



PUNCHFORCE

Operation Manual

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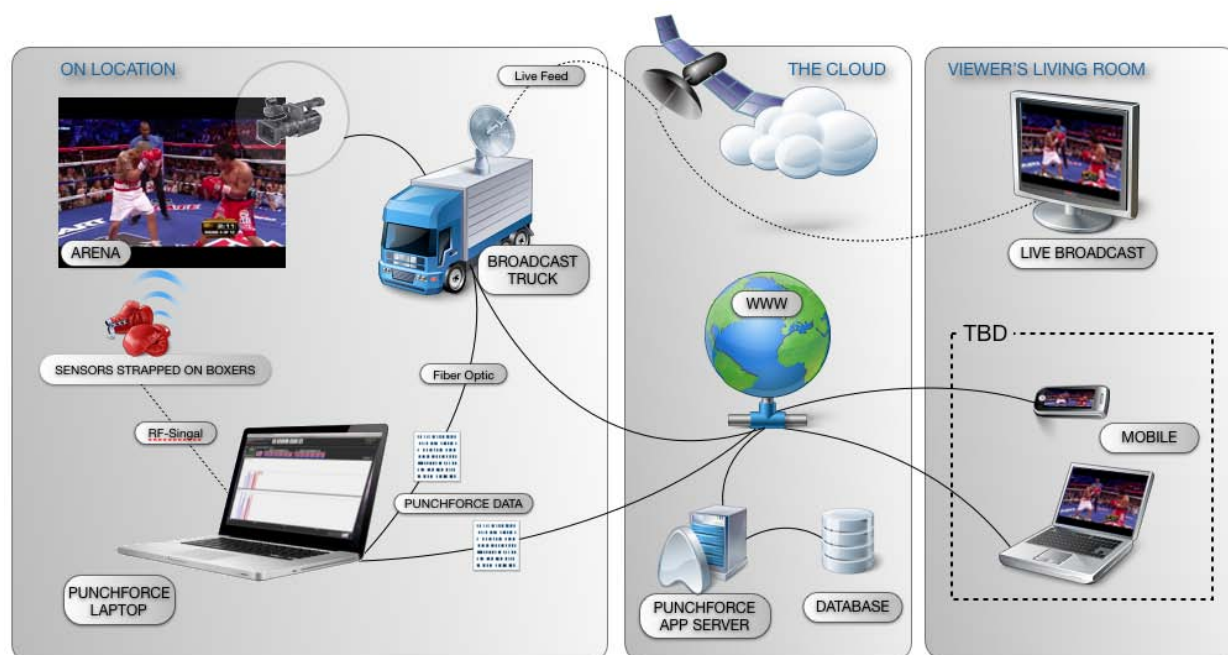
PunchForce System

Overview

The PunchForce system comprises hardware which records the speed and force of a boxer's punch during a live boxing match with software which graphs the data and feeds it to systems for viewing. The data is simultaneously stored in a database for use via online applications as well as sent to a broadcast truck to be rendered into graphics for on-air viewing.

This document will concentrate on the part of the system known as the PunchForce application. Only enough context required to understand the application is included.

Context Diagram



PunchForce Operator Tasks

For a live fight, the PunchForce laptop operator is responsible for the following tasks:

- Data entry of 'tale of tape' information for each boxer.
- Determining the sensor units to be used for each boxer.
- Assisting and verifying that each sensor unit is properly taped to the correct wrist for each glove of each boxer.
- Establishing internet connectivity (whether wired or wireless) for the laptop.
- Setting up and verifying that the base unit is attached to the laptop and recognized by the application.
- Verifying the PunchForce application can connect to the server (i.e., the database).
- Verifying the PunchForce application can connect to the broadcast truck (known as The Hancock).
- Setup the PunchForce dashboard for the fight (i.e., select Event, Bout, map sensors to boxers).

Preconditions

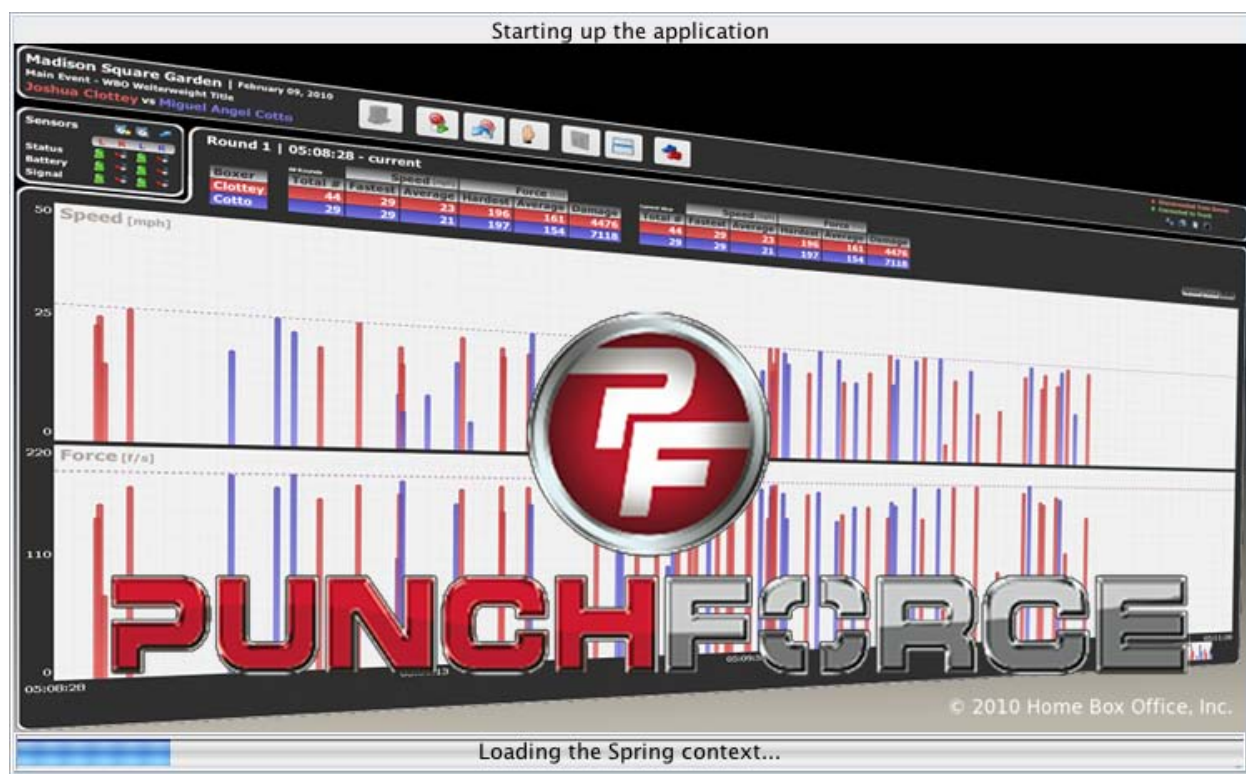
Before each fight, the 'tale of tape' information must be obtained from HBO Sports for each boxer of each bout within the event. This information needs to be entered into the PunchForce application (see above). This data entry can be done prior to fight night.

PunchForce Application

Application Startup

After connectivity has been ensured (by opening a web browser and successfully viewing a page on the internet), the application may be launched by double-clicking the PunchForce icon on the desktop:

Upon application launch, the Splash Screen will appear:



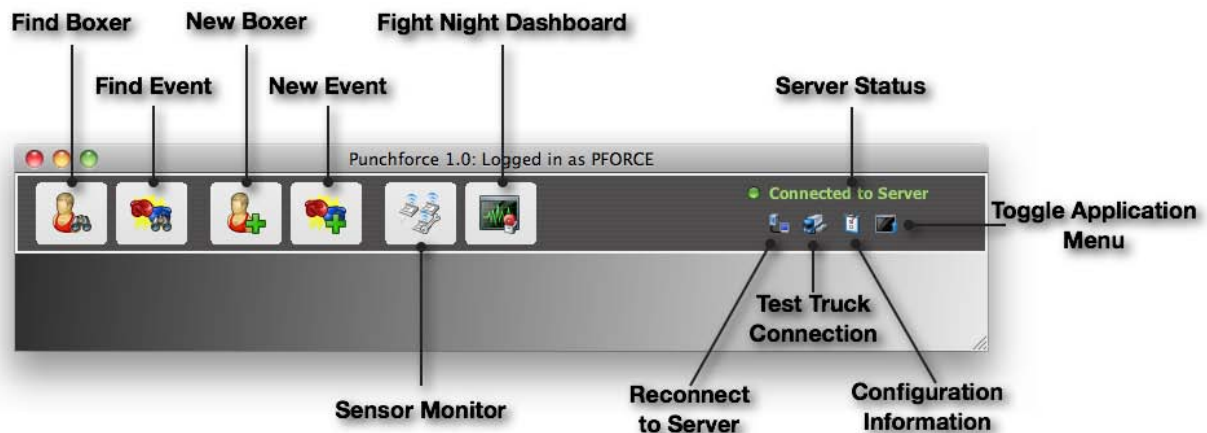
Shortly, the PunchForce application will prompt for login, enter the username and password (these will be provided and will rarely change, if they do change, PunchForce operators will be notified).



For error conditions at this step, see [Troubleshooting](#) below.

Upon successful login, the PunchForce application will load and the PunchForce desktop screen will show.

PunchForce Desktop



The PunchForce desktop is comprised of the top navigation bar along with the desktop area where PunchForce windows are displayed. The navigation bar consists of the following items.

- [Finders](#) (search for existing data)
- [Data Entry](#) (add new, edit existing Boxer/Event)
- [Sensor Monitor](#) (check which sensor units are in range, check health of in-range sensors)

- [Fight Night Dashboard](#) (opens the fight night dashboard where punches are recorded)
- [Status Area](#) (gives detailed information about configuration as well as server/truck connections)

Status Area

This area is located in the upper right corner of the PunchForce desktop. It includes the Server Status, the Reconnect to Server, the Test Truck Connection, the Configuration Information and the Toggle Application Menu buttons.

Server Status

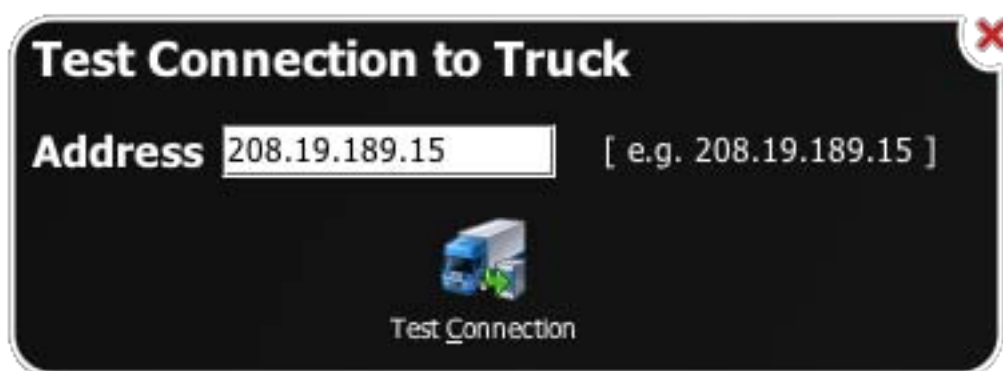
This should always be green and display Connected to Server. If not please see [Troubleshooting](#) below.

Reconnect to Server

If already connected, clicking this button simply opens a dialog displaying the server status. If the application becomes disconnected, clicking this button brings up a dialog allowing the operator to reconnect to the server, see [Troubleshooting](#) below.

Test Truck Connection

Clicking this button brings up a dialog which tests the connection between the PunchForce application and the broadcast truck ('The Hancock' operated by SportsMEDIA). It is necessary before the fight begins to test connectivity between the PunchForce application and the broadcast truck.



Note, the values are for explanatory purposes only.

To test the connection specify the broadcast truck's IP address (supplied by SportsMEDIA at fight night) and click Test Connection.

If the IP address is correct and SportsMEDIA has 'The Hancock' ready, a success message will flash on the PunchForce desktop.

Truck Comm. Success



Tip

A successful test will store the IP address for later use so the operator does not need to remember it.

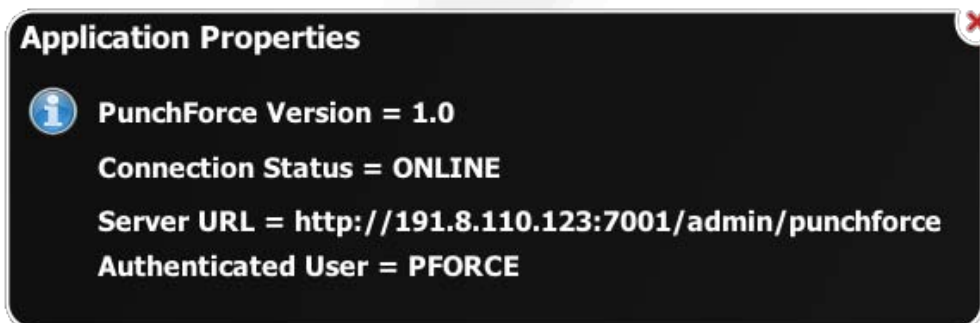
If the IP address is incorrect or SportsMEDIA was not ready, the connection will be refused and a failure message will flash on the PunchForce desktop.

