ATOMTEX®

Scientific and Production Unitary Enterprise

RSA Lite

Software User's Manual

Contents

Important! Screenshots in this Software User's Manual can differ from actual "**RSA Lite**" user interface screens in user's rugged handheld computer.

Version 1.0.0

1 Contents and intended purpose of "RSA Lite"

"**RSA Lite**" is an Android application and can be used on rugged handheld personal computers (hereinafter the HPC) supplied with Backpack-based Radiation Detector model AT1120B (gamma and neutron) (hereinafter the BRD) for the following purposes:

− Spectral radiation monitoring of indoor and outdoor areas with geo-referencing

− Measurement of ambient gamma radiation dose equivalent rate

− Detection of neutron radiation sources.

"**RSA Lite**" requires Android operating system version 4.2 or later.

"**RSA Lite**" offers the following functions:

− Connecting to gamma and neutron channels

− Automatic setting of gamma and neutron channels parameters

− Preparing gamma and neutron channels for operation

− Measurement and display of ambient gamma radiation dose equivalent rate

− Measurement of gamma radiation count rate

− Indication of ambient neutron radiation dose equivalent rate

− Measurement of detectable neutron radiation count rate

− Voice notifications about all modes of program operation and radiation environment to operator

− Logging of events and scan results

− Snap measurement to location using a GPS receiver and display measurement results

− Saving measurement files to cloud storage.

The delivery package includes:

− External storage medium containing the software installation package and electronic copy of the Software User's Manual

− Printed copy of the Software User's Manual.

Basic user skills and knowledge about Android OS are required to operate this program. This Software User's Manual does not describe standard principles of launching and closing programs, as well as how to use menus and tool bars for sending commands, and perform other actions.

1.1   How to install the "RSA Lite"

1   Turn on the HPC.

2   Copy the "**RSA Lite.apk**" file to HPC memory.

3   Run the "**RSA Lite.apk**" file on HPC and wait until the program installation is complete.

Before installing a new version of the program, uninstall the previous version of it. Follow by running the "**RSA Lite.apk**" file on HPC with a new version of the program.

1.2   How to start/close the program

To start the program, tap the "**RSA Lite**" icon (see the Figure 1).

Figure 1

Open the main menu of the program by swiping from the left edge of the HPC screen to the right or by tapping the "▤" menu button.

Minimizing the window does not close the program and it continues to run in the background.

To close the program, select "**Menu→Exit**".

1.3   How to uninstall the "RSA Lite"

To uninstall the "**RSA Lite**" program, use standard uninstall procedures of your Android OS.

The HPC stores measurement files, event logs, GPS coordinates, saved settings of uninstalled program in a dedicated folder in its internal memory.

1.4   How to connect the components

To start operation, connect all components using respective cables from delivery set and adjust connections between BRD components.

"RSA Lite" uses gamma and neutron channels by connecting to existing BT-DU3 adapter and automatically detects the types of detection units (hereinafter the DU).

BT-DU3 adapter connects to HPC by Bluetooth wireless link.

1.4.1   Pairing of Bluetooth headphones

1   Activate pairing mode on the headphones as described in the headphones manual.

2   Open "**Bluetooth**" settings window and turn **Bluetooth** on.

3   Search for devices.

4   Select headset from the list of devices.

5   After pairing the headset connects automatically (you hear a short melody in the headset when the connection has been established).

1.4.2   Pairing of smart glasses

Smart glasses use Bluetooth wireless interface to connect to HPC (see section 4 in the Software User's Manual for the "**RadGlasses**" program).

1.4.3   Establishing connection to BT-DU3 adapter

1   Connect the DU to BT-DU3 adapter using DU cables from the delivery set.

2   Start the BT-DU3 adapter by pressing and holding the "**Power**" button until the LEDs are on.

Important! The BT-DU3 adapter powers off automatically in 10 minutes, if no connection has been established to it.

3   Start the "**RSA Lite**" program.

4   Turn on the Bluetooth on HPC and pair the BT-DU3 adapter.

5   Automatic search for devices starts the first time you run the program. Tap the "**Search devices**" button for searching devices, and tap the "**Stop device search**" button for stopping the search.

6   Select BT-DU3 in the list of devices.

7   To change the BT-DU3 adapter, select "**Menu→Find Connect instrument**". A list of devices available for connection will be displayed. Select the BT-DU3 included into the BRD delivery set from the list of devices, which will be used for further operation.

1.5   Running time and battery charging

While in stand-alone mode the HPC runs on built-in battery and BT-DU3 adapter supplies power to gamma and neutron channels, which are charged by AC adapters. Minimum continuous operation time of HPC (with a 3400 mA/h battery) is 10-12 hours in stand-alone mode with fully charged batteries. This parameter varies depending on HPC specifications.

Minimum continuous operation time of BT-DU3 adapter is 20 hours in autonomous mode with fully charged battery and depends on the number of measurement channels connected.

The program keeps track of free HPC memory and if available memory is not enough for 19 minutes (0.3 hours) of scanning, the program displays notification and terminates after closing the notification dialog.

