USER'S GUIDE
OF THE
PRODUCT SPECIFICATION
FOR THE
AEROACOUSTICS BRANCH QUIET FLOW FACILITY
DYNAMIC DATA ACQUISITION AND RECORDING SOFTWARE
(DDARS)

NASA-DID-P600

Prepared for:
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PREFACE

The following typographic conventions are used throughout this document.

Bold

is used to denote menu or panel button selections, disk file names, program names (module names, utilities names), setup file names, selection settings (i.e., run, point, test numbers), and user messages. Do not use quotation marks around bold items unless it is displayed as such to the user.

Italic

is used to denote names of disk directory names, menu names, window names, report names, and names of text entry boxes.

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DAIMB Project Manager:	_____	_____
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1.0 INTRODUCTION

1.1 IDENTIFICATION OF DOCUMENT

This document is the User's Guide for the Aeroacoustics Branch Quiet Flow Facility Dynamic Data Acquisition and Recording Software (DDARS). DDARS is a stand-alone high-speed data system configured and controlled through the use of a menu-driven selection system developed on the Compaq Alpha series computers.

1.2 SCOPE OF DOCUMENT

Wyle Laboratories developed this document under contract NAS1-98100, NASA Job Number R28351, Wyle Task Order Number 60016.T0.43 for the NASA Langley Research Center, Data Acquisition and Information Management Branch (DAIMB). It was prepared in accordance with the project task plan, Wyle standards and conventions, and the NASA Software Documentation Standard Software Engineering Program (NASA-STD-2100-91).

1.3 PURPOSE AND OBJECTIVES OF DOCUMENT

This document is intended as a detailed operational guide to the DDARS system showing step-by-step operations that are required to successfully acquire and record high-speed data. It is not intended as a replacement for vendor supplied hardware and software operational manuals.

1.4 DOCUMENT STATUS AND SCHEDULE

This document will be published in October 2002.

1.5 DOCUMENT ORGANIZATION

This document is organized into the following sections:

1.0 Introduction
2.0 Related Documentation
3.0 Overview of Purpose and Functions
4.0 Installation and Initialization
5.0 Startup and Termination
6.0 Functions and Their Operation
7.0 Errors and Error Conditions
8.0 Recovery Steps
9.0 Abbreviations and Acronyms
10.0 Glossary
11.0 Appendices

Section 1.0 discusses the scope, purpose and objectives, schedule, and organization of this document. Section 2.0 provides references to the documents relevant to this document and those used in the development of the DDARS. Section 3.0 describes the purpose and overall capabilities of the system. Section 4.0 details the procedures for installing and initializing the software and data storage areas. Section 5.0 describes the startup and shutdown procedures. Section 6.0 describes each function in terms of its purpose, procedure for execution, expected input, and related functions. Sections 7.0 and 8.0 present and explain possible error conditions and recovery procedures that may be used to correct the errors. Section 9.0 lists the full term for all abbreviations and acronyms used in this document. Section 10.0 is a glossary of terms used in this document. Section 11.0 provides Appendices relating to the DDARS system.

2.0 RELATED DOCUMENTATION

This section identifies all related documentation. Document numbers refer to the initial version of the documents.

2.1 PARENT DOCUMENTS

The following documents are parent to this document:

1. DAIMB project Job Order Number R28351
2. NASA Software Documentation Standard NASA-STD-2100-91
3. DAIMB Task Order 60016.T0.43

2.2 APPLICABLE DOCUMENTS

The following documents contain information directly applicable to the development of this document:

1. Requirements of the Product Specification For The Neff 495 Dynamic Data Acquisition And Recording Software
   Wyle Document Number SD621T043-640R0-D1
   April 2002
   http://wyleprocedures/NasaSuppFac/DDARS/640r0.pdf

2. Requirements of the Product Specification for the Quiet Flow Facility Dynamic Data Acquisition and Recording System
   Wyle Document Number SD621T043-647R0-D1
   April 2002
   http://wyleprocedures/NasaSuppFac/DDARS/647r0.pdf

3. System 495
   Data Acquisition and Recording System
   Neff Instrument Corporation
   Document Number 495900

4. SL Graphical Modeling System
Version 5.x
Reference Manual
SL Corporation, March 1995

5. Reference Manual Pages
Digital Equipment Corporation
Part Number: AA-PS36A-TE

6. NetCDF User's Guide
An Interface for Data Access
Version 2.4
February 1996

7. 4196 System
Operation and Maintenance Instructions
Precision Filters, Inc.
Manual Number: 671A-3337

8. Model 27000A System
Operations and Maintenance Instructions
Precision Filters, Inc., Rev. B
Manual 878-3887
May 1996

9. Architectural Description for the Product Specification of the Software and Hardware Design for the Quiet Flow Facility Site-Specific Equipment
Wyle Document Number SD621T043-656R0-TLD
September 2002
http://wyleprocedures/NasaSuppFac/DDARS/656r0.pdf

10. SL Graphical Modeling System
Version 5.x
Function Reference Manual
SL Corporation, August 1995
Part Number: FREF-950804

11. Technical Description for the External Interrupt Conditioner Model 8903A
Wyle Document Number: HD63211-262R0-D8, April 1990
Wyle Drawing Number: B8903-005 (3 sheets)
Wyle ECN Number: 94-302

3.0 OVERVIEW OF PURPOSE AND FUNCTION

The DDARS system is an on-line application comprised of software programs that operate in conjunction with the Compaq OSF/1 operating system to acquire, display and record test data and control the overall AeroAcoustics Branch Quiet Flow data acquisition process in general.

The graphical user interface was developed using the Sherrill-Lubinski Graphical Modeling System (SL-GMS) that provides development tools for creating dynamic graphical screens allowing them to be embedded into the "C" language application software.

To operate the DDARS, the user must have a working knowledge of the UNIX operating system and be able to operate the standard and non-standard peripherals (i.e., X-terminals) that interface with the DDARS system. This information is found in manuals applicable to the Compaq/ALPHA computer, Neff 495 Data Acquisition Unit, other data acquisition and signal conditioning equipment, and hardcopy units used with the system.

3.1 NEFF 495 FUNCTIONAL OVERVIEW

The Neff 495 system is a high-speed data acquisition system for processing multiple analog input signals in the 1kHz to 200 kHz frequency range. The main box assembly contains the Input/Output (I/O) Control Logic card, power supply assembly, backplane assembly and up to 16 channel cards. Up to 15 expansion boxes may be chained off the main box, each allowing up to 16 channel cards bringing the total number of channels possible up to 256. The expansion box is similar to the main box assembly, with the only exception being an Expansion Logic card in place of the main box I/O Control Logic card. The I/O Control Logic card contains the system microprocessor, system control logic, system clock, SCSI bus interface hardware and SCSI bus terminator.

Each input channel includes its own sampling Analog/Digital (A/D) converter, memory module, programmable gain amplifier, sixth-order Bessel anti-aliasing filter, and bridge

conditioning and excitation power. The sampling A/D converters are available from the factory with 12 or 14 bit converter resolution, and memory modules that range from 256 KiloWords (KWords) to 1, 2, and 8 MegaWords (MWords).

This system is currently configured with two Neff 495 data acquisition units (DAU 1 and DAU 2). DAU 1 has 36 12-bit A/D input channel cards with programmable AC/DC coupling. DAU 2 has 32 14-bit input channel cards. Each input channel has 2 MegaWords of memory, full-scale gain input ranges of ±5 millivolt (mV) to ±10.24 volt (V) in 12 binary weighted steps, filter cut-off frequencies of 10kHz, 20kHz, 50kHz, and 100kHz, and includes a plug-in mode card for mounting bridge completion, calibration, and balance limit resistors for operation with quarter, half, and full bridge circuits. A Digital to Analog Converter (DAC) is provided for bridge balance. The system processor uses a successive approximation algorithm for bridge balance with a range determined by a user-supplied balance limit resistor.

All system setup parameters are stored in non-volatile Random Access Memory (RAM) on the I/O Control Logic card and are restored at power-up. Parameters saved include channel gain, filter and input source select values. Auto balance DAC and excitation supply settings are also saved. Channel memory module data is not saved.

Data is simultaneously sampled on all channels. The new data is available to be recorded on the channel's on-board memory module or moved to the host Compaq Alpha computer via the SCSI bus interface.

3.2 COMPAQ/ALPHA FUNCTIONAL OVERVIEW

The Neff 495 system is connected to and controlled from a Compaq Alpha 3000 Model 500 computer running the OSF/1 UNIX based operating system. The Compaq Alpha contains two SCSI ports, each containing 8 bus lines. The Neff 495 data acquisition units are connected to one of the SCSI ports.

The Compaq Alpha computer also contains a device driver low-level application library. This method provides access to all of the functions available to the Neff 495. The device driver is loaded into the system at boot time, and acts as a pass-through between the high-level control software and the Neff 495.

3.3 SOFTWARE SYSTEM OVERVIEW

The DDARS system is divided into five functional areas. The functional areas are initiation, environment configuration, setup, data capture, and graphical displays. Each is a separate and distinct area of DDARS, but necessary for the operational success of the total system.

The initiation function is responsible for the activation of the DDARS system following the request for initiation by the user. A detailed description of this function is located in Section 5.0, Startup and Termination, which addresses both the hardware and software initiation.

The environment configuration function is a stand-alone process that must have been run at least once before the DDARS system is activated. This function creates a file that defines for the system the hardware specifications for the Neff 495 data acquisition units. A detailed description of this function is located in Section 6.1, Environment Configuration, of this manual.

The setup function is responsible for defining on-line parameters to control the Neff 495 systems, Precision Filter switch matrix, and post plot processing and set test conditions. A

detailed description of these functions is located in Section 6, Functions and their Operation, of this manual.

The data capture function is responsible for the collection and recording of channel data as requested by the user. A detailed description of this function is located in Section 6.5, Data Capture, of this manual.

The graphical display function provides real-time display and post analysis of channel data. A detailed description of this function is located in Section 6.6, Graphical Display, of this manual.

3.4 4196 PRECISION FILTER FUNCTIONAL OVERVIEW

The Precision Filter 4196 system is a programmable patch switch matrix system with the capability of sending 192 electrical input signals to 32 output signals. The Master Mainframe contains the following components: Control Module, I/O Connector Cards, and Switch Cards. The mainframe provides control of the master and slave mainframes using the GPIB remote interface. The GPIB interface provides the ability to control the system from a remote host computer. A non-volatile static Random Access Memory (RAM) is used to store the system configuration.

This system is currently configured with one Master Mainframe which contains a 160 x 32 matrix and one Slave 32 x 32 matrix.

4.0 INSTALLATION AND INITIALIZATION

4.1 SOFTWARE

The software is installed in the */usr/ddars* system directory on the Compaq/Alpha. The *run* subdirectory will contain the configuration-controlled executable software. Any new development or modifications will be performed and tested on *dev* and *test* directories prior to being moved to the *run* to maintain configuration control. Subdirectories *lib*, *exe*, and *models*, and several source directories, have been created in the Configuration Management database. As indicated by the names, *lib* contains the object code, *exe* contains the executable load modules, and *models* contain the SL-GMS graphical screens. The source directories are named according to their function within the program operation.

The */usr/ddars/run/scripts* directory will contain the configuration-controlled scripts necessary to run the DDARS system. If, when starting the system the scripts cannot be found, the script directory name should be added to the logon search path.

All system and graphical setup and environment configuration files will be read and/or saved on the directories */usr/nef495/setup* and */usr/nef495/config*, respectively.

Four data directories, **/data1, /data2, /data3** and **/data4**, have been created to which data is recorded during tests. Directory **/data1** is designated as the default directory at startup. The user may create subdirectories under these directories. It is advised that each user keep a separate subdirectory for their test data. It is the responsibility of the users to keep these subdirectories managed. Routinely archiving test data will help to ensure that there will be enough disk space available for all users.

4.2 HARDWARE

For a detailed description of the QFF data acquisition equipment, see Section 2.2, reference 9. The microphones are connected directly to the 38 input channels of the first Neff 495 chassis, DAU 1. The pressure sensors are connected to the 160 input channels of the Precision Filters 27000A preamplifier located under the floor in the wind tunnel. The output signals of this chassis are wired to input channels of the Precision Filters 4196 Switch Matrix. The 32 output channels of this chassis are connected to the 32 inputs of the second Neff chassis, DAU 2. The microphones are mounted on a boom that can be controlled by the boom control software described in Section 2, reference 9.

The Neff 495 in *External Trigger* mode receives a TTL level of 0 to 5 Volts, and is input on a 9-pin "D" connector on the rear panel of the Neff 495 chassis. This external trigger is synchronized with the external clock using a Wyle-developed trigger processing circuit, described in Section 2.2, reference 11. Two jumpers are available on the I/O Control Logic card to select either a positive going edge or a negative going edge to trigger on. This trigger will cause all channels enabled to record data at the same time.

The *Analog Trigger* mode uses one of the analog input channels as a trigger source. Whatever gain was selected for that analog channel is applied to the analog signal and a jumper is used to carry this signal over to the I/O Control Logic card. This jumper must be placed on the analog channel that is to be monitored. The analog level to be triggered on is the actual analog signal level coming into the system. All enabled channels will start recording at the same time when this trigger level is reached. Caution needs to be used if a free running signal is always present on the analog channel. When the Neff 495 is placed in an *armed* state and the analog signal exceeds the trigger threshold, then the system will begin immediately to record data.

5.0 STARTUP AND TERMINATION

Three main steps are required by the user before the DDARS system is able to acquire and record test data. These steps are as follows:

1. Power ON the hardware equipment.
2. Prepare the DDARS environment configuration file.
3. Activate the DDARS system.

The following subsections explain the way the user accomplishes the above steps to bring the DDARS system to a point of readiness for test data acquisition and recording.

5.1 HARDWARE SYSTEM ACTIVATION

The hardware equipment needed by the DDARS system must be individually powered ON as follows:

1. Compaq/ALPHA computer
2. Data acquisition equipment
3. Printer
4. All terminals

Once this has been accomplished, the system should complete its own "autoboot" sequence to bring up the Compaq OSF/1 operating system and make the system available for user logon. For more information, consult the individual manufacturer's equipment startup and activation instructions. Note that the X window system is required for DDARS operation. A window manager of the user’s preference may be used to communicate with the X window system.

5.2 DDARS SYSTEM ACTIVATION

There are two independent programs to the DDARS system: the **Environment Configuration** program and the **Data Acquisition** program. After logging on to the Compaq/Alpha, the DDARS system is activated by typing the names of script files at the terminal window's system prompt. These script files contain all commands necessary to run the DDARS system and are located in the directory */usr/ddars/run/scripts*. The user should change to this directory before doing any work with the DDARS system. To avoid this step, the user may put the directory into his/her home path (see the UNIX shell man pages for details).

To start the DDARS **Environment Configuration** program, type **./runcfg &** at the terminal window's command prompt. Operation of this program is described in Section 6.1.

To start the DDARS **Data Acquisition** program, type **./run495 &** at the terminal window's command prompt. The main menu, *Neff495 Dynamic Acquisition & Recording System* shown in Figure 6.2-1, is displayed on the user's X-terminal. The menu contains diamond shaped push buttons that invoke submenus that control the major functions of the DDARS system. Functions are selected by clicking the appropriate push button. These functions are described in Section 6.2.

5.3 SYSTEM TERMINATION

To exit the program, click on the **RETURN** button on each submenu until you return to the main menu, *Neff495 Dynamic Acquisition & Recording Software* (Figure 6.2-1). Then, click on the **QUIT** button. To exit the operating system, logout procedures depend upon the window manager used by the user. See the appropriate window manager documentation.

6.0 FUNCTIONS AND THEIR OPERATION

This section presents the functional areas of the system for the successful configuration and control of the data acquisition process. The next few subsections detail these areas of operation for the DDARS system user. Default settings have been provided where necessary to prevent Neff 495 hardware failures and to ensure that the DDARS system will operate properly.

The user interface on the SL-GMS menu screens includes text entry boxes, action buttons, option boxes and graphics displays. It is important to remember that all user-text input *must* be terminated by pressing the **ENTER/RETURN** key; the SL-GMS modeling system provides no indication when a text entry is complete. This ensures that the input is terminated and accepted by the system. Push button options only require a mouse button click on the entry. In push button group selections, the selected option is highlighted in green.

Each screen contains a **RETURN** button and a **PRINT** button. The **RETURN** button returns the user to the screen from which that screen was called. The **PRINT** button creates a postscript file, *sldump.ps*, of the screen. The postscript file will be written in the user's current working directory. Because the postscript file is not uniquely named for each screen, only the last printed screen will exist in the file. If a screen dump is to be saved, it must be renamed immediately from a terminal window. Screen dumps cannot be manipulated from DDARS screens.

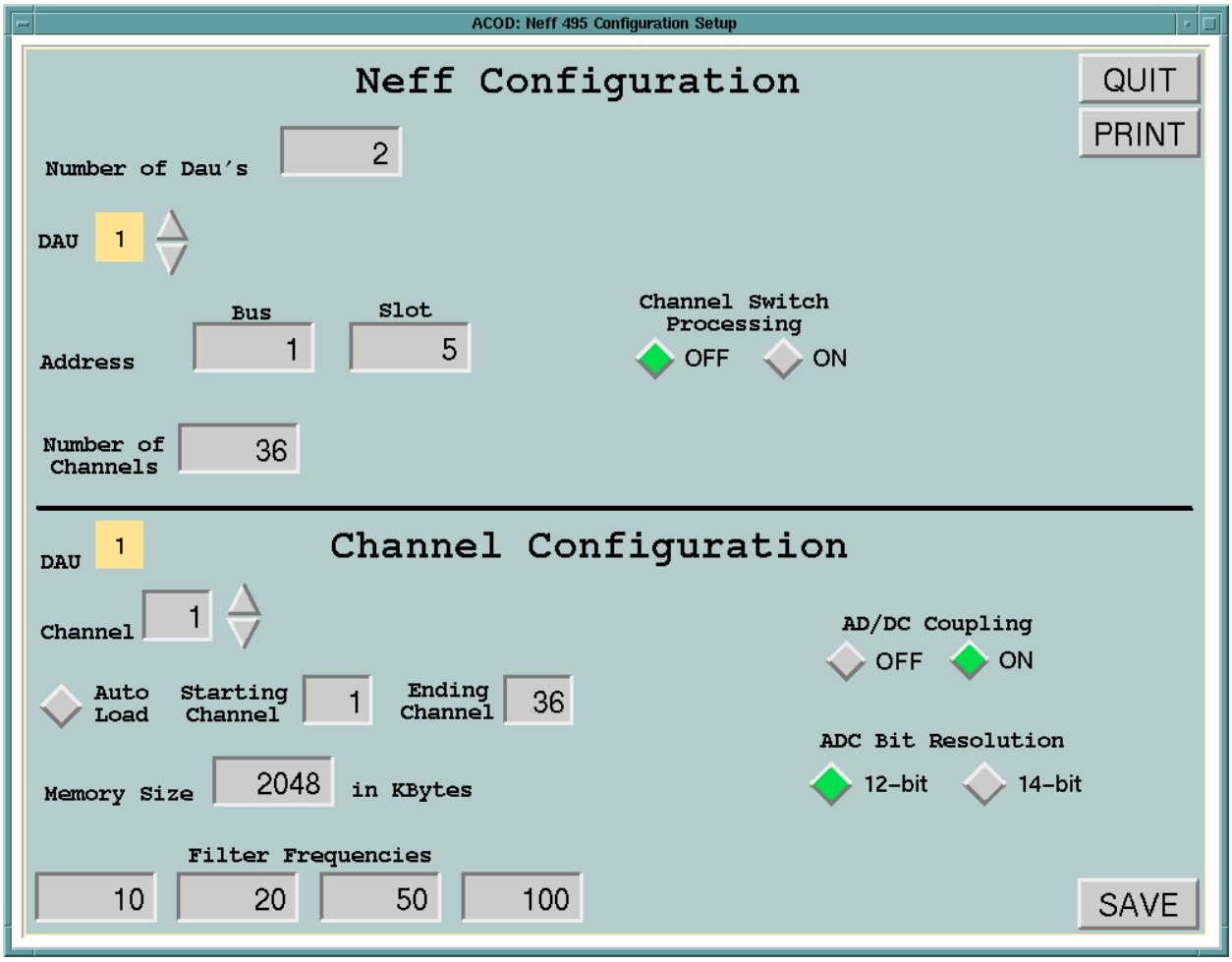
6.1 ENVIRONMENT CONFIGURATION

The environment configuration defines the specifications for Neff 495 data acquisition units. This information is written to file **./cfg495 &** under directory */usr/nef495/config*. This file is read at startup to set run-time options. The file contains the number of Neff 495 data acquisition units being supported and, for each Neff 495 the SCSI bus address, the number of channels assigned, the Precision Filter Switch Matrix control flag, and the number of

switch channels assigned. For each input channel, the file also contains the memory size in kilobytes, ADC bit resolution, AC/DC coupling flag, and four programmable cut-off frequency settings. Modifications to any of these parameters, with the exception of Switch Matrix parameters, can only be made through the off-line configuration function and must be made before the DDARS system is started. See Appendix A for a description of the file format.

An **auto load** function is provided for channel processing that allows the user to prototype one channel and update a range of channels with the same information.

Typing **./runcfg &** at the system prompt followed by pressing the **ENTER/RETURN** key starts the configuration process. The *Neff Configuration Menu* screen (Figure 6.1-1) is displayed on the user's terminal.



6.1-1. Neff Configuration Menu Screen

A description of the various fields and options for the *Neff Configuration* screen follows.

Number of Dau's - This text entry box allows the user to set the number of Neff 495 data acquisition units that will be accessed by the DDARS system. The maximum number that can be assigned is based on the number of physical units. The default setting is **2**.

DAU - This is an UP or DOWN arrow selection group that determines to which Neff 495 the information on the screen applies. UP and DOWN arrows are used to

increment or decrement the DAU number. The currently selected DAU is highlighted in yellow. The default setting is DAU **1**.

Address/Bus/Slot - These two boxes allow the user to enter the address on the SCSI bus interface for the DAU. The default setting for DAU 1 is **bus 1 slot 5**. The default setting for DAU 2 is **bus 1 slot 6**.

Number of Channels - This option allows the user to enter the number of channel cards installed for the DAU. The maximum number of channels that can be defined is **48**.

Channel Switch Processing – This push button selection group allows the user to specify whether a Precision Filter Switch Matrix is being used in conjunction with the DAU. The options are OFF and ON. The default setting for DAU 1 is **OFF**. The default setting for DAU 2 is **ON**.

Number of Switch Channels – This entry box appears when switch processing is enabled for the DAU. The option allows the user to enter the number of switch channels configured on the Precision Filter Switch Matrix. The default setting for DAU 1 is **0**. The default setting for DAU 2 is **160**.

The following options are available to set channel configuration options for channels assigned to the DAU specified.

DAU - This information-only field displays for which DAU the channel options apply.

Channel - This text entry box that allows the user to enter the channel number for display and/or modification. UP and DOWN arrows are used to increment or

decrement through the channel list. The range of channel numbers is based upon the maximum number defined for the DAU. The default setting is channel **1**.

Starting Channel - This text entry box allows the user to enter the starting channel for the auto load option. The default setting is **1**.

Ending Channel - This text entry box allows the user to enter the last channel to be modified by the auto load function. The default setting is the last channel defined for the DAU.

Auto Load - Initiates the setting of channel specifications from the prototype.

AC/DC Coupling - This push button selection group allows the user to specify whether the channel card has been modified for AC/DC coupling. The default setting for DAU 1 channels is **ON**.

Memory Size - This text entry box allows the user to enter the amount of memory in kilobytes. The default setting is 2048 kilobytes, 2 megawords.

Filter Frequencies - These text entry boxes allow the user to enter four cut-off filter frequencies. The default settings are **10kHz, 20kHz, 50kHz** and **100kHz**.

ADC Bit Resolution - This push button selection group allows the user to specify the analog-to-digital converter for the channel. Options are 12-bit and 14-bit. The default setting for DAU 1 is **12-bit**.

SAVE – This push button allows the user to save changes into the configuration file **/usr/nef495/config/cfg495** at any time. The configuration file name cannot be changed.

QUIT - Clicking on this push button exits the configuration process and returns the user to the system prompt. If a save is not performed before exiting, all modifications are lost.