Truck Comm. Failure

To remedy this, see [Troubleshooting](#) below.

Configuration Information

Clicking this button brings up a dialog with detailed configuration information, like the connected user's name, the server URL, the truck IP (if applicable, this will only be displayed within the [Dashboard](#)).



Toggle Application Menu

Clicking this button will toggle on and off the application menu (the application menu will appear above the navigation menu). This menu is not necessary and used only for advanced debugging. It includes options like an about dialog, application exit and options to clear user preferences (saved window sizes, etc). These options are only necessary if the PunchForce application team needs to debug the application. The operator can ignore this menu.

Finders (searching for data)

The PunchForce application has two windows which are used to search for data. Each window is nearly identical to the other only varying in search criteria and what type of data is returned. One searches for boxers (i.e., Talent) and the other searches for events.

Each finder is composed of three areas. The first is the search area, the top portion of the window. This is where the operator fills in search criteria for which she wishes to search. The second is the toolbar located under the search area. This contains the search button as well as buttons which operate on the returned results (more detail [below](#)). The third is the results table located on the bottom of the screen. This area is where the search results are populated.

The screenshot shows the 'Event Finder' window. On the left, three labels with arrows point to specific parts of the window: 'Search Criteria' points to the top section with dropdown menus and text boxes; 'Toolbar' points to the middle section with icons for Search, Add, Edit, and Delete; 'Results Table' points to the bottom section which is a table of search results.

Event Name	Scheduled Date	Scheduled Time	City	State/Province	Country
Test Event	Feb 12, 2010				
Test Event 2	Jan 13, 2010				

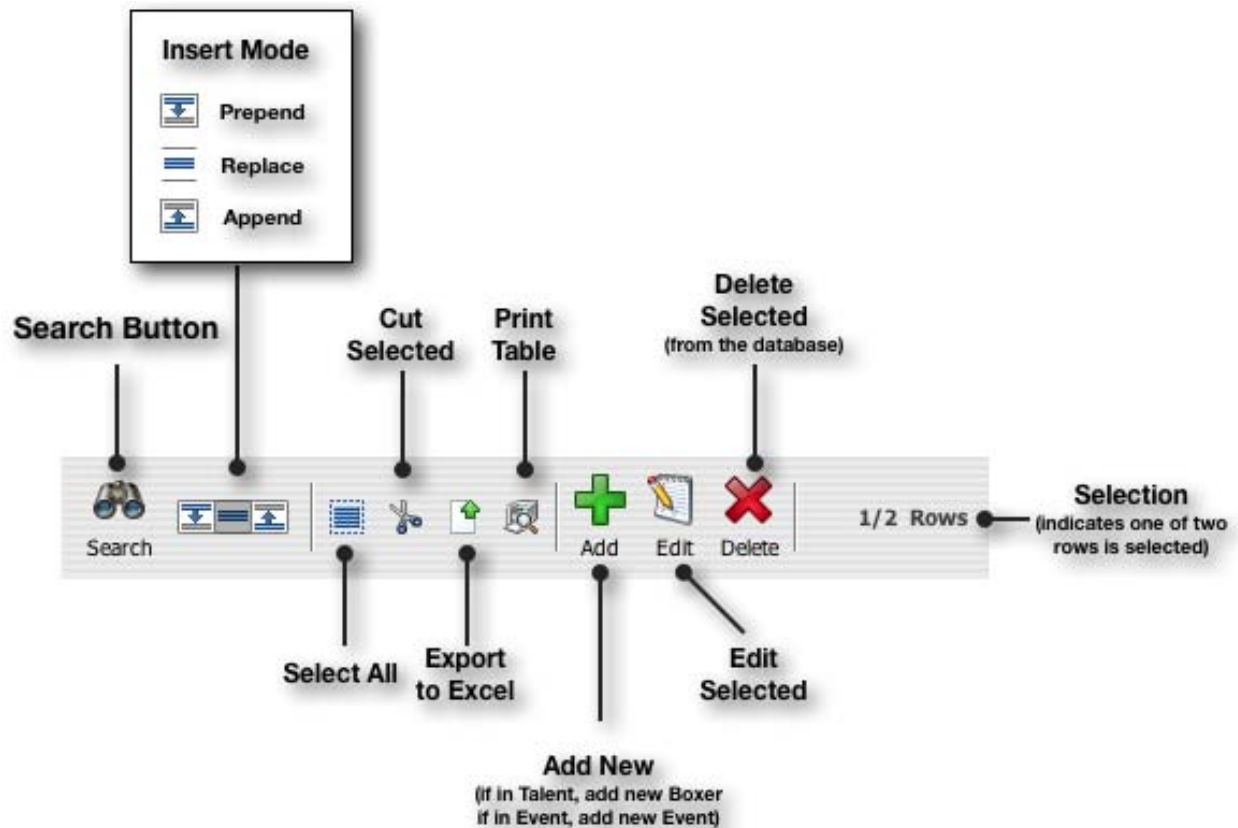


Tip

Typically the operator will not have to manually search within the event finder as it prefetches recent and upcoming events automatically.

Finder Toolbar

The finder toolbar is the middle portion of the finder window. It includes the search button as well as buttons which operate on the selected rows in the results table.



Search Button

Uses the search criteria to find data to display in the results table. If clicked in error, the operator may cancel the search by clicking the button again.

Insert Mode

Toggles between the three search modes. Prepend means that any new search results are added above the current results. Replace means that upon a new search the old results are replaced by the new ones. Append means that new search results are added to the bottom of the current results.

Select All

Selects all the rows in the results table.

Cut Selected

Removes the selected rows from the results table. This removal is only from the table, the data still exists in the database.

Export to Excel

Takes the rows in the results table and makes a new Microsoft Excel® file containing the data.

Print Table

Displays the rows within the results table within a web browser so that the entries can be printed.

Add New

Clicking this button causes a new entry (if in the event finder a new Event object and if in the Talent finder a new Boxer object) to be created. The entry's values are null and an editor ([see below](#)) is opened so that the values can be populated.

Edit Selected

If one row is selected in the results table, clicking this button causes the selected entry to be opened for editing ([see below](#)).

Delete Selected

Clicking this button causes all selected entries to be deleted permanently from the database. This action should be used cautiously. Note, a confirmation dialog appears in case the button is clicked on accident.

Selection

The selection label indicates how many total rows are in the results table as well as how many are currently selected. The first number is the number selected and the second is the total number of results.

Editors (adding/editing data)

The PunchForce application has three windows for pre-fight data entry. The operator can add/edit a boxer object, an event object and a bout object. The same editor window can be used to add a new entry or to edit an existing. The editors are all structured in a similar manner. The top portion is the toolbar. The toolbar contains the edit/save button (which all editors share) as well as other custom buttons (for instance the event editor has buttons to add/delete bout objects). The middle portion of the window is the data entry portion. It is where the operator types in data. The bottom portion of the window is the validation table. It shows detailed information about data entry errors (for instance, a date field entered in the wrong format).

The screenshot shows the 'Talent Editor' window. On the left, three labels with leader lines point to the window's sections: 'Toolbar' points to the top section containing 'Save' and 'Add New' buttons; 'Data Entry' points to the middle section containing 'First Name', 'Middle Name', and 'Last Name' input fields; 'Validation Table' points to the bottom section which is a table with two rows of error messages.

Level	Message
✖	First name is required.
✖	Last name is required.

General Editor Information

Besides structure, all three editors share the following functionality.

Read Only Mode

If an entry is being viewed (non-new), the editor will open in a read only mode. The data entry portion will be grayed and disabled for edit. To go into edit mode click the Edit button (pencil icon).

Save When Valid

Once in edit mode, the data entry fields enable for edit. The Edit button becomes a Save button (this is how the editor opens when a new entry is being added). The Save button will be disabled however whenever there are validation errors (entries within the validation table). Each data type (talent, event, bout) has distinct rules which may cause a validation error. For instance, it is nonsense to save a talent object without a name specified so until a first and last name are entered the operator is unable to save the talent object. Likewise, it is invalid to save a bout object if the two boxers (red/blue) are the same. These rules exist to prevent the operator from accidentally saving data in an invalid state.

The following details specific edit information for each data type.

Talent Editor

The talent editor is used to add boxers into the system. It can be accessed from the PunchForce desktop's navigation bar or from within the Talent Finder window by clicking the Add or Edit buttons.

If a boxer has already been entered it will not need to be entered again for a different fight. Operators should feel free to enter boxers into the system even if the boxer does not have an upcoming fight.



Tip

Because the only data entered from within the talent editor for a boxer is the boxer's name, editing of previously entered boxers is rare as boxers' names rarely change.

The talent editor's toolbar contains one non-standard button, the Add New button. This button is a shortcut to allow the operator to enter a new boxer from within the current window. It is useful when the operator needs to enter many boxers into the system in succession.

Event Editor

The event editor is used to edit information regarding a fight night. This includes the location of the event, the date of the event as well as all bouts (fights). Typically all bouts should be recorded for an event even if the PunchForce sensors will not be strapped on the boxers for that bout. The event editor includes three custom buttons in the toolbar area to add/edit/delete bout objects.

Add Bout to Event **Delete Selected Bouts**

Edit Selected Bout

Event Information

Bouts for the Event

Name	Fight Number	Red Talent Name	Blue Talent Name	Status
Pacquiao Vs. Clottey	1	Manny Pacquiao	Joshua Clottey	Not Started
Undercard Fight	Rehearsal 1	Salvador Sanchez...	Roberto Marroq...	Not Started



Tip

Typically all the event information, including all bout information, is known prior to fight night. To eliminate errors and allow more time for other tasks the operator should enter this information before the fight night.

The event editor can be accessed from the PunchForce desktop's navigation bar or from within the Event Finder window by clicking the Add or Edit buttons.

Bout Editor

The bout editor is used to enter information for an individual fight including the red and blue boxers participating and their tale of tape information.

Auto populates boxer attributes from their last bout

Bout Information

Boxer Attributes for Bout

Bout Information	
Bout Name	Pacquiao Vs. Clottey
Fight Number	1
Weight Class	Welterweight
Status	Not Started

Red Boxer					Blue Boxer				
Boxer	Manny Pacquiao				Boxer	Joshua Clottey			
Arm Length [in]	13	Arm Weight [lb]	13		Arm Length [in]	13	Arm Weight [lb]	13	
Day of Weight [lb]	13	Weigh-in Weight [lb]	13		Day of Weight [lb]	13	Weigh-in Weight [lb]	13	
Wingspan [in]	13	Bout Result			Wingspan [in]	13	Bout Result		

Level	Message
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The auto populate button is a data entry shortcut for entering boxer attributes. After specifying the red and blue boxers the operator should click this button. Doing so will pull all boxer attributes for each boxer from their last individual fights. For instance if the bout is between Manny Pacquiao and Joshua Clottey, clicking the auto populate button will pull each boxers' data from his last recorded bout.



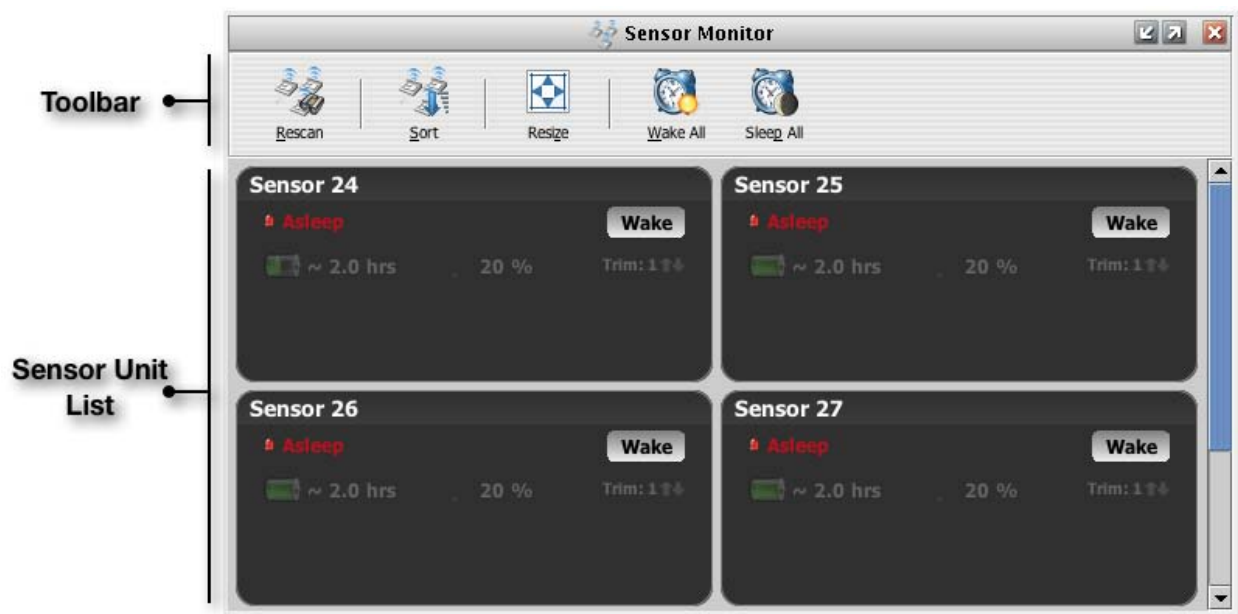
Tip

Operators should use the auto populate button. As many of the attributes of a boxer are static (like arm length and arm weight) this can save a lot of data entry time.

