It's about the data

StartleMonitor™ II

User Manual
Version 10.00

For Systems Using Load Cell Sensors
S-723-001

8 January 2025

Applies to:
Software Build
19163-17

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DISCLAIMER

The images, pictures, illustrations and photos in this manual are for illustration purposes only and do not necessarily represent the exact product.

CHAPTER 1
INTRODUCTION, *STARTLEMONITOR II* DESCRIPTION, SOFTWARE & HARDWARE INSTALLATION

1.1 Introduction

1) Congratulations on the purchase of your ***StartleMonitor™ II*** System. We have enhanced the usability of the System with the release of our second-generation System, and we are confident you will receive years of service from the System.

Figure 1 StartleMonitor™ II Cabinet

1.2 StartleMonitor II Description

We designed ***StartleMonitor II*** to put data in your hands as quickly as possible. Further, we designed default settings, file storage and user defined output files with flexibility and keystroke reduction in mind. Chapter 2 provides detailed explanations of these features. But first let us look at the basics of running the System.

It is a basic three step process:

1. Fill in session information screen.
2. Run the data collection session.
3. Reduce the data collected for export.

Once you have learned how to set up the System, it's that simple.

The User Manual is divided into three chapters as follows:

- Chapter 1 – Introduction, ***StartleMonitor II*** Description, and Software & Hardware Installation.
- Chapter 2 – Getting Started.
- Chapter 3 – Changing the Full-Scale Setting and Calibrating the System.

StartleMonitor II records animal responses with a dedicated microprocessor. The collected data is then transmitted via serial communication to the host Personal Computer (PC).

1.3 Hardware and Installation

The following paragraphs describe how to assemble and set up the StartleMonitor System hardware, and how to connect to the host PC.

1.3.1 Unpacking the Hardware

Use care when removing the hardware from its shipping container to prevent damage to any protruding connectors, controls, or indicators. Although components are thoroughly inspected mechanically and electrically before packing for shipment, they must be inspected upon receipt for damage in transit.

1. Make sure each item on the packing list is included with the shipment.

2. Inspect all items for dents, chips and heavy scratches (gouges) that may have resulted from shipping. Check for broken or bent connectors, controls, and indicators. Photographs of damage may be helpful in substantiating subsequent claims against the shipping company. Kinder Scientific insures all shipments for damage and your receiving department is responsible for reporting any damage immediately to both Kinder Scientific and the carrier (e.g., UPS or FEDEX). **Any failure to report shipping damage will void the shipping insurance and Kinder Scientific will assume no responsibility for said losses.**

1.3.2 Reshipment Procedure

If a component is to be reshipped after receipt (e.g., because of shipping damage), if possible, use of the original shipping container and packing materials is recommended. If this is not possible or feasible, contact Kinder Scientific at Support@KinderScientific.com for advice on making this shipment.

1.3.3 Returned Equipment with Warranty or Damage Claims

If a component is damaged in transit or does not operate as specified when received, notify the carrier and **Kinder Scientific** customer service **within 15 days of receipt** at Support@KinderScientific.com or by calling 1-858-679-1515. Make sure you get a Service Work Order (SWO) number from Kinder Scientific prior to returning any equipment. Please attach a tag or form that includes the SWO number, your company's name, address, person to contact, and telephone number. A brief description of the damage or problem will also be helpful. **The carrier requires that you keep the shipping material for evaluation during the claim process. If you discover damage, please DO NOT THROW THE SHIPPING MATERIAL AWAY. This will void the claim against the carrier and Kinder Scientific will not cover the shipping damage loss; that is the purpose of the shipping insurance that is included with every shipment.**

1.3.4 Equipment Description

The features of the ***StartleMonitor*** Systems are as follows:

- The basic ***StartleMonitor*** System is comprised of a compact cabinet with a Service Pack mounted on the right side of the cabinet, a BSC100 or BSC Jump Control Chassis and at least one restrainer.

- The ***BSC100 or BSC Jump Control Chassis*** provides the interface between the host computer and the ***StartleMonitor*** cabinet. Up to eight ***StartleMonitor*** cabinets can be connected to the ***BSC100 Control Chassis.*** Up to an additional eight StartleMonitor cabinets (for a total of 16) can be connected to the ***BSC100 Control Chassis*** through a ***BSC100 Expansion Device***. Up to two ***StartleMonitor*** cabinets can be connected to the ***BSC Jump Control Chassis.*** No additional StartleMonitor cabinets can be connected to the ***BSC Jump 100 Control Chassis.***
- Separate power supplies provide power for the ***BSC100 or BSC Jump Behavioral System Core (BSC)*** and each ***StartleMonitor Cabinet/Service Pack.***

1.4 StartleMonitor Specifications

STARTLEMONITOR **SPECIFICATIONS**	
Electrical	
Voltage:	90-240 Vac
Frequency:	50-60 Hz
Physical	
Depth:	16" (40.64 cm)
Width:	15.75" (40 cm)
Height:	19.5" (49.53 cm)
Weight:	70 lbs. (31.8 kg) including sensor and restrainer
Construction:	Medical Grade Cabinet built from high quality laminate and MDF
Acoustic Performance	
Full Range White Noise:	57 to 120 dB, +/- 1 dB
Chamber to Chamber Variation:	+/- 1 dB
Cabinet Isolation:	-35 dB, +/- 2 dB as measured at ventilation holes.
Response Performance	
Load Cell Transducer Calibrated and Reported in Newton:	+/- 3 % full scale (excluding building noise and vibration at customer site)
Control Circuitry and Software	
Control:	Independent BSC Control Chassis - BSC100 or BSC Jump
Communication (PC to BSC100 or BSC Jump Control Chassis):	RS232 cable
Communication (BSC100 or BSC Jump Control Chassis to station):	Single IEEE DB25 parallel cable
Operating System:	Windows 7 Pro or Windows 10 Pro

Table 1 StartleMonitor Specifications

1.5 StartleMonitor II Service Pack

The SCM100 Service Pack ("Service Pack") contains the controls and most of the electronics for the ***StartleMonitor II*** System and is located on the side of the ***StartleMonitor II*** cabinet. Figure 2 and Table 2 describe the Service Pack controls, indicators and connectors.

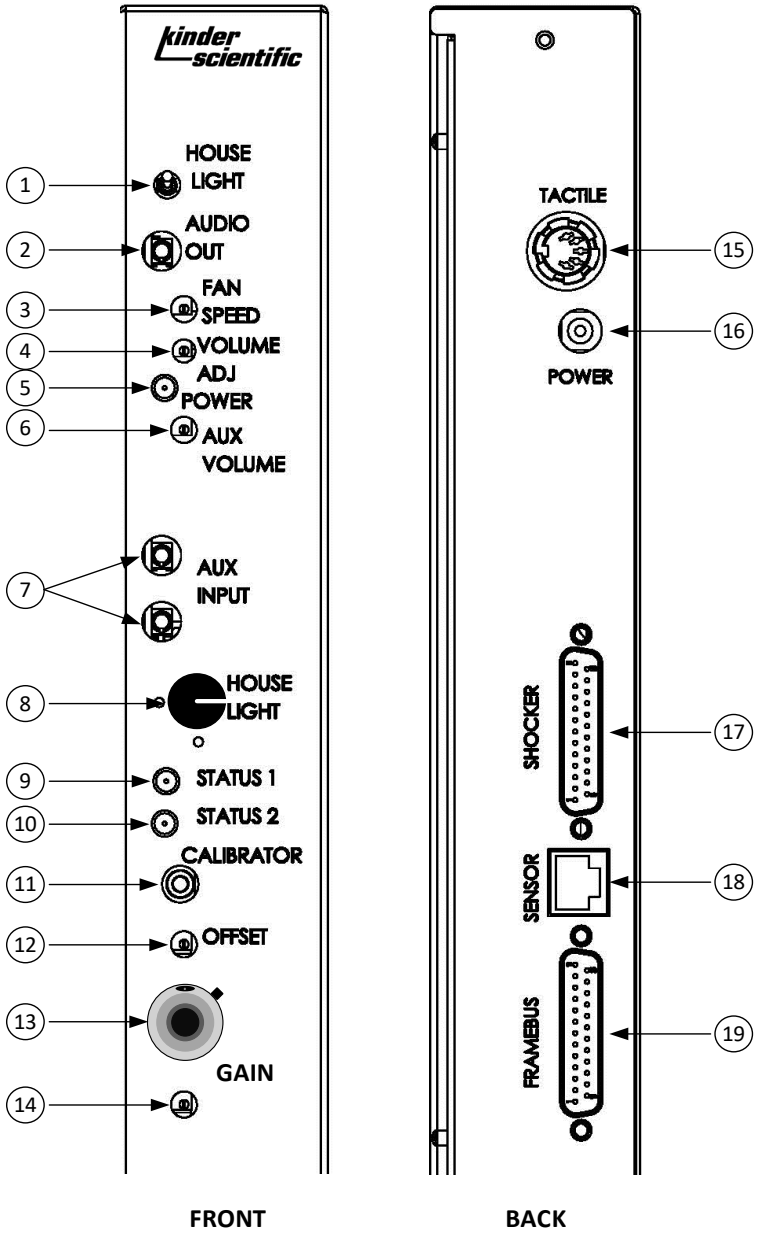


Figure 2 **StartleMonitor** Service Pack Controls, Indicators & Connectors on Front (left) and Back (right)

	NAME	TYPE	FUNCTION
1.	**HOUSE LIGHT**	Toggle Switch	Turns the HOUSE LAMP on and off. **NOTE** Make sure this switch is turned OFF for fear potentiated startle and for most audio startle.
2.	**AUDIO OUT**	Female audio connector	External speaker
3.	**FAN SPEED**	Potentiometer	Adjusts exhaust fan speed.
4.	**VOLUME ADJ**	Potentiometer	Adjusts sound level for chamber speaker.
5.	**POWER**	LED Indicator (green)	Lights when power is ON (supplied to the startle chamber).
6.	**AUX VOLUME**	Potentiometer	Used with the tinnitus option.
7.	**AUX INPUT** (2)	Female audio connector	Used in conjunction with the AUX VOLUME potentiometer
8.	**HOUSE LIGHT**	Potentiometer	Used to adjust the brightness of the house lamp inside the startle chamber. To prevent damage to House Light, do not leave House Light on in brightest setting for extended time periods.
9.	**STATUS 1**	LED Indicator (amber)	Blinks ON and OFF when a trial starts
10.	**STATUS 2**	LED Indicator (green/red)	Comes on when there is a fault.
11.	**CALIBRATOR**	Female input connector	Input from **Impulse Calibrator** – Not used with Load Cell Systems
12.	**CIRCUIT OFFSET**	Potentiometer	**Adjustment for the Circuit Offset (used primarily for manufacturing set up and calibration)**
13.	**GAIN** (fine gain adjustment)	Potentiometer, 10-turn Vernier Dial	Used in part, including by the User, to calibrate the System including the load cell.
14.	**GAIN** (course gain adjustment)	Potentiometer	Used for moving the usable response window.
15.	**TACTILE**	5-Pin DIN connector	Solenoid connection for air puff.

16.	**POWER**	Female power supply connector	Receives input from the + 15 Vdc power supply.
17.	**SHOCKER**	25-pin male D type connector	Programmable shock input.
18.	**SENSOR**	CAT-5 Connector	Load cell power ethernet port.
19.	**FRAMEBUS**	25-pin male D type connector	Startle I/O connection from the BSC100 or BSC Jump Control Chassis

Table 2. StartleMonitor Service Pack
Controls, Indicators & Connectors

1.6 BSC100 or BSC Jump Control Chassis

As with all Kinder Scientific Systems, the BSC100 or BSC Jump Control Chassis has its own separate embedded microprocessor controller. This architecture provides a stable partition between the data collection effort and the host PC. This greatly enhances the process of real-time data collection within the Windows Operating System. Communication between the BSC100 or BSC Jump Control Chassis' embedded controllers and the PC's Windows platform is via a RS232 serial port or an ethernet port.

Each BSC100 Control Chassis is itself capable of controlling and monitoring up to eight stations using a single PC. Additional stations can be controlled through the BSC100 Control Chassis using BSC100 Expansion Devices. Each BSC Jump is itself capable of controlling and monitoring up to two stations using a single PC and cannot be expanded to control or monitor additional stations. Examples of the Behavioral System Core are Figure 3 (BSC100) and 4 (BSC Jump).

Figure 3 BSC100 Control Chassis

Figure 4 BSC Jump Control Chassis

1.7 StartleMonitor II Assembly & Interconnection

Each ***StartleMonitor*** System ships complete with all the hardware required for assembly. Each ***StartleMonitor*** System will have the following hardware (refer to Figures 5 and 6):

SM100 (Figure 5)

1. StartleMonitor II Station
2. Power Supply for BSC100 or BSC Jump (110/220-volt input - + 5, ± 12-volt output)
3. Power Cord for Power Supply of #2 above
4. Power Supply for each StartleMonitor cabinet (110/220-volt input - +15)
5. Power Cord for Power Supply of #4 above
6. Access Hole Stopper – tapered black rubber plug
7. Cat5 Ethernet Cable
8. BNC to BNC cable
9. BSC100 or BSC Jump Control Chassis (as appropriate)
10. At least one Restrainer for each StartleMonitor cabinet
11. Sound Meter
12. Adjustment Tool
13. Additional Restrainer (optional)
14. Vent Mesh Screen
15. 100-gram weight
16. Load Cell Sensing Assembly
17. DB25 Parallel Cable
18. DB9 Serial Cable

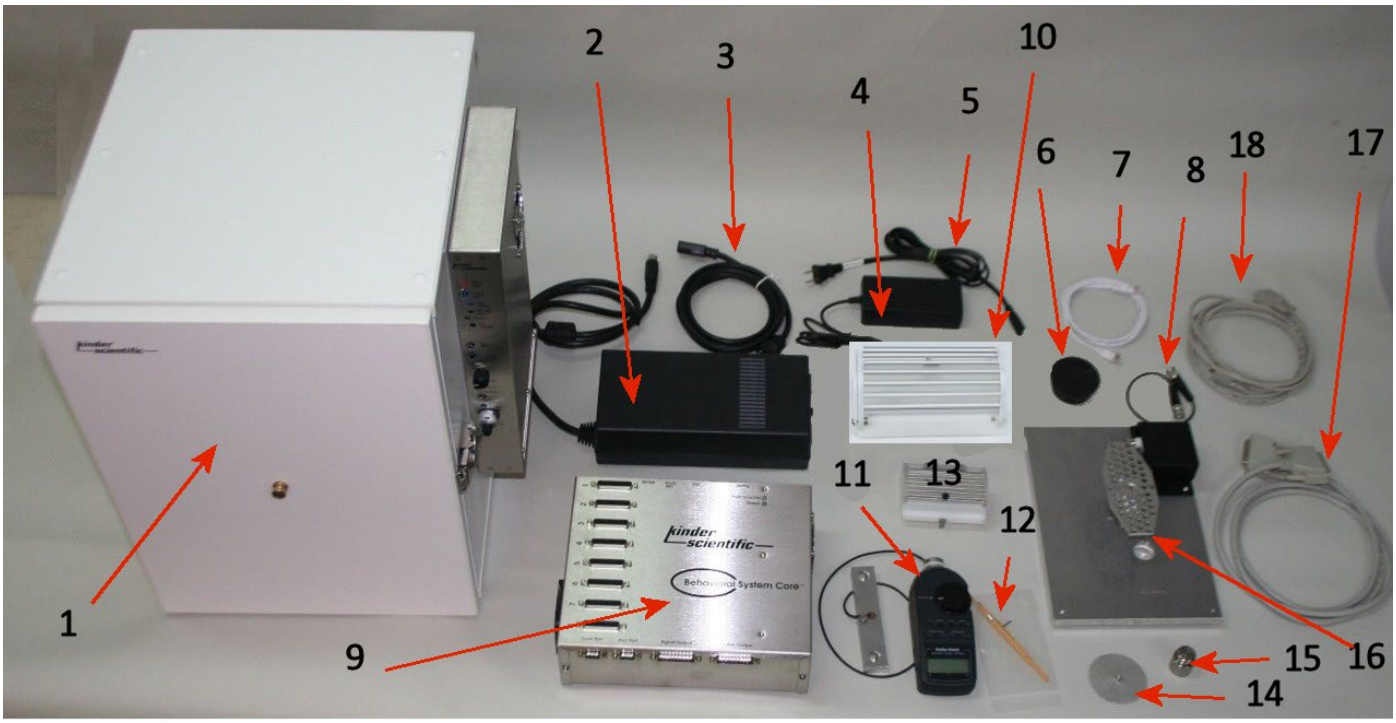


Figure 5 StartleMonitor II Components

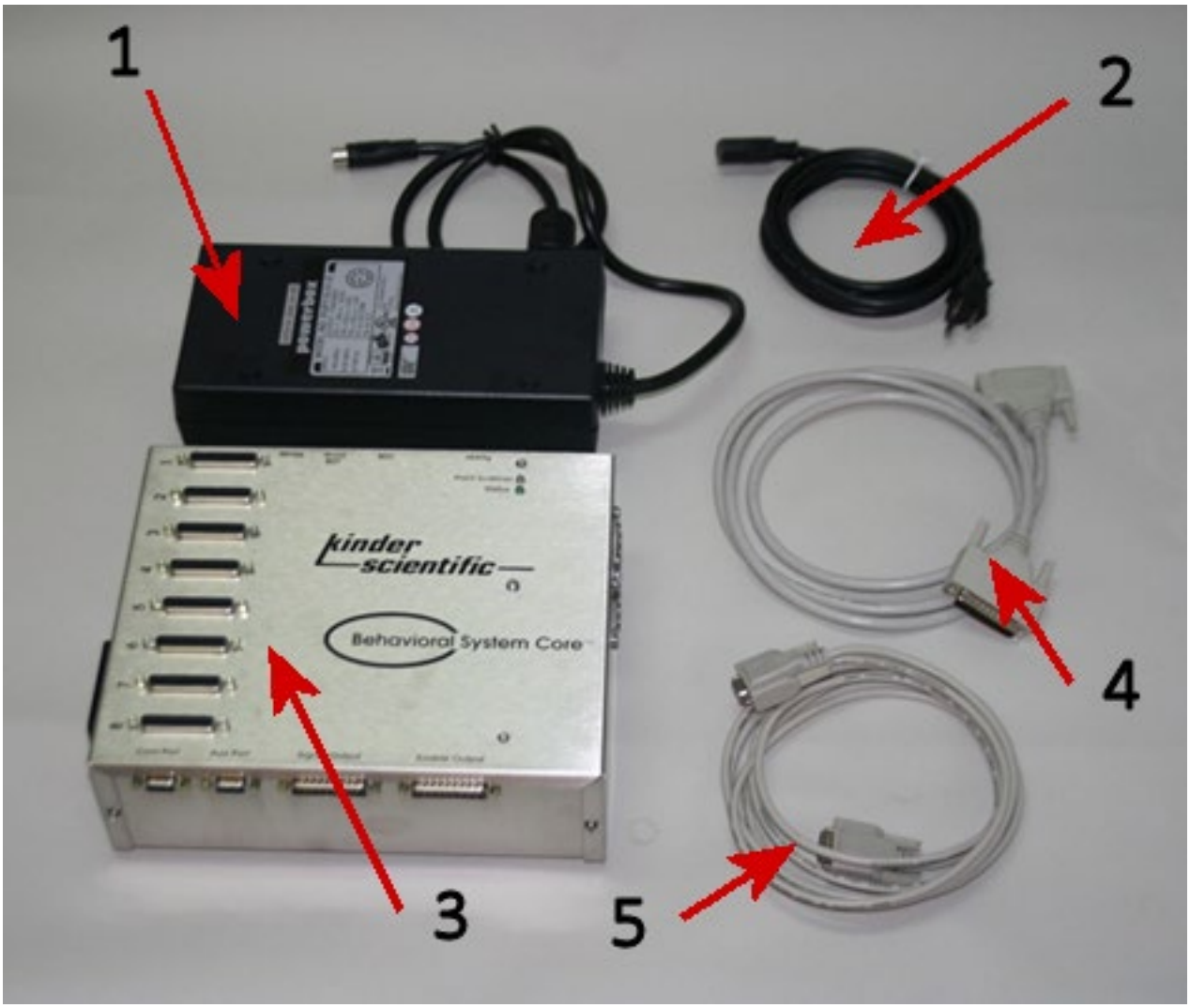


Figure 6 BSC100 Components (BSC Jump is similar)

1. Power Supply for BSC100 or BSC Jump - 110/220-volt input - + 5, ± 12-volt output
2. Power Cord for 110/220-volt input - + 5, ± 12 volt output Power Supply
3. BSC100 Control Chassis
4. DB25 Parallel I/O cable (one for each station to connect the BSC100 or BSC Jump Control Chassis to each StartleMonitor cabinet)
5. RS232 DB9 serial cable (to connect the BSC100 or BSC Jump Control Chassis to the host PC)

1.7.1 Assembly

CAUTION

Do not plug in any power supplies or make any ac connections until the assembly is completed.

1.7.2 Cabinet Location.

The ***StartleMonitor II*** System is a highly sensitive measuring device. It is important to locate the cabinets on a rigid surface. However, we recommend that the supporting surface be not so rigid that individual StartleMonitor cabinets become mechanically coupled to each other. For example, it is highly recommended NOT to place the cabinets directly on a very rigid surface such as granite. The load cell sensor of the StartleMonitor II System is so sensitive that the startle response of an animal in one cabinet has been detected (albeit at a much lower level) in adjacent cabinets when each cabinet has been placed on a rigid surface such as granite. If it is necessary to place the StartleMonitor cabinets on a very rigid surface such as granite, it may be necessary to place the cabinets on narrow cushioning material such as rubber mats to de-couple the respective cabinets from each other.

Also, do not place the cabinets on roll-around carts as this makes consistent calibration efforts difficult. If the StartleMonitor cabinet must be placed on stainless steel shelving that does not provide substantial rigidity, make sure the shelves, and consequently the StartleMonitor cabinets, are positioned to prevent inadvertent contact by personnel during sessions.

1.7.3 Cabinet Assembly.

Once the cabinets are placed in a suitable location, continue the assembly process as follows:

1. Locate the Ventilation Screen and place it in the hole in the bottom of the cabinet as shown in Figure 7. This screen keeps refuse from entering the ventilation system.

Figure 7 Installing the Ventilation Cover

2. Refer to Figure 8 and insert the Load Cell Sensing Assembly. Center the assembly from left to right as much as possible and place it directly under the speaker (towards the front of the cabinet). Connect the BNC to BNC and Cat5 ethernet cables to the load cell circuit.

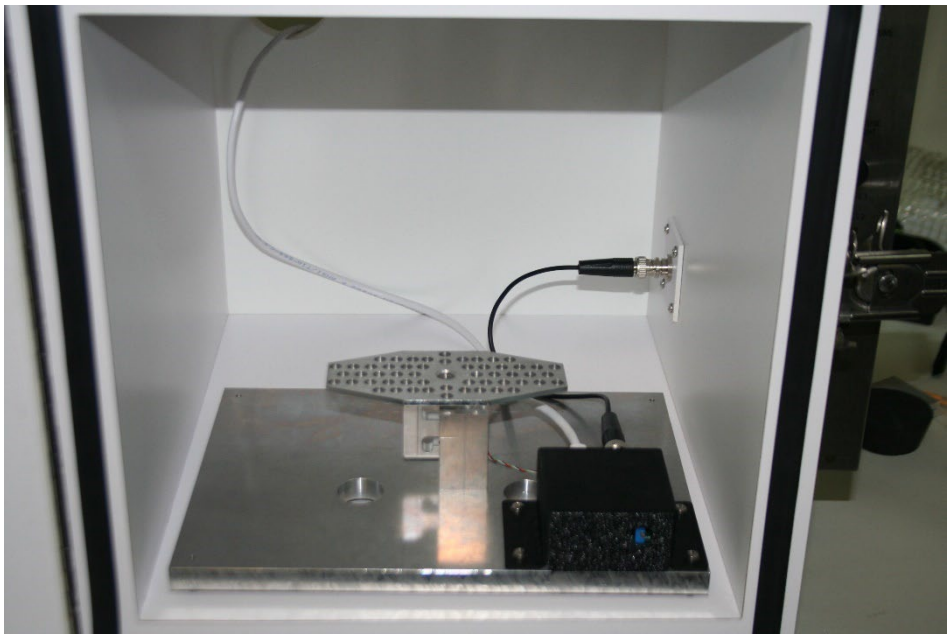


Figure 8 Installing the Load Cell Sensing Assembly

3. Refer to Figure 9 and install the Restrainer. Slide the Restrainer onto the Load Cell Plate and make sure the clips on the bottom of the Restrainer are securely in contact with the Load Cell Plate.

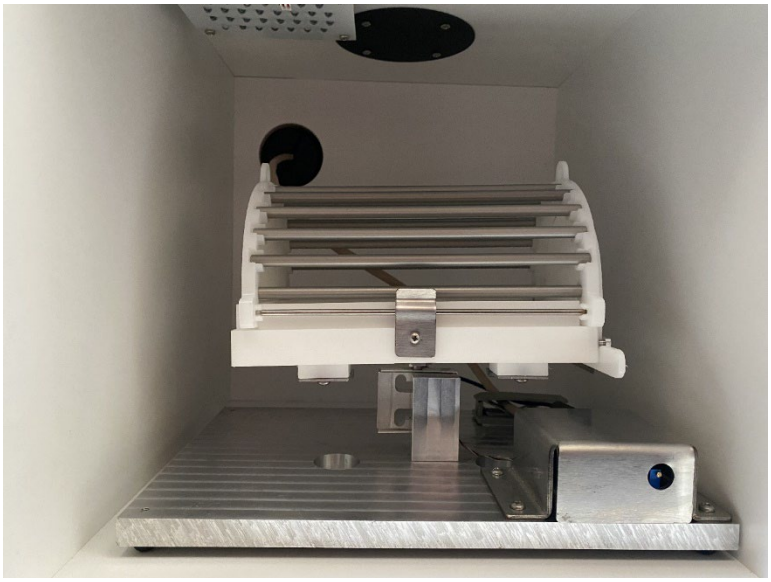


Figure 9 Installing the Restrainer

1.7.4 Interconnection

NOTE

Refer to FIGURE 10 while performing the System interconnection for more than 8 StartleMonitor chambers. The process is similar for the BSC Jump. Of course, with the BSC Jump, there will be no Behavioral System Core Expansion and the BSC Jump will only have 2 connections to individual stations. Other than that, the connection is exactly as shown in Figure 10.

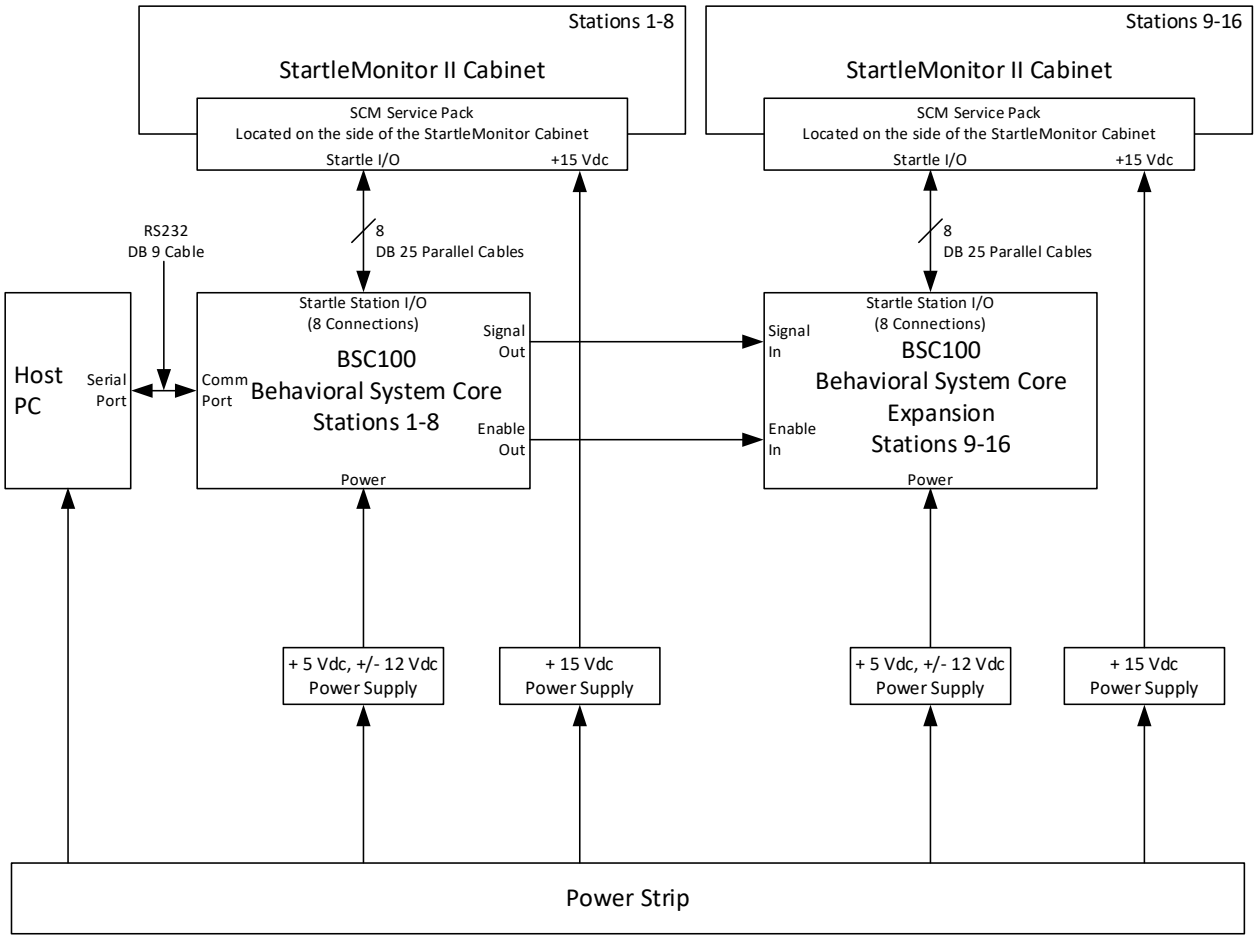


Figure 10 StartleMonitor II Interconnect Diagram

NOTE

The power strip must have enough outlets to supply power to *all* components. Make sure the power strip has a current rating of at least 15 amps and is equipped with a circuit breaker and an on/off switch. This allows you to turn on all the components with one switch.

1. Make sure all power is turned off before making any connections.
2. Connect the serial cable from the host PC to the serial connector labeled **Comm Port** located on the right side of the BSC100 or BSC Jump Control Chassis (refer to Figure 6).

3. Connect the I/O cable from the BSC100 or the BSC Jump Control Chassis to the connector located on the rear of the SCM Service Pack, starting with BSC100 or BSC Jump Control Chassis connector number 1.

4. Connect any subsequent I/O cables to their respective Service Packs.

NOTE

Plugging or unplugging the DB25 I/O cable with the power turned on can cause a latch-up condition in the BSC100 or BSC Jump Control Chassis. This will result in the sensing side of the System to function improperly. This condition can be cleared by power-cycling the entire System (i.e., turning the System off and then on again).

5. Once all of the I/O cable connections have been made, connect the + 5 Vdc, +/- 12 Vdc power supply to the BSC100 or BSC Jump Control Chassis and to the power strip.

6. Connect a + 15 Vdc power supply to the connector located on the rear of each SM100 Service Pack (#16 in Figure 2) and to the power strip. Make sure these power supplies are connected and plugged into the power strip as well.

1.8 Software Installation

NOTE

You *must* have administrator privileges on the computer you are using to install/uninstall the software. If you do not have administrator privileges, you will not be able to install the software.

1.8.1 PC Requirements

PC Requirements Summary:

The technical requirements for the PC to run the Kinder Scientific StartleMonitor System are not high. In fact, virtually any "modern" PC will easily run the software for these Systems. But here are specific PC requirements:

- **Type of PC:** The software may be run on either desktop or laptop PCs.
- **Minimum Processor Requirements:** i5 processors or later.

- The software works well on i5 processors but will also run well on later generation processors.

- **Hard Drive Type/Minimum Hard Drive Capacity:** 50 GB or larger.
  - The configuration files the Systems use are miniscule and the data and reduced files are not large either. So, 50 GB SSD or larger will work well.
- **Minimum RAM Requirements:** Minimum 8 GB.
  - The Behavioral System Core ("BSC") in either the BSC100 or BSC Jump configuration is the "computer" that actually runs the StartleMonitor System. So, the desktop or laptop PC acts as an interface with the BSC and also does the post-session data analysis. Neither being an interface nor doing the post-session analysis is very demanding on the PC.
- **Operating System (OS):** Windows™ 7 Pro or Windows™ 10 Pro versions.
  - We STRONGLY recommend the Pro version. Also, for the post data analysis, we recommend having Microsoft® Excel installed on the PC and, for validating the System in the first place in GLP environments, we recommend having Microsoft Word installed on the PC.
  - NOTE: Support for Microsoft® Windows™ XP ended April 8, 2014. The ***StartleMonitor*** software will *not* run on Windows™ NT, 95 and 98, ME, 2000 or XP operating systems.
- **Other Hardware requirements (specific ports to connect to hardware, PCIe cards, second network port, etc.):** Either a RS232 serial port or an ethernet port.
  - RS232 serial ports are getting increasingly difficult to get on a new PC. It is usually possible to add an RS232 port (e.g., through adding a board). But the configuration of some PCs makes this option difficult to implement. We are aware that some people run 1 or 2 station Systems (e.g., through the use of a BSC Jump) on a USB to RS232 adapter. However, the variability of such adapters makes the likelihood of a favorable outcome unpredictable. Consequently, we don't support such configurations. Further, it appears that these adapters cannot handle the bandwidth of running more than one or two stations.
  - Regarding an ethernet port, because of interrupt conflicts, the same ethernet port cannot be used for both connecting the PC to the BSC and also connecting the PC to an intranet or the internet. Since it is often desirable for the PC to be connected to the intranet or internet while connected to the BSC, an additional ethernet port is

therefore required. This is typically done by installing an ethernet board in the PC with the board having one or more new ethernet ports. When this is done, we have observed that many PCs have a difficult time either recognizing the new ports generally or specifically when our software tries to recognize the port. In either case, this is 100% a Microsoft problem which Kinder Scientific Support is poorly able to help with. This problem usually turns out to be a Microsoft internal interrupt conflict between the original port and the new ports. However, a competent IT group should be able to resolve this Microsoft problem and set up the ports to run as desired.

- **General PC requirements (certain power mode selected, avoiding auto A/V scans, avoid auto Windows updates, avoid screen savers, etc.):**
  - **ANTI-VIRUS SOFTWARE**. We recommend having a dedicated computer for running the StartleMonitor System that is not plugged in to your network and that does not run anti-virus software. The reason for this is that occasionally Microsoft's priority in communication protocols interrupts your System's ability to get information from the BSC to the interface desktop or laptop computer. This doesn't happen often, but it does happen occasionally.

    We realize that many facilities choose not to isolate their computers from their networks or to install anti-virus software or both. So, to remedy this, our System (in the BSC) has a buffer system to store data temporarily in the event of a Microsoft-induced communication glitch. If there is such a glitch, the buffer holds the data and keeps trying to resend it to the computer. Almost always the BSC eventually is able to send to the desktop or laptop computer and the data flow catches up.

    We include this information in this Manual not to shock you but to let you know that running on a network or using anti-virus software can cause a problem, usually short lived, and our System design is intended to deal with this. This is rarely a problem but has manifested itself in the past (i.e., the risk is not zero). Kinder Scientific has hundreds of StartleMonitor Systems currently running and almost all of them have never shown any problems with this communication conflict. But, there have been a few. With those Systems having problems, working with the respective IT teams, we have been able to find the problem (so far, it has always been either the anti-virus software or a network interrupt conflict) and fix it.
  - **OS UPDATES**. We STRONGLY recommend NOT doing Windows OS updates during a trial due to the very real possibility that one of these updates could cause a conflict, generated by the updated Microsoft® OS, with the back-and-forth communications between the PC and the BSC with potentially catastrophic

consequences. ANY OPERATING SYSTEM UPDATES SHOULD BE DONE BETWEEN TRIALS.

- **REMOTE STATUS CHECK SOFTWARE**. We recommend NOT using programs or apps that do remote status checks of the host PC or the PC network. Some A/V software and some intranet related status inquiry applets interfere with the PC to BSC communication. Usually this just causes error messages to temporarily flash indicating short term communication issues; the System is designed to overcome these short-term communication issues and fixes itself. But, sometimes these programs cause communication errors that exceed short-term and crash the System.

- **SCREEN SAVER OR POWER SAVER SOFTWARE**. We recommend NOT using screen savers or power setting controllers that cause the PC to ever pause, sleep or hibernate. Some screen savers or screen saver settings and some power settings cause the PC to temporarily pause. This, at best, causes short term communication issues like those described above and at worst causes the PC to sleep or hibernate which will likely cause a System crash.

- **UNINTERUPTED POWER SUPPLIES**. We STRONGLY recommend using uninterrupted power supplies to power the BSC and ideally also the PC. The BSC stores data in the midst of a study for a short time and if the PC has a relatively short-time stop, as might happen with a power glitch (surge or relatively short stoppage of a few minutes), the BSC then passes the data to the PC.

- **RF INTERFERENCE**. If there is any chance of RF interference from either other nearby equipment or from the power lines themselves (typically manifest as either a strong 50 Hz. or 60 Hz. signal), using RF choke beads as is well understood will eliminate this problem (the details of applying RF choke beads are beyond the scope of this manual).

1.8.2 Preparation for Software Installation

To run Kinder Scientific software, you must run either Windows 7 or Windows 10 Operating System on the host computer and we HIGHLY recommend running the Professional version of the OS.

1.8.3 Software Installation

- To install the StartleMonitor software, we recommend you create a folder on the desktop of the computer (desktop or laptop that will be the interface for the StartleMonitor System) and name the folder "StartleMonitor Software." Then, save the listed Installation Files into that folder. **It is VERY important for the installation that all these Installation Files are saved into the same folder and that you don't change the name of or otherwise alter any of the Installation Files.** These are the Installation Files:

    1. Autorun.inf
    2. BuildVersion.txt
    3. Install.bat
    4. KS_Setup.bmp
    5. SMInstall.exe

- Once the files have all been transferred into this folder, close all programs and turn off virus protection software, if any, to prevent installation conflicts.

