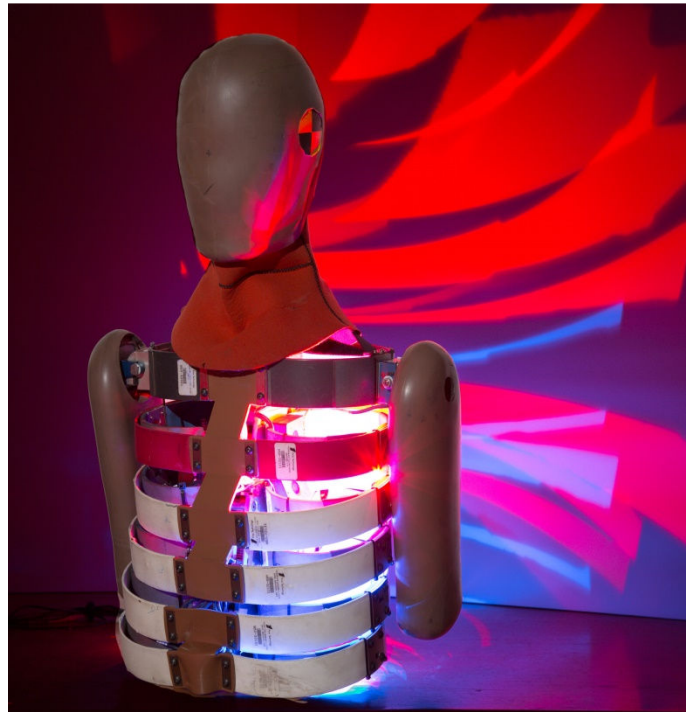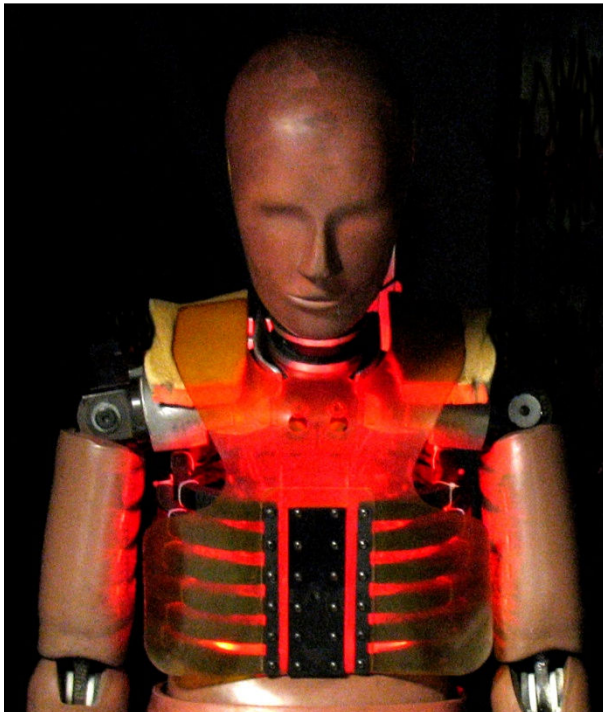# BOXBORO
## s y s t e m s

# RibEye™ Multi-Point Deflection Measurement System
# Software User Manual (Version 6.0)

**Boxboro Systems, LLC**
**978-257-2219**
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**RibEye™ Multi-Point Deflection Measurement System
Software User Manual (Version 5.0)**

## 1.0    RibEye Control Software Description

The RibEye control software is used to set up the RibEye for a test, download the data from the RibEye, view the data, and export the data for crash test analysis.  The RibEye software works with all Boxboro Systems RibEye models.  When the software connects to a RibEye, it adapts the screens according to the features and capabilities of the connected RibEye.

### 1.1    Computer Requirements

The RibEye Control software works on PCs running Windows 7 and Windows 10.

### 1.2    Software Installation

First, insert the RibEye USB thumb drive into a USB port.  Using Windows Explorer, open the "RibEye Installer" directory and run the "setup.exe" program.  Then follow the instructions on the screen.  This program installs the RibEye control software and the National Instruments LabWindows/CVI Run-Time Engine.  The RibEye program is installed in the C:\Program Files(x86)\RibEye_6_0 directory and will not overwrite previous versions of RibEye software.  The installer creates shortcuts on your Desktop and Start Menu.

The Boxboro Systems website has the latest version of the RibEye software; you can download the software from the website's RibEye page:  www.boxborosystems.com/ribeye.html.

### 1.3    Software Configuration

This version of RibEye software uses an initialization file, RibEye_6_0.ini, which is stored in the RibEye installation directory, typically C:\Program Files(x86)\RibEye_6_0.  The initialization (INI) file lets you configure things like ISO codes for channel names and default values for most controls.  Items that can be set in the INI file are discussed below in the sections that relate to them.

Instructions on how to configure your software by editing the INI file are presented in Appendix A.  You can edit the INI file with any text editor such as Notepad.  When editing the file, be sure to follow the format presented in the appendix.  If the INI file is accidently corrupted while editing it, a spare copy is installed in the installation directory.  You can  make a copy of the spare INI file, and change the copy's name to RibEye_6_0.ini to start with a fresh version.

## 2.0    RibEye Control Software Operation

The main screen upon start-up of the RibEye control software is shown in Figure 1.  Note that most of the controls are grayed out, and only the "Connect/Setup", "Plot", and "Export" tabs are visible.  Without connecting to a RibEye, the software can be used only to re-plot existing data sets and to export them. The "Status" box shows the current state of the RibEye (disconnected).

**Figure 1.  RibEye control software main screen upon start-up**



### 2.1    Connecting to the RibEye

The control software can communicate to RibEyes via Ethernet over a Local Area Network (LAN).  The "Connect to RibEye via:" drop-down menu has the option for connecting via RS232 Serial for special configurations.

Typically you connect the RibEye to the same local area network (LAN) that your PC is connected to. The RibEye can be connected to a router on the vehicle or via special cables to some data acquisition systems.  You can also connect your PC directly to a RibEye with an Ethernet cable.  For older PCs that do not have an auto-sensing Ethernet port, you need a crossover Ethernet cable.

Select Ethernet in the "Connect to RibEye via:" drop-down menu.  Next, select the IP address for your RibEye in the "IP Address" box.  You can also type an IP address into the box.  RibEyes are shipped from the factory with a default IP address of **192.168.0.240**.  If your network IP addresses do not begin with **192.168.0**, you must change the RibEye IP address to match your network in order for the software to communicate with it.  For example, if your network address starts with **175.22.49**, then the RibEye IP address must be changed to **175.22.49.xxx**.  (Please refer to section 2.2 below to change the IP address and to view the IP address of your network.)  The last three digits of the RibEye IP address must not be the same as another device on your network.  Ask your system administrator to tell you what unused address to use.  The last three digits of the RibEye IP address can be any number between 002 and 254.

## 2.2    Finding RibEyes on Your LAN and Changing a RibEye IP Address

The "Find RibEyes" button is used to search for all RibEyes that are currently connected to your LAN and powered up (Figure 2).  RibEyes that are not turned on will not be found, and the software will display a message box saying that no RibEyes were found on the network (Figure 3).

### Figure 2.  "Find RibEyes" screen
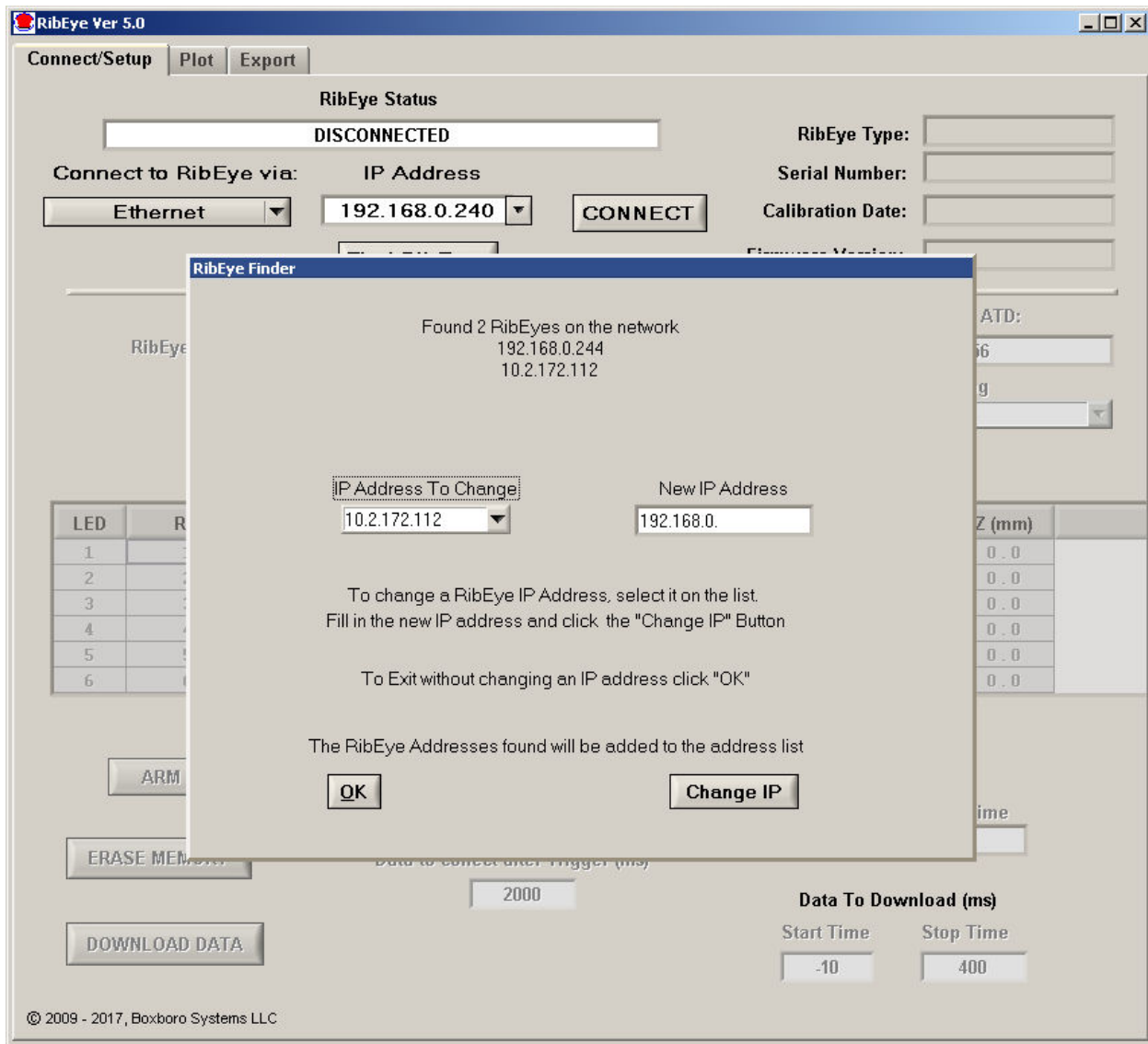
**Figure 3. "Find RibEyes" screen when no RibEyes found**
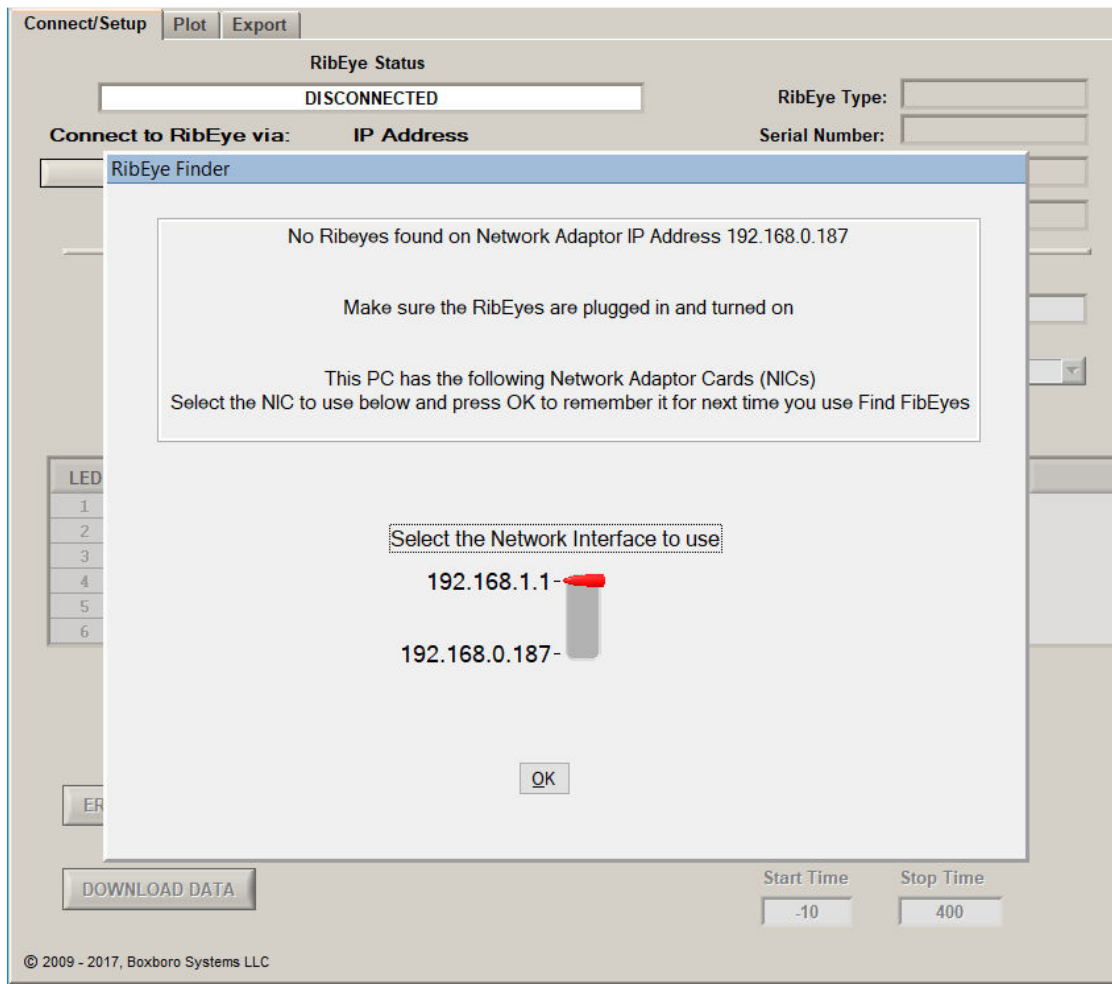


When you click on the "Find RibEyes" button, a UDP Broadcast message is sent out of your LAN port requesting that RibEyes respond. Note that the first time you run the program after installation, your firewall might block the UDP message and display an information box asking if the program should be allowed. When the RibEyes have been found, they are displayed in the pop-up screen (top center). If you press the OK button, the RibEye IP addresses are automatically added to the "IP Address" drop-down menu on the main RibEye screen.

When no RibEyes are found on the network, even though they are powered on and connected, it might be because your computer has multiple Network Interface Cards (NICs), and the Find RibEye commands are being sent to the wrong Ethernet port. In this case, as shown above in Figure 3, the Find RibEyes software will display more than one Network Interface to use. Select the Ethernet port for the network that the RibEye is connected to, and click the OK button. The software will store the correct Ethernet adaptor to use when you click on the "Find RibEyes" button again.

### 2.2.1  How Finding RibEyes Works

For older RibEyes, with two cables from the Trunk Box to the controller, or for WorldSIDs with serial numbers less than 100, the software listens to port 1020 for a UDP protocol broadcast message from the RibEyes. Each RibEye sends out a UDP broadcast packet every 10 seconds.

For newer RibEyes, with a single cable from the Trunk Box to the controller, or for WorldSIDs with serial numbers greater than 100, the software sends a UDP protocol broadcast message out on port 30718. Each RibEye on the network responds with its IP address.

Note that some network routers and most firewalls block UDP broadcast packets. See your system administrator if this feature doesn't work, and tell your administrator what ports need to be allowed (1020 and/or 30718). The Windows firewall can be told to allow messages on these ports.

Changing the RibEye IP address (see section 2.2.2 below) also uses the UDP protocol and the UDP broadcast address to communicate with the RibEyes, even if they are not on the same network subnet.

Alternative methods for changing the RibEye's IP address are shown in Appendixes B–C for the older and newer model RibEyes. The newer model RibEyes have a web interface that can be used to adjust other network parameters if needed. However, these other network parameters should be changed only by your system administrator.

### 2.2.2  Changing a RibEye IP Address

Depending on your LAN configuration, you might have to change the RibEye IP address in order to communicate with it. Typically, as noted above, the RibEyes have to be on the same subnet (the network address, minus the final 3 digits) for proper communications.

To change a RibEye IP Address, select the RibEye address you want to change in the drop-down box labeled "IP Address To Change". Enter your selected RibEye's desired new address in the "New IP Address" box. Note that the software automatically shows the subnet address of your PC, but you can over-ride the address assigned by the computer – click on the "Change IP" button and enter your RibEye's IP address. If you do not need to change any addresses, click on the OK button.

When you click on the Change IP button, if the change is successful, you will get a message that the program is waiting for the RibEye to re-boot. This takes about 10 seconds.

If the new RibEye address is the same as another device on your network, you will get an error message as shown below. Pick another address to use for the RibEye.
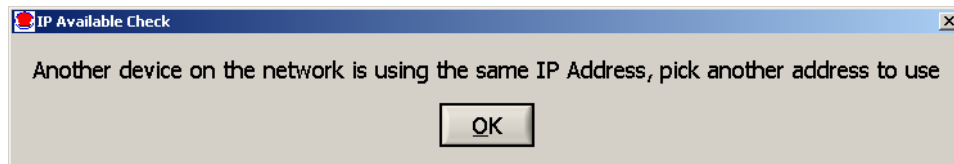


If the new RibEye address is the same as another RibEye on your network, you will get an error message as shown below. Pick another address to use for the RibEye.
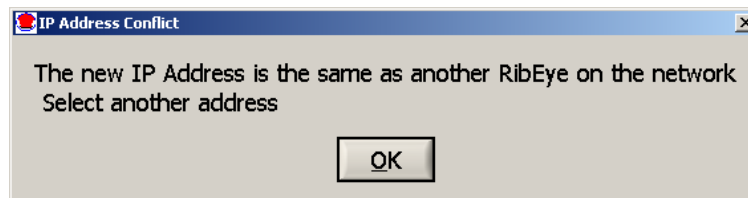
In rare circumstances, another device on your  network uses the same protocol to change its IP address as the RibEye does. If this occurs, you will get the error message shown below. To prevent changing the address on the other device that uses the same protocol, you should remove the RibEye from your network and connect the RibEye directly to a PC and change its address. Then you can put the RibEye back on the network.



**INI File Note:**  If you have an older RibEye – Hybrid III RibEye with two cables from the controller to the trunk box, or a WorldSID RibEye with a serial number below 100 – these RibEyes have an older style Ethernet adaptor that uses a different protocol for finding RibEyes.  The older style systems require that you wait 15 seconds for the RibEyes to respond.  To enable the protocol for the older style RibEyes, you must edit the INI file. Go to the [webwidget] section and set the Widget Type = 0.  This setting finds both the older and newer RibEyes.

### 2.2.3  Issues Communicating with RibEyes

The RibEye software always uses the default Ethernet port on your PC to try to communicate with a RibEye.  The following are some potential problems and work-arounds.  To determine what LAN connections your PC has, open a DOS command prompt window and type: ipconfig/all.  This shows you the LAN connections on your PC.

### 2.2.3.1  Your PC Has Multiple NICs

If your PC has multiple Network Interface Cards (NICs), unplug the Ethernet cables from the NICs connecting to LANs that the RibEye is *not* connected to.  Try to communicate with the RibEye again. Once communication is established with the RibEye, you can plug the other Ethernet cables back in. The PC should now remember, via its routing table, which NIC to use to send command to the RibEye. Note that instead of unplugging the ethernet cables from the NICs not used for the RibEye, you can disable the NICs using the Windows control panel.

### 2.2.3.2  Your Laptop Has Wired and WIFI Connections

If your laptop has both wired and wireless (WIFI) Ethernet connections, it connects to one LAN via wireless and a second LAN via the wired Ethernet port.  To connect with the RibEye, turn off the WIFI port and establish communications via the wired port.  After communications have been established with the RibEye, you should be able to turn your WIFI port back on and still be able to connect to your RibEye.

According to one customer, to make their laptop communicate to the RibEye on the wired Ethernet port while the WIFI was enabled, they had to –

- Right-click on their wired Local Area connection
- Select Properties
- Select Advanced
- Go to the Speed and Duplex setting
- Set it to Auto-negotiate

Then they were able to connect to the RibEye with the wired port while leaving the WIFI port enabled.

### 2.3    Main Screen After Connecting to the RibEye

After you have selected the correct IP address, click on the "Connect" button to connect to the RibEye. When the software connects to the RibEye, it retrieves the following data and fills it in on the screen: RibEye Type, Serial Number, Calibration Date, and Firmware Version.  The software also retrieves and fills in the "RibEye Installed in ATD" text field.  For most RibEye models, the RibEye trigger setting is also retrieved and displayed.  Figure 4 shows the main screen after the software has connected to the RibEye.  Note that "Live Display tab is now visible, and the various control buttons are activated.

