

3. SETTING OF THE INSTRUMENT

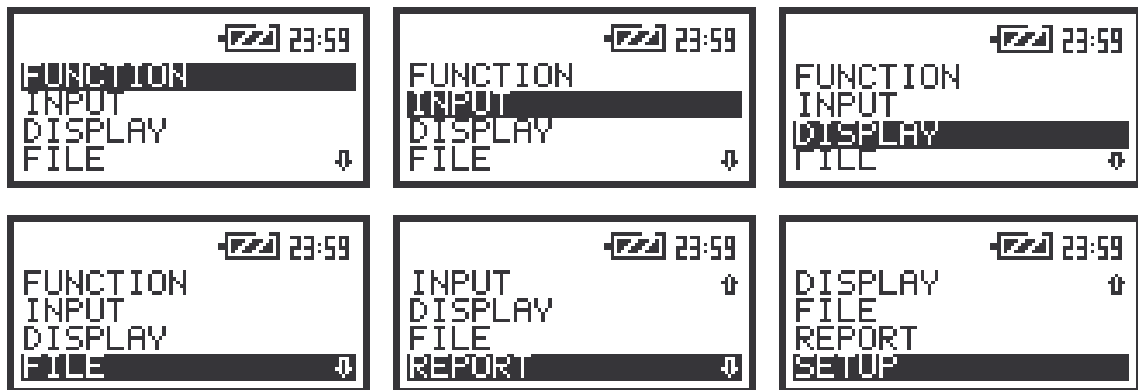
In order to perform the measurements using the instrument the user has only to plug in the preamplifier with the microphone and switch the power on.



Notice: The user has to press the <PAUSE> and <START / STOP> push-buttons in parallel in order to switch the power On/Off.

3.1. BASIS OF THE INSTRUMENT'S CONTROL

The instrument is controlled by means of nine push-buttons of the keyboard. Using it one can access all available functions. These functions are placed in the system of lists and sub-lists. The main list contains the headers of six lists which also contain sub-lists or positions (elements). The main list is opened after pressing the <MAIN> push-button. This list contains the following lists: *FUNCTION*, *INPUT*, *DISPLAY*, *FILE*, *REPORT* and *SETUP*. The elements of each list are described in details in Chapter 4 and 5. Only one list can be accessed in a time, this one which name is highlighted (displayed inversely). The change of the highlighted line is done after pressing the <▲>, <▼> (or <◀>, <▶>) push-buttons.



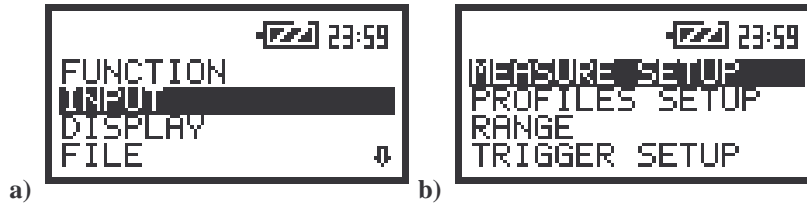
The view of the screens with the displayed inversely elements of the main list

After double pressing of the <MENU> push-button the list containing four sub-lists lately accessed by the user appears on the screen. After switching on the instrument this list contains four **EMPTY** texts which means that the user did not open yet any sub-list. The examples of this list are presented below. Such solution enables one to access very fast four, the most frequently used, lists without the necessity of passing the whole path.



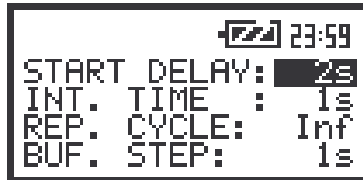
The view of the screens with the sub-lists which were lately accessed by the user (after double pressing of the <MENU> push-button)

After the selection of the desired list (the <▲> or <▼> push-buttons), the user has to press the <ENTER> push-button in order to enter it. After this new sub-lists, positions (elements) or various data specification appear on the screen.



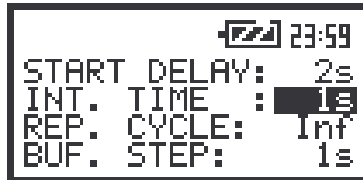
The view of the screens with the main list (a) and the elements of the *INPUT* lists

Next pressing of the <ENTER> push-button enables one to access mentioned above sub-lists.



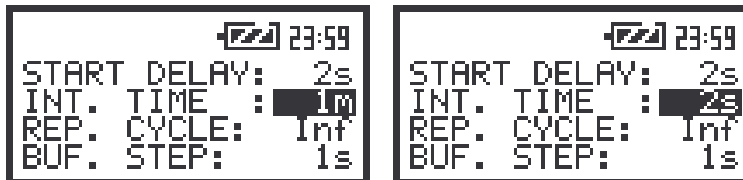
The view of the screen with the opened MEASURE SETUP sub-list

The desired position of a list is accessed after pressing the <^> or <v> push-button.



The screen with the opened MEASURE SETUP sub-list; the INT.TIME position accessible

The change of the value in a selected position is performed by pressing the <left> or <right> push-buttons.



The screens with the accessed INT.TIME position after pressing the <left> or <right> push-buttons, respectively

The <ENTER> push-button is used for the confirmation of the selection in a position and for closing the opened sub-list. The sub-list is closed ignoring any changes made in a sub-list by pressing the <ESC> push-button.



The screens after three consecutive pressing of the <ESC> push-button from the MEASURE SETUP sub-list

As it was mentioned, some of the sub-lists end with the windows informing the user about the state of the instrument, available memory, not existing files or buffers, standards fulfilled by the unit, etc.



The view of the screens during and after the accessing the METEO option

In order to close such window the user has to press the <ESC> push-button. In the instrument there are also windows which are used for entering text (i.e. the name of the file, the header for the printed reports from the measurements).