- Double click on SMInstall.exe file. The screen of Figure 11 will appear. Again, make sure that you open the SMInstall.exe file from the location where all these five Installation Files have been transferred. The installation uses an AUTORUN feature and will open the following Window:

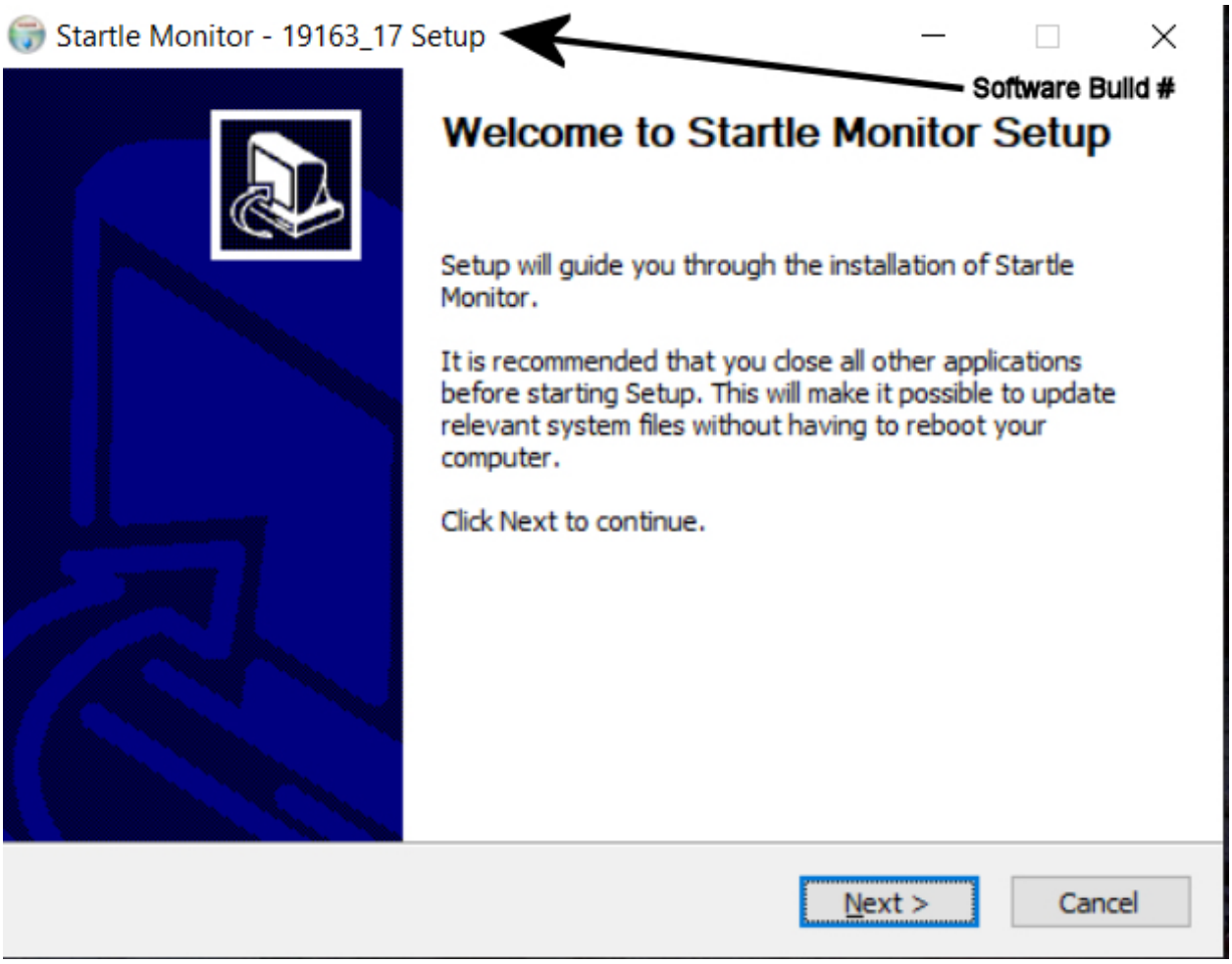


Figure 11 StartleMonitor Software Wizard Screen

- Click Next.
- If you are upgrading from an earlier ***StartleMonitor*** software build, the software will give you the following message (Figure 12):

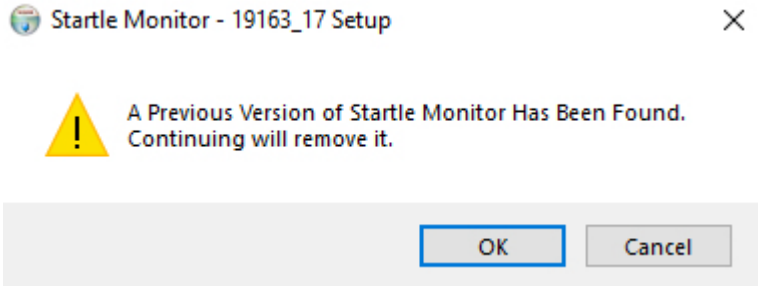


Figure 12 Upgrading Build Message

- Click “OK” and the installation software will automatically uninstall the older build and install the newer software build. Existing session files, configuration files, data files, etc., will not be affected by uninstalling the earlier build and then installing the newer build.

With either a new installation or an installation of a new software build, the following Screen will appear (Figure 13):

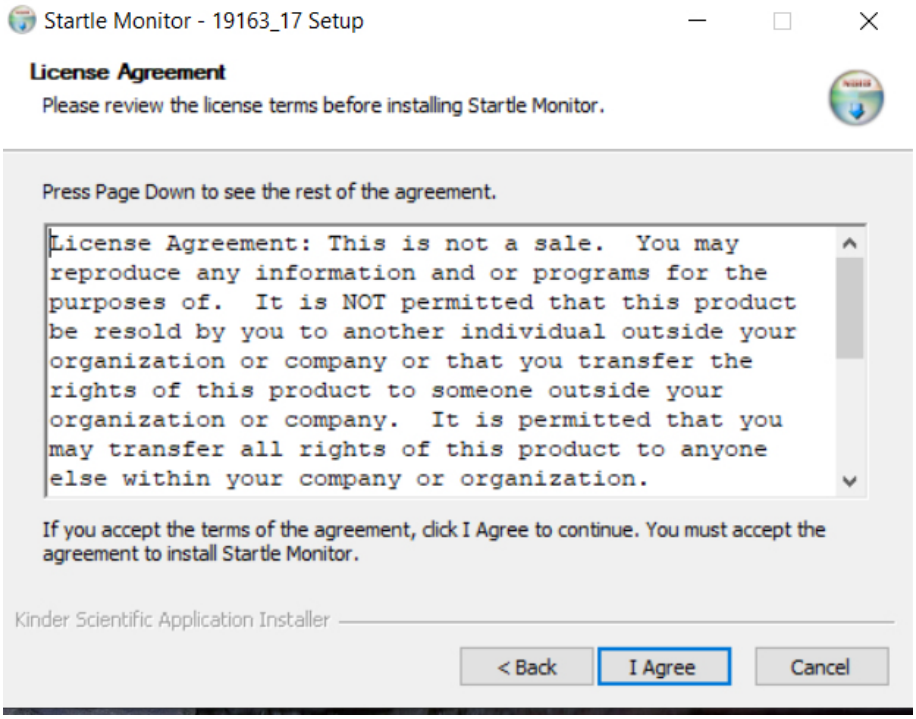


Figure 13 License Terms

- Read through the License Agreement and, if you agree with the Terms, click on **I Agree**. The following screen (Figure 14) will appear:

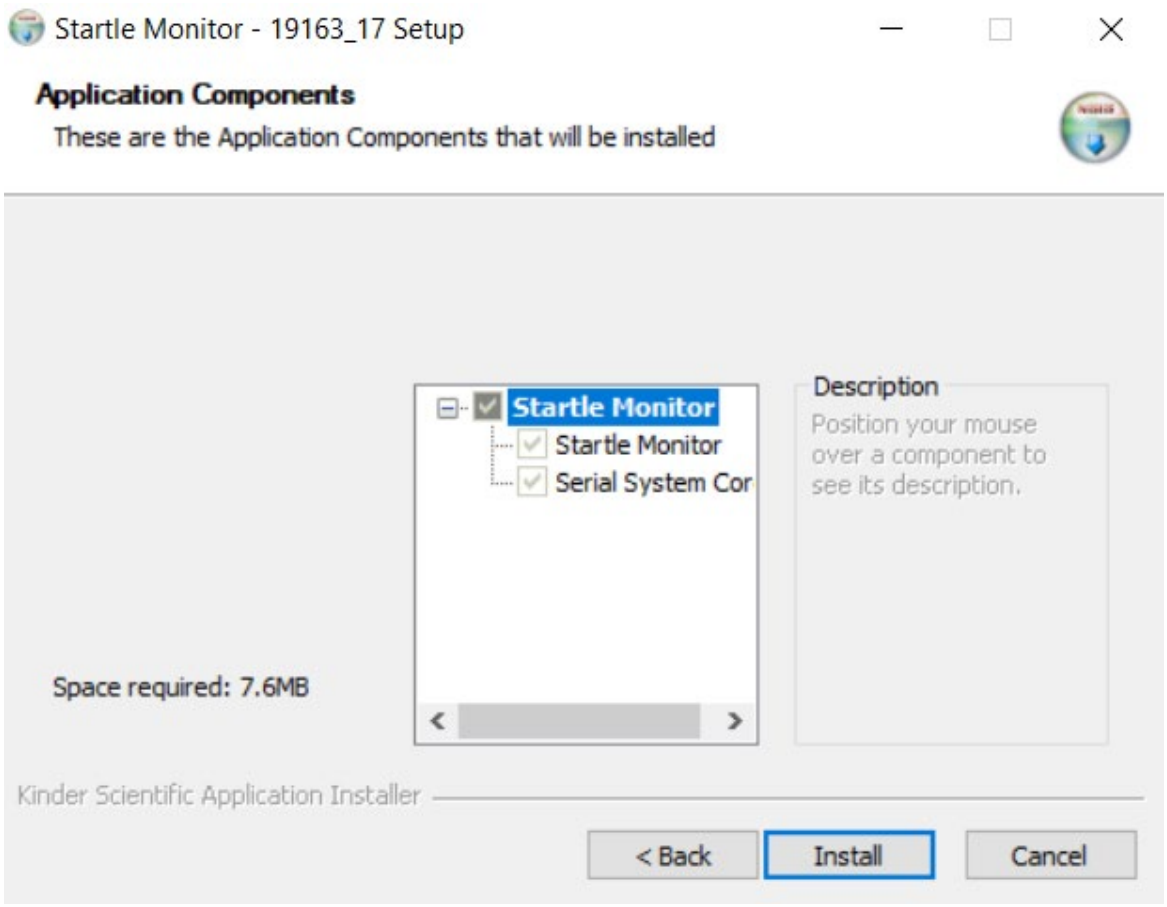


Figure 14 Application Components

If you have purchased the Tinnitus option, the following screen (Figure 15) will appear.

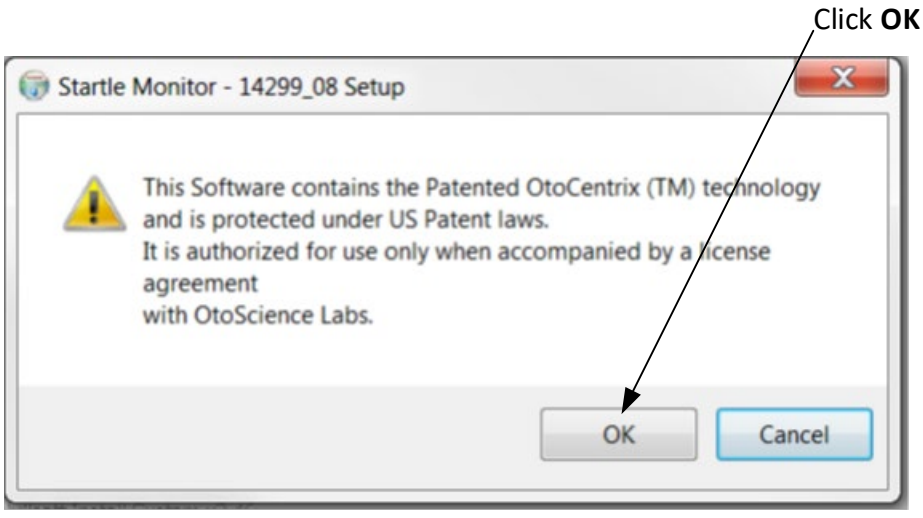


Figure 15 Tinnitus Option

If not proceed to the next screen (Figure 16).

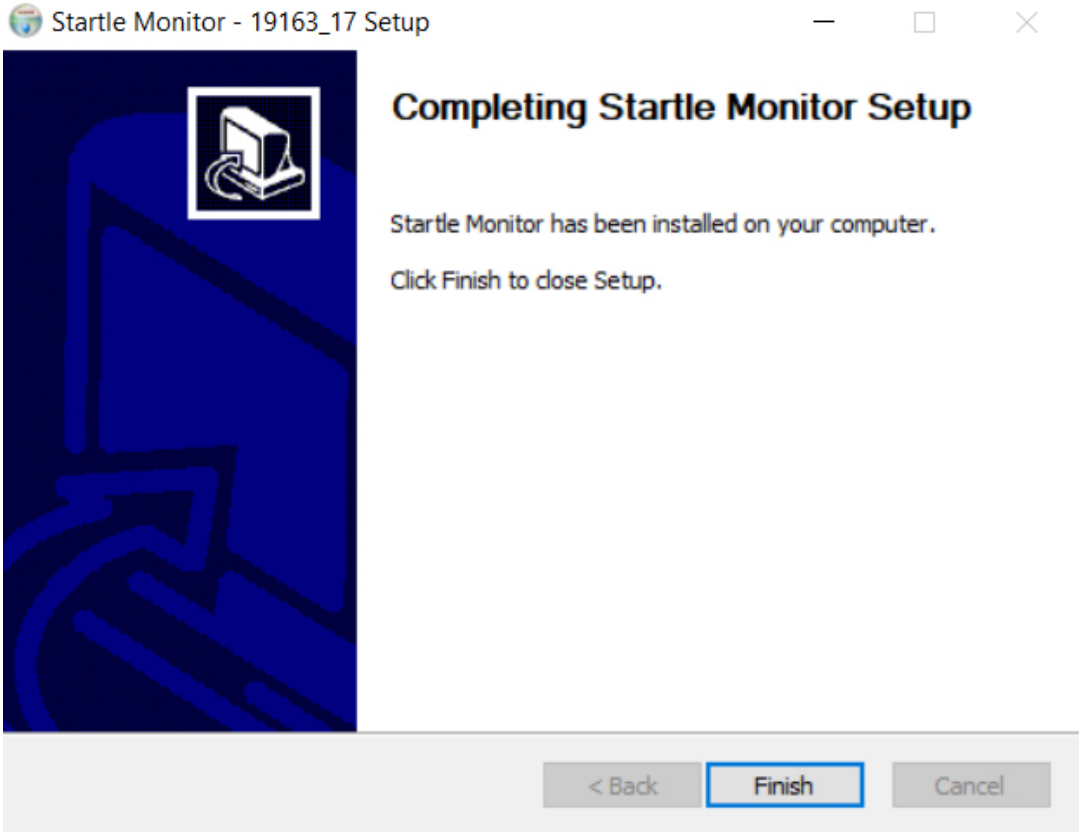


Figure 16 Finish Installation Wizard

- Click the **FINISH** button; the software installation is complete, and the installation screens will close.

3. To start the StartleMonitor software, click on the StartleMonitor icon. If you are a GLP facility, when you click on the StartleMonitor icon the following screen (Figure 17) will appear. Call or email Kinder Scientific to obtain the License Key.

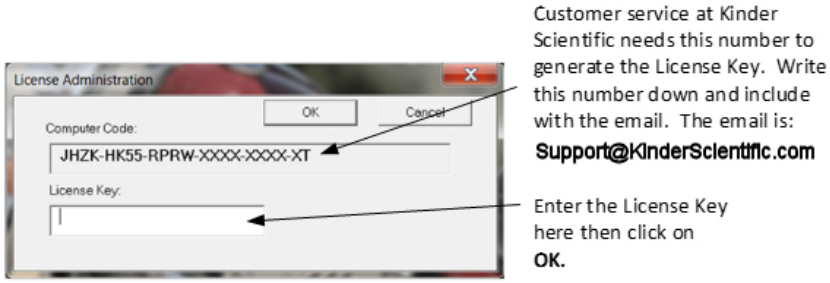


Figure 17 License Key Window

4. If you are not a GLP facility, or if a GLP facility after entering the License Key, the following screen (Figure 18) will appear:

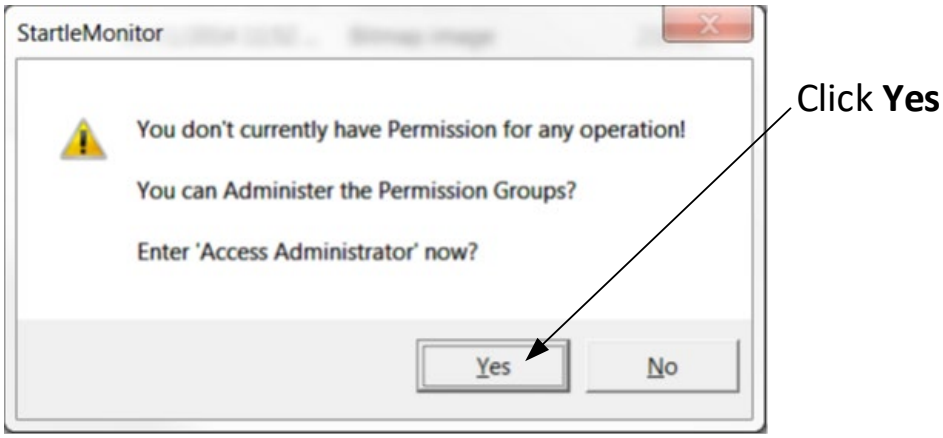


Figure 18 Access Administrator Window

5. The following screen (Figure 19) will appear:

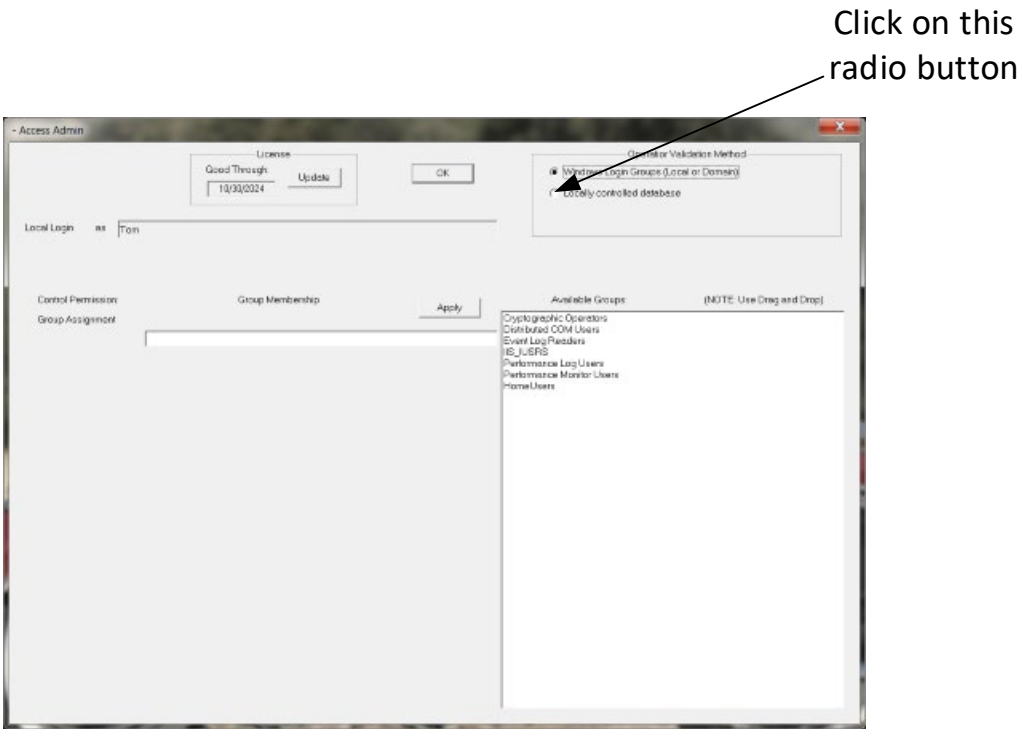


Figure 19 Permissions Window

6. After you click the radio button shown in the previous illustration, the following screen (Figure 20) will appear:

Figure 20 User Login Window

7. The following screen (Figure 21) will appear:

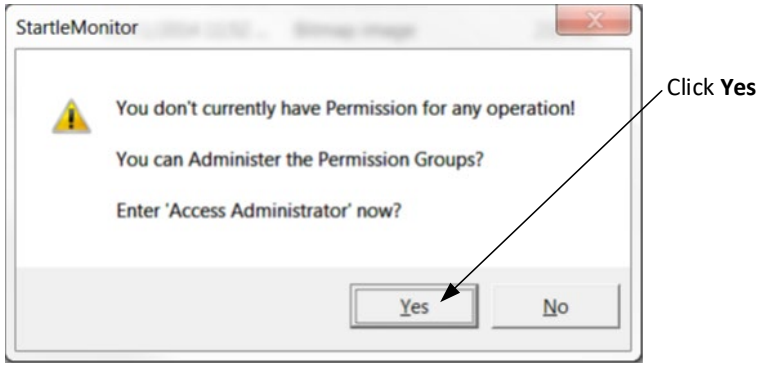


Figure 21 Access Administrator Window II

8. The **Access Admin** screen (Figure 22) will appear. This screen is where users' login information is created and maintained. Refer to the following illustration and the instructions that follow on the next page to assign access control and permissions.

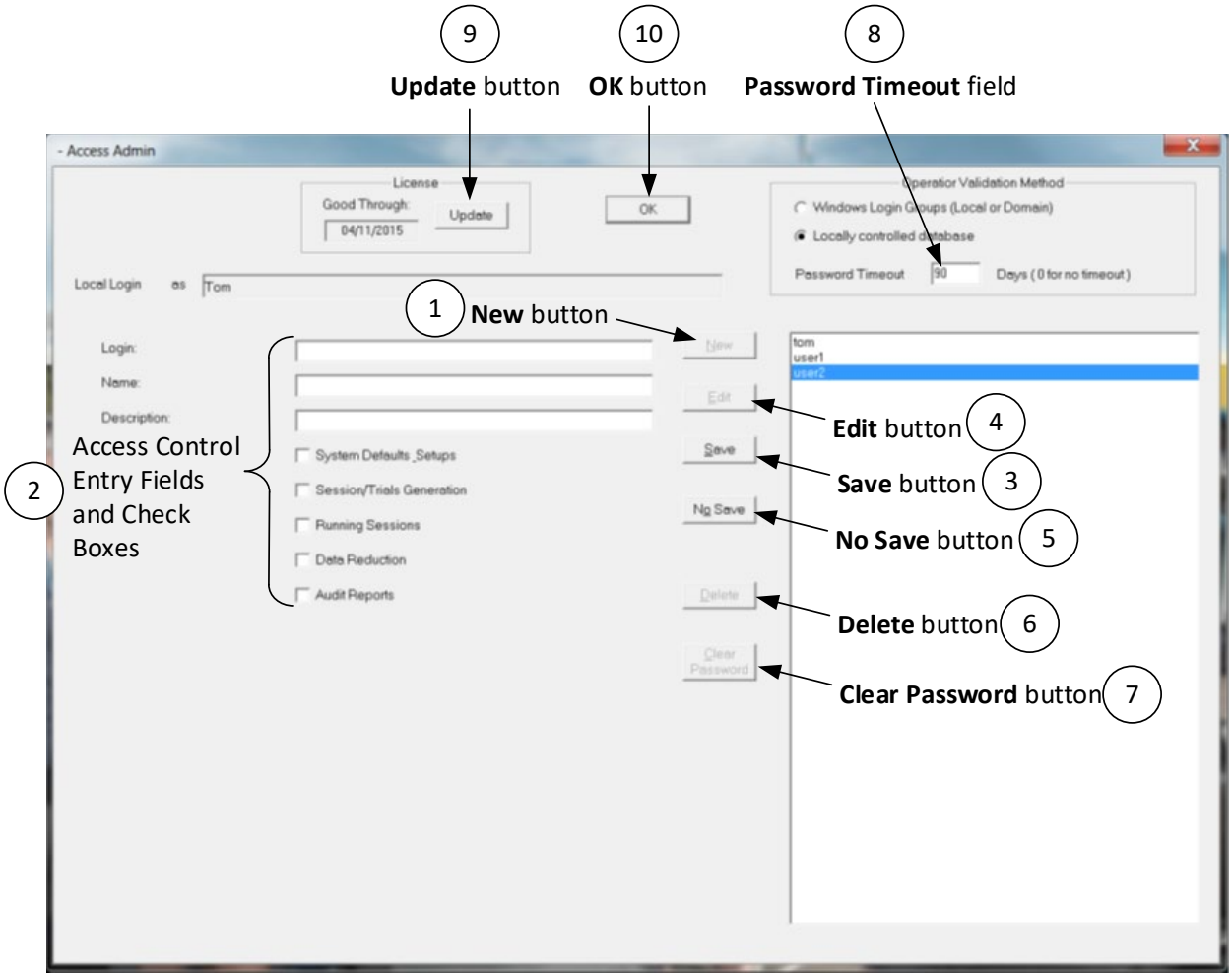


Figure 22 Access Controls

1 Start by clicking on the **New** button. The Access Control entry fields and the permissions check boxes will be activated.

2 Enter a login name in the **Login:** entry field. The next two fields, **Name:** and **Description:** are optional. However, an entry must be made in the **Login:** entry field to continue.

The check boxes (e.g., System Defaults Setups) are used to assign permissions for specific tasks to each user. This allows you to customize access for each user. At least one box must be checked to continue.

③ Once the field entries are made and the boxes are checked, click the **Save** button. The user login name will move to the large field on the right of the screen. Additional entries can be made by repeating the previous three steps as many times as needed.

④ The **Edit** button is used to modify a user's permissions. This is accomplished by clicking on the user's name and then clicking on the **Edit** button. The user's information will appear in the Access Control entry fields and the check boxes.

⑤ The **No Save** button is used to remove information from the Access Control entry fields and check boxes *before* you click **Save**.

⑥ The **Delete** button is used to delete users. Click on the user's login name then click on **Delete**.

⑦ The **Clear Password** button is used to clear (remove) a user's password so that the password can be reset as described in Section 1.9. Click on the user's login name then click on **Clear Password**.

⑧ The **Password Timeout** field is used to define how long a user's password is good. Enter a value in this field before you click on the **Save** button. The default value is 90 days. If a value of zero is entered the password will not time out.

⑨ The **Update** button is used to update your License Key as previously described in this section.

⑩ Click on the **OK** button when all entries are made to your satisfaction. This screen can be accessed at any time by opening up StartleMonitor and selecting **Access Admin** from the **File** menu.

9. After you have followed the instructions in the previous step the following screen (Figure 23) will appear:

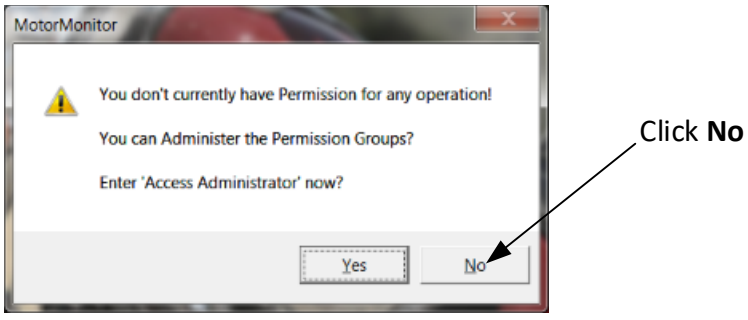
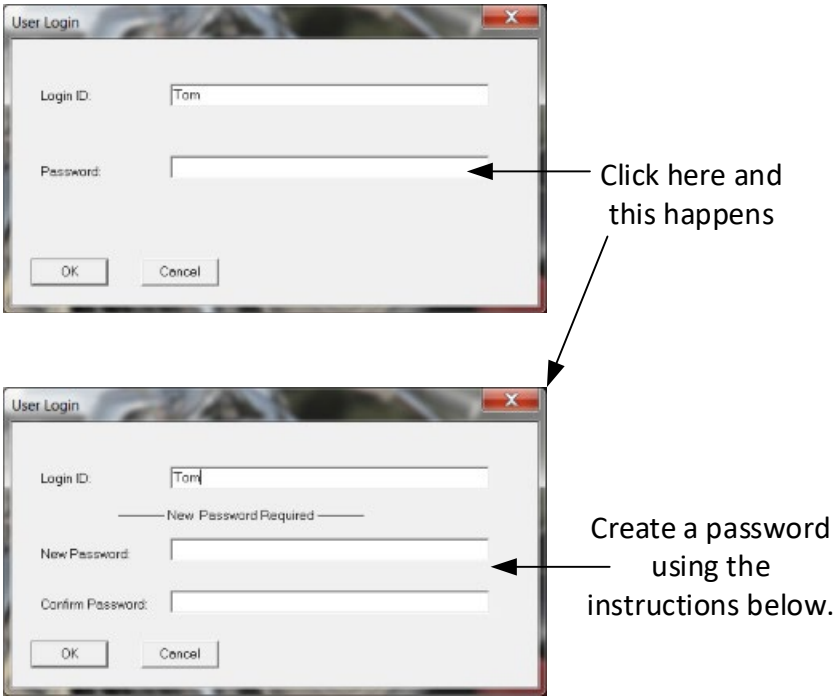


Figure 23 Access Administrator Window III

10. Once you have clicked **No**, the StartleMonitor software will close. Click the StartleMonitor icon to re-open the StartleMonitor software and follow the instructions in the next illustration (Figure 24).



1.	Password structure:
a.	Must contain at least one special character. For example: !, @, #, $, %, ^, &,*
b.	Must contain both letters and numbers.
c.	Must be at least 8 characters.
d.	Must contain at least 1 capital letter.

Figure 24 Password Window

1.9 Resetting a User Password After Expiration

1. Login as Admin. You do not need a password if you are a Windows Administrator. Open the StartleMonitor software, access the **File** menu and select **Access Admin**. The following screen (Figure 25) will appear:

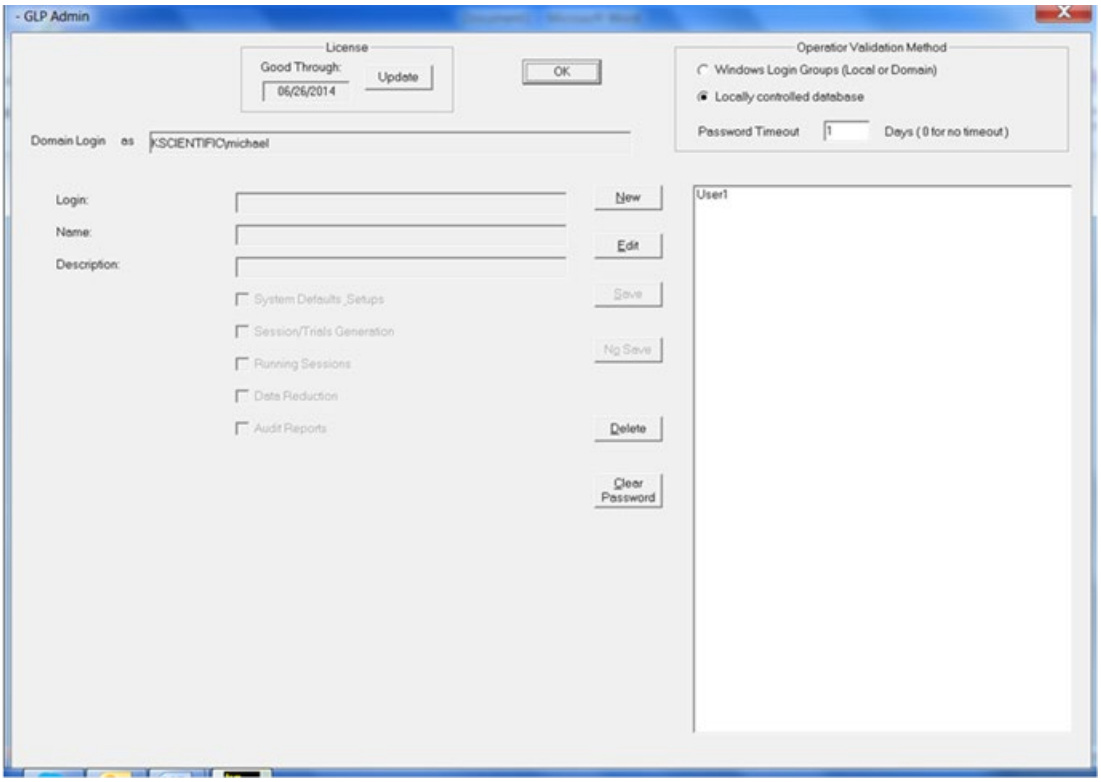


Figure 25 Access Controls Password Window

2. Highlight the user you want to reset and click on **Clear Password**. The user will be asked to set a new password at the next usage.

1.10 Hearing Protection

Should users of the StartleMonitor System use hearing protection? The StartleMonitor System can produce sounds up to about 115 dB. Although 115 dB is quite loud, operators should only hear the sound with the door closed and with the sound greatly reduced by having to pass through the walls of the Startle Chamber itself. Those walls provide about 35 dB sound attenuation both for outside sounds coming into the Startle Chamber and for the sounds originating inside the Startle Chamber (e.g., the 115 dB sound) to be passed out of the Startle Chamber.

Using the 115 dB sound as an example, obviously inside the Startle Chamber the sound level would be 115 dB. But, because of the attenuation of the Startle Chamber itself, immediately outside the Startle Chamber, the sound level would be attenuated to about 80 dB. In addition, the farther you are from the Startle Chamber, the more the sound is attenuated at a $1/r^2$ pace. Also, the sound emitted is periodic and not continuous. Health experts agree that any continuous sound above about 85 dB is cause for concern for long-term hearing damage. Even if an operator were to leave the door open when the 115 dB sound was produced, because of the short duration of the sound, there should be no long-term problems. As a result, we do

not recommend that users of the StartleMonitor System use hearing protection. However, please be advised that in this matter, as with all matters, it is important that you do what you feel is best for yourself and your employees and agents.

CHAPTER 2
GETTING STARTED

2.1 Getting Started

Turn on the computer and all the power supplies (each power supply has its own on/off switch). Turn on the power strip. Make sure the exhaust fan is running on the SCM Service Pack (*see Section 1.5*). Once the computer is up and running, enable the ***StartleMonitor II*** software by double-clicking on the ***StartleMonitor II*** icon. The first thing you will see once the ***StartleMonitor*** program is enabled is a screen similar to Figure 26.

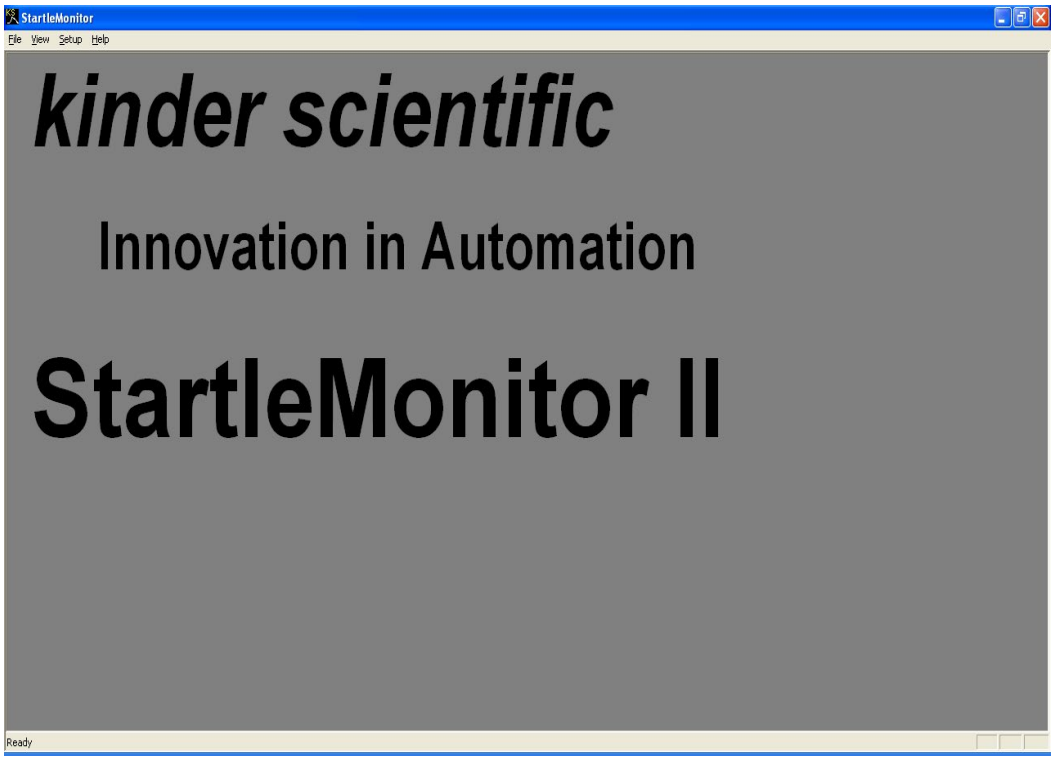


Figure 26 StartleMonitor II Startup Screen

2.2 Setup of the StartleMonitor System

The following paragraphs describe the preliminary setup parameters for proper operation.

2.2.1 Procedure to Update Firmware and Connect BSC to Your Computer

1. **Set the BSC to the correct setting for the StartleMonitor software.**

The BSC must be set to the correct type of System (e.g., StartleMonitor, MotorMonitor or AvoidanceMonitor) to operate correctly. To do this for the StartleMonitor System, set the indicator dial on the back of the BSC to "2" by using a small screwdriver to turn the indicator dial to "2" as shown below (Figure 27).

Figure 27 Setting on BSC for StartleMonitor System

2. **Connect the BSC to the computer and the StartleMonitor software.**

For StartleMonitor software builds 14299_08 and higher, including build 19163_17, from the main StartleMonitor software page, click "Setup" at the top of the page (Figure 28).

Figure 28 Setup Tab

A dropdown menu should appear including the option to Link to Default System Core (Figure 29).

Figure 29 Link to Default System Core

Click “Link to Default System Core.” Towards the bottom of the window that appears should be the option “Auto Probe for BSC” (Figure 30).

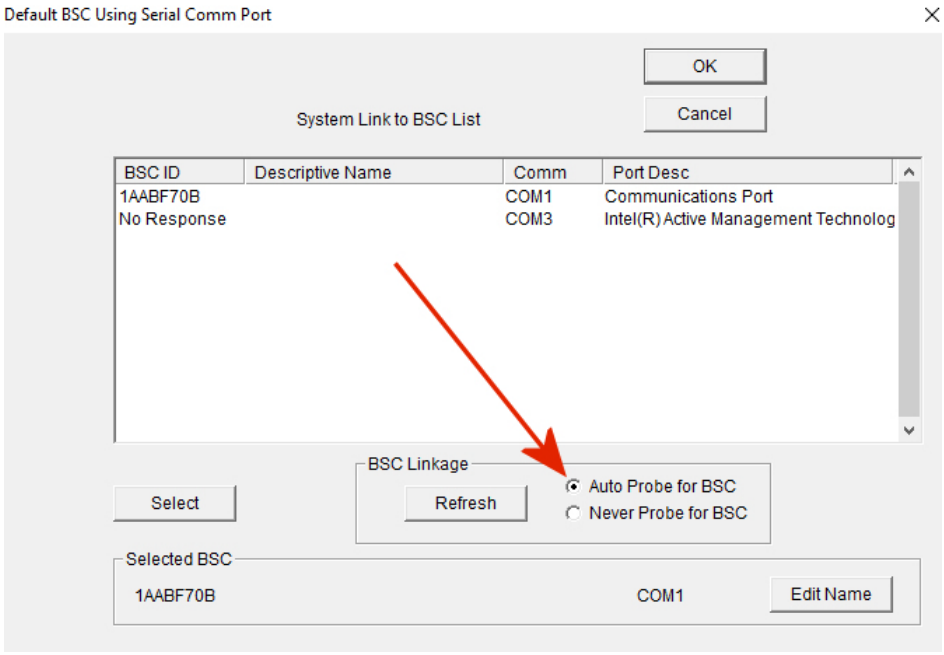


Figure 30 Auto Probe for BSC

Select the “Auto Probe for BSC” button and then hit "Refresh." The BSC and corresponding COM port should appear in the window with the BSC ID and Descriptive Name. Click on your BSC which will be highlighted and hit the Select button. Click on the OK button at the top of the window. Then exit and restart the software. Your BSC with the upgraded firmware should now be connected to the software.

If you have questions about any of these steps or any other matter, please contact Kinder Scientific Support at Support@KinderScientific.com.

3. Confirm that the BSC has the latest version of the firmware.

With the StartleMonitor software installed and open, the BSC connected to the desktop or laptop computer and turned on, click on the KS icon in the upper left corner of the main software page (Figure 31).

Figure 31 System Core Upgrade Icon

That will produce a dropdown menu that will include the option "System Core Upgrade" (Figure 32).

Figure 32 System Core Upgrade Option

Click "System Core Upgrade" and the BSC should upgrade its firmware from information contained in the files in the location where you placed the installation files. This process should only take a few minutes.

2.2.2 Setting the Comm Port

All Kinder Scientific Systems use separate embedded microprocessor controllers in their BSC100 or BSC Jump Control Chassis. This architecture provides a partition between the data collection effort and the file handling and display efforts of the host PC. This partition greatly enhances the application within the Windows platform. To function properly, the embedded controller must communicate with the Windows platform through an RS232 serial port or an ethernet port.

NOTE

The PC you will be using *must have* an available serial or ethernet port. Preferably, Comm 1, although Comm ports 1 through 6 can be selected. You must select a Comm port for the software to communicate with the BSC100 or BSC Jump.