**Figure 4.  RibEye control software main screen after connecting to RibEye**
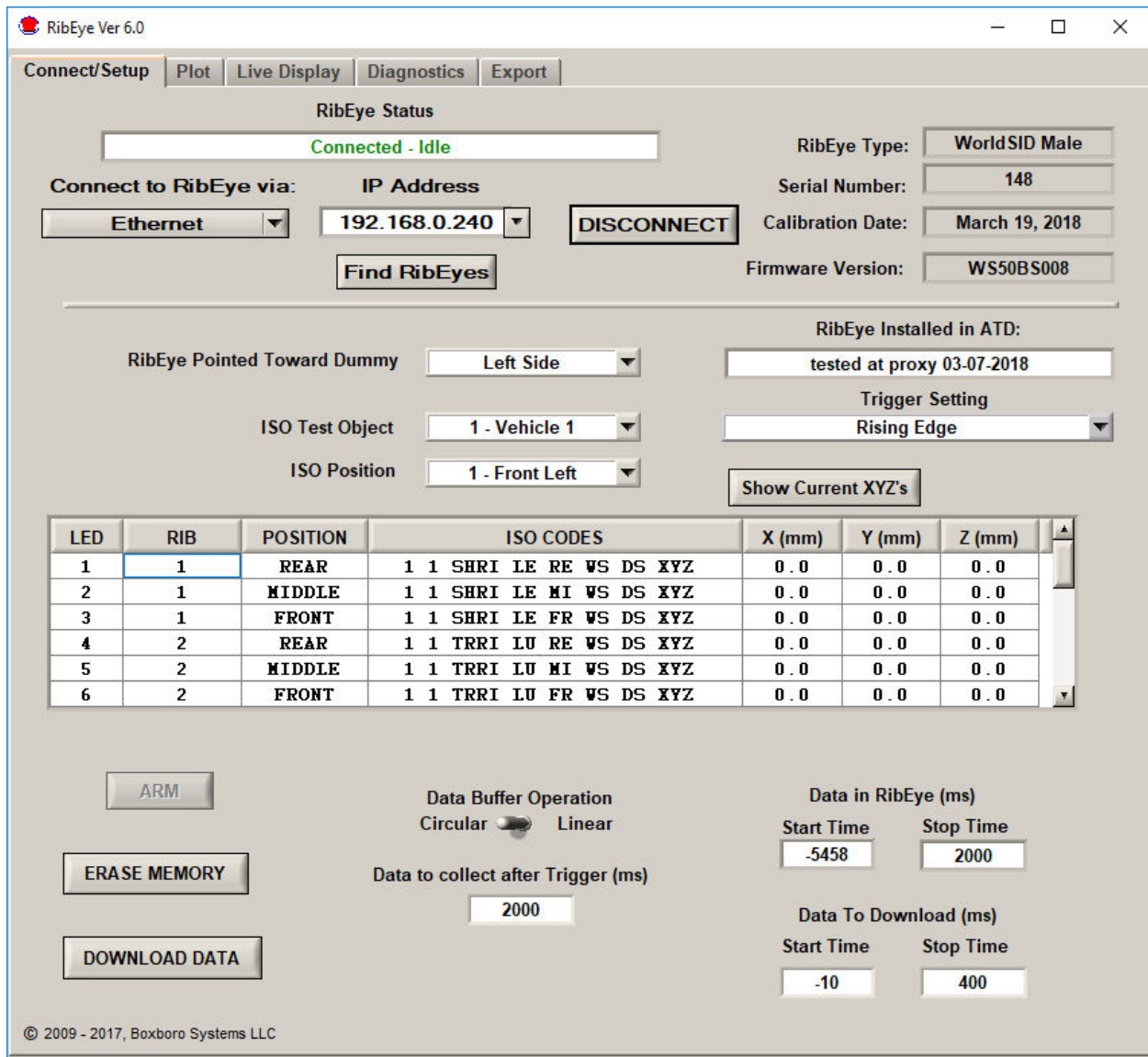
## 2.4   Text Field Under "RibEye Installed in ATD"

This text field can be used for any purpose, but it is typically used for dummy identification, so that if multiple RibEyes are being used, you can verify that you are connected to the right one. The user can change this text field, and the software stores the data in the RibEye's flash memory.

After you change the text in this field, either press the "Enter" key on your keyboard or click outside the text box on the screen. The software then writes the updated information to the RibEye, and a confirmation box pops up as shown in Figure 5. Click on "OK" to close the box.

**Figure 5.  Confirmation of updated data
under "RibEye Installed in ATD"**
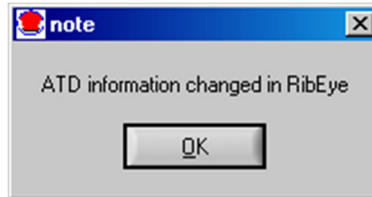


## 2.5   Trigger Setting

The "Trigger Setting" drop-down menu is used to select the trigger signal type and polarity. The RibEye trigger setting is stored in the RibEye's flash memory. If you change the setting, the new setting is written to the RibEye. The two options are –

- Rising Edge –when you want to trigger on a rising voltage at the trigger input
- Falling Edge –when you want to trigger on a falling voltage at the trigger input

Older RibEye models show two additional options for differential-type trigger signals –

- Differential - Rising Edge
- Differential - Falling Edge

Refer to the Hardware User Manual for your RibEye for more information on Trigger connections.

Some versions of the RibEye do not show the "Trigger Setting" menu because they are designed to be directly connected to a specific data acquisition system, and the trigger setting is fixed to operate with that system. Refer to your RibEye Hardware User Manual for more information.

## 2.6   "RibEye Pointed Toward Dummy" Field

The drop-down menu for "RibEye Pointed Toward Dummy" is shown only for side-impact dummies. The selections for impact direction, Left Side or Right Side, are used to convert data from the RibEye coordinate system to the dummy coordinate system. For the SID-IIs and the WorldSID, changing the direction changes the signs of the X and Y data. For the Polar Left or Right settings, the RibEye coordinate system is rotated about the Z-axis of the dummy by plus-or-minus 41 degrees.

For new WorldSID RibEyes (serial number greater than 100), "RibEye Pointed Toward Dummy" also loads a new calibration file into the RibEye. The RibEye uses different calibration files for left-side and right-side impact. If you switch the RibEye from one side of the dummy to the other, use this control to load the appropriate calibration file.

The direction selection is checked whenever data is read from the RibEye, and the coordinate conversions are applied to the data as it is received.

### 2.7 ISO Code Settings

The drop-down menus for "ISO Test Object" and "ISO Position" (Figure 6) are used to generate the standard ISO channel naming codes as shown in the table on the screen in Figure 6. When you change any of the values in the drop-down menus, you will see the changes reflected in the ISO codes in the table. The ISO codes are used as channel headers in the exported data files. The channel codes are not stored in the RibEye. The "Rib" and "Position" entries for each LED in the table cannot be changed by the user. When data is downloaded, the ISO codes are read from the table and are used to name the channels in the data files. For the formal definitions of the channel codes, see ISO/TS 13499 RED B (Version 1.5), Road vehicles – Multimedia data exchange format for impact tests.

**Figure 6. ISO code settings**



| LED | RIB | POSITION | ISO CODES | X (mm) | Y (mm) | Z (mm) |
|-----|-----|----------|-----------|--------|--------|--------|
| 1 | 1 | REAR | 1 1 SHRI LE RE VS DS XYZ | 0.0 | 0.0 | 0.0 |
| 2 | 1 | MIDDLE | 1 1 SHRI LE MI VS DS XYZ | 0.0 | 0.0 | 0.0 |
| 3 | 1 | FRONT | 1 1 SHRI LE FR VS DS XYZ | 0.0 | 0.0 | 0.0 |
| 4 | 2 | REAR | 1 1 TRRI LU RE VS DS XYZ | 0.0 | 0.0 | 0.0 |
| 5 | 2 | MIDDLE | 1 1 TRRI LU MI VS DS XYZ | 0.0 | 0.0 | 0.0 |
| 6 | 2 | FRONT | 1 1 TRRI LU FR VS DS XYZ | 0.0 | 0.0 | 0.0 |

Appendix D contains special setup instructions for the Hybrid III 50th Male 2-axis adjustable-LED RibEye, which allows LEDs to be placed on any rib or on the sternum. Please contact Boxboro Systems for the special firmware needed to convert a standard RibEye to an adjustable-LED model.

The ISO codes used in the RibEyes are shown in Table 1.  The format is –

A B CCCC DD EE FF GG H I

**Table 1.  ISO codes used in RibEyes**

| Letters | ISO Definition | Options |
|---|---|---|
| A | Test Object | Can be defined by the user, typically:<br>    1 = vehicle 1<br>    2 = vehicle 2<br>    3 = vehicle 3<br>    S = sled<br>    etc. |
| B | Position | Standard seating positions 0–9 |
| CCCC | Main Location | Typically the rib name or sternum<br>For frontal dummies:<br>    RIBS or STRN for sternum<br>For side-impact dummies:<br>    SHRI = shoulder rib<br>    TRRI = thoracic rib<br>    ABRI = abdominal rib |
| DD | Fine Position 1 | The rib number such as 01, 02, 03<br>Or a position code such as:<br>    UP = upper; MI = middle; LO = lower<br>    LU = left upper; RU = right upper<br>    LM = left middle; RM = right middle<br>    LL = left lower; RL = right lower |
| EE | Fine Position 2 | A position code such as:<br>    UP = upper; MI = middle; LO = lower;<br>    LE = left; RI = right;<br>    OU = outer; FR = front; RE = rear |
| FF | Fine Position 3 | The dummy type such as:<br>    S2 = SID-IIs<br>    WS = WorldSID 50$^{th}$ Male<br>    W5 = WorldSID 5$^{th}$ Female<br>    H3 = Hybrid III 50$^{th}$ Male<br>    HF = Hybrid III 5$^{th}$ Female<br>    PE = Polar<br>    BA = Ballistic SID-IIs for vest/weapons testing |
| GG | Dimension | Always DS for displacement |
| H | Direction | X, Y, or Z |
| I | Filter Class | 0 = unfiltered<br>A = CFC 1000<br>B = CFC 600<br>C = CFC 180<br>D = CFC 60 |

**INI File Note:**  You can change the ISO codes for the Main Location, Fine Position 1, and Fine Position 2 for WorldSIDs and Hybrid III dummies by editing the INI file.  Two sections of the INI file, [WorldSIDleft] and [WorldSIDright], apply to WorldSID 5$^{th}$ and 50$^{th}$ dummies.  A third section, [HybridIII], applies to Hybrid III 5$^{th}$ and 50$^{th}$ dummies.  These sections are described in more detail in Appendix A.

The previous version of RibEye software (version 5.3, released in October 2017) used the same ISO codes for a WorldSID RibEye mounted on either side of the dummy.  If you want to continue using this existing channel-naming convention, copy the 5.3 INI file WorldSID ISO codes to the [WorldSIDleft] and [WorldSIDright] sections in the INI file for version 6.0.

### 2.7.1  ISO Codes for Ambient Light Channels

The ambient light channels have special ISO codes.  The ambient light data is always unfiltered, and the units are 16-bit counts (0-65,535).  0 is for no ambient light, and 65,535 is a full-scale reading.  The values are proportional to the ambient light power, but the data is not calibrated to standard optical power units such as lumens.

The ISO codes for the Test Object and Seating Position are the same as the standard ISO codes.  The ISO codes for the other locations are shown in Table 2.

**Table 2.  ISO codes for ambient light**

| Letters | ISO Definition | 2-Axis RibEyes | 3-Axis RibEyes | WorldSID |
|---------|---------------|----------------|----------------|----------|
| CCCC | Main Location | SENS | SENS | SENS |
| DD | Fine Location 1 | LE for left sensor<br>RI for right sensor | LE for left sensor<br>RI for right sensor<br>MI for middle sensor<br>TO for top sensor<br>BO for bottom sensor | MI for middle sensor<br>TO for top sensor<br>BO for bottom sensor |
| EE | Fine Location 2 | 99 | 99 | RE for red (upper ribs)<br>BL for blue ( lower ribs) |
| FF | Fine Location 3 | 99 | 99 | 99 |
| GG | Dimension | PO | PO | PO |
| H | Direction | 0 | 0 | 0 |
| I | Filter | 0 | 0 | 0 |

### 2.7.2  "ISO Test Object" Menu

The "ISO Test Object" drop-down menu sets the first character of the ISO codes shown in Table 1 above.  Typically this is used to indicate the vehicle that the RibEye dummy is in.  This list of options can be modified by right-clicking your mouse inside the drop-down menu box.  This pulls up a screen where you can enter additional test objects as shown in Figure 7.  The "ISO Test Object" list is stored in a text file:

C:\Program Files(x86)\RibEye_5_0\isotestobject.txt

You can directly edit this file to delete or add entries.  The file is read at program startup to populate the drop-down menu list.

**Figure 7.  Adding to "ISO Test Object" list**

### 2.7.3  "ISO Position" Menu

The "ISO Position" drop-down menu lets you choose the standard dummy positions in a vehicle.  The "ISO Position" sets the second character of the ISO codes shown in Table 1 above.  Figure 8 lists the options for dummy positions.

**Figure 8.  "ISO Position" list of options**

```
1 - Front Left        ▼
  0 - Other
✓ 1 - Front Left
  2 - Front Middle
  3 - Front Right
  4 - 2nd Row Left
  5 - 2nd Row Middle
  6 - 2nd Row Right
  7 - 3rd Row Left
  8 - 3rd Row Middle
  9 - 3rd Row Right
```
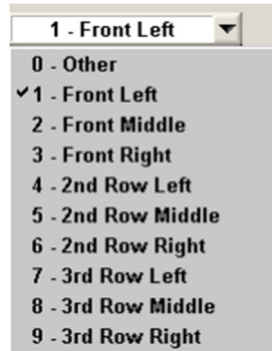
## 2.8    "Show Current XYZ's" Button

The "Show Current XYZ's" button turns on the LEDs briefly and report the current positions in the dummy coordinate system based on the Left or Right setting in the "RibEye Pointed Toward Dummy" field.  For 2-axis systems, the button is labeled "Show Current XY's".  The current positions displayed are the average of 2000 points collected by the RibEye.

Note that you can copy the current positions into a spreadsheet by highlighting the entries with your mouse and pressing CTRL-C to copy the data to the windows clipboard.  Then you can paste the data into a spreadsheet.  Some users find this to be a convenient way to track the rib's initial positions from test to test.

## 2.9    Data Collection Setup, Arm, and Download Controls

Figure 9 illustrates these controls, which are described in the following sections.

**Figure 9.  Data collection setup, arm, and download controls**
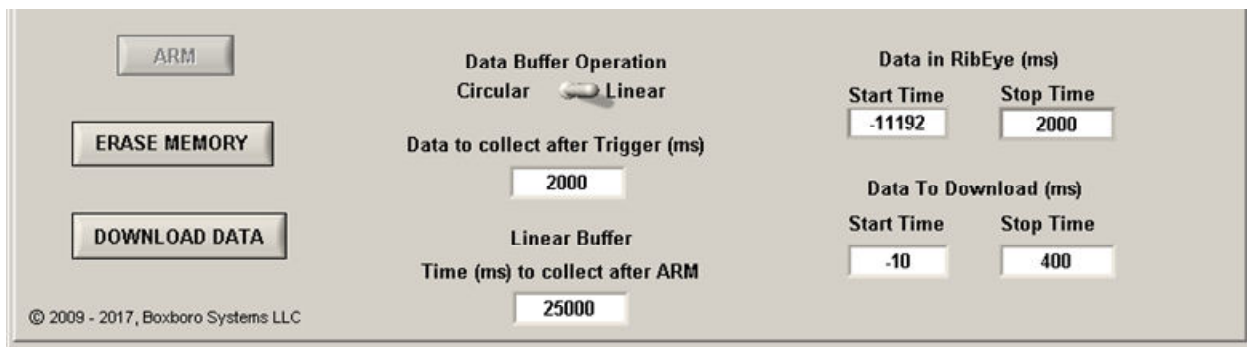
### 2.9.1  Data Buffer Operation

The RibEye has a 30-second D-RAM data buffer (25 seconds for WorldSID), which can be configured as a circular or linear buffer. When the data buffer is set to "Circular", only the "Data to collect after Trigger" box is shown. In this mode, when the RibEye is armed, it begins collecting data to a circular buffer. It continues to collect data to the circular buffer until it receives a trigger signal (see section 2.9.4 "Arm/Disarm" and "Trigger" Buttons). After a trigger is received, RibEye continues to collect data for the number of milliseconds entered in the "Data to Collect after Trigger" box. You can set this value from 1 to 30,000 milliseconds (ms). Note that if you set the "Data to Collect after Trigger" to 30,000 ms (the buffer's full capacity), no pre-trigger data will be saved.

When the data buffer is set to "Linear", the RibEye collects up to 30 seconds of data, starting from when it is armed. If a trigger is received, it continues to collect data until it has either collected the amount of data set in the "Data to Collect after Trigger" box, or until the "Time (ms) to collect after ARM" is reached, whichever happens first. If no trigger is received, the RibEye stops collecting data after the time period specified in "Time (ms) to collect after ARM". If a trigger is detected, the time the trigger occurs is set to 0 ms. Table 3 shows some examples.

#### Table 3.  Linear buffer operation examples

| Data to collect after Trigger (ms) | Time (ms) to collect after ARM | Trigger occurs (ms after ARM) | Data Stored in RAM Buffer | |
|---|---|---|---|---|
| | | | Start Time | Stop Time |
| 2,000 | 30,000 | 10,000 | –10,000 | 2,000 |
| 2,000 | 30,000 | 29,000 | –29,000 | 1,000 |
| 2,000 | 30,000 | No Trigger | 0 | 30,000 |

**INI File Note:** By editing the INI file, you can set the default values for 1) the Circular/Linear Buffer Switch and 2) the Data to Collect After Trigger. See Appendix A for more details.

### 2.9.2  Flash Memory Data Storage

Immediately after data collection stops, data is copied from the RAM buffer to flash memory. The flash memory holds 2 seconds of data (1.7 seconds for WorldSID). If the RibEye is powered down after it writes to flash memory, only 2 seconds of data will be available to download. If a trigger occurred during the test, the flash holds data from –500 to 1,500 ms (–200 to 1,500 ms for WorldSID), where Time 0 is the time the trigger occurred. If no trigger occurred, the RibEye stores the last 2 seconds of data acquired in flash memory. If the linear buffer was set to 30,000 ms to collect after arm, the flash holds 28,000–30,000 ms. Current model WorldSID RibEyes (serial number greater than 100) also have an SD-card flash-memory module that stores the entire 25 seconds of WorldSID test data.

Note that if power is interrupted while the RibEye is writing data to flash memory, then when the RibEye is rebooted, it will report the data in flash as –

Start Time = –29, 999 ms
Stop Time = 27,999 ms (–28,299 for WorldSID)

There might or might not be any good data in flash memory, but the data can be downloaded and inspected.

### 2.9.3  "Erase Memory" Button

The "Erase Memory" button erases the RibEye RAM and flash memory. This typically takes about 10 to 14 seconds depending on the RibEye model, but the memory specifications say that it can take longer. A pop-up box appears asking you to confirm that you want to erase the memory. The RibEye "Status" box displays "Erasing RibEye Flash Memory", and a progress bar appears.

### 2.9.4 "Arm/Disarm" and "Trigger" Buttons

Clicking on the "Arm" button (see Figure 9 above) starts the RibEye collecting data. Note that if memory is not erased as described above, the "Arm" button is inactive. When you click the "Arm" button, the RibEye will turn on the LEDs briefly and check that all LEDs are reporting good data. If one or more LEDs is reporting an error code, a message box will appear as shown in Figure 10. You have the choice to "continue to ARM" or to stop and determine why the LED is reporting an error code. See section 2.9.6 for more information on error codes.

**Figure 10.  Error code notification when arming the RibEye**
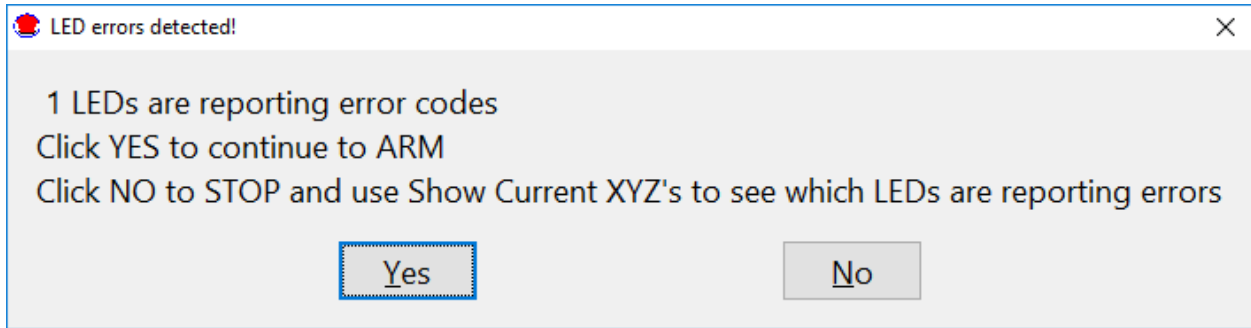


If there are no error codes, or if you decide to continue even though there are error codes, the ARM button label changes to "Disarm", and a "Trigger" button appears as shown in Figure 11.

