ST 062

Technical Description and User's Guide

St. Petersburg
2009

CONTENTS

1 INTRODUCTION

This User's Guide contains information necessary for the setup and operation of the ST 062.

Before operating your ST 062, read this User's Guide carefully and consult it every time you have questions about the operation of the unit.

The information in this User's Guide is subject to change without prior notice.

The manufacturer reserves the right to change the product's specifications in such a manner that they do not worsen or reduce the product's functionality.

2 PURPOSE

ST 062 is designed for detecting and identifying mobile radio transmitters of cellular communications standards (mobile phones and modems of GSM 900, 1800, UMTS), wireless data transmission (WI FI and BLUETOOTH) and cordless phones (DECT). From now forward all of specified units will be unified as **DRTD** – Digital Radio Transmitting Devices.

Additionally indication of base stations (from now forward – **BS**) power signal strength and data exchange intensity is provided.

Indication of wireless video cameras working in 2.4GHz frequency range using modulation FM and AM is provided.

The ST 062 will operate in accordance with its specifications in the following environment: operating temperature: –10º to 35º C; relative humidity: up to 95%.

3 SPECIFICATIONS

3.1 Frequency ranges, MHz	890-960, 1710-1900, 1942-2142, 2.4-2480
3.2 Level ranges of displayed signal, dBm	
890-960	minus 75 – plus 10
1710-1900	minus 70 – plus 10
1942-2142	minus 80 – plus 10
2.4-2485	minus 70 – plus 10
3.3 Alarm level setting range, dB	60
3.4 Indication	color OLED display 169X128
3.5 Built-in power supply	3.6 V Li-Polymer rechargeable battery
3.6 Minimal consumption current, mA	300
3.7 Main block dimension, mm	90x54x21
3.6 7 Main block weight, kg, max	0.15

4 SET CONTENT

You will find the following in the ST 062 set:

1. Main block
2. HF antenna
3. USB cable
4. Power supply/charger
5. MiniCD with software
6. Technical Description and User's Guide

5 OPERATING PRINCIPLES AND REFERENCE

By the principle of its operation, the ST 062 is digitally controlled direct-conversion receiver with a color OLED display. The control is performed using six-button keypad.

To detect signals, the ST 062 scans a series of frequency ranges of the known transmission standards. The user can set up the detection threshold and the number of desired frequency bands.

Signals identification is performed on basis of analysis of detected signals time parameters. **"ST 062 PC DATA"** firmware provides **ST 062** work under PC control widening user possibilities in received data visualization, its storing and further analysis.

5.1 OPERATING MODES

The ST 061 operates in two main modes: AUTOMATIC and MANUAL.
Additional is LOG VIEW mode.

5.1.1 AUTOMATIC MODE is intended for DRTD automatic detection when it exceeds the operation threshold set by user. When recording is enabled, the data on signal is written into events log. Scheduled work is provided.

5.1.2 MANUAL MODE provides possibility of chosen ranges viewing in manual mode. The signal level and time diagram are always displayed.
This mode is intended for detection of
- location of DRTD;
- threshold levels value for following use in AUTOMATIC MODE.

BS SIGNALS LEVEL VIEWING is only possible in this mode.

5.1.3 LOG VIEW MODE

is intended for viewing the log of events taking place in the result of the unit running in AUTOMATIC MODE**.** Time of event, its duration, type of event, signal strength are displayed.

5.2 DESCRIPTION OF MAIN BLOCK

On the front panel of the block color graphical display and keypad are situated.

The top of the detector has SMA port for HF antenna connecting and MINI DIN port for additional HF modules connecting.

The left side of the detector has USB port and port for connecting additional display devices or actuating devices.

5.3 SERIAL NUMBER AND INTEGRITY SEAL

On the back of the block is a nameplate. The following information is written on it by metallography:
- type of device;
- serial number;
- manufacturer name and logo – «СмерШ Техникс» (SmerSH Technics);
- country of production – Russia.

