NetForce

Users Manual

AMTI ACQUISITION SOFTWARE

Version 3.05.01

AMTI NetForce Users Manual

Version 3.05.01

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SYMBOLS

Your attention is requested.

Important tip that may be of help

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⚠ BEFORE YOU INSTALL!!!

- Please read the instructions carefully
- This manual is compatible with NetForce version 3.5.2
- NetForce version 3.5.2 is compatible with MS WIN 2000/XP/Vista/7 32 and MS WIN 7 64 operating systems.
- You have to use at least a Pentium 4 processor, with 1 GB RAM (3GB recommended) and 50GB or more, free hard disk space. With machines slower than this, you must use a slow acquisition rate, and you will not be able to have 3D graphs, or more than three real time plots.
- A DT3034 acquisition card is required for successful analog data acquisition through NetForce. The DT3034 card is compatible with Windows XP/Vista/7.
- All instructional references to the AMTI Gen 5 signal conditioner likewise apply to the AMTI Optima Signal conditioner as well. The Optima specific display screens are described in the Optima user manual, version 1.0.0.

Upgrading from Netforce 32-bit to the 64-bit version:
- Upgrading requires complete removal of all previously installed files.
- The default program file folder location differs from the 32-bit default location. The default folders are "System32" and "SYSWOW64", respectively, for the 32-bit and 64-bit programs.

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 ORGANIZATION OF MANUAL

Section 1 provides an introduction and overview of the manual.   Section 2 describes the main screen of the program that serves as the primary user interface.   Section 3 provides operating instructions for many common tasks; section 4 describes the main menu of the program.   Sections 5 through 25 describe in detail the various dialog boxes used for entering data and setting the various options and controls of the program.

Please note that throughout this manual it is assumed that the user is familiar with the Microsoft Windows mouse point and click operations and basic Windows controls.   For a review of some of the controls used in NetForce please see **Appendix I - Common Windows Controls.**

1.2 NETFORCE REAL-TIME DATA ACQUISITION

AMTI's NetForce software is a flexible data acquisition system designed to facilitate the use of AMTI's multi-axis force platforms for biomechanics and industrial force measurements.   NetForce is designed to run on a wide variety of PC's and operating systems.   Our design approach was to develop a system which could take advantage of the speed of top end hardware while providing reasonable performance on lower end hardware and older computer systems.

NetForce allows the user to monitor and save data from multiple transducers. The software can simultaneously support up to two RS-232/USB products, four Ethernet or analog data format products, or 12 USB Gen 5 signal conditioners. NetForce's real-time display mode permits the concurrent display of up to 12 channels of data and provides a real time COP graph as well.   The displayed data is run-time selectable and the outputs of any of the installed multi-axis instruments can be viewed with a few mouse clicks.

It must be cautioned however that not all things are possible on all computer systems.   Slower speed systems simply do not have the computing horsepower to perform all of the calculations necessary to display all of the possible data channels while performing high-speed data acquisition as well.   The NetForce real time display software includes performance monitoring logic that optimizes performance across a wide variety of hardware platforms.   The performance monitoring logic favors

the acquisition of flawless data while sacrificing the frame rate of real time data display on slower speed systems.   This means that if the computer systems hardware performance is taxed, because of the various settings and options that the user has selected, the performance monitoring logic will start dropping frames from the real time visual display in order to free up system resources to perform the real time data acquisition task.   Dropping display frames does not mean that data has been lost, it just means that the visual display will become jerky and less visually pleasing.

As previously mentioned, our design approach was to provide a flexible system that performs well on a wide variety of computer equipment.   The rich complement of display and acquisition options offered in NetForce makes it possible to tax or even overwhelm the most powerful PC hardware available today.   **Appendix F - Bench Mark Performance** provides bench mark performance data for the several types of data acquisition available in NetForce on a number of computer systems.   This is bench mark performance data only.   Different computer systems with different amounts of memory, graphics adapters and internal chip sets will perform differently.

A number of different factors contribute to the real time performance of the NetForce data acquisition software.   Ethernet systems have a strong dependence on the number of amplifiers (or number of force platforms) connected to the network system.   Each amplifier sends data across the Ethernet network, which in turn is handled by the operating system's internal network software.   This network interaction provides additional overhead, which the CPU must handle.   Analog systems are more or less independent of the number of attached platforms as the NetForce software always acquires data from the full 32 channels of data available on the data acquisition card (only the enabled channels are saved).   With the exceptions above, the parameters, which most strongly influence the data acquisition performance, are:

Data acquisition rate

Data acquisition duration

Number of channels displayed

Display decimation rate

Display Mode (recurring vs. single sweep)

The above parameters and options are all user selectable.   Acquisition rate and duration are set in the Trigger or Horizontal dialog boxes. Channels are enabled for display using the channel enable buttons. The display decimation rate is modified using the + and - buttons under the graph windows. The Recurring or Single Sweep Mode is chosen in the Horizontal dialog box.

In general the acquisition rate and the acquisition duration are dictated by the requirements of the test procedure or experiment, however, it should be noted that high acquisition rates and long acquisition times greatly encumber the system.   If it is expected to collect data from several platforms,

at rates of 1000 Hz or more, for 2 or more seconds, then high-speed computer hardware will be necessary.   With less demanding applications some experimentation with the display setup, (the number of displayed channels and decimation rate) will generally yield good results.   For the slowest speed systems the display mode may be set to single sweep which eliminates real time updating of the display and dedicates all of the CPU's resources to the process of data acquisition.   The following rules of thumb are useful when selecting your computer hardware and setting up your test procedures:

High speed, long duration requires a high speed computer (1.2 GHz or better)

The fewer channels displayed the faster the system will run.

Single sweep mode dedicates all system resources to acquisition.

With the design of AMTI's NetForce software we have addressed the issue of the ever-increasing complexity of PC's by providing a System   Diagnostics module available from the Setup selection on the main menu of the program. System Diagnostics runs a series of tests to evaluate your computer's CPU and graphics performance so that we may better compare it with our test computer's performance. System Diagnostics also enumerates the various settings and options that you have chosen to run your tests and provide details about the operating system and hardware on which you have installed AMTI NetForce. We provide the means to save the System Diagnostics output as a text file that can be conveniently inserted in an E-mail request for technical support.

2.0 AMTI-NETFORCE MAIN SCREEN

Please see the Main Screen layout below to familiarize yourself with the locations of the various controls and **features** of NetForce.   This screen serves as a real time graphics display for data acquisition and provides the primary user interface to control the data acquisition process.
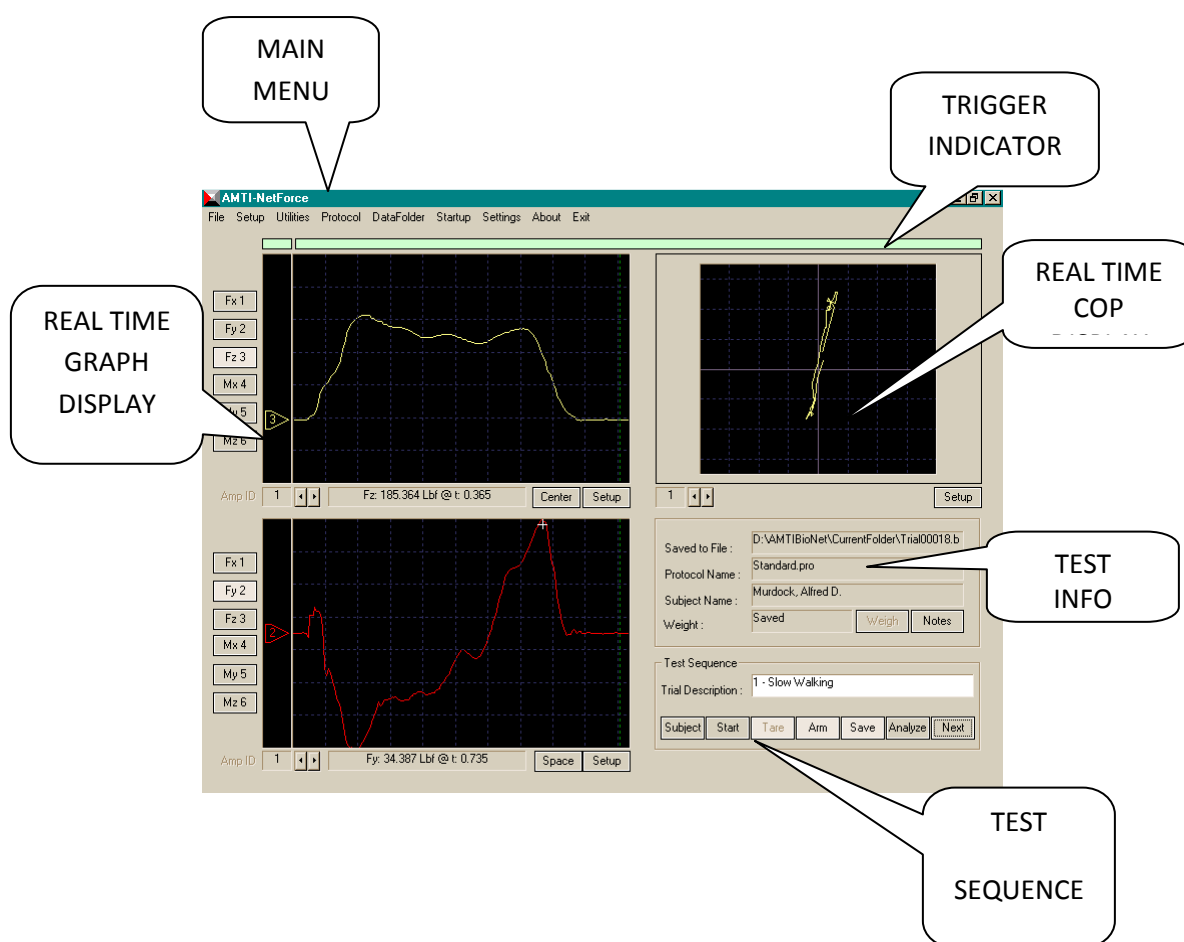
2.1 MAIN MENU OVERVIEW

The NetForce Main Menu provides selections for setup and operation of the NetForce data acquisition system.   A brief description of the Main menu choices is given here.   More detailed information is presented in section 4.0 below, and in the dialog box sections presented later in this manual.
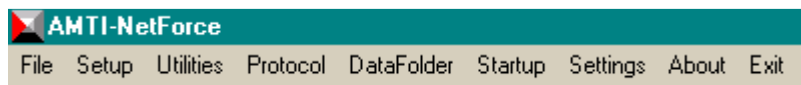
FILE

This option can be used to export data to text files and save files in binary (.bsf) format.

SETUP

This option provides access to functions for hardware setup and installation options.   It includes hardware setup, regional specific (units and date format) information, file saving and export options, external program linking and other options.

UTILITIES

This option provides access to the subject database.

PROTOCOL

This option permits the selection of a default protocol to be used for sequencing trials.

DATAFOLDER

This option permits the selection of a default folder to be used for storing data and maintaining the subject and test database.

STARTUP

This option provides several functions that prepare attached hardware for data acquisition.   The available selections depend on the installed hardware.

SETTINGS

This option provides dialog boxs to set parameters for data acquisition, triggering and display.

ABOUT

This option provides the software version number (important for support) and copyright.

EXIT

       This will allow you to Exit from the program.   A message box will ask if you want to save the current settings.   Responding yes will save all of the display and acquisition settings so that they will become the defaults when the program is restarted.

2.2 REAL TIME GRAPH DISPLAY

There are two real time graph displays located one above the other on the left hand side of the Main Screen.   These graphs display the force and moment signals in real time as the data is acquired from the data acquisition system.   Each graph display is controlled by several buttons and controls located around the margins of the display.   The functions of the various controls are discussed in the following paragraphs.
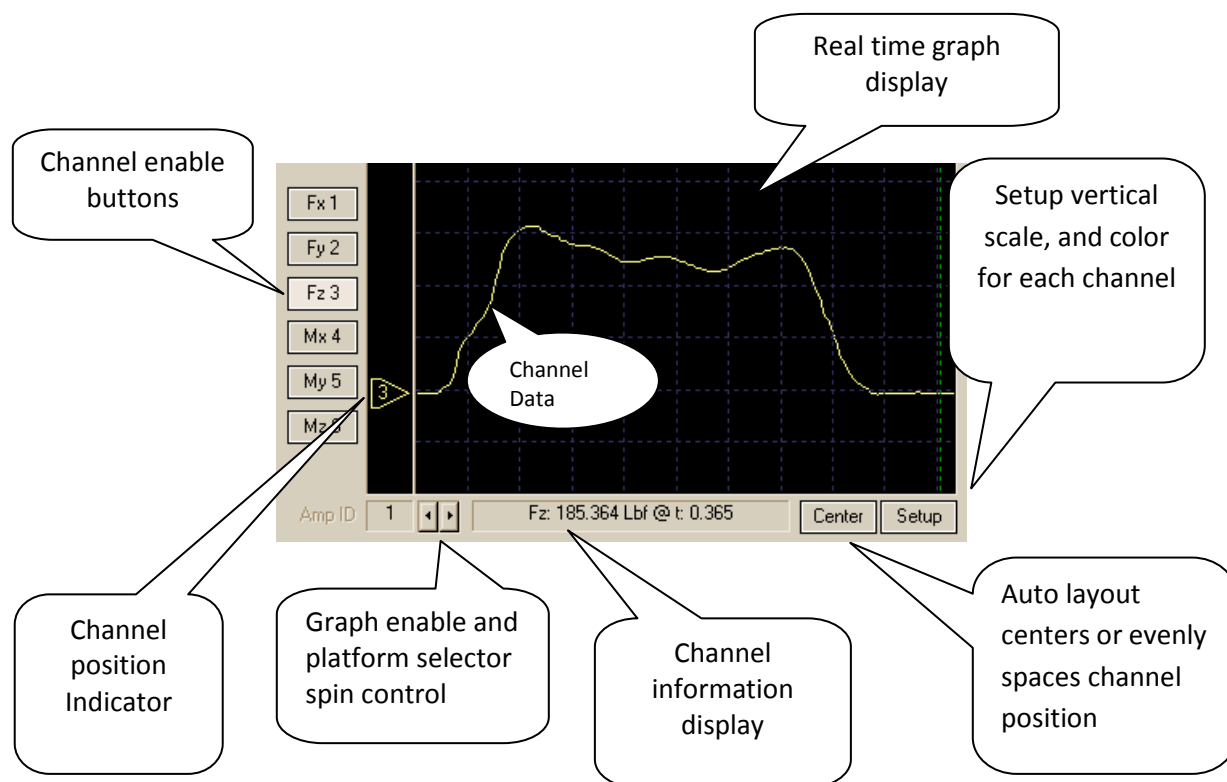
2.2.1 CHANNEL ENABLE BUTTONS

The Channel Enable Buttons are used to enable or disable the display of individual channels. There are six buttons corresponding to the platform's six force and moment axes.   A single left mouse click will toggle the selected channel on or off.   Note that for best performance with slower speed computers it is advisable display as few channels as possible.

2.2.2 CHANNEL POSITION INDICATOR

The data display for each channel can be positioned vertically as follows. Position the mouse cursor over the Channel Position Indicator and press the left mouse button; while holding the left button down drag the indicator to the desired vertical position. Release the mouse button when the desired position is attained.

The Channel Position Indicator indicates the zero position for the associated channel. The Auto Layout button, which is labeled "Center" in the above figure, can be used to automatically center all the displayed channels on the screen or to disperse the enabled channels at regularly spaced intervals. The Auto Layout button's label toggles from Center to Space each time it is pressed.

2.2.3 GRAPH ENABLE AND PLATFORM SELECTOR SPIN CONTROL

The Graph Enable and Platform selector spin control allows you to select any one of the installed amplifiers or platforms for real time display. The two arrows next to the spin control will cycle the displayed value from 0 to n where n is the number of platforms (or amplifiers) that you have installed using the Hardware installation dialog box.

When 0 is selected that graph display will be disabled. When any other number is selected, then the channels of data from the corresponding platform or amplifier will be available for display. Note that during data acquisition all of the data from all of the installed instruments is gathered even if the installed hardware is not enabled for display.

Note for DT3002/Dt3034 users.

AMTI's multi axis instruments and AMTI's amplifiers are six channel instruments and hence the NetForce software is organized to provide convenient selection and display of six channel devices. However in analog modes, when using a 32 channel DT3002/DT3034 data acquisition card, third party instruments may be installed that provide more than six channels of outputs. Such devices would be installed in blocks of six channels and would be viewed in blocks of six channels as described above.

2.2.4 CHANNEL INFO DISPLAY

Under each of the Real Time display graphs is the Channel Information display. This display may be activated by double right clicking the mouse in the vicinity of the channel data displayed on the graph. This feature is recommended for use once the data display has been stopped. If it is used during real time display the display may become jerky or erratic.

Once a channel has been selected a cross hair cursor will be displayed on the screen. You may drag the cursor across the screen and it will follow the data displayed for the selected channel. The Channel Information display will show you the data amplitude (in the selected vertical units) and the time relative to the beginning of the display window.

To deselect the channel again double click the mouse in the vicinity of the channel of interest.   The cross hair will disappear and the channel will be deselected.

2.2.5 SETUP BUTTON

The Setup button opens a dialog box in which you may set the vertical scale and chose the color of the displayed data channel.

2.3 COP GRAPH DISPLAY

     The COP Graph display shows the center of pressure as calculated from the Mx and My moments and the Fz force in real time.   The effects of the Fy and Fx shear forces are neglected for the purpose of this display.   This display is enabled by use of the spin control as described above.   Setup and display options are available by pressing the Setup button.

Real Time COP
Graph Display

| 1 | ◀ ▶ |

Setup

Graph Enable and
Platform Selector
spin control

COP
Setup
Button
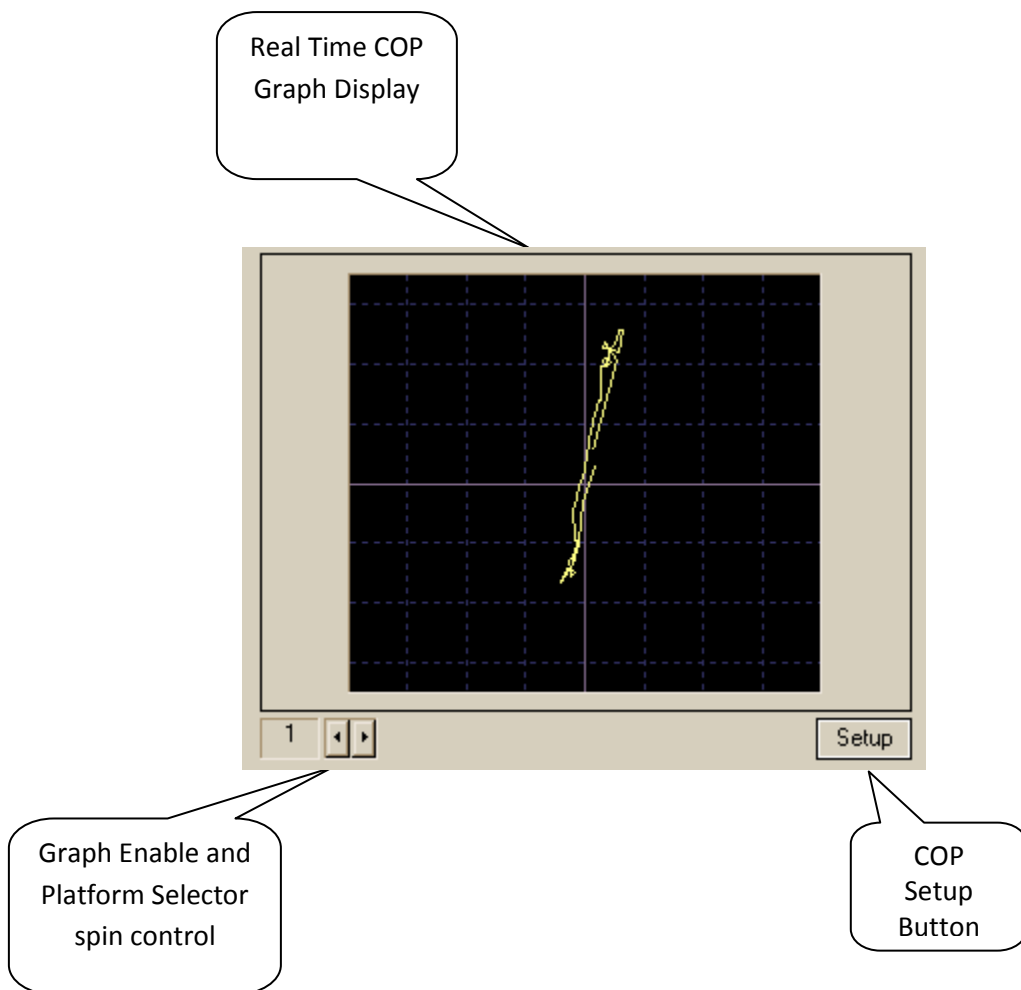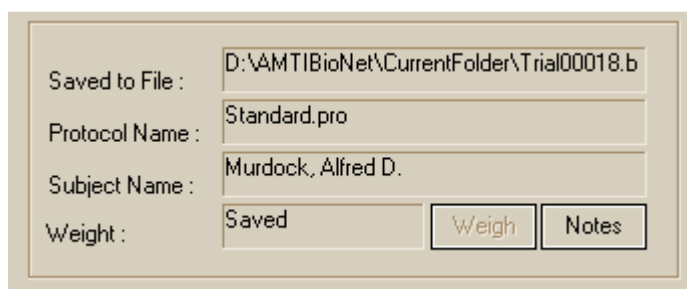
2.4 Trigger Indicator

The Trigger Indicator indicates when a trigger event has been detected.   The small pane on the left flashes when the event has been detected and the long bar on the right indicates the progress toward completion of the required sample duration.

2.5 Test Information Display

The Test Information Display is a text display comprised of four text cells and two control buttons.   The top text cell, labeled Saved to File, shows the path and the file name to which data was last saved.   The next cell, labeled Protocol Name, shows the name of the currently selected protocol file, which is used to govern the test sequence.   The Subject Name cell indicates the currently selected subject.

On the bottom of the Test Information Display are two control buttons (*Weigh* and *Notes*) and the Weight text cell.

The *Weigh* button is used to weigh the subject.   This button is enabled only after the *Start* and *Tare* buttons have been pressed in the Test Sequence button group thus assuring that the system has been properly tared prior to taking a weight measurement.   The resulting weight is displayed in the Weight text cell.

The *Notes* button is active only if a subject has been selected.   The *Notes* button allows you to view, edit and append a note file for each subject that is attached to the subject database.

2.6 TEST SEQUENCE BUTTON GROUP

The Test Sequence button group provides the operating controls for acquiring and saving data. The normal sequence of operation is outlined following:

IMPORTANT NOTE

Before you start collecting data as described in steps 1 through 12 below you should select the Startup selection from the main menu.   The startup sub menu presents three options that are enabled appropriately to match your hardware installation. The three options are:

HARDWARE ZERO

This option is enabled for almost all installations.   This option causes the attached hardware to perform an internal "auto zero" which eliminates most of the offset caused by thermal drift of the hardware components.

SYSTEM CHECK

This option is enabled only for DigiAmps.   The function interrogates all of the installed amplifiers to make sure they are on line and functioning properly.

SYSTEM CALIBRATION

This option is enabled only for DigiAmps.   The function causes the DigiAmps internal 16 bit A/D to perform a calibration procedure to provide the most accurate data.

For the highest accuracy, all of the enabled options above should be activated once when the amplifiers have been turned on, again after about an hour when the amplifiers have warmed up, and perhaps once a day thereafter (while the amplifiers remain on).

Once the Startup procedures have been accomplished you may begin acquisition by following steps 1 through 12 below.

1) Press the *Subject* button to select or enter a new subject

2) Press the *Start/Stop* button to start the real time data acquisition process and to initialize the protocol sequence.   Note that the first trial required by the protocol will be displayed in the Trial Description edit box.

3) With the subject standing off the platform press the *Tare* button.

4) If you now want to weigh the subject have the subject stand quietly on the platform and press the *Weigh* button. *This step is optional*.

5) Have the subject stand off the platform and position him/herself properly for the beginning of the trial.

6) Press the *Arm* button.   This readies the trigger logic in anticipation of a trigger event.

7) Have the subject perform the trial such as walking across the platform.

8) The trigger logic will sense the trigger event and will stop the data acquisition process accordingly.

9) View the data on the screen, if it is acceptable then press the *Save* button.   If it is not, then repeat the process beginning with step 2 above.

10) You may press the *Analyze* button to analyze the saved data with AMTI's BioAnalysis software.   This step is optional as you may later analyze multiple trials in BioAnalysis.

11) Press the *Next* button to increment to the next step in the protocol.

12) Repeat steps 2 through 11 until all of the required trials (as specified by the protocol) have been completed.

At any point during this process while the subject is selected you may use the *Notes* button to make comments about the subject's performance.

Whenever a subject is selected the system will follow the trial sequence specified by the protocol file.   If all of the trials specified in the protocol file have been completed then the system will simply append additional trials to the subject's entry in the database and the data files will be saved normally.   This allows you to use a protocol file to specify the required trials but permits you the flexibility to break away from the protocol if so desired.

If you chose to perform trials in an order other then that specified in the protocol file, you may press the *Next* and *Start* buttons successively until the desired trial is displayed in the Trial Description edit box.   Once the desired trial is displayed then continue on with steps 2 through 11 above.