When HPC battery charge is below 5 %, the program displays low HPC battery notification and after a while switches the BRD to **"Idle"** mode.

When BT-DU3 adapter battery charge is below 4 %, the program displays a low battery notification and switches the BRD to **"Idle"** mode after closing the notification dialog.

## 2   Using the program

How to work with "**RSA Lite**":

1   Start the "**RSA Lite**" program

2   Connect to BT-DU3 adapter (see 1.4.3)

3   Wait until "**RSA Lite**" connects to gamma and neutron channels

4   Type a keyword or scanning place name or comment. It will be added to the name of the result folder. By default, the result folder has a unique name, which includes the date and time the scanning started

5   Wait until the background acquire process is complete

6   Start radiation scanning, carry the BRD on foot, in car etc

7   GPS signal appears only if you are in satellite visibility zone (in open ground outdoors)

8   Stop moving when gamma radiation alarm signal sounds and find maximum radiation point according to gamma channel count rate

9   When neutron radiation detection signal is generated, stop and find maximum radiation point according to neutron channel count rate.

Maintaining operability of "**RSA Lite**":

1   The program periodically generates an audio signal to inform user that it is operating normally.

2   The program provides gamma and neutron channels diagnostics. In case of a failure or error, the program enters the "**Connecting**" mode. In this case power BT-DU3 adapter off and on again. If failure persists, contact manufacturer.

3   If the program finds no gamma channel calibration data, then it will switch to the "**Connecting**" mode. Restart scanning. If failure persists, contact manufacturer.

2.1 User interface description

The user interface is represented as control and indication units shown in figure 2.
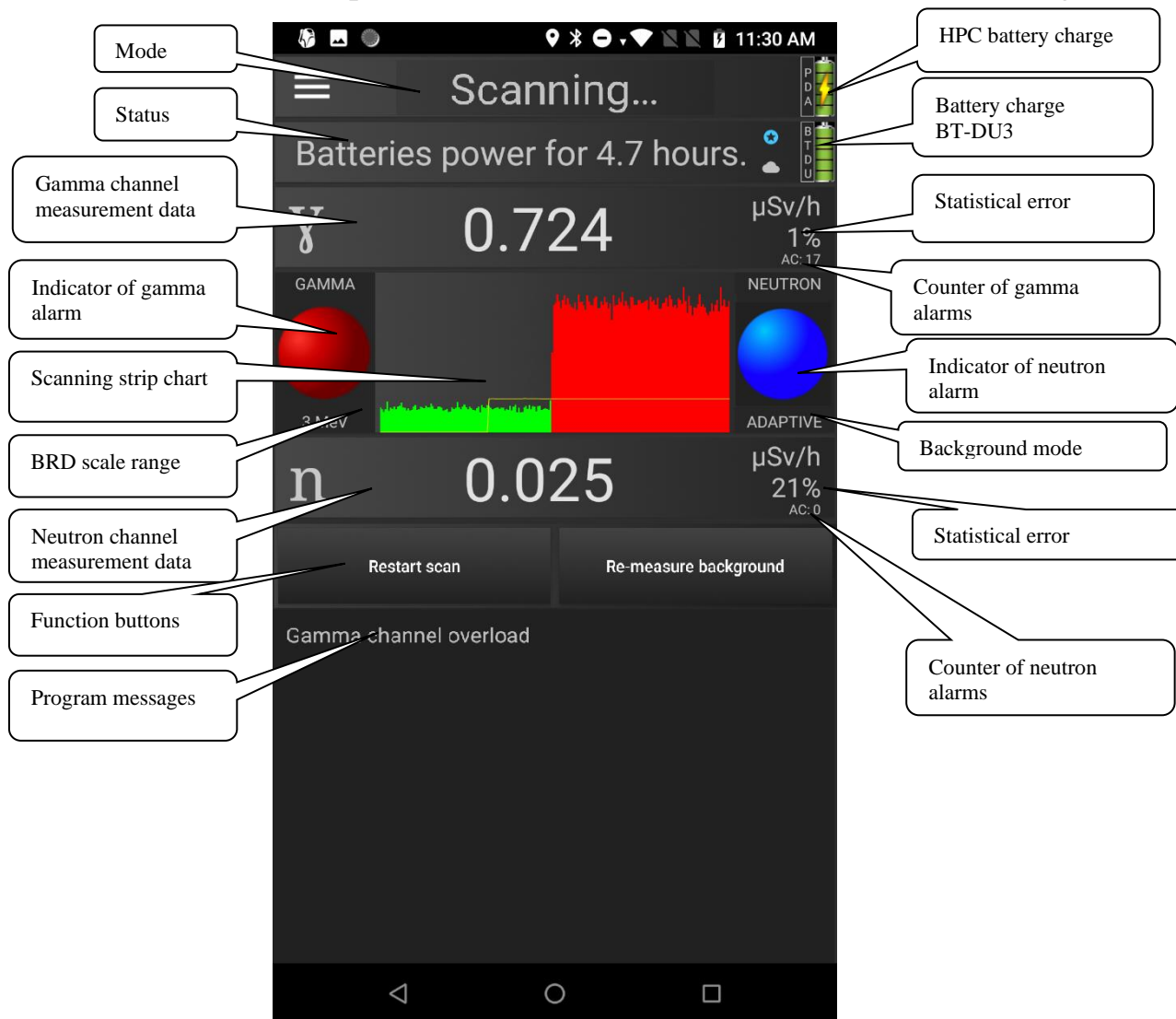
Figure 2

Mode – current mode of BRD.