5.4 PACKAGING

For transportation and storing the unit components are placed in a box made of corrugated cardboard with the dimensions of 170 x 150 x 60 mm.

For convenience and safety of the unit components packing, the foamed polyurethane inserts are provided.

6 OPERATING THE ST 062

6.1 DISPLAY AND CONTROLS

6.1.1 DISPLAYING of the work results is performed on color graphical OLED display having 169X128 resolution.

Indication common for all the operational modes is highlighted violet and contains:
- in upper right corner of the display – indicator of power supply condition (see item 6.2), indicator of scheduled work (if chosen), and real-time clock (hours-minutes);
- lines in bottom part of the display indicating short names of digital data transmission standards chosen by user for the work.

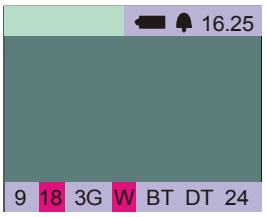


Fig. 1

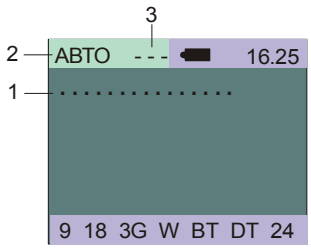
9 – GSM 900
18- GSM 1800
3G- 3G (UMTS)
W- WI- WI (WLAN)
BT- BLUETOOTH
DT-DECT
2.4- devices, other than WLAN and BLUETOOTH, operating at 2.4-2.485 GHz range (for example, wireless surveillance cameras, microwave ovens, etc.) as well as data transmission intensity traffic in this frequency range.

In case of this kind of signal choice for running the name is highlighted black, otherwise it remains grey. At alarm conditions fulfillment for this kind of signal the background of the name is highlighted red.

6.1.2 Indication in AUTOMATIC MODE

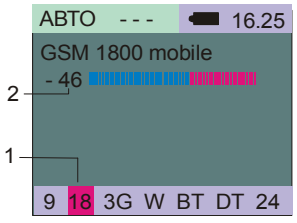
In this case automatic sequential channels switching, signal identification and its level measuring as well as comparison with the set threshold are performed. Simultaneous signal level displaying in one two or three channels is possible. In case of threshold level exceeding (single or repeated) over a period longer than "minimum duration" (set in the menu), alarm indication condition is fulfilled that is displayed as corresponding channel red highlighting in lower status line as well as data recording into log (if this recording is enabled). In addition, acoustic alarm sounds if it is enabled in the menu. It should be noted that event record and displaying in status line will take place even if there are more than three channels number with threshold exceeding. At that current level displaying in remaining (not including in the three) channels will be absent.

When alarm indication condition ends (signal level drops below the threshold), new alarm event in this case will be able only in a time that is more than "event delay" value that sets in menu.



1 – enabled automatic mode displaying in the absence of detected signals
2 - chosen mode
3- writing in events log disabled

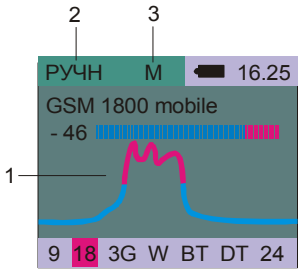
Fig. 2



1- Additional displaying of GSM 1800 detected signal
2- signal strength numerical value

Fig. 3

6.1.3 Indication in MANUAL MODE



Signal strength is displayed digitally and graphically. Digitally the estimated radio signal power value relative to antenna input in dBm is displayed. Te values range is от -95 dBm to +10 dBm. -95 dBm value corresponds to level of identified signal absence. Graphically this value is displayed on multisegmented two-color scale. Left part of the scale is displayed in blue color, its right side - in red. In red color the segments corresponding to level exceeding the threshold level set in MENU are displayed.

From the keypad manual choice of channel for permanent strength displaying is performed. Under the level indicator two-color time diagram of signal strength change is displayed. In red color the diagram parts where signal level exceeds threshold are displayed.