6.2 DDARS SYSTEM ACTIVATION

After logging on to the Compaq/Alpha, the DDARS system is activated by typing at the terminal window's system prompt **./run495 &**. This script file contains all commands necessary to run the DDARS system. The DDARS main menu, *Neff495 Dynamic Acquisition & Recording System*, shown in Figure 6.2-1, is displayed on the user's X-terminal. Also, the *Data Capture* window (Section 6.5) appears on the main console screen, and the *Overview* window (Section 6.8) appears on the second console screen. However, if DDARS is run remotely, the *Overview* window appears on the main terminal screen with the *Main* and *Data Capture* windows.

The *Neff495 Dynamic Acquisition & Recording System* menu contains diamond shaped push buttons that invoke submenus that control the major functions of the DDARS system. Functions are selected by clicking the appropriate push button.

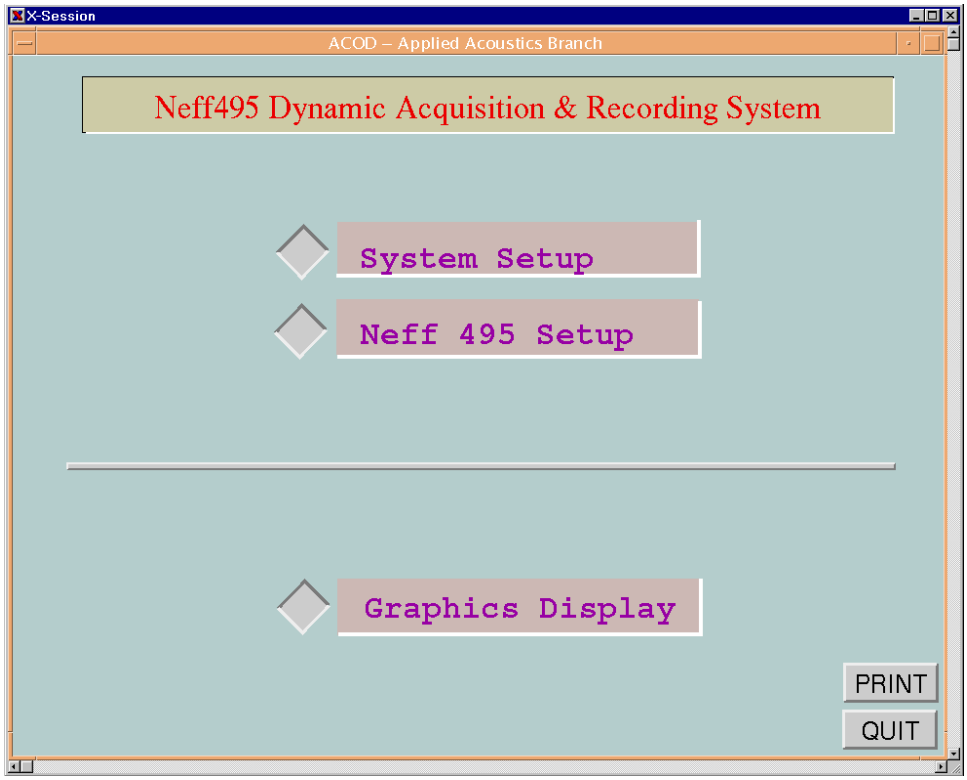


Figure 6.2-1. Neff495 Dynamic Acquisition & Recording System

A description of the functions on the menu follows.

System Setup - Pops up the facility and *System Setup Menu* (Figure 6.3-1). See Section 6.3 for a description of this function. Note that all Neff 495 system and facility experimental setup information are saved from this screen.

Neff 495 Setup - Pops up the *Neff 495 Setup Menu* screen (Figure 6.4-1). See Section 6.4 for a description of this function. Note that all Neff 495 system and facility experimental setup information are saved from the *System Setup Menu* screen described above.

Graphics Display - Invokes the *Graphics Display Menu* screen (Figure 6.6-1), which replaces the *Neff495 Dynamic Acquisition & Recording System* screen (Figure 6.2-1). See Section 6.6 for a description of this function.

PRINT - Clicking on this push button creates a postscript file, *sldump.ps*, of the screen. This file will be written in the user's current working directory.

QUIT - Clicking on this push button causes the DDARS to exit and returns the user to the system prompt. Before terminating the system, the user should ensure that all system setup changes are saved. This is accomplished by clicking on the **SAVE SETUP** button on the *System Setup Menu* screen (Figure 6.3-1).

6.3 SYSTEM SETUP

The facility-specific *System Setup Menu* screen (Figure 6.3-1) pops up after selecting the **System Setup** option on the *Neff495 Dynamic Acquisition & Recording Software* screen (Figure 6.2-1). From this screen the user is able to enter or select all information required to specify system parameters and record test conditions. Test conditions are set from a separate submenu that is invoked from this screen. Setup information for both experimental conditions and Neff 495 settings can be saved to and read from a previously defined file or entered manually. See Appendix B.1 for a description of the file format.

The test, run, and trigger point numbers displayed on the screen are used to create a prefix for the test data file name, e.g. **T0999R0001P001**. If a file already exists in the data directory specified with this prefix, a pop-up window will appear with a message that a file already exists. If the test, run, or trigger point number is not changed, the data currently in the file will be overwritten. If the files are in NetCDF format, they cannot be overwritten, and either the data directory must be changed or the NetCDF files must be removed using operating system utilities.

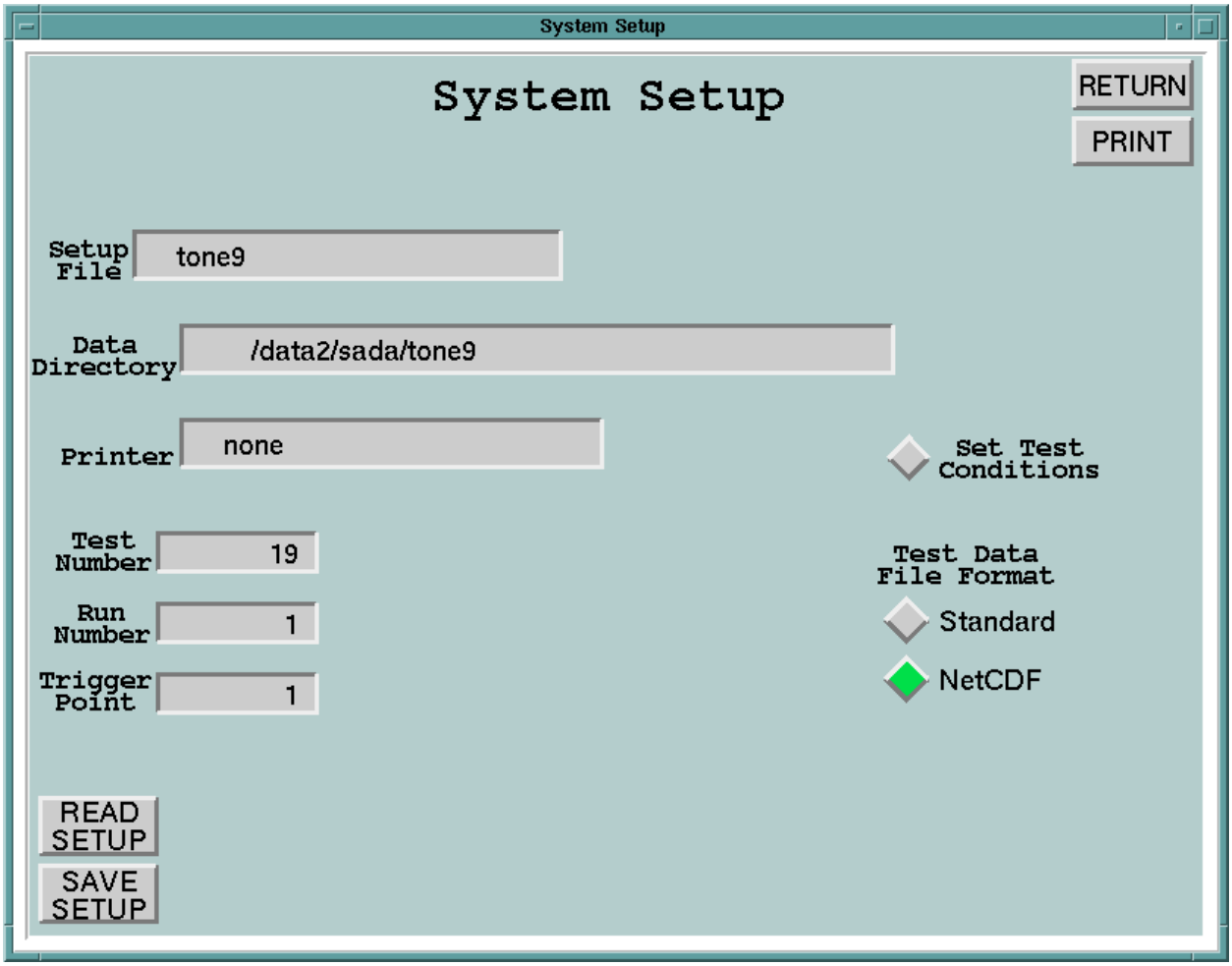


Figure 6.3-1. System Setup Menu Screen

A description of the various fields and options follows.

Setup File - This text entry box allows the user to enter the name of a file containing all system and Neff 495 setup information up to 21 alphanumeric characters, beginning with a letter. The default setting is no setup file assigned.

Data Directory - This text entry box allows the user to enter the full path name where the test data will be stored up to 40 alphanumeric characters, beginning with a letter. The default data directory is **/data1**.

Printer - This text entry box allows the user to specify the printer where postscript files for the screen will be printed up to 21 alphanumeric characters. No printer is currently attached to this system. The default setting in no printer assigned.

Test Number - This text entry box allows the user to enter a test number. Test numbers range from 1 to 9999. The default test number is **1**.

Run Number - This text entry box allows the user to enter a run number. Run numbers range from 1 to 9999. The default run number is **1**.

Trigger Point - This text entry box allows the user to enter a trigger point number. Point numbers from range 0 to 999. The trigger point value allows for a series of points to be acquired within the same run. This is useful if baseline data is needed. This value is automatically incremented after the save is completed. The default trigger point is **1**.

Test Data File Format - This is a push button selection group which allows the user to specify the format of the test data. Test data formats are Standard and NetCDF. Standard format stores the data to disk using standard UNIX writes. NetCDF is a common network format that allows the data to be machine independent. The default setting is **Standard**.

READ SETUP - Clicking on this push button will initiate a read of setup information from the file. If the file exists, it will be read and information updated on the setup menu screens and downloaded to the Neff 495 systems. If the file does not exist, an error message highlighted in red will appear. Default values or the current settings will be in effect until the user changes them or a valid setup file is read.

SAVE SETUP - Clicking on this push button will initiate a write of facility and Neff 495 system setup information to the file. If the file exists, the information currently stored in the

file will be overwritten. If the file does not exist, it will be created. If no setup file has been specified, an error message highlighted in red will appear on the screen.

Set Test Conditions - Clicking on this push button pops up the Test Conditions Menu Screen. See Section 6.3.1 for a detailed description of this screen.

6.3.1 Test Conditions

The *Test Conditions Menu* screen (Figure 6.3.1-1) pops up after selecting the **Set Test Conditions** option on the *System Setup* screen. From this screen, the user defines conditions for the current test. This information can be read from a previously configured file or entered manually. This information is written as part of the header information to the test data file. Any changes made during a test will not be updated to the file. See Appendix B.3 for a detail description of the file format.

A description of the various fields and options follows.

Test Conditions File Name - This text entry box allows the user to enter the name of the file containing the values for the test conditions up to 21 alphanumeric characters, beginning with a letter. The default setting is no file name assigned.

Test Engineer - This text entry box allows the user to enter the name of the test engineer up to 21 alphanumeric characters. The default is no engineer assigned.

READ FILE - Clicking on this push button will initiate a read of the information from the file. If the file exist, it will be read and the screen updated. If the file does not exist, an error message highlighted in red will appear screen. Default values or the current settings will be in effect until they are changed by the user or a valid file is read.

Mach Number - This text entry box allows the user to enter a five digit number to two decimal places. The default value is **zero**.

Geometry ID - This text entry box allows the user to enter a two digit geometry identification number. The default value is **zero**.

Boundary Layer Trip Number - This text entry box allows the user to enter a two digit boundary layer trip number. The default value is **zero**.

Excitation - This text entry box allows the user to enter a six digit number to two decimal places. The default value is **zero volts**.

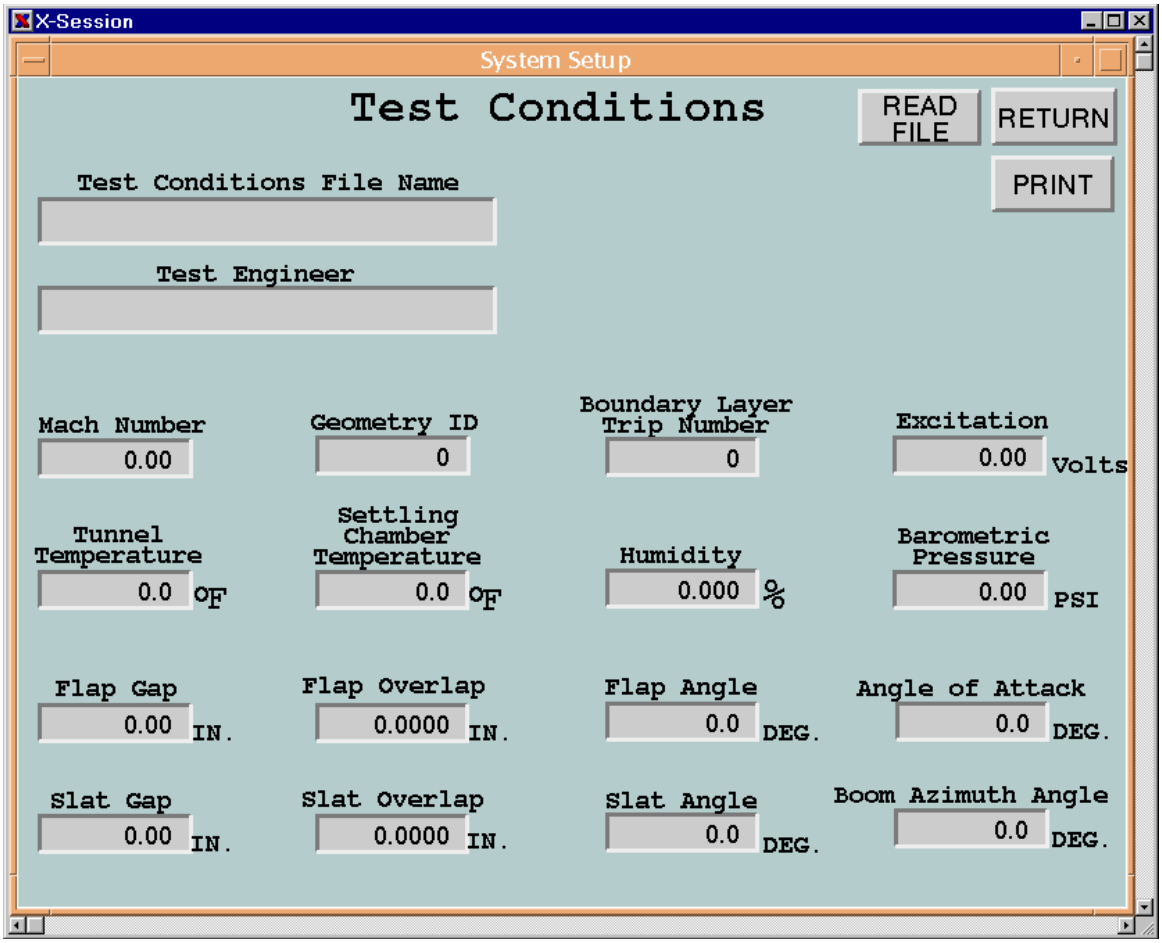


Figure 6.3.1-1. Test Conditions Menu Screen

Tunnel Temperature - This text entry box allows the user to enter a four digit number to one decimal place. The default value is **zero degrees**.

Settling Chamber Temperature - This text entry box allows the user to enter a four digit number to one decimal place. The default value is **zero degrees**.

Humidity - This text entry box allows the user to enter a seven digit number to three decimal places. The default value is **zero degrees**.

Barometric Pressure - This text entry box allows the user to enter a five digit number to two decimal places. The default value is **zero PSI**.

Flap Gap - This text entry box allows the user to enter a six digit number to two decimal places. The default value is **zero inches**.

Flap Overlap - This text entry box allows the user to enter an eight digit number to four decimal places. The default value is **zero inches**.

Flap Angle - This text entry box allows the user to enter a three digit number to one decimal place. The default value is **zero degrees**.

Angle of Attack - This text entry box allows the user to enter a three digit number to one decimal place. The default value is **zero degrees**.

Slat Gap - This text entry box allows the user to enter a six digit number to two decimal places. The default value is **zero inches**.

Slat Overlap - This text entry box allows the user to enter an eight digit number to two decimal places. The default value is **zero inches**.

Slat Angle - This text entry box allows the user to enter a three digit number to one decimal place. The default value is **zero degrees**.

Bcom Azimuth Angle - This text entry box allows the user to enter a three digit number to one decimal place. The default value is **zero degrees**.

6.4 NEFF 495 SETUP

The *Neff 495 Setup Menu* screen (Figure 6.4-1) pops up after selecting the **Neff 495 Setup** option from the *Neff495 Dynamic Acquisition & Recording Software* screen (Figure 6.2-1). The Neff 495 is set up when the *System Setup* file (Section 6.3) is read. Changes applied in this menu may be saved by returning to the *System Setup* menu and saving a new *System Setup* file.

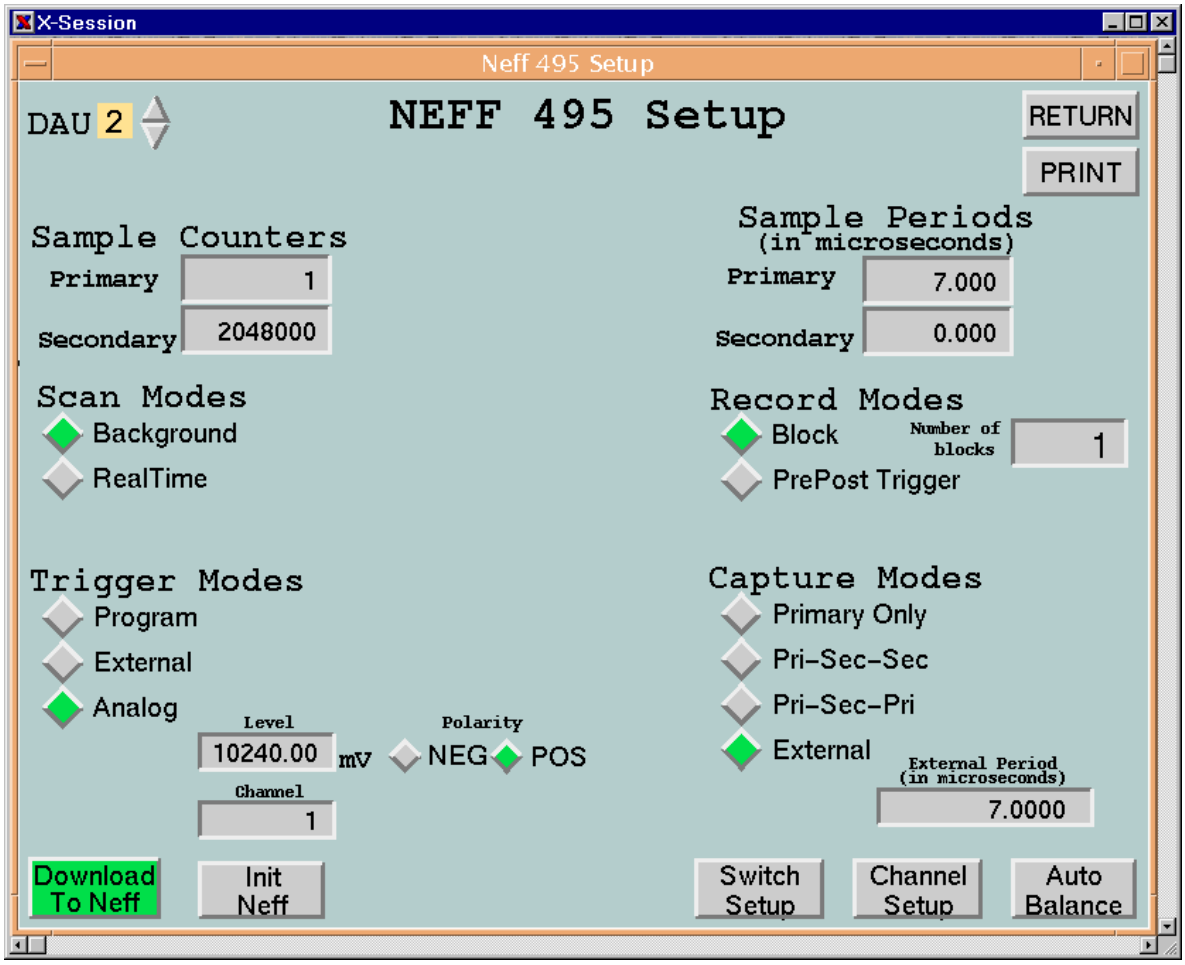


Figure 6.4-1. Neff 495 Setup Menu Screen

This menu and submenus allow the user to set parameters required to configure a Neff 495 and to perform a Neff auto-balance. The user may download changes by clicking the **Download to Neff** button. Also, on exiting this screen, any changes will be automatically sent to the Neff 495 systems.

A description of the various fields and options follows.

DAU - This is an UP or DOWN arrow push button selection group that determines to which Neff 495 the information on the screen applies. UP and DOWN arrows increment or decrement the DAU number highlighted in yellow. The default setting is **DAU 1**.

Sample Counters (Primary) - This text entry box allows the user to enter the number of primary samples to be acquired during the scan period. The total number (primary, secondary and pre-trigger samples) that can be acquired during a scan is limited by the amount of memory on the channel card.

Sample Counters (Secondary) - This text entry box allows the user to enter the number of secondary samples to be acquired during the scan period. The maximum number of secondary samples that can be acquired is based on the maximum memory size less the number of primary samples. If the user enters a value that when added to the primary sample counter is greater than the maximum memory size, the number of secondary samples is reduced accordingly. The default setting is **zero secondary samples**.

Sample Periods (Primary) - This text entry box allows the user to enter the primary scan period for the DAU in microseconds (µs). The maximum rate (minimum period) is dependent upon the A/D converter resolution of the DAU.

Sample Periods (Secondary) - This text entry box allows the user to enter the secondary scan rate for the DAU in microseconds (µs). The maximum rate is dependent upon the A/D converter resolution of the DAU. A 12-bit A/D has a maximum sample rate of 1 MHz. A 14-bit A/D has a maximum sample rate of 250kHz. Enter 1 microsecond to achieve a 1 megahertz rate. Enter 4 microseconds to achieve a 250 kilohertz rate. The minimum rate is 13107 microseconds. The default setting is **no secondary rate**.

Scan Modes - This push button selection group that allows the user to specify the scan mode for the DAU. Options are *Background* and *Real-Time* modes. Background data is written to the Neff on-board memory module and then read on command, whereas, Real-Time data is read directly from the asynchronous transfer buffer. *Real-Time* mode takes up the remaining resources of the computer, so no other actions should be attempted while in *Real-Time* mode. The default setting is *Background* mode.

Record Modes - This push button selection group allows the user to specify the recording mode for the DAU. Options are *Block* and *PrePost Trigger*. *Block* mode permits recording of one or more blocks of post-trigger data to the channel on-board memory module up to the maximum memory size. Block recording begins when the trigger signal is received. *PrePost Trigger* mode begins recording data when the system is "armed" before the initiation of the trigger, and continues to record the user specified number of samples after the trigger signal is received. The default setting is *Block* mode.

When *Block* mode is selected, a text entry box appears which allows the user to specify the number of blocks to be acquired before test data is written to disk. The maximum number of blocks that can be acquired is determined by the sample counters and the capture mode. The default setting is **one block**.

When *PrePost Trigger* mode is selected, a text entry box appears which allows the user to specify the number of pre-trigger samples to be acquired. The number of pre-trigger, primary, and secondary samples must not exceed the maximum amount of memory. If this occurs, the number of pre-trigger samples will be reduced accordingly. The default setting is **zero pre-trigger samples**.

Trigger Modes - This push button selection group allows the user to specify the trigger mode for the DAU, which refers to the way the DAU is triggered to begin data recording.