Sensor Monitor

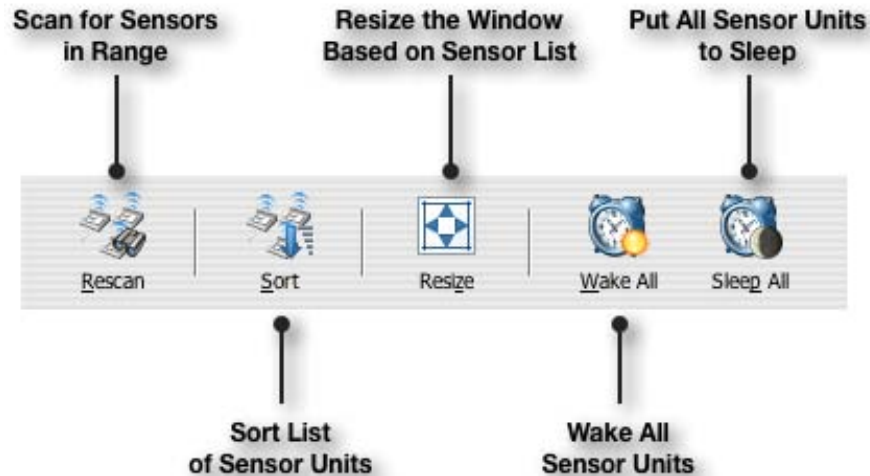
The sensor monitor window provides means to manage the individual sensor units within the PunchForce application. Its primary use is to gauge the battery life and rf-signal strength of individual sensor units prior to strapping the units on the boxers. This monitoring allows the operator to choose the strongest units to use for each fight.

The sensor monitor window is comprised of two areas. The top portion of the window is the toolbar which contains buttons to interact on all sensor units. The bottom area of the window contains a listing of the individual sensor units. These units and their functions are described in detail below.



Sensor Monitor Toolbar

The sensor monitor toolbar acts upon the sensor monitor window itself as well as has functions which act upon all sensor unit objects.



Rescan Button

This button causes the base unit to rescan for in-range sensor hardware units. This functionality is similar to rescanning for wifi networks on a computer. The operator may need to use this functionality several times when configuring the sensor units (i.e., as she turns the units off and on a rescan will be necessary to recognize new units in-range).

Sort Button

The sort button is a convenience for the operator when interacting with a large number of sensor units. The sort will order the sensor unit list first by sleep status (awake units will show before asleep units) and then by the sensor unit id number (lower id numbers will appear first).

Resize Button

The resize button is a convenience for the operator which is useful when a rescan operation causes many new sensor units to display in the list. Clicking this button will resize the window to a best fit size based on the number of sensor units in-range.

Wake All Button

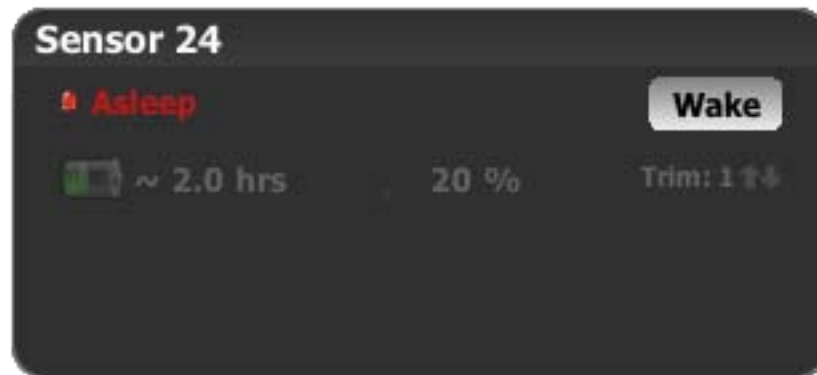
The wake all button will wake each sensor unit in-range. It is analogous to clicking wake on each sensor unit individually.

Sleep All Button

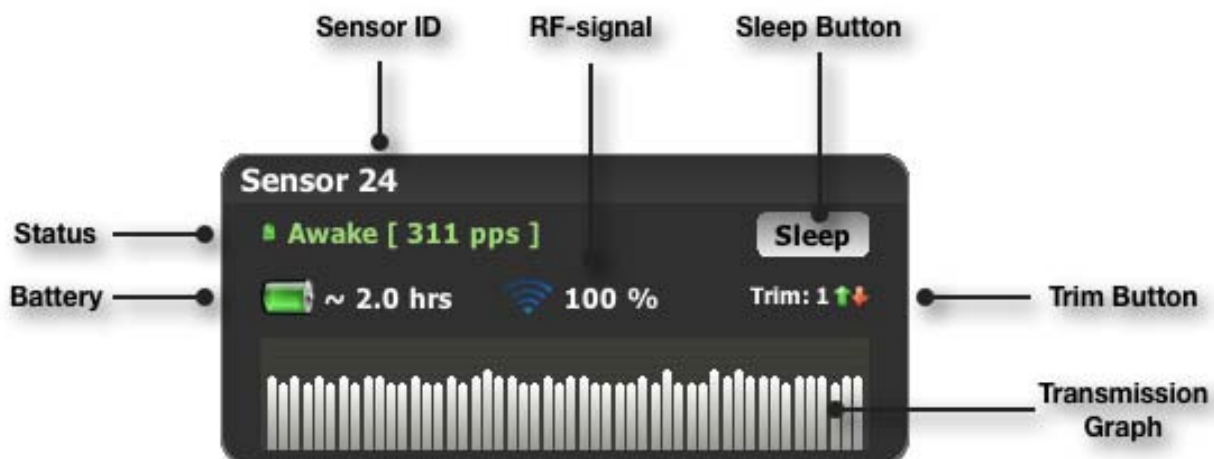
The sleep all button will sleep each sensor unit in-range. It is analogous to clicking sleep on each sensor unit individually.

Individual Sensor Unit

The sensor monitor's sensor unit list is comprised of all in-range sensor hardware units. Each individual sensor hardware unit is represented in the program as:



This shows sensor with id 24. It is currently asleep and could be activated by clicking the wake button. Once activated the sensor unit's diagnostic information becomes apparent.



Sensor ID

A hardware unique ID for the sensor unit. This ID is printed on the [sensor hardware unit itself](#).

Status

The status is either asleep, transitioning or awake. If awake, the number of packets (of transmission) per second is also displayed. So in the example above sensor unit 24 is transmitting at 311 packets per second. A status of transitioning only occurs briefly while the unit is going to sleep or while it is waking up.

Battery

The battery indicator gives a graphical battery icon as well as an approximate amount of time remaining.

RF Signal

The rf-signal strength is similar to a wifi signal strength. A higher signal indicates better transmission.

Sleep Button

The sleep button will put the sensor hardware unit to sleep. This is desirable when the unit is not being tested or when the fight has yet to start as a sleeping unit does not waste battery life.

Trim Button

The trim button affects the sensitivity of the sensor hardware unit when registering punches. During a fight it may be necessary to raise or lower the trim of an individual unit if too few or too many punches are being detected by the PunchForce application. For more information, see [Troubleshooting](#) below.

Transmission Graph

The transmission graph is a visual representation of the packet transmission for the sensor hardware unit. Many high bars indicates a healthy signal.

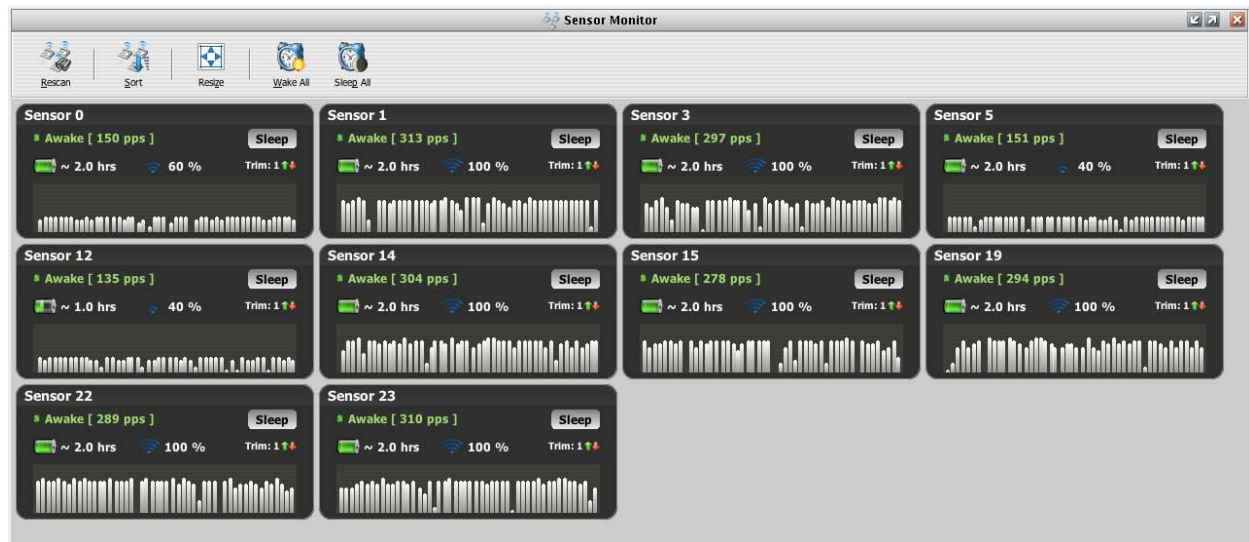
Testing the Sensor Units Pre-Fight

One of the most important jobs of the operator is ensuring that the sensor units strapped to each boxer work and have adequate battery life to continue working throughout the fight. The sensor monitor window is intended to assist the operator in choosing the best possible sensor hardware units for a particular fight.

The operator should perform the following steps when testing the sensor hardware units.

- Open the PunchForce laptop application and ensure the base unit is connected properly (see here for [Troubleshooting](#)).
- Open the Sensor Monitor window within the application.
- Turn on the sensor units by pulling out the off switches (documented [here](#)).
- Click the Wake All button in the Sensor Monitor window (may have to click Rescan first).

Doing this will show all sensor hardware units and their diagnostic information. Here is an example of ten sensor hardware units awake within the sensor monitor.



To pick the best sensors the operator should follow the following guidelines.

- The sensor unit should have a full battery (indicated by a full battery icon and the label '~ 2.0 hrs').
- The sensor unit should be transmitting at, at least, 100 packets per second.

Given these guidelines sensor unit 12 shown in the example picture above would be ruled out since it's battery is halfway drained.

Often picking the best sensors will amount to common sense. From the example picture above even though all sensors but sensor 12 meet the guidelines, it is clear that sensor 1 is better suited than sensor 0 because sensor 0's transmission rate is half (150) that of sensor 1's transmission rate (313).

For error conditions while testing the sensors see [Troubleshooting](#) below.



Tip

As soon as the sensor units have been tested, the operator should put all sensor hardware units to sleep. This will ensure that the battery life is conserved for the fight.

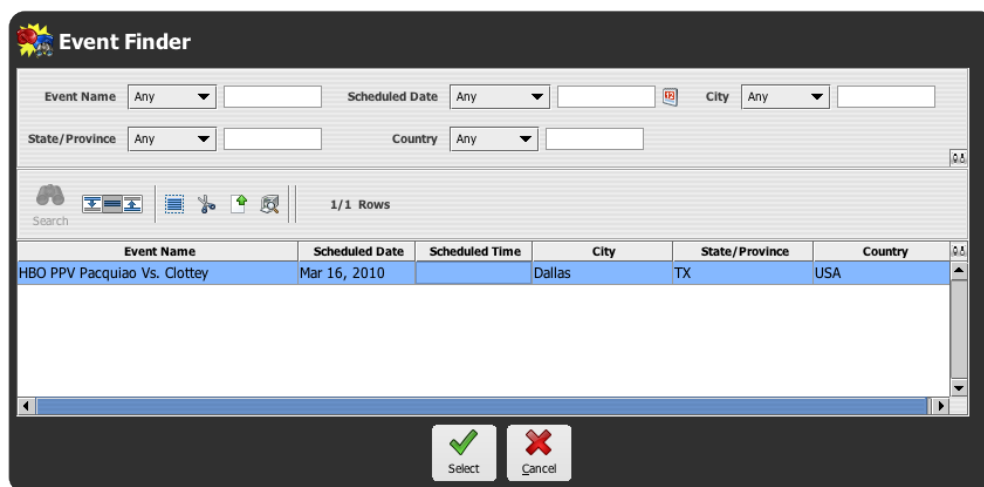
Fight Night Dashboard

The dashboard is the heart of the application. After pre-fight data entry, truck testing and sensor unit testing is completed the operator will interact exclusively within the dashboard.

On open the dashboard brings up a wizard forcing the operator to select an event and a corresponding bout. After the operator has selected the bout the dashboard needs to associate the sensors to the boxers' gloves. The following details each step of the wizard.

Dashboard Wizard

The first step in the wizard is the event selection. This step brings up a wrapped Event Finder (see [here](#)). Typically the event will automatically be brought up in the results table but if not the operator can use the search criteria to find the proper event. Once the event is found, select it and click the Select button.



The Event Finder screen features a search form at the top with dropdown menus for Event Name, Scheduled Date, City, State/Province, and Country. Below the form is a table with 1/1 Rows. The table has columns for Event Name, Scheduled Date, Scheduled Time, City, State/Province, and Country. The first row is highlighted in blue.

