DVB-T SIGNAL ANALYZER
OPERATING MANUAL

DVB-T OPERATING MANUAL

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DVB-T OPERATING MANUAL

1 GENERAL INFORMATION

1.1 Introduction

This operating manual is intended for introducing the design, functions, and basic instructions related to operation and servicing of NEON (Analyzer).

NEON is designed for testing and adjustment of television and broadcasting distribution networks as well as of separate components of such networks, or other electronic devices. The Analyzer allows measurement of channel level, parameters of TV signal with analog and digital modulation of DVB-T standart.

The Analyzer can be used both in laboratory, powered by an external power source, and in field, powered by batteries or car cigarette lighter.

The reliability of the NEON is ensured by fulfillment of regular maintenance procedures. These procedures and their intervals are described in Section 5.

In this manual the following abbreviations are used:

ADC	- Analog-to-Digital Converter
BER	- Bit Error Ratio
CD	- compact disk
COFDM	- Coded Orthogonal Frequency Division Multiplexing
DVB-T	- Digital Video Broadcasting - Terestrial
IF	- Intermediate Frequency
LCD	- Liquid Crystal Display
MER	- Modulation Error Ratio
MPEG2	- Motion Pictures Expert Group
PC	- Personal Computer
preBER	- BER before Viterbi decoder
postBER	- BER after Viterbi decoder
QAM	- Quadrature Amplitude Modulation
QPSK	- Quadrature Phase Shift Keying

VECTOR reserves the right to make changes to this manual without prior notice. In case of any questions regarding NEON, please contact us:

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1.2 Safety Precaution

Thoroughly inspect the product and carefully read the related documentation to get acquainted with all the safety markings and instructions before you start to operate the Analyzer.

WARNING Only trained service personnel aware of the hazards involved should perform repair on the Analyzer.

CAUTION Tuning the Analyzer and replacement of the components that influence the accuracy of measurements without service personnel is strictly prohibited, since the components used in the Analyzer are purpose-made and their replacement will result in inaccurate operation of the Analyzer. To exclude the possibility of mechanical damage to the NEON, the instructions regarding the storage and transportation (Sections 7 and 8) of the Analyzer must be observed.

2 GENERAL PRESCRIPTION AND PRINCIPLE OF OPERATION

2.1 Function

The NEON offers measurement of the following parameters of analog channels: video carrier level, V/A ratio, and C/N ratio. For digital channels channel power can be measured. For DVB-T signals NEON offers measurement of reception quality parameters: modulation error ratio MER, bit error ratio BER before and after Viterbi decoder, erroneous packets after Reed-Solomon decoder counter and constellation diagram. NEON features automatic defining of the settings (channel frequency, subcarriers number, subcarriers modulation type, guard interval, code rate, spectrum inversion). The NEON can be connected to a personal computer to access additional modes. The Analyzer allows to measure direct and alternating voltage of the remote power supply of the TV and broadcasting distribution networks.

The appearance of the Analyzer is shown in Figure 1.1. and Figure 1.2.

Figure 1.1

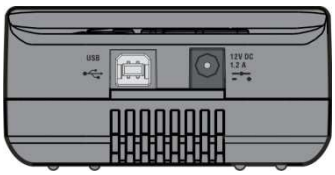

Figure 1.2

This Operating Manual is made in accordance with the firmware version 13.0.0.4 for NEON.

2.2 Environmental Conditions

Normal operating conditions:
a) ambient temperature (23±5) °C;
b) relative air humidity (55±25)%;
c) atmospheric pressure 84-106 kPa (630-795 mm Hg);
d) voltage transients correspond to installation category CAT. II.

Rated operating conditions:
a) ambient temperature from -10 to 50 °C;
b) relative air humidity not greater than 90% at 25 ºC temperature;
c) atmospheric pressure 84-106 kPa (630-795 mm Hg).

2.3 Package Content

The Analyzer package includes:
a) NEON ..... 1 pc;
b) Rubber boot ..... 1 pc;
c) Li-Ion battery ..... 1 pc;
d) “F”-”F” adapter ..... 1 pc;
e) 12V/1.2A charger ..... 1 pc;
f) Reference card ..... 1 pc;
g) Opearting manual ..... 1 pc.

2.4 Specification

Operating frequency range ..... 45 to 900 MHz
Resolution ..... 125 kHz
Channel template ..... set with PC (section 4.9.6)

Input parameters:
input impedance within operating frequency range:.....75 Ohm
input impedance for frequencies up to 50 Hz:.....at least 200 kOhm
Allowed resulting value of AC input voltage for frequencies over 5 MHz:……..3 V
Allowed resulting of AC and DC input voltage for frequencies under 100 Hz:.....150V

Level measurement range ..... 30 to 120 dBµV
Measurement level resolution ..... 0.1 dB
Accuracy within 30 – 120 dBµV level range ..... ±1.5 dB
Accuracy at operating temperature ..... ±2.2 dB
Measurement channel passband for -3 dB level ..... 230 ± 60 kHz
Frequency indication ..... 6 characters on LCD
Channel number indication ..... 3 characters on LCD
Signal level indication ..... 4 characters on LCD
Input signal modulation
- Channel bandwidth ..... 7, 8 MHz
- Channel modulation type ..... COFDM
- Subcarriers modulation type ..... QPSK, QAM16, QAM64
- Subcarriers number 2k, 4k, 8k
- Guard interval 1/32, 1/16, 1/8, 1/4
- Hierarchical modulation type ..... α=1, α=2, α=4
- Code rate 1/2, 2/3, 3/4, 5/6, 7/8

Operating channel power range ..... 60 to 110 dBµV
MER measurement range (for QAM64, code rate 3/4) ..... 18 to 35 dB
MER measurement resolution ..... 0.1 dB
MER measurement accuracy at operating channel power ..... ±2.0 dB
BER measurement range

preBER ..... $1.0x10^{-1}$ to $1.0x10^{-8}$
postBER ..... $1.0x10^{-1}$ to $1.0x10^{-8}$
Channel power treshold (postBER less than $2x10^{-4}$)
For QAM64, code rate 3/4, SNR=46 dB ..... 40 dBµV
Frequency auto tuning range ..... ±0.500 MHz
Warm-up time, less than ..... 5 min
NEON powering:
from AC circuit with 100/220V voltage and 50/60 Hz via 12V/1.2A charger;
from external DC source with 10 to 14 V voltage and ripple level no greater than 0.5 V;
from Li-ion battery with 1500 mAh capacity.
Current consumed from external power
source or batteries, not greater than ..... 0.6 A
Continuous stable operation under normal conditions (when powered by external source)
no less than ..... 24 hrs
Battery life under normal conditions (1500 mAh battery capacity), no less than 3 hrs
Mean time between failures, no less than ..... 10000 hrs
Average lifetime, no less than ..... 5 years
Dimensions ..... 193x94x53 mm
Package dimensions ..... 255x180x70 mm
Weight ..... 0.46 kg
Weight in package ..... 0.5 kg

2.5 Design and Operation Overview

2.5.1 Principle of Operation

The NEON Analyzer is a receiver of DVB-T signals with demodulation of the traffic stream to MPEG-2. The input tuner is a super heterodyne receiver with triple frequency conversion (auto or manual frequency tuning). Modulation error ratio MER and constellation diagram are measured in the process of DVB-T signal demodulation based on vector analysis. Bit error ratio BER in digital stream is determined by means of analysis of Viterbi and Reed-Solomon decoders operation. Channel power is measured by means of analog-to-digital converter after signal detection at output of logarithmic detector of the amplifier of the third IF. Level of analog channels is detected with peak detector. Power of digital channels and noise level are detected with average detector. The principle of spectrum analyzer is based on sequential analysis method with spectrum indication on the LCD display.

The view displayed on the screen in the MER/BER mode DVB-T signals reception quality parameters measurement is the numeric values of the measured digital parameters (MER, bit error ratio BER before and after Viterbi decoder and erroneous packets counter after Reed-Solomon decoder). The constellation diagram mode shows the vector structure of the quadrature components of the demodulated digital signal on the phase plane. The signal level measurement mode in a frequency point displays for the analog signals: the numeric value of the signal level, V/A and C/N ratios, for digital signals: the value of the actual channel power.

2.5.2 Block Diagram

The block diagram of NEON is shown in Figure 2.5.1.

