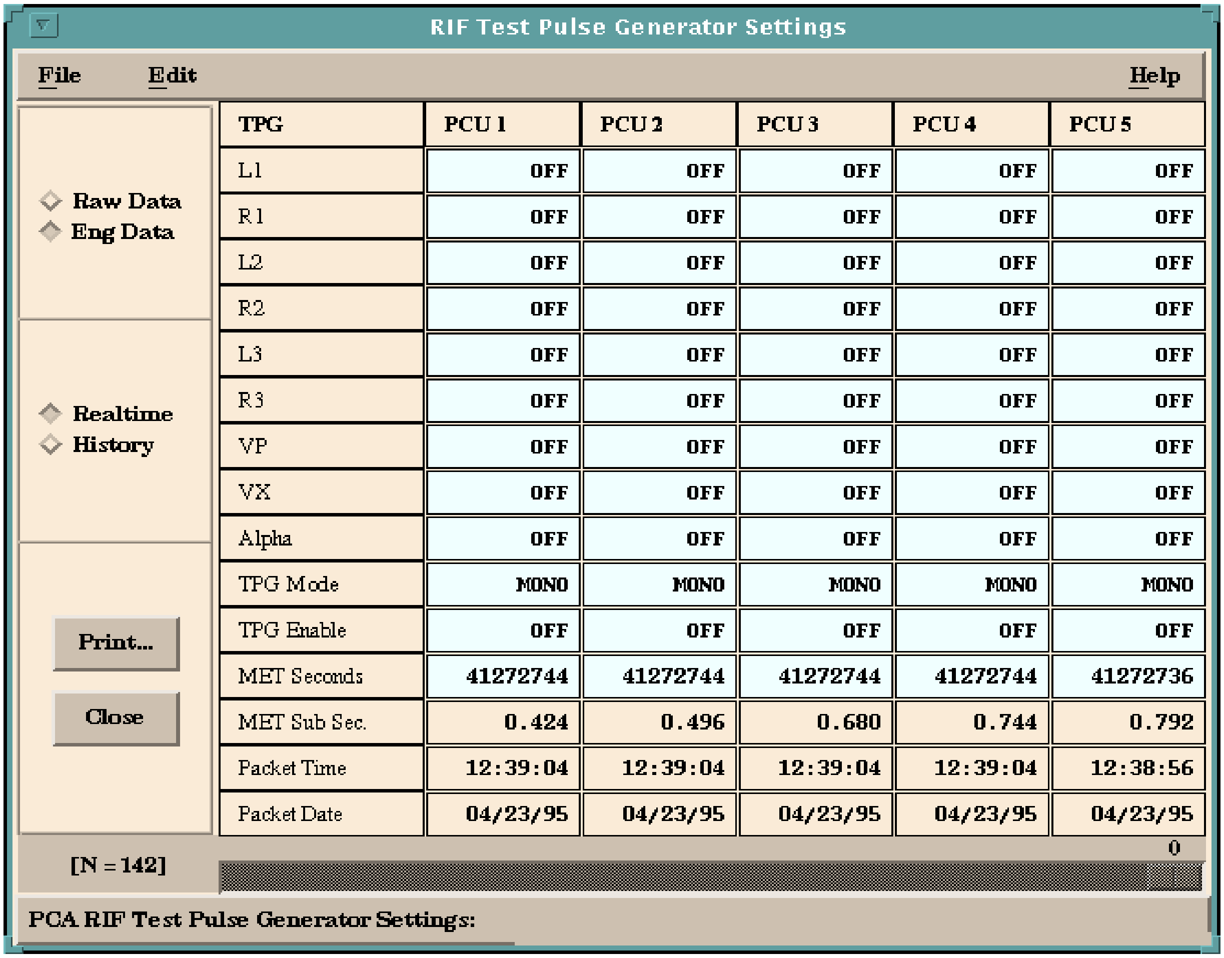
Voltages V	PCU 1	PCU 2	PCU 3	PCU 4	PCU 5
+12V LVPS	12.000	12.007	11.997	12.001	11.951
−12V LVPS	-11.980	-11.995	-11.989	-12.005	-12.021
+6V LVPS	5.988	6.006	6.000	5.989	5.982
−6V LVPS	-5.981	-5.986	-5.982	-5.971	-5.993
+12V RIF	11.987	12.049	11.972	12.003	12.029
−12V RIF	-11.938	-11.992	-11.951	-11.977	-12.019
+5V RIF	5.000	5.053	4.984	4.998	4.985
S/C Det Amp A					
S/C Det Amp B					
MET Time (Sec.)	41272744	41272744	41272744	41272744	41272736
Sub Sec.	0.424	0.496	0.680	0.744	0.792
Packet Time	12:39:04	12:39:04	12:39:04	12:39:04	12:38:56
Packet Date	04/23/95	04/23/95	04/23/95	04/23/95	04/23/95

