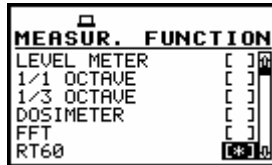


## G. RT 60 MEASUREMENT OF THE REVERBERATION TIME



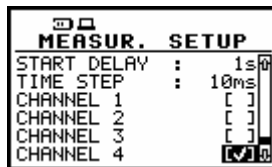
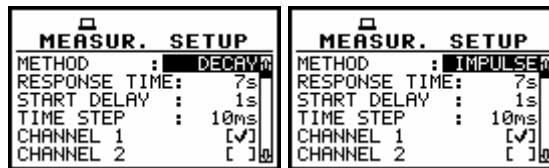
**Notice:** It is recommended to familiarize with the **Appendix H** before proceeding. This chapter describes only the navigation of the instruments for one channel measurements (CHANNEL 4), whereas **Appendix H** depicts the definitions and description of the reverberation time measurement.

1. Select the RT 60 measurement function in the **MEASUREMENT FUNCTION** window (path: **FUNCTION / MEASUREMENT FUNCTION**). Press **<ENTER>** for confirmation.



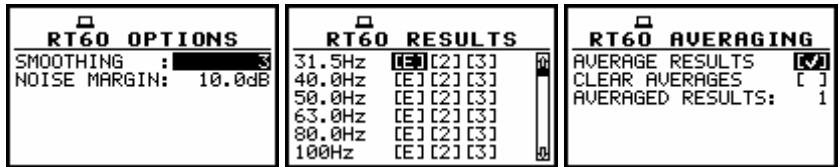
2. Select measurement parameters in **MEASUREMENT SETUP** window (path: **INPUT / MEASUREMENT SETUP**)

- **METHOD: DECAY, IMPULSE** (depending on the sound source)
- **RESPONSE TIME: 1s to 30s** (default 7s, for details see Appendix H)
- **START DELAY: 0.1s to 60s** (default 1s)
- **TIME STEP: 10 ms to 100 ms** (default 10ms)
- Tick the channel/ channels for RT60 measurements (**CHANNEL 1, CHANNEL 2, CHANNEL 3, CHANNEL 4**)
- Press **<ENTER>** for confirmation of made settings

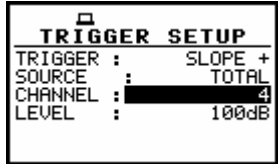


3. Select options / parameters in **RT60 SETUP** window (path: **INPUT / RT60 SETUP**)

- **RT60 OPTIONS**
  - **SMOOTHING: 0 to 15** (default 3)
  - **NOISE MARGIN: 3.0dB to 20.0dB**
  - press **<ENTER>** for confirmation
- **RT60 RESULTS**
  - **EDT ([E] or [ ]), RT20 ([2] or [ ]), RT30 ([3] or [ ])** for each 1/3 octave frequency
  - press **<ENTER>** for confirmation
- **RT60 AVERAGING**
  - **AVERAGE RESULTS [✓] or [ ]**
  - **CLEAR AVERAGES [ ] or [✓]**
  - **AVERAGED RESULTS : 1**
  - press **<ENTER>** for confirmation



4. In the *INPUT / TRIGGER SETUP* window select the number of the **CHANNEL** and signal **LEVEL** for the RT60 measurement triggering purpose. Press **<ENTER>** for confirmation.



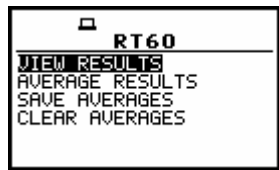
5. Press **<Start / Stop>** push-button to start the measurement – The **WAITING FOR TRIGGER** message will appear on the display.



6. When the trigger condition is fulfilled the **MEASUREMENT IN PROGRESS** message appears on the display and next the **RT60 CALCULATION IN PROGRESS** message appears on the display.

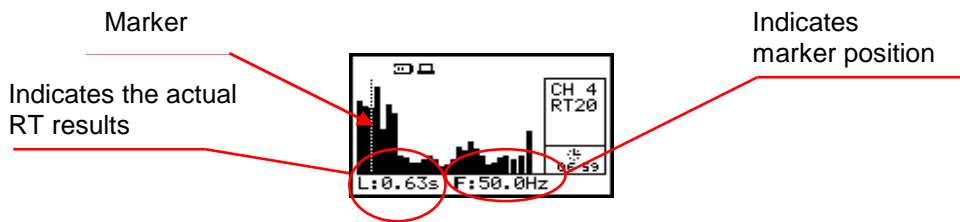


7. When the averaging is enabled and the calculations are done the following window appears on the display (level **0**). The user can view the results (**VIEW RESULTS**) and, if they are acceptable, include them to the averaging process by the **AVERAG RES.** function. Then proceed with the next measurements which could be averaged with the previous results. To save averaged results enter the **SAVE AVERAG.** sub-list. To save last (actual) measurement results enter the **SAVE** sub-list (*path: MENU / FILE / SAVE*) or utilize the **AUTO SAVE** option (*path: MENU / FILE / SAVE OPTIONS*).