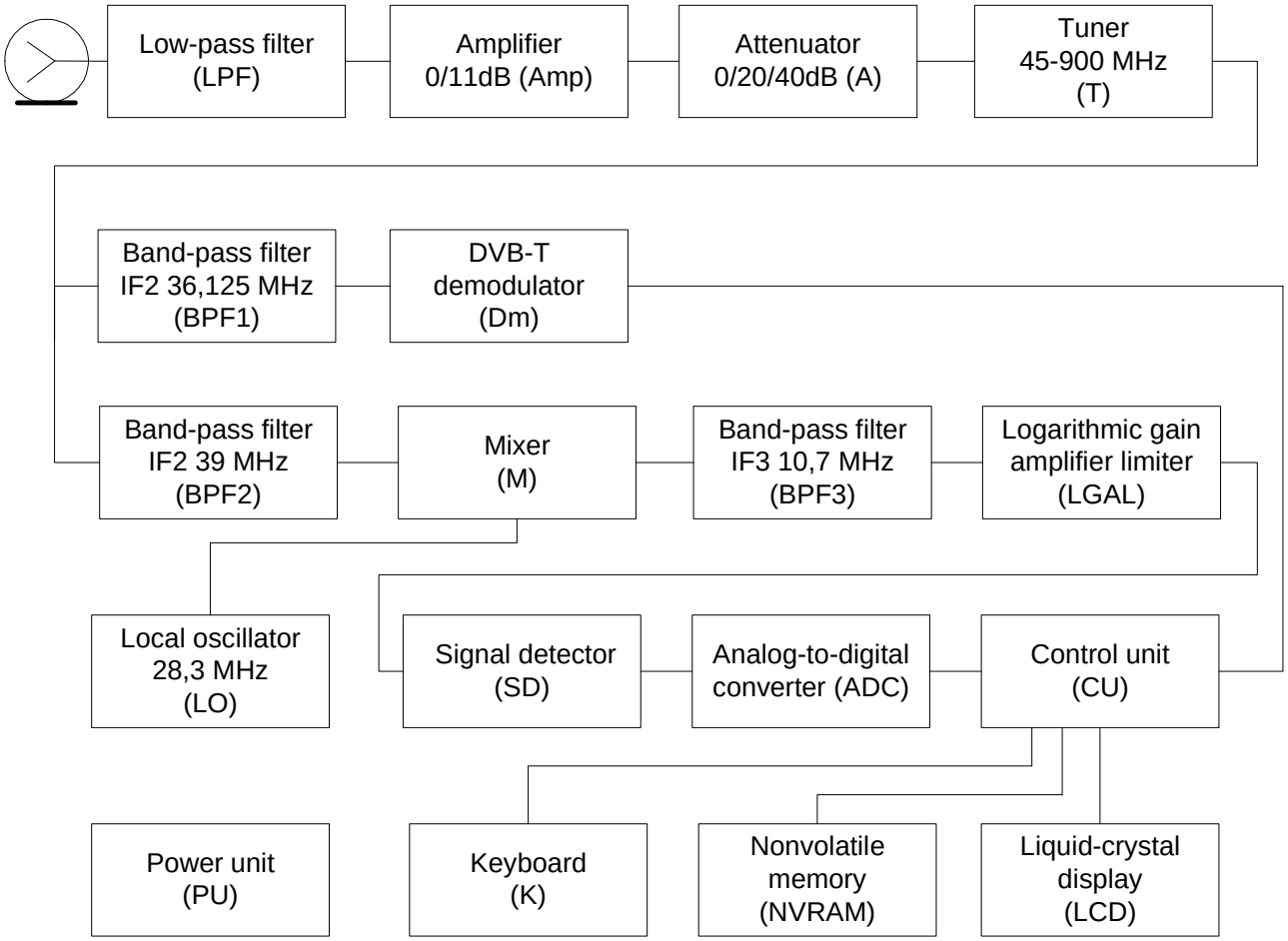

Figure 2.5.1

After the low-pass filter (LPF), the input signal if necessary is strengthened by the wide-band amplifier (Amp) or reduced by the attenuator (A). Then the signal is converted into the second IF 39 MHz in level measurement mode or 36.125 MHz in DVB-T signal demodulation mode by the tuner (T) with frequency double conversion.

The signal of the second IF by means of mixer (M) controlled by the local oscillator (LO) is converted into the third IF, and further is filtered at 10.7 MHz frequency by the bandpass filter (BPF3), which defines the receiver measurement filter bandwidth.

Logarithmic gain amplifier limiter (LGAL) performs logarithmation and signal detection.

Signal detector (SD) allows measuring of signal level by means of analog-to-digital converter (ADC). SD uses peak detection for measuring analog channel level and average detection for measuring noise level and digital channel power. The digital code of the input signal level logarithm is defined as real value and is corrected in accordance with the calibration matrix of the control unit (CU) microcontroller.

In DVB-T signal demodulation mode the signal with the second IF, after bandpass filter (BPF1) filtering comes to DVB-T demodulator (Dm), which performs demodulation and signal parameters measurement. The control unit processes the measured results.

The control unit receives the commands from the user entered via keypad (K), processes the data, displays them on the LCD, and also controls the operation with external PC.

The nonvolatile memory (NVRAM) stores the calibration coefficients set by the manufacturer, data log pages, channel template, channel plans and service information.

The Power Unit (PU) generates the required voltages either from battery or from an external power source.

2.5.3 Component Arrangement

The NEON is implemented in plastic shockproof sectional housing that includes printed and three-dimensional wiring. NEON dimensions are 193x94x53 mm.

The front panel of the Analyzer represents the tactile silicon keypad and a graphical display (Figure 1.1). The front panel has a connector for PC connection and external power source connector (Figure 1.2). The input 75-Ohm input “F”-male connector is located on the rear panel.

3 REPARATION FOR OPERATION

Perform external examination to make sure your NEON is free from any visible mechanical damage.

Upon receipt of the package, check the availability of the items contained in it against the list provided (Section 2.3).

If the NEON has been kept in the environment other than the rated operating conditions, leave your Analyzer in facilities with normal operating conditions at least for 2 hours prior to operation.

4 OPERATION PROCEDURE

4.1 Controls and Indicators

The location of controls, indicators and connectors is shown in Figure 1.1. These elements have the following functions:

a) **F1, F2, F3** functional keys enable the commands corresponding to icons shown on the screen of NEON;
b) key allows you to return to the previous menu level;
c) key enables auxiliary functions;
d) ▲, ▼, ◄ , and ► arrows allow you to edit the current operation mode;
e) key allows you to choose an element from the list;
f) key switches the power of NEON on/off;
g) – + **12V DC 1.2A** connector is for connection to an external power source;
h) **USB** connector is for connection to a computer;
i) **«INPUT»** connector is for signal input, “F”-male connector.

4.2 Preparation for Measurement

Before you start operating your NEON make sure to carefully read this Operating Manual as well as to inspect the location of the controls and indicators of the Analyzer (Section 4.1).

To prepare your Analyzer for operation with the external power source, connect the Charger to the connector located on the front panel of the NEON and then to the power source.

To prepare your NEON for operation in stand-alone mode, powered by the battery, push and hold the key until the LCD backlight turns on.

The following message (see Figure 4.2.1) will appear on the screen:

Figure 4.2.1

The screen displays the name and model of the Analyzer. After approximately 1 second, the Analyzer will open the main mode-selection menu (Figure 4.3.1), further referred to as “Main menu”.

4.3 Measurement Procedure

4.3.1 General Information

The Analyzer features on-screen menu for selection of modes of operation. The icons of the menu correspond to various functions. The Main menu (see Figure 4.3.1) will appear on the screen after the Analyzer is powered up.

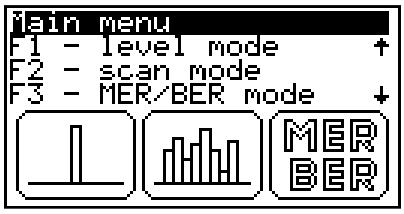

Figure 4.3.1

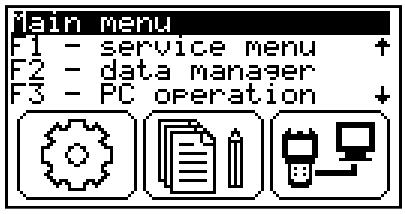

Figure 4.3.2

To change Main menu line press ▲ or ▼ arrow. You will see the following line of the Main menu (Figure 4.3.2). To return back to the previous line press ▲ or ▼ arrow once again. Function of menu are selectable with the functional keys **F1**, **F2** and **F3**, which are under the required icons. To return to the Main menu from the selected function, press ⮉ key.

The Main menu contains 6 icons corresponding to the following functions:

a) LEVEL measurement.....  ;

b) SCAN measurement.....  ;

c) MER/BER measurement .....  ;

d) Service menu.....  ;

e) Data manager menu.....  ;

f) PC connection .....  .

When choosen  from theMain menu, Service menu will appear on the screen (Figure 4.3.3), and when choosen  - Data manager menu (Figure 4.3.4).