If you do not select a subject then you may still acquire and save data but the process no longer follows the sequence of trials specified in the protocol file.   In this case you can perform steps 2 through 10 above, omitting steps 4 and 11 as they become irrelevant if a subject is not selected.   Data acquired in this manner will be saved normally but there will be no subject information saved to the header of the data file (this means that the user must manually record the trial description, file name etc.) and no entry will be made in the subject database.   Thus if no subject is selected the responsibility of keeping track of the trials and data files is relinquished to the operator but data may be acquired and saved normally.   This is particularly useful for evaluation and setup operations while you are trying to get things going properly.

3.0 NETFORCE OPERATION

3.1 ACQUIRING DATA

The *Start* button in the *Test Sequence* button group is used to start and stop data acquisition. Once the **Start** button is pushed data is acquired continuously until either the *Stop* button is pressed or until a trigger event is detected if a trigger mode is enabled.

The Data Rate (in datasets per second) and Duration (in seconds) settings, which are accessed through the main menu selection *Settings* and the sub menu selection *Acquisition Settings,* set respectively, are the rate at which data is acquired from the installed hardware and the duration of the data sample.

Once the *Start* button is pressed data is written into a circular buffer in the computers memory in a continuous manner. After the set duration has been reached old data is discarded and new data is added to the circular buffer. In this manner the latest t seconds of data is retained in memory (where t is the duration specified in Acquisition Settings).

This process is brought to a halt when the *Stop* button is pressed or when a trigger event is detected. The *Stop* button stops the data acquisition process immediately whereas trigger event detection allows the acquisition process to continue for a user specified amount of time.

The trigger event detection is controlled by selecting the main menu choice *Settings* and the sub menu choice *Trigger Settings* which will display the *Trigger Method* dialog box.

The value set in Trigger Position controls the amount of data that will be recorded prior to the trigger, and by default, the amount of data that will be recorded following the trigger event. As an example if the Duration is set to 1.0 second and the Trigger Position is set to 5 % then 0.05 seconds of data prior to the trigger will be stored and 0.95 seconds of data following the trigger will be stored. This provides a flexible mechanism to capture data around the event of interest.

3.2 SAVING FILES

AMTI NetForce provides several methods to save files and two different types of files may be created.

The file types created are binary (.bsf) files referred to as BSF files, and text files. The BSF files are compatible with AMTI's BioAnalysis program and a full description of the file structure is provided in **Appendix B – Data File Format**.

Text files are comma delimited text files with a column of data representing each channel of the installed hardware. Each row of data comprises a data set taken at a single instant in time (various hardware front ends will actually have some small amount of channel to channel skew, please see your hardware manual for more information).

The several methods to save files provide different levels of automated functionality.   Each of these methods is discussed below.

• From the main screen press the *Save* button in the test sequence box

This method creates BSF files, which are compatible with AMTI's BioAnalysis software and future utilities offered by AMTI.   If a subject is selected this method also updates the subject database with an entry indicating the trial description, date, and data file name all of which is attached to the selected subject.   This makes the process of maintaining a list of trials and subject information simple. The subject database can then be used in the future to lookup and display the attached data files.

• From the main menu select **File** then *Save BSF File*

This method also creates BSF files, which are compatible with AMTI's BioAnalysis software, but no entry is made in the subject database.

• From the main menu select **File** then *Export Data File*

This method creates a text file that may be read by a spreadsheet or text editor.

In all three of the file save methods described above, data files will be placed in the currently selected data folder.   The *DataFolder* selection on the main menu allows you to select a new default data folder.   This folder will remain active until another folder is selected.   The *Data Folder* button on the Subject Management screen has the same effect but it also allows you to quickly navigate to different folders to view and edit subject data.

If you are using the subject database feature an independent database will be maintained in each data folder and hence the data folders provide the root level of organization for your data files.

SUGGESTED FOLDER ORGANIZATION

• For compatibility with BioAnalysis ver 2.0

For best compatibility with BioAnalysis version 2.0 and earlier it is recommended that a new data folder be created for each subject tested.   The folder name should in some manner indicate the name and date of the examination.   Versions of BioAnalysis 2.0 and earlier do not have the capability of reading the subject database and organization of your data files is best accomplished using a per-subject data folder.   In this case the subject database in each folder will simply contain a listing of the trials for that single subject.

• For compatibility with BioAnalysis ver 2.1 and later

Version 2.1 of BioAnalysis was available for release in Sept. of 2001.   From this version forward BioAnalysis will supported use of the subject database.   In this case the best way to organize your database is around broad groups of subjects.   For instance in a research environment you might create

a folder for a specific research project or perhaps separate folders for a normal population and another for subjects with the pathology under study.   Although the theoretical limits for the number of subjects in a database and the number of files in a folder is extremely high, very large databases will slow things down.   As a benchmark we tested 1000 subjects and trials in a database on a 400 MHz PC with good results.

DATA FILE NAMES

NetForce provides two methods of naming files, which are independently controlled for BSF files and exported text files.   The *Auto* mode automatically names files by integrating a prefix and an automatically generated sequential number.   No file save dialog box is displayed when in this mode. The *Manual* mode displays a file save dialog box prior to saving the file, and allows the user to enter his/her own choice of file names.

Settings for file naming are available by choosing the main menu selection *Setup* and the sub menu selection *Export and File Options*.   This will display the *File Management Options* dialog box. On the left side of this dialog box are two sections labeled *BSF File Options* and *Export Options*.   Within these sections you will see check boxes titled *File Name Mode* that can be set to *Auto* or *Manual* mode. You will also see in these sections edit cells for *File Name Prefix* and *File Seed Number*, which as mentioned above, are used to automatically generate new file names.

3.3 SELECTING A SUBJECT

As previously mentioned the *Subject* button in the Test Sequence button group is used to access the subject database and permits you to select an existing subject or enter a new subject.   The *Subject* button also allows you to access the subject database to edit subject information and to perform database house cleaning.   These later functions are described in the Subject Management dialog box section of this manual.

When a subject is added to the database a protocol file is attached to that subject's entry in the database.   When you select a subject a message box will ask if you want to use the subject's protocol or the default protocol (if the two protocols are different).   If you chose to use the subject's protocol then it will be set as the default.   If you want to conduct tests on a subject using a different protocol it is best to create a new subject entry using the Copy function provided in the Subject Manager.   This two-step process allows you to select the desired subject, press the Copy button then use the Protocol Browse button to select a different protocol.

3.4 USING PROTOCOLS

The protocol file maintains a list of trial descriptions, which form an examination or complete test when the trials are run in sequence.   This list of trials guides the sequencing of the testing process by appropriately prompting the operator when it is time to perform the next trial and by providing a brief description of the required trial.

The protocol file may be selected directly by using the main menu selection *Protocol* and the sub menu selection *Select/View Protocol.* The protocol may be selected indirectly by selecting a subject as described in section 2.7.3 above.   In either case the selected protocol will become the default and will remain active until another protocol is selected.

The protocol is only used if a subject is selected.   If no subject is selected you may acquire and save data but the test sequencing will not be active and the protocol is simply bypassed.

The protocol file also maintains the Data Rate and the trial Duration data acquisition parameters.   When a protocol file is selected directly using the main menu or when a protocol file is selected by selecting a subject these values override the settings you have made by selecting Acquisition Settings from the Settings pull down menu.

3.5 SUGGESTED SETTINGS

The following settings are suggested to get things going, feel free to use the flexibility of NetForce to setup a test methodology that fits your own needs.

SUGGESTED SETTINGS FOR SINGLE PLATFORM GAIT

1) Select *Settings* from the main menu then *Acquisition Settings* from the pull down menu.   The *Horizontal Time Base* dialog box will be displayed.

Set *Duration* to: 1 second

Set *Data Rate* to: 1000 (for DigiAmp, Gen 5, and Analog installations) or

200 (for AccuGait and MiniAmp installations)

Leave the rest of the settings at their default values but check to make sure the *Mode* is set to Recurring.

2) Select *Settings* from the main menu then *Trigger Settings* from the pull down menu.   The *Trigger Method* dialog box will be displayed.

Under *Event Type*

Check: *by Channel Level*

In *Level Event*

Set *Amp ID* to: 1

Select *Channel*:   3-Fz

Set *Level* to: 5 lbf

Select *Edge*:   Rising

In *Acquisition Parameters*

Set Trigger Position to: 5 %

Select *OK*

3) Select *Settings* from the main menu then *Graph 1 Setup* from the pull down menu.   The *Vertical Scale* dialog box will be displayed.   Under the Units/Division heading locate the Fy and Fz channels.

Set *Fy* to: 10

Set *Fz* to: 50

Select *Units* :   lbf

Select *OK*

4) On the main screen

Use the Graph Enable and Platform Selector Spin Control to set Graph 1 and Graph 2 to *Amp ID* 1.   Use the Channel Enable Buttons to disable all but Fz on Graph 1 and all but Fy on Graph 2.   Use the Channel Position Indicator to position the Fy and Fz plots at the desired location.

5)   Follow the steps in 2.6 above to capture a set of gait data.

SUGGESTED SETTINGS FOR TWO PLATFORM GAIT

1) Use the same acquisition and trigger settings as above but in *Acquisition Settings* set *Duration* to 2 seconds.

2) Use the Graph Enable and Platform Selector Spin Control to set Graph 2 to *Amp ID* 2.

3) Use the Setup button for Graph 2 to set Fz to 50 lbf per division.

4) Use the Channel Enable Buttons to disable all but Fz on Graph 2.

SUGGESTED SETTINGS FOR BALANCE

1) Select *Settings* from the main menu then *Acquisition Settings* from the pull down menu.   The *Horizontal Time Base* dialog box will be displayed.

Set *Duration* to: 20 seconds

Set *Data Rate* to: 50

Select *OK*

2) Select *Settings* from the main menu then *Trigger Settings* from the pull down menu.   The *Trigger Method* dialog box will be displayed.

Under *Event Type*

Check: No Trigger

Select *OK*

3) Use the Platform Selector Spin Control to set the COP plot to *Amp ID* 1.

4) Use the COP setup button to setup the COP plot.

3.6 WEIGHING A SUBJECT

In the Test Sequence button group, press *Subject*, select, or enter a new subject. Press the *Start* button followed by the *Tare* button. Have the subject stand quietly on the platform and press the *Weigh* button. A message box will be displayed asking if you want to save the weight for the current subject, press yes. The weight will be saved to the subject database for the selected individual.

3.7 THE ANALYZE BUTTON

The Analyze button provides an interface to run AMTI's BioAnalysis Software. Advanced users with programming knowledge can use this button to run programs of their own design.

To configure the analyze button, from the main menu select *Setup*, in the sub menu select *Export and File Options*, this will open the *File Management Options* dialog box. On the right side of the screen you will see a group of controls labeled *Analysis Link*. The Analyze button will run any program that is entered in the Program edit box. The full path, for example "C:\AMTINetForce\BioAnalysis.exe", of the program must be entered.

3.8 RE-DOING A TRIAL

From time to time it is necessary to redo a trial. If you are working through the Test Sequence buttons and have not yet pressed the *Save* button then simply go back to the *Start* button and repeat the sequence.

If you have already saved the trial and you want to redo it, then you must highlight the trial in the subject database by single left clicking on it, and then press the *Select* button to select it. A message box will be displayed asking if you want to display the trial or redo the trial. Follow the on screen instructions to redo the trial. If you then follow through the normal trial sequence control you will be returned to the next unfinished trial in the protocol when the *Next* button is pressed.

4.0 MAIN MENU

The main menu choices activate pull down sub menus, which provide a variety of functions and setup options. The various selections are discussed below.

4.1 FILE SUBMENU
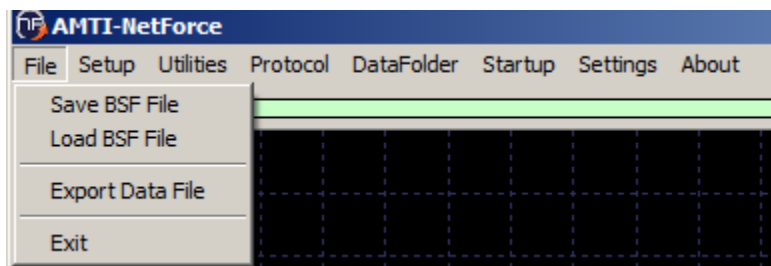
SAVE BSF FILE

This selection saves the data displayed on the screen to a BSF file, which is compatible with AMTI's BioAnalysis software. No entry is made in the subject database.

LOAD BSF FILE

This selection opens a file open dialog box and allows you to navigate to the file of choice. When the file is opened it is displayed on screen as if it had just been acquired. If you press the Start button the displayed data is cleared but the file remains intact in its original form.

EXPORT DATA FILE

This selection saves the data displayed on the screen to a text file, which may be read by a spreadsheet or text editor. The text files are comma delimited with a column of data representing each channel of the installed hardware. Each row of data comprises a data set taken at a single instant in time (various hardware front ends will actually have some small amount of channel to channel skew, please see your hardware manual for more information). The numerical values are represented in the selected system units and the tare values have been subtracted from the data.

The two file save menu choices described above place data files in the currently selected data folder. The *DataFolder* selection on the main menu allows you to select a new default data folder. This folder will remain active until another folder is selected. The *Data Folder* button on the Subject Manager screen has the same effect but it also allows you to quickly navigate to different folders to view and edit subject data.

The **Exit** selection exits from the program.   A message box will ask if you want to save the current settings.   Responding yes will save all of the display and acquisition settings so that they will become the defaults when the program is restarted.

4.2 SETUP SUBMENU

The Setup submenu has several choices that are used to setup various system options. These choices are discussed below.
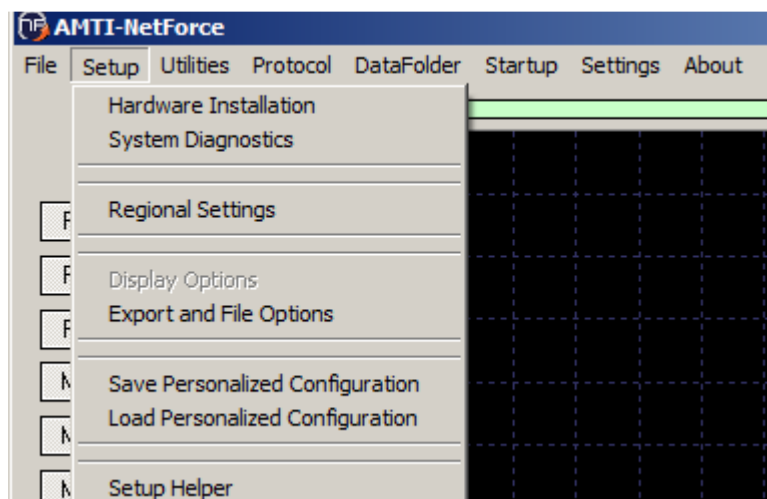
HARDWARE INSTALLATION

The *Hardware Installation* selection opens the *Hardware Installation* dialog box and permits the user to install new hardware or modify the existing installation. Please see section 16.0 - Dialog Box: *Hardware Installation* for more information.

SYSTEM DIAGNOSTICS

The *System Diagnostics* selection opens the *Diagnostics* dialog box and performs an evaluation of the hardware and software system. Please see section 20.0 - Dialog Box: *Diagnostics* for more information.

EXPORT AND FILE OPTIONS

The *Export and File Options* selection opens the *File Management* dialog box. This dialog box permits the user to establish the various file naming options and to setup the system to link to external programs. Please see section 21.0 - Dialog Box: *File Management Options* for more information.

SAVE PERSONALIZED CONFIGURATION

The *Save Personalized Configuration* selection provides a convenient way to save all of the current settings, including acquisition settings, trigger settings and screen and display settings to a personalized user named file.

LOAD PERSONALIZED CONFIGURATION

The *Load Personalized Configuration* selection loads the configuration information saved with the *Save Personalized Configuration* function described above.   When a new configuration is loaded you will be asked to exit the program to activate all of the new settings.

SETUP HELPER

The *Setup Helper* selection runs the walk through setup which is normally run the first time the program is run.   This is particularly useful when installing a new hardware system.

4.3 UTILITIES SUBMENU
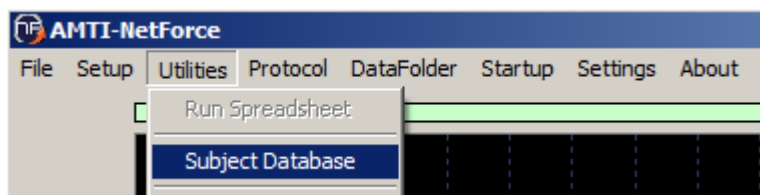
SUBJECT DATABASE

The *Subject Database* opens the *Subject Database Utilities* dialog box which provides several functions for exporting information from the subject and test database.   See section 22.0 - Dialog Box: *Subject Database* for more information.

4.4 PROTOCOL SUBMENU
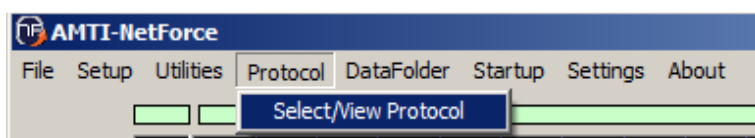
The *Protocol* selection opens the *Protocol* dialog box which allows the user to select or create a new test protocol.   The test protocol provides a list of the required trials to help standardize the testing process.   Please see section 11.0 - Dialog Box: *Protocol* for more information.

4.5 DATAFOLDER SUBMENU
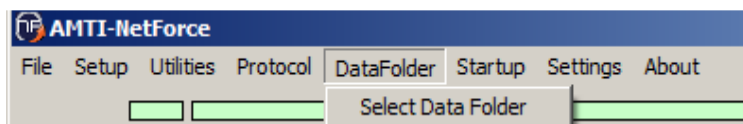
The *DataFolder* selection, shown above, allows you to select a new default data folder. This folder will remain active until another folder is selected. The *Data Folder* button on the Subject Management screen has the same effect but it also allows you to quickly navigate to different folders to view and edit subject data.

The selected data folder acts as the repository for all data files and contains the subject database for that folder. A new subject database is created for each folder the first time the subject manager is entered when that folder is selected.

4.6 STARTUP SUBMENU
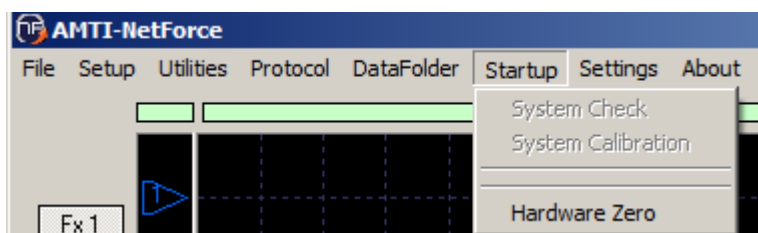
Before you start collecting data you should select the **Startup** choice from the main menu. The **Startup** sub menu presents three options which are enabled appropriately to match your hardware installation. Once you have pressed one of the options it will become checked on the menu and will remain checked until the program is restarted. The check marks serve as a reminder that you have performed the necessary startup tasks.

For the highest accuracy all of the enabled options above should be activated once after the amplifiers have been turned on, again after about an hour when the amplifiers have warmed up and then perhaps once a day thereafter (while the amplifiers remain on).

The three startup options are:

SYSTEM CHECK

This option is enabled only for DigiAmps. The function interrogates all of the installed amplifiers to make sure they are on line and functioning properly.

SYSTEM CALIBRATION

This option is enabled only for DigiAmps.   The function causes the DigiAmps internal 16 bit A/D to perform a calibration procedure to provide the most accurate data.

HARDWARE ZERO

This option is enabled for all installations.   This option causes the attached hardware to perform an internal "auto zero" which eliminates most of the offset caused by thermal drift of the hardware components.

4.7 SETTINGS SUBMENU
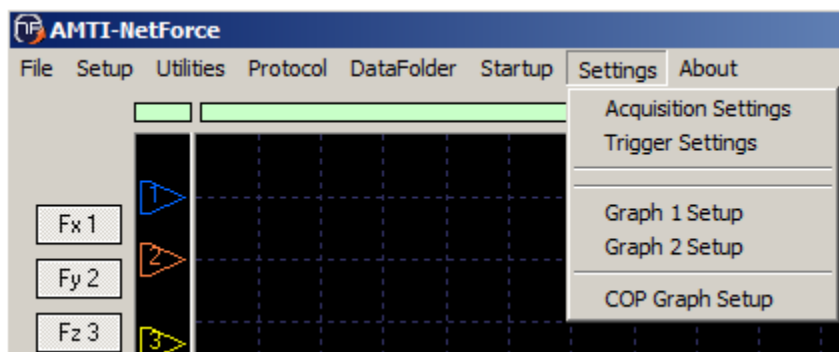
ACQUISITION SETTINGS

This menu selection opens the Horizontal Time Base dialog box which is used to set the data acquisition rate and the data sample duration.   This dialog box is explained in detail in section 6.0 - Dialog Box: *Horizontal Time Base.*

TRIGGER SETTINGS

The Trigger Settings menu choice opens the *Trigger Method* dialog box which is used to setup various trigger options.   The *Trigger Method* dialog box is described in section 5.0 - Dialog Box: *Trigger Method.*

GRAPH 1 AND GRAPH 2 SETUP

These two menu choices perform the same function as the Setup button under the real time graph displays.   In both cases the Vertical Scale dialog box will be displayed.   This dialog box includes settings for the vertical scale of the graph series as well as choice of the graph series colors.   The Vertical Scale dialog box is explained in detail in section 7.0 - Dialog Box: *Vertical Scale*

COP GRAPH SETUP

The COP Graph Setup menu selection opens the COP Graph dialog box.   This dialog box presents various settings for the COP plot and is explained in section 8.0 - Dialog Box: *COP Graph.*
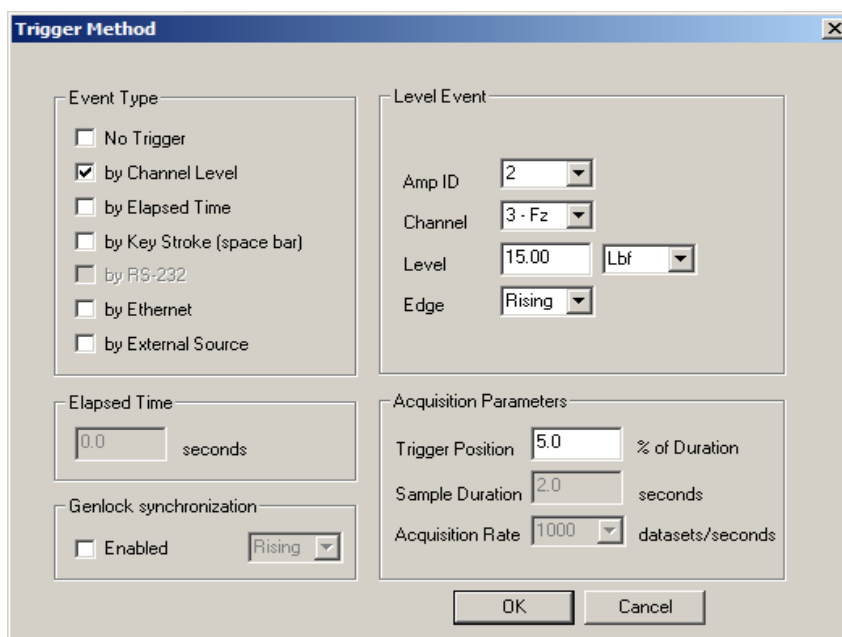
4.8 ABOUT SUBMENU

The *About* dialog box displays the software version number and copyright.   The version number is useful when you have questions about the behavior of the software.

5.0 DIALOG BOX: *TRIGGER METHOD*

The *Trigger Method* dialog box is activated by selecting *Trigger Settings* found in the *Settings* submenu located on the Main Screen.   This dialog box provides settings and controls which control the function of the trigger event detection logic.

The dialog box is organized into four groups of controls.   At the top left is the *Event Type* group; beneath the *Event Type* group is the *Elapsed Time* group.   At the top right is the *Level Event* group and under that is the *Acquisition Parameters* group.

5.1 EVENT TYPE GROUP

Event Type group consists of seven check boxes which permit the selection of different trigger sources.   These are discussed individually below.

CHECK BOX: NO TRIGGER

This selection disables the sensing of trigger events.

CHECK BOX: BY CHANNEL LEVEL

This selection enables triggering by channel level sensing.   When Channel Level is checked use the selections in the Level Event group as described below. Use the Amp ID and Channel settings to select the desired amplifier and channel to monitor for the trigger event.   Use the Level edit box and

Units combo box to set the trigger level.   Select "rising" or "falling" from the Edge combo box to specify whether the trigger event will occur when the signal rises to the set point level; or drops to the set point level.   This selection is typically used for gait applications.

CHECK BOX: BY ELAPSED TIME

This permits a delayed acquisition to occur.   The system will wait the specified time before acquiring the data.   Use the *Elapsed Time* group to set the amount of delay time in seconds.

CHECK BOX: BY KEY STROKE (SPACE BAR)

This permits triggering by key stroke.   It is recommended to use the *Space Bar* key since using the *Enter* key will exit the program.   When activated the *Space Bar* key acts as the data acquisition trigger.   This is typically used for balance applications.