6.1.4 CONTROLS

The control keys functions are listed in table 1.

Table 1

PWR	Power On/Off
↵	Return to previous MENU level. Exit from protocol viewing
SCAN/MAN	Choice of main operating modes
↑ ↓	MENU items navigation. Events navigation in LOG VIEWING mode
MENU **ENTER**	MENU entry / Choice confirmation Events banks navigation in LOG VIEWING mode

To turn on and off the ST 062 press "PWR" key. The following will temporarily appear on the display:

"ST 062 Version X.X.
SmerSH Technics
St Petersburg
Russia Ver.X.X.
www.smersh.ru".

where X.X. is the installed firmware version number.

6.2 POWER SUPPLY

The ST 062 can be powered by

- a built-in Li-Pol rechargeable battery;
- external power supply/charger;
- USB port of PC.

At built-in rechargeable battery running its status is represented by  icon.

When the battery is fully charged it is indicated by a filled battery pictogram. When the battery is almost completely discharged, the battery indicator will turn from solid to blinking outline.

When the battery level is too low, the display will show "BATTERY DISCHARGED" for ten seconds.

An average operation time of the detector with a fully charged battery is approximately 3 hours.

To extend the built-in battery life, we recommend avoiding the situation when it is completely discharged.

When external power supply/charger is used or at work with USB port the battery icon will change to DC icon  .

6.2.1 Charging the Battery

Connect the power supply/charger to the USB port of the main block.

Connect the power supply/charger to an 220 V electric outlet.

When the unit is switched off "BATTERY CHARGING" will appear on the display for ten seconds, when the unit is switched on, the segments of battery icon will move.

When the battery is fully charged, the display will indicate "BATTERY CHARGED."

It takes approximately 2.5 hours to charge the battery to 100 per cent using the charger and about 12 hours using USB port.

6.3 DESCRIPTION OF ST 062 DETECTION CHANNELS

In AUTOMATIC and MANUAL modes the following channels are detectable:

GSM 900 mobile (9) – work of GSM phone in transmission mode in 900 MHz range;
GSM 1800 mobile (18) – work of GSM phone in transmission mode in 1800 MHz range;
3G (UMTS) mobile (3G) – work of GSM-3G phone in transmission mode in 1940-1960 MHz range;
DECT mobile (DT) – work of DECT in transmission mode in 1900 MHz range;
WLAN mobile (W) – work of Wi-Fi modules (as well as other devices with pulse radio-frequency emission with the exception of Bluetooth) in transmission mode in 2400 range;
BLUETOOTH (BT) – work of Bluetooth modules in transmission mode in 2.4 GHz range;
Traffic (W) – displays estimated data exchange intensity in 2400 MHz range (any pulse devices woring in this range, e.g., Wi-Fi and Bluetooth modules, etc.);
FM 2.4 GHz (24) – radio transmitters work with permanent radio transmission in 2.4 GHz range (e.g., cordless video cameras).

In MANUAL mode the BASE STATIONS (BS) radio emission level is available:
GSM 900 base (9) – work of GSM base station in transmission mode in 900 MHz range;
GSM 1800 base (18) – work of GSM base station in transmission mode in 1800 MHz range;
3G1 (UMTS) base (3G) – work of GSM-3G base station in transmission mode in 1945 MHz range;
3G2 (UMTS) base (3G) – work of GSM-3G base station in transmission mode in 1950 MHz range;
3G3 (UMTS) base (3G) – work of GSM-3G base station in transmission mode in 1955 MHz range;
DECT base (DT) – work of DECT base station in transmission mode in 1900 MHz range;
WLAN AP (W) – work of Wi-Fi network access point as synchronizing pulses transmission in 2400 MHz range;

6.3.1 DETAILED DESCRIPTION OF ST 062 DETECTION CHANNELS

6.3.1.1 GSM 900 mobile and GSM 1800 mobile.

Signal strength indication takes place at presence identification of pulses having duration specific for GSM standard. The measuring cycle length is 30 ms. At identification condition fulfillment the quasi-peak amplitude of detected pulse will be displayed.
For 900MHz: threshold sensitivity is -75dBm, dynamic range is 85dB.
For 1800MHz: threshold sensitivity is -70dBm, dynamic range is 80dB.