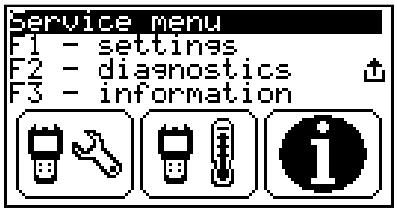

Figure 4.3.3

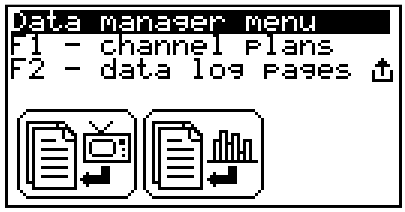

Figure 4.3.4

Function of service menu and data manager menu are selectable with the functional keys **F1**, **F2** and **F3**, which is under the required icon. To return to corresponding menu from the selected function, press key. To return to the Main menu press once again.

Service menu and data manager menu contains 5 icons corresponding to the following functions:

a) Setup.....;

b) Self-test.....;

c) Identification.....;

d) Channel plans manager.....;

e) Data log manager .....;

The Analyzer offers six modes to measure TV signal parameters:

a) TV channel level and signal power in frequency point, V/A and C/N ratios, as well as alternating and direct voltage at the input of the Analyzer in LEVEL mode;
b) TV channels level in SCAN mode;
c) TV channels level ripple in RIPPLE mode;
d) Signal spectrum in SPECTRUM mode;
e) DVB-T signal reception quality parameters in MER/BER mode;
f) DVB-T signal constellation diagram in CONSTELLATION mode.

LEVEL, SCAN and MER/BER modes are selectable from the Main menu. SPECTRUM and RIPPLE mode are selectable from SCAN mode by pressing function keys **F2** and **F3**, correspondingly. CONSTELLATION mode is selected from MER/BER mode by pressing **F2** functional key.

4.3.2 LEVEL Measurement Mode

The icon in the Main menu refers to this mode. In this mode you can measure TV channel parameters and signal level in a frequency point.

The screen view in channel parameter measurement mode is represented in Figure 4.3.5 (for analog channel) and in Figure 4.3.6 (for digital channel).

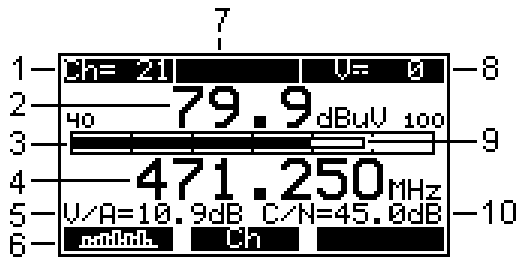

Figure 4.3.5

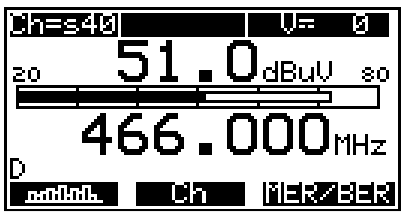

Figure 4.3.6

On the screen you will see the following data:

1 – channel number
2 – current channel level measured in dBmV, dBuV or dBm
3 – indicator of current channel level
4 – selected frequency in MHz
5 – V/A ratio in dB
6 – command line with commands activated by **F1**, **F2** or **F3** keys
7 – channel name (when working with selected channel plan)
8 – direct voltage or effective alternating voltage at the input of the Analyzer, at 50/60 Hz frequency, in V
9 – indicator of highest registed channel level
10– C/N ratio in dB

When digital channel level is measured you will see **D** message instead of **V/A** or **C/N** on the screen.

When you open LEVEL mode, you can see channel plan name indicated by **«Plan:»**, if one has been selected.

When the LEVEL function is activated, the NEON measures the parameters of the TV channel which was last selected in one of the measurement modes. This mode will be indicated by **Ch** shortcut in command line. The channel modulation type (digital or analog) corresponds to the selected channel plan. If the channel plan has not been selected, the modulation type is determined automatically.

Three parameters are measured for analog channels. Video carrier level is measured in the frequency point defined in accordance with the channel template for operation without channel plan. If channel plan has been selected, the frequency point will be taken from this channel plan. To determine V/A ratio, the Analyzer additionally measures the audio carrier, which is defined in accordance with the channel template. The V/A value will be displayed on the screen in position 4 (Figure 4.3.5).

Under the channel level value on the screen you can see current signal level indicator and the indicator of the highest registered signal level. The highest registered signal level indicator is reset each time you change the channel number or press key.

To measure C/N ratio the Analyzer performs measurement in the frequency point with the lowest content of the useful components of RF signal within the channel bandwidth. If a channel plan has been selected the measurement frequency will be defined by the channel plan, if not, it will be defined automatically by means of searching the optimal frequency within frequency offset range of minus 1.500 to minus 1.000 MHz relatively to video carrier frequency. C/N ratio will appear in position 8 (Figure 4.3.5). The C/N ratio will be calculated by the following formula:

C/N = Uch – Unoise – 10Lg(Bch/Bm) – K, where

C/N – carrier to noise ratio value;
Uch – channel level;
Unoise – noise level;
Bch – video channel bandwidth;
Bm – measurement channel passband;
K – correction factor.

When working with selected channel plan C/N ratio measurement can be switched on/off separately for each channel (Section 4.4.2). When working without channel plan C/N ratio measurement can be swithced off for all channels by means of channel template (Section 4.9.6).

For digital channels the Analyzer measures signal power within the channel bandwidth.

To perform this measurement, the Analyzer applies the integration method. The NEON calculates the total signal power value by measuring the power within all of the channel bandwidths in 125 kHz increments. It then recalculates the total value into actual power value using the following formulas:

$$Usum = \sum_{i=0}^{\frac{Bch}{0.125}} \left[10^{Ui/20}\right]$$

$$Uch = 20 \cdot \log(Usum) + K$$, where

Ui – signal power value in i-point of the channel;
Bch - digital channel bandwidth in MHz;
Usum – total signal power value in the channel bandwidth, uV;
Uch - actual channel power in dBuV;
K - correction coefficient.

The value of the **Bch** bandwidth is determined by the channel plan (Section 4.4.2) or channel template if no channel plan has been selected (Section 4.9.6). The K constant are determined empirically.

To increase the accuracy of the measurement operating with a channel plan, set the digital channel parameters (Section 4.4.2) to their optimal values.

The range of voltage measurement at the Analyzer input is from 10 to 100 V. The absolute error of the measurement is lower than ±1.5 V. The measured value of the voltage is indicated in position 7 (Figure 4.3.5). If the voltage is direct you will see **V=** on the screen, if it is alternating **V~** will appear.

To measure channel parameters, select the required channel by ◄ and ► arrows.

If no channel plan is selected, using ◄ and ► arrows you can switch to any channel in accordance with the channel template (Section 4.7). Once a signal is detected, the Analyzer will automatically determine the channel type. The measurements will be performed in accordance with these parameters.

If one of the channel plans has been selected (Section 4.5), the selection will be performed between the channels of the plan.

You can access other measurement modes using functional keys. **F1** key will open SCAN mode (Section 4.3.3). **F2** key will activate the mode of signal level measurement in a frequency point. **F3** key will open MER/BER measurement mode (Section 4.3.6), if the selected channel is digital.

The view of the screen in the mode of signal level measurement in a frequency point is shown in Figure 4.3.7.

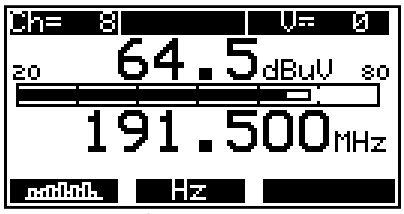

Figure 4.3.7

In this mode V/A ratio and C/N ratio are not displayed, as well as **D** message.

In the mode of signal level measurement in a frequency point the level is measured at the selected frequency. This mode is indicated by **Hz** message in the command line. The tuning to the frequency is performed with 125 kHz step by ◄ and ► arrows.

Pressing **F2** key you can return to channel parameters measurement mode.

4.3.3 SCAN Measurement Mode

The  icon in the Main menu refers to this mode. This mode displays the signal levels as a bar-graph. See Figure 4.3.8:

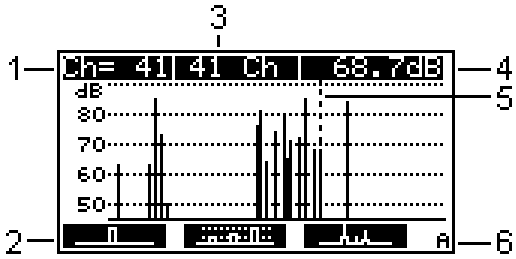

Figure 4.3.8

On the screen you will see the following data:
1 – number of channel indicated by marker
2 – command line with commands activated by **F1**, **F2** and **F3** keys
3 – channel name (when working with selected channel plan)
4 – measured level of channel indicated by marker, in dBmV, dBuV or dBm
5 – marker
6 – channel status: **A** – analog, **D** - digital.

You can navigate the marker by means of ◄ and ► keys.

If no channel plan has been selected, all the channels of the channel allocation standard will be displayed on the screen. Channel modulation type is determined automatically when you enter the mode and each time, signal is appeared on the input. It is shown by the progress indicator «**channels scanning**». The modulation type of the channel indicated by the marker will be shown in position 6 while the measurement is being performed.

