Safe Training Systems Ltd

Safe-Series

Simulators

Safe Training Systems Ltd
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User Manual
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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/D2 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.

5.0 FH40 GL10

5.1 Technical Data

Instrument Name	**STS Safe-FH40G**			
	Description The STS Safe-FH40G simulator is a simulated radiation survey meter designed to aid the tuition of workers in the nuclear industry in safe practices and in understanding the nature and mechanics of ionising radiation . The instrument operates using an STS radio frequency detection head which detects the presence of a simulated radiation field, generated by the Safe-MiniSource, with the resultant reading displayed on the LCD Display of the instrument. The Safe-FH40G may be used in conjunction with the Dosi-Safe or Safe-EPD dosimeter simulators to provide a more in depth training experience.			
Dimensions (mm)	180H		110W	35D
Weight (KG)	0.25KG			
Construction	Moulded Plastic Case			
Controls	4 Button key pad		4 function keys	Gloved operable buttons
Control Keys	On/Off Press & Hold OFF	Menu	Backlight on/off & menu scroll	Audio on/off and menu scroll
Display Type	Digital		65 x 35mm LCD	Black & White
Backlight	Yes		On/off from keypad	
Battery	2 x AA 1.5V cells		THIS UNIT CANNOT BE MAINS RECHARGED	Battery life 7 hrs+
Detector	STS radio frequency Detector			
Audio Output	Yes – Selectable on/off		Rate and Alarm	
Alarm Thresholds	YES		Set in menu	
Scale	Scale automatically displayed for each range			
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		Network OK icon displayed	

	ready.		
Available Sources	Safe-MiniSource, Safe-MiniSource Variable	Available in a range of activity levels	
Additional Information	The STS Safe-FH40G 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 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. Instrument response will be affected by environmental conditions such as the presence of large reflective surfaces, substantial metal structures and variable wall thicknesses.		

5.2 Operational Controls

Backlight on/off

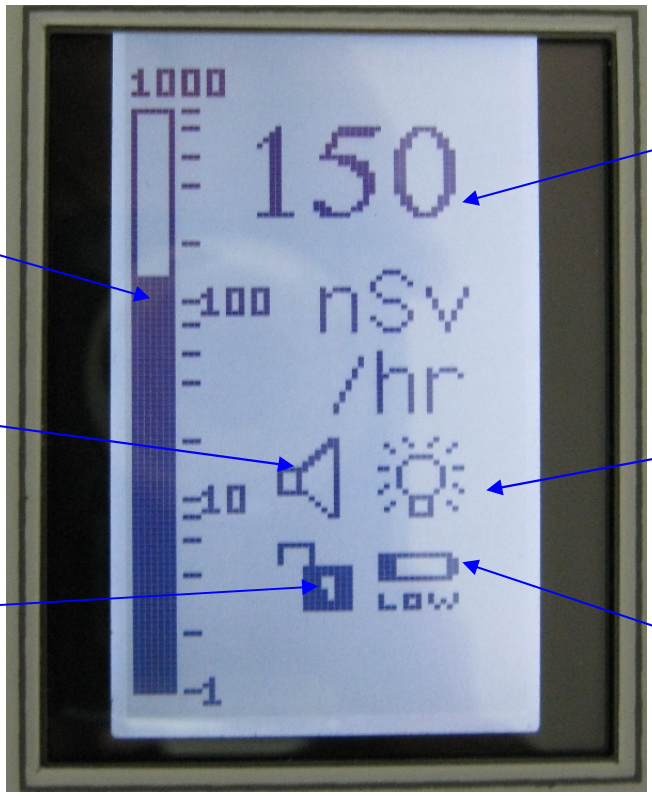
ON / OFF Press and hold to turn off

Menu up/down -Press together to LOCK or UNLOCK

Menu & Item Select/Set

Audio on/off

The Home Screen displays Rate with Auto scaling units, a reading Graph and information Icons



Rate reading with auto-scaling units

Readings Bar Graph

Audio Status

Backlight Status

Menu LOCK Status

Battery low Status

Starting an exercise

To ensure that good network connection is made the FH40 instruments should be turned on before the source(s) are activated.

