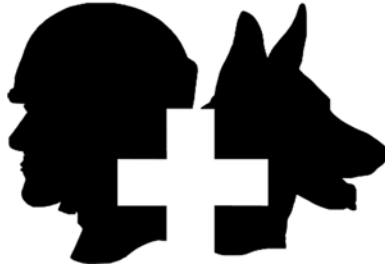


# **TRAUMA F/X®**

*Improving Survivability*



TRAUMAFX® TOUCHSCREEN REMOTE CONTROL  
TRANSMITTER

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## **TraumaFX® Touchscreen Remote Control Transmitter (TSR) User Guide**

Rev\_Q1\_2021

**TRAUMA F/X®**  
*Improving Survivability*

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# TraumaFX® Touchscreen Remote Control Transmitter (TSR)

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<b>Chapter 1: Introduction.....</b>	<b>1</b>
About the TraumaFX® Touchscreen Remote Control Transmitter.....	1
Compatible TraumaFX® Upper and Lower Units .....	1
Item Checklist .....	2
Standard Components and Accessories .....	2
System Overview .....	2
Special Notes and Cautions.....	2
Water Resistance and Cleanup.....	2
Touchscreen Remote Control Transmitter .....	3
Third Party User Manuals .....	3
Compliance .....	3
<b>Chapter 2: Touchscreen Remote Control Transmitter (TSR) Features</b>	<b>4</b>
Cautions and Care.....	4
<b>Chapter 3: Getting Started.....</b>	<b>5</b>
Notes on General Use and Care.....	5
Charging the Batteries .....	5
TSR Transmitter Batteries.....	5
General Use and Care of Batteries.....	6
Installing and Removing the Battery.....	7
Installing and Removing the TSR Transmitter Battery.....	7
<b>Chapter 4: Operating the TraumaFX® Touchscreen Remote Control Transmitter (TSR).....</b>	<b>8</b>
Power .....	8
Sync Check.....	8
Pairing/Syncing a TraumaFX® Upper or Lower Unit.....	10
Standard Mode .....	11
Session Control Screen .....	11
Scenarios.....	13
Beginning and Ending a Training Session .....	14
Monitor Leads .....	15
ABCs – Airway, Breathing, and Circulation .....	15
Vitals.....	16
Airway.....	18
Breathing .....	19
Circulation .....	20
Other .....	20
CPR Mode .....	21
Switching to CPR Mode .....	22

## TABLE OF CONTENTS

Cardiac Arrest .....	23
ACLS/ALS Mode .....	25
ACLS Main Screen .....	26
Megacode Screen .....	27
Vitals Screen .....	27
Running an ACLS Session .....	29
Monitor Leads.....	30
Treatment Options .....	30
Using Medications .....	32
Medicine Effects.....	32
Medicine History .....	32
CPR.....	33
Other Remote Options.....	33
Flush Screen.....	33
After Action Reporting (AAR).....	34
Standard Mode AAR .....	35
ACLS Mode AAR.....	36
Settings Screens.....	37
Upper Settings.....	38
Teeth Force.....	38
Upper Body Blood Pressure Arm Calibration .....	39
Upper Body Hemostatic Packable Force.....	40
Lower Settings .....	41
Lower Body Hemostatic Packable Force.....	41
Remote Settings .....	41
AAR.....	41
Brightness.....	42
Date/Time .....	43
VitalsBridge Calibration .....	43
Packing .....	44
<b>Chapter 5: After Use Care .....</b>	<b>45</b>
<b>Chapter 6: Troubleshooting .....</b>	<b>46</b>
Additional Support.....	46
Customer Service and Support.....	46
<b>Appendix A – TSR Transmitter Technical Specifications.....</b>	<b>47</b>
Touchscreen Remote Control Transmitter (TSR) .....	47
Makita DC18RC Battery Charger .....	48

## Chapter 1: Introduction

### About the TraumaFX® Touchscreen Remote Control Transmitter

The TraumaFX® Touchscreen Remote Control Transmitter (TSR) is a ruggedized controller used with the all powered TraumaFX® upper and lower units. With its simple and durable design, the TSR transmitter provides end users with instant treatment feedback, and the ability for the trainer to customize user scenarios in accordance with the learning opportunity at hand.

#### Compatible TraumaFX® Upper and Lower Units

- Multiple Amputation Trauma Trainer (MATT)®
- Packable Hemostatic (HEMO) Trauma Trainer
- HEMO – Gunshot Wound
- Clinical Response Lower (CRL)
- Emergency Medical Trauma Trainer – Tactical Medical Lower (EMITT-TML)
- Emergency Medical Trauma Trainer – Active Shooter Lower (EMITT-ASL)
- AirwayPlus Lifecast – Pulses/Breathing (APL-PB)
- AirwayPlus Lifecast – Intubation/Packable (APL-IP)
- Clinical Response Upper (CRU)
- Clinical Response Upper – Resuscitate (CRU-R)
- Emergency Medical Trauma Trainer – Tactical Medical Upper (EMITT-TMU)

The TSR transmitter is designed for rugged use in realistic training environments; however, it is not impermeable to damage. To ensure proper operation, do not subject the TSR transmitter unit to unnecessarily harsh treatment. Careful preventive maintenance and frequent after-use inspection is essential to ensure the service life of your TSR transmitter controller. Please review ***Chapter 5: After Use Care*** which outlines the standard preventive maintenance required under the terms of the TraumaFX® limited warranty.



### Item Checklist

The components listed below are required to set up and operate your TraumaFX® Touchscreen Remote Control Transmitter.

### Standard Components and Accessories

Accessory Name	Order Number
18v Makita Battery	KGS-TFX-LO-BT-1
Touchscreen Remote Control Transmitter	TFX-TSREM-1

Figure 1

### System Overview

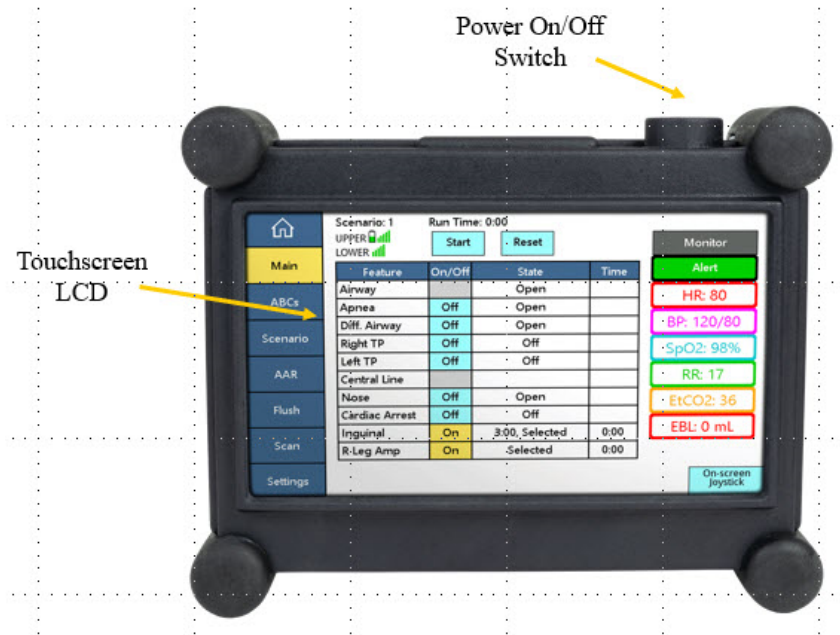


Figure 2

### Special Notes and Cautions

***Read all TraumaFX® instructional manuals before attempting to assemble, install, or operate any TraumaFX® product.***

#### Water Resistance and Cleanup



***DO NOT USE PRESSURIZED WATER OR SUBMERGE THE TSR UNDER WATER. REMOVE BATTERIES BEFORE CLEAN UP TO AVOID ELECTRIC SHOCK!***

The TSR transmitter is water resistant, but is not waterproof. Carefully wipe the TSR transmitter with a soft, wet cloth or sponge after each use.



#### Touchscreen Remote Control Transmitter

The Touchscreen Remote Control Transmitter (TSR) has an extended range (see technical specifications) and can be used indoors or outdoors. Note that indoor range is subject to building design and construction materials. Test system operations whenever setting up in a new location or moving to a different area of a building.



#### Third Party User Manuals

The TSR transmitter uses third-party commercially available equipment. Where such equipment is provided, the associated user manuals and any pertinent documentation are provided as well.



#### Compliance

If the TSR transmitter is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



# Chapter 2

## Chapter 2: Touchscreen Remote Control Transmitter (TSR) Features

This section describes the features of the TSR transmitter that contribute to the unique training experience that TraumaFX® upper and lower units provide:

- Responsive touch screen for quick access to all features
- Easy to use, menu-driven software – takes only minutes to learn
- All sensor data recorded on main control screen for quick reference
- Display shows vitals, blood loss, airway status, and elapsed time
- Feedback for tourniquet application, wound hemostasis, airway intervention, needle decompression, chest tube placement
- Preset scenarios provided, or quickly create your own
- Rugged exterior for use in all training locations and situations
- ACLS mode for running ACLS/ALS megacodes, with AAR
- Water and weather resistant
- One TSR can be used to operate both upper and lower units
- Ergonomically molded-in handgrips and wrist strap for comfortable use
- Wireless communication with manikin up to 200M away outdoors and 50m in indoor/urban areas
- Operational day or night
- User adjustable brightness
- Simulation starts with single button push – trainer can focus on the event and not the remote
- Operated by a single Makita 18v Li-ion battery – the same type used to power all TraumaFX® units

### Cautions and Care

The TSR transmitter unit is water resistant, but not waterproof. Avoid direct water contact with the battery compartment.

# Chapter 3

## Chapter 3: Getting Started



***Read all TraumaFX® manuals before attempting to assemble, install, or operate any TraumaFX® products or accessories.***

### Notes on General Use and Care

The TraumaFX® Touchscreen Remote Control Transmitter (TSR) is designed for rugged use in realistic training environments. Careful preventive maintenance and frequent after-use inspection is essential to ensure the service life. Please review **Chapter 5: After Use Care**, which outlines the after use care required under the terms of the TraumaFX® limited warranty.

### Charging the Batteries



TSR Transmitter Batteries

***Read all instructions provided in the Operating Manual – Makita Battery Charger before using.***

Each TSR transmitter utilizes one (1) 18v Makita Lithium-Ion battery for operation. Additional batteries are available for purchase through TraumaFX by contacting your account representative or customer support.

Only use the batteries and charger(s) provided by TraumaFX; use of different equipment may result in damage to the batteries and/or TraumaFX equipment and will void the limited warranty. Read the instructions for the Makita battery and charger in the *Operating Manual – Makita Battery Charger* provided.

The TSR transmitter battery is a consumable item (with a one (1) year manufacturer's warranty); as with most batteries, Makita batteries have a finite shelf life. After considerable use, a "used" battery's voltage will drop to a point that it will no longer be able to hold a charge.

### Recharging TSR Transmitter Battery

1. **Plug** the Makita quick charger (Figure 3) into a standard 110V wall outlet.
2. **Slide** the battery onto the quick charger until firmly in place and the indicator light illuminates (each battery takes approximately 30-45 minutes to charge, and depending on the amount of usage, provides a full day of training support).
3. **Remove** the battery when readout indicates charging is complete.



Figure 3

**NOTE:** A 220V Makita charger is available for International use. This is a special-order item and available for purchase through TraumaFX by contacting customer support or your account representative.

### General Use and Care of Batteries

All batteries used in TraumaFX products were specially selected to provide optimal operational performance. However, as with all batteries, they will last longer with proper care and maintenance. To preserve the life of the batteries, the following best practices are recommended:

1. Only use the batteries and charger(s) provided by TraumaFX; use of different equipment may result in damage to the batteries and/or the TraumaFX unit(s).
2. Remove battery from the TSR transmitter at the end of each training session. Batteries should never be stored inside a unit or TSR transmitter.
3. Recharge batteries immediately after use by placing them in the Makita battery charger.
4. Fully recharge all batteries before each training exercise. This is indicated by a solid green light on the charger for each battery.
5. Never mix a fully charged battery with a partially charged battery as this will cause the TraumaFX unit to not operate properly.
6. Never mix an old battery with a new battery as this will quickly degrade the new battery.
7. Store batteries indoors, away from extreme temperatures (not above 120°F or below 38°F).

8. Only charge TraumaFX-related batteries using the approved chargers supplied with the TraumaFX system.

## Installing and Removing the Battery

### Installing and Removing the TSR Transmitter Battery

1. **Install** the battery by inserting the battery into the back of the unit (Figure 4) by sliding the battery into the battery slot until it locks into place.
2. **Remove** the battery by pressing the white, push button located on the battery to remove the battery from the touch screen remote controller.



Figure 4

## Chapter 4: Operating the TraumaFX® Touchscreen Remote Control Transmitter (TSR)

This chapter describes the operational features of the TSR transmitter written from the perspective of having paired both an upper and lower unit to the TSR transmitter. If an instruction is incompatible with your current set-up (e.g. paired with only an upper or only a lower), please disregard.

### Power

Power for the TSR transmitter is provided by one (1) 18v (3.0-5.0Ah) Makita Lithium-Ion battery. All batteries are fully rechargeable and come with a charger and manufacturer's instructions and operating manuals.

### Sync Check

Prior to beginning a training exercise with any upper or lower unit, performing a quick link check between the TSR transmitter and the upper or lower unit is highly recommended. Prior to shipment, each TSR transmitter is synced and fully tested with its paired upper or lower unit and should not require any customer adjustment.

To perform a quick sync check, perform the following:

1. **Power on the TSR transmitter** by pressing the power switch on the top of the controller.
2. **Power on the TraumaFX® Upper or Lower Unit** by pressing the power switch (push button). When the power switch is on a bright green LED will light up.