If one of the channel plans has been selected, the scanning will be performed only over the selected plan channels. In this case, after entering SCAN mode you will see selected channel plan name indicated by **«Plan:»** for a few seconds. The navigation by ◄ and ► keys will be fulfilled only within the selected channel plan. The channel name will be displayed in position 3, modulation type will be displayed in position 6.

In SCAN mode the Analyzer applies estimating method for determining the digital channel level. This method involves measurement of the signal level in the central point of the channel, which is further recalculated into channel level value using the following formula:

Uch = Um +10Lg (Bch/Bm) + K, where

Uch - channel level;
Um – channel level in the central point;
Bch - digital channel bandwidth;
Bm – measurement channel passband;
K - correction coefficient.

The value of the **Bch** bandwidth is determined by the channel plan (Section 4.4.2) or by channel template (Section 4.9.6), if no channel plan has been selected. The K constant are determined empirically.

This method helps to accelerate the measurement process but gives additional error when digital channel has high ripple.

The graph reference level shown in Figure 4.3.8 is automatically set to the channel with the maximum level.

You can access other measurement modes using functional keys. **F1** key will open LEVEL measurement mode (Section 4.3.2). **F2** key will open RIPPLE measurement mode (Section 4.3.4). **F3** key will open SPECTRUM measurement mode (Section 4.3.5).

4.3.4 RIPPLE Measurement Mode

This measurement mode is selected from SCAN mode by pressing **F2** key. This mode displays signal levels as vertical bars and the horisontal level lines between the peaks of the two selected channels. The screen view is represented in the Figure 4.3.9:

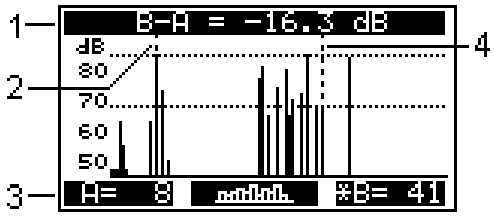

Figure 4.3.9

On the screen you will see the following data:
1 – channels ripple value between A and B markers
2 – A marker
3 – command line with commands activated by **F1**, **F2** and **F3** keys
4 – B marker

Adjust the marker position by ◄ and ► arrows. Selection of the marker is performed by **F1** and **F3** keys and indicated by the asterisk in the command line.

If no channel plan is selected, all the channels of the channel template will be displayed on the screen. Channel modulation type is determined automatically each time, signal is appeared on the input and what is shown by the progress indicator (**channels scanning**).

If one of the channel plans has been selected, the scanning will be performed only over the selected plan channels. The navigation by ◄ and ► keys will be fulfilled only within the selected channel plan.

The graph reference level shown in Figure 4.3.9 is automatically set to the channel with the maximum level. The marker positions are saved into the memory and restore once you enter RIPPLE measurement mode again.

Channels measurement nad representation on the graph according to the same principle as in SCAN measurement mode (Section 4.3.3).

You can return to SCAN measurement mode by pressing **F2** key.

4.3.5 SPECTRUM Measurement Mode

This measurement mode is selected from SCAN mode by pressing **F3** key. This mode displays spectrum of the input signal in scaleable frequency range. See Figure 4.3.10:

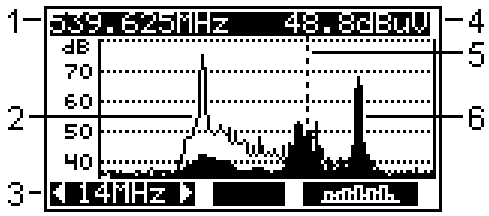

Figure 4.3.10

On the screen you will see the following data:
1 – frequency of the frequency point indicated by marker
2 – trace of highest registered signal level
3 – command line with commands activated by **F1**, **F2** and **F3** keys
4 – current signal level of the frequency point indicated by marker, in dBmV, dBuV or dBm
5 – marker
6 – current signal level trace

Adjust the marker position by ◄ and ► arrows. Select frequency range scale with **F1** key from the fullowing list:

a) 14MHz . Spectrum diagram is in 13.750 MHz frequency range. LCD pixel corresponds to 0.125 MHz frequency range;

b) 28MHz. Spectrum diagram is in 27.500 MHz frequency range. LCD pixel corresponds to 0.250 MHz frequency range;
c) 55MHz. Spectrum diagram is in 55.000 MHz frequency range. LCD pixel corresponds to 0.500 MHz frequency range;
d) 110MHz. Spectrum diagram is in 110.000 MHz frequency range. LCD pixel corresponds to 1.000 MHz frequency range;

Measuring of spectrum is pefrormed in 0.125 MHz step. When you choose **28MHz**, **55MHz** or **110MHz** frequency range several frequency points corresponds to one LCD pixel. In this case the frequency point with the highest level will be dispayed.

The highest registered signal level trace is reset each time you change the frequency range or press key.

Progress of spectrum measurement is indicated with white point run at the bottom of the spectrum diagram.

You can return to SCAN measurement mode by pressing **F3** key.

4.3.6 MER/BER Measurement Mode

The MER BER icon in the Main menu refers to this mode. This mode displays the table of the parameters featuring the input DVB-T signal quality. The screen view is represented in the Figure 4.3.11:

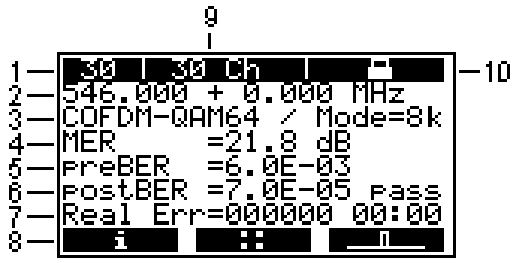

Figure 4.3.11

On the screen you will see the following data:
1 – channel number
2 – selected frequency and frequency shift in MHz
3 – signal modulation parameters (subcarrier modulation type and subcarriers number)
4 – MER value in dB
5 – perBER value
6 – postBER value
7 – erroneous packets after Reed-Solomon decoder counter
8 – command line with commands activated by **F1, F2** and **F3** keys
9 – channel name (when working with selected channel plan)
10 – demodulator status.

When this mode is activated or tuning to a channel is performed, the Analyzer will start input signal synchronization process, which will be indicated by a progress bar in position 10. The lock icon will appear in position 10 once synchronization is achieved. Subcarrier modulation type and subcarriers number will be presented in position 3. Some time later MER, preBER, postBER and erroneous packets number measured values will appear in positions 4, 5, 6 and 7. If postBER value is lower than 2.0E-04, then postBER marked with **«pass»** message, otherwise with **«fail»** message.

If signal level value of the selected channel is insufficient, low level icon will be blinking in position 10. Channel synchronization in this case is impossible. If signal level is high enough, but sinchronization hasn't been achieved in 5 seconds, then channel has too high noise level, or channel has modulation other than DVB-T.

To measure channel parameters, select the required channel by ◄ and ► arrows.

If no channel plan is selected, using ◄ and ► arrows you can switch to any channel in accordance with the selected channel template (Section 4.7). Once a signal is detected, the Analyzer will automatically

determine the channel parameters: frequency offset, spectrum inversion, subcarriers number, subcarriers modulation type, guard interval and code rate.

If one of the channel plans has been selected, the tuning will be performed between the digital channels of the channel plan. In this case, after entering MER/BER mode you will see selected channel plan name indicated by **«Plan:»** for a few seconds. The channel parameters will be taken from the channel plan. If the selected channel plan does not include any digital channels, tuning to channels will not be performed.

NOTE! When working with no channel plan selected, the Analyzer can only synchronize on DVB-T signal which has bandwidth, the same as the selected channel in the channel template (Section 4.7)

NOTE! When working with hierarchical modulated channel, postBER is measured for low priority stream.

When you press , current measurement is interrupted and demodulator starts channel sinchronization once again.

You can access other measurement modes using functional keys. **F2** key will activate CONSTELLATION measurement mode **(Section 4.3.3)**. **F3** key will open LEVEL measurement mode **(Section 4.3.2)**.

Press **F1** key, if you want to get detailed information of channel parameters. Channel parameters table is represented in the Figure 4.3.12.

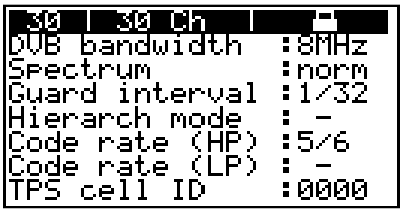

Figure 4.3.12

On the scrren you will see the following parameters:

a) **DVB bandwidth** – channel bandwidth;
b) **Spectrum** – spectrum type: inverted or normal;
c) **Guard interval** – guard interval relative duration;
d) **Hierarch mode** – hierarchical modulation mode;
e) **Code rate (HP)** – high priority stream relative code rate;
f) **Code rate (LP)** – low priority stream relative code rate (for hierarchical modulation only);
g) **TPS cell ID** – transmitter ID in hexadecimal format.