**Figure 11.  "Disarm" and "Trigger" buttons that appear after arming**
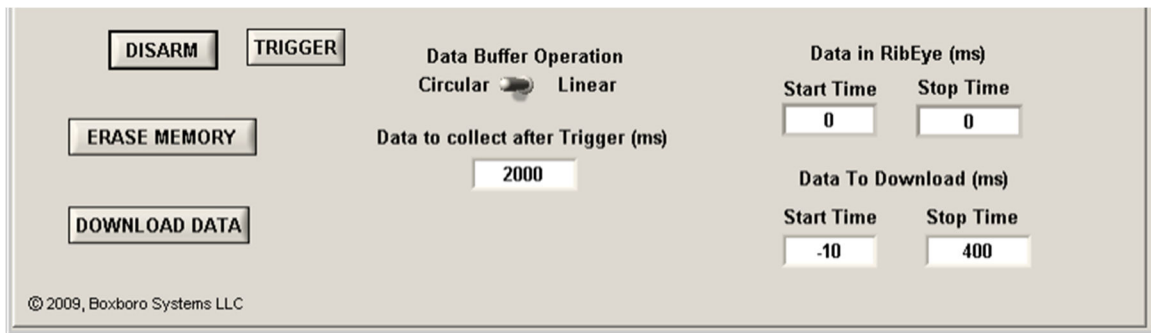
Then the RibEye Status box displays "Collecting Pre-Trigger Data", and a message pops up (Figure 12) asking if you plan to disconnect the Ethernet cable to the RibEye.

**Figure 12.  Message pop-up after arming**
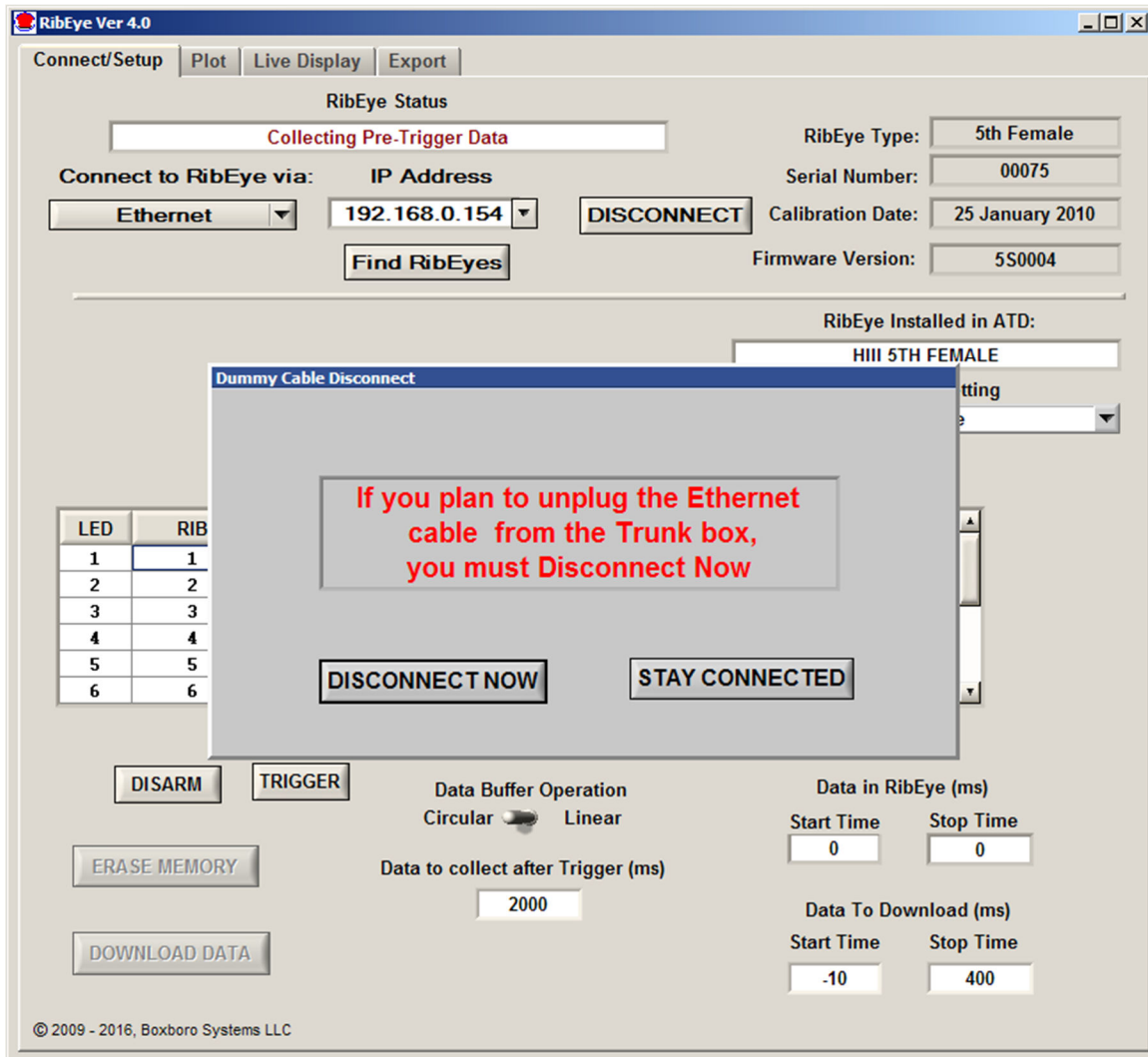


If you *do* plan to disconnect the cable, you must click on the "Disconnect Now" button. This will close communications to the RibEye so that disconnecting the cable will not lock up communications. If you *do not* plan to disconnect the Ethernet cable, you can click the "Stay Connected" button.  After the test is completed and the Ethernet cable is plugged back in to the Trunk Box, you can click on the "Connect" button to re-establish communications with the RibEye.

The "Disarm" button causes the RibEye to stop collecting data, and ==*no data will be stored*==.  The "Trigger" button marks a trigger event, and the RibEye will treat it as if a hardware trigger occurred.

During data acquisition, the RibEye Status displays either "Collecting Pre-Trigger Data" or "Collecting Post-Trigger Data and Storing to Flash".  Once the data is stored to flash memory, the RibEye Status changes to "Connected-Idle". At this time, you can download the data collected.

### 2.9.5  "Download Data" Button

The "Download Data" button downloads data from the RibEye based on the "Start Time" and "Stop Time". You can set the start and stop times within your expected region of interest.  However, the start and stop times must be within the range of data stored in the RibEye, or an error message will appear.

**INI File Note:** You can set the default values for the download start and stop times in the INI file's [connect_tab_controls] section.

When you click on the "Download Data" button, a progress bar appears showing the percent completion of the download. As part of the Download process, the software reads the ISO channel codes from the main tab and internally stores the channel codes with the data set. If the "ISO Test Object", "ISO Position", or "RibEye Pointed Toward Dummy" settings are incorrect, you have to re-download the data to store the correct values with the data set.

All RibEye data from your selected Start Time to Stop Time is downloaded. The LED X, Y, and Z data is downloaded in millimeters, and the ambient light readings for each sensor are downloaded in counts (65,535 maximum).

After the download is complete, the program displays the "Export" tab, allowing you to save the data. You can either save the data without seeing it or switch to the "Plot" tab (section 5.0) to preview the data before saving (see section 5.0, "Plot" Tab).

### 2.9.5.1  WorldSID Data Download and Conversion to Engineering Units

For current model WorldSIDs (serial number greater than 100), the RibEye program downloads raw sensor data from the RibEye and converts it to engineering units in the software program. When you export the data from a WorldSID, the program also stores an additional file with the same name as the data files but with an RDF extension (RDF = raw data file).

Downloading raw data from the WorldSID and converting to engineering units in the PC is faster than converting to engineering units in the RibEye. To convert the raw data to engineering units, the calibration file for your WorldSID must be stored in the RibEye installation directory. The calibration file name format is:

<div align="center">

SNXXX_CAL DATE_YYYY Side_cal.bin
Example:  SN133_18 March 2017_Left Side_cal.bin

</div>

Where:       XXX is the serial number of the RibEye

CAL DATE is the last calibration date for the RibEye

YYYY is the RibEye's orientation, either left-side or right side

WorldSID RibEyes are normally calibrated for left-side impact. On special request, they can be calibrated for right-side impact, in which case there is a second calibration file.

The calibration file is automatically placed in the RibEye program directory (typically C:\Program Files(x86)\RibEye 6_0) by the RibEye installer. A copy of the calibration file also appears in the "Calibration file for PC and README" directory of the software installation USB thumb drive, which is shipped with the RibEye. However, if you download RibEye installation software from the Boxboro Systems website, you have to manually copy the calibration file to the RibEye installation directory.

If you have already installed a previous version of the RibEye software for your WorldSID, the calibration file is stored in the installation directory for that version, such as C:\Program Files (x86)\RibEye_5_3. You can copy the calibration file from the existing directory to the new software version 6_0 directory.

### 2.9.6  Error Codes in Data File

If the RibEye cannot accurately calculate a LED position, it generates error codes in the data file, causing a drop-out in the plots. The RibEye forces the X, Y, and Z data to the same error code. Error codes can be generated in three potential situations:

1. Light from a LED is blocked between the LED and one of the sensors
2. A LED moves out of the RibEye's range, so that the LED cannot send enough light to the sensor
3. Too much ambient light exists to accurately resolve the LED's position.

For 2-axis systems, the X and Y data is forced to the following numbers:

    1, if the left sensor (dummy's left) is blocked or sees too much ambient light

    2, if the right sensor (dummy's right) is blocked or sees too much ambient light

    3, if both sensors are blocked or see too much ambient light

    327, if a divide-by-zero condition occurred in the data processing

For 3-axis systems, the X, Y, and Z data is forced to the following numbers:

    1, if the top sensor is blocked or sees too much ambient light

    2, if the bottom sensor is blocked or sees too much ambient light

    3, if both top and bottom sensors are blocked or see too much ambient light

    4, if the middle sensor is blocked or sees too much ambient light

    5, if the middle and top sensors are blocked or see too much ambient light

    6, if the middle and bottom sensors are blocked or see too much ambient light

    7, if all three sensors are blocked or see too much ambient light

    8, if a divide-by-zero condition occurred in the data processing

    9, if data goes past the end of the calibration curves

Error codes are generated whenever the RibEye begins to operate outside of its measurement range. The RibEye's measurement range is defined in RibEye Hardware User manual for your version of the RibEye.

If an error code occurs, you must discount the data for a few milliseconds before and after the drop-out in the plots. The cause of a drop-out is usually a loose cable that swings between the LED and the sensors, blocking the light, or a chest pot arm that swings between the LED and sensor (usually rib 6 right). A drop-out can also occur in the 5th Female dummy if the lap belt forces the dummy's abdomen insert up into the rib cage, blocking the LEDs on ribs 6 and 5, which generally occurs when the dummy submarines under the lap belt.

In all of these cases, before and after the light is completely blocked, the obstacle reflects light or partially blocks light, which confuses the sensor and causes bad data to be reported. That's why a few milliseconds of data must be discounted before and after the blockage and drop-out.

> ***NOTE:  The error codes can get masked by filtering the data.  Therefore, we strongly recommend reviewing and saving a copy of the unfiltered data so that the error codes are preserved.***

### 3.0   "Export" Tab

The "Export" tab is shown in Figure 13.  If data has been downloaded from the RibEye, the "Data in Memory" field displays "Downloaded RibEye Data in Memory".  If an existing RibEye data file was imported (see section 5.0, "Plot" Tab, for importing an existing file), the existing file name is displayed. You can export either downloaded data or an existing file.

You can choose to save and export the data in three formats:  Diadem, CSV (comma-separated-values), or ISO.  The data can be stored unfiltered or filtered at Class 1000, 600, 180, or 60.  The data can have the pre-trigger offsets removed (Relative) or have the pre-trigger offsets preserved (Absolute).

**Figure 13.  "Export" tab with format selection box expanded**
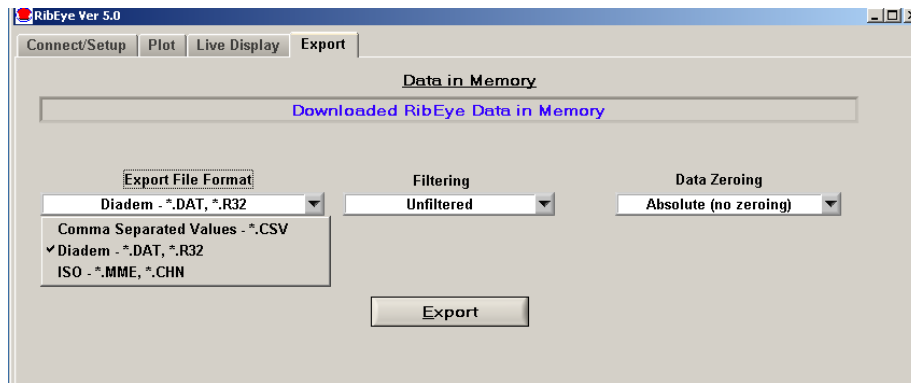


**INI File Note:**  You can set default values for the Export File Format and Data Zeroing, as well as the default data Storage Location, in the [ExportDefault] section of the INI file. You can still over-ride the default and select other options in the drop-down box.

After you have chosen the data format, filtering, and data zeroing options, click on the "Export" tab to choose the file name and location and to export the data.  The program brings up a file selection box as shown in Figure 14.

**Figure 14.  Export file selection panel for a Diadem file**
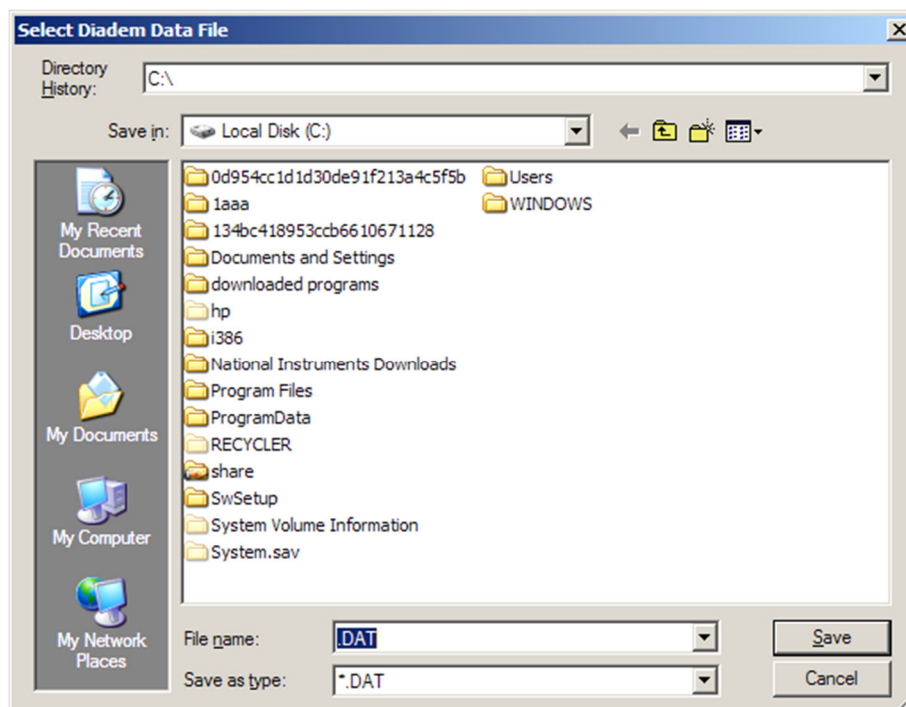
### 3.1 Data Zeroing

The Data Zeroing selection has two choices:

1. Relative to pre-T0 average, with the pre-trigger offsets removed

2. Absolute, with the pre-trigger offsets preserved.

#### 3.1.1 Relative to Pre-T0 Average

This selection calculates the average of the first 100 data points (10 ms at 10-kHz sample rate) of each channel and subtracts the average from all of the channel data points. This forces each data channel to start at approximately zero mm displacement.

If the data set does not contain at least 100 data points prior to time zero, the relative calculation cannot be performed. The selection box is forced to "Absolute (no zeroing)" and grayed (see section 3.1.2 below), and a message is displayed as shown in Figure 15.

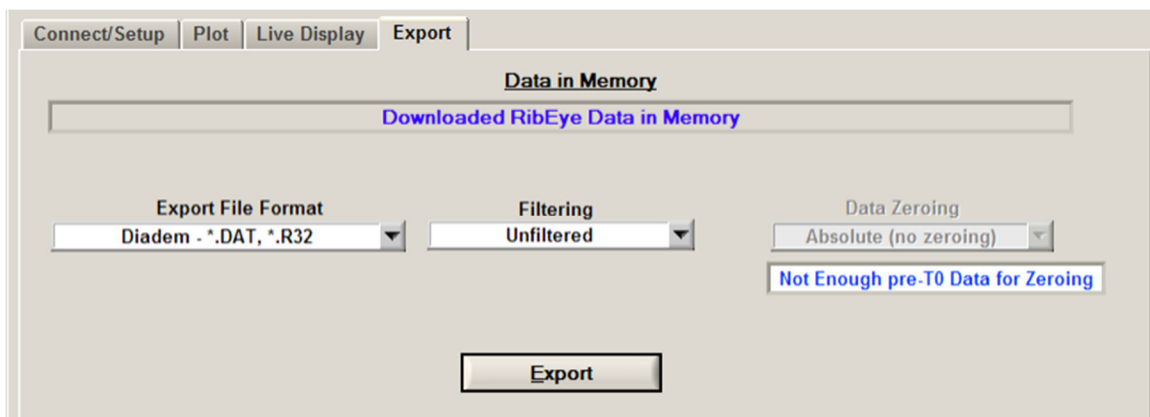**Figure 15. Insufficient pre-T0 data for zeroing**



If you are reprocessing a CSV or ISO data file that was already zeroed, you cannot re-zero the data. The selection box is forced to "Relative to Pre-T0 Average", and a message is displayed that the data is already zeroed, as shown in Figure 16. The Diadem file format preserves the absolute data and uses offset data from the channel headers to create relative data, so data that was saved as relative in Diadem format can be re-exported as absolute. (Ambient light data is always stored as absolute data.)

**Figure 16. Exporting data that was already zeroed**
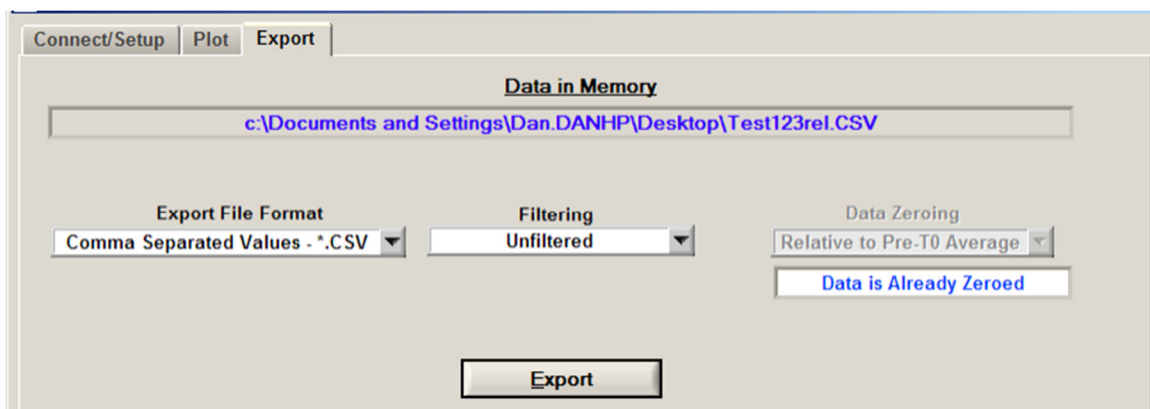


#### 3.1.2 Absolute (no zeroing)

If you choose the Absolute data option, all channel data is the X, Y, or Z distance with respect to the origin of the RibEye coordinate system. Refer to your RibEye Hardware User Manual for the definition of the RibEye coordinate system. This selection preserves the initial positions of the LEDs.

### 3.2   Filtering

Data can be exported unfiltered or filtered at Class 1000, 600, 180, or 60.  The program uses the phaseless 4-pole Butterworth filter used by NHTSA (National Highway Transportation and Safety Administration, U.S.).  The last character of the ISO channel codes is set to the filter used:

0  = No Filter
A = Class 1000
B = Class 600
C = Class 180
D = Class 60

If you are exporting previously filtered data, you cannot re-filter the data.  The "Filter Selection" box is set to the filter that the data was already filtered at and grayed-out so it cannot be changed, and a message appears that the data is already filtered, as shown as in Figure 17.