CHECK BOX: BY EXTERNAL SOURCE

This selection allows triggering by an external source.   The source is dependent on the specifications of the installed hardware.   AMTI's DigiAmp, MiniAmp (using the ADI-32 Analog Data Interface), AccuSway, and AccuGait products all have the capability of accepting an input for a trigger or external sync signal.   The DigiAmp, AccuSway and AccuGait products accept a rising or falling edge CMOS 5 volt logic level signal to provide the sync pulse.   The MiniAmp using the ADI-32 accepts a switch closure for a sync input.   Using the DT-3002 setup a sync signal may be applied to the data acquisition cards digital input pins on the cards Port B.   An input on B0 corresponds to Amplifier ID 1, B1 corresponds to Amplifier ID 2, B2 corresponds to Amplifier ID 3, and B3 corresponds to Amplifier ID 4. This input must comply with the digital input specifications for the DT3002 card.

5.2 LEVEL EVENT GROUP

The *Level Event* group of controls includes five edit box and combo box controls which are enabled appropriately when a selection is made in the *Event Type* group of check boxes.   These controls are discussed below.

COMBO BOX: AMP ID

This control is used to select the source amplifier or platform for the trigger signal in multi amplifier or platform installations.   This selection applies to all trigger methods that are source dependent.

COMBO BOX: CHANNEL

The *Channel*   selection applies to level triggering only.   This selection sets the channel which will be monitored for an appropriate level transition.

EDIT BOX: LEVEL

The *Level* selection applies to level triggering only.   This entry sets the level, in the specified units, at which the trigger event will occur.

COMBO BOX: UNITS

The *Units*   selection allows the user to specify in which units the *Level* entry will be interpreted.

COMBO BOX: EDGE

The *Edge*   selection may be set to Rising or Falling.   This sets the trigger monitoring logic to detect a signal that is either rising up through the trigger level or falling down below the trigger level. Typically for gait applications "rising" would be chosen.   For applications where it is desired to determine if the platform has been unloaded a falling level can be chosen.

5.3 ACQUISITION PARAMETERS GROUP

The *Acquisition Parameters* group contains three controls which are discussed below.

EDIT BOX: TRIGGER POSITION

The trigger position edit box provides a flexible method of setting the amount of pre-trigger data and post trigger data with a single entry.   This entry is expressed as a percent of the total duration of the test.   For example if a value of 10.0 is entered then 10 percent of the data will be pre-trigger data and 90 percent of the data will be post-trigger data.

EDIT BOX: SAMPLE DURATION

The *Sample Duration* allows the user to specify the duration of the test in seconds.   The sample is the total length of the data sample.   Typically for gait the sample duration will be 1 second for a single platform, 2 seconds for 2 platforms to 4 seconds for 4 platforms.   For balance trials sample duration's of 20 to 60 seconds are chosen.   Although no limits are placed on the sample duration this setting affects the number of calculations that are necessary to update the real time data display as well as the size of the buffers necessary to acquire data.   The real limitation on sample duration is largely hardware system dependent.   If the user expects to collect data at a high data rate (>=1000 data sets per second) and for several seconds from several platforms a high performance system will be required. The *Sample Duration* setting may also be set in the *Horizontal Time Base* dialog box.

COMBO BOX: ACQUISITION RATE

The *Acquisition Rate* combo box allows the user to select the desired acquisition rate. Permissible acquisition rates depend on the installed hardware.   Please note that the system's ability to achieve these acquisition rates is computer hardware dependent.   The *Acquisition Rate* setting may also be set in the *Horizontal Time Base* dialog box.

Gen 5 Digital Acquisition Rates									
datasets per second									
2000	1800	1500	1200	1000	900	800	600	500	450
400	360	300	250	240	225	200	180	150	125
120	100	90	80	75	60	50	45	40	30
25	20	15	10						

Analog Card Acquisition Rates (Mini Amp, DT3034, DT3002)									
datasets per second									
8000	7680	4000	3840	2000	1920	1000	960	500	480
240	200	120	100	60	50				

Accusway, Accugait, Hall Effect, and MiniAmp Digital Acquisition Rates					
datasets per second					
These acquisition rates apply to MSA-6 with SN 6394 and higher, and Hall Effect products (Accu- -- and HE6X6 models) with SN 0457 and higher.					
Hall Effect Products (AccuSway, AccuGait, HE6X6)		Hall Effect Products (Two at once)		MiniAmp	
RS232 serial	Serial to USB converter	RS232 serial	Serial to USB converter	RS232 serial	Serial to USB converter
50	50	50	50	50	50
60	60	60	60	60	60
100	100	100	100	100	100
120	120	120	120	120	120
200	200	200	200	200	200
	240		240		240
	300		300		300
	400		400		400
	500		500		500
	600		600		600
	1000				1000
	1200				1200

| DigiAmp Digital Acquisition Rates									
datasets per second									
8000	4000	2000	1000	500	200	100	50		

5.4 FOOTER GROUP

BUTTON: OK
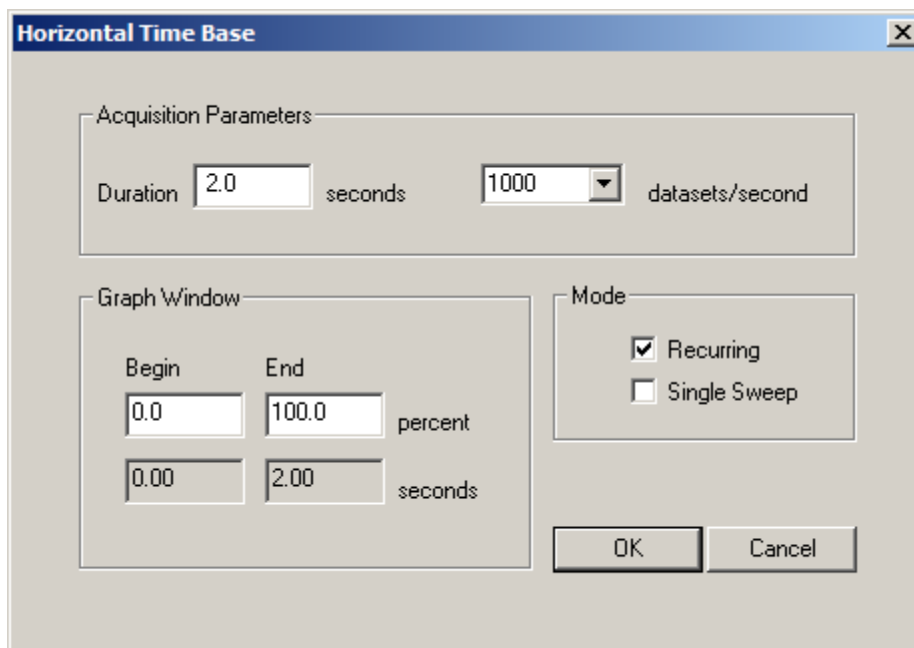
The *OK* push button saves the changes and exits the dialog box.

BUTTON: CANCEL

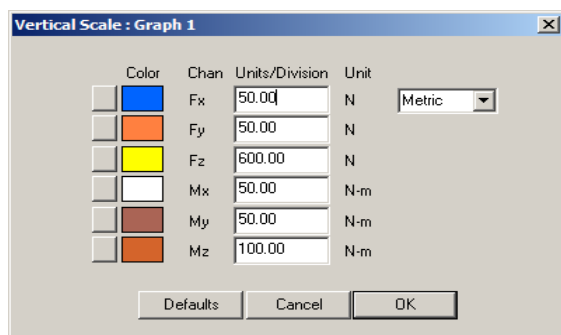The *Cancel* push button exits from the dialog box without further action.

6.0 DIALOG BOX: *HORIZONTAL TIME BASE*

The *Horizontal Time Base* is accessed by selecting *Acquisition Settings* under the *Settings* submenu found on the main screen.   This dialog box provides controls to adjust the time base of the displayed data and the duration of the data acquisition process.   The dialog box is organized into three groups of controls: *Acquisition Parameters*, *Graph Window*, and *Mode*.   The three groups are discussed below.

6.1 *ACQUISITION PARAMETERS* GROUP

The *Acquisition Parameters* group contains two controls: an edit box in which to enter the sample duration in seconds and a combo box in which to select the data rate in data sets per second. Note that these two controls have the same function as their counter parts, *Sample Duration* and *Acquisition Rate* in the *Trigger Method* dialog box.   Please refer to the *Trigger Method* dialog box discussion for additional information.

6.2 GRAPH WINDOW GROUP

The Graph Window group is located under the Acquisition Parameters group.   This group has four edit boxes organized in two columns labeled Begin and End.   These four edit boxes allow the user to specify what portion of the total duration of the data sample will be displayed in the graph window at

any time.   This creates a time zoom effect allowing a closer scrutiny of the data in the specified interval.   Also, it is useful on slower systems to reduce the amount of data displayed in the graph windows to provide improved acquisition performance.   The user enters the desired beginning point of the display window in the top edit box of the begin column as a percent and the desired ending point in the top edit box of the End column in a similar manner.   The bottom windows display the beginning and end points of the graph window in seconds.

6.3 MODE GROUP

The *Mode* group is located to the right of the *Graph Window* group.   This group has two check boxes which are discussed below.

CHECK BOX: RECURRING

Select the *Recurring* mode for continuously updated real time graphic display of data.   This mode is suitable for most applications and provides instantaneous visual feed back of the force outputs of the platform.   Once a trigger event has been detected the display will be frozen after the proper amount of post trigger data has been collected.

CHECK BOX: SINGLE SWEEP

The *Single Sweep* mode functions similarly to AMTI's earlier products.   In this mode the screen display is not updated with new data until after the trigger event has been detected. Both modes produce the same result from a data acquisition perspective; however, the *Single Sweep* is not as computationally demanding and is more suited for slower computer systems.

6.4 DIALOG BOX FOOTER

DEFAULT BUTTON: OK

The *OK* push button saves the changes and exits the dialog box.

BUTTON: CANCEL

The *Cancel* push button exits from the dialog box without further action.

7.0 DIALOG BOX: *VERTICAL SCALE*

The *Vertical Scale* dialog box is accessed by selecting the *Setup* button under one of the two Amplitude vs. Time graphs.   The scale settings made in this dialog box apply to the corresponding Amplitude vs. Time graph but the color settings apply to both Amplitude vs. Time graphs.
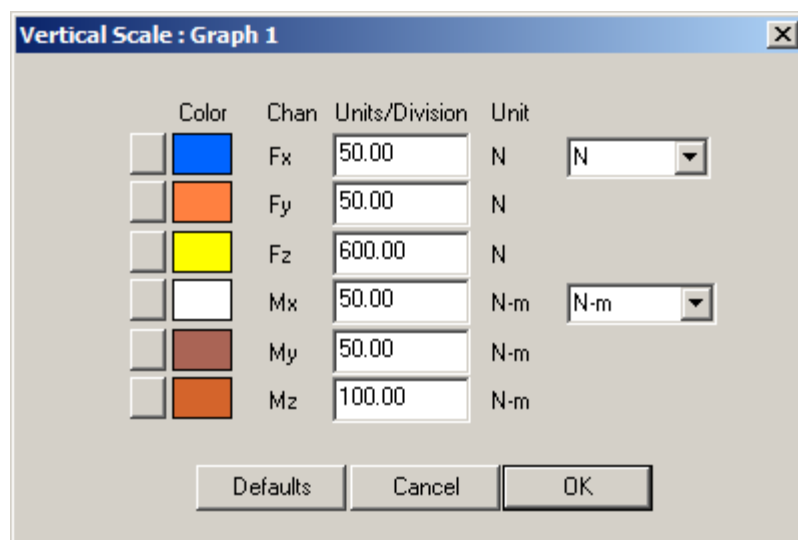
The *Vertical Scale* dialog box is organized in rows which correspond to the six channels of the graph.   From top to bottom the channels are labeled *Fx, Fy, Fz, Mx, My* and *Mz*. For usages other then AMTI force platforms and multi-axis transducers these labels correspond to channels 1, 2, 3, 4, 5 and 6 of the selected amplifier.

On the left of the screen is a column of six buttons labeled *Set* with a color sample to the right of the button.   These buttons are used to set the color of the graph series.   Pressing the set button will open the Color Dialog box in which the user can select the desired color for the graph series.

To the right center of the dialog box are combo boxes under the label *Units*. Each of these combo boxes applies to channels of data from AMTI's force platforms.   The top most applies to the force channels and has selections for English and metric force units.   The bottom combo box applies to the moment channels and has selections appropriate for English and metric moment units.   Both of the combo boxes permit settings of bits and Volts which allow the user to view the data in "raw" form.

The center column in the dialog box is *Units/Division*.   This setting, along with the *Units* setting is used to establish the vertical scale of the graph display.   The Amplitude vs. Time graphs are marked with a series of evenly spaced horizontal lines.   The spacing between any two lines is considered a division.   This setting defines how much force or moment will be required to cause a displacement of

the graph series by one division.   For example a setting of 10 with the units setting of Lbf will establish a vertical scale of 10 pounds per division and subsequently the application of a 10 pound force will cause the appropriate graph series to be displaced upward 1 division.

BUTTON: DEFAULTS

The *Defaults* push button restores all of the colors of the graph series to a set of default colors.

DEFAULT BUTTON: OK

The *OK* push button saves the changes and exits the dialog box.

BUTTON: CANCEL

The *Cancel* push button exits from the dialog box without further action.

The *Vertical Scale* dialog box is accessed by selecting the *Setup* button under one of the two Amplitude vs. Time graphs or from the **Settings** pull down menu..

7.1 GEN 5 *VERTICAL SCALE* DIALOG BOX

If the software is configured to use a Gen 5 signal conditioner the *Vertical Scale* dialog boxes will appear as shown below.   The unit types selected through the *Vertical Scale: Graph 1* dialog box will apply to all other displays as well.   The unit selections are English, metric, bits, or volts.

The Units/divisions values are entered in each displays individual setup box.
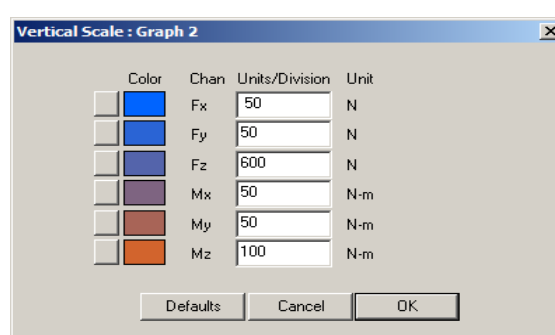
Display 1 Amplitude vs. Time graphs   Display 2 Amplitude vs. Time graphs
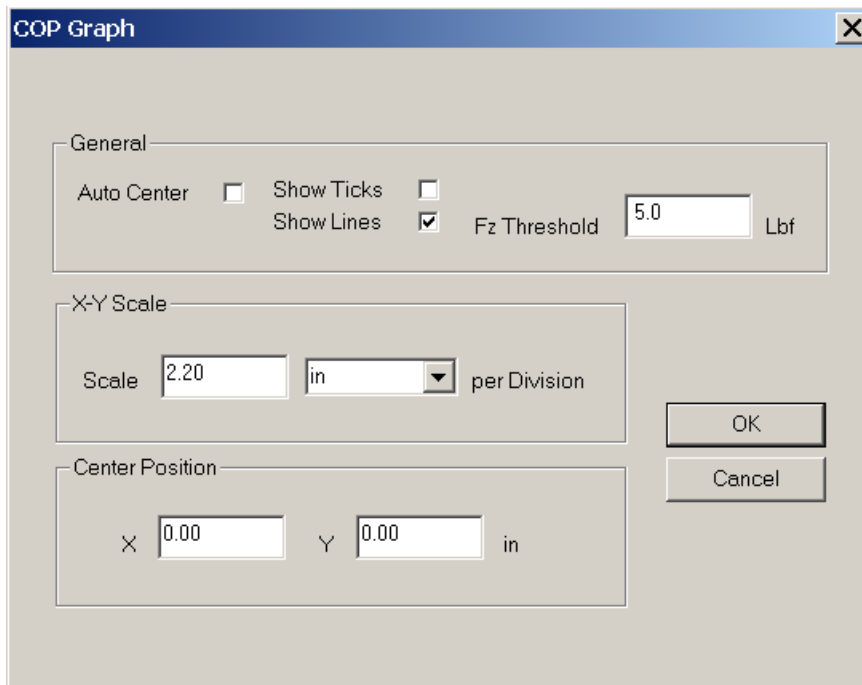
Force and Moment Units			
Channels	Label	English	Metric
1	Fx	lb	N
2	Fy	lb	N
3	Fz	lb	N
4	Mx	in-lb	N-m
5	My	in-lb	N-m
6	Mz	in-lb	N-m

8.0 DIALOG BOX: *COP GRAPH*

The *COP Graph* is accessed by selecting *COP Graph Setup* under the *Settings* submenu located on the main screen.   The *COP Graph* has several groups of settings which control the appearance and action of the COP graph.   These are discussed below.

8.1 GENERAL GROUP

The *General* group provides the following controls:

CHECK BOX: AUTO CENTER

This enables the real time centering of the COP graph based on a running average of the data. This permits a lower scale factor (and hence a higher magnification of the data) without losing the COP as the platform surface is traversed.   This setting does not affect the final storage of the data.

CHECK BOX: SHOW TICKS

Sets the COP display to be shown with individual ticks for each data point.

CHECK BOX: SHOW LINES

Sets the COP display to be shown with inter connected lines between the data points.

EDIT BOX: FZ THRESHOLD

This setting establishes a threshold Fz value under which the COP will not be displayed.   This is particularly useful for display of the COP during gait trials to prevent the plot from showing the noise that is inherent when Fz is zero.   The threshold is in English or metric units as selected in the units combo box.

8.2 X-Y SCALE GROUP

The *X-Y Scale* group includes two controls which act together as follows.

EDIT BOX: SCALE

The *Scale* edit box sets the scale in units per division for the COP graph.   A setting of 2 will display a 2 unit traversal of the COP in 1 division on the graph.

Combo *BOX: UNLABELED (UNITS) PER DIVISION*

The combo box, to the right of the *Scale* edit box, sets the units for the display in inches or cm. Changing this value will also change the units for the Fz Threshold above and the *Center Position* below.

The *Center Position* group has two edit boxes that allow the user to specify the center position of the COP plot relative to the center of the graph.   The two exit boxes are labeled *X* and *Y* corresponding the XY coordinates of the new specified center position.   These values will be interpreted in the units specified above.

8.3 DIALOG BOX CONTROLS

BUTTON: OK

The *OK* push button saves the changes and exits the dialog box.

BUTTON: CANCEL

The *Cancel* push button exits from the dialog box without further action.

9.0 DIALOG BOX: *SYSTEM CHECK*

The *System Check* is activated by selecting *System Check* from the *Startup* submenu located on the main display screen.   This dialog box is available only with DigiAmp installations. *System Check* transmits an inquiry across the Ethernet interface to determine which amplifiers are on line and compares the results to the hardware installation information.   The results of the system check are displayed in eight columns of data labeled: *Amp ID*, *Installed, On Line*, *Platform No., Platform SN, Amp SN, Cal Date* and *Version*.   If an amplifier is on line and installed the columns *On Line*, *Installed* will be marked yes and the remainder of the information will be filled in. Amplifiers that are installed but off-line will be marked accordingly.

System Check

Amp ID	Installed	On Line	Platform No.	Platform SN	Amp SN	Cal Date	Version
1	Yes	Yes	1	4908.1	1028	06\03\08	F - 1.00
2	No	No	-	--------			
3	No	No	-	--------			
4	No	No	-	--------			
5	No	No	-	--------			
6	No	No	-	--------			

Press to Continue

The *System Check* is a valuable diagnostic tool to determine if the installed amplifiers are responding.   If installed amplifiers fail to respond then make sure that all the amplifiers are powered on (indicated by the Power LED) and that the Amplifier ID is set properly using the amplifiers Key Pad and LCD menu.   After power up of the amplifier take the following steps to set the amplifier ID.

1) Wait until the amplifier LCD reads:

Main DSA Menu

A) Auto zero

2) Press the Down key once

3) The amplifier LCD will now read:

Main DSA Menu

B) Amplifier ID

4) Press the Enter Key

5) The amplifier LCD will now read:

Main DSA Menu

1 (or 2, 3, 4, 5 or 6)

6) If the proper ID is not showing on the LCD then use the Up and Down keys to cycle to the proper choice.

7) Press the Enter Key

8) The amplifier LCD will now read:

Main DSA Menu

B) Amplifier ID

9) Press the Down key five times

10) The amplifier LCD will now read:

Main DSA Menu

G) Save Settings

11) Press the Enter Key

Once the above steps have been taken the default ID of that amplifier will be saved and every time the amplifier is re-powered the ID will be restored.   This ID provides the AMTI-NetForce software with the means to identify the various amplifiers on the network.

After these steps have been taken re-select *System Check* from the *Startup* submenu again.   If no amplifiers are recognized then the installation of your TCP/IP Ethernet may be faulty.   Please refer to Microsoft's network installation instructions to better understand how to set up for TCP/IP networking.   Step by step instructions have been included in Appendix D of this manual.

10.0 DIALOG BOX: *COMMENTS*

The *Comments* dialog box is used to create, edit and attach an annotation file to the selected subject (please see section 12.0, Subject Management for additional information on how to enter or select a subject).   The *Comments* dialog box is available from the *Notes* button located on the main screen in the test info display only when a valid subject has been selected using the *Subject* button.
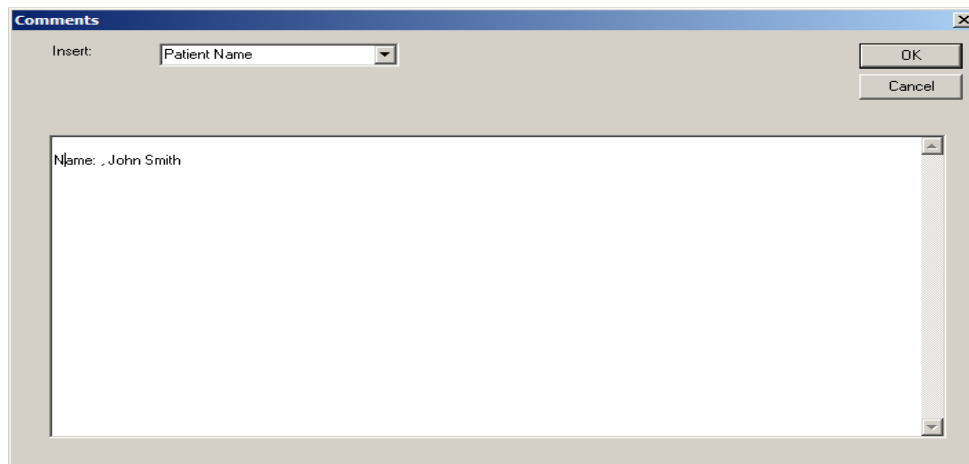
The *Comments* dialog box contains an edit box and the *Insert* combo box which are discussed below.

EDIT BOX:
You may type any desired text in the edit box and upon pushing the OK button that text will be saved into a text file and will be attached to the selected subject in the subject database.   Upon future activation of the *Notes* button the proper comment file will be loaded and displayed for the currently selected subject.   The comment files will be saved into the current folder.

COMBO BOX: INSERT
The *Insert* combo box contains a list of insertable items which when selected will automatically insert text into the comment file at the end of the current text.   You may insert the subject name, date and time or full subject and test information.

BUTTON: OK
The *OK* push button saves the changes and exits the dialog box.

BUTTON: CANCEL

The *Cancel* push button exits from the dialog box without further action.

11.0 DIALOG BOX: *PROTOCOL*

The *Protocol* dialog box is accessed from the *Protocol* button in the Main Menu.   This button is available only in the biomechanics version of AMTI-NetForce.
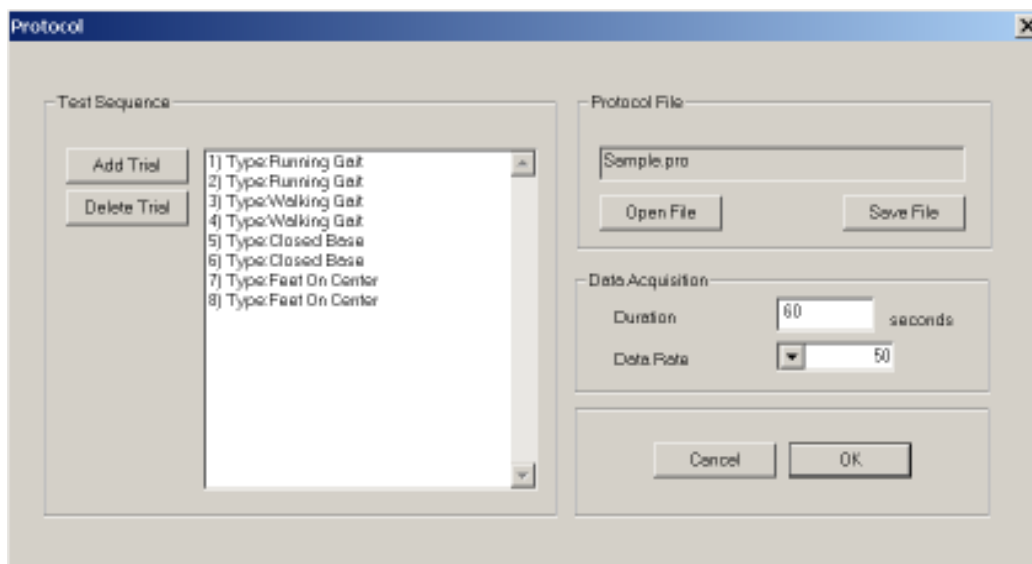
The selected protocol defines a sequence of trials which is to be followed by the examiner to help standardize the testing process in multiple trial tests.   The current trial description is displayed in a display box in the *Test Sequence* group above the control buttons immediately after *Start* is pushed. Each time a trial is completed and the *Next* button is pushed the trial description is updated to show the next trial in the protocol.   The trial description is saved in the data file and in the subject database along with the data file name for future examination and retrieval of data.   After all of the trials have been completed the *Next* button will prompt for the next subject.