- **VIEW RESULTS** - By pressing the **<ENTER>** push button when this text is highlighted the user enters to level **1** of the visualization system to the graphical view (bar graph) of reverberation time results. If the results are acceptable, the user may include them to averaging process by the **AVERAG RES.** function in level **0** list.

Below the Reverberation Time results are presented on the display (level **1**)



- **AVERAGE RESULTS** - By pressing the **<ENTER>** push-button on this text the user activates the selection of the actual reverberation time result (last measurement) to be included to averaging process. The actual results are averaged with the results previously averaged or the results prepared to average with the upcoming results (the results which would be obtained in the next measurements).

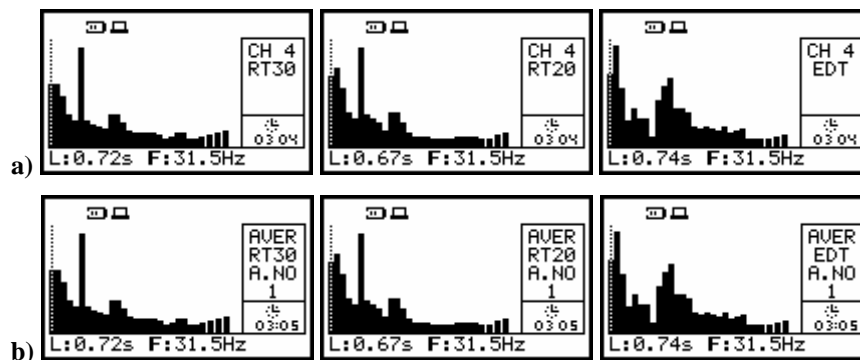
- **SAVE AVERAGES** - By pressing the **<ENTER>** push-button the user can save averaged result (only the values after the last averaging process). This option is available (the text can be highlighted) only when the averaging process was performed (what is indicated by appearing the **OK** text in the end of the line **AVERAGE RES.:** - see picture (b) above).

- **CLEAR AVERAGES** (Clear averaging process) – By pressing the **<ENTER>** push-buttons on this text and confirming the clearing in appearing dialog box, the user starts the new averaging process (all data obtained in averaging process will be lost if they were not saved by the **SAVE AVERAG.** function).

8. If the averaging process is disabled the visualization screen of level 1 appears on the display just after RT60 calculations execution. To save results enter the **SAVE** sub-list (*path: MENU / FILE / SAVE*) or utilize the **AUTO SAVE** options (*path: MENU / FILE / SAVE OPTIONS*).

**The navigation keys in level 1:**

- **<ENTER>** push-button - Enter upper level 2, where on the display three (**EDT, RT 20 and RT 30**) **RT 60** results are presented for the actual marker position in level 1.
- **<ESC>** push-button - Return to lower level 0 (if the averaging process is enabled).
- **<▲>, <▼>** push-buttons - switch between the data presented on the bar graph. Explicitly between the reverberation time results obtained by the different definitions of the **RT 60: EDT, RT 20 and RT 30** (for more detail about that see **Appendix H**). If the averaging process is enabled the averaged data of the **RT 60** function are also available to view **AEDT** (averaged **EDT**), **A 20** (averaged **RT 20**) and **A 30** (averaged **RT 30**). The all possibilities are presented below: (a) actual measurement results (b) averaged results. The results from selected channels, the average result from the selected channel and average result from all channels are also available.



- <<>, <>> push-buttons - Move the marker in the left and right direction on the bar graph. The actual position of the marker and the reverberation time at its position are indicated in the right region of the display (see figure above – the indicating positions).

➤ **LEVEL 2**

The display of level 2 visualization system presents the three reverberation time results (**EDT, RT 20, RT 30**) for the 1/3 octave band (or total level) pointed by the marker on the level 1.