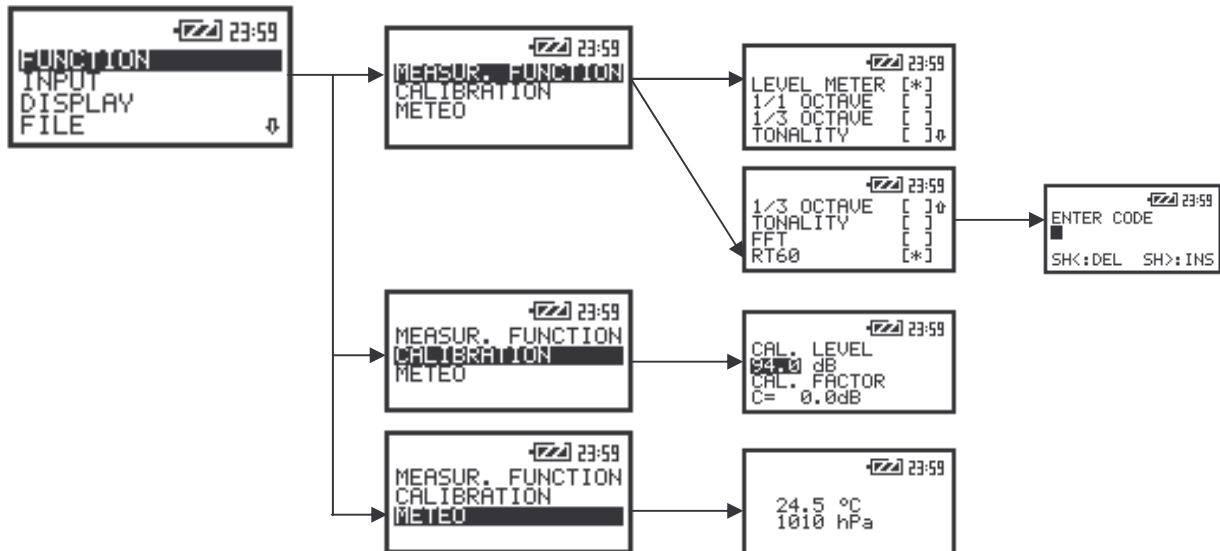


The screens during the edition of the text which has to be printed as a header in the measurement reports

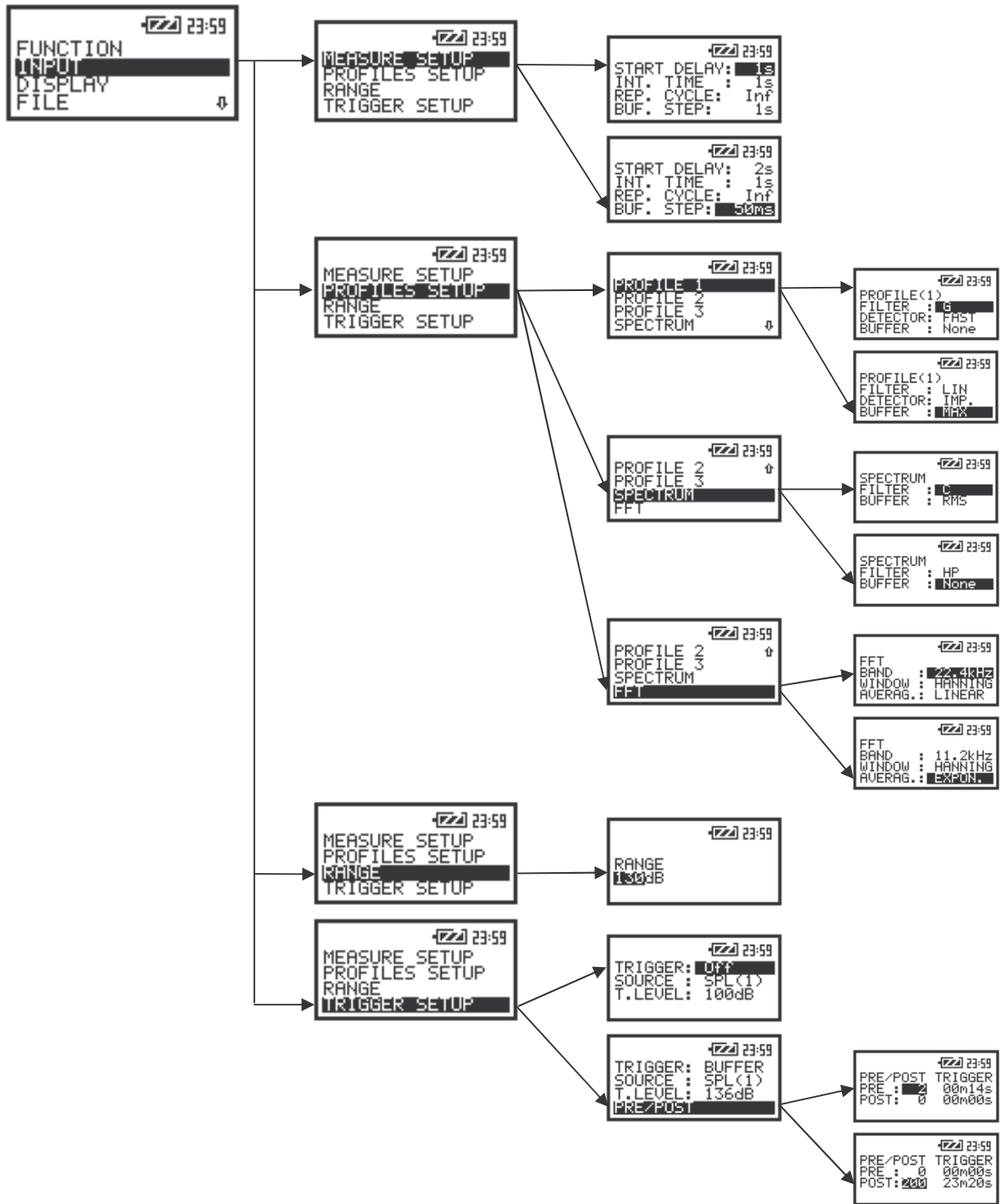
Below the structure of the elements of the main list is presented The more detailed description of the *FUNCTION* and *INPUT* lists is given in Chapter 4 and the *DISPLAY*, *FILE*, *REPORT* and *SETUP* lists – in Chapter 5.

∇ *FUNCTION* (one of the main lists available after pressing the <MENU> push-button)

- ∅ **MEASUREMENT FUNCTION** (sub-list)
 - § LEVEL METER (position); available values: [] / [*]
 - § 1/1 OCTAVE (position); available values: [] / [*]
 - § 1/3 OCTAVE (position); available values: [] / [*]
 - § TONALITY (position); available values: [] / [*]
 - § FFT (position); available values: [] / [*]
- ∅ **CALIBRATION** (sub-list)
 - § CAL. LEVEL (position); available values of the calibration level: **54dB .. 134dB**
 - § CAL. FACTOR (position); it displays the calculated calibration factor
- ∅ **METEO** (window in which the measured temperature and pressure are displayed)
 - § Result of the measurement of temperature
 - § Result of the measurement of pressure