A text file is provided to create a list of standardized trial descriptions which in turn can be selected and added to a given protocol.   This file is named TrialList.txt and it is located in the AMTIBioNet directory.   This file may be edited with MS WordPad or other text editor which has the capability of saving a raw text file in ASCII format.   This file provides a flexible source of trial names for the user.   Several rules must be observed when modifying this file.   The file can be extended with new entries at any time; however, if entries are removed then the system will no longer be able to properly resolve references to those entries.   This will cause the message Not Available to appear where the trial description would normally be observed.   Similarly do not reorganize the entries. New entries should be added to the end of the file only.   And finally the entries must be limited to 20 characters in length, longer lines will be truncated.   Note that the Select Trial dialog box available using

the Add Trial button can be used to add trial names to the TrialList.txt file.   Please see section 24.0 - Dialog Box: *Select Trial* for additional information.

Please note that TrialList.txt file provides a standardized list of trial names that the user can modify.   When building a protocol file the user in turn selects items from this list and enters them in the protocol file to define the sequence for that particular testing process.   The *Protocol* dialog box allows the user to conveniently build and edit a protocol file based on the entries in the TrialList.txt file.

The default protocol is loaded when the system is started.   A new default protocol may be set using the *Protocol* button in the main screen to access this dialog box.   Use the *Open File* button to view and select the desired protocol file.   Once selected, press the *OK* button to save the protocol as the default.

When a subject is selected from the subject data base the protocol file that was in effect when the testing occurred is determined.   The user is asked if they want to use the subject's protocol file or to use the default protocol file.   If the user elects to use the subject's protocol then that protocol will remain in effect until either a new protocol is selected or until the next session when the default protocol will be reloaded.

The following controls are found in the *Protocol* dialog box.

11.1 PROTOCOL FILE GROUP

BUTTON: OPEN FILE

Opens the Windows *File Open* dialog box which provides a list of existing protocol files.   A default entry, "Standard.pro" is available when the system is first started.   Once selected the protocol will be displayed in the *Test Sequence*   edit box and the file name will be displayed in the edit box directly above the *Open File* and *Save File* buttons.

BUTTON: SAVE FILE

Opens the Windows *File Save* dialog box which allows the user to save the file under a user specified name.   Note that protocol files are always saved in the NetForce root directory (i.e. the directory in which the executable program resides).

11.2 TEST SEQUENCE GROUP

Button: *Add Trial*

The *Add Trial* button opens a list box with a list of trial descriptions obtained from the TrialList.txt file.   The user may select one of the trial descriptions and add it to the Protocol list. Please see section 25.0 -- Dialog Box: *Select Trial* for more information.

BUTTON: DELETE TRIAL

The *Delete Trial* button removes the currently selected trial from the Protocol list.   Use the mouse to select a trial in the Test Sequence edit box.

EDIT BOX: TEST SEQUENCE

The *Test Sequence* edit box displays the sequence of trials for the selected protocol file.   This list may be modified by using the *Add Trial* and *Delete Trial* buttons.

11.3 DATA ACQUISITION GROUP

COMBO BOX: DATA RATE

The *Data Rate* combo box is provided as a convenience to display the required test data rate. Please note that different hardware installations are capable of different data rates.   It is possible if hardware installations are changed that this setting may not be achievable by the installed hardware. Because of this it is necessary to manually set the current *Data Rate* and *Duration* in the *Horizontal Time Base* dialog box described in section 6.0.

EDIT BOX: DURATION

The *Duration* specifies the test duration for all of the trials in the selected protocol.   The comments in the *Data Rate* section above apply.

11.4 DIALOG BOX CONTROLS

BUTTON: OK

The *OK* push button makes the currently selected protocol the default protocol and exits the dialog box.   The default protocol will remain in effect until a different protocol is selected.

BUTTON: CANCEL

The *Cancel* push button exits from the dialog box without further action.

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11.5 DIALOG BOX: *SELECT TRIAL*

The *Select Trial* dialog box is accessed by selecting *Add Trial* from the *Protocol* dialog box discussed in section 11.0.   This dialog box is used to add new trials to the protocol and to add new trial descriptions to the TRIALTYPE.TXT file.   A list of currently available trial types is displayed by opening the list attached to the combo box.   Any of the currently available types may be selected and copied to the Protocol file by selecting the *OK* button.   Each of the buttons is discussed below.
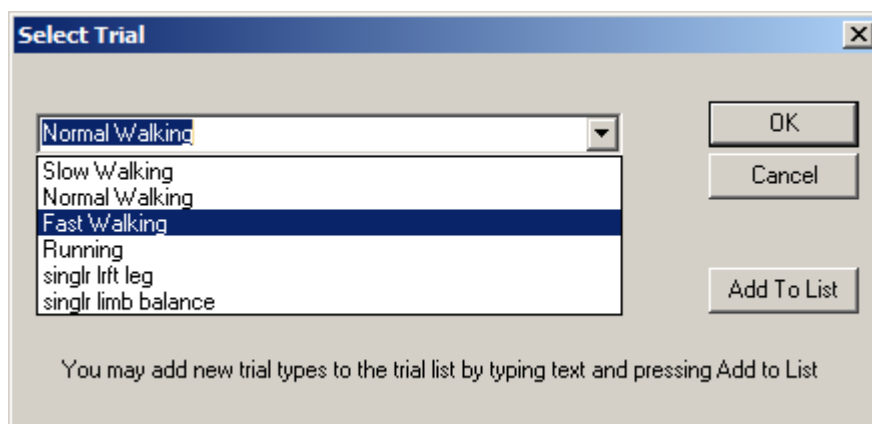
BUTTON: ADD TO LIST

        The *Add to List* button adds the text entered in the combo box edit window to the list of available trial types.   This button does not add the item to the Protocol, it simply makes the trial description available for future reference.

BUTTON: OK
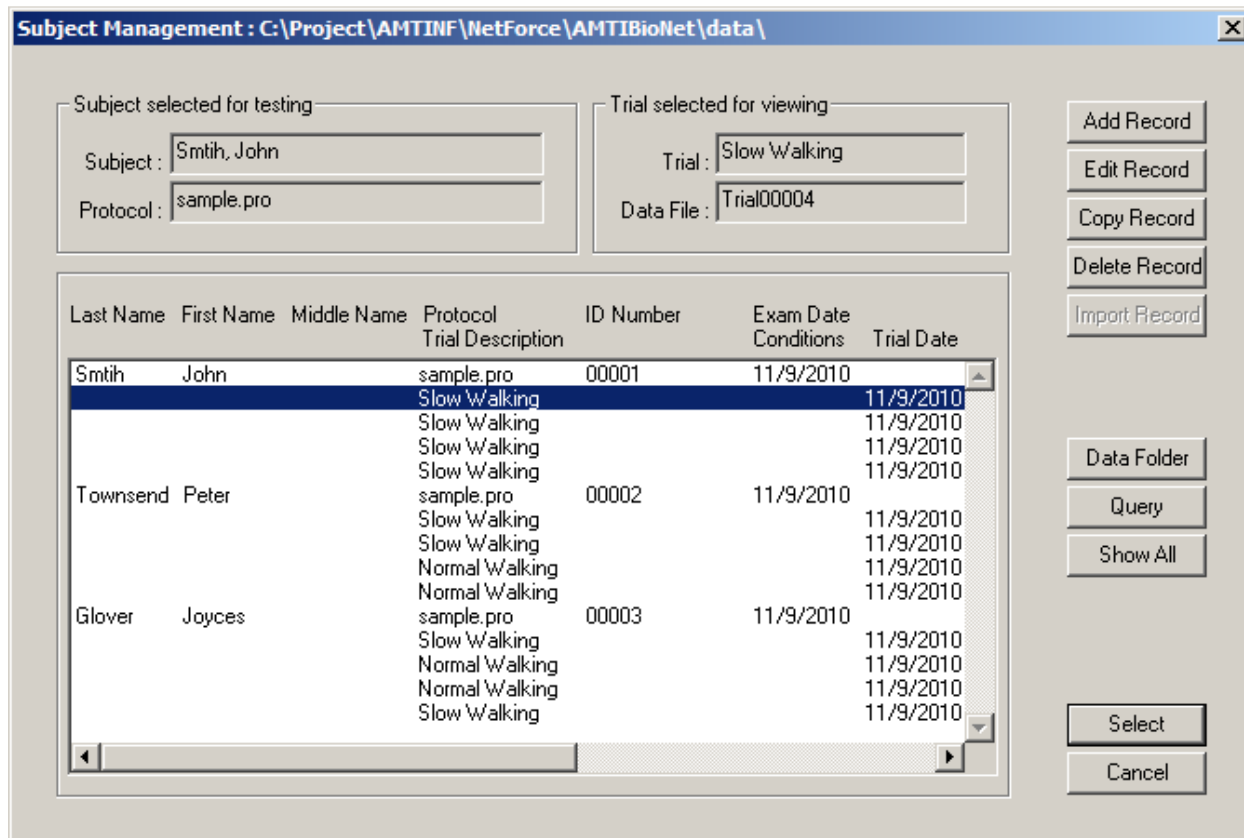
        The *OK* button will copy the selected trial description into the protocol trial sequence list.

BUTTON: CANCEL

        The *Cancel* button exits without further action.

12.0 DIALOG BOX: *SUBJECT MANAGEMENT*

The *Subject Management* dialog box is accessed by selecting the *Subject* button located on the Main Screen in the *Test Sequence* group.   This dialog box displays a list of test subjects and the tests which have been completed on those subjects.   Subject management provides functionality to create a new test subject, delete a subject and all associated tests and to edit the subject information to make corrections and additions.

Note that a subject database is maintained in every data directory or folder.   When the user selects a data folder using the *Folder* button in the NetForce main screen that folder becomes the default.   Subsequently when the user activates the *Subject* button the system will access the subject database in the default data folder.   The first time that the user activates the *Subject* button in a new folder the data base will be created in that folder.

When backing up data files it is important to copy the folder and all of its contents to the archive or backup location to make sure that the patient database is copied as well.

The primary control in the *Subject Management* dialog box is the edit box which displays a list of subjects and tests which have been completed on those subjects.   The list contains subject information lines and test information lines.   After a subject has been entered in the data base and selected as the active subject subsequent tests will be appended to that subjects test list.   Each subjects test list shows up immediately following the subject information line.

SPECIAL CONTROLS

There are two special mouse controls which facilitate selecting and editing the subject information.   Double clicking (left mouse button) on a subject information line will open the *Subject Info Edit* dialog box in preparation for editing that subjects data. Double clicking (left mouse button) on a test information line will select that subject, load the test data for display and prepare the system to start the test sequence again at that particular test (based on the subjects original test protocol).

BUTTON: ADD RECORD

The *Add Record* button opens the *Subject Info Edit* dialog box and permits the user to enter new subject information and add a record to the subject database.   See 13.0 – Dialog Box: Subject Info Edit for more information.

BUTTON: EDIT RECORD

The *Edit Record* button opens the *Subject Info Edit* dialog box and permits the user to edit an existing record and save the changes.   The *Edit Record* button requires that the subject of interest be selected first with a single left click of the mouse.   See 13.0 – Dialog Box: Subject Info Edit for more information.

BUTTON: COPY RECORD

The *Copy Record* button copies the subject information from the currently highlighted record to facilitate creating a new record for a subsequent examination.   The normal mode of use operation is to create a subject entry each time a subject is examined.   In this way all of the trials from a single examination will be attached to a single subject entry.

BUTTON: DELETE

The *Delete* button requires that a trial or that a subject be selected with a single left click of the mouse.   If a trial is selected then that single trial will be deleted.   In this case the user will be asked if they want to delete the data file as well.   If a subject is selected rather then a trial the user will be notified that all test data and trial records will be deleted.   If the user responds "Yes" then the delete function will traverse the subject's trial records and will delete all of the data files, the trial records and finally the subject information.

BUTTON: DATA FOLDER

The data folder button opens a file open dialog box that allows you to navigate to another data folder.   If you select a different folder the contents of the selected database will be displayed and the new folder will become the default.

BUTTON: QUERY

The *Query* button allows the user to search for a specific subject or group of subjects based on name, examiner or other information as permitted by the key fields. See 14.0 – Dialog Box: Query for more information.

BUTTON: SHOW ALL

Following a query only the results of the query are displayed in the subject list.   To restore the contents of the list to the complete subject listing press the *Show All* button.

DEFAULT BUTTON: OK
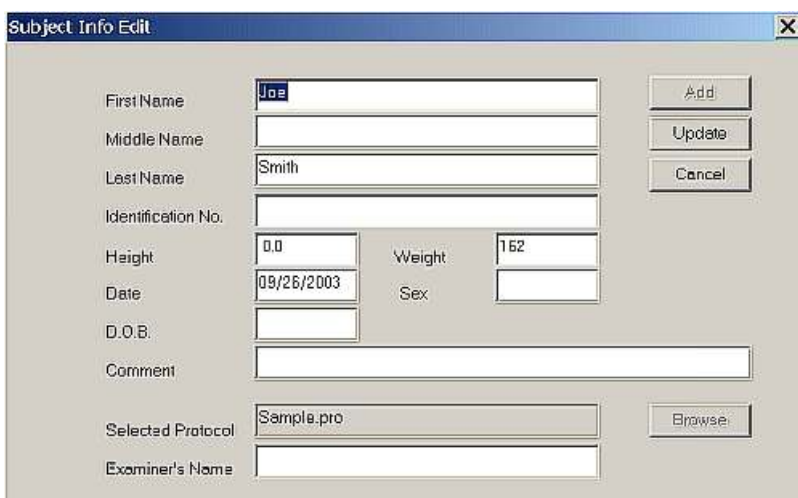
The *OK* button selects the currently highlighted subject for future tests and then closes the *Subject Management* dialog box.

BUTTON: CANCEL

The Cancel push button exits from the dialog box without further action.

13.0 DIALOG BOX: *SUBJECT INFO EDIT*

The *Subject Info Edit* dialog box is accessed by selecting the *Add Record* or *Edit Record* button located on the Subject Management dialog box (see section 12.0) and provides the means to add or edit subject information.

The *Subject Info Edit* dialog box provides the following editable fields in which to enter information. These are all "free form" alpha numeric fields and may be used at the user's discretion.

Edit Box: *First Name*
Edit Box: *Middle Name*
Edit Box: *Last Name*
Edit Box: *Identification No.*
Edit Box: *Height*
Edit Box: *Weight*
Edit Box: *Date*
Edit Box: *Sex*
Edit Box: *D.O.B. (Date of Birth)*
Edit Box: *Comment*
Edit Box: *Selected Protocol*
Edit Box: *Examiner's Name*

Note that if the *Examiner's Name* is changed from a previous name the new name can be saved as a default and will be inserted automatically for future use.   When a record is saved the old examiner's name is compared to the current name in this edit box and if different the user will be asked

if they want to save the new name as a default.   A Yes response will save the new examiners name which will become the default until it is again replaced.

The following buttons control the updating or adding of new records.

BUTTON: ADD

The *Add* button adds a new subject record to the database.   This button may also be used to effectively copy an existing subject's information to add at a subsequent examination time.   This is done by first selecting the desired subject in the *Subject Management* dialog box then selecting the *Edit Record* button in *Subject Management*.   The old information will be displayed here in the *Subject Info Edit* dialog box.   Choosing *Add* will then make a copy of the existing record and append the data base accordingly.   If *Add Record* is selected in the *Subject Management* dialog box then this screen is cleared in preparation for adding a new subject to the data base*.*

BUTTON: UPDATE

The *Update* button is available only when *Edit Record* is selected in the *Subject Management* dialog box.   This button updates the currently selected record with the edited subject information.

BUTTON: CANCEL

The *Cancel* push button exits from the dialog box without further action.

BUTTON: BROWSE

This button opens a File Open dialog box which allows you to select available protocols that exist on your computer.

14.0 DIALOG BOX: *QUERY*

This dialog box is accessed by selecting the *Query* button in the *Subject Management* dialog box. The *Query* dialog box permits the user to search for a specific subject by the following fields.
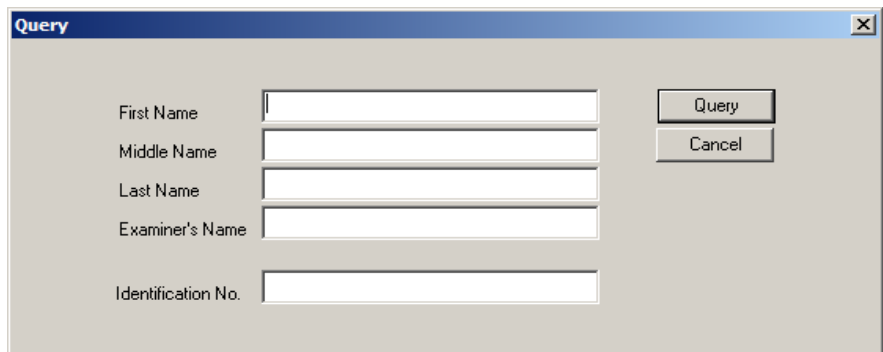
Edit Box: *First Name*
Edit Box: *Middle Name*
Edit Box: *Last Name*
Edit Box: *Examiner's Name*
Edit Box: *Identification No.*

The query will be performed on a partial entry.   For instance, if W is entered in the last name field then the query will find all the subjects with a last name beginning with W.   The query is case sensitive.

BUTTON: QUERY

The *Query* button activates the query.   The results are displayed in the Subject List in the *Subject Management* dialog box.

BUTTON: CANCEL

The *Cancel* push button exits from the dialog box without further action.

15.0 DIALOG BOX: *SELECT FOLDER*

This dialog box is accessed by selecting the *DataFolder* button in the main menu.   The *Select Folder* dialog box is used to select or create a new data folder.   It is recommended that all data folders be maintained in the AMTIBioNet directory for improved visibility.   Once selected the data folder becomes the default and remains so until a new folder is selected.   All data files and the patient database for those files will be maintained in the data folder.

The suggested organization is to maintain all data files for a particular study or research effort in one folder.   In this manner the associated subject database will reflect the cumulative research effort. In a more clinical environment it might be desirable to maintain folders by year or by examiner depending on the user's requirements.   Please note that a different subject database serves each folder.   To access subject data in different folders it is necessary to first select that folder.   Subject data bases of more then 1000 records will begin to seem sluggish on slower computer equipment. Therefore, it is recommended that different folders be used to segregate data and subject information on a rational basis.

The *Select Folder* dialog box is a standard windows *File Open* dialog box.   Please note that an "*." character sequence appears in the file name edit cell of the dialog box.   Do not delete these characters; the open folder dialog box will not function properly if you do.

To select an existing folder use the navigation controls in the dialog box to find the desired folder as follows.   Double click on the subfolder of interest.   That folder name will then be displayed in the *Look In:* edit box and a list of subfolders will be displayed in the list box.   Once the desired folder is displayed in the *Look In:* edit box click on the *Open* button.   The *Select Folder* dialog box will close and a message box will be displayed in which you may confirm the selected folder.   Please double check to make sure you have selected the proper folder.   Once you have confirmed the selection press the *OK* button to accept the folder as the default.

To create a new folder select the *Create New Folder* icon and then enter the folder name.   You must then click somewhere outside of the name field to save the name.   Now double click on the new folder to open it and select the *Open* button. A message box will be displayed indicating the name of the selected folder.   Press the *OK* button to accept the selected folder as the default.
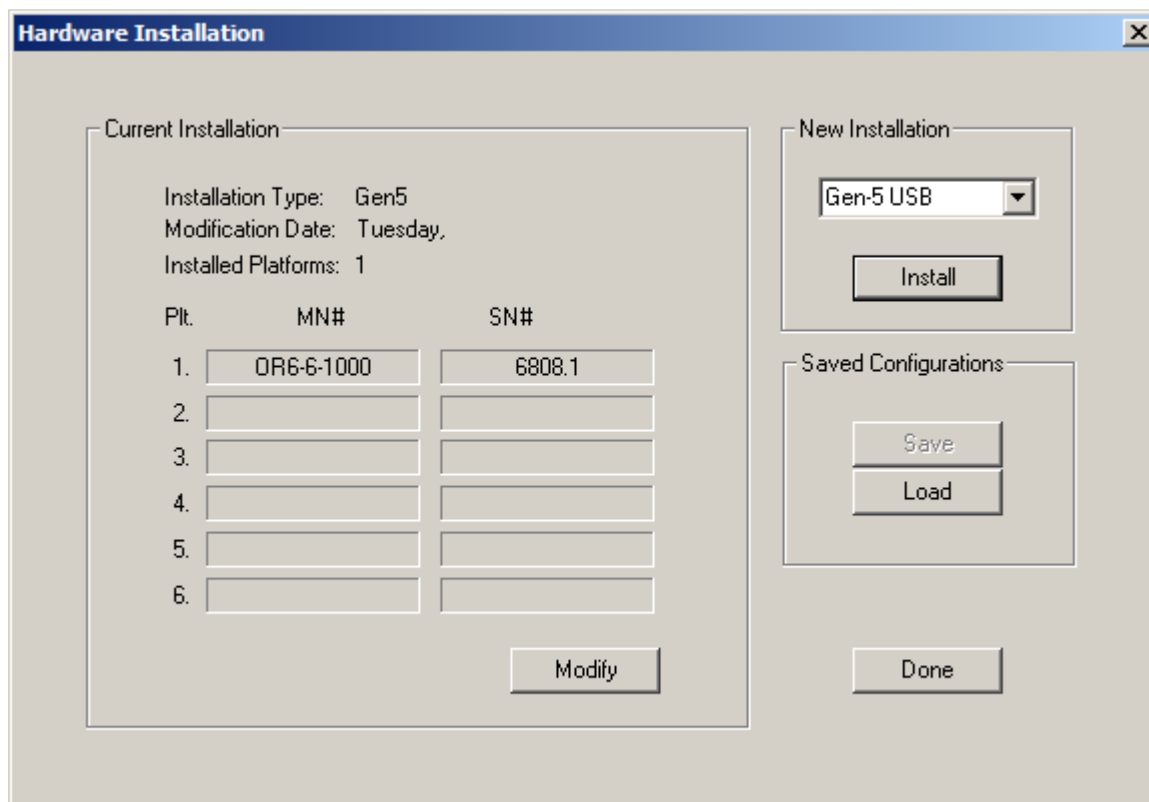
BUTTON: CANCEL
The *Cancel* push button exits from the dialog box without further action.

16.0 DIALOG BOX: *HARDWARE INSTALLATION*

The *Hardware Installation* dialog box is accessed through the main menu selection *Setup* and the sub menu selection *Hardware Installation*.   Proper hardware installation must be performed before the system will function properly.

The *Hardware Installation* dialog box is divided into two sections, *Current Installation* and *New Installation*.   The former provides information about the current installation whereas the *New Installation* section provides a series of choices to chose and install new hardware.

On the left side in the *Current Installation* section are three lines which display the *Installation Type, Modification Date* and *Installed Platforms* (number of installed platforms). There are two additional columns of information organized in 6 rows corresponding to the maximum number of platforms that can be installed.   Note that different AMTI products support different numbers of platforms.

Installation Type	Communication protocol	Maximum Number of Platforms
Accusway	RS 232	2
Accugait RS 232	RS 232	2
DigiAmp Ethernet	Ethernet	4
Gen 5/Optima	USB 2.0	12
MiniAmp	RS232	2
MiniAmp	DT3002	4
MiniAmp	DT3034	4
DT3002	Analog inputs	4
DT3034	Analog inputs	4

If a platform is installed the Model number and the Serial Number will be displayed in the *MN#* and *SN#* columns respectively.

To modify or create a new hardware installation, use the buttons in the *New Installation* section of the screen.   To install a new hardware system make the proper selection as described below.

ACCUSWAY RS-232
This selection is for the AccuSway product using the RS-232 serial interface or serial to USB converter.

ACCUGAIT RS-232
This selection is for the AccuGait product using the RS-232 serial interface or serial to USB converter.

DIGIAMP ETHERNET
This selection is the for DigiAmp product using the Ethernet interface.
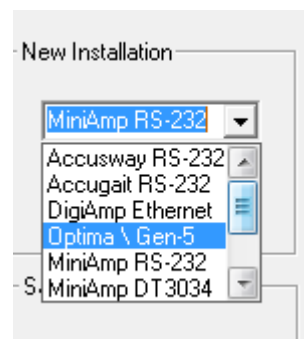
MINIAMP RS-232
This selection is for the "MiniAmp" product using the RS-232 serial interface or a serial to USB converter.

GEN 5 / OPTIMA USB
This selection is for the "Gen 5" or Optima product using the USB interface for data acquisition.

MINIAMP DT3034
This selection is for the "MiniAmp" product using the analog interface.   Support is provided for the Data Translations DT3034 card.

DT3034

This will be used for any older AMTI amplifier products not shown on any other buttons. Support is provided for the Data Translations DT3034 card.   This button can also be used to install the Gen 5 and DigiAmp products in the analog mode.

