



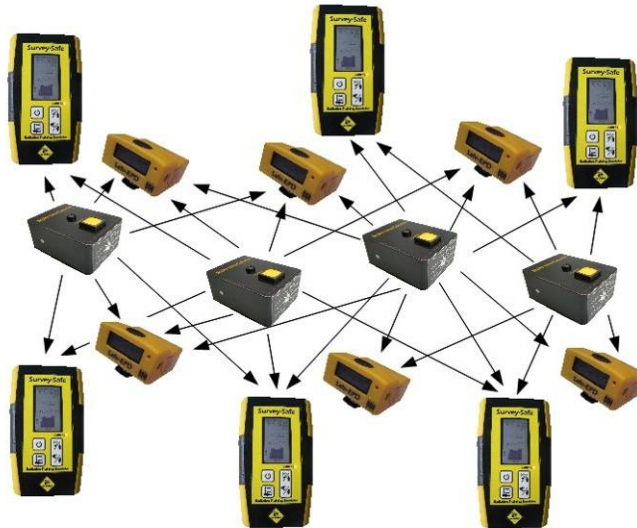
Safe Training Systems Ltd.

Safe-Series Simulators

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User Manual  
V 1.3 June 2014



## **Contents:**

### **1.0 Customer Care**

### **2.0 Warning Notices**

### **3.0 Safety Notices**

### **4.0 Operational Characteristics**

4.1 Initial Startup –Network Connection

4.2 Inverse Square

4.3 Attenuation

4.4 Field Pattern

4.5 Polar Response

### **6.0 Dosi-Safe Dosimeter**

6.1 Technical data

6.2 Operational Controls

6.3 Maintenance

### **10.0 Warranty Information**



## 1.0 Customer Care

Safe Training Systems have had over 20 years of experience in the development, manufacture and maintenance of simulated instruments. Our aim is to manufacture instruments to a high standard using high quality materials and electronic components. All units produced are assembled to strict guidelines and are then passed through functional and visual checks before being signed off by quality control.

However accidents do happen and very occasionally faults may occur in instruments in the field, this manual describes basic maintenance which can be done by the operator.

Where a fault occurs – or an instrument is damaged in operation which cannot be rectified please return the unit –suitably packaged- to STS who will assess the instrument and provide a quote for repair if outside of warranty.

Instruments within warranty (12 months from date of delivery) will be repaired free of charge provided that the failure is not as a result of misuse or physical damage.

Any repairs should be sent to:

Instrument Repairs  
Safe Training Systems Ltd  
Holly House  
Maidenhead Road  
Wokingham  
UK  
RG40 5RR



## 2.0 Warning Notices

### 2.1 Control of Simulators

STS aims to make simulators that are indistinguishable from real instruments, so that the person being instructed experiences the best possible training. A consequence of this is that there is a possibility that the simulator could be mistaken for a real instrument, and then used for a real monitoring task, when, obviously, no readings would result.

To guard against this danger, simulators must be effectively managed so that they cannot be used for real monitoring, while at the same time their benefit as a precise simulator of a real instrument is not diminished.

- 2.1.1** This equipment is not suitable to be operated whilst on board an aircraft.
- 2.1.2** This equipment may not operate in the close proximity of high energy emissions, eg RADAR installations.
- 2.1.3** This equipment is not intended to be used in or close to Life Support appliances, devices or systems where malfunction of the STS product can reasonably be expected to result in a personal injury.
- 2.1.4** This equipment is not designed to be intrinsically safe and should not be used in potentially explosive atmospheres.

### 3.0 Safety Notices

These units use a low powered radiofrequency device running from batteries generating 3.3 Volts and as such should pose no risk to health.

Instruments should be kept clean and not exposed to excessive moisture, very high humidity or rain. The instruments are not IP rated and as such any failure occurring through water ingress is not covered under the warranty.

Please note the following safety advice:

- a) Remove batteries before taking this unit on board an aircraft.
- b) Remove batteries before returning this unit for repair.
- c) Remove batteries before storage for any extended period(in excess of 4 weeks).