6.3.1.2 GSM 900 base and GSM 1800 base

In these channels quasi-peak measurement of signal strength is performed. The measuring cycle length is 30 ms.
For 900MHz: threshold sensitivity is -85dBm, dynamic range is 95dB.
For 1800MHz: threshold sensitivity is -70dBm, dynamic range is 80dB.

6.3.1.3 3G (UMTS) mobile

In these channel quasi-peak measurement of signal strength is performed. The measuring cycle length is 15 ms.
Threshold sensitivity in the channel is -85dBm, dynamic range is 95dB.

6.3.1.4 3Gx (UMTS) base

3Gx may assume a value 3G1, 3G2, 3G3, that corresponds to various frequency ranges for three UMTS base stations.

In this channel quasi-peak measurement of signal strength is performed. The measuring cycle length is 5 ms.
Threshold sensitivity in the channel is -85dBm, dynamic range is 95dB.

6.3.1.5 DECT mobile and DECT base

In these channels signal strength indication takes place at presence identification of pulses having duration specific for DECT standard, different for mobile phone and base station. The measuring cycle length is 30 ms. At identification condition fulfillment the quasi-peak amplitude of detected pulse will be displayed.
Threshold sensitivity in the channel is -80dBm, dynamic range is 90dB.

6.3.1.6 Group of transmission channels in 2.4GHz range

6.3.1.6.1 WLAN AP

In this channel signal strength indication takes place at presence identification of pulses having duration specific for Wi-Fi network (WLAN AP – wireless LAN access point). The measuring cycle length is 120 ms. At identification condition fulfillment the quasi-peak amplitude of detected pulse will be displayed.
Threshold sensitivity in the channel is -80dBm, dynamic range is 90dB.

6.3.1.6.2 WLAN mobile

In this channel signal strength indication takes place at presence identification of any pulse signals which duration does not meet WLAN AP and BLUETOOTH identification condition. As a rule these are signals of mobile WLAN device as well as various equipment working in 2.4GHz range in pulse mode, such as wireless computer mice, joysticks etc. The measuring cycle length is 120 ms. At identification condition fulfillment the quasi-peak amplitude of detected pulse will be displayed.
Threshold sensitivity in the channel is -80dBm, dynamic range is 90dB.

6.3.1.6.3 BLUETOOTH

In this channel signal strength indication takes place at presence identification of pulses having duration specific for Bluetooth standard, detectable at files and audio data transmission from Bluetooth headset. The measuring cycle length is 120 ms. At identification condition fulfillment the quasi-peak amplitude of detected pulse will be displayed.
Threshold sensitivity in the channel is -75dBm, dynamic range is 85dB.

6.3.1.6.4 FM 2.4 GHz

In this channel measuring of constant component takes place nonmetering all the pulse signals. The measuring cycle length is 120 ms.

Threshold sensitivity in the channel is -85dBm, dynamic range is 95dB.

6.3.2.6.5 Traffic

This indicator makes it possible to detect intensity of any digital data transmission in 2.4GHz range. This indicator DOES NOT DISPLAY signal strength. The result is displayed in 0% to 99% range. At that the values with results <10% mean low activity of data transmission. The values with results >50% correspond to large digital-data stream. E.g., this way working Wi-Fi video camera, for which large transmission content is specific, may be detected. At that depending on distance from mobile WLAN or WLAN AP detection of data-flow direction (to the computer or from the computer) may be detected.