Status – current status of BRD. Tap this line to display detailed information about BRD status in a new dialog. This ⊙ icon is displayed when the external settings file tracking is enabled. The ☁ icon is displayed when the file transfer to cloud storage is enabled in the settings. The loading process is visualized in percentage.

Gamma channel measurement data – Tap this line to cycle gamma radiation dose rate value (μSv/h), pulse count rate value (cps), and accumulated dose (μSv). If the high dose rate DU is enabled, the 5 modes change: dose rate (μSv/h), count rate (cps), dose (μSv), wide-range DU dose rate (μSv/h), and wide-range DU count rate (cps).

Indicator of gamma alarm – Gamma channel alarm indicator (red).

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Neutron channel measurement data – Tap this line to cycle neutron radiation dose rate value (μSv/h) and detectable neutron radiation count rate value (cps).

App messages – Various messages with a information of the latest alarm, etc. Tap this line to display event log in a new window.

Scanning strip chart – Strip chart of gamma channel count rate values. Green strip indicates there are no alarms. Blue strip indicates there are neutron channel alarms. Red strip indicates there are gamma channel alarms.

Statistical error – Statistical error of gamma or neutron radiation dose rate or count rate.

Alarms counter – Number of alarms on the gamma or neutron channel.

Indicator of neutron alarm – Neutron channel alarm indicator (blue).

BT-DU3 battery charge – Charge level of BT-DU3 adapter battery.

HPC battery charge – Charge level of HPC battery.

Background mode – The type of background under which the measurement is made.

2.2 "Connecting" mode

In "**Connecting**" mode the program connects to gamma channel and neutron channel. See Figure 3 for "**Connecting**" mode screen.
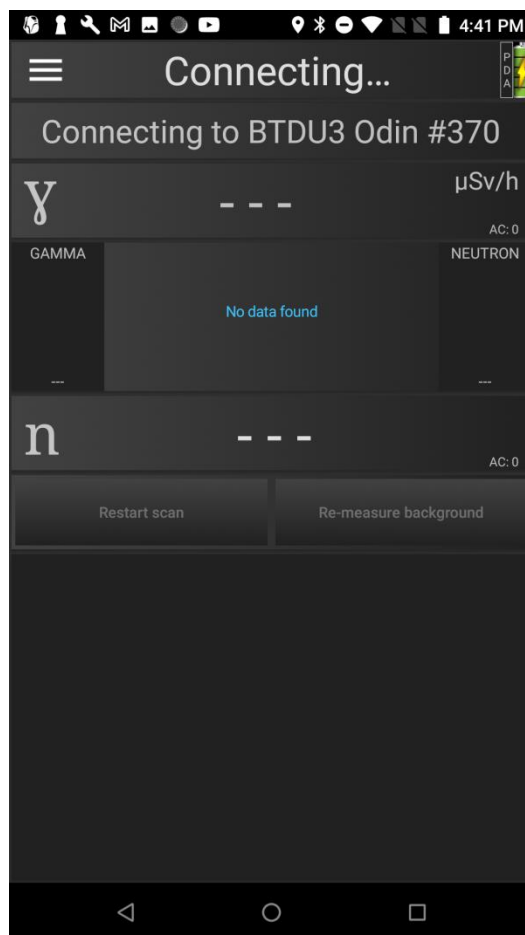

Figure 3

2.3 "Preparing" mode

In "**Preparing**" mode the program prepares channels for operation and warms up the gamma channel.

2.4 "Background" mode

Background data is necessary for proper implementation of BRD search functions for gamma-emitting sources of radiation. The duration time of the "**Background**" mode is 30 seconds; within this time the program measures gamma channel count rate and stores it in memory. See Figure 4 for "**Background**" mode screen.
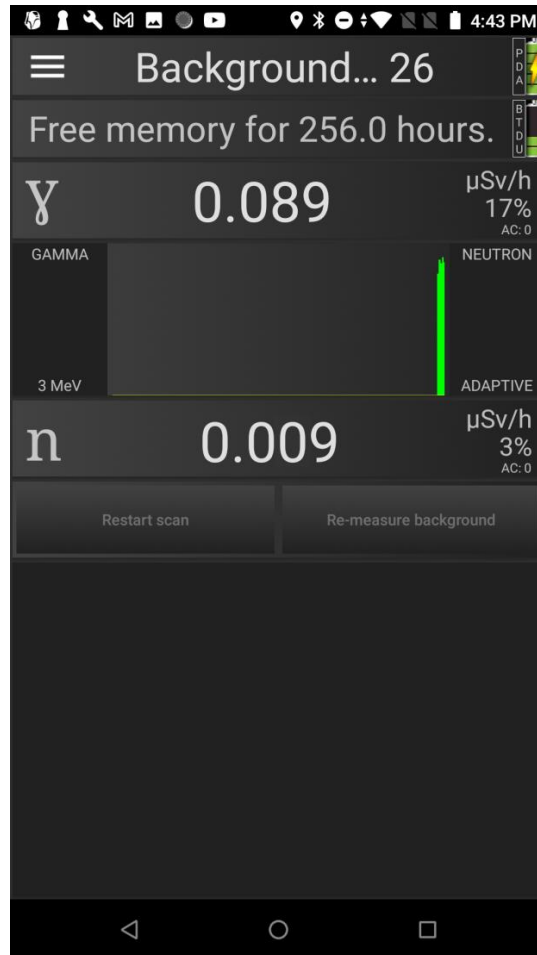