## 4.0 Operational Characteristics

### 4.1 Initial Setup of Network

The Safe-Series operates similar to a wifi network and as such has a Master Control Device. In order for the units to function correctly the Master instrument must be switched on first, then any other instruments or simulated radiation sources. Once initially set up the devices will remember the configuration set and use this until such time as the setup is changed. Only the Survey-Safe, Safe-FH40, Safe-EPD or the Dosi-Safe can be configured to be a Master instrument, this is done in the instruments on screen menu options.

### 4.2 Inverse Square

The **Safe-Series** has been designed to provide as realistic as possible response to the Inverse Square Law. Radiofrequency is by its nature governed by the principle of  $1/D^2$  so the simulators start from a position of strength. It is however impossible to actually recreate the full characteristics of gamma radiation and so there are other factors which will influence the instruments response. These include reflections, materials used in casings and materials in the local environment where the instrument is being used. These factors will all have some effect on the accuracy of the inverse square representation, the instruments software does compensate for some of this loss through reflections and the end result is very close to the expected relationship.

### 4.3 Attenuation

Attenuation by Materials

The wavelength selected for use in the **Safe-Series** was chosen because it provides the best simulation of ionising radiation attenuation. At this wavelength, most common building materials provide approximately the same attenuation for ionising radiation (Cs 137) as does the simulator, using its radiofrequency signal.

In particular, wood, glass, brick, concrete and plasterboard all have appropriate attenuation characteristics.

Metals of any thickness totally attenuate the radiation field although due to reflected signal it is possible for some of the signal to leak out of containers which are not fully sealed.

For training purposes it is suggested that sources are placed in plastic, wood or card containers if the source is to be concealed. That said the source can be successfully hidden in vehicles without any issues.

### 4.4 Field Pattern

The **Safe-MiniSource** has been specifically designed to generate as near an isotropic field as is possible. The use of advanced antennae design and sophisticated software enables a field to be generated in three different axis and thus forms a virtually complete sphere or radiated signal. Some factors may cause imperfections in the field pattern such as large metal objects which cause significant reflection of the signal, or other objects between the



detector and the signal generator. These are however minor imperfections and should not greatly affect the received signal on the Survey Meter or Dosimeter.

#### 4.5 Polar Response

The **Survey-Safe** and **Dosi-Safe** instruments have also been specifically designed to eliminate loss of signal seen when the instrument is pointed away from the source. The unique system of Antennae in the instrument allows for the instrument to face in any direction and still receive the signal generated by the **Safe-MiniSource**. As with real instruments there is some minor loss when the instrument is pointing 180 degrees away from the source but unlike other systems the signal is not lost altogether.

## 6.0 Dosi-Safe Dosimeter

### 6.1 Technical data

Instrument Name	<b>STS</b>	<b>Dosi-Safe Dosimeter</b>
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**Description**

The STS Dosi-Safe simulator is a simulated generic Electronic Personal Dosimeter designed to aid the tuition of workers in the nuclear industry in safe practices and in understanding the accumulation of dose over time but without exposure to radiation .

The instrument operates using an STS radio frequency detection head which detects the presence of a simulated radiation field with the resultant reading displayed on the LCD Display.

The instrument will work simultaneously with the Survey-Safe to provide a complete training experience. Set-able alarm levels, background and chirp rates allow the user to create their own specific training environment.

Dimensions (mm)	120H	65W	23D
Weight (KG)	0.15KG		
Construction	Moulded Plastic Case		
Controls	Surface mounted pushbuttons	Suitable for gloved use	
Buttons	On/Off	Menu	Select
Display Type	Digital	2 Line 16 character LCD	
Backlight	Yes		
Battery	2 x AA 1.5V cells	THIS UNIT CANNOT BE MAINS RECHARGED	Battery life 20 hrs+
Detector	STS radio frequency Detector		
Audio Output	Yes	Alarm and chirp rate	
Alarm Thresholds	Yes (rate and Dose alarms)	Set in user menu	
LED	Red Led	Chirp and alarm response	
Functionality	Dose display	Rate Display	
Background	Level set in user menu		
Operating & Storage Temperature	Operating temp 0 to +30C	Storage temp 0C to +40C	
Warm up time	10 seconds from switch on to ready.		
Available Sources	Safe-MiniSource		
Additional Information	The STS Dosi-Safe is not designed to be intrinsically safe and therefore should not be used in hazardous environments. The units are not waterproof and contain delicate and sensitive electronics which may be		