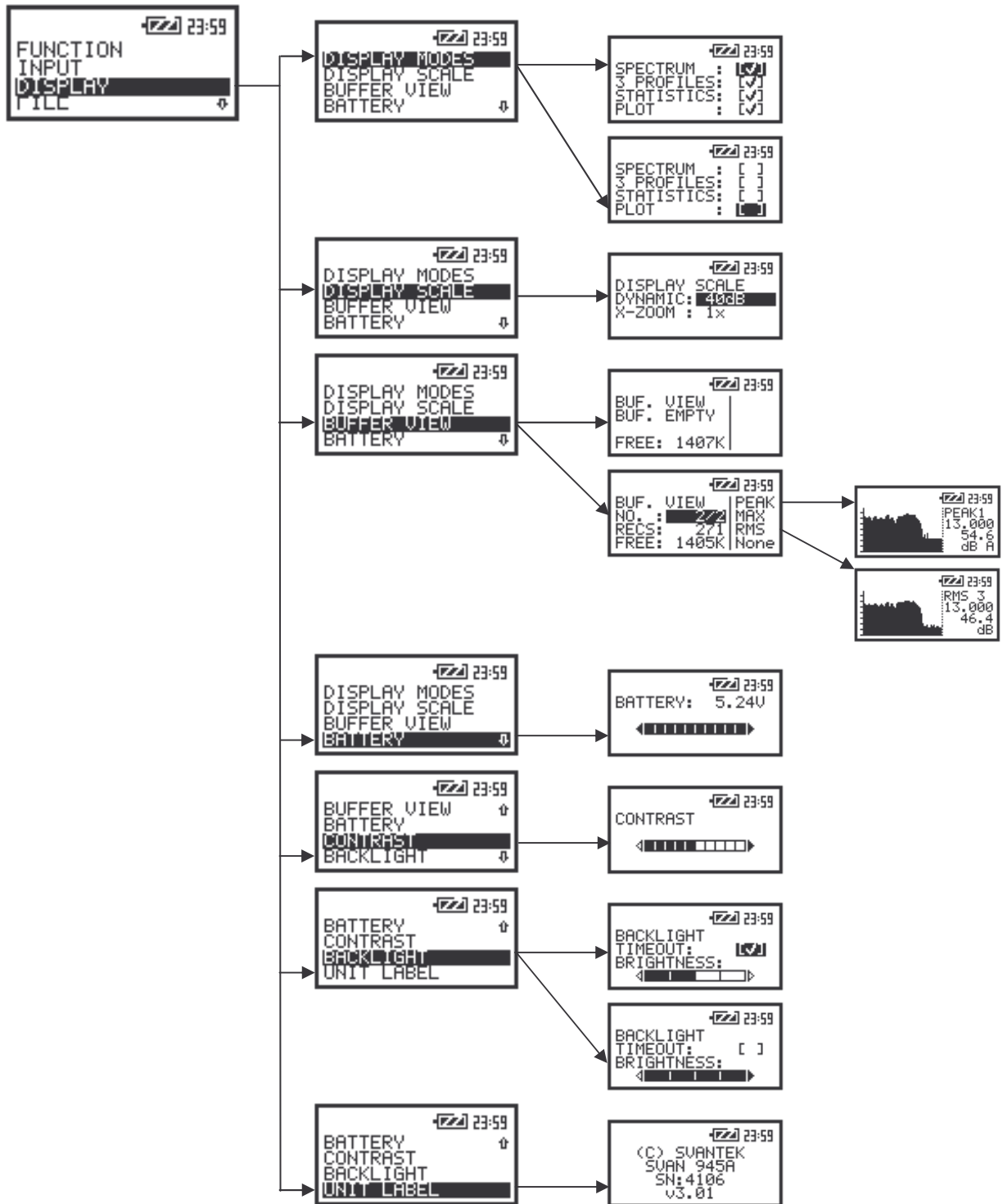


Control diagram of the *FUNCTION* list



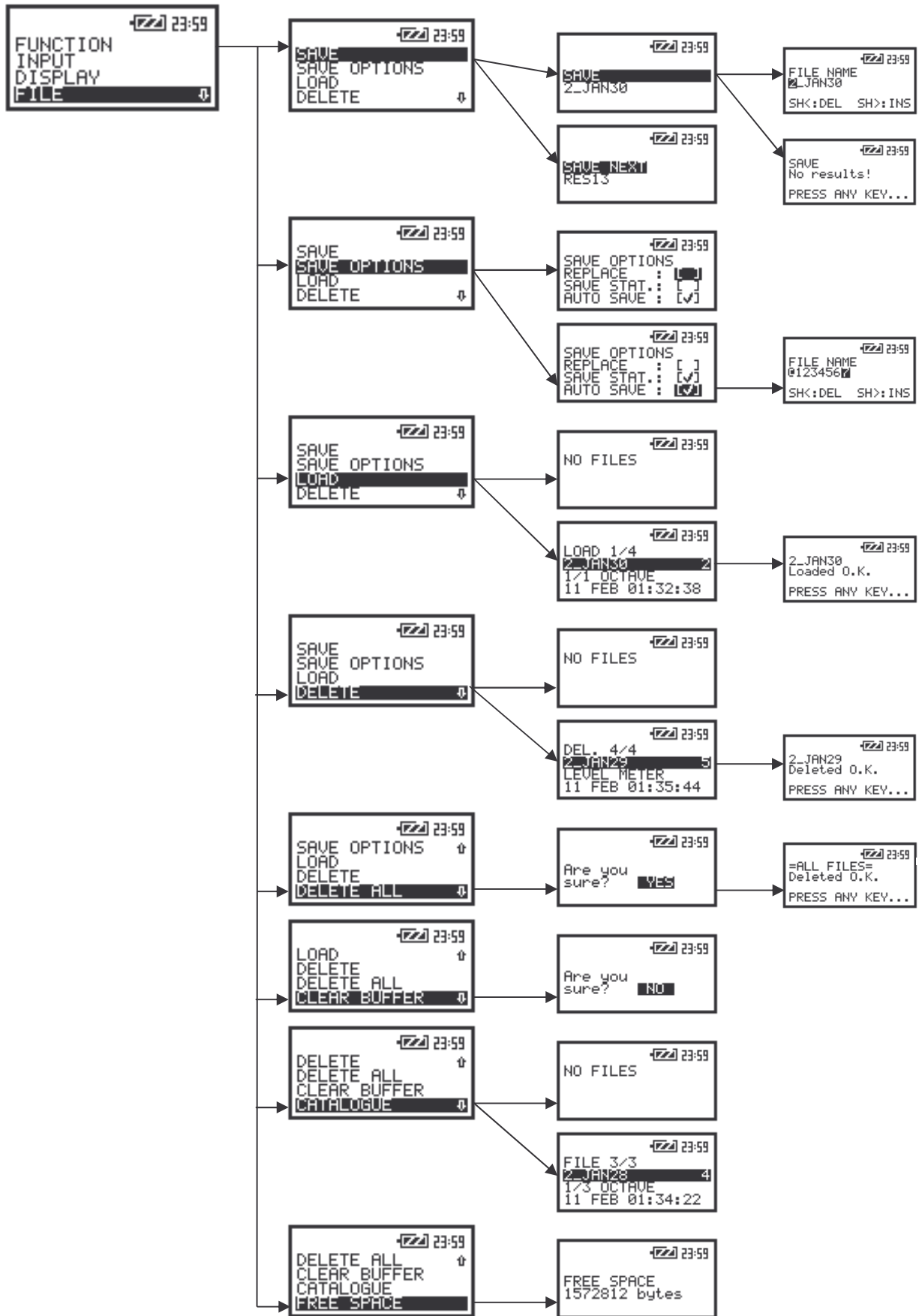
Control diagram of the *INPUT* list

- ∇ **DISPLAY** (one of the main lists available after pressing the <MENU> push-button)
 - ∅ **DISPLAY MODES** (sub-list); it enables the user to activate ([√]) or switch off ([]) the available modes of result's presentation
 - § **SPECTRUM** (position); available values: [√] or []; this position is not active in the **SLM** mode
 - § **3 PROFILES** (position); available values: [√] or []
 - § **STATISTICS**: (position); available values: [√] or []
 - § **PLOT**: (position); available values: [√] or []
 - ∅ **DISPLAY SCALE** (sub-list)
 - § **SCALE**: (position); available values of the scale of graphical modes of the result's presentation: **LINEAR, LOGARITHM**
 - § **DYNAMIC**: (position); available values of the dynamics of graphical modes of the result's presentation: **80dB, 40dB, 20dB, 10dB**
 - § **X-ZOOM**: (position); it informs the user about the multiplier for the horizontal axis of the graphical modes of the result's presentation): **1x**
 - ∅ **BUFFER VIEW** (sub-list)
 - § **NO.:** (position); available number of the files in the instrument's buffer containing the results of measurements
 - § **RECS** (position); it informs the user how many records with the measurement results contains the selected file from the instrument's buffer)
 - § **FREE** (position); it informs the user about the size of the available memory in the instrument's buffer
 - ∅ **BATTERY** (window); it informs the user about the state of the internal battery of the instrument
 - ∅ **CONTRAST** (sub-list)
 - § **CONTRAST** (position); it enables the user to select one from eleven possibilities of the contrast of the instrument's screen
 - ∅ **BACKLIGHT** (sub-list)
 - § **TIMEOUT** (position), available values [√] or []
 - § **BRIGHTNESS** (position); it enables the user to select one from five possibilities of the brightness of the instrument's backlight of the screen and the keyboard
 - ∅ **UNIT LABEL** (window); it informs the user about the serial number of the unit, the internal software version and the standards which the instrument fulfils