3. Press the **'Settings'** button on the TSR transmitter's main menu (Figure 5) to view the *Settings* screen.

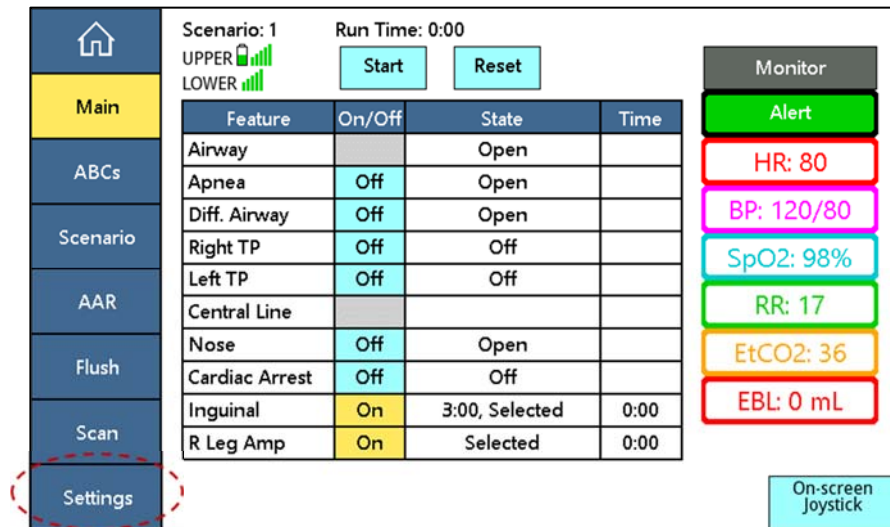


Figure 5

4. Check for connected upper or lower unit. The upper- or lower-unit serial number will appear in the lower half of the screen if they are paired with that particular TSR transmitter (Figure 6). As the image shows, this TSR transmitter is paired with lower unit HEMO-2500 and upper unit APL-PB-1434.

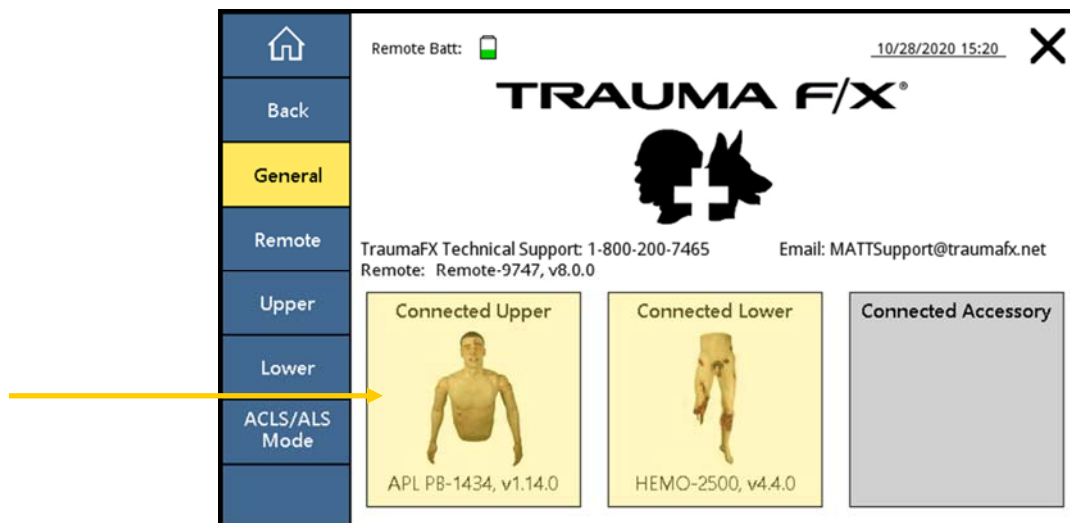


Figure 6

## Pairing/Syncing a TraumaFX® Upper or Lower Unit

Should a TraumaFX® Upper or Lower unit stop communicating with the TSR transmitter, please sync the unit by performing the following steps:

1. Power on the TSR transmitter.
2. Power on the TraumaFX® Upper and/or Lower Unit.
3. Press '**Scan**' on the main menu to switch to the *Scanning* screen.
4. The bottom half of the screen will be populated with the TraumaFX® units in range (Figure 7). If the specific unit does not appear, check that the unit is powered on and then press '**Scan**' again.

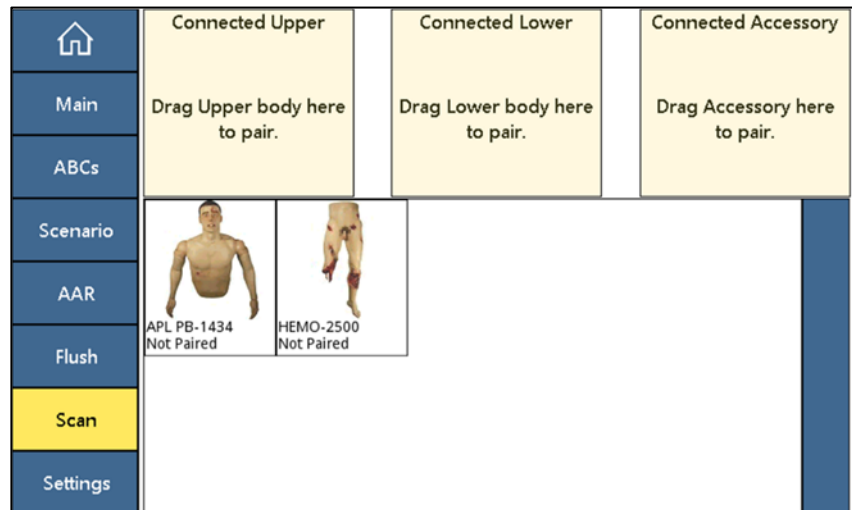


Figure 7

5. Touch the desired upper- or lower-unit image and drag it to the corresponding Connected Upper or Connected Lower box.
6. Release the unit image on the Connected box. The bottom half of the screen will be replaced with a pairing status message.
7. After the TSR transmitter successfully pairs with the unit, the Connected box will display the unit (Figure 8).

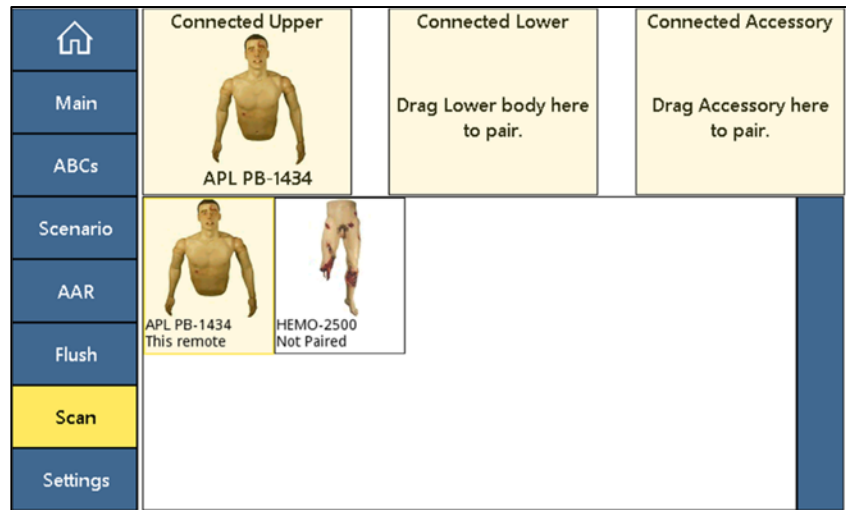


Figure 8

8. Drag the Connected unit image to the available body list to unpair.
9. Press '**Main**' on the menu to return the *Session Control* screen.



**IMPORTANT:** MATT units built or shipped prior to April 2014 will not work with TraumaFX® TSR transmitter.

## Standard Mode

TraumaFX touch screen remote control transmitters ship in Standard Mode. This mode is used for trauma response training with a targeted focus on TC3 injuries.

### Session Control Screen

The TraumaFX TSR transmitter is session-based. The *Session Control* screen is the main operating screen. It can be accessed by pressing '**Main**' on the menu. Closing a screen or pressing the **Home** icon in Standard Mode will switch the TSR transmitter to the *Session Control* screen.

Session Control Features (Figure 9):



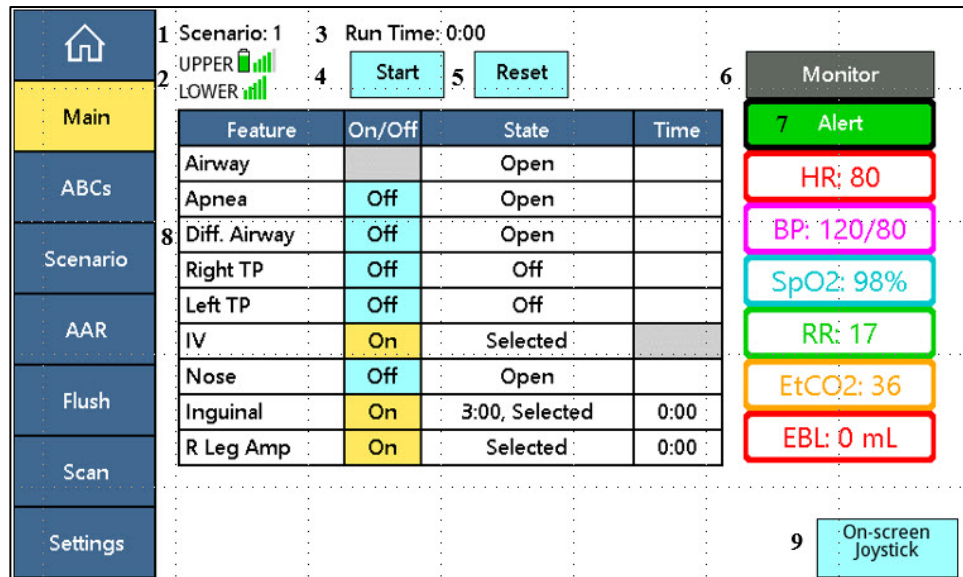


Figure 9

1. **Scenario:** Current active scenario number.
2. **Connected Unit Status:** Upper/Lower battery level and signal strength.
3. **Run Time:** How long the session has been running.
4. **'Start' / 'Pause' / 'Resume' / 'AAR' button:** Start or Pause the current session. Press 'AAR' after a session has been stopped to switch to the After Action Report (AAR) overview.
5. **'Stop' / 'Reset' button:** Stop the current session, or Reset the current session states and times for all features.
6. **'Monitor' button:** Opens a menu to set which vital signals should be displayed on the monitor. Available if a TraumaFX® Vital Signs Monitor or VitalsBridge unit is connected.
7. **Vitals:** Current vital signs.
8. **Feature Table:** List of injuries and/or features available for the connected units. Injuries can be immediately turned on or off with the on/off buttons.
9. **'On-screen Joystick' button:** Button to enable the on-screen joystick. Once enabled, touch anywhere on the screen to bring up the on-screen joystick. The joystick is used to move the animatronic legs (Figure 10).



Figure 10

### Scenarios

There are currently twenty (20) built-in training scenarios, which can be accessed by pressing the ‘**Scenario**’ button on the main menu. These scenarios are numbered, along with a list of physiology settings including respiration rate, heart rate, blood pressure, blood loss, oxygen saturation,

end-tidal CO<sub>2</sub>, ECG setting, wounds turned on or off, IV turned on or off, and state of the eyes (state of the eyes is for the CRU and CRU-R only). These provide a starting point for a session (Figure 11). The scenarios can be run as they are or can be modified by the user either before or during a session. Changes to the scenario are automatically saved, making that scenario customized. Any changes can be undone at any time by pressing the ‘**Reset-Default**’ button on the *Scenario* screen. All parameters can be set to zero by pressing the ‘**Reset-Zero**’ button.

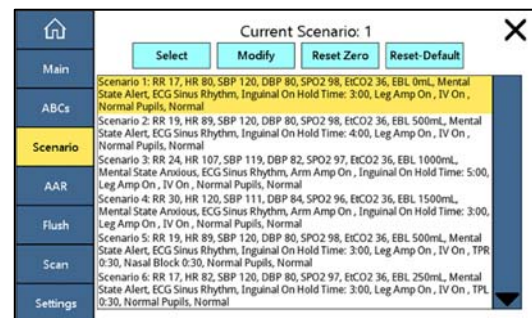


Figure 11

To select a Scenario:

1. Stop and Reset the current session.
2. Access the scenarios by pressing the ‘**Scenario**’ button on the main menu.
3. Highlight the desired scenario by touching it for two seconds or using the arrows on the scroll bar.
4. Press ‘**Select**’ to choose the scenario.

There are two (2) ways to modify a Scenario:

1. On the *Scenarios* screen, highlight the desired scenario and press **‘Modify’**. Navigate the *ABCs* screen to select and save the parameters you wish to use.
2. From the *Session Control* screen, access the *ABCs* screen by pressing the **‘ABCs’** button on the menu or the vitals column. Any changes made either before or during an active session will be saved to the selected scenario.

### Beginning and Ending a Training Session

1. A scenario is a set of injuries and vital signs. A session is an instance of a scenario. Begin a session by pressing **‘Start’**.
2. End a session by pressing **‘Stop’**.

You can pause and resume a session at any point during training (Figure 12).