	<p>caused to fail if exposed to moisture. Units should be stored in a clean and dry environment, batteries should be removed if storing for more than 4 weeks.</p> <p>Instrument response will be affected by environmental conditions such as the presence of large reflective surfaces, substantial metal structures and variable wall thicknesses.</p>
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### Factory Default Settings

Background:

3: 150 nSv/hr

Rate Alarm:

2: 100 uSv/hr

Chirp Dose:

3: 500 nSv

Dose Threshold 1:

2: 500 uSv

Dose Threshold 2:

2: 10 mSv

### Available settings via Menu

Background:

1: 0 nSv/hr

2: 50 nSv/hr

3: 150 nSv/hr

4: 500 nSv/hr

Rate Alarm:

1: 20 uSv/hr

2: 100 uSv/hr

3: 500 uSv/hr

4: 1 mSv/hr

Chirp Dose:

1: 0 nSv

2: 150 nSv

3: 500 nSv

4: 1 uSv

Dose Threshold 1:

1: 100 uSv

2: 500 uSv

3: 1 mSv

4: 5 mSv

Dose Threshold 2:

1: 5 mSv

2: 10 mSv

3: 20 mSv





4: 100 mSv

## 6.2 Operational Controls



On/ Off  
Press and  
hold to  
turn off

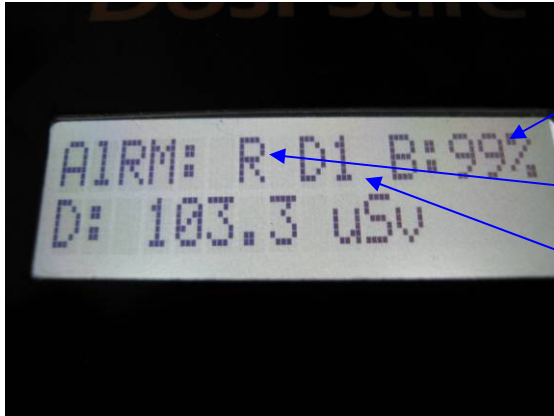
Menu Option Select  
and Backlight  
Acknowledge Alarm

Scroll through  
Menu

Pocket/Belt  
Clip

Dose Display:

Battery Level  
Percentage



Rate Alarm Triggered:  
R – Rate Alarm

Dose Alarm Triggered:  
D1 - Dose Alarm  
D2 - Final Dose Alarm

Rate Display:



Audio Status



To view the user selectable menu items use the scroll key to move through the Home menu, the Home menu will loop through DOSE, RATE, and Options screens.



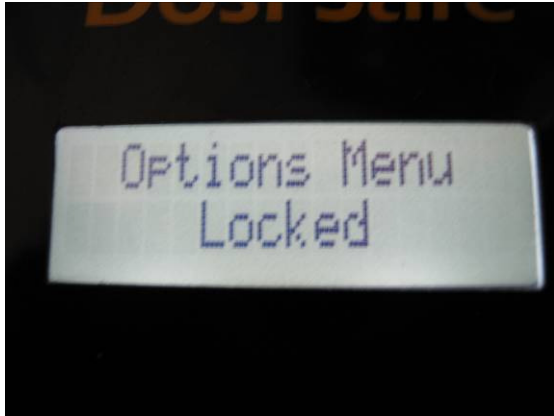
The Backlight can be turned on by Pressing the Select button when at the DOSE/RATE screen.



To enter the options menu, press SELECT. The instrument must be unlocked to enter this menu.