2.2.3 Setting the Comm Port for Software Builds 14299-08 and Later

For build versions of the StartleMonitor software later than 14299_08, including build #19163_17, the software automatically locates available Comm ports and allows you to choose the Comm port of your choice. Setting the Comm port is accomplished as follows:

1. Turn on the PC and open the StartleMonitor II program. A screen like the one shown in Figure 33 will appear.

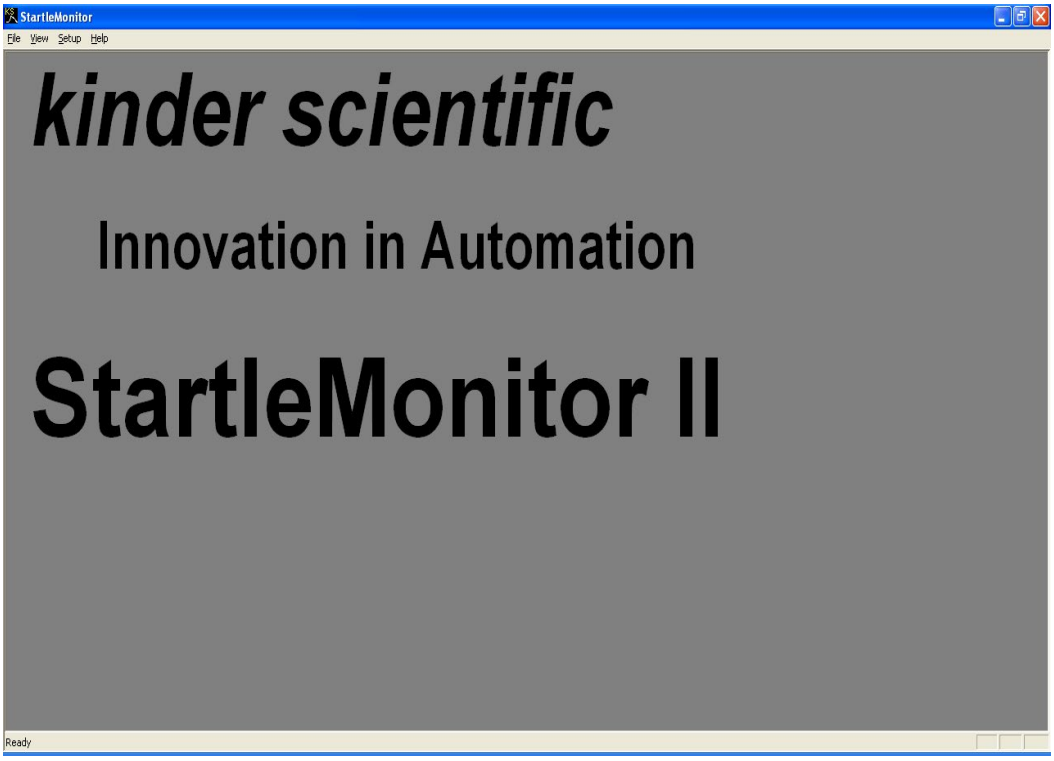


Figure 33 StartleMonitor II Start Up Screen

2. Select the **Setup** pull-down menu. Click on **System Core Link**. Select a Comm Port and Click **OK**. This is shown in Figure 34.

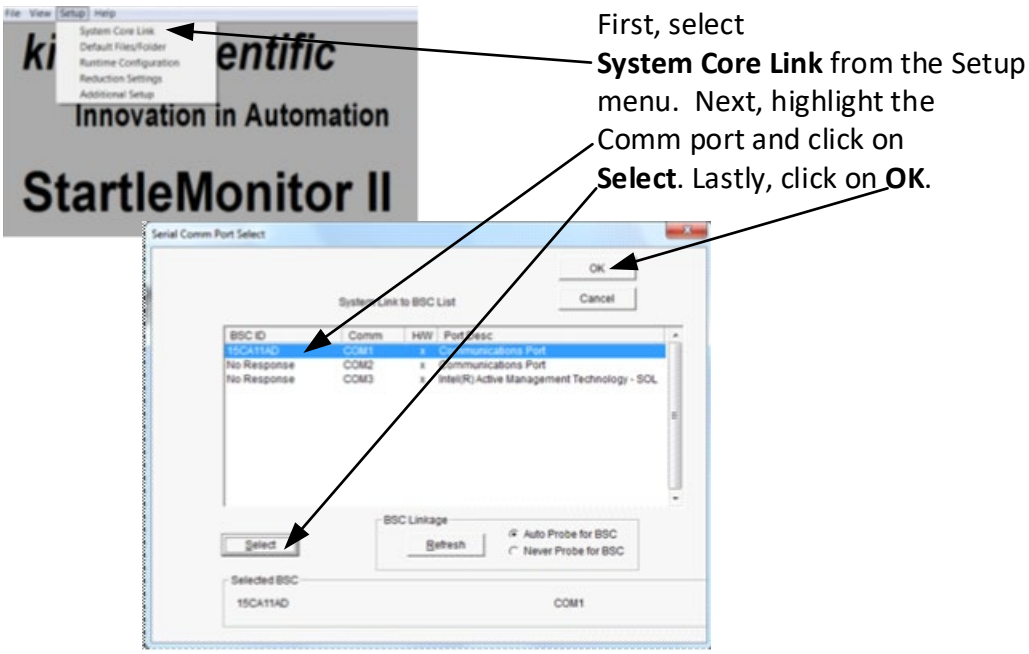


Figure 34 Selecting the BSC and Comm Port (Software Builds 14299008 and later)

2.2.4 Setting the Comm Port for Software Builds 14299-08 and Earlier

For software builds earlier than 14299_08, you will have to select your Comm Port as follows. Only follow this Comm port set up process if your software build is older than 14299_08.

Setting the Comm port is accomplished using the **Setup** pull-down menu. Click on **Setup** >> **Comm Port** (may say **System Core Link)**. Select a Comm Port and Click **OK**. This is shown in Figure 35.

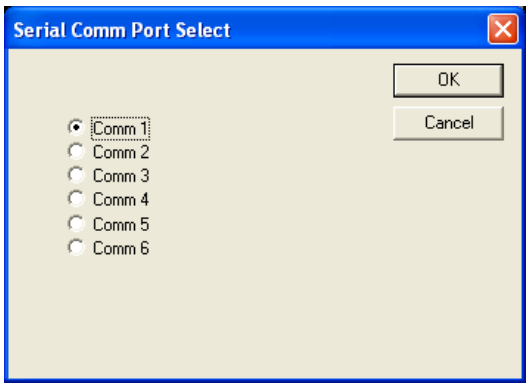


Figure 35 Setting the Comm Port for Builds 14299-08 and Earlier

2.2.5 Setting Default Files/Folders

You can accept the installation default locations where the System stores the raw data files and the reduced files, or you can change them. To do this, click on **Setup** and then **Default Files/Folder** as shown in Figure 36.

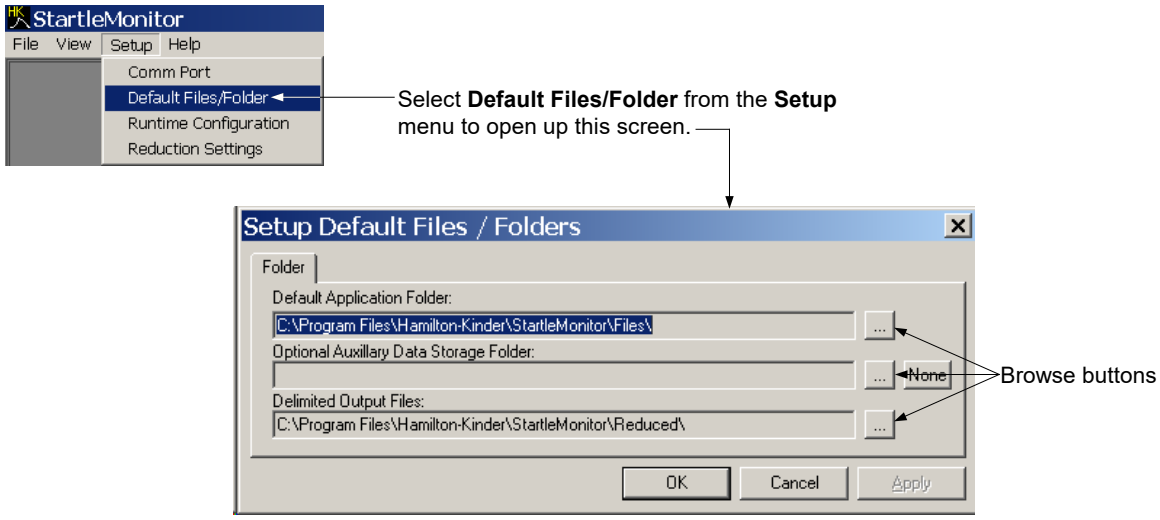


Figure 36 Default Files/Folder Screen

The **Default Application Folder** setting determines where the raw data files will be stored and where session files are saved.

The **Optional Auxiliary Data Storage Folder** is used as a redundancy storage site and may be set to any path, including any desired network drives.

The **Delimited Output Files** setting determines where the System will store all reduced files. It can be set to any valid path.

NOTE

These three default file/folder location selections *do not* include CD drives.

2.2.6 Setting Runtime Configuration

There are four Default Runtime Settings to make: **Full Scale, Acclimatize Time, Record Window,** and **Background Level.**

To set these parameters, Click on **Setup** and **Runtime Configuration**. The **Default Runtime Settings** screen will appear as shown in Figure 37.

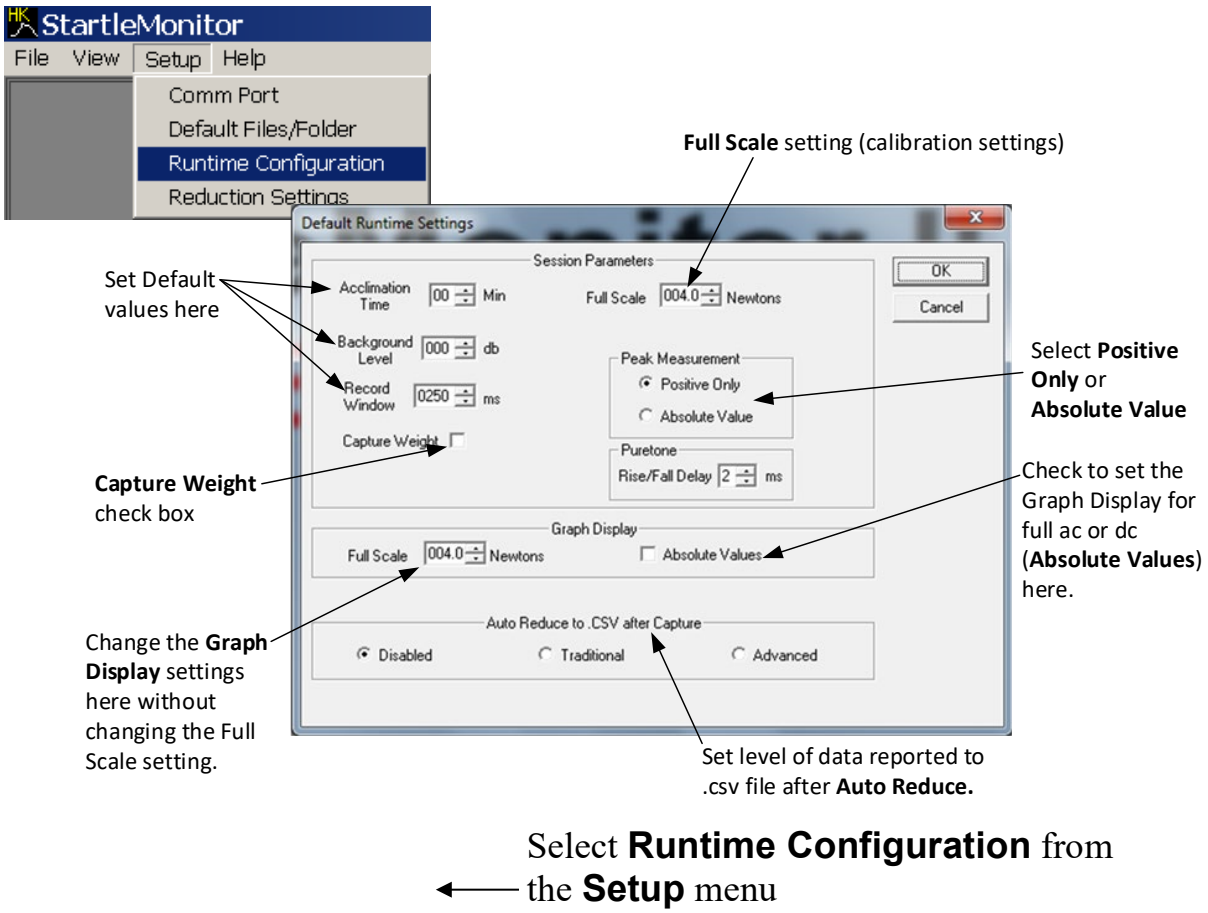


Figure 37 Default Runtime Settings Screen

There are 2 Full Scale settings in use in the StartleMonitor System: The Full Scale used in Session Parameters and the Full Scale used in viewing the results of individual trials or in diagnostic. The **Full Scale** (Session Parameters) setting is provided as a method of synchronizing or scaling the System to specific units of measure (Newton) and will be discussed later (Sections 3.2 and 3.3.2). For the 10-pound load cell that the StartleMonitor System uses, the maximum reportable response, including the animal and the restrainer

weight, is 10 pounds (44.5 Newton). Of course, this maximum response would correspond to large, strong and healthy animals. For mice and juvenile rats, the response would be much less. So, initially try a setting of 17.0 Newton for mice and juvenile rats. Similarly, for 500 gm strong rats, consider using a setting of 33 Newton and for 700 gm strong rats try 44.5 Newton.

The System takes data independently of the Full Scale Graphic Display setting. So, when viewing animals' responses, if it appears that your graphic setting is too low or too high (i.e., the response curves are extending beyond the graphic view or are too small, respectively), simply change the Full Scale Graphic Display setting to aid in viewing the animals' responses.

Peak Measurement. The load cell transducer creates an AC signal, i.e., a positive voltage when the subject jumps (pushes down) and a negative value as the system returns to its resting position. You can set the software to calculate Max Newton force based on either the highest **Absolute Value** (push or retract) or the **Positive Only** (push) value. We generally recommend using the **Positive Only** value.

Acclimation Time helps calm the animal, which helps in reducing variability in animal response to the startle stimuli. This is typically set to 5 minutes.

The **Record Window** Setting determines the length of each *analog* recording. This setting will appear automatically on the session input screen to create each new session. It can be changed to a different value when creating new sessions or changed on the **Setup** menu as the new default. If you are new to startle research, we suggest you set the setting to 500 milliseconds.

Background Level is used during Inter-Trial-Intervals (ITI's) to set the sound level in the StartleMonitor chambers if your trials contain a Background command as the last entry on the trial.

Auto Reduce to .csv after Capture enables the software to automatically reduce the raw data to a "comma separated values" file after capture and sets the type of data to be included in the reduction. CSV files are useful for easy reading from spreadsheet programs such as Microsoft Excel.

Capture Weight, when checked, enables the feature in the software that automatically compensates for the offset of the test subject's weight in the reduced data. If this box is checked, another screen will appear. This is described in Section 3.2, **Calibrating the System**.

2.2.7 Reduction Settings

The settings on this screen allow you to perform several tasks as shown in Figure 37 and described on the next page.

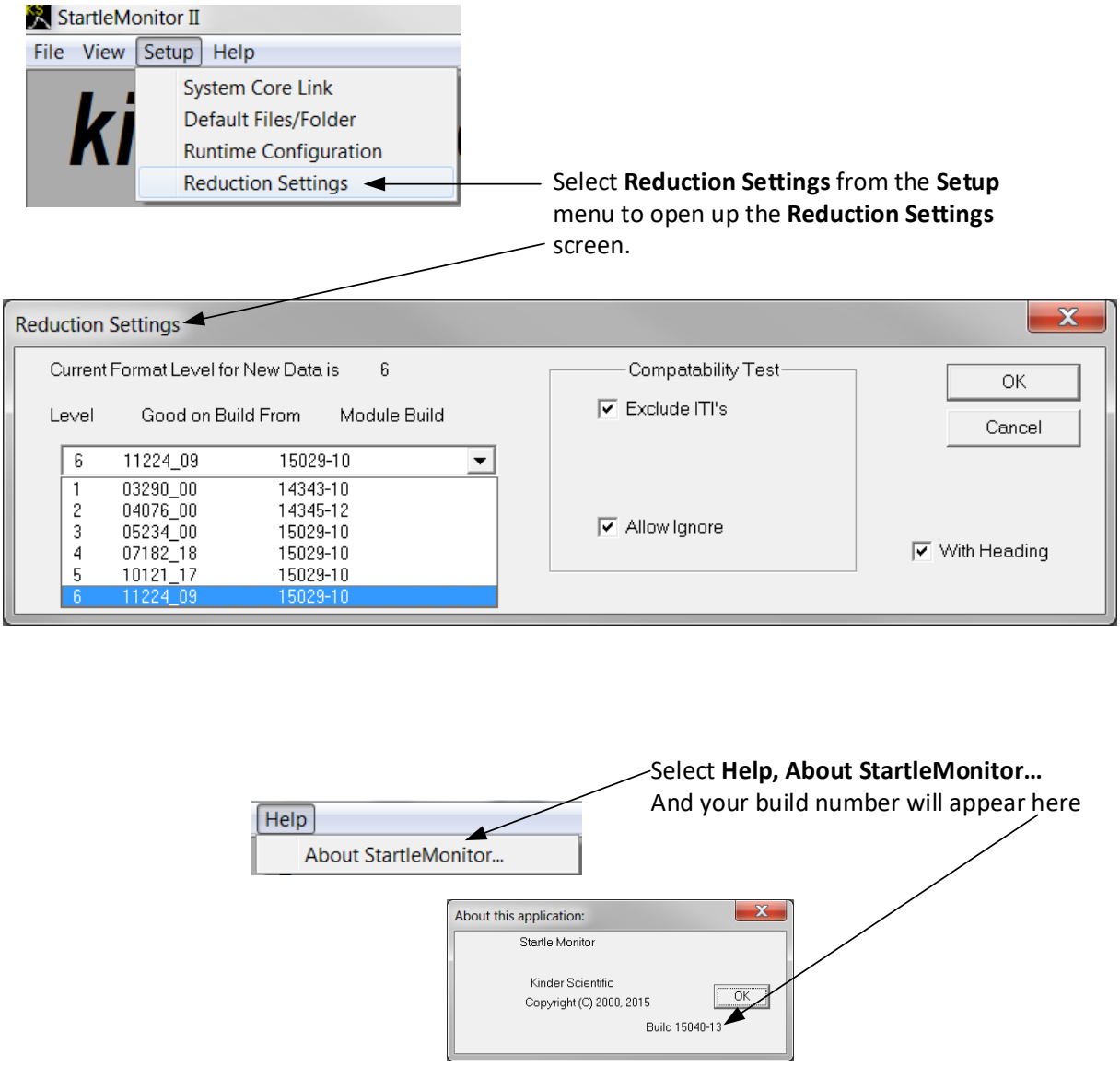


Figure 38 Reduction Settings Screen

The following is a description of the Reduction Settings screen.

Check the **With Heading** box so you don't have to select it each time you do a reduction.
Compatibility Test Field. For non-GLP labs it is recommended that you check both boxes.

The **Exclude ITI's** box will ignore differences in ITI values between different sessions.

The **Allow Ignore** box will allow you to ignore the differences in sessions. For example, different ITI's, different number of trials, and different structures altogether. In other words, it will allow you to have multiple sessions of different formats to be reduced into one output file.

The dropdown menu below **Current Format Level for New Data is 6** allows you to reduce older data files. The first column of numbers, **Good on Build From**, is the build number of the application software. The second column of numbers, **Module Build**, is the build number of the reduction DLL file and is of no particular importance to the user. The first column of numbers, **Good on Build From**, is the column the user should be concerned with.

A description of the build number is as follows:

The first two numbers are the year of the build. The next three numbers are the Julian date of that year. The last two numbers are the hour of the day. In Figure 38, Level 6 is selected. The corresponding lowest build number, 11224_09, was released in the year 2011, on the 224th day of the year (August 12) at 9 am. The corresponding highest build number for the older builds, 19163_17, was released in the year 2019, on the 163rd day of the year (June 12) at 5 PM.

If you select level 1, you will be able to reduce data files that have build numbers that fall on or between the build numbers indicated (build numbers 03290_00 through and including 14343_10). Similarly, if you select level 2 you will be able to reduce data files that have build numbers that fall on or between the build numbers indicated (build numbers 04076_00 through and including 14345_12) and so on down the list.

If you want to find the build number of your software, look at the number in parentheses at the top of each page of the StartleMonitor software OR click on the HELP tab on any page of the software, then select About Startle Monitor II and read the build number in the lower right corner of the window that appears (it will be shown as Build followed by the seven number build number).

2.3 Post-Installation Procedure to Calibrate the Sound

Here is the process for calibrating the sound on the StartleMonitor System.

1. Open the StartleMonitor software.

2. Click on the View tab and select Diagnostic from the dropdown menu. A screen similar to that below (Figure 39) should appear.

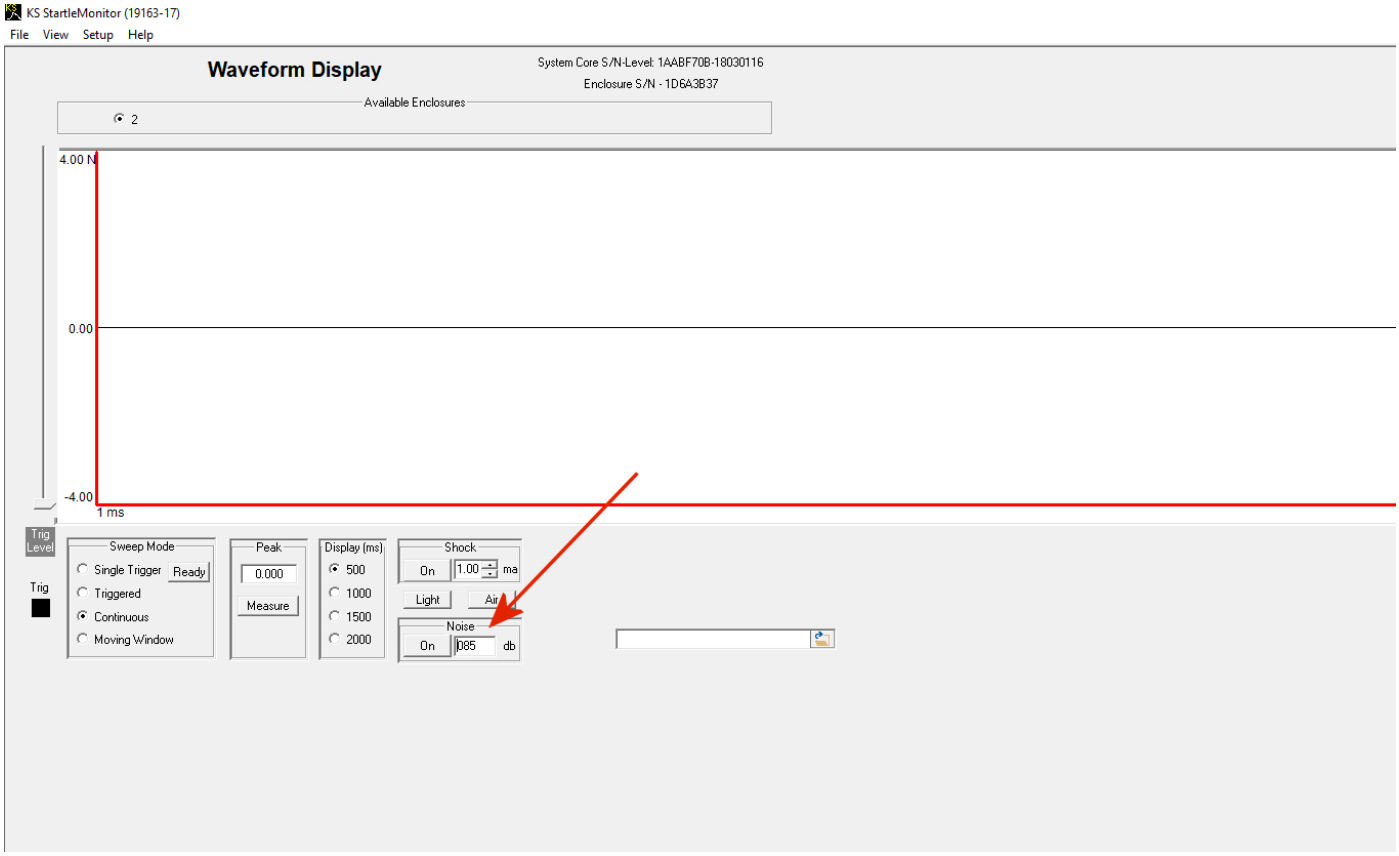


Figure 39 Diagnostic Screen Noise Level Setting

3. In the Noise window at the bottom of the screen highlighted by the red arrow in the screen shown above, enter “85.”
4. Set the Sound Pressure Meter range to “90” (this setting will include 85 dB).
5. Set the Sound Pressure Meter microphone embedded in the aluminum bar on the top of the Load Cell Assembly and close the door to the Startle Chamber. It is important that the door be closed and locked so that the sound quality inside the Chamber isn’t affected by either sound leaks out of or into the Chamber.

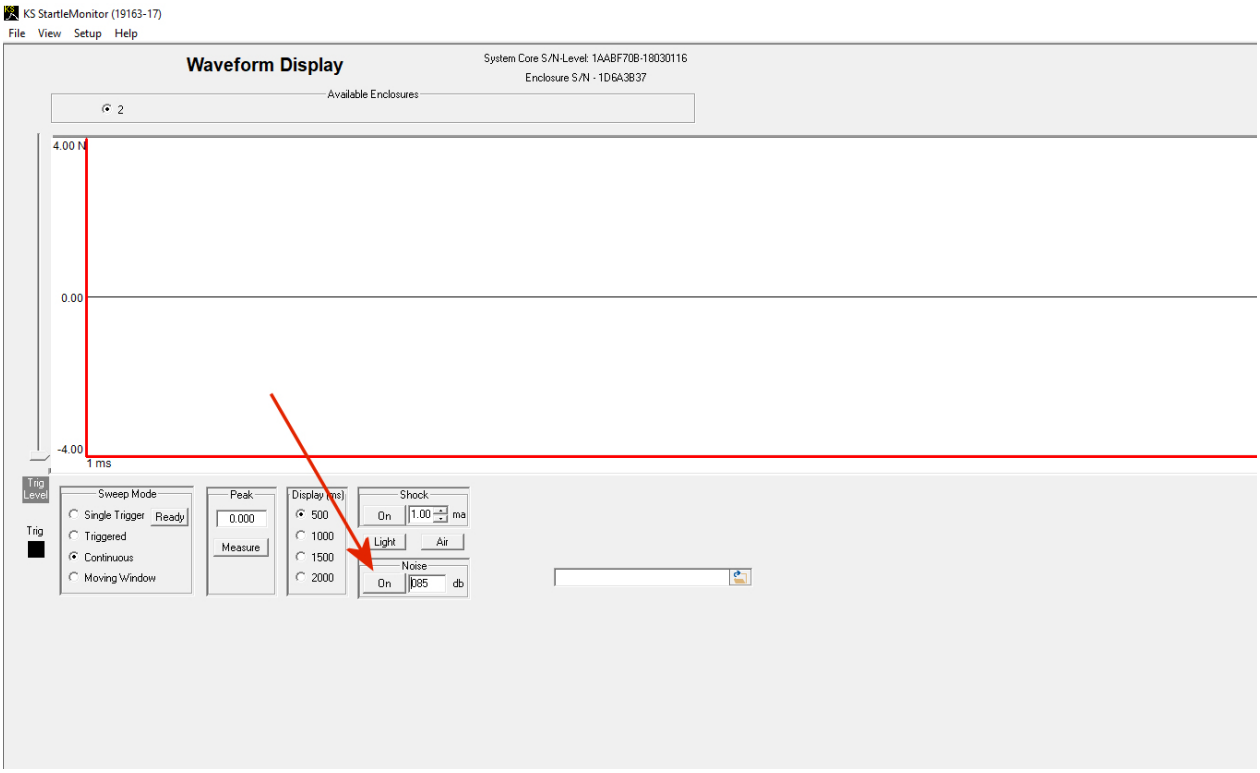


Figure 40 Diagnostic Screen Noise Level "On" Button

6. Click the On button in the Noise window indicated by the red arrow in the screen shown above (Figure 40). Note the reading on the Sound Pressure Meter.

7. If the reading on the Sound Pressure Meter is NOT 85 dB, with a small screwdriver adjust the Circuit Offset potentiometer on the SCM100 Service Pack (shown as #12 in Figure 2) and repeat step 6. Continue adjusting the Circuit Offset potentiometer until the Sound Pressure Meter reads 85 dB when the On button is pushed.

8. In the Noise window, enter "75."
9. Set the Sound Pressure Meter range to "80" (this setting will include 75 dB).
10. Click the On bottom in the Noise window. The reading on the Sound Pressure Meter should be 75 = +/- 3 dB.
11. In the Noise window, enter "65."
12. Set the Sound Pressure Meter range to "70" (this setting will include 65 dB).

13. Click the On bottom in the Noise window. The reading on the Sound Pressure Meter should be 65 = +/- 3 dB.
14. In the Noise window, enter "95."
15. Set the Sound Pressure Meter range to "100" (this setting will include 95 dB).
16. Click the On bottom in the Noise window. The reading on the Sound Pressure Meter should be 95 = +/- 3 dB.
17. In the Noise window, enter "105."
18. Set the Sound Pressure Meter range to "110" (this setting will include 105 dB).
19. Click the On bottom in the Noise window. The reading on the Sound Pressure Meter should be 105 = +/- 3 dB.
20. In the Noise window, enter "115."
21. Set the Sound Pressure Meter range to "120" (this setting will include 115 dB).
22. Click the On bottom in the Noise window. The reading on the Sound Pressure Meter should be 115 = +/- 3 dB.
23. If you don't get the readings on the Sound Pressure Meter as described in the preceding steps, contact Support@KinderScientific.com.

2.4 Checking Communications

Use the following procedure to make sure the software is communicating with the hardware.

1. Select the **View** menu, and then click on **Diagnostic**. If there is a communications failure, a screen like Figure 41 will appear with the error message **System Core: Link Not Available** displayed.

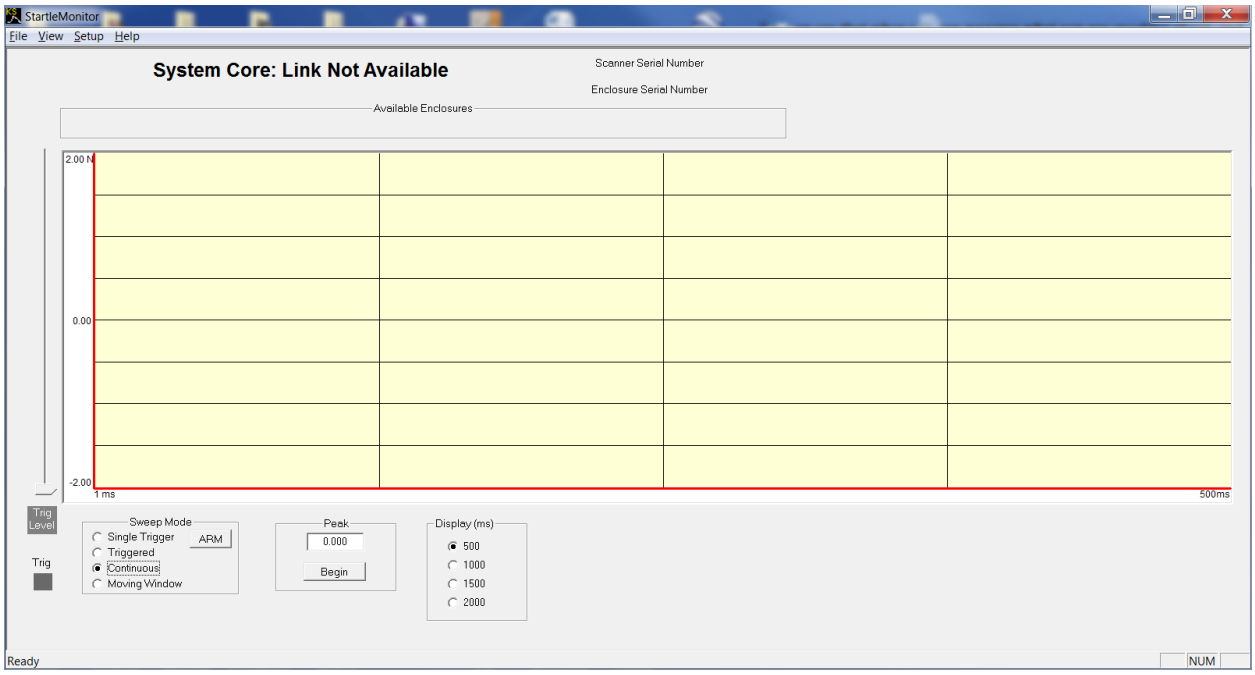


Figure 41 Diagnostic Communications Failure Screen

What this screen indicates in the upper left corner is a failed attempt of the PC to communicate with the BSC100 or BSC Jump Control Chassis. If you get this screen, check the following:

2. Make sure the RS232 cable that connects the PC to the BSC100 or BSC Jump Control Chassis is properly connected.

3. Make sure the BSC100 or BSC Jump Control Chassis power supply is connected and turned on.

4. Make sure the SCM StartleMonitor Service Pack (*see Section 1.7.1*) power supply is connected and turned on. This can be verified by making sure the Service Pack exhaust fan is running.

5. Make sure all power cables are properly connected.

6. If the power strip the power supplies are plugged into has an on/off switch, make sure it's turned on and there is power to the power strip.

7. Make sure a Comm Port is selected (Sections 2.2.2 – 2.2.4). If one is already in use by some other device, try the other Comm Port selections.

8. A visual indication that the problem is rectified will be the words **Comm Failure** being replaced by **Waveform Display**.

9. Once proper communication has been established, select **Close** from the **File** menu to exit the diagnostic screen.

2.5 Session Basic Concepts

Collecting startle data can be broken into three basic components: the acclimation period, individual trials, and inter-trial intervals (ITI's). The diagram shown in Figure 42 illustrates the three components.

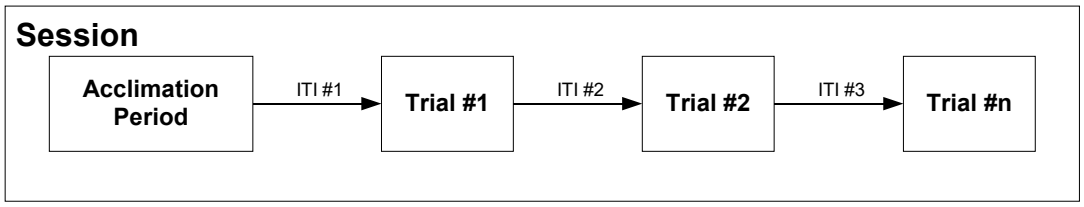


Figure 42 Session Block Diagram

Basically, there are three types of files created when running the StartleMonitor (four including the reduced file, but not relevant for this discussion). These are:

Filename._kssmdat – This is a data file resulting from running a session (animal data, etc.). This file *cannot* be opened from Windows. It is the raw data file.

Filename._kssmtrl – The trial file is a subset of the session and contains the commands for a specific trial (each trial block in Figure 42 represents a subset of trial commands). This file *cannot* be opened from Windows.

Filename._kssmses – This is the saved session file. This file contains all the commands for running a session, but no animal data. If you want to create a saved session file, use the **SAVE AS** command (before *running* the session) and a session file (i.e., the commands to run a session) will be saved. If you don't save such a session file, every time you want to run a session, you will have to create the session file from scratch. This file *can* be opened from Windows.

As shown in Figure 42, a *Session* is constructed from a series of *trials* and *ITI's*. A session may contain any number of different trial types and any imaginable list of ITI=s (99 trials max.). Each trial contains a series of desired stimuli commands and an *analog* response recording. The first time you open the Session/Trial screen (Figure 43) it will contain blank lists and variables set to zero (except the record window, which is set to 500).

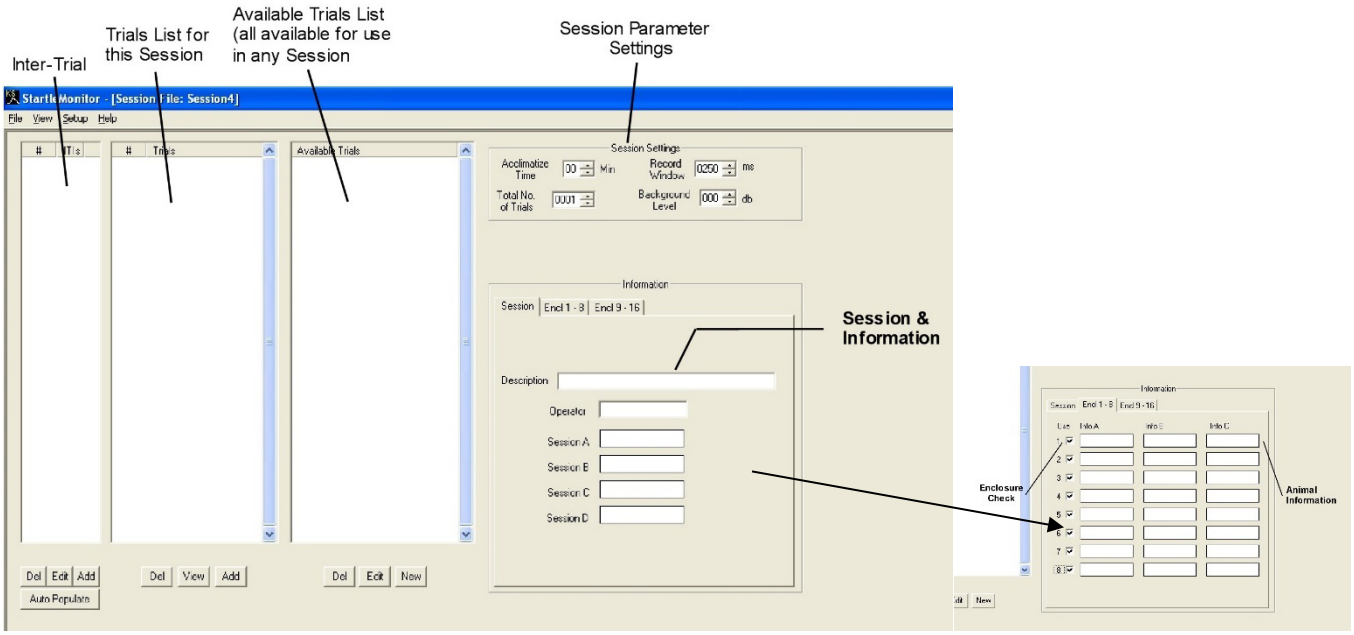


Figure 43 Session/Trial Editing Screen Description

To activate the Session/Trial editing screen click on **File** and **New** from the StartleMonitor software home page. This is the only screen needed to create, modify, save and/or run sessions. There are seven sections used on this screen to operate the System.

Although the seven sections can be set up in any order you choose; they are listed here in logical steps for the beginner. The first section is to create all trial types necessary for a particular paradigm. Next, you will create sessions from the list of those trials. To create new trials, click the **New** button located at the bottom of the **Available Trials** list. A screen similar to Figure 44 will appear.