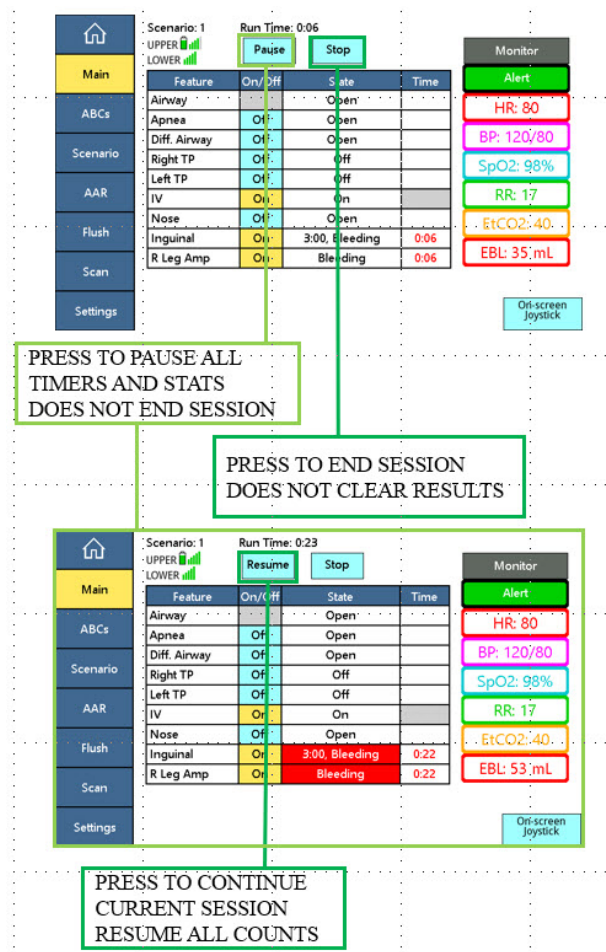


Figure 12

## Monitor Leads

The '**Monitor**' button opens the *Monitor Leads* pop-up. This screen allows the user to select which leads have been connected to the patient and patient monitor (Figure 13).

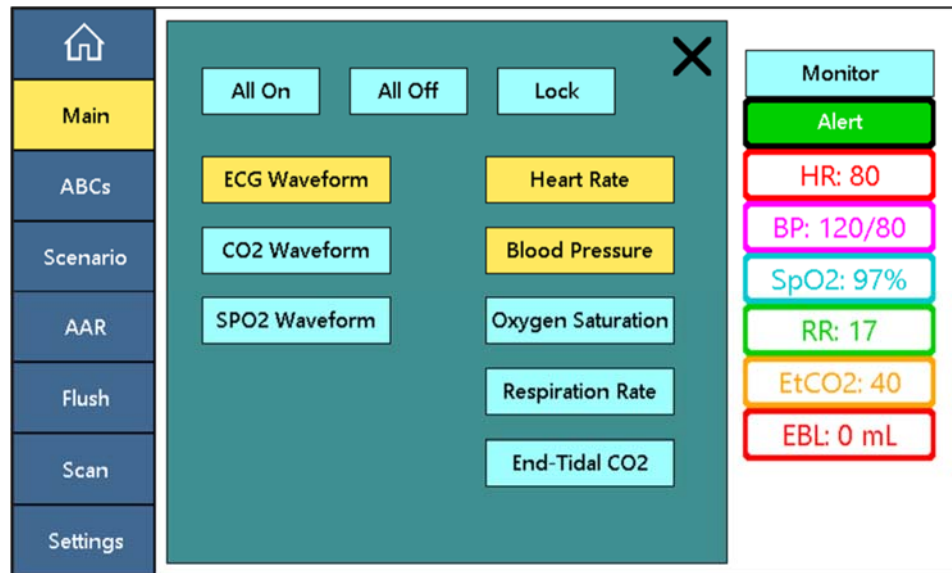


Figure 13

- '**All On**': Turns all the signals on.
- '**All Off**': Turns all the signals off.
- '**Lock**': Will lock the current lead settings for all future sessions until they are deliberately changed again. By default, all leads turn off at the start of each session.
- '**ECG Waveform**'
- '**CO2 Waveform**'
- '**SPO2 Waveform**'
- '**Heart Rate**'
- '**Blood Pressure**'
- '**Oxygen Saturation**'
- '**Respiration Rate**'
- '**End-Tidal CO2**'

## ABCs – Airway, Breathing, and Circulation

Pressing the '**ABCs**' button on the main menu or the vitals column on the *Session Control* screen opens the *ABCs* screen. The *ABCs* screen has a **Vitals**, **Airway**, **Breathing**, **Circulation**, and **Other** option. Each of these submenus gives access to different session and scenario parameters that can be adjusted prior to or during an active session. Any changes are automatically saved to the current Scenario

number, so changes will not have to be re-entered for every session. Switch between the different *ABCs* submenus by pressing the corresponding button at the top of the screen.

### Vitals

The **Vitals** submenu gives the user access various physiologic parameters. Press the value box to adjust the current vital setting.

The following vitals are available (Figure 14):

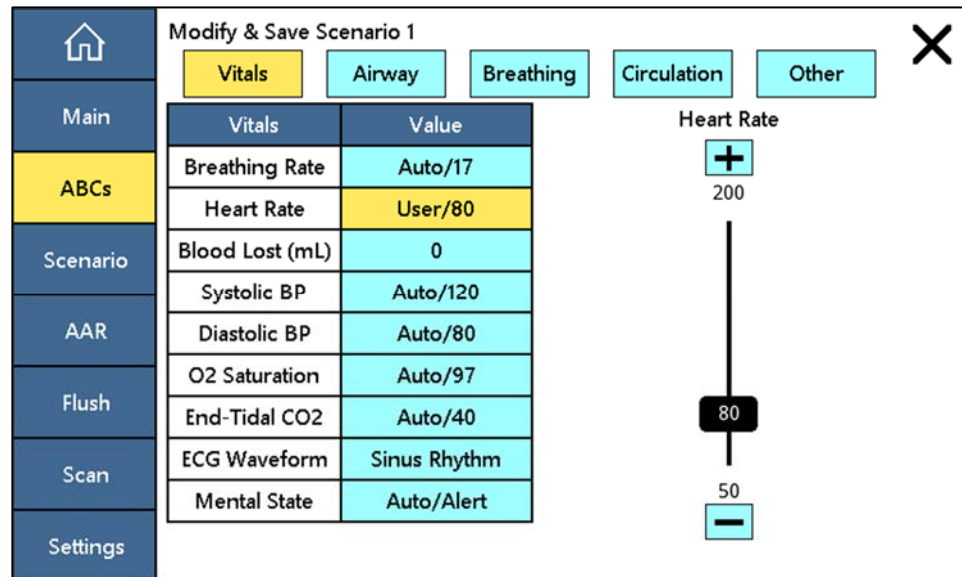


Figure 14

- **Breathing Rate:** The breathing rate can be set from 1 to 60 breaths per minute. This will override the rate determined by the physiology engine.
- **Heart Rate:** The heart rate can be set from 20 to 200 beats per minute. This will override the pulse determined from the physiology engine.
- **Blood Lost (ml):** The system measures any blood loss during the session; this setting allows the user to start with a preset blood loss to increase the severity of the injury at the onset of the session. The user can select between 0 and 1500ml.
- **Systolic BP:** The user can set the systolic blood pressure from 40 to 230 mmHg, overriding the rate determined by the physiology model.
- **Diastolic BP:** The user can set the diastolic blood pressure from 20 to 130 mmHg, overriding the rate determined by the physiology model.
- **O2 Saturation:** The user can set the percent oxygen saturation, overriding the rate determined by the physiology model.

- **End-Tidal CO2:** The user can set the EtCO2 from 0 to 60 mmHg, overriding the value determined by the respiration rate.
- **ECG Waveform:** The user can select from several preset ECG waveforms (Figure 15). Viewing the waveforms requires the purchase of the optional TraumaFX® ECG Simulator, Vital Signs Monitor, or VitalBridge. See the corresponding accessory user guide for more details on available waveforms. Pulseless waveforms cannot be selected outside of CPR Mode.
- **Mental State:** The user can override the physiology driven mental state (Figure 16).

Modify & Save Scenario 1			
	<div>Vitals</div> <div>Airway</div> <div>Breathing</div> <div>Circulation</div> <div>Other</div>		
Main			
ABCs	Vitals	Value	
	Breathing Rate	Auto/17	
Scenario	Heart Rate	User/80	<div>Sinus Rhythm</div> <div>Torsades</div>
	Blood Lost (mL)	0	<div>VFIB</div> <div>2nd Deg Type I</div>
AAR	Systolic BP	Auto/120	<div>Asystole</div> <div>2nd Deg Type II</div>
	Diastolic BP	Auto/80	<div>PEA</div> <div>Complete Block</div>
Flush	O2 Saturation	Auto/97	<div>1st Deg Block</div> <div>Atr. Flutter</div>
	End-Tidal CO2	Auto/40	<div>AFIB</div> <div>SVT</div>
Scan	ECG Waveform	Sinus Rhythm	<div>Pacing</div> <div>VTach</div>
	Mental State	User/Anxious	
Settings			

Figure 15

<div>Home</div> <div>Main</div> <div>ABCs</div> <div>Scenario</div> <div>AAR</div> <div>Flush</div> <div>Scan</div> <div>Settings</div>	Modify & Save Scenario 1			
	Vitals	Airway	Breathing	Circulation
		Alert		
		Anxious		
		Confused		
		Lethargic		
		Unconscious		

Figure 16

### Airway

The **Airway** submenu allows the user to set different airway options. Press the on/off box to toggle the injury on or off. Note, when activating a new feature during an active session you will need to return to the *Session Control* screen for the feature to activate.

The following options are available (Figure 17):

<div>Home</div> <div>Main</div> <div>ABCs</div> <div>Scenario</div> <div>AAR</div> <div>Flush</div> <div>Scan</div> <div>Settings</div>	Modify & Save Scenario 1				
	Vitals	Airway	Breathing	Circulation	
		Diff. Airway	1:00		
		TBI Nose	Off		

Figure 17



- **Difficult Airway:** Swells larynx and stops breathing. Can be set on a timer using the minute and second sliders. Set to 0 to start immediately.
- **TBI Nose:** Blocks the nasal passages. Can be set on a timer using the minute and second sliders. Set to 0 to start immediately.

### Breathing

The **Breathing** submenu allows the user to set various breathing features. Press the on/off box to turn the injury on or off or to change the feature option.

The following breathing options are available (Figure 18):

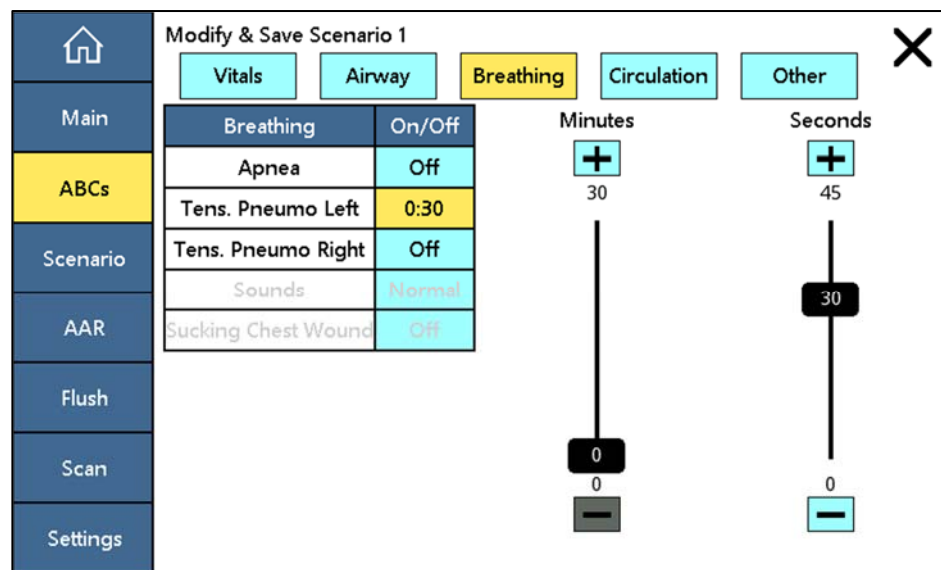


Figure 18

- **Apnea:** Stops breathing. Can be set on a timer using the minute and second sliders. Set to 0 to start immediately.
- **Tens. Pneumo Left:** Tension pneumothorax on the left side. Can be set on a timer using the minute and second sliders. Set to 0 to start immediately.
- **Tens. Pneumo Right:** Tension pneumothorax on the right side. Can be set on a timer using the minute and second sliders. Set to 0 to start immediately.
- **Sounds:** Change lung sounds from normal to crackles, stridor, or wheezing. Only available on uppers with additional breath sounds.
- **Sucking Chest Wound:** On or Off. Only available on the EMITT-TMU.



## Circulation

The **Circulation** submenu allows access to all bleeding functions (Figure 19). Press the on/off box to turn the injury on or off.

