

**USER MANUAL**

# **missim SIMULATOR**



Date: 24.02.2015

**Together  
ahead. RUAG**

<b>MODIFICATIONS</b>					
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# Missim Simulator

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## 1. Introduction

### 1.1. Notices

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RUAG Schweiz AG  
RUAG Aviation  
P.O. Box 501  
3800 Interlaken  
Switzerland  
[www.ruag.com](http://www.ruag.com)  
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### 1.2. Software Revision

This manual is valid for the firmware that was installed in the instrument at the date of manufacture. However, upgrading the firmware may add or change the product functionality. For the latest firmware and documentation, contact RUAG Schweiz AG.

### 1.3. Warranty

The material contained in this document is provided “as is” and is subject to change, without prior notice, in future editions. Further, to the maximum extent permitted by applicable law, RUAG Schweiz AG disclaims all warranties, either expressed or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. RUAG Schweiz AG shall not be liable for errors, incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should RUAG Schweiz AG and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall have priority.

## 1.4. Technology Licenses

The hardware and/or software described in this document are furnished under a license and must only be used or copied in accordance with the terms of this license.

Used OpenSource code and associated licenses are handed out on the missim PC software CD-ROM, delivered with your missim unit.

## 1.5. Application

The missim simulator is designed for the testing of electronic warfare systems only and must not be used for other applications. The simulator works with radar, missile and laser sensors and is intended for the following use cases:

- **GO/NO GO preflight check**  
Simple & easy to use setup of the missim simulator with predefined test scenarios for the flightline.  
For more information, see chapter 6.1.      PreMission Mode
- **System check**  
Highly scalable missim simulator setup which allows to select multiple platforms, configurations, sequences & scenarios for maintenance, trouble-shooting and system verification activities.  
For more information, see chapter 6.2.      Expert Mode
- **Independent simulator configuration**  
The missim PC SOFTWARE delivered with each missim simulator allows to design and upload customer specific test emitters, scenarios and sequences for both PreMission and Expert mode. These TLSs can be created independently of the missim simulator (e.g. in an EW lab), distributed to the test facilities and uploaded to the missim simulator as required.  
For more information about TLS creation, check the missim PC SOFTWARE user manual.

For proper functionality make sure the test emitters meet the sensor specification. Please check that all emitter characteristics programmed on the missim simulator match the characteristics of the electronic warfare system under test.

RUAG Schweiz AG is not responsible for any injuries or damages if the missim simulator is used for other applications as specified.

Operations performed on the missim simulator (PreMission and ExpertMode) can also be performed via missim wired remote control software. This functionality is offered as an add-on. Please contact RUAG Aviation for more information.

## 1.6. Cleaning

Clean the outside of the simulator with a soft, lint-free, slightly dampened cloth. Do not use abrasive detergent or chemical solvents.

## 2. SAFETY INFORMATION

### 2.1. General

Do not use this product in any way other than those specified by the manufacturer. The protective features of this product may be impaired if it is used in a way not specified in the operation instructions. Do not install substitute parts or perform any unauthorized modification to the product. Return the product to RUAG Aviation for service and repair to ensure that safety features are maintained.



**WARNING:** Do not open the missim simulator or the missim charger. An open missim or charger does not comply with the safety regulations. Missim contains invisible radiations sources (LASER, radio frequencies, UV-C light) and high voltage which can cause significant harm. An open missim or charger shall not be used anymore and must be sent back to RUAG Aviation.



**CAUTION:** During operation the missim simulator radiates radio frequencies energy at 1.5 GHz to 18 GHz and 36 GHz. It is the responsibility of the owner to make sure these frequencies do not disturb commercial / public radio links or other RADAR stations in his area.



**CAUTION:** The missim output power at radar, laser and UV-C wavelengths are set to a level allowing the stimulation of EW systems at a range of between 0 to 20 m. Depending on the EW sensor sensitivity, plus other factors, the usable range may be greater such that airborne platforms at low altitude could detect a threat and dispense. Make sure that the EW system related safety measures are taken.

### 2.2. LASER SAFETY


The simulator is classified according to the EN 60825-1:2008 regulations. Incorrect handling may cause serious eye injury.

- The eye safety distance of the 905nm Laser is at about 0.25m. Despite this short distance, it is strictly forbidden to point the missim simulator against human beings or animals.
- The 655nm Laser is eye safe due to the blinking reflex. Intended suppression of the blinking reflex may cause serious eye injury.

Always follow the safety instructions below:

- **Do always hold the missim in a way that the outlet ports point away from the operator, especially away from his eyes.**
- **It's strictly forbidden to point the device against other human beings or animals**




 <b>LASER</b> <b>1, 2, 3R</b>	Laser data EN 60825-1:2008			
	Laser medium	Laser diode		
	Wavelength	620-690nm	905nm	1550nm
	Emission time	CW/Pulsed	Pulsed	Pulsed
	Max. radiant power (Average)	0.95mW	11 mW	5 mW
	Max. radiant energy (Average)	-	1.1uJ	0.5uJ
	Beam	-	Expanded	
	Laser Class	2	3R	1
<b>CAUTIONS:</b> <b>VISIBLE AND INVISIBLE LASER RADIATIONS</b> <b>AVOID DIRECT EYE EXPOSURE</b> <b>DO NOT TARGET HUMANS OR ANIMALS</b> <b>ALWAYS READ SAFETY INSTRUCTIONS</b>				

**2.3. UV-C SAFETY**

The missile simulator is classified according to the EN 12198-1:2008 regulations. The UV-C source is not dangerous, as long as the safety distance is adhered and the exposure time is not exceeded. The maximum exposure time in a distance of 20cm is 5 hours. Shortening the distance reduces the exposure time rapidly. The critical value at the outlet port is 47 seconds.


Always follow the safety instructions below:

- **Do always hold the missim in a way that the outlet ports point away from the operator, especially away from his eyes.**
- **It's strictly forbidden to point the device against other human beings or animals**


 <b>UV-C</b> <b>Cat. 2</b>	Safety of machinery EN 12198-1:2008	
	Ultraviolet medium	UV-C LED
	Wavelength	265 nm
	Emission time	Programmable
	Max. radiant power (Average)	1.75uW
	Beam	25°
Ultraviolet Class	2	
<b>CAUTIONS:</b> <b>INVISIBLE RADIATIONS</b> <b>DO NOT LOOK INTO BEAMS</b> <b>DO NOT TARGET HUMANS OR ANIMALS</b> <b>ALWAYS READ SAFETY INSTRUCTIONS</b>		

**2.4. RF SAFETY**

The RADAR (12 / 36 GHz) simulator is safe according to the EN 12198-1:2008 regulations.

 <b>RF</b>	Safety of machinery EN 12198-1:2008		
	RF medium	Semiconductor	
	Frequency	12 GHz	36 GHz
	Emission time	CW/Pulsed	Pulsed
	Max. radiant power (Average)	+15 dBm	+13 dBm
	Beam	24°	8°
	RF Class	0	0
<p align="center"><b>CAUTIONS:</b>  <b>INVISIBLE RADIATIONS</b>  <b>DO NOT TARGET HUMANS OR ANIMALS</b>  <b>ALWAYS READ SAFETY INSTRUCTIONS</b></p>			

The RADAR (1.5 – 18 GHz) simulator is safe according to the EN 12198-1:2008 regulations.

 <b>RF</b>	Safety of machinery EN 12198-1:2008	
	RF medium	Semiconductor
	Frequency	1.5-18 GHz
	Emission time	CW/Pulsed
	Max. radiant power (Average)	+15 dBm
	Beam	24°
	RF Class	0
<p align="center"><b>CAUTIONS:</b>  <b>INVISIBLE RADIATIONS</b>  <b>DO NOT TARGET HUMANS OR ANIMALS</b>  <b>ALWAYS READ SAFETY INSTRUCTIONS</b></p>		

**2.5. Main Power Disconnect**

Unplug power cord from the missim then remove charger supply from the wall outlet before servicing. Only qualified, service-trained personnel should remove the cover from the simulator.

### 3. Abbreviations

<b>Abb.</b>	<b>Description</b>
BIT	Built-In-Test
CBIT	Continuous Built-In-Test
DSS	Defense Security Service
EIRP	Equivalent Isotropically Radiated Power
ERP	Equivalent Radiated Power
EW	Electronic Warfare
HFI	Hostile Fire Indication
IBIT	Initiated Built-In-Test
LAS	Laser Simulator
MAS	Missile Approach Simulator
ML	Missile Laser
MSDS	Material Safety Datasheet
RAS	Radar Simulator
RF	Radio Frequency
RML	Radar Missile Laser
RoHS	Restriction of the use of certain hazardous substances in electrical and electronic equipment
TLS	Threat Library Set (this missim file contains all user data defining user specific emitters and test scenarios)
UDF	User Data File of the EW System
WB	Wide Band
WB-RML	Wide Band Radar Missile Laser

### 4. Inventory

Please verify that all items on the packing list or invoice copy have been shipped to you. Contact RUAG Aviation if anything is missing or damaged. If something is missing or damaged, make sure to contact RUAG Aviation immediately otherwise RUAG Aviation cannot be held responsible.

Depending on the configuration ordered, you should receive at least the following parts:



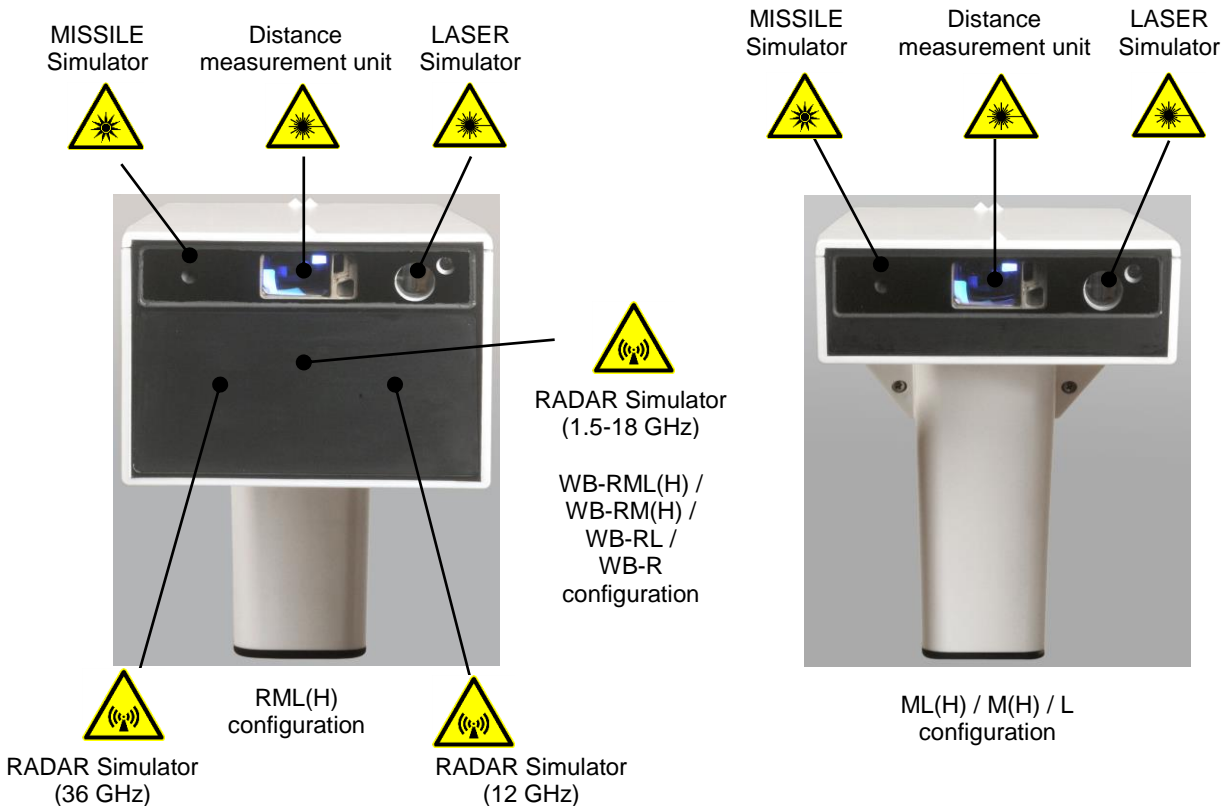
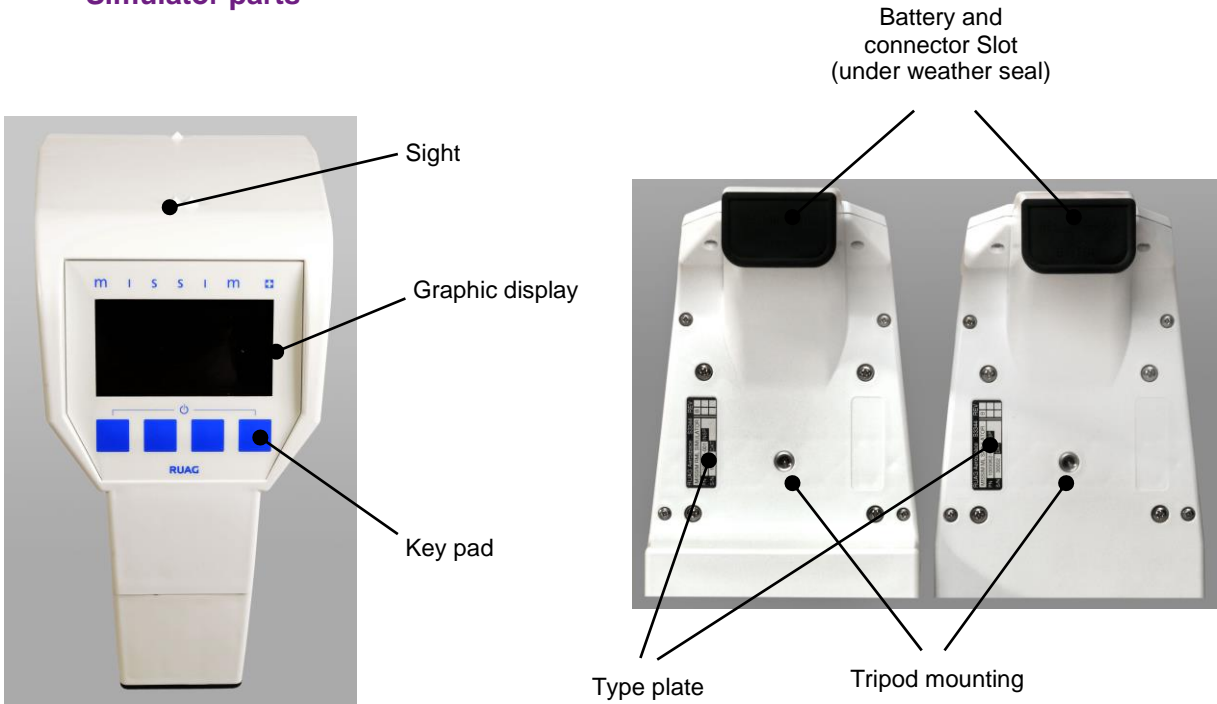
Pos.	Description	Configuration
1.1	MISSIM SIMULATOR <sup>1)</sup>	WB-R WB-RM WB-RMH WB-RL WB-RML WB-RMLH RML RMLH
1.2	MISSIM SIMULATOR <sup>1)</sup>	M MH L ML MLH
2	CHARGER SUPPLY	
3	POWER CABLE <sup>2)</sup>	CEE 7/VII (D, A, NL, S, EU)
		NEMA 5-15 (USA, CDN, MEX)
		BS 1363 (GB, IRL)
		T12 (CH)
		or other country specific cable
4	USB CABLE (1.8 meters)	
5	MISSIM TRANSPORT CASE	
6	MISSIM CD-ROM	
7	MISSIM USER MANUAL	
8	SOFTWARE USER MANUAL	

- 1) Depending on the configuration ordered. This also affects the color.
- 2) Depending on the country missim is delivered to

Please do also verify customized material if ordered.

## 5. First Steps

### 5.1. Simulator parts



### 5.2. Charger

Before using the simulator make sure the battery is charged.

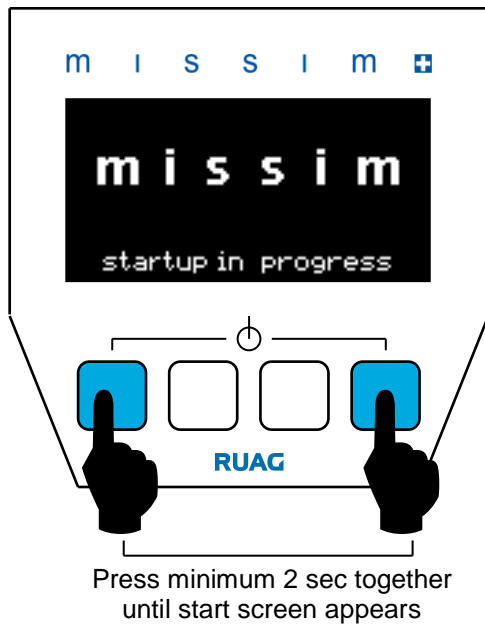
Please read Battery chapter on page 43 for further instructions.



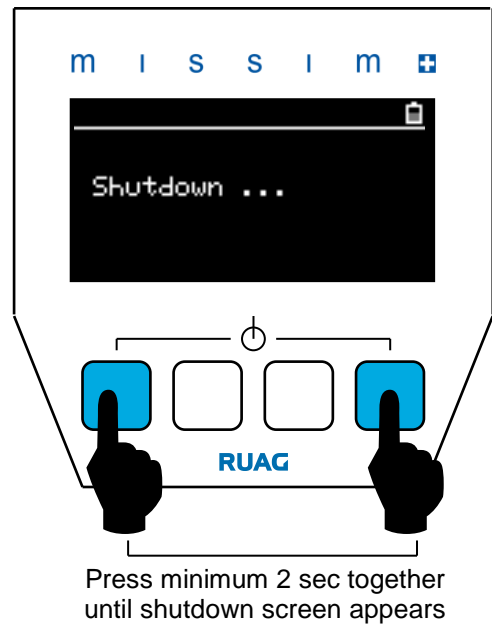
**CAUTION:** Battery charging is only allowed indoors in dry environment.