Ambient light data is always stored unfiltered, as noted above. Length Change calculations (see section 4.2 below) are always done with class 600 filtering of the X and Y data and can not be re-filtered.

**Figure 17.  Exporting previously filtered and zeroed data**
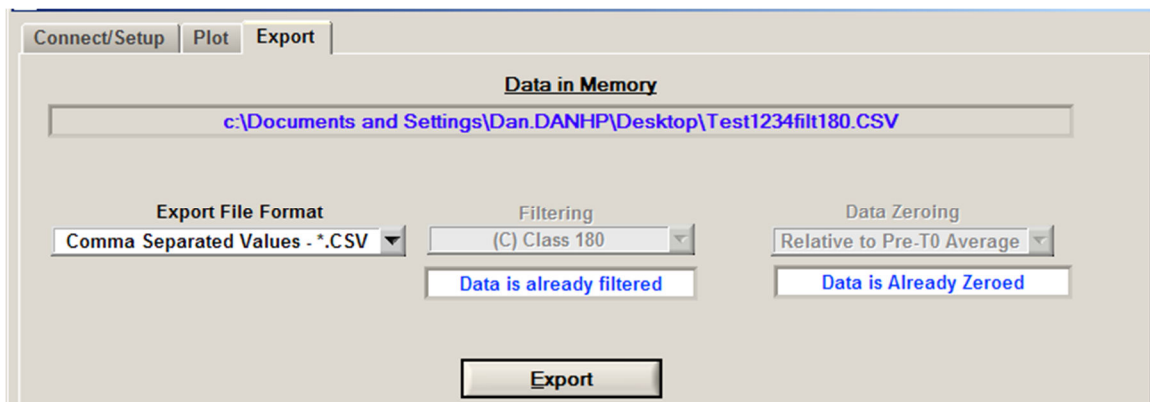


### 3.3   Data formats

All three data format options include the following information about the test:

- The test date

- RibEye type

- RibEye serial number

- The ISO channel codes, including the filter code as the last character

- Number of data points per channel and the start time relative to the trigger time

- The text from the field under "RibEye Installed in ATD" (see section 2.4).

- The trigger setting when the test was run

- Data stored as absolute or relative

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### 3.3.1  Diadem Data Format

The Diadem data format is used for importing data into National Instruments' Diadem data processing program.  When this format is chosen, the program opens a file selection box with the "Save as type" selection set to ".DAT".  Enter a test file name, such as "mydata".  The program creates two files:

mydata**.**DAT (an ASCII file describing the data)

mydata**.**R32 (a binary file with the test data in 32-bit floating point format)

For more information on the Diadem format, see the following document from the National Instruments web site:

http://digital.ni.com/public.nsf/ad0f282819902a1986256f79005462b1/
7c72161d9b13ef1086256ce8007f570b/$FILE/dmheader.pdf

### 3.3.2  CSV Format

The CSV format (comma-separated values) creates a spreadsheet compatible file with a CSV extension. Data is arranged in columns, with the ISO codes as the column headers.  The file selection box displays the "Save as type" selection set to ".CSV".  Enter a test file name, such as "mydata', and the program creates a file called "mydata.CSV".

#### 3.3.2.1  Alternative CSV Format

If you do not wish to use the standard ISO code channel header formats, an alternative CSV format has been added.  To use the this alternative format, you must edit the INI file and set USE ALT CSV = 1. The alternative CSV format builds channel name headers as follows –

[dummy position in car][rib name and LED location][axis]

Where the axis is defined by a single character (X, Y, or Z).

In the INI file, you can define your own names, up to 10 characters, for the ISO seating position codes 0–9. You can also define the rib name and LED location for Hybrid III and WorldSID dummies, using up to 30 characters in the INI file.

The program uses your defined text for the dummy position and rib names/LED location and adds the 1-character axis at the end.  For example, if you used ISO Code 1 for position and named it "Driver_", and you named the shoulder rib rear LED "Shoulder Rear_", for the X axis data the channel name header will be "Driver_Shoulder Rear_X".

Some information normally included in the ISO codes may not be in the user-defined alternative channel names. This information, such as the filter type and ISO Test Object, appears instead in the file header.

### 3.3.2.2 Ambient Light Channels

When using the alternative CSV format, the ambient light data channels use the seating position text, such as DRVR, and add text as shown below for Hybrid III and WorldSID:

**Hybrid III Ambient Light Channels**
DRVR_Amb_Left ........................ Left sensor
DRVR_Amb_Right .................... Right sensor

**WorldSID Ambient Light Channels**
DRVR_Amb_Top_R ............. Shoulder sensor
DRVR_Amb_Bot_R .............. Thorax 2 sensor
DRVR_Amb_Mid_R ............. Thorax 1 sensor
DRVR_Amb_Top_B ............. Thorax 3 sensor
DRVR_Amb_Bot_B ......... Abdomen 2 sensor
DRVR_Amb_Mid_B ........ Abdomen 1 sensor

### 3.3.3 ISO MME Format

The ISO MME format is described in ISO/TS 13499 RED B (Version 1.5), Road vehicles – Multimedia data exchange format for impact tests.  When you select the ISO format option, the file selection box displays the "Save as type" selection set to "**.**MME".  When you enter a test file name, such as "mydata", the program breaks down the file location and filename into the format "/PATH/mydata".  It then creates a directory called "/PATH/mydata" and builds the files as shown in Figure 18.

**Figure 18.  ISO MME format directory and files**
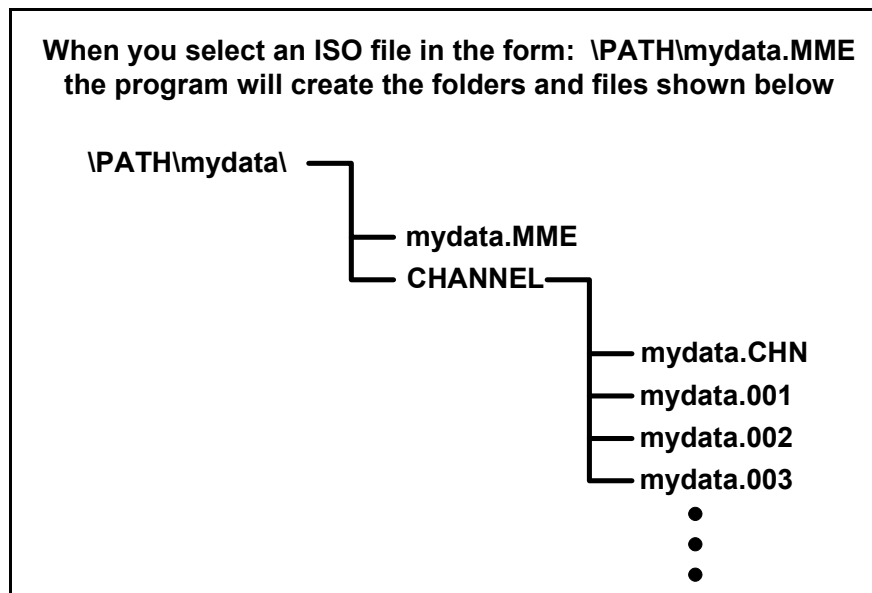


The file "mydata**.**MME" is a generic test descriptor file in ASCII format, where the only data that changes are the test data and a timestamp for when the file was created.

The file "\CHANNEL\mydata**.**CHN" is an ASCII file that contains the number of data channels and a list of the ISO channel name codes.

The files "mydata**.**001" through "mydata**.**00n" are ASCII files, one per data channel, that contain the data for each channel in floating point format.

## 4.0   Calculated Data Channels

For the WorldSID 5th and 50th ATDs, the software adds calculated data channels for what 1D and 2D IR-Traccs would report. This allows you to compare RibEye data to data collected with IR-Traccs. It also allows the use of rib certification corridors developed using IR-Traccs.

A Length Change calculation has been added to the RibEye software for all of the LED positions (see section 4.2 below).

For existing test data sets, you can reprocesses the RDF file to add the IR-Tracc and Length Change calculations to the data, and re-export new files including this information in any of the three export formats.

### 4.1   1D and 2D IR-Tracc Calculated Channels

Calculations for processing 1D and 2D IR-Tracc data have been added to the software for the WorldSID 5th Female and 50th Male RibEyes.  For each rib, the program calculates the 1D IR-Tracc compression. In the RibEye software, this data is called the uncorrected IR-Tracc output.

The program also calculates the 2D IR-Tracc lateral displacement, Y.  In the RibEye software, this data is called the X-corrected IR-Tracc output, which includes a correction for motion in the X direction.

The WorldSID 5th Female RibEye uses a string pot for the shoulder, so only the uncorrected IR-Tracc output can be calculated for the shoulder.  This data is provided so that thorax calibration corridors that are based on the uncorrected and corrected IR-Tracc data can be used compatibly with RibEye data.

#### 4.1.1   IR-Tracc Data Channel Name Settings

The channel names for the calculated IR-Tracc data depend on an INI file setting in the [IRTracc_MME_Names] section.  The variable "use_MME_IRT_Channel_Names" can be set to 0 or 1.

If "use_MME_IRT_Channel_Names" is set to 0:
The program will behave like version 5.3 of the RibEye software – that is, the channel names for the calculated IR-Tracc data will be the same as the channel names for the middle LED on each rib, with one difference:

1.   For 1D IR-Tracc data, the direction code is changed to "U" for uncorrected
2.   For 2D IR-Tracc data, the direction code is changed to "C" for corrected

For example, for the WorldSID shoulder rib middle LED, the IR-Tracc channel names for left-side impact would be –

SHRI LE MI WS DS **U** for a 1D IR-Tracc

SHRI LE MI WS DS **C** for a 2D IR-Tracc

(Please refer back to Table 1 for a list of the ISO codes used in RibEyes.)

**INI File Note:** If you have changed the ISO code names in the INI file, the IR-Tracc channel names will use your changed ISO code names with the U or C code for the axis direction.  If you use the Alternative CSV format, the IR-Tracc channel names will use your designated channel names with the U or C code for the axis direction.

If "use_MME_IRT_Channel_Names" is set to 1:

The program will use the channel name format requested by the MME group.  For left-side impact, the channel names for the 12 calculated IR-Tracc channels would be:

**1D uncorrected data**
SHRI LE 00 WS DS 0
TRRI LE 01 WS DS 0
TRRI LE 02 WS DS 0
TRRI LE 03 WS DS 0
ABRI LE 01 WS DS 0
ABRI LE 02 WS DS 0

**2D corrected for X data**
SHRI LE 00 WS DS Y
TRRI LE 01 WS DS Y
TRRI LE 02 WS DS Y
TRRI LE 03 WS DS Y
ABRI LE 01 WS DS Y
ABRI LE 02 WS DS Y

For right-side impact, the LE would be changed to RI.

### 4.1.2  Calculations for 1D and 2D IR-Tracc for WorldSID 50th Male RibEye

To calculate what an IR-Tracc would report, we need the pre-event length of the IR-Tracc and the relative X, Y, and Z data from the RibEye.  We can use the absolute position data from the RibEye to determine the IR-Tracc Pot pre-event length. Please refer to Figure 19 (on the next page), where the symbol definitions and calculations are as follows:

$Y_o$ = Pre-T0 LED position = RibEye LED position absolute data

$dY$ = change in RibEye Y (relative) = $Y_o - y(t)$ where $y(t)$ is the RibEye Y at time $t$
$dX$ = change in RibEye X (relative)
$dZ$ = change in RibEye Z (relative)

$\underline{Y_r = \text{distance from LED to IR-Tracc rod-end pivot at rib}}$
$Y_r$ = 5.3 mm for T1 and A1
$Y_r$ = 10.0 mm for Shoulder, T2, T3, and A2

$\underline{Y_s = \text{distance from RibEye origin to IR-Tracc pivot point at the spine end}}$
$Y_s$ = 9.1 mm for all ribs except shoulder
$Y_s$ = -2.4 mm for shoulder

$L1 = Y_o - Y_s + Y_r$ = initial length of IR-Tracc
$Y1 = L1 - dY$
$L2 = \sqrt{Y1^2 + dX^2 + dZ^2}$

Uncorrected IR-Tracc displacement = $L1 - L2$ = IRTuc
$\Theta$ = IR-Tracc angle ( rotation in the XY plane) = $\arctan[dX/Y1]$

With the IR-Tracc uncorrected length and the angle $\Theta$, the corrected Y and X for the IR-Tracc is:
   IRTcy = $L1 - L2\cos\Theta$
   IRTcx = $dX$

Therefore, with no Z motion of the rib:
   IRTcy = $dY$ from RibEye
   IRTcx = $dX$ from RibEye

With Z motion, IRTcy < $dY$ and IRTcx < $dX$

**Figure 19.  Calculating  IR-Tracc output from WorldSID 50th Male RibEye**
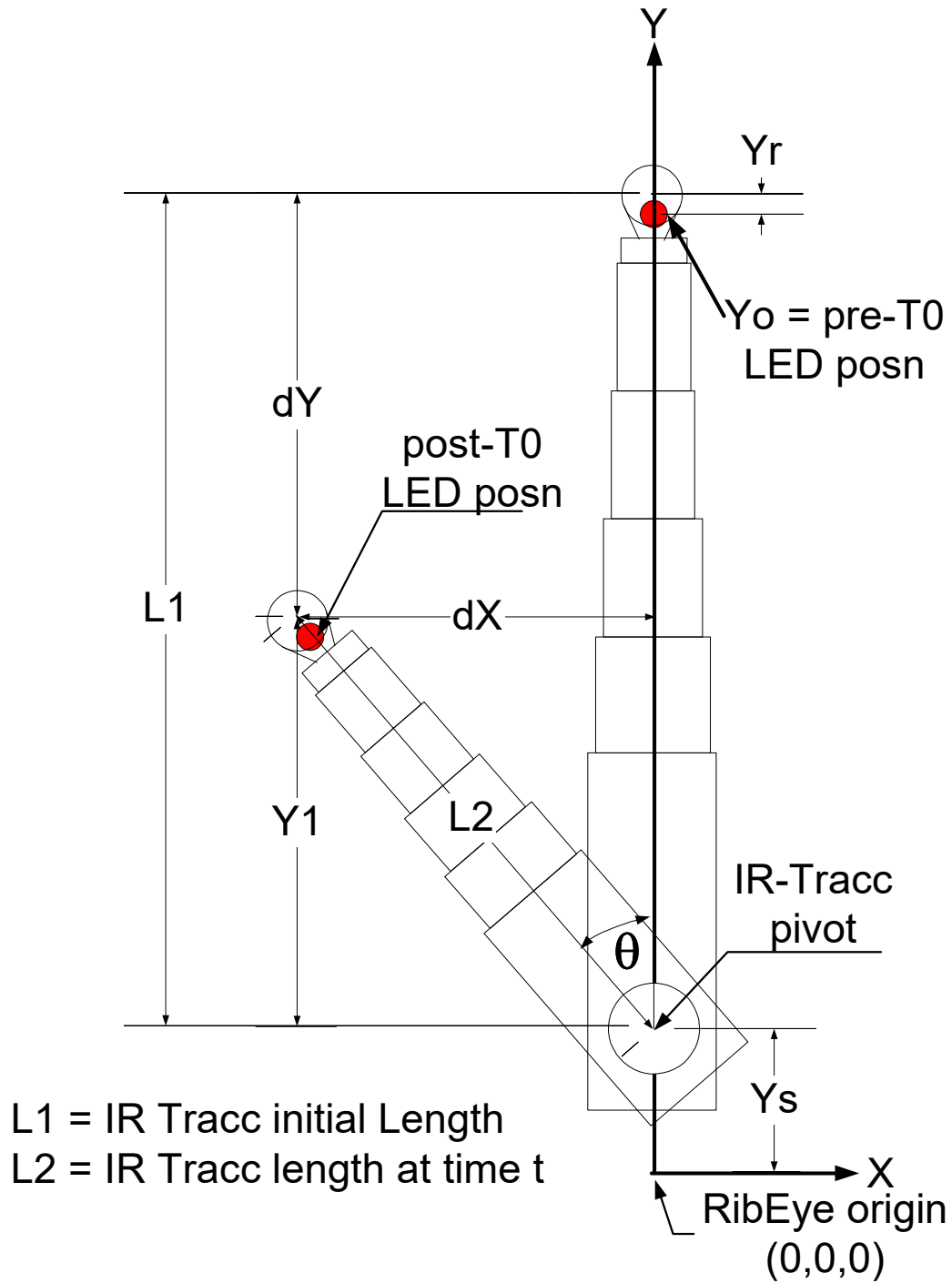
### 4.1.3  Calculations for 1D and 2D IR-Tracc for WorldSID 5th Female RibEye

To calculate what an IR-Tracc or string pot would report, we need the pre-event length of the IR-Tracc/string pot, and the relative X, Y, and Z data from the RibEye.  We can use the absolute position data from the RibEye to determine the IR-Tracc/string pot pre-event length. For IR-Tracc output for all ribs except shoulder, please refer to Figure 20 (on the next page), where the symbol definitions and calculations are as follows:

$Yo$ = Pre-T0 LED position is the RibEye LED position absolute data

$dY$ = change in RibEye Y (relative) = $Yo - y(t)$ where $y(t)$ is the RibEye Y at time $t$
$dX$ = change in RibEye X (relative)
$dZ$ = change in RibEye Z (relative)

$\underline{Yr = \text{distance from LED to IR-Tracc rod-end pivot at rib}}$
$Yr$ = 1.0 mm

$\underline{Ys = \text{distance from RibEye origin to IR-Tracc pivot point at the spine end}}$
$Ys$ = 9.1 mm for all ribs except shoulder (see below)

$L1 = Yo - Ys + Yr$ = initial length of IR-Tracc
$Y1 = L1 - dy$
$L2 = \sqrt{Y1^2 + dX^2 + dZ^2}$

Uncorrected IR-Tracc displacement = $L1 - L2 = IRTuc$
$\Theta$ = IR-Tracc angle ( rotation in the XY plane) = $\arctan[dX/Y1]$

With the IR-Tracc uncorrected length and the angle $\Theta$, the corrected Y and X for the IR-Tracc is:
   $IRTcy = L1 - L2\cos\Theta$
   $IRTcx = dX$
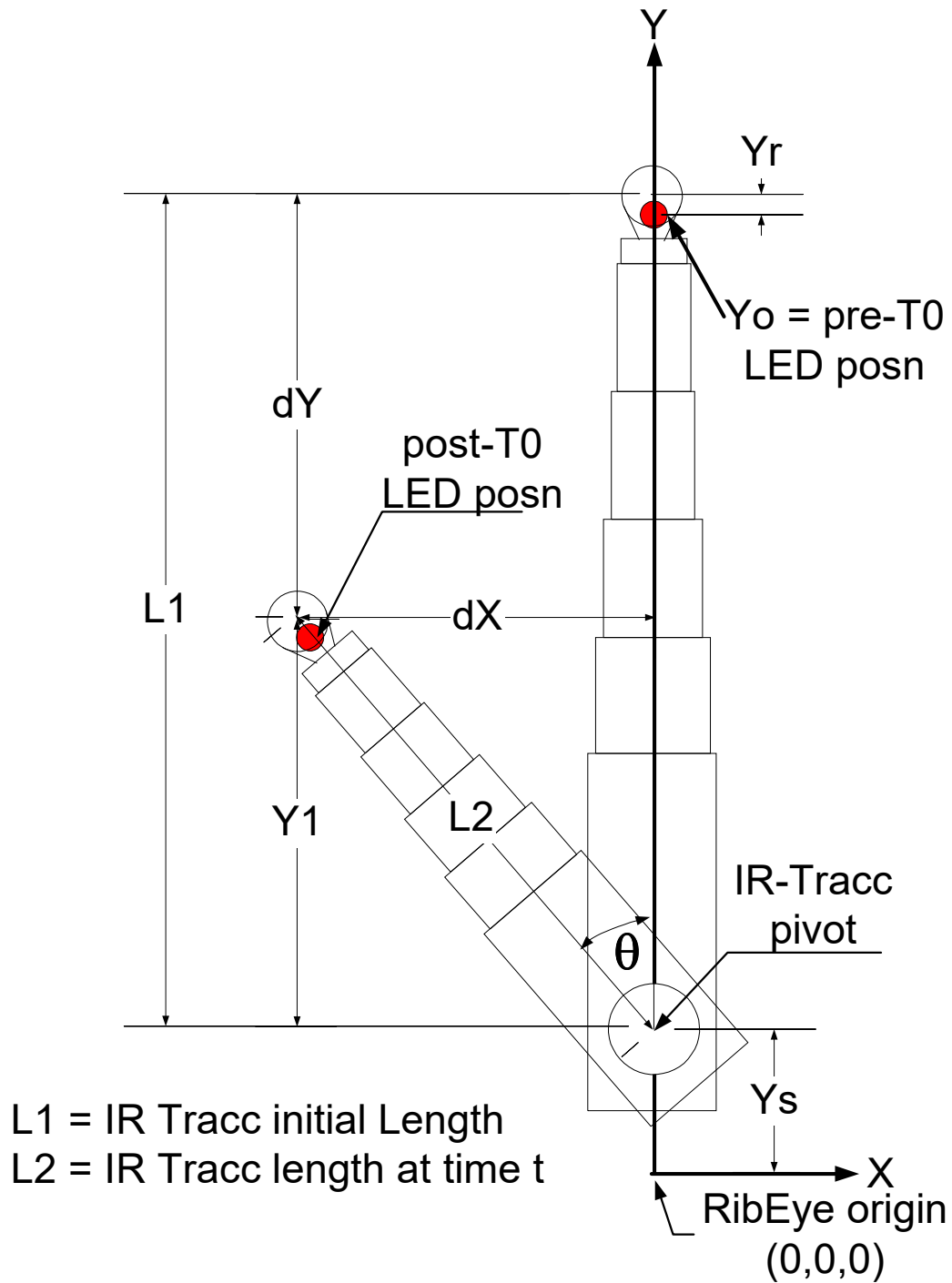
Therefore, with no Z motion of the rib:
   $IRTcy = dY$ from RibEye
   $IRTcx = dX$ from RibEye