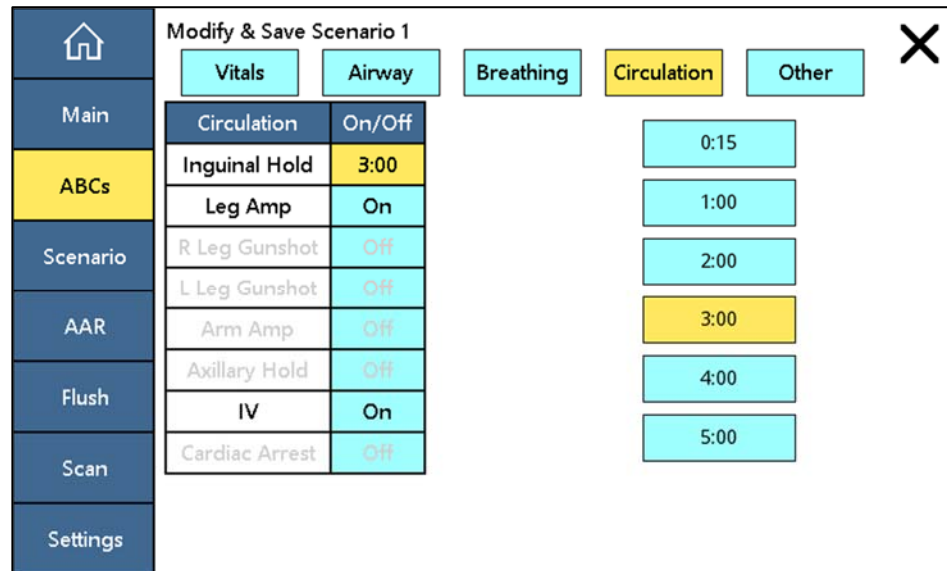


Figure 19

- **Inguinal Hold:** Turns on the inguinal wound (HEMO, EMITT, CRL). The user can set the required hold time; the default time is 3 minutes, but this can be shortened to 15 seconds for demonstration purposes or can be set to 1, 2, 4 or 5 minutes.
- **Leg Amp:** Leg amputation(s). On/off.
- **R Leg Gunshot:** Right leg gunshot wound (EMITT-ASL). On/off.
- **L Leg Gunshot:** Left leg gunshot wound (HEMO-G). On/off.
- **Arm Amp:** Arm amputation (uppers with a bleeding arm amp). On/off.
- **Axillary Hold:** Turns on the axillary wound (APL-IP). The user can set the required hold time; the default time is 3 minutes, but this can be shortened to 15 seconds for demonstration purposes or can be set to 1, 2, 4 or 5 minutes.
- **IV:** On/off. The IV and bleeding upper wounds cannot be on at the same time.
- **Cardiac Arrest:** Cardiac Arrest injury which stops breathing and pulses and starts CPR Mode. See **Cardiac Arrest** section for more details. CRU-R only.

## Other

Additional scenario options are available under the **Other** menu. Press the action box to set the option or toggle the feature on and off.

The following options are available (Figure 20):

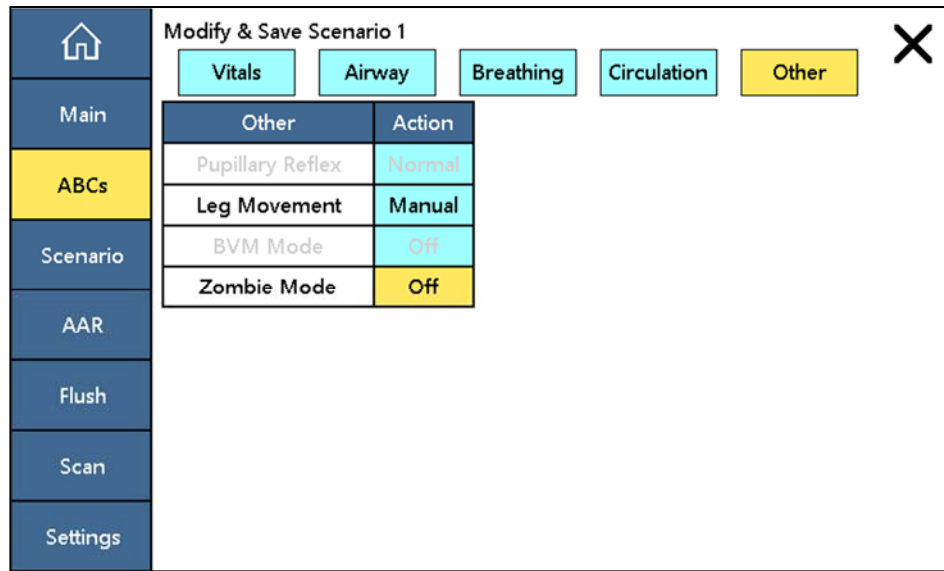


Figure 20

- **Pupillary Reflex:** For the CRU and CRU-R upper units, this button allows the user to set the state of the light-sensing eyes.
  - **Normal:** Default, leaves the eyes in light sensing mode.
  - **Dilated:** Non-reactive dilated pupils.
  - **Pinpoint:** Non-reactive constricted pupils.
  - **TBI:** Right eye fixed in a dilated state while the left eye remains light reactive.
  - **Off:** Non-reactive normal-sized pupils.
- **Leg Movement:** Allows the user to switch between **Manual** leg movement (using the joystick to control the legs) and **Automatic**, which will move the legs randomly whenever a session is active and the patient is conscious.
- **BVM Mode:** All uppers with intubation besides the CRU-R must be placed in BVM mode to detect Bag Valve Mask ventilation.
- **Zombie Mode:** Selecting Zombie Mode will allow a session to continue past the point of death. Normally, a session ends when death occurs (by exsanguination, oxygen depletion, etc.); in this mode, the cause of death will show on the TSR screen, but the session will continue to operate.

#### CPR Mode

The CRU-R has a dedicated mode for CPR training. In CPR Mode all other features are turned off to focus on CPR training. The Session Control table is replaced with a rate and depth table (Figure 21). The rate and depth of the current compressions are displayed as well as the overall percent success for the session. Bagging rate is displayed in the vitals column. Note the upper unit will not show a

physical bagging response as performing compressions while the unit breathes will damage the unit.

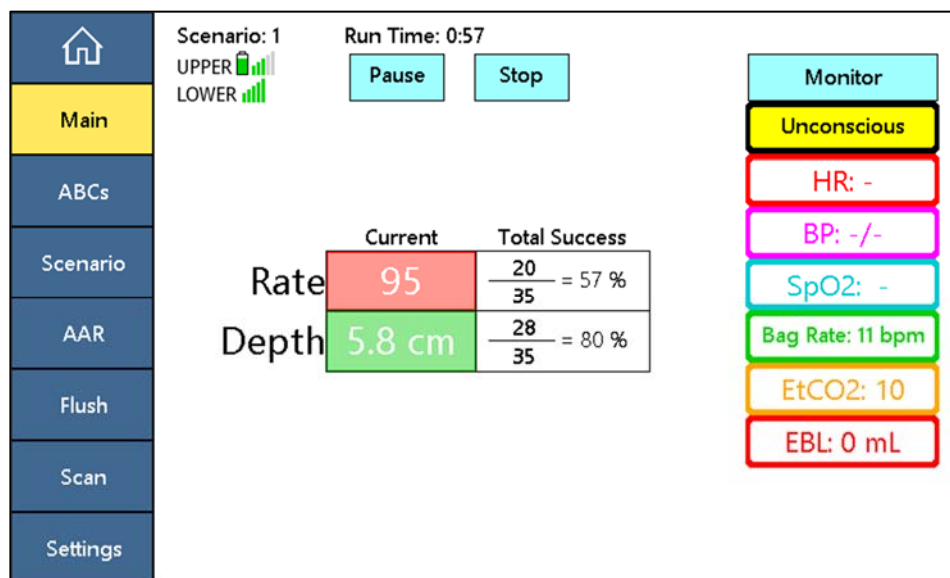


Figure 21

### Switching to CPR Mode

To enter CPR Mode, go to the *Settings Screen* by pressing '**Settings**' on the main menu. If a CRU-R is connected, the '**CPR Mode**' option will be available on the main menu (Figure 22). Press it to enter CPR Mode.

To exit CPR Mode, return to the *Settings Screen*. The last entry will now be labeled '**Standard Mode**'. Press it to exit CPR Mode and return to Standard Mode.

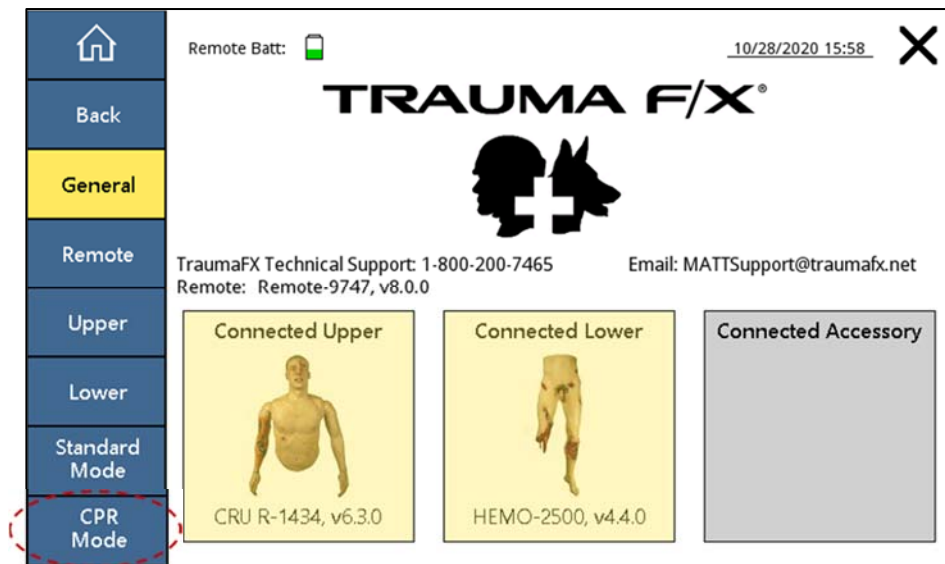


Figure 22

## Cardiac Arrest

CPR Mode can be turned on in the middle of an active session using the **Cardiac Arrest** injury. The Cardiac Arrest injury is located under the **Circulation** submenu (Figure 23). The Cardiac Arrest injury can be set on a timer using the minute and second sliders. Set the timers to 0 to start immediately. The ECG waveform can also be defined. The default is Asystole; any chosen waveform will automatically be pulseless.

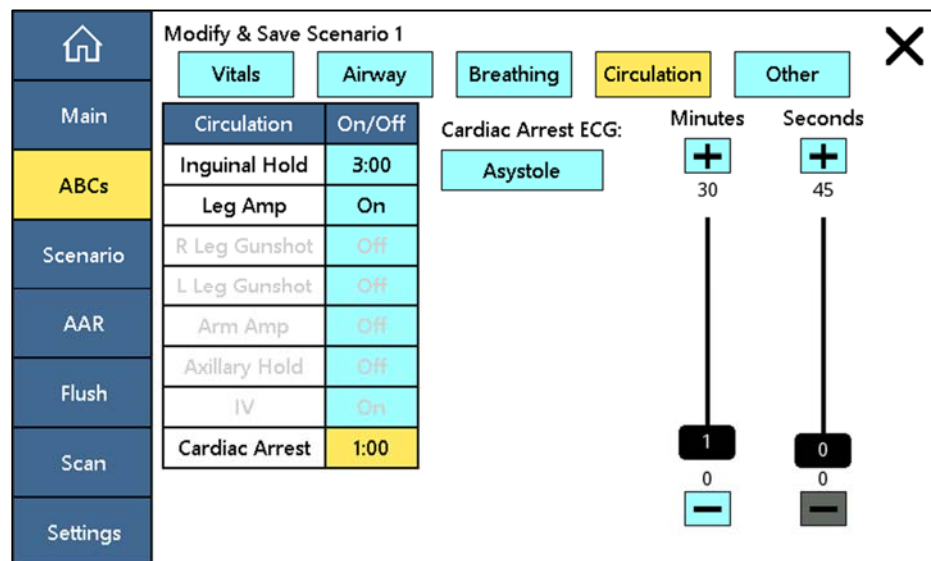


Figure 23

When the Cardiac Arrest injury starts, all other active injuries turn off. Breathing and pulses stop. The display switches to the CPR Mode display which provides feedback about the rate and depth of the compressions and bagging (Figure 24).

Cardiac Arrest has two additional options from normal CPR Mode: **‘Declare Death’** and **‘Turn On Pulses’**. Press **‘Declare Death’** to end the Cardiac Arrest injury in failure. If Zombie Mode is enabled, declaring death will switch back to the Session Control table. The Cardiac Arrest injury will be marked as a cause of death, and all the previously stopped injuries will resume.

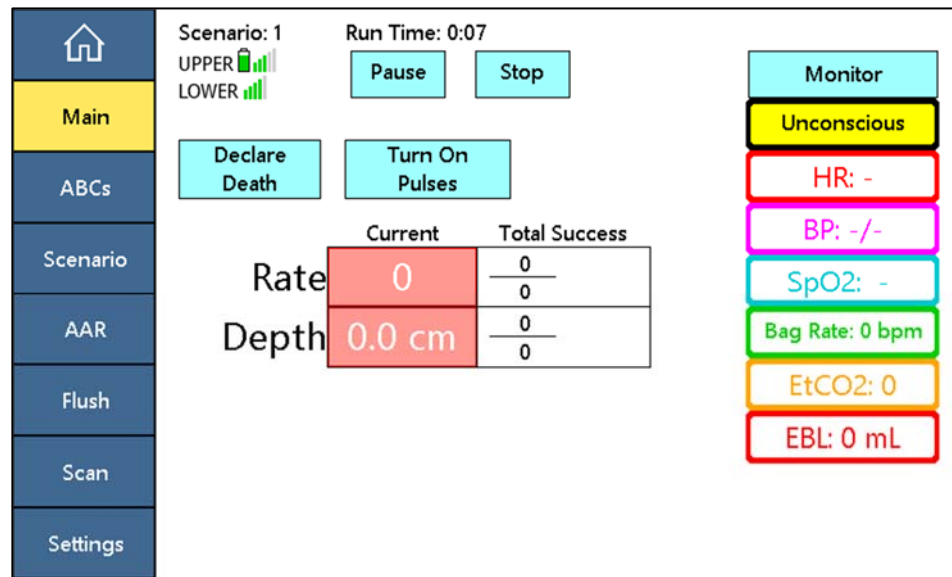


Figure 24

Pressing **‘Turn On Pulses’** will turn on pulses on the body allowing the student to identify return of spontaneous circulation (ROSC). If the instructor is satisfied that ROSC has been achieved, they can then press **‘Pulses Checked, End Cardiac Arrest’** to end the Cardiac Arrest successfully (Figure 25). CPR Mode will exit, returning to the Session Control table. All previously active injuries will resume.