Figure 4

It is necessary to acquire background at a distance from examination object since this background serves as a reference for analysis of gamma radiation intensity from detected radioactive source.

2.5   "Scanning" mode

The "**Scanning**" mode is a process of gamma and neutron radiation sources detection with snap to location and saving all results.

This is the main operation mode. See Figure 5 for "**Scanning**" mode screen.
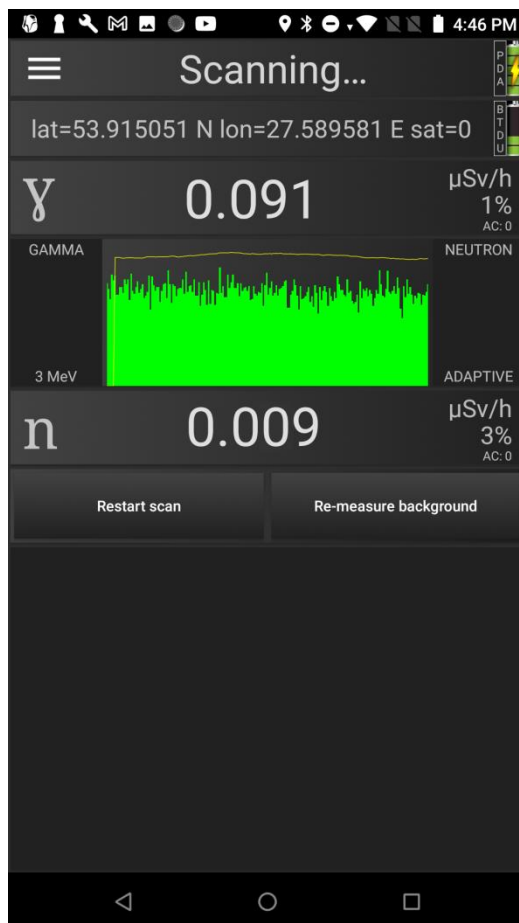

Figure 5

The "**Scanning**" mode features:

– Measure gamma channel count rate three times per second and save it to the count rate file with unique name in the **results folder**

– Measure neutron channel count rate once per second and save it to the count rate file with unique name in the **results folder**

– Perform GPS snap to location and saves snap data to spectra files, count rate files, Google Earth waypoint files in the **results folder**.

When you search for a radiation source and hear audio signals, start moving in the direction where these sounds are generated at a higher rate to locate the source of radiation.

When you search for a radiation source and hear audio signals, start moving in the direction where these sounds are generated at a higher rate to locate the source of radiation.

The program detects neutron radiation using analysis of neutron radiation count rate overrun over preset thresholds. If a single threshold is exceeded, sound, voice and light alarms for the neutron channel are activated.

Restart the scanning by going to "**Menu→Restart scanning**" or by tapping the "**Restart scan**" button. Then the program suggests adding a keyword, comment or name of a place where scanning takes place.

In "**Scanning**" mode you can work in various background modes:

Permanent background – Background acquired once before scanning and is used for comparison during search for gamma radiation. Permanent background re-measurement ban be forced by using the "**Menu→Reset and re-measure background"** command or by tapping the "**Re-measure background**" button in the main window of the program

Adaptive background – Background acquired before scanning, however further it constantly changes and adapts to alterations of radiation level. Adaptation runs if there are no gamma channel alarms only. In adaptive background mode the background value is adjusted to current radiation background approximately in 30 seconds.

You can switch to desired background mode by going to "**Menu→Settings→General settings→Background mode**" and select the "**Permanent**" or "**Adaptive**" variant.

2.6   "Threshold override" sub-mode

If the safety threshold is exceeded, the program triggers a voice and sound alert. At the same time the message area displays "**Radiation safety alarm**" message. That is an indication to **IMMEDIATELY** leave the location where the radiation contamination has been detected!

2.7   "Overload" sub-mode

When the upper range limit of the connected DU is exceeded, the overload mode is triggered. In this case, the program informs user by voice alert and alarm, and the letters "**OL**" will be displayed near the alarm indicator. In case the spectrometric DU is overloaded (when the wide-range DU is connected) the readings will automatically switch from spectrometric to wide-range, and the message "**Dose rate overload**" will appear in the mode display line and message area of the program (see Figure 6).