With Z motion, $IRTcy < dY$ and $IRTcx < dX$

**Figure 20.  Calculating  IR-Tracc output from
WorldSID 5th Female RibEye (all ribs except shoulder)**



L1 = IR Tracc initial Length
L2 = IR Tracc length at time t

### 4.1.4  Calculations for Shoulder String Pot

For shoulder data, please refer to Figure 21 (on the next page), where the symbol definitions and calculations are as follows:

$Y_s$ = distance from RibEye origin to string pot origin at the spine end
$Y_s$ = –59.2 mm (Note:  Negative sign to use same equations as above)
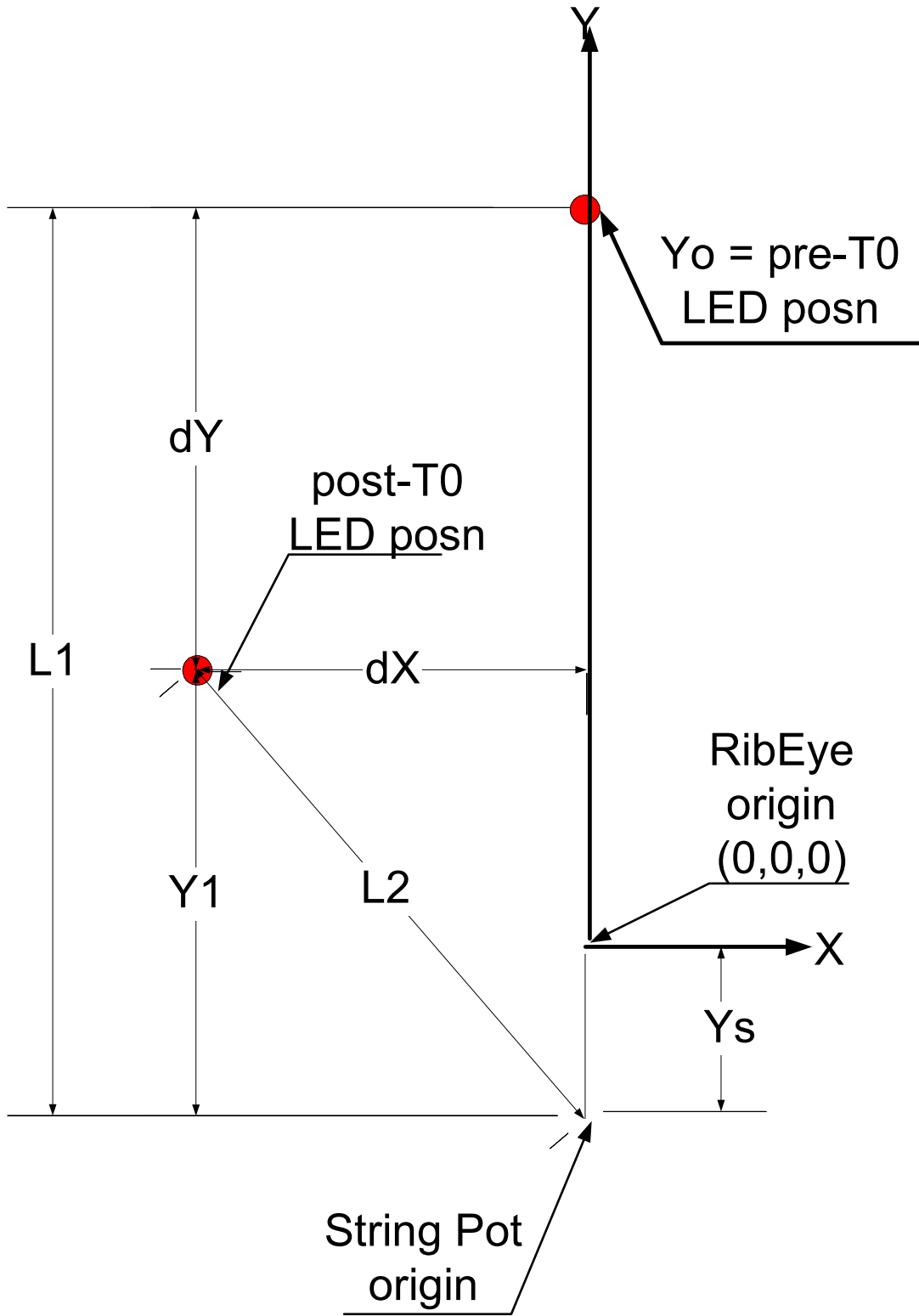$L_1$ = initial length of string pot
$L_1 = Y_o - Y_s$

$Y_1 = L_1 - dy$
$L_2$ = string pot length at time t
$L_2 = \sqrt{Y_1^2 + dX^2 + dZ^2}$

**Figure 21.  Calculating String Pot output from
WorldSID 5th Female RibEye shoulder rib**

Y

Yo = pre-T0
LED posn

dY

post-T0
LED posn

L1          dX

RibEye
origin
(0,0,0)

Y1     L2

X

Ys

String Pot
origin

## 4.2 Length Change Calculated Channels for WorldSID 5th and 50th RibEyes

The program calculates the Length Change for each LED to the RibEye origin in the XY plane for each of the 18 LEDs, adding 18 data channels to the output file. For each of the data channels, the program uses the same data channel name (either ISO codes or alternative CSV format name) and changes the axis to L for Length Change.

The RibEye origin is defined as the center of the Thorax 1 sensor for the upper three ribs and the center of the Abdomen 1 sensor for the lower three ribs (see Figure 22). The Shoulder, Thorax2, Thorax 3, and Abdomen 2 ribs are displaced in the X direction relative to the RibEye origin. For the Length Change calculation, the LED X distance is shifted to the centers of the rib using the offsets shown in Table 4. (Offsets are for a RibEye mounted for left-side impact; change the numerical signs for right-side impact.)

**Table 4. X Offsets for Length Change Calculation**

| Rib | WS-50th | WS-5th |
|---|---|---|
| | X Offset (mm) | |
| Shoulder | −19.86 | −7.09 |
| Thorax 1 | 0 | 0 |
| Thorax 2 | 4.72 | 14.21 |
| Thorax 3 | −20 | −20.01 |
| Abdomen 1 | 0 | 0 |
| Abdomen 2 | 20 | 20.11 |

**Figure 22. WorldSID 50th Male RibEye Coordinate System**
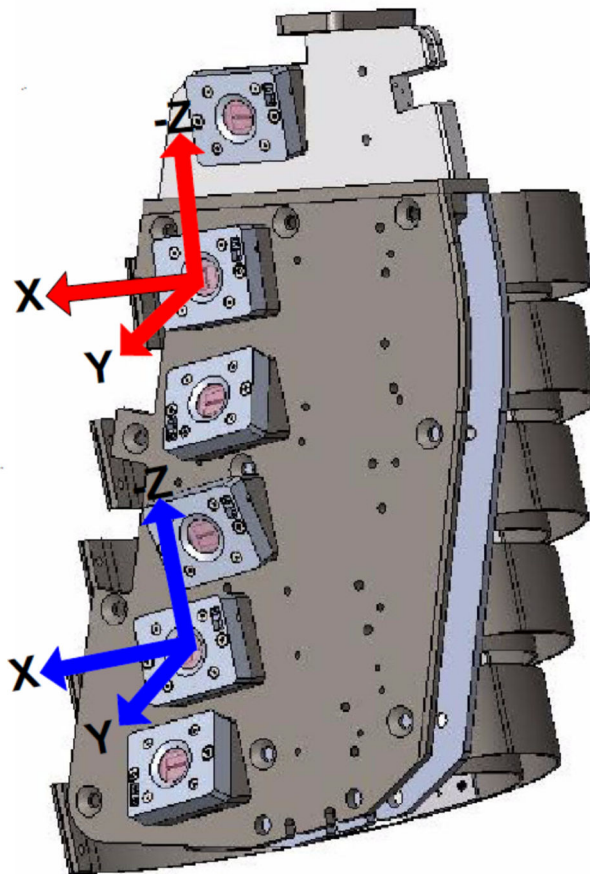
The Length Change for a LED at time t is the initial vector length from the LED to the RibEye origin in the XY plane minus the vector length from the LED to the RibEye origin at time t.
The Length Change is calculated as follows:

$$Lo = sqrt(Xo^2 + Yo^2)$$

Where:

Lo is the initial distance from the LED to the RibEye origin
$Xo$ = pre-Time0 RibEye X – X Offset (from Table 4)
$Yo$ = pre-Time0 RibEye Y

$$L(t) = Lo - sqrt(X(t)^2 + Y(t)^2) = \text{Length Change at time t}$$
$X(t)$ = RibEye X data at time t – X Offset (from Table 4)
$Y(t)$ = RibEye Y data at time t

On a purely lateral impact, the center LED shows the largest Length Change.  If the dummy is hit obliquely, for a hit toward the front of the dummy, the front LED shows the largest Length Change.
If the dummy is hit obliquely toward the rear, the rear LED shows the largest Length Change

The channel names for the calculated Length Change channels will be the channel name for the LED, but with the direction code set to L.  For example, the length change channel for left-side impact, shoulder rib, rear LED, WorldSID 50th would be –

<p align="center">SHRI LE RE WS DS **L** B</p>

**Note:**  The filter class for the Length Change calculations is always set to B = class 600.  No other filtering options are allowed for the length change calculation.

## 5.0    "Plot" Tab

The "Plot" tab (Figure 23) displays a quick view of RibEye data.  If data has been downloaded from the RibEye, the "Current File" box displays "Downloaded RibEye Data in Memory".  If an existing RibEye data file was read in, the existing file name is displayed.

**Figure 23.  "Plot" tab**
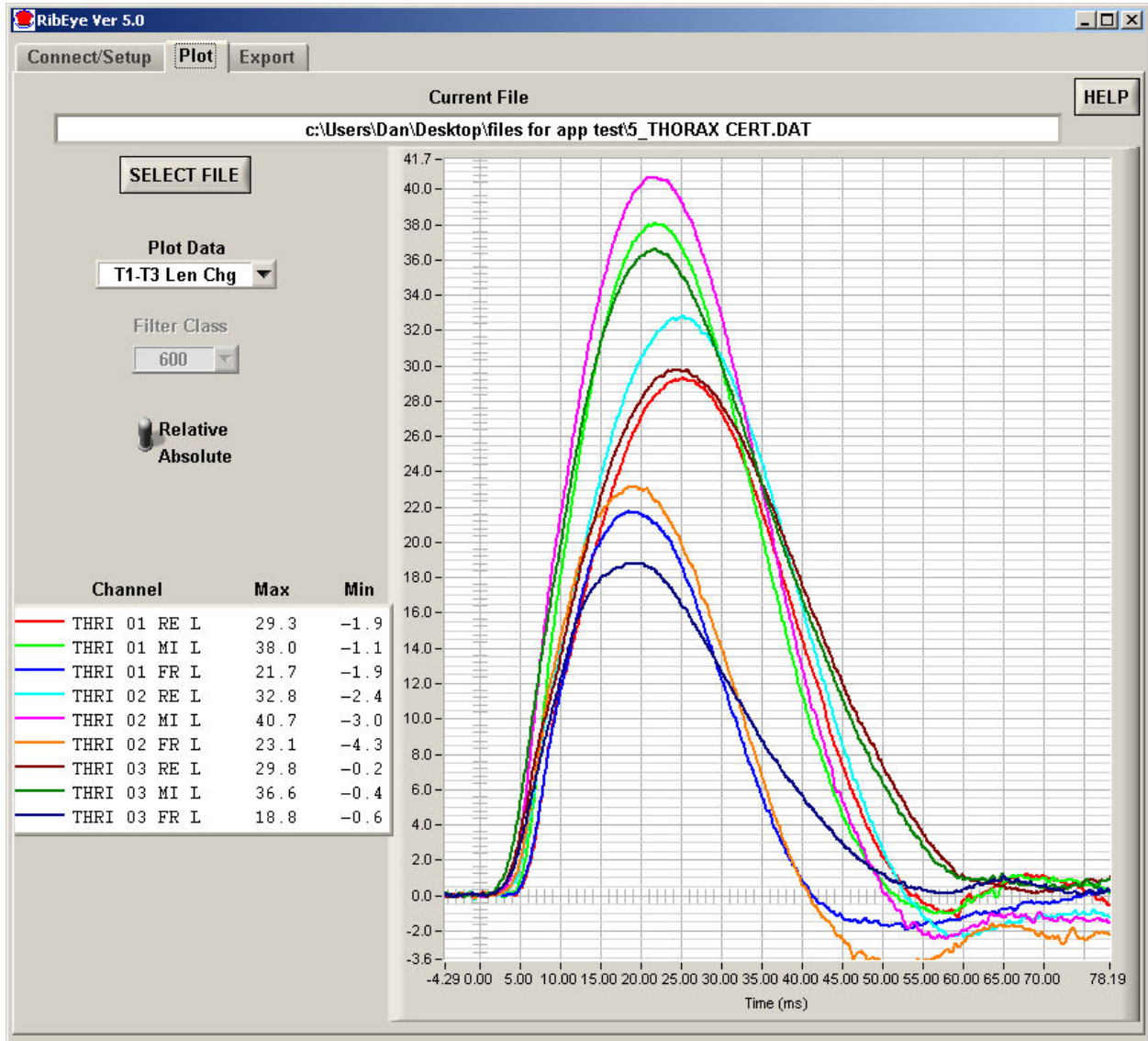
### 5.1    "Select File" Button

The "Select File" button allows you to read an existing RibEye data file to plot.  After a file is read in, you can also re-export the file (see section 3.0 for more information on exporting).

When you click on the "Select File" button, a file browser opens (Figure 24) for you to choose the file to read.  Set the "Files of Type" drop-down menu to:

     **\*.**DAT for Diadem files

     **\*.**CSV for Comma-Separated-Values files

     **\*.**MME for ISO files

     **\*.**RDF for raw data files downloaded from WorldSID RibEyes

Select the Diadem, CSV, ISO, or RDF file that you want to open.

If you open a WorldSID RDF file, the program gives you the option to re-process the file with different ISO codes in case you made the wrong choice when you originally downloaded the file.  It will use the appropriate calibration file (left- or right-side impact) for converting the data to engineering units.

### Figure 24.  "Select File" browser
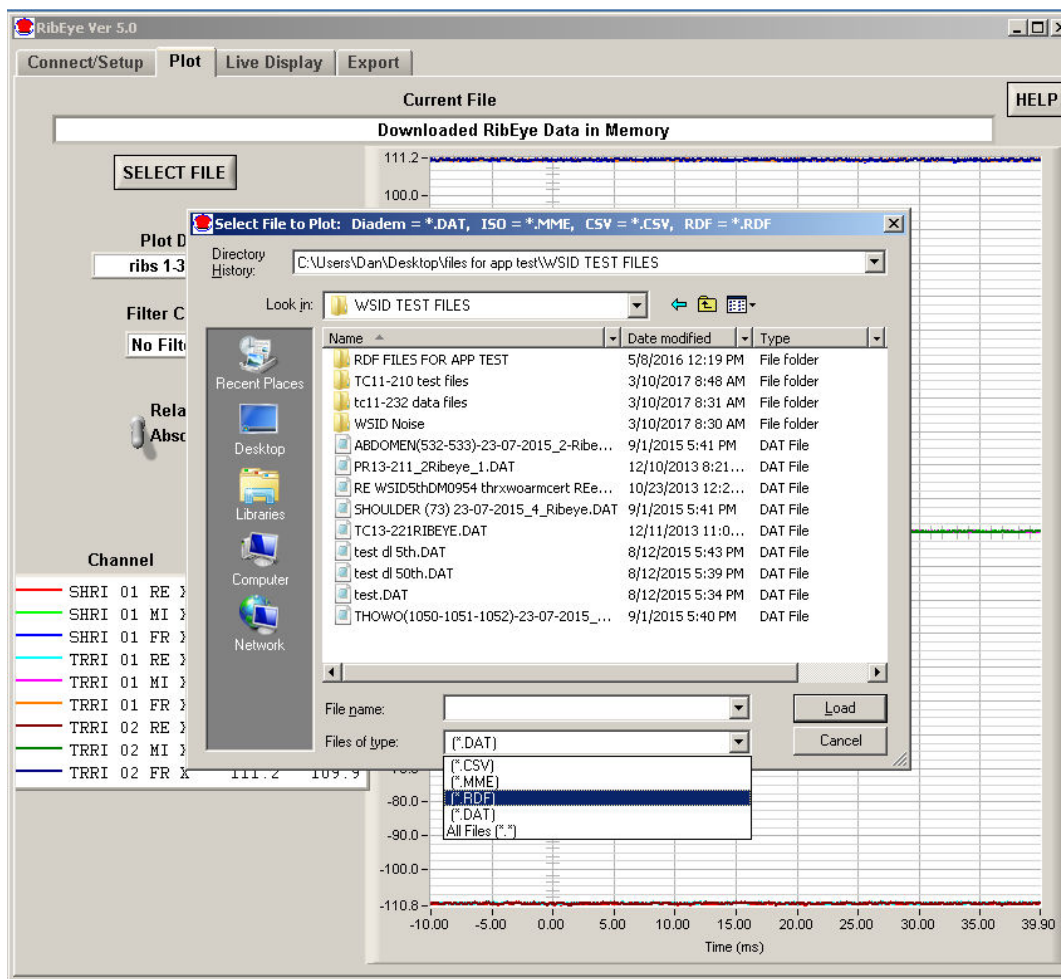


**INI File Note:**  The [ReadFilesDefault] section allows you to select the default directory where the program will look for data files.  You can always navigate to another location if the file you want to plot is not in the default location.

### 5.2   "Plot Data" Selection

The "Plot Data" selection allows you to select the data to plot.  The options depend on the type of RibEye used to collect the data.  You can view the X, Y, and Z displacement data.  You can also view the ambient light readings.  The ambient light data is useful to review if you see drop-outs in the data (refer to section 2.9.6 above for more information on error codes).

Additional plots include IR-Tracc calculations, length calculations, and XY and YZ cross-plots.  Note that the XY and YZ cross-plots  include the RibEye range when plotted in absolute mode.  In relative mode, the plot is auto-scaled to the data, and the range is not shown. Figure 25 shows the plot options for a WorldSID dummy.