6.4 FIRST TURNING ON

Attach the HF antenna to the main unit.
Turn the unit on by pressing "PWR" key.
If the text "BATTERY DISCHARGED" appears on the display, you will need to charge it (see 6.2.1.).
Set the internal clock of the ST 062. The clock is set from the MENU (see Table 4 in 6.7.).

After turning on the unit by default enters in AUTOMATIC MODE with the following FACTORY SETTINGS:

- control of all **DRTD** types:GSM 900, GSM 1800, 3G, WI FI, BLUETOOTH, DECT;
-activity control in 2.4GHz range;
- thresholds (minus dB):GSM 900 – 55, GSM 1800 – 55, 3G (UMTS) – 65, WI- FI (WLAN) -15, BLUETOOTH – 65, DECT- 45, 2.4 ГГц – 65;
- recording to events log disabled.

"Treadmill" displaying (Fig. 2) means absence of signals exceeding the threshold level in the receiving end. Turn on GSM mobile phone at the distance one meter or less from the ST 062 and check displaying the information of the signal detected similar to shown on fig. 3.

Signal strength indication is presented as digital and graphic. Digitally estimated radio signal value relative to antenna input in dBm is displayed. The data span is -95 dBm to +10 dBm. Graphically the value is displayed on multisegment two-color scale. Left part of the scale is shown in blue, right side is red. In red the segments are displayed which level exceeds the threshold level set in the MENU.

-95 dBm corresponds to the condition of detectable signal absence (See fig. 2).

Switch to MANUAL MODE pressing SCAN/MAN key. Pressing ▼ ▲ keys causes review levels and time diagrams of **DRTD** signals. On two-color diagram of signal strength change vs. time in red the diagram segments are displayed where the signal strength exceeds the threshold.

Switch the ST 062 to **BS** review mode. To do that chose this potion in the MENU (MENU – TRANSMITTER TYPE - BASE STATION TYPE) Estimate the **BS** strengths and time diagrams.

At that the action at turning on for the first time may be finished.

6.5 OPERATING IN AUTOMATIC MODE

Exclude the unnecessary ranges. It lets decrease the undetection probability, as the ranges analysis is performed in consecutive order. The full cycle length is 375 ms. At that 40 ms are for service data exchange (keypad and indication). Analysis time for GSM 900, 1800 and 3G is 40 ms, WI FI and BLUETOOTH, traffics is 150 ms.

Set the detection threshold on the basis of the values obtained in the result of operation in MANUAL MODE.

If necessary, enable recording to EVENTS LOG (MENU – PROTOCOL – RECORDING).

Ensure the sign change "---" on the events counter "000" in item 3 on fig.2. Then when alarm conditions are fulfilled the event information will be saved in the ST 062 nonvolatile memory. The memory consists of 30 banks. Maximum events number in the bank is equal to 999. When beginning of record to a new bank is necessary this option should be chosen in the MENU. Bank No. 1 always contains the newest events, bank No. 30 – the oldest ones.

By the MENU the time is set within which since the new signal appearance all subsequent level changes (disappearance, appearance) will be considered as one signal (delay time). It is implemented to prevent baseless log filling with information on the same signal, e.g., in the result of short-time signal source shading by people going past.

In case of the ST 062 use as control unit for DRTD signals suppression devices it is recommended to set delay time 8 sec. or more. It prevents unfounded short-time switching on/off of output radio emitting units of suppression devices.

Possibility of minimum event length to be memorized in ST 062 setting is provided.

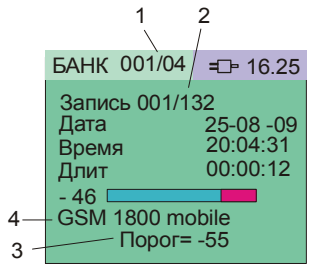
6.6 LOG VIEW

This mode may be chosen from the MENU.
If the log is empty, the text "EVENT LOG EMPTY" will appear on the display.

The state of the display in this mode is shown in Fig. 5.