Event Name	Scheduled Date	Scheduled Time	City	State/Province	Country
HBO PPV Pacquiao Vs. Clottey	Mar 16, 2010		Dallas	TX	USA

At the bottom of the screen are two buttons: a green checkmark icon labeled 'Select' and a red X icon labeled 'Cancel'.

After selecting the event the wizard will present all the associated bouts for the given event. Similarly the operator should select the correct bout and then click the Select button. If the event selected from the previous step was incorrect the operator can select a different event by clicking the Go Back button.

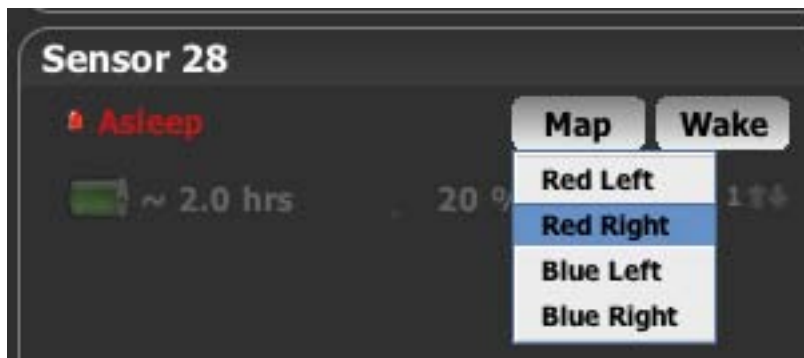


The Select a Bout to Open screen displays a table with 2 rows. The table has columns for Name, Fight Number, Red Talent Name, Blue Talent Name, and Status. The first row is highlighted in blue.

Name	Fight Number	Red Talent Name	Blue Talent Name	Status
Pacquiao Vs. Clottey	1	Manny Pacquiao	Joshua Clottey	Not Started
Undercard Fight	Rehearsal 1	Salvador Sanchez III	Roberto Marroquin	Not Started

At the bottom of the screen are three buttons: a green checkmark icon labeled 'Select', a blue circular arrow icon labeled 'Go Back', and a red X icon labeled 'Cancel'.

The last step in the wizard is to map the sensors to the corresponding boxer. The wizard will list all in-range sensors (see [Troubleshooting](#) for errors). The sensors will have an additional button next to the Wake button. This is the Map button.

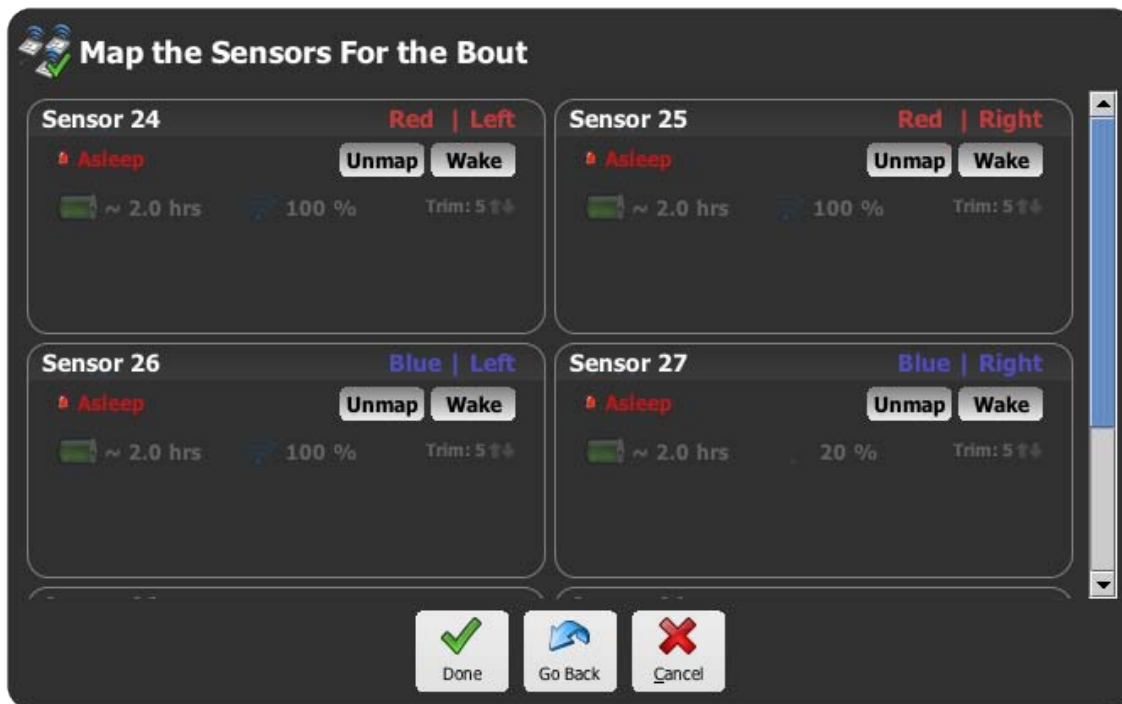


The operator should map the proper sensors to the proper glove for each boxer.



Tip

The result of mapping a sensor to a boxer's glove is instantly saved to the database for later retrieval. This means that if the mapping process is interrupted, previously mapped sensors will reappear when the operator next uses the wizard.



When this is complete, the operator can enter the dashboard screen by clicking the Done button.

Dashboard Post-Wizard

After clicking Done in the wizard, the Dashboard appears. There is one thing to verify before interacting with the dashboard itself.

The application automatically connects to the broadcast truck (SportsMEDIA's 'The Hancock' machine) which was configured prior to entering the dashboard (see [here](#)). If the connection succeeds a message will flash on the screen indicating as much.

Truck Connected

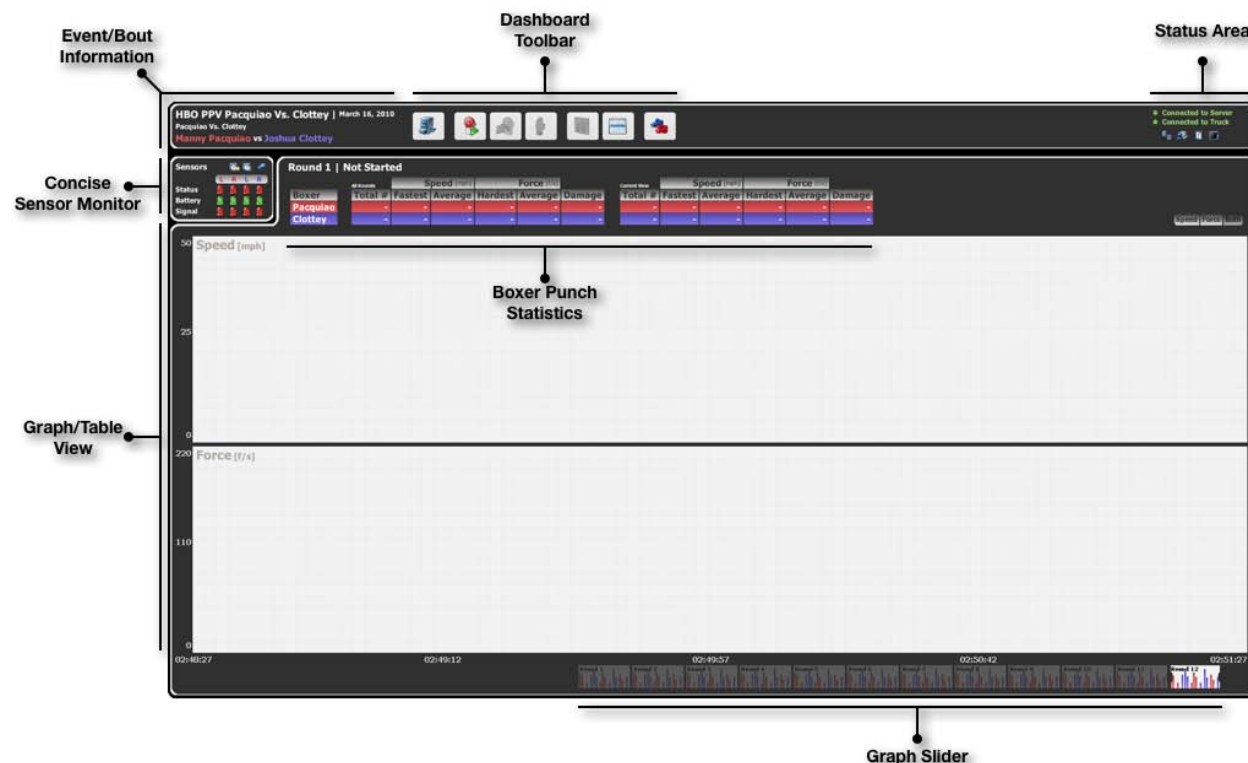
This can also be confirmed by looking at the [Status Area](#) (upper right hand corner of the screen) because within the dashboard the [Status Area](#) will display the truck connection status.

● Connected to Truck

For help with error condition at this point, see [Troubleshooting](#) below.

Dashboard Layout

The dashboard is composed to display a large amount of information in an organized manner.



Event/Bout Information

The upper left hand corner of the dashboard displays the event name and date as well as the boxers' names for the current bout.

Dashboard Toolbar

The dashboard toolbar is explained in detail [below](#).

Status Area

The status area within the dashboard is identical to that within the PunchForce desktop (see [here](#)) with the addition of truck connectivity information.

Concise Sensor Monitor

The concise sensor monitor area displays the most pertinent information of the [sensor monitor](#) so that the operator can keep tabs on the health of the sensor hardware units throughout the fight. Its functionality is explained [below](#).

Boxer Punch Statistics

The boxer punch statistics area is explained in detail [below](#).

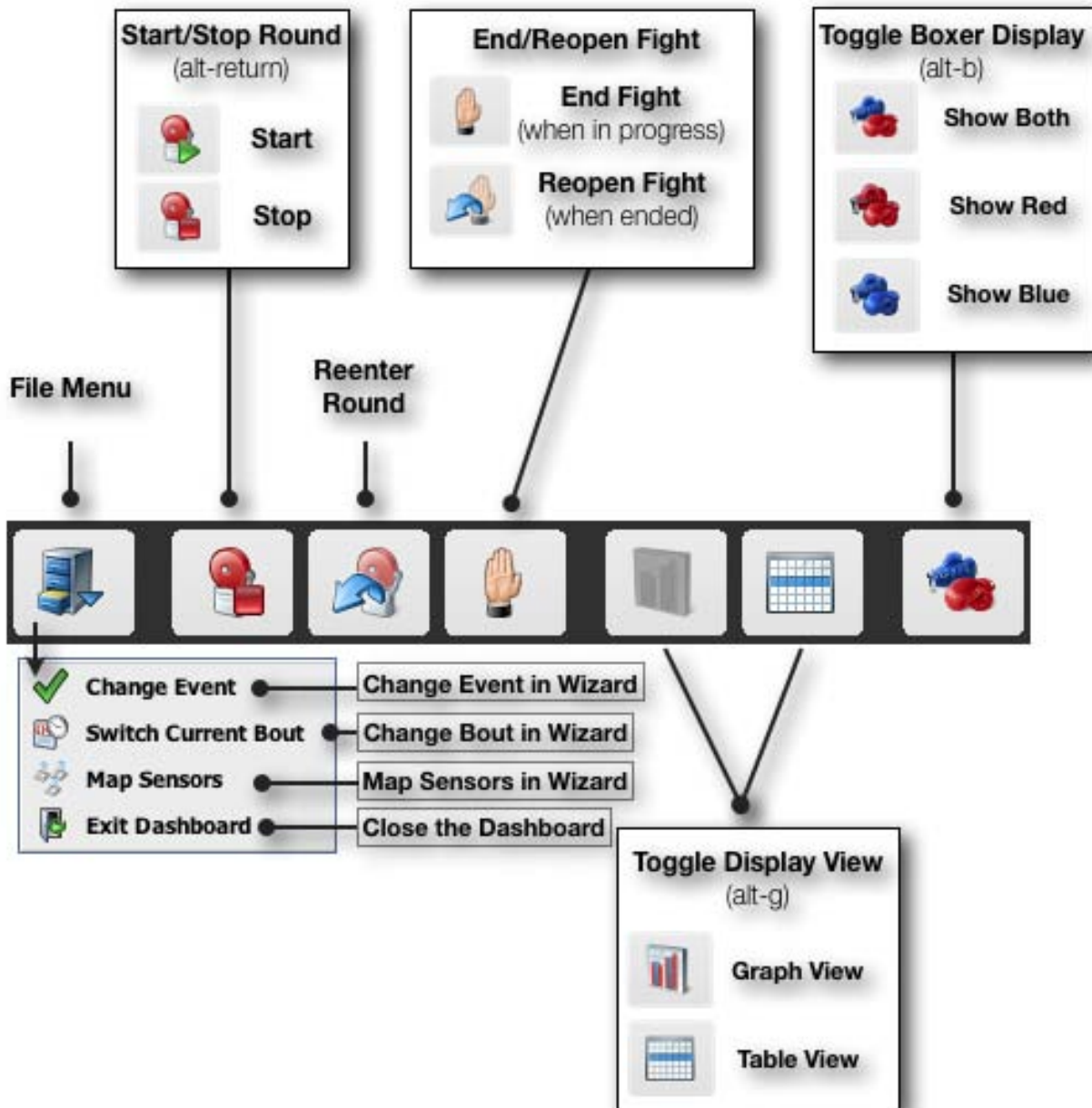
Graph/Table View

This area comprises the majority of the screen space within the dashboard. It displays the punches by each boxer as they happen. The view is either a graphical representation (a bar chart) or a tabular representation of the punches.