### 5.3. Switching missim ON or OFF

#### Switching ON



#### Switching OFF



### 5.4. Display information

The display indicators described below can be shown when the simulator is running.

Label	Description
1	Battery Capacity indicator
2	External Power indicator
3	Emitting indicator
4	Error indicator
5	Warning indicator
6	Scroll Up arrow
7	Scroll Down arrow
8	Scroll Up button
9	Scroll Down button
10	Selected Menu Item
11	Total Number of Menu Item

### 5.5. How to navigate

Move the selection bar using the 'scroll up' and 'scroll down' buttons. Select the highlighted menu item by pressing the push-button below the 'OK' label. Pressing the **Exit** button (if available) moves one level up in the menu structure.

If a menu consists of more menu item than are visible on the display, the scroll up indicator and/or the scroll down indicator will appear.

The item / total items number shows the actual position of the selection bar.

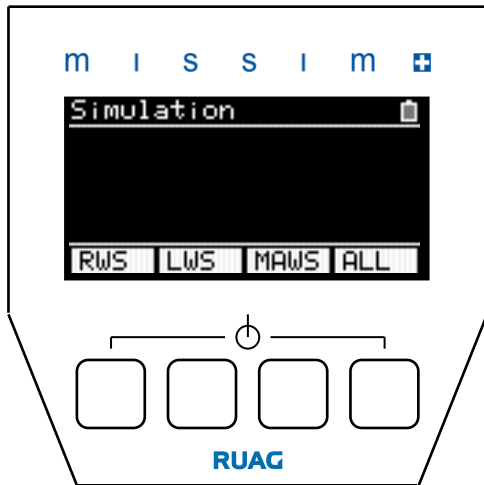
Label	Description
1	Selection bar
2	Current Item / Total Items



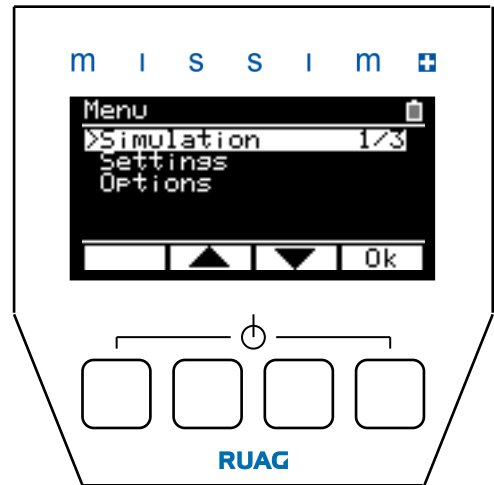
## 6. Operating Modes

The missim simulator supports two different operating modes which are defined in the Threat Library Set (TLS). These two modes meet the different operational requirements for testing an EW suite.

**PreMission Mode**

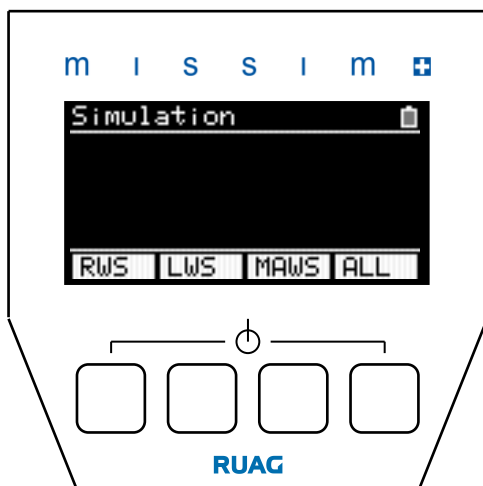


**Expert Mode**



### 6.1. PreMission Mode

The PreMission Mode allows fast testing of a defined EW suite in a defined environment. This mode is suitable for efficiently executing a predefined test before the start of a mission and for other quick checks. The test can be executed after a very short training, requires minimal user intervention and offers a very reproducible test execution. The PreMission Mode supports up to four different emitters or test scenarios which can be started by pressing one of the 4 missim buttons. The complete definition of the PreMission test mode is programmed using in the missim PC software.



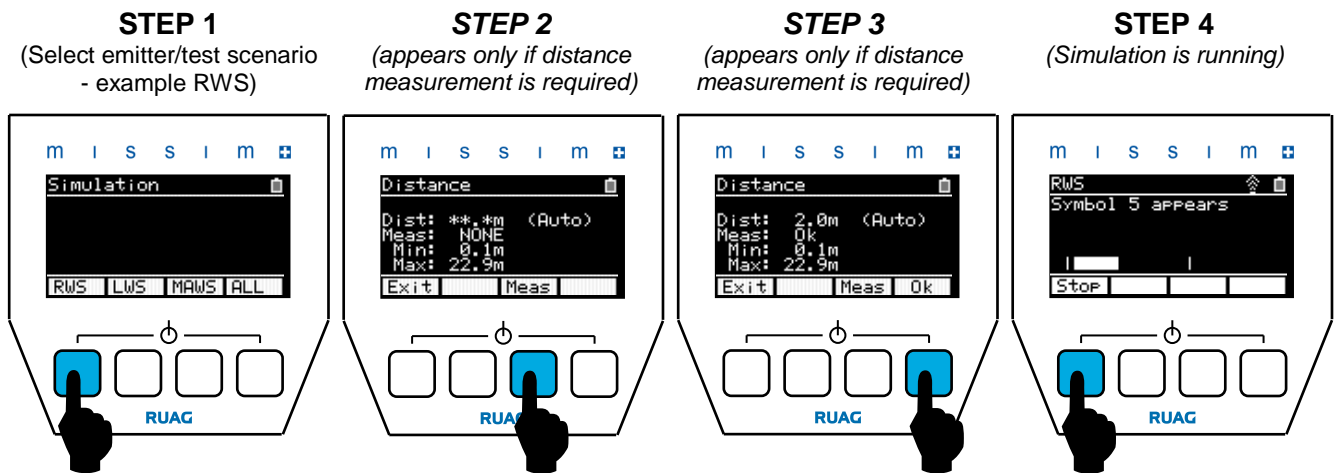
**NOTE:** Only available when a PreMission Mode is defined in the installed TLS. Also check if the PreMission mode is enabled in the settings (see on page 28).

### 6.1.1. Simulation in PreMission Mode

The different test scenarios (maximum 4) are named on the lowest line of the display. To start a simulation, simply press the button below the scenario to execute this. If the programmed simulation requires a distance measurement, the Distance page appears.

For further information about distance measurement please refer to page 41.

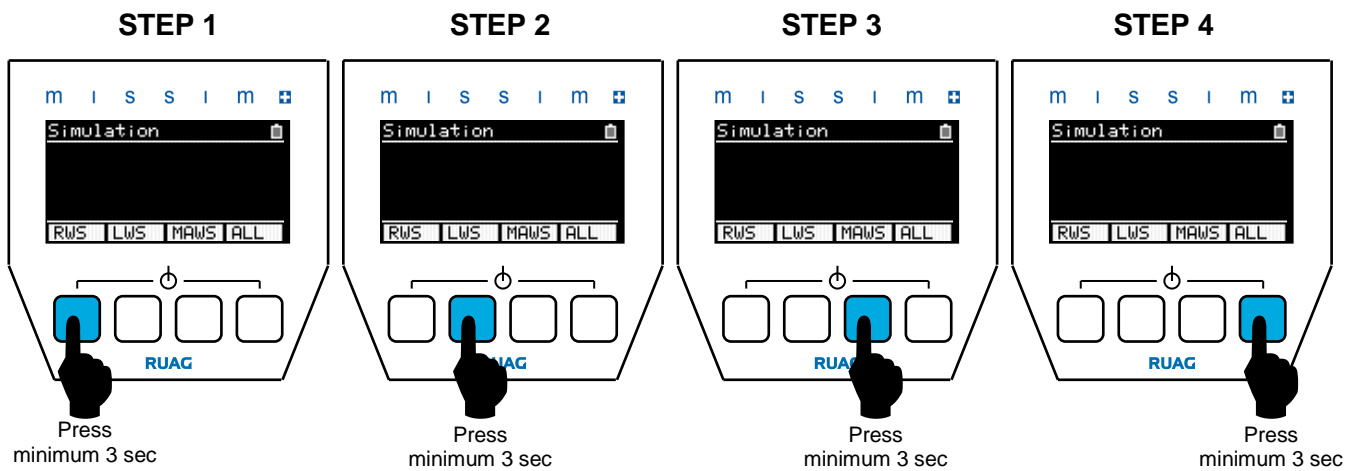
For further information about simulation status information read page 37.



### 6.1.2. User Data Erase function in PreMission Mode only

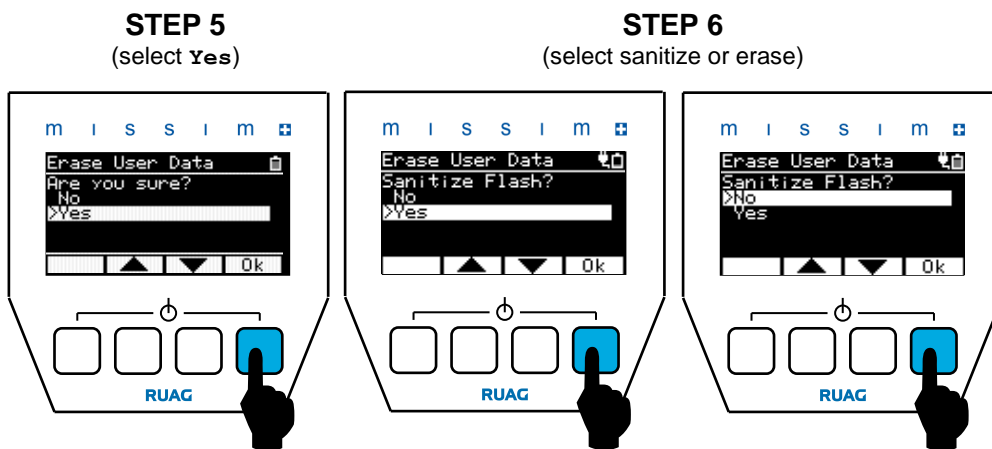
The missim user data consists of all user defined emitter and test scenario related data, this data is stored in the so called Threat Library set (TLS). Sometimes these threat scenarios are based on classified information hence a function is provided to erase the user data / TLS. The erase routine will erase the whole internal Flash memory. If the user would like to sanitize the memory, the whole internal Flash memory will be sanitized according to DSS ISL 2007-01 “DSS Clearing and Sanitization Matrix”.

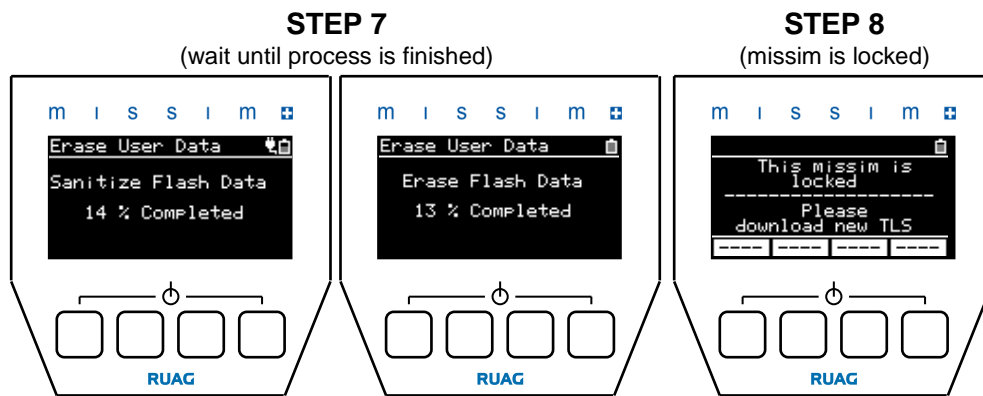
As the PreMission mode menu does not offer access to the settings and options menu, like the expert mode, the operator has to execute the following button sequence to erase the user data:



After the correct execution of the erase sequence, the simulator will ask the user whether they really want to erase the user data. Select 'YES' and press the 'OK' button to go to the next step or 'NO' followed by 'OK' to return back to the PreMission Mode.

After confirming the erase procedure, missim will ask if you would like to sanitize the Flash memory. Select 'YES' and press the 'OK' button for the time consuming but safer sanitizing process or 'NO' followed by 'OK' to start the normal erase process.





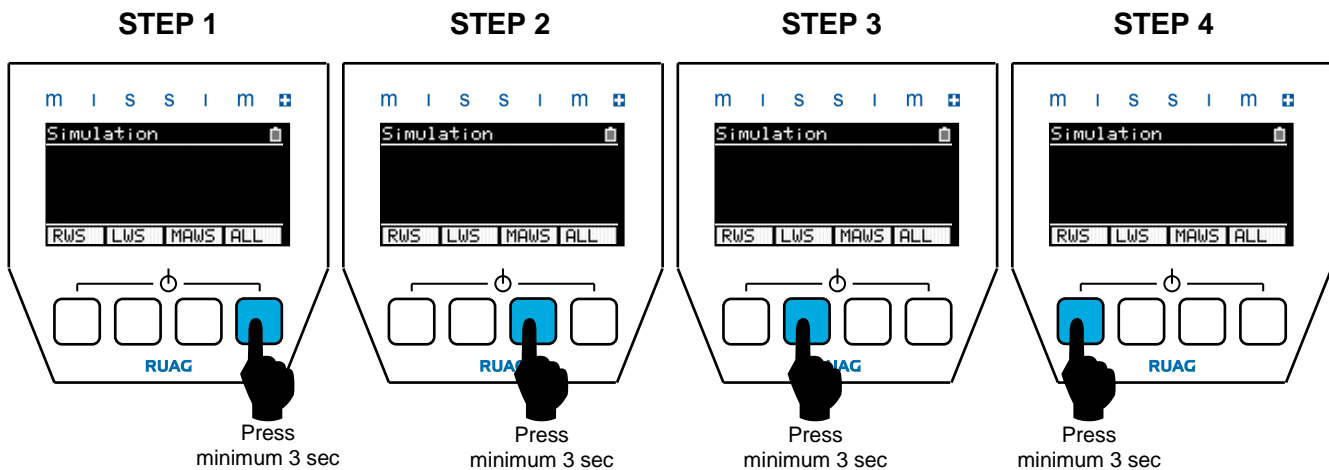
**NOTE:** The operational system software and the pre-programmed generic TLS will not be affected when you erase the user data.



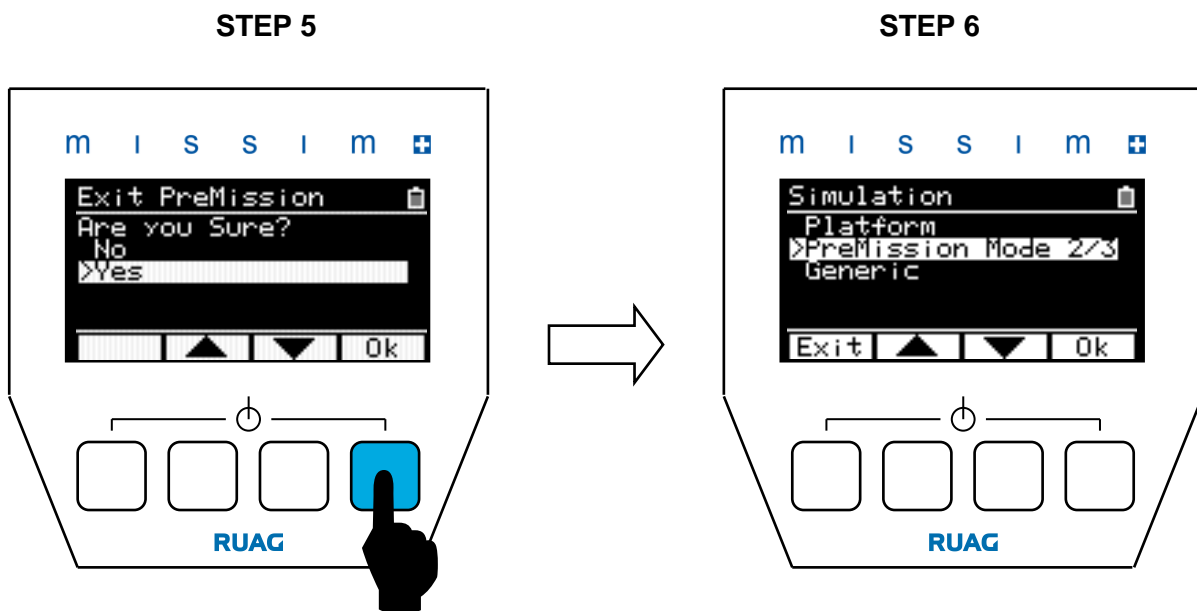
**NOTE:** If the user data is erased whilst in PreMission mode, the missim will be locked until a new TLS (user data) is downloaded.

### 6.1.3. Change from PreMission to Expert Mode

Changing from the PreMission Mode to Expert Mode is only recommended for EW specialists as this mode will allow access to all simulator options and settings. To enter Expert Mode, execute the following button sequence:



After executing the correct button sequence, the simulator will ask if you really want to change to Expert Mode. Select 'YES' if you want to proceed. Select 'NO' if you want to go back into PreMission Mode.