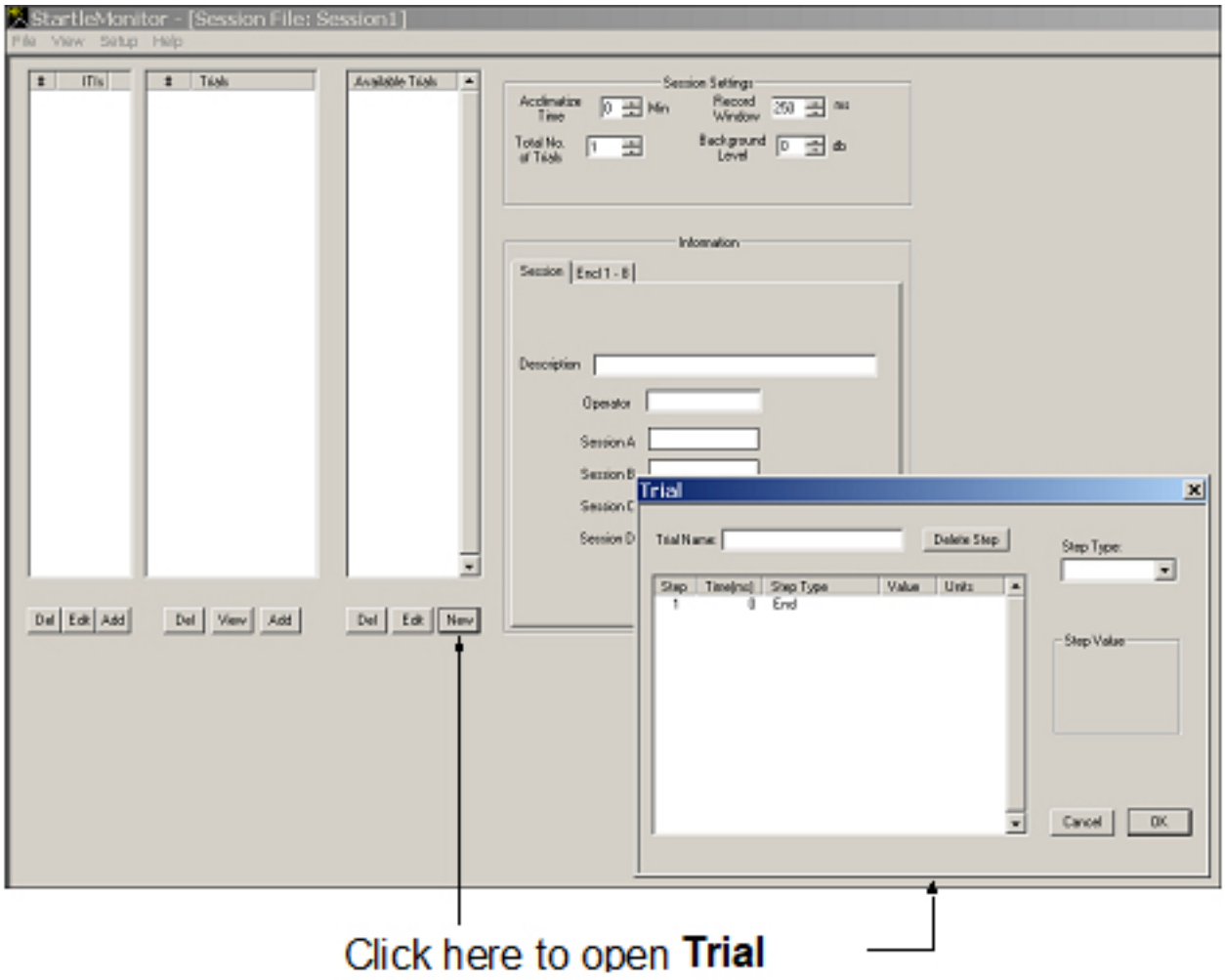


Figure 44 Session/Trial Editing and Programming Screen Examples

2.5.1 Section 1 - Creating Trials

There are seven items on the **Step Type** menu for creating trials. These seven items are shown in Figure 45 and described as follows:

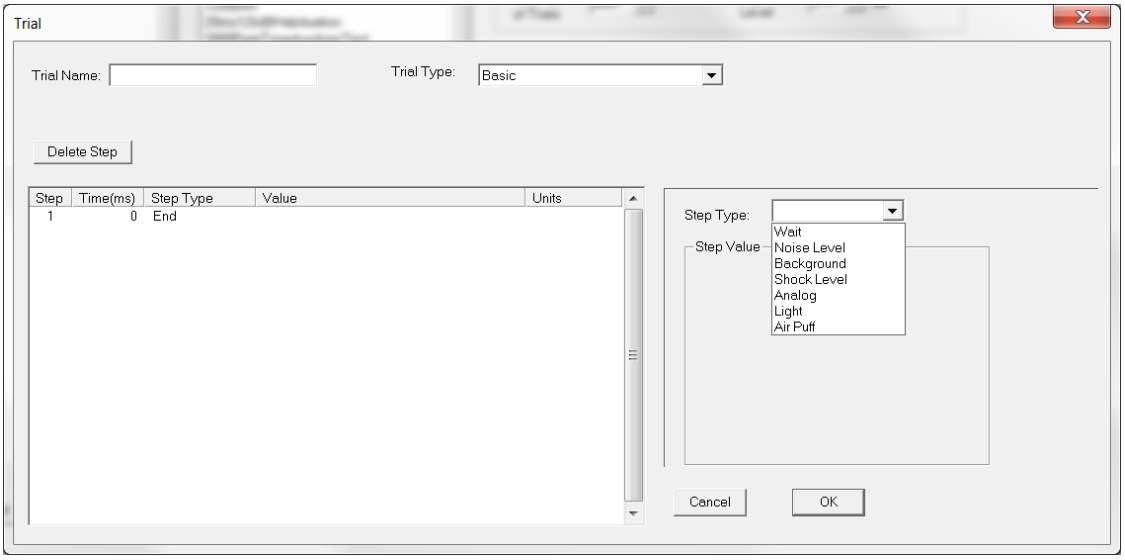


Figure 45 Trial Programming Screen Example

1. **Wait** – Used to advance the timeline of the trial.
2. **Noise Level** - Sets the noise level of the startle sound produced in decibels.
3. **Background** – Returns the white noise level to a value set by the Session parameter.
4. **Shock Level** – Sets the shock level *and* turns the shock on/off. Any value turns the shocker on and a value of 0 turns the shocker off.
5. **Analog** – sometimes referred to as a record window. This Step tells the software when to *begin* recording Analog data. The length of the window is set in the Session parameters.

NOTE

Only one Analog entry per trial is allowed. However, for a trial to be valid *and* reducible, **Analog *must be* selected**.

6. **Light** – Simple on/off Step command for house light. Typically used with fear potentiated sessions.
7. **Air Puff** – Simple on/off Step for Tactile trials.

Five of the seven **Step Type** items require a **Step Value** entry. These variables will appear in the **Step Value** window when the related **Step Type** is selected. This is shown in Figure 46.

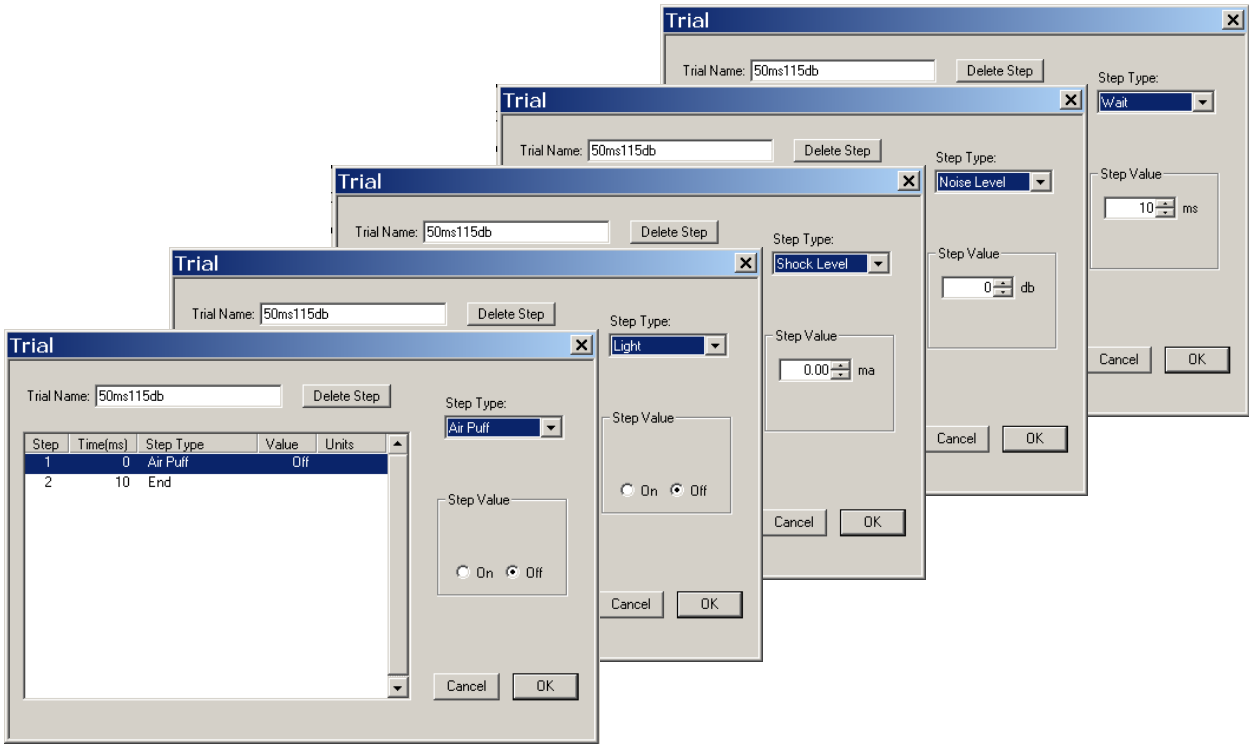


Figure 46 Step Value Examples

2.5.2 Step-by-Step Trial Screen Instructions

Before continuing, a brief step-by-step procedure for selecting and entering trial step types for creating a trial is provided as follows:

NOTE

The test and values entered in this procedure are arbitrary. They are provided only as an example to familiarize you with the proper selection sequence for creating a trial.

1. Enter a Trial Name. Trials will not be accepted without a name.

2. Click on **End** to highlight the line (Figure 47). You will do this often during trial creation efforts. Think of this step much like an *enter* key. Each time you add a step, click on the end key to register the entry.

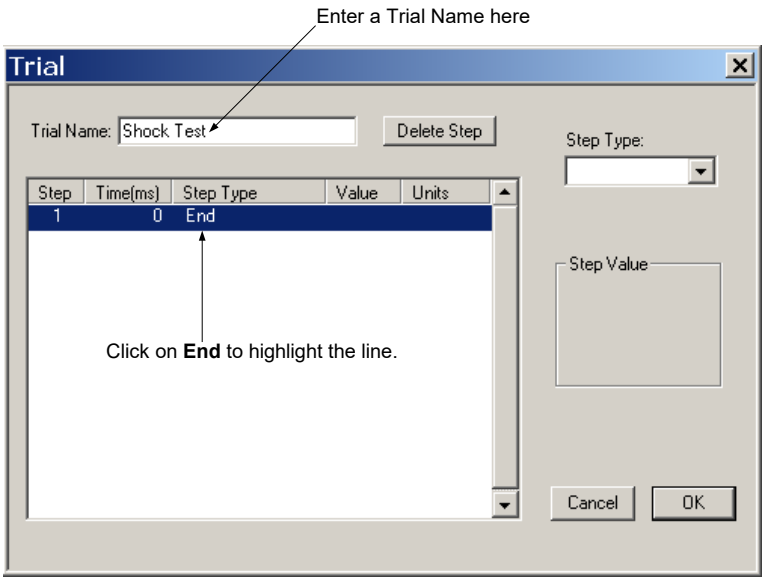


Figure 47 Step-by-Step Trial Example 1

3. Select **Shock Level** from the **Step Type** menu. The **Trial** screen will appear as shown in Figure 48.

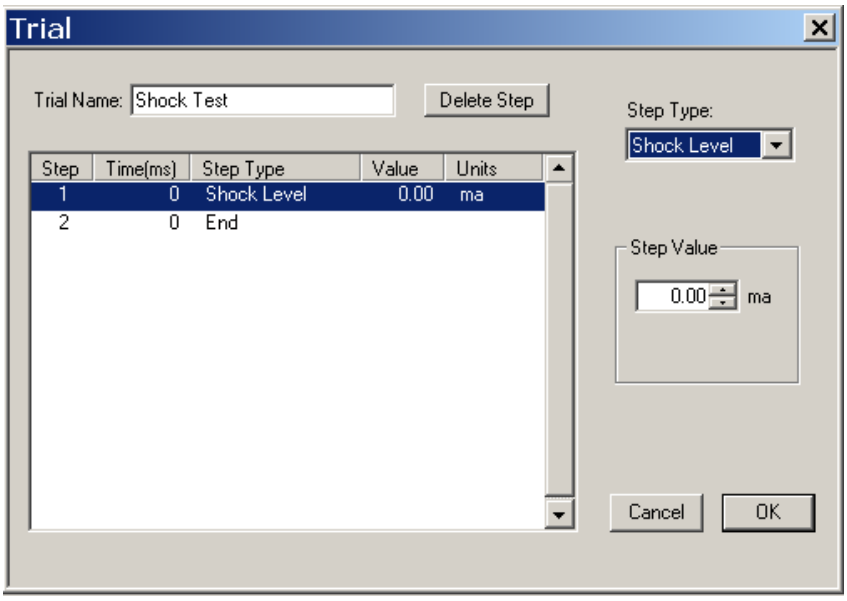


Figure 48 Step-by-Step Example 2

4. Select a **Step Value** of 0.02 ma, and then click on **End**. The **Trial** screen will appear as shown in Figure 49.

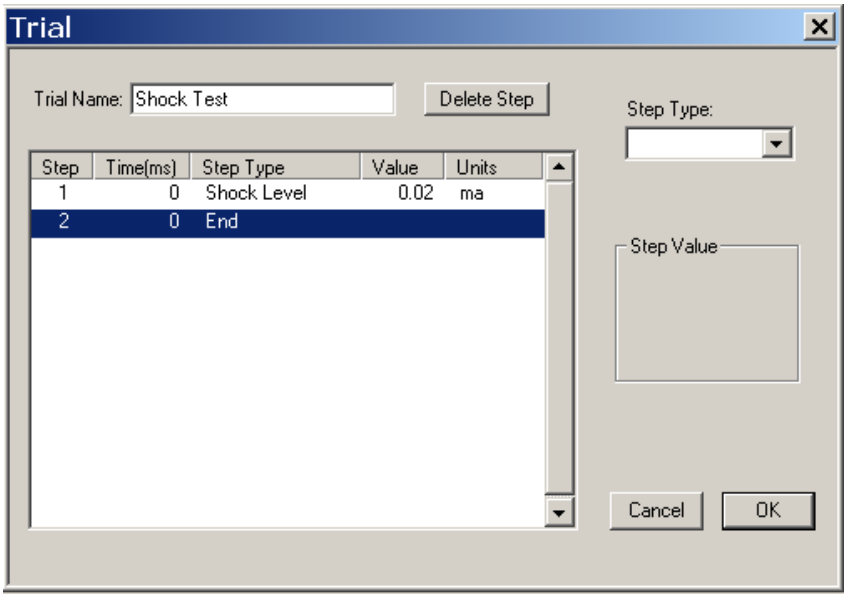


Figure 49 Step-by-Step Trial Example 3

5. Select **Analog** from the **Step Type** menu. The **Trial** screen will appear as shown in Figure 50.

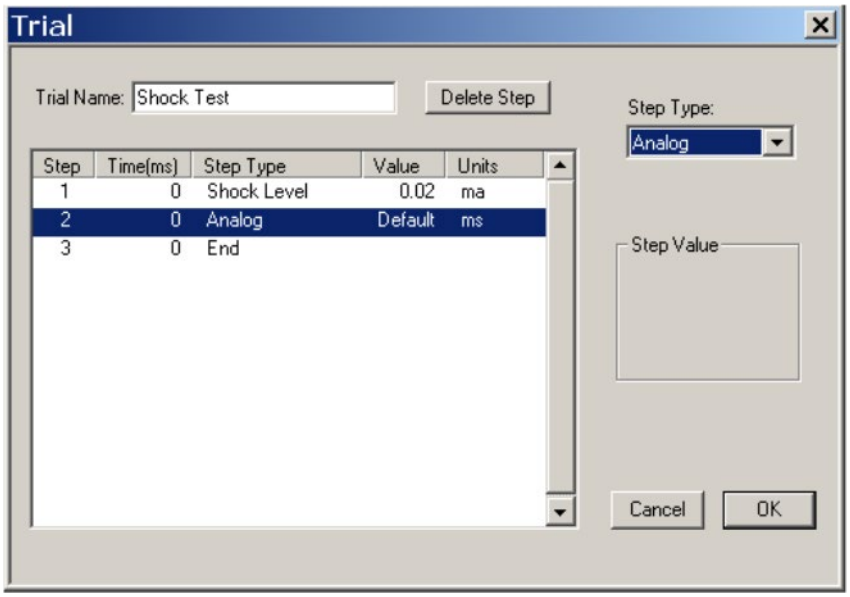


Figure 50 Step-by-Step Trial Example 4

6. Select **End**. The **Trial** screen will appear as shown in Figure 51.

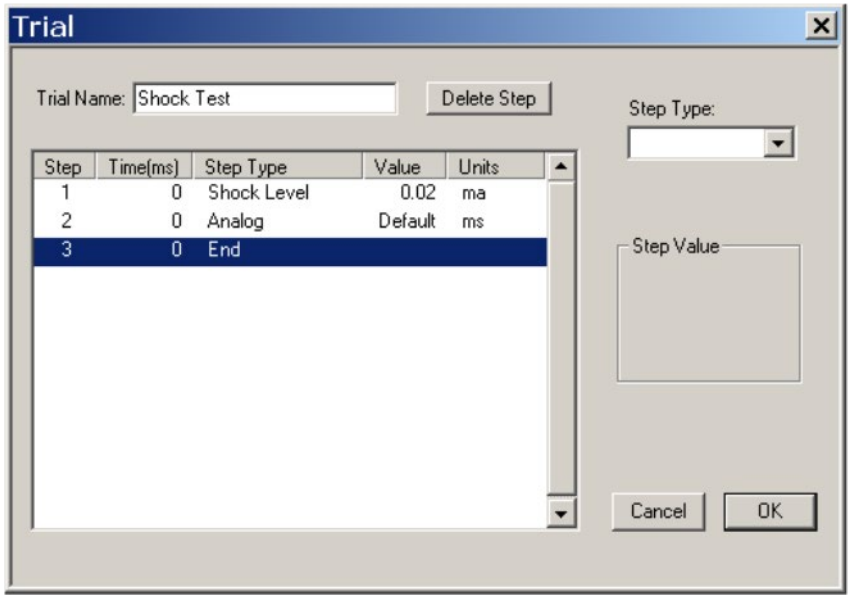


Figure 51 Step-by-Step Trial Example 5

7. Select **Wait** from the **Step Type** menu. The **Trial** screen will appear as shown in Figure 52.

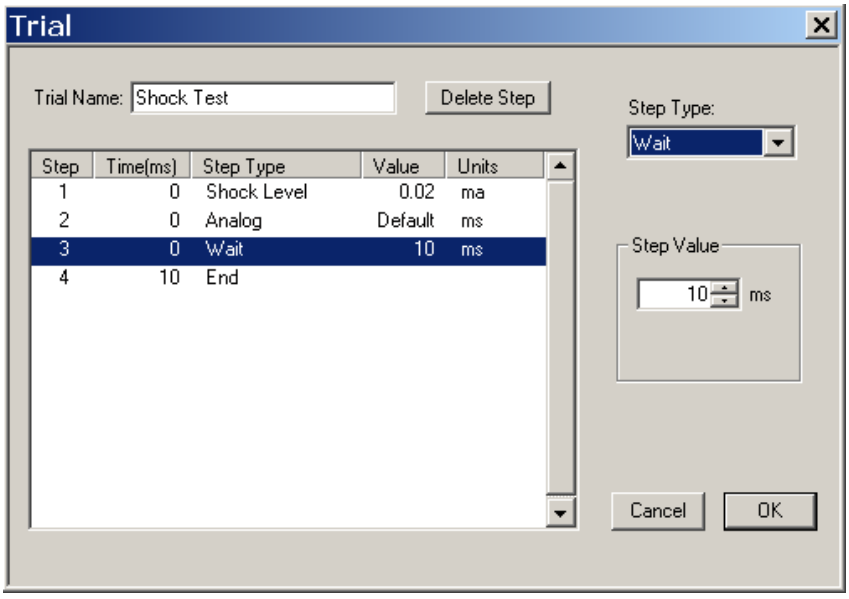


Figure 52 Ste-by-Step Trial Example 6

8. Select a **Step Value** of 0.10 ms, and then click on **End**. The **Trial** screen will appear as shown in Figure 53.

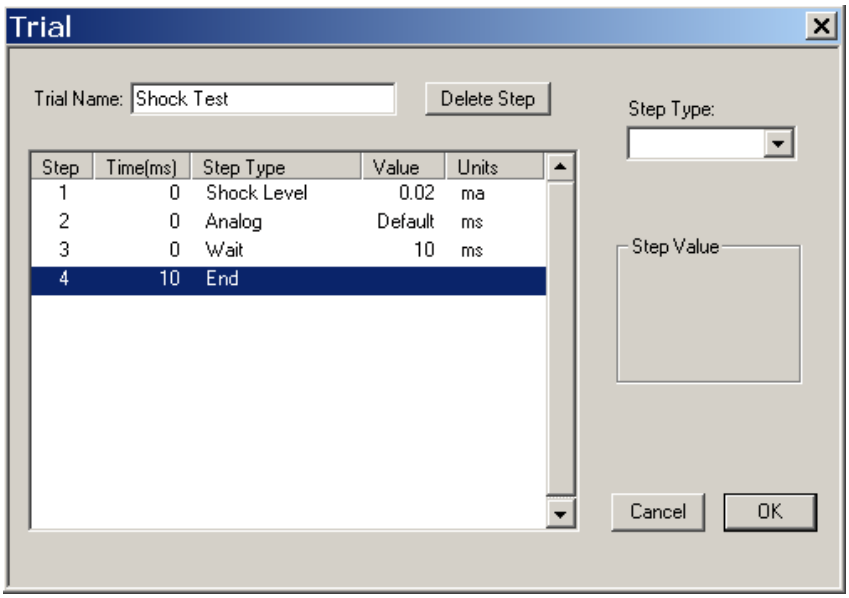


Figure 53 Step-by-Step Trial Example 7

9. Select **Shock Level** from the **Step Type** menu. The **Trial** screen will appear as shown in Figure 54.

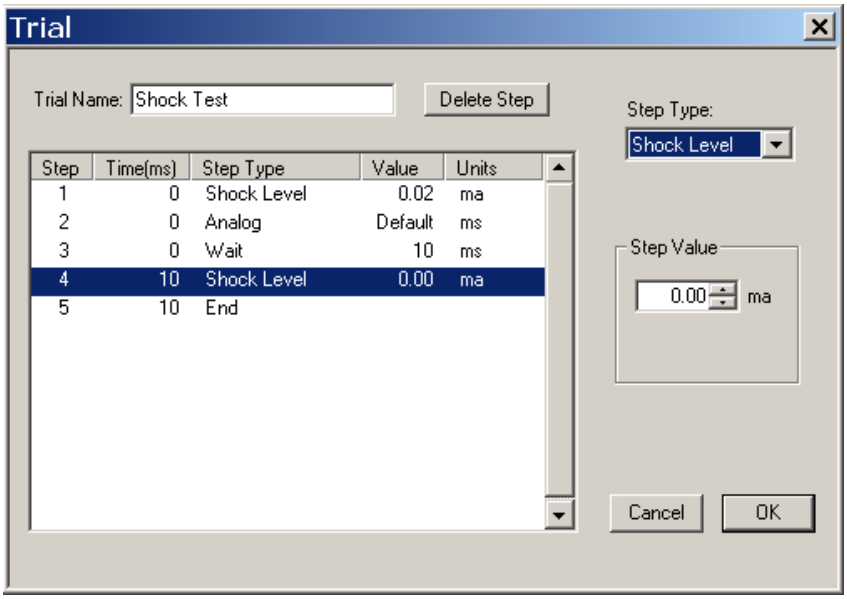


Figure 54 Step-by-Step Trial Example 8

10. Select a **Step Value** of 0.00 ma, then click on **End**. The **Trial** screen will appear as shown in Figure 55.

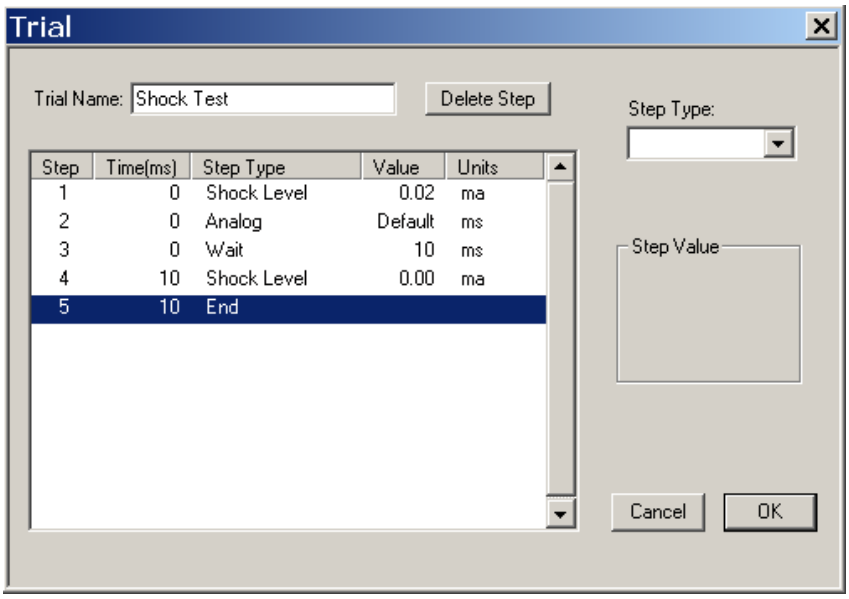


Figure 55 Step-by-Step Trial Example 9

11. Click on **OK** to accept the test. The trial just created using the step-by-step procedures above will appear as shown in Figure 56.

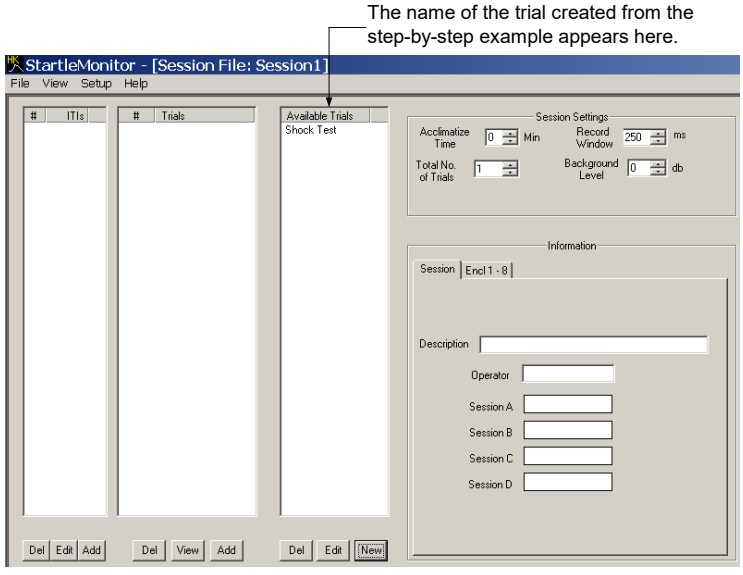


Figure 56 Step-by-Step Trial Example 10

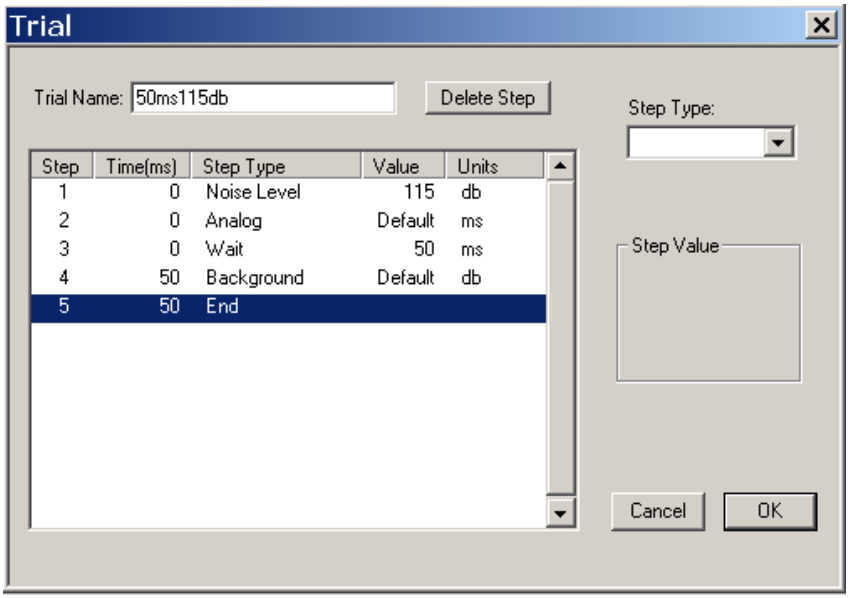
NOTE

Remember before selecting each **Step Type** and before selecting **OK** to accept the trial, the **End** line must be highlighted first.

The step-by-step procedures in the previous example created a trial that provides a shock level of 0.02 mA lasting 10 ms in duration.

As previously described, when you first open a new trial the first line displayed is always the **End** line. This line will move down on the Window as you add Steps, always maintaining the last position on the list (when you begin there is only one line so the first and last line are one and the same). The following tips will help you in your programming efforts.

Tip 1. Create a list on paper that contains what you want to occur in each trial. For example, if you want to perform a basic acoustic trial your list might include a 50 ms pulse of 115 dB white noise and an *Analog* recording. The trial will look similar to Figure 57.



Step	Time(ms)	Step Type	Value	Units
1	0	Noise Level	115	db
2	0	Analog	Default	ms
3	0	Wait	50	ms
4	50	Background	Default	db
5	50	End		

Figure 57 Trial Programming Screen Setup

Note the name used for the trial. It's a good idea to select a name that readily describes what the trial is used for, especially dB levels and pulse width (e.g., 85 dB PPI).

Tip 2. Always click on the End line as the last step of each command line creation; use it like an Enter key. Once you click on the last line (or any other line), the entire line will be highlighted in blue to let you know it is selected.

Tip 3. For commands containing values such as noise (dB), shock (milliamps), duration (ms), Light (on/off) and/or Air Puff (on/off), remember to set the appropriate **Step Value** before clicking on the End line. Take special care to insure that on/off values are set properly (there are no error checks for these values, i.e., you could have 2 "off" values in sequence which would have no effect on the stimulus).

Tip 4. Remember to use a trial name that describes what the trial does (e.g., 90 dB 30 ms for a 30 millisecond 90 dB audible stimulus). This will be extremely valuable as your trial list grows.

Tip 5. **CAUTION AND EXTREMELY IMPORTANT!** All stimuli statuses remain in effect when the trial ends. For example, if you set the sound level to 120 dB as the last command in a trial, the sound will be at 120 dB during the following ITI. Remember to turn off or set values in the trial so that the stimuli are at the desired levels for the following ITI.

Figure 58 is an example of a trial setup for a 50-millisecond pulse of white noise at 115 decibels. The first step is to set the desired sound level, in this case, 115 dB. The next step is the **Analog** step. The **Analog** step is typically placed at the beginning of the startle stimulus and is the step that initiates both the beginning of the stimulus (in this case, the audible 115 dB sound) and the beginning of the record window. For a basic acoustic startle trial, applying the Analog command after setting the desired sound level, would be the appropriate step. The third step, Wait for 50 ms, applies the 115 dB sound for 50 ms. (Note, if you would like to apply the sound stimulus for a time greater or less than 50 ms, change the time to whatever desired length you choose.) After the 50 ms of step 3, the **Background** step is used to set the background noise level between acoustic startle pulses. Note that the Background level is set to the Default level. (Setting the Default level for the Background is discussed in Sections 2.2.6 and 2.5.1.) The **Background** step gives each trial definition more flexibility by making the trials independent of any particular session background value set in an individual trial. Alternately, the 50 ms Wait command could be followed by setting the Noise Level to a desired level (e.g., 0 dB).

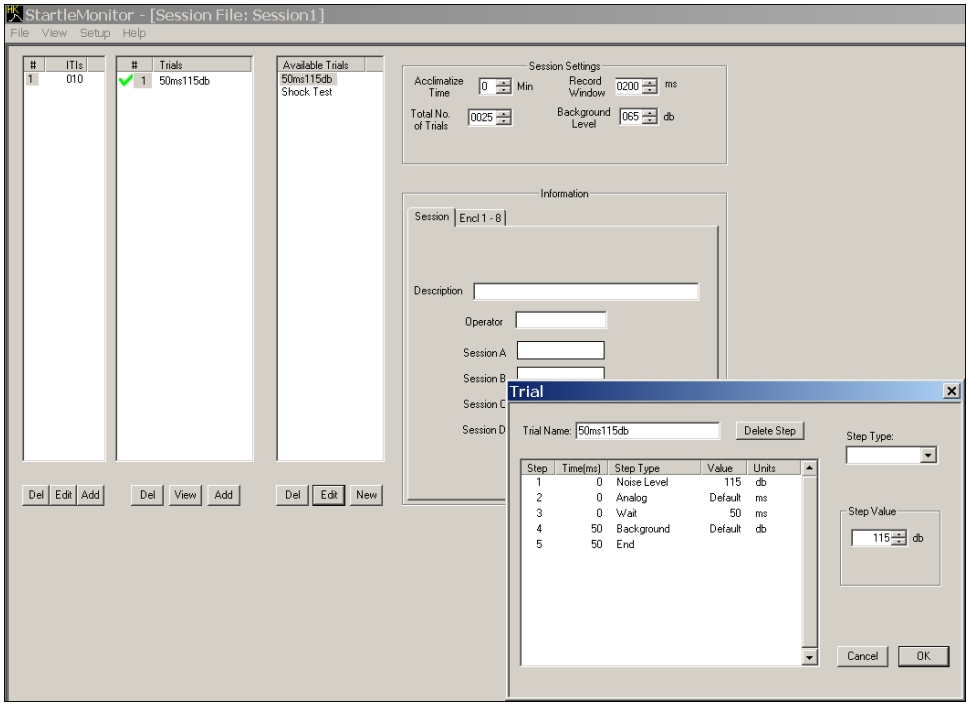


Figure 58 Session/Trial Editing and Programming Screen Setup

The Wait command is used to advance the timeline in the trial. In the previous example, the **Wait** step has determined the length of the white noise pulse. The **Wait** step has a special effect when considering the **Analog** step. The **Analog** step only determines when the recording window begins, *not* when it ends. The **Analog** recording will always last for the time specified in the **Session Settings** list. In the previous example, the record window will last for 200 milliseconds because that is the Record Window length set in the Session Settings. If you would like a record window of different than 200 ms, simply change the Record Window value to your desired time length. You cannot have different length record windows in the same session. Remember that the trial will last until the recording has been completed. In the previous example, the trial will last for 200 milliseconds even though the last line might seem to imply 50 milliseconds. That is, the trial will complete the data collection process even though the last line in the trial definition does not show that ending time.

2.5.3 Section 2 - Adding Trials to a Session

To add trials to a session simply double click each trial in the sequence you want them inserted into the session. Your screen will appear like the one shown in Figure 59. You may also Click the **Add** button in the **Trials** column and add the selected trial.

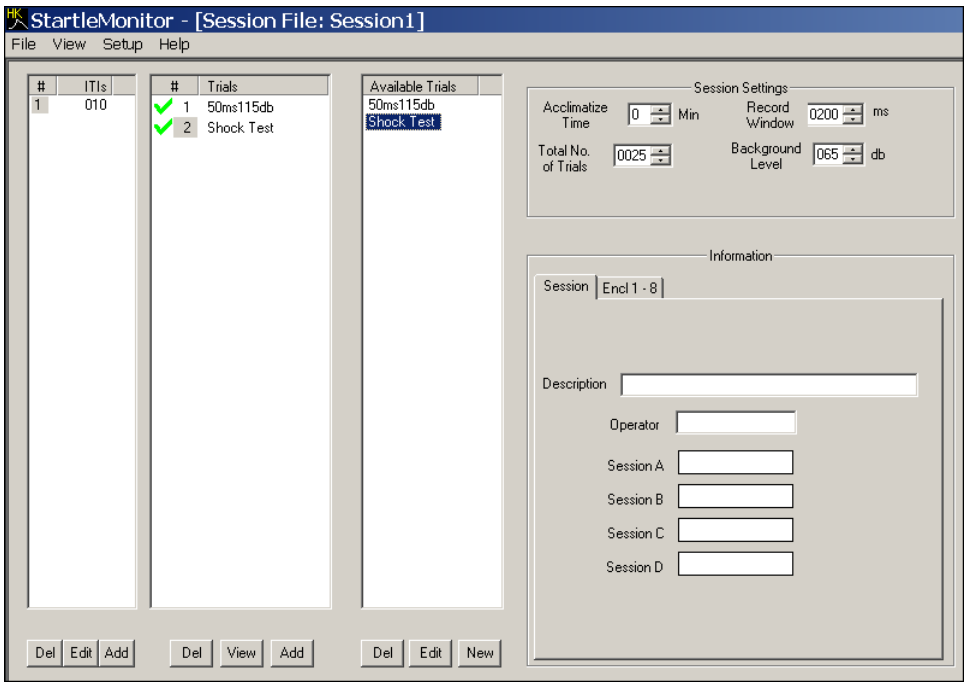


Figure 59 Session/Trial Editing Screen Add Trials Example

You may add as many different trial types as you like (99 max); you can even use the same trial repeatedly in the same session.

CAUTION

Deleting trials from the **Available Trials** list completely deletes them from the computer. Be careful not to delete a trial just because you do not intend to use it in the current session; consider the trials listed in the Available Trials windows as candidate trials you could use or have available to use.

2.5.4 Section 3 - Inter-Trial Interval List

To add an ITI to the session, click on the **Add** button at the bottom of the ITI column and enter the desired time in seconds (Figure 60). Continue to add ITIs as desired. If you need a pseudo-random ITI list such as is typically used in Pre-Pulse inhibition, you will need to manually enter them from a list you create.

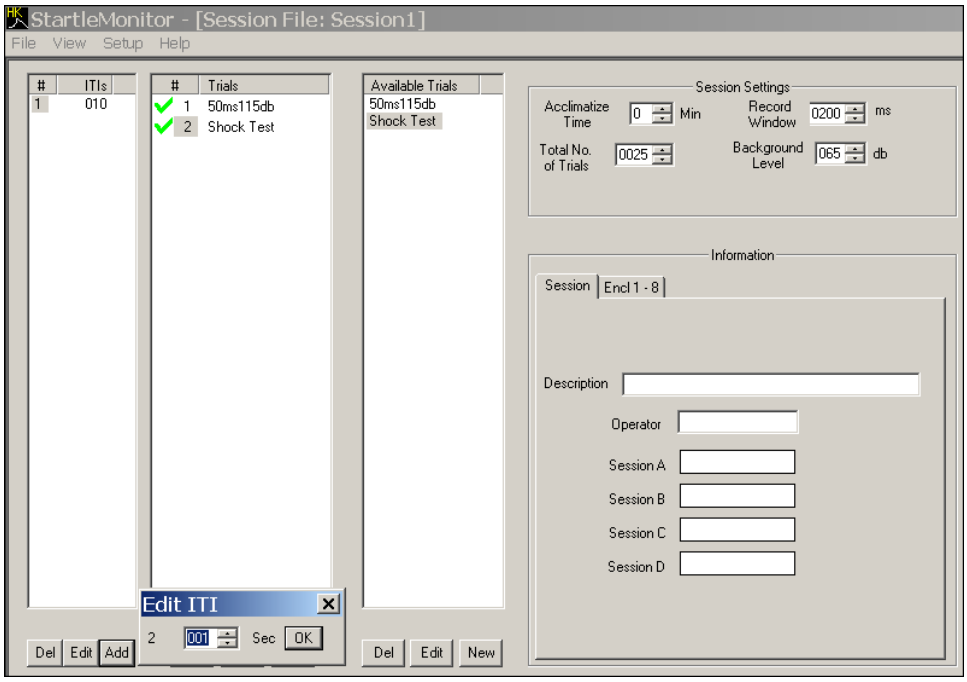


Figure 60 Session/Trial Editing Screen Add ITI Example

2.5.5 Section 4 – Auto Populate

After setting the total number of trials in Session Settings (paragraph 2.5.3*)* it is possible to randomly select the duration of ITI's of during a session. Select the **Auto Populate** button below the ITI management buttons on the Session/Trial Editing Screen (Figure 61). A new screen will pop up, allowing ITI Auto Populate settings to be made. (Figure 62).

The **number of Random ITI's** is limited by the total number of trials selected in Session Settings. In this example, 99 trials were programmed as the total number of trials, allowing a maximum of 98 random ITI's to be selected. 2 ITI's is the minimum allowable number.

Center Value is the number in seconds that the ITI's will deviate around.

Spread about Center (+/-) is the deviation in seconds from the center value.

Max Duplicates is the greatest number of duplicate ITI values allowable. In this example, 99 trials were programmed as the total number of trials, allowing a maximum of 98 duplicate ITI's to be selected.