Switching between banks is performed using MENU ENTER key.
The bank with the most recent events will have the lowest number.

Use ▼ ▲ buttons for switching between events.
The events are numbered according to the sorting criterion (set in the MENU).
If you choose sorting by a parameter other than time in the Menu, the text "Sorting. Please Wait." may appear briefly on the screen.
To exit the Event Log view mode, press ↵ key.



1 – Viewed bank No./Amount of used banks
2 - Viewed event номер No./Amount of event s in the bank
3 – detection threshold
4 –detected standard

Fig. 5

6.6.1 MENU

To enter the MENU, press the MENU ENTER key.
Select one of four main MENU options:
TRANSMITTER TYPE – choice (See table 2).
THRESHOLD – setting of required threshold for signal recording (See table 3)
LOG – settings for LOG VIEW mode (See table 4).
SYSTEM – settings defining general unit setup (See table 5).

Use VOL+ and VOL- keys to highlight the required menu item. To choose a menu press MENU ENTER.
To go up one level press ↵

Table 2

Transmitter type			
Option	Description	Value	Default Settings
GSM	GSM 900	Selected/Not selected	Selected
	GSM 1800		
2400 MHz	WLAN	Selected/Not selected	Selected
	BLUETOOTH		
	Traffic		
	VIDEO CAMERA		
	MICROWAVE OVEN		
Additionally	DECT	Selected/Not selected	Selected
	3G (UMTS)		
	WiMAX (OPTIONAL)		
FOR MANUAL MODE ONLY			
Base stations		Selected/Not selected	Not selected

Table 3

Threshold			
Option	Description	Value	Default Settings
GSM	GSM 900	-75 to -01 dB	-65 dB
	GSM 1800		
2400 MHz data	WLAN level		-25 dB
	BLUETOOTH level		-55 dB
	Volume of traffic	0-99%	40%
2400 MHz other	Video camera threshold	-75 to -01 dB	-65 dB
	Microwave oven threshold		-60 dB
Additionally	DECT threshold		-45 dB
	3G (UMTS) threshold	-90 to -01 dB	-85 dB
	WIMAX threshold (OPTIONAL)	-75 to -01 dB	-55 dB

Table 4

	LOG		
view	When chosen access to events log is provided		
record	When chosen recording to events log is provided		
New bank	Events recording to new bank is initiated		
Sorting	Sorts events in the log by one of the criteria	By Time: Displays events as they occur	Selected
		By Level: Displays events by signal level in descending order	Not selected
		By Band: Displays events by frequency band	Not selected
		By Duration: Displays events by duration time in descending order	Not selected
Erase All	Erases all information about events. You will be prompted with "Are you sure? Press ENTER if yes. Any other key if no." To confirm your action you must press SENS EXIT. Upon success, the text "All entries deleted" will appear. If you do not erase event records, the bank with the oldest events will be automatically erased to free up space for new events.		
Min. length	Sets minimal events length at which recording will be performed.	0 to 10 sec. with 1-sec. increments	1 sec.
Event delay	Sets interval between events of the same type that will be logged as two separate events	0-2 minutes with 1-sec. increments	5 sec.

