

**IT-083**

# **DVB-S/S2 SIGNAL ANALYZER**

OPERATING MANUAL



 **PLANAR**

15.07.2013

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## 1. PRODUCT FAMILY GENERAL INFORMATION

IT-08 is a multifunction handheld compact lightweight measurement instrument incorporating two components. One of the components, MB-08 Base Unit, remains invariable and provides color display, control and powering (from batteries or mains adapter) features. The other component, MC-08x, is one of the removable modules, which determine measurement functions of the whole instrument.

IT-08 is capable to satisfy all your requirements in radio, cable and satellite, analog and digital TV measurements.

According to your measurement target, you can easily and quickly plug in one of the modules into the Base Unit and perform the desired measurements. So, replacing the modules you can obtain options featuring the following different applications:

- **IT-081 TV Level Meter** (MC-081 module plugged-in), 5 to 900 MHz range. Measurement of level, V/A and C/N ratios, spectrum;
- **IT-082 DVB-S Signal Analyzer** (MC-082 module plugged-in), 950 to 2150 MHz range. Measurement of reception quality parameters (BER, MER) for digital satellite (DVB-S with QPSK modulation). Powering LNB SAT. Integrated DiSEqC generator;
- **IT-083 DVB-S/S2 Signal Analyzer** (MC-083 module plugged-in), 950 to 2150 MHz range. Measurement of reception quality parameters (BER, MER) for digital satellite (DVB-S/S2 with QPSK/8PSK modulation). Powering LNB SAT. Integrated DiSEqC generator;
- **IT-084 TDR Cable Reflectometer** (MC-084 module plugged-in) for identification and precision fault location in cables up to 1600 m in length;
- **IT-086 Optical Power Meter** (MC-086 module plugged-in), measurement at -60 dBm to +23 dBm range and wavelengths 1310 and 1550 nm.
- **IT-087 DVB-C Signal Analyzer** (MC-087 module plugged-in), 47 to 862 MHz range. Measurement of channel level, C/N and V/A ratios, spectrum, channel power, MER, BER, and constellation diagram.
- **IT-088 DVB-T Signal Analyzer** (MC-088 module plugged-in), 47 to 862 MHz range. Supports DVB-T and DVB-H with COFDM modulation. Measurements for analog channels: channel level, C/N and V/A ratios, spectrum, and for digital channels: channel power, C/N ratio, MER, BER, and constellation diagram.
- **IT-089 DVB-T/T2 Signal Analyzer** (MC-089 module plugged-in), 45 to 865 MHz range. Measurements for analog channels: channel level, C/N and V/A ratios, spectrum, and for digital channels: channel power, C/N ratio, MER, BER, constellation and echo diagrams. Powering of antenna amplifiers.

Now we are pleased to offer you the eight above modules, but the number is supposed to grow in the nearest future. You can purchase MB-08 Base Unit accompanied by any of the module(s), currently required, at your option. Later on, you can acquire any other module(s) to expand your measurement abilities.

## IT-08 GENERAL FEATURES (similar for all the IT-08 family instruments):

MB-08 dimensions (WxHxD)	90 x 200 x 55 mm
MC-08x dimensions (WxHxD)	60 x 70 x 27 mm
IT-08 weight	0.6 kg (including batteries) 2.2 kg (in package)
keypad	made of rubber
display	2.8" color TFT, 320x240 pixels
power supply	
internal	NiMH AA rechargeable batteries, 2100 