Options are *Program, External,* and *Analog*. *Program* trigger causes data recording to begin immediately upon receipt of the software trigger command. The *External* trigger causes the Neff to "arm" and data capture begins when the TTL signal is received. The *Analog* trigger monitors any channel in the scan list for a specified signal level. When the threshold is reached data recording is started. The default setting is *Program* mode.

When *Analog* trigger is selected, two text entry boxes appear allowing the user to enter the analog trigger level and the Neff channel number. The threshold level ranges from -10240 millivolts to +10240 millivolts relative to the channel's output. A push button selection group also appears allowing the user to specify the polarity, which refers to the direction of the signal. The options are **NEG** and **POS**. A **NEG** polarity causes a trigger to occur when the signal goes below the threshold level. A **POS** polarity causes the trigger to occur when the signal goes above the threshold level. The default setting is positive (**POS**) polarity.

Capture Modes - This push button selection group allows the user to specify the capture mode. The options are *Primary Only, Pri-Sec-Sec, Pri-Sec-Pri* and *External. Primary Only* acquires data using the primary sample counter and sample period, then maintains the primary sample period throughout the run. *Pri-Sec-Sec* acquires data using both sample counters and periods, then remains at the secondary sample period. *Pri-Sec-Pri* is exactly the same as *Pri-Sec-Sec* except that the sampling rate is switched back to the primary sample period. *External* acquires data using an external sample clock and the secondary sample counter. Sampling continues at the external sample clock rate. The default setting is **Primary Only**.

When *External* capture mode is selected, a text entry box appears which allows the user to enter the external clock sampling rate. This value is written with the test data for post analysis and does not affect the external clock. Default setting is **1 microsecond**.

Download To Neff - Clicking on this push button causes all Neff and channel setup information to be downloaded to the DAU. When the download has been completed successfully, the button will pop back up. If the DAU download is successful, the button will be highlighted in green. An error in the download will cause the button to be highlighted in red. A recovery attempt can be made by trying to initialize the DAU using the **Init Neff** option.

Init Neff - Clicking on this push button returns the DAU to an idle state and terminates any mode of operation. All setup information is lost. An error during initialization will cause this button to be highlighted in red.

Channel Setup - Clicking on this push button pops up the *Channel Setup Menu* screen (Figure 6.4.1-1). See Section 6.4.1 for a detailed description of this screen.

AutoBalance - Clicking on this push button pops up the *Neff Autobalance* screen. See Section 6.4.2 for a detailed description of this screen.

6.4.1 Channel Setup

The *Channel Setup Menu* screen (Figure 6.4.1-1) pops up after selecting the **Channel Setup** option on the *Neff 495 Setup* screen. From this screen, the user may display and/or modify parameters required to configure Neff 495 channels. Modifications made to channel parameters are not applied until the **ACCEPT EDIT** button is clicked. This screen also provides an auto load function that allows the user to prototype one channel and updates a range of channels with the same information. The **ACCEPT EDIT** is not required for Auto Load.

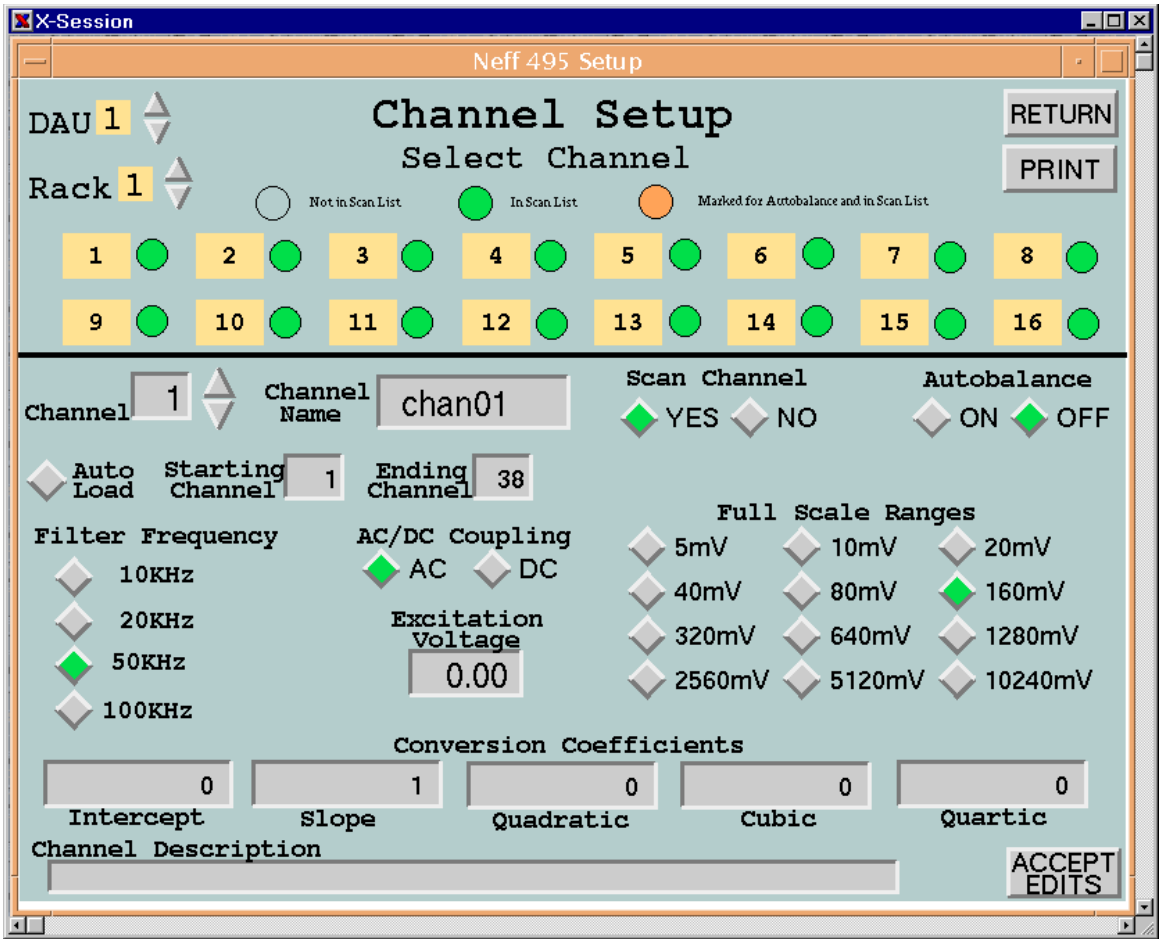


Figure 6.4.1-1. Channel Setup Menu Screen

A description of the various fields and options follows.

DAU - This is an UP or DOWN arrow push button selection group that determines to which Neff 495 the information on the screen applies. UP and DOWN arrows increment or decrement the DAU number, highlighted in yellow. The default setting is **DAU 1**.

Rack - This is an UP or DOWN arrow push button selection group that determines to which rack the select channel information applies, 16 channels per rack. UP and DOWN arrows increment or decrement the rack number highlighted in yellow. The default setting is **Rack 1** (channels 1-16).

Select Channel - This is an information-only display. The information displayed is based on rack selection, 16 channels per rack (no more than 48 channels, per DAU are supported). The indicated highlight color identifies whether the channel is currently in the scan list, and those channels marked for **Autobalance**.

Channel - This text entry box allows the user to specify the channel for display and/or modification. UP and DOWN arrows are used to increment or decrement through the channel list. The range of channel numbers is based upon the maximum number defined in the environment configuration. The default setting is **channel 1**.

Channel Name - This text entry box allows the user to assign a name up to 9 alphanumeric characters. For the **Auto Load** option, channel names are assigned if not previously assigned. The default setting is **no name assigned**.

Scan Channel - This push button selection group allows the user to specify whether data will be acquired for the channel. Options are **YES** and **NO**. The default setting is channel not scanned (**NO**).

Autobalance - This push button selection group allows the user to mark this channel to be auto-balanced. Options are **ON** and **OFF**. At the time the user initiates the auto-balance, only those channels in the scan list and marked for auto-balance will be auto-balanced to determine the DAC correction. The default setting is no auto-balance (**OFF**).

Starting Channel - This text entry box allows the user to enter the starting channel number for the auto load option. The default setting is **1**.

Ending Channel - This text entry box allows the user to enter the last channel for auto load option. The default setting is the last channel defined for the DAU.

Auto Load - Initiates the setting of channel specifications from the prototype.

Filter Frequency - This push button selection group allows the user to set the filter frequency. Options are **10kHz, 20kHz, 50kHz,** and **100kHz**. The default setting is **100kHz**.

AC/DC Coupling - When this push button selection group appears, the user may specify channel coupling. Options are **AC** and **DC**. The default setting is **DC**.

Excitation Voltage - This text entry box allows the user to enter the excitation voltage. The valid range is 0 to 10 volts. The default setting is **5 Volts**.

Full-scale Ranges - This push button selection group allows the user to set the full-scale range of the channel. Options are **5mV, 10mV, 20mV, 40mV, 80mV, 160mV, 320mV, 640mV, 1280mV, 2560mV, 5120mV,** and **10240mV**. The default setting is **80 millivolts**.

Conversion Coefficients - These text entry boxes allow the user to enter five 12-digit conversion coefficients for each channel. These conversion coefficients may be applied to the millivolt readings to produce engineering units (EU). The conversion equation is as follows:

$$EU = C0 + C1*mvdata + C2*mvdata^2 + C3*mvdata^3 + C4*mvdata^4$$

The default settings are **0,1.0,0,0,0**.

Channel Description - This text entry box allows the user to enter a description for the channel up to 62 alphanumeric characters. The default setting is **no description**.

ACCEPT EDITS - Clicking on this push button forces the modifications made to the channel parameters to be accepted. The changes made will be downloaded to the Neff 495 upon exiting the Neff 495 Setup screen or when the **Download to Neff** option is selected.

6.4.2 Neff Autobalance

The *Neff Autobalance* screen (Figure 6.4.2-1) pops up after selecting the **Autobalance** option on the *Neff 495 Setup* screen. An auto-balance will minimize offset at the A/D output for those channels selected by the user. Before the auto-balance is initiated, five hundred samples are acquired at the 160-millivolt range and averaged for a pre-autobalance reading. The Neff 495 is then commanded to perform an auto-balance. The auto-balance DAC outputs a voltage between 0 and the excitation supply voltage level. The DAC output voltage then drives the balance limit resistor, which is connected to one corner of the bridge. A DAC output voltage is then selected to balance the bridge output voltage to zero. The original gains are restored and five hundred samples are acquired and averaged for a post-autobalance reading. These auto-balance readings are written as part of the header information to the test data file. The table shown displays the Neff channel number, name, pre-autobalance and post-autobalance averages for those channels marked for auto-balance.

A description of the various fields and options follows.

DAU - This is an UP or DOWN arrow push button selection group that determines to which Neff 495 the information on the screen applies. UP and DOWN arrows are used to increment or decrement the DAU number highlighted in yellow. The default setting is **DAU 1**.

Rack - This is an UP or DOWN arrow push button selection group that determines to which rack, 16 channels per rack, the auto-balance information applies. UP and DOWN arrows are used to increment or decrement the rack number, which is highlighted in yellow. The default setting is **Rack 1** (channels 1-16).

Settling Time - This text entry box allows the user to enter a time in milliseconds to delay between scans. The default setting is **5 milliseconds**.

AUTOBALANCE - Clicking on this push button initiates the auto-balance for the DAU.

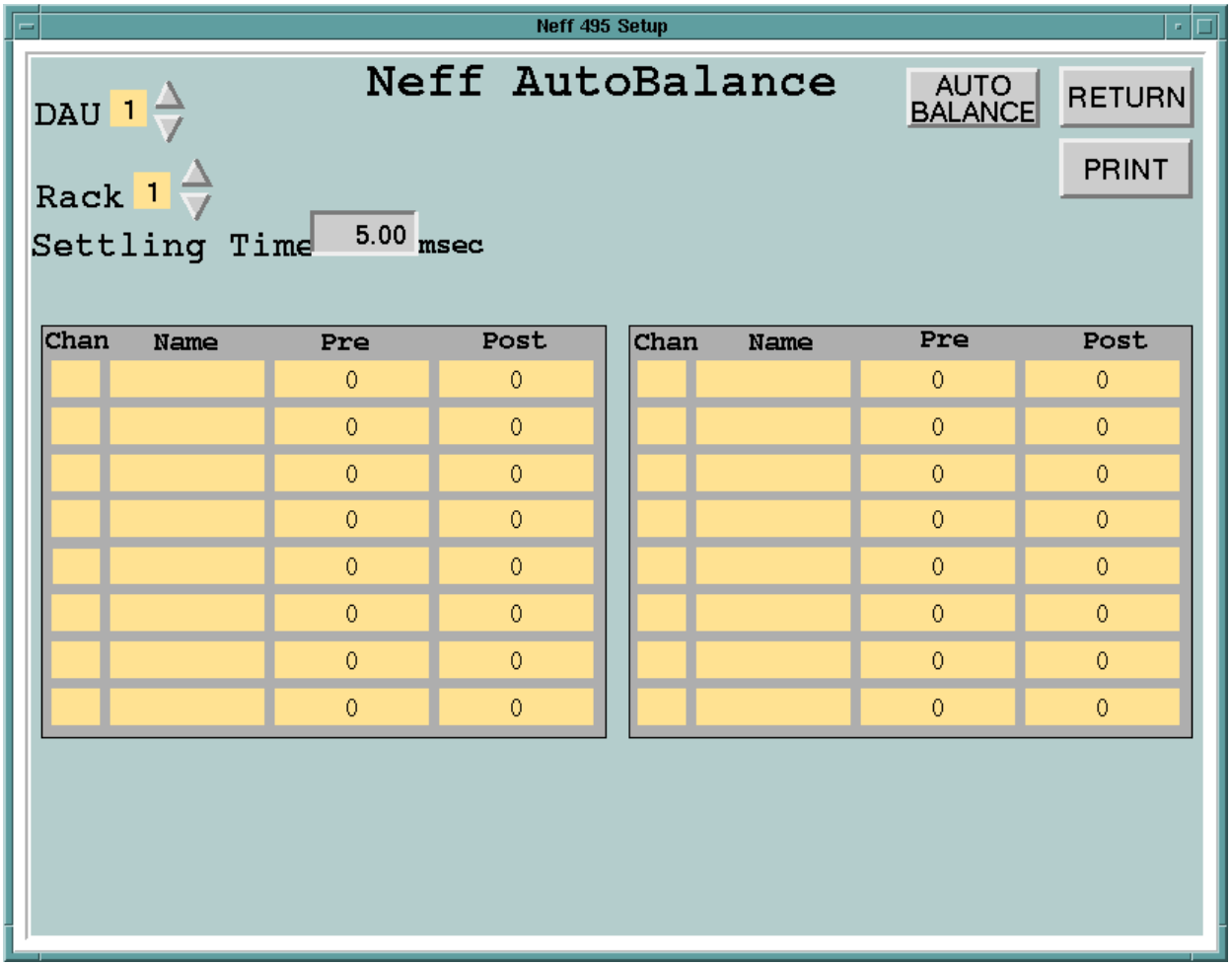


Figure 6.4.2-1. Neff Autobalance Screen

6.5 DATA CAPTURE

The *Data Capture Menu* screen (Figure 6.5-1) appears when the DDARS system is started. This screen controls the data acquisition and recording process, and takes complete control of the Neff 495 DAUs when the **Take Data** button is pressed. The *Monitor Mode* graphics windows (Section 6.6) and the *Overview* Window (Section 6.8) will freeze and remain inactive until the data acquisition and recording process is finished.

The test, run, and trigger point numbers are also modifiable from this screen. The Neff 495 system will begin recording data to channel memory on the next internal clock cycle after the trigger condition has been satisfied. When the system has completed recording the user-specified number of samples, the data is written to the individual channel files. After all data has been saved, the trigger point number is incremented.

The test data file names are derived from the test, run, trigger point, block, DAU and channel numbers. For example, **/data1/model1/T0001R0002P003B01N1C4** refers to data from test 1, run 2, point 3, block 1, DAU 1, and channel 4 located in the *model1* subdirectory of the */data1* disk directory. The test, run, and point numbers are used to create a prefix for the test data file name, e.g. **T0001R0002P003**. If a file already exists in the data directory with the prefix, a pop-up will appear with a message that the file already exists. If the test, run, or trigger point number is not changed, the data currently in a standard file will be overwritten. Files created in NetCDF format cannot be overwritten. It will be necessary to either change the data directory or delete the NetCDF files from the directory.

At the beginning of each data file is a header record containing run-time specific parameters such as test, run, point and channel numbers, channel name, excitation voltage, filter frequency, full-scale range, etc. The header record is written followed by the raw data in counts. See Appendix C for a description of the header record format.

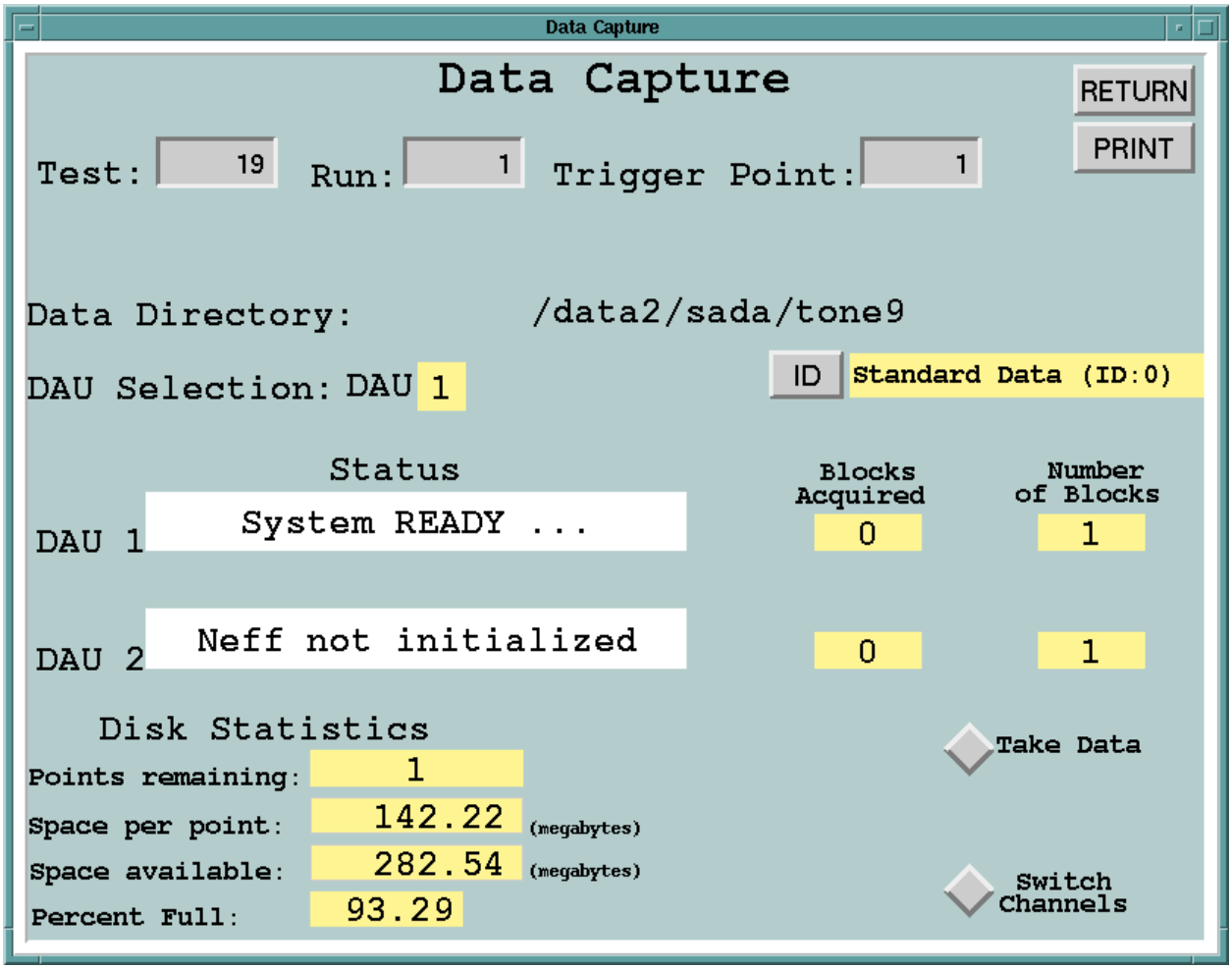


Figure 6.5-1. Data Capture Screen

A description of the various fields and options follows.

Test - This text entry box allows the user to enter a test number. Test numbers range from 1 to 9999. The default test number is **1**.

Run - This text entry box allows the user to enter a run number. Run numbers range from 1 to 9999. The default run number is **1**.

Trigger Point - This text entry box allows the user to enter a trigger point number. Point numbers range from 0 to 999. The default trigger point number is **1**.

Data Directory - This information-only area displays the full path name of the test data storage area.

DAU Selection - This option allows the user to control which Neff 495 system data will be acquired from. The DAU selection is limited to those systems initialized and has channels being scanned. The DAU is then considered ready. If all DAUs are ready, an UP/DOWN arrow selection group and the **ALL** button will appear. The arrow selection group allows the user to specify data collection on one DAU. If **ALL** is selected, this button will be highlighted in green and data will be acquired from all units. If only one DAU is ready, the up/down arrows and the **ALL** button are not displayed.

ID - Clicking on this push button pops up a submenu, which allows the user to set the ID number that uniquely identifies the data acquired in standard type data files. The ID number and a text description of the ID are also displayed. Clicking on the **ID** push button after selecting an ID exits the pop-up menu. The default ID is **zero, Standard Data**. Refer to Appendix C.

Status - This information-only field displays the current status of the Neff 495 data acquisition units. See Appendix D for a detailed description of the Neff statuses.

Blocks Acquired/Number of Blocks - This information-only field displays the number of blocks that have been acquired and total number of blocks to be acquired. This information appears when *Block* record mode is selected. The number of blocks acquired is incremented after each block is acquired during the acquisition process until it matches the total number to be acquired. The data is then written to disk.

Disk Statistics - This information-only area displays detailed information about the test data directory. The first field displays the number of points remaining based on the amount of space required in megabytes to store one data point, which is shown in the next field. The third field displays the amount of space available in megabytes on the directory. The last field displays the percentage of space on the current data directory that has already been used. If the first two fields values are zero, the data acquisition units have not been initialized.

Take Data - Clicking on this push button initiates data acquisition.

Save Now - This push button is only available if more than one block of data is being acquired. Clicking on this push button interrupts the data acquisition process and writes the data that has been acquired to disk. The trigger point number is incremented after the save is complete.

6.6 GRAPHICS DISPLAY

The *Graphics Display Menu* screen (Figure 6.6-1) replaces the DDARS *Neff495 Dynamic Acquisition & Recording Software* screen (Figure 6.2-1) after selecting the **Graphics Display** option. Two modes are provided for the user to view data, *Monitor Mode* and *Post Analysis Mode*. *Monitor Mode* previews real-time data. *Post Analysis* displays data that has been archived to disk. The following subsections deal with the graphics displays and edit functions that are available to the user.

The *Monitor Mode* displays will freeze temporarily as long as the data acquisition and recording process is active (Section 6.5).