Graph Slider

The graph slider is used to limit or expand the visible rounds shown on the graph. By default the graph slider restricts the viewable region to the current round. The operator can use the slider to view several rounds at once or only a portion of a certain round. It is explained in detail [below](#).

Dashboard Toolbar



File Menu

The file menu provides the operator access back to the wizard so that the event or bout can be switched as well as providing access to remap sensors. The file menu is also where the operator exits the dashboard (returns to the PunchForce desktop).



Tip

Once a fight is in progress the File Menu becomes disabled to prevent the operator from accidentally changing the event/bout. To reenale, end the fight by clicking the End Fight button.

Start/Stop Round

Clicking the start round button (keyboard shortcut, alt-enter) will start the next round. A message will flash on the screen alerting the operator.

Starting Round 1

As expected, clicking the stop round button will stop the current round. Similarly a message will flash on the screen.

Stopping Round 1



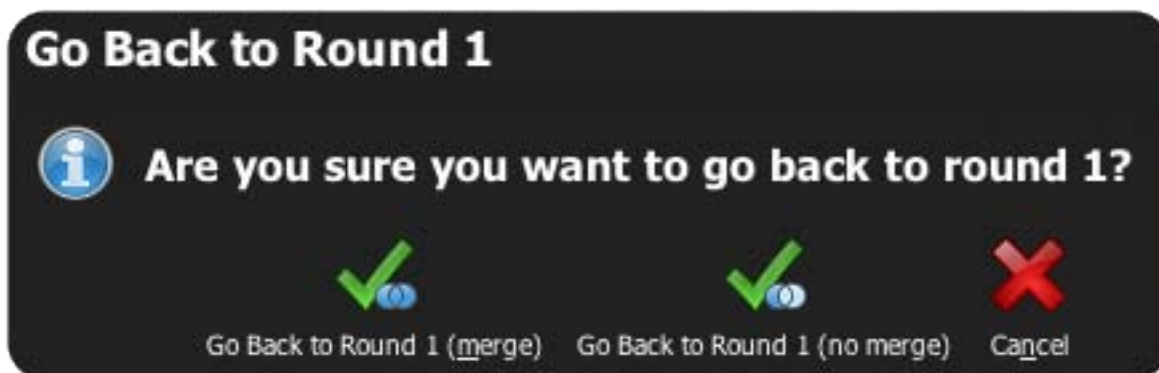
Tip

If the fight has not yet begun clicking the start button will automatically start the fight.

Reenter Round

Clicking the reenter round button will do one of two things depending upon the current state of the fight. If there is no round currently in progress, clicking the button will reopen the previous round. For instance, if the operator accidentally clicked stop round during the first round, the operator will want to click the reenter round button to reopen the first round.

If, however, there is a round currently in progress when the reenter round button is clicked, the operator will be asked if punches already recorded in the open round should be merged into the previous round or discarded. For instance, if the operator accidentally stops round one and then starts round two without realizing the mistake, punches could be logged within the erroneous round two. The operator should click the reenter round button and merge the punches into round one.



End/Reopen Fight

Clicking the end fight button will stop the current fight regardless of the current round status. This is typically only used when the fight ends prematurely (before end of round 12 because of knockout, etc) because if the fight goes twelve rounds, stopping the twelfth round also stops the fight.

If the fight has already been stopped, the fight can be reopened by clicking the button again. Typically this is only done because the operator has inadvertently stopped the fight.

Toggle Display View

The graph/table view (keyboard shortcut, alt-g) either displays the punch data in a bar graph or in a tabular representation. These buttons toggle between the two display modes. Within the graph view, there are additional view filters available. The operator can choose to display both a speed and force graph (default) or just speed or just force graphs. The operator can toggle between these modes with the buttons located on the top of the graph view in the far right of the dashboard display.



The table view can also be manipulated. The columns can be reordered by the operator by clicking on the column header and dragging it to a different location. Additionally, the data within the table can be sorted by each available column. To sort the data the operator should double click on the column header for which to sort. Double clicking on the same column again will reverse the sort order.

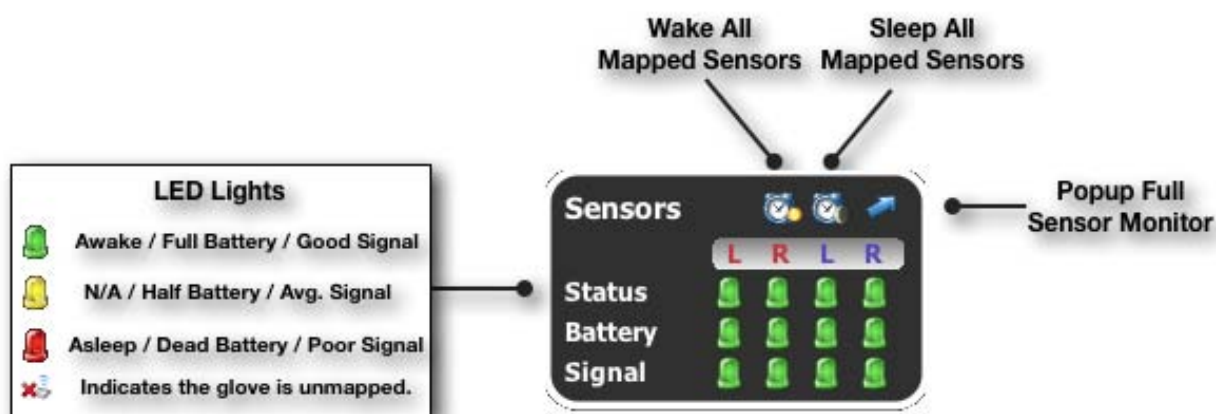
Round	Boxer	Glove Hand	Speed (mph)	Force (f/s)	Time -
2	Lucian Bute	LEFT	14.0	19.0	02:44:51.41 PM
	Lucian Bute	RIGHT	24.0	181.0	02:44:50.81 PM
	Lucian Bute	LEFT	27.0	190.0	02:44:50.71 PM
	Librado Andrade	LEFT	24.0	191.0	02:44:50.11 PM
	Librado Andrade	RIGHT	22.0	160.0	02:44:50.01 PM
	Lucian Bute	RIGHT	14.0	144.0	02:44:48.31 PM
	Librado Andrade	RIGHT	24.0	199.0	02:44:47.61 PM
	Librado Andrade	RIGHT	26.0	187.0	02:44:47.51 PM
	Librado Andrade	RIGHT	21.0	192.0	02:44:46.91 PM
	Lucian Bute	LEFT	25.0	29.0	02:44:46.61 PM
	Lucian Bute	RIGHT	15.0	159.0	02:44:45.41 PM
	Librado Andrade	RIGHT	23.0	182.0	02:44:44.71 PM
	Librado Andrade	LEFT	29.0	170.0	02:44:44.41 PM
	Librado Andrade	LEFT	24.0	165.0	02:44:44.01 PM
	Lucian Bute	LEFT	25.0	183.0	02:44:43.71 PM
1	Librado Andrade	LEFT	22.0	197.0	02:44:39.81 PM
	Lucian Bute	LEFT	28.0	160.0	02:44:38.31 PM
	Lucian Bute	LEFT	26.0	179.0	02:44:35.01 PM
	Librado Andrade	RIGHT	21.0	161.0	02:44:34.81 PM
	Lucian Bute	RIGHT	27.0	194.0	02:44:34.71 PM
	Lucian Bute	LEFT	29.0	177.0	02:44:34.61 PM
	Lucian Bute	LEFT	24.0	197.0	02:44:32.51 PM
	Librado Andrade	RIGHT	27.0	168.0	02:44:31.01 PM
	Lucian Bute	RIGHT	24.0	159.0	02:44:30.11 PM
	Librado Andrade	RIGHT	25.0	198.0	02:44:29.71 PM

The sort order can be determined by looking at the column header. A triangular arrow will indicate the sort arrow. An up-arrow indicates an ascending order whereas a down arrow indicates a descending order. By default the table is sorted by the time of the punch occurrence in an ascending order (most recent on top).

Toggle Boxer Display

The toggle boxer display button (keyboard shortcut, alt-b) filters the graph and table views. The default is to show all punches by both boxers (the red and blue boxing glove icons). But the operator is free to show only the punches thrown by the red boxer or show only the punches thrown by the blue boxer.

Concise Sensor Monitor



The concise sensor monitor allows the operator to keep tabs on the sensor hardware units without using a large amount of screen space.

The operator should occasionally check to make sure that all the LED lights are green. If an LED light is yellow the operator should take extra care in monitoring the sensor units. If any unit's LED becomes red the operator should click the Popup Full Sensor Monitor button which opens a dialog containing the full [sensor monitor](#). The operator should examine why the sensor hardware unit has failed and if possible remedy the situation. Often, like in the case of a sensor hardware unit running out of battery during a fight, there will be no remedy and so the operator should ignore the issue.

If the LED icon is not displayed and instead the sensor icon with a red 'x' is displayed the glove is unmapped. The operator should immediately map the glove to the proper unit via the [wizard](#).

Boxer Punch Statistics

Current Round(s) with Time
(determined by the graph slider)

Damage is the accumulation of force

Round 2 | 05:04:46 - current

Boxer	All Rounds		Speed [mph]		Force [f/s]		Current View	Speed [mph]		Force [f/s]		Damage
	Total #	Fastest	Average	Hardest	Average	Damage		Total #	Fastest	Average	Hardest	
Clottey	31	29	23	198	174	6335	14	29	25	196	174	1841
Cotto	40	29	23	199	158	5416	11	29	24	192	167	2445

Boxer Names

Statistics for all Rounds

Statistics for Current View
(current view is determined by the graph slider)

The boxer punch statistics panel gives running statistics for each boxer. The top left corner displays the viewable round range along with the time range for the given round(s). This defaults to the current round, showing the start time of the round until the current time. The current view can be changed by dragging the [graph slider](#).

There are two sections of statistics. The first (left most) are the running statistics for the entire bout. The second (right most) gives only the statistics for the viewable area in the graph. Again, by default this is the current round unless the operator has explicitly changed this by modifying the [graph slider](#).

In each statistics section, the first column gives the total number of punches thrown by the given boxer. So in the example above, the red boxer, Clottey, has thrown a total of 31 punches overall and 14 punches in the current round (the current view).

The next two columns give speed information. The Fastest column denotes the fastest punch thrown by the boxer for the given section in terms of miles per hour. The Average column denotes the average punch speed for the given boxer. So in the example above, the red boxer, Clottey, has thrown his fastest punch at 29 mph in the second round. His average speed throughout all rounds is 23 mph and his average speed in the second round (the current view) is 25 mph.

The next two columns give force information. The Hardest column denotes the hardest punch thrown by the boxer for the given section in terms of newtons. The Average column denotes the average force for the given boxer. So in the example above, the red boxer, Clottey, has thrown his hardest punch throughout all rounds at 199 newtons and his hardest punch in the second round (the current view) is 192 newtons. His average force throughout all rounds is 158 newtons and his average force in the second round (the current view) is 167 newtons.

The last column is labeled Damage. It is the accumulation of the force values inflicted upon the boxer. For example, Clottey has been punched by Cotto a total of 40 times. The accumulation of all the force values for these 40 punches makes up Clottey's damage value.

Graph Slider

The graph slider, located at the bottom of the dashboard, allows the operator to manipulate the displayed range of the graph view. By default the only portion of the fight displayed within the graph view is the current round. The operator can expand this area or restrict it by dragging the graph slider knobs.

For instance, the following shows a fight with six rounds where the only visible round displayed in the graph view is the sixth round.



The operator can choose to view more rounds by dragging the left knob to the left. Below, the operator has chosen to display all rounds within the graph view.



By using the right knob, the operator can choose to see only some of the first rounds. Below the operator has moved the graph slider so that only the first three rounds are displayed within the graph view.



Similarly, the operator can drag both knobs towards the middle to view only one particular, past round. Below the operator has adjusted the graph slider so that only the third round is visible within the graph view.