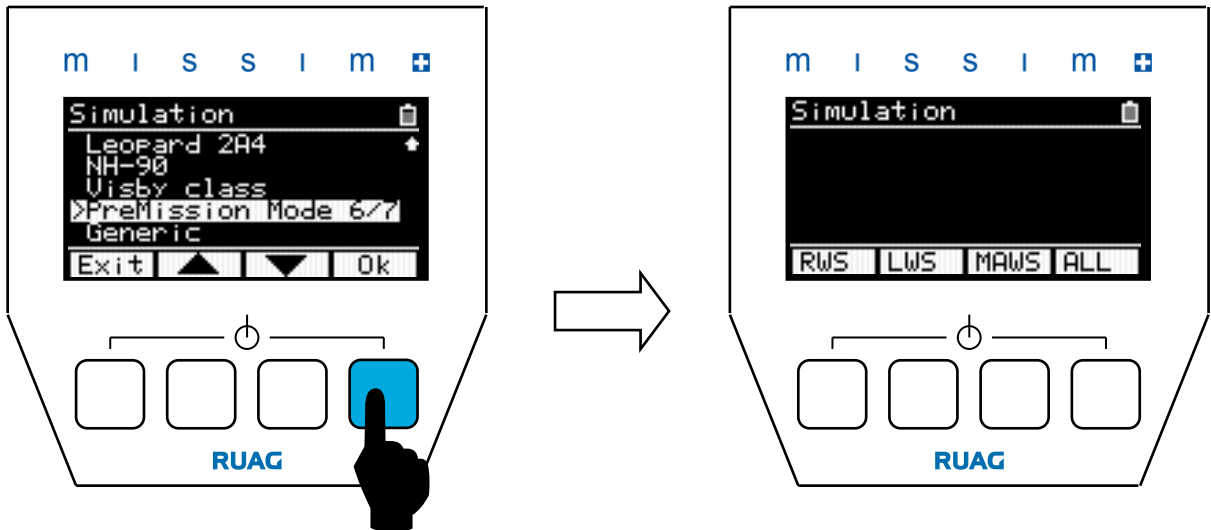


**NOTE:** If the missim Simulator is locked after a user data erase, the change to Expert Mode functionality can not be performed until a new TLS is loaded.

### 6.1.4. Re-entry into PreMission Mode

The PreMission Mode can be re-entered in two ways:

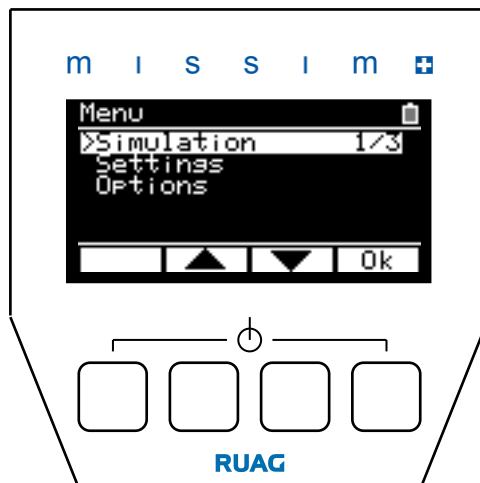
- By selecting **Simulation** → **PreMission Mode\***
- Switching missim 'off' and 'on' again (if PreMission mode is 'Enabled' in the Settings)\*



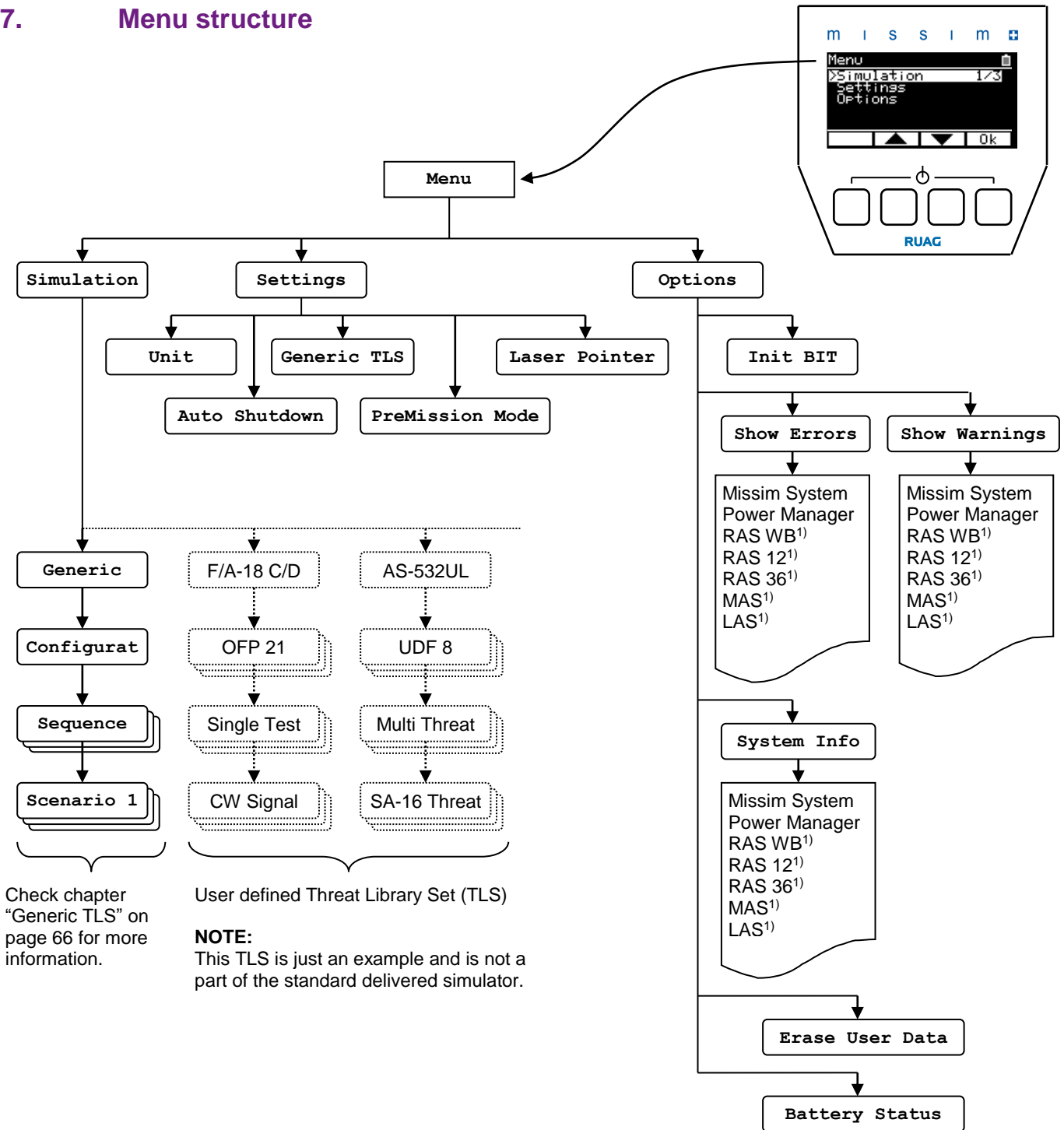
**\*NOTE:** Only available when a PreMission Mode is defined in the installed TLS.

### 6.2. Expert Mode

The Expert Mode gives access to all emitters, defined in the installed TLS, allowing the flexibility to test a variety of EW systems. This mode also gives the possibility to change the settings on the missim simulator.



## 7. Menu structure



1) Depending on the actual missim configuration (please refer to chapter 4 for details) not all simulator modules (RAS WB, RAS 12, RAS 36, MAS or LAS) will appear in the menu structure.

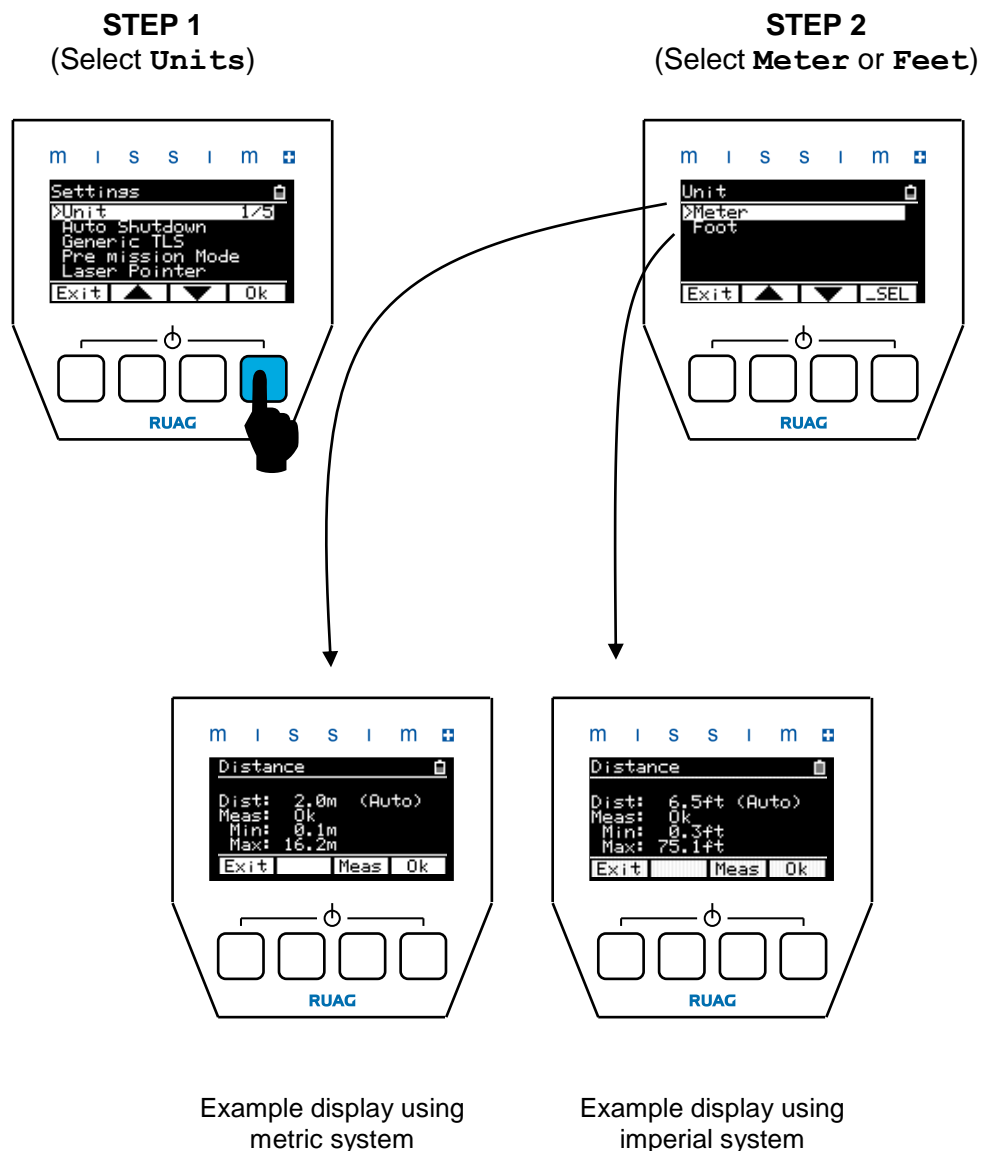


## 7.1. Settings

### 7.1.1. Unit (Expert Mode only)

This function is used to change the displayed values between metric and imperial units.

Using the 'up' and 'down' buttons highlight the desired unit (selection bar) then press the '\_SEL' button to select.



**NOTE:** The unit setting can be locked in the PC software. In this case, the user can not change the unit setting at the missim.

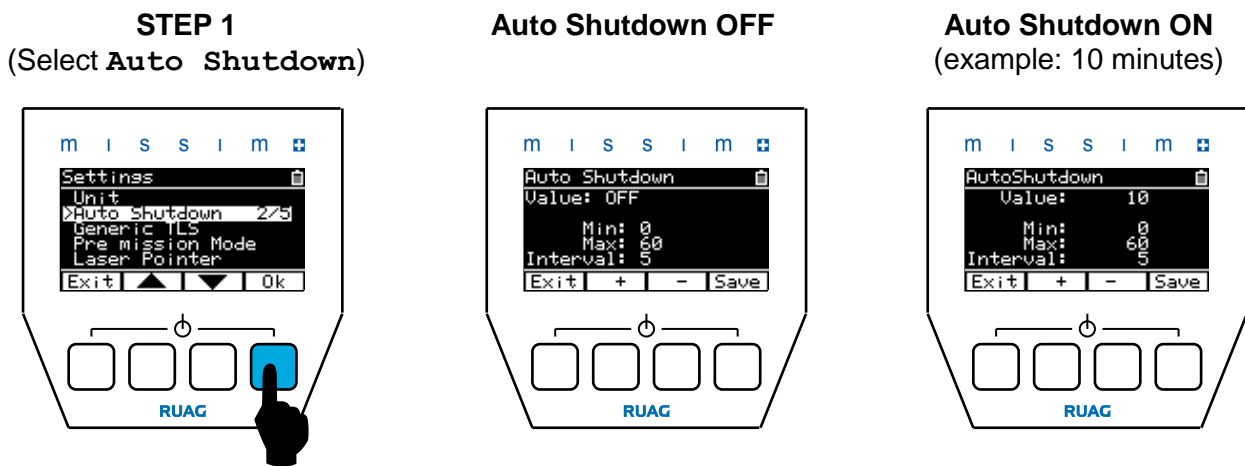
### 7.1.2. Auto Shutdown (Expert Mode only)

This function is used to shut down the missim simulator automatically when missim is inactive for a defined time and is running on battery power. The auto shutdown function is completely disabled if missim is connected to the charger.

The user can define an auto shut down time between 5 and 60 minutes in 5 minutes increments.

The auto shutdown time is set by pressing the '+' or '-' button. To disable the auto shutdown, set a time below 5 minutes using the '-' button until the value **OFF** appears.

Once finished confirm set time by pressing the 'Save' button.



### 7.1.3. Auto Shutdown (PreMission Mode only)

In the PreMission mode the user can not change the settings. However, the auto shutdown can be configured by changing to the Expert Mode and defining the Auto Shutdown time here. See page 22 for additional information.



**NOTE:** After loading a TLS with PreMission Mode, the auto shutdown is set to a standard value of 15 minutes.



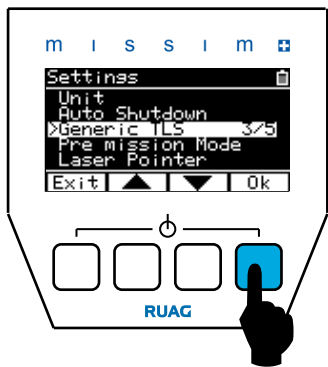
**NOTE:** The auto shutdown time setting can be locked in the PC software. In this case, the user can not change the defined auto shutdown time at the missim.

### 7.1.4. Generic TLS (Expert Mode only)

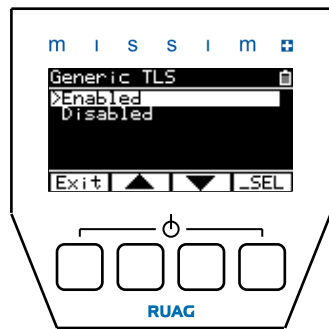
This function is used to enable or disable the Generic TLS (Threat Library Set). If the function is enabled, the Generic TLS is listed in the **Simulation** menu.

Using the 'up' and 'down' buttons highlight the desired option then press the '**\_SEL**' button to select.

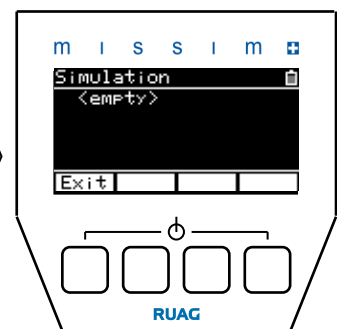
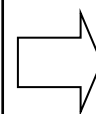
**STEP 1**  
(Select **Generic TLS**)



**Select Setting**



If Generic TLS is disabled and no user TLS is loaded, the user can not start any simulation.



**NOTE:** The Generic TLS is available in the Export Mode only.



**NOTE:** Disabling the Generic TLS does not delete it from the system but instead only hides it in the simulations menu.



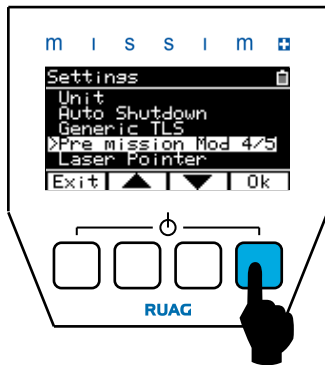
**NOTE:** The visibility definition for the Generic TLS can be locked in the PC software. In this case, the user can not change the Generic TLS visibility setting at the missim.

**7.1.5. PreMission Mode (Expert Mode only)**

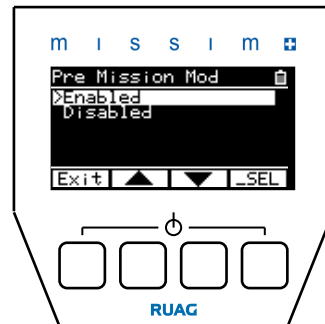
This function is used to enable or disable the PreMission Mode. If the function is enabled, the simulator will power up in the PreMission Mode, if a PreMission Mode enabled TLS is installed on this missim.

Using the ‘up’ and ‘down’ buttons highlight the desired option then press the ‘\_SEL’ button to select.

**STEP 1**  
(Select **PreMission Mode**)



**Select Setting**



**NOTE:** The PreMission Mode definition can be locked in the PC software. In this case, the user is unable to change the PreMission Mode setting at the missim. This means that the missim always starts up to PreMission Mode. The user is still able to change to Expert Mode later on.

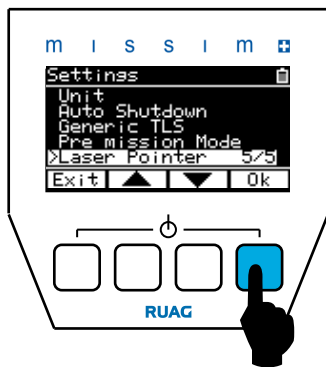
**7.1.6. Laser Pointer (Expert Mode only)**

This function is used to enable or disable the Laser Pointer. If the function is enabled, missim will switch on the Laser Pointer whilst emitting.