Press key to return to MER/BER measurement mode.

4.3.7 CONSTELLATION Measurement Mode

This measurement mode is selected from MER/BER mode by pressing **F2** key. This mode displays DVB-T channel constellation diagram. See Figure 4.3.13:

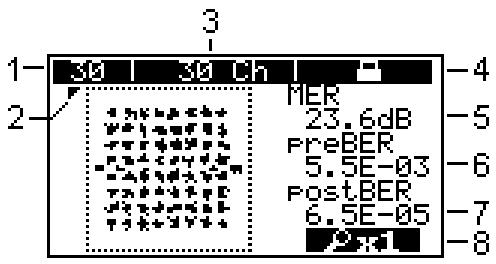

Figure 4.3.13

On the screen you will see the following data:

1 – channel number
2 – quadrant marker
3 – channel name (when working with selected channel plan)
4 – demodulator status
5 – MER value in dB
6 – preBER value
7 – postBER value
8 – diagram zoom scale choosing key

When there is not sinchonization with the channel, constellation diagram is empty. After sinchronization is being achieved quadrature modulation points is displayed on the diagram. For example, for QAM64 subcarrier modulation 64 points of data subcarriers and 4 points of pilot subcarriers will be displayed. View of constellation diagram allows to determine distortion behavior in the channel.

MER, preBER and postBER measurement values are displayed in positions 5, 6 and 7.

With ▲, ▼, ◄ , and ► keys you can choose diagram quadrant for being zoomed. Choosed quadrant is marked with the arrow (position 2). For activating zoomed view mode press **F3** button. Press **F3** button once again to return to native view mode.

Press ⮉ key to return to MER/BER measurement mode (Section 4.3.6).

4.3.8 SNAPSHOT Function

SNAPSHOT function allows saving of screenshots to nonvolatile memory when you work in one of the following modes LEVEL, SCAN, RIPPLE, MER/BER or CONSTELLATION.

To make a screenshot, press the ✱ key when you are in one of the listed above modes and hold it down for 3 seconds, after this the icon shown in Figure 4.3.14 will appear in the middle of the screen. The Analyzer will save the screenshot and it will be possible to go on with the work.

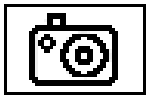

Figure 4.3.14

The Analyzer can save up to 32 screenshots. Only the last 32 screenshots are saved. The screenshots can be viewed using **NEONTools** software.

4.4 Data Manager

4.4.1 General Information

Data manager provides automation of measurement and result recording procedures. The Analyzer offers two tools: Channel plan manager and Data log manager. The memory capacity allows you to save up to 16 channel plans (up to 112 channels per plan), and up to 130 data log pages (with maximum number of channels). The NEON allows you to view the saved data in stand-alone mode or by means of a computer.

4.4.2 Channel Plan Manager

The  icon in the data manager menu refers to this mode. The mode allows you to perform all the operations with channel plans (viewing, editing, deleting, and creating channel plans). The screen view is represented in the Figure 4.4.1.

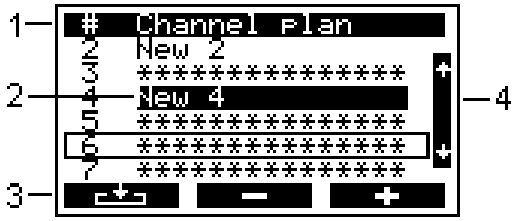

Figure 4.4.1

On the screen you will see the following data:
1 – table header line
2 – channel plan selected for the measurement
3 – command line with commands activated by **F1**, **F2** and **F3** functional keys
4 – scroll bar

The first column is contains a plan index number. The second column is a plan name of up to 15 characters in length. This name is assigned by the user during creating and later can be edited by NEONToolsTerrestrial PC software. If the channel plan is not available, it will be indicated by ************** message. If a channel plan has been selected in Setup (Section 4.5), its name will be highlighted in inverse color (position 2).

Using ▲, ▼ arrows you can select a channel plan from 1 to 16 index number. The selected channel plan will be framed.

The list of available commands:
a) **F1** key to view and edit the selected channel plan;
b) **F2** key to delete the selected channel plan;
c) **F3** key to create a new channel plan in automatic mode.

Channel Plan Editing

To view and edit a channel plan, select the required one and press **F1**. You will see the channel plan table. The screen view is represented in the Figure 4.4.2.

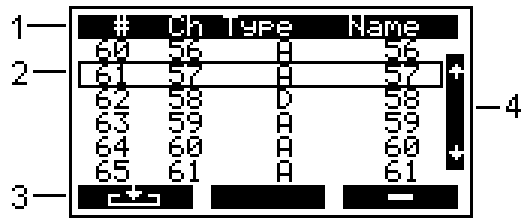

Figure 4.4.2

On the screen you will see the following data:
1 – table header line
2 – selected line
3 – command line with commands activated by **F1**, **F2** and **F3** functional keys
4 – scroll bar

The table represents a list of channels comprising the channel plan. The top line divides the table into columns. The first column is the index of channel (from 1 to 112). The second column is a channel number covering the channel plan's point. The third column is the channel modulation type: **A** or **D** (analog or digital). The fourth column is the channel name of up to 6 characters. The bottom line shows the commands that can be activated by the functional keys. These commands are as follows:
a) **F1** key to view and edit the selected frequency point;
b) **F3** key to delete the selected frequency point.

To edit a channel, select the required one by ▲ and ▼ keys (the selected line will be framed, position 2). Then press **F1** key. The table of channel parameters will appear. The screen view is represented in the Figure 4.4.3 (for analog channel) and in the Figure 4.4.4 (for digital channel).

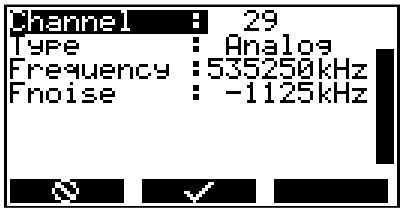

Figure 4.4.3

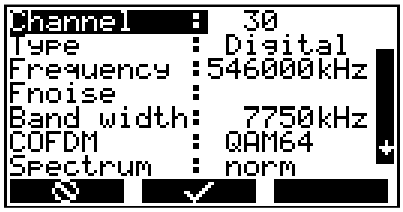

Figure 4.4.4

There are two groups of parameters:

General parameters:

a) **Channel –** channel number;
b) **Type** – channel type: analog or digital;
c) **Frequency** – frequency of the video carrier for analog channel or central frequency for digital channel;
d) **Fnoise –** frequency shift for C/N ratio measurement for analog channels. Can be adjusted from -8000 to +8000 kHz with 125 kHz step. You can turn off the C/N measurement for a channel by setting frequency shift value as 0. In this case **«------»** value will be presented in the table;

Digital channel parameters:

a) **Band width** – channel bandwidth. Can be adjusted from 1000 to 8000 kHz with 125 kHz step;
b) **COFDM** – subcarriers modulation type. Available values: **------**, **QPSK, QAM16, QAM64**. The «**------**» symbol means modulation type diffrerent from DVB-T.
c) **Spectrum –** spectrum type: normal or inverted. Available values: **norm**, **inv**;
d) **DVB bandwidth –** DVB-T channel bandwidth. Available values: **6MHz**, **7MHz**, **8MHz**;
e) **Carriers –** subcarriers number. Available values: **2k**, **4k**, **8k**;
f) **Guard interval –** guard interval relative duration. Available values: **1/32**, **1/16**, **1/8**, **1/4**;
g) **Hierarch mode –** hierarchical modulation type (for QAM16 and QAM64 subcarriers modulation only). Available values: **---**, **α=1**, **α=2**, **α=4**;
h) **Code rate (HP)** – high priority stream relative code rate. Available values: **1/2**, **2/3**, **3/4**, **5/6**, **7/8**;
i) **Code rate (LP)** – high priority stream relative code rate (for hierarchion modulation enabled only). Available values: **1/2**, **2/3**, **3/4**, **5/6**, **7/8**;

The initial values of the parameters are set during automatic detection of a channel plan and can be manually edited by means of channel editing function.

When you create a new channel plan (Section 4.4.2.3) channel parameters are set according the following rules:

a) For analog channels frequency is set to video carrier frequency of the channel. The noise frequency offset is defined automatically by means of searching the optimal frequency within frequency offset range of minus 1.500 to minus 1.000 MHz relatively to video carrier frequency;
b) For digital channels frequency is set to central frequency of the channel. If the Analyzer is synchronized on DVB-T signal, then the real channel central frequency will be set. Channel bandwidth is set according to channel template (Section 4.7). DVB-T channel parameters are detected automatically.

To fine tune a parameter, select it by **▲, ▼** keys, and then scroll to the required values by **◄, ►** keys.