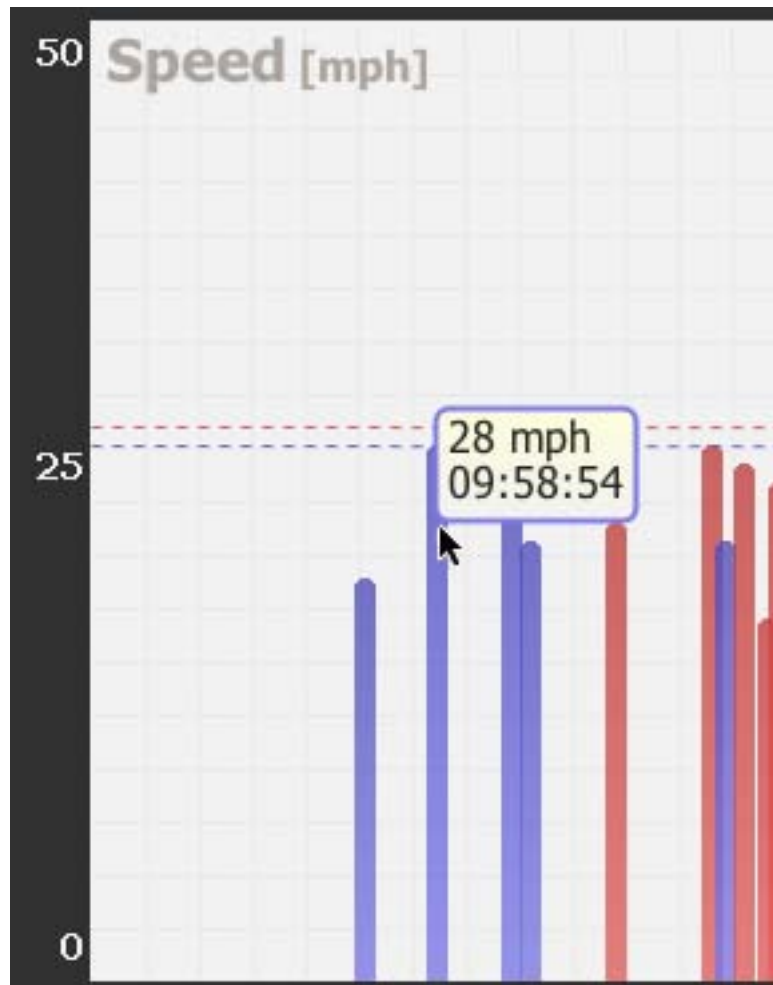
Remember that the graph slider not only affects the graph view but also the statistics within the current view portion of the [boxer statistics panel](#). So, for instance, when the graph slider contains rounds one through three (like is the case two images above), the boxer statistics panel will reflect this.

Rounds 1-3 05:04:03 - 05:59:13										
Boxer	All Rounds			Speed [mph]			Force [f/s]			Current View
	Total #	Fastest	Average	Hardest	Average	Damage	Total #	Fastest	Average	
Clottey	42	29	23	198	169	7764	35	29	23	172
Cotto	49	29	23	199	158	7138	42	29	23	159

Note, how the label is for Rounds 1-3 with the start time being the start time of round one and the end time being the end time of round three. Also, the current view statistics (right panel) shows punch statistics for the boxers for rounds one through three. The total statistics panel (left panel) is unchanged by the graph slider as it always represents the total statistics of the bout. So in this example, the red boxer, Clottey, has thrown a total of 42 punches for all six rounds and a total of 35 punches within rounds one through three.

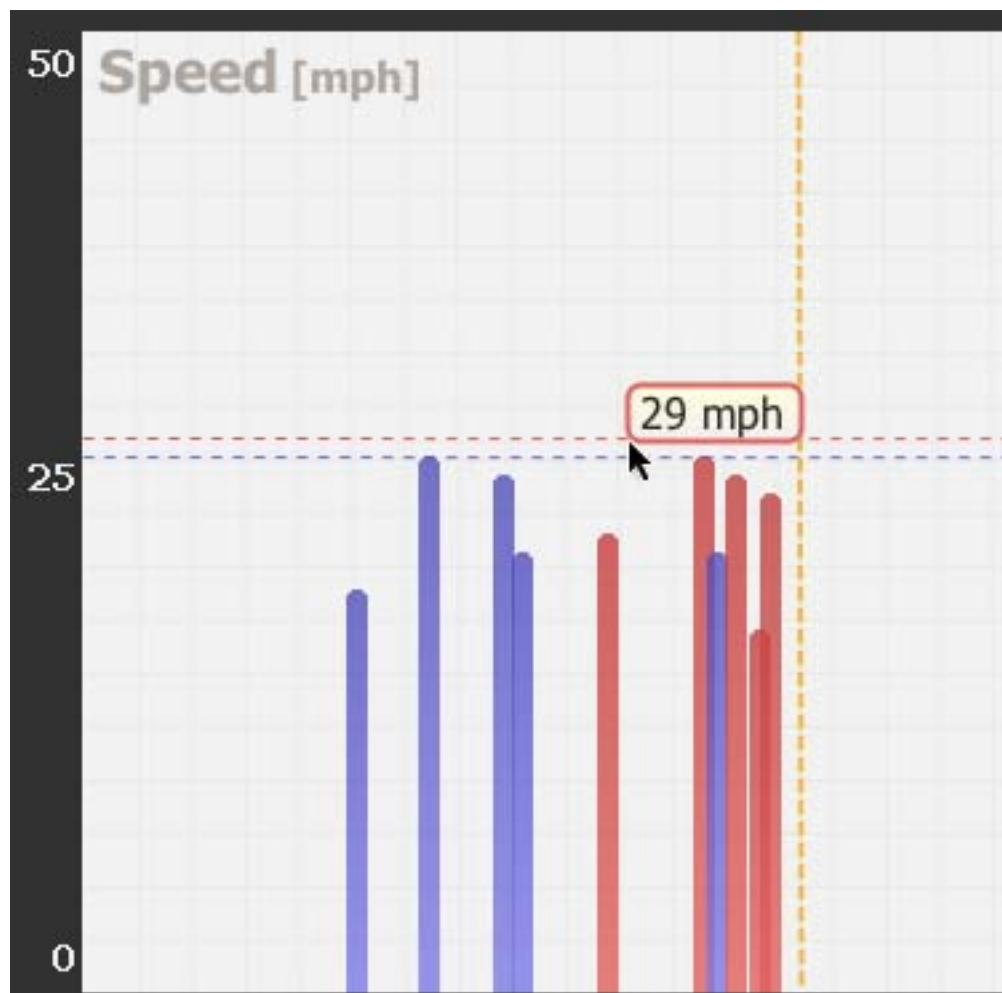
Graph View

The primary view in the dashboard is the graph view. This is a bar graph of each punch thrown by each boxer. The graph is updated in real time as punches occur. Besides [toggling the display view](#), [toggling the boxer view](#) or using the [graph slider](#), the operator can also get more information about each punch by hovering the mouse icon over a particular punch bar. Doing so will produce a tooltip displaying detailed information about the particular punch.



In the example above, the blue boxer has thrown a 28 mph punch at time 9:58:54 pm.

The graph view also gives high marks for each of speed and force. Within the speed and force graphs there are dotted horizontal lines representing the faster and hardest punches thrown by each boxer respectively. For instance, in the example below the red boxer's fastest punch was 29 mph. The blue boxer's faster punch is slightly lower. To see the exact value the operator could hover the mouse over the dotted line.



One other item to note about the graph view is the time marker. The time marker is a dotted vertical orange line which represents the current time within an in-progress round. So in the example above, the time marker shows that just recently the red boxer has thrown four punches with the blue boxer throwing one in between. The time marker is always the right most item within the graph view as it represents the current time. Needless to say, the time marker is not visible within the graph when viewing already completed rounds.

Troubleshooting

Could Not Login

If the username or password entered is incorrect, login will fail.



First ensure the information is valid and retry. If the information is valid and login continues to fail, verify internet connectivity by opening a web browser and pointing it to this location (<https://qa.homebox.com/admin/punchforce/>) [todo, blangel, change to production link]. Click the link to re-install the application, after doing so please re-open the application and try again.

If instead, there is a connection failed error, try again. If this persists, please contact someone from the PunchForce Application team via HBO Sports as this indicates an issue with the application server.



Server is Disconnected

If at any point the application's Server Status area becomes red displaying Disconnected from Server the application has lost connection with the server.



To remedy this click the Reconnect to Server button (the leftmost button on the Status Area, see [above](#)). This will bring up a dialog allowing the operator to reconnect to the server, click the Connect button.



This will bring up the Login dialog as when the application first started. Login as before. If when clicking the Connect button the following warning is displayed, go to the website <https://qa.homebox.com/admin/punchforce> [todo, blangel, change to prod link] and click the link to reinstall the application, then rerun the application.



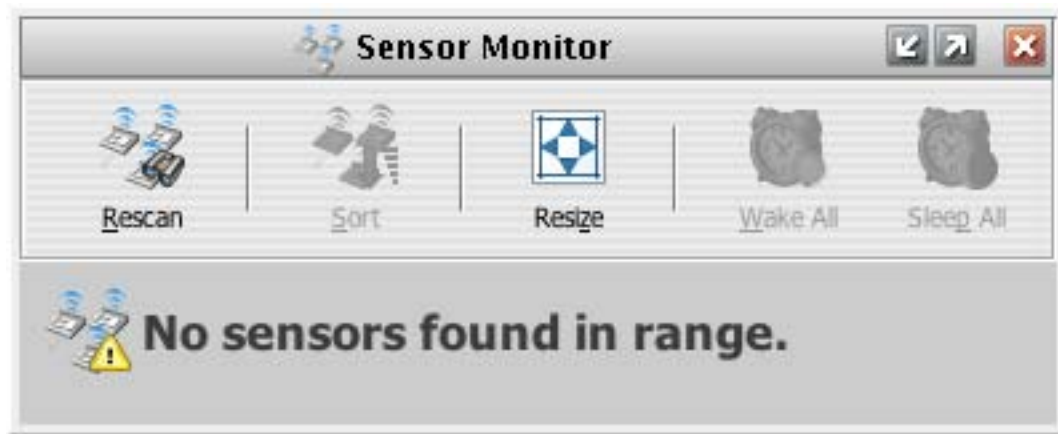
Truck Test Connection Failed

If the connection test to the broadcast truck fails, verify the PunchForce laptop has internet connectivity and is available on the same intranet as SportsMEDIA's 'The Hancock' computer. SportsMEDIA can assist in this. Also verify that the IP address entered is exactly as SportsMEDIA dictates. Once this has been verified retry the test. Note, the operator should wait about fifteen seconds between tests to guarantee all network cacheing has been flushed.

Sensor Unit Errors

No Sensors In-Range

If the Sensor Monitor window displays the warning that no sensors were found in range.



The most likely remedy will be to click the Rescan button. This is because sometimes there is a delay in the base unit recognizing the sensor hardware units even though the off switch (documented [here](#)) has been removed.

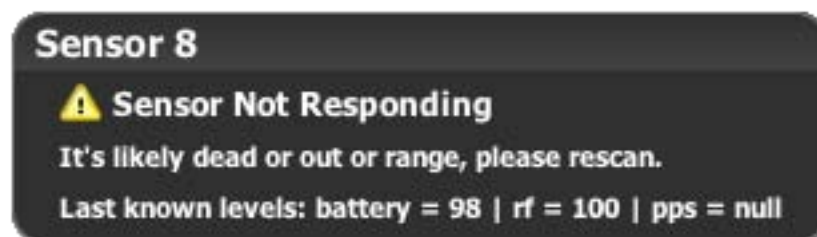
If clicking the Rescan button a couple of times still doesn't solve the issue the problem is likely caused by the hardware. Ensure two things:

- the sensor unit's off switch is pulled out (see [here](#)).
- the base unit is properly connected to the laptop ([see here](#)).

After verifying, try clicking the Rescan button again. If this still fails, restart the application and try again. If the application still is not recognizing the sensor units contact the PunchForce application team immediately via HBO Sports.

Sensor Not Responding

If an individual sensor does not send data to the base unit for three seconds the application reports that it is not responding.



Sometimes this happens spuriously because of heavy load or interference from people between the sensor unit and the base unit. To remedy, the operator should first click the Rescan button. If the sensor does not respond after clicking the Resend button it is likely that the sensor hardware unit has run out of battery or has too low of an rf-signal to accurately report to the base unit. These sensor units should be replaced with a backup and placed on the [charger](#).

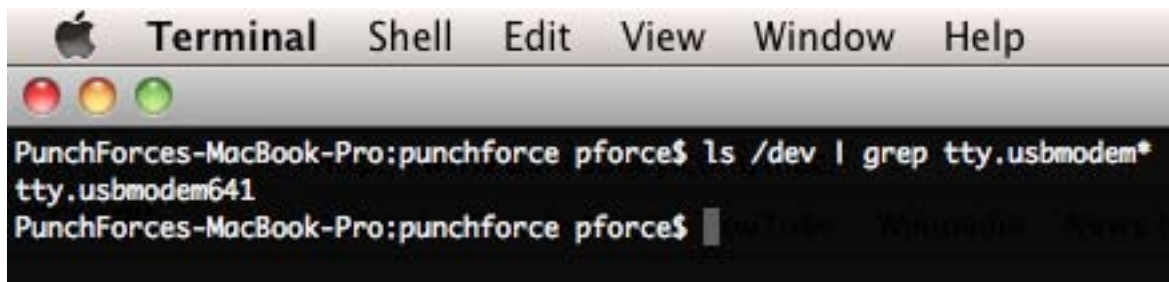
Base Unit Connection

Typically the operator will ensure the base unit is connected by opening the Sensor Monitor and verifying that sensor hardware units with their off key unplugged (documented [here](#)) show up. However, if the base unit is not properly connected to the laptop the following error may occur.



To remedy this do the following things.