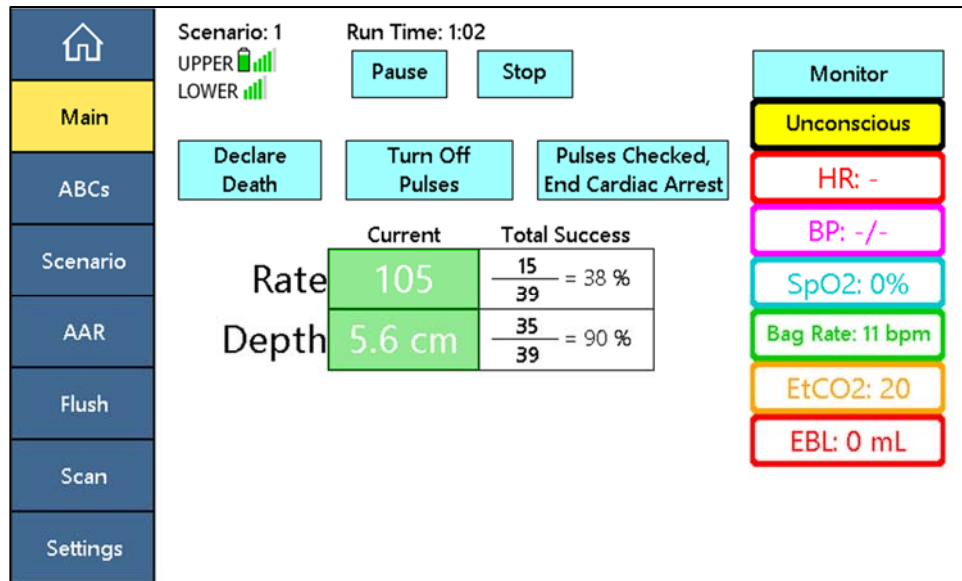


Figure 25

## ACLS/ALS Mode

The TSR transmitter has two modes: Standard, centered around TC3 injuries and treatments, and ACLS/ALS, focused on teaching ACLS algorithms. Previous sections of this chapter have dealt with operation in Standard Mode.

To switch modes, go to the TraumaFX *Settings* screen. The second to last button on the main menu toggles Standard vs ACLS Mode (Figure 26). The mode is saved to memory, meaning the Touch Screen Remote Controller will boot-up in its previous mode.

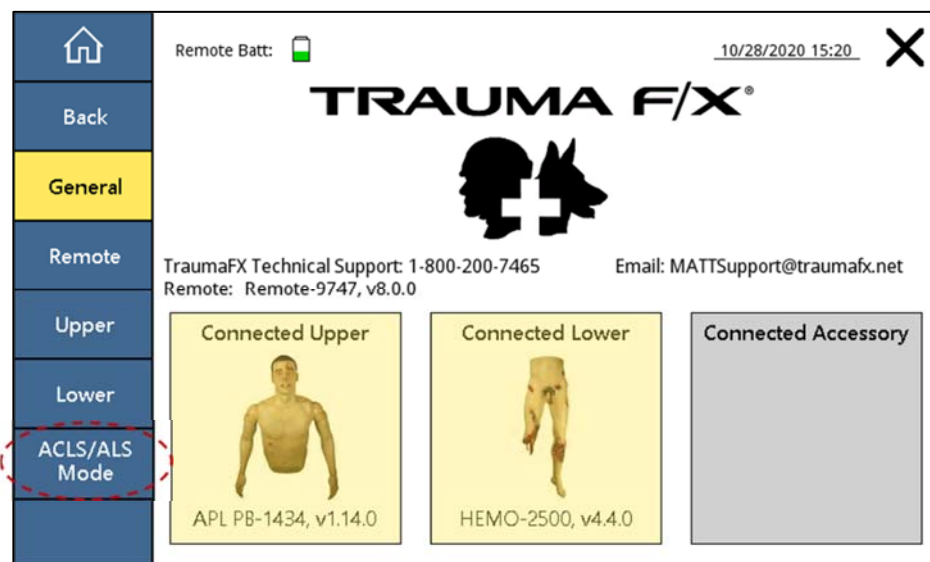


Figure 26

### ACLS Main Screen

The *ACLS Main* screen replaces Standard Mode's *Session Control* screen. This is the first screen on the Touch Screen Remote Control Transmitter if the TSR transmitter is powered on in ACLS mode.

The screen provides the following selections (Figure 27):

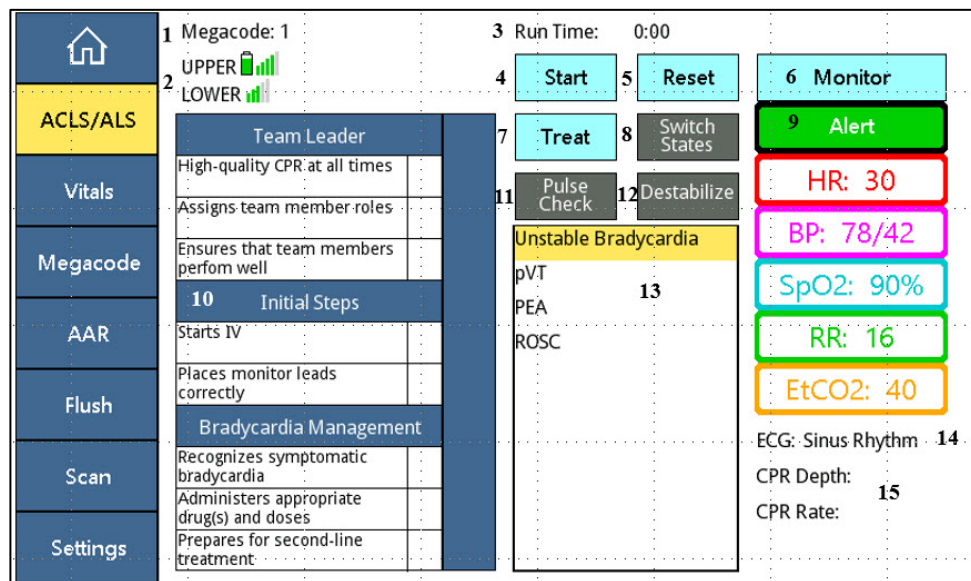


Figure 27

1. **Connected Unit Status:** Battery indicator for the connected upper and lower units.
2. **Checklist:** ACLS/ALS training checklist. Touch the right column to check that the student successfully passed the step. New sections are added as the training progresses to new megacode states.
3. **'Pulse Check' button:** Adds a timestamped 'Pulse checked' message to the log file.
4. **'Start' / 'Pause' / 'Resume' / 'AAR' button:** Starts, pauses, and resumes the megacode session. After the training has been stopped, press 'AAR' to switch to the After Action Review (AAR) overview.
5. **'Reset' / 'Stop' button:** Stops and resets the megacode session.
6. **'Treat' button:** Opens the treatment pop-up which includes a list of medicines and the defibrillator simulation options panel.
7. **'Monitor' button:** Opens a menu to set which vital signals should be displayed on the monitor. Available if a TraumaFX® Vitals Sign Monitor or Vitals Bridge unit is connected.
8. **'Switch States' button:** Changes to the next megacode state. Will change to the next state in the list unless overridden by the user selecting a different state. Select a state by pressing down on a state for two seconds.

9. **‘Destabilize’ button:** Available for a stable bradycardia or tachycardia. Pressing this button will destabilize the patient’s vitals by dropping the blood pressure and stopping breathing.
10. **Vitals:** Current vital signs. Touching anywhere on the vitals column will bring up the *Vitals* screen allowing the current vitals to be changed.
11. **Run Time:** How long the megacode session has been running.
12. **Current Megacode:** Current active megacode.
13. **State List:** States for the current megacode. Press down on a state until it is highlighted blue to change the next state.
14. **Current ECG Waveform:** Current ECG Waveform. Connect a Vitals Sign Monitor or Vitals Bridge unit to see the rhythm.
15. **CPR:** CPR depth and rate. Only available for the CRU-R. Note: CPR should only be performed with pulseless states. Performing CPR while the unit is breathing will damage the manikin.

#### Megacode Screen

The TSR transmitter has 20 preset megacodes. Each megacode can be edited. Megacodes can have up to 10 states and must have at least a starting and ending state. States can be added or removed.

To select a megacode, press the **‘Megacode’** button on the main menu. This will switch the remote to the *Megacode* screen (Figure 28). This screen shows:

- **Megacode List:** The TSR comes with 20 preprogrammed megacodes.
- **‘Close’ button:** Press the X to return to the *Main ACLS* screen.
- **‘Select’ button:** Sets the current megacode to the highlighted megacode. Not available if a megacode is actively running.
- **‘Edit’ button:** Switches to the *Vitals* screen to change the states and vitals for the highlighted megacode.
- **‘Reset’ button:** Resets the highlighted megacode to the default values.
- **‘Reset All’ button:** Resets all 20 megacodes to their default values.

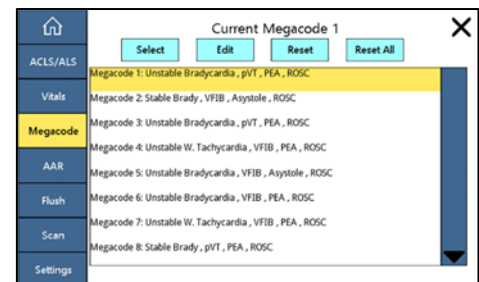


Figure 28

#### Vitals Screen

To edit a megacode, press the **‘Edit’** button on the *Megacode* screen or the **‘Vitals’** button on the main menu. This will change the screen to the *Vitals* screen (Figure



29). From this screen, the user can add new states, remove current states, and change the vitals settings for a selected state.

Edit Megacode 1			
ACLS/ALS	Unstable Bradycardia, HR 30, BP 78/42, RR 16	Vitals	Value
Vitals	pVT, HR 180, BP-, RR 0	ECG Waveform	Sinus Rhythm
Megacode	PEA, HR 40, BP-, RR 0	Heart Rate	30
AAR	New State	Breathing Rate	16
Flush	ROSC, HR 70, BP 110/70, RR 16	Systolic BP	78
Scan		Diastolic BP	42
Settings		O2 Saturation	90
		End-Tidal CO2	40
		Pacing	80
		Mental State	Alert

Figure 29

1. **State List:** List of current states in the selected megacode.
2. **New State:** A new state to add to the megacode. Press 'Save' to add it to the state list (Figure 30).
3. **Vitals:** Current vitals settings for the highlighted state. Press the value box to change the vital.
4. **'Close' button:** Returns to the previous screen.
5. **'Save' button:** Saves the vitals changes if the state is already part of the state list. Otherwise it adds the state to the list. A megacode can have up to 10 states.
6. **'Remove' button:** Removes the selected state from the list. The first and last states cannot be removed.
7. **'Reset' button:** Resets any unsaved changes.
8. **'Pulses Off' button:** Turns off pulses to make the state PEA.
9. **'Unstable' button:** Identifies the bradycardia or tachycardia state as unstable regardless of the vitals (Figure 31). A bradycardia or tachycardia is automatically saved as unstable if the blood pressure is hypotensive.

**Edit Megacode 1**

Category	Value
ACLS/ALS	Unstable Bradycardia, HR 30, BP78/42, RR 16
Vitals	pVT, HR 180, BP-, RR 0
Megacode	PEA, HR 40, BP-, RR 0
AAR	New State
Flush	ROSC, HR 70, BP110/70, RR 16
Scan	
Settings	

Vital Sign	Value
Sinus Rhythm	Asystole
VFIB	80
Asystole	16
PEA	120
1st Deg Block	80
AFIB	98
Pacing	40
More	80
	Alert

Buttons: Save, Reset, Remove, Pulses Off, Unstable

Figure 30

**Edit Megacode 1**

Category	Value
ACLS/ALS	Unstable Bradycardia, HR 30, BP78/42, RR 16
Vitals	pVT, HR 180, BP-, RR 0
Megacode	PEA, HR 40, BP-, RR 0
AAR	Unstable Bradycardia, HR 40, BP120/80, RR 16
Flush	New State
Scan	ROSC, HR 70, BP110/70, RR 16
Settings	

Vitals	Value
ECG Waveform	Sinus Rhythm
Heart Rate	40
Breathing Rate	16
Systolic BP	120
Diastolic BP	80
O2 Saturation	98
End-Tidal CO2	40
Pacing	80
Mental State	Alert

Buttons: Save, Reset, Remove, Pulses Off, Unstable

Figure 31

## Running an ACLS Session

The TSR transmitter must be paired to a TraumaFX upper body simulator to begin an ACLS session. From the *ACLS Main* screen, press **Start** to begin a session. Once started, this button changes to **Pause**, and then changes to **Resume** during a pause. To stop and reset the session, press the **Stop** button.

### Monitor Leads

The '**Monitor**' button opens the *Monitor Leads* pop-up where the user can select which leads have been connected to the patient and patient monitor (Figure 32).