To save the channel, press **F2**. To abort the function without saving changes, press **F1** key. Always check all the parameters after the channel plan has been automatically set. It is more convenient to determine the parameters in the spectrum measurement mode using PC. In case of incorrect (or non-optimal) settings, fine tune the parameter manually. Otherwise, it can lead to errors in channel parameters measurement.

NOTE! The Analyzer can only synchronize on DVB-T signal which has bandwidth, the same as the channel in the channel template (Section 4.7). You can tune the DVB-T channel bandwidth manually in the channel plan.

Pressing key will confirm saving changes if any and exit the mode. You should consider that when you save changes to or delete a channel plan, the data log pages which are related to the plan becomes deleted.

To delete the selected channel, press **F3** key.

Channel Plan Erasing

To erase a channel plan, select the required one and press **F2**. The confirmation request dialog will appear. To abort erasing, press **F3**. To confirm erasing of the plan, press **F1**.

Channel Plan Creating

To create a new channel plan in auto mode, supply the signal to the RF input of the Analyzer, select position of the plan in the table and press **F3**. After the Analyzer has completed scanning all the channels of the channel template, it will switch to channel plan editting mode (Section 4.4.2.1). Edit the channel plan parameters if needed, and save the plan into the memory.

4.4.3 Data Log Manager

General Information

The Data log manager enables you to measure parameters of the TV channels within a channel plan, to check the network parameters against the limit plan, and save the check results into memory. This function allows you to view the measurement results and the errors in different parameters, download the data onto your PC for further processing and report preparation.

Data Log Pages

The icon in the Data manager menu refers to this mode. This mode allows you to perform with data log pages such operations as viewing, deleting and creating of a new page. The screen view is represented in the Figure 4.4.5 and Figure 4.4.6.

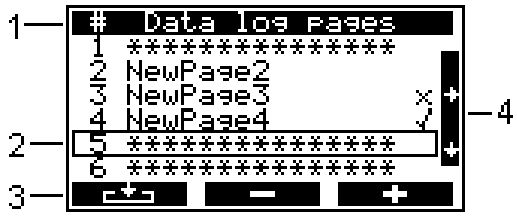

Figure 4.4.5

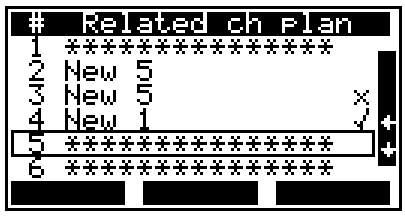

Figure 4.4.6

On the screen you will see the following data:
1 – table header line
2 – selected line
3 – command line with commands activated by **F1**, **F2** and **F3** functional keys
4 – scroll bar

The top row of the table (position 1) divides the table into columns. The first column represents the page numbers form 1 to 130. The second column is the page name. The third column is the result of check against the limit plan (no icon – page not measured yet, √ - no errors, × - some errors). Figure 4.4.6 represents the list of the channel plan names which are related to data log pages. The bottom line (position 3) contains the list of commands that can be activated by the functional keys. Press ◄ and ► arrows to switch between the views of the screen. Press ▲, ▼ keys to select the required page. The selection will be framed (position 2).

The list of available commands:

a) **F1** key to view, update and check against the limit plans the selected page;
b) **F2** key to delete the selected page or clear all the page;

c) **F3** key to create a new data log page.

Data Log Pages Operation

To view a data log page, press **F1** or . Page data table will appear on the screen (Figures 4.4.7 or 4.4.8).

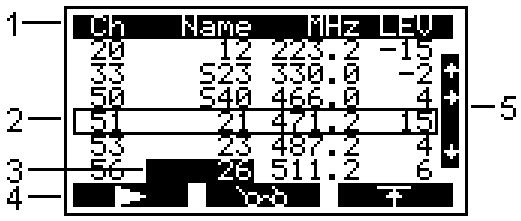

Figure 4.4.7

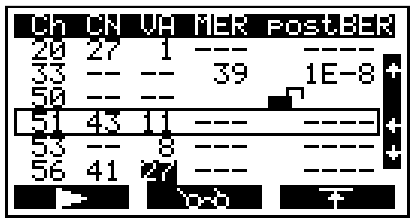

Figure 4.4.8

On the screen you will see the following data:
1 – table header line
2 – selected line
3 – channel with some errors
4 – command line with commands activated by **F1**, **F2** and **F3** functional keys
5 – scroll bar

Two views of the table are available, for basic and additional parameters. You can switch between these views by ◄ and ► arrows. The top line of the table (position 1) divides the table into columns. In basic parameters screen (Figure 4.4.7) the first column is the channel number. The second column is the channel name. The third column is the video carrier frequency for analog channels or central frequency for digital channels (with rounding up to 0.1 MHz). The fourth column is video carrier level or digital channel level in dBuV, dBmV or dBm depending on the preset units. In the additional parameters screen (Figure 4.4.8) the first column is the channel number, the second column represents C/N ratio (in dB). The third column is V/A ratio (in dB). The fourth column displays MER (in dB) and the fifth column will display postBER values. For digital channels you will see «**--**» message in the second and third columns, and for analog channels «**--**» message in the fourth and fifth columns. If the noise measurement has been disabled for one of the analog channels, «**--**» message will be displayed in the second column for this channel. If DVB-T demodulator synchronization with digital channel has not been achieved during its measurement, no lock icon will appear in the fourth and fifth columns.

The bottom line (position 4) contains the commands that you can activate by the functional keys.

Press ▲ or ▼ keys to select the required channel. The selection will be framed (position 2).

The list of available commands:

a) **F1** key to measure the page;
b) **F2** key to view the measurement results in SCAN measurement mode (Section 4.3.3);
c) **F3** key to view and edit the limit plan parameters.

To start page measuring, press **F1** key. Measuring process will be indicated by a progress bar. After the measuring is completed, the new values will appear in the measurement result field of the screen. If the channel name is highlighted in inverse color (position 3), this indicates that the errors have been detected in this channel during the check against the limit plan. Incorrect parameters are also highlighted in inverse color.

To identify the errors, activate the limit plan manager (**F3** key). The table of limit plan parameters will appear on the screen (Figure 4.4.9).

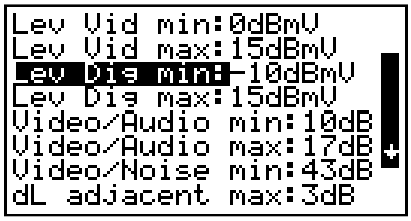

Figure 4.4.9

This table represents the parameters for the measurement results to be verified with. The parameters are editable only using a PC. The table contains 13 parameters:

a) **Lev Vid Min.** The minimum value of video carrier level for analog channel. Default value: 48 dBuV. Available values: 45 to 95 dBuV;
b) **Lev Vid Max.** The maximum value of video carrier level for analog channel. Default value: 85 dBuV. Available values: 45 to 95 dBuV;
c) **Lev Dig Min.** The minimum value of digital channel level. Default value: 48 dBuV. Available values: 45 to 95 dBuV;
d) **Lev Dig Max.** The maximum value of digital channel level. Default value: 85 dBuV. Available values: 45 to 95 dBuV;
e) **Video/Audio min.** The minimum value of V/A ratio. Default value: off. Available values: 5 to 20 dB;
f) **Video/Audio max.** The maximum value of V/A ratio. Default value: off. Available values: 5 to 20 dB;
g) **Video/Noise min.** The minimum value of C/N ratio. Default value: off. Available values: 15 to 55 dB;
h) **dL adjacent max.** The maximum value of ratio between the adjacent channel levels. Default value: 10 dB. Available values: 2 to 10 dB;
i) **Video/Dig max.** The maximum value of ratio between analog and digital channel levels. Default value: 25 dB. Available values: 5 to 30 dB;
j) **MER(QPSK) min.** The minimum value of MER for DVB-T channels with QPSK subcarriers modulation. Default value: 12 dB. Available values: 2 to 35 dB;
k) **MER(QAM16) min.** The minimum value of MER for DVB-T channels with QAM16 subcarriers modulation. Default value: 27 dB. Available values: 6 to 35 dB;
l) **MER(QAM64) min.** The minimum value of MER for DVB-T channels with QAM64 subcarriers modulation. Default value: 30 dB. Available values: 10 to 35 dB;
m) **postBER max.** The maximum value of postBER. Default value: off. Values available: 1E-4, 1E-5, 1E-6, 1E-7, 1E-8, off. If you make off setting, postBER parameter will not be measured when the data log page is measured.

For editing limit plan, choose parameter you want to change with ▲ or ▼ keys. Then tune parameter value with ◄ and ► keys. For swithing off parameter set the minimal parameter's value with ◄ key. You will see **«off»** message. Press or key to return to the data log page table. The channels, which failed the check against the selected parameter of limit plan, will be highlighted with the channel names in inverse color. To check the page against some other parameter, you will need to open the limit plan manager again and make a new selection.

When creating data log pages, there will be set limits from the page, which was saved before.