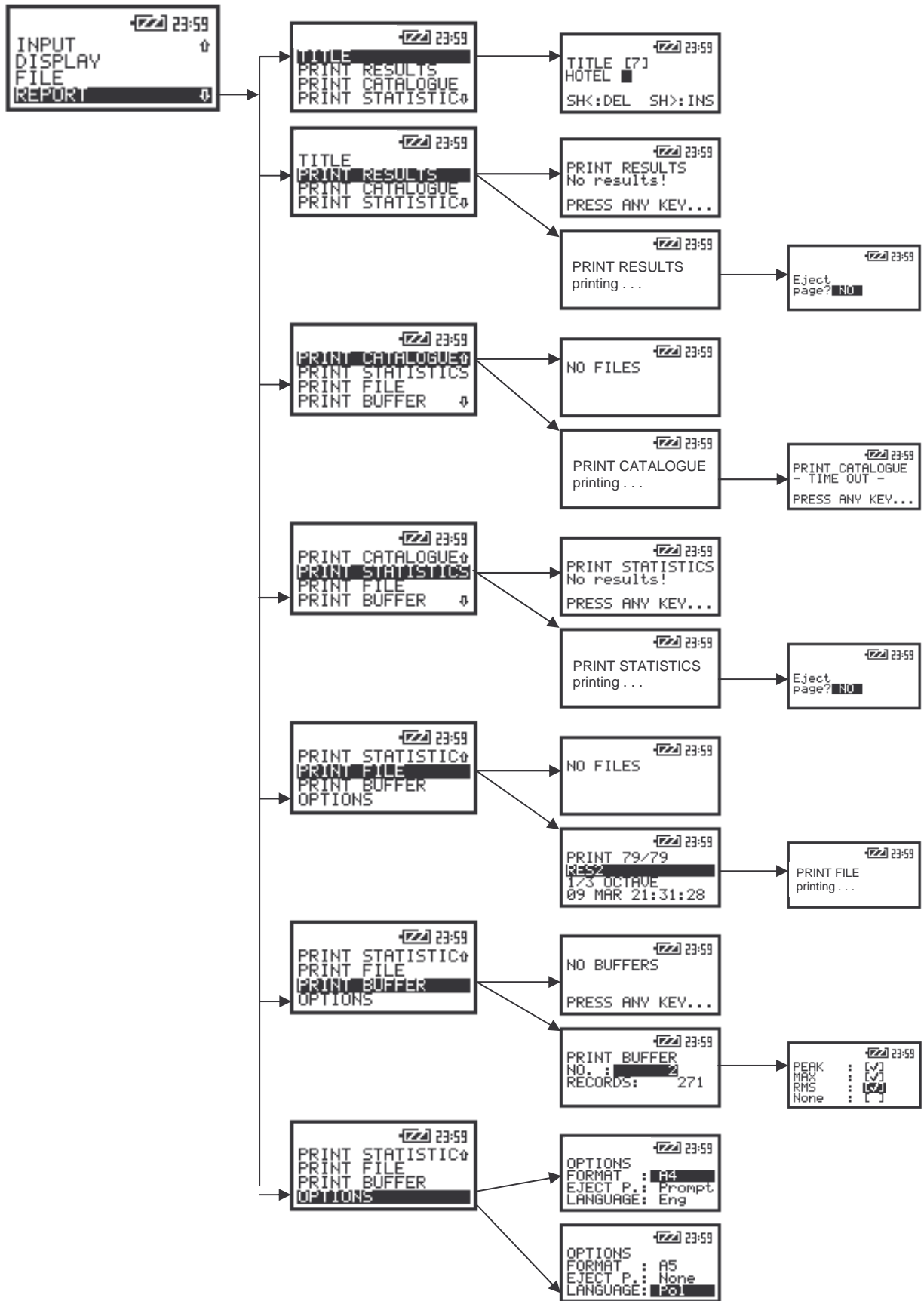
Control diagram of the *DISPLAY* list

- ∇ **FILE** (one of the main lists available after pressing the <MENU> push-button)
 - ∅ **SAVE: [name of the file]** or **SAVE NEXT: [name of the file]**; name of the file can be fully edited in the **FILE NAME** window after pressing the <ENTER> pushbutton in the case of **SAVE** or can be edited in the simplify way by pressing the <◀>, <▶> push-buttons together with <SHIFT> - in the case of **SAVE NEXT**; the **No results!** text is displayed in the case when the instrument did not perform any measurement
 - ∅ **SAVE OPTIONS** (sub-list)
 - § **REPLACE:** (position); it enables the user to replace the existing files in the instrument's memory by the files having the same name; available values: [√] or []
 - § **SAVE STAT.:** (position); it enables the user to save or not to save along with the measurement results the calculated statistics; available values: [√] or []
 - § **AUTO SAVE:** (position); it enables the user to save the measurement results in the instrument's memory without entering **SAVE** or **SAVE NEXT** position; available values: [√] or []
 - ∅ **LOAD** (sub-list); it enables the user to verify the list of files in the memory and to load to the working buffer of the instrument the selected one; the **NO FILES** text is displayed in the case when the instrument's memory is empty
 - ∅ **DELETE** (sub-list); it enables the user to verify the list of files in the memory and to delete the selected one; the **NO FILES** text is displayed in the case when the instrument's memory is empty; the confirmation is required before the erasing of the selected file
 - § **Are you sure?**
 - ∅ **DELETE ALL** (sub-list); it enables the user to delete all files saved in the instrument's memory; the confirmation is required before the erasing of all files
 - § **Are you sure?**
 - ∅ **CLEAR BUFFER** (position); it enables the user to delete all files saved in the buffer of the instrument; the confirmation is required before the erasing of all files from the buffer memory
 - § **Are you sure?**
 - ∅ **CATALOGUE** (sub-list); it enables the user to verify the list of files in the memory; the **NO FILES** text is displayed in the case when the instrument's memory is empty
 - ∅ **FREE SPACE** (window); it informs the user about the size of the available memory for saving the measurement results in the files



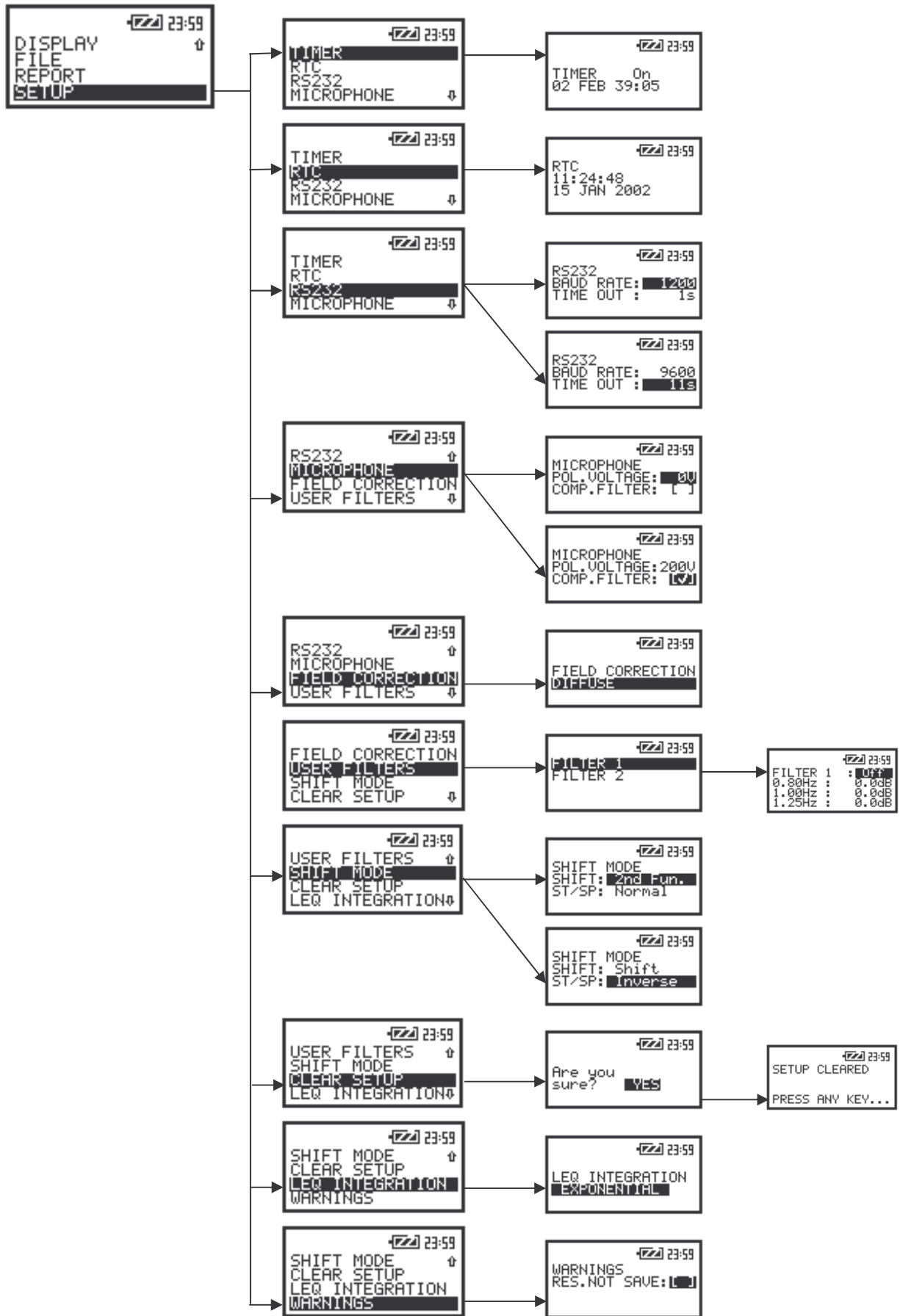
Control diagram of the *FILE* list

- ∇ **REPORT** (one of the main lists available after pressing the **<MENU>** push-button)