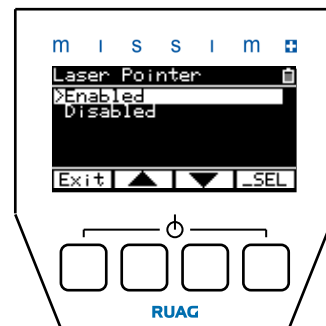
The same laser source is used for the distance measurement, however the distance measurement function will be unaffected by this setting and will use the laser as normal during the measurement process.

Using the 'up' and 'down' buttons highlight the desired option then press the '\_SEL' button to select.

**STEP 1**  
(Select **Laser Pointer**)



**Select Setting**



**CAUTION:** The missim simulator uses a red class 2 LASER for the distance measurement. Do not target any humans or animals. Respect all safety instruction on page 8.



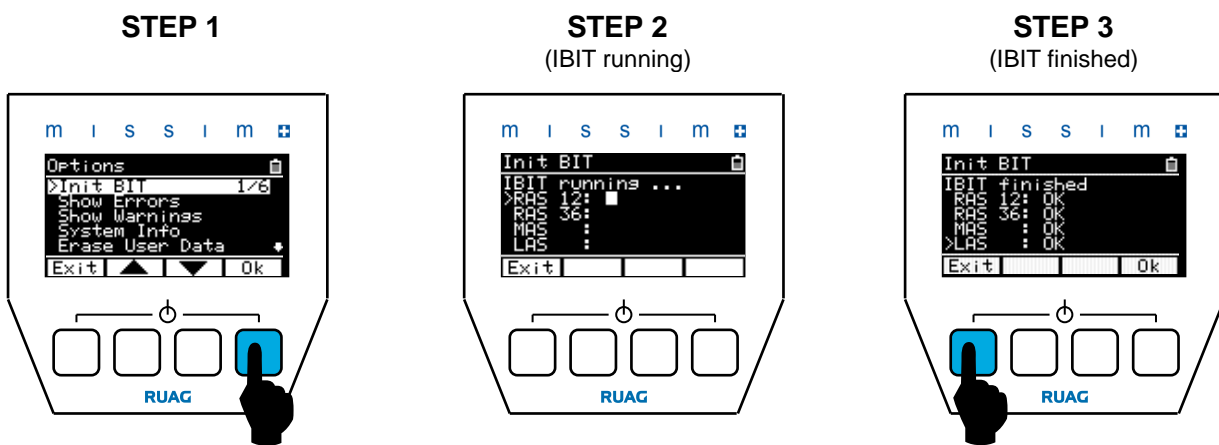
**NOTE:** The laser pointer usage definition can be locked in the PC software. In this case, the user is unable to change the laser pointer setting at the missim.

## 7.2. Options

### 7.2.1. Init BIT (Expert Mode only)

This function activates the Initiated Built In Test (IBIT) which will test the simulator thoroughly. The IBIT can take several seconds to complete and will clear all warnings and errors at the start of the process.

During the IBIT the error indicator 'E' and/or warning '!' indicator will appear if any problems are detected.



After IBIT has completed, press 'OK' to get the BIT status of the simulator or press 'Exit' to go back to the Option Menu. Read page 48 for more information on the BIT.



**CAUTION:** During IBIT the simulator will radiate high power signals. Make sure that no receiver is affected unintentionally. Follow all safety instructions for normal simulator operation.



**NOTE:** The simulator also runs an internal Continuous Built In Test (CBIT). The CBIT monitors the simulator continuously and detects critical system malfunctions without starting the IBIT.

Therefore the error indicator 'E' or the warning indicator '!' can appear without initiating IBIT. To get more information on reported errors and warnings, start the IBIT to report the full system health status.

During CBIT the missim emitters will not emit.

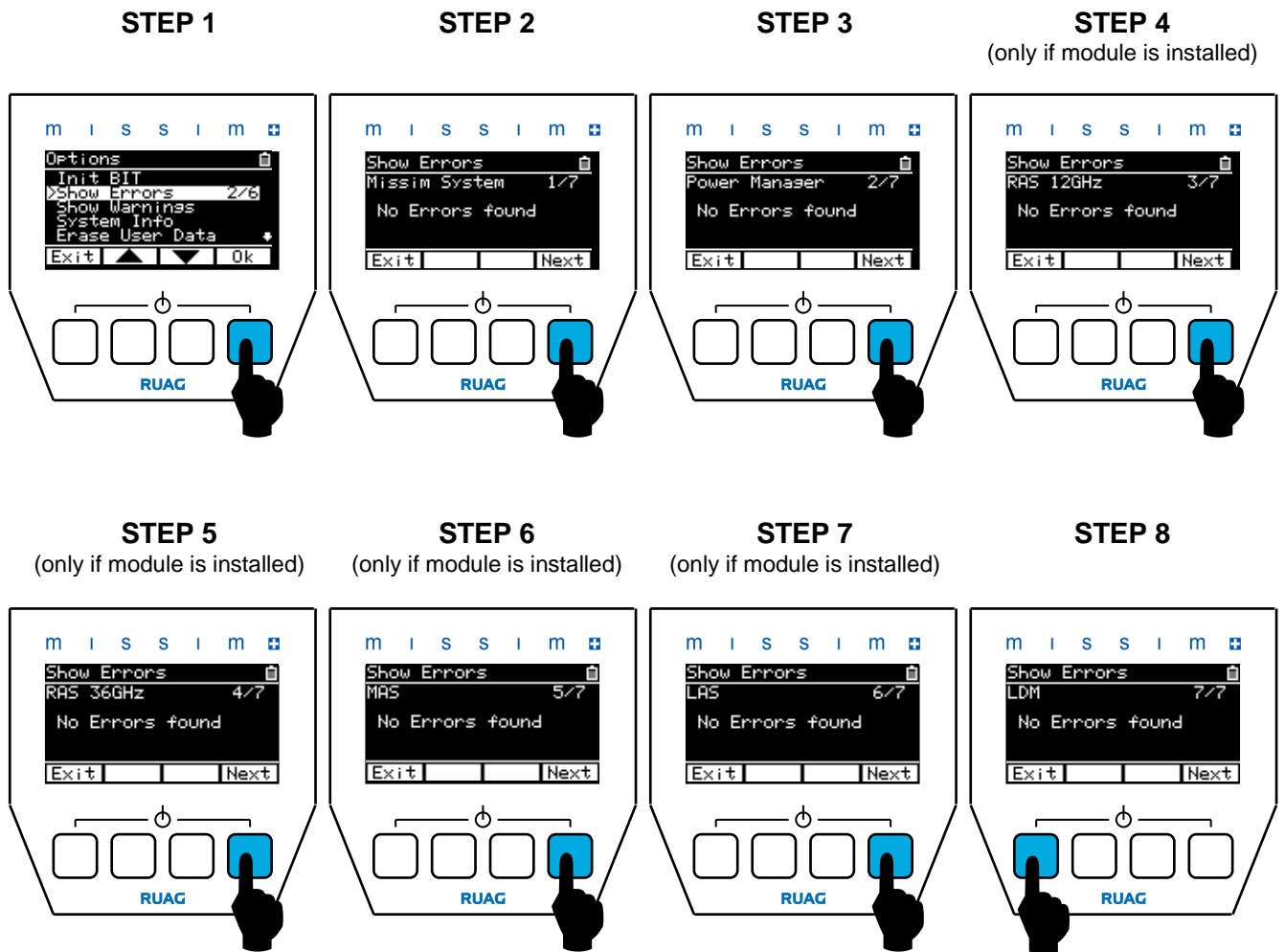


**NOTE:** The above images show the RML configuration. Other missim configurations may have more/less items.

### 7.2.2. Show Errors / Show Warnings (Expert Mode only)

This function shows the system health status, any errors or warnings encountered during an IBIT are displayed on these pages. Please report displayed error messages to RUAG Aviation in order to get troubleshooting support.

Press the 'Next' button for moving to the next BIT page.  
 Press the 'Exit' button to go back to the Option menu.



**NOTE:** The procedure is identical for the 'Show Warnings' function.

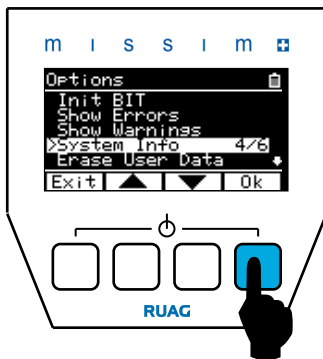


**NOTE:** The above images show the RML configuration. Other configurations may have more, less or different pages.

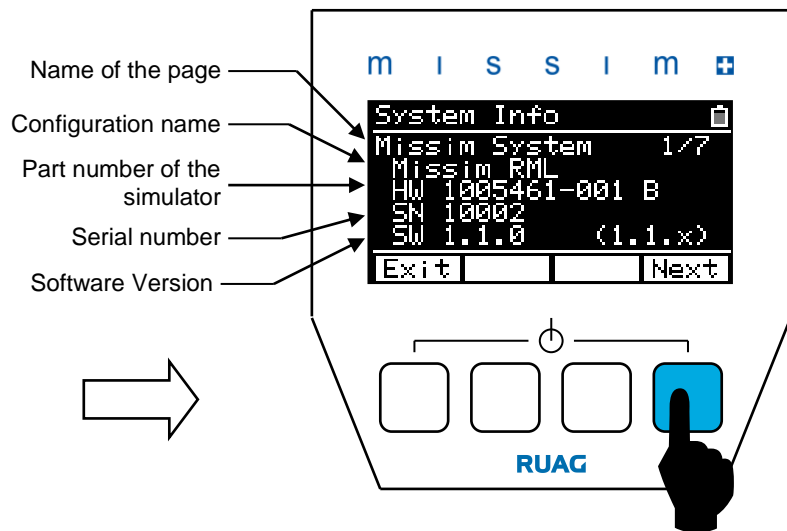
### 7.2.3. System Info (Expert Mode only)

This function reports missim internal system information, for example serial numbers, software versions, hardware information etc.

#### System Info

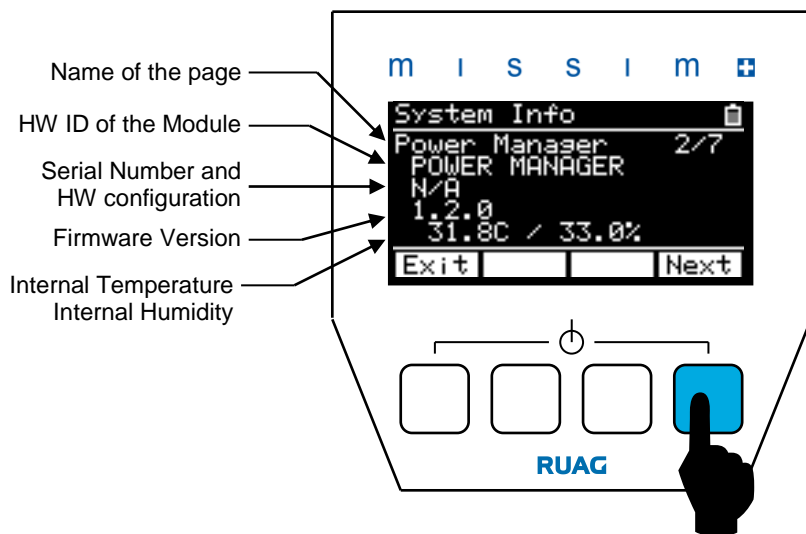


#### Page 1: Missim System



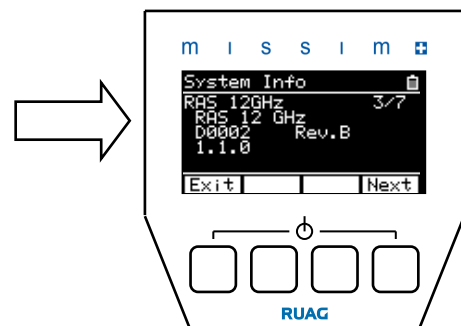
Press the 'Next' button for moving to the next information page or press 'Exit' to leave the System Info pages.

#### Page 2: Power Manager



#### Page X

(depends on your configuration)





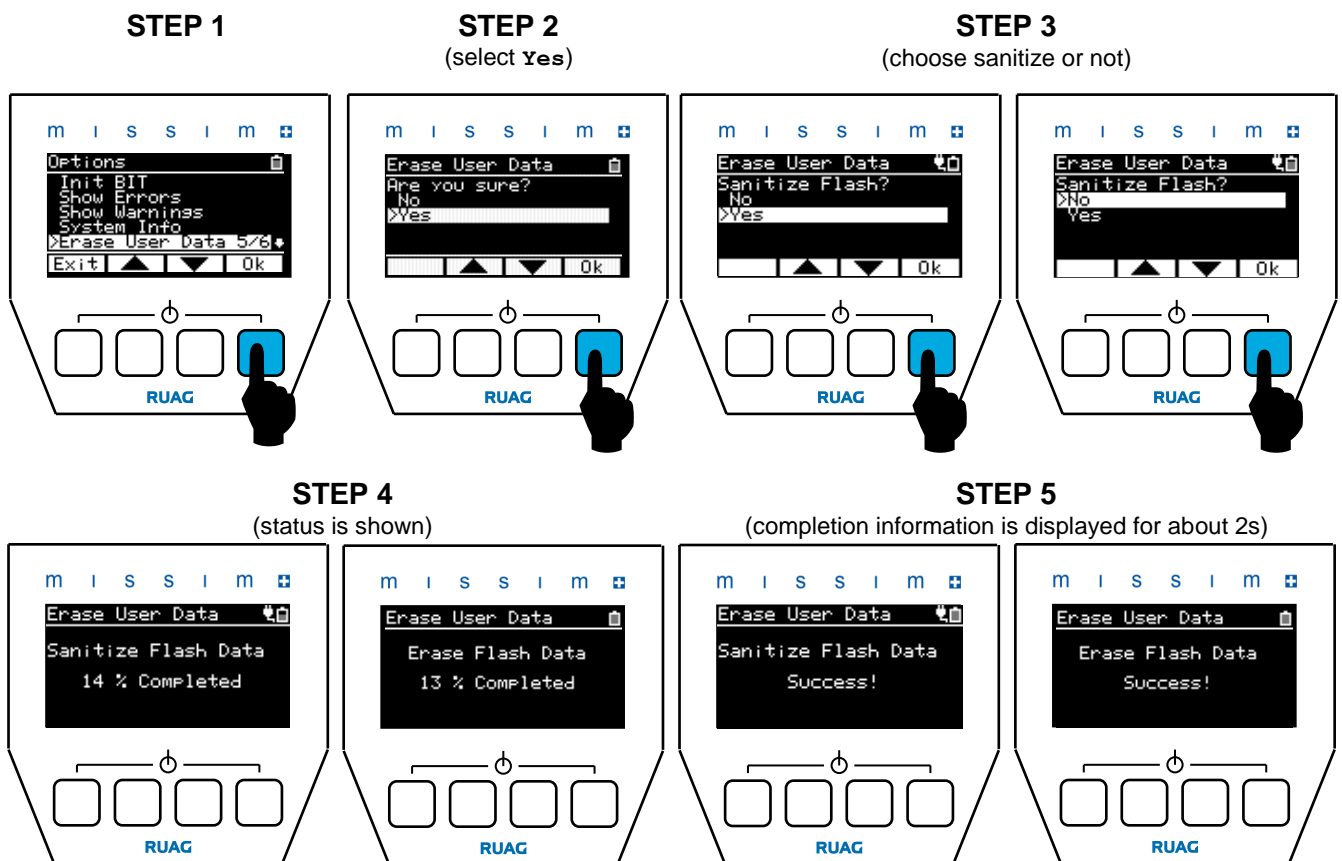
### 7.2.4. Erase User Data in Expert Mode

The Erase User Data function will erase the user data (TLS).

The erase routine will erase the whole internal Flash memory. If the user would like to sanitize the memory, the whole internal Flash memory will be sanitized according to DSS ISL 2007-01 “DSS Clearing and Sanitization Matrix”.

After the selection of the ‘Erase User Data’ function, the missim will ask whether you really want to erase the user data. Select ‘**YES**’ and press the ‘**Ok**’ button to go to the next step or ‘**NO**’ followed by ‘**Ok**’ to return back to the Option menu.

After confirming the erase procedure, missim will ask if you would like to sanitize the Flash memory. Select ‘**YES**’ and press the ‘**Ok**’ button for the time consuming but safer sanitizing process or ‘**NO**’ followed by ‘**Ok**’ to start the normal erase process.



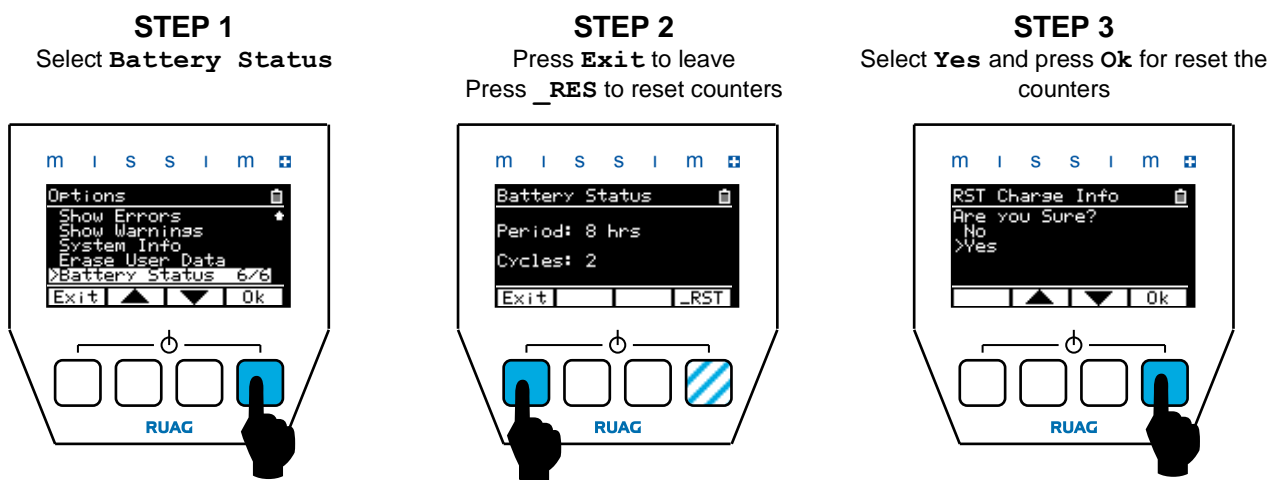
**NOTE:** The operational system and the pre-programmed generic TLS will not be affected when you erase the user data.