**Figure 25.  Plot options for a WorldSID**
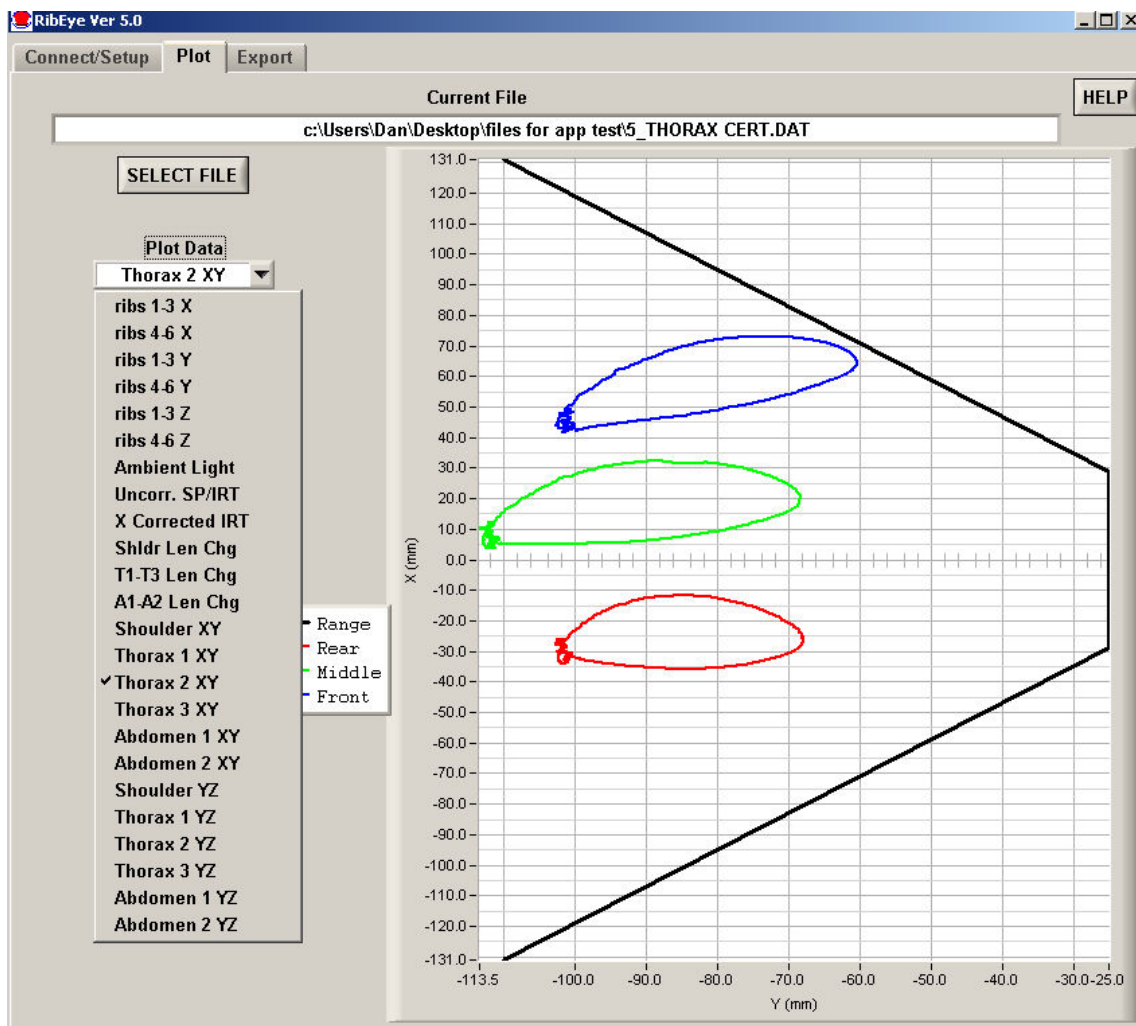
### 5.3 "Filter Class" Selection

The NHTSA standard phaseless Butterworth filter is used for filtering.  You can view the data with the following filter classes:

    No filter

    CFC 1000

    CFC 600

    CFC 180

    CFC 60

If  pre-filtered data from a file is read in, the "Filter Selection" box is set to the filter used when the data was stored, and the data can not be re-filtered. For a Length Calculation, the data is filtered to class 600 and cannot be changed.

### 5.4 "Relative/Absolute" Switch

The "Relative/Absolute" switch set to "Relative" removes the zero offsets from the data by subtracting an average of the first 100 samples from each channel from the rest of the channel data.  If less than 100 samples of data (10 ms at 10 kHz) was downloaded prior to time-zero, the "Relative/Absolute" switch will be forced to the "Absolute" position, and the data cannot be zeroed.

If data is read from a file that was stored as "Relative" data, the "Relative/Absolute" switch will be forced to "Relative" and cannot be changed to "Absolute" for ISO and CSV files.  Diadem files can always be viewed as "Absolute" or "Relative".

### 5.5   Zooming and Modifying a Plot Style

To analyze and modify a plot, perform the following steps:

- Zoom in on the plot by holding the "Ctrl" key and left mouse button and draw a box around the area of interest.

- Pan the plot by holding the "Ctrl" and "Shift" keys and left mouse button and moving the mouse.

- Undo zoom and pan operations by pressing "Ctrl" and the space bar.  You can undo as many as the last 25 operations.

- Zoom out by holding the "Ctrl" key and clicking the right mouse button.

- Right-click on a trace name in the "Legend" box to change colors, line thickness, or plot style or to hide the trace (Figure 26).

**Figure 26.  Changing plot styles by
right-clicking on a trace in the "Legend" box**
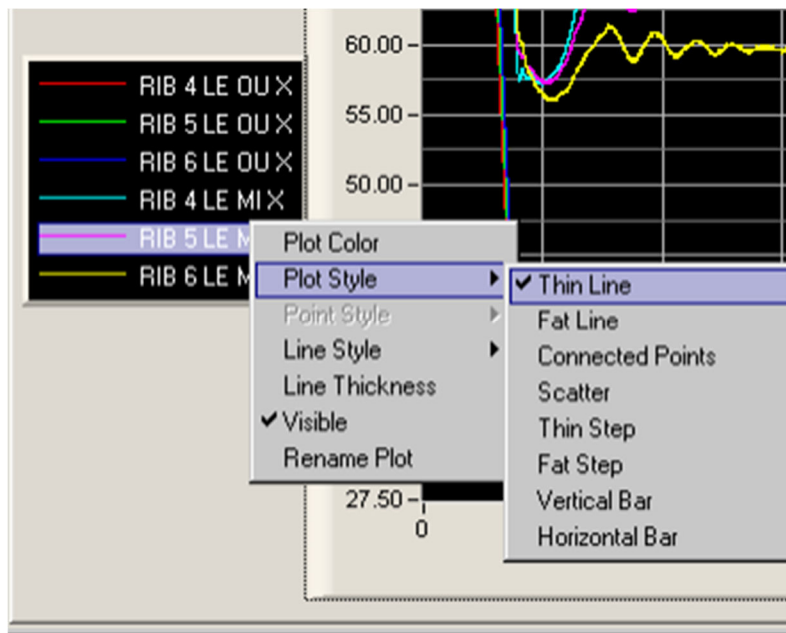
## 6.0    "Live Display" Tab

The "Live Display" tab shows the current positions of the LEDs, which are updated approximately 1 to 3 times per second depending on the RibEye model.  You can use this display to verify that everything is working correctly.  You can zoom the plots around the LEDs so you can see the effect of someone pushing on the ribs.

For 3-axis RibEyes, the "Coordinate System" switch shows the LEDs in either the XY or ZY planes. Figure 27 shows the "Live Display" tab for the WorldSID RibEye on a test fixture with the LEDs at X = –110, X = 0, and X = +110 mm. Figure 28 shows the same RibEye with the LED positions in the ZY plane.

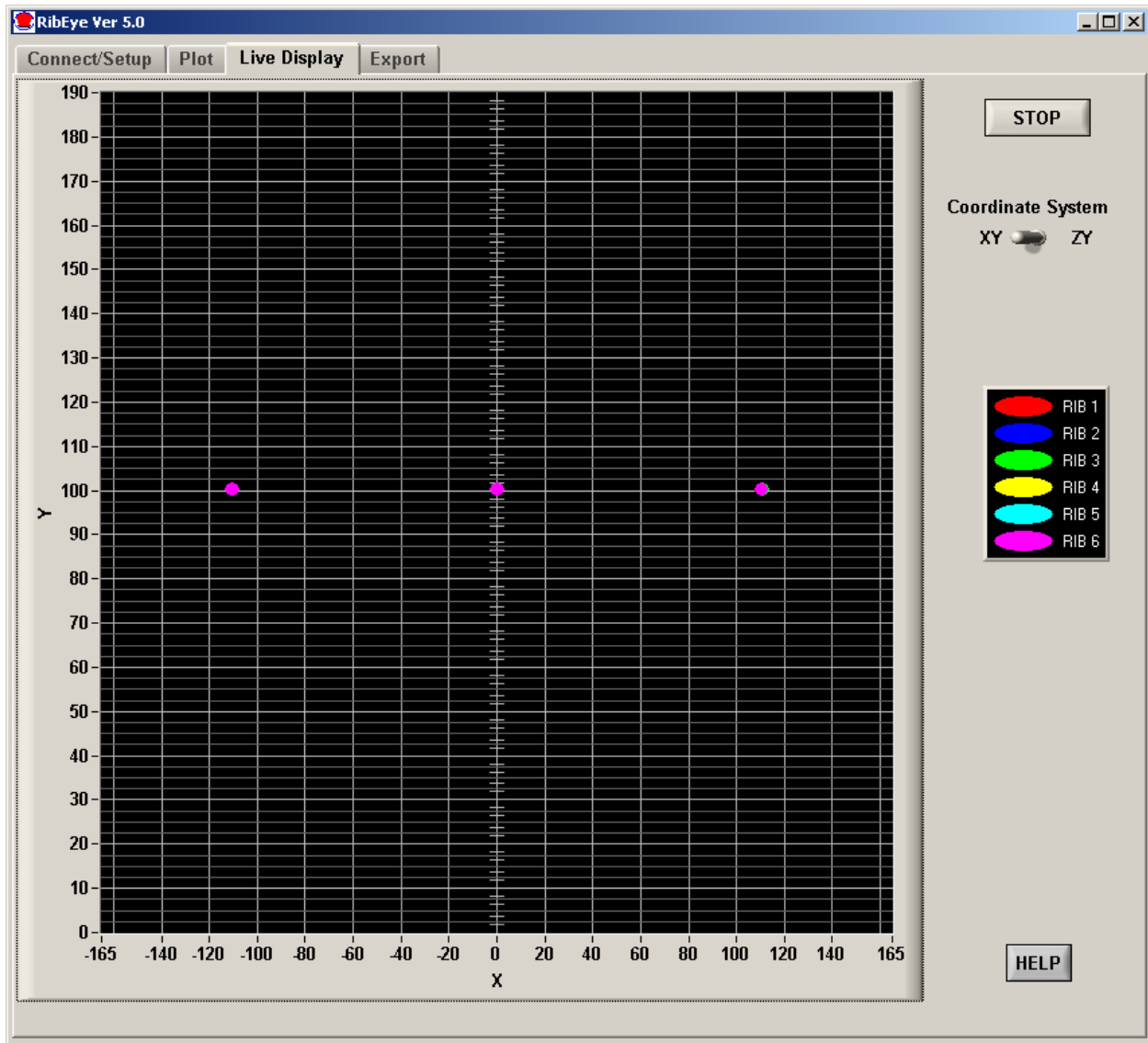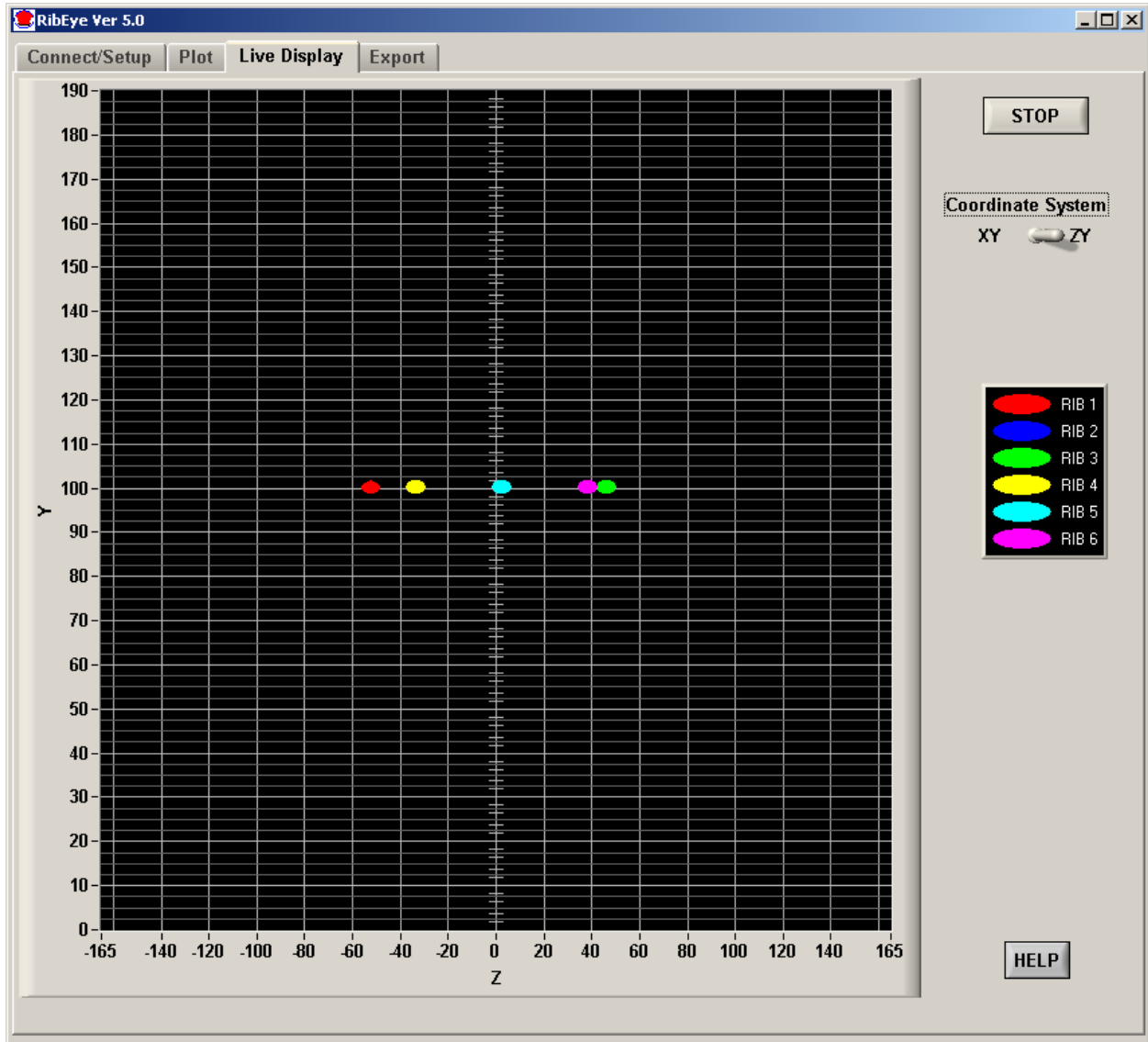**Figure 27.  "Live Display" tab for WorldSID RibEye, XY plane**

**Figure 28. "Live Display" tab for WorldSID RibEye, ZY plane**

## Appendix A. Using the INI File to Configure Software

This version of RibEye software uses an initialization file, RibEye_6_0.ini, which is stored in the RibEye installation directory, typically C:\Program Files(x86)\RibEye_6_0.  The initialization (INI) file lets you configure things like ISO codes for channel names and default values for most controls.

You can edit the INI file with any text editor such as Notepad, following the format presented below.  If the INI file is accidently corrupted while editing it, a spare copy is installed in the installation directory. You can  make a copy of the spare INI file, and change the copy's name to RibEye_6_0.ini to start with a fresh version.

When using the INI file, if you add comments or reminders of your own, you must preface each comment line with a semicolon (;) as the first character in the line.

The INI file has several sections.  The section names are in brackets, and the variables that can be set follow the section names.

**ISO Codes for Channel Name Headers**

The first three sections in the INI file show the ISO code channel names for the WorldSID and Hybrid III RibEyes, as well as the channel name format for the calculated IR-Tracc channels.  In the INI file you can change the settings for the Main Location, Fine Position 1, and Fine Position 2 (CCCC, DD, and EE). Please refer to section 2.7, ISO Code Settings, for more information on ISO channel naming.

You can set the Main Location, Fine Position 1, and Fine Position 2 however you like.  The INI file supplied with the RibEye software uses the settings defined by the ISO MME group.  However, you do not have to use the MME group's settings and can enter your own preferences for the Main Location, Fine Position 1, and Fine position 2.

## *WorldSID ISO Channel Names*

The WorldSID ISO codes are used for both the 50th Male and 5th Female WorldSID 3-axis RibEyes with 18 LEDs.  Put in only 10 characters for each LED, including the spaces between the Main Location, Fine Position 1, and Fine Position 2.

### WorldSID RibEye, Left-Side Ribs

```
[WorldSIDleft]
:
Shoulder Rib Rear LED =   SHRI LE RE
Shoulder Rib Middle LED = SHRI LE MI
Shoulder Rib Front LED =  SHRI LE FR
;
Thorax 1 Rib Rear LED =   TRRI LU RE
Thorax 1 Rib Middle LED = TRRI LU MI
Thorax 1 Rib Front LED =  TRRI LU FR
;
Thorax 2 Rib Rear LED =   TRRI LM RE
Thorax 2 Rib Middle LED = TRRI LM MI
Thorax 2 Rib Front LED =  TRRI LM FR
;
Thorax 3 Rib Rear LED =   TRRI LL RE
Thorax 3 Rib Middle LED = TRRI LL MI
Thorax 3 Rib Front LED =  TRRI LL FR
;
Abdomen 1 Rib Rear LED =   ABRI LU RE
Abdomen 1 Rib Middle LED = ABRI LU MI
Abdomen 1 Rib Front LED =  ABRI LU FR
;
Abdomen 2 Rib Rear LED =   ABRI LL RE
Abdomen 2 Rib Middle LED = ABRI LL MI
Abdomen 2 Rib Front LED =  ABRI LL FR
;
```

**WorldSID RibEye, Right-Side Ribs**

```
[WorldSIDright]
;
Shoulder Rib Rear LED =   SHRI RI RE
Shoulder Rib Middle LED = SHRI RI MI
Shoulder Rib Front LED =  SHRI RI FR
;
Thorax 1 Rib Rear LED =   TRRI RU RE
Thorax 1 Rib Middle LED = TRRI RU MI
Thorax 1 Rib Front LED =  TRRI RU FR
;
Thorax 2 Rib Rear LED =   TRRI RM RE
Thorax 2 Rib Middle LED = TRRI RM MI
Thorax 2 Rib Front LED =  TRRI RM FR
;
Thorax 3 Rib Rear LED =   TRRI RL RE
Thorax 3 Rib Middle LED = TRRI RL MI
Thorax 3 Rib Front LED =  TRRI RL FR
;
Abdomen 1 Rib Rear LED =   ABRI RU RE
Abdomen 1 Rib Middle LED = ABRI RU MI
Abdomen 1 Rib Front LED =  ABRI RU FR
;
Abdomen 2 Rib Rear LED =   ABRI RL RE
Abdomen 2 Rib Middle LED = ABRI RL MI
Abdomen 2 Rib Front LED =  ABRI RL FR
```

**Note:** In previous versions of the RibEye software, the WorldSID channel names were the same for both left- and right-side impact. You can still use the previous channel names by pasting the following code into both the [WorldSIDleft] and [WorldSIDright] sections of the INI file: Alternatively, to use the previous channel names, in the RibEye software installation directory (C:\Program Files (x86)\RibEye_6_0) rename the file "RibEye 5.3 channel names.ini" to "RibEye_6.0.ini".

```
 Shoulder Rib Rear LED =   SHRI 01 RE
 Shoulder Rib Middle LED = SHRI 01 MI
 Shoulder Rib Front LED =  SHRI 01 FR
 :
 Thorax 1 Rib Rear LED =   TRRI 01 RE
 Thorax 1 Rib Middle LED = TRRI 01 MI
 Thorax 1 Rib Front LED =  TRRI 01 FR
 ;
 Thorax 2 Rib Rear LED =   TRRI 02 RE
 Thorax 2 Rib Middle LED = TRRI 02 MI
 Thorax 2 Rib Front LED =  TRRI 02 FR
 ;
 Thorax 3 Rib Rear LED =   TRRI 03 RE
 Thorax 3 Rib Middle LED = TRRI 03 MI
 Thorax 3 Rib Front LED =  TRRI 03 FR
 ;
 Abdomen 1 Rib Rear LED =   ABRI 01 RE
 Abdomen 1 Rib Middle LED = ABRI 01 MI
 Abdomen 1 Rib Front LED =  ABRI 01 FR
 ;
 Abdomen 2 Rib Rear LED =   ABRI 02 RE
 Abdomen 2 Rib Middle LED = ABRI 02 MI
 Abdomen 2 Rib Front LED =  ABRI 02 FR
```

## *Calculated IR-Tracc Channel Names*

Please refer to section 4.1 of this manual for a description of the ways that the calculated IR-Tracc channels are named. You can use either the original channel names, with U for uncorrected data and C for X-corrected data (as in software version 5.3), or the newer MME naming convention.

To use the MME naming convention for IR-Tracc channel names, in the [IRTracc_MME_Names] section, set –

use_MME_IRT_Channel_Names = 1

To use the RibEye 5.3 software naming scheme with just the dimension changed to U for 1D or C for 2D IR-Traccs, set –

use_MME_IRT_Channel_Names = 0

### IR-Tracc MME Channel Names

```
[IRTracc_MME_Names]
;
use_MME_IRT_Channel_Names = 1
;
```

## *Hybrid III ISO Code Formats*

The Hybrid III ISO codes are used for both the 5th female and 50th Male 2-axis RibEyes with 12 LEDs.
Rib 1 is the top rib, Rib 6 is the bottom rib.

**Hybrid III RibEye**

```
[HybridIII]
;
Rib 1 Left =  RIBS 01 LE
Rib 1 Right = RIBS 01 RI
;
Rib 2 Left =  RIBS 02 LE
Rib 2 Right = RIBS 02 RI
;
Rib 3 Left =  RIBS 03 LE
Rib 3 Right = RIBS 03 RI
;
Rib 4 Left =  RIBS 04 LE
Rib 4 Right = RIBS 04 RI
;
Rib 5 Left =  RIBS 05 LE
Rib 5 Right = RIBS 05 RI
;
Rib 6 Left =  RIBS 06 LE
Rib 6 Right = RIBS 06 RI
;
```

## CSV Data Formats

Note that there are two CSV data formats that can be set in the [ALTCSV] section of the INI file. Please refer to this manual's section 3.3.2.1, Alternative CSV Format, for more information.