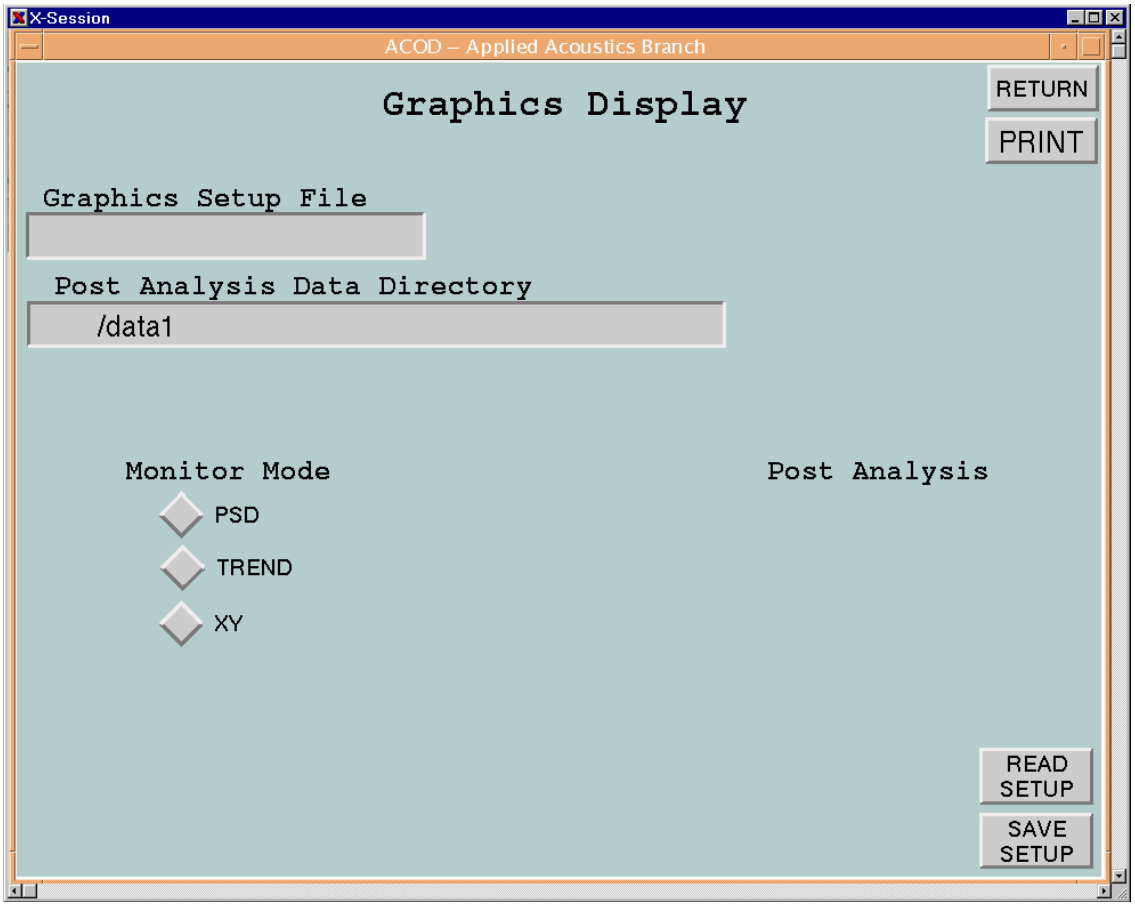


Figure 6.6-1. Graphics Display Menu Screen

A description of the various fields and options follows.

Graphics Setup File - This text entry box allows the user to enter the name of a file containing graphical setup information up to 21 alphanumeric characters, beginning with a letter. See Appendix B.2 for a description of the file format. The default setting is **no file assigned**.

Post Analysis Data Directory - This text entry box allows the user to enter the full path name up to 40 alphanumeric characters of the partition where the data files can be found. The default setting is **no directory assigned.**

Monitor Mode/Post Analysis - These push button selection groups allow the user to invoke a graph for data display. *Monitor Mode* options are **PSD, TREND,** and **XY**. *Post Analysis* options are **PSD, TREND, XY,** and **EXPORT DATA**. See Sections 6.6.1 through 6.6.4 for a detailed description of the options.

READ SETUP - Clicking on this push button initiates a read of the file and initializes the graphical screens. If the file does not exist, an error message highlighted in red will appear on the screen. Default values or the current settings will be in effect until changed by the user or a setup file is read.

SAVE SETUP - Clicking on this push button initiates a write of setup information to the file. If the file exists, the information currently stored in the file will be overwritten. If the file does not exist, the file will be created.

6.6.1 PSD Display

The *PSD Graphics Display* screen (Figure 6.6.1-1) pops up after selecting **PSD** from the *Monitor Mode* or *Post Analysis* selection group on the *PSD Graphics Display* screen. The spectrum plot displayed on this screen is generated after a Power Spectral Density (PSD) has been performed on the data. A maximum of 4096 samples are acquired for each update cycle.

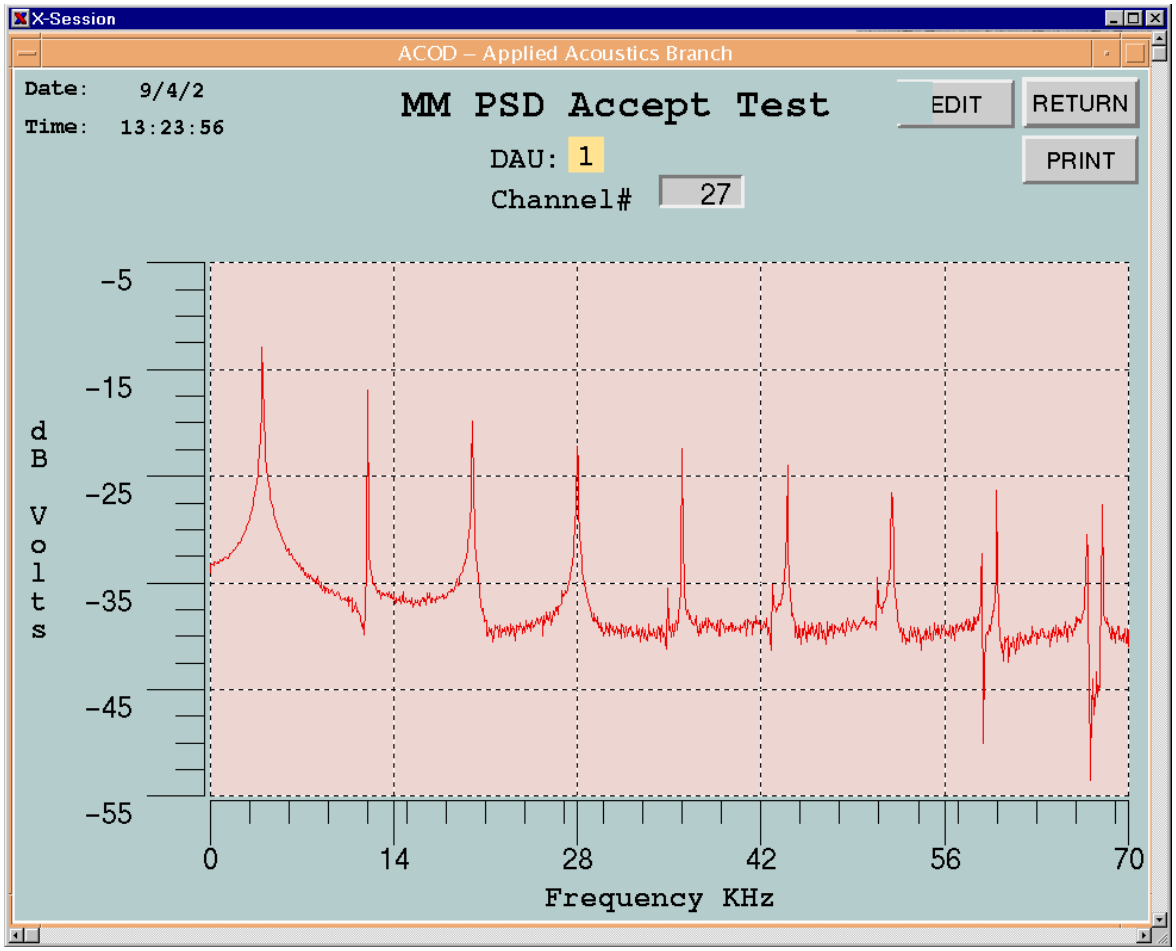


Figure 6.6.1-1. PSD Graphics Display Screen

A description of the various fields and options follows.

Date/Time - This information-only area displays the current system date and time.

Title - This information-only area displays the user definable title for the screen.

EDIT - Clicking this push button pops up one of two *PSD Display Edit* screens depending on the mode. See Sections 6.6.1.1 and 6.6.1.2 for a detailed description of these screens.

SCAN - In *Monitor Mode*, this push button appears when the trigger type is **MANUAL**. Clicking on this push button initiates a Neff scan and updates the plot. In *Post Analysis*, the next scan is read from the disk file.

DAU - This information-only area appears when in *Monitor Mode* and shows from which Neff 495 the real-time data was retrieved.

Channel # - In *Monitor Mode*, this text entry box allows the user to enter the number of a channel being scanned without going to the edit screen. Entering a **-1** for the channel number will terminate updates. In *Post Analysis*, this is an information-only area that displays the channel number.

X/Y Axis Labels - This information-only area displays the user-definable labels for both axes.

scan error - This appears when an error occurs during a real-time scan or while reading the disk file and is located in the lower left hand corner of the screen highlighted in red. This error terminates plot updates.

6.6.1.1 Monitor Mode PSD Display Edit

This *PSD Display Edit* screen (Figure 6.6.1.1-1) pops up after selecting the **EDIT** option on the *PSD Graphics Display* screen when in *Monitor Mode*. This pop-up allows the user to modify parameters affecting the *PSD Display* screen. A description of the various fields and options follows.

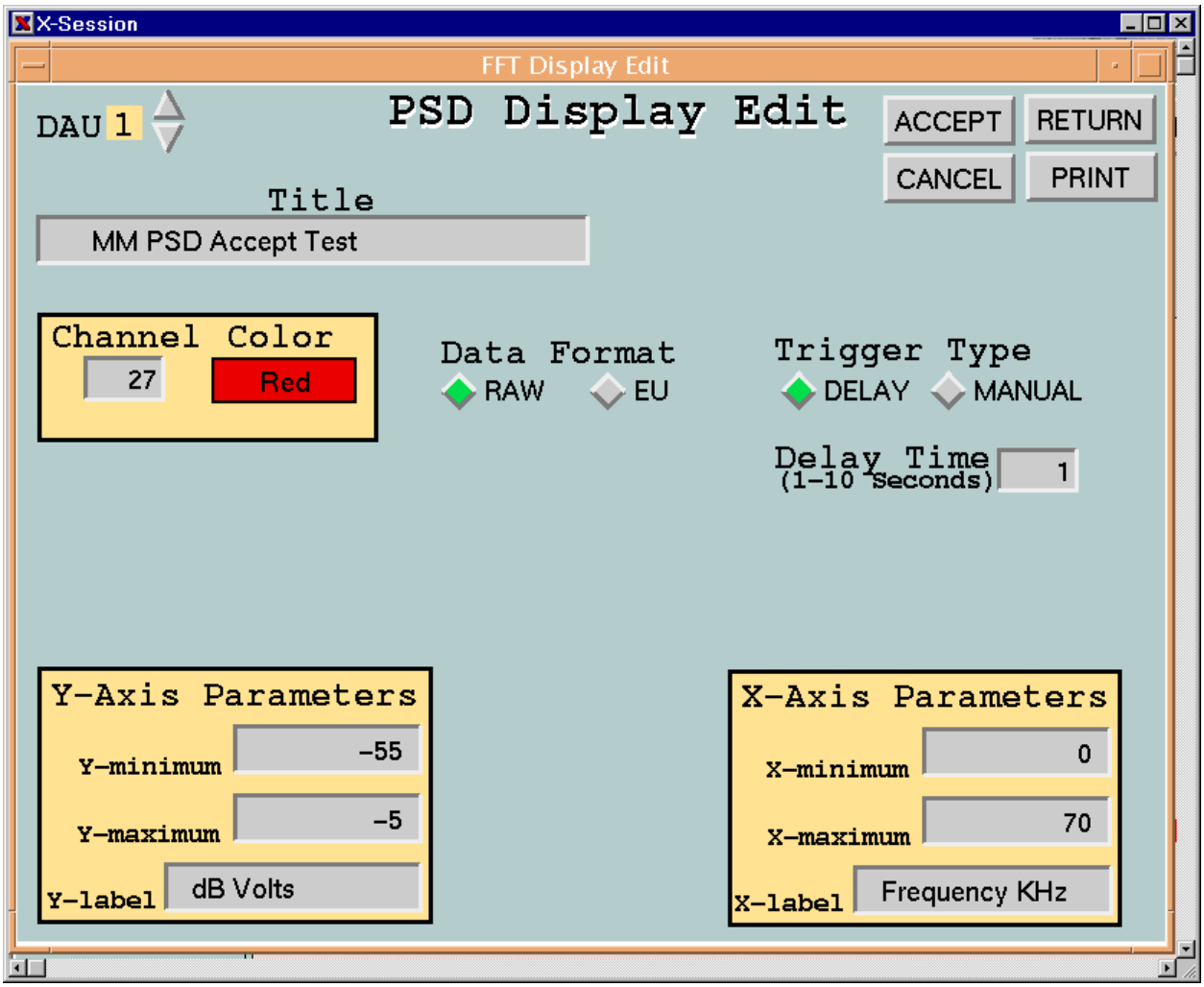


Figure 6.6.1.1-1. Monitor Mode PSD Display Edit Screen

DAU - This arrow selection group allows the user to specify which Neff 495 the information on the screen applies. UP and DOWN arrows increment or decrement the DAU number highlighted in yellow. The default setting is **DAU 1**.

Title - This text entry box allows the user to enter a title for the *PSD Display Edit* screen up to 21 alphanumeric characters. The default title is **MM PSD Display**.

ACCEPT - Clicking on this push button validates that any changes made to the edit options will be in effect upon returning to the *PSD Display* screen. If the channel specified is not being scanned, the channel entry will be reset to **-1** and the graph is not updated.

CANCEL - Clicking on this push button will cancel any modifications made since the last **ACCEPT EDIT** update. The screen options will be restored to their previous settings.

Channel - This text entry box allows the user to enter the number of a channel being scanned for real-time display. Entering a **-1** as the channel number will terminate updates. The default setting is **no channel (-1)**.

Color - This is a cycle box that allows the user to specify the trace color for the data. Color options are red, green, yellow, blue, magenta, cyan, black, grey and orange. The default setting is **red**.

Data Format - This push button selection group allows the user to specify how the data will be displayed. Options are **RAW** and **EU**. The Raw data option is displayed in gain adjusted millivolt readings. The EU option converts the data to engineering units before plotting. The default setting is **RAW**.

Trigger Type - This push button selection group allows the user to specify the update mode for the graph. Options are **DELAY** and **MANUAL**. For delay trigger, updates are based on the delay time. Manual trigger only updates when requested by the user using the **SCAN** push button on the *PSD Display* screen. The default setting is **DELAY**.

Delay Time - This text entry box allows the user to enter the time in seconds between scans for delay trigger. Valid entries range from 1 to 10 seconds. The default setting is **10 seconds**.

Y-minimum - This text entry box allows the user to enter a six-digit number for the y-axis lower limit. The default setting is **-300**.

Y-maximum - This text entry box allows the user to enter a six-digit number for the y-axis upper limit. The default setting is **300**.

Y-label - This text entry box allows the user to specify a label for the y-axis up to 17 alphanumeric characters. The default label is **Magnitude DB**.

X-minimum - This text entry box allows the user to enter a four-digit number for the x-axis lower limit. The default setting is **zero**.

X-maximum - This text entry box allows the user to enter a four-digit number for the x-axis upper limit. The upper limit is based on the filter frequency setting of the channel. The default setting is **100**.

X-label - This text entry box allows the user to specify a label for the x-axis up to 17 alphanumeric characters. The default label is **Frequency (kHz)**.

6.6.1.2 Post Analysis PSD Display Edit

The *PSD Display Edit* screen (Figure 6.6.1.2-1) pops up after selecting the **EDIT** option on the *PSD Display* screen when in *Post Analysis Mode*. This pop-up allows the user to modify parameters affecting the *PSD Display* screen. A description of the various fields and options follows.

(not available until Playback reactivated)

Figure 6.6.1.2-1. Post Analysis PSD Display Edit Screen

Title - This text entry box allows the user to enter a title for the *PSD Display* screen up to 21 alphanumeric characters. The default title is **PB PSD Display**.

ACCEPT - Clicking on this push button validates any changes made to the edit options and will be in effect upon returning to the *PSD Display* screen. If the test data file does not exist, the fileprefix entry will be blanked out and the channel number entry reset to **-1**.

CANCEL - Clicking on this push button will cancel any modifications since the last **ACCEPT EDIT** update. The screen options will be restored to their previous setting.

Fileprefix - This text entry box allows the user to enter the name of the Neff data file up to 31 alphanumeric characters. The channel number will be appended to this prefix to create the full file name. The default setting is **no file assigned**.

Channel - This text entry box allows the user to enter the channel number. The channel number will be appended to the fileprefix to create the full file name. The default setting is **no channel (-1)**.

Color - This is a cycle box that allows the user to specify the trace color for the data. Color options are red, green, yellow, blue, magenta, cyan, black, grey and orange. The default setting is **red**.

File Offset - This text entry box allows the user to enter a six-digit number which is an offset into the test data file where data retrieval is to begin. Valid entries range from 0 to the maximum number of samples acquired during data capture. The default setting is the beginning of the file (**0**).

Data Format - This push button selection group allows the user to specify how the data is to be displayed. Options are **RAW** and **EU**. Raw data is displayed in gain-adjusted millivolt readings. The EU option converts the data to engineering units before plotting. The default setting is **RAW**.

File Format - This push button selection group allows the user to specify the format of the test data file. Options are **Standard** and **NetCDF**. The default setting is **Standard**.

Y-minimum - This text entry box allows the user to enter a six-digit number for the y-axis lower limit. The default setting is **-300**.

Y-maximum - This text entry box allows the user to enter a six-digit number for the y-axis upper limit. The default setting is **300**.

Y-label - This text entry box allows the user to specify a label for the Y-axis up to 17 alphanumeric characters. The default label is **Magnitude DB**.

X-minimum - This text entry box allows the user to enter a four-digit number for the x-axis lower limit. The default setting is **zero**.

X-maximum - This text entry box allows the user to enter a four-digit number for the x-axis upper limit. The upper limit is based on the filter frequency setting of the channel. The default setting is **100**.

X-label - This text entry box allows the user to specify a label for the x-axis up to 17 alphanumeric characters. The default label is **Frequency (kHz)**.

6.6.2 Trend Chart

The *Trend Chart Graphics* screen (Figure 6.6.2-1) pops up after selecting **TREND** from the *Monitor Mode* or *Post Analysis Mode* options on the *Graphics Display* screen. The plot on this screen will continuously display data for up to four channels in strip chart format.

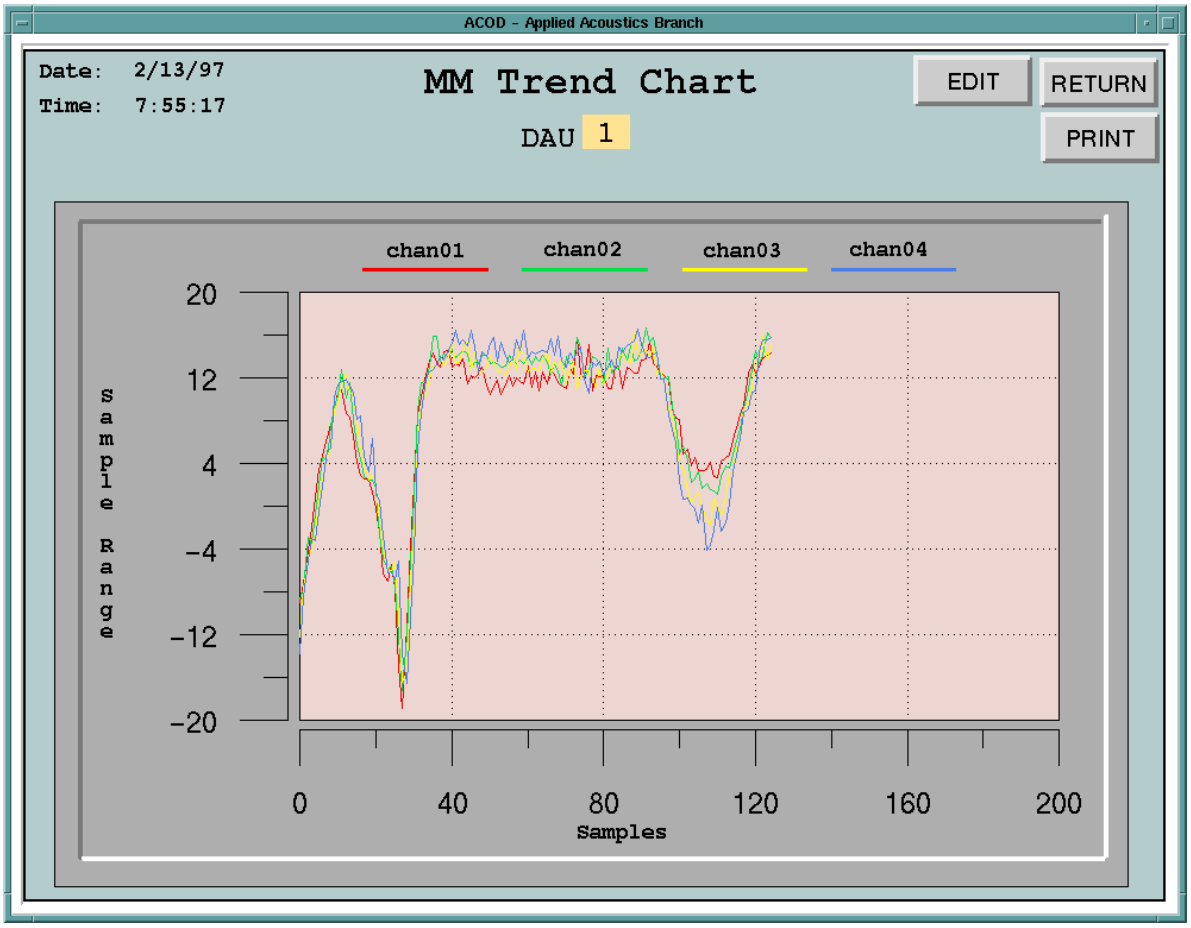


Figure 6.6.2-1. Trend Chart Graphics Screen

A description of the various fields and options on the screen follows.

Date/Time - This information-only area displays the current system date and time.

Title - This information-only area displays the user definable title for the screen.

EDIT - Clicking on this push button pops up one of two *Trend Chart Edit* screen depending on the mode. See Sections 6.6.2.1 and 6.6.2.2 for a detailed description of this screen.

SCAN - In *Monitor Mode*, this push button appears when the trigger type is **MANUAL**. Clicking on this push button initiates a Neff scan and updates the plot. In *Post Analysis Mode*, the next scan is read from the disk file.

DAU - This information-only area appears when in *Monitor Mode* and shows from which Neff 495 system the data was retrieved.

Channel Name/Trace Color - This information-only area appears above the trend chart plot displaying the name and trace color for the channels. If no name has been assigned to a channel, a default name is assigned. The default setting is the prefix "chan" followed by the channel number.

X/Y Axis Labels - This information-only area displays the user-definable labels for both axes.

scan error - This appears when an error occurs during a real-time scan or while reading the disk file and is located in the lower left hand corner of the graph highlighted in red. This error terminates plot updates.

6.6.2.1 Monitor Mode Trend Chart Edit

The *Trend Chart Edit* screen (Figure 6.6.2.1-1) pops up after selecting the **EDIT** option on the *Trend Chart* screen when in *Monitor Mode*. This screen allows the user to modify parameters affecting the *Trend Chart* screen.