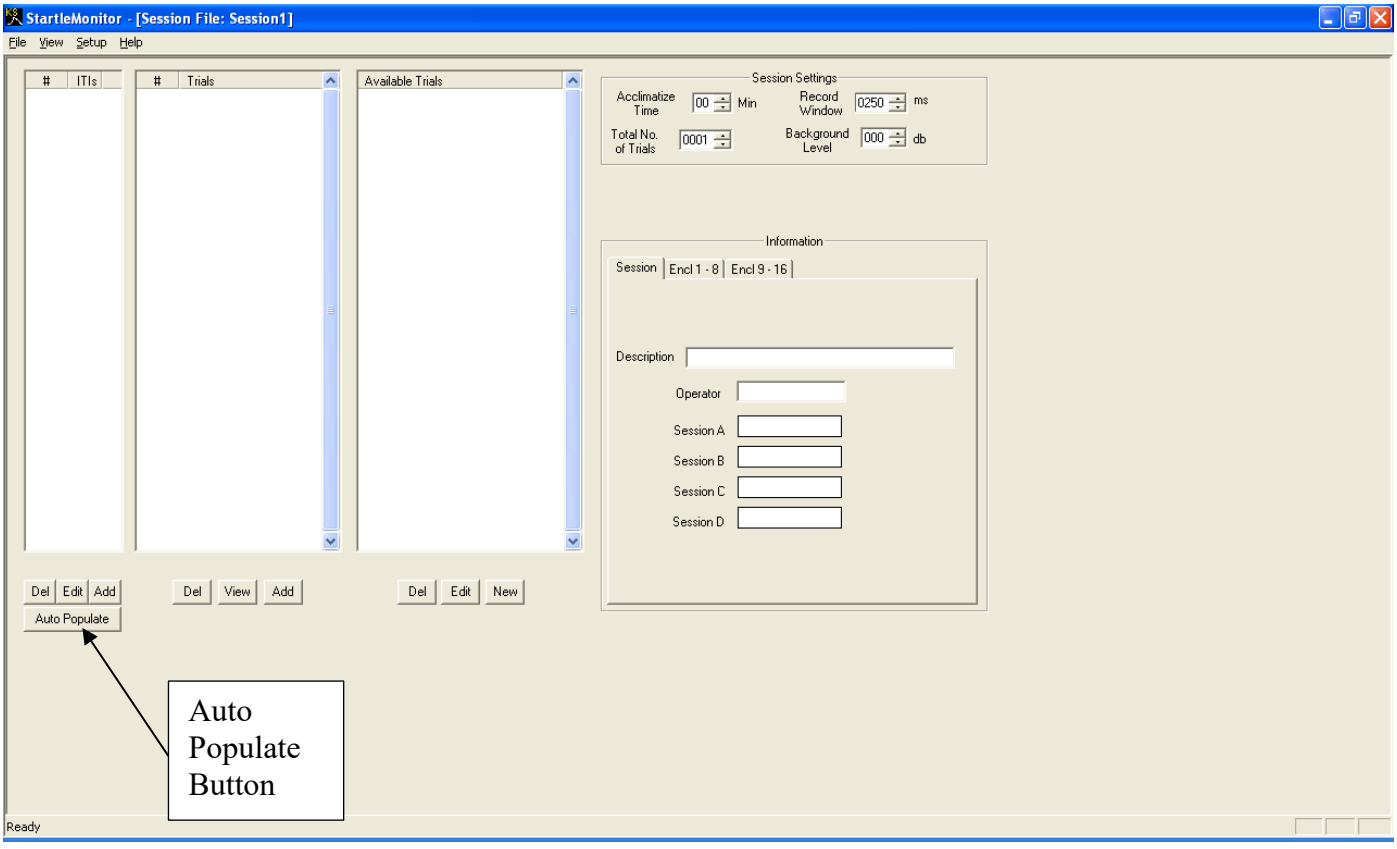


Figure 61 Session/Trial Editing Screen with Auto Populate Button

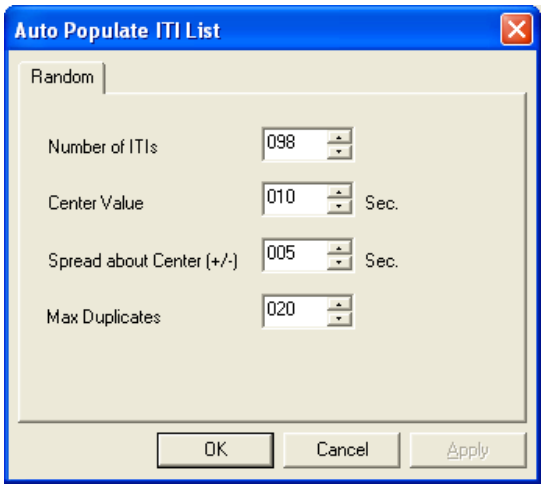


Figure 62 Auto Populate ITI List

2.5.6 Section 5 - Session Settings

There are 4 session parameters to set: Acclimatize time, Total No. of Trials, Record Window and Background Level.

1. **Acclimatize Time** - This is typically set to 3 or more minutes depending on the animal type and the experience in your lab. The time spent by the animal during Acclimatizing helps calm the animal which helps in reducing variability.

2. **Total No. Of Trials.** This number must be at least equal to the number of trials in the Trials list. You can have *more* trials than listed. The System will simply continue to rotate around the list until the number of entered trials is reached.

3. **Record Window** - This number is automatically pre-filled by the default setting. You may change the record length to whatever you like. Just remember to set a length long enough to capture the entire response. The startle response is typically on the order of about 40 ms and occurs at around 360 ms after an acoustic startle pulse; there is some variability in these numbers. As a result, the record window should be structured to cover the time span of expected startle response.

4. **Background Level** - This level is used during ITI's (assuming your trials contain a Background command as the last entry on the trial).

2.5.7 Section 6 - Session Information

The session information fields are not mandatory but useful for retaining information important about the session. These information fields are used to store common information

about the session or any other information you chose to store relating to the study. For example, you might store the drug type, animal strain, or any other information that is common to all subjects. Any information typed in these fields will appear in the reduced data files.

2.5.8 Section 7 - Enclosure Information

You will need to check the Use box for each enclosure you want to use. Once you have done this you may also enter the Animal information (step 7.) Note that all stimuli used will be produced in all stations connected regardless of which chambers are selected here, i.e., if one of the doors is open on stations 5-8 in the example in Figure 63 you will hear the full white noise pulse of 115 dB. So, remember to always keep all station doors closed regardless of whether you have selected them or not.

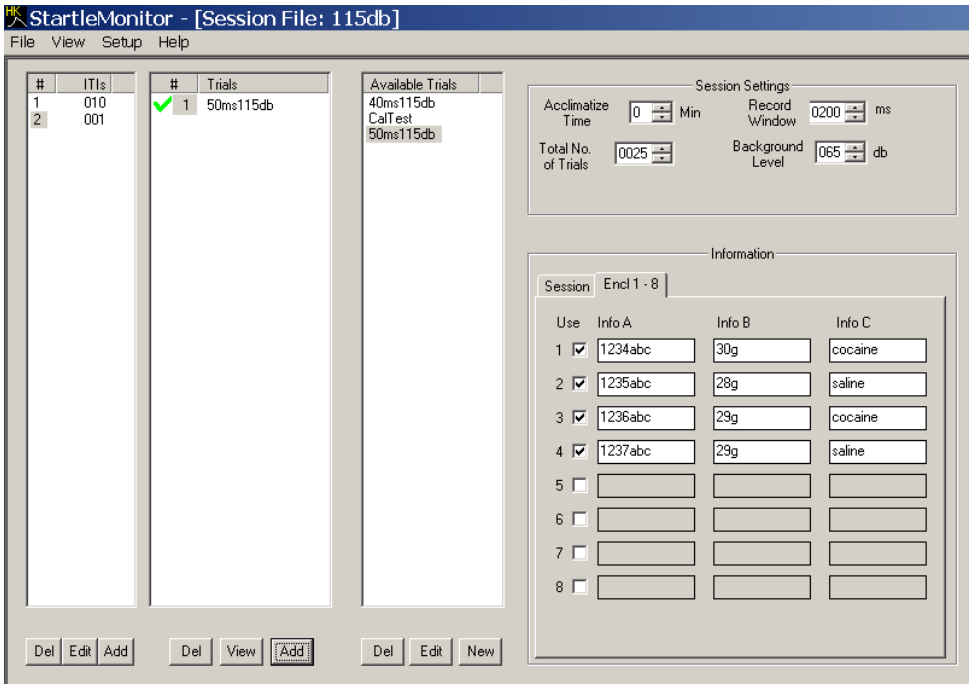


Figure 63 Session/Trial Editing Screen
Enclosure Information Example

2.5.9 Section 8 - Animal Information

Here you may keep information data that is particular to each subject such as weight, id #, etc.

At this point you can save the session by clicking on **File** and **Save As** and then give the session a unique name. Finish the process by clicking the **Save** button.

2.6 Running Sessions

Some long-standing industry questions have been addressed with the features incorporated in this System:

1. Does the subject's weight affect the response?

   Yes, it does if the sensor assembly is a Piezo-Plexiglas type. No, if the sensor assembly is a load-cell type. For this reason, in part, Kinder Scientific has moved to a load-cell type sensor.

2. What is the advantage of a load cell over a Piezo-Plexiglas transducer?

   The Piezo-Plexiglas transducer is a kinetic energy device and is made up of two items where the transducer is married to a Plexiglas plate. The spring characteristics of the Plexiglas plate produce a resonance between the two items.

   The load cell is a force transducer where the load cell and sensing apparatus are one item. This type of measurement device more faithfully follows the test subject.

3. What is the subject's baseline activity?

   This is any activity that occurs while the subject is in the enclosure, prior to the test startle elicitation. The user will see this when reducing completed session data files as described in Section 2.7.

2.6.1 Designing a Session

During the post session reduction process, the technician can choose 1 or 2 windows for data analysis. All measures (peak, avg., 1st reading, time to peak, and RMS value) are calculated for both windows and placed in the output file. For example, the first window (Figure 64) can be used as the baseline activity measurement for the trial by assessing the first 250 ms (set to analyze from 1 to 250 ms).

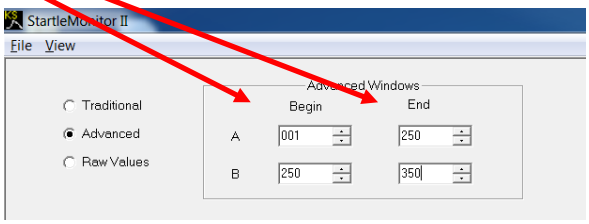


Figure 64 Advanced Windows Options

Then the second window (Figure 65) can be set for a data analysis window (e.g., a 100 ms window) set to analyze data, for example, from only 250 to 350 ms. The analysis windows can start and stop at any point of the collected data and the two windows are completely independent of each other. In the following graphic we show a retrace of a live 400 gm subject that is being testing for hearing loss.

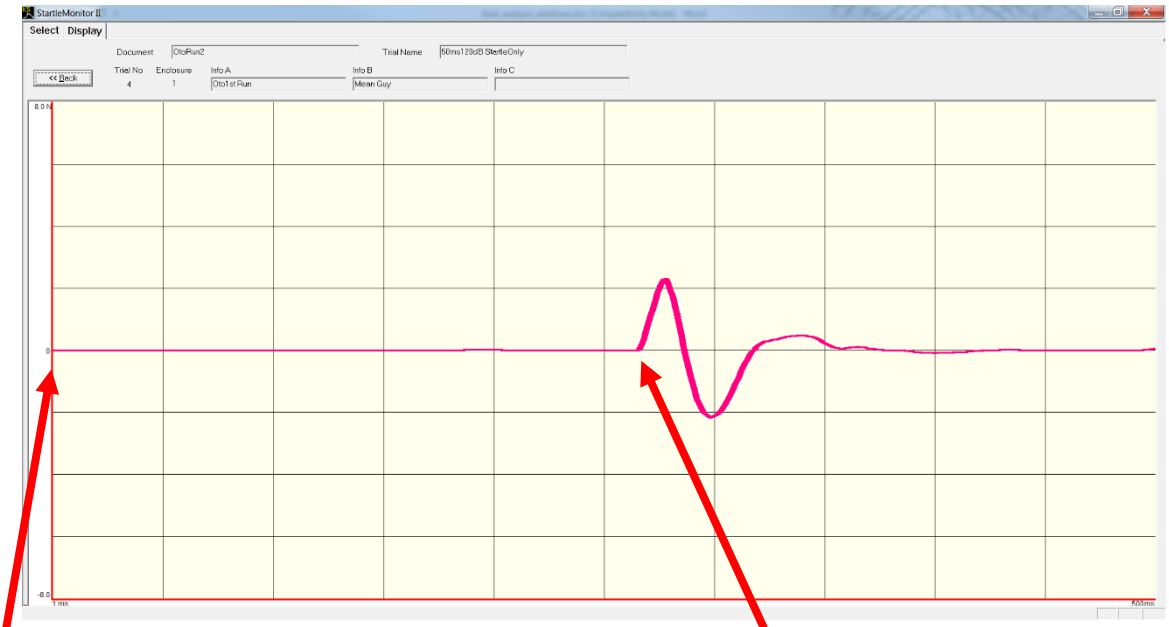


Figure 65 Typical Startle Response

This is a very clean and robust startle response. The white noise startle pulse occurred at time 0 ms and the resulting startle response occurs at approximately 278 ms.

In the second graph (Figure 66) we show how the dual window, post session analysis approach works. The highlighted areas correlate to the above window settings and the output data would be analyzed according to the previous time settings. It is the exact same data trace. The **Green** highlighted area is the proposed baseline activity area, which is analyzed and provided in the output data as window A. The **Blue** area is the standard or typical data reduction that has been provided in the past by both the Kinder Scientific System and other vendors. The beige areas are irrelevant and are not chosen for data reduction in either Window A or Window B.

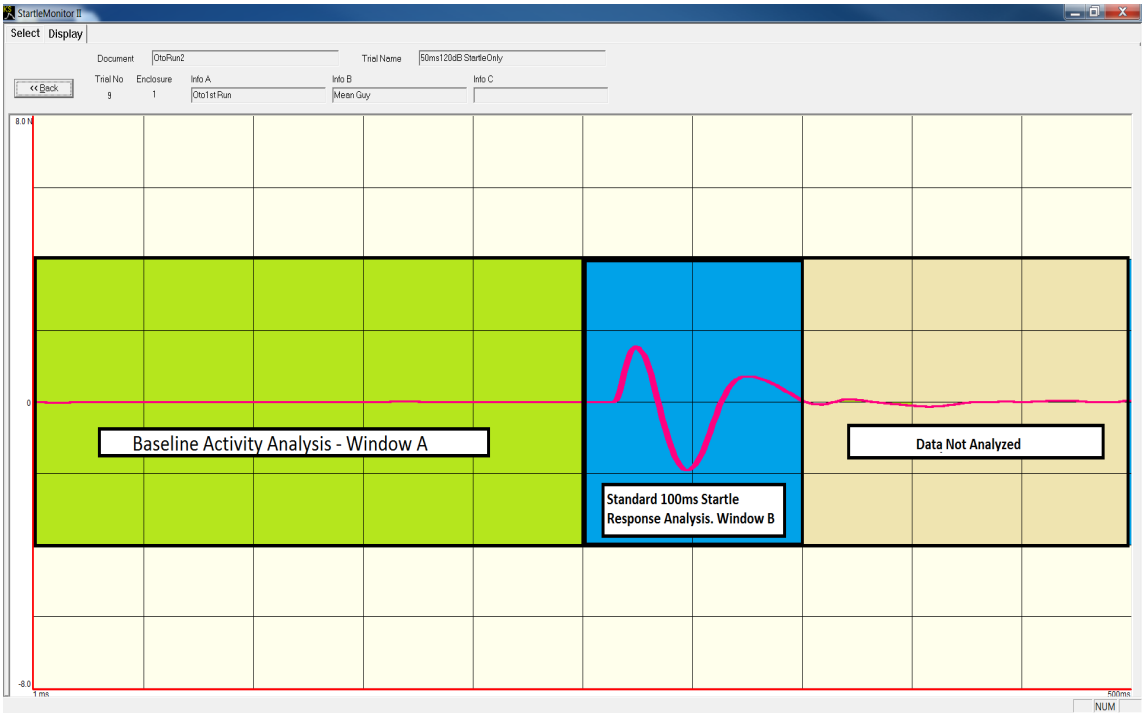


Figure 66 Trial Design for Baseline Activity Analysis

The third graph, **Trial Design for Baseline Activity Analysis** (Figure 67), is provided as a visual aid for designing a session.

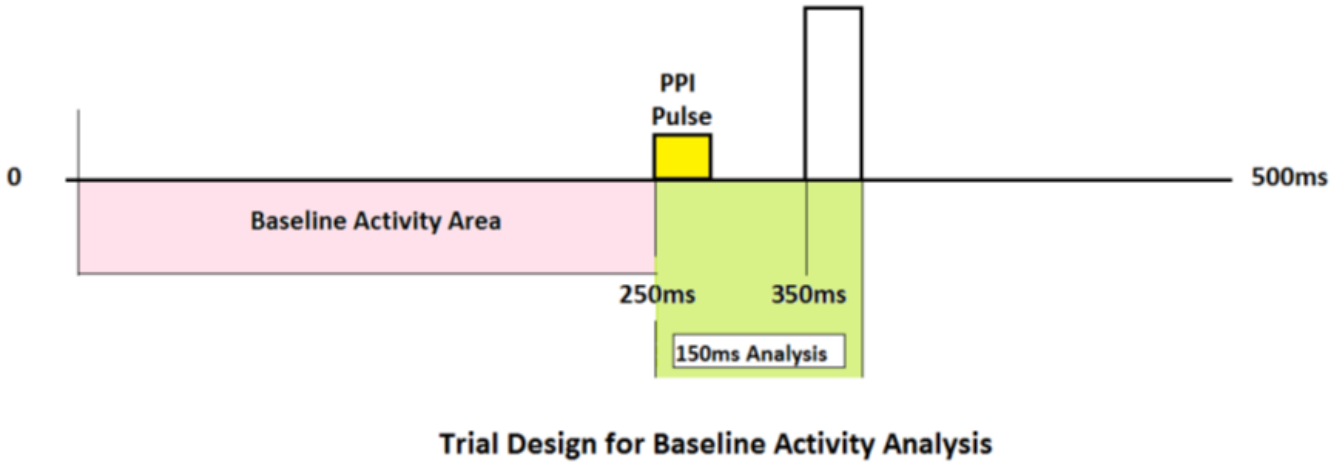


Figure 67 Example of Trial Design for Baseline Activity Analysis

2.6.2 Running a Saved Session

To run a *saved* session, start at the ***StartleMonitor*** opening screen (Figure 25), and perform the following steps:

1. Select the **File** pull-down menu then click on **Open**. The **Saved Sessions:** screen will appear similar to the one shown in Figure 68.

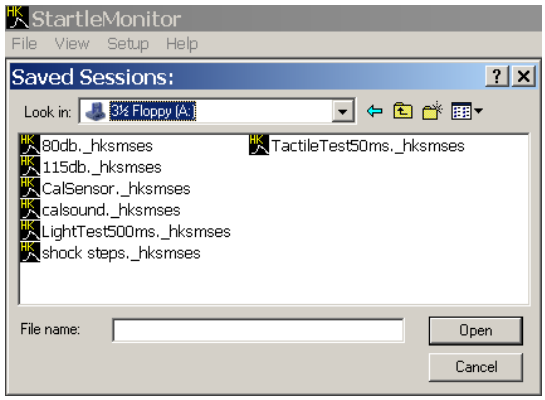


Figure 68 Saved Sessions Screen

2. Select the desired file, and then select **Open**. Your screen should appear similar to the one shown in Figure 69.

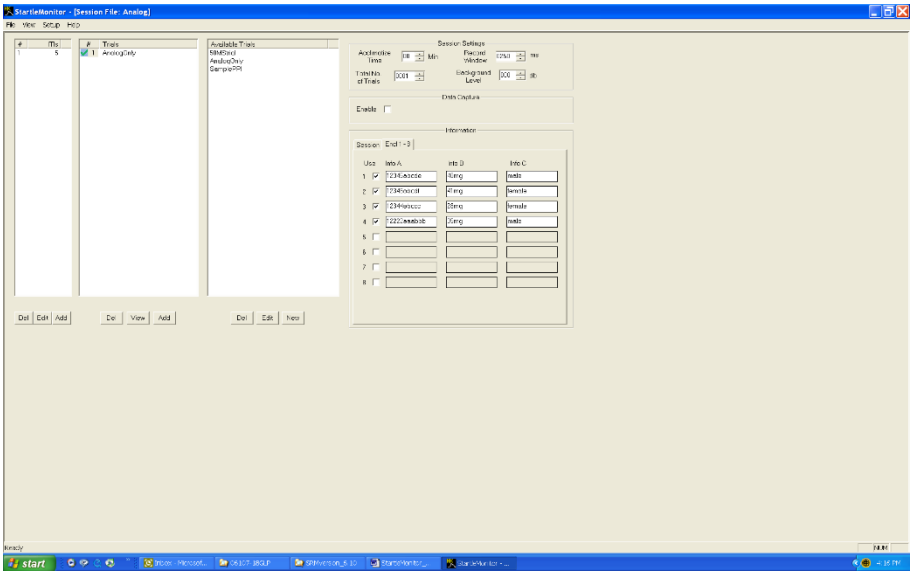


Figure 69 Session/Trial Editing
Saved Session Screen Example

3. At this point add or change specific enclosure information, specific session information and any other changes needed for the session.

4. Next, select **File** and then **Run** (Figure 70).

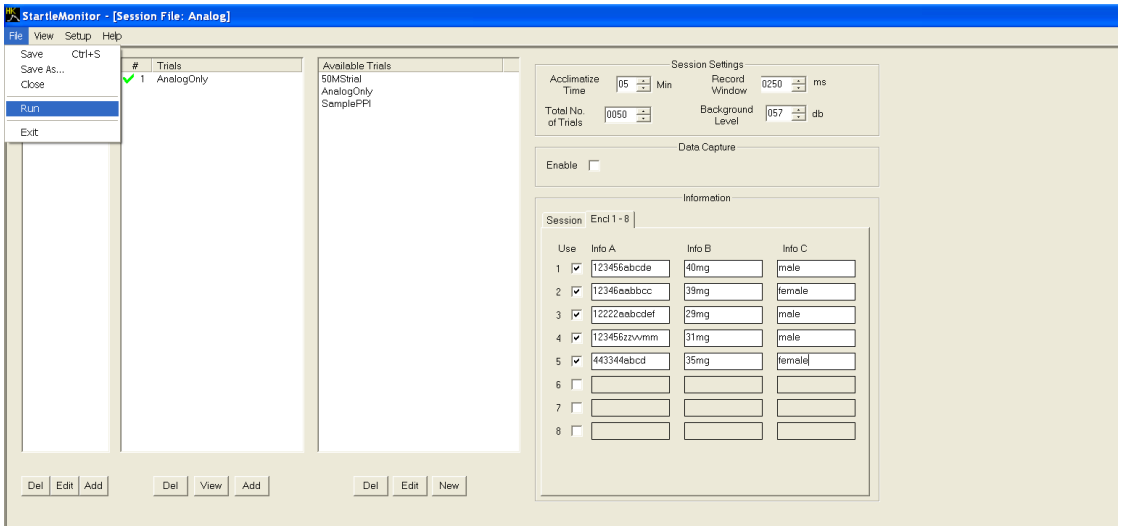


Figure 70 Selecting Run Example

5. The **Save Data To:** screen will appear similar to the one shown in Figure 71.

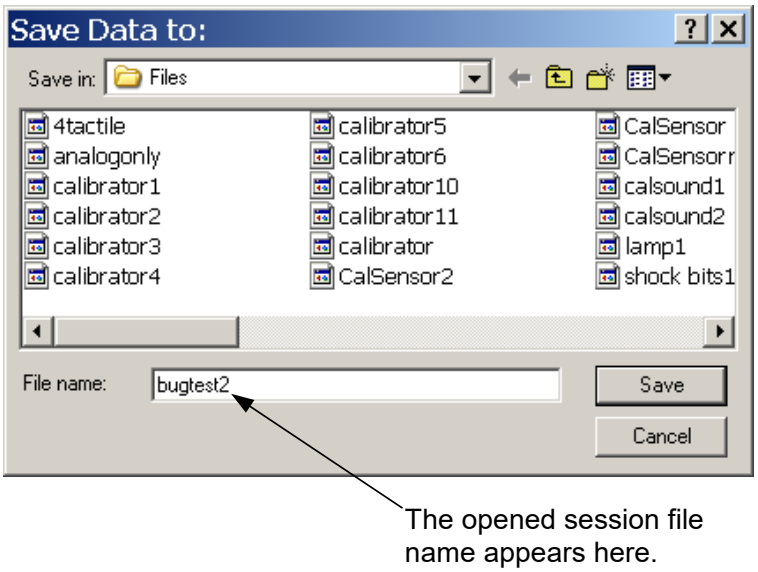


Figure 71 Save Data to Screen

6. Note that opened session file name appears in the **File name:** field. Enter a new file name.

7. Select **Save.** The session will run automatically.

8. If you want to stop a session before completion, click on the **File** pull-down menu and select **Abort**.

NOTE

In a GLP System, when you select **Save**, you will be prompted to re-enter your password (the same one you logged on to the computer with) before the session will run (Figure 72).

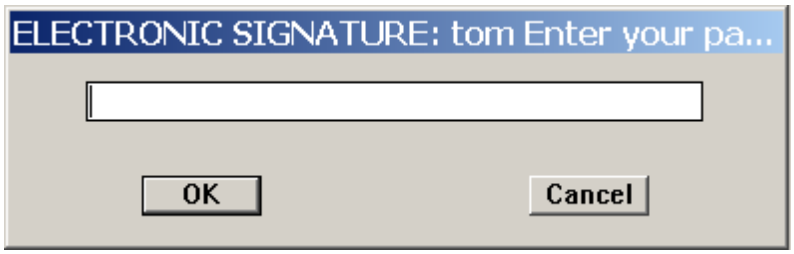


Figure 72 Password Re-entry Field

2.6.3 Running a New Session

To run a *new* session, start at the ***StartleMonitor*** opening screen (Figure 26), and perform the following steps:

1. Click on **File, New** and then go back to Section 2.5 and create a new session and then save it.

2. Next, click on **File, Run**, and a window will appear saying **Run with MODIFIED or UNSAVED Session?** (This window only appears if this is your first saved session.) If you are ready to run a session, click **Yes**, the program will allow you to continue. Click **No** if you are unsure about continuing. If you click **Yes**, the **Save Data to:** screen will appear. Enter an appropriate file name.

NOTE

You must select at least one enclosure from the session screen before the program will allow a session to be run.

3. Click **Save**.

4. In a GLP System, enter your electronic signature.

5. The following window (Figure 73) appears (only if the **Capture Weight** check box on the **Default Runtime Settings** screen is checked as described in Section 2.6.3):

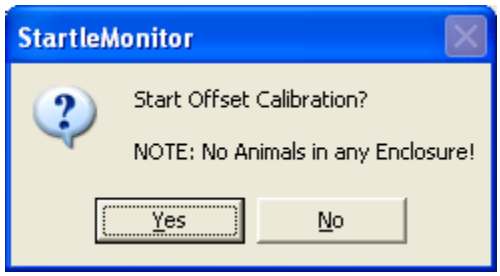


Figure 73 Start Offset Calibration Window

NOTE

If the offset exceeds the tolerance amount you will get the following message (Figure 74):

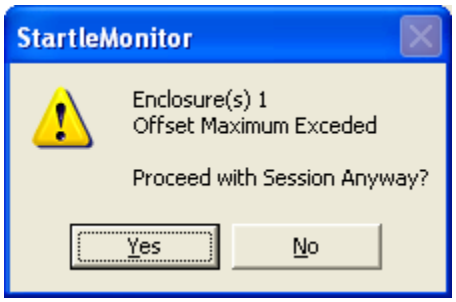


Figure 74 Offset Maximum Exceeded Warning

Observe that the window of Figure 73 displays the message "NOTE: No Animals in any Enclosure!" What the System is doing at this

point is determining whether the calibration you did previously is still valid. The calibration could be off for at least two reasons: (1) the electronics have drifted outside of an acceptable range, or (2) you calibrated with one type of restrainer and now are using a different type with a different weight which is outside of an acceptable range.

While it is still possible to run the session, we strongly recommend that you **do not proceed.** Running the session with the offset out of tolerance will result in unusable data. For GLP customers we **do not support** running the session with this warning.

6. Click yes to tare the mechanical offsets.

7. The following window (Figure 75) appears:

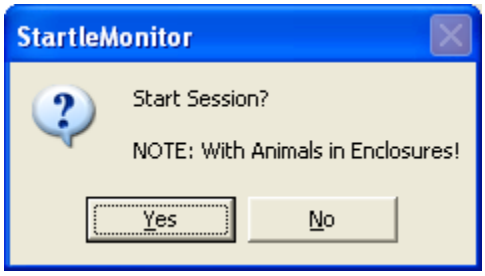


Figure 75 Start Session Window

8. Click on Yes to tare the animal weight. ("Tare the animal weight" means the System removes the animal's weight from its determined startle response.)

9. Place the animal(s) on the sensing plate in the cabinet(s) (Figure 76).

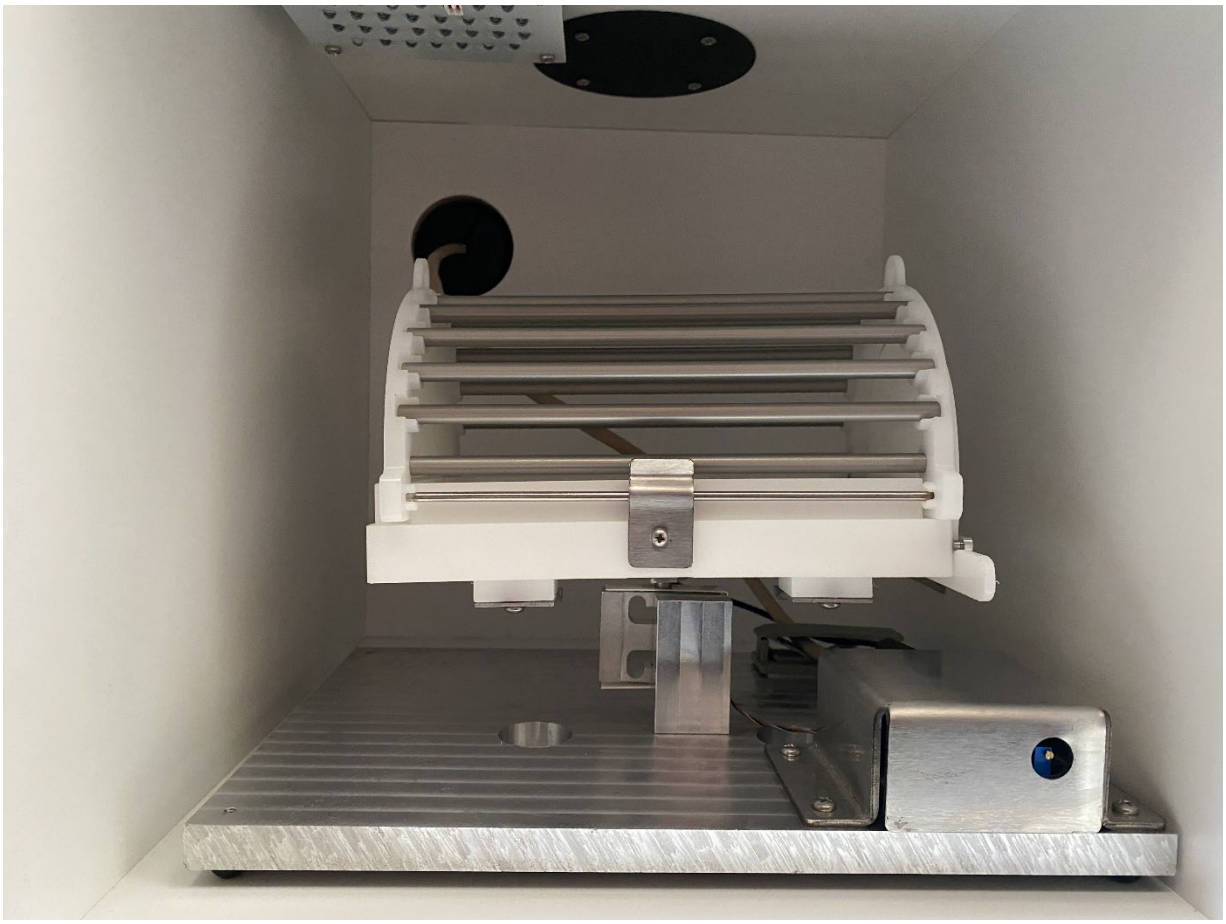


Figure 76 Animal Location

10. Select **Run** from the **File** menu. When the trial is completed, proceed to the next section.

2.7 Reducing Completed Session Data Files

You can select any number of files for reduction and have the resulting data placed into a single file. To do this click on the desired files in the **Documents in** list, one at a time, until you have all desired files highlighted and then click the right chevron. This will add the selected files to the **Documents to Reduce** list. Another way to create the list is double click each file. Each double click automatically moves that file to the **Documents to Reduce** list. If you make a mistake and move a file that you do not want on the list, simply click on the file in the list and then click the left chevron. The two double chevrons move all files back and forth. These features are shown and described in Figure 77, Figure 78 and the references that follow.

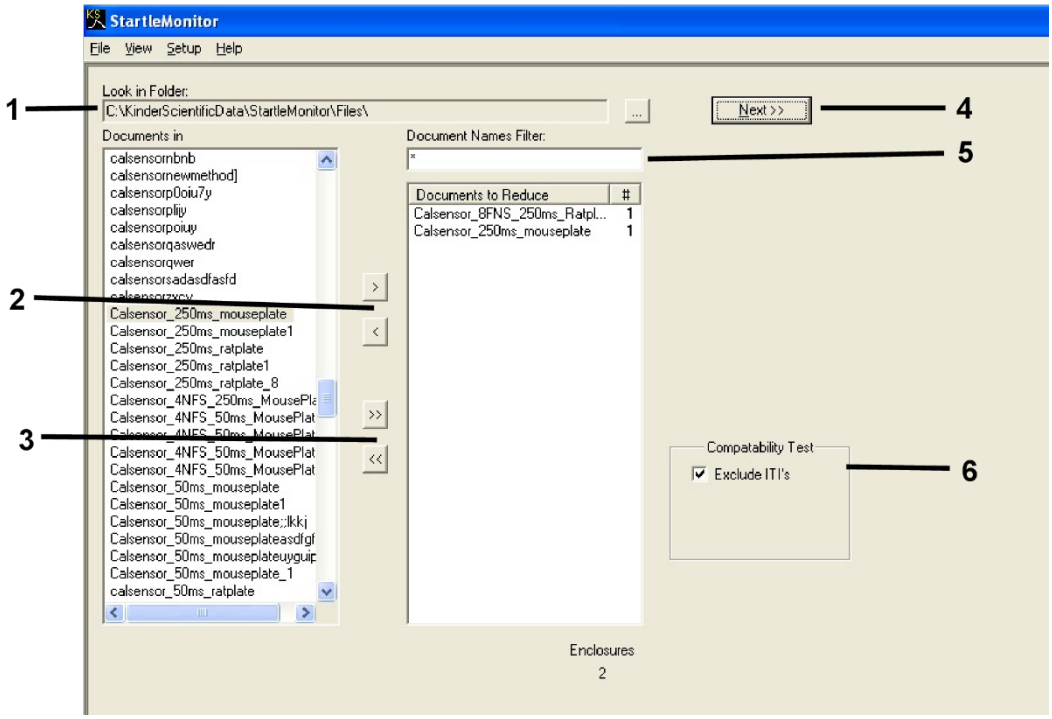


Figure 77 Reduce File Selection Screen 1

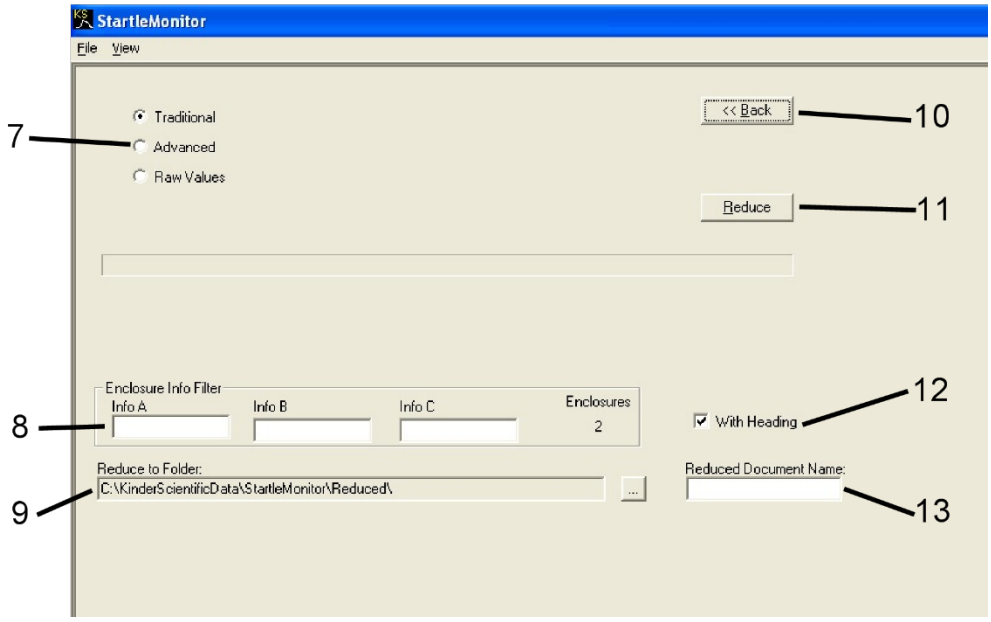


Figure 78 Reduce File Selection Screen 2

1. **Look in Folder:** This is where the source files for reduction are located. If you have created multiple folders for file management purposes, you will need to tell the software where to look for the data files you want to reduce. To do this click on the browse button at the end of the **Look in Folder** field and select the appropriate path.
2. **Left/Right Single Chevrons.** Used to move *single* or *selected* files back and forth.
3. **Left/Right Double Chevrons.** Used to move *all* the files back and forth.
4. **Next:** This button sends you to the **Reduce** screen where the reduction is initiated.
5. **Document Names Filter:** Enter in this field a key word or words specific to certain files. Only those files containing the key word or words will be displayed in the **Documents in** list.
6. **Compatibility Test:** Enabling this function omits ITI's from the file compatibility test. The test compares setup compatibility between selected files. If it detects an incompatibility in setup parameters, it will not allow the files to be merged into a single reduced file.
7. **Reduce to .CSV Data Type Selection Radio Buttons:** These buttons allow the user to select the content of the reduced data
8. **Enclosure Info Filter:** These fields are used to input data relevant to the session as defined by the user.
9. **Reduce to Folder:** This is the output file destination. You can direct the output file to any folder or drive that you desire, including network drives. The easiest way to do this is to use the browse button and select the desired folder. This is because the path must be exact.
10. **Back Button:** Returns user to the previous Reduction Setup Screen.
11. **Reduce Button:** Initiates the reduction process, placing the reduced file into the pre-defined reduction destination folder.
12. **With Heading:** Check this box if you want column names to be included with the reduced file.
13. **Reduced Document Name:** This is where you give the reduced file a name. Remember to add the **.csv** extension to the file name. You can send the output file to any drive and folder location your computer has access to, including network drives.

The responses can range from 0 to about 20 Newton for typical rodent studies for 400 gm adult rats. Clearly this implies a larger range of response for larger rats and a smaller range for juvenile rats and mice. To get the best resolution in detecting the animal's startle response, it is important to set the appropriate Full Scale Setting for the animal as discussed in Sections 3.1, 3.2 and 3.3.3.

Once you've set a Full Scale Setting, be careful to watch for an over-range condition (Offset Maximum Exceeded message) as shown in Figure 79.

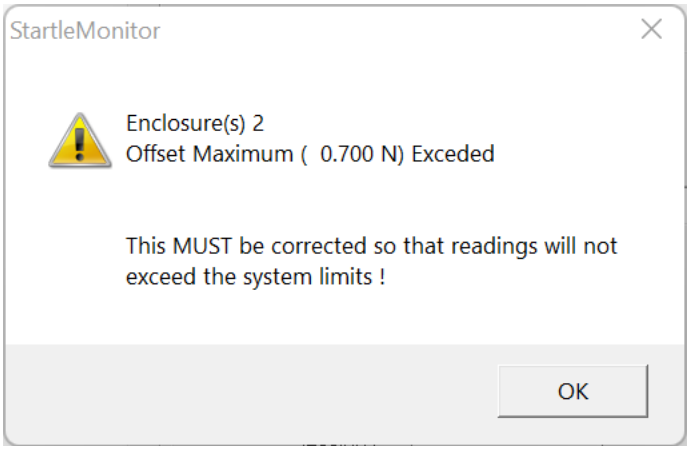


Figure 79 Offset Maximum Exceeded Error Message

"Over-range condition" means that with the current Full Scale Setting, the weight of animal + the weight of the restrainer + the expected animal response is likely to exceed the Full Scale Setting (i.e., the Full Scale Setting is too low). If you get this error message, the System will not allow you to run a session until this condition is corrected.

For example, a rule of thumb for the size of an animal's startle response is about 5 – 10 times its weight for mice, 2 – 5 times its weight for juvenile rats and 2 – 3 times its weight for adult rats. So, for a 400 gm adult rat, the animal's maximum expected response would be about three times its weight or about 1200 gm. (The conversion from grams to Newtons is to multiply the number of grams by 0.009807. In this case, the expected animal response in Newtons would be 11.7684 or about 12 N.)