In case the spectrometric DU is overloaded (when the wide-range DU is not connected) or if the wide-range DU is overloaded, the message "**Gamma channel overload**" is displayed in the mode display line and the message area of the program (see Figure 6).
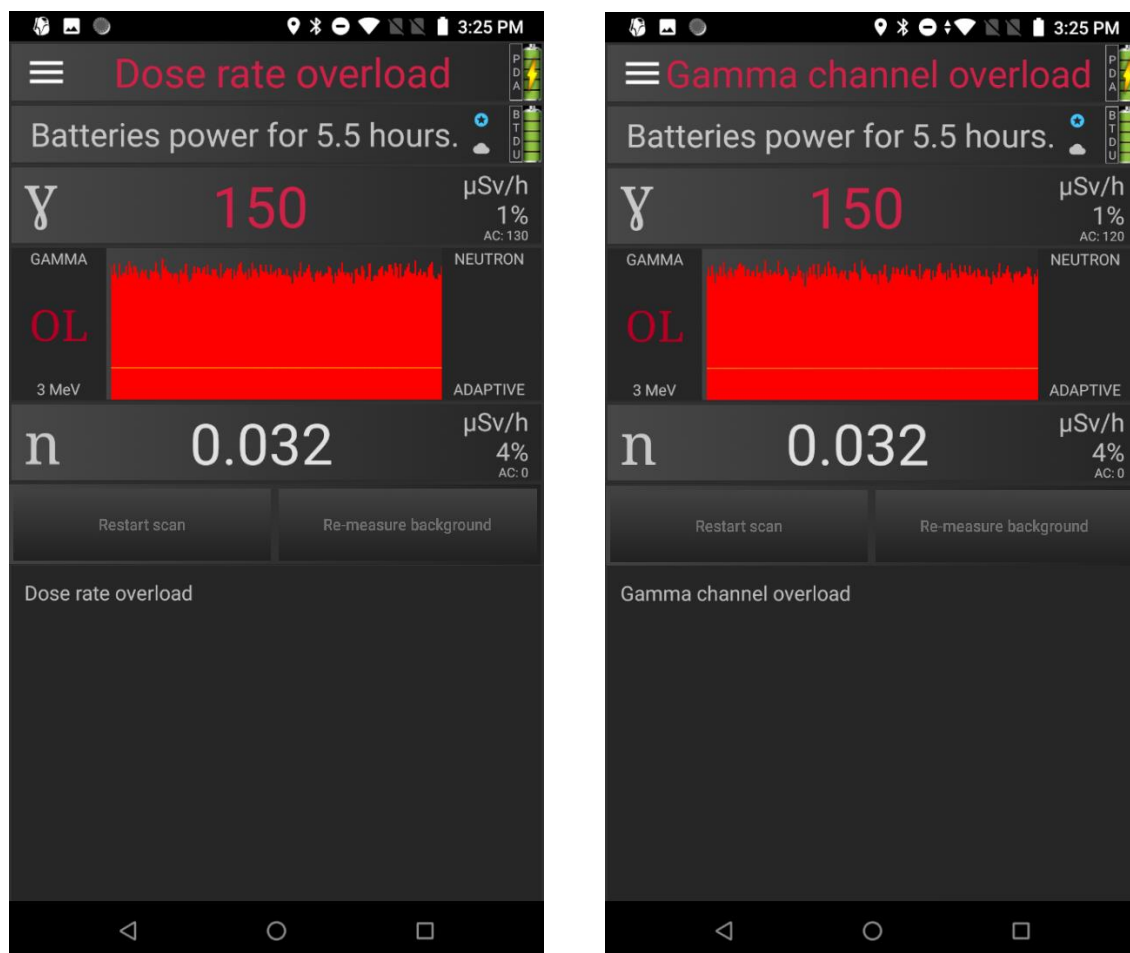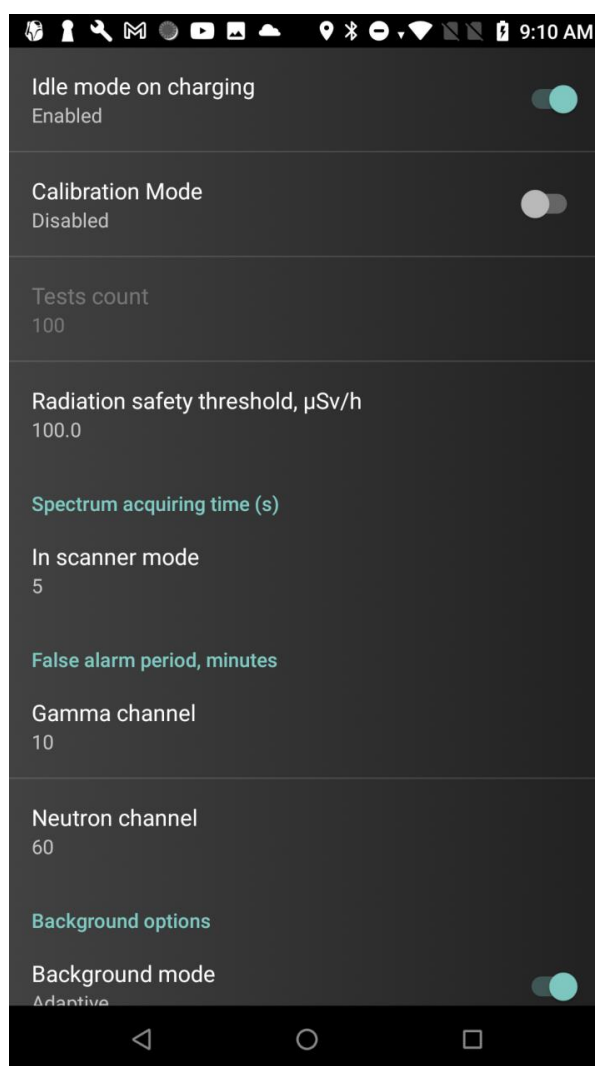