### 7.2.5. Battery Status (Expert Mode only)

This function shows the battery charge statistic. The user can inquire the battery charging time and the battery charging cycles. This information helps to identify a battery that is nearing the end of its useful life and should be replaced if a preventive maintenance program has been adopted.

If the battery has more than 500 charge cycles the warning indicator ‘!’ appears and the warning message ‘**Replace Battery**’ will be shown on the ‘**Show Warnings**’ page.

Use the ‘**\_RES**’ button to reset both values. This will also remove the warning message.



**NOTE:** Only reset the counters after replacing the battery as all charging information will be deleted.

### 7.3. Simulation

Before starting a simulation, make sure the correct user data (TLS) is loaded. A generic TLS is delivered with each simulator, but there is no guarantee that the programmed generic emitters will work with a particular EW system. Check chapter “Generic TLS” on page 66 for further information.

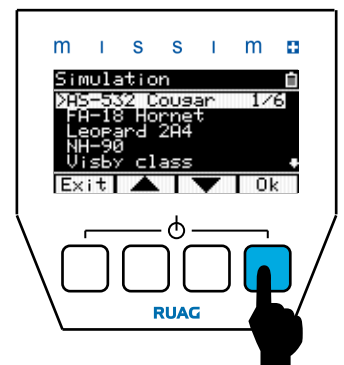
Contact your local EW officer to check the compatibility between the missim TLS and the EW system under test.



**NOTE:** The TLS is user defined. The TLS defines the platform-, configuration-, sequence-, scenario-names, all emitter details and the emitter execution within a scenario. For information about programming a TLS please contact your EW officer or refer to the missim PC SW manual.

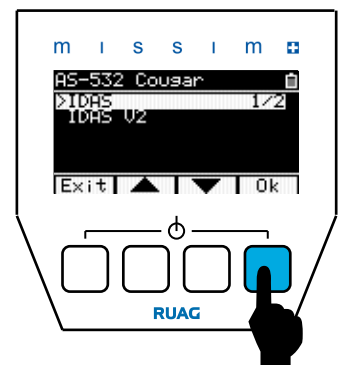
#### 7.3.1. Chose the Platform (Expert Mode only)

The platform represents an aircraft, land vehicle or ship model. Select the platform you want to test.



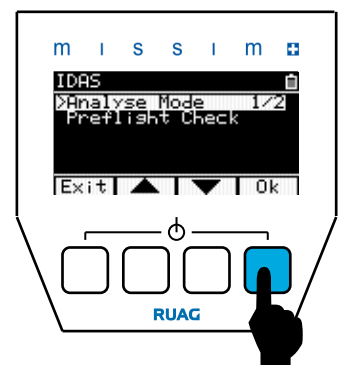
#### 7.3.2. Chose the Configuration (Expert Mode only)

The configuration represents the installation setup i.e. the installed EW system and/or the installed library version of the EW system. Select the configuration you want to test.



#### 7.3.3. Chose the Sequence (Expert Mode only)

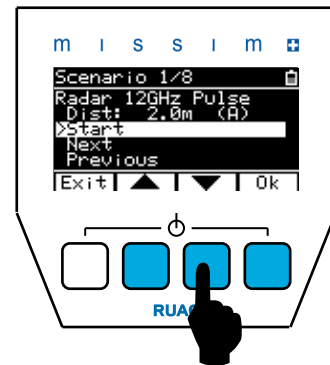
The Sequence represents the test method (e.g. fully automatic testing or single emitters). Select the sequence you want to use for the test.



### 7.3.4. Chose the Scenario (Expert Mode only)

The scenario represents the actual test setup. Each scenario may contain one or more emitters which may be scheduled or executed manually one after the other. Select the scenario you want to use to stimulate the system.

Select **'Next'** function and press **'Ok'** to jump to the next scenario. Select **'Previous'** function and press **'Ok'** to jump to the previous scenario.

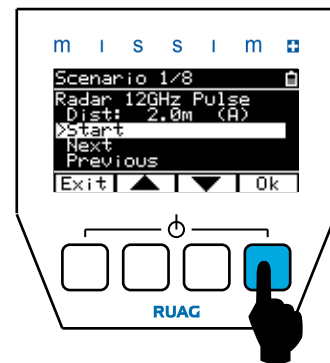


### 7.3.5. Starting a scenario (Expert Mode only)

Before starting the scenario, make sure all safety instruction (read page 8, the EW system manuals and the pilot's handbook) are taken into account.

When a distance compensation measurement is required (using the laser measure or manual input) the simulation will only start upon a valid distance (read page 39 for more information).

The simulation can be started by selecting the **'Start'** function and pressing **'Ok'**.



**CAUTION:** During simulation the simulator will radiate some high power signals. Follow all safety instructions!



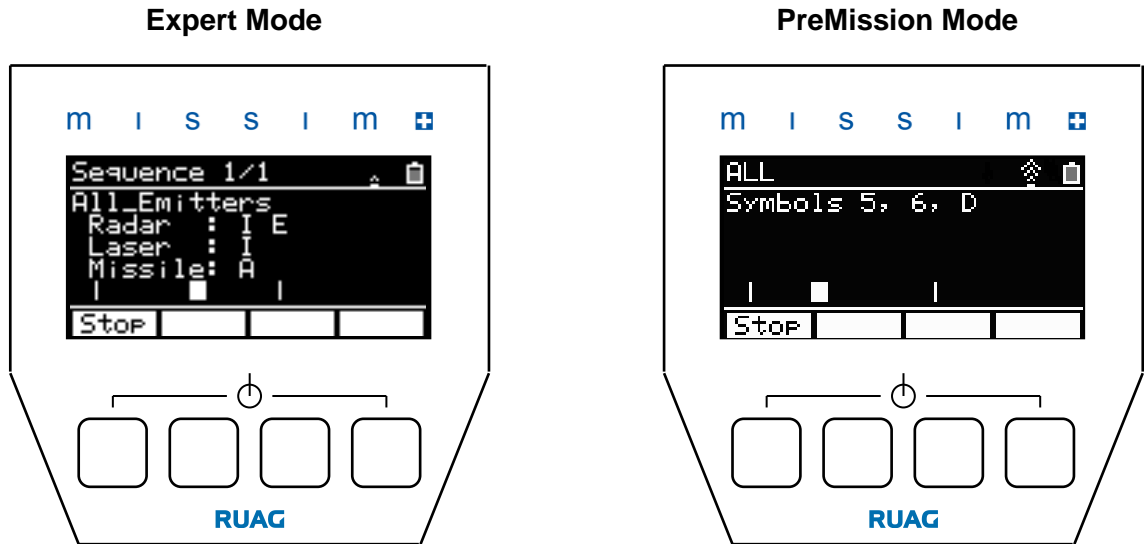
**NOTE:** The TLS may define the AUTO FORWARD and AUTO START mode for the scenarios. If the current executed scenario is AUTO FORWARD mode and the next scenario is AUTO START mode the next scenario will be selected and started automatically after the current has completed.



**NOTE:** Depending on the definitions in the user data / TLS, each scenario may have other distance requirements. In these cases, a new distance measurement may be necessary for each scenario. If the previous distance measurement value is within the minimum and maximum distance range of the new scenario, missim uses the previous distance value.

**7.3.6. Simulation status**

During simulation the missim will show its progress and status information on the screen.

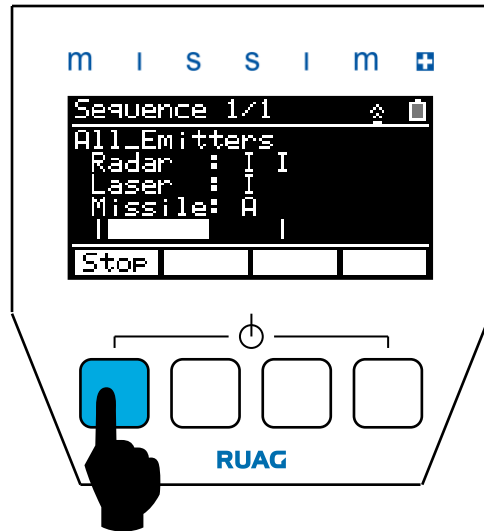


Status Information (Expert Mode only)	
<b>Radar : I (I)</b> <b>Missile: I</b> <b>Laser : I</b>	If the symbol 'I' appears, the module is in stand-by mode The radar function (RML configuration only) has two different frequencies (12 & 36GHz) modules, these are displayed with two separate 'I' symbols on the Radar status line
<b>Radar : I (I)</b> <b>Missile: I</b> <b>Laser : A</b>	If the symbol 'A' appears, the module is active for defined period.
<b>Radar : I (I)</b> <b>Missile: I</b> <b>Laser : E</b>	If the symbol 'E' appears, the module is active in endless mode (will run until scenario stops or is stopped)

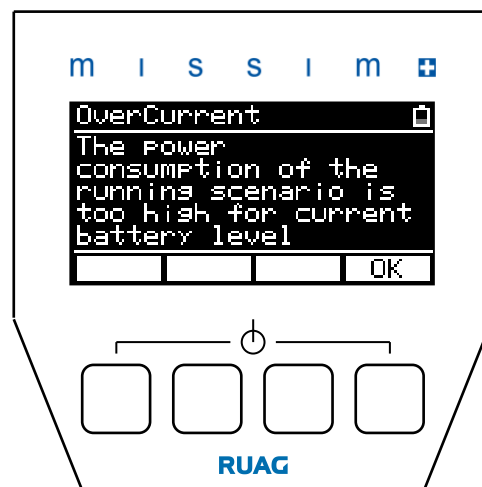
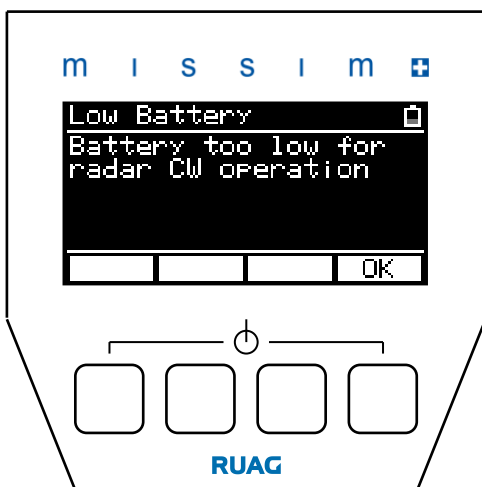
Progress bar	
[ ██████████ ]	Scenario runs until the progress bar is full and will stop automatically. Using the 'Stop' button will end the scenario earlier if required.
[ █ ]	Scenario running in endless mode. Using the 'Stop' button will end the scenario if required.

### 7.3.7. Stop Simulation

Depending on the TLS, the simulation will stop automatically. However, if an endless scenario is running, pushing the 'Stop' button will terminate the scenario. The 'Stop' button can also be used during the execution of a scheduled scenario.



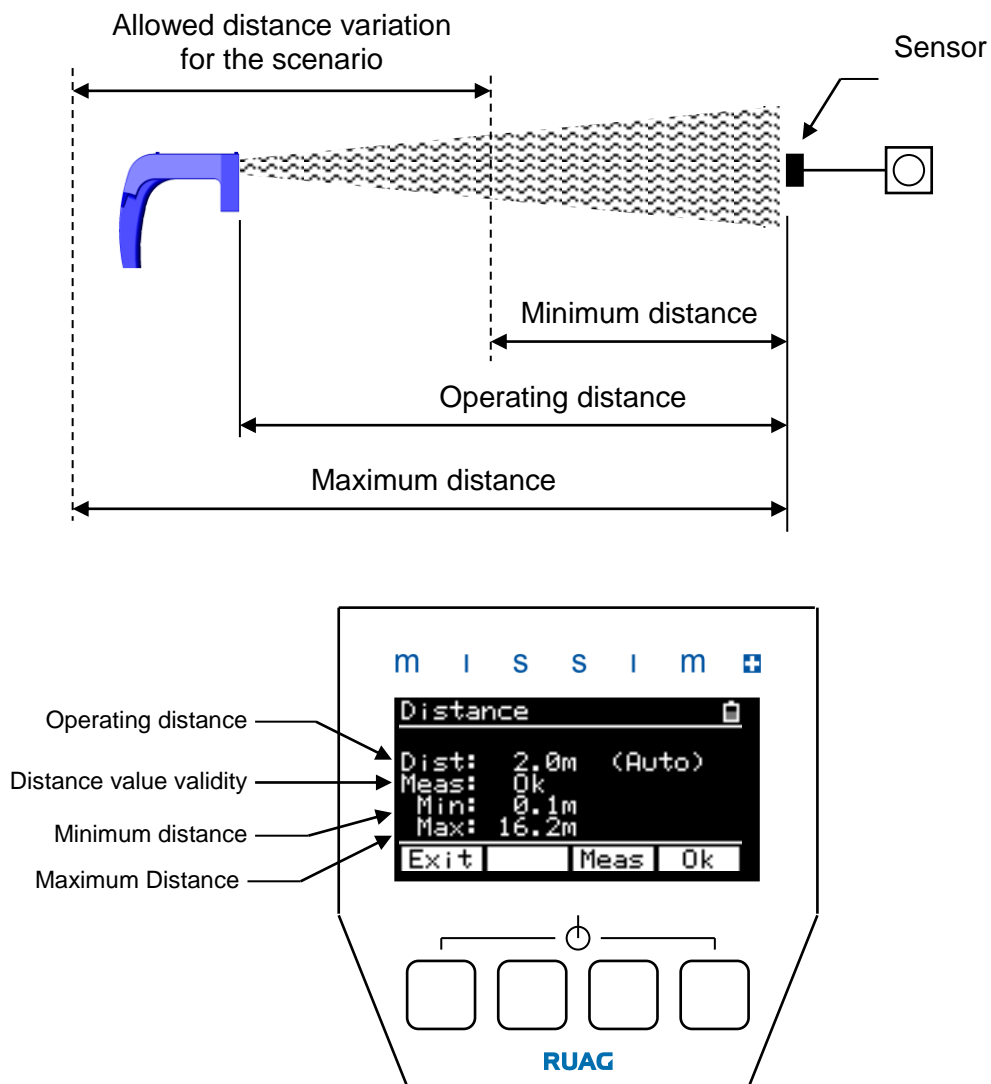
A scenario can also be terminated by two missim protection functions. Those functions prevent an uncontrolled missim shutdown in case the battery level is not sufficient for the scenario currently being executed. If one of the protection functions has been triggered, one of the following two screen messages is shown and the scenario is stopped. After such an event, the missim can still be used for less power consuming scenarios. The scenario causing the activation of the protection function can be executed again, after the missim battery has been charged."



### 7.3.8. Distance compensation

Missim incorporates the intelligence of being able to deliver the specified signal strength (power density) at the EW sensor independently of the distance between missim simulator and the sensors.

To achieve this missim uses distance compensation to automatically adjust the radiated power to compensate for different distances to the sensor. This function makes sure the signal strength (power density) at the sensor is always at the level defined in the TLS.



The signal strength for each scenario/emitter is defined in the TLS. Depending on the defined power density (signal strength), missim calculates the minimum and maximum operational distances. Operation outside this range may not be possible because the radiated power may be too low or too high for a proper simulation.

The missim simulator supports three different distance compensation modes: **AUTO**, **Manual** and **Fix**. These compensation modes are defined in the TLS and can not be changed on the missim.

### 7.3.9. Distance compensation modes

#### Auto (A)

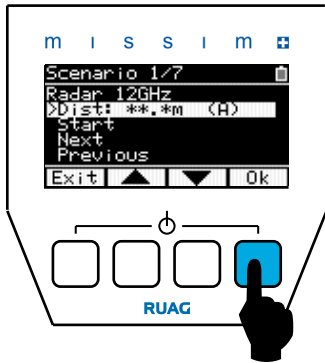
The distance between the simulator and the sensor is measured by the laser distance measurement (LDM) unit. Only a valid measurement will allow starting the simulation.

#### Manual (M)

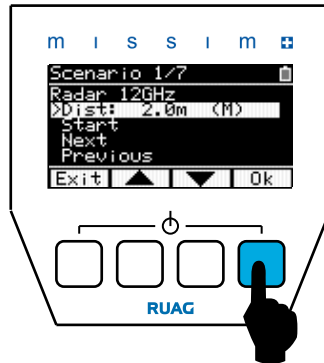
The user defines the distance between the simulator and the sensor by using the + and - buttons.

#### Fix (F)

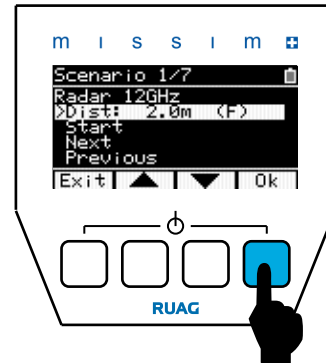
The TLS defines a fix distance between the missim and the sensor. The user can not change the value.



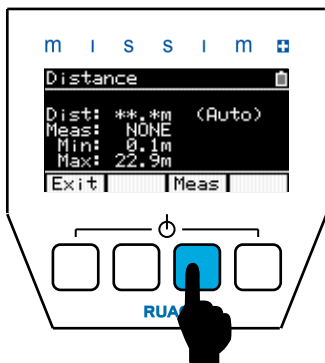
Distance measurement is necessary



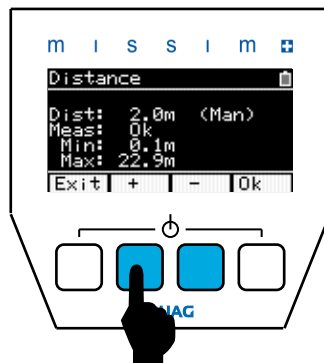
Distance is adjusted by the user



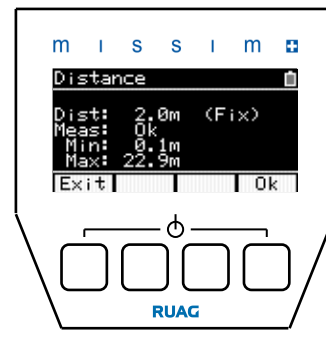
Distance is fixed. Additional information is available on an additional page.