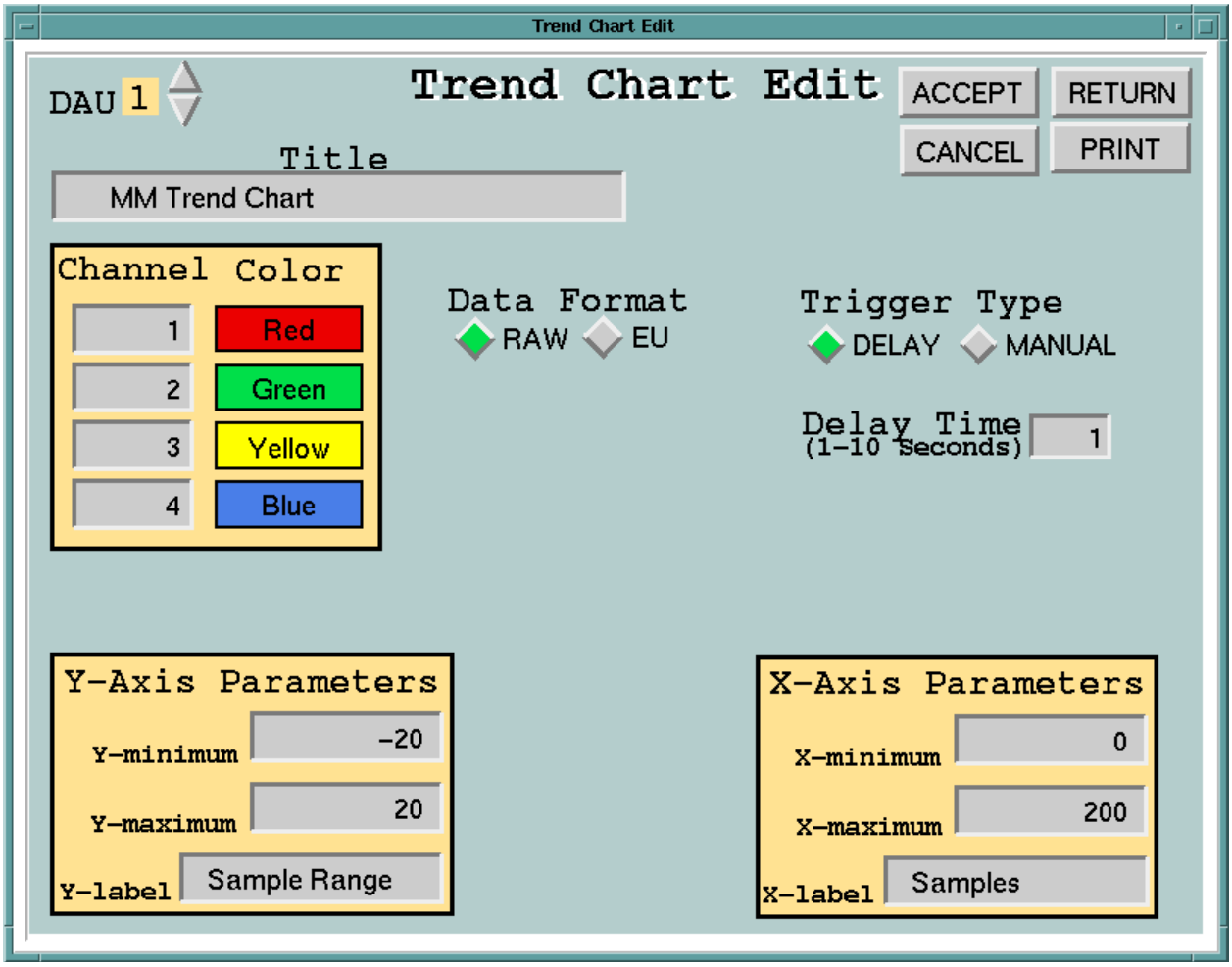


Figure 6.6.2.1-1. Monitor Mode Trend Chart Edit Screen

A description of the various fields and options follows.

DAU - This arrow selection group allows the user to specify which Neff 495 the information on the screen applies. UP and DOWN arrows increment or decrement the DAU number highlighted in yellow. The default setting is **DAU 1**.

Title - This text entry box allows the user to enter a title up to 21 alphanumeric characters for the screen. The default title is **MM Trend Chart**.

ACCEPT - Clicking on this push button validates the changes made to the edit options and will be in effect upon returning to the *Trend Chart* screen. If any channel entered is not being scanned, it will be eliminated from the update list and reset to **-1**.

CANCEL - Clicking on this push button will cancel any modification made since the last **ACCEPT EDIT** update. The screen options will be restored to their previous setting.

Channel - These four text entry boxes allow the user to enter the number of any channel being scanned. Entering a **-1** removes the channel from the update list. The default setting is **no channels (-1)**.

Color - This is a cycle box that allows the user to specify the trace color for the channel data. Trace colors are red, green, yellow, blue, magenta, cyan, black, grey and orange. Each channel is assigned a default color. The default settings are **red, green, yellow** and **blue**, respectively.

Data Format - This push button selection group allows the user to specify how the data will be displayed. Options are **RAW** and **EU**. Raw data is displayed in gain-adjusted millivolt readings. The EU option converts the data to engineering units before plotting. The default setting is **RAW**.

Trigger Type - This push button selection group allows the user to specify the update mode for the graph. Options are **DELAY** and **MANUAL**. Delay trigger updates the data based on the delay time. Manual trigger only updates when requested by the user using the **SCAN** push button on the *Trend Chart* screen. The default setting is **DELAY**.

Delay Time - This text entry box allows the user to enter the time in seconds between scans for delay trigger. Valid entries range from 1 to 10 seconds. The default setting is **10 seconds**.

Y-minimum - This text entry box allows the user to enter a six-digit number for the y-axis lower limit. The y-axis is scaled based on the full-scale range for the Neff. The default setting is **lowest negative range (-10240)**.

Y-maximum - This text entry box allows the user to enter a six-digit number for the y-axis upper limit. The y-axis is scaled based on the full-scale range of the Neff. The default setting is the **maximum positive range (+10240)**.

Y-label - This text entry box allows the user to specify a label for the Y-axis up to 17 alphanumeric characters. The default label is **Y-Axis Label**.

X-minimum - This text entry box allows the user to enter a six-digit number for the x-axis lower limit. The default setting is **zero**.

X-maximum - This text entry box allows the user to enter a six-digit number for the x-axis upper limit. The x-axis is continuous. The default setting is **200**.

X-label - This text entry box allows the user to specify a label for the x-axis up to 17 alphanumeric characters. The default label is **X-Axis Label**.

6.6.2.2 Post Analysis Trend Chart Edit

The *Trend Chart Edit* screen (Figure 6.6.2.2-1) pops up after selecting the **EDIT** option on the *Trend Chart* screen when in *Post Analysis*. This pop-up allows the user to modify parameters affecting the *Trend Chart* screen

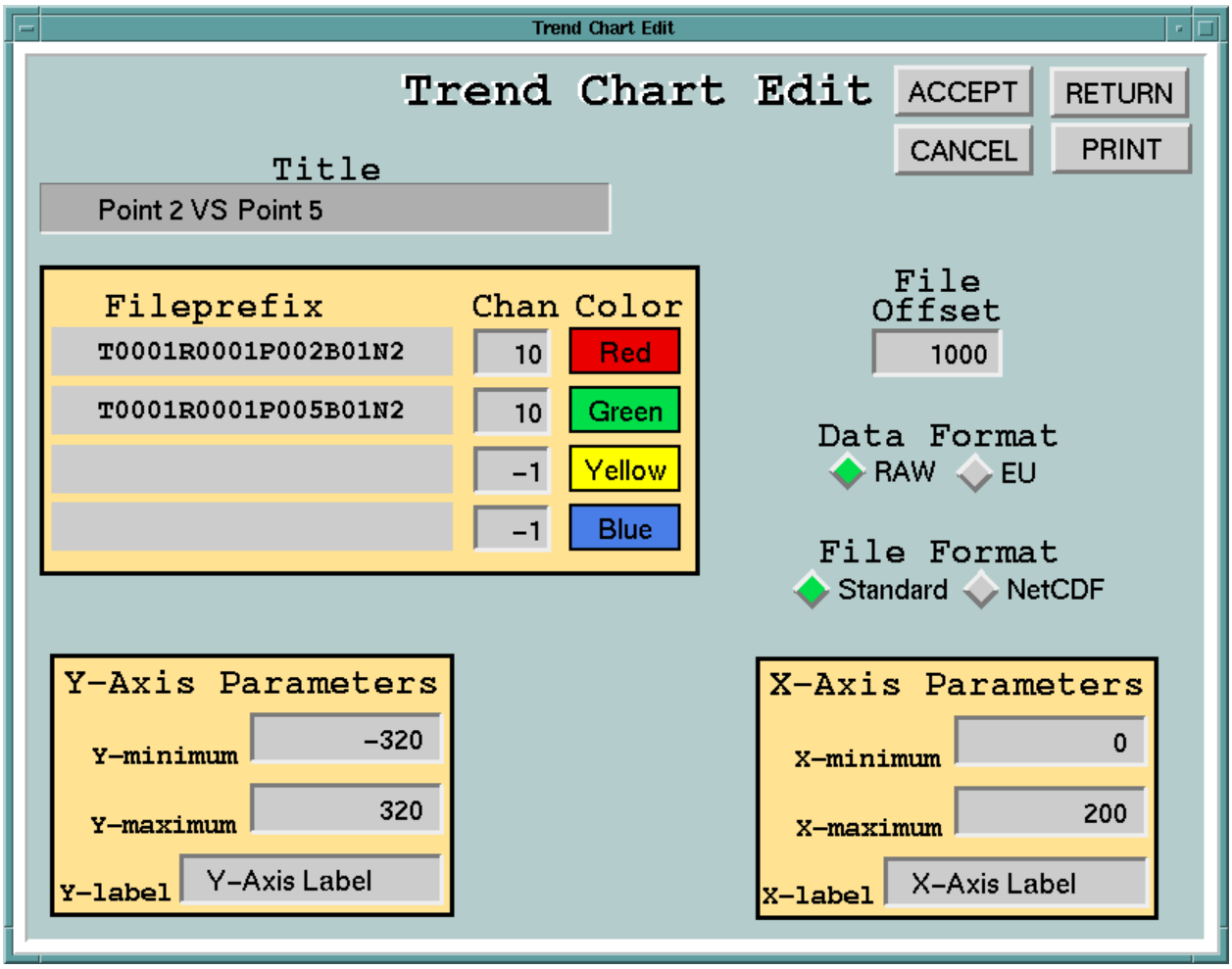


Figure 6.6.2.2-1. Post Analysis Trend Chart Edit Screen

A description of the various fields and options follows.

Title - This text entry box allows the user to enter a title up to 21 alphanumeric characters for the screen. The default title is **PB Trend Chart**.

ACCEPT - Clicking on this push button validates any changes made to the edit options and will be in effect upon returning to the *Trend Chart* screen. If a test data file does not exist in the directory, the fileprefix entry will be eliminated from the update list and the channel number entry will be reset to **-1**.

CANCEL - Clicking on this push button will cancel any modification made since the last **ACCEPT EDIT** update. The screen options will be restored to their previous setting.

Fileprefix - These four text entry boxes allow the user to enter the prefix for the test data file of up to 31 alphanumeric characters. The associated channel number will be appended to this prefix to create the full file name. The default setting is **no files assigned**.

Channel - These four text entry boxes allow the user to enter the channel number associated with the fileprefix. The channel number will be appended to the prefix to create the full file name. The default setting is **no channel (-1)**.

Color - This is a cycle box that allows the user to specify the trace color for each file. Color options are red, green, yellow, blue, magenta, cyan, black, grey and orange. Each channel is assigned a default color. The default settings are **red, green, yellow** and **blue**, respectfully.

File Offset - This text entry box allows the user to enter a six-digit number which is the offset into the test data file where data retrieval is to begin. Valid entries range from 0 to the maximum number of samples acquired during data capture. The default setting is the beginning of the file **(0)**.

Data Format - This push button selection group allows the user to specify how the data is to be displayed. Options are **RAW** and **EU**. Raw data is displayed in gain-adjusted millivolt readings. The EU option converts the data to engineering units before plotting. The default setting is **RAW**.

File Format - This push button selection group allows the user to specify the format of the test data files. Options are **Standard** and **NetCDF**. The default setting is **Standard**.

Y-minimum - This text entry box allows the user to a six-digit number for the y-axis lower limit. The y-axis is scaled based on the full-scale range for the Neff. The default setting is lowest negative range **(-10240)**.

Y-maximum - This text entry box allows the user to enter a six-digit number for the y-axis upper limit. The y-axis is scaled based on the full-scale range of the Neff. The default setting is the maximum positive range **(+10240)**.

Y-label - This text entry box allows the user to specify a label for the Y-axis of up to 17 alphanumeric characters. The default label is **Y-Axis Label**.

X-minimum - This text entry box allows the user to enter a six-digit number for the x-axis lower limit. The default setting is **0**.

X-maximum - This text entry box allows the user to enter a six-digit number for the x-axis upper limit. The x-axis is continuous. The default setting is **200**.

X-label - This text entry box allows the user to specify a label for the x-axis up to 17 alphanumeric characters. The default label is **X-Axis Label**.

6.6.3 XY Plot

The *XY Plot Graphics* screen (Figure 6.6.3-1) pops up after selecting **XY** from the *Monitor Mode* or *Post Analysis* options on the *Graphics Display* Screen. This option allows the user to display real-time data for up to 20 channels on either of two 10-trace graphs. The x-axis is the number of samples and the y-axis is sized by the largest full-scale range. The data is displayed in either millivolts or in engineering units. The zoom option on this graph allows the user to focus on a smaller portion of the graph without changing the X-axis limits via the edit.

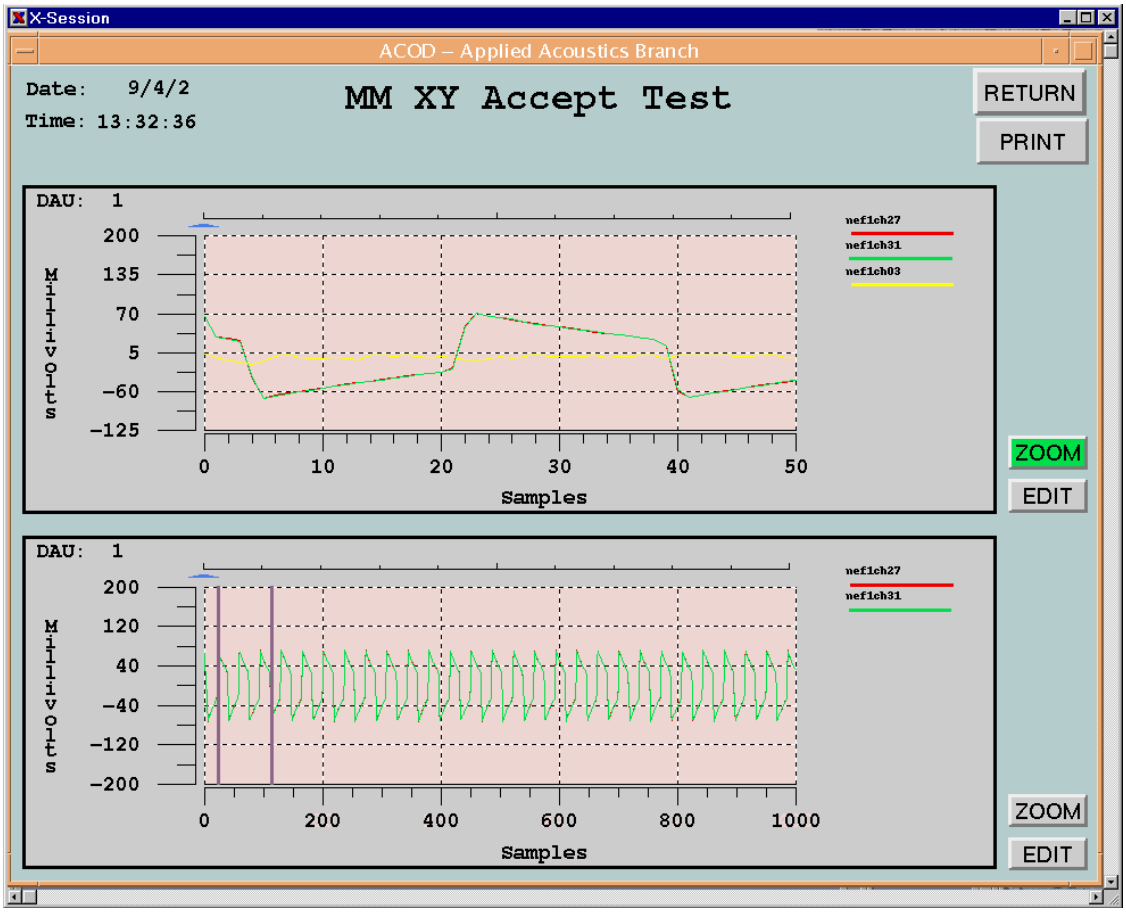


Figure 6.6.3-1. XY Plot Graphics Screen

A description of the various fields and options follows.

Date/Time - This information-only area displays the current system date and time.

Title - This information-only area displays the user definable title for the screen.

SCAN - In *Monitor Mode*, this push button appears when the trigger type is **MANUAL**. Clicking on this push button initiates a Neff scan and updates both plots. In *Post Analysis*, the next scan is read from the disk file.

DAU - This information-only area appears on each graph when in *Monitor Mode* showing from which Neff 495 system the real-time data was retrieved.

Slider bar/blue arrow/horizontal bars - This sliding bar with a blue up arrow below it and horizontal bars are used by the zoom option. Moving the blue arrow sets the zoom option's upper and lower boundaries. When the zoom option is in effect, the horizontal bars will not appear.

ZOOM - This is a toggle push button that changes its setting from zoom out to zoom in and zoom in to zoom out. When zoomed in, the push button is highlighted in green. Clicking on this push button causes only those samples between the slider bars to be displayed.

EDIT - This push button pops up one of two *XY Plot Edit* screens depending on the mode. See Sections 6.6.3.1 and 6.6.3.2 for a detailed description of this screen.

Channel Name/Trace Color - This information-only area appears on the right hand side of each graph displaying the name and trace color for the channels. If a name has not been assigned to a channel, a default is assigned. The default setting is the prefix "chan" followed by the channel number.

X/Y Axis Label - This information-only area displays user-definable labels for each axis.

scan error - This appears when an error occurs during a real-time scan or while reading the disk file and is located in the lower left hand corner of each graph highlighted in red. This error terminates plot updates.

6.6.3.1 Monitor Mode XY Plot Edit

The *XY Plot Edit* screen (Figure 6.6.3.1-1) pops up after selecting the **EDIT** option on the *XY Plot Edit* screen. This screen allows the user to display and/or modify XY display options.

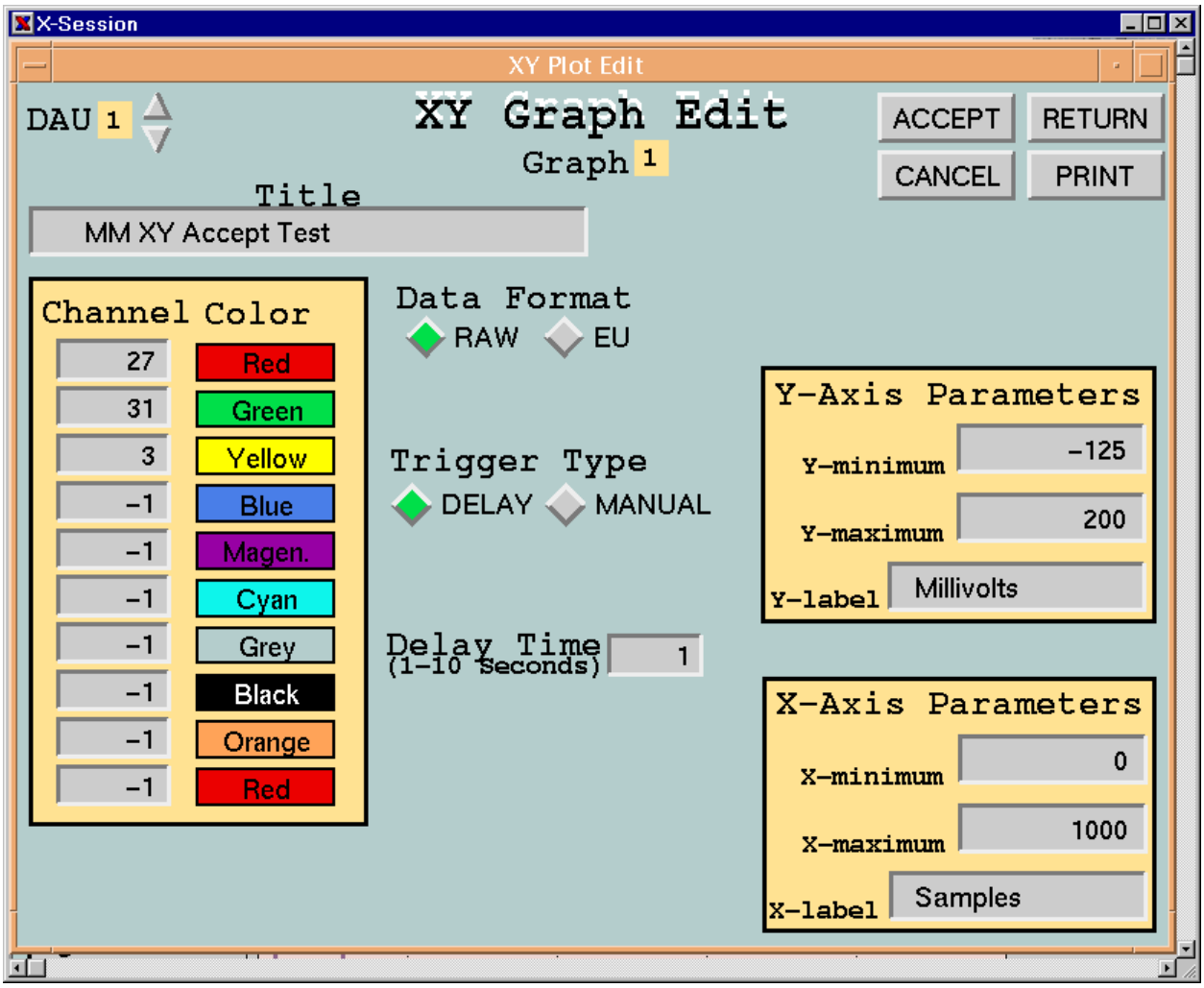


Figure 6.6.3.1-1. Monitor Mode XY Plot Edit Screen.

A description of various fields and option follows.

DAU - This arrow selection group allows the user to specify which Neff 495 the information on the screen applies. UP and DOWN arrows increment or decrement the DAU number highlighted in yellow. The default setting is **DAU 1**.

Title - This text entry box allows the user to enter a title for the *XY Plot* screen of up to 21 alphanumeric characters. The default title is **MM XY Plot**.

Graph - This information-only area displays the graph number of the *XY Plot* for which the information on the screen applies.

ACCEPT - Clicking on this push button validates any changes made to the edit options and will take effect upon returning to the *XY Plot* screen. If the test data file does not exist, the fileprefix entry will be blanked out and the associated channel entry reset to **-1**.

CANCEL - Clicking on this push button will cancel any modification made by the user since the last **ACCEPT DATA**. The options will be restored to their previous setting.

Channel - These ten text entry boxes allow the user to enter the number of any channel being scanned. Entering a **-1** for a channel removes the channel from the update list. The default setting is **no channels (-1)**.

Color - This is a cycle box that allows the user to specify the trace color for the channel data. Trace colors are red, green, yellow, blue, magenta, cyan, black, grey and orange. Each channel is assigned a default color.

Data Format - This push button selection group allows the user to specify the output format for the data. Options are **RAW** and **EU**. Raw data is displayed in millivolt readings. EU option converts the data to engineering units before plotting. The default setting is **RAW**.

Trigger Type - This push button selection group allows the user to specify the update mode for the graph. Options are **DELAY** and **MANUAL**. Delay trigger updates the data based on the delay time. Manual trigger only updates the data when requested by the user using the **SCAN** push button on the *XY Plot* screen. The default setting is **DELAY**.

Delay Time - This text entry box allows the user to enter the time in seconds between scans for delay trigger. Valid entries range from 1 to 10 seconds. The default setting is **10 seconds**.

Y-minimum - This text entry box allows the user to enter a six-digit number for the y-axis lower limit. The y-axis scale is based on the maximum full-scale range for Neff channels. The default setting is lowest negative range **(-10240)**.

Y-maximum - This text entry box allows the user to enter a six-digit number for the y-axis upper limit. The y-axis scale is based on the largest full-scale range of the Neff. The default setting is the maximum positive range **(+10240)**.

Y-label - This text entry box allows the user to specify a label for the Y-axis up to 17 alphanumeric characters. The default label is *Y-Axis Label*.

X-minimum - This text entry box allows the user to enter a six-digit number for the x-axis lower limit. Valid entries range from 0 to 4096 samples. The default setting is **0**.

X-maximum - This text entry box allows the user to enter a six-digit number for the x-axis upper limit. The maximum x-axis range is 4096 samples. The default setting is **4000**.

X-label - This text entry box allows the user to specify a label for the x-axis up to 17 alphanumeric characters. The default label is **X-Axis Label**.

6.6.3.2 Post Analysis XY Plot Edit

The *XY Plot Edit* screen (Figure 6.6.3.2-1) pops up after selecting the **EDIT** option on the *XY Plot* screen when in *Post Analysis*. This pop-up allows the user to modify parameters affecting the *XY* screen.