RT60	
CHANNEL	4 500Hz
EDT	= 0.51s
RT20	= 0.26s
RT30	= 0.30s

**The navigation keys:**

- <ENTER> push-button - Enter upper level 3, where on the display the decay curve for actual 1/3 octave band (or total level) is presented.
- <ESC> push-button - Return to lower level 1. The marker position at level 1 will be set to the actually presented 1/3 octave band (or total level) in level 2.
- <▲>, <▼> push-buttons - scroll up and down the presented 1/3 octave bands (or total level) reverberation time results (for more details see the table).
- <<>, <>> push-buttons – switching between channels

➤ **LEVEL 3**

The level 3 is the highest level of the results visualization system. At this level the display presents the plot in which the decay curve of the sound pressure level versus time is illustrated. The graph is plotted for actual 1/3 octave band or (total level) which was indicated in the previous level 2. This level allows calculating the user reverberation time by placing the marker **A5** on the decay curve. The display view and the description of it are shown in the picture below.

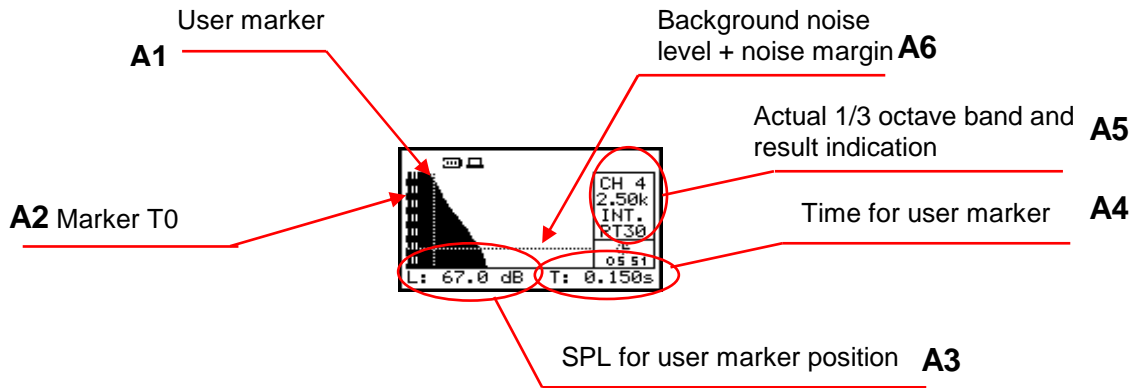
The legend for the figure below:

- **A1** – This vertical dotted line indicates the user marker position. By placing this marker the user can calculate the own reverberation time indicated as the **RT USER** (for more details see **Appendix H**)
- **A2** – This line indicates the T0 marker position. This marker is used as a starting point to all three (and the **RT USER** also) reverberation time calculations (for more details see **Appendix H**).
- **A3** – This field shows the **SPL** (sound pressure level) in the actual marker (**A1**) position.
- **A4** – This field denotes the actual user marker position and shows label of the marker (when the user marker actual position is the same as T0 marker or T1 marker the upper line indicates that).
- **A5** – Text placed in this field indicates which 1/3 octave band (or total level) decay curve is plotted on the display
- **A6** – This horizontal dotted line indicates the calculated steady sound level value. In the crossing point of this line with the decay curve, the marker T0 is placed. This marker is used as a starting point to all three (and the **RT USER**) reverberation time calculations (for more details see **Appendix H**).



**Notice:** The data to plot the graph of the decay curve can be selected between **RAW DATA, SMOOTH DATA** or **INTEGRATED DATA** (path: **DISPLAY/ DISPLAY MODES**).

Display in level 3 with the legend is presented below.



**The navigation keys:**

- **<ESC>** push-button – Return to the lower level **2** keeping the actual 1/3 octave band (or total levels) position.
- **<▲>**, **<▼>** push-buttons – Switch the data presented on the graph between 1/3 octave bands (or total levels), the **A5** indicates actually plotted data.
- **<Shift> + <▲>** push-buttons – Scroll the decay curve graph in up vertical directions.
- **<Shift> + <▼>** push-buttons – Scroll the decay curve graph in down vertical directions.
- **<<>**, **<>>** push-buttons – Move the marker in horizontal directions (left / right) and also scroll the decay curve plot in the horizontal direction if the user tries to move the marker outside the visible area of the display. By holding the **<Shift>** push-button the move of the marker is accelerated.
- **<ENTER>** - enter to the level 2 and level 2' and calculate the user reverberation time for actual marker position

RT60	
CHANNEL	4 8.00kHz
EDT	= 0.41s
RT20	= 0.17s
RT30	= 0.19s
RT USER	= 0.20s