In addition, the typical weight of an adult rat restrainer (e.g., a SM2001LC Rat Restrainer) is about 522 gm. Adding together the animal's weight (400 gm ~ 4 N) with its expected maximum response (1200 gm ~ 12 N) and then adding the weight of a typical restrainer (522 gm ~ 5 N) produces a weight of 2122 gm (~ 21 N). There are 454 gm per pound so 2122 gm

converts to 4.67 pounds. As explained in Section 3.2, we recommend a 20 – 25% "Safety Factor" to allow for especially large or powerful response. So, applying a 25% Safety Factor means that the total expected response plus the Safety Factor is about 2829 gm (~ 28N or ~ 6.23 pounds). So, in this case, we recommend you use a Full Scale Setting of 28 N.

The current load cell used on the SM1000 StartleMonitor station is a 10-pound load cell. In this example, since the load cell will "weigh" and produce an output consisting of all of these elements, the combined expected "weight" of the animal and restrainer weight and the animal's response of 4.67 pounds plus a 25% Safety Factor (combined ~ 6.23 pounds) is less than the 10 pound capacity of the load cell (so no clipping of the animal's response should occur by exceeding the 10 pound range of the load cell) AND the 25% Safety Factor means that the animal's response is likely to be within the range set by the Full Scale Setting. So, no "over-range condition" or clipping of the signal should result. But note, that for animals with especially strong responses, it is possible to produce an "over-range condition" and for large animals with strong responses clipping may occur.

There are 18 different data items presented in the reduced output file. These items are separated into 2 basic types: redundant entries and animal specific data. Redundant data types are ones where all the fields in the column are identical, i.e., every entry in the output file for that field (or at least common in a number of fields) is the same. This is driven by the need for certain information to be included in the output file such as the name of the session, date, time and general session information. While it is redundant to have these data entered on each line, it is forced because the file is in a standard data file format.

Redundant Data Types (in order presented in output file).

1. **Session** - Name of session run.
2. **Date** - Date session was run (4-digit year, 2-digit month, 2-digit day).
3. **Time** - Time of day session was begun (2-digit 24-hour clock with 2-digit minutes).
4. **SesInfoA -** General user input field relating to entire session.
5. **SesInfoB -** General user input field relating to entire session.
6. **SesInfoC -** General user input field relating to the entire session.
7. **SesInfoD -** General user input field relating to entire session.

Animal specific data types (in order presented in output file).

8. **TrialNo** - Trial number of data recording event.
9. **Encl -** Enclosure Number.
10. **EnclInfoA -** User input field for a specific animal
11. **EnclInfoB -** User input field for a specific animal
12. **EnclInfoC -** User input field for a specific animal
13. **TrialName -** Trial used for the specific recording event
14. **TrialIndex -** Trial indexing of all trials
15. **First(N) -** Response amplitude of first data in record window(Newton)
16. **Max(N) -** Maximum (highest) response during entire record window (Newton).
17. **MaxTime(ms) -** Time Maximum response occurs from beginning of record window(milliseconds).
18. **Ave(N) -** Sum of all data recordings divided by total number of recordings.

Examples of output data files are shown in Figure 80, 81 and 82.

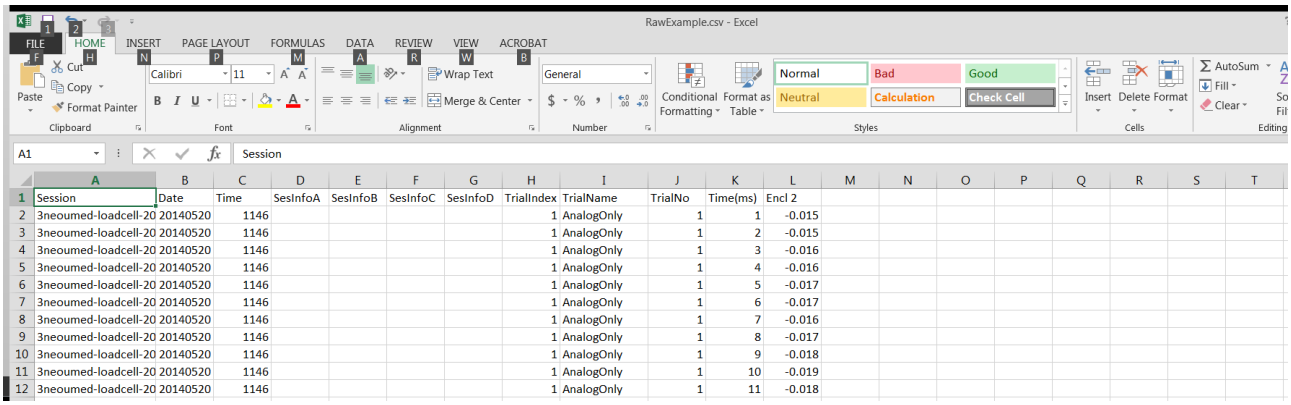


Figure 80 Reduced Output RAW Data File Example

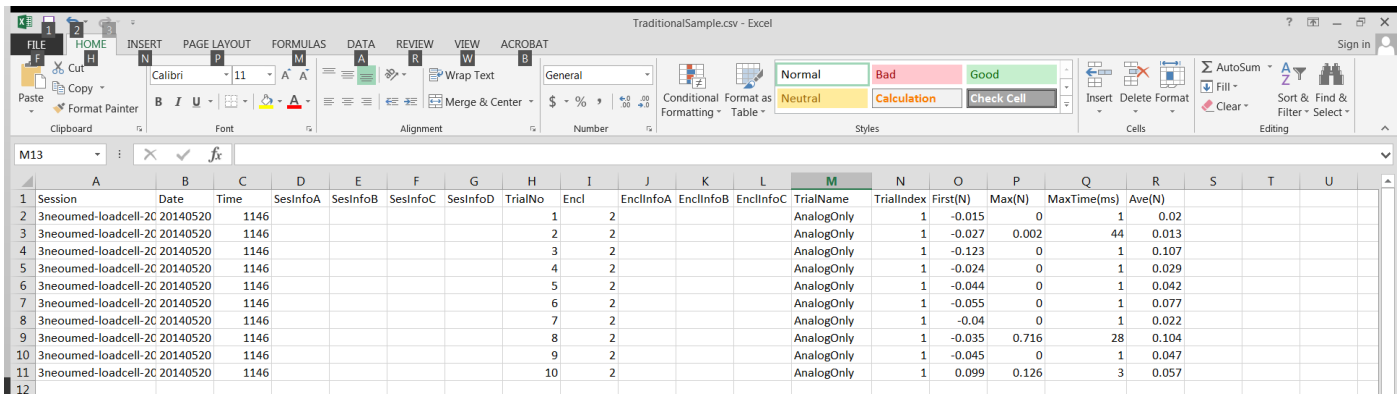


Figure 81 Reduced Output TRADITIONAL Data File Example

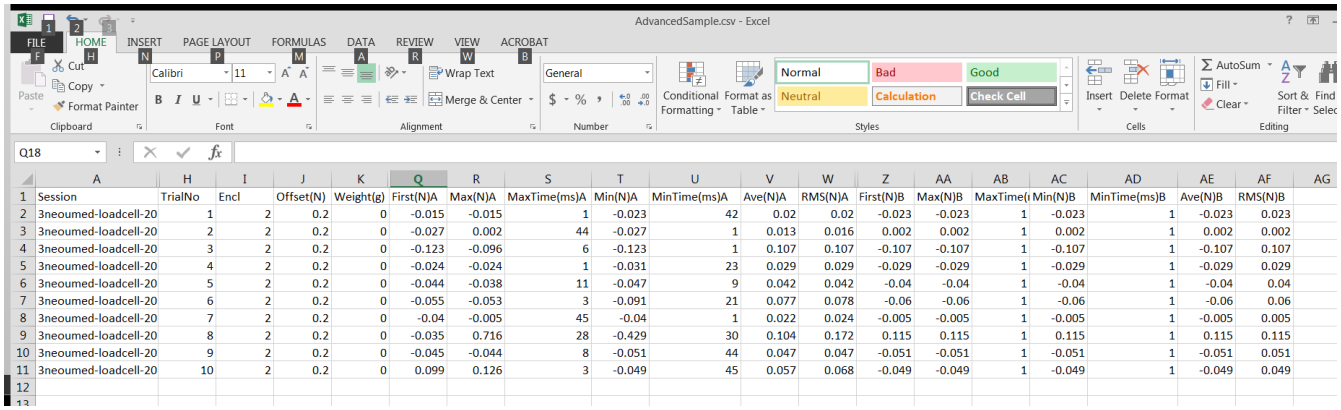


Figure 82 Reduced Output ADVANCED Data File Example

2.8 File Handling Tips & Techniques

There are several features that have been designed into the StartleMonitor System, that can help the user in their day-to-day use. These features include creating a Saved Session header to use repeatedly, using Saved Sessions as a method of pre-entering the entire information set for a particular study, and the ability to edit sessions and trials.

2.9 Using Saved Sessions

Figure 83 is an example of what might typically be retained in a Saved Session for repeated use. It has all parameters set and the Session & Enclosure Information fields have been left blank. In this manner, you will be able to re-open this Saved Session for repeated use, greatly reducing redundant keystroke entry. Using this method, you can create an entire library of Session designs. To save the information you simply Click on **File** then **Save As** and provide a unique name for the Saved Session. To use the file in the future, click on **File**, then **Open** and select the Saved Session of your choice and fill in the blank information fields.

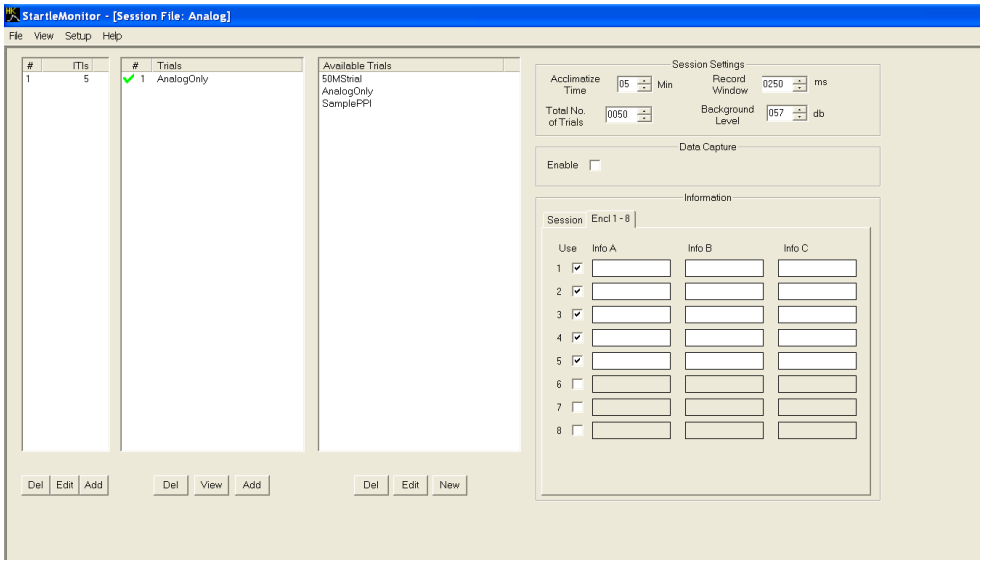


Figure 83 Typical Saved Session Screen Example

You can also create a set of Saved Sessions that include the Session & Enclosure information. This will enable you to pre-enter all information for a particular study in advance and then simply open and run those Saved Sessions on the day of the test.

2.10 Cautionary Note on Editing Sessions

The ***StartleMonitor*** System allows you to both edit Trials and edit existing Sessions. This feature enhances your ability to make changes easily to existing protocols. However, there is one particular editing rule that must be carefully observed. If you edit a Trial that has already been used in an existing session, the System does *not* automatically update the use of that trial in existing Sessions. For example, on the screen shown in Figure 84 you will note the session uses the Trial **PPI65+2dB**. If you were to edit the Trial **PPI65+2dB** from the existing **Available Trials** list, it would cause any *future* sessions to contain the newly edited information. However, the existing **PPI65+2dB** trial in the **Trials** list would *not* contain the new information. If the existing trial is saved under the same name, the corresponding trial in the **Trials** list will have a red mark next to it and a red field with the statement **Differences Alert** will appear at the bottom of the list (Figure 84). For the newly edited Trial information to be used in any existing trials you will need to delete the use of the related trials in the **Trials** list and then re-select those trials for use in the session.

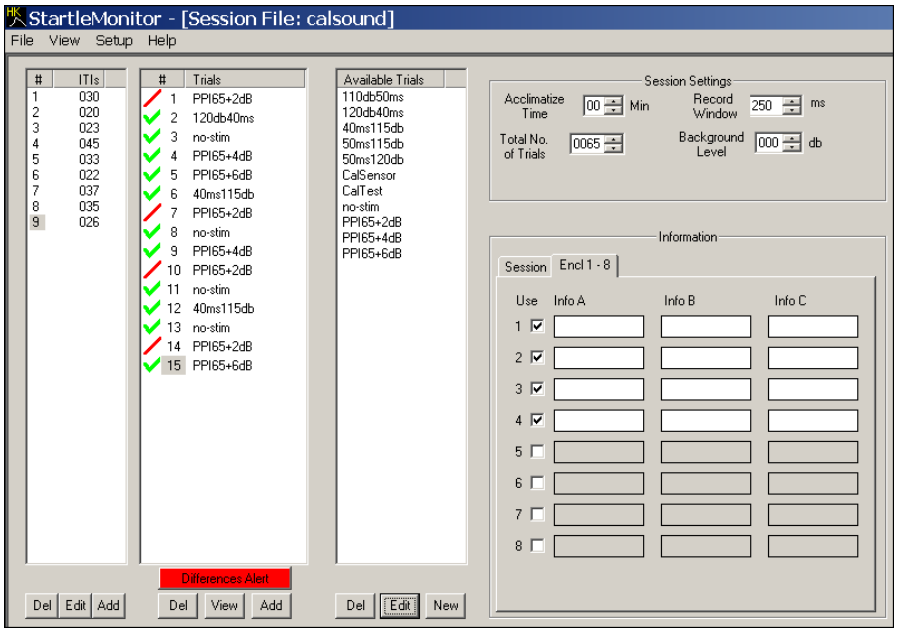


Figure 84 Differences Alert Example

2.11 Types of Session Files

When you create a Saved-Session file ***StartleMonitor*** will create a file with the name you provide and an extension of **_kssmses** (session header file.). Once you actually run this Saved Session to collect animal data *StartleMonitor* will create a new file with the same base name and a new file extension of **kssmdat** (data file). You will be able to open the original Saved Session file as many times as needed and run new studies (sessions), but you will have

to provide a new base name before you run the session, i.e., ***StartleMonitor*** will not allow you to overwrite an already existing data file. Note, however, it will allow you to overwrite an already existing Saved Session file.

2.12 Session and Trial Examples

Basic Habituation Session (typical for mice)

Session/Trial Parameters

- 5-minute acclimation
- 500 ms record window
- 65 dB background white noise
- 50 identical trials of basic acoustic startle
- 8 second ITI (only one ITI type)
- 120 dB white noise for 40 millisecond duration

Figures 85 and 86 are examples of what a typical trial and session, respectively, should look like.

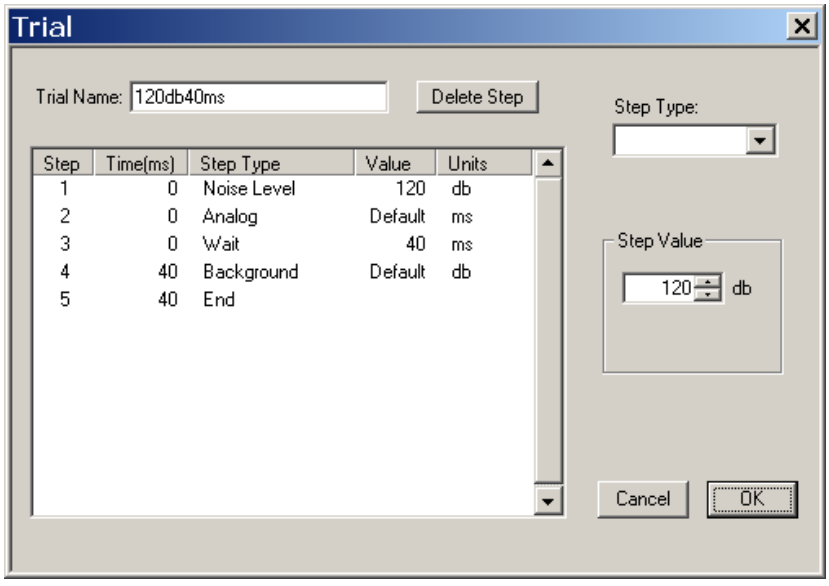


Figure 85 Basic Habituation Trial Programming Screen Example

Figure 86 is an example of how the Session design should appear.

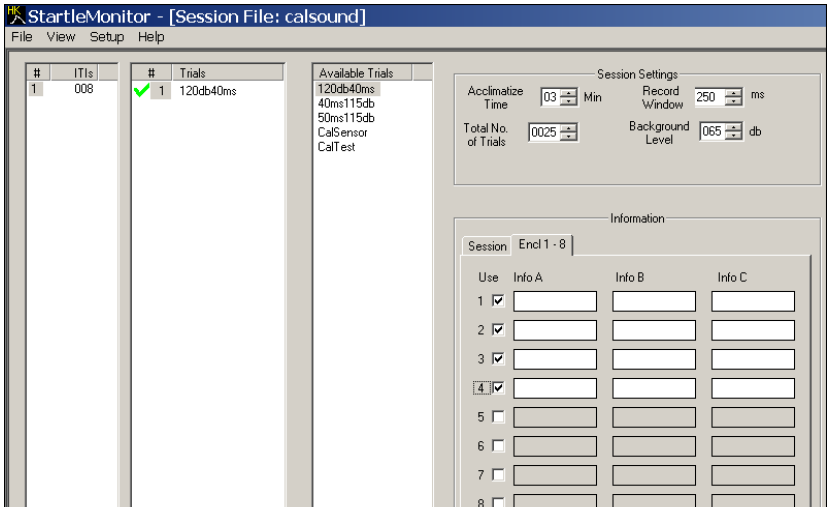


Figure 86 Basic Habituation Session/Trial Editing Screen Example

Pre-Pulse Inhibition Trial (PPI) – Basic Demonstration Example 2, 4, & 6 dB above background

Figure 87 shows a basic 2 dB above background (65 dB) PPI trial.

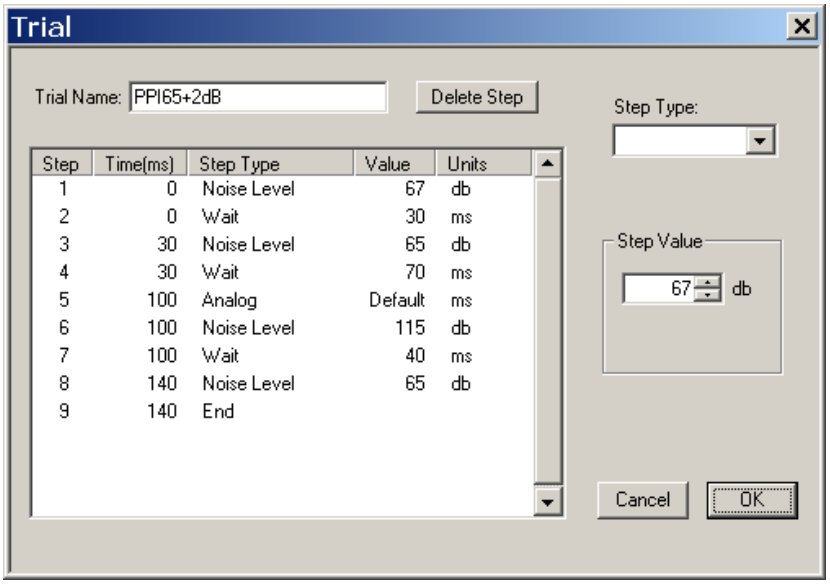


Figure 87 Pre-Pulse Inhibition Trial (PPI) Programming Screen Example

Typically, there would be 1 or 2 more PPI trial types containing different levels of pre-pulse values, e.g., 4 & 6 dB above background. In the session there would also be no-stim trials,

i.e., trials with no stimulus at all but would contain an analog recording and additional trials with basic acoustic startle trials, e.g., 115 dB 40 ms white noise only trials. Figure 88 is an example of how a typical PPI session might look.

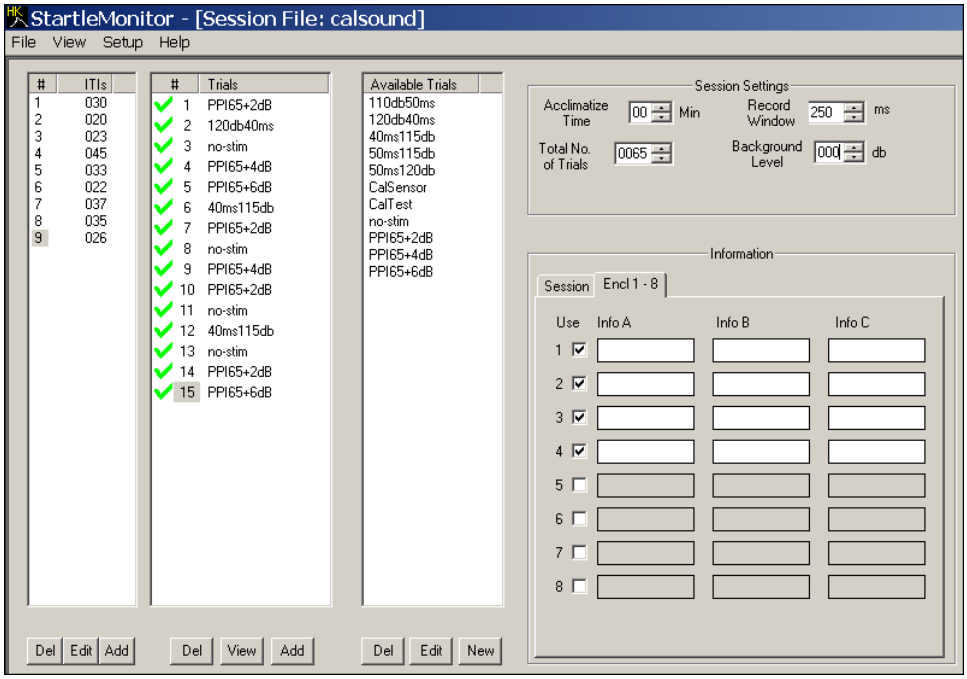


Figure 88 Pre-Pulse Inhibition (PPI) Trial
Editing Screen Example

The previous example is offered for demonstration purposes only to show how to create a session that contains the essential elements of PPI sessions. Your particular design may vary significantly depending on your objectives. For example, you may be adjusting the width of the pre-pulse depending on the strain of animal selected and/or adjusting the onset-to-onset spacing between the beginning points of the pre-pulse and startle pulse of white noise.

2.13 Importing Animal Information Using the Import Subjects Menu Selection

Instead of manually typing in each of the three animal information fields you can import the data directly from a Comma Separated Values file. There are a few simple rules you need to follow to use this feature.

1. Save the Subject information in a Comma Separated Values file.
2. The first column is always the number of the station.
3. The 2nd, 3rd, and 4th columns will be imported into Subject *Info A, Info B, & Info C,* respectively.
4. You can put up to 16 enclosures of information sorted in any order.
5. You will be prompted if the software finds any problems with the format.

This is accomplished as follows:

1. Open **Notepad** by clicking on **All Programs, Accessories**, and then **Notepad** from your computer.
   Assume you want to import the following data.

Animal Number	Weight	Sex
#123	30gm	male
#124	30gm	female
#200	32gm	female
#201	33GM	male

   Enter your information in the same format as described in the following example and name the file *SubjectList1.csv*.

   2,#123,30gm,male
   1,#124,30gm,female
   3,#200,32gm,female
   4,#201,33GM,male

2. Save the file under **KinderScientificData/StartleMonitor/Files** on your **C** drive (Figure 89).
3. Open a ***saved session***.
4. From the Session screen click on **Setup** and then **Import Subjects**.
5. The following screen will appear:

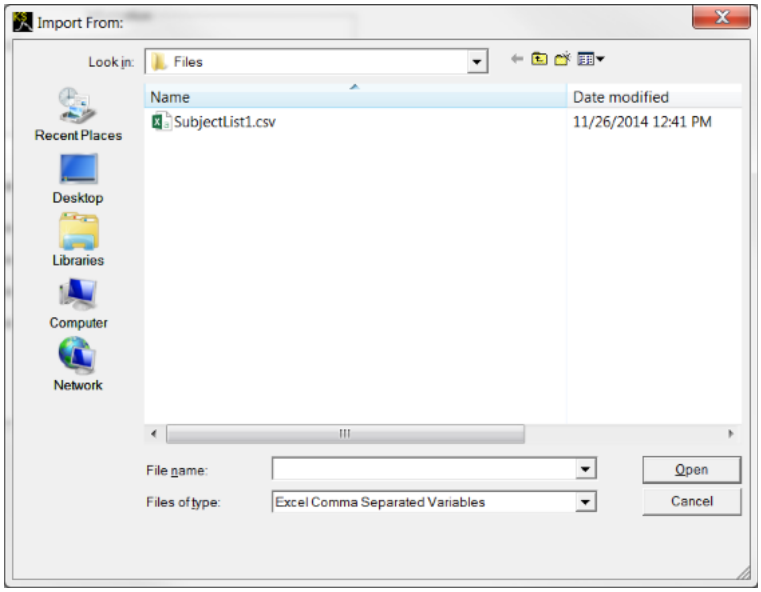


Figure 89 Import Subjects Location Window

6. Highlight the file saved in the Imports Subjects Location Window (Figure 89) and click **Open**.
7. The Session screen will now have the enclosure information fields filled in as shown in the following example (Figure 90):

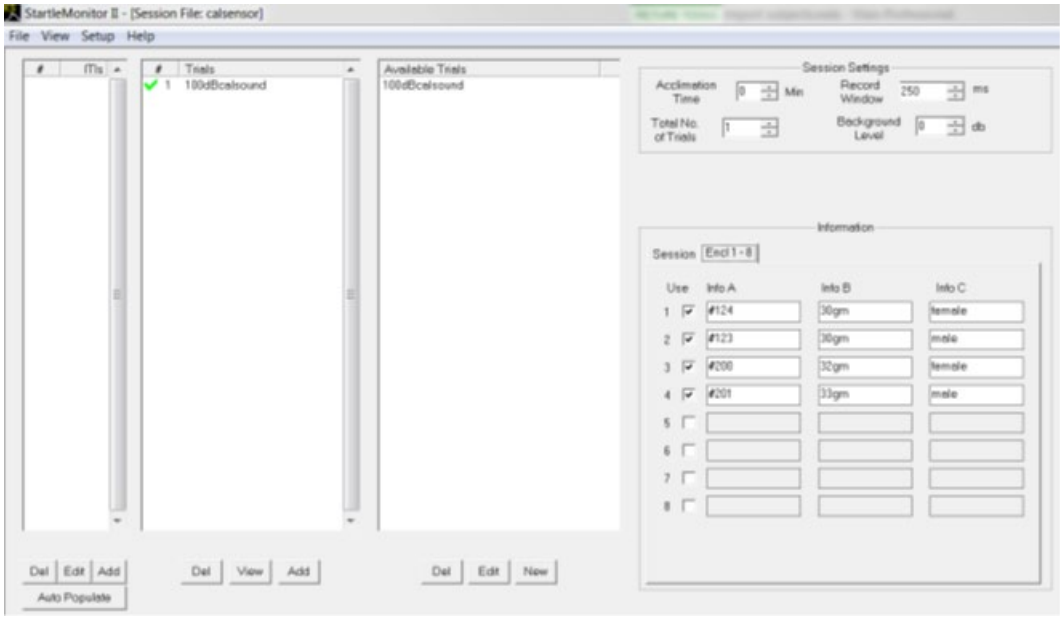


Figure 90 Enclosure Information Fields Filled

2.14 Auto-Reducing Session Files

You can set the System to automatically reduce each session as it finishes. To select this feature, go to the main Window and click on Setup and Runtime Configuration. In the Auto Reduce to CSV after Capture field select either Traditional or Advanced. This is shown in Figure 91.

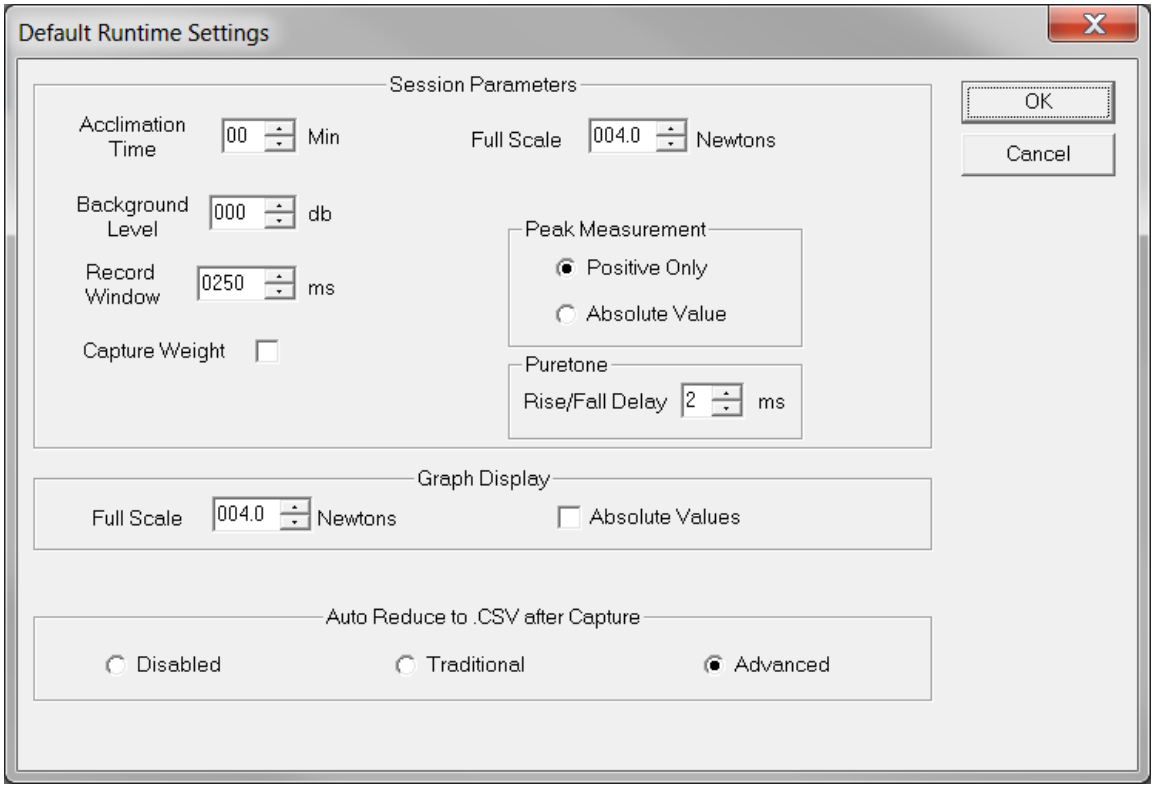


Figure 91 Default Runtime Settings Screen

With this selected, a CSV file with the same base name you use for the raw data file will be created containing the reduced data.

2.15 How to Generate a Graph of a Reduced File

A graph of any reduced file can be displayed by referring to Figure 92 and following the instructions.

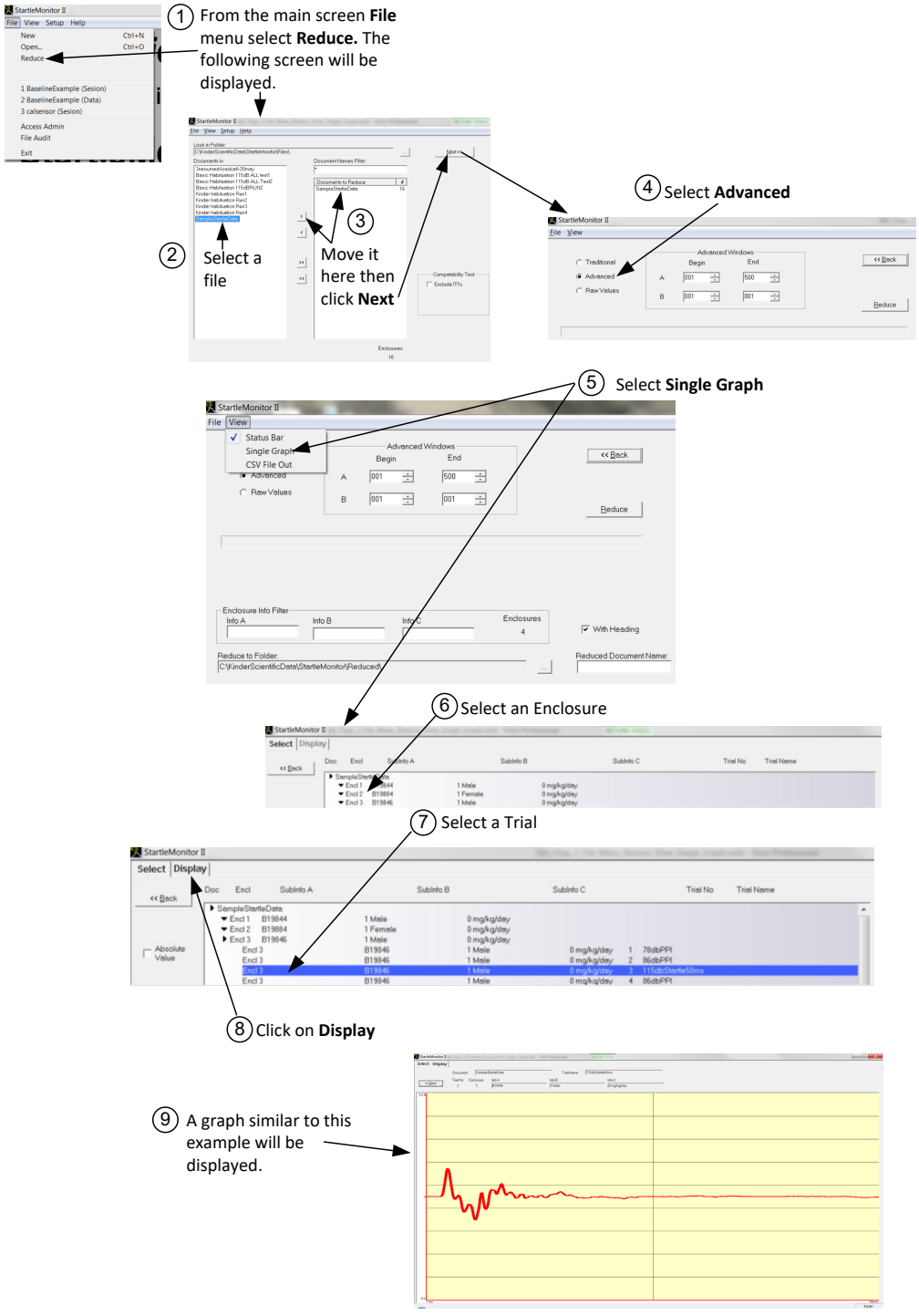


Figure 92 Graphing a Reduced File

2.16 GLP Considerations

Much consideration has been given to how Kinder Scientific products will service the needs of GLP level labs. Along with a highly detailed effort to provide all the documentation, training and archiving needs there has also been an effort to build-in certain features that will ultimately service the needs for 21 CFR Part 11 for the FDA. This mandate requires GLP labs to ensure that data files contain audit trails, electronic signatures and much more. To help with this requirement, ***StartleMonitor II*** products have all related information stored in the raw data file. The configuration used, information input, operators name and more are included in each raw data file!

2.17 Printing Session Information

Most labs require some type of audit trail containing electronic signatures and much more. To help with this requirement, ***StartleMonitor*** products have all related information stored in the raw data file. The configuration used, information input, operators name and more are included in each raw data file.

2.18 Security of the Raw Data

A key feature related to the ***StartleMonitor*** System's ability to help you meet the FDA Part 11 requirements is that once the raw data is taken, no one, not even anyone at Kinder Scientific and not even with any backdoor or secret key, can change or alter the raw data in any way. Once the raw data is taken and a .ksmmdat file created (the raw data file), it cannot be tampered with. This feature is part of the FDA requirement to keep the data pristine.

A corollary to this is that information related to that raw data file (e.g., the System configuration, the Session data including information about the animals and the Operator) are all embedded in the raw data file. Because the raw data file cannot be tampered with, this information related to the raw data also cannot be tampered with; it is embedded with the raw data.

In the data reduction menu, you can obtain a printout of an individual session as follows:

1. Go to the first data reduction screen as shown below (Figure 93).

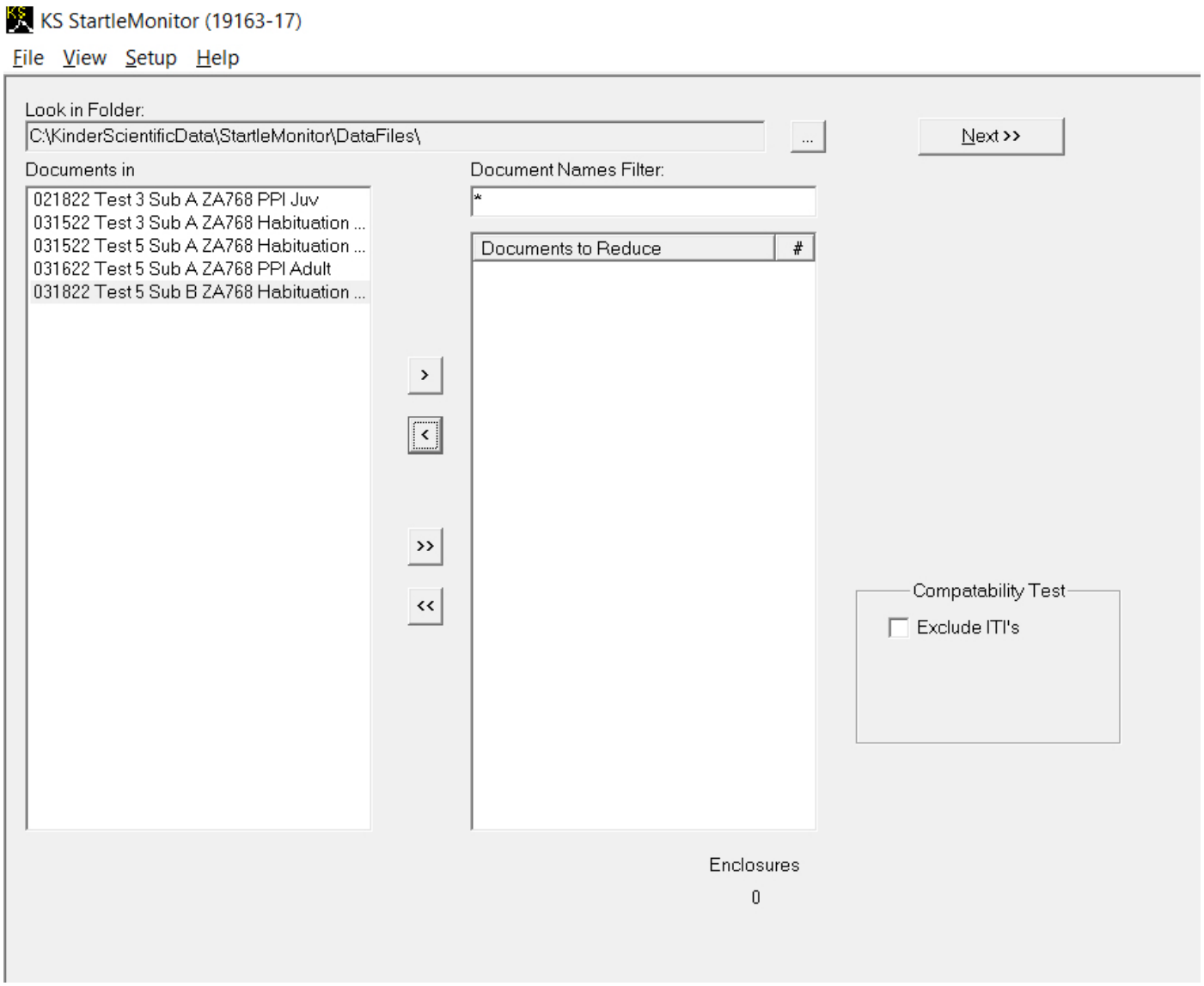


Figure 93 First Data Reduction Screen

2. Select one or more individual sessions in question from the **Files in Folder** list.

3. Move the selected file or files into the **Documents to Reduce** list by hitting the ">" button to move just the selected files. To move all the files listed in the **Document in** window, push the ">>" button.