FIGURE 9 Detector Discriminator Settings



DISCR.	PCU 1	PCU 2	PCU 3	PCU 4	PCU 5
L1	LOW	LOW	LOW	LOW	LOW
R1	LOW	LOW	LOW	LOW	LOW
L2	LOW	LOW	LOW	LOW	LOW
R2	LOW	LOW	LOW	LOW	LOW
L3	LOW	LOW	LOW	LOW	LOW
R3	LOW	LOW	LOW	LOW	LOW
VP	LOW	LOW	LOW	LOW	LOW
VX	LOW	LOW	LOW	LOW	LOW
Alpha	LOW	LOW	LOW	LOW	LOW
VLE window	150	150	150	150	150
MET Seconds	41272744	41272744	41272744	41272744	41272736
MET Sub Sec.	0.424	0.496	0.680	0.744	0.792
Packet Time	12:39:04	12:39:04	12:39:04	12:39:04	12:38:56
Packet Date	04/23/95	04/23/95	04/23/95	04/23/95	04/23/95

FIGURE 10 RIF Test Pulse Generator Settings



TPG	PCU 1	PCU 2	PCU 3	PCU 4	PCU 5
L1	OFF	OFF	OFF	OFF	OFF
R1	OFF	OFF	OFF	OFF	OFF
L2	OFF	OFF	OFF	OFF	OFF
R2	OFF	OFF	OFF	OFF	OFF
L3	OFF	OFF	OFF	OFF	OFF
R3	OFF	OFF	OFF	OFF	OFF
VP	OFF	OFF	OFF	OFF	OFF
VX	OFF	OFF	OFF	OFF	OFF
Alpha	OFF	OFF	OFF	OFF	OFF
TPG Mode	MONO	MONO	MONO	MONO	MONO
TPG Enable	OFF	OFF	OFF	OFF	OFF
MET Seconds	41272744	41272744	41272744	41272744	41272736
MET Sub Sec.	0.424	0.496	0.680	0.744	0.792
Packet Time	12:39:04	12:39:04	12:39:04	12:39:04	12:38:56
Packet Date	04/23/95	04/23/95	04/23/95	04/23/95	04/23/95

FIGURE 11 RIF Diagnostics

RIF Diagnostics

File Edit Help

Raw Data
Eng Data

Realtime
History

Print...
Close

Diagnostics	PCU 1	PCU 2	PCU 3	PCU 4	PCU 5
Chip #1 Counter Rate	8718.0	17468.0	13094.0	16378.0	13093.0
Chip #1 Selected Counter	Xe L1 left	Xe L1 left	Xe L1 left	Xe L1 left	Xe L1 left
Chip #1 Test Bit	0	0	0	0	0
Chip #1 Counter Status	Enabled	Enabled	Enabled	Enabled	Enabled
Chip #2 Counter Rate	0.0	0.0	0.0	0.0	0.0
Chip #2 Selected Counter	unused	unused	unused	unused	unused
Chip #2 Test Bit	0	0	0	0	0
Chip #2 Counter Status	Enabled	Enabled	Enabled	Enabled	Enabled
Clock Speed	125 KHz	125 KHz	125 KHz	125 KHz	125 KHz
Clock Selected Counters	0	0	0	0	0
Clock Chip #1 Mode	Single	Single	Single	Single	Single
Clock Chip #2 Mode	Single	Single	Single	Single	Single
Last CMD LS Byte	00	00	00	00	00
1 pps Timeout Det.	–	–	–	–	–
Rate r/o Timeout Det.	–	–	–	–	–
Waiting for 1 pps	–	–	–	–	–
HRM last rate	–	–	–	–	–
HRM last 2 rates	–	–	–	–	–
MET Seconds	41272744	41272744	41272744	41272744	41272736
MET Sub Sec.	0.424	0.496	0.680	0.744	0.792
Packet Time	12:39:04	12:39:04	12:39:04	12:39:04	12:38:56
Packet Date	04/23/95	04/23/95	04/23/95	04/23/95	04/23/95

[N = 142] 0

PCA RIF Diagnostics: <Realtime> data in <eng.> format with <Limit checking enabled *Hold mode*>