The normal CSV format uses the ISO MME channel names. To use standard ISO code format, set –

USE_ALT_CSV = 0

The alternative CSV format lets you create your own non-ISO channel names, without the redundant information such as object type and filter type that is in the normal CSV file channel headers.

To use the alternative CSV format, set –

USE_ALT_CSV = 1

The alternative CSV format channel names use the following format:

dummy position in car_rib name and LED location_axis

The code formats in the INI file provide –

- Conversion from the ISO Seating Positions (up to 10 characters)
- Alternative Rib Names and LED Positions for WorldSID and Hybrid III RibEyes (up to 30 characters)

Note that for ISO Seating Positions, the program reads up to the maximum characters (up to 10), starting from the first non-blank character after the equal sign (=) and ending with the Enter key (carriage return) at the end of each line. Spaces are allowed within the text. However, do not use commas – the program will replace commas with an underscore (_).

The program automatically adds the axis at the end as a single character, X, Y, or Z.

For example, using the settings below, for a dummy in the driver's seat, the Hybrid III left-side rib 1 X axis would be –

DRVR_RIB1_LE_DS_X

Please refer to the following code formats (which are included in the INI file) for configuring CSV data.

**Normal CSV Data Format**

```
[ALTCSV]
;
USE_ALT_CSV = 0
;
```

**Alternative CSV Data Format:**
**Conversion from ISO Seating Positions (10 characters maximum)**

```
;
ISO POSN 0 = OTHR
ISO POSN 1 = DRVR
ISO POSN 2 = 1MID
ISO POSN 3 = PASS
ISO POSN 4 = RR/L
ISO POSN 5 = RR/C
ISO POSN 6 = RR/R
ISO POSN 7 = 3R/L
ISO POSN 8 = 3R/C
ISO POSN 9 = 3R/R
;
```

**Alternative CSV Data Format:**
**Hybrid III Rib Names and LED Positions (30 characters maximum)**

```
;
alt H3Rib 1 Left =  _RIB1_LE_DS_
alt H3Rib 1 Right = _RIB1_RI_DS_
;
alt H3Rib 2 Left =  _RIB2_LE_DS_
alt H3Rib 2 Right = _RIB2_RI_DS_
;
alt H3Rib 3 Left =  _RIB3_LE_DS_
alt H3Rib 3 Right = _RIB3_RI_DS_
;
alt H3Rib 4 Left =  _RIB4_LE_DS_
alt H3Rib 4 Right = _RIB4_RI_DS_
;
alt H3Rib 5 Left =  _RIB5_LE_DS_
alt H3Rib 5 Right = _RIB5_RI_DS_
;
alt H3Rib 6 Left =  _RIB6_LE_DS_
alt H3Rib 6 Right = _RIB6_RI_DS_
;
```

**Alternative CSV Data Format:**
**WorldSID Rib Names and LED Positions**

```
;
alt WS Shoulder Rib Rear LED =    _SHRI_RE_DS_
alt WS Shoulder Rib Middle LED = _SHRI_MI_DS_
alt WS Shoulder Rib Front LED =   _SHRI_FR_DS_
;
alt WS Thorax 1 Rib Rear LED =    _THRI_RE_DS_
alt WS Thorax 1 Rib Middle LED = _THRI_MI_DS_
alt WS Thorax 1 Rib Front LED =   _THRI_FR_DS_
;
alt WS Thorax 2 Rib Rear LED =    _THRI_RE_DS_
alt WS Thorax 2 Rib Middle LED = _THRI_MI_DS_
alt WS Thorax 2 Rib Front LED =   _THRI_FR_DS_
;
alt WS Thorax 3 Rib Rear LED =    _THRI_RE_DS_
alt WS Thorax 3 Rib Middle LED = _THRI_MI_DS_
alt WS Thorax 3 Rib Front LED =   _THRI_FR_DS_
;
alt WS Abdomen 1 Rib Rear LED =    _ABRI_RE_DS_
alt WS Abdomen 1 Rib Middle LED = _ABRI_MI_DS_
alt WS Abdomen 1 Rib Front LED =   _ABRI_FR_DS_
;
alt WS Abdomen 2 Rib Rear LED =    _ABRI_RE_DS_
alt WS Abdomen 2 Rib Middle LED = _ABRI_MI_DS_
alt WS Abdomen 2 Rib Front LED =   _ABRI_MI_DS_
;
```

## Find RibEyes Options

For more information, please refer to section 2.2 in this manual.

Older generation RibEyes require a 15-second wait when finding RibEyes on the network.  The newer ones do not require a wait.  If you are using only newer generation RibEyes, you can eliminate the 15-second wait time by setting the "widgetType" in the webwidget section.

For current-generation WorldSID RibEyes and Hybrid III RibEyes with a single cable from the controller to the Trunk Box, set –

> widgetType = 1

For older generation RibEyes with a MultiTech Ethernet converter, set –

> widgetType = 0

**Find RibEyes**

```
[webwidget]
;
widgetType = 1
;
```

**<u>Connect/Setup Tab Controls</u>**

For more information, please refer to section 2.9 in this manual.

This code allows you to set defaults for controls on the Connect/Setup tab.

- Set the default for Data Buffer Operation to

   0 for a circular buffer

   1 for a linear buffer

- Set the default for the data collection period after Trigger for both circular and linear buffers.  The number is in milliseconds (ms) of data collection following Trigger.

- Set the default Download Time (in ms) – that is, the Start and Stop Times.

**Connect Tab Settings**

```
[connect_tab_controls]
;
Buffer Type = 0
;
Data After Trigger = 2000
;
Download Start Time = −10
;
Download Stop Time =  400
;
```

## Export Formats and Data Storage

For more information, please refer to section 3.0 in this manual.

This section allows you to set your default export formats and the location where you want to store your data files.

Set the default export format to –

> 0 for CSV
> 1 for Diadem
> 2 for ISO MME

The default for the Absolute/Relative data drop-down box is –

> 0 for Absolute Data
> 1 for data relative to pre-Time 0 data

The default storage location – that is, the file's path name – is the directory where you want to store your exported data.  The path name can be up to 255 characters maximum.  The default storage location appears on the program's export screen.  You can set the default location to a local or network drive.  The storage location can be changed during exporting to save the file in another location.

Note that you must put in two (2) backslashes (\\) for every single backslash in the path name.  For example, for the C:\DATA directory, put in C:\\DATA.

**Export Format and Data Storage Location**

```
[ExportDefault]
;
Default Export Format = 1
;
Default Relative_Absolute = 0
;
Default Storage Location = C:\\DATA
;
```

## Location to Read Stored Data Files

For more information, please refer to section 5.0 in this manual.

This section allows you to set the default location for the program to read stored data files when you are on the plot tab.  The location can be up to 255 characters maximum, and can be a local file location or a network store.  The file selection box will point to the default location, but can be changed to another directory during operation.

Note that you must put in two (2) backslashes (\\) for every single backslash in the path name. For example, for the C:\DATA directory, put in C:\\DATA

**File Read Location**

```
[ReadFilesDefault]
;
Default File Read Location = C:\\DATA
;
```

## Appendix B.  Alternative Methods of Setting the RibEye's IP address

Previously, section 2.2 described how to change the RibEye's IP address using the RibEye software.  This appendix describes alternative methods for changing the RibEye IP address.

When the RibEye ships from the factory, its IP address is set to 192.168.0.240.  For newer RibEyes, with Boxboro Systems labels and a single cable from the Trunk Box to the RibEye controller, or for WorldSIDs with serial number greater than 100, you can change the RibEye IP address using a web browser.  Instructions to do this are described below.

For older RibEyes, with two cables from the Trunk Box to the controller, you can change the RibEye's IP address by sending commands to the RibEye over the LAN connection to port 23 using a Telnet terminal program.  Instructions for using Telnet to change the IP address are given in Appendix C for Windows 7.

Note:  In order to communicate with the RibEye over a LAN, it must be on the same subnet as the LAN.  The RibEye's default IP address of 192.168.**0**.240 is on the **0** subnet.  If your LAN has a different subnet, you can connect your PC directly to the RibEye, then set your PC to a fixed IP address on the 192.168.**0** subnet.  Instructions for configuring your PC to a fixed IP address are shown in Appendix C-3 for Windows 7.

The following shows how to change the RibEye's IP address using a web browser.  This example assumes that the RibEye address is 192.168.0.240, and that the PC's IP address is any address on the 192.168.**0** subnet, except 192.168.0.1 or 192.168.0.240.

Launch your web browser on your PC and go to http://192.168.0.240.  You should see the screen shown in Figure B1.  Note that some versions of Internet Explorer must be set to "Compatibility Mode" to properly display the setting screens.

### Figure B1.  First screen for changing the RibEye IP address
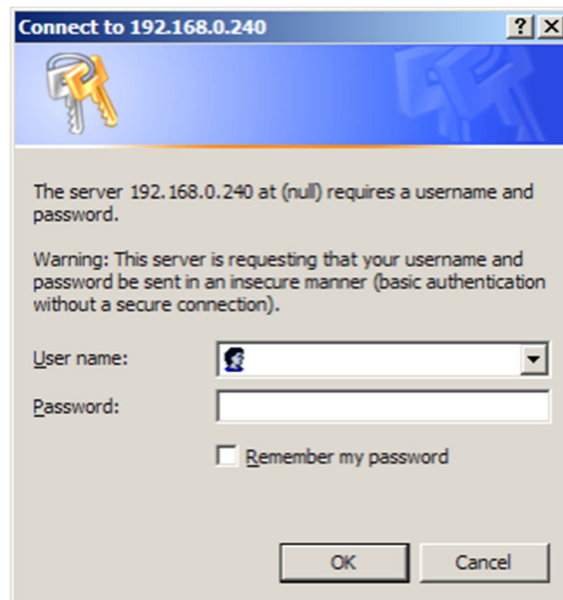
Do not enter a user name or password.  Just click on the "OK" button, and the program takes you to the Configuration Manager screen (Figure B2).

**Figure B2.  Configuration Manager screen**
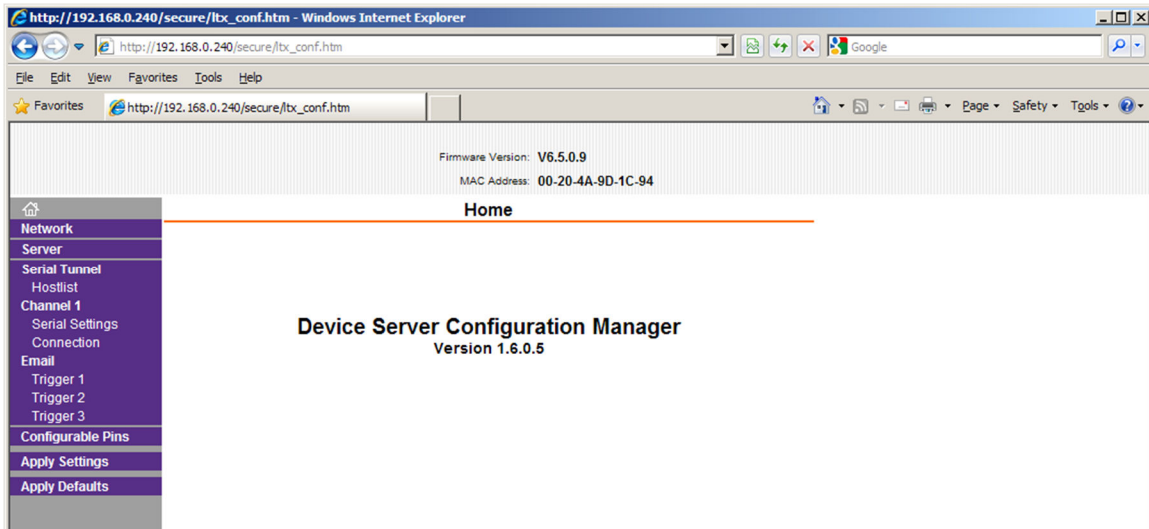


Click on the "Network" selection on the left side of the screen, and the Network Settings screen appears (Figure B3).  Type in your new IP Address for the RibEye in the IP address box.  Then click on the "OK" button.  Next click on "Apply Settings" on the left side of the screen.

**Figure B3.  Network Settings screen**
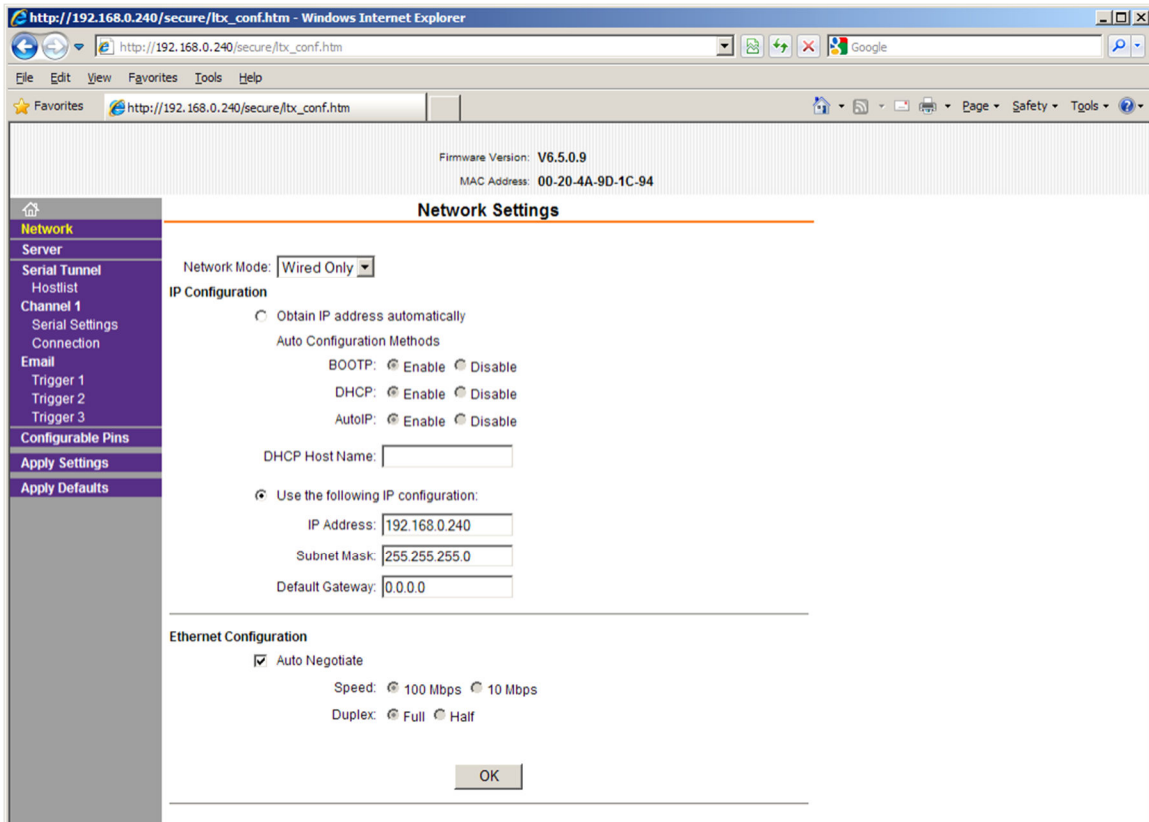
After a few moments, the confirmation screen appears (Figure B4), and the RibEye's IP is changed.

**Figure B4.  Confirmation screen**
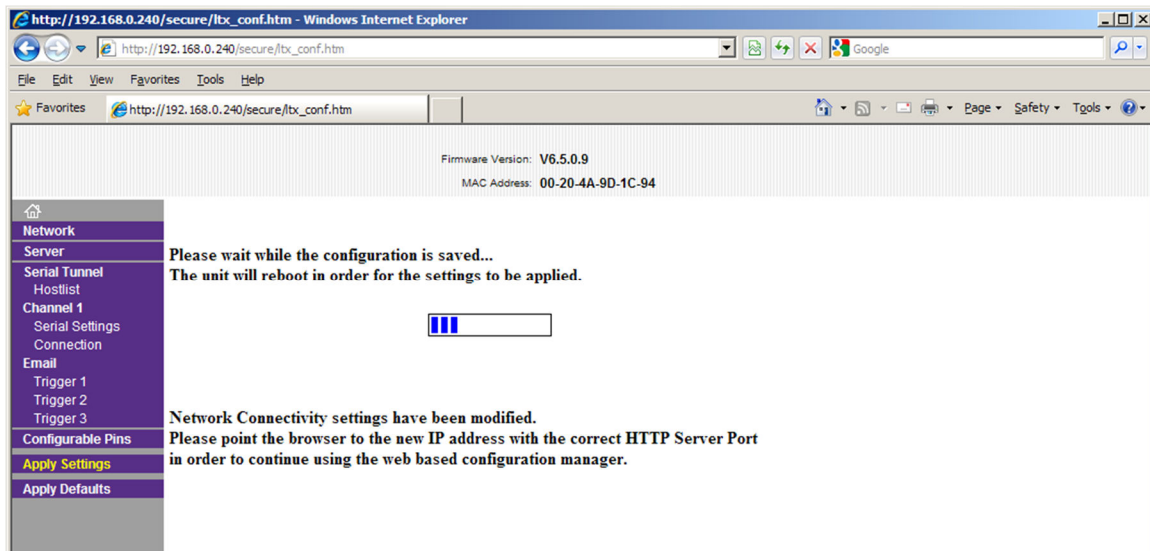


To reconnect to the RibEye, you have to put the new IP address in your web browser.  If you changed the IP address to a different subnet than your PC, you have to change your PC IP address to the new subnet. In most cases, you would change your PC back to having a network assigned IP address, and you can plug the RibEye into your LAN.

**IMPORTANT:**  *If you change the RibEye IP address, you should write the new IP address on a sticker and attach the sticker to the RibEye Trunk Box so that the number is readily available for the next time you are using the RibEye.*

**IMPORTANT:** *Do not change any other settings, or you will not be able to communicate with your RibEye.*

**Appendix C-1.  Setting the RibEye's IP address for Older Models – Windows 7**

For older RibEyes with two cables from the Trunk Box to the RibEye controller, you can change the RibEye's IP address by sending commands to the RibEye over the LAN connection to port 23 using a Telnet terminal program.

When the RibEye ships from the factory, its IP address is set to 192.168.0.240.  You can change the RibEye's IP address by sending commands to the RibEye over the Ethernet connection to port 23 using a Telnet terminal program.

If your local LAN uses the 192.168.**0.**xxx subnet, you can reconfigure the RibEye over your LAN.  If your local LAN uses another subnet, such as 192.168.**1.**xxx**,** you have to set your computer to a fixed IP address on the 192.168.**0**.xxx subnet and connect directly from your computer to the RibEye.

Note that some LAN routers allow communication on several subnets simultaneously.  Check with your computer support staff to see if your LAN supports multiple subnets.

Appendix C-2 describes how to enable the Windows 7 Telnet Client on your Windows 7 PC if it has not been previously enabled.

Appendix C-3 describes how to set you Windows 7 PC to a fixed IP address.

Change the RibEye's IP address using the Windows 7 Telnet Client

1.  Click on the start button, then select "Run".  This opens the window shown in Figure C1.  Type "command" in the box and click on the OK button.

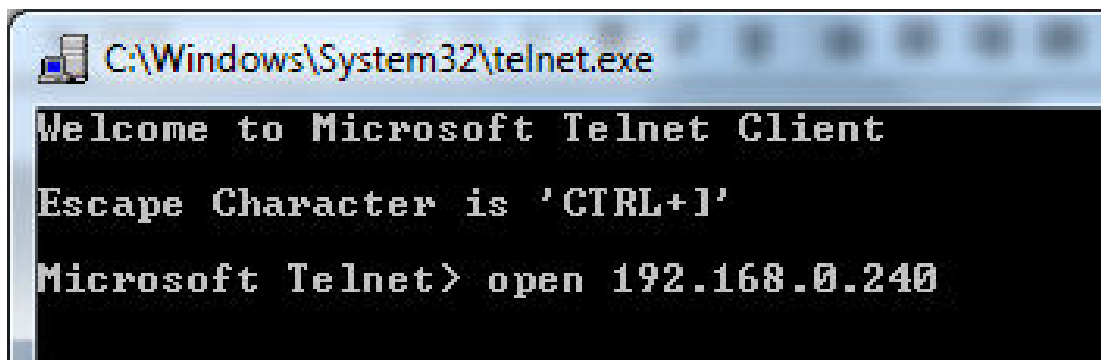**Figure C1.  Windows 7 Telnet screen 1**
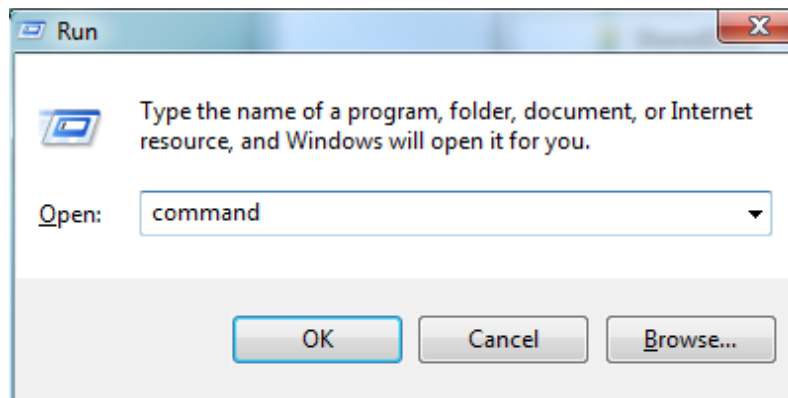
2.  A DOS window appears.  Type "Telnet " and press the "Enter" key for Telnet Client to open as shown in Figure C2.