Data Log Page Erasing

To erase a data log page, select the required page and press **F2**. The confirmation request dialog will appear. To cancel erasing, press **F2**. To confirm erasing of the selected page, press **F1**. To confirm erasing of all the pages, press **F3**.

Data Log Page Creating

To create a new data log page, select the required fpage and press **F3**. Channel plan selection screen will open. Press ▲ and ▼ keys to select the channel plan to be measured. Press . The screen will display the data log page table with initial values (Figure 4.4.7). Then you can perform all the operations described in Section 4.4.3.3: measuring, checking against a limit plan and saving the page into memory.

4.5 Setup

The  icon in the Service menu refers to this mode. The setup mode allows you to modify the general parameters of the Analyzer. The screen view is represented in the Figure 4.5.1.

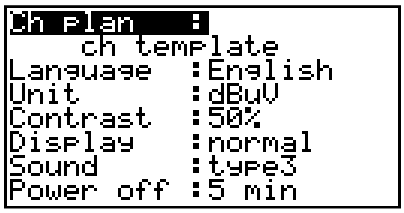

Figure 4.5.1

Choose parameter for editinig with ▲ or ▼ keys. Then scroll parameter with ◄ and ► keys.
The table represents the following settings:

a) **Ch plan.** Select channel plan from the available (Section 4.4.2). If a channel plan is not selected, **ch template** will be displayed;
b) **Language**. Select language. Available settings: **English**;
c) **Unit.** Select measurement units for the signal level. Available settings: **dBuV**, **dBmV**, **dBm**;
d) **Contrast**. Set LCD contrast from 0 to 100%;
e) **Display.** Select display mode. Available settings: **normal** – white characters in the blue background; **revers** – blue characters in white background;
f) **Sound.** Select key pressing sound. Available settings: **off** – silent; **type1**, **type2**, **type3** – three types of sound.
g) **Power Off.** Select automatic power off mode. Available settings: **off** – function turned off, **5 min**, **15 min** – automatic power off after 5 min and 15 min of having no keys pressed respectively. This function can be active only when powered from the battery.

4.6 Self-Test

The  icon in the Service menu refers to this mode. The self-test mode allows you to check the performance of the components of NEON and its functional condition. The screen view is represented in the Figure 4.6.1.

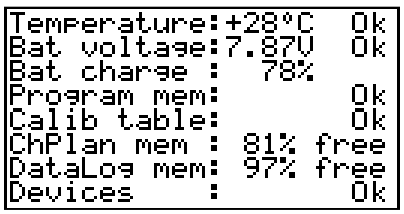

Figure 4.6.1

The table represents the following parameters to be checked:
Temperature. Temperature inside the Analyzer.
The function checks the temperature inside the Analyzer. Temperature is the main environmental factor, which influences the accuracy of measurements. To check the accuracy of measurements of the signal level, use the temperature parameter. If the temperature value is within the allowed range of – 10 to 50 ºC, then **Ok** status will be displayed at the end of the parameter line. If the temperature is not within this allowed range, then status will not be displayed. If instead of temperature «---» value is displayed, this indicates that temperature measuring device is faulty. In this case, please contact the service center.

Bat voltage. Voltage of the battery.

Bat charge. Battery level status.
The battery voltage and battery level status parameters allow you to check the battery condition. Perform this check when operating in stand-alone mode (power supply switched off). If the measured battery voltage is higher than 6.8 V, then **Ok** status is indicated, if the voltage is lower than 6.8 V, then **Low** status is indicated. The voltage will then be recalculated into the battery level status value in percent, which will help you to estimate the time remaining for the Analyzer to operate. Please note that with decrease of ambient temperature the battery capacity also decreases. This should be taken into account when estimating the operating time of the Analyzer.

Program mem. Firmware status.
This function checks the firmware status of your NEON. If no errors detected, the **Ok** status is displayed. If an error has been detected, the **Error** status is displayed. In this case, the firmware must be reinstalled (Section 4.9.5).

Calib table. Calibration table status.
This function checks calibration table. If no errors detected, the **Ok** status is displayed. If an error has been detected, the **Error** status is displayed. In this case, please contact the service center.

ChPlan mem. Channel plan memory status.
DataLog mem. Data log memory status.
This function shows the free memory in percent for each memory type.

Devices. Internal devices status.
This program checks the condition of the Analyzer components. If no errors detected, the **Ok** status is displayed. If an error has been detected, the **Error** status is displayed. In this case, please contact the service center.

4.7 Identification

The  icon in the Service menu refers to this mode. The Identification function allows you to determine the Analyzer model, its serial number, modification and firmware version, channel template name. The screen view is represented in the Figure 4.7.1.

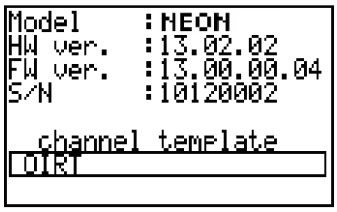

Figure 4.7.1

Your NEON data are displayed in the upper part of the screen:
a) **Model –** Analyzer model;
b) **HW ver. –** Analyzer hardware version;
c) **SW ver. –** Analyzer firmware version;
d) **S/N –** Analyzer serial number.

In the lower part of the screen, you will find name of the channel template, which can be edited with external PC (Section 4.9.6).

4.8 Battery Operation

The NEON is powered by Li-ion battery of no less than 1500 mAh capacity.

To determine the battery level status, use the self-test function of the Analyzer (Section 4.6.3). When the effective charge level of the battery drops to the critical point you will hear a warning beep. This signifies that the time of operation until total battery discharge is a few minutes.

When you connect an external 12 V DC power source or the car cigarette lighter socket of 12 V to the Analyzer, battery charging automatically switches on. The protection circuit will cut off the charging process when the temperature in the battery compartment is higher than 60 ^{0}C. That is why make sure to charge the battery in the ambient temperature not higher than 35 – 40 ^{0}C. We do not recommend you to charge batteries under high temperature, because they will not be able to gain full charge. Also, we do not recommend deep discharging of battery, because it leads to battery life time decreasing. You can control charging process from Self-test menu (Section 4.6). If battery level is reached 100%, it means that charging is finished and battery is ready for using.

CAUTION! NEON is shipped with nonstandard Li-ion battery. In the case of its malfunctioning or expiration of its life time, it can be repaced with a new one only in the service center. Do not try to do it yourself.

4.9 PC Communication

4.9.1 General Information

You can operate with your NEON via PC. For connection to PC use **USB** on the front panel of your Analyzer. The **NEONToolsTerrestrial** software allows the following:

a) measurement of video carrier level, C/N ratio and V/A ratio for analog channels and channel power for digital channels;
b) measurement of spectrum within scaleable frequency band (from 45 to 900 MHz);
c) measurement of DVB-T signal reception quality;
d) viewing and creating data log pages;
e) editing of channel plans;
f) editing of channel template;
g) saving and documenting of measurement results.

4.9.2 Software Installation

You can find all the necessary information about software installation from the «**readmy.txt**» document, which is distributed with the **NEONToolsTerrestrial** installation file.

4.9.3 USB Driver Installation

Please, install **NEONToolsTerrestrial** software (Section 4.9.2) before the USB driver installation.
Follow the steps:

a) Plug the USB cable into the Analyzer **USB** port on the front panel;
b) Switch on the Analyzer;
c) Wait for USB driver installation master being appeared;
d) Choose manual USB driver installation and set folder "**Drivers**" as a path to the driver. It is in the place you installed **NEONToolsTerrestrial** software to;
e) Wait for driver being installed;

When the driver is successfully installed you can communicate your NEON with **NEONToolsTerrestrial** software.

4.9.4 PC Communication Launch

To launch communication of your NEON with PC refer to the following steps:

a) Switch on the Analyzer;
b) Plug the USB cable into the Analyzer **USB** port on the front panel;
c) Choose  icon from the Main menu.

After that you can see the screen with the blinking **«Waiting for command»** message. The analyzer is ready for communication with **NEONToolsTerrestrial** software.

4.9.5 Firmware Updating

The NEON offers the capability to update its firmware without use of any additional equipment. We go on with improving NEON firmware. Each version of the firmware has its unique identification number, e.g. 13.0.0.3. The Analyzer firmware version is displayed in the Identification mode (section 4.7).

Before firmware updating make sure **NEONToolsTerrestrial** software and NEON USB driver have been installed.