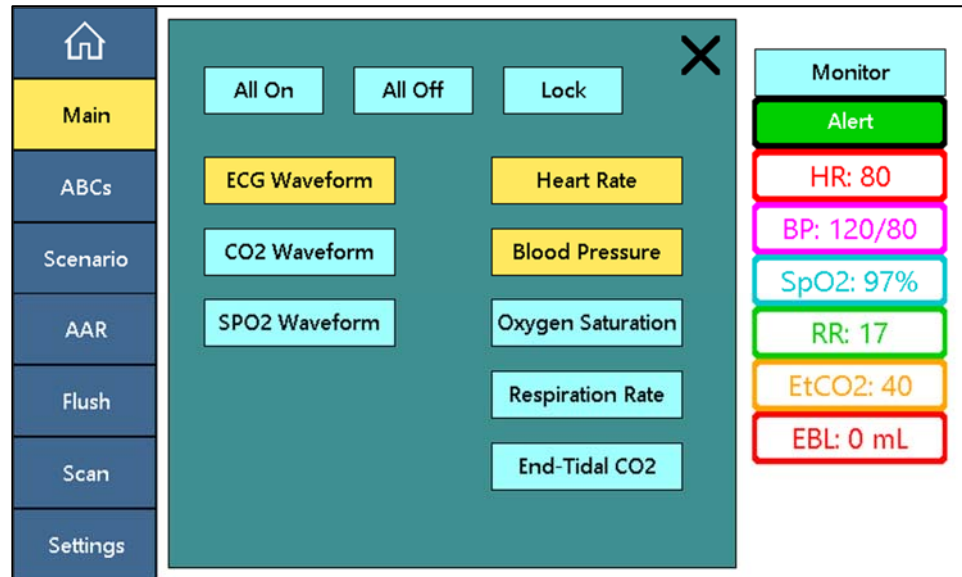


Figure 32

- '**All On**': Turns all the signals on.
- '**All Off**': Turns all the signals off.
- '**Lock**': Will lock the current lead settings for all future sessions until they are deliberately changed again. By default, all leads turn off at the start of each session.

Once the leads have been chosen, press '**Close**' to return to the *ACLS Main* screen.

### Treatment Options

Various treatment methods can be simulated in ACLS Mode. Press the '**Treat**' button on the *ACLS Main* screen to access the following treatment options (Figure 33):

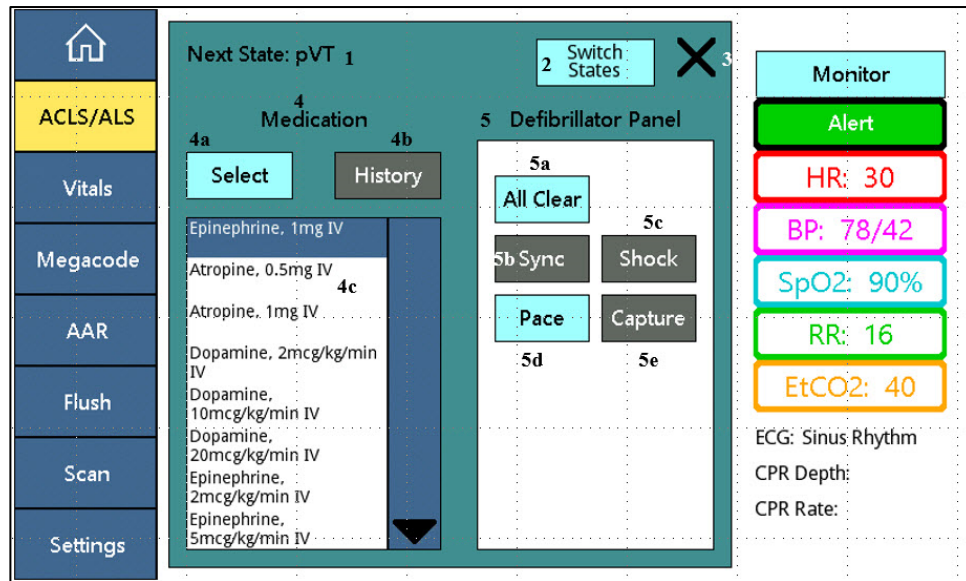


Figure 33

1. **Next state:** Identifies the next state in the megacode state list. Press ‘Switch States’ to change to this state.
2. **‘Switch States’:** Changes to the next state in the megacode.
3. **‘Close’:** Closes the *Treatment* pop-up.
4. **Medication**
  - a. **‘Select’:** The highlighted medicine will be administered. Opens the *Apply Medicine Effects* window to review the medicine’s effect on the vitals.
  - b. **‘History’:** Opens the *Medication History* screen. This screen provides a list of all the medications that have been given this session and allows the user to clear the effects of any still ongoing medications. This is the only way to end the effects of any drips.
  - c. **List:** List of medicines that can be given for the current megacode state.
5. **Defibrillator Panel:**
  - a. **‘All Clear’:** Logs ‘All clear’ to AAR file.
  - b. **‘Sync’:** Adds sync markers to ECG waveform on the monitor. Only available for applicable waveforms.
  - c. **‘Shock’:** Inserts a shock effect into ECG waveform on the monitor.
  - d. **‘Pace’:** Adds pacing markers to the monitor. Only available for bradycardias.
  - e. **‘Capture’:** Use to simulate successful pacing capture. Monitor switches to pacing waveform, heart rate changes to pacing heart rate (can be changed via ‘Vitals’; the default is 80 bpm), blood pressure increases. Available after ‘Pace’ is pressed.

## Using Medications

### Medicine Effects

When a medicine is selected from the medication list, the *Apply Medicine Effects* pop-up appears (Figure 34). This screen has sliders for heart rate, systolic blood pressure, respiration rate, and oxygen saturation. The initial slider values are the resulting vitals from the medicine effect calculations from the built-in medicine physiology. Adjust the sliders to override the vitals. The diastolic blood pressure is tied to the systolic blood pressure and will change by the same amount. Press **‘Infuse and change vitals’** to apply the medicine and change the vital values to the selected slider values. To simulate an ineffective medicine, press **‘Infuse with no effect’**. This will log that the medicine has been administered, but the vitals will not change.

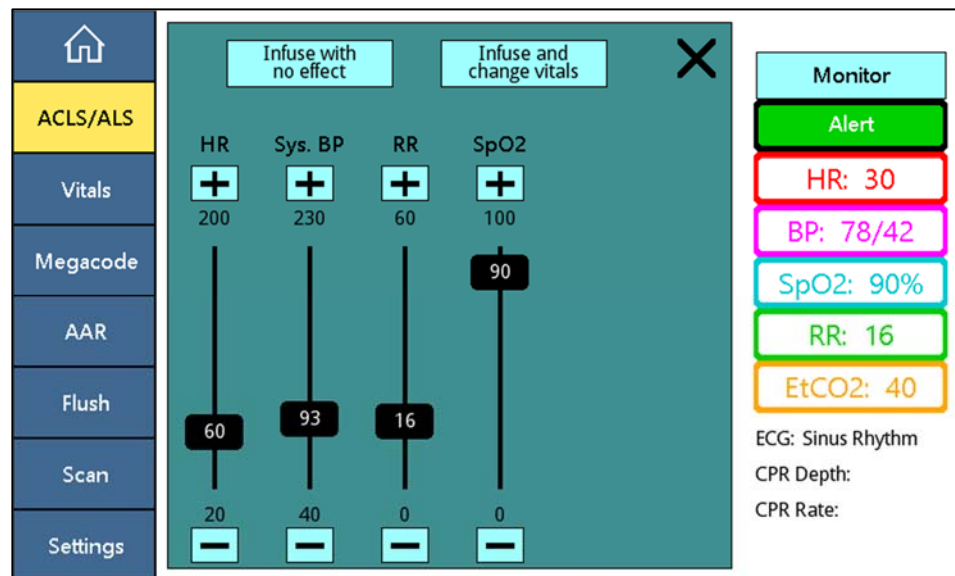


Figure 34

### Medicine History

Press the **‘History’** button on the *Treatment* screen to bring up the *Medicine History* pop-up (Figure 35). This screen provides a list of all the medicines that have been applied this session. Up to 10 medicines can be administered per megacode session.

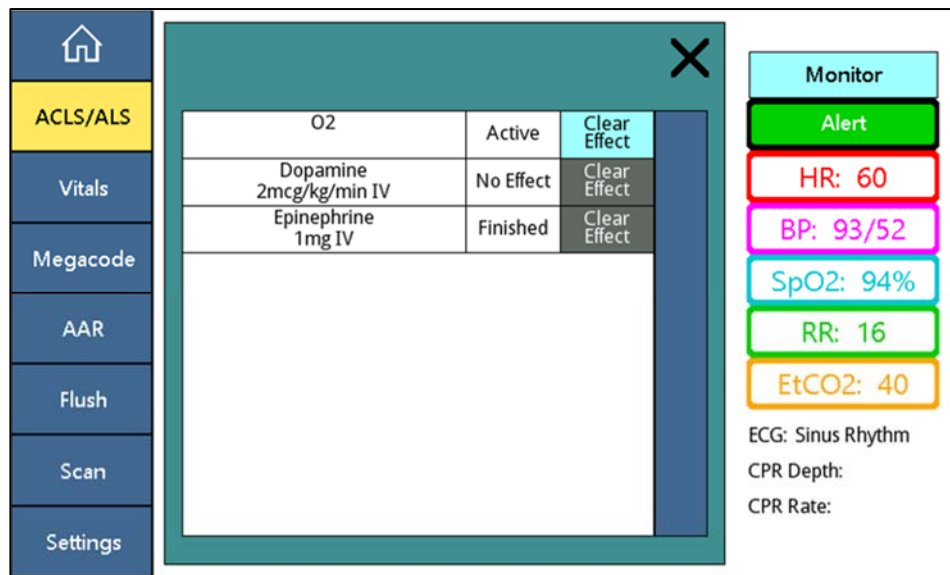


Figure 35

1. **Medicine:** Name of medicine and the dose. The most recent medicine is listed first.
2. **Current Status**
  - a. **Active:** Medicine is actively affecting the vital signs.
  - b. **No Effect:** Medicine was applied but with no effects on the vitals.
  - c. **Finished:** Medicine was applied, but the effect has worn off.
  - d. **Cleared:** Medicine was applied, but the effect has been manually ended.
3. **'Clear Effect':** End effect of active medicine. Use this to simulate removing a drip.
4. **'Close':** Returns to the *Treatment* window.

#### CPR

If the connected upper body has CPR capabilities, the TSR will display the CPR statistics when a pulseless state is selected. The current compression depth and rate readings are displayed. If the current reading is within the “good” range, the text will be green; otherwise it will be red. The overall percentage of successful depth and rate readings is also displayed.

**Caution:** Do not perform CPR compressions on a breathing simulator; this could cause damage to the breathing system.

#### Other Remote Options

##### Flush Screen

The *Flush* screen provides access to the following buttons or options (Figure 36); note, only those pertaining to the units paired will be active.

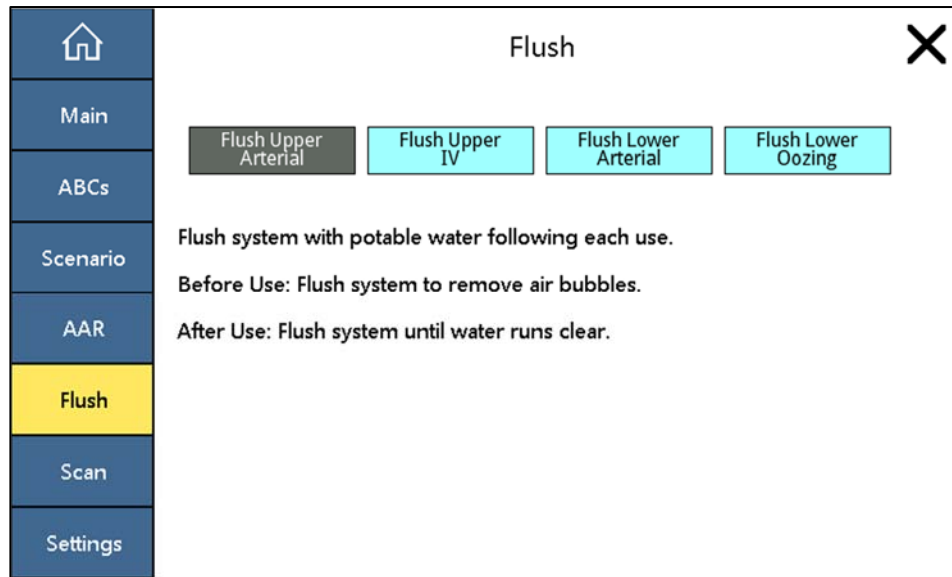


Figure 36

- **‘Flush Upper Arterial’** (Applicable to uppers with an arterial injury)
- **‘Flush Upper IV’** (Applicable to uppers with powered IVs)
- **‘Flush Lower Arterial’** (Applicable to all lower units)
- **‘Flush Lower Oozing’** (Applicable to the HEMO lower unit only)

#### After Action Reporting (AAR)

The TSR has built-in After Action Reporting (AAR) options. Select **‘AAR’** from the main menu to switch to the *AAR List* screen (Figure 37). This screen lists the AAR files for the last 100 run sessions.

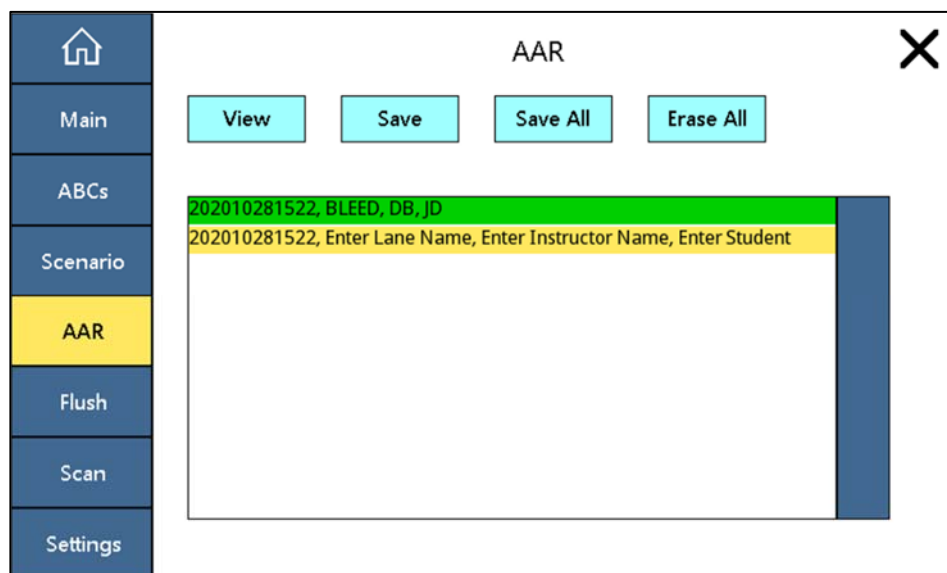


Figure 37

- **‘View’**: Switch to the detailed AAR file view. Go to the detailed view to change the file, lane, instructor, and student names.
- **‘Save’**: Available if an SD card is inserted. Saves the log file for the highlighted AAR file. Saved files will be highlighted green.
- **‘Save All’**: Available if an SD card is inserted. Saves the log file for all the AAR files in memory. Saved files will be highlighted green.
- **‘Erase All’**: Will completely remove all the AAR files from saved memory.