In analog mode all settings for the DigiAmp must be made manually using the DigiAmp's Key Pad and LCD interface.

In analog mode all setting for the Gen 5 would be made using the AMTI System Configuration software program.

When one of the above product type selections are made and the **Install** button is pressed the proper setup dialog box will be displayed.   Each acquisitions selection has its own setup dialog box whose descriptions can be found in sections 17.0 and 18.0.

BUTTON: MODIFY

The *Modify* button can be used to modify the current installation.

BUTTON: DONE

The *Done* button exits and asks the user if they want to save changes.   Yes will save the changes and No will discard the changes.

BUTTON: LOAD

The *Load* button allows you to load a named configuration file that you have saved previously using the *Save* button.
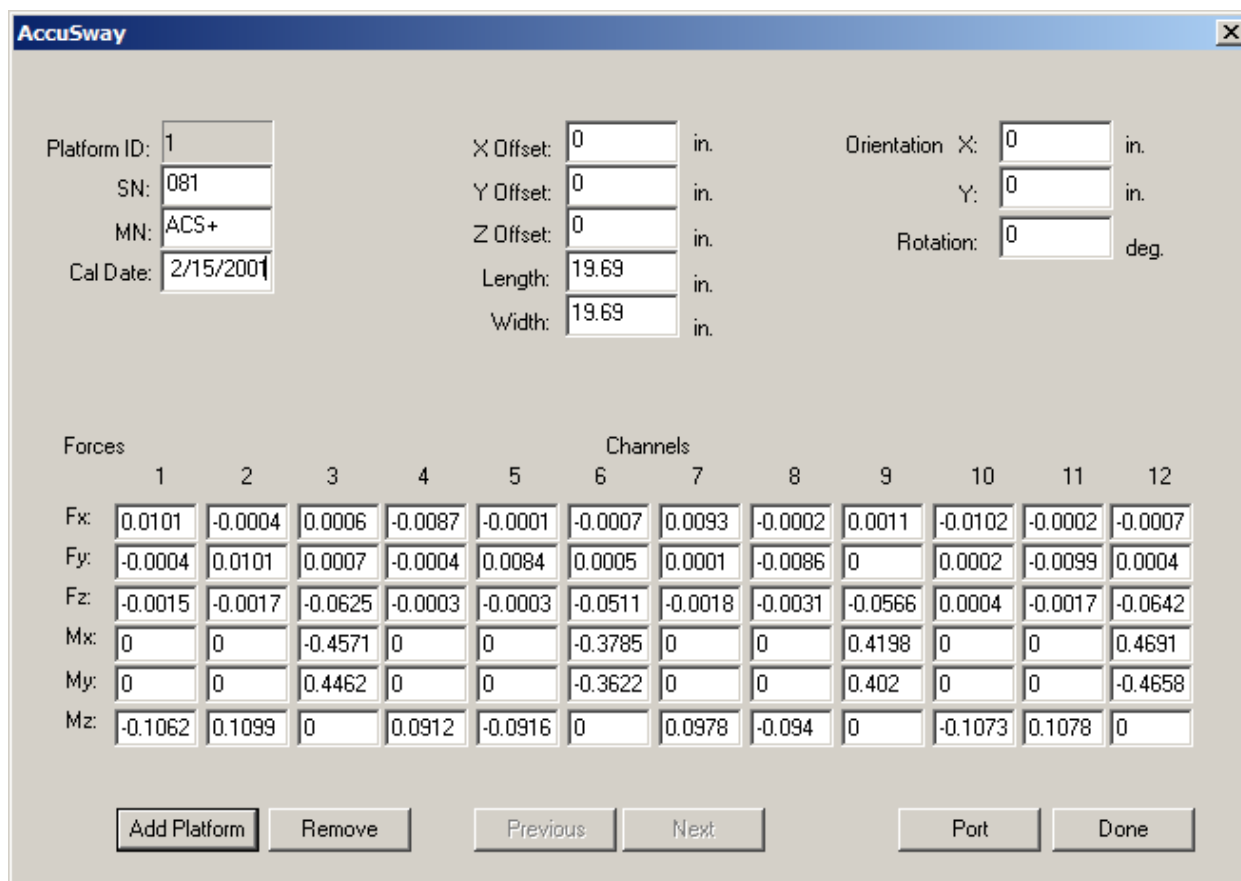
BUTTON: SAVE

The *Save* button allows you to save named configurations of force platforms and transducers to retrieve at a later time. You are prompted to name a .cfg file when you select *Save*.

The *Save* and *Load* buttons are useful for multiple projects that use a different number of force platforms or a combination of force platforms and multi-component transducers. For example you may install 3 platforms using the MiniAmp Serial button and use the *Save* button to name it 'threeFP'. Then you may remove the 3 platforms and install 1 platform using the AccuSway button and use the *Save* button to name that 'oneACS'. When you are finished using the AccuSway platform and would like to return to the 3 platform setup you may select *Load* and choose the 'threeFP' configuration file and all 3 platforms will be restored.

17.0 DIALOG BOX: *ACCUSWAY* AND *ACCUGAIT*

The *AccuSway* and *AccuGait* installation dialog boxes are accessed by selecting the *AccuSway* or *AccuGait* buttons in the *Hardware Installation* dialog box.   The dialog box is organized in three sections. At the top is the *Platform Information* section, in the center is the *Channel Calibration Matrix* and at the bottom is the *Controls* section. These sections and their controls are discussed below.

17.1 PLATFORM INFORMATION

The *Platform Information* section contains several edit boxes which are used to store and display general information about the installed platform.   This information is filled in when the user chooses the *Add Platform* button discussed below.   The specific fields and their usage is discussed below.

EDIT BOX: PLATFORM ID

This field indicates the platform number. Note that with AccuSway systems only one platform may be installed whereas with AccuGait installations up to two platforms may be installed.   This number will correspond to the Amplifier ID (the amplifiers in AccuSway and AccuGait are internal to the

platforms) in the main program and elsewhere in this manual.   This number is automatically set when the *Add Platform* button is selected.

EDIT BOX: CAL DATE

This field displays the calibration date of the platform.   See the *Add Platform* button below.

EDIT BOX: MN

This field displays the model number of the platform. See the *Add Platform* button below.

EDIT BOX: SN

This field displays the serial number of the platform. See the *Add Platform* button below.

EDIT BOX: X, Y, AND Z OFFSETS (PLATFORM OFFSETS)

The force sensing origin of the platform differs from the geometric center of the platform.   In the *X* and *Y* directions this difference is small and results from manufacturing variations but in the *Z* (vertical) direction   this difference is significant, typically about 1.2 to 1.5 inches for most AMTI products.   The X and Y values are presented here for your information but are not used by the NetForce software.   The Z value is used in the calculation of the COP and should be used to calculate moments about the X and Y axis.

EDIT BOX: LENGTH

EDIT BOX: WIDTH

Length and *Width* display the dimensions of the platform and are presented for your information.

EDIT BOX: ORIENTATION X, Y, AND ROTATION

These values are maintained for advanced users.   They should reflect the position and orientation of each platform in a multi platform system relative to the center of platform 1.   Platform 1 should be set to X=0, Y=0 and Rotation = 0.   These values are preserved in the .BSF file and can be used by advanced users writing their own analysis routines.

17.2 CHANNEL CALIBRATION MATRIX

The *Channel Calibration Matrix* section is organized in six rows labeled *Fx, Fy, Fz, Mx, My,* and *Mz* and 12 columns labeled 1-12.   The values in this matrix are the factory calibration coefficients provided on the calibration CD included with every platform.   These coefficients permit the proper calculation of the forces and moments from the AccuSway and AccuGait raw data.

17.3 CONTROLS SECTION

BUTTON: ADD PLATFORM

The *Add Platform* adds a new platform to the installation.   The *Add Platform* button will ask you to confirm that you want to add a platform.   If you respond "Yes" then *Add Platform* opens a *File Open* dialog box.   Insert your calibration CD into the appropriate drive and use thenavigation controls in the *File Open* dialog box to navigate to the that drive.   The calibration CD will contain a file named xxxx.plt if you have a strain gage transducer or two files named Analogxxxx.acl and Digitalxxxx.acl if you have a Hall Effect transducer.   xxxx is the serial number of the platform that you purchased.   Click on the file that corresponds to your transducer and select the *Open* button. This will automatically fill all the fields of the screen with the proper information. You will either choose xxxx.plt or Digitalxxxx.acl. The Analogxxxx.acl is not used by NetForce and is provided as a reference only. Following this procedure use the *Port* button described below to set the proper communications parameters.

BUTTON: REMOVE

The *Remove* button removes the currently selected platform.   Please note that only the last platform in the list may be removed.   You must use the *Next* button to advance to the last platform then use *Remove* to remove it.   By repeating the procedure you may remove any or all of the installed platforms.

BUTTON: PREVIOUS

In multi platform installations the *Previous* cycles to the previous platform in the list.

BUTTON: NEXT

In multi platform installations the *Next* cycles to the next platform in the list.

BUTTON: PORT

The *Port* button opens a dialog box which allows you to set the proper communications port for your AccuSway or AccuGait hardware.   The communications port must correspond to the communications port that the AccuGait or AccuSway product is connected to on your computer.

DEFAULT BUTTON: DONE

The *Done* button queries you whether to save the changes or not.   If you select "Yes" then the installation information will be saved as the current Hardware installation.

18.0 DIALOG BOX: *MINIAMP-RS232*

DIALOG BOX: *DIGIAMPE-NET* (DIGIAMP)

DIALOG BOX: *MINIAMP DT3034*

DIALOG BOX: *DT3034*

DIALOG BOX: *MINIAMP DT3002*

DIALOG BOX: *DT3002*

The dialog boxes which are used to setup AMTI's products, DigiAmp, MiniAmp and the generic analog setup for Data Translations DT3002 and DT3034 board are all very similar and are discussed in general below.   Specific differences are noted where appropriate for the several products and hardware configurations.

These dialog boxes are accessed by choosing the *MiniAmp-RS232, DigiAmp-Ethernet*, *MiniAmp DT3034, DT3034, MiniAmp DT3002, DT3002, selections* to install in the *Hardware Installation* dialog box. These dialog boxes are organized in four sections.   At the top left is the *Amplifier* section, at the top right is the *Platform* section, in the center is the *Channel Setup* section and at the bottom is the Controls section.   These sections and their controls are discussed below.

18.1 AMPLIFIER GROUP

The *Amplifier* section displays general information about the installed amplifier.   These fields are discussed in detail below.

EDIT BOX: ID: (PLATFORM NO.)

This value is automatically set when a new device is added using either the *Add Platform* or *Instrument* buttons.   With DigiAmp installations the procedure to set the Amplifier ID on each amplifier must be followed in order for the system to properly recognize the installed hardware.   This procedure is described in a step by step procedure in 9.0 -- Dialog Box: *System Check*.   With analog systems the data acquisition card is considered to be broken down into blocks of six channels where each block serves one amplifier and thus serves one platform.   This basic organization does not preclude using spare channels for such devices as EMG inputs but such instruments must be set up in one or more blocks of six channels using the *Instrument* button.

EDIT BOX: SN:

This is the serial number edit box.   The serial number should be obtained by the user from the tag on the hardware and entered here.

EDIT BOX: MN:

This is the model number edit box.   The model number should be obtained by the user from the tag on the hardware and entered here.

EDIT BOX: A/D RES:, MAX REF:, MIN REF:

These values correspond to the resolution and range of the analog to digital conversion hardware.   These values are automatically filled in depending on the product selection button.   The DigiAmp will report 65536, 4.096, -4.096; the MiniAmp DT3034 will report 65535, 10, -10; all other products will report 4096, 10 and -10.

18.2 PLATFORM GROUP

The *Platform* section displays general information about the installed platforms.   These fields are filled out when the *Add Platform* button is used to get platform information from the calibration CD delivered with every AMTI multi axis force product.   Each of the fields in this section is discussed below.

EDIT BOX: DATE:

The platform factory calibration date

EDIT BOX: SN:

The platform serial number

EDIT BOX: MN:

The platform model number

EDIT BOX: X OFF:, Y OFF: AND Z OFF:

These edit boxes are used to maintain values for the x, y, and z offsets.   The force sensing origin of the platform differs from the geometric center of the platform.   In the *X* and *Y* directions this difference is small and results from manufacturing variations but in the *Z* (vertical) direction   this difference is significant, typically about 1.2 to 1.5 inches for most AMTI products.   The X and Y values are presented here for your information but are not used by the NetForce software.   The Z value is used in the calculation of the COP and should be used to calculate moments about the X and Y axis. These values are automatically filled in from the platform calibration diskette.

EDIT BOX: LENGTH AND WIDTH

Length and *Width* display the dimensions of the platform and are presented for your information.

LABEL ORIENTATION

EDIT BOX: X OFF:, Y OFF: AND ROTATION:

These values are maintained for advanced users. They should reflect the position and orientation of each platform in a multi platform system relative to the center of platform 1. Platform 1 should be set to X=0, Y=0 and Rotation = 0. These values are preserved in the .BSF file and can be used by advanced users writing their own analysis routines.

18.3 CHANNEL SETUP GROUP

In the center of the dialog box is the *Channel Setup* section. This section contains 6 rows of information corresponding to the platform and amplifier channels for Fx, Fy, Fz, Mx, My, and Mz. The information is organized into six columns with slightly different usage depending on whether the installed system is a DigiAmp system or an analog system. In the following sections the usage of each of these columns is discussed along with the product to product variations.

LABEL: CHAN LABEL

The *Channel Label* column is used to display an appropriate label for each of the channels. When the *Add Platform* button is used the channels are automatically labeled *Fx, Fy, Fz, Mx, My,* and *Mz*. If the *Instruments* button is used then the user may set the labels to identify their own instruments channel usage. Please limit the number of characters to four or less so that the labels will be properly displayed in other parts of the program.

LABEL: PLAT. SENS.

These values correspond to the platform sensitivities as provided on the platform calibration CD. These values are automatically filled in when the user uses the *Add Platform* button to install a new platform. If you are installing an instrument other then a multi axis force platform then these values may be set to reflect the sensitivity of your instrument. These values should be entered in Engineering units/micro-volt.

LABEL: AMP GAIN OR CARD GAIN

This column provides a combo box with appropriate selections. The usage is discussed below separately for DigiAmp and analog installations.

DigiAmp installations

With DigiAmp installations the column label will read *Amp Gain*. Values of 1000, 2000, 4000 and 8000 will be available. With the DigiAmp these values are automatically downloaded to the amplifier via the Ethernet prior to the acquisition of data.

MiniAmp and Analog Installations (using DT3002 or DT3034)

This column will read **Card Gain**.   Values of 1, 2, 4 and 8 will be available.   These values are used to set the data acquisition card's gain.   These values are automatically sent to the data acquisition card to set the card's gain.

LABEL: CORRECTION OR AMP GAIN

This column provides an edit box in which to enter a gain or a gain correction factor.   The usage is discussed below separately for DigiAmp and analog installations.

DigiAmp installations

With DigiAmp installations the column label will read **Correction**.   Normally this value will be set to 0.   This value provides a correction factor that is added to the gain to correct for small variations in gain.   AMTI's in house calibration procedure automatically provides a similar correction factor which is built into the DigiAmp so this value can be neglected.

MiniAmp and Analog Installations (using DT3002 or DT3034)

With MiniAmp and Analog Installations this column will be labeled **Amp Gain**.   This value must be set to correspond to the amplifiers calibrated gain.   The amplifiers calibrated gains are provided on a calibration sheet shipped with each analog amplifier.   Please note it is imperative to set this value and the amplifiers gain jumper to the same value in hardware otherwise the calculated outputs will be in error.

LABEL: EX VOLTS

This column is always used to enter the desired strain gage excitation voltage.   With DigiAmp installations the value is automatically down loaded to the amplifier prior to taking data.

With MiniAmp and Analog Installations the user must make sure that the amplifier excitation voltage jumpers correspond to values entered here otherwise the calculated outputs will be in error. The user should refer to the amplifier calibration sheet's excitation voltage column and enter the measured calibration voltage in these cells.   Note that for improved accuracy the user should calculate a correction factor for cable voltage drop and adjust the excitation voltage accordingly.

LABEL: GVP

This column displays the product of gain and, excitation voltage for the user's convenience.

DIGIAMP FILTERS

At the right of the *Channel Setup* section are two combo boxes available only with DigiAmp installations.   These combo boxes allow the user to select the filter type and frequency which will be applied to the digital filters in the amplifier.   These selections are discussed below.

Combo Box: *Filter*

This option is only available with DigiAmp installations. Select Bessel or Butterworth filter types. Bessel filters provide the minimum phase shift between frequency components while Butterworth provides the flattest amplitude response. Please refer to the DigiAmp manual for more information.

Combo Box: *Frequency*

This option is only available with DigiAmp installations. The *Frequency* combo box provides the following selections: Pass Through, 10, 20, 30, 50, 100, 200, 300, 500 and 1000. Pass through implements no digital filter while the numerical values represent the cutoff frequency in Hz. Please refer to the DigiAmp manual for more information.

18.3 DIALOG BOX CONTROLS

The following buttons are provided in the *Control* section of the dialog box.

BUTTON: ADD PLATFORM

The *Add Platform* adds a new platform to the installation. This button is grayed out until the last installed platform is displayed by using the *Next* button. The *Add Platform* button will ask you to confirm that you want to add a platform. Respond *Yes*. *Add Platform* will then open a *File Open* dialog box. Insert your calibration CD into the CD drive and use the navigation controls of the File Open dialog box to navigate to the appropriate drive. The calibration CD will contain a file named "xxxx.plt" where xxxx is the serial number of the platform that you wish to install. Click on the "xxxx.plt" file and select the *Open* button. This will automatically fill all the fields of the screen with the proper information

BUTTON: INSTRUMENT

The *Instrument* is used to add an additional six channels of instrument (non platform) settings. With analog installations you may continue adding instruments until all 32 channels have been allocated. Note that with the 6th instrument only the first two channels will be active.

BUTTON: REMOVE

The *Remove* button removes the currently selected platform. Please note that only the last platform in the list may be removed. You must use the *Next* button to advance to the last platform then use *Remove* to remove it. By repeating the procedure you may remove any or all of the installed platforms.

BUTTON: PREVIOUS

In multi platform installations the *Previous* cycles to the previous platform in the list.

BUTTON: NEXT

In multi platform installations the *Next* cycles to the next platform in the list.

BUTTON: REVIEW

The *Review* button is a very useful diagnostic tool.   This button will present the *Review* dialog box which reports the range and resolution of your measurements based on the selected gains and excitation voltages.   See Section 18.4 – Review Settings for more information.
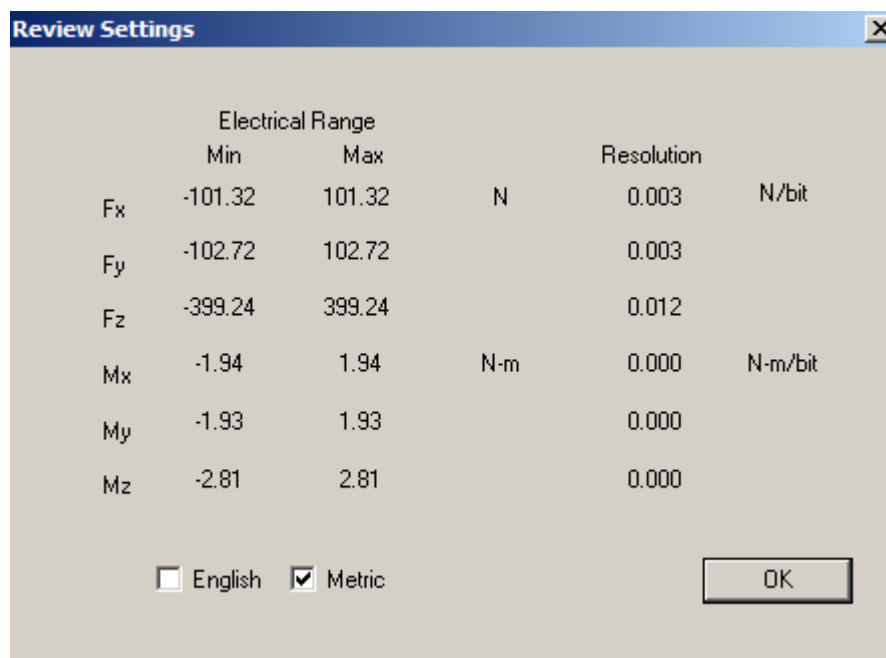
DEFAULT BUTTON: DONE

The *Done* button queries the user if they want to save the changes.   A *Yes* response will save the changes and assign the settings to the current hardware installation database.

18.4 DIALOG BOX: REVIEW SETTINGS

The *Review Settings* dialog box is accessed on the instrument setup dialog boxes discussed in section 18.0 and provides a review of the settings that the user has selected.   This dialog box multiplies out the gain, sensitivity and excitation voltage and back calculates, based on the A to D converter's range and resolution, the loads which will cause saturation of the system.   The dialog box also retrieves the nominal full scale loads which can be applied to the specified hardware (based on model number) and displays them appropriately

The dialog box is organized into six rows corresponding to the platform channels *Fx, Fy, Fz, Mx, My* and *Mz*.   The values for each channel are grouped in columns under the headings; *Electrical Range*,   and *Resolution*.   These columns and their meanings are discussed below.

LABEL: ELECTRICAL RANGE, MAX AND MIN

The *Max* and *Min Electrical Range* columns report at what load saturation will occur given the specified gains, excitation voltages and sensitivities.   By changing the settings in the Hardware Installation dialog box the range can be tailored to suit the application.

LABEL: RESOLUTION

This value specifies the maximum resolution based on the A to D converter's resolution.   In a real application mechanical and electrical noise might degrade the achieved resolution.

CHECK BOX: ENGLISH AND METRIC

The *English* and *Metric* check boxes allow the user to review the settings in English Units or metric units.   These settings do not affect other parts of the program.

DEFAULT BUTTON: OK

The *OK* button exits with out taking further action.

19.0 DIALOG BOXES: AMTI SYSTEM CONFIGURATION

This section describes the function, use and controls provided by the AMTI System Configuration Software for coordinating, configuring and maintaining multiple Gen 5 signal conditioners

The following paragraphs provide a brief description of what each dialog box in the Gen 5 setup section does; the sections following will describe each dialog box in more detail.

19.1 DIALOG BOX : AMTI SYSTEM CONFIGURATION

The *AMTI System Configuration* dialog box is the central control consul for configuring one or multiple Gen 5 signal conditioners. Available global configuration options consist of selecting data output formats, setting acquisition rates, detecting connected Gen 5's, setting the platform order for data collection, and zeroing all platforms. Additionally each *Installed Amplifier* and *Associated Platform* can be easily identified and accessed for configuration.

19.2 DIALOG BOX: PLATFORM CALIBRATION

The *Platform Calibration* dialog box displays all of the calibration information of the platform connected to the associated Gen 5. The Gen 5 uses the platform calibration data in order to process the platform data. If the platform is an AMTI Smart Platform the correct platform calibration settings are automatically loaded into the Gen 5 when it is powered on. If the platform is not an AMTI Smart Platform the user, through this dialog box, must load the platform calibration files from CD and download the calibration information to the Gen 5.

19.3 DIALOG BOX: AMPLIFIER CONFIGURATION

Use the *Amplifier Configuration* dialog Box to configure the Gen 5 optimally for the expected application. The configuration options help achieve optimal system resolution, with maximum signal to noise ratios. The excitation outputs, gain amplification, zero setpoints and other features are configured in this dialog box.

19.4 CONFIGURING THE GEN 5/OPTIMA FOR OPTIMAL MECHANICAL RANGE

For best results the Gen 5 signal conditioner should be setup to achieve both the highest possible signal to noise ratio and maximum system resolution. This is accomplished by independently configuring each channel.   The three adjustable configuration settings that affect the measurement range are the excitation voltage, the amplifier gain, and the zero set point.