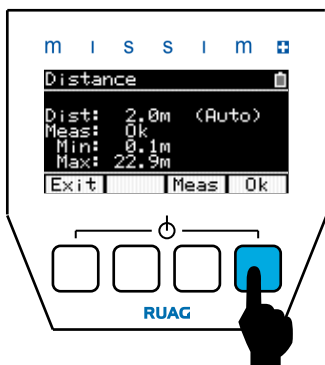
Initiate a measurement



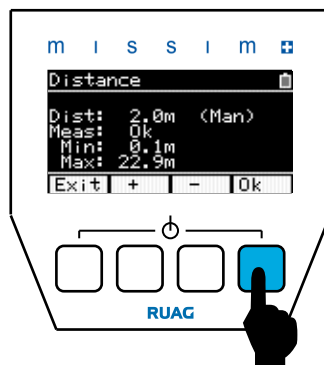
Adjust the desired distance



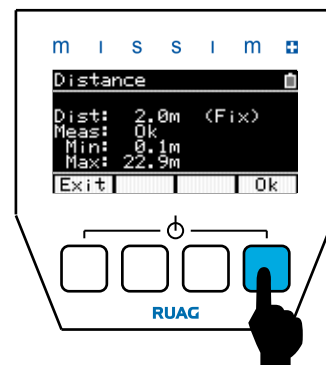
No changes are possible



Accept the measured distance



Accept the adjusted distance



Acknowledge the fix distance



**NOTE:** Pressing 'Exit' will discard any measurements changes that have been made.



### 7.3.10. Distance measurement

The distance measurement is only available when the Auto Distance compensation mode is defined in the TLS. To make a valid distance measurement, consider the following:

1. Use the sight on top of the simulator to focus on the area of interest \*.
2. The surface area of interest must reflect a minimum of light to get a valid distance measurement.
3. Keep the simulator settled in your hand. Device jittering may inhibit a distance measurement.



**\*NOTE:** The surface area, to measure the distance to, can also be selected by observing the location of the red laser light used for the actual distance measurement.



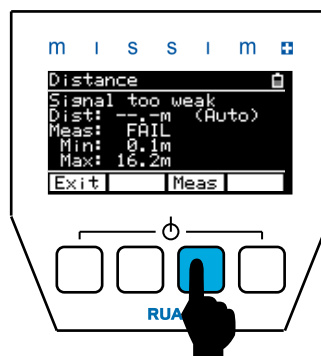
**CAUTION:** The missim simulator use a red class 2 LASER for the distance measurement. Do not target any humans or animals. Respect all safety instruction on page 8.



**NOTE:** Be aware that the distance measurement LASER can be reported as a threat by a laser warning system.



**NOTE:** An invalid distance measurement will be reported by the simulator with a **Signal too weak** message.



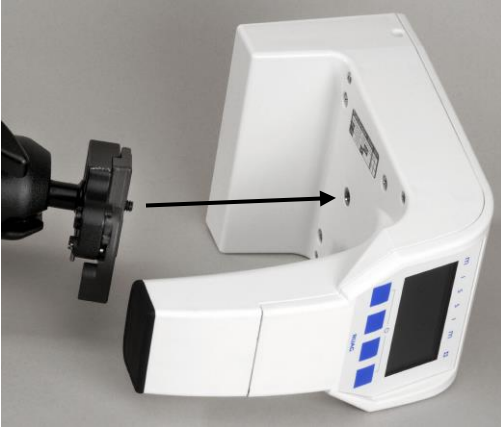
Repeat the distance measurement by pressing **'Meas'** or leave the Distance mode by pressing **'Exit'**.



**NOTE:** For long distances or if no valid distance measurement is possible, use a tripod to prevent any jittering. If problems continue change the TLS option from Measured Mode to Manual or Fix mode.

## 8. Tripod




The simulator has a tripod fitting with a standard 1/4"-20 UNC thread mounting. To attach the simulator to a tripod simply screw the tripod's screw into the simulator's mount.



## 9. Battery

### 9.1. Replacing the battery

The simulator contains a rechargeable battery module. Normally it is not necessary to remove the battery module but if the battery reaches the end of its life the user can replace the battery module as follows:

Step	Instruction	Illustration
1	Make sure that the simulator is turned off and that no power cord is connected.	
2	Remove the black handhold cover	
3	Release the securing screw as shown	
4	Remove the battery module from handhold   <b>CAUTION:</b> Make sure no other metallic parts to make contact between the terminals or other parts of the module.	
5	Slide the new battery module into the handhold	
6	Tighten the securing screw by hand and/or with a screwdriver	
7	If necessary, connect the power supply to the new battery module in order to charge the battery.	



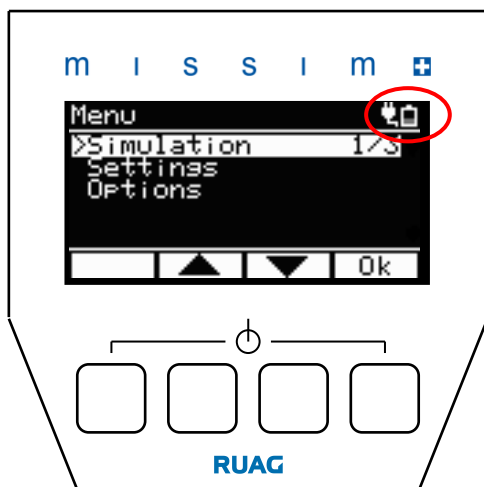
**CAUTION:** If the handhold cover is removed, the simulator is not splash waterproof anymore. Always use the handhold cover in wet environments.

## 9.2. Charging the battery

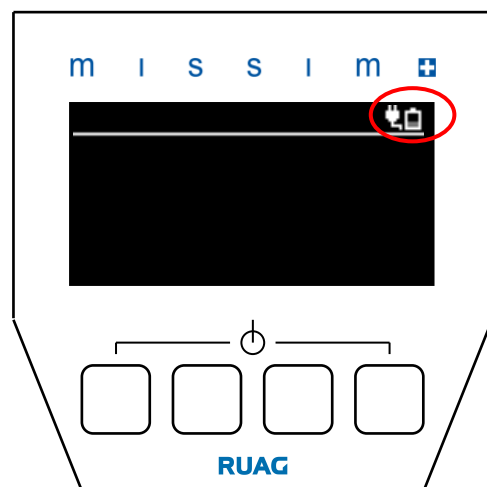
1. Connect the charger to a mains socket, the green LED at the charger will illuminate.
2. Connect the charger plug to the simulator; the display battery indicator bar will start scrolling. If charging fails, contact RUAG Aviation.



**Battery charging when missim is switched ON**



**Battery charging when missim is switched OFF**



3. When the battery is fully charged, the battery indicator bar stops scrolling. Disconnect the charger from the simulator and the mains socket.



**CAUTION:** Battery charging is only allowed indoors in dry environments.



**CAUTION:** In case the available mains plug does not match with the mains socket at the particular location, use a certified adapter or obtain a suitable power cord from RUAG Aviation.

### 9.3. Battery information

The missim device is powered by a rechargeable battery. The full performance of a new battery is only achieved after two or three complete charge and discharge cycles. The battery can be charged and discharged many hundreds of times but it will eventually wear out.

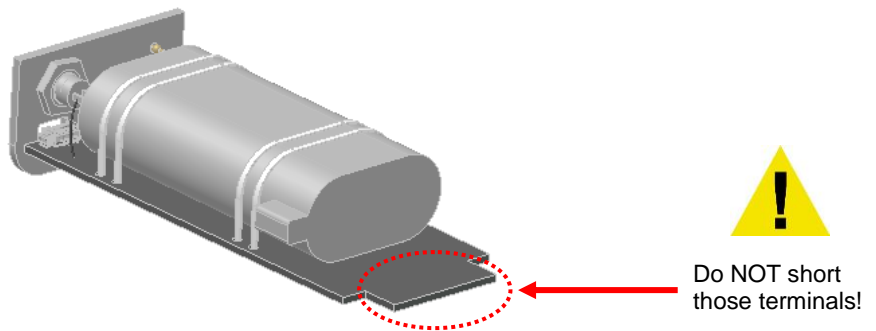
When the simulation and standby times are noticeably shorter than normal, replace the battery. Use only RUAG Aviation approved batteries and recharge your battery only with RUAG Aviation approved chargers.



**CAUTION:** Unplug the charger from the mains power and the missim device when not in use. Do not leave a fully charged battery connected to a charger for a long time.

Use the battery only for its intended purpose. Never use any charger or battery that is damaged. The battery module should never be kept in a wet environment.

Do not short-circuit the battery module. Accidental short-circuiting can occur when a metallic object such as a coin, clip, or pen causes direct connection between the positive (+) and negative (-) terminals of the battery module. This is possible, for example, when carrying a spare battery module in a pocket or purse. Short-circuiting the terminals will damage the battery module and/or the connecting object potentially leading to fire or injury.



Leaving the battery module in extreme hot or cold places, such as in a closed vehicle in summer or winter will reduce the capacity and lifetime of the battery module. Battery performance is particularly limited in temperatures below freezing.

Do not dispose of batteries in a fire, as they may explode. Batteries may also explode if damaged. Dispose of batteries according to local regulations. Please recycle when possible and do not dispose as household waste.



### 9.3.1. Battery spares calculation

For the dimensioning of spare part pools and preventive replacement programs the following guideline can be used:

The guideline assumes typical flight line usage being characterized by 40 typical go/no-go tests covering 3 sensors each and daily recharging of the missim battery. In this case the battery will be usable for approximately 15 to 18 months.

In the case of less or more intensive usage the battery lifetime will more or less be determined by the number of charging cycles (at least 500 cycles). In cases of infrequent usage the battery should be exchanged after maximum 5 years.

In the case of batteries in a spare part pool or very infrequent usage it is strongly recommend recharging <sup>1)</sup> the battery every 12 months in order to avoid deep discharge which results in shortened lifetime. The batteries should not be stored in the spare part pool for longer than 3 - 4 years as the battery capacity will also decrease when not in use.

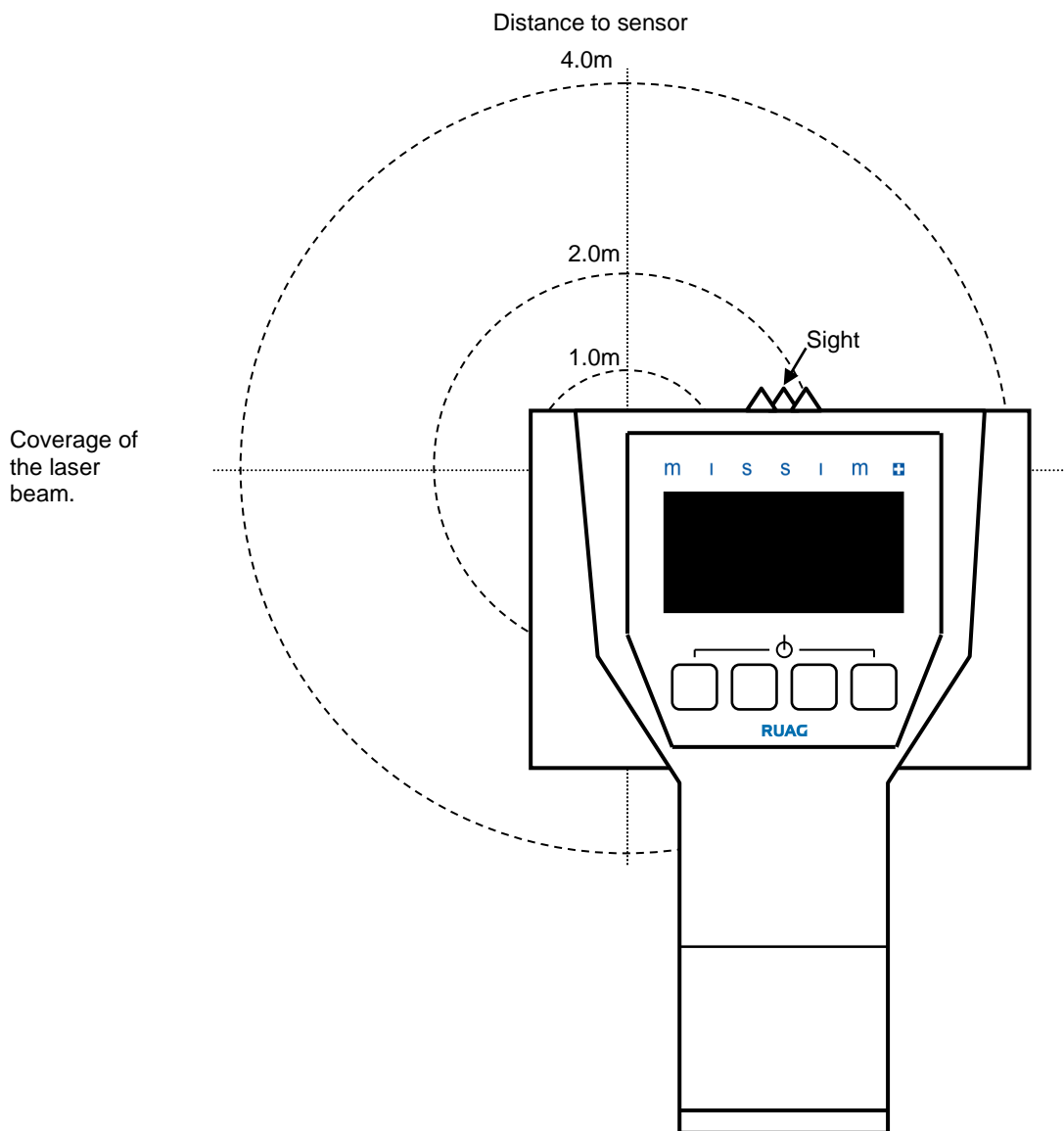
Recommend storage temperature for the battery is +15° to +20° C.

*1) Recommended charging time is between 1 to 2 hours, the battery will show the lowest capacity decreases if stored at approximately 60 % of its capacity.*

## 10. Radiation

### 10.1. Parallax Error

The sight and the radiation outputs have some parallax error. This physical law is noticeable at short operation distances. All modules, with the exception of the laser module, have a wide radiation beam which reduces the impact of the parallax error. When using the laser emitters at a short distance please be aware that you should aim with missim to a point being to the right side of the sensor. Please refer to the figure below for more details.



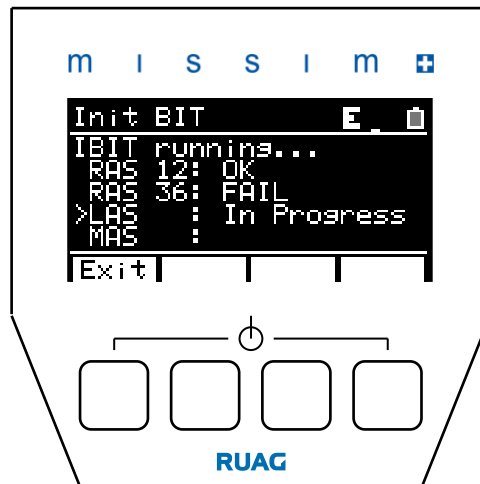
## 11. BIT Failure Codes

The missim simulators runs a Continuous Built In Test (CBIT) and the operator can start an extended Initiated Build In Test (IBIT). If any BIT fails, the operator gets a message.

### 11.1. Codes during Init BIT

The CBIT runs permanently and monitors several parameters like power supply, temperature and internal communications. If a problem occurs, the **E** symbol will be displayed on the screen.

Code	Description	Action
<b>OK</b>	IBIT on the module was successfully	
<b>FAIL</b>	A problem was detect on the module	After completing the IBIT on all modules, the errors are listed according to the <b>Show Errors</b> function (see page 31).





## 11.2. Error messages

### 11.2.1. Error Page: System 1/7

Message	Description	Action
No errors detected	The core software works fine.	
Temp too high	The internal temperature is too high.	Shut down the simulator and cool down
Temp too low	The internal temperature is too low.	Shut down the simulator and warm up
Humidity too high	The internal humidity is too high.	Shut down the simulator. Send the unit back for maintenance
Humidity too low	The internal humidity is too low. Under these conditions, the specified accuracy is not guaranteed.	None

### 11.2.2. Error Page: Power Manager 2/7

Message	Description	Action
No errors detected	Power Manager works fine	
+1.2V fault	The +1.2V power supply is out of specification.	Send the unit back to maintenance.
+2.5V fault	The +2.5V power supply is out of specification.	Send the unit back to maintenance.
+3.3V fault	The +3.3V power supply is out of specification.	Send the unit back to maintenance.
+5.0V fault	The +5.0V power supply is out of specification.	Send the unit back to maintenance.
+12V fault	The +12V power supply is out of specification.	Send the unit back to maintenance.
-5.0V fault	The -5.0V power supply is out of specification.	Send the unit back to maintenance.
Battery fault	The battery is faulty.	Replace the battery package. See page 43 for the instruction.
Charger fault	The battery can not be charged.	Replace the charger. If not successfully replace the battery package. See page 43 for the instruction.