 - ∅ **TITLE** (position); it enables the user to edit the text which will be placed in the header of the printed report from the measurements
 - ∅ **PRINT RESULTS** (position); it enables the user to print out on a printer connected directly to the instrument the measurement results; the **No results!** text is displayed in the case when the instrument did not perform any measurement
 - ∅ **PRINT CATALOGUE** (position); it enables the user to print out on a printer connected directly to the instrument the catalogue of the files stored in the memory
 - ∅ **PRINT STATISTICS** (position); it enables the user to print out on a printer connected directly to the instrument the statistics of the measurement results; the **No results!** text is displayed in the case when the instrument did not perform any measurement
 - ∅ **PRINT FILE** (sub-list); it enables the user to print out on a printer connected directly to the instrument the selected file with the measurement results; the **NO FILES** text is displayed in the case when the instrument did not save any file
 - ∅ **PRINT BUFFER** (sub-list); it enables the user to print out on a printer connected directly to the instrument the measurement results in a selected file from the buffer; the **NO BUFFERS** text is displayed in the case when the instrument did not perform any measurement and the buffer is empty
 - § **NO.** (position); available numbers of all files saved in the buffer of the instrument's memory
 - § **RECS** (window); it informs the user about the number of records which contains the selected file from the buffer
 - **None, PEAK, MAX, MIN** or **RMS** (position for the first profile); available values: [] or []
 - **None, PEAK, MAX, MIN** or **RMS** (position for the second profile); available values: [] or []
 - **None, PEAK, MAX, MIN** or **RMS** (position for the third profile); available values: [] or []
 - **None** or **RMS** (position for **1/1 OCTAVE** or **1/3 OCTAVE** so-called spectra); available values: [] or []
 - **FROM RESULT** (sub-list); the selection of the starting time from which the measurement results saved in the file of the buffer has to be printed
 - **TO RESULT** (sub-list); the selection of the ending time to which the measurement results saved in the file of the buffer has to be printed
 - ∅ **OPTIONS** (sub-list)
 - § **FORMAT:** (position); available values of the format of the print out: **A4** or **A5**
 - § **EJECT P.:** (position); available values for the paper ejection in a printer connected directly to the instrument: **None**, **Prompt** or **Auto**
 - § **LANGUAGE:** (position); available values for the language in which the report has to be printed: **Eng** or **PoI**