19.5 DIALOG BOX: AMPLIFIER CALIBRATION
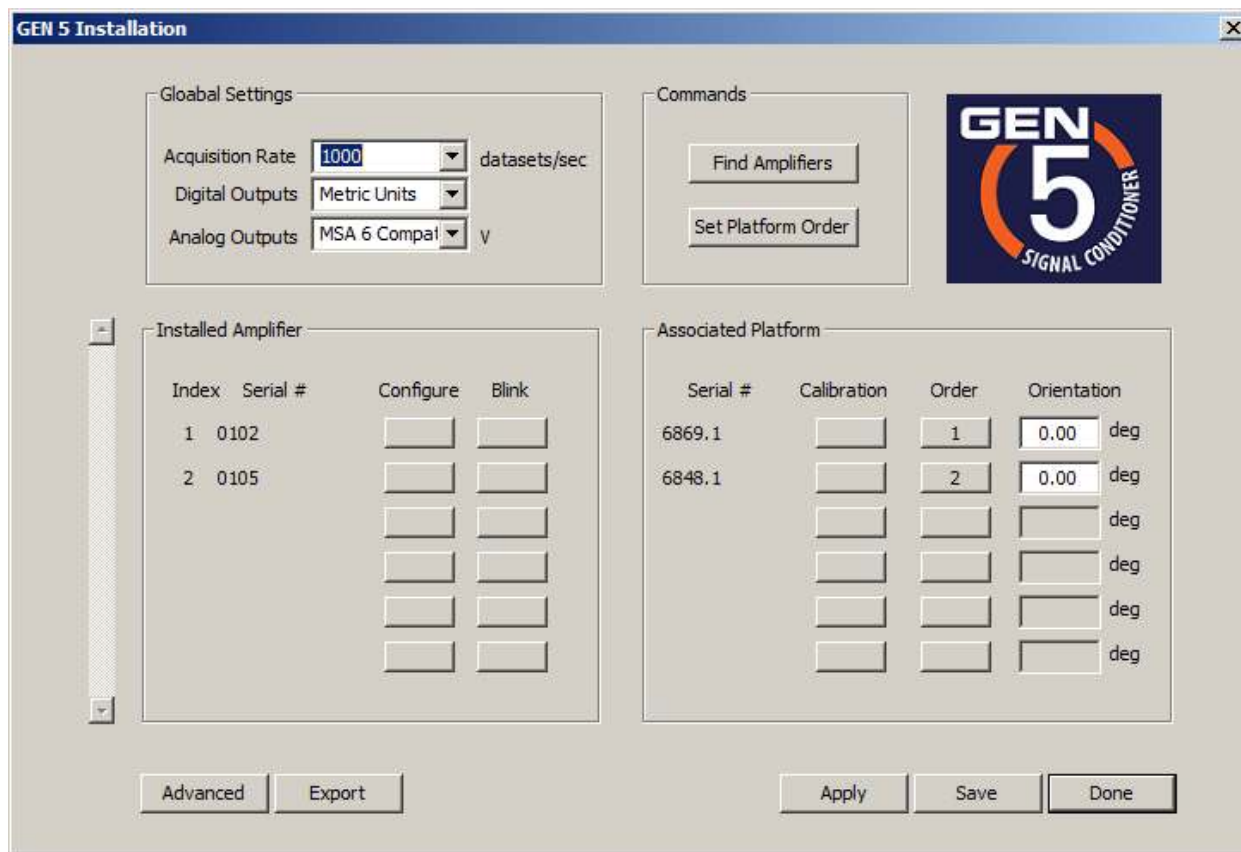
The Gen 5 signal conditioner is precision calibrated at the factory.   The *Gen 5 Calibration* dialog box displays all of the calibration parameters of the selected Gen 5. This dialog box is informational only.

19.6 THE AMTI SYSTEM CONFIGURATION FILE

The Gen 5 Setup software maintains a configuration file containing the last saved platform order and global settings.   The file is called AMTIUSBSetup.cfg and is located n the C:\Windows\system32 folder. Whenever the Gen 5 Setup software is started it reads this configuration file and restores these settings.

19.1 DIALOG BOX: AMTI SYSTEM CONFIGURATION

The *AMTI System Configuration* dialog box is the central control console for configuring one or multiple Gen 5/Optima signal conditioners. Global configuration options include selecting data output formats, setting acquisition rates, detecting connected Gen 5's, setting the platform order for data collection, and zeroing all platforms. Additionally each *Installed Amplifier* and *Associated Platform* can be easily identified an accessed for configuration.

19.1.1 GLOBAL SETTINGS GROUP

The *Global Setting Group* controls settings applied to all connected Gen 5's. These settings are acquisition rate, and digital and analog output formats.

Acquisition Rate - The Acquisition rate is the collection rate in datasets per second for recording digital data through the USB port. The table below shows the available selections.

Acquisition Rates									
2000	1800	1500	1200	1000	900	800	600	500	450
400	360	300	250	240	225	200	180	150	125
120	100	90	80	75	60	50	45	40	30
25	20	15	10						

Output Formats

AMTI force platforms and multi-component force and torque transducers measure the three orthogonal components of the applied force and the three orthogonal components of the applied torques and/or moments. The Gen 5 collects these six channels of data.   The table below defines the relationship between channel order, and the force, moment and torque components of an applied load. The respective units are also listed.

Channel	Label	Definition	English Units	Metric Units
0	Fx	The force component in the platform x direction	inches	Newton
1	Fy	The force component in the platform y direction	inches	Newton
2	Fz	The force component in the platform z direction	inches	Newton
3	Mx	The moment and torque around the platform x axis	in – lb	N-m
4	My	The moment and torque around the platform y axis	in – lb	N-m
5	Mz	The moment and torque around the platform z axis	in – lb	N-m

The Gen 5 signal conditioner provides multiple output formats. There are three digital output formats and two analog. The output format determines the level of signal conditioning that will be applied. The table below defines the relationship between output format selections and the associated signal conditioning.

Digital Outputs	Output Format	Signal Conditioning	Port
	English Units	Full Conditioning	USB
	Metric Units	Full Conditioning	USB
	Bits	Diagnostic	USB
Analog Outputs	Volts	Full Conditioning	Analog
	Volts	MSA 6 compatible	Analog

Digital Outputs – There are three selections for the USB digital output units. The choices are metric, English or bits. If the units are English or metric the data is fully conditioned. If bits are selected the data is not conditioned.

Analog Outputs – The analog output full scale range is +- 5 volts. The two conditioning selections are Fully Conditioned and MSA 6 Compatible. Fully conditioned is the recommended choice, with all Gen 5 signal conditioning features enabled. The MSA 6 Compatible choice was developed for people familiar with the AMTI MSA 6 amplifier and who wish to use the Gen 5 in the same way. When running in MSA 6 Compatible mode the Gen 5 analog output range is +- 5 V with possible gain amplifications of 500, 1000, 2000, and 4000. All of the signal conditioning features of the Gen 5 will be applied except for crosstalk corrections.

19.1.2 COMMANDS GROUP

The Commands Group consists of commands applied to all connected Gen 5's. The commands are *Find Amplifiers*, and *Set Platform Order.*

Find Amplifiers – By clicking on the button *Find Amplifiers*, the software will detect all Gen 5 signal conditioners connected to the computer, and display a list in the *Installed Amplifier* group of the dialog box. This is also done automatically when the program is started.
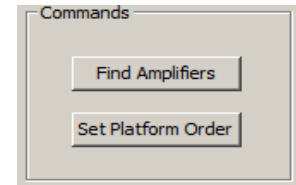
Set Platform Order – By clicking on the button Set Platform Order, the order of the connected transducers can be set for digital data collection.   A single dataset sample consists of 6 channels of force, torque and moment data, if there are multiple platforms the datasets will be concatenated together.   The question is which platforms data should be presented first in each dataset.   By setting and saving the platform order that problem is resolved.

 There are two ways to set the platform order once the *Set Platform Order* button has been clicked:

> a) After *Set Platform Order* is clicked, each button in the *Order* column of the *Associated Platform Group* will be labeled **Push.** Click on the buttons in the desired sequence to set the platform order. As the buttons are pressed they will display their sequence numbers.

> b) After *Set Platform Order* is clicked, walk on the platforms in the order of the desired sequence, and the software will register the order automatically.

19.1.3 INSTALLED AMPLIFIERS GROUP
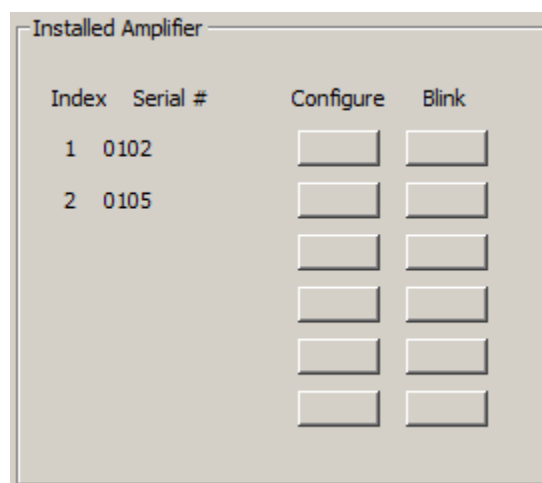
The Installed Amplifiers Group describes, and gives access to the configuration settings of each Gen 5 connected to the computer

Index – The Index number of the Gen 5 as it is stored in the setup program.

Serial – The serial number of the Gen 5.

Configure - Clicking the Configure button opens up the Amplifier Configuration dialog box.   The Amplifier Configuration dialog is used to configure a Gen 5.

Blink - The **Blink** button is for identification of the connected Gen 5. Clicking the button will make the respective Gen 5 front LED flash 10 times.
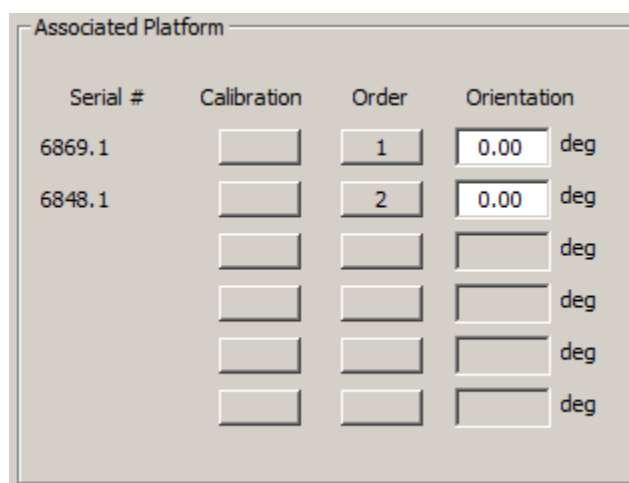
19.1.4 ASSOCIATED PLATFORM GROUP

The Associated Platform Group describes, and gives access to the calibration settings of each platform connected to the associated Gen 5.

Serial – The serial number of the platform.

Calibration - Click on the Calibration button to open the *Platform Calibration* dialog box. The *Platform Calibration* dialog box is for configuring the Gen 5 to work with the connected platform. If the attached platform is an AMTI smart platform this task is accomplished automatically by simply powering up the Gen 5 with the platform connected. If the platform is not an AMTI smart platform the user must enter this dialog box, load the platform calibration file (xxxx.plt) which was shipped with the platform and download the file to the Gen 5.

Order - Each button below the *Order* label displays the current data collection sequence of the connected platform. For more information see the *Set Platform Order* command description in the *Commands Group* of this dialog box.

Orientation – Because of physical space limitations it may be desirable to change the orientation of the platform's X and Y axes. For that purpose, you may enter a rotation angle in degrees (0 -360) to rotate the X and Y axis around the Z axis. This feature is not compatible with the MSA 6 compatible analog output mode or the digital raw bit diagnostic output. It will work will all other digital and analog output selections.

Example: *Standard orientation degrees: .*
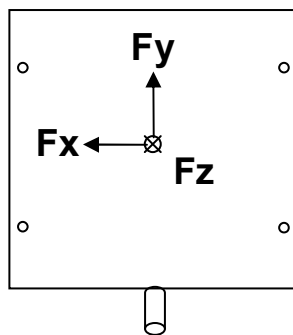
Rotation of the axes by 180
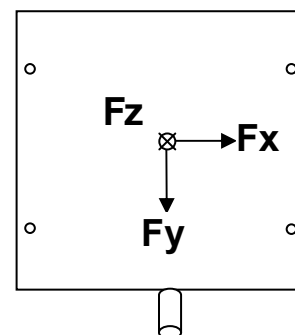
19.1.5 DIALOG BOX FOOTER

Export - Click on the button *Export* to save the settings of all connected Gen 5's to a single text file. The parameters included are: date, analog output range, Gen 5 model number, Gen 5 serial number, platform model number, platform serial number, the selected digital output units, the platform capacities, the Gen 5 electrical maximums and minimums represented as engineering units, the currently selected gain and excitation settings, the analog sensitivities required for *MSA 6 compatible mode*, and the analog conversion factor required for *fully conditioned* mode.

Advanced - Clicking on the button *Advanced* loads the *Genlock* dialog box.   The Genlock feature only applies to digital outputs. The software used for digital data collection must also accommodate this feature.

Genlock Dialog Box - Genlock, which stands for generator lock, is a common technique that uses a specific reference signal to synchronize the data with an external video source.   When *Genlock On* is checked the Gen 5 will collect a single dataset on either the rising or falling edge of an analog signal, input into the Genlock port in the back of the Gen 5.
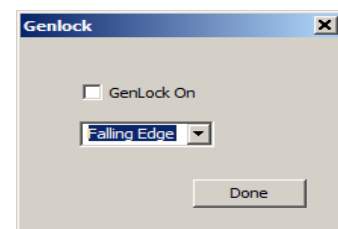
Apply - Clicking on the *Apply* button will temporarily apply all of the configuration changes you have made in this dialog box.   When the Gen 5 is rebooted, the device will default to its last saved settings.

Save – Clicking on the *Save* button will save any configuration changes you have made. Changes to the Gen 5 configuration will be saved directly to the Gen 5 and configuration changes such as platform order will be save to a configuration file on the PC.   The saved settings will be reloaded upon startup.

Quit – Exit the Program

19.2 DIALOG BOX: PLATFORM CALIBRATION

The *Platform Calibration* dialog box displays all of the calibration information of the platform connected to the associated Gen 5. The Gen 5 uses the platform calibration data in order to process the platform data.   Each Gen 5 stores the associated platform calibration information in non volatile memory.   If the platform is an AMTI smart platform the correct platform calibration settings are automatically loaded into the Gen 5 when it is powered on. If the associated platform is not an AMTI smart platform the platform calibration information must be downloaded to the Gen 5 through this dialog box.

19.2.1 PLATFORM INFORMATION GROUP

Date- The date of the platform calibration

Serial – The serial number of the platform

Model – The model number of the platform

X Offset – The x offset is the difference in distance between the geometrical center of the platform and the electrical center of the platform along the x axis.

Y Offset – The y offset is the difference in distance between the geometrical center of the platform and the electrical center of the platform along the y axis.

Z Offset - The z offset is the difference in distance between the platform top surface and the electrical center of the platform along the z axis.

Length – The platform length

Width – The platform width

Platform Capacity					
Fx	Fy	Fz	Mx	My	Mz
lb	lb	lb	in-lb	in-lb	in-lb
500.00	500.00	1000.00	11800.00	7900.00	5900.00

Platform Capacity - The *Platform Capacity* values are the platform's maximum mechanical loads and torques that can be safely applied in the specified directions. The platform capacities will always be present if the platform is an AMTI smart platform.   If they are not present you may enter them manually. They are informational only and not used for calculations.

Inverted Sensitivity Matrix B(i,j)

Input to Channel i (lb, in-lb is B(i,j)) times the electrical output j (uV/Vex)

	Vfx	Vfy	Vfz	Vmx	Vmy	Vmz
Fx	500.0000	500.0000	1000.0000	11800.0000	7900.0000	5900.0000
Fy	-0.0039	0.3353	0.0050	0.0012	-0.0011	0.0014
Fz	-0.0010	-0.0008	1.3075	0.0024	-0.0013	0.0048
Mx	-0.0164	0.0059	-0.0101	6.0980	-0.0247	-0.0230
My	0.0064	0.0041	0.0013	0.0192	4.8161	0.0477
Mz	-0.0029	0.0523	-0.0470	0.0099	-0.0135	2.8168

Inverted Sensitivity Matrix – The calibration of a force platform involves determining the sensitivity of each channel to all applied load components. For the AMTI calibration process, the platform is bolted to a precision calibration stand. Loads are then applied at various points in the three coordinate directions while the outputs from all six channels are recorded. The result is a six by six matrix used to convert voltage outputs of the six channels into measurement of the force and moments applied to the plate. The calibration matrix is used to correct crosstalk.

Bridge Resistance

Fx	Fy	Fz	Mx	My	Mz	
700.00	700.00	350.00	700.00	700.00	700.00	Ohms

Bridge Resistance - The wheatstone bridge is a configuration of strain gages used in measurement transducers. They are at the heart of every strain gage force plate. The bridge resistance of the wheatstone bridge is measured in ohms. Each channel of an AMTI force plate has a specific bridge resistance common to its model type. If the bridge resistance is not present you may load it by clicking on the **Bridge** button and selecting the model type.

19.2.2 DIALOG BOX FOOTER

| Lock | Load File | Bridge | Apply | | OK |
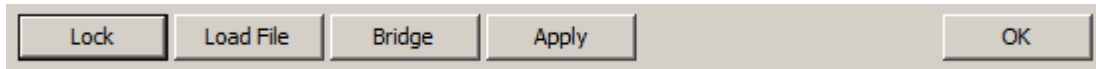
Lock/Unlock - Click on Lock/Unlock button to unlock the dialog box for editing.

Load File - Click on the button Load File to load the calibration file that accompanied the platform. The filename will consist of the platform serial number followed by a 3 digit (plt) extension (xxxxx.plt).

Bridge - This button opens up the Bridge Resistance dialog box.   You can now select the corresponding platform or transducer model series connected to the Gen 5 and then click **OK**. The values in the *Bridge Resistance* group will be automatically updated.
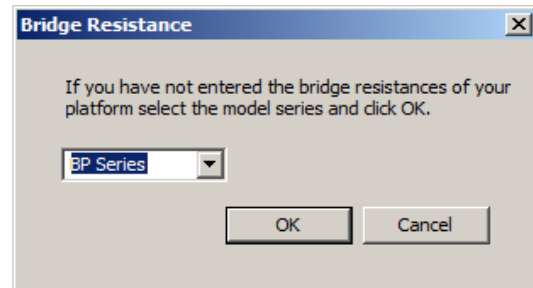
Apply - Clicking on the *Apply* button will temporarily apply all of the configuration changes you have made in this dialog box.
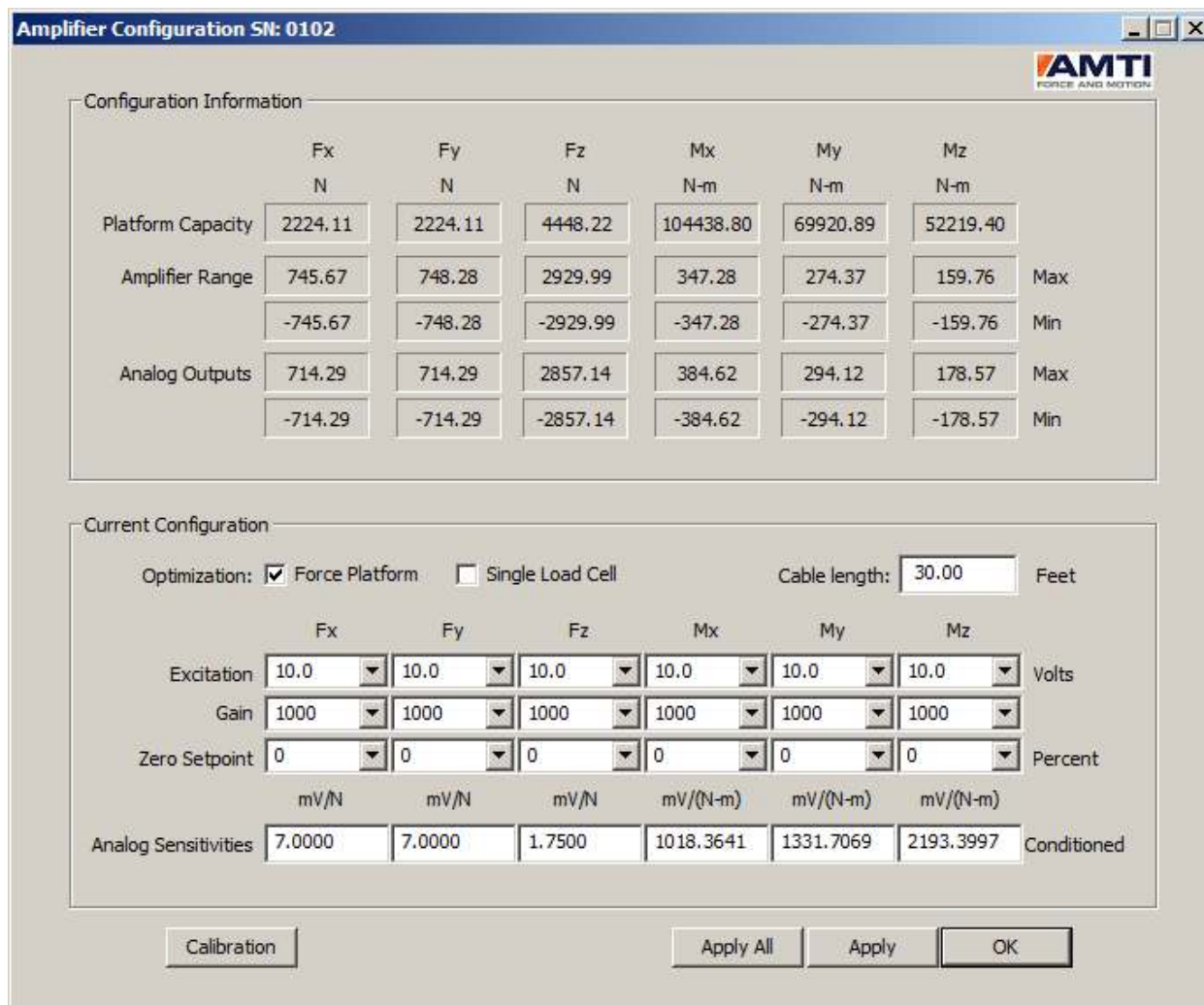
 If you would like to apply the changes permanently you must press the *Save* button on the main dialog box in addition to clicking the *Apply* button here.

OK - Clicking the Ok button returns you to the AMTi Gen 5 Setup dialog box.

19.3 AMPLIFIER CONFIGURATION DIALOG BOX

Use the *Amplifier Configuration* dialog Box to configure the selected Gen 5/Optima.   The *Configuration Information* group shown in the top half of the window displays the Gen 5 measurement limits for the current configuration. The *Current Configuration* group located in the bottom half of the dialog box allows the user to modify the configuration settings.   The user may modify the configuration and view the effect on measurement limits by pressing the *Apply* button located at the bottom of the dialog box.

This dialog box display is organized in columns, each representing one of the six data channels.   When units are displayed they are represented in the measurement units selected in the *Global Settings* group of the *AMTI Gen 5 Setup* dialog box.

19.3.1 CONFIGURATION INFORMATION GROUP

The *Configuration Information* group displays the Gen 5 measurement limits for the current configuration.

Configuration Information	Fx N	Fy N	Fz N	Mx N-m	My N-m	Mz N-m	
Platform Capacity	2224.11	2224.11	4448.22	104438.80	69920.89	52219.40	
Amplifier Range	745.67	748.28	2929.99	347.28	274.37	159.76	Max
	-745.67	-748.28	-2929.99	-347.28	-274.37	-159.76	Min
Analog Outputs	714.29	714.29	2857.14	384.62	294.12	178.57	Max
	-714.29	-714.29	-2857.14	-384.62	-294.12	-178.57	Min

Platform Capacity - The *Platform Capacity* values are the platform's maximum mechanical loads and torques that can be safely applied in the specified directions. The platform capacities will only be present if the platform is an AMTI smart platform.

Amplifier Range - The *Amplifier Range* is the full-scale output range available for all digital and analog output under the current configuration. Maximum and minimum values are displayed for each channel.
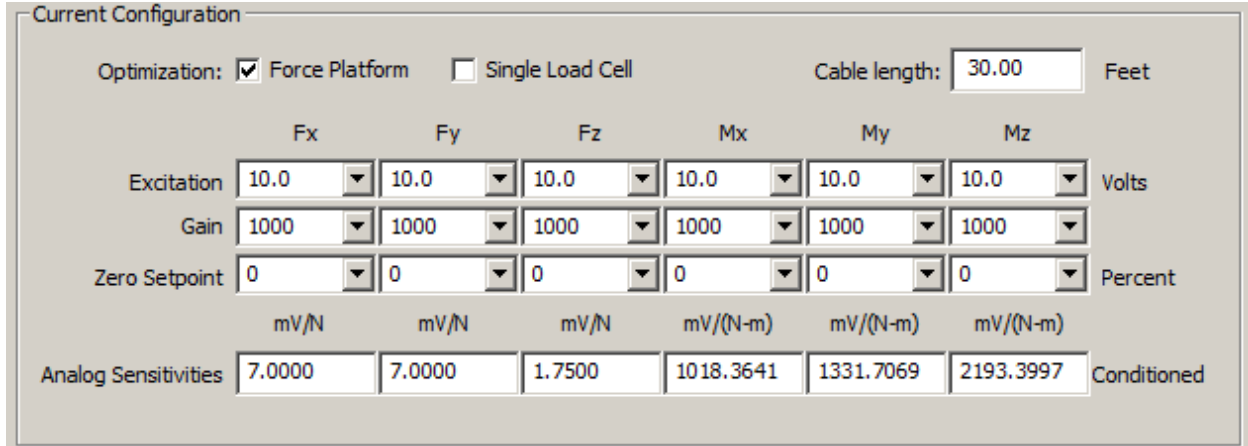
These values are functions of the Gen 5 electrical output range and the selected channel excitations, gains and setpoints. The range will update automaticallly if the settings are changed in the *Current Configuration* group of the dialog box and the *Apply* button has been pressed.

Analog Outputs – The values listed in Analog outputs depend on output mode.   If the analog output mode is set to MSA 6 compatible the *Analog Outputs* will not be visible. The output range will be identical to the Amplifier Range.

For *fully conditioned* analog outputs   the ranges are determined by the *Analog Senstivities* values. The *Analog Senstivities* set the output millivolts per unit of mechanical load for each channel. Although the *Analog Outputs* range can exceed the *Amplifier Range* the analog outputs themselves will not.   The *Analog Sensitivities* are entered in the Current Configuration Group.