**11.2.3. General failure messages valid for all modules**

Message	Description	Action
<b>I2C Bus Failure</b>	The communication on the I <sup>2</sup> C bus was faulty.	Repeat the IBIT. If the failure occurs again, send the unit back to maintenance.
<b>Reset</b>	An unwanted reset was detected on the module.	Repeat the IBIT. If the failure occurs again, send the unit back to maintenance.
<b>EEPROM Conf Page</b>	The configuration page on the EEPROM is faulty.	Contact RUAG Aviation for further instruction.
<b>EEPROM Cal Page</b>	The calibration page on the EEPROM is faulty.	Send the unit back to maintenance.
<b>EEPROM Head Page</b>	The head page on the EEPROM is faulty.	Contact the service provider for further instruction.
<b>EEPROM failure</b>	Failed to access EEPROM.	Repeat the IBIT. If the failure occurs again, send the unit back to maintenance.
<b>DC/DC fault</b>	The DC/DC converter is faulty	Send the unit back to maintenance.

**11.2.4. General failure messages valid for RAS / MAS /LAS**

Message	Description	Action
<b>IBit Comms Error</b>	IBIT communication error.	Restart missim and repeat IBIT. If the failure occurs again, send the unit back to maintenance.
<b>IBit Timeout</b>	IBIT timed out	Restart missim and repeat IBIT. If the failure occurs again, send the unit back to maintenance.

**11.2.5. Error Page: RAS 12 or RAS WB 3/7 and RAS 36 4/7**

Message	Description	Action
<b>RF Power fault</b>	The RF output power is to low.	Send the unit back to maintenance.
<b>Max. RF Power Test</b>	Max. RF Power test failed.	Repeat the IBIT. If the failure occurs again, send the unit back to maintenance.
<b>DC 1 Error</b>	DC/DC converter 1 failed.	Send the unit back to maintenance.
<b>DC 2 Error</b>	DC/DC converter 2 failed.	Send the unit back to maintenance.
<b>DC 3 Error</b>	DC/DC converter 3 failed.	Send the unit back to maintenance.
<b>-5.0V fault</b>	The -5.0V power supply is out of specification.	Send the unit back to maintenance.
<b>RF Attenuator</b>	The RF attenuators are not working correctly.	Send the unit back to maintenance.
<b>RF Amp overheat (Over Temperature)</b>	Amplifier overheated.	Shut down the simulator and cool down
<b>Temperature</b>	RF module overheated.	Shut down the simulator and cool down
<b>PLL1 doesn't lock</b>	The PLL1 can not lock the oscillator.	Repeat the IBIT again. If the failure occurs again, send the unit back to maintenance.
<b>Constant Wave Path</b>	Constant wave path faulty.	Send the unit back to maintenance.
<b>Pulse Path</b>	Pulse path faulty.	Send the unit back to maintenance.
<b>Band 0 Error</b>	Error in frequency band 0	Send the unit back to maintenance.
<b>Band 1 Error</b>	Error in frequency band 1	Send the unit back to maintenance.
<b>Band 2 Error</b>	Error in frequency band 2	Send the unit back to maintenance.
<b>Band 3 Error</b>	Error in frequency band 3	Send the unit back to maintenance.
<b>Band 4 Error</b>	Error in frequency band 4	Send the unit back to maintenance.
<b>Band 5 Error</b>	Error in frequency band 5	Send the unit back to maintenance.
<b>Band 6 Error</b>	Error in frequency band 6	Send the unit back to maintenance.
<b>Band 7 Error</b>	Error in frequency band 7	Send the unit back to maintenance.
<b>Band 8 Error</b>	Error in frequency band 8	Send the unit back to maintenance.
<b>Band 9 Error</b>	Error in frequency band 9	Send the unit back to maintenance.
<b>Band 10 Error</b>	Error in frequency band 10	Send the unit back to maintenance.

**11.2.6. Error Page: MAS 5/7**

Message	Description	Action
<b>UV-LED fault</b>	The UV-LED does not work correctly.	Send the unit back to maintenance.
<b>UV-LED Current fault</b>	The UV-LED current is out of specification.	Repeat the IBIT. If the failure occurs again, send the unit back to maintenance.
<b>UV-LED Voltage fault</b>	The UV-LED voltage is out of specification.	Repeat the IBIT. If the failure occurs again, send the unit back to maintenance.
<b>UV-LED Detect. fault</b>	The UV-LED detector is faulty.	Send the unit back to maintenance.
<b>-3.3V fault</b>	The -3.3V power supply is out of specification.	Send the unit back to maintenance.

**11.2.7. Error Page: LAS 6/7**

Message	Description	Action
<b>Voltage fault</b>	The fine voltage regulation is faulty.	Send the unit back to maintenance.
<b>Current fault</b>	Current sensor error.	Send the unit back to maintenance.
<b>Detector fault</b>	Laser detector error.	Send the unit back to maintenance.
<b>1550nm fault</b>	The 1550nm LASER is faulty.	Send the unit back to maintenance.
<b>905nm fault</b>	The 905nm LASER is faulty.	Send the unit back to maintenance.
<b>525nm fault</b>	The 525nm LED is faulty.	Send the unit back to maintenance.

**11.2.8. BIT Page: LDM 7/7**

Message	Description	Action
<b>No errors detected</b>	LDM works fine	
<b>No Response</b>	The LDM does not respond.	Send the unit back to maintenance.

**11.3. Warning messages**

**11.3.1. Warning Page: System 1/7**

Message	Description	Action
<b>Replace Battery</b>	Battery end of life. Charge cycle expired.	Change battery module.
<b>UV-LED end of life</b>	The UV-LED has reached the end of life and has to be replaced.	Send the unit back to maintenance.

The other warning pages (2 – 7) are not used today and are reserved for future use.

## 12. Frequently Asked Questions (FAQ)

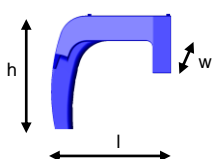
Problem	Answer
<p>The simulator does not start.</p>	<ol style="list-style-type: none"> <li>1. Make sure the battery module is installed and the battery is charged.</li> <li>2. Connect the charger. If still no display appears, press the RESET button under the handheld cover. Use a thin pin that does not break.</li> </ol> <div style="text-align: center;"> <p>RESET button</p> </div> <ol style="list-style-type: none"> <li>3. If missim still doesn't start up, contact RUAG Aviation.</li> </ol>
<p>Communication between the missim and the PC with the USB interface is not possible.</p>	<p>Make sure that the respective guidelines for establishing the USB link were followed properly. Details can be found in the Missim PC Software Manual.</p> <p>Remove the USB cable.</p> <p>Restart the missim and wait until it has started up completely.</p> <p>Reconnect the USB cable.</p> <p><b>Note:</b> Don't connect or unplug the external power during USB operation. This may disturb the USB connectivity in some cases.</p>
<p>Only generic simulations are available</p>	<p>Contact your local EW officer. The EW officer has the possibility to load missim with valid user data / TLS.</p> <p>A user defined TLS is normally not part of the delivery.</p>
<p>The simulation does not stimulate the sensor (not one time)</p>	<p>This problem can have several causes.</p> <p>Check missim's functionality. Start the IBIT (Initiated Build-In-Test) to make sure that missim works properly. If an error appears contact RUAG Aviation.</p> <p>Check the selected TLS. Selecting the wrong platform, configuration, sequence or scenario may not work with your sensor, EW system and UDF. To load the correct TLS into the simulator, contact your local EW officer.</p> <p>Check the sensor installation and configuration. Wrong sensor software or a wrong selected UDF (User Data File) may not report the missim emissions as threat.</p> <p>If the sensor still doesn't work, the sensor or the EW system may not work properly.</p>

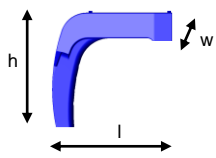
Problem	Answer
<p>The simulation does not stimulate the sensor properly.</p>	<p>Make sure the radiation of the simulator hits the sensor at the right angle. The receiving sensitivity of a sensor is normally reduced if the radiation is received not bore sight but sideward's.</p> <p>Check that the line of sight between the simulator and the sensor are not obstructed by objects. Clean the missim front area if it is dirty. Clean sensor surface if area is dirty.</p> <p><b>Note:</b> For any work at the sensor, always follow the maintenance instructions of the sensor supplier!</p> <p>If the sensor still doesn't work, the sensor or the EW system may not work properly.</p>
<p>The simulation can not be started.</p>	<p>Check whether the distance between missim and sensor is within the range of the specified minimum/maximum distances. If not, move the missim to a suitable distance.</p>
<p>The battery indicator is blinking</p>	<p>The battery indicator will blink if the battery is empty. Charge the battery otherwise missim will shut-down automatically.</p> <p>If the battery indicator continues blinking with the external power supply connected, the charging function does not work properly.</p> <p>Replace the battery module and try again.</p>
<p>Battery not charging</p>	<p>Check the power cord and the mains socket connection.</p> <p>Make sure that the green LED on the power supply/charger is illuminated.</p> <p>Press the RESET Button under the handhold.</p> <p>If charging is still no possible, contact RUAG Aviation.</p>
<p>During operation the error indicator appears.</p>	<p>If the error indicator <b>E</b> appears, start the IBIT (Initiated Built-In-Test). If the error indicator is still displayed, contact RUAG Aviation.</p> <p>If the error indicator is cleared after an IBIT but appears again later, contact RUAG Aviation.</p>
<p>Warning: <b>UV-C LED end of life</b> appears</p>	<p>This warning indicates the end of life of the missile simulator source. Send missim for exchange of the UV-C LED and recalibration. The missile simulation may still work, but the radiation energy level is not guaranteed anymore.</p>
<p>The sand glass appears sometimes for non logical reason.</p>	<p>Missim uses power saving mechanisms. Missim shuts-down unused hardware. The wake-up time may cause some delays before missim is ready again.</p>
<p>The missim simulator is locked.</p>	<p>If a PreMission Mode was defined in the downloaded TLS and a user data erase was completed, the missim will be locked.</p> <p>Download a new TLS to unlock missim.</p>

### 13. Simulator Specification

#### 13.1. Dimensions and weight

##### 13.1.1. Simulator

MISSIM SIMULATOR MODEL									
									
Configuration		WB-R	WB-RL	WB-RM	WB-RMH	WB-RML	WB-RMLH	RML	RMLH
P/N		1012263-10x	1012262-10x	1012261-10x	1012261-11x	1012260-10x	1012260-11x	1016672-10x	1016672-11x
Dimension	Length	200 mm							
	Width	140 mm							
	Height	190 mm							
Weight	Including Battery	1.1 kg	1.2 kg	1.2 kg	1.2 kg	1.3 kg	1.3 kg	1.6 kg	1.6 kg

MISSIM SIMULATOR MODEL						
						
Configuration		ML	MLH	M	MH	L
P/N		1016677-10x	1016677-11x	1016678-10x	1016678-11x	1018197-10x
Dimension	Length	200 mm				
	Width	140 mm				
	Height	190 mm				
Weight	Including Battery	1.1 kg	1.1 kg	1.0 kg	1.0 kg	1.0 kg

### 13.1.2. Transport Case



Type:		Plastic hard-case
Dimension	Length	410 mm
	Width	340 mm
	Height	210 mm
Weight	Case & Accessories only	4.5 kg
	Total	Simulator weight + 4.5 kg

### 13.2. User Interface

Topic	Parameter	Value
Display	Technology	OLED
	Resolution	128 x 64 pixels
	Size	2.7"
	Color	Monochrome, yellow
	Contrast	2000 : 1
	Brightness	100 cd/m <sup>2</sup> (typically)
Keypad	Push Buttons	4

### 13.3. Calibration

The simulator is calibrated before delivery. The calibration is valid until the DueDate, apparent on a yellow sticker on your missim unit. Please contact RUAG Aviation for a recalibration.

### 13.4. Connectors

Topic	Parameter	Value
External power <sup>1)</sup>	Voltage	12VDC +/-5%
	Current	~600 mA for battery charging only ~2'200 mA for operation
	Connector	EIAJ, 2.1mm connector
USB	Standard	1.1
	Mode	Client ("B" mode)
	Speed	Full Speed (12 Mbits/s)
	Connector	USB Mini-B
	Power	No power acquisition
RS-232	Used for maintenance at RUAG only	

**Note:**

1) Use missim charger only.



### 13.5. Battery Power

P/N: 1014573-001		
Topic	Parameter	Value
Battery specification <sup>3)</sup>	Technology	Lithium-Ion
	Voltage	7.4 V
	Capacity	2.6 Ah <sup>1)</sup>
	Charge time	Max. 8 hours
Battery operation	Stand-by	8 hours min <sup>1)</sup>
	Low radiation power	Up to 90 min <sup>1) 2)</sup>
	High radiation power	Up to 40 min <sup>1) 2)</sup>

**Note:**

- 1) Battery capacity and simulation operating time will decrease in a cold environment or with a frequently recharged / old battery.
- 2) The radiation power is determined by the TLS emitter specification and the distance to the sensor (using distance compensation)
- 3) MSDS for the used lithium-ion cells is available on request. Please contact RUAG Aviation for more details.

### 13.6. Charger

P/N: 1015615-001		
Topic	Parameter	Value
Input specification	Voltage	100 - 240 VAC 50 – 60 Hz
	Current	0.8 A
	Connector	IEC 60320 C14
Output specification	Voltage	12 VDC
	Current	2 A max
	Connector	2.1x5.5x12mm Centre +VE
Certification	Safety	UL 60950-1, CSA C22.2 No. 60950-1, EN 60950-1, IEC 60950-1, GB 4943, CE
	EMI	FCC CFR 47 PART 15, GB 9254, EN 55022, EN 61000-3
	EMS	EN 50024 (EN 61204-3), GB 17625 EN 61000-4

### 13.7. Radar Simulator (12 / 36 GHz)

This module is installed in an “R” model only! Please check your missim configuration to make sure this module is installed in your missim.

12 GHz part:

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
PLL	Center frequencies	$f_{center}$		12.000		GHz	
	Center accuracy	$f_{center}$		±2		MHz	
	Frequency steps	$\Delta f$		None		MHz	
	Carrier noise				±5	MHz	
	Spurious and harmonics			< 25 < 40		dBc	> $f \pm 200$ kHz > $f \pm 20$ MHz
	PLL settling time	t				5	ms

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
RF Power	Max. output Power	$P_{max}$		+28.0		dBm	EIRP
	Min. output Power	$P_{min}$		-22.0		dBm	EIRP
	Power Resolution			1.0		dB	
	Power Accuracy			4.0		dB	

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
Pulse Modulator	Pulse repetition interval	PRI	5.0		100'000 or CW	us	
	PRI resolution			10		ns	
	PRI accuracy			20		ns	
	Pulse width	PW	0.05		100 or CW	us	
	PW resolution			10		ns	
	PW accuracy			20		ns	
	RF ON/OFF isolation	$\Delta P$	30			dB	
	Fall and rise time	t			15	ns	
Pulse pattern memory	PRI entries			255			
	PW entries			255			

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
Antenna specification	Center frequency	$f_{center}$		12.00		GHz	
	Gain main lobe	$G_t$		13		dB	
	Polarization			Vertical			
	Beam width horizontal			24		°	
	Beam width vertical			28		°	

36 GHz part:

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
PLL	Center frequencies	$f_{\text{Center}}$		36.000		GHz	
	Center accuracy	$f_{\text{Center}}$		$\pm 6$		MHz	
	Frequency steps	$\Delta f$		None		MHz	
	Carrier noise				$\pm 5$	MHz	
	Spurious and harmonics			< 25 < 40 < 50		dBc	> $f \pm 200$ kHz > $f \pm 20$ MHz < 18 GHz
	PLL settling time	$t$				5	ms

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
RF power	Max. output power	$P_{\text{max}}$		+55.0		dBm	EIRP
	Min. output power	$P_{\text{min}}$		+5.0		dBm	EIRP
	Power resolution			1.0		dB	
	Power accuracy			4.0		dB	

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
Pulse modulator	Duty cycle	D.C.			1.0	%	
	Pulse repetition interval	PRI	5.0		100'000	us	see D.C. limitation
	PRI resolution			10		ns	
	PRI accuracy			20		ns	
	Pulse width	PW	0.05		100	us	see D.C. limitation
	PW resolution			10		ns	
	PW accuracy			20		ns	
	RF ON/OFF isolation	$\Delta P$	30			dB	
	Fall and rise time	$t$				15	ns
Pulse pattern memory	PRI entries			255			
	PW entries			255			

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
Antenna specification	Center frequency	$f_{\text{center}}$		36.00		GHz	
	Gain main lobe	$G_t$		22		dB <sub>i</sub>	
	Polarization			Horizontal			
	Beam width horizontal			8.7		°	
	Beam width vertical			9.4		°	

**13.8. Wideband Radar Simulator (1.5 – 18 GHz & 36 GHz fixed Frequency)**

This module is installed in a “WB-R” model only! Please check your missim configuration to make sure this module is installed in your missim.