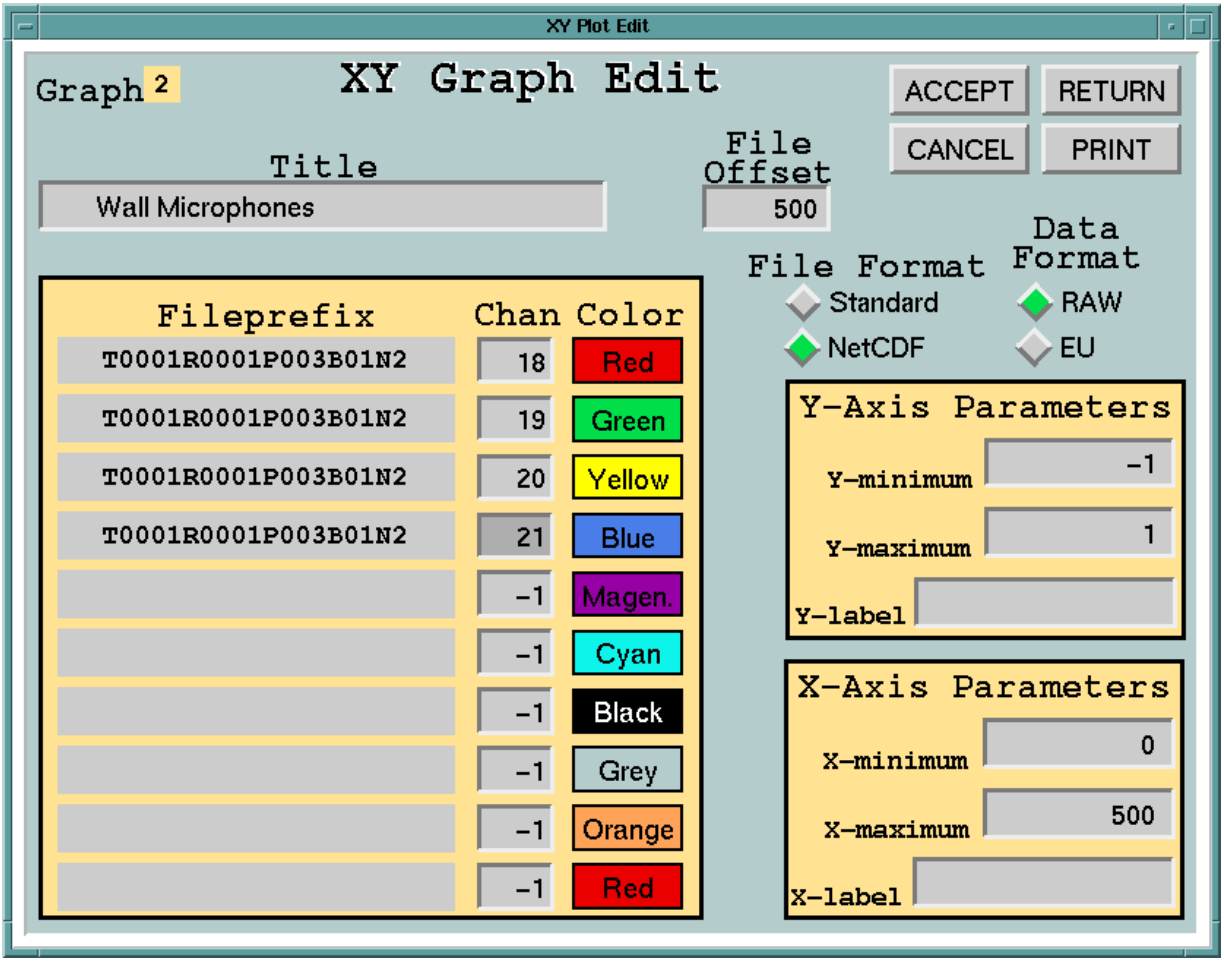


Figure 6.6.3.2-1. Post Analysis XY Plot Edit Screen

A description of the various fields and options follows.

Title - This text entry box allows the user to enter a title up to 21 alphanumeric characters for the screen. The default title is **PB XY Plot**.

Graph - This information-only area displays the number of the XY graph for which the information on the screen applies.

ACCEPT - Clicking on this push button validates any changes made to the edit options and will be in effect upon returning to the *XY Graph* screen. If a test data file does not exist in the directory, the *Fileprefix* entry will be eliminated from the update list and the channel number entry will be reset to **-1**.

CANCEL - Clicking on this push button will cancel any modification made since the last **ACCEPT EDIT** update. The screen options will be restored to their previous setting.

Fileprefix - These ten text entry boxes allows the user to enter the prefix for the test data file up to 31 alphanumeric characters. The associated channel number will be appended to this prefix to create the full file name. The default setting is **no files assigned**.

Channel - These ten text entry boxes allows the user to enter the channel number associated with the *Fileprefix*. The channel number will be appended to the prefix to create the full file name. The default setting is **no channel (-1)**.

Color - This is a cycle box that allows the user to specify the trace color for each file. Color options are red, green, yellow, blue, magenta, cyan, black, grey and orange. Each channel is assigned a default color.

File Offset - This text entry box allows the user to enter a six-digit number which is the offset into the test data file where data retrieval is to begin. Valid entries range from 0 to the maximum number of samples acquired during data capture. The default setting is the beginning of the file **(0)**.

Data Format - This push button selection group allows the user to specify how the data is to be displayed. Options are **RAW** and **EU**. Raw data is displayed in gain adjusted millivolt readings. The EU option converts the data to engineering units before plotting. The default setting is **RAW**.

File Format - This push button selection group allows the user to specify the format of the file. Options are **Standard** and **NetCDF**. The default setting is **Standard**.

Y-minimum - This text entry box allows the user to enter a six-digit number for the y-axis lower limit. The y-axis is scaled based on the full-scale range for the Neff. The default setting is lowest negative range **(-10240)**.

Y-maximum - This text entry box allows the user to enter a six-digit number for the y-axis upper limit. The y-axis is scaled based on the full-scale range of the Neff. The default setting is the maximum positive range **(+10240)**.

Y-label - This text entry box allows the user to specify a label for the Y-axis of up to 17 alphanumeric characters. The default label is **Y-Axis Label**.

X-minimum - This text entry box allows the user to enter a six-digit number for the x-axis lower limit. Valid entries range from 0 to 4096 samples. The default setting is **0**.

X-maximum - This text entry box allows the user to enter a six-digit number for the x-axis upper limit. The maximum x-axis is 4096 samples. The default setting is **4000**.

X-label - This text entry box allows the user to specify a label for the x-axis up to 17 alphanumeric characters. The default label is **X-Axis Label**.

6.6.4 Export Data

The *Export Data* screen (Figure 6.6.4-1) pops up after selecting the **Export Data** option on the *Graphics Display* screen. This function takes as its input the binary data from up to eight previously captured data files and outputs an ASCII data file including the sample time. The user is requested to enter the data file names, file offset, number of samples, and the sample resolution. The user may also select to output the data in millivolts or engineering units. When converting the data to engineering units, the coefficients can be obtained from the test data file or entered manually.

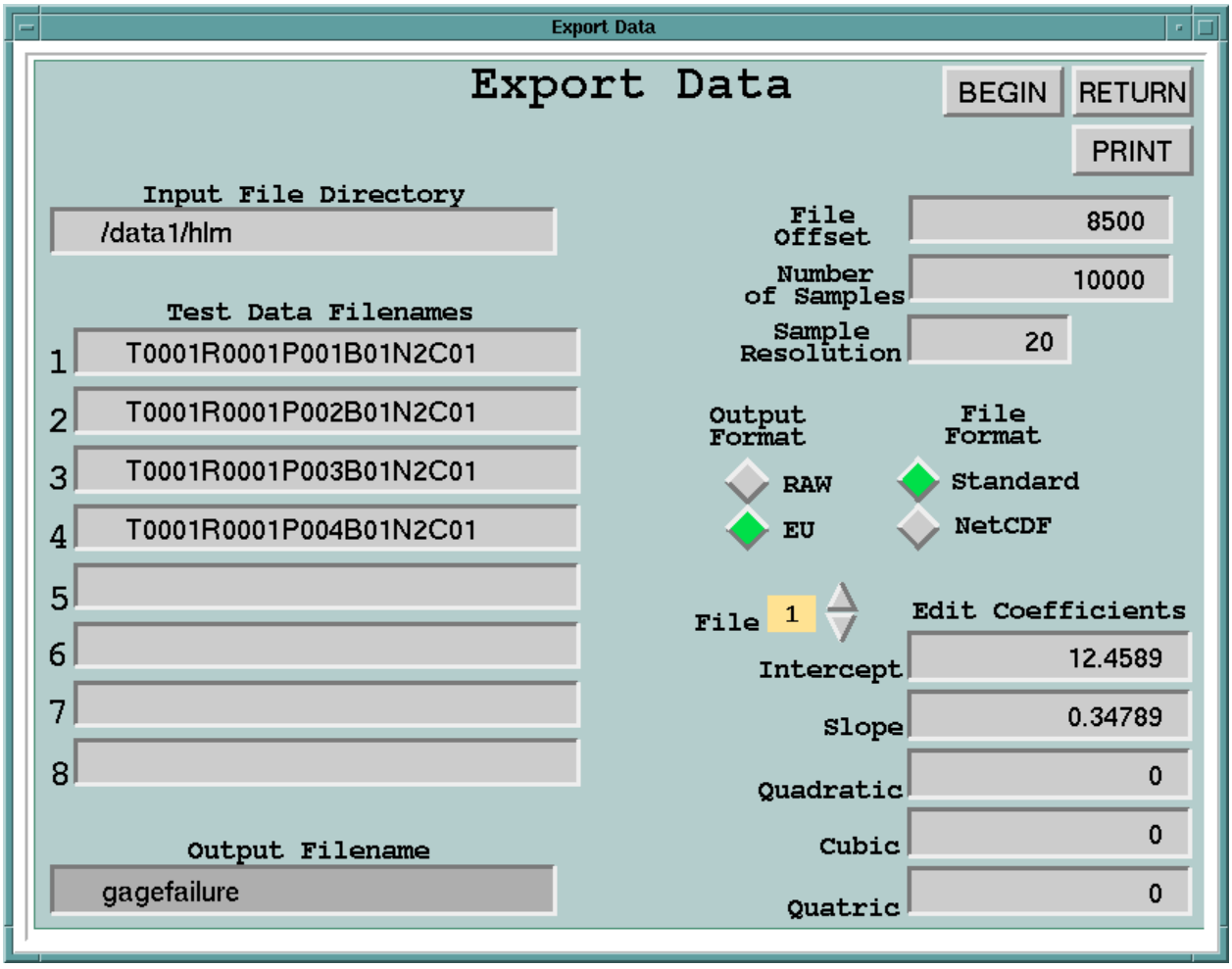


Figure 6.6.4-1. Export Data Screen

A description of the various fields and options follows.

BEGIN - Clicking on this push button initiates the export process. Any error will terminate the process and a message will appear on the screen.

Input File Directory - This text entry box allows the user to enter the full path name of the partition where the data files can be found up to 31 alphanumeric characters. The default directory is ***/*data1**.

Test Data Filenames - These eight text entry boxes allow the user to enter the names up to 31 alphanumeric characters of the test data files. If any file entered does not exist, the filename entry will be removed. The default setting is **no files assigned**.

Output Filename - This text entry box allows the user to enter the name up to 21 characters of the file where the ASCII output will be written. If a simple file name is entered, the file will be created in the user's working directory. If the file already exists, it will be overwritten.

File Offset - This text entry box allows to user to enter an eight digit offset into the file where data retrieval will begin. Valid entries range from 0 to the maximum number of samples acquired during data capture. If the input is greater than zero, then the offset must be locatable in all the files. The default setting is the beginning of the files **(0)**.

Number of Samples - This text entry box allows the user to enter an eight digit number which is the number of samples to be retrieved. This sample count must be available in all files. The default setting is **one point (1)**.

Sample Resolution - This text entry box allows the user to specify the samples of interest in the set. The default setting is **every sample (1)**.

Output Format - This push button selection group allows the user to specify data format. Options are **RAW** and **EU**. Raw data is in gain adjusted millivolt readings. The EU option converts the data to engineering units. The default setting is **RAW**.

File Format - This push button selection group allows the user to specify the format of the test data file. All files must be of the same format. Options are **Standard** (Appendix C) and **NetCDF** (Section 2.2, reference 6). The default setting is **Standard**.

File - This UP and DOWN arrow group appears when the output format is EU. The UP and DOWN arrows are used to cycle through the file list and display the coefficients entered for the channel. The file number is highlighted in yellow. The default setting is the **first file (1)**.

Edit Coefficients - These text entry boxes appear when the output format is EU. The user is allowed to modify the coefficients used for the conversion of raw data to engineering units.

6.7 QUIET FLOW FACILITY EQUIPMENT

Each facility that uses the DDARS uses specific interface equipment to condition its sensors to the Neff 495 channel inputs.

This section describes the QFF facility equipment control software. For a description of the equipment and its layout, see Section 2.2, reference 9.

6.7.1 QFF Switch Matrix Setup

The *Switch Matrix Setup* screen (Figure 6.7.1-1) pops up after selecting the **Switch Setup** option on the *Neff 495 Setup* screen described in Section 6.4. From this menu and submenu, the user may enable and/or disable Precision Filter Switch processing, set and display switch channel assignments. This information may be read from a previously generated file or entered manually. See Appendix B.3 for a detailed description of the file format.

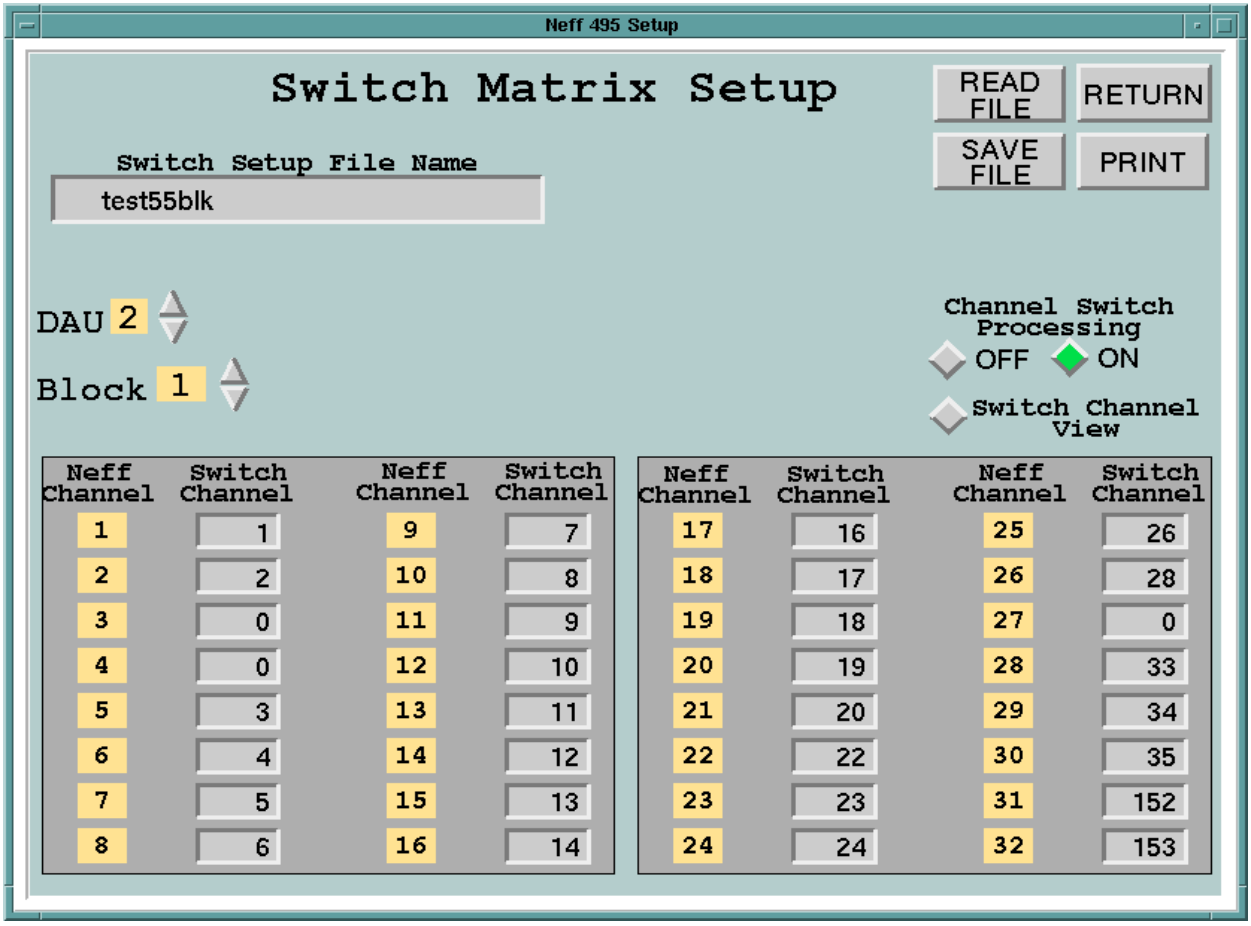


Figure 6.7.1-1. Switch Matrix Setup Screen

A description of the various fields and options follows.

Switch Setup File Name - This text entry box allows the user to enter the name of the file containing the channel assignments of up to 21 alphanumeric characters, beginning with a letter. The default setting is **no file assigned**.

READ FILE - Clicking on this push button will initiate a read of the switch channel assignments from the file. If the file exists, it will be read and the screen will be updated. If the file does not exist, an error message highlighted in red will appear on the screen.

Default values or the current settings will be in effect until they are changed by the user or a valid file is read.

SAVE FILE - Clicking on this push button will initiate a write of switch channel assignments to the file. If the file exists, the information currently stored in the file will be overwritten. If the file does not exist, it will be created. If no file name has been specified, then a message highlighted in red will appear on the screen.

DAU - This UP or DOWN arrow push button selection group determines to which Neff 495 the information on the screen applies. UP and DOWN are used to increment or decrement the DAU number highlighted in yellow. The default setting is **DAU 1**.

Block - This UP or DOWN arrow push button selection group determines to which switch block the information on the screen applies. A maximum of twelve blocks are defined, 32 channels per block. The default setting is **Block 1**.

Channel Switch Processing - This push button selection group allows the user to determine whether a Precision Switch Matrix is used in conjunction with the DAU. The initial setting of this option is based on switch control flag set in the environment file, but may be overridden from this screen.

Switch Channel View - This push button appears when switch processing has been enabled for the DAU. Clicking on this push button pops up the *Switch Channel View* screen (Figure 6.7.1-2). This screen displays the Precision Filter Switch Matrix input channels Neff output channel assignments by blocks. The UP and DOWN arrows are used to increment or decrement through the switch channel list, 16 channels at a time. The DAU number is also displayed. Figure 6.7.1-2 shows the layout of the screen.

Neff Channel - This is an information-only area that defines the Neff output channel number.

Switch Channel - This text entry box allows the user to enter the input channel to be assigned to the Neff channel.

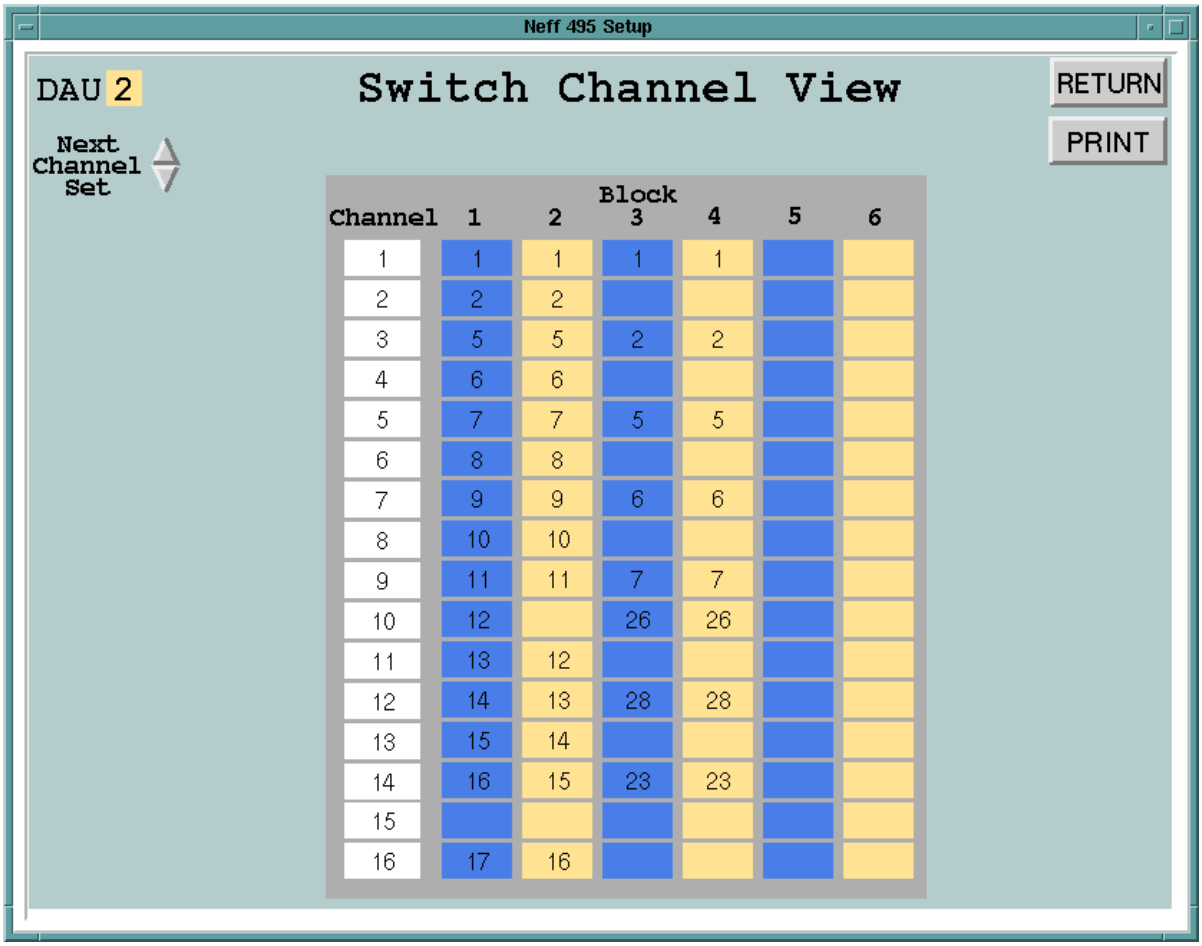


Figure 6.7.1-2. Switch Channel View

6.7.2 Microphone Boom Control System

The 32-element array of microphones is attached to a mounting fixture, which is attached to a movable boom. This arrangement is described in Section 2.2, reference 9. The boom elevation angle is controlled by a *tcl/tk* script, **pan.tk**, which in turn controls several other programs. Figure 6.7.2-1 illustrates the *Boom Control* window.

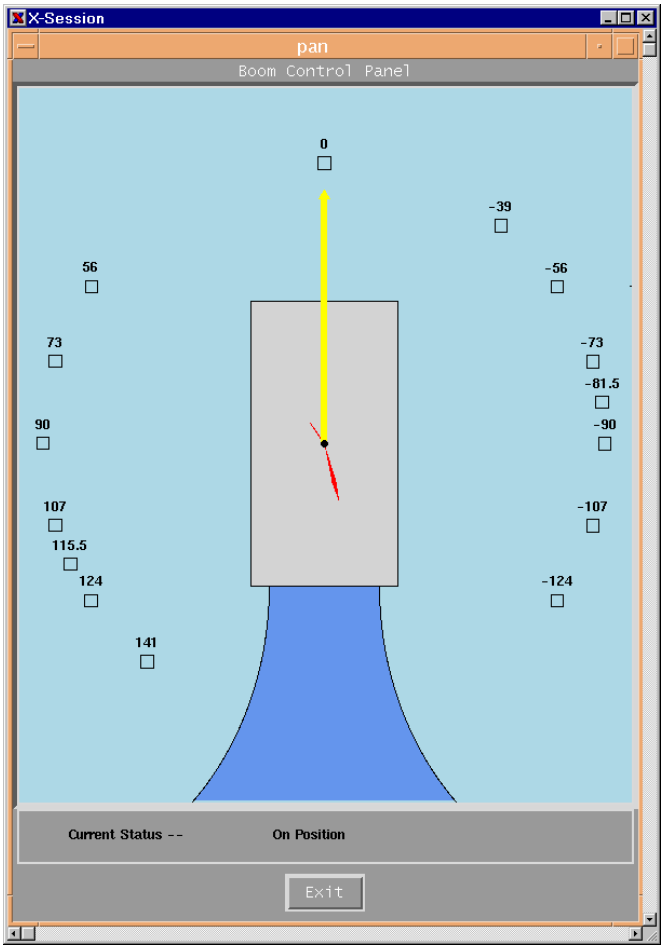


Figure 6.7.2-1. Boom Control Window

A description of the fields in this window is as follows:

Angle Boxes - Clicking in one of these boxes generates a command to the Boom Control system to move the boom to the specified angle. The angles are read from file */usr/nef495 /setup/boom_angles* (Appendix B.5) when the program starts up. This file must be built with a text editor, since the program cannot write it. Also, the program reads the file only upon startup. If angles in the file are changed, the program must be restarted.