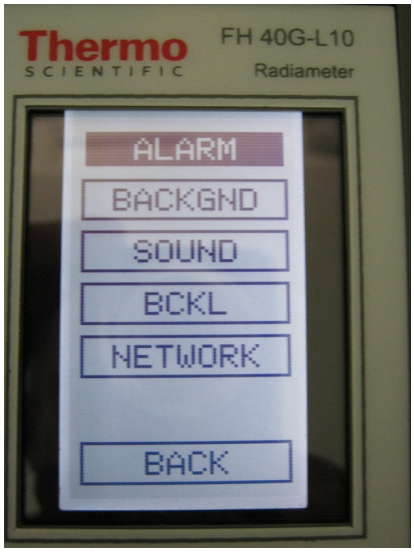
Setting up Alarm and Background levels

To enter the menu options, the device must be unlocked. The current lock status is shown in the bottom left corner of the home screen.

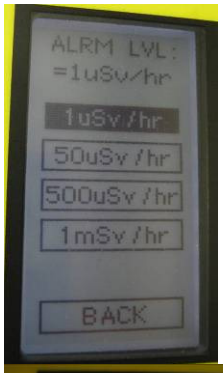
To unlock or lock the instrument, press both UP and DOWN simultaneously. The Lock Status icon will change to show the new Lock status.

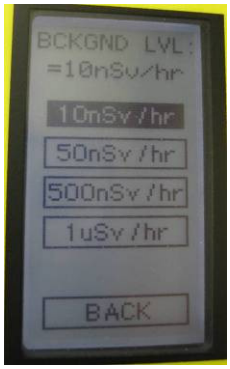
Press the Menu Button once , with the instrument unlocked, to Access the user menu.

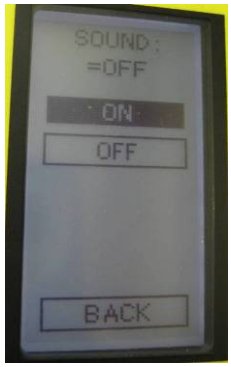
Use the Up and down arrows to scroll and the select button to choose.



By Selecting each menu item the following information is displayed, to move back to the menu scroll down to the BACK button and press select

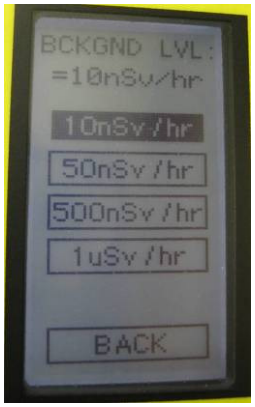






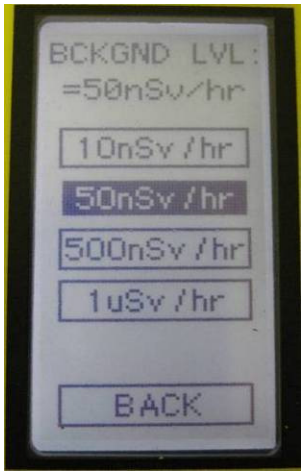
To Change the settings of a menu item use the following steps. First Enter the main menu

Select the desired item from the list by scrolling down and pressing select in this case the background Level.

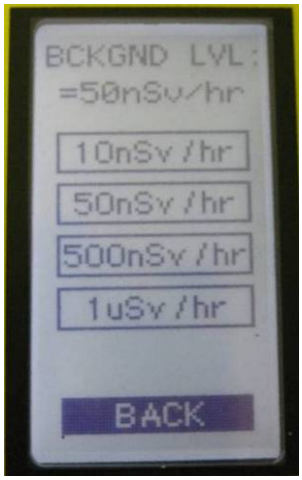


The initial screen displays the current value selected at the top of the screen, in this case =10nSv/hr