19.3.2 CURRENT CONFIGURATION GROUP

Selections within the *Current Configuration* group allow for optimal configuration of the Gen 5 for the expected application. After making changes pressing the Apply button will both apply the settings and update the measurement limit information displayed in the *Configuration Information* group.

Optimization – The signal conditioner should be optimized to work with the type of transducer you are using.

Force Platform - If the transducer you are using is an OR or BP series force plate, select Force Platform.

Single Load Cell -If the tranducer you are using is not an OR or BP series Force Plate, select SingleLload Cell.

Cable Length - The *Cable Length* is used to correct the excitation voltage drop due to the analog cable length; the cable length must be entered in feet. The drop or line loss is a function of the bridge resistance and the excitation voltage.

Excitation – The *Excitation* selections corresponds to the voltage excitation sent to the strain gage bridges to measure force. You can choose 2.5, 5 or 10 volts. There are two things to consider when selecting the excitation voltage. First, a higher excitation voltage provides a better signal to noise ratio. Second, a higher excitation voltage may exacerbate thermal drift. Typically, at room temperature 10 volt excitation is the correct choice.

A few AMTI transducers use a single aggregate excitation voltage for all channels. This is usually done for very small transducers where space is a limitation. If this is the case select the same excitation voltage for all channels. If you have such a transducer it will indicated in the manual.

Gain – The *Gain* selections set the internal amplifier gain. Four gains are available: 500, 1000, 2000 and 4000. When selecting a gain the most important consideration is the bit resoulution of the measurement range.   The higher gain will always correspond with a better bit resolution, therefore always choose the largest gain which, when applied still encompasses the application measurement range.

Zero Setpoint - The *Zero Setpoint* allows the user to offset the measurement range of the signal conditioner to better adapt to the test being conducted.   The zero set point offsets are expressed as percents of the full scale measurement range.

The tables below illustrate the effects of three different zero set point settings for a single channel of a Gen 5 configured for a +-1000 Newton measurement range. The first table is referring to the digital outputs and the second table is referring to the analog outputs.

Digital Output in Newtons			
Zero Setpoint %	0	75	-75
Maximum amplifier range	1000	250	1750
Zero load output	0	0	0
Minimum amplifier range	-1000	-1750	-250

Analog Output in Volts			
Zero Setpoint %	0	75	-75
Maximum amplifier range	5.0	5.0	5.0
Zero load output	0.0	3.75	-3.75
Minimum amplifier range	-5.0	-5.0	-5.0

Consider offsetting the measurement range when by doing so, you can apply a greater gain setting than otherwise. This will achieve greater system resolution.

	mV/N	mV/N	mV/N	mV/(N-m)	mV/(N-m)	mV/(N-m)	
Analog Sensitivities	7.0000	7.0000	1.7500	1018.3641	1331.7069	2193.3997	Conditioned

Analog Sensitivities – The *Analog Sensitivities* are user defined scale factors which set the analog output in millivolts per unit of load for each channel.   The table below identifies the units used to express analog sensitivity for each channel.

Analog Sensitivity Unit Table		
Units	Forces (Fx, Fy, Fz)	Moments (Mx, My, Mz)
English	millivolts/pound	millivolts/inch-pound
Metric	millivolts/Newton	millivolts/Newton-meter

   If the analog output mode is set to *MSA 6 compatible* the *Analog Sensitivities* will not be available. The analog output range will be identical to the *Amplifier Range*.

19.3.3 DIALOG BOX FOOTER

Calibration – Clicking on the calibration button will open the *Gen 5 Calibration* dialog. The Gen 5 is factory calibrated. This dialog box will allow you to view the calibration tables.

APPLY - Clicking on the *Apply* button will temporarily apply all of the configuration changes you have made in this dialog box.   When the Gen 5 is rebooted, the device will default to its last saved settings. Additionally, the *Configuration Information* group output ranges are updated on the dialog box display to reflect the configuration changes.

If you would like to make the configuration changes permanent you must press the *Save* button in the main dialog box in addition to clicking the *Apply*, or *Apply All* buttons here.

Apply All – Clicking on the *Apply All* button will temporarily apply, to all connected Gen 5's, all of the configuration changes you have made in this dialog box. This feature is only recommended if you want all of the platforms to have the same configuration settings.

Ok – Clicking the *Ok* button returns you to the *AMTI Gen 5 Setup* dialog box.

19.4 CONFIGURING THE GEN 5/OPTIMA FOR OPTIMAL MECHANICAL RANGE

For best results the Gen 5/Optima signal conditioner should be setup to achieve both the highest possible signal to noise ratio and maximum system resolution. This is accomplished by independently configuring each channel.   The three adjustable configuration settings that affect the measurement range are excitation voltage, amplifier gain, and zero set point.

To achieve the best signal to noise ratio you want the Gen 5 to output the largest possible excitation voltage. This will normally be 10 volts; except for the most thermally variable conditions. Under those conditions a lower excitation might be required to minimize thermal drift.

  To achieve the best system resolution, apply the largest gain setting available where the Gen 5 measurement range is greater than the expected application range.   By strategically utilizing the Gen 5 *Zero Setpoint* feature to offset the Gen 5 measurement range, a higher gain than normal can occasionally be accomplished.

	N	N	N	N-m	N-m	N-m	
Amplifier Range	745.67	748.28	2929.99	347.28	274.37	159.76	Max
	-745.67	-748.28	-2929.99	-347.28	-274.37	-159.76	Min

	Fx	Fy	Fz	Mx	My	Mz	
Excitation	10.0	10.0	10.0	10.0	10.0	10.0	Volts
Gain	1000	1000	1000	1000	1000	1000	
Zero Setpoint	0	0	0	0	0	0	Percent

Apply

The figure above shows the portion of the Amplifier Configuration dialog box of the Gen 5 Setup software used for configuring measurement range.   Each channel *Amplifier Range* is a function of the excitation, gain, and zero set point selection displayed in the combo boxes below it. To modify the amplifier ranges simply choose your selections and then press Apply. Pressing Apply will download the new setting to the signal conditioner and update the Amplifier Range on the display.

To optimally configure a Gen 5 start with an initial excitation setting of 10, a gain of 500, and a zero set point of 0. If the amplifier range is greater than the expected applied load range increase the gain to next level and continue to do so until you discover the largest gain you can apply and still encompass the expected applied load range for that channel.

19.5 DIALOG BOX : AMPLIFIER CALIBRATION

Gen 5 signal conditioner is precision calibrated at the factory.   The Amplifier *Calibration* dialog box displays all of the calibration parameters of the selected Gen 5/Optima. The settings displayed here should not be modified and require a password to access.   The calibration tables are presented in 6 columns, each column is representing one of the 6 data channels (Fx, Fy, Fz, Mx, My, Mz).

Amplifier Calibration SN: 0102

Amplifier Calibration Tables

Calibration Date	Model#	Serial#	Firmware#	AD Res
12/22/2010	GEN 5	0102	C1.0.0-S1.0.0	3.0228

Gain Calibration

	Fx	Fy	Fz	Mx	My	Mz
500	1.0017	0.9999	1.0015	0.9979	0.9959	1.0008
1000	2.0028	1.9996	2.0011	1.9948	1.9898	1.9994
2000	3.9925	3.9841	3.9894	3.9750	3.9674	3.9876
4000	7.9565	7.9387	7.9749	7.9227	7.9219	7.9453

Excitation Calibration

	Fx	Fy	Fz	Mx	My	Mz	
2.5	2.5254	2.5191	2.5175	2.5126	2.5175	2.5159	Volts
5	5.0148	5.0056	5.0112	4.9954	5.0066	0.0000	Volts
10	9.9944	9.9814	9.9902	9.9588	9.9803	9.9767	Volts

Analog Output Calibration

	Fx	Fy	Fz	Mx	My	Mz
Gains	-2.4980	-2.4989	-2.4925	-2.4949	-2.4936	-2.4998
Offsets	15.0000	3.2000	8.0000	12.8000	13.9000	13.8000

Lock   Open File   Apply   OK

19.5.1 AMPLIFIER CALIBRATION TABLES GROUP

Calibration Date	Model#	Serial#	Firmware#	AD Res
11/13/2009	GEN 5	GEN5SN-000000	C 02/19/10	3.0228

Calibration Date – The date the Gen 5 was calibrated

Model# - The model number of the Gen 5

Serial# - The serial number of the Gen 5

Firmware# - The firmware version number of the embedded software in the Gen 5

AD Res – The calibrated reference voltage used by the Gen 5 analog to digital converter.

Gain Calibration

	Fx	Fy	Fz	Mx	My	Mz
500	1.0017	0.9999	1.0015	0.9979	0.9959	1.0008
1000	2.0028	1.9996	2.0011	1.9948	1.9898	1.9994
2000	3.9925	3.9841	3.9894	3.9750	3.9674	3.9876
4000	7.9565	7.9387	7.9749	7.9227	7.9219	7.9453

Gain Calibration –The Gen 5 supports analog gains of 500, 1000, 2000, and 4000 for each channel. This table displays the calibrated correction factors for each gain selection.

Excitation Calibration

	Fx	Fy	Fz	Mx	My	Mz	
2.5	2.5254	2.5191	2.5175	2.5126	2.5175	2.5159	Volts
5	5.0148	5.0056	5.0112	4.9954	5.0066	0.0000	Volts
10	9.9944	9.9814	9.9902	9.9588	9.9803	9.9767	Volts

Excitation Calibration – The Gen 5 outputs 6 channels of excitation voltage to the platform strain gage bridges to measure force.   The excitation voltage selections are 2.5, 5.0, and 10.0 volts. This table displays the calibrated correction values for each excitation selection.

Analog Output Calibration – To supply analog outputs the Gen 5 signal conditioner uses a digital to analog converter (DAC).   Each channel of the DAC requires both a gain and offset correction.

> **Gains** – The DAC gain corrections
> **Offset** -The DAC offset corrections

19.5.2 DIALOG BOX FOOTER

Lock/Unlock – If you press the Lock/Unlock button to unlock this screen for editing, a dialog box will appear asking a password. To obtain a password AMTI must be contacted. AMTI does not want the factory calibrated settings to be modified.

Open File – Click the Open File button to load a Gen 5 calibration file. The calibration file name will consist of the serial number and the three digit extension cal. (xxxx.cal)

Apply - Clicking on the Apply button will temporarily apply all of the configuration changes you have made in this dialog box to the Gen 5.

> If you would like to apply the changes permanently you must press the **Save** button on the main dialog box in addition to clicking the *Apply* button here.

OK - Clicking the Ok button returns you to the Amplifier Configuration dialog box.

19.6 THE AMTI SYSTEM CONFIGURATION FILE

The Gen 5 Setup software maintains a configuration file containing its last saved settings.   The file is called AMTIUSBSetup.cfg and is located n the C:\AMTI\CFG folder. Whenever the Gen 5 Setup software is started it reads this configuration file and restores the configuration.   The stored parameters are listed in the table below.

Global Settings	Description , Range, or possible values
Configuration file version number	12345 (current version)
Number of Gen 5's	0-15 (range of possible values)
Acquisition Rate	0-2000 (range of possible values)
Run mode	0-4 (Range of possible values)
Genlock state	0-2 (Range of possible values)
For each connected Gen 5	Gen 5 will be listed in data collection order
Gen 5 serial number	Text string
Gen 5 model number	Text string
Platform serial number	Text string
Platform model number	Text string

The meaning of the possible run modes settings in the configuration file are listed in the table below.

Run Mode	Digital Outputs	Analog Output
0	Metric	MSA 6 compatible
1	Metric	Fully conditioned
2	English	MSA 6 compatible
3	English	Fully Conditioned
4	Bits	MSA 6 compatible

The meaning of the possible Genlock states, from the configuration file, is listed in the table below.

State	Description
0	Genlock off
1	collect datasets on rising edge
2	collect datasets on falling edge

20.0 DIALOG BOX: *DIAGNOSTICS*

The *Diagnostics* dialog box is available from the *Setup* selection on the main menu by selecting the *System Diagnostics* option.   *System Diagnostics* runs a series of tests to evaluate your computer's CPU and graphics performance so that AMTI's technical support personnel may compare it with a benchmark computer's performance.   System Diagnostics also enumerates the various settings and options which you have chosen to run your tests.   It provides details about the operating system and hardware on which you have installed AMTI NetForce.   Note also that we provide the means to save the *System Diagnostics* output as a text file which can be conveniently inserted in an E-mail request for technical support.

CONTROL: TEST WINDOW

At the top of the *Diagnostics* dialog box is a test window in which the output of a counter appears.   This window is used to test the graphics performance of the system when the *Diagnostics* button is pressed.
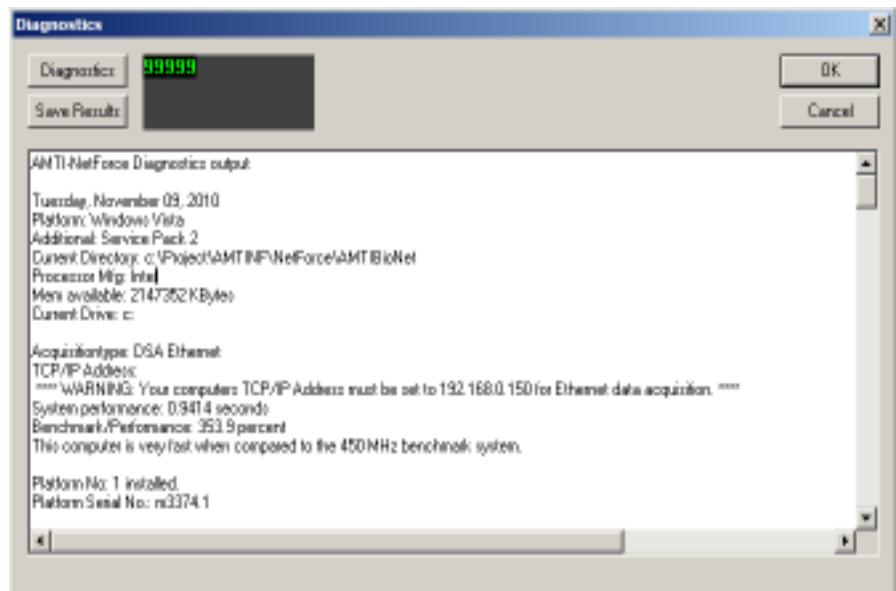
In the center of the screen is an edit box in which the results will be displayed after the *Diagnostics* tests have been completed.

BUTTON: DIAGNOSTICS

The button runs the tests.

BUTTON: SAVE RESULTS

This button saves the results of the tests to a text file which may be inserted in an e-mail request for technical support.   This will help us identify your computer system and evaluate the selections and options that you have chosen to run your tests.

DEFAULT BUTTON: OK

The OK button exits without taking further action.

21.0 DIALOG BOX: *FILE MANAGEMENT OPTIONS*

The *File Management Options* dialog box contains a number of settings and controls which affect the way data files are saved and exported.   It is also used to set various parameters that control linking to external programs such as AMTI's BioAnalysis program and various spread sheet programs.   This dialog box is available from the *Export and File Options* selection under *Setup* in the main menu.
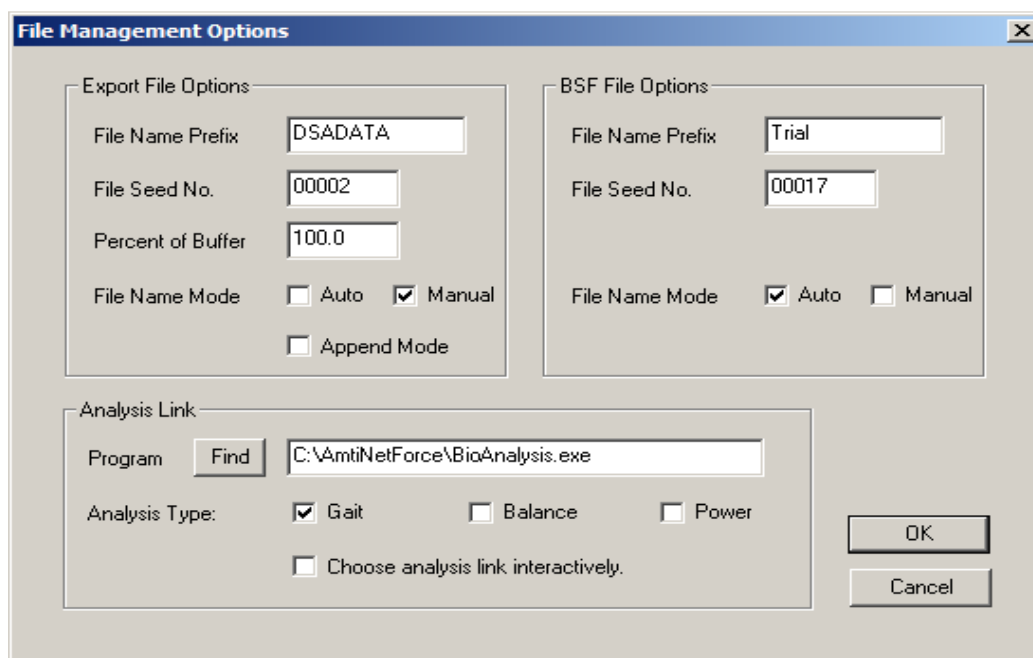
      The dialog box is organized in four sections, *Export File Options,, BSF File Options* and *Analysis Link*.   These four sections and their controls are discussed below.

21.1 EXPORT FILE OPTIONS GROUP

      The *Export File Options* section provides similar controls to the *BSF File Options* section described below.   The only difference is that these settings control the naming of exported .txt files when the *File Export* and *Run Spread Sheet* options are selected.   A *File Name Prefix, File Seed No.* and *Auto* and *Manual* are available as described in the above.

      This section includes two additional controls which affect how export files are maintained. These are discussed below.

CONTROL: APPEND MODE

The *Append Mode* mode check box determines whether exported data will be appended to a single on going file or whether a new file will be created each time the data is saved using the *File Export* function.   The *Append Mode* is likely to find application outside of the conventional gait and balance testing scenarios.

EDIT BOX: PERCENT OF BUFFER

If *Append Mode* is checked the *Percent of Buffer* setting determines what percent of the current data buffer will be appended to the ongoing data file.   For most gait and balance applications this value should be set to 100 percent.

21.2 *BSF FILE OPTIONS* GROUP

The *BSF File Options* section includes several controls which affect the way .BSF data files are saved.   Note that .BSF data files are the native data file format used by both AMTI-NetForce and AMTI's BioAnalysis program.   The controls in this section are discussed below.

EDIT BOX: FILE NAME PREFIX

The File Name Prefix establishes a prefix which will be used for all .BSF file names.

EDIT BOX: FILE SEED NO.

The *File Seed No.* edit box establishes a seed number which will be incremented each time a file is saved.   As an example if the *File Name Prefix* above is set to AMTIDATA and the *File Seed No.* is set to 1 then the next data file will be named AMTIDATA00001.BSF, subsequently the next file will be AMTIDATA00002.BSF and so on.   This applies only if the *Auto* check box is checked as discussed below.

CHECK BOX: FILE NAME MODE, AUTO AND MANUAL

The *File Name Mode* check boxes, *Auto* and *Manual*, determine whether files will be automatically named by the system using the *File Name Prefix* and the *File Seed No.* discussed above or whether a dialog box will be presented allowing the user to manually enter a file name.

21.3 ANALYSIS LINK GROUP

The *Analysis Link* section is used to establish the linking between the BioAnalysis program (or other user program) and AMTI NetForce.   This section includes a *Find* button and an edit window in which the full path to the BioAnalysis program must be specified.   This information is used by the *Analyze* button in the main dialog box of the program to execute the BioAnalysis program.

If you know the location of the BioAnalysis.exe program then simply type the full path and file name in this edit box.   If you do not know the location, use the *Find* button to locate the BioAnalysis.exe program.   Once the *Find* button has located the BioAnalysis program it will automatically insert the proper information in the link fields for you.

The *Analysis Type* specifies whether you are conducting a Gait, Balance, or Power Trial.

21.4 DIALOG BOX CONTROLS

BUTTON: OK

The *OK* button exits and saves the settings as defaults.

BUTTON: CANCEL

The *Cancel* button exits with out taking further action.

21.5 DIALOG BOX: *FIND EXTERNAL PROGRAM*

The *Find External Program* dialog box is accessed by selecting Find on the File Management dialog box and is used to provide a link to AMTI BioAnalysis software.
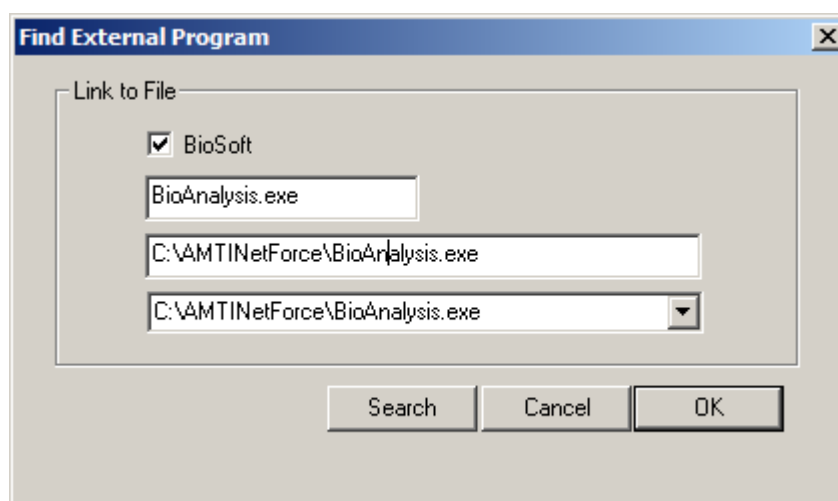
21.5.1 LINK TO FILE GROUP

The *Link to File* section provides check box options for *BioSoft.*

21.5.2 DIALOG BOX CONTROLS

Button: Search

The search button opens a file open dialog box which is used to navigate to the head of the search path.   The usual selection will be the root directory of the drive on which the desired program is installed.   Once the root directory has been selected choosing the open button will activate the search. The search procedure traverses every sub-directory from the chosen root.   This process can take considerable time on slower computer equipment so please be patient.

Once the search has been completed the full path name will be displayed in the combo box below the File Name edit box.

Button: *OK*

  The *OK* button will copy the full path name into *File Management Options* dialog box and will make appropriate additional linking settings.

Button: *Cancel*

  The *Cancel* button exits without further action.

22.0 DIALOG BOX: *SUBJECT DATABASE UTILITIES*

The *Subject Database Utilities* dialog box is accessed by selecting *Subject Database* in the *Utilities* option on the Main Menu and allows the user to export the subject and test information to text files that can be viewed and edited in either a spread sheet or document editor.   The *Subject Database Utilities* function uses the database in the current folder as selected with the *Folder* button in the main dialog. The output text files will also be written into that folder.

There are two check boxes labeled *Single Subject* and *All Subjects*.   The *Single Subject* check box enables exporting of only the currently selected subject as selected with the *Subject* button in the main dialog box where as the *All Subjects* selection will enable scanning and outputting of the entire patient data base.
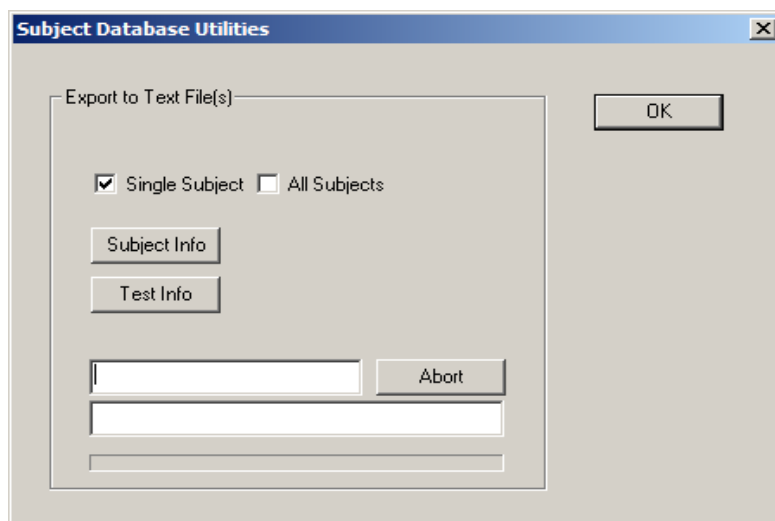
BUTTON: SUBJECT INFO

The *Subject Info* button creates a text file with line items for each subject.   The text file name is SubjectInfo.txt.   This file will be overwritten each time the *Subject Info* button is pushed.

BUTTON: TEST INFO

The *Test Info* button creates a text file with line items for each subject.   The text file name is TestInfo.txt.   This file will be overwritten each time the *Test Info* button is pushed.   Note that both of the output files are unformatted comma delimited text files.   These files can be read by most spread sheet programs.

BUTTON: ABORT

The *Abort* button terminates the process immediately.

DEFAULT BUTTON: OK

The *OK* button closes the dialog box and exits without further action.

BUTTON: CANCEL

The *Cancel* button exits with out further action.

APPENDIX A - SAMPLE ANALYSIS INTERFACE

The *Analyze* button on the main screen executes any user program which has been setup by the user in the *File Management Options* dialog box (see section 22.0).   To setup such a program chose *Setup* from the main menu and then *Export and File Options* from the pull down menu, the *File Management Options* dialog box will be displayed.

In the *File Management Options* dialog box refer to the *BioSoft Link* section.   There is an edit box to the right of the *Find* button. The *Analyze* button will execute any program specified in this edit box.   The full path to the program must be specified.