Figure 6

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2.8   "Idle" mode

The "**Idle**" mode is an idle operation mode of BRD.

The BRD activates this mode in the following cases:

− Low HPC and/or BT-DU3 adapter batteries

− Low HPC memory to store data

− Gamma channel has no calibration by energy

− Gamma channel fault.

The "**Idle mode on charging**" option (see Figure 7) prevents using the "**RSA Lite**" program while charging when the AC adapter is connected. In this case the "**RSA Lite**" automatically switches to the "**Idle**" mode.

Figure 7

The "**Calibration Mode**" option allows connecting any DU (even neutron or wide-range DU) to the BT-DU3 adapter without having to connect spectrometric DU. It is required for BRD calibration purposes.

2.9   "Log view" mode

To view the event log in "**Scanning**" mode, tap the "**Program messages**" field. All logs have unique names, which consist of date and time. When you completed viewing the log, click the "**Back**" button on the HPC screen.

2.10   General program settings

The "**Menu→Settings→General settings**" option (see Figure 8) allows to:
- − Enable or disable options to start "**Idle**" mode on charging
- − Enable or disable Calibration Mode
- − Set tests count
- − Set the safety threshold
- − Set the acquisition time for scanning mode
- − Set the false alarm period value for gamma channel and neutron channel
- − Set background options – Selecting the type of background to be acquired (adaptive or constant) for gamma channel, selecting the background value for the neutron channel.
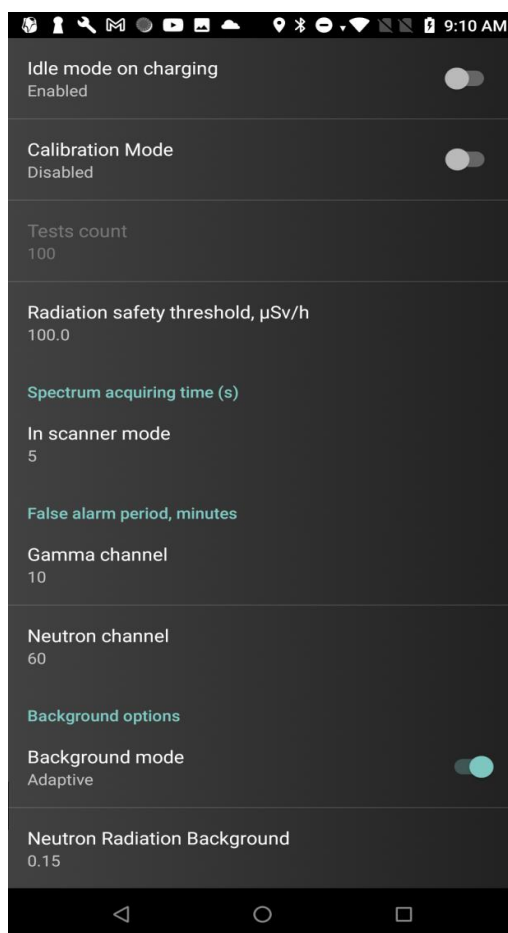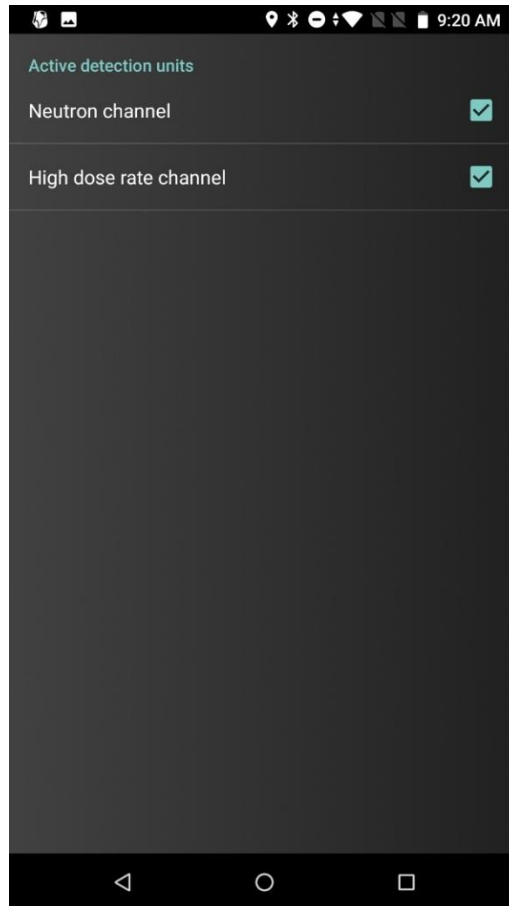