Control diagram of the *REPORT* list

- ∇ **SETUP** (one of the main lists available after pressing the **<MENU>** push-button)
 - ∅ **TIMER** (sub-list)
 - § **TIME** (position); it enables the user to set time of the self switching on of the instrument
 - ∅ **RTC** (sub-list)
 - § **RTC** (position); it enables the user to set the internal real time clock of the instrument
 - ∅ **RS232** (sub-list)
 - § **BAUD RATE:** (position); available values of the transmission speed in the RS 232 serial interface: **1200, 2400, 4800, 9600, 19200, 38000, 57600 or 115200**
 - § **TIME OUT:** (position); available values of the reaction time: **1s ..60s**
 - ∅ **MICROPHONE** (sub-list)
 - § **POL.VOLTAGE:** (position); available values of the polarisation voltage for the microphone connected to the instrument: **0V or 200V**
 - § **COMP.FILTER:** (position); available values of the additional filter for compensation the non-linearity of the frequency characteristic of the microphones supplied with the instrument: **[√]** or **[]**
 - ∅ **FIELD CORRECTION** (sub-list)
 - § **FIELD CORRECTION** (position); available values of the compensation required in the case of the measurements performed in the defuse field conditions: **FREE or DIFFUSE**
 - ∅ **USER FILTERS**(sub-list)
 - § **FILTER 1:** (sub-list); the positions become available after pressing the **<ENTER>** push-button
 - **FILTER 1 :** (position); it enables the user to switch on or off the correcting filter used in **1/1 OCTAVE** or **1/3 OCTAVE** analysis; available values: **[√]** or **[]**
 - **0.80 Hz:** (position); available values of 0.8 Hz centre frequency filter: **-100.0dB ... 100.0dB**
 - ...
 - **20.0kHz:** (position); available values of 20kHz centre frequency filter: **-100.0dB ... 100.0dB**
 - § **FILTER 2:** (sub-list); the positions become available after pressing the **<ENTER>** push-button
 - **FILTER 2:** (position); it enables the user to switch on or off the correcting filter used in **1/1 OCTAVE** or **1/3 OCTAVE** analysis; available values: **[√]** or **[]**
 - **0.80 Hz:** (position); available values of 0.8 Hz centre frequency filter: **-100.0dB ... 100.0dB**
 - ...
 - **20.0kHz:** (position); available values of 20kHz centre frequency filter: **-100.0dB ... 100.0dB**
 - ∅ **SHIFT MODE** (sub-list)
 - § **SHIFT:** (position); available modes of the **<SHIFT>** push-button: **Shift** or **2nd Fun.**
 - § **ST/SP:** (position); available modes of the **<START / STOP>** push-button: **Normal** or **Inverse**
 - ∅ **CLEAR SETUP** (position); it enables the user to return to the factory made settings of the instrument; the confirmation has to be done before the execution of this function
 - § **Are you sure?**
 - ∅ **LEQ INTEGRATION** (sub-list)
 - § **LEQ INTEGRATION:** (position); available values of detector's type: **LINEAR** or **EXPONENTIAL**
 - ∅ **WARNINGS** (sub-list)
 - § **RES.NOT SAVE:** (position); it enables the user to switch on or off the warning that the results of the measurement were not saved in the memory; available values: **[√]** or **[]**



Control diagram of the *SETUP* list

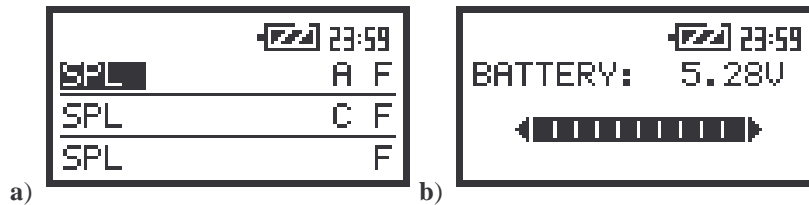
3.2. POWERING OF THE INSTRUMENT

The **SLM** is powered from the internal rechargeable NiMH battery 4.8 V / 1.6 Ah. The instrument is equipped with the external power (110 V / 220 V mains) adapter. For the external power operation and recharging the battery, this adapter should be connected to the **Power** socket located on the bottom cover of the instrument. The battery has to be charged until the switch off of the red diode named **CHARGING** placed on the instrument's keyboard. In order not to decrease the battery lifetime at least **once for ten charging the battery has to be fully discharged** (up to self switch off of the instrument)!



Notice: The battery is also recharged during the instrument's operation with the external power. The internal power supply circuit protects the battery from the overcharging. Nevertheless, it is not recommended to keep the external power continuously plugged into the **Power** socket.

The fully charged battery ensures more than 8 hours of the continuous work of the instrument (with the backlight off). The operation time is decreased about 20 % with the backlight switched on. The battery condition can be checked by means of the **BATTERY** function. It is also presented continuously on the display by means of the „battery” icon.



The screen in 3 PROFILES mode with the battery icon (a) and in the open BATTERY position (b)

The instrument indicates too low state of the battery displaying the text:

**ALERT !!!
BATTERY LOW !**

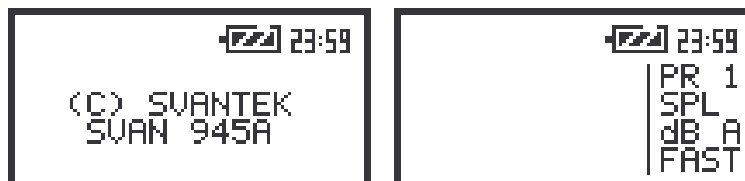


Notice: It is strongly recommended to use in this case as soon as possible the external power adapter. In the other case the instrument after a while will be switched off by itself!