Current Status - This status field shows the boom status during program operation. Possible messages include:

Message	**Color**	**Meaning**
On Position	Black	Boom has reached the commanded position and is stopped.
Moving Boom	Red	Boom is moving and command has not timed out.
Boom motion timed out try again	Red	Boom did not reach commanded position before timeout.

6.7.3 Pressure Sensor Preamplifier System

The QFF pressure sensors are interfaced to the switch matrix through a Precision Filters, Inc., preamplifier/filter chassis Model 27000A. The software that controls the settings of the preamplifier is called **gain_all**. This is a command-line interface program, which requires users to type command strings and read text responses. To start **gain_all**, open a terminal window, *cd to /usr/ddars/run/scripts* and type **./rungain**. The terminal window (Figure 6.7.3-1) displays an automatic sequence of startup commands to the preamplifier chassis. These commands and values are read from */usr/nef495/config/ 27000.cfg* (Appendix A.2). The first set of commands initializes the preamplifier cards in the master chassis. If the slave chassis is not connected, then a series of error messages is displayed when its responses are not present, as shown below.

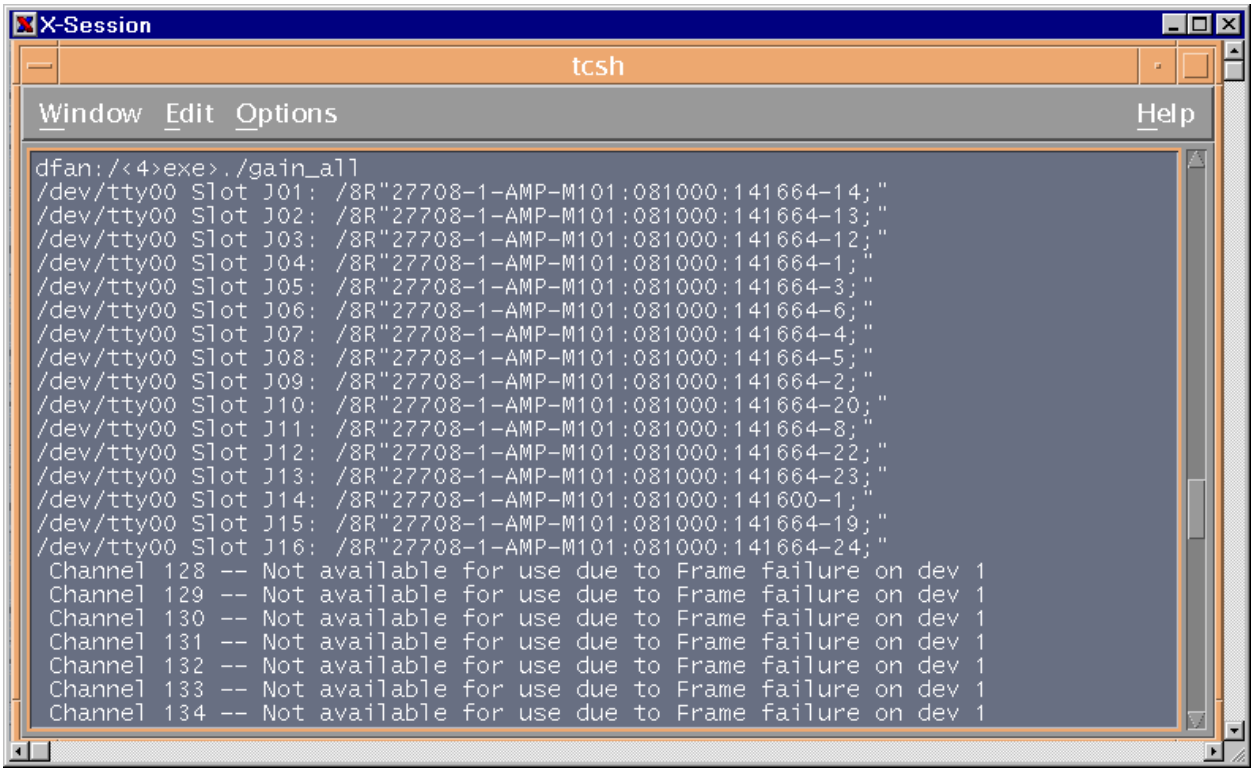


Figure 6.7.3-1. gain_all startup window

Figure 6.7.3-2 shows the end of the startup sequence:

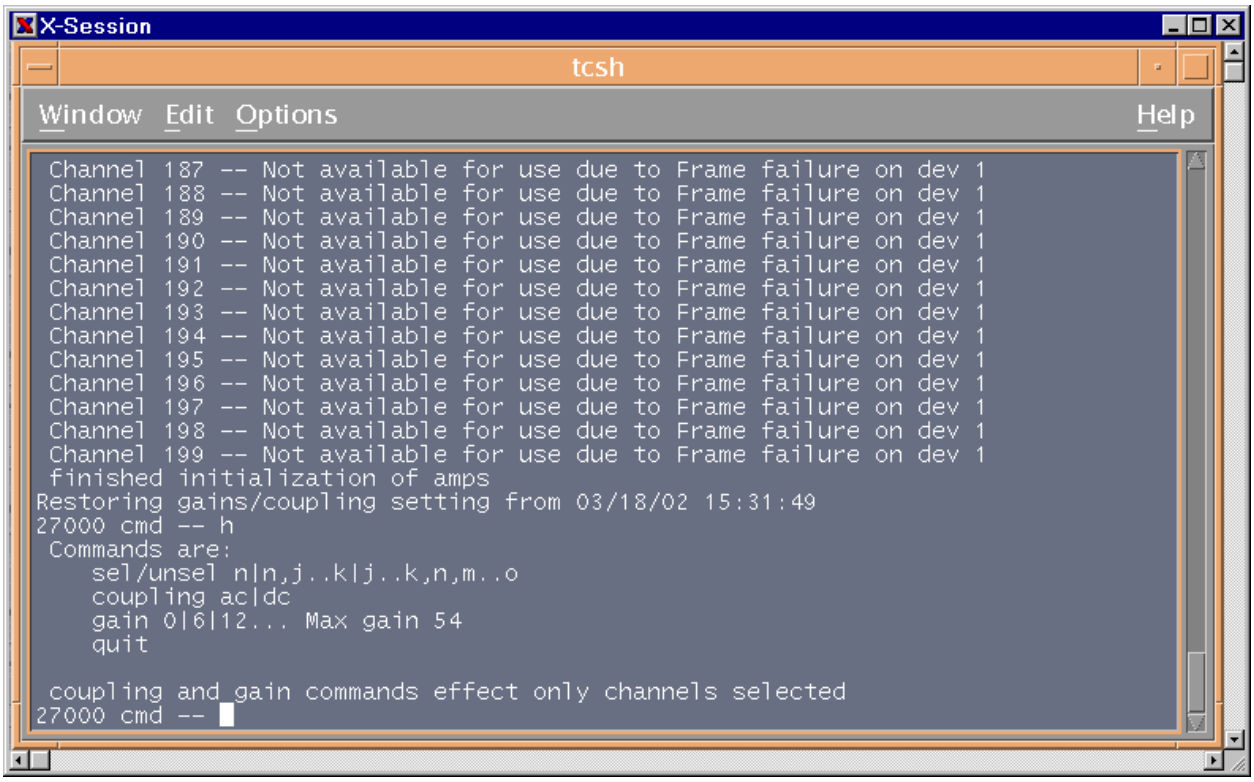


Figure 6.7.3-2. gain_all startup window with help command output

Message	Description
finished initialization of amps	Shows end of the chassis and channel initialization sequence.
Restoring gains/coupling setting from 03/18/02 15:31:49	Reading the setup file from */usr/nef495/setup/27000.settings* (this is a binary file written only by the program).
27000 cmd -- h	User gives a help command (any invalid command will work).
Commands are: **sel/unsel n|n,j..k|j..k,n,m..o** **coupling ac|dc** **gain 0|6|12... Max gain 54** **quit** coupling and gain commands effect only channels selected	Response from the program to the user's request for help.
27000 cmd --	Program request for user command

Commands to **gain_all** are shown in the table below. Only the first character is used and any unknown character is equivalent to help. A space is required between the command and any parameters.

Command		Description
s)elect		Select a range of channels for following commands to affect.
	s	Show currently selected channels.
	s 3	Select channel 3.
	sel 1..9	Select channels 1 through 9.
	select 5, 10..16	Select channel 5 and channels 10 through 16.
	s 1..8, 17..24	Select channels 1 through 8 and channels 17 through 24.
c)oupling		Select ac or dc coupling of the selected channels only.
	c	Show coupling of selected channels: do coupling is in normal video, ac coupling in inverse video

Command		Description
	c a	Switch selected channels to ac coupling.
	c ac	Switch selected channels to ac coupling.
	cou d	Switch selected channels to dc coupling.
g)ain		Change gain of the selected channels only. Gains must be in multiples of 6, and are interpreted in dB. Allowable range is 0 -- 54 dB.
	g	Show gain setting for each selected channel.
	g 48	Switch all selected channels to 48 dB gain.
	ga 12	Switch selected channels to 12 dB gain.
	gain 54	Switch selected channels to 54 dB gain.

6.8 OVERVIEW WINDOW

At the Quiet Flow Facility, an *Overview Window* (Figure 6.8-1) has been developed to permit users to view at a glance the signal present on up to 36 input channels at once. The *Overview Window* in is the form of a 9 row by 4 column array of plots that may be configured for either *PSD* or *Time History* snapshot display. All plots are of the same type at any time.

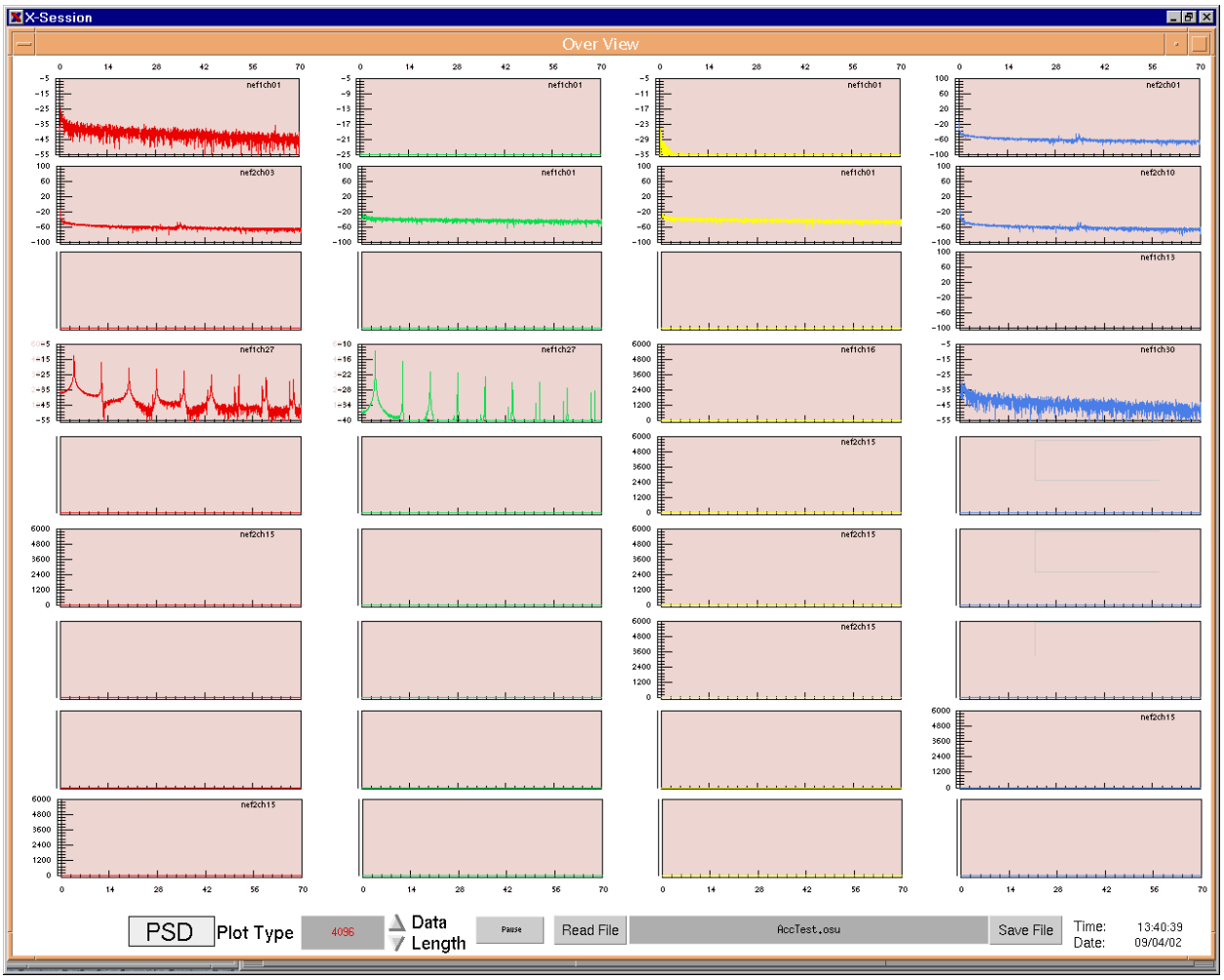


Figure 6.8-1. Overview Window

A description of the fields and controls follows.

Plot labels - In the upper right corner of each plot is the plot label. Clicking on the label pauses the *Overview Window* and brings up the *Plot Edit* window, described below in Section 6.8.1.

Plot Type - Switches between Power Sprectral Density (PSD) and Time History plots. Both plot types allow change of individual plot Y-axis scales in the *Plot Edit* window raised by clicking on the plot label.

Data Length up, down arrow buttons - For the **PSD** type, select the number of samples in the data array upon which the transform is executed. For the **Time History** type, select the total data samples available for plotting. For each plot type the data actually displayed is determined in the *Xmin, Xmax* plot axis settings (Section 6.8.1).

Pause - The *Overview Window* consumes tremendous computer resources, which slows and delays other operations. You may speed some operations substantially by *Pausing* the *Overview Window* updates when it is not needed for *System Setup* menu or plot editing operations.

Read File - Read the Overview setup file shown in the *Overview Setup File name* text entry box.

Overview Setup File name text entry box - Click on this box to provide a file name to be read by the **READ FILE** button or saved by the **SAVE FILE** button. The file format is described in Appendix B.6.

Save File - Save the current setup into the Overview setup file shown in the *Overview Setup File name* text entry box

6.8.1 Overview Plot Edit Window

The *Overview Plot Edit Window* (Figure 6.8.1-1) allows the user to change the setup of an individual plot within the *Overview Window*. The box labeled **Graph Settings** applies only to the plot being edited. The box labeled **Global Settings** affects all plots in a window type (**PSD** or **Time History**). A description of each function follows.

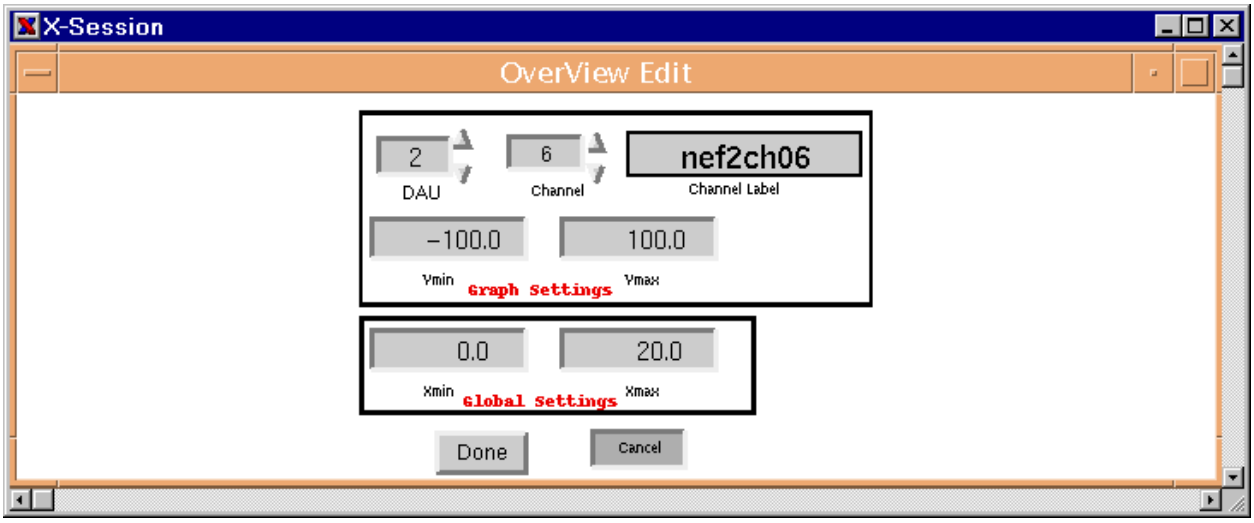


Figure 6.8.1-1. Overview Plot Edit Window

DAU - The selector button group that allows the user to specifiy which DAU to get plot data from for this plot.

Channel - The selector button group that allows the user to specifiy which channel within the selected DAU to get plot data from for this plot.

Channel Label - A text display box showing the label that will be displayed in the plot label field when the **Done** button is clicked. The *Channel Label* may not be changed since it is read from the *Neff 495 Setup* information. Return to the *Neff 495 Setup* menu to change this channel label.

Ymin - The lower limit of the plot Y-axis.

Ymax - The upper limit of the plot Y-axis.

Xmin - The lower limit of the X-axis of all plots of the displayed type (**PSD** or **Time History**).

Xmax - The upper limit of the X-axis of all plots of the displayed type (**PSD** or **Time History**).

Done - Accepts all changes and returns the user to the *Overview Window*. The plot that was clicked will show the changes.

Cancel - Discards all changes and returns the user to the *Overview Window*. The plot that was clicked will not be changed.

7.0 ERRORS AND ERROR CONDITIONS

The overall objective of the DDARS was to provide a flexible, user-friendly front-end control system to aid the user in the operation of the Neff 495. Default values are used whenever possible to minimize error conditions. This section discusses possible errors that the user may encounter, and suggested resolutions. Any error messages output by the control software will be written to the *XTerm* window that the system was invoked from. Problems are listed below in **bold** print followed by a resolution.

Unable to bring up DDARS Main Menu screen, the menu screen disappears, or does not respond.

In the unlikely event that this happens, the user may have to clear any remaining program modules from the system, and bring up the system again. To do this, the user needs to know the process id values of the remaining executables. In a separate terminal window, type

ps –e | grep ddars

This will identify all processes that are still running from a previous DDARS run. The leftmost number is the process id. Figure 7.0-1 shows a successful sequence of commands to clean out old DDARS processes and allow a clean new copy of the system to run.

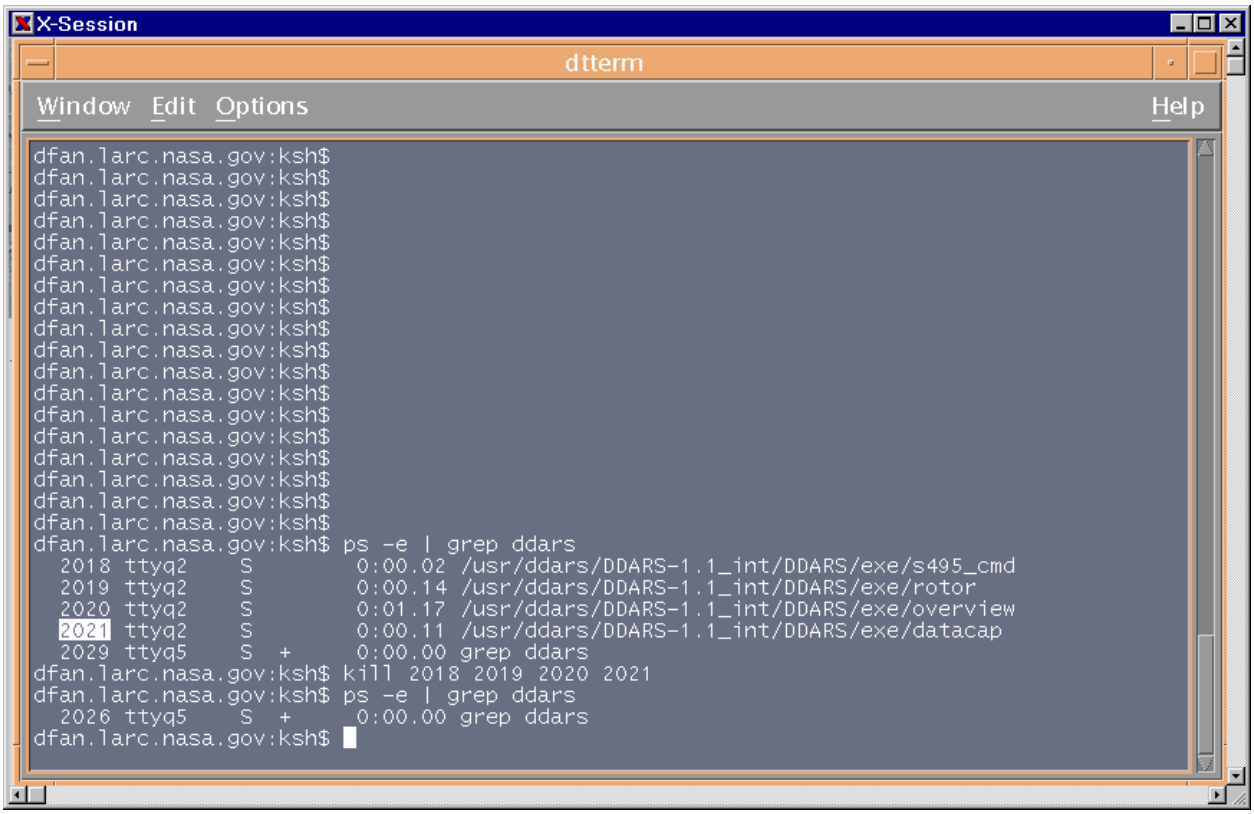


Figure 7.0-1. Clearing Out Old DDARS Processes

After all are out of the system the user may issue the **./run495 &** command to bring up the system again. If the problem recurs, contact your system administrator.

The user enters a setup file name and none of the changes appear.

The file may be empty. This may occur during a save when the */usr* directory is full.

DOWNLOAD TO NEFF button does not pop back up.

Check that the Neff is powered up. If the Neff is not powered up, it is necessary to reboot the entire system. This is because the Neff device driver requires that the Neff be found at start up. If the Neff is already powered up, check all SCSI cables and Neff boards for proper connection.

Monitor Mode signals are not what are expected.

Check that all hardware is connected properly. If trying to output in engineering units, check the conversion coefficients for the channel. The slope coefficient should not be zero. Verify that full-scale gain range is adequate for expected signal.

NOTE: Allow time for at least one update to complete because the initial graphics display may contain old memory data. Ensure that a successful auto-balance has been completed.

Post Analysis signals are not what are expected.

Check that the correct subdirectory is displayed (and terminated) on the *Graphics Display* screen. Check that the file name is correct and properly terminated and contains the correct subdirectory name if different from the default. Check that the offset value doesn't exceed the actual number of samples contained in the file. If trying to output in engineering units, check the conversion coefficients (especially slope).

In Data Capture Mode, trigger will not complete.

This depends on the trigger mode selected and requires that the system and channel setup information be downloaded to the Neff 495. Under normal operation, the program trigger will always complete. If *External Trigger Mode* is selected, check that the TTL event or contact closure is occurring, and that the appropriate cables are connected. If the *Analog Trigger Mode* is selected, check that the cable is connected from the channel of interest to

the I/O Control Logic card. Also verify that the user-selected level of interest is within the range of the signal. The *External Trigger Mode* is the only trigger mode that allows the user to return out of before the trigger completes. Once the user "arms" the system in *Analog Trigger Mode*, the hardware is monitoring the signal and cannot be "disarmed". Removing the red cable from the front of the Neff will cause the trigger to complete. Of course this is not the desired condition for data collection, so the system should be prepared to re-trigger after the problem is corrected. The user may want to reset the trigger point value, and re-download the system with the correct analog trigger information.

During Data Capture Mode, a file full error is received.

The data directory partition is full. Archive and remove old test data files. Be sure to check all subdirectories. The test data cannot be saved, and the test will need to be redone after clearing enough space.

During Data Capture Mode, a file error is received.

This error points to a problem in writing to the disk. This could mean that the user doesn't have the appropriate permissions to write to the partition.