1.6.7 Graphics Display Screens

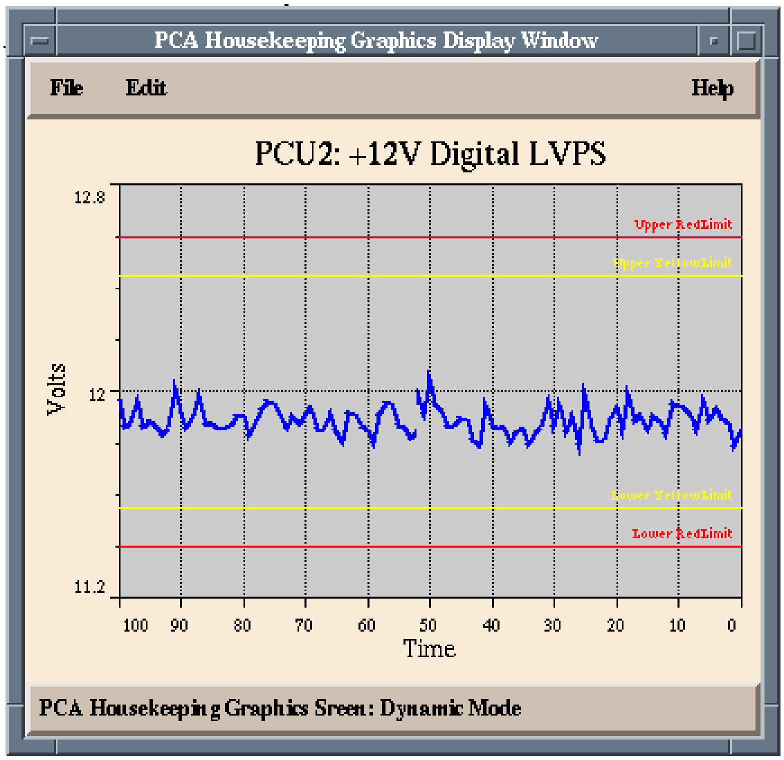
Items to be plotted can consist of individual parameters or a combination of parameters. The simplest case for plotting graphs applies when only one parameter is plotted. Multiple parameters can be plotted on the same graph by the user selecting any combination of parameters for display.

1.6.7.1 Single Parameter Graphs

For single parameter graphs, the parameter required is selected from the text display screen by clicking on the parameter display item. The parameter pop-up panel will appear. See Section 1.6.3 on page 9. By clicking on the Plot button of the parameter popup panel, a strip chart with time samples on x-axis and the parameter value on y-axis will appear. If the text display screen is in history mode, then a pop-up panel will appear from which the desired time span can be selected. These graphs will be drawn with:

- The 4 limit lines, if applicable, drawn horizontally
- The parameter trace color in blue
- The red and yellow limit lines in red and yellow colors
- The last 100 points plotted if in real-time.

FIGURE 12 Graphics Window for the Display of Strip Char



1.6.7.2 Multi-parameter Graphs

For obtaining multi-parameter graphs first user needs to build a combination of parameters as an entity with a name associated with it. This can be done through make graph operation from main menubar. Once the user executes make graphs it pops up a panel for selecting parameters. All the parameters that are clicked in the text screens are added to the list. This list should be saved in order to bring it up again. Once the combination is saved, the multi-parameter graph can be displayed through the display graphs menu.

A typical multi-parameter graph is depicted in Figure 13 on page 21. This can also be displayed both in static or dynamic mode. A legend is shown on the right side edge of the graph to understand the plots. This graph can be printed through the print command from the menubar's File menu.