To update the Analyzer's firmware proceed as follows:

a) Plug the USB cable into the Analyzer **USB** port on the front panel;
b) Switch on the Analyzer;
c) If you see **«Bootloader»** message on the screen, that means the firmware is damaged and you should skip step (d);
d) Launch PC communication (Section 4.9.4);
e) Launch **NEONToolsTerrestrial** software and choose Firmware updating manager icon on the navigation bar at the top of the window (Figure 4.9.1);

Figure 4.9.1

f) You will see the Firmware updating manager (Figure 4.9.2);

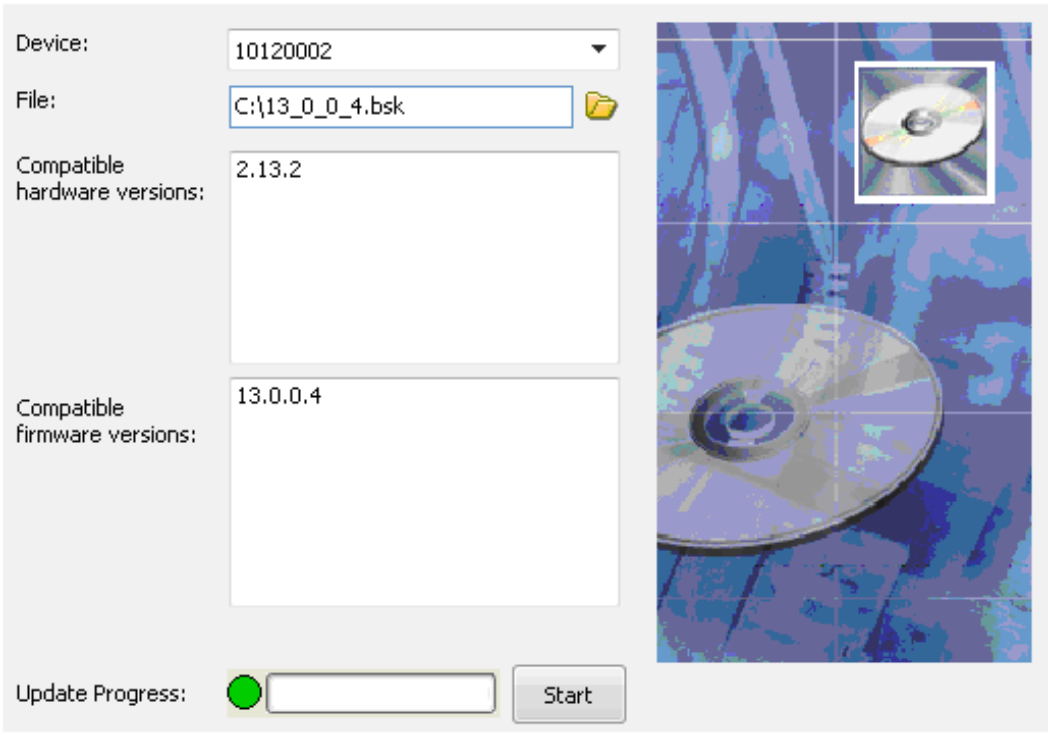

Figure 4.9.2

g) Choose device for firmware updating in the **«Devices:»** list;
h) Specify the path to the firmware updating ***.bsk** file;
i) Press **«Start»** button;

If your Analyzer functions properly, USB port cable connected correctly and the firmware updating file is compatible with the NEON, the process of program updating onto your Analyzer will automatically start. **The Analyzer must be powered from an external power source.** After the download is over the pop-up window will announce that the operation has been successfully completed. The NEON will reboot and start operating similar to when it has been powered up.

CAUTION Do not interrupt the firmware updating process. This can lead to malfunction of the Analyzer. But, if this does occur, repeat the firmware updating once again.

4.9.6 Channel Template Editing

NEONToolsTerrestrial software allow editing of the Analyzer's channel template. To access channel template manager press the icon with the Globe on the navigation bar (Figure 4.9.3).

Figure 4.9.3

Channel template manager window will appear on the screen. See figure 4.9.4.

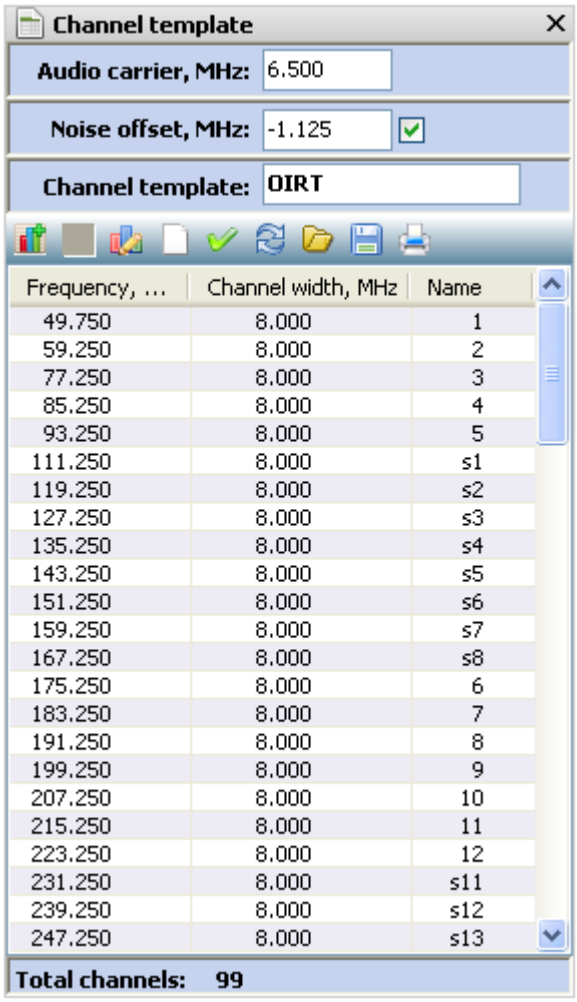

Figure 4.9.4

Channel template manager allow to:
a) Channel template creating;
b) Channel template editing;
c) Channel template saving to or loading from the file. Standart channel templates: OIRT and CCIR are distributed with the **NEONToolsTerrestrial** software. You can find them in the folder “TvSystems” in the place all user data are stored;
d) Channel template saving to or loading from the NEON.

Channel template consists of the following parameters:
a) **Audio carrier**. Audio carrier frequency shift from the channel video carrier. Uses for V/A ratio measurement.
b) **Noise offset**. Frequency point for noise measurement shift from the channel video carrier. This value uses as an default noise frequency offset value when creating or editing channel plan with **NEONToolsTerrestrial** software. If noise offset is disabled, then C/N ratio measurement is switched off.
c) **Channel template**. The name of the channel template. You can see it in the Information mode (section 4.7).
d) **Frequency**. Video carrier frequency. Set for every channel.
e) **Width**. Channel band width. Uses for digital channels power measuring and determining its central frequency. Set for every channel.
f) Name. Identity number of the channel which you can see in measurement modes. Set for every channel.

5 MAINTENANCE

Required maintenance is limited to observation of instructions related to proper operation, storage, and shipment, which are supplied in this Manual and also minor defects correction.

Perform preventive inspections covering check of controls, reliability of assembly, and the keypad condition after the warranty period has expired and annually since then.

6 TROUBLESHOOTING

Defect detection: The NEON fails to switch on in stand-alone mode.

Possible reason: Extremely low charge or malfunction the battery.
Methods of correction: To check the NEON condition, connect the external power adapter. If the Analyzer switches on, check the battery voltage in self-test mode (Section 4.6.3). Low voltage (under 6.8 V) is an evidence that the battery is discharged or malfunctioning. Voltage that is higher than normal (over 8.5 V) indicates that the battery is malfunctioning. The battery should be charged in case it is low (Section 4.8) or replaced in the service center if it is malfunctioning.

Defect detection: The NEON is switched on in stand-alone mode but instead of displaying the Main menu it displays message **«Bootloader»**.

Possible reason: The Analyzer's firmware is damaged.
Methods of correction: Reinstall analyzer's firmware (Section 4.9.5).

Defect detection: The NEON does not react on pressing any of keys.

Possible reason: The Analyzer's firmware may be frozen.
Methods of correction: Press and hold ⏻ key for 5 seconds. Then switch on The Analyzer.

Defect detection: High error at level measurements in some or all of the channels.

Possible reason: Increased wear of the RF input adapter.
Method of correction: Replace the RF input adapter by a good one.

Possible reason: Incorrect channel plan setting, which makes the NEON to tune to an offset video carrier point.
Method of correction: Adjust the channel plan (Section 4.4.2.1).

Possible reason: Incorrect selection of the channel template.
Method of correction: Check the parameters of the channel template (Section 4.9.6).
Defect detection: When measuring DVB-T channel parameters «**Demodulator error**» message appears on the screen.

Possible reason: Demodulator malfunction.
Method of correction: Please contact the service center.

7 STORAGE

Store your NEON under the following conditions: environment temperature from -20 to +40 °C, relative humidity up to 90 % (at 30 °C).

8 TRANSPORTATION

The NEON must be shipped in any closed vehicle at temperature from -20 to +40 °C, relative humidity 90% (at 30 °C) and atmospheric pressure of 84 to 106.7 kPa (630 to 800 mm Hg).

Cargo holds, railway cars, containers, and truck beds, utilized for shipment of the NEON should be free from any traces of cement, coal, chemicals, etc. When shipped by air the products should be kept in aircraft sealed compartments.