When the *Analyze* button is pressed AMTI-NetForce places a copy of the last saved data file in a memory file location to make it available for other programs including AMTI's BioAnalysis program.   In this appendix the technique for accessing that memory file is described.   The actual file structure is described in Appendix B - Data File Format.

Accessing the Memory File

The memory file name is *shfile.*   This file may be accessed using the file mapping API provided in Microsoft's Visual C/C++.   The following sample code describes the technique.

```
/* Code to open the memory file */

        HANDLE hAMap;

        LPVOID lpMapAddress;

        // Open the map file

        hAMap = ::OpenFileMapping(FILE_MAP_READ | FILE_MAP_WRITE,

                                        TRUE, "shfile");

        // If the memfile handle is null then return now.

        if (hAMap == NULL){

                CloseHandle(hAMap);

                return -1;

        }
```

```
// Map a view of the file

lpMapAddress = MapViewOfFile(hAMap, FILE_MAP_ALL_ACCESS, 0, 0, 0);

// Error check

if( lpMapAddress = = NULL ){

        UnmapViewOfFile(lpMapAddress)

        CloseHandle(hAMap);

        return -1;

}

// At this point a map file exists at the memory address contained in

// lpMapAddress.    You may use lpMapAddress and offsets into the

// file to read the data in the file.
```

The sample program named NetForceInterface included in the NetForceInterface folder provides the best means to interface with AMTI-NetForce.   This sample code and documentation are provided as is and AMTI makes no warrantee as to their suitability or correctness.

APPENDIX B - DATA FILE FORMAT (.BSF FILES)

Each data file (.bsf file) will be prefixed by a version number cast as a long.   The current version as of March 14, 2000 is 100.   Following the version number there will be a SPgsMainHdr (main header) structure which will be followed by at least 1 SPgsInstrHdr (instrument header) structures.   There will be a SPgsInstrHdr for each block of 6 channels setup as a platform or instrument in the system setup.

The following strategy is suggested for reading a .bsf file.   Note that following each read the file pointer is left pointing to the next un read byte of the file.   Thus successive read commands can be used to parse the elements of the file with a minimum of effort.

Read the version number

Check if value = 100

Read the SPgsMainHdr

Retrieve the *num_of_plats* and the *num_of_instrs* values.   The instrument header count will equal the sum of these two variables.   We define *instHeadCount = num_of_plats +   num_of_instrs.*

Retrieve the *trl_lth* and *rate* variables which are used to calculate the number of data sets in the file. We define the number of data sets, *NumDatasets = trl_lth * rate.*

Loop through the instrument headers

Loop *instHeadCount* times reading an instrument header and extracting the desired data.

Read the instrument header

In order to read the data the value of *num_chans* must be retrieved from each instrument header. The sum of the number of channels for all the instruments is calculated as *SumNumberOfChannel =* Σ*num_chans.*

The following values should be recovered from the instrument header to facilitate processing of the stored data:

sens[0] to sens[*num_chans*]

ampgain[0] to ampgain[*num_chans*]

extvoltage[0] to extvoltage[*num_chans*]

acqrange[0] to acqrange[*num_chans*]

These values correspond to the sensitivity, amplifier gain, excitation voltage, and acquisition card bit resolution respectively.   The most straight forward process is to load all of the values into aggregate arrays for all of the instruments which can then be easily indexed after reading the raw data.

Loop through the data

Loop through the data *NumDatasets* times, each time reading a data set.   Each data set will contain *SumNumberOfChannel* words of data where each word is a two byte integer value.

Each data value can be conditioned into engineering units by the following calculation:

Value = (1,000,000 * Data[k]) / (acqrange[k] * sens[k] * ampgain[k] * extvoltage[k])

The ".bsf" data file has the following organization:

> long Version
>
> SPgsMainHdr
>
> SPgsInstrHdr (1)
>
> > …
>
> SPgsInstrHdr (n)
>
> Data

The main header and instrument header structures are shown below.   Note that these structures are packed on 4 byte bounderies.   In C/C++ (Microsoft) this is accomplished by using the precompiler pragma: #pragma pack(4) followed by #pragma pack() with empty braces to restore the default packing.

/************************BSF HEADERS*************************/

#pragma pack(4)

```
typedef struct SMnHeaderTag {
        LONG size_header;               // Size of the structure in bytes
        LONG num_of_plats;              // Number of active platforms
        LONG num_of_instrs;             // Number of active instruments
        char name[100];                         // Subjects name
        char test_date[12];             // Test date
        char sub_dob[12];               // Subjects date of birth
        double weight;                  // Subjects weight
        double height;                  // Subjects height
        char sex;                       // Subjects sex
        LONG trl_num;                   // Number of trials
        double trl_lth;                 // Length of the trial in seconds
        LONG zmth;                      // Zero method
        LONG wtmth;                     // Weight method
        LONG delayks;                   // Delay after keystroke
        LONG trigmth;                   // Trigger method 0 is keystroke, 1 by chan and 2 external
        LONG trigchan;          // Triggering platform
        LONG pre_trig;                  // Pre trigger values
        LONG post_trig;         // Post trigger values
        double trigval;                 // Trigger value
        LONG rate;                      // Rate of acquisition
        char protocol[150];             // Protocol file used
        char test_type[200];            // Type of test    e.g eyes open etc.
        char cmnfl[150];                // A file name which contains comments
        char trldscfl[150];             // A file name with trial descriptions
        char test_by[100];              // Examiner name
        LONG units;                     // Units where 0 is english and 1 is metric
        } SPgsMainHdr;
```

```
typedef struct SInstrHeaderTag {
        LONG size_header;               // Size of the structure in bytes
        LONG ser_num;           //Serial number of the instrument or platform
        LONG layout_num;                // The layout or platform number
        char model[20];                 // Name of the instrument
        LONG num_chans;                 // Number of channels
        LONG tr_strt_chan;              // True start channel .. depends on hardware setup
        LONG tr_end_chan;               // True end channel .. depends on hardware setup
        LONG data_strt_chan;            // Start channel in the data file
        LONG data_end_chan;             // End channel in the data file
        float length;                   // Length of the platform
        float width;                    // Width of the platform
        float offset[3];                // Instrument x,y,z offset
        float sens[MAX_CHNS];           // Sensitivities (possible 32 channels)
        int    chans[MAX_CHNS];         // Channel numbers (possible 32 channels)
        float coord[4][4];              // Coordinate transformation
        float interdist[3];             // x,y and z distances from the previous platform
        float    ampgain[MAX_CHNS];     // Amplifier Gains (possible 32 channels)
        float extvoltage[MAX_CHNS];     // Excitation voltage
        float acqrange[MAX_CHNS];       // Acquisition card range (bits/volt)
        float zero_period;              // Tz
        float latency_period;           // Tl
        float trigger_time;             // Ttrig
        float end_time;                 // Tend
        float post_trig_time;           // Tpost
        LONG zero[MAX_CHNS];            // Zero values
        LONG rate;                      // Data set interval
        float trig_val;                 // Trigger value
        float end_val;                  // End value
        } SPgsInstrHdr;
#pragma pack()
```

APPENDIX C - ETHERNET SETUP FOR DIGIAMPS

AMPLIFIER ETHERNET SETUP

Each DigiAmp must be uniquely identified on the Network.   This is accomplished by using the Key Pad and LCD interface to set the amplifier ID.   Please read the amplifier manual and observe all the cautions and recommendations in the manual before setting the amplifier ID.   The following text describes the steps necessary to set the amplifier IDs.

Power up the amplifier.

The LCD will display:
Main DSA Menu
A) Auto Zero

Press the Down key, the LCD will display:
Main DSA Menu
B) Amplifier ID

Press the Enter key, the LCD will display:
Main DSA Menu
1 (1,2,3,4,5 or 6 depending on previous setting)

Press the Down key to cycle through the choices 1 through 6.

Press the Enter key when the desired choice is displayed.

The LCD will display:
Main DSA Menu
B) Amplifier ID

Press the Down key 5 times, the LCD will display:
Main DSA Menu
G) Save Settings

Press the Enter key
This saves and activates the amplifier ID setting.

Press the Down key 3 times to get back to the "top" of the menu, the LCD will display:
Main DSA Menu
A) Auto Zero

Note in a typical installation the amplifier ID will be set to correspond to the platform number. Platforms should be numbered such that the first platform in a walkway is platform 1 and so on.   This convention will maintain consistency between the amplifier numbering and platform numbering scheme used in AMTI-NetForce.

NETFORCE ETHERNET SETUP

Run the *AMTI-NetForce* software, select *Setup* from the main menu and *Hardware Installation* from the sub menu.   This will open the *Hardware Installation* dialog box.   Select the *DigiAmp* button. This will open the *DigiAmp* dialog box.   Click on the *Add Platform* button.   An *Open File* dialog box will be presented.   Insert your calibration CD into the CD drive and use the file navigation controls to locate your calibration file.   The calibration file will have a name xxxx.plt where xxxx is the serial number of the platform to install.   Please note that by default platforms and amplifiers are installed from 1 to 6 in sequential order.   So the first platform and amplifier that you install should correspond to platform 1, the second to platform 2 etc.   To add a second platform press the *Next* button then press *Add Platform* again.   Repeat the above sequence until all of the desired platforms and amplifiers have been installed. You may now use the *Next* and *Previous* buttons to navigate between platforms and you may set any of the parameters such as gain, excitation voltage and filter frequency for the amplifier hardware.   These values are automatically downloaded to the amplifiers when data acquisition is started.

APPENDIX D - STEP BY STEP INSTALLATION PROCEDURES FOR ETHERNET INSTALLATIONS (DIGIAMP)

REQUIREMENTS:

The Ethernet system requires a 10 Megabit per second, thin net (BNC coaxial connector), Ethernet card. Another option would be an RJ45 Ethernet card with an external RJ45 to BNC converter box. Please follow the card manufacturer's instructions to install the card and its drivers in your computer.

The Ethernet system is designed to interface with AMTI's DigiAmp (DSA-6) amplifier. One or more DigiAmp amplifiers are required.

NETWORK AND ETHERNET INSTALLATION
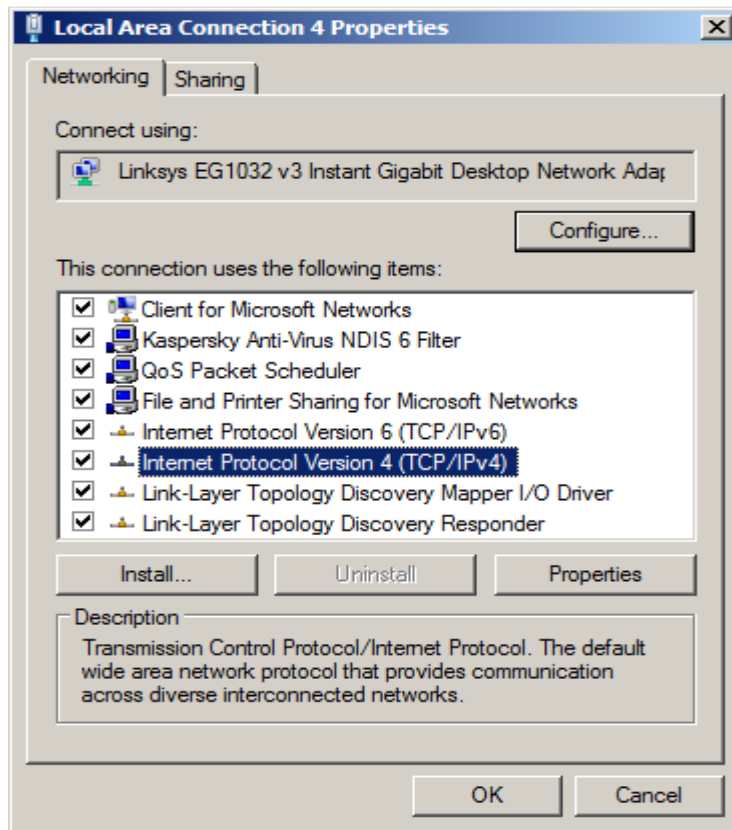
Go to the properties window of the Network card. Highlight TCP/IP version 4. The following dialog box will appear.
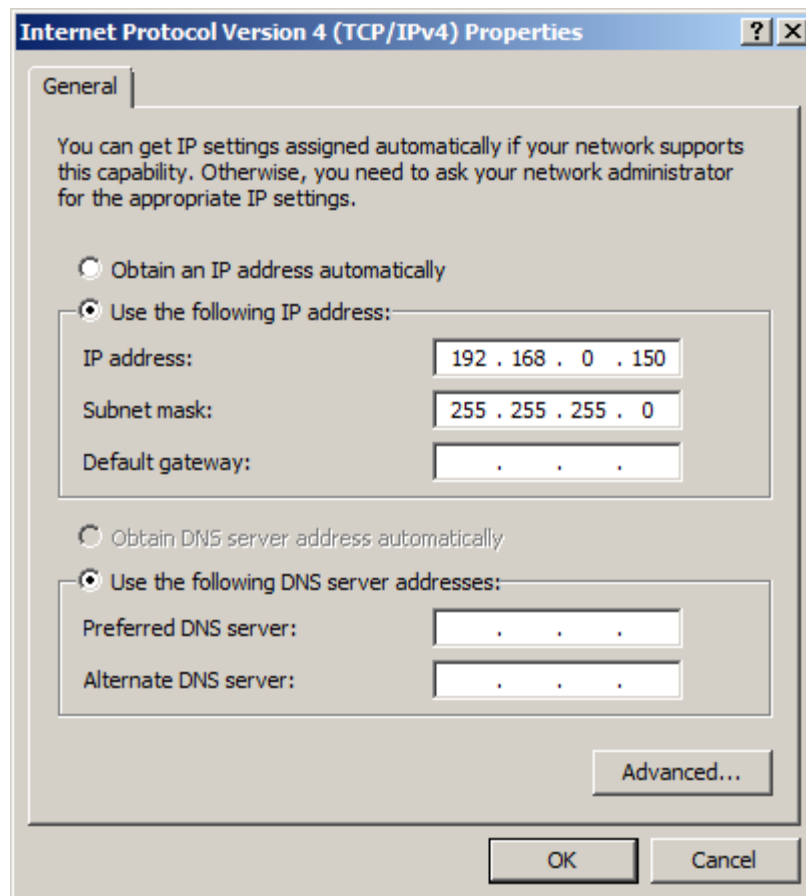
Click on Use the following IP address and fill in the *IP Address* and the *Subnet mask* as follows:

IP Address: 192.168.0.150

Subnet Mask: 255.255.255.0

This sets the PC's TCP/IP address to 192.168.0.150 which is required for AMTI's NetForce Ethernet data acquisition.

HARDWARE SETUP

Once the Ethernet card is installed and the amplifier is positioned where desired the computer and the amplifier may be interconnected with a length of 50 ohm coaxial cable terminated with female BNC connectors.   This cable is standard "thin net" Ethernet cable and is available at most computer stores.   The cable may be from a minimum of 4 feet up to a maximum of 500 feet in length.

IMPORTANT NOTE: The cable must always be connected to the card and to the amplifier using a Tee connector.   The Tee connector provides the means to daisy chain up to 5 amplifiers on the Ethernet system.   Unused terminals on the Tee connector MUST be terminated with a 50 ohm terminating cap.

These components are all standard Ethernet components and are available at most computer stores (a kit containing a Tee connector and 50 ohm cap is provided with each amplifier).   Please re-read the note above.   This is the most common error made when hooking up an Ethernet system.

It is recommended that an isolated Ethernet network be established for use with the DigiAmp amplifiers.   This network should be independent of any general purpose business system.   The reason for this is that the data transfer process from the amplifiers uses a high percentage of the Ethernets bandwidth and furthermore the process must continue in real-time.   Using an isolated network guarantees that the full Ethernet bandwidth will always be available for data transmission.

OPERATING SYSTEM SETUP

The Ethernet communications system uses UDP data transfer and requires that your network installation be configured for TCP/IP.   This configuration varies somewhat depending on the installed operating system.

The Ethernet system uses fixed TCP/IP addresses.   The host computer (the PC running the NetForce software) address must be set to 192.168.0.150.   Each attached amplifier will have a different address based on the Amplifier ID set by using the Key Pad and LCD interface on the amplifier. The Amplifier ID's can be set to any value from 1 to 6.   This number is added to the host address producing addresses from 192.168.0.151 to 192.168.0.156.   If the network is not completely isolated then the network administrator must be aware that TCP/IP addresses 192.168.0.150 through 192.168.0.156 are reserved for the AMTI-NetForce data acquisition system.

APPENDIX E - COMMON WINDOWS CONTROLS

Button Control

The following three examples illustrate three Button control styles used in AMTINetForce. These controls are used to actuate a command or initiate a process.   The controls are actuated by pressing the left mouse button once when the mouse cursor is positioned over the control.

Example 1
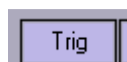
Example 2
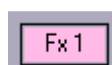
Example 3

Radio Button

The Radio Button control is illustrated below.   This control allows the user to select one of several available options.   The control is actuated by pressing the left mouse button when the mouse is positioned over the circular button portion of the control.   A black dot in the center indicates that the selection has been made.
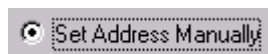
Check Box

The Check Box control allows you to toggle an option on or off.   The control is actuated by pressing the left mouse button when the mouse is positioned over the rectangular control area.   The on state is indicated by a check mark.   The off state is indicated with the check cleared.
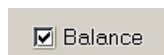
ON   OFF

Edit Box

The Edit Box control is illustrated below.   This control allows the user to enter text or numerical data.   The edit box is selected by placing the curser over the text rectangle and then pressing the left mouse button once.   Once selected text information may be entered from the key board.

C:\amtibios\bin\BioAnalysis.exe
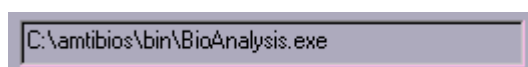
Spin Control

The Spin Control is illustrated below.   The spin control is activated by pressing one of the arrow buttons located beside the control.   The arrow buttons will cycle through several preset numerical choices which will be presented in the controls display window.   The choices are usually sequential integer values.

Amp ID   1

Combo Box

The Combo Box control allows the user to select one choice from a list of choices.   The Down arrow on the right of the combo box control displays a list of choices.   Left clicking once with the mouse over the down arrow will display the list.   Once the list is displayed a selection can be made by double left clicking on the desired item.   The choice will be displayed in the window after it has been selected.

1000
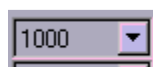
List Box

The List Box control is used to display a list of items.   In some cases the list may be editable. Usually items in the list can be selected by single left clicking over the item of interest.
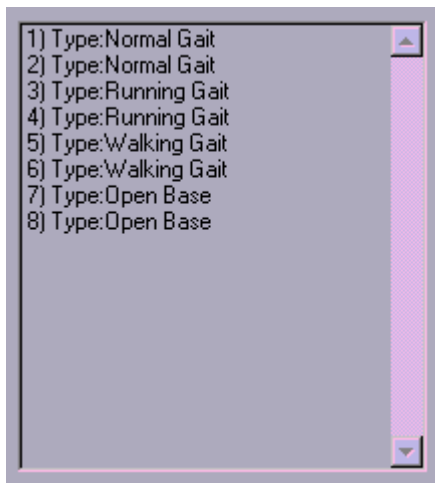
APPENDIX F – INSTRUCTIONS FOR USB TO SERIAL CONVERTER

These instructions apply to the Sewell model SW-1301 Serial to USB converter bought from AMTI.

INSTRUCTIONS FOR INSTALLING THE USB SERIAL CONVERTER ON XP
1) Plug the Cable into a USB port.

2) The "Welcome to the Found New Hardware Wizard" should appear. If it doesn't, go to step 8.

3) Ensure the product driver CD (included with package) has been inserted in your CD-ROM drive.

4) Select the option: "Install the software automatically (Recommended)."

5) Press "Next".

6) Windows should find the "Prolific USB-to-Serial Comm Port" driver.

7) Press "Finish" when prompted by Windows to complete the installation.

*** If the "Found New Hardware Wizard" did not appear in step 2 ***

8) Open Device Manager by doing the following:

      a) Click on "Start" and then "Control Panel."

      b) Switch to Classic View (if in Category View).

      c) Double click on "System."

      d) Select the Hardware tab.

      e) Press the "Device Manager" button.

9) Under "Ports (COM & LPT)," look for a USB Device entry with a yellow exclamation point by it.

10) Right click on the USB Device and select "Update Driver."

11) This should bring up the "Welcome to the Hardware Update Wizard."

12) Ensure the product driver CD (included with package) is inserted in your CD-ROM drive.

13) Select the option: "Install the software automatically (Recommended)."

14) Press "Next." Now begin at step 5 above and continue.

INSTRUCTIONS FOR LOCATING THE COM PORT
1) Open Device Manager by following Step 8 above.

2) Click on "+" next to Ports and you will see "Prolific USB-to-Serial Comm Port (COM X)"

COM X is the com port that the serial to USB converter is using and this is the COM you should choose in NetForce.

INSTRUCTIONS FOR CHANGING THE COM PORT
Some serial devices may not work with the USB to Serial Converter because they require COM 1, 2, 3 or 4 and the converter sometimes installs as COM 5.

1) Open Device Manager by following Step 8 above.

2) Click on "+" next to Ports and double click on "Prolific USB-to-Serial Comm Port (COM X)"

3) Click on the "Port Settings" tab. Click on the "Advanced" button.

4) On the bottom left side pull down the bar and select COM 1, 2, 3 or 4 (NOTE: Choose one that does not say "in use" next to it). Click "OK."

5) Click "OK" again. Notice that the device will show up as being on the same COM port that it was before (i.e., COM 5), but will show up on the new port if you close the Device Manager and open it again.

6) Close the Device Manager. Your serial device should work properly.

You can find additional technical support and/or download the most recent drivers at the following url: http://www.sewelldirect.com/USBtoSerialSupport.asp

APPENDIX G – TROUBLESHOOTING TIPS

I press the start button and I don't see any data.

Have you selected an amplifier to view? Notice the Amp ID on the display to the right is set to 0. That means the display is turned off.   Use the display arrows to scroll to an available amplifier.
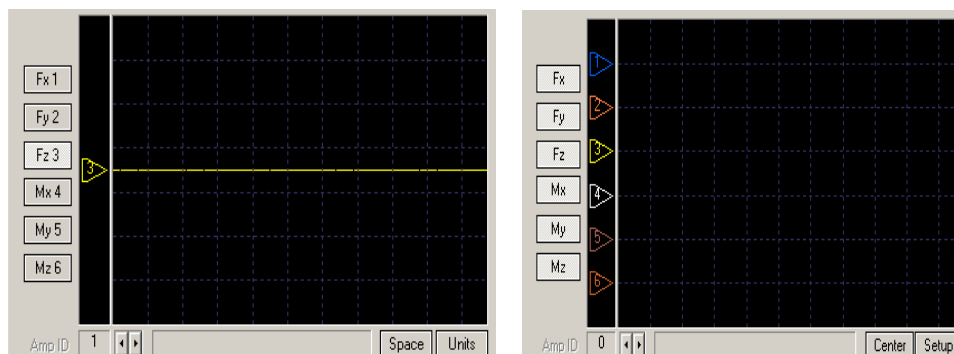
Have you enabled the channels within the display area? To enable the channels they must be both highlighted and lie within the display area. Notice that the display to the right has enabled channels Fx1 through Mz6 but the legends are not within the display area. Press Center and then Space to space the legends within the display area.
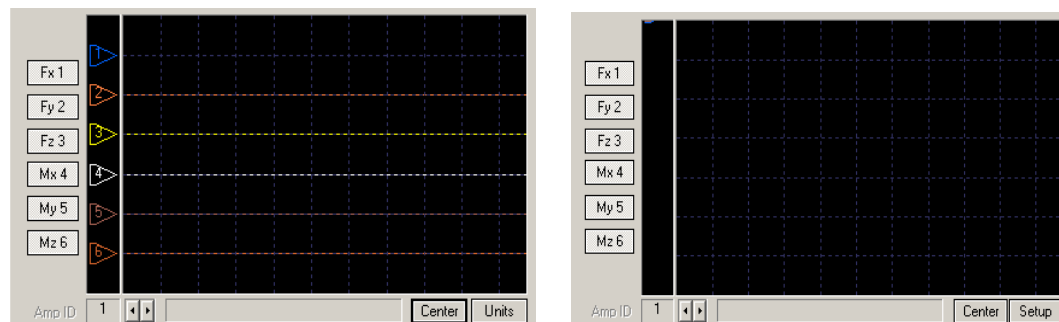
Have you scaled the data correctly? To scale the display press the setup button under the display. Make sure the units per division are large enough that data will appear within the display.

Have you zeroed the platform? If the platforms have not been zeroed sometimes the data will not lie within the display.
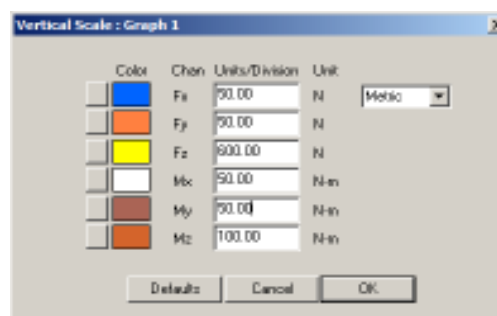
I press the start button and my data is a straight line with all zeros or a straight line and the data value never changes.

You have forgotten to perform a hardware zero on the platform.

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