- Ensure the USB cord is plugged firmly into the laptop as well as the base unit itself (the base unit has a green led light next to the USB connection which will light up if connected correctly). After verifying this restart the application and retry.
- If that did not resolve the issue, open up a Terminal (by typing **Cmd-Space** then typing **Terminal** and hitting the **Enter** key). In the open terminal type **ls /dev | grep tty.usbmodem*** and then hit the **Enter** key. The following result should come back:

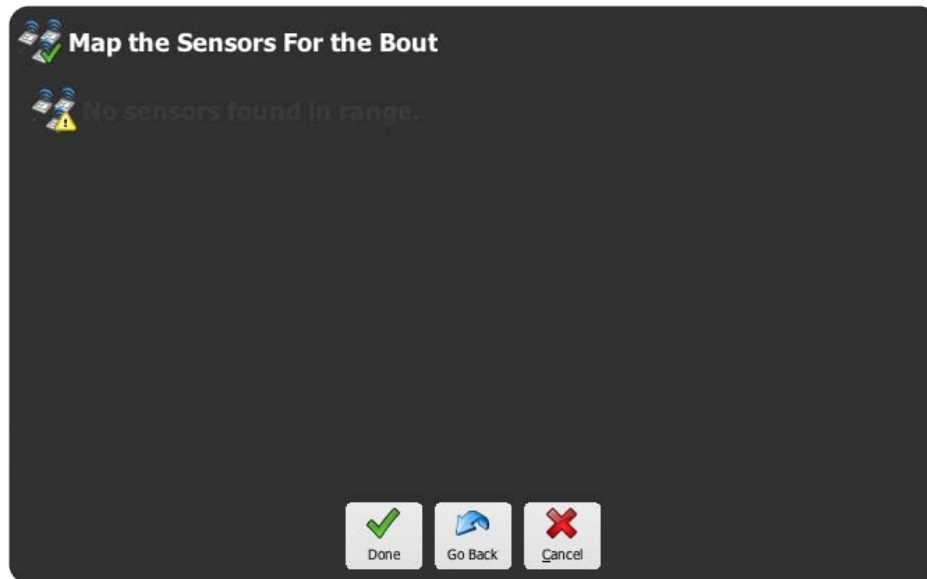


If no result came from issuing the command (`tty.usbmodem*` did not show, where `*` is some number) the base unit is not being recognized by the OS. This could mean a USB cord failure, or worse case, the base unit itself has failed. Either way the application cannot operate and the PunchForce application team needs to be notified immediately via HBO Sports.

If the proper result did show then try restarting the application and retrying as there may have been a delay in the OS recognizing the device. If the problem still isn't resolved notify the PunchForce application team via HBO Sports.

Dashboard Wizard Errors

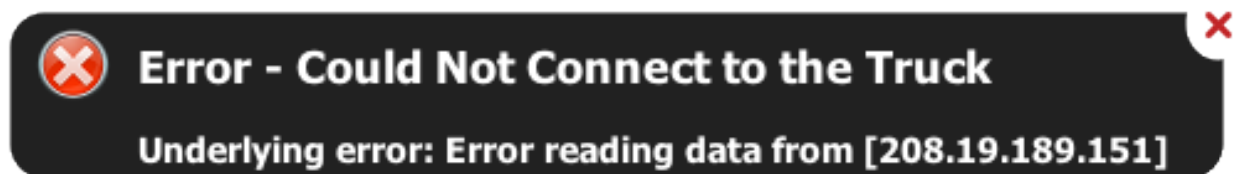
If upon entering the Dashboard wizard's mapping screen there are no sensors present, the operator should ensure the sensor hardware units are physically in-range and have their off switch unplugged (see [here](#)). If so, then the operator should click the Go Back button reselect the correct Bout and click the Select button (this essentially acts like a Rescan of the sensor units).



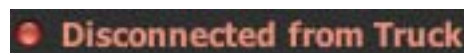
If this does not correct the problem, exit the Dashboard wizard (click the Cancel button) and ensure the sensors are found within the Sensor Monitor (see [here](#)).

Within Dashboard, Truck Connection Issues

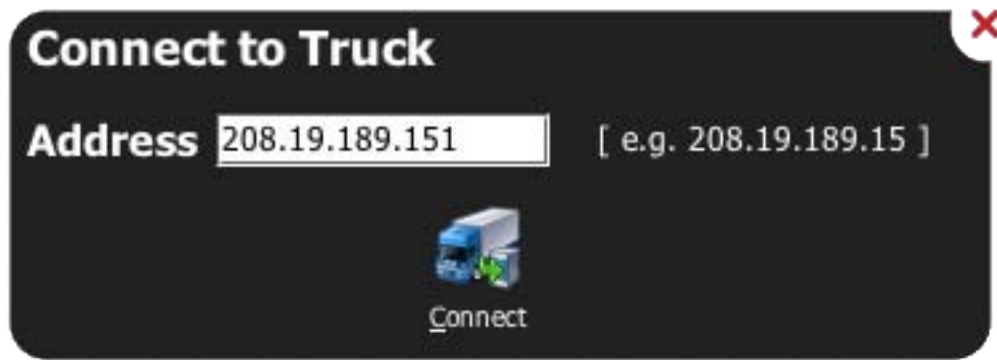
If the application could not establish a connection with the broadcast truck an error message will appear similar to the following



and the [Status Area](#) will indicate as much.



To resolve this, first click the Connect to Truck icon in the [Status Area](#). This will bring up the truck connection dialog (identical to the [test truck connection](#) dialog except that the connection is maintained and not just tested).

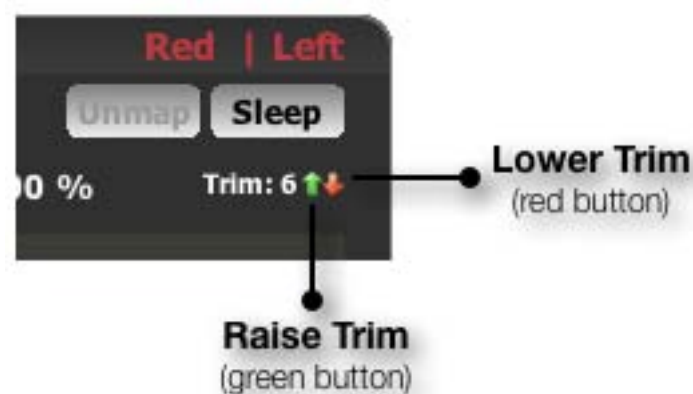


Verify the truck address and then click Connect. If the connection still fails, see [here](#) for remedies.

Punch Discrepancy Between Boxer and Application

If during the fight it is clear that punches are not being recorded by the application (the operator sees a boxer throw a punch but a punch is not displayed in the dashboard) or the application is recording too many punches (the application displays punches the operator did not see the boxer throw) the operator can attempt to remedy this by using the trim functionality.

To use this functionality the operator should click the Popup Full Sensor Monitor button in the [concise sensor monitor](#). Within the sensor monitor, the operator should identify the sensor hardware unit in question (if the red boxer is throwing punches but they're not being registered, identify the sensor units attached to the red boxer) and raise/lower the trim values. Ideally the operator will identify the particular glove hand which is having the issue. If, however, this is not possible, raise/lower the trim for both gloves (note, this may cause the non-offending glove to register too many/few punches, in which case, the operator would correct by using the opposite trim function for that glove).



In above example the operator has raised the trim of the red boxer's left glove to 6 (the default is 5). This means that the operator has attempted to resolve an issue where punches thrown by the boxer were not being registered within the PunchForce application. If, however, the application were reporting punches which the boxer did not throw (too many) the operator would have lowered the trim.

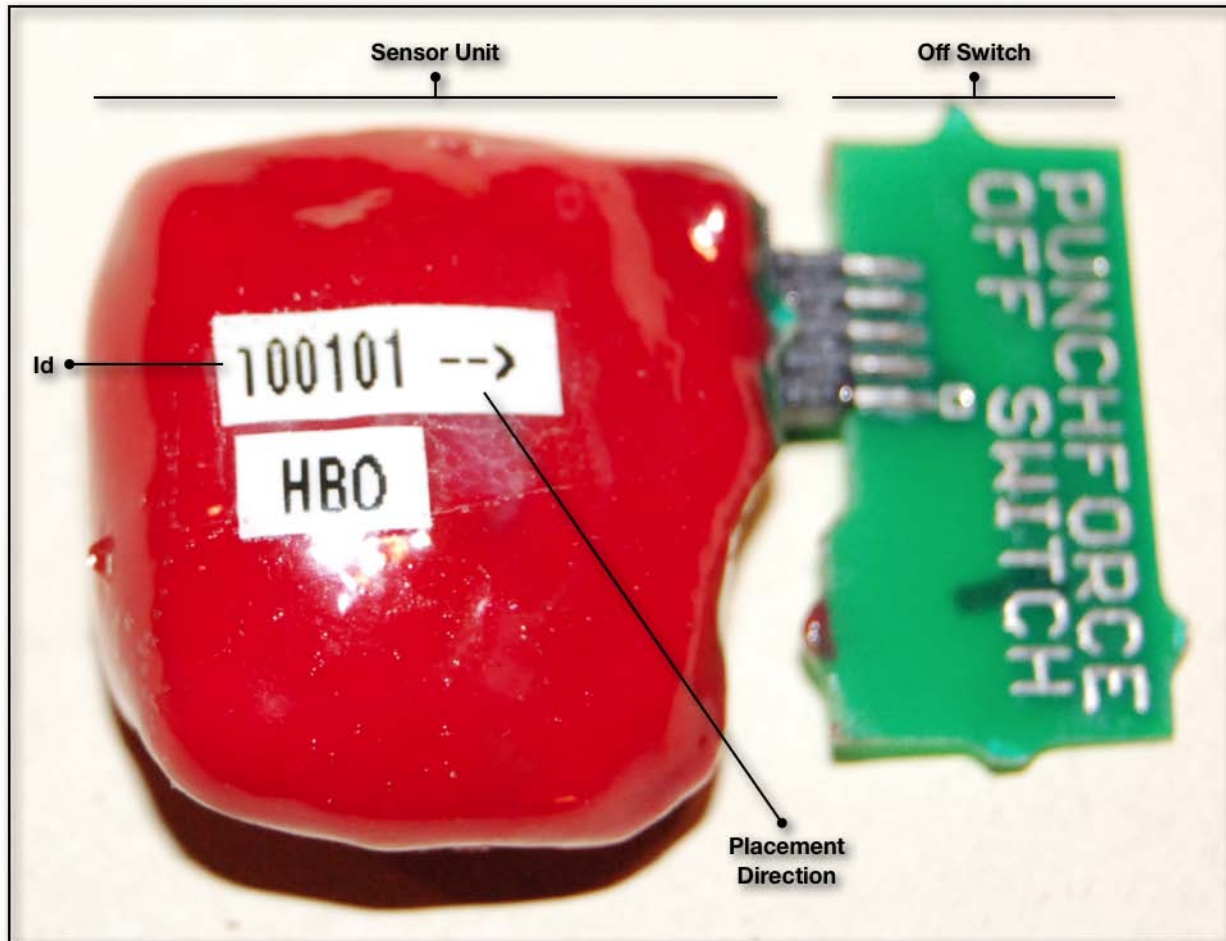
FCC PART 15 COMPLIANCE INFORMATION

NOTE: The Punchforce Base Unit has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or Modifications to the Punchforce System not expressly approved by HBO/Time Warner could void the user's authority to operate the equipment.