The backlight of the display and the keyboard can be activated by means of the <> > push-button. For saving the power of the battery, in the normal "day-light" operation it is recommended to **keep the backlight off**. The user can set the **TIMEOUT** position in the **BACKLIGHT** sub-list of the **DISPLAY** list which will cause the self made backlight switching off in the case when the keyboard is not used during the last 30 seconds. If it happened the first pressing of any push-button switches the backlight on.

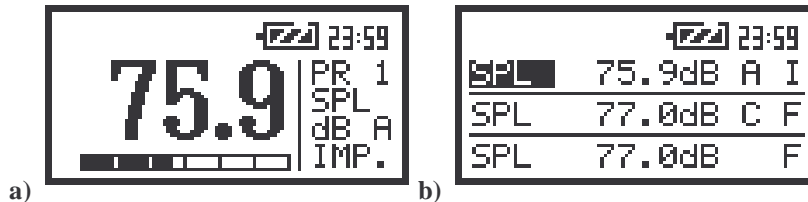
3.3. INITIAL SETUP OF THE INSTRUMENT

The instrument passes the self-test after switching on (in this time the producer and the name of the instrument is displayed on the screen) and then it enters the default Sound Level Meter (**SLM**) mode. The default display mode for result's presentation is one profile (see Chapter 4 for details).



The view of the screen after switching on the instrument

To start the measurements the user has to press **<START /STOP>** push-button. The result of the measurement is displayed, in so-called one profile mode, using well visible big characters. Under the result the analogue-like indicator is presented. On the left side of the screen, the profile from which comes the measurement (**PR 1**, **PR 2** or **PR 3**), the function name (**SPL**, **LEQ**, **SEL**, **Ltm3**, **Ltm5**, **Lxx**, **PEAK**, **MAX** or **MIN**), the unit of the measurement with weighted filter (**dB** for **LIN** filter, **dB A** for **A** filter, **dB C** for **C** filter or **dB G** for **G** filter) and the detector time constant (**IMP.**, **FAST** or **SLOW**) are presented in the following lines.



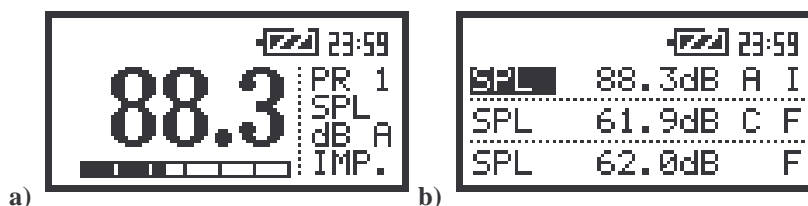
The view of the screen in one profile (a) and 3 PROFILES display mode (b) with the SLM measurement results

The results of the measurements can be presented in one profile, in **3 PROFILES**, in **STATISTICS** and in **PLOT** (these are the available display modes set by the producer, cf. the description of the **DISPLAY MODES** sub-list of the **DISPLAY** list). It is possible to change the display mode pressing the **<^>** or **<v>** push-buttons together with the **<SHIFT>** one. In so-called **3 PROFILES** display mode the results of the measurement from all profiles are displayed simultaneously. The units, weighted filter and detector time constant are also shown. The default settings (set up by the producer) for the profiles are as follows:

- PROFILE 1 - **A** weighting filter (**FILTER: A**), **FAST** type of the RMS detector (**DETECTOR: FAST**), the results of the measurements are not stored in the buffer's file (**BUFFER: None**);
- PROFILE 2 - **C** weighting filter (**FILTER: C**), **FAST** type of the RMS detector (**DETECTOR: FAST**), the results of the measurements are not stored in the buffer's file (**BUFFER: None**);
- PROFILE 3 - **LIN** (or **Z**) weighting filter (**FILTER: LIN**), **FAST** type of the detector (**DETECTOR: FAST**), the results of the measurements are not stored in the buffer's file (**BUFFER: None**).

The user can change all mentioned above settings using **PROFILE x** sub-list of the **INPUT** list. The instrument remembers all changes. The return to the default settings (set up by the producer) is possible after the execution of the position **CLEAR SETUP** available in the **SETUP** list.

The instrument can be used not only as the **SLM** but also as **1/1 OCTAVE**, **1/3 OCTAVE**, **FFT** analyser etc. In order to distinguish the **SLM** mode of the unit from the others which are available in one profile display mode the continuous vertical line separates the measurement result from its description and in **3 PROFILES** display mode two continuous horizontal lines are used to separate the measurement results from different profiles. In other modes than **SLM** the mentioned above lines are dotted.



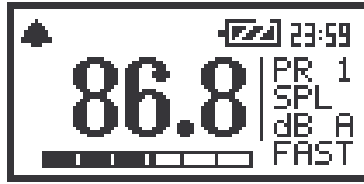
The view of the screen in one profile (a) and 3 PROFILES display mode (b) with the measurement results which are not from the SLM mode



Notice: See Chapters 4 and 5 for more details concerning different settings.

More data about the instrument's state are given by means of the icon's row visible in the top of the display. The meanings of the icons are as follows:

- “Bell” is displayed as a **WARNING** in several situations. When the “Bell” icon is visible the user has to pay attention to the state of the instrument. Typically some user’s action is required (e.g. on the low battery state, on too high input signal - **OVERLOAD** etc.).



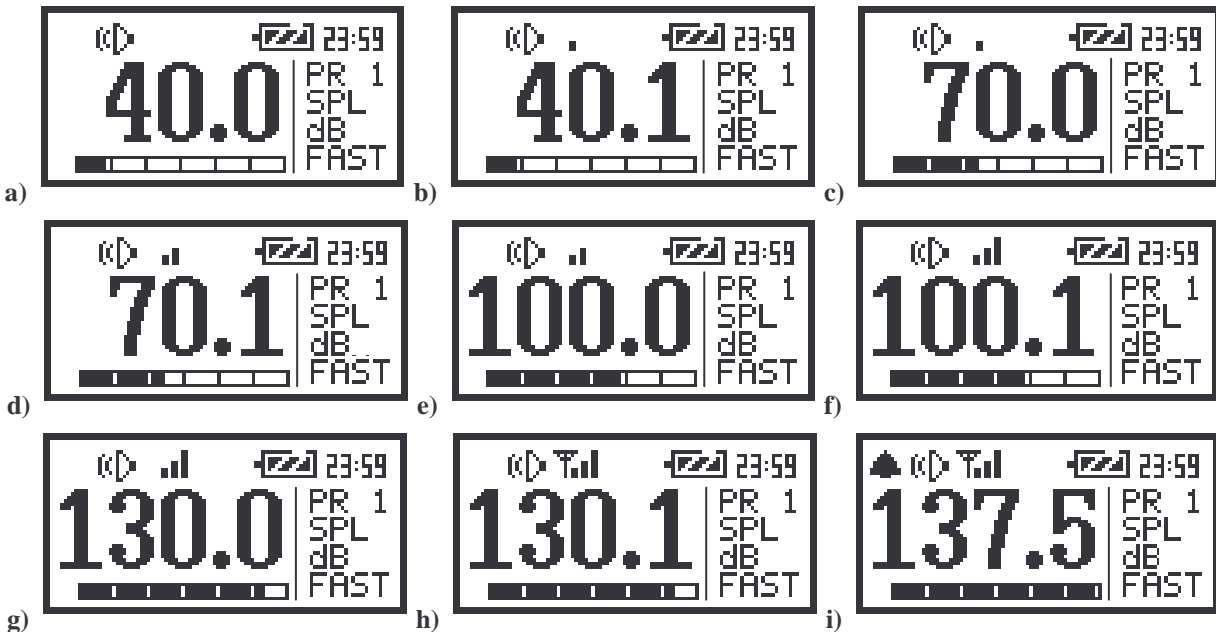
The view of the screen with the “Bell” icon