Init NEFF button is highlighted in red.

If this event occurs, communications with the Neff cannot be completed. Power must be recycled on the Neff. Exit the DDARS system before powering down the Neff.

8.0 RECOVERY STEPS

The recovery steps necessary to correct errors were discussed above in Section 7.0.

9.0 ABBREVIATIONS AND ACRONYMS

This section contains a list of abbreviations and acronyms that are found in this document.

AC - Alternating Current

A/D - Analog/Digital

ADPPS - Acoustics Data Processing and Plotting Software

DAC - Digital to Analog Converter

DAIMB - Data Acquisition and Information Management Branch

DAU - Data Acquisition Unit

DB - Decibel, defined as 10 $\log_{10}$ (signal value)

DC - Direct Current

DDARS - Dynamic Data Acquisition and Recording Software

FIFO - First In / First Out

I/O - Input / Output

kHz - Kilohertz

KWords - Kilowords

MWords - Megawords

MHz - Megahertz

mV - Millivolts

µs - Microseconds

NASA - National Aeronautics and Space Administration

PID - Process Identification number

PSD - Power Spectral Density

SCSI - Small Computer Systems Interface

SL-GMS - Sherrill-Lubinski Graphical Modeling System

TTL - Transistor - Transistor Logic

V - Volts

10.0 GLOSSARY

Auto-balance

Method used to remove DC bias from each reading by "zeroing" out the gauge before beginning the data capture.

SCSI-2

Data bus and associated protocol used by the Neff 495 and Compaq/Alpha to communicate commands, data, and status between the two devices. There are many other devices that communicate through the SCSI-2 bus, including external disk drives.

11.0 APPENDICES

A DDARS System and Neff Parameters

B DDARS Setup Files

C DDARS Test Data File Information

D Data Capture Menu Neff 495 Statuses

APPENDIX A

DDARS System and Neff Parameters

A.1 Neff 495 Environment Configuration File Format

The information contained in this file sets DDARS system and Neff parameters. The file is located in directory */usr/nef495/config/cfg495*. Do not overwrite a valid copy of this file with test configurations; save it to another name before testing. The Neff configuration program can read and write only to this name. After testing is complete, the good configuration may be restored by renaming it **cfg495**.

DDARS may be configured with two Neff 495 systems each having 48 input channel cards. If the Neff 495 system has less than 48 physical channels, field 4 of line 2 is set to the number of channels available. Lines 2 through 50 are duplicated for each Neff 495.

Line	Field	Data Type	Description
1	1	integer	Number of Neff 495 systems (2)
2			Neff 495 DAU 1 system parameters
	1	integer	System number (1)
	2	integer	SCSI bus address
	3	integer	SCSI slot address
	4	integer	Number of input channel cards (36)
	5	integer	Precision Filter Switch Matrix specifier = 0, No Precision Filter Switch = 1, Precision Filter Switch Matrix used
	6	integer	Number of switch input channels

Line	Field	Data Type	Description
3-50			Neff 495 DAU 1 channel parameters
3			Channel 1 parameters
	1	integer	Channel number
	2-5	integer	Four filter frequency settings
	6	integer	Memory size in kilobytes
	7	integer	ADC bit resolution (12 or 14)
	8	integer	AC/DC coupling specifier = 0, AC/DC disabled = 1, AC/DC enabled
4-50			Channels 2 thru 48
51			Neff 495 DAU 2 system parameters
	1	integer	System number (2)
	2	integer	SCSI bus address
	3	integer	SCSI slot address
	4	integer	Number of input channel cards (32)
	5	integer	Precision Filter Switch Matrix specifier = 0, No Precision Filter Switch = 1, Precision Filter Switch Matrix used
	6	integer	Number of switch input channels
51-99			Neff 495 DAU 2 channel parameters

A.2 Precision Filters Preamplifier Chassis Configuration File Format

This file contains information needed to initialize the Precision Filters, Inc., Model 27000A preamplifier chassis and its channel cards. Most of the file is in preformatted hard-coded strings. The file is in directory */usr/nef495/config/27000.cfg*.

Line	Type	Description
1 – 32	String	Channel card configuration command string
33 -- 288	Preformatted String	Channel Setup Information
Column 1 – 11	Preformatted String	"Chan – {channel number}"
Field 2	Decimal integer	Device (chassis) number
Field 3	Decimal integer	Card number
Field 4	Decimal integer	Channel number (0 – 7) on card
Field 5	Decimal integer	Register 0 value (=800)
Field 6	Decimal integer	Register 1 value (=0)
Field 7	Decimal integer	Register 2 value (=0)
289	**** (Four asterisks)	DAC offset table boundary
290 -- 389	Preformatted decimal integers	
Field 1	4-digit decimal integer	Dummy for line number indication
Field 2	5-digit decimal integer	DAC offset value
Field 3	5-digit decimal integer	DAC offset value
Field 4	5-digit decimal integer	DAC offset value
Field 5	5-digit decimal integer	DAC offset value
Field 6	5-digit decimal integer	DAC offset value
Field 7	5-digit decimal integer	DAC offset value
Field 8	5-digit decimal integer	DAC offset value
Field 9	5-digit decimal integer	DAC offset value
Field 10	5-digit decimal integer	DAC offset value
Field 11	5-digit decimal integer	DAC offset value
390	**** (Four asterisks)	DAC offset table boundary

APPENDIX B

DDARS Setup Files

The purpose of the following sections is to provide a detailed description of the formats of the setup files used by the DDARS system. Most of these files are generated using the **SAVE** option on the *Setup Menu* screens. Setup files may also be edited off-line using a text editor. All these files are located in directory */usr/nef495/setup*.

B.1 Setup File Format

This file contains information to set DDARS system and Neff 495 parameters. There are forty-eight channels for each DAU defined. This allows additional channel cards to be added without changing the format of the file. The file is in directory */usr/nef495/setup/{user specified name}*. See **AccTest.ssu** for example.

Line	Field	Data Type	Description
1-3			DDARS system parameters
1	1	string	Data directory full path name, 40 characters maximum
	2	integer	Data file format specifier = 0, Standard = 1, NetCDF
2	1	string	Post script printer name, 21 characters maximum, or 'none'
3	1	integer	Test number
	2	integer	Run number
	3	integer	Trigger point number
4-8			Neff 495 DAU 1 system parameters
4	1	integer	Primary sample counter
	2	integer	Secondary sample counter
	3	integer	Block counter
	4	integer	Pre/Post trigger sample counter
5	1	float	Primary scan period
	2	float	Secondary scan period
	3	float	External clock scan rate

Data Line	Field	Type	Description

6	1	integer	Scan mode = 0, Real-time = 1, Background
	2	integer	Capture mode = 0, Primary Only = 1, Pri-Sec-Sec = 2, Pri-Sec-Pri = 3, External
	3	integer	Trigger mode = 1, Program = 2, External = 4, Analog
	4	integer	Record mode = 0, Block = 1, PrePost
7	1	integer	Analog trigger channel number
	2	integer	Trigger polarity = 0, Negative = 1, Positive
	3	float	Trigger threshold limit
8	1	float	Neff auto-balance settling time
9-296			Neff 495 DAU 1 channel parameters
9-14			Channel 1 parameters
9	1	string	Channel Header (**Channel**01)
10	1	string	Channel name (8 characters)
11	1	integer	Scan specifier = 0, Not scanned = 1, Scanned
	2	integer	Auto-balance specifier = 0, Not auto-balanced = 1, Auto-balance
	3	integer	AC/DC coupling specifier = 0, DC = 1, AC
12	1	integer	Filter frequency
	2	integer	Full-Scale range
	3	float	Excitation
	4	hex	Excitation code

Line	Field	Data Type	Description
13	1-5	float	Five coefficients
14	1	string	Channel description (62 characters)
15-296			Channels 2 thru 48 parameters
299-301			Neff 495 DAU 2 system parameters
302-589			Neff 495 DAU 2 channel parameters
590-592			ADPPS parameters
590	1	integer	Auto activation specifier = 0, Auto activation disabled = 1, Auto activation enabled
	2	string	Window option, 7 characters maximum hanning, hamming, or boxcar
	3	integer	Remote system activation specifier = 0, local activation = 1, remote activation
	4	string	Remote system name (8 characters)
591-592		string	Print command for print plot option (2 lines with a maximum of 42 characters each or 'none')

B.2 Graphics Setup File Format

This file contains parameters to set the *Graphics Display* screens. *Fileprefix* and channel parameters are not saved from post analysis display screens. The file is in directory */usr/nef495/setup/{user specified name}*. See **AccTest.gsu** for example.

Line	Field	Data Type	Description
1	1	string	Post analysis directory full path name (40 characters)
2-12			Monitor mode PSD Display parameters
2	1	string	Title (21 characters)
3	1	integer	Neff DAU number
4	1	integer	Channel number
5	1	integer	Channel trace color = 0, Red = 1, Green = 2, Yellow = 3, Blue = 4, Magenta = 5, Cyan = 6, Black = 7, Grey = 8, Orange
6	1	integer	Trigger type = 0, Delay = 1, Manual
7	1	integer	Delay time in seconds
8	1	integer	Data display format = 0, Raw = 1, EU
9	1	integer	X-axis lower limit
	2	integer	X-axis upper limit
10	1	integer	Y-axis lower limit
	2	integer	Y-axis upper limit
11	1	string	X-axis label (17 characters)
12	1	string	Y-axis label (17 characters)

Line	Field	Data Type	Description
13-23			Monitor Mode Trend Chart parameters
13	1	string	Title (21 characters)
14	1	integer	Neff DAU number
15	1-4	integer	Four channel numbers
16	1-4	integer	Four channel trace colors
17	1	integer	Trigger type
18	1	integer	Delay time
19	1	integer	Data display format
20	1	integer	X-axis lower limit
	2	integer	X-axis upper limit
21	1	integer	Y-axis lower limit
	2	integer	Y-axis upper limit
22	1	string	X-axis label (17 characters)
23	1	string	Y-axis label (17 characters)
24-42			Monitor Mode XY plot parameters
24	1	string	Title (21 characters)
25	1	integer	Trigger type
26	1	integer	Delay time
27-34			Graph 1
27	1	integer	Neff DAU number
28	1-10	integer	Ten channel numbers
29	1-10	integer	Ten trace colors
30	1	integer	Data display format
31	1	integer	X-axis lower limit
	2	integer	X-axis upper limit
32	1	integer	Y-axis lower limit
	2	integer	Y-axis upper limit
33	1	string	X-axis label (17 characters)
34	1	string	Y-axis label (17 characters)
35-42			Graph 2
35	1	integer	Neff DAU number
36	1-10	integer	Ten channel numbers
37	1-10	integer	Ten trace colors
38	1	integer	Data display format
39	1	integer	X-axis lower limit
	2	integer	X-axis upper limit
40	1	integer	Y-axis lower limit
	2	integer	Y-axis upper limit

Line	Field	Data Type	Description
41	1	string	X-axis label (17 characters)
42	1	string	Y-axis label (17 characters)
43-49			Post Analysis PSD Display parameters
43	1	string	Title (21 characters)
44	1	integer	Data display format
45	1	integer	File format
46	1	integer	X-axis lower limit
	2	integer	X-axis upper limit
47	1	integer	Y-axis lower limit
	2	integer	Y-axis upper limit
48	1	string	X-axis label (17 characters)
49	1	string	Y-axis label (17 characters)
50-56			Post Analysis Trend Chart parameters
50	1	string	Title (21 characters)
51	1	integer	Data display format
52	1	integer	File format
53	1	integer	X-axis lower limit
	2	integer	X-axis upper limit
54	1	integer	Y-axis lower limit
	2	integer	Y-axis upper limit
55	1	string	X-axis label (17 characters)
56	1	string	Y-axis label (17 characters)
57-69			Post Analysis XY plot parameters
57	1	string	Title (21 characters)
58-63			Graph 1
58	1	integer	Data display format
59	1	integer	File format
60	1	integer	X-axis lower limit
	2	integer	X-axis upper limit
61	1	integer	Y-axis lower limit
	2	integer	Y-axis upper limit
62	1	string	X-axis label (17 characters)
63	1	string	Y-axis label (17 characters)

Line	Field	Data Type	Description
64-69	1	integer	Graph 2
64	1	integer	Data display format
65	1	integer	File format
66	1	integer	X-axis lower limit
	2	integer	X-axis upper limit
67	1	integer	Y-axis lower limit
	2	integer	Y-axis upper limit
68	1	string	X-axis label (17 characters)
69	1	string	X-axis label (17 characters)

B.3 Test Conditions File Format

The information in this file sets test condition variables. The file has no specific order, but is keyword driven. Each line consists of an identifier keyword, of which only the first four characters are required, followed by a value to set the condition. A blank space is used as a separator between the keyword and the value. Only those conditions which the user desires to set need be in the file.

The file is in directory */usr/nef495/setup/{user specified name}*. See **AccTest.csu** for example.

Keyword	**Data Type**	**Description**
machnumber	float	Mach number
geometryid	integer	Geometry id number
tripnumber	integer	Boundary layer trip number
excitation	float	Excitation voltage
tuntemperature	float	Tunnel temperature
scmtemperature	float	Settling chamber temperature
humidity	float	Humidity
barometricpressure	float	Barometric pressure
angleofattack	float	Angle of attack
flapgap	float	Flap gap
flapoverlap	float	Flap overlap
flapangle	float	Flap angle
slatgap	float	Slat gap
slatoverlap	float	Slat overlap
slatangle	float	Slat angle
azimuth	float	Boom azimuth angle
engineer	string	Test engineer (21characters)

B.4 Precision Filter Switch Matrix File Format

This file contains the Precision Switch Matrix input channel assignments for the Neff 495 DAU that it is being used in conjunction with. Each line has 32 entries for the number of Neff input channels. The file is in directory */usr/nef495/setup/{user specified name}*. See **AccTest.msu** for an example.

Line	Field	Data Type	Description
1	1-32	integer	Switch Matrix channel numbers for Block 1
2	1-32	integer	Switch Matrix channel numbers for Block 2
3	1-32	integer	Switch Matrix channel numbers for Block 3
4	1-32	integer	Switch Matrix channel numbers for Block 4
5-12	1-32	integer	Switch Matrix channel numbers for Block 5 thru 12

B.5 Boom Angle Settings

The Boom Control Program, **pan.tk**, reads this file at startup to determine at what angles to permit the user to set the microphone boom. It then paints its selection boxes at the correct locations on the display. The file is located in directory */usr/nef495/setup/boom_angles*.

The file is simply a column of floating-point formatted numbers, e. g.:

```
-81.5
115.5
0
-124
-107
-90
-73
-56
-39
56
73
90
107
124
141
```

Note that neither order nor data format are significant.

B.6 Overview Window Setup File Format

The *Overview* Window is inactive until first the *System Setup* file (Appendix B.1), then the *Overview Window Setup* file described below are read. The name of the file is typed into the file location text box (Section 6.8), and the file is read by clicking on the **Read File** button. Changes to the setup may be saved by typing a name into the text box and clicking on the **Save File** button. The file is in directory */usr/nef495/setup/{user specified name}*. See **AccTest.osu** for an example.

The file is organized in fields of keyword-parameter pairs. The keywords may be upper or lower case, and keywords and values are separated by spaces, tabs, or line breaks. The file is freeform, but the keywords **WINDOW** and **PLOT** set the environment for succeeding keyword operations until another corresponding **WINDOW** or **PLOT** is encountered. Successive keywords will overwrite previous operations unless an intervening **WINDOW** or **PLOT** changes the keyword environment.

Keyword	Parameter Type/Value	Description
WINDOW	integer	Number of the window to which following keywords apply (presently only valid for 1 window).
TYPE	PSD	Window starts up in *PSD* mode.
	TIME	Window starts up in *TIME HISTORY* mode.
PSD_LENGTH	Integer	Must be one of 128, 256, …, 16384 (power of 2). Length of data array on which the PSD transform is performed.
PSD_X_MIN	Float	Minimum X-axis PSD value for all plots.
PSD_X_MAX	Float	Maximum X-axis PSD value for all plots.
TIME_LENGTH	Integer	Must be one of 128, 256, …, 16384 (power of 2). Length of data array acquired for Time History display.
TIME_X_MIN	Float	Minimum X-axis Time History value for all plots.
TIME_X_MAX	Float	Maximum X-axis Time History value for all plots.
PLOT	Integer	Number of the plot to which succeeding plot-specific operations are applied. Plots are numbered across, then down. The first row contains plots 1, 2, 3, 4. Plots not initialized in a file are cleared and made inactive.
DAU	Integer	DAU part of channel specification for the current plot.
CHAN	Integer	Channel part of channel specification for the current plot.
PSD_Y_MIN	Float	Minimum Y-axis PSD value for the current plot.
PSD_Y_MAX	Float	Maximum Y-axis PSD value for the current plot.
TIME_Y_MIN	Float	Minimum Y-axis Time History value for the current plot.
TIME_Y_MAX	Float	Maximum Y-axis Time History value for the current plot.

Keyword	Parameter Type/Value	Description
/*	Characters	Ignore everything until the keyword "*/" is encountered (implements a C-style comment field)

A special command sequence consists of the **PLOT, DAU,** and **CHAN** commands in sequence. The **CHAN** command loads all the plot-specific parameters into the current plot parameter array, allowing the user to display many channels with the same parameters by simply listing the plot-DAU-channel triples. The following prototype setup file illustrates the use of this feature.

```
/*  This is a functional prototype for AccTest.osu setup files.  */
window 1          type time          /* Start up in time mode (only 1 window supported) */

/* Set up global parameters for both plot types */
psd_length 4096     psd_x_min 0.000000     psd_x_max 70.000000
time_length 2048     time_x_min 0.000000     time_x_max 500.000000

plot 1     dau 1     chan 1 /* declare one plot to start things up */

/* set plot parameters for current and all succeeding plots */
psd_y_min -60.000000     psd_y_max 0.000000
time_y_min -100.000000     time_y_max 100.000000

/* Set plots 2 and 3 just like plot 1 */
plot 2     dau 1     chan 3
plot 3     dau 1     chan 5

/* Change PSD parameters for plot 3 (current) and all succeeding */
psd_y_min -55.000000     psd_y_max 0.000000
plot 4     dau 2     chan 1

/* Change time history parameters for plot 4 and all succeeding */
time_y_min -200.000000     time_y_max 200.000000
plot 6     dau 2     chan 6
plot 7     dau 2     chan 9
plot 8     dau 2     chan 10
plot 12     dau 1     chan 13
plot 14     dau 1     chan 15
plot 15     dau 1     chan 16
plot 16     dau 1     chan 17
plot 19     dau 2     chan 15
plot 21     dau 2     chan 15
plot 23     dau 2     chan 15
plot 27     dau 2     chan 15
plot 32     dau 2     chan 15
plot 33     dau 2     chan 15
```

/* Note that plots 5, 9, 10, 11, and all others not specifically set up will be inactive. Specified plots in range 4 – 33 will have identical parameters. */

APPENDIX C

DDARS Test Data File Information

C.1 INTRODUCTION

The purpose of the following information is to provide a description of the data written to the test data file created by the DDARS system and provide the equations used in converting the raw data to millivolt values and engineering units. The format shown in this section is valid only when the output format of the file is 'Standard'. The data types specified below are defined as short (16-bits), integer (32-bits), float (32-bits) and string (8-bits per character).

C.1 HEADER RECORD

A standard header record is written at the beginning of each test data file and is 348 words in length. The header contains environment parameters needed for post test processing. A standard UNIX write was used to move the header to the file. The record also has a sub-structure containing the test condition variables.

Record Position	Data Type	Description
1-2	integer	Neff channel number
3-8	string	Channel name (12 characters)
9-10	integer	Switch Matrix input channel number
11-12	integer	Neff DAU number
13-14	integer	Test number
15-16	integer	Run number
17-18	integer	Trigger point number
19-20	integer	Data ID = 0, Standard Data = 1, Piston Calibration = 2, Detailed Calibration
21-28	integer	Date/time (16 characters) (Format: daymonyr.hh:mm)
29-30	integer	Channel memory size
31-32	integer	A/D bit resolution (12 or 14)

Record Position	Data Type	Description
33-34	integer	AC/DC coupling specifier = 0, DC = 1, AC
35-36	integer	Primary sample counter
37-38	integer	Secondary sample counter
39-40	integer	Number of blocks recorded
41-42	integer	Number of pre-trigger samples
43-44	float	Primary sample period
45-46	float	Secondary sample period
47-48	integer	Scan mode = 0, Real-time = 1, Background
49-50	integer	Record mode = 0, Block = 1, Pre-Post trigger
51-52	integer	Trigger mode = 1, Program = 2, External = 4, Analog
53-54	integer	Capture mode = 0, Primary only = 1, Primary-Secondary-Secondary = 2, Primary-Secondary-Primary = 3, External
55-56	integer	Filter frequency
57-58	integer	Full-scale range
59-60	float	Excitation
61-62	float	Pre-autobalance
63-64	float	Post-autobalance
65-74	float	Five coefficients
75-106	string	Channel description (64 characters)
107-120	string	Test Engineer (28 characters)
121-128	string	Calibration file name (16 characters)
129-130	integer	Switch matrix specifier = 0, switch disabled = 1, switch enabled
131-132	integer	Number of samples recorded
133-148	integer	Eight spare words

Record Position	Data Type	Description
149-348		Test Conditions Sub-structure
149-150	integer	Geometry ID
151-152	integer	Boundary layer trip number
153-154	float	Mach number
155-156	float	Tunnel temperature
157-158	float	Settling chamber temperature
159-160	float	Humidity
161-162	float	Barometric pressure
163-164	float	Angle of attack
165-166	float	Flap angle
167-168	float	Flap gap
169-170	float	Flap overlap
171-172	float	Slat angle
173-174	float	Slat gap
175-176	float	Slat overlap
177-178	float	Excitation
179-180	float	Azimuth angle
181-348	float	Eight-four spare words

C.2 TEST DATA FILE FORMAT

A test data file is created for each channel being scanned for a DAU. These files will be generated when all data has been acquired for a trigger point. A header record is written at the beginning of each file.

Record Position	Data Type	Description
1-348		Header Record
349	short	Raw data (in counts)
.		
.		
.		
RECLEN	short	Last recorded data sample (RECLEN is computed as follows: number of samples recorded (words 131-132) + 348 (header record size)

C.3 DATA CONVERSION

The following equations are used to convert the raw data to gain adjusted millivolt values and engineering units. The conversion factor used in for both 12-bit and 14-bit Analog/Digital converters is a hexadecimal 8000. The conversion coefficients (C0, C1, C2, C3, C4, and C5) are applied to the millivolt reading to produce engineering units (EU). See section 6.3.1 for a description of the conversion coefficients.

mvdata = raw counts * full-scale range / #8000

$EU = C0 + C1*mvdata + C2*mvdata^2 + C3*mvdata^3 + C4*mvdata^4$

APPENDIX D

Data Capture Menu Neff 495 Statuses

The following statuses are displayed on the *Data Capture Menu* screen. These statuses reflect the condition of the Neff 495 data acquisition units before and during the capture sequence. Data capture should not be started for a DAU that is off-line or not initialized.

Neff Statuses	Description
System Ready -	System and channel parameters have been downloaded to the DAU. The DAU is ready to acquire data.
Device Offline -	The DAU did not respond to setup commands at startup. Check the SCSI interface bus and slot address in the environment configuration.
Neff not initialized -	DAU has no channels assigned. No data maybe acquired from this DAU.
Autobalance not done -	At least one channel for the DAU has been marked for auto-balance and no auto-balance was performed prior to data capture. This status will also appear when a channel has been added to or deleted from the list after an auto-balance has been performed.
External ARMED -	A data capture was initiated and the DAU is in external capture mode. Data recording will commence after the interrupt signal has been received.
Analog ARMED -	A data capture was initiated and the DAU is in Analog trigger capture mode. Data recording will commence after the channel's threshold level has been reached.
Recording -	The DAU is recording data.

Neff Statuses	Description
File ERROR -	An error occurred while transferring Neff data to a file. An error message will also appear on the startup terminal. The error code displayed in the message will indicate the exact error.
Scan ERROR -	An error occurred while recording data. An error message will also appear on the startup X-terminal. The Neff status code displayed will indicate the exact error.
System ERROR -	An error occurred while communicating with the Neff. Re-initialize the system and restart. If this fails, contact hardware personnel.
Data Saved -	All channel data has been written to test data files.
Record Complete -	This status is displayed when recording of channel data to the on-board memory is complete and before the save process is initiated.