Figure 8

Use the **"Menu→Settings→Hardware configuration**" option to specify the BRD configuration (see Figure 9).
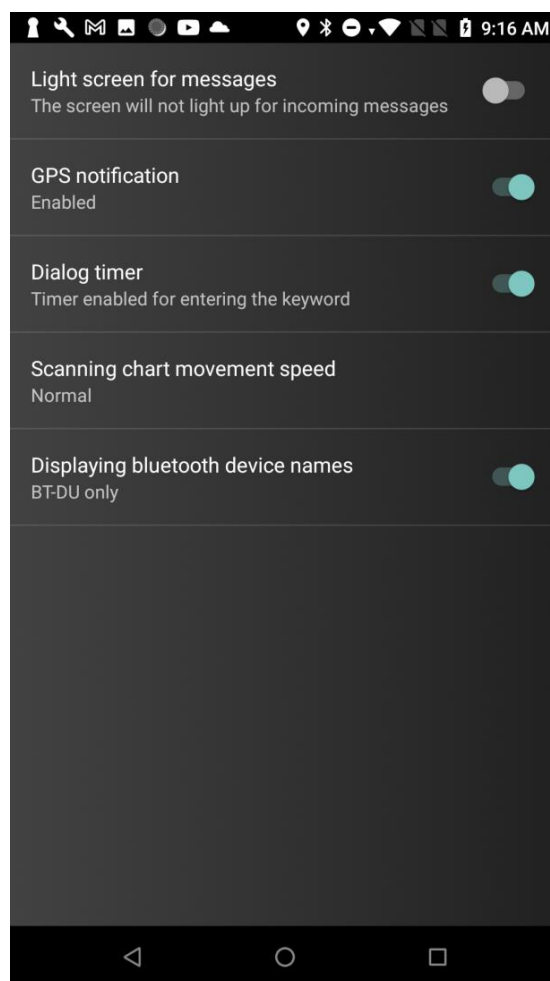

Figure 9

If a DU box in the "**Active detection units**" window is selected, the program will periodically try to establish a connection with this type of DU. If communication to the DU is lost, the program will notify the user by a voice message.

Choose "**Menu→Notifications**" to change the notification settings of the program. (see Figure 10).

The notification window has the following settings:
- Light up/do not light up the screen on incoming messages
- Enable/disable GPS notifications
- Enable/disable the timer in the keyword and start stabilization dialog boxes
- Scanning chart movement speed (**Very slow**, **Slow**, **Normal**, **Fast**, **Very fast**)
- Enable/disable displaying BT-DU devices only in Connect Instrument Dialog.

Figure 10

Advanced configuration of the program is available in "**Menu→Manage Settings**" (see Figure 11). The settings management window contains the following options:

- − To change the storage location of program data
- − To specify an external settings file
- − To import the current program settings
- − To export settings
- − To reset the settings to defaults.
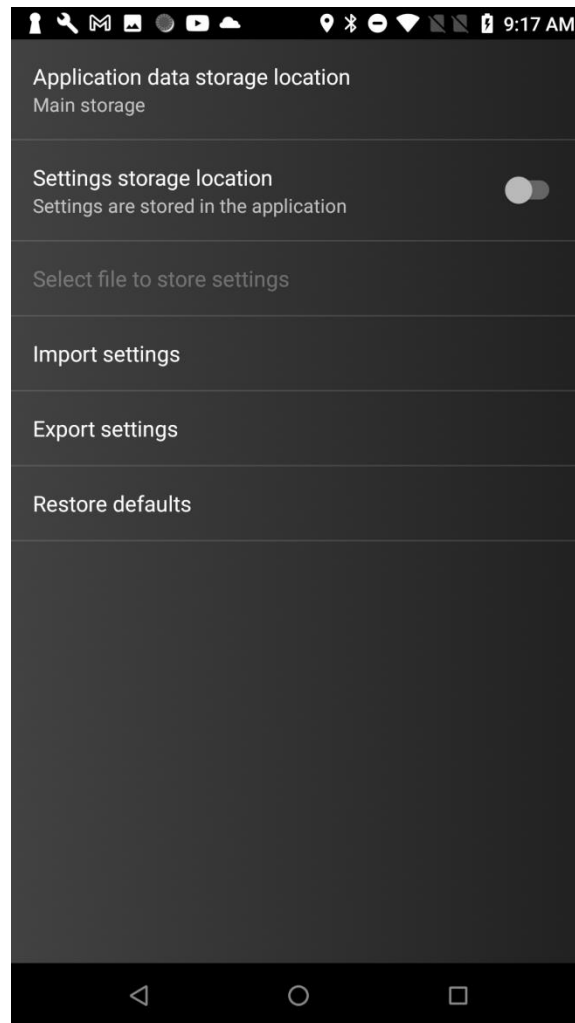
Figure 11

External settings file allows managing the program settings. When this mode is enabled, the program starts monitoring this external file and if a change occurs in it, immediately overwrites its settings with the settings in file. Changes to program settings have no effect on the settings in the external file.