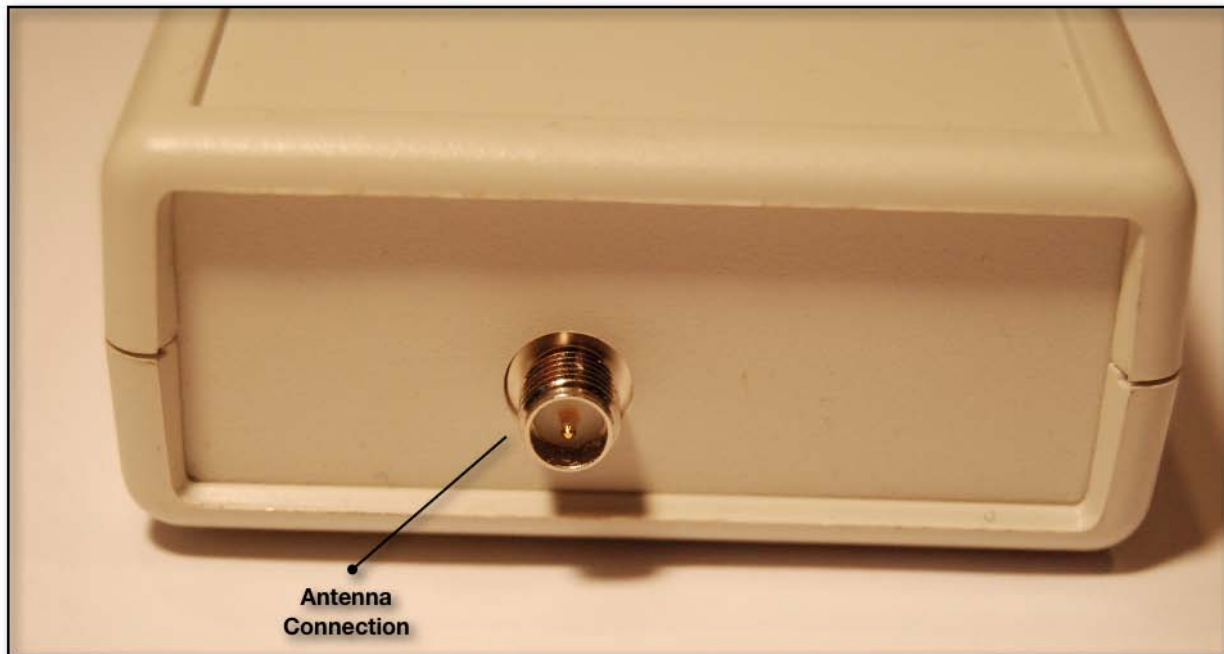
Appendix A: Hardware Parts

Sensor Unit

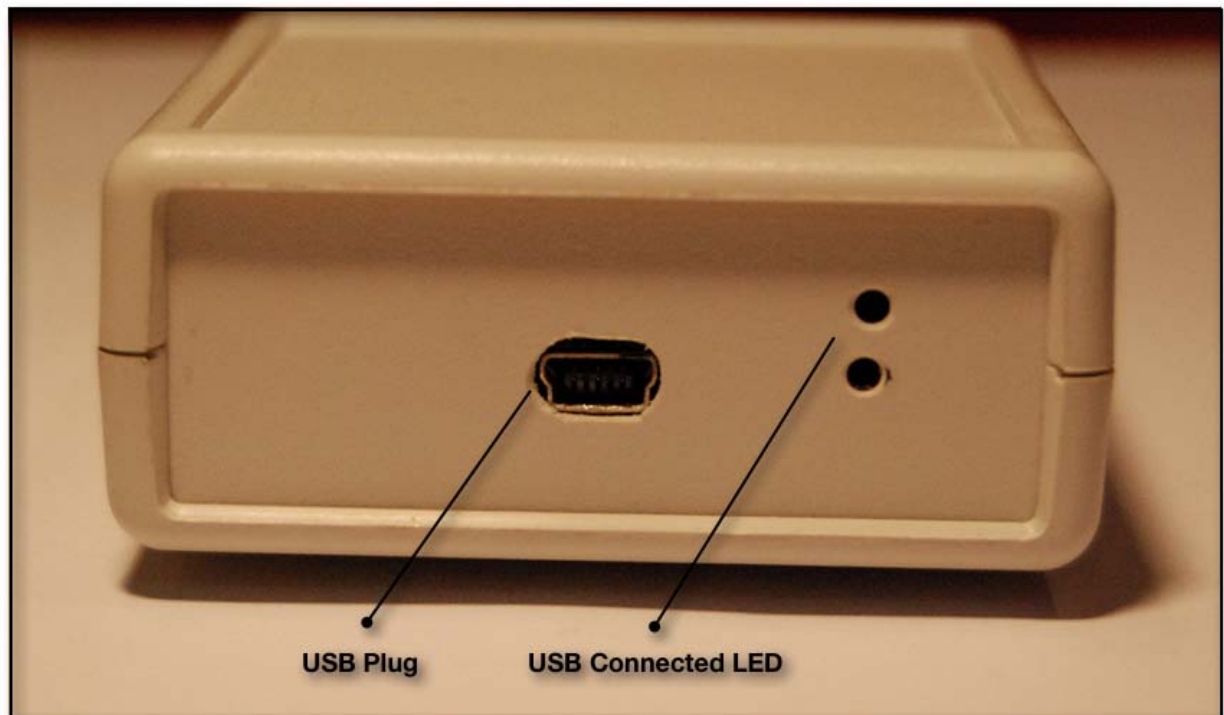


Base Unit

Front Side



Back Side

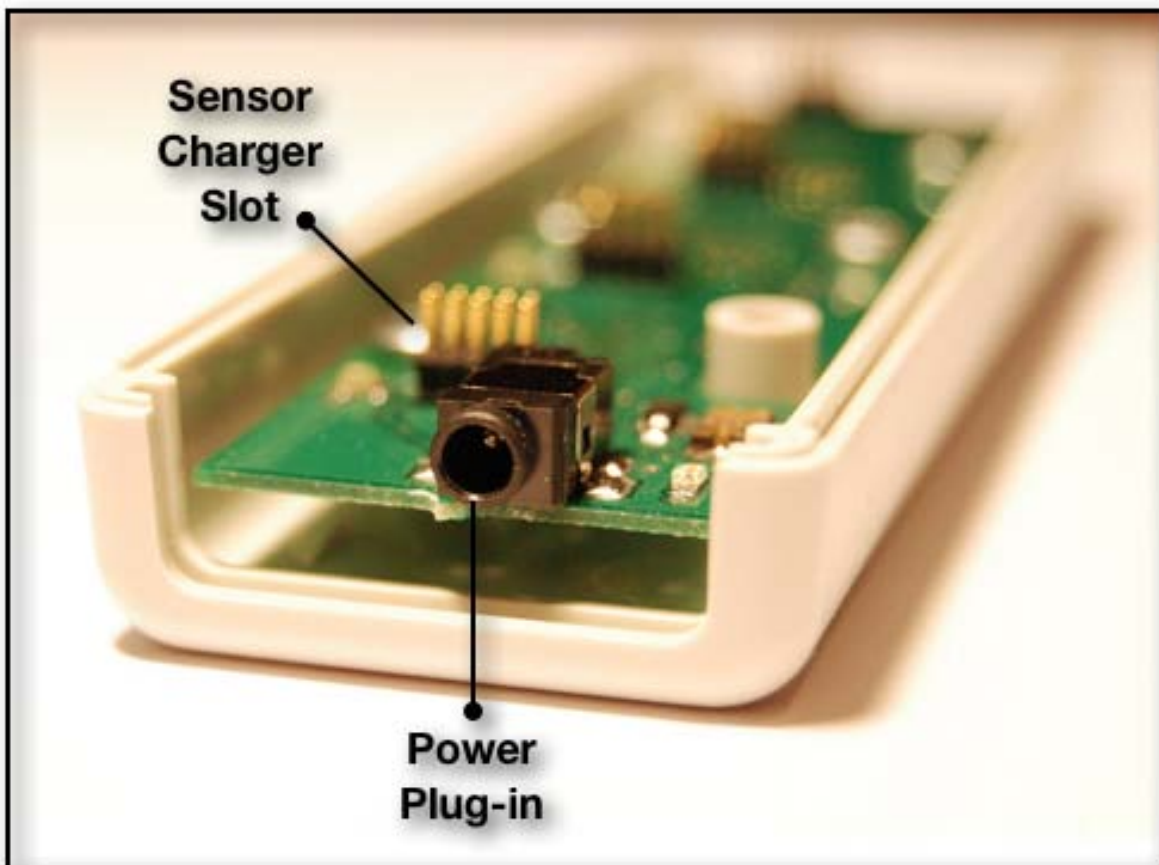
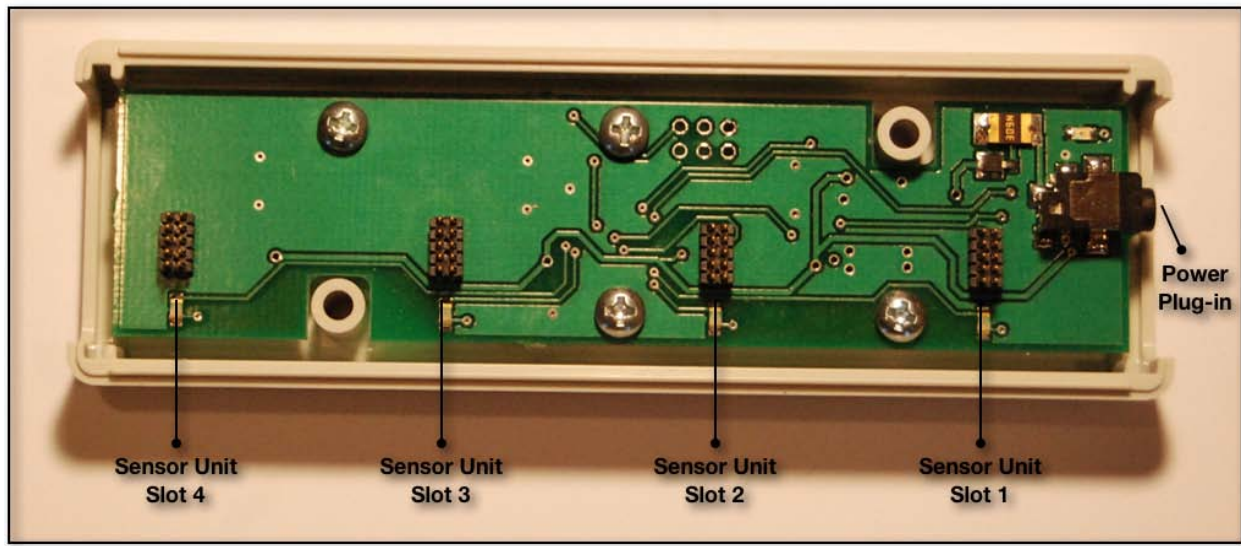


Base Unit Antenna



Base Unit Antenna

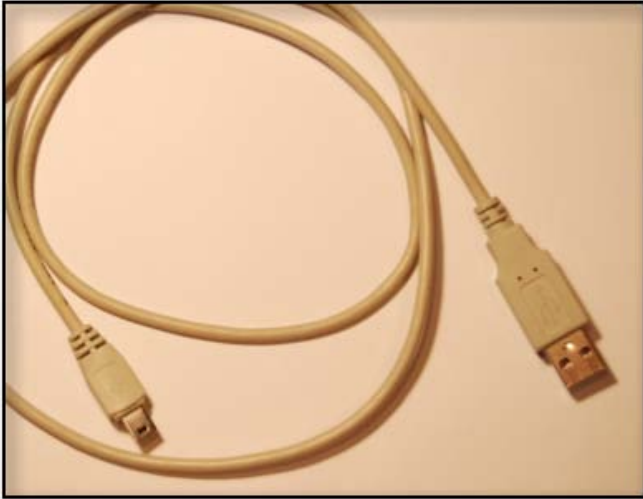
Sensor Unit Charger



Auxiliary Hardware (cables, etc)

Base Unit USB Cable

This is a standard USB to USB-mini cable (often used for digital cameras). Any USB-to-USB-mini cable will work.



Sensor Unit Charger AC/DC Power Adapter

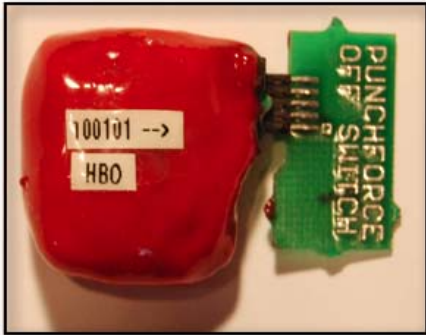


Appendix B: Hardware Installation/Usage

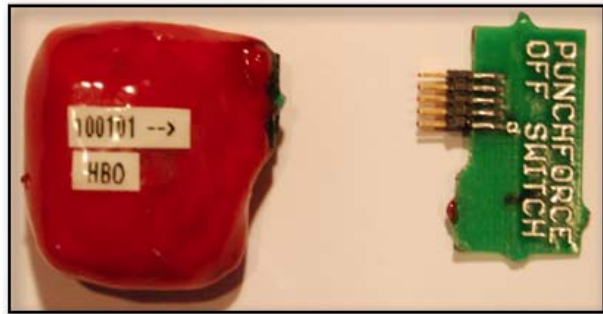
Sensor Unit On/Off

Each sensor unit is equipped with an on/off switch. When the switch is attached to the unit the sensor is in the off state (meaning the sensor unit is not using battery, is implicitly asleep, and is not reachable from the base unit). To turn the unit on, the operator removes the switch.

Off



On



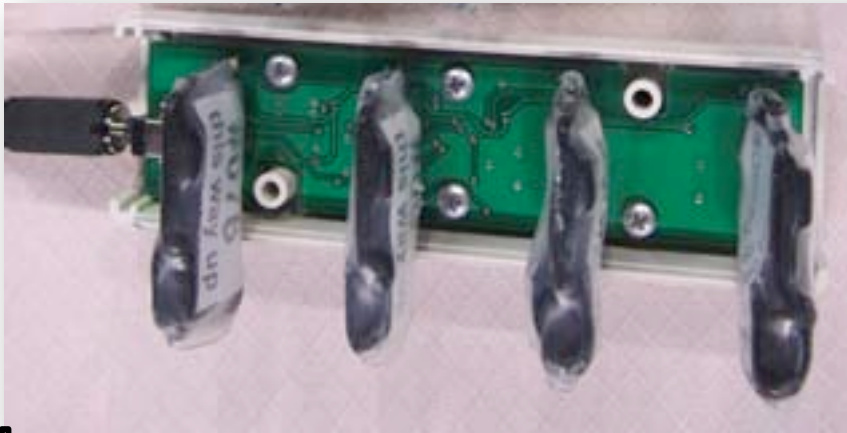
Sensor Unit Glove Placement

The sensor units should be taped onto the boxers' wrists with the label side up and the arrow pointed towards the fingers.



Charging the Sensor Units

To charge the sensor units, the operator places the sensor unit on the charger. The correct placement is on any slot with the sensor unit's label pointed away from the power plugin-in.



Setting up the Base Unit

To setup the base unit, the operator will screw in the antenna to the base unit (the screw-in works similarly to screwing in a coaxial cable to one's television). Next, plug the mini end of the USB cable into the base unit. Then plug the USB cable into the PunchForce laptop. The base unit's connection LED will become green as soon as the PunchForce laptop has identified it.