To change the value scroll down to the desired value and press select



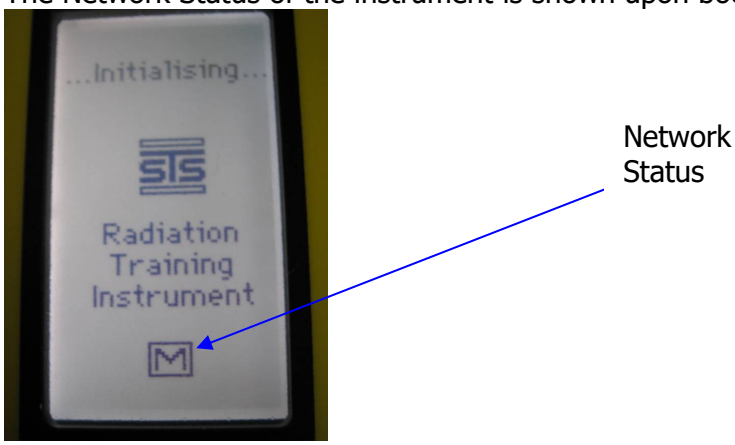
The top of the screen now displays the new value set , in this case =50nSv/hr, to exit back to the menu scroll down to BACK and press Select, this returns you to the main menu. To start taking readings exit the main menu in the same way to return to the home screen.



Here is a breakdown on each of the menu options:

- Background – 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.
- 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.
- Sound – This determines the initial audio state of the device upon turning on.
- BCKL – This determines the initial LCD backlight 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.)

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



Maintenance

The Safe-FH40 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 cap on the base of the instrument. The Safe-FH40 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.

6.0 Safe-MiniSource (Variable)

6.1 Technical Data

Instrument Name	**STS**		**Safe-MiniSource (variable)**
	Description The STS Safe-MiniSource (variable) is a simulated radiation source for use with the Survey-Safe, Safe-EPD & Dosi-Safe range of instruments. The Safe-MiniSource (variable) is a variable activity source with a near isotropic field pattern, its small size makes it easily hidden for carrying out training such as lost source recovery.		
Dimensions (mm)	80H	60W	40D
Weight (KG)	0.20KG		
Construction	Moulded Plastic Case		
Controls	1 surface mounted push button	Gloved operable button	
Control Keys	On/Off	Variable dial	
Display Type	None		
Backlight	N/a		
Battery	2 x AAA 1.5V cells	THIS UNIT CANNOT BE MAINS RECHARGED	Battery life 10 hrs+
Emitter	STS radio frequency Detector	3 pole emitter for 360 degree Isotropic field	
Low Battery LED	Green on	Red – Low Battery	
Isotope Activity	Variable activity from 0.5uSv to 25mSv/hr at 1M range		
Operating & Storage Temperature	Operating temp 0 to +30C	Storage temp 0C to +40C	
Warm up time	10 seconds from switch on to ready.		
Available Meters	Survey-Safe	Dosi-Safe	Safe-EPD

Additional Information	The STS Safe-MiniSource 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 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. Instrument response will be affected by environmental conditions such as the presence of large reflective surfaces, substantial metal structures and variable wall thicknesses.

Factory Default Settings

Levels:
0 = 0.5uSv/hr
1 = 2.5uSv/hr
2 = 5uSv/hr
3 = 25uSv/hr
4 = 50uSv/hr
5 = 250uSv/hr
6 = 0.5mSv/hr
7 = 2.5mSv/hr
8 = 5mSv/hr
9 = 25mSv/hr

6.2 Operational Controls

The **Safe-MiniSource** is designed to be simple to use and as such has only a power on/off (press and hold to turn off) button and a LED and a variable dial. The LED shows Green to show the source is switched on and working and that the battery level is ok. The LED will turn Red when the battery life is low and will extinguish once the batteries are exhausted. To change the activity level use a small flat blade screw driver to rotate the dial to the desired setting.

6.3 Maintenance

The Safe-MiniSource 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 by removing the 4 screws ion the corners. The Safe-MiniSource uses 2 alkaline AAA 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.

7.0 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.