This option enables settings to be controlled, for example, from another program.

You can create an external settings file yourself or use an existing file:

a) Select file. Use this setting to navigate to settings file (.txt file extension). By selecting a settings file, file monitoring enables automatically

b) Create new file. By selecting this setting you can navigate to file location and specify the name of the settings file. If this file already exists, the program will either overwrite it with program settings, or the settings will be replaced with the settings from file (user-selectable option). When you tap the "**Save**" button, the dialog box closes and file monitoring enables automatically.

The file obtained under "**Settings→Export Settings**" can be used as an external settings file.

The main screen icon " " is displayed when external settings file monitoring option is enabled. Once the file is deleted, monitoring will be paused.

Only necessary settings can be kept in the external file, and the program will overwrite only the settings contained in the file.

2.11   Cloud storage

The program has a function for uploading files to a cloud storage. Use the "**Upload files to cloud storage**" option to enable it (see Figure 12).
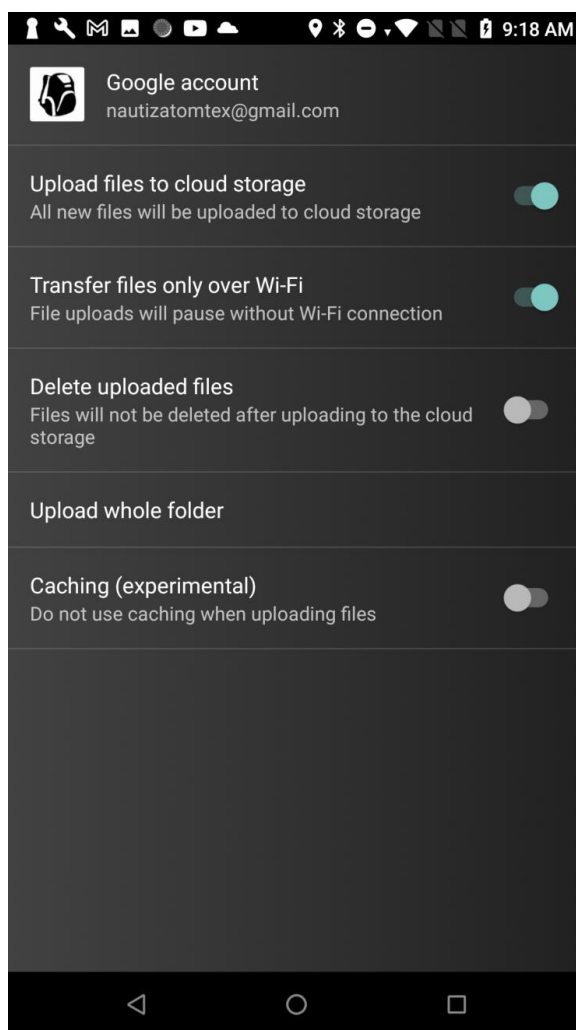
Figure 12

Follow by selecting Google account. Files will be uploaded to Google Drive in the "**ATOMTEX/RSA Lite**" folder of this account If the folder does not exist, it will be created automatically. The program screen will display the " " icon. For multiple files uploading the upload process is displayed as a percentage.

Navigate to "**Menu→About**" to view the "**RSA Lite**" version information.

2.12   Data management

To manage the data collected during BRD operation, use a file manager available in the HPC to browse for "**Device memory\ATOMTEX\RSA Lite**" program folder.

You can delete, copy, move and view file and folder properties in a standard way for Android OS.

To "**Share**" a file(s) do the following:

1   Select the file from the list (a check-mark will be added to the selected file(s))

2   Tap "**Share**" in the pop-up menu

3   Choose transfer medium: e-mail, cloud storage, instant messaging, etc.

To transfer the data folder, it shall be archived first. Do the following:

1   Select the folder from the list (a check-mark will be added to the selected folder(s))

2   Tap the button with three dots in the header bar. Select "**Compress**" in the new context menu

3   Select an archiving method "**Compress**".

To "**Share**" this new archive file, follow steps 1-3 for transferring a file.

Keep in mind the limitations established by the web services while sending the files.

3   Troubleshooting

Possible faults and methods of their elimination are presented in the table 1.

Table 1

Problem	Decision
No GPS signal	Make sure GPS is turned on and the HPC is in open area
No connection to BT-DU3 adapter	Make sure that BT-DU3 adapter is charged and turned on
	Make sure BT-DU3 adapter is connected to detection units by DU cables
	Check BT-DU3 adapter settings as described in Section 1.4.3
	Try to restart BT-DU3 adapter
Low memory messages in "**RSA Lite**"	"**RSA Lite**" stores data to HPC memory. If HPC doesn't have enough free memory, then transfer the measurement results to a desktop computer or delete the measurement results to free the memory
The program doesn't respond	Restart the HPC. Check operation
	Reinstall the program and configure the connection with the BT-DU3 adapter. Check operation
	Otherwise, report the problem to manufacturer (**http://www.atomtex.com**)