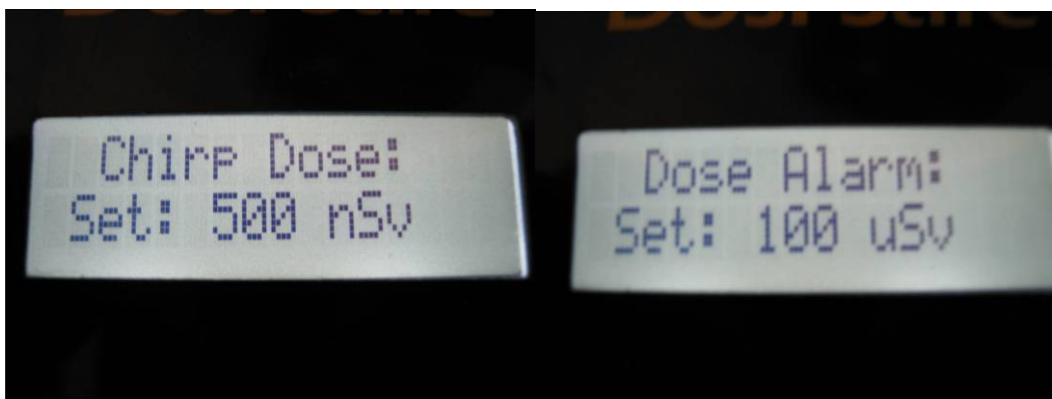
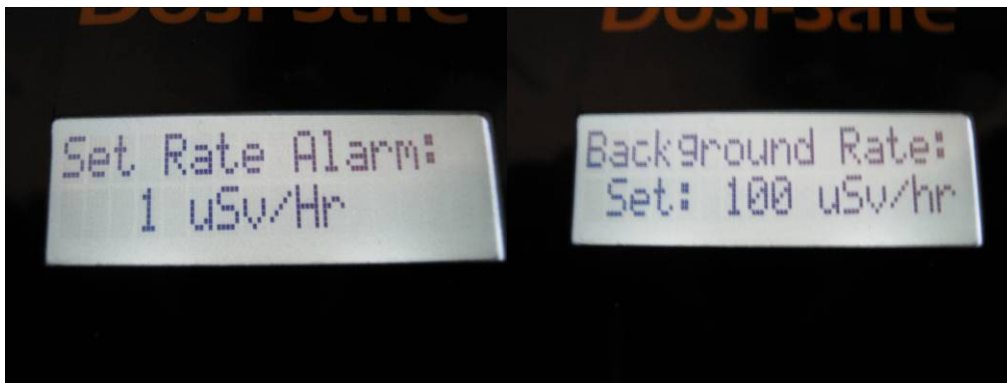
Options Menu:

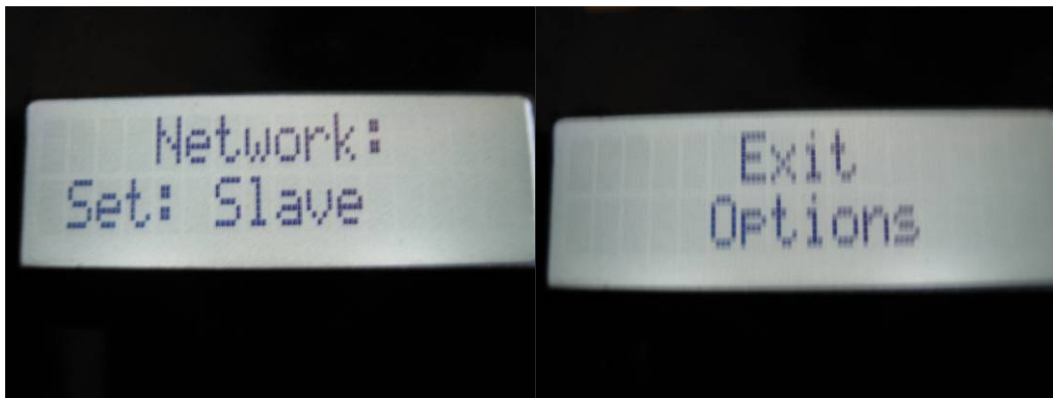
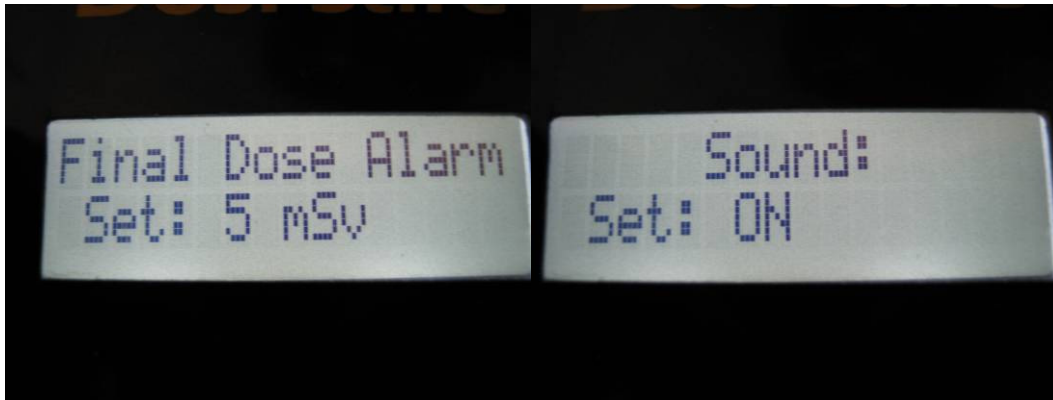
Audio on/off