4. Go to the second data reduction screen shown below (Figure 94).

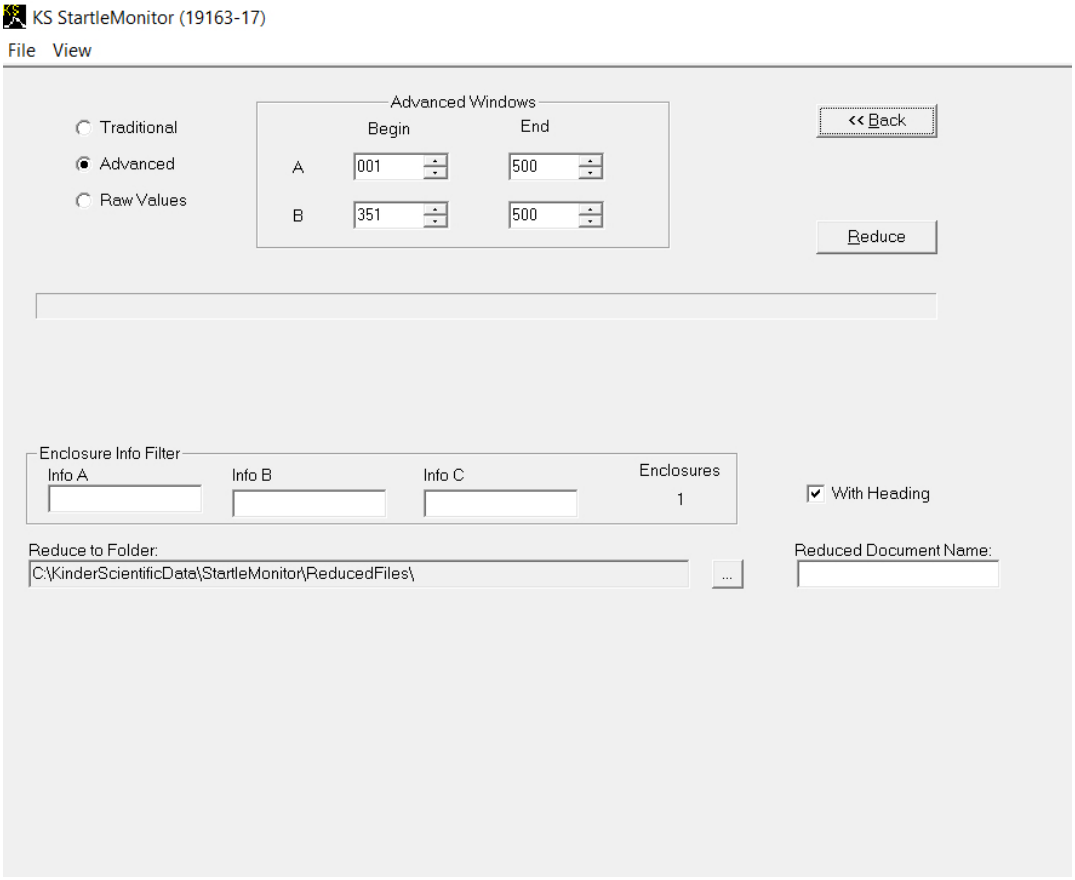
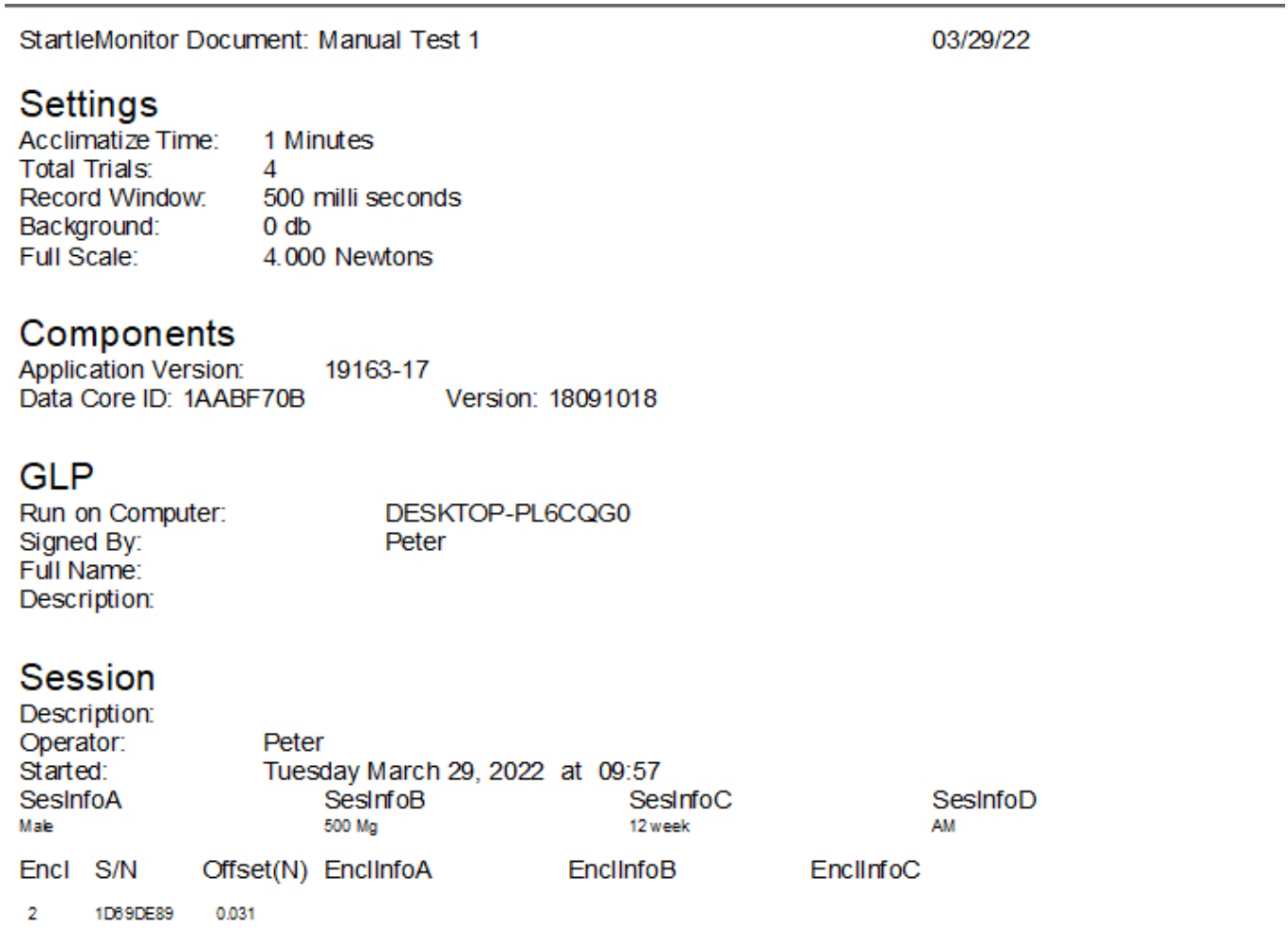


Figure 94 Second Data Reduction Screen

5. Click on the **File** pull-down menu and then click on **Print**. An example of a session printout is shown in Figure 95.



StartleMonitor Document: Manual Test 1 03/29/22

Settings

Acclimatize Time: 1 Minutes
Total Trials: 4
Record Window: 500 milli seconds
Background: 0 db
Full Scale: 4.000 Newtons

Components

Application Version: 19163-17
Data Core ID: 1AABF70B Version: 18091018

GLP

Run on Computer: DESKTOP-PL6CQG0
Signed By: Peter
Full Name:
Description:

Session

Description:
Operator: Peter
Started: Tuesday March 29, 2022 at 09:57

SesInfoA	SesInfoB	SesInfoC	SesInfoD
Male	500 Mg	12 week	AM

Encl	S/N	Offset(N)	EnclInfoA	EnclInfoB	EnclInfoC
2	1D89DE89	0.031			

Figure 95 Session Printout Example

2.19 The Audit Function

The audit function IS ONLY FOUND IN THE GLP VERSION OF THE STARTLEMONITOR SOFWARE. As described in this Section 2.19 and as demonstrated in Figure 95, the audit function displays the characteristics of the raw data including the System Settings (e.g., Acclimation Time, Total Trials, Record Window length, Background Noise and Full Scale Settings), StartleMonitor software build number, the serial number and firmware build of the Behavioral System Core (BSC), the Computer ID number running the software, the Microsoft ID name, description and electronic signature of the person signed in to run the System, the Session Description, Operator, start date and time of the Session and, for each enclosure, the serial number of the ***StartleMonitor*** chamber, the Offset and up to four

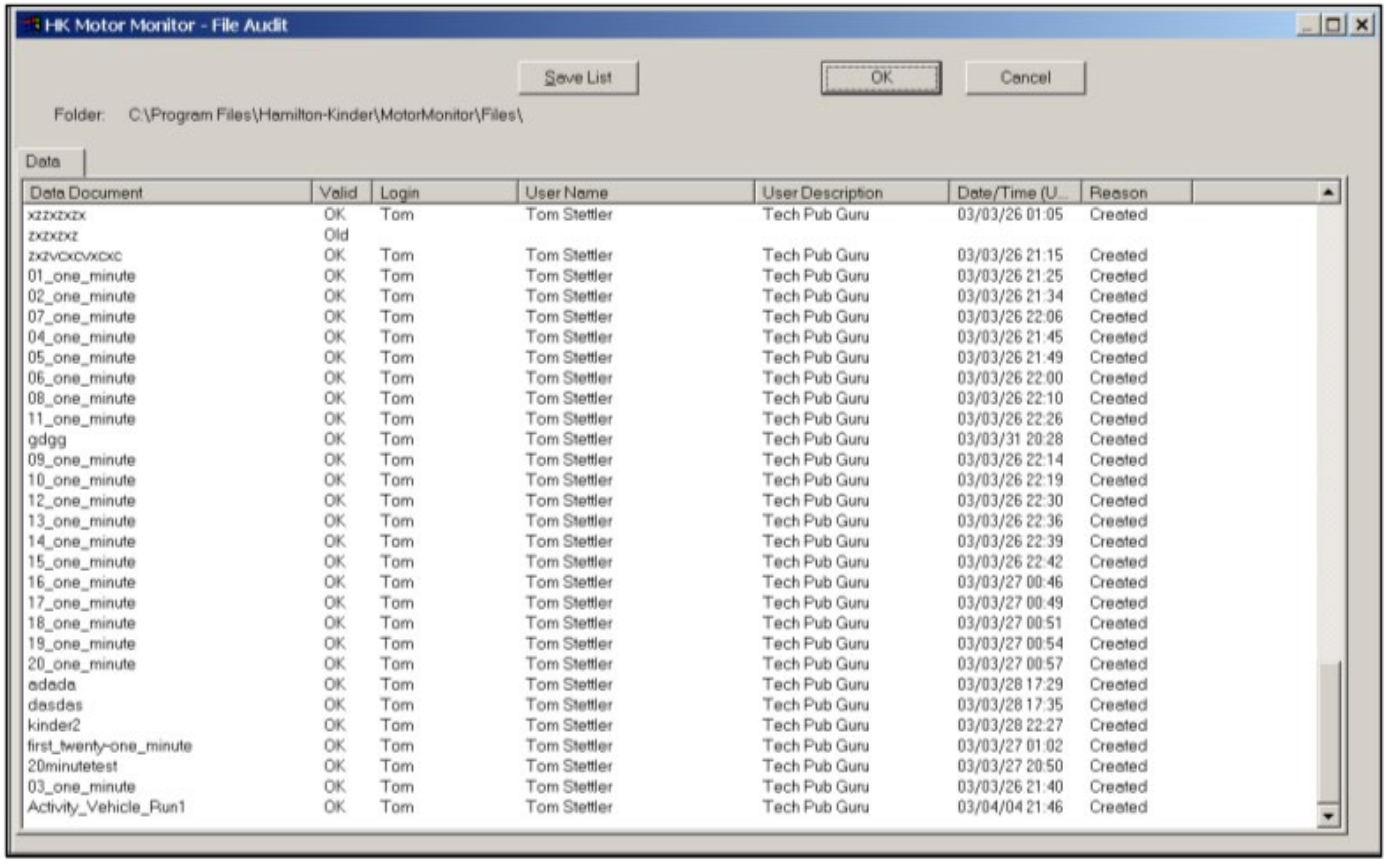
additional bits of information related to the animal and the test (e.g., animal ID number, animal sex, medicament dosage, stage of the trial).

2.19.1 Using the GLP Audit Features

The GLP Audit function is fully automated and accessed by clicking on **File** from the main screen and then selecting **File Audit** (Figure 96).

Figure 96 Accessing the Audit Function

The function will automatically run an audit on the designated files and display the results on your screen as shown in Figure 97.



Data Document	Valid	Login	User Name	User Description	Date/Time (U...	Reason
xzzxzxzx	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 01:05	Created
zxzxzxz	Old					
zxzvcxcvxcxc	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 21:15	Created
01_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 21:25	Created
02_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 21:34	Created
07_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 22:06	Created
04_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 21:45	Created
05_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 21:49	Created
06_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 22:00	Created
08_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 22:10	Created
11_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 22:26	Created
gdgg	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/31 20:28	Created
09_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 22:14	Created
10_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 22:19	Created
12_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 22:30	Created
13_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 22:36	Created
14_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 22:39	Created
15_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 22:42	Created
16_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/27 00:46	Created
17_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/27 00:49	Created
18_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/27 00:51	Created
19_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/27 00:54	Created
20_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/27 00:57	Created
adada	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/28 17:29	Created
dasdas	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/28 17:35	Created
kinder2	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/28 22:27	Created
first_twenty-one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/27 01:02	Created
20minutetest	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/27 20:50	Created
03_one_minute	OK	Tom	Tom Stettler	Tech Pub Guru	03/03/26 21:40	Created
Activity_Vehicle_Run1	OK	Tom	Tom Stettler	Tech Pub Guru	03/04/04 21:46	Created

Figure 97 GLP File Audit Screen

As can be seen in Figure 97, the audit report output contains seven fields. Part 11 requires that the FDA has access to these audit reports and the audit reports be sorted by field types. To meet this requirement, we provide an option to save the report as a **.csv** file. In this manner, the report (or multiple reports) can be easily sorted by any method desired. To save the report as a **.csv** file simply click on the **Save List** button once the report has finished running. Be sure to add the ".csv" suffix to the file name; this ensures that when you open the file, Microsoft knows to open it as a comma delimited file.

The following information provides a description of each of the seven data fields.

1. Data Document – This column provides the name of each raw data file that was included in the report. The report automatically includes all raw data files that are located in the current Default File Folder. If you are a member of the System Default Setups group

entered in the GLP Admin screen, you can view or change the folder and its path by clicking on **Setup** and then **Default Files Folder** from the main screen. A screen as shown in Figure 98 will appear.

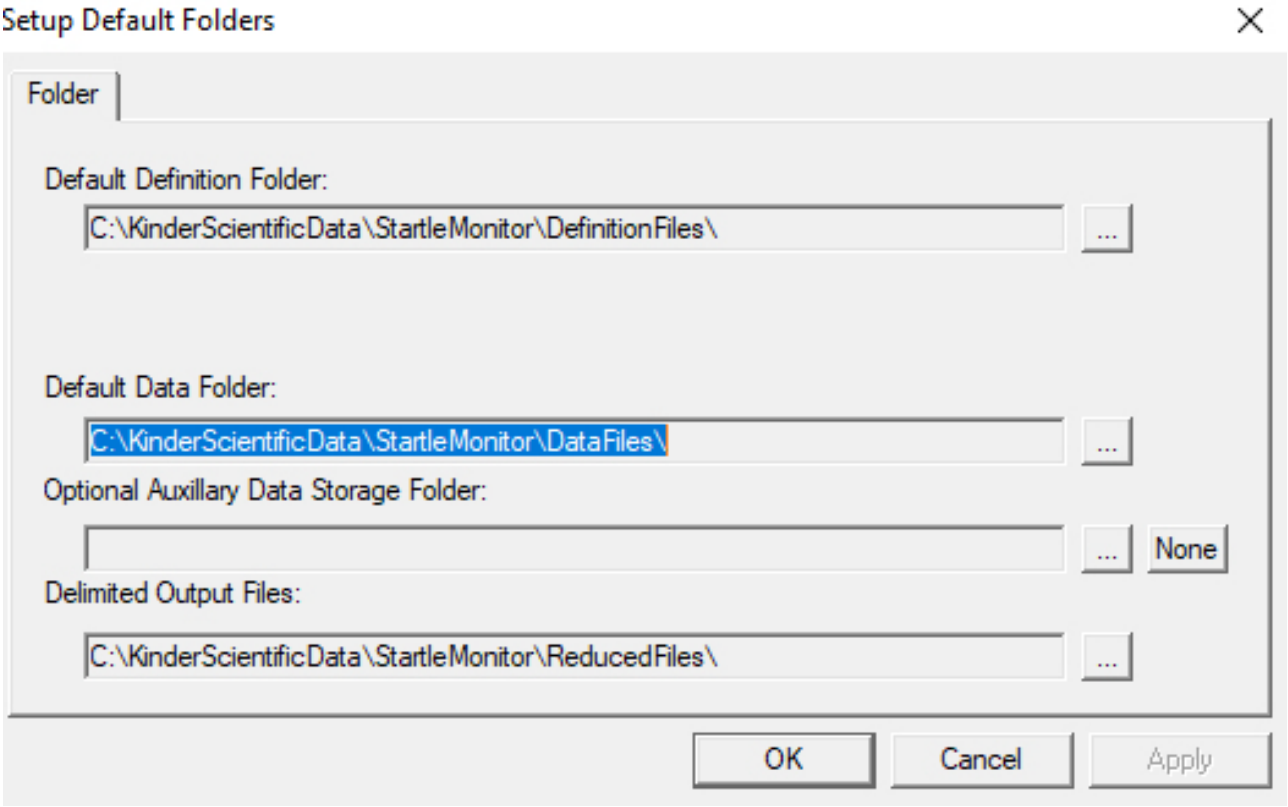


Figure 98 Setup Default Files/Folders Screen

NOTE

Changing the Default Data Folder will change which folder will be used to access the raw data when the Audit Report is run. Note that changing the Default Data Folder also changes where the StartleMonitor software stores any future raw data files. Accordingly, if you are using the same computer to perform an Audit as your technicians are using to run sessions, you will need to make sure to return this path to the original state.

2. **Valid –** Result of Checksum routine. We implemented checksum routines to answer the concerns about data integrity as files are moved across different media during the natural course of a study. The FDA has expressed concern over where an "original" raw data file was first stored. Their concern is a natural one and seems based on the

experience most computer users have had when file integrity becomes challenged during a copying process. To solve this question, we build a checksum into every raw data file at the closing of the data session. This checksum can then be used as a permanent check of the original file integrity. If a single bit or any combination of bits changes, the checksum will capture that event. The checksum routine is not intended to indicate what bit(s) has changed but rather provide validation that none have changed or an indication that some bit or bits have changed.

There are three possible results in this field:

- **Old** occurs when a data field is included that was run by an older non-GLP version of the ***StartleMonitor*** software.
- **OK** occurs when the checksum is still valid (i.e., there are no changes to the raw data). This results in a green checkmark next to the raw data file name.
- **Failed** occurs when the checksum indicates that some of the data has been changed from its original value. This results in a red "X" next to the raw data file name.

3. **Login –** Logon ID for the user who electronically signed the document.
4. **User Name –** Descriptive name of the user who electronically signed the document.
5. **User Description –** Windows Description of the user who electronically signed the document.
6. **Date/Time(UTC) –** Date/Time stamp (uses Universal Time Code) of electronic signature.
7. **Reason –** Reason for the electronic signature. Currently the only valid reason for a signature in our System is "Created." Nevertheless, the reason is provided to meet Part 11 requirements.

2.19.2 The GLP Admin Features

These features apply only to GLP versions of the StartleMonitor software. To access the GLP Admin Features, File on the StartleMonitor start page and then select **GLP Admin** from the dropdown menu. The **GLP Admin** screen will appear as shown in Figure 99.

There are two functions performed by the GLP Admin screen. These are group assignments and updating the annual License Key.

As previously described, control of access to the software functions must be entered by a valid Group Administrator to each function field where access is desired. Any user who is a member of the entered group will be granted access to that function. If a Group Membership field is left blank, no user will be granted access to that function. Only one group is permitted for each function. If a user needs access to multiple functions, then they must be members of each of the related groups.

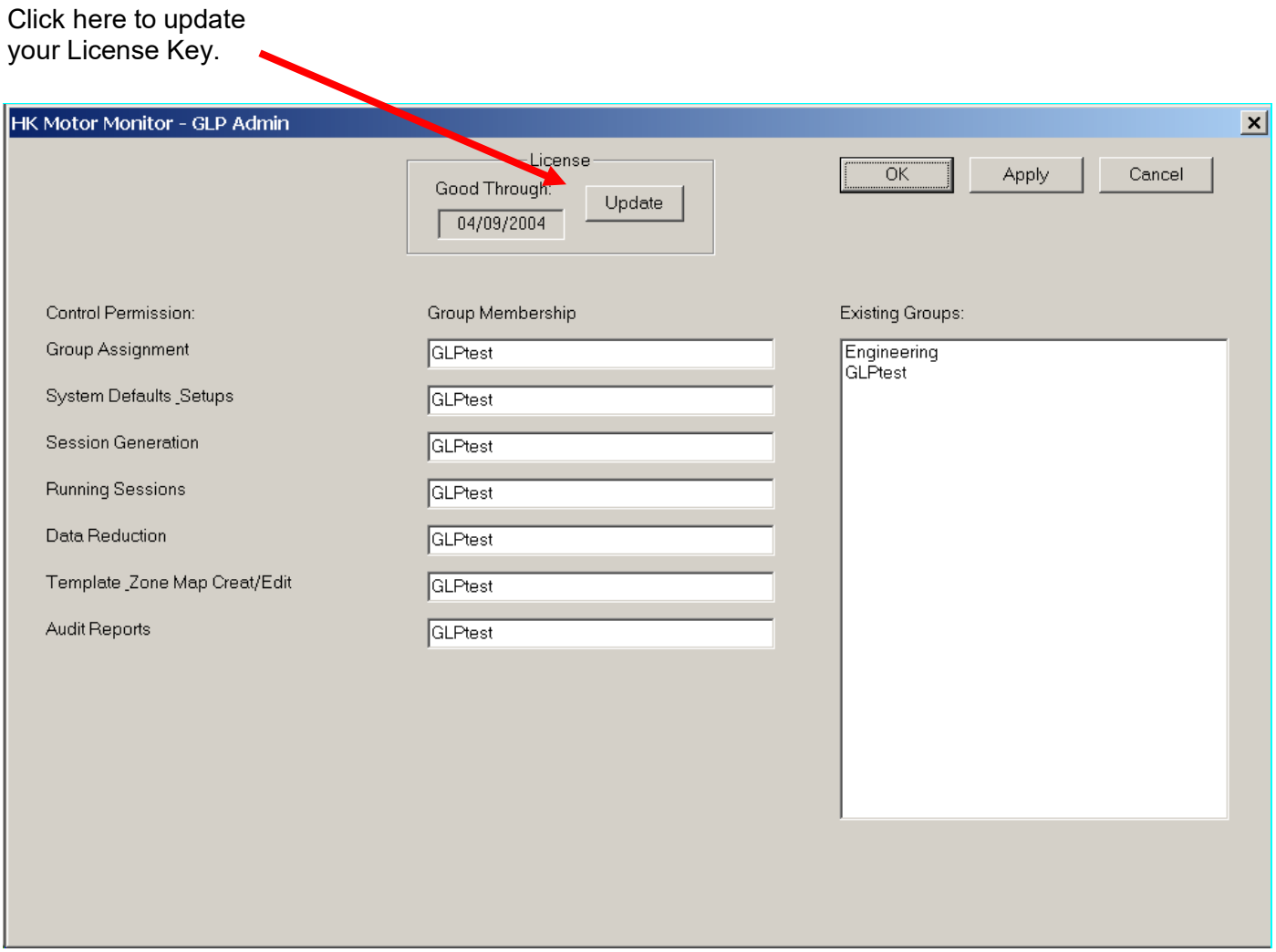


Figure 99 GLP Admin Screen

At the end of the Licensing period, the software will prohibit access to any user for running new sessions. All other features of ***StartleMonitor*** will remain available. In this way if your lab chooses not to re-new the software license, your staff will still be able to access all audit and data reduction features. This is provided so that you may meet your ongoing requirements for GLP data archiving and retrieval.

When your software license expires, you will need to contact Kinder Scientific customer service to update your License Key. We maintain the original Computer Code in your customer file so you will not need to supply it again unless you move the product to a different computer. Thirty days before the expiration date the message shown in Figure 100 will appear when you open the software.

Figure 100 Software License Expiration Warning Message

You will need to submit a new purchase order for renewal and obtain a new License Key from Kinder Scientific customer service. To update your License Key, click on the **Update** key on the GLP Admin screen. This will cause the License Administration screen as shown in Figure 101 to appear. Enter your License Key here, then click on **OK.**

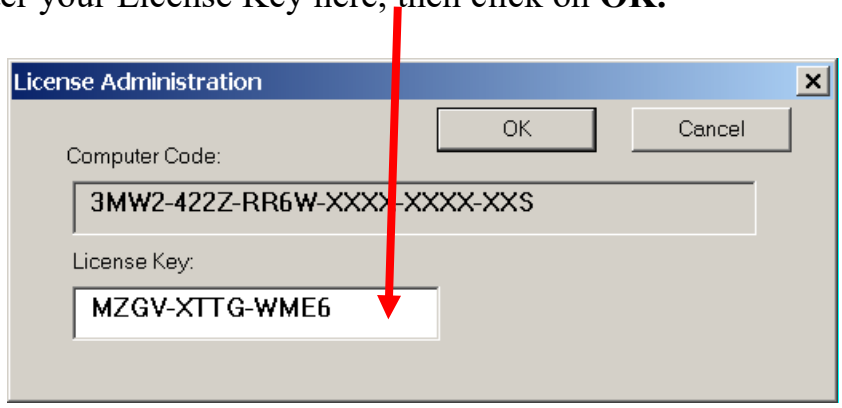


Figure 101 License Administration Screen

Enter the new License Key and click on **OK**. Your license will now be valid for an additional year (or for the term submitted on the purchase order).

2.19.3 Answers to Questions About the GLP Audit Features

1. **Does the audit information show the changes from the Session Template?** The audit information shows precisely what the Session Template was for that Session. Hence, there is no change from the Session Template. Instead, the Session Template for that Session is the Session Template.

2. **How do I find or access the Audit information?** To access a copy of the Audit Report, at the main software page click on File, then New from the dropdown menu and then select Reduce from the next dropdown menu (Figure 102).

Figure 102 Accessing File Audit Function

This opens the File Audit Page (Figure 103).

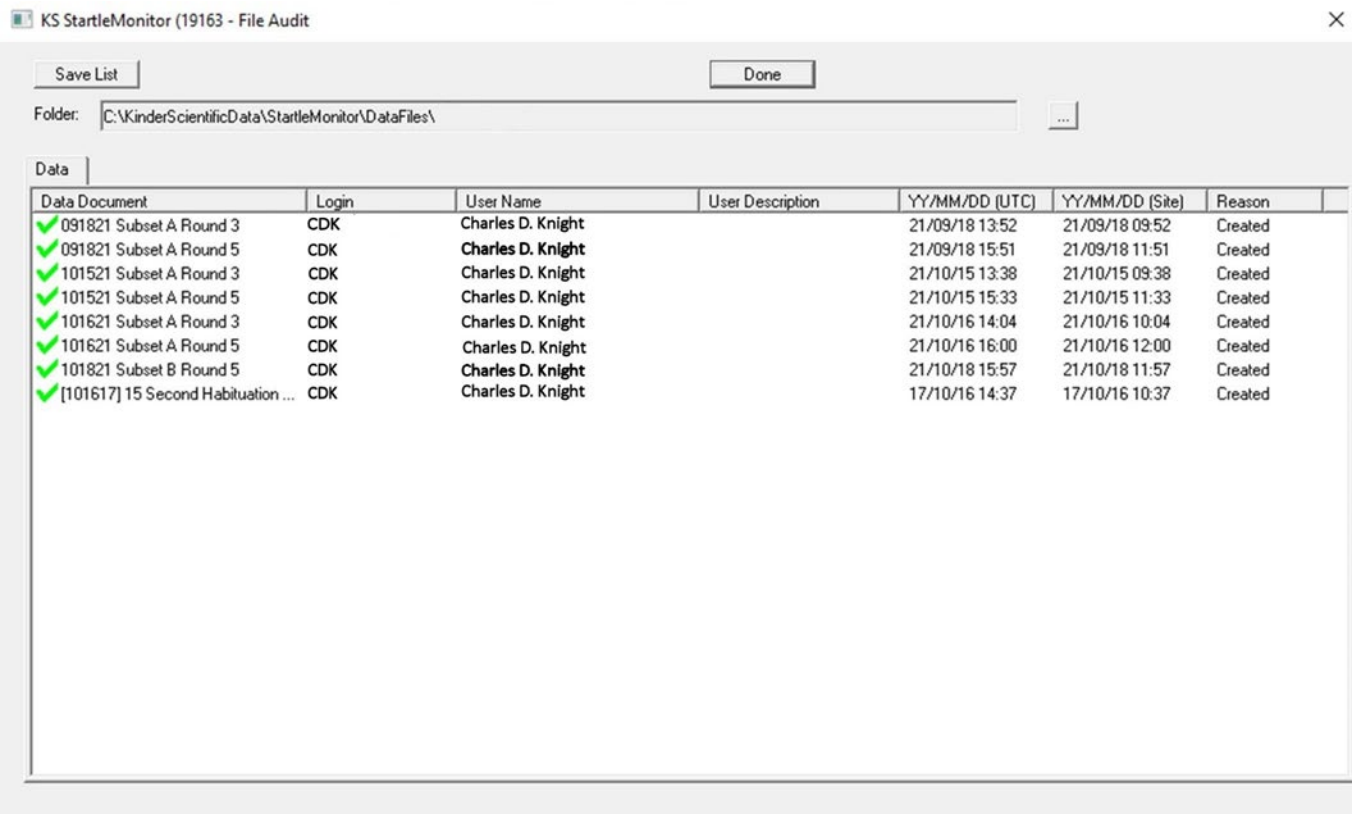


Figure 103 File Audit Screen

3. **Is there an Audit trail?** The information for each Session is displayed. Since this information cannot be altered, comparing the information from successive Sessions reveals the changes between Sessions.

CHAPTER 3

CHANGING THE FULL-SCALE SETTING, CALIBRATING THE SYSTEM & SOUND LEVEL CALIBRATION INSTRUCTIONS

3.1 Introduction to Calibration

CAUTION

While performing the steps in this chapter there are two critical adjustments that will affect the validity of your data. These adjustments are the offsets. If these adjustments are not properly made, YOUR DATA WILL BE AT RISK. Make sure you understand how to accomplish the following two goals before using the System.

- **Calibrate the System to Newton units of force.**
- **Remove all System offsets (tare) including the weight of the mechanical apparatus.**

The ***StartleMonitor System*** uses a 14-bit A/D (analog to digital converter) to convert the analog output of the System's load cell assembly into a digital signal that can be processed by the ***StartleMonitor*** software. The response portion of the System is a precision digital voltmeter with a Full Scale range of 5 volts. Because the transducer creates only fractions of volts, the signal must be amplified before being presented to the A/D converter. This portion of the circuit is traditionally called a "conditioning circuit." An adjustment potentiometer with a precision vernier dial is provided at each station for calibration adjustment. (The adjustment potentiometer is labeled "13" in the drawing of the SCM100 Service Pack of Figure 2.) This vernier dial setting functions like a "volume" control for the conditioning circuit. When performed as will be described hereafter, adjusting the vernier dial calibrates the System to Newtons.

The Full Scale Setting determines the System's overall sensitivity and, when set properly, provides the best possible accuracy. In other words, the 14-bit A/D converter provides 16, 384

total bits across the 5-volt range of the load cell output. In order for the data produced to be the most accurate, the System must be adjusted so that the entire animal response is spread over the entire 16,384 bits and not forced to be recognized by a subset of those bits (e.g., half the bits or 8192 bits) as could happen were the Full Scale Setting incorrectly set. You will need to become familiar with the System before choosing a different Full Scale setting than the ones previously recommended.

3.2 Determining Full Scale Setting

If the Full Scale Setting being used for a particular Session results in an over-range condition (see Section 2.7), the Full Scale Setting should be increased. Simply increase the Full Scale Setting by 20%, run the Session again and see if an over-range condition, or close thereto, still exists. Continue this process until there is no over-range condition and there is a safety margin as described hereafter. A proper Full Scale Setting will result in the highest response reading reaching *no more* than 75-80% of the Full Scale Setting. For example, if the highest response recorded is 3.0 Newton, then a Full Scale Setting of 4.0 Newton would be appropriate to include a 25% safety margin or 3.75 for a 20% safety margin.

Remember that an animal's expected maximum response is about 2-3 times its weight for adult rats, 2 – 5 times its weight for juvenile rats and 5 – 10 times for mice. So, for example with an expected 3.0 Newton maximum response in a mouse, we'd expect the animal to weigh between about 1/5 – 1/10 of that or about 0.6 – 0.3 Newton (about 30 – 60 gm). Converting this weight first to pounds (1 pound is equal to about 4.45 Newton) produces a weight in pounds of between about 0.07 and 0.13 pounds.

Of course, calculating what the animal's expected maximum response would be based on the animal's weight in grams would proceed in the reverse direction. For example, starting with a juvenile rat weighing about 100 gm, we would expect a typical response of between about 2 – 5 times the animal's weight: 200 gm – 500 gm. Converting this to Newton produces a predicted animal response of about 2 – 5 N.

If, after using the recommended settings, you find the highest responses recorded are less than 50% of the Full Scale Setting, you may want to consider decreasing the Full Scale Setting. The data you have already collected will easily provide the answer.

The paradigm you are performing may affect your choice for the Full Scale Setting. For example, both tactile (air puff) and fear potentiated (foot shock) startle paradigms typically induce larger responses than basic acoustic startle.

The following is a list of items when considering checking or changing the Full Scale Setting.

- Animal size – mouse versus rat.
- Animal age – young juvenile versus mature adults.
- Animal weight – light versus heavy.
- Animal condition – strong and healthy versus weak, infirm or obese.
- Fear Potentiated Startle – The basic paradigm should demonstrate a larger than basic acoustic startle.
- Tactile – Air puff presentation will typically produce larger responses than acoustic startle.

3.3 Calibrating the System

3.3.1 Basic Tools

Locate the Sound Pressure Meter, adjustment tool, and calibrator weights as shown in Figure 104.

Figure 104 Calibration Items

3.3.2 Understanding Offsets

System offsets are a natural part of using load cells as force transducers. Just as you would experience when purchasing items from a deli, a tare function (i.e., an allowance made for the weight of the restrainer in order to determine the net weight of the animal) must be performed to bring the measurement system into balance prior to use. This tare function is performed automatically by the StartleMonitor software before each session is run. The two main components considered when performing the tare function are the subject animal weight and the weight of the restrainer. Combined, these weights necessarily reduce the full measurement

span of the System and must be taken into consideration with choosing the Full Scale Settings. Figure 105 demonstrates this effect.

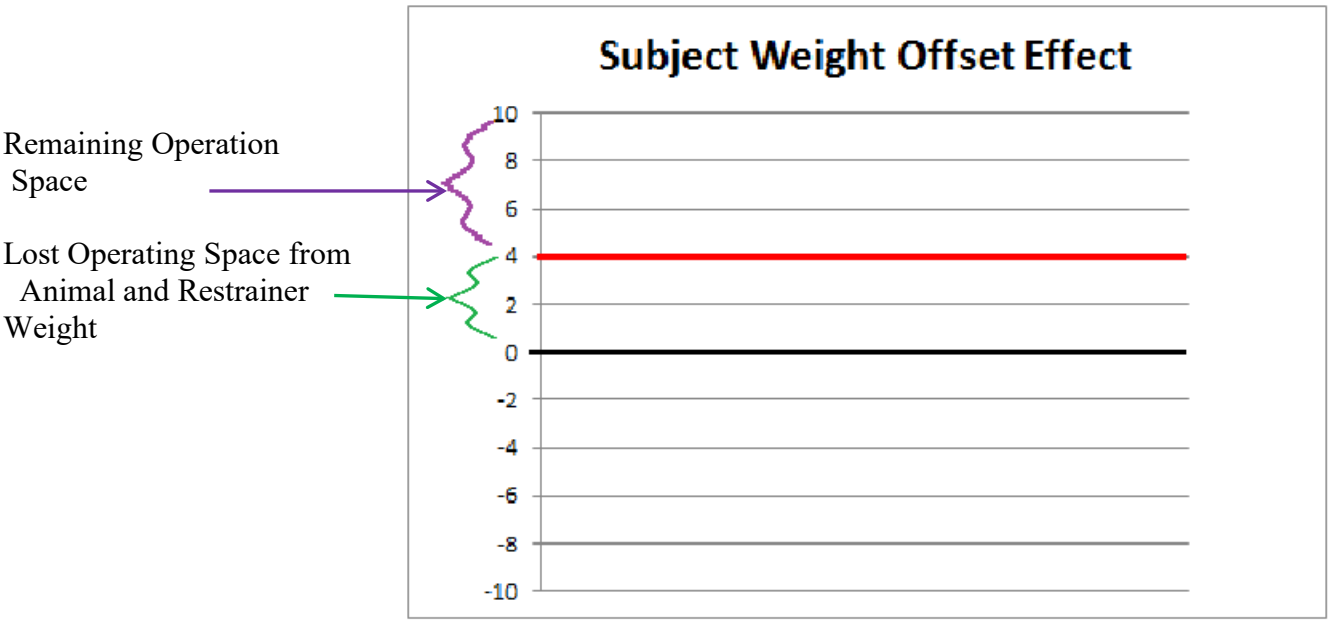


Figure 105 Subject Weight Offset Effect

In the example illustrated above, the System's Full Scale Setting has been set to 10 Newton. In this example, the animal and restrainer combined have a weight of 4 Newton (400 grams since 100 gm ≈ 1 Newton). Without the combined animal and restrainer weight, the System is at Zero (**black** line) and with the animal and restrainer weight included, the System measures 4 Newton (**red** line). The user should anticipate responses of about 2 – 3 times its weight for an adult rat, about 2 – 5 times its weight for a juvenile rat and 5 – 10 times its weight for a mouse.

Example #1
A 4 Newton animal (adult rat) would be expected to have a response of 2 – 3 times its weight or a maximum of 12 N. So, the total "weight" measured by the load cell will be the animal's weight (4 Newton) plus the weight of a restrainer (typically about 0.45 pounds (2 N) for a mouse restrainer and from 0.5 – 2 pounds (2.5 N – 9.5 N) for various rat restrainers) plus the expected startle response (3 times the animal weight or 12 Newton) for a total (4 + 5 + 12) of 21 Newton. This is considerably less than the 44.4 Newton capacity of the 10-pound load cell.

Example #2
In another example, suppose you have a 1 kg rat. Obviously, this is a large rat! 1 kg equates to 1000 gm which equates to 10 Newton. A 10 Newton animal (adult rat) would be expected

to have a typical response of 2 – 3 times its weight or about a typical maximum of 30 N. So, the total "weight" measured by the load cell will be the animal's weight (10 Newton) plus the weight of a restrainer (in this case, because of the size of the rat, the restrainer would be the largest with a corresponding weight of 2 pounds (9.5 N)) plus the expected startle response (3 times the animal weight or 30 Newton) for a total (10 + 9.5 + 30 Newton) of 49.5 Newton.

Of course, 49.5 Newton exceeds the 44.5 Newton Full Scale Setting. Therefore, in this example it is possible (likely!) that the System will go over the maximum 10-pound range of the load cell and miss capturing the maximum values. In other words, the System will likely clip the maximum values that will result when the animal's startle response is captured.

Example #3
A 1 Newton animal (adult mouse) would be expected to have a response of 5 – 10 times its weight or a maximum of 10 N. So, the total "weight" measured by the load cell will be the animal's weight (1 Newton) plus the weight of a restrainer (typically about 0.45 pounds (2 N) for a mouse restrainer) plus the expected maximum startle response (10 times the animal weight or 10 Newton) for a total (1 + 2 + 10) of 13 Newton. This again is considerably less than the 44.4 Newton capacity of the 10-pound load cell.