#### Standard Mode AAR

The *Standard Mode AAR Summary* screen shows a summary table for the session. The summary table lists the starting vitals, every active injury and if the injury was treated, and either the ending vitals or the cause(s) of death (Figure 38). If an SD card is inserted, the full log file or just the summary table can be saved as a comma separated file (.csv) by pressing **‘Save to SD.’** The file, lane, instructor, and student names can all be edited from this screen. Press **‘Edit Name’** or any of the name boxes to open the *Keyboard* screen (Figure 39).

**Scenario 1 AAR Summary** [Close X]

20201028\_1522\_Scen1Checklist [Edit Name] [Save to SD]

20201028\_1522\_Scen1Log [Edit Name] [Save to SD]

Starting Vitals		
Vital	Value	Unit
Mental State	Alert	
Heart Rate	80	bpm
Respiration Rate	17	bpm
Blood Pressure	120/80	mmHg
SpO2	98	%
EtCO2	40	mmHg
Estimated Blood Loss	0	mL

**Injuries**

Injury	Onset Time	Treated?	Treatment Time

Lane: BLEED

Instructor: DB

Student: JD

10/28/20 15:22

Session Time: 0:14

Figure 38



Enter Lane Name

1	2	3	4	5	6	7	8	9	0
Q	W	E	R	T	Y	U	I	O	P
A	S	D	F	G	H	J	K	L	
Z	X	C	V	B	N	M			
		.	-	-					

Space Clear Backspace Save

Figure 39

**‘Clear’** will erase the current name. The name will not be changed unless **‘Save’** is pressed.

#### ACLS Mode AAR

The *ACLS Mode AAR Summary* includes a checklist modeled on the training checklists in the American Heart Association handbook (Figure 40). Steps that can be detected by the TSR will be automatically checked off. The remaining steps can be manually checked off by the instructor by touching the check column. This checklist is on the *ACLS Main* screen and can be filled out as the session runs or after the session has ended.

**Megacode 1 AAR Summary**

20201028\_1522\_Mega1Checklist

20201028\_1522\_Mega1Log

Team Leader	
High-quality CPR at all times	yes
Assigns team member roles	yes
Ensures that team members perform well	yes

Initial Steps	
Starts IV	yes
Places monitor leads correctly	yes

Bradycardia Management	
Recognizes symptomatic bradycardia	yes
Administers appropriate drug(s) and doses	
Prepares for second-line treatment	

Edit Name Save to SD  
 Edit Name Save to SD

Lane: Enter Lane Name  
 Instructor: Enter Instructor Name  
 Student: Enter Student Name

10/28/20 15:22

Session Time: 0:06

Figure 40

If an SD card is inserted, the full log file or the checklist can be saved as a comma separated file (.csv) by pressing 'Save to SD.' The file, lane, instructor, and student names can all be edited from this screen. Press 'Edit Name' or any of the name boxes to open the *Keyboard* screen (Figure 39).

### Settings Screens

The *General Settings* screen (Figure 41) provides access to the following screens or options:

**TRAUMA F/X**

1 Remote Batt:

2 10/28/2020 15:58

3

Back

General

Remote 4

Upper 5

Lower 6

Standard Mode 7

CPR Mode 8

9 TraumaFX Technical Support: 1-800-200-7465 Email: MATTSupport@traumafx.net  
Remote: Remote-9747, v8.0.0 10

11 Connected Upper  
CRU-R-1434, v6.3.0

12 Connected Lower  
HEMO-2500, v4.4.0

13 Connected Accessory

Figure 41

1. **Remote Batt:** Indicator that displays the current TSR battery life.

2. **Date/Time:** Current date and time. Touch to update.
3. **'Close' button:** Returns to the main screen. Pressing **'Back'** or the **Home** icon will also exit to the main screen.
4. **'Remote' Settings:** Switches to the Remote Settings options.
5. **'Upper' Settings:** Switches to the Upper Settings options.
6. **'Lower' Settings:** Switches to the Lower Settings options.
7. **Remote Mode:** Toggles between Standard and ACLS mode.
8. **CPR Mode:** Switches to CPR Mode. Only available if a CRU-R is connected.
9. **Customer Support information**
10. **Remote Information:** Remote name, serial number, and software version.
11. **Connected Upper:** Connected upper unit name, serial number, and software version. Press the box to switch to the Upper Settings.
12. **Connected Lower:** Connected lower unit name, serial number, and software version. Press the box to switch to the Lower Settings.
13. **Connected Accessory:** Connected accessory name, serial number, and software version.

## Upper Settings

*Teeth Force* The *Teeth Force Threshold* screen allows the user to change the teeth 'Contact' (associated with the APL-IP, APL-PB and CRU upper units) (Figure 43) and/or 'Broken' (associated with APL-IP unit only) (Figure 42) threshold. Press **'Teeth'** from the settings menu to get the current threshold settings. Then use the slider(s) to increase or decrease the numeric value until the desired value is achieved. Press **'Save Value'** to set the new threshold on the upper body.

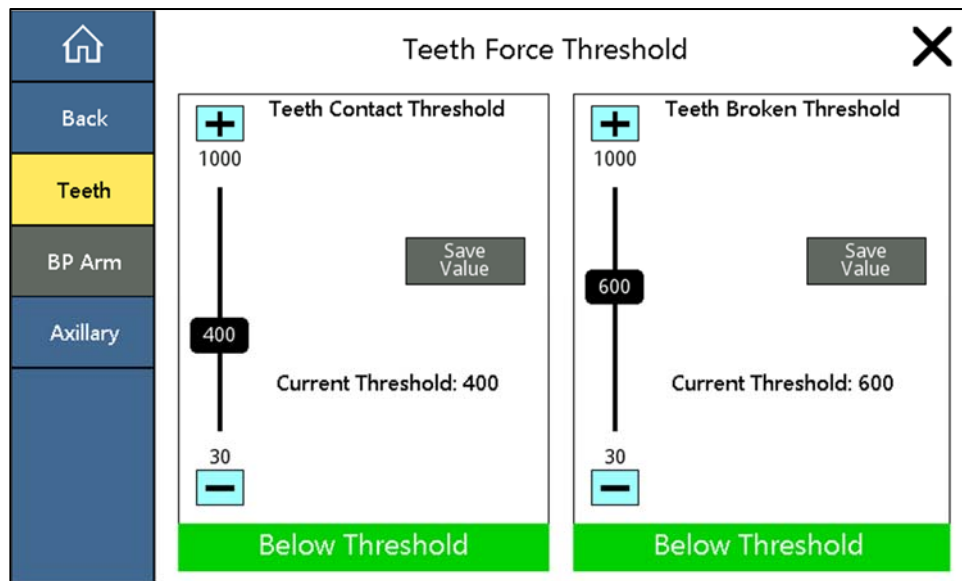


Figure 42

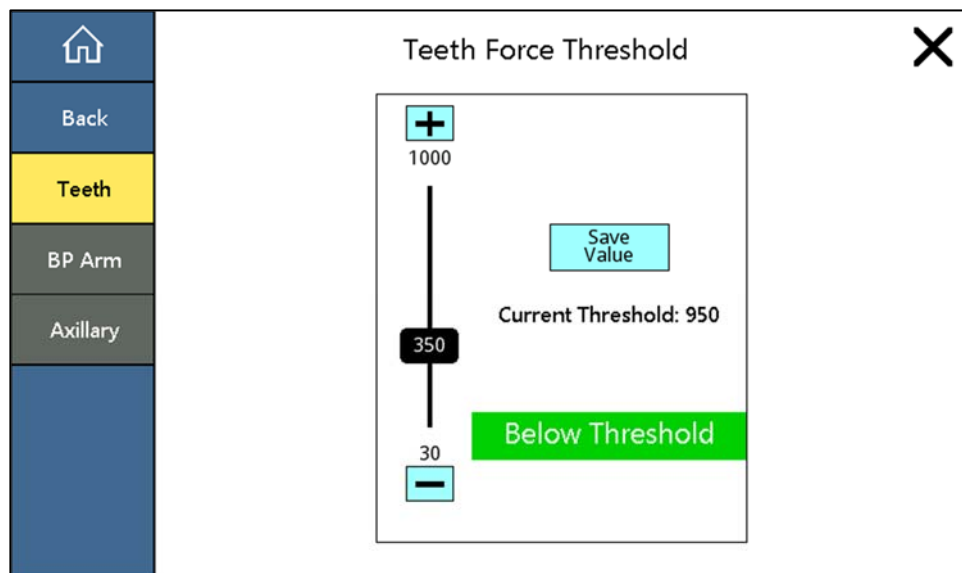


Figure 43

*Upper Body Blood Pressure Arm Calibration* The upper settings provide a calibration screen for the blood pressure arm on the CRU and CRU-R (Figure 44). Follow the on-screen instructions to calibrate the blood pressure arm if the blood pressure cuff readings deviate significantly from the blood pressure displayed on the remote.

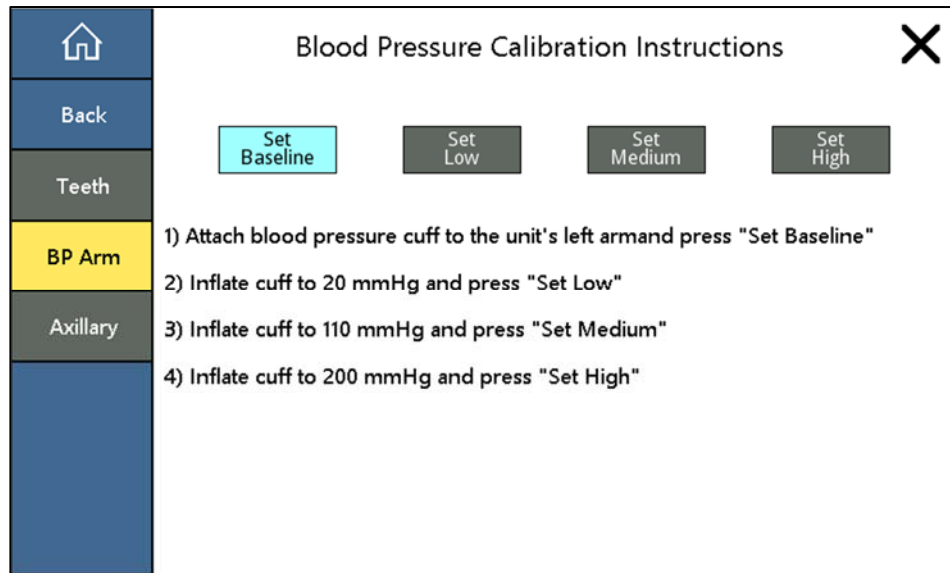


Figure 44

*Upper Body Hemostatic Packable Force* The *Hemostatic Packable Force Threshold* screen allows the amount of pressure required to occlude bleeding in the hemostatic wound available on the APL-IP to be changed (Figure 45). Press 'Axillary' on the menu to retrieve the current threshold from the upper body. When accessing this screen, use the slider to increase or decrease the numeric value until the desired value is achieved. Press 'Save Value' to save the new force threshold value on the upper body.

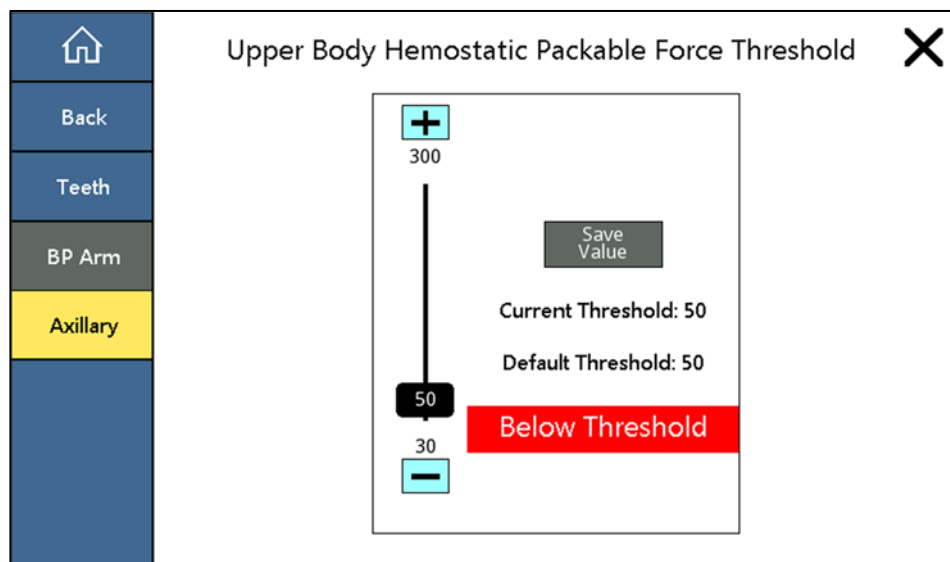


Figure 45

## Lower Settings

*Lower Body Hemostatic Packable Force* The *Hemostatic Packable Force Threshold* screen allows the amount of pressure required to occlude the bleeding in the hemostatic wound available on the HEMO, HEMO-G, CRL, EMITT-ASL and EMITT-TML to be changed (Figure 46). Press '**Inguinal Force**' on the menu to retrieve the current threshold from the lower body. Lower the slider value to decrease the force required to stop the packable wound. Raise slider value to increase the force required to stop the packable wound. Press '**Save Value**' to save the new force threshold value on the lower body.