**Figure C2.  Windows 7 Telnet screen 2**
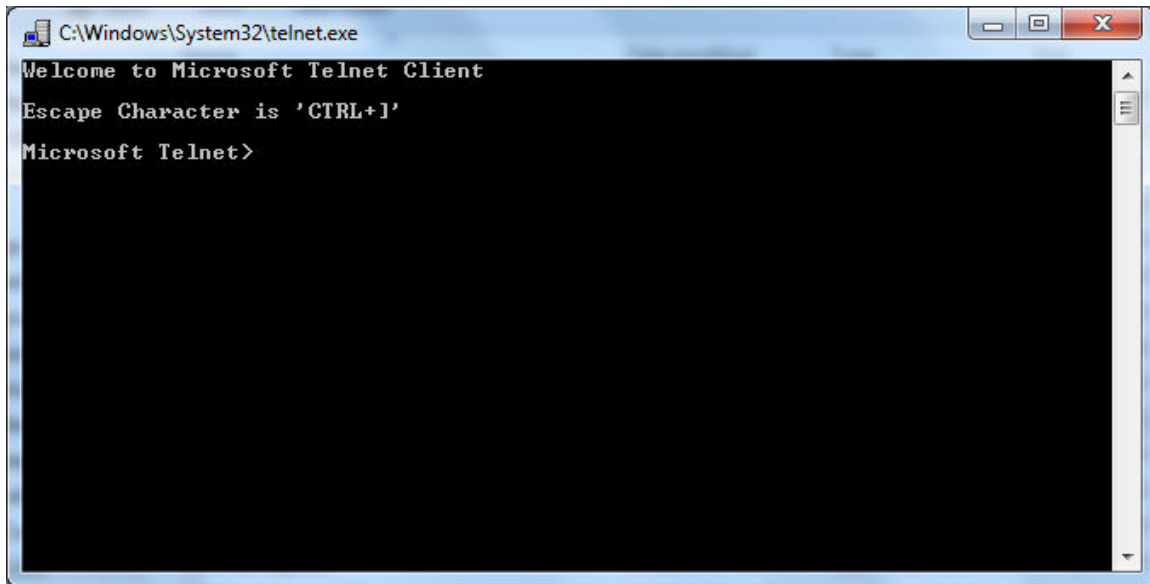


3.  At the prompt, type "open [RibEye IP address]" or "o [RibEye IP address]."  For example,  "open 192.168.0.240" as shown in Figure C3.

**Figure C3.  Windows 7 Telnet screen 3**



4.  After you hit "Enter", you first get a message saying "Connecting…" and then one that says "Connected."  Then you will see the RibEye command prompt, which is  #.

5.  After you have connected to the RibEye, at the command prompt #, type the following as shown in Figure C4, but replacing the "x"s with the new IP address:

set ip eth0 ip-address xxx.xxx.xxx.xxx

**Figure C4.  Windows 7 Telnet screen 4**



6.  Press the "Enter" key again.  The IP address of the RibEye is now changed temporarily.  It is not permanently stored in the RibEye flash memory, so if the RibEye is powered down, it will not remember the change.

7.  Since the RibEye IP address is now changed, Telnet Client cannot communicate with it any more. You must close the Telnet Client connection by pressing the "Ctrl" key and the right bracket key, "]" simultaneously.

If you changed the RibEye IP address to a new subnet, you have to change your computer's IP address to the new subnet before you can communicate with the RibEye again.

8.  Now you can reconnect to the RibEye with its new IP address using the "open [ip address]" command. When you get the command prompt, type "save" as in Figure C5 and press the "Enter" key.  Now the new IP address is permanently saved in the RibEye flash memory.

**Figure C5.  Windows 7 Telnet screen 5**
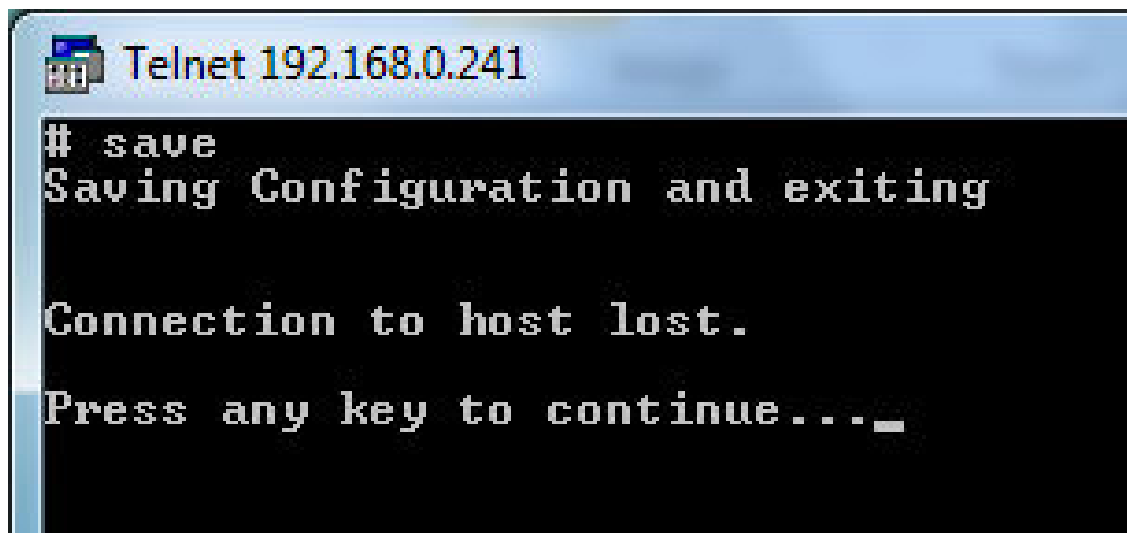


9.  When you press any key you will be returned to the Telnet prompt.
Type "q" to exit from Telnet Client, or just close the DOS box.

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**Appendix C-2.  Enabling Windows 7 Telnet Client**

Telnet is not enabled with Windows 7 by default, but you can enable it by following the steps below, as shown in Figure C6:

1.  Go to Start ► Control Panel ► Programs

2.  Under "Programs and Features", click "Turn Windows features on or off"

3.  In the "Windows Features" dialog box, select the "Telnet Client" check box

4.  Click the "OK" button.  The installation may take several minutes.

**Figure C6.  Enabling Windows 7 Telnet Client**
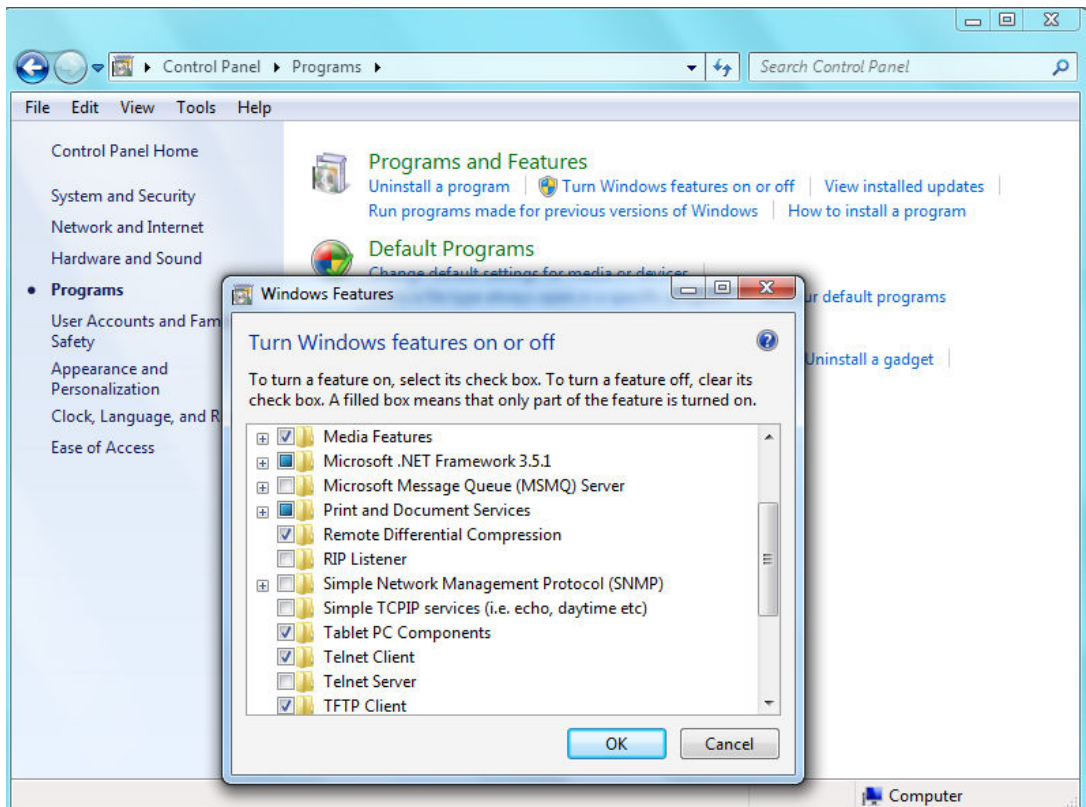
## Appendix C-3.  Configuring Windows 7 for a Fixed IP Address

If you want to connect a PC directly to the RibEye instead of through your LAN, you must set up your IP with a fixed address on the same subnet as the RibEye.  For example, if the RibEye IP address is 192.168.0.240, you must set up your PC IP address to be 192.168.0.xxx, where "xxx" is any number between 2 and 254 except 240.

1.  Go to Start ► Control Panel ► Network and Internet ► Network and Sharing Center.   This opens the screen shown in Figure C7:

**Figure C7.  Windows 7 configuration for fixed IP address screen 1**
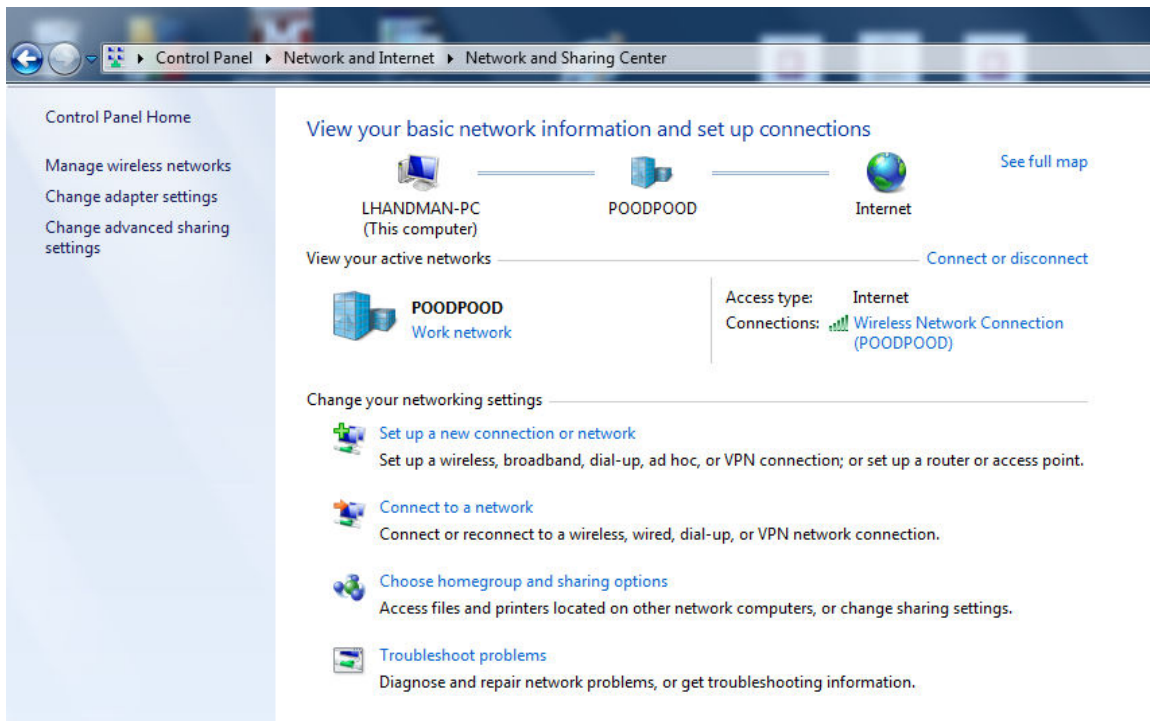


2.  On the left (shaded) side of the screen, click on "Change adapter settings".  You will be taken to a screen shown in Figure C8:

**Figure C8.  Windows 7 configuration for fixed IP address screen 2**

3.  Right-click on "Local Area Connection" and click on "Properties" in the drop-down menu, which takes you to the screen shown in Figure C9:

**Figure C9.  Windows 7 configuration for fixed IP address screen 3**
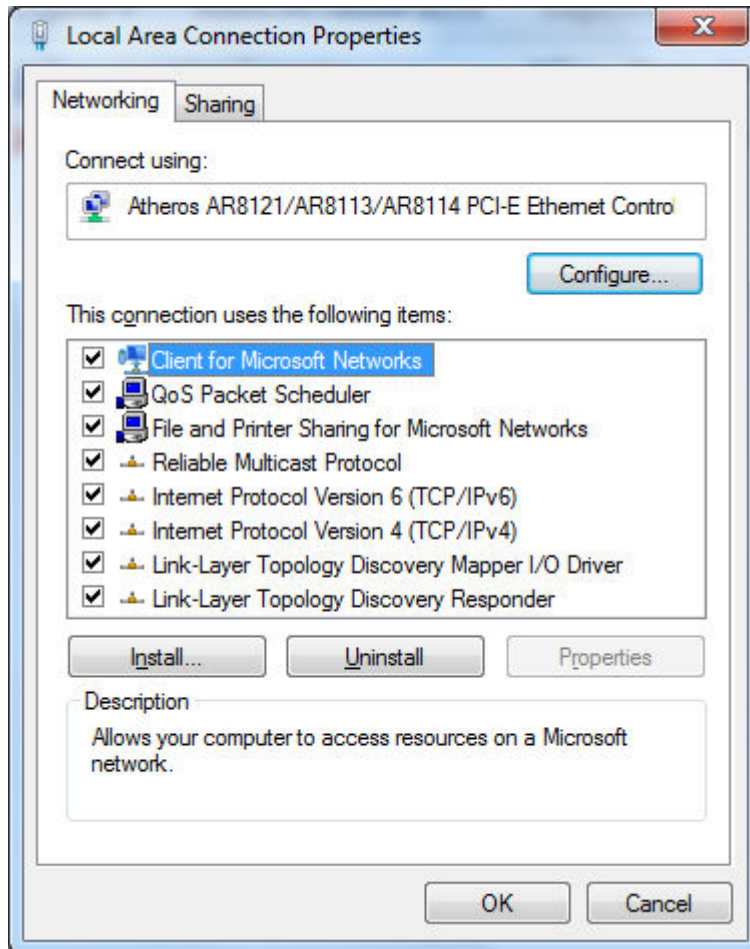
4.  Click on "Internet Protocol Version 4 (TCP/IPv4) to highlight it, then click on "Properties" to arrive at the next screen, Figure C10.  Select "Use the following Internet address".

**Figure C10.  Windows 7 configuration for fixed IP address screen 4**
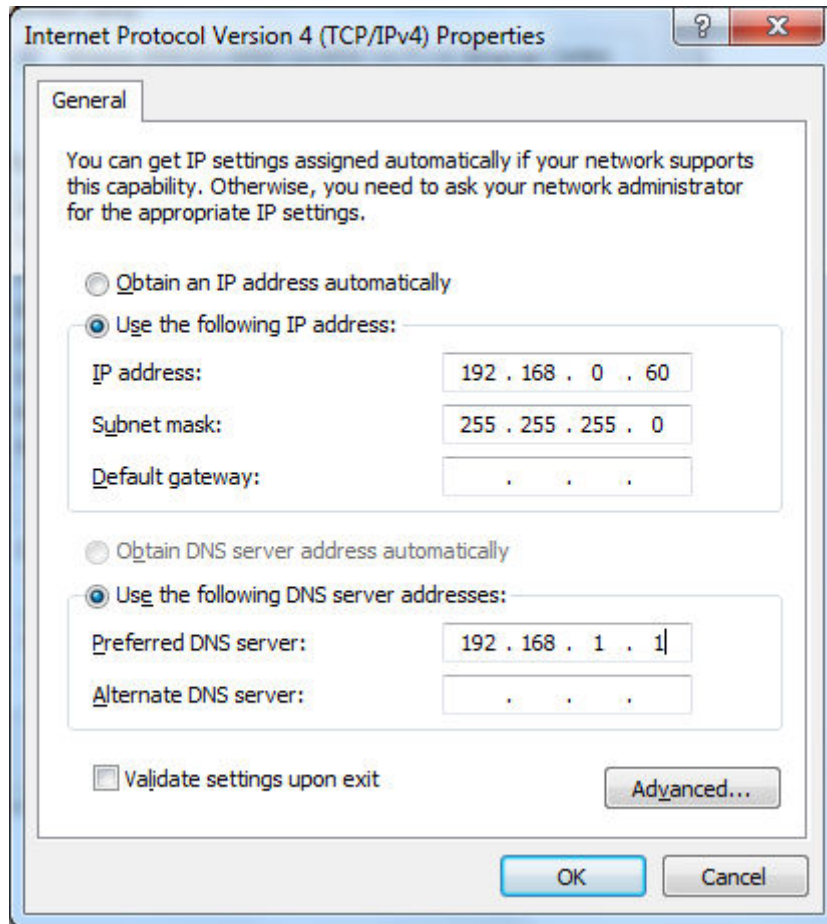


5.  Set the IP address to your desired address, and make sure the subnet mask is set to 255.255.255.0 as shown in Figure C10.  You don't have to fill in the default gateway or DNS server addresses.

6.  Click on the "OK" button until all windows are closed.  You might get a message saying that you have to re-boot for the changes to take effect.

7.  You are now set to a fixed IP address.

## Appendix D.  Instructions for Hybrid III 50th Male Adjustable-LED 2-Axis RibEye

Special firmware is available for the 50th Male 2-axis RibEye that allows the user to put any LED on any rib or on the sternum.  The user may also place multiple LEDS on a single rib.  Special LED mounts are available that attach the LEDs to the rib stiffener bars at the sternum in addition to the normal LEDs that attach to the ribs. When running the special firmware, the "RibEye Type" box displays "50th ADJ".

The 2-axis 50th Male RibEyes use different calibration curves to process the data for each rib.  Therefore, the RibEye must know which rib each LED is located on.  When the RibEye software connects to a "50th ADJ" RibEye, the LED position and ISO codes table have drop-down boxes on the RIB and POSITION columns, as shown in Figure D1.

### Figure D1.  Drop-down menus for the RIB and POSITION columns





Any of the 6 ribs can be selected for any LED.  Rib 1 is the top rib, and Rib 6 is the bottom rib.  The positions can be set to Left or Right, and Rib or Sternum as shown in Figures D1 and D2.  Note that the ISO codes change with the RIB and POSITION settings.

### Figure D2.  RIB and POSITION changed



When any of the RIB or POSITION entries are changed, two buttons appear:  "Save LED Setup to RibEye" and "Cancel LED Setup Changes".  When you have finished configuring the LEDs, you must

either save the settings or cancel them.  When you click on the "Save LED Setup to RibEye" button, the LED setup data is written to the RibEye flash memory.  The next time you connect to the RibEye, the software will read the LED settings from the RibEye flash memory and set up the LED table with the correct data.  If you click on the "Cancel LED Setup Changes" button, the changes are cancelled, and the table resets to its last state.

**WARNING**: *Make sure that the LEDs are mounted on the rib you have specified in the table to prevent the RibEye from using the wrong calibration curves.*

Note that the "Download Data" button is grayed out and inoperable while you are editing the LED table and while the "Save LED Setup to RibEye" and "Cancel LED Setup Changes" buttons are visible.

If you put more than two LEDs on either side of the ribcage, you will have duplicate ISO channel codes for some channels.  In this case, you can look at the absolute data from the RibEye to determine the initial location of each of the LEDs.

If you mount LEDs on the sternum stiffeners half-way between two ribs, you can use either rib number. For example, if the LED is mounted to the sternum stiffener half-way between ribs 3 and 4, you can set the RibEye software for either rib 3 or rib 4.