In view of the foregoing, the recommended <u>minimum</u> Full Scale Setting equations are:

Minimum Full Scale Setting$_{\text{Adult Rat}}$ = Animal Weight (in Newton) + Restrainer Weight (in Newton) + 3X Animal Weight (Newton)

Minimum Full Scale Setting$_{\text{Juvenile Rat}}$ = Animal Weight (in Newton) + Restrainer Weight (in Newton) + 5X Animal Weight (Newton)

Minimum Full Scale Setting$_{\text{Mouse}}$ = Animal Weight (in Newton) + Restrainer Weight (in Newton) + 10X Animal Weight (Newton)

But remember that we recommend that the there be a "safety margin" of about 20 – 25% for the Full Scale Setting in case the animal has a particularly strong startle response. To achieve this safety margin, take the minimum Full Scale Setting as calculated above and divide the minimum Full Scale Setting by 0.75 or 0.80 (see section 3.2). In this case, the recommended Full Scale Setting for a 400 gm rat (4 Newton) with a 25% safety margin would be 24 N/0.75 or 32 Newton.

As a result, the recommended <u>minimum</u> Full Scale Setting equations that include a 25% safety margin are:

Minimum Full Scale Setting (25% Safety Margin)$_{\text{Adult Rat}}$ = (Animal Weight (in Newton) + Restrainer Weight (in Newton) + 3X Animal Weight (Newton))/0.75

Minimum Full Scale Setting (25% Safety Margin)$_{\text{Juvenile Rat}}$ = (Animal Weight (in Newton) + Restrainer Weight (in Newton) + 5X Animal Weight (Newton))/0.75

Minimum Full Scale Setting (25% Safety Margin)$_{\text{Mouse}}$ = (Animal Weight (in Newton) + Restrainer Weight (in Newton) + 10X Animal Weight (Newton))/0.75

Therefore, in Example #1 above the recommended Full Scale Setting including a 25% safety margin would be:

$$(4\ N_{\text{Animal Weight}}\ (400\ \text{gm}) + 5\ N_{\text{Restrainer Weight}}\ (500\ \text{gm}) + 12\ N_{\text{Animal Response}}\ (1200\ \text{gm}))/0.75_{\text{25\% Safety Margin}} = 28\ \text{N}\ (2800\ \text{gm}).$$

In Example #2 above the recommended Full Scale Setting including a 25% safety margin would be:

$$(10\ N_{\text{Animal Weight}}\ (1000\ \text{gm}) + 9.5\ N_{\text{Restrainer Weight}}\ (950\ \text{gm}) + 30\ N_{\text{Animal Response}}\ (3000\ \text{gm}))/0.75_{\text{25\% Safety Margin}} = 66\ \text{N}\ (6600\ \text{gm}).$$

Of course, if 49.5 N exceeds the 44.5 N limit of a 10-pound load cell, 66 N especially exceeds the 44.5 N limit! So, unless there is a scientifically based reason to expect the animal's response to be considerably lower than the typical response for an animal of this size, we recommend that you don't use this size animal in the StartleMonitor System.

In Example #3 above the recommended Full Scale Setting including a 25% safety margin would be:

$$(1\ N_{\text{Animal Weight}}\ (100\ \text{gm}) + 2\ N_{\text{Restrainer Weight}}\ (200\ \text{gm}) + 10\ N_{\text{Animal Response}}\ (1000\ \text{gm}))/0.75_{\text{25\% Safety Margin}} = 17\ \text{N}\ (1700\ \text{gm}).$$

WARNING

The maximum measurable response possible is the 10-pound (44.5 Newton) load cell capacity reduced by the animal and restrainer weight. In the previous examples, the maximum possible measurable response is NOT the full 10 pounds (44.5N) but rather the 10 pounds minus the weight of the animal and the restrainer.

The load cell in your StartleMonitor System is a 10-pound load cell. 10 pounds is about 44.5 Newton. Working backwards, using the recommended Full Scale Setting equation with the

25% safety margin described above produces a maximum animal weight, taking into account a restrainer weight of about 5200 gm, of about 7.0 Newton (~ 700 grams or ~ 1.6 pounds).

Using animals with weights above about 700 grams typically reduces the safety margin. Scientifically, this might still be acceptable if the larger animals aren't strong or active as might be the case with, for example, obese animals. With strong, active animals around or above this weight, you may see animal responses that exceed the capability of the load cell to detect (i.e., the combined animal and restrainer weight and animal startle response may exceed 10 pounds). Consequently, we recommend, particularly when using larger animals, that you check your data to be sure you aren't seeing clipping in the maximum animal responses.

3.3.3 Setting Zero Offsets

There are two types of zero offsets; circuit offset and mechanical offset. You can think of the circuit offset as the offset needed to remove the slight variation in the electronics of the entire station including the circuit board that controls the operation of each station but minus the electronics of the load cell assembly. The mechanical offset is the offset needed to calibrate the load cell assembly including the load cell itself along with its related circuit board. The circuit offsets should generally be very stable. We recommend the user check these values before each study to ensure proper values. The software automatically checks offset values before each session is run and will tare the System of these offset values. If the value exceeds 0.125 volts, a warning appears during an initial session startup. If the circuit offsets appear not to be stable, i.e., they need continual adjustments to meet the requirement, please contact the factory at Support@KinderScientific.com for customer service.

3.3.4 Circuit Offsets

Step 1. Disconnect all sensing plates.

Step 2. From the main window, Click on **View** then **Diagnostic**, then **View Actual Voltage**. The following screen will appear (Figure 106).

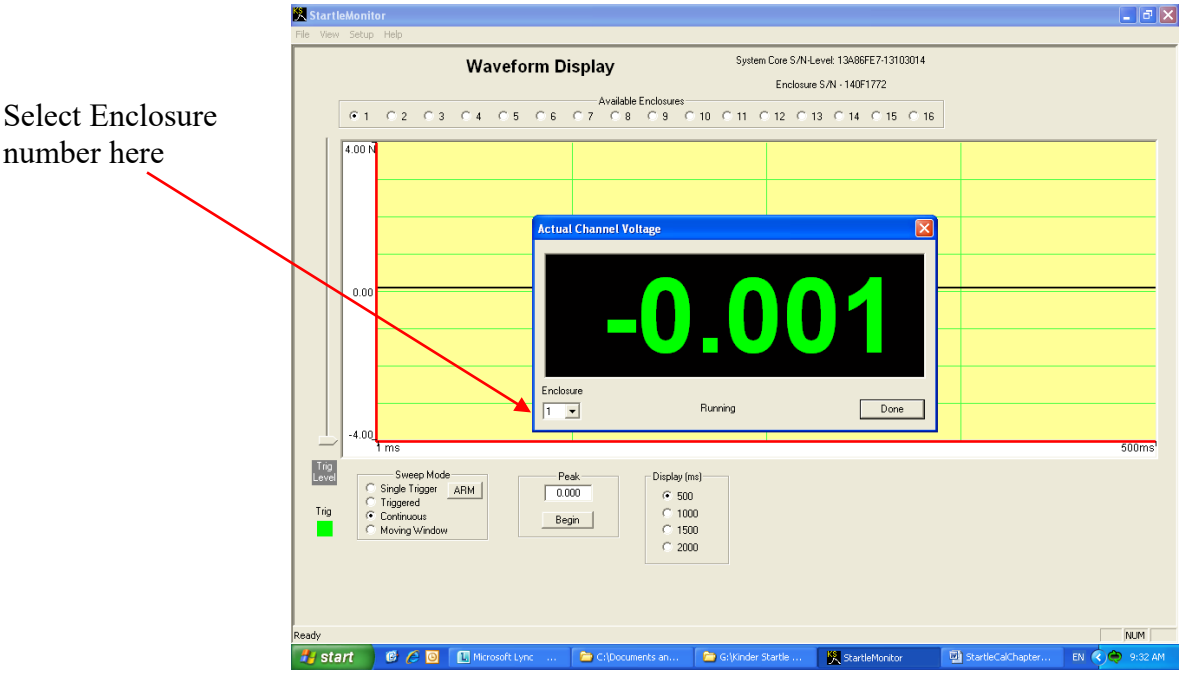


Figure 106 View Actual Voltage Screen (Circuit)

Step 3. Using the adjustment tool, adjust the OFFSET potentiometer on the Service Pack (Figure 106) of Enclosure 1 for a value of 0.000 volts +/- .010 volts (Figure 105).

NOTE

On older Systems, the **OFFSET** adjustment potentiometer is located on the side of the Service Pack instead of the front as shown in Figure 107.

Adjust Offset here

Figure 107 Circuit Offset Potentiometer Location

Step 4. Repeat the previous step for all enclosures. Each enclosure can be selected by pressing the down arrow in the Enclosure box and then selecting the desired enclosure number.

Step 5. Reconnect all load cell assemblies.

3.3.5 Mechanical Offsets

Step 1. The mechanical offsets are more sensitive than the circuit offsets. We recommend the user check these values before each study to ensure proper values. The software automatically checks offset values before each session is run and will tare the System of these offset values. If the value exceeds 0.125 Volts a warning appears during an initial session startup (Figure 108).

The 0.125 Volt level represents a 0.25-pound weight difference with the System's 10-pound load cell and its associated circuitry (load cell assembly). In other words, if the voltage being produced by the load cell assembly exceeds by 0.125 volts the voltage it expects to see from the load cell assembly, based on the current mechanical offset setting, the error message of Figure 3-5 is produced. This voltage difference likely is the result of fluctuations in the output from the load cell assembly. If the circuit offsets appear not to be stable, i.e., they need continual adjustments to meet the requirement, please contact the factory at Support@KinderScientific.com for customer service.

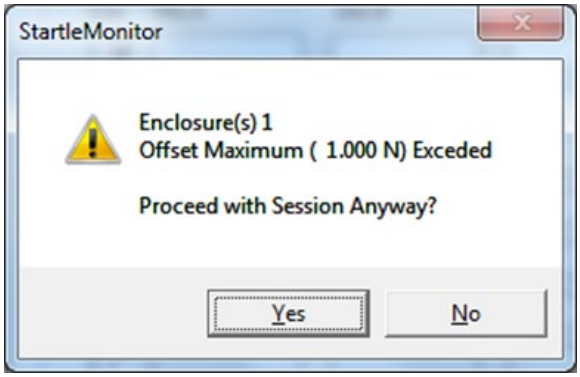


Figure 108 Maximum Offset Warning Message

Step 2. From the main window, Click on View then Diagnostic, then View Actual Voltage. The following screen will appear (Figure 109).

Select Enclosure number here

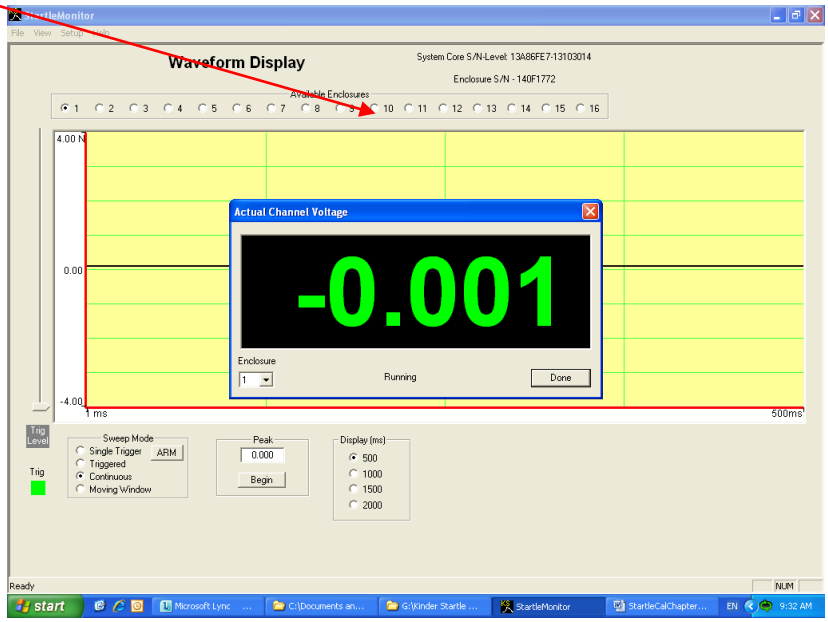


Figure 109 View Actual Voltage Screen (Mechanical Offset)

Step 3. Using the adjustment tool, adjust the Offset pot on Sensing Plate of Enclosure 1 (Figure 110) for a value of 0.000 Volts +/- .050 Volts.

Adjust mechanical Offset here

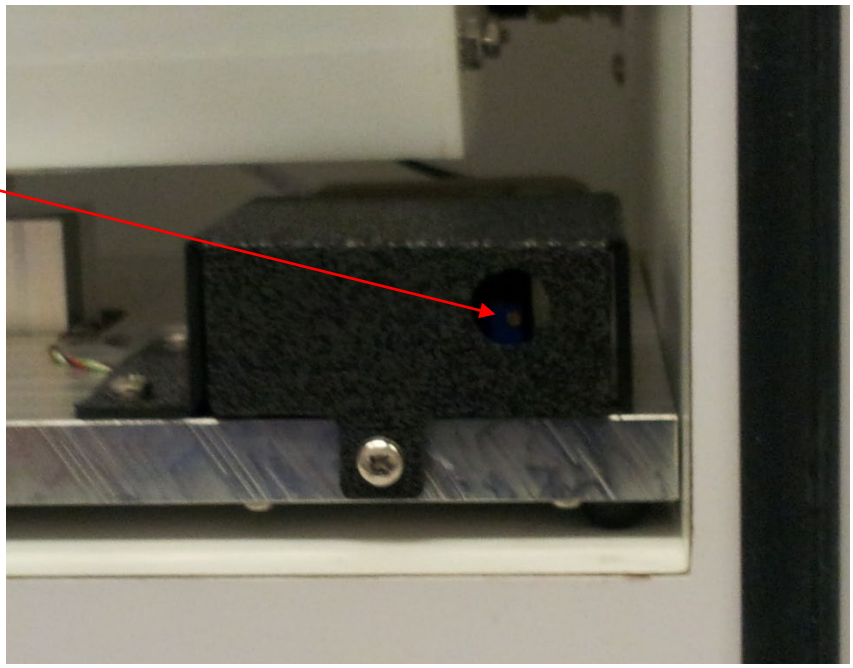


Figure 110 Mechanical Offset Potentiometer Location

Step 4. Repeat the previous step for all enclosures. Each enclosure can be selected by pressing the down arrow in the down arrow in the Enclosure box and then selecting the desired enclosure number.

Step 5. Close diagnostics.

3.4 Creating a CalSensor Session

Calibration is accomplished by running a specially designed session. Each time you change sensitivity and/or calibrate you will run this session. The session design is simple; it contains only one trial type which is an analog command to record the sensing plate. The trial is repeated for as many iterations as desired (a minimum of 20 trials for the session is suggested). To create the CalSensor session perform the following steps:

Step 1. From the main menu in ***StartleMonitor***, click on **File** and then **New**. Your screen should appear similar to Figure 111.

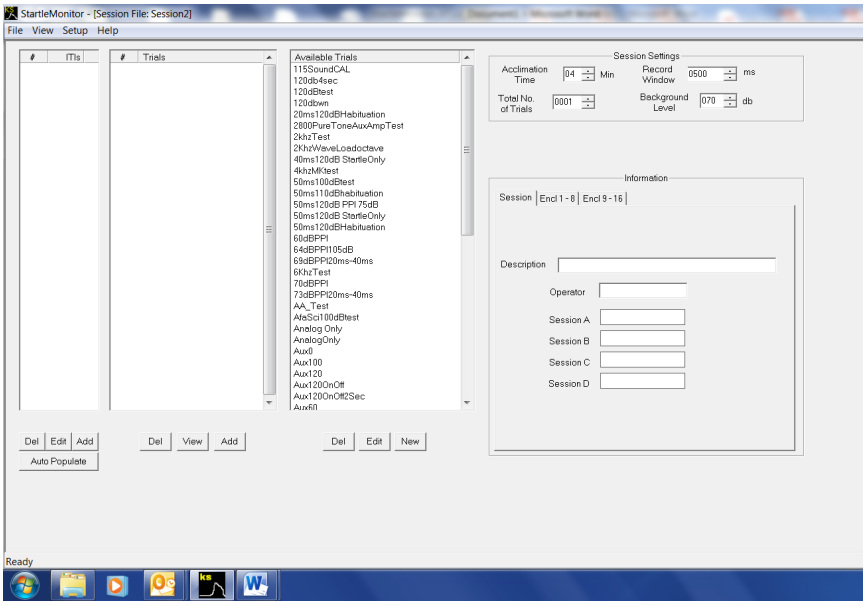


Figure 111 Session/Trial Editing Screen

Step 2. Next, create a **CalSensor** trial by clicking on the **New** button in the **Available Trials** column.

Step 3. Fill out the trial as shown in Figure 112.

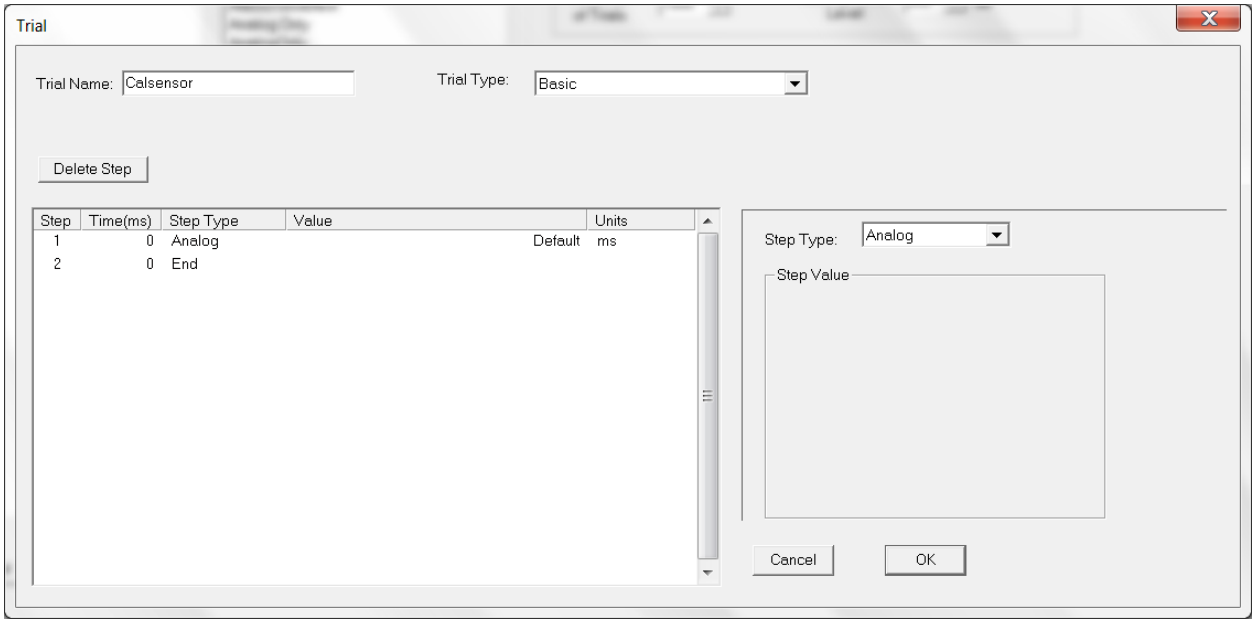


Figure 112 CalSensor Trial Screen Example

Step 4. To save the trial **CalSensor** click on **OK**.

Step 5. Create a session named **CalSensor** like the one shown in Figure 113. You may decide to have more iterations, but the approach should be the same. For GLP requirements you may want to enter the Study number in one of the Session Information fields for reference and proof and attach a copy of the reduced data to that study. Additionally, you may not have all 16 enclosures, and you would therefore select only the ones you have. The System will produce sound only in those chambers that are selected.

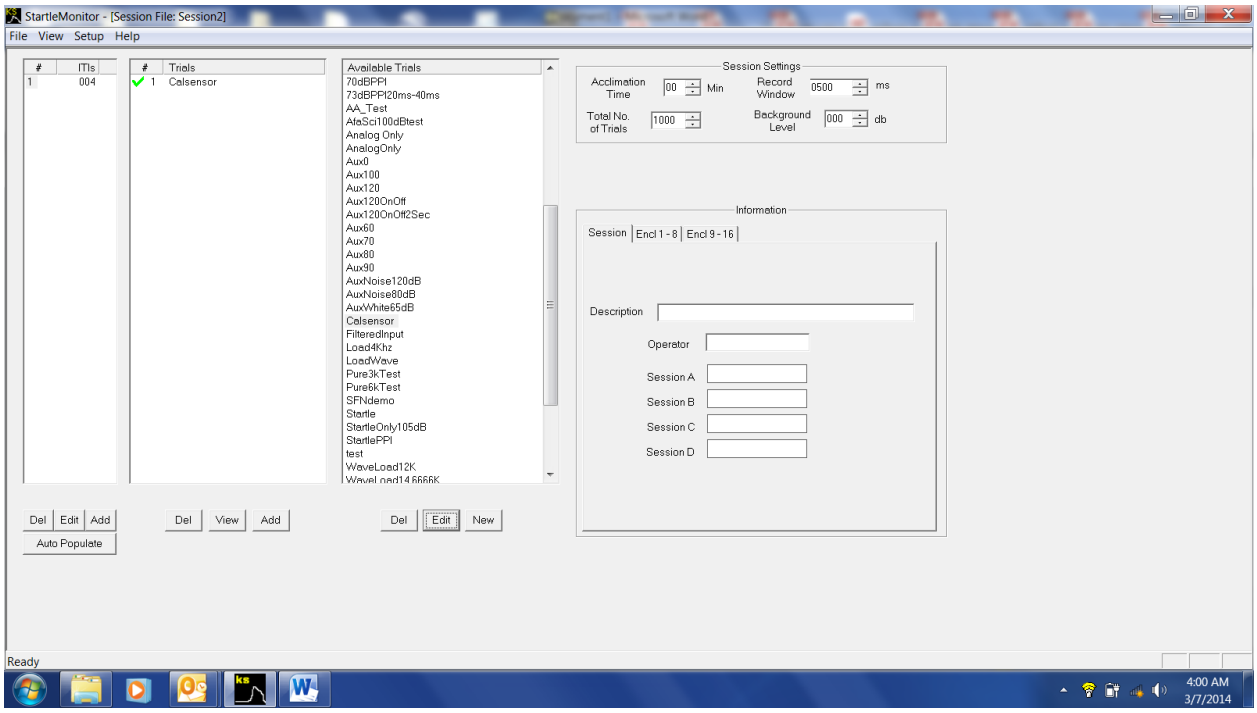


Figure 113 CalSensor Session Example

Step 6. Use an ITI of 4 seconds. To save the **CalSensor** session click on **File**, **Save As** and enter the name **CalSensor (N)** where N=date or other unique name and then click on **Save**. Each time you perform a calibration session simply open this session and run it. If you are saving the calibration sessions, you may consider running a separate session for each enclosure. This will create a data file for each enclosure calibration effort.

3.5 Calibrating the System

The final steps are to calibrate or synchronize the System to Newton as the specific unit of measure. To calibrate the System, perform the following steps:

1. From the main window click on file, then open and select the **CalSensor** session.
2. Click on **File, Run**, and provide an appropriate file name.
3. Click **Save**.
4. Enter your electronic signature
5. The following window (Figure 114) appears (only if the **Capture Weight** check box on the **Default Runtime Settings** screen is checked as described in Section 2.6.3):

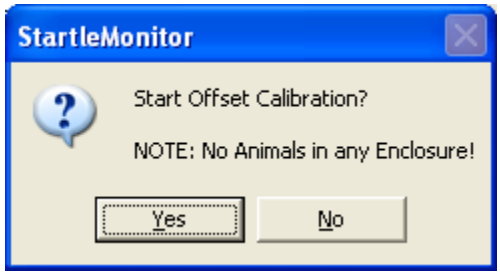


Figure 114 Mechanical Offset Initial Message

NOTE

If the offset exceeds the tolerance amount you will get the following message (Figure 115):

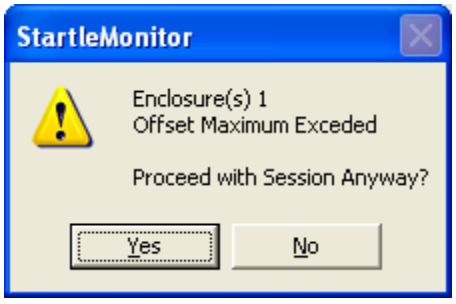


Figure 115 Mechanical Offset Outside Tolerance Message

While it is still possible to run the session, we strongly recommend that you **do not proceed.** Running the session with the offset out of tolerance will result in unusable data. For GLP customers we **do not support** running the session with this warning.

8. Click **Yes** to tare the mechanical offsets.

7. The following window (Figure 116) appears:

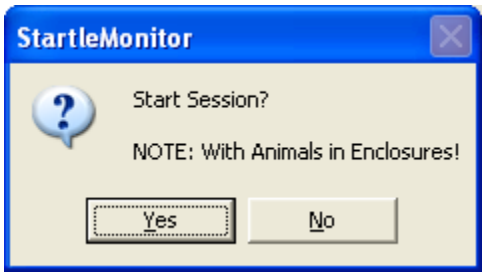


Figure 116 Start Session Message

8. Click on **Yes** to tare the animal weight.

9. Place the 100gm weight on the sensing plate in cabinet #1 (Figure 117).

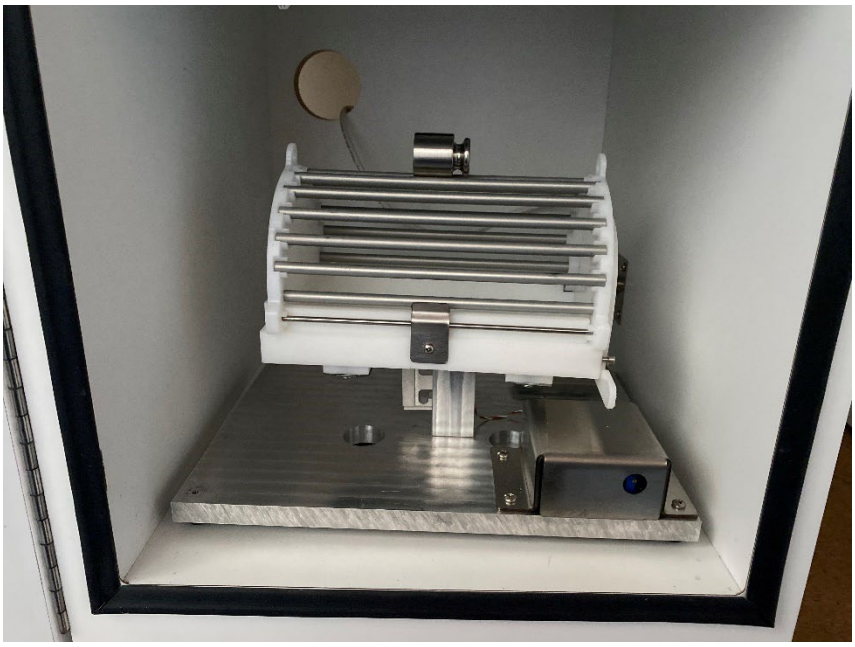


Figure 117 100gm Weight Location

10. Run the **CalSensor** session and adjust the **GAIN** vernier dial as needed to obtain a Max N reading of .9807 Newton (100gm =.9807N)

11. Move the calibrator to the next cabinet.

12. Set the **GAIN** Vernier dial to the same setting as the previous cabinet.

13. Make only fine adjustments with the **GAIN** vernier dial until the response is .9807 Newton.

14. Repeat steps 3 through 6 until all cabinets are recording .9807 Newton +/- 0.050 N or **0.9317N to 1.0297N.**

NOTE

Always make sure that the last thing you do during calibration is to run the **CalSensor** Session. That is, any change of the vernier dial should force a re-calibration of the System. Remember, the 100gm calibration weight is your standard; use it to make sure that you are always properly calibrated to Newtons.

3.6 Final Sound Level Calibration

The following information describes how to perform final calibration of the Startle Cabinet sound level.

3.7 Required Equipment

Locate the items in the following list and follow the installation steps:

Startle Cabinet with SM100 Service Pack
BSC100 or BSC Jump Control Chassis
BSC100 or BSC Jump Control Chassis Power Supply
Sensing Plate
Animal Restrainer
SMSPL Sound Pressure Meter
Adjustment tool

3.8 Setup Instructions

1. Refer to Figure 118 and place the external microphone mount of the Sound Pressure Meter on top of the sensing plate.

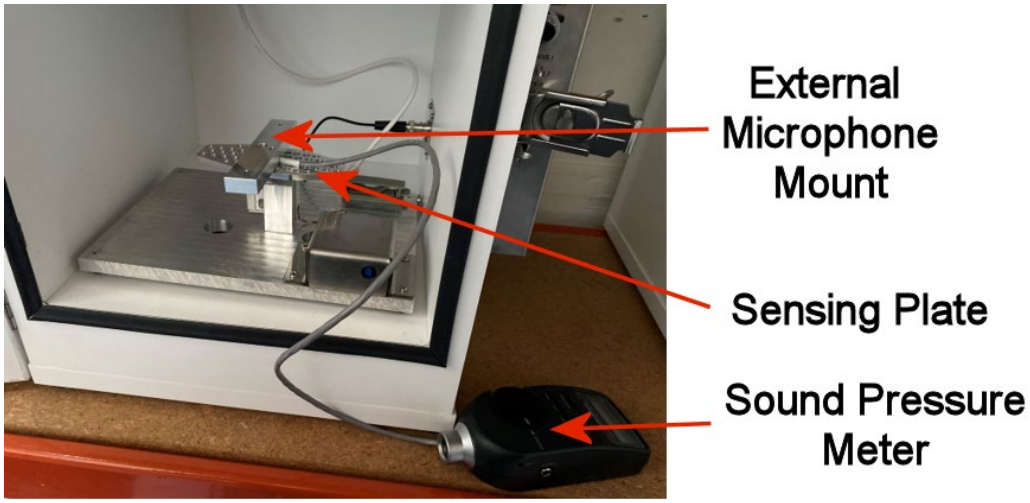


Figure 118 External Microphone & Sound Pressure Meter Installation

2. Close the door of the cabinet and make sure the Sound Pressure Meter cable is not pulled tight (Figure 119).

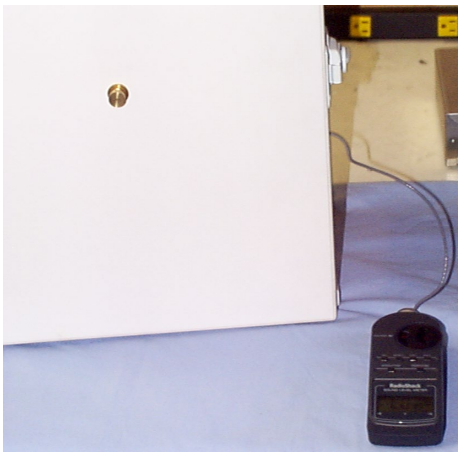


Figure 119 Door Closed with Sound Meter

3. Proceed to Section 3.9, **Creating a CalSound Session & Calibrating the Sound Level.**

3.9 Creating a CalSound Session & Final Calibrating the Sound Level

Final Calibration is accomplished by running a specially designed session. To create the CalSound session, perform the following steps:

1. From the main menu in ***StartleMonitor*** software, click on **File** and then **New**. Your screen should appear similar to Figure 120.

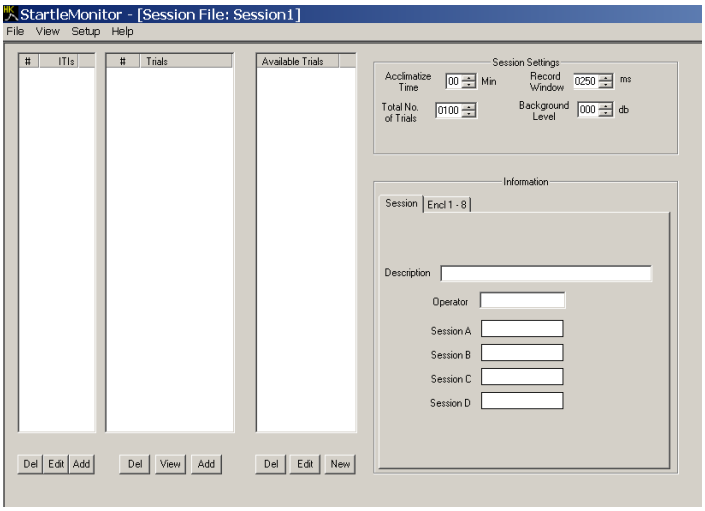


Figure 120 Session/Trial Editing Screen

2. Next, create a **CalSound** trial by clicking on the **New** button in the **Available Trials** column (Figure 120).

3. Name the trial **100dBcalsound** and fill out the trial as shown in Figure 121.

4. Save the trial **100dBcalsound**, by clicking on **OK**. The session screen will display

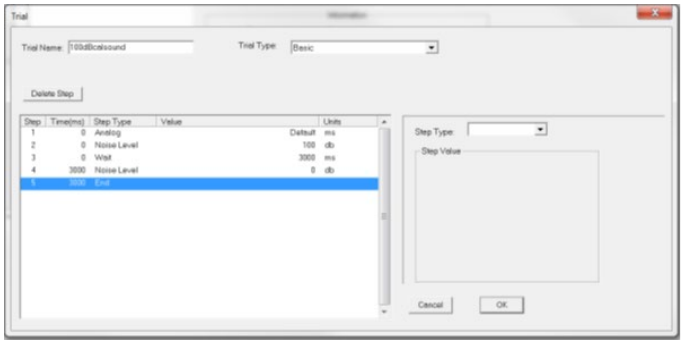


Figure 121 CalSound Trial Screen Example

the new trial in the **Available Trials** list.

5. In the **Session Settings** group on the session screen, make the following selections:

   Acclimatize Time: 0 Min

   Total No. of Trials: 100

   Record Window: 250 ms

   Background Level: 0 dB

6. In the **Information** group on the session screen enter **100dBcalsound** in the **Description** field and enter your name in the **Operator** field.

7. Click on the **Enclosure** tab and select the number of enclosures you will be calibrating.

8. Click on **100dBcalsound** in the Available Trials list. The display should appear similar to the one shown in Figure 122.

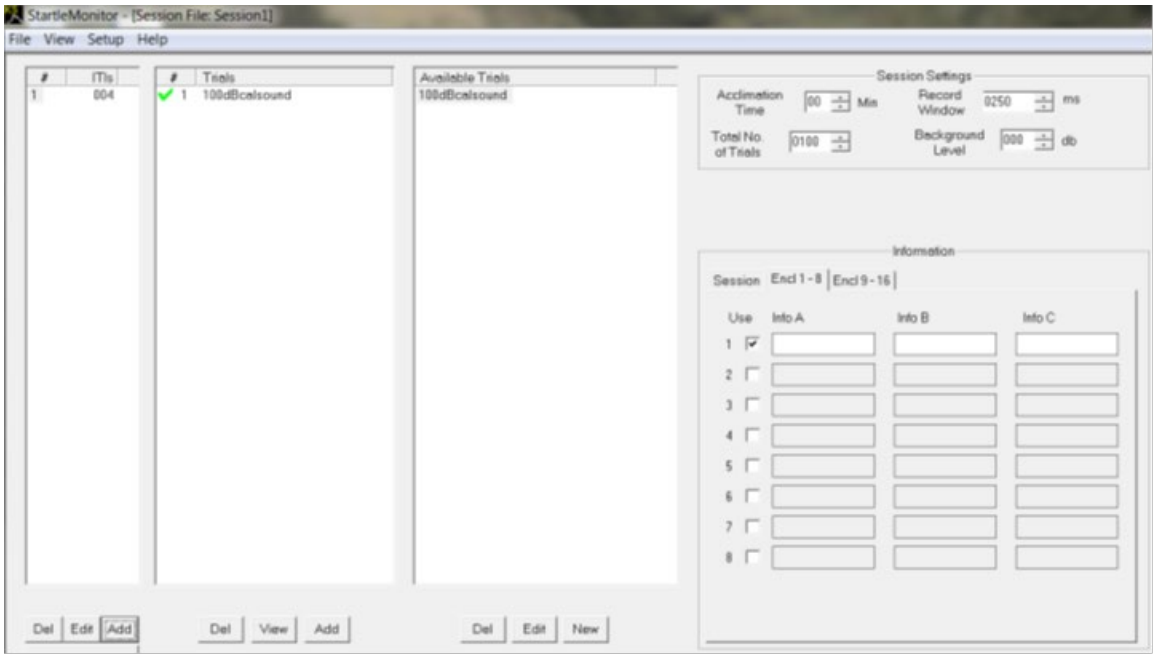


Figure 122 CalSound Session Screen Example

9. Click on the **Add** button located at the bottom of the **ITIs** list and enter an **ITI** of 1 second.

10. On the Sound Pressure Meter, rotate the level selector switch to the 110 position.

11. Press the **Weighting** switch and make sure the LCD display reads **A** weighting.

12. Referring to Figure 123, note the location of the **VOLUME ADJ** (adjust) potentiometer. This is where the adjustment is made for sound level calibration.

NOTE

On older Systems, the sound level adjustment potentiometer is located on the side of the Service Pack instead of the front as shown in Figure 122 and is labeled **SOUND LEVEL**.

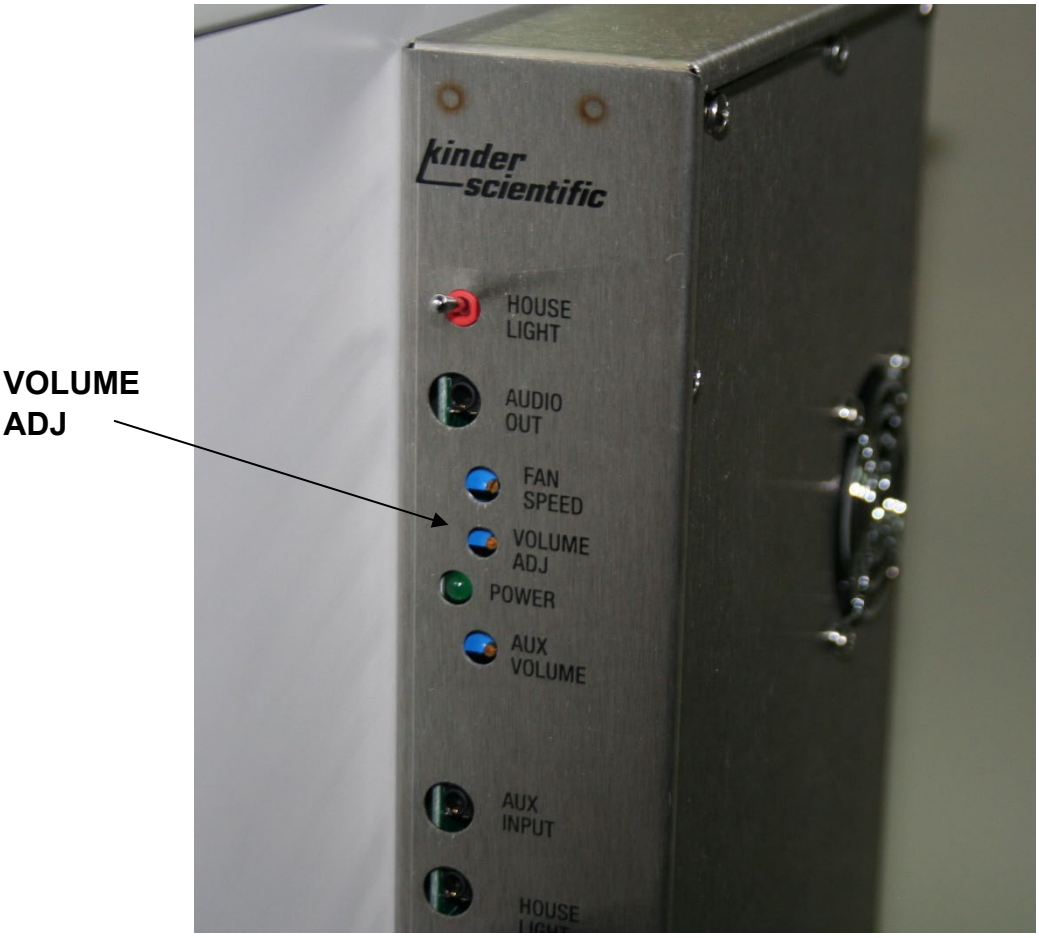


Figure 123 **Volume ADJ** Potentiometer Location

13. Select **Run** from the File menu.

14. You should be hearing a steady audible tone coming from the Startle Cabinet.

15. Using the adjustment tool provided, adjust the **VOLUME ADJ** potentiometer as shown in Figure 123 until the Sound Pressure Meter reads **100 dB**.

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