FIGURE 13 Multi-Parameter Graph

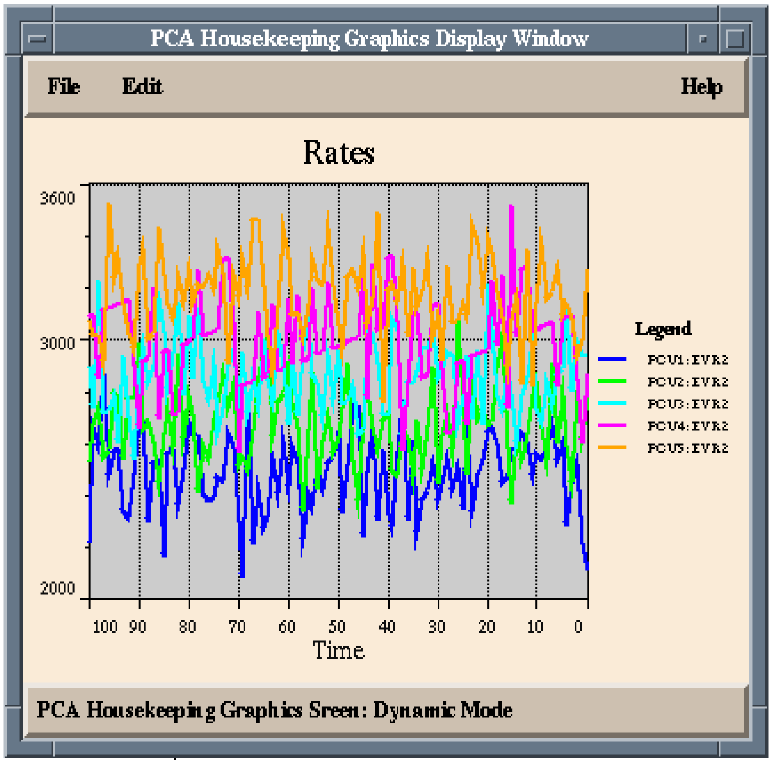
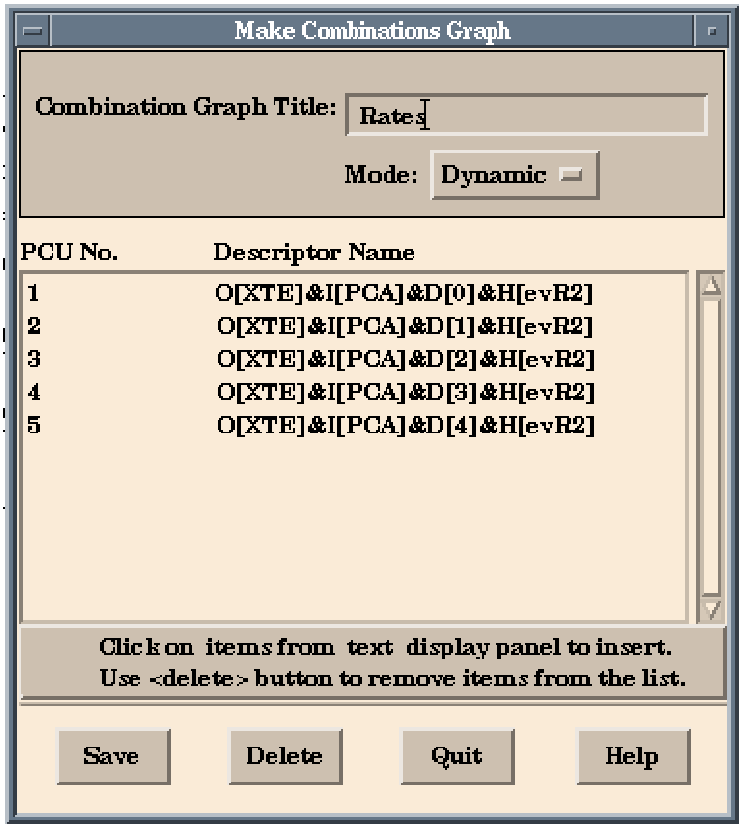


FIGURE 14 Popup panel for selecting parameter combinations



1.6.7.3 Selecting Multiple Parameter Combinations

Two types of operations can be performed on a combination of several parameters (two or more, upto a maximum limit of six):

- building multi-parameter graphs, and
- exporting data.

To build a multi-parameter combination some menu options will be required to:

- identify the start of building a new combination

  In order to build a combination graph, select *Make Graphs* from the *Edit* pulldown menu from the main menubar. To export data, select *Export Data* from the *File* pull-down menu from the main menubar. Once the selection has been made, a pop-up Combinations panel (Figure 14 on page 22) will appear.
- give the combination a name

  Enter a name in the *Combination Graph Title:* keyin area. If a combination with the entered name already exists, then it will be listed in the panel's display area.

- click on all required parameter items

  For this, open the text screens with all the desired parameters and click on the items. As the parameters are clicked, the PCU number and the descriptor name of the pata-meter will appear on the Combination panel's display area. PCU numbers for Space craft and other non-housekeeping parameters are used internally by the program and should be ignored.
- select the mode of display

  This works only for graphs. Graphs can be active (dynamic) or dormant (static). Active graphs will display a defined time span (upto 100 points) from the local history and update the graph with incoming data as a strip chart. For dormant graphs, the time range selection options for plotting is the same as for single parameter graphs.
- close the build operation

  Press on the *Save* button at the bottom of the panel. The combination is saved to disk as a file under the given title in *$SOCOPS/tmp/* directory.

  If exporting data, an ascii text file of the chosen set of parameters is also saved to disk. The text file is written under the given title with a *.asc* extension.

1.6.8 Packet Statistics

The packet statistics pop-up panel displays the time since data acquisition started, the number of correct order packets seen, the number of packets missed, and the percentage missing for each PCU. In a real-time scenario, there could be gaps in the telemetry which could go unnoticed. This tool is one way of knowing if there were any packets missing and it's percentage if any. The Reset button will zero all the values and restart the process.

1.7 Error and Warning Messages

TBD

1.8 Recovery Steps

TBD

1.9 Abbreviations and Acronyms

PCA - Proportional Counter Array

TPG - Test Pulse Generator

RIF - Remote Interface

PCU - Proportional Counter Unit

1.10 Glossary

1.11 Notes

1.12 Appendices