- “Loudspeaker” icon is displayed when the measurement is started and executed.



The view of the screen with the “Loudspeaker” icon

- “Vertical bars” icon corresponds to the current **input signal level** (it is related to the maximum measured value over the last second). The sign Υ means that the level of the signal was from 0.1 dB to 10 dB higher then the current measurement range. For the SLM mode, in which only one range is available (130 dB), the result of the measurement is in this case from 130.1 dB to 140 dB. The indicator of the overload (the “Bell” icon) appears when the signal overpasses more than 7.5 dB the measurement range (cf. Fig. below).



The view of the screen in the SLM mode without the “Vertical bars” icon (a); with one “Vertical bar” (b), (c); with two “Vertical bars” (d), (e); with three “Vertical bars” (f), (g); with three “Vertical bars” and the Υ sign (h); with the indicator of the overload (i)

The number of the “Vertical bars” on the screen depends on the level of the measured signal, the selected mode (SLM, 1/1 OCTAVE, 1/3 OCTAVE analysis, etc) and the calibration factor. The limits of the

signal causing the different icon's indication for the calibration factor equal to 0 dB are presented in the Table 3.1. Non-zero value of this factor causes the shift of the limits given in the table.



Notice: The “Bell” icon is used as an indicator of an overload.

In the case when the level of the measured signal is too low in the relation to the measuring range (when the level of the input signal is under the linearity of the range declared in App. C, so-called **UNDERRANGE**) in one profile mode the message is displayed in the field of the analogue indicator of the measurement result. The arrow directed down is used for this reason in **3 PROFILES** mode.



The view of the screen when the level of the measured signal is too low

Table 3.1. The limits of the signal causing the different icon's indication

INDICATOR	SLM	1/1 OCTAVE or 1/3 OCTAVE ANALYSIS	
	130 dB range	105 dB range	130 dB range
“Bell”	≥ 137.5 dB	≥ 114.5 dB	≥ 137.5 dB
↑ + 3 “Bars”	≥ 130.1 dB	≥ 105.1 dB	≥ 130.1 dB
3 “Bars”	100.1 dB – 130.0 dB	80.1 dB – 105.0 dB	105.1 dB – 130.0 dB
2 “Bars”	70.1 dB – 100.0 dB	55.1 dB – 80.0 dB	80.1 dB – 105.0 dB
1 “Bar”	40.1 dB – 70.0 dB	30.1 dB – 55.0 dB	55.1 dB – 80.0 dB
	≤ 40.0 dB	≤ 30.0 dB	≤ 55.0 dB
UNDERRANGE	< 24.0 dB A	< 24.0 dB A	< 44.0 dB A
UNDERRANGE	< 24.0 dB C	< 24.0 dB C	< 42.0 dB C
UNDERRANGE	< 30.0 dB	< 30.0 dB	< 48.0 dB

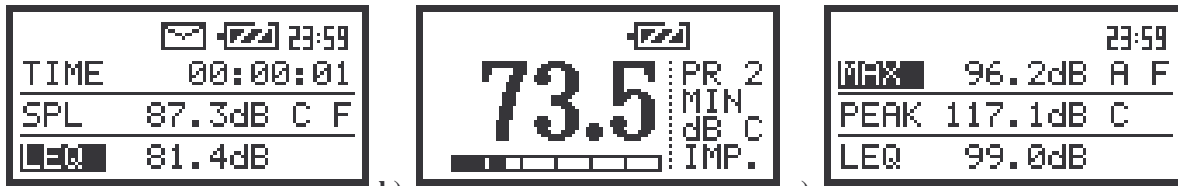
- “Tree” icon is displayed in a flashing mode together with the “Loudspeaker” when the measurement is started, the trigger is switched on and the level of the signal is too low to start the registration.



The view of the screen with the “Tree” and “Loudspeaker” icon

- “Envelope” icon is presented when the current measurement results are logged in the instrument's buffer. Together with this icon the “Loudspeaker” icon is always displayed. In the case when the “Envelope” icon starts flashing, it means that the whole buffer of the instrument is filled. The new measurement result are not saved in it. If the user wants to save these results, he has to execute first

the **CLEAR BUFFER** function from the *FILE* list which removes from the buffer memory all saved there results.



a) The view of the screen with the icons: “Envelope” (a); “Battery” (b) and with internal real time clock (c)

- “**Battery**” icon corresponds to the internal **battery state**. This icon is also used for the indication of the current state (the current filling) of the internal battery during the charging process.

- “**Clock**” icon displays the internal clock state (**the current time**) when the colon is flashing or the current time of the measurement (set in the **INT. TIME**). In the latter case the colon is displayed without flashing. The current time of the measurement is displayed after the start of the measurement and is shown also during it’s pausing (after pressing the **<PAUSE>** push-button). In the case of the cutting off the last results (cf. the **<PAUSE>** push button description) the indicator is also updated. When the **2nd Func.** mode is selected (cf. the description of the **SHIFT MODE** sub-list of the **SETUP** list) instead of the clock the text **2n dF** is flashing. This flashing lasts from the pressing of the **<SHIFT>** push button till the pressing of any other one.



Notice: The time of the measurement is displayed **in minutes and seconds** in the range from **1 sec. to 39 minutes and 59 seconds**. After this limit the hours and minutes are shown (i.e. 00:40).



Notice: In all modes of the instrument the “**Battery**” and the “**Clock**” icons are always displayed on the screen.



Notice: **THE USER DYNAMICALLY MODIFIES THE DEFAULT SETUP. The last set-up of the instrument (during the power off) is stored and is available after power on..**