At the Options menu homescreen press SELECT and RIGHT simultaneously to Lock or Unlock the instrument. The Lock status will be show on this screen. :

Once in the options menu, there will be various setting available for selection:





For all the menu items it is possible to select a value from four preset levels. To do this first

scroll  to the desired menu option and then press the select  button to enter the item.


To exit the options menu, press SELECT , at Exit Options.

In this case it is the Rate Alarm level, currently the level is set at 1uSv/Hr



To change the level Press the Select Button  the display will then display Set Alarm Level: as below



To choose from a preset level use the scroll button  to choose the new desired level, in this case 50uSv/Hr



To save this new value press the Select button  the screen will now update to show Alarm Level: Set : in this case at 50uSv/Hr as below.



Here is a breakdown on each of the menu options:

- Background Rate – This determines the dose rate level when there is no source present. This is used to create an environment with a constant dose rate level.
- Rate Alarm – This Alarm determines the dose rate level to which any great increase in dose rate will trigger an audio alarm. This alarm will have a frequency of 1 tone every second.
- Chirp Dose – An audible beep every time set dose is accumulated.
- Dose Alarm: The first dose alarm. The instrument will alarm once the accumulated dose reaches this threshold.
- Final Dose Alarm: The final dose alarm. The instrument will alarm once the accumulated dose reaches this threshold.
- Sound – This determines the initial audio state of the device upon turning on.
- Network – This determines the network type of this instrument. There are two states: Master and Slave. The Master instrument will control the addition of any new instruments into the Radiation simulation network. There must always be one Master instrument switched on to control this network. The Slave units do not have this controlling function, but will join any radiation simulation networks upon turning on.





(This radiation network technology is common to all SAFE-Series instruments.) After initial configuration, the devices will remember the set up and use this the next time they are turned on until such time as the set up is manually changed.

The Network Status of the instrument is shown upon boot up as shown:



### Audible Alarms:

The Dosimeter has 3 audible alarms.

**Chirp Dose** – The Dosimeter will give one single short beep for each incremental amount of dose received ie Set at 50nSv will beep at the first 50, then after a further 50 etc.

**Rate Alarm** – The Dosimeter will give an intermittent alarm beep when the rate alarm threshold is exceeded. This Alarm will have an audible intermittent sound until acknowledged



by pressing the button.

**Dose Alarm** – The Dosimeter will give a continuous broken beep when the dose alarm



threshold is exceeded. This Alarm will continue until acknowledged by pressing the button.

**Final Dose Alarm** – The Dosimeter will give a continuous beep when the final dose alarm



threshold is exceeded. This Alarm will continue until acknowledged by pressing the button.

## 6.3 Maintenance

The **Dosi-Safe** does not contain any user serviceable parts and as such no repair or adjustment should be attempted as this will both invalidate the warranty and lead to potential damage of the circuit.

The batteries are accessed through the panel on the rear of the instrument. The **Dosi-Safe** uses 2 alkaline AA cells, professional or long life cells are recommended for best performance. Batteries should be removed when not in use for prolonged periods and partially discharged cells should never be mixed with new cells.





## **10.0 Warranty Information**

All STS products are guaranteed for a period of 12 months from the date of supply. This guarantee cover workmanship and component failure only and does not cover accidental damage, damage through misuse or neglect.