Table 5

System				
Option	**Description**	**Value**		**Default Settings**
Language	**Язык (Language)** Language choice for displaying	English (Английский)/Russian (Русский)		Russian (Русский)
Indication	**Brightness** Sets brightness of the backlight	10 to 100 per cent with 10 per cent increments		50
	Display Off Sets time before backlight will turn off after the last key pressing	(8 seconds to 2 minutes with 8-second increments). The rightmost position equals 99 min 99 sec.		40 sec.
	Display Auto On Switches display on at signal detection (if switched off)	Selected/Not selected		Selected
	Acoustic alarms Acoustic alarm confirming key pressed Periodic acoustic alarm when "BATTERY DISCHARGED" text is on the screen Variable acoustic alarm when the signal is detected	Selected/Not selected		Selected
Time	**Schedule** Schedule setting in AUTOMATIC MODE Sets time in hours (0 to 23) for single or repeated AUTOMATIC MODE auto switching on for preset time. Detected signals for each session are recorded to specific bank.	Sets time	On time: Default value 9-00	Selected
			Off time: Default value 17-00	
		Daily		Not selected
	Clock setting Sets date and time	The parameter cycles through hours (H), minutes (M), seconds (S), day (D), and month (M). Press ENTER to proceed to the next parameter.		
	Sync with PC Automatic synchronization with computer clock during information exchange	Selected/Not selected		Selected
	Adjustment setting Daily clock adjustment setting	-2 min. to +2 min. with the accuracy 1 second per day		00:00.
Relays	Relays work Relays contacts closing/opening at signal detection	Selected/Not selected		Not selected
factory settings	Resets ALL settings to factory defaults			

7 WORKING WITH THE COMPUTER

To begin the work, install the software from the MiniCD or download the latest version from the manufacturer Web-site at www.smersh.ru/manual/ST062.

Connect the main block to the computer with USB cable that comes with the detector. When prompted to install the device driver choose the installation path. BE SURE TO confirm the installation by agreeing with the prompt.

7.1 ST 062 PC DATA software

The software is intended to:

- real-time graphic display of data and the results of operation of the ST 062;
- the ST 062 remote full control using PC;
- extended settings assignment for MONITORING mode;
- load and display textual and graphical information of the operation of the ST 062 in MONITORING mode (Event Log);
- The full manual on the software is recorded on the MiniCD

7.2 Firmware updating via Internet

Enter the following in the address bar of your Internet browser: www.smersh.ru\manual\st062\

WARNING! The following steps are true for Microsoft Internet Explorer™. The procedures for other web browsers may be different from those described below.

Select the appropriate firmware version. You will be presented with the following prompt: "Would you like to open the file or save it to your computer?" Choose Open and within a few seconds the application will be downloaded and launched.

Connect the USB cable to the ST 062 and a free USB port on your PC. Press PWR/MODE key.

Monitor the updating process on your computer display. If this process fails, the application will offer you to attempt again.

You can copy the downloaded updater application to any portable media and use it on another PC running Microsoft Windows™ as needed.

8 SOME LIMITATIONS AND RECOMMENDATIONS

8.1. Use the original packaging for storing and transporting the ST 062 set.
If you are not using the unit for a prolonged period of time, keep it in a closed, heated room with a temperature of 10 to 35ºC (50º to 95º F) and relative humidity of no more than 80 %.
When transporting the unit in the original packaging, take measures to prevent it from blows or excessive pressure.
8.2. After the unit has been exposed to temperatures below –5ºC (23º F) for prolonged periods (over 4 hours), turn it on only after making sure there are no visible traces of condensation.
8.3. When operating the ST 062 , try to protect it from concentrated moisture (rain, drizzle, and snow).
8.4. Prevent the LCD from prolonged exposure to direct sunlight.

9 WARRANTY INFORMATION

9.1. The manufacturer guarantees that the unit will comply with the specifications for a period of 12 months beginning from the day of purchase.
9.2. The manufacturer will carry out repairs of the unit and its accessories or replace them if they malfunction or if the functioning will not comply with the stated specifications free of charge during the guarantee period.
9.3. This warranty only covers free-of-charge repair or adjustment of faults that are not the result of improper use, failure to follow the usage tips and recommendations stated in the User's Guide, improper storage or shipment, and mechanical damage to the unit or its parts. The warranty will only be ensured with a guarantee claim accompanied by a properly filled out certificate of warranty.
9.4. The manufacturer offers post-guarantee servicing of the unit .

10 Quality control certificate

The «ST062» manufacture _____ is produced according to the requirement, accepted and approved as ready for operation.

Q.C. chief

Stamp

_____ _____

Personal signature clarification of signature

_____

Year, month, day