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
PLL	Frequency	f	1.5	36.0	18.0	GHz GHz	Variable Fix
	Center Deviation (PLL close loop)	f <sub>Center</sub>			±4 ±6	MHz MHz	1.5 – 18 GHz 36 GHz
	Center Deviation (PLL open loop)	f <sub>Center</sub>			±10 n/a	MHz	1.5 – 18 GHz 36 GHz
	Frequency steps	Δf		1 1		MHz MHz	Close Loop Open Loop
	Carrier Noise				±5	MHz	
	Spurious			55		dBc	
	Harmonics			40		dBc	
	PLL Settling Time (PLL closed loop)	t			1	ms	
FM Modulation	Deviation	f			±50	MHz	
	Deviation Resolution	f		1 10		MHz MHz	Close Loop Open Loop
	Deviation Rate		±10			MHz/us	
	Modulation rate	f	0.1 0.1 Hz		100 1 MHz	Hz -	Close Loop Open Loop
FM Pattern Memory	FM Entries			255			
	Dwell time			10 1		ms us	Close Loop Open Loop
AM Modulation	Power Offset	ΔP	0		+/-10	dB	Part of the power dynamic
	Offset step size			1		dB	
	Modulation Frequency <i>Dwell time</i>	f	0.5 1		500 1'000	Hz ms	<i>Dwell time</i>
AM Pattern Memory	AM Entries			255			
Pulse Modulator	Pulse Repetition Interval	PRI	5.0		100'000 or CW	us	not 36 GHz
	PRI Resolution			10		ns	
	PRI Accuracy			20		ns	
	Pulse Width	PW	0.05		50 or CW	us	not 36 GHz
	PW Resolution			10		ns	
	PW Accuracy			20		ns	
	Duty Cycle	D.C.			5.0	%	
	RF ON/OFF Isolation	ΔP	30			dB	
Fall and Rise time	t			15	ns		
Pulse Pattern Memory	PRI Entries			255			
	PW Entries			255			

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
RF Power	Max. Pulse output Power including Antenna Gain (EIRP)	P <sub>EIRP</sub> <sup>1)</sup>		+10.0 +20.0 +25.0 +25.0 +22.0		dBm	@ 1.5 GHz @ 3 GHz @ 5 GHz @ 10 GHz @ 18 GHz T <sub>A</sub> 25°C
		P <sub>EIRP</sub>		+55.0		dBm	36 GHz T <sub>A</sub> 25°C
	Max. CW Power including Antenna Gain (EIRP)	P <sub>EIRP</sub> <sup>1)</sup>		+3.0 +11.0 +16.0 +17.0 +14.0		dBm	@ 1.5 GHz @ 3 GHz @ 5 GHz @ 10 GHz @ 18 GHz T <sub>A</sub> 25°C
		P <sub>EIRP</sub>		N/A		dBm	36 GHz
	Power Dynamic			50		dB	
	Power Resolution		1.0			dB	
	Power Accuracy			4.0		dB	

1) Output power for all WB-Version with part number extension -00x and -01x can be up to 3dB less than listed

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition	
Antenna Specification	Frequency Range	f	1.5		18.0	GHz	Variable	
	Polarization		Vertical					1.5 – 18 GHz
	Far field distance	l		1		m		
	Beam Horizontal			~140		°		
	Beam Vertical			~140		°		

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition	
Antenna Specification	Center Frequency	f <sub>center</sub>		36.00		GHz		
	Polarization		Horizontal					
	Far field distance	l		1.72		m		
	Beam Horizontal			8.7		°		
	Beam Vertical			9.4		°		

### 13.9. Missile Approach Simulator module (MAS)

This module is installed in an “M” model only! Please check your missim configuration to make sure this module is installed in your missim.

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
Optical characteristics for UV-C	Peak wavelength	$\lambda_p$		263 ±7		nm	
	Spectrum half width	$\Delta\lambda$		~12		nm	
	Rise and fall time (Power settled)	$t_{rf}$		< 1		ms	10 / 90 / 10 %
	Max. output power	$P_{max}$		-5.0		dBm	ERP @ 263nm
	Min. output power	$P_{min}$		-65.0		dBm	ERP @ 263nm
	Power resolution			0.1		dB	
	Power accuracy			4.0		dB	
	Angle of reflected beam	$\alpha$		~25°		°	NA=0.22

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
Missile profile data	Programmable power resolution			0.01		dB	
	Sample rate		1		100	ms	
	Sample resolution			1		ms	
	Sample accuracy			0.1		ms	
	Data points		1		1000	N	

**13.10. Laser Simulator module (LAS)**

This module is installed in an “L” model only! Please check your missim configuration to make sure this module is installed in your missim.

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
Optical characteristics	Source technology			LED Laser Laser			@525 nm @905 nm @1550 nm
	Peak wavelengths	$\lambda_p$		525 905 1550		nm	
	Spectrum half width (at 50% intensity point)	$\Delta\lambda$		30 5 12		nm	@525 nm @905 nm @1550 nm
	Max. output power	$P_{max}$		~ 6 +11.0 +5.0		mW mW mW	@525 nm @905 nm @1550 nm
	Min. output power	$P_{min}$		~ 6 +8.5 +4.0		mW mW mW	@525 nm @905 nm @1550 nm
	Power resolution			1.0		dB	
	Power accuracy			4.0		dB	
	Output focal point (inside of the device)	d		5 14 14		mm	@525 nm @905 nm @1550 nm
	Angle of reflected beam	Horizontal $\alpha$		15 3.0 3.0		°	@525 nm @905 nm @1550 nm
Vertikal $\beta$			15 3.0 3.0		°	@525 nm @905 nm @1550 nm	

Topic	Parameter	Symbol	Min	Typ	Max	Unit	Condition
Pulse modulator	Pulse repetition interval	PRI	0.018		2'000	ms	
	PRI resolution			100		ns	
	PRI accuracy			20		ns	
	Pulse width	PW	0.1 10 10		10'000 100 100	us ns ns	@525 nm @905 nm @1550 nm
	PW resolution			10		ns	
	PW accuracy			20		ns	
	Fall and rise time	t			30 10 10	ns ns ns	@525 nm @905 nm @1550 nm
	Duty cycle	D.C.			10 0.1 0.1	% % %	@525 nm @905 nm @1550 nm
Pulse Pattern Memory	PRI entries			255			
	PW entries			255			

### 13.11. Environment Specification

This specification is only valid for the missim simulator but not applicable for the accessories like charger, CD, cords etc.

Test	Parameter	Range / Standard	
Environment	Temperature	-20°C...+60°C (Operating) -40°C...+85°C (Storage)	MIL-STD-810 F
	Humidity	max. 95%	MIL-STD-810 F Proc. I
	Vibration	Basic Transportation (with transport case)	MIL-STD-810 F Method: 514.5, Cat 4, Proc. I
	Shock	Transit drop (with transport case)	MIL-STD-810 F Method: 516.5, Proc. IV
	Rain		MIL-STD-810 F Method: 506.4, Proc. I (30 min)
	Altitude	Operational (< 6'562 ft)	MIL-STD-810 F Method: 500.4, Proc. II
		Storage (< 15'000 ft)	MIL-STD-810 F Method: 500.4, Proc. II
	Chemical resistance	Kerosene, avgas, diesel, lubricants, cleanser, solvent	MIL-STD-810 F Method: 504
	Salt resistance	5% NaCl	MIL-STD-810 F Method: 509.4
	Sand and dust		MIL-STD-810 F Method: 510.4, Proc. I
	EMV (EMC / EMI)		MIL-STD-461 E Ground, Air Force
	ESD		EN 61000-6-2, Class B



**13.12. Safety Specification**

Radiations	RADAR Simulator	12 GHz	IEC / EN 12198-1:2008 Class 0
		36 GHz	IEC / EN 12198-1:2008 Class 0
		1.5-18 GHz	IEC / EN 12198-1:2008 Class 0
	MISSILE Simulator	UV-C (265nm)	IEC / EN 12198-1:2008 Class 1
	LASER Simulator	620-690 nm	IEC / EN 60825:2008 Class 2
		905 nm	IEC / EN 60825:2008 Class 3R
1550 nm		IEC / EN 60825:2008 Class 1	

**13.13. RoHS**

The missim simulator meets the RoHS requirements (Restriction of the use of certain hazardous substances in electrical and electronic equipment) which are defined in the European Union instructions 2002/95/EG.

## 14. Generic TLS

Missim is delivered with a generic TLS (Threat Library Set) which contains sequences of generic emitters. All generic emitters are unclassified. There is no guarantee that those generic emitters will work with a particular EW system. However, during RUAG’s own tests, these generic emitters were usable with more or less all EW systems.

### 14.1. RAS\_Sequences

The following table contains the settings & parameters of sequences with generic radar emitters. Note that these sequences are only available in “R” configurations of the missim simulator.

Sequence							Emitter					
							Pulse			Frequency		
										Pulse		FM
Name	Mode	Delay [ms]	Duration [ms]	BPD [dBm/m <sup>2</sup> ]	Distance Compensation	Range [m]	PRI [us]	PW [ns]	Center [GHz]	Delta [MHz]	Time [ms]	
<b>Radar_1_5GHz-Pulse<sup>1)</sup></b>	Endless	0	-	-7.0	Measured	0.0 - 3.2	Pulse	550	500	1.500	-	-
Pulsed radar system in the L band.												
<b>Radar_1_5GHz-CW<sup>1)</sup></b>	Endless	0	-	-7.0	Measured	0.0 – 1.4	CW	-	-	1.500	-	-
Continuous wave radar system in the L band.												
<b>Radar_4_GHz-Pulse<sup>1)</sup></b>	Endless	0	-	-7.0	Measured	0.1 – 10.0	Pulse	550	500	4.000	-	-
Pulsed radar system in the S respectively C band.												
<b>Radar_4_GHz-CW<sup>1)</sup></b>	Endless	0	-	-7.0	Measured	0.0 – 3.6	CW	-	-	4.000	-	-
Continuous wave radar system in the S respectively C band.												
<b>Radar_8_GHz-Pulse<sup>1)</sup></b>	Endless	0	-	-7.0	Measured	0.1 – 11.6	Pulse	550	500	8.000	-	-
Pulsed radar system in the C respectively X band.												
<b>Radar_8_GHz-CW<sup>1)</sup></b>	Endless	0	-	-7.0	Measured	0.0 – 4.6	CW	-	-	8.000	-	-
Continuous wave radar system in the C respectively X band.												
<b>Radar_12_GHz-Pulse</b>	Endless	0	-	-7.0	Measured	0.1 – 8.1	Pulse	550	500	12.000	-	-
Pulsed radar system in the X respectively Ku band. This type of signal is mostly used by search and designation radars.												
<b>Radar_12_GHz-CW</b>	Endless	0	-	-7.0	Measured	0.0 – 3.2	CW	-	-	12.000	-	-
Continuous wave radar system in the X respectively Ku band. This type of signal is mostly used by designation radars (for radar guided missiles).												
<b>Radar_16_GHz-Pulse<sup>1)</sup></b>	Endless	0	-	-7.0	Measured	0.1 – 8.1	Pulse	550	500	16.000	-	-
Pulsed radar system in the Ku band.												
<b>Radar_16_GHz-CW<sup>1)</sup></b>	Endless	0	-	-7.0	Measured	0.0 – 3.2	CW	-	-	16.000	-	-
Continuous wave radar system in the Ku band												
<b>Radar_36_GHz-Pulse</b>	Endless	0	-	+22.0	Measured	0.1 – 8.1	Pulse	550	1000	36.000	-	-
Pulsed radar system in the Ka band. This type of signal is mostly used by search and designation radars and often for radar guided missiles.												
<b>Radar_5GHz-CW-FM<sup>1)</sup></b>	Endless	0	-	-7.0	Measured	0.0 – 3.8	CW	-	-	5.000	+/-10.0	10
Continuous wave radar signal with frequency hopping.												
<b>Multi_Radar<sup>1)</sup></b>	Single	0	5'000	-7.0	Measured	0.1 – 3.2	Pulse	550	500	12.000	-	-
		5'000	5'000	+22.0			Pulse	550	1000	36.000	-	-
		10'000	5'000	-7.0			CW	-	-	12.000	-	-

Combination of search and designation radars in X respectively Ku and Ka band.

1) R-WB configurations only

### 14.2. LAS Sequences

The following table contains the settings & parameters of sequences with generic laser emitters. Note that these sequences are only available in “L” configurations of the missim simulator.

Sequence							Emitter			
Name	Mode	Delay [ms]	Duration [ms]	BPD [dBm/m <sup>2</sup> ]	Distance Compensation	Range [m]	PRI [us]	PW [ns]	Quantity []	Wavelength [nm]
<b>Laser_525nm</b>	Endless	0	-	+45.0	Fixed	0.1	100'000	10'000'000	1	525
Laser dazzler. This type of laser tries to blind the pilot or driver.										
<b>Laser_1550nm</b>	Endless	0	-	+40.0	Measured	0.2 – 13.6	5'000	100	1	1550
Laser designator. This type is mostly used for laser guided missiles. The selected wavelength covers the newer laser generation.										
<b>Laser_905nm</b>	Endless	0	-	+40.0	Measured	0.2 – 13.6	5'000	100	1	905
Laser designator. This type is mostly used for laser guided missiles. The selected wavelength covers the older laser generation.										
<b>LBR_10kHz_905nm</b>	Endless	0	-	+45.0	Measured	0.1 – 7.6	100	100	1	905
Laser beam rider (LBR) with a modulation of 10kHz. This type of signal is used for laser guided missiles which fly in the beam.										
<b>LBR_10_15kHz_905nm</b>	Endless	0	-	+45.0	Measured	0.1 – 7.6	66.7	60	1	905
							33.3	30	1	
							33.3	30	1	
							66.7	60	1	
							66.7	60	1	
							33.3	30	1	
							33.3	30	1	
							66.7	60	1	
Laser beam rider (LBR) with modulations of 10 and 15kHz. This type of signal is used for laser guided missiles which fly in the beam.										
<b>Multi_Laser</b>	Single	0	5000	+40.0	Measured	0.2 – 13.6	5'000	100	1	905
		5000	5000	+40.0			5'000	100	1	1550
Laser designator of older generation followed by laser designator of newer generation										

### 14.3. MAS Sequences

The following table contains the settings & parameters of sequences with generic missile emitters. Note that these sequences are only available in “M” configurations of the missim simulator.

Sequence							Emitter			
Name	Mode	Delay [ms]	Duration [ms]	BPD [dBm/m <sup>2</sup> ]	Distance Compensation	Range [m]	Missile profile	Steps []	Wavelength [nm]	
<b>Missile</b>	Single	0	5'000	-80	Measured	2.5 – 115.7	Interval [ms/step]	40	125	265

Generic missile with constant approach speed.

Points	Generic Missile (Gain, dB)	Generic Missile (Gain, Linear)
0	0	0.0
20	10	10.0
40	15	20.0
60	18	30.0
80	20	40.0
100	22	50.0
120	27	500.0

### 14.4. HFI Sequences

The following table contains the description of sequences with generic hostile fire emitters. All emitters are UV-C based and simulate direct hostile fire towards the sensor. Note that these sequences are only available in “H” configurations of the missim simulator.

Sequence						Hostile Fire Scenario				
Name	Mode	Delay [ms]	Duration [ms]	Distance Compensation	Range [m]	Caliber [mm]	Ammunition	Fire Mode	Rate of fire [RPM]	Distance [m]
<b>5_56_TRC_100M_SEMI</b>	Single	0	2'000	Measured	1.0 – 20.1	5.56	TRACER	SEMI	-	100
<b>5_56_TRC_200M_SEMI</b>	Single	0	2'000	Measured	1.9 – 20.1	5.56	TRACER	SEMI	-	200
<b>5_56_TRC_300M_SEMI</b>	Single	0	2'000	Measured	2.9 – 20.1	5.56	TRACER	SEMI	-	300
<b>7_62_TRC_100M_SEMI</b>	Single	0	2'000	Measured	1.5 – 22.5	7.62	TRACER	SEMI	-	100
<b>7_62_TRC_200M_SEMI</b>	Single	0	2'000	Measured	3.0 – 22.5	7.62	TRACER	SEMI	-	200
<b>7_62_TRC_300M_SEMI</b>	Single	0	2'000	Measured	4.4 – 22.5	7.62	TRACER	SEMI	-	300
<b>12_7_TRC_300M_SEMI</b>	Single	0	3'000	Measured	4.1 – 45.3	12.7	TRACER	SEMI	-	300
<b>12_7_TRC_600M_SEMI</b>	Single	0	3'000	Measured	8.1 – 45.3	12.7	TRACER	SEMI	-	600
<b>12_7_TRC_1000M_SEMI</b>	Single	0	3'000	Measured	13.5 – 45.3	12.7	TRACER	SEMI	-	1000
<b>7_62_TRC_200M_AUTO<sup>1)</sup></b>	Single	0	5'000	Measured	4.5 – 33.0	7.62	TRACER	AUTO	600	200
<b>12_7_TRC_300M_AUTO<sup>1)</sup></b>	Single	0	5'000	Measured	4.1 – 38.7	12.7	TRACER	AUTO	600	300

1) The auto fire sequences simulate a series of 30 rounds with a tracer every 3<sup>rd</sup> round.

### 14.5. MIX\_Sequences

The following table contains the settings & parameters of sequences with multiple generic emitters . Note that these sequences are only available in configurations with more than one module (R/M/L) installed.

#### 14.5.1. (WB-)RML configurations

Sequence							Emitter							
Name	Mode	Delay [ms]	Duration [ms]	BPD [dBm/m <sup>2</sup> ]	Distance Compensation	Range [m]	Pulse	Frequency		Missile profile		Wavelength		
								PRI [us]	PW [ns]	Center [GHz]	Interval [ms/step]	Steps []	Wavelength [nm]	
<b>All_emitters</b>	Single	0	5'000	-7.0	Measured	2.5 – 3.2	Pulse	550	500	12.000				
		5'000	5'000	+40.0			Pulse	5'000	100				905	
		10'000	5'000	+22.0			Pulse	550	1000	36.000				
		15'000	5'000	+40.0			Pulse	5'000	100				1550	
		20'000	5'000	-7.0			CW	-	-	12.000				
		25'000	5'000	-80 to -53							40	125	265	
		Multiple emitters simulating the following scenario:												
<ul style="list-style-type: none"> <li>- Search and designation radar</li> <li>- Laser guided missile</li> <li>- Radar guided missile</li> <li>- Laser guided missile</li> <li>- Radar guided missile</li> <li>- Approaching missile</li> </ul>														

#### 14.5.2. ML configurations

Sequence							Emitter					
Name	Mode	Delay [ms]	Duration [ms]	BPD [dBm/m <sup>2</sup> ]	Distance Compensation	Range [m]	Pulse	Frequency		Missile profile		Wavelength
								PRI [us]	PW [ns]	interval [ms/step]	Steps []	Wavelength [nm]
<b>All_emitters</b>	Single	0	5'000	+40.0	Measured	2.5 – 13.6	Pulse	5'000	100			905
		5'000	5'000	+40.0			Pulse	5'000	100			1550
		10'000	5'000	-80 to -53						40	125	265
Multiple emitters simulating the following scenario:												
<ul style="list-style-type: none"> <li>- Laser guided missile</li> <li>- Laser guided missile</li> <li>- Approaching missile</li> </ul>												