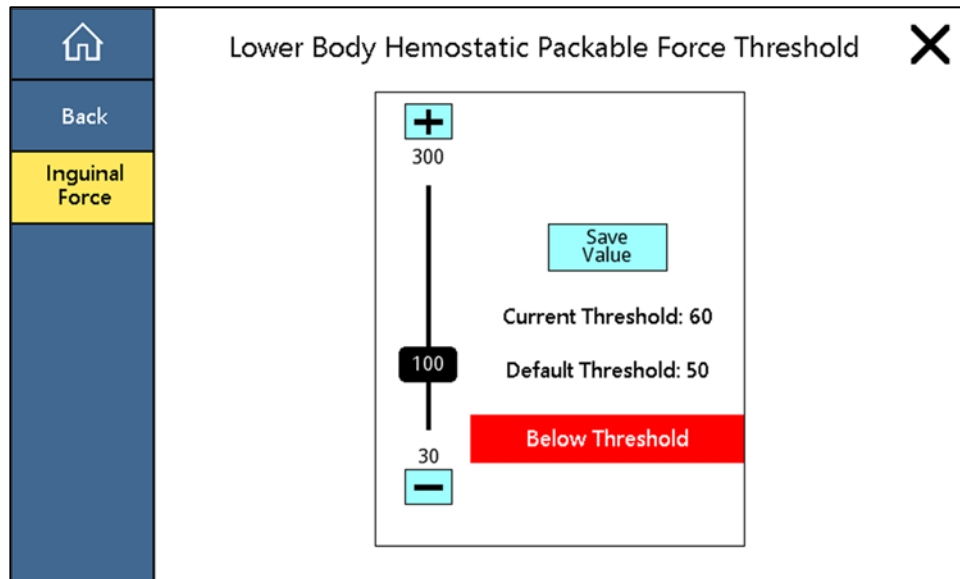


Figure 46

## Remote Settings

### AAR

The TSR transmitter provides an option to adjust the lane, student, and instructor name at the start of every session. The *AAR Configuration* screen (Figure 47) allows this option to be enabled or disabled.

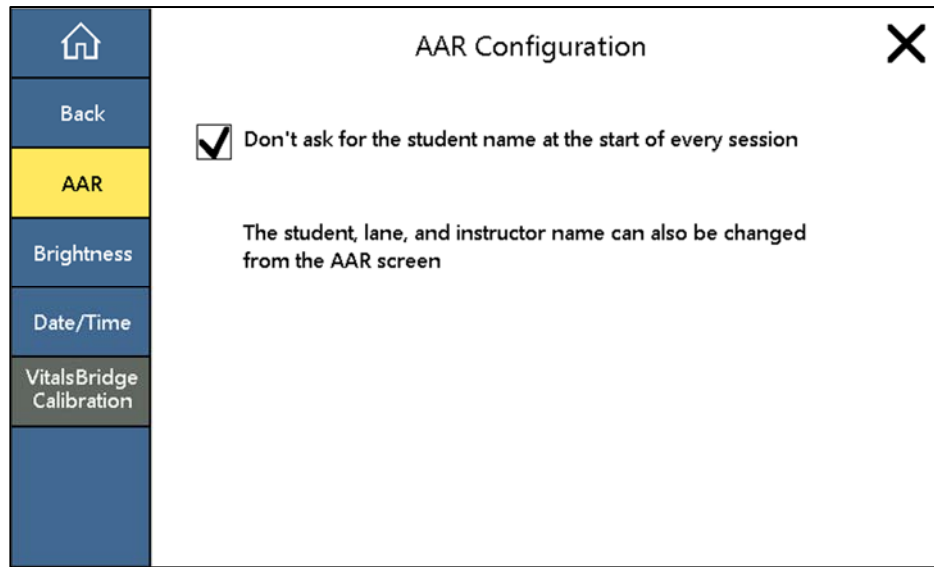


Figure 47

### *Brightness*

The touch screen brightness can be changed with the *Brightness* screen (Figure 48). The default brightness is 70%. Adjust the brightness using the slider. The screen brightness will adjust allowing the brightness level to be previewed. Once the brightness level is satisfactory, press '**Save Brightness**' to change to the brightness level. '**Invert Colors**' can be used to toggle between Dark and Light viewing modes.

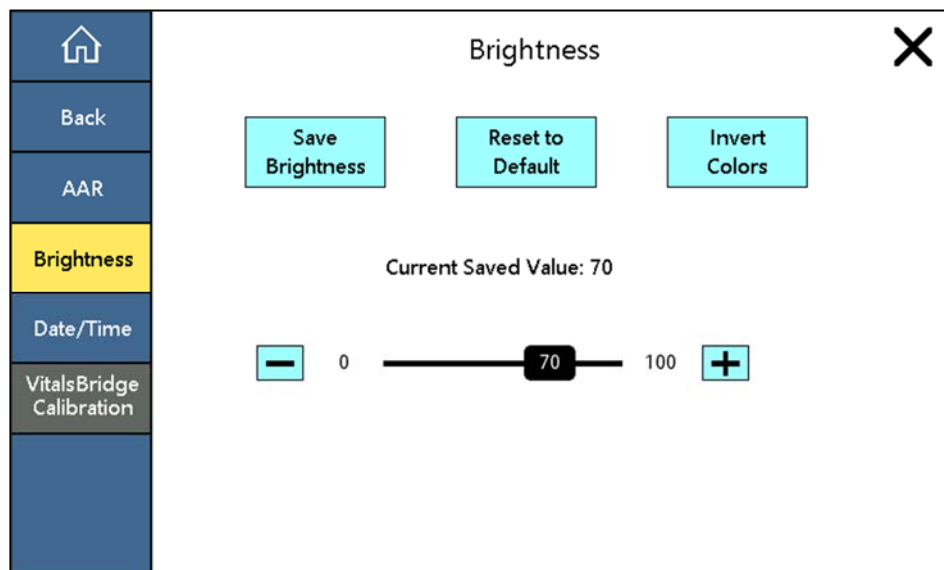


Figure 48

*Date/Time*

The current date and time can be changed from the *Date/Time* screen (Figure 49). The date is mainly used for AAR. Touch any of the date and time buttons to change the current value. Press ‘Save’ to update the current TSR date and time.

The screenshot shows the *Date/Time* screen with a sidebar menu on the left and a main content area. The sidebar menu includes: Home (house icon), Back, AAR, Brightness, **Date/Time** (highlighted in yellow), VitalsBridge Calibration, and an empty blue box. The main content area displays 'Current Date and Time: 10/28/2020 15:52' and a 'Save' button. Below this, there is a calendar grid with buttons for months (Oct, Jan, Feb, March, April, May, June, July, Aug, Sept, Oct, Nov, Dec) and time (28, 2020, 15, 52). A close button (X) is in the top right corner.

Figure 49

*VitalsBridge Calibration*

The *VitalsBridge Calibration* screen (**Error! Reference source not found.**) is available if a VitalsBridge unit is connected. The VitalsBridge must be calibrated to use CO<sub>2</sub> or SpO<sub>2</sub>. Follow the on-screen instructions to set the calibration values. **Caution!** Once the calibration is started, it must be finished.



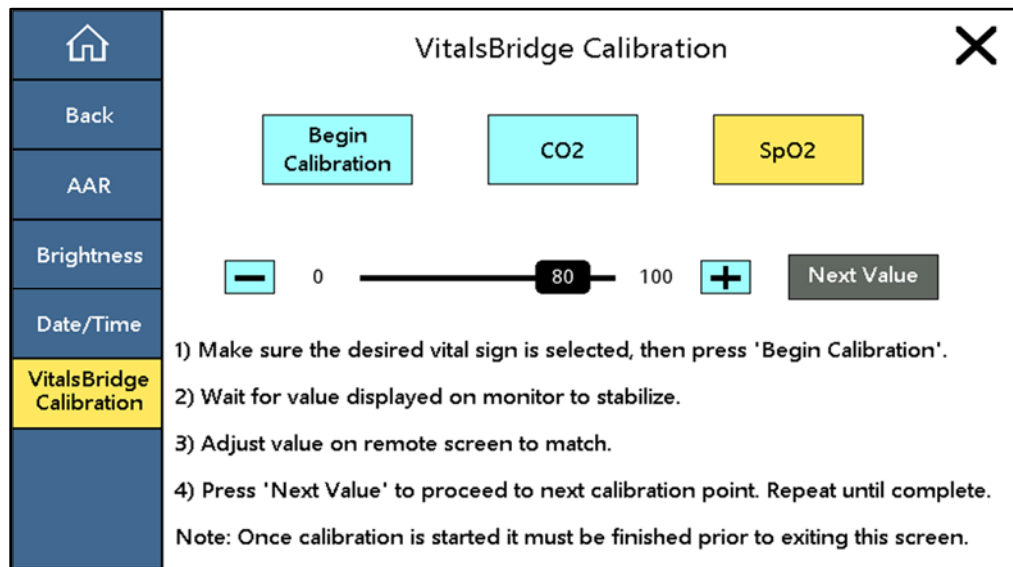


Figure 50

## Packing

Prior to storing the TSR transmitter, always perform the following procedures:

1. **Power down** the TSR transmitter.
2. **Remove** the battery from the TSR transmitter.
3. **Store** the battery and its charger in their proper places in the accompanying upper- or lower-unit storage case.
4. **Place** the TSR transmitter in its proper place in the upper- or lower-unit storage case.

## Chapter 5: After Use Care



To keep the TSR transmitter operating as designed, the following preventive maintenance actions must be completed after each training session.

These easy to perform maintenance actions will help ensure the TSR transmitter remains in peak operating condition for each training session:

1. **Remove battery** daily after training is complete. Do not store battery in the transmitter as this could cause the battery to fail.
2. **Fully recharge the battery** after each training exercise. To extend the service life of the batteries, do not run the batteries until they are completely out of charge.
3. **Do not use** a partially charged battery as this will cause the TSR transmitter to operate improperly.
4. **Only use** approved chargers supplied with the TSR transmitter, or upper or lower unit to recharge the batteries.
5. **Read the User's Manual** for the Battery Chargers and follow instructions and precautions listed inside the manual.

# Chapter 6

## Chapter 6: Troubleshooting

Contact TraumaFX Technical Support at: [MATTSupport@traumafx.net](mailto:MATTSupport@traumafx.net), or call 1-800-200-7465 if trouble-shooting steps do not resolve an issue you are experiencing.

Issue	Actions
<b>Condensation appears on the screen</b>	<ol style="list-style-type: none"><li>1. Store in a cool, dry place and do not subject the TSR to wet conditions.</li></ol>
<b>The TSR will not turn on</b>	<ol style="list-style-type: none"><li>1. Check to verify you are using a fully charged battery.</li><li>2. Replace the battery, as needed.</li></ol>
<b>TSR transmitter is not working</b>	<ol style="list-style-type: none"><li>1. Check to see if the upper or lower unit is turned on.</li><li>2. Is the LCD displaying information (located on the front panel)?</li><li>3. Is the TSR showing “Paired” with the upper or lower unit?</li><li>4. Ensure all batteries in the both the upper or lower unit and TSR are fully charged.</li></ol>

Additional Support  
Customer Service and Support

For other troubleshooting issues not identified above, please contact TraumaFX Technical Support at [MATTSupport@traumafx.net](mailto:MATTSupport@traumafx.net), or 1-800-200-7465.

## Appendix A – TSR Transmitter Technical Specifications

### Touchscreen Remote Control Transmitter (TSR)

**Weight:** 4 lbs.

**Power Supply:** One (1) 18 V (3.0-5.0Ah) Li-ion battery

**Effective Range:** Outdoor range is 200 meters (line of site); indoor range is 50 meters but is subject to building construction materials that may impede signal.

**Indoor or Outdoor Use**

**Altitude Rating:** Altitude up to 2000 m

**Temperature Rating:** Temperatures between 32°F and 109°F (0°C to 43°C)

**Humidity Rating:** Maximum relative humidity 90% for temperatures up to 84°F (29°C) decreasing linearly to 42% relative humidity at 109°F (43°C)

**IP Rating:** IP40

**Transmit power:** 63mW (18dBm)

**RF Data Rate:** 250,000 bps

**FCC ID:** Contains FCC ID: OUR-XBEEPRO\*\* The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

**FCC Approval:** Systems that include XBee/XBee-PRO Modules inherit MaxStream's Certifications. FCC ID: OUR-XBEEPRO

**ISM (Industrial, Scientific & Medical):** 2.4 GHz frequency band

Manufactured under ISO 9001:2000 registered standards XBee/XBee-PRO RF Modules are optimized for use in US, Canada, Australia, Israel, and Europe (contact MaxStream for complete list of approvals).

**IMPORTANT:** The XBee/XBee-PRO OEM RF Module has been certified by the FCC for use with other products without any further certification (as per FCC section 2.1091). Modifications not expressly approved by MaxStream could void the user's authority to operate the equipment.

### Makita DC18RC Battery Charger

***Input:*** A.C. 120 V 50 – 60 HZ

***Output:*** D.C. 7.2 V – 18 V

***Weight:*** 1.0 kg (2.2 lbs)

after each use, 3  
after use care, 5, 45  
batteries, 5, 7  
battery charger. *See* Charger  
charger, 5, 6  
compliance, 3  
Customer Service, i, 46

Radio Control. *See* transmitter  
RC transmitter, 8  
Technical Specifications, 47  
training, 1, 4, 5, 6, 8, 45  
transmitter, 45  
warranty, 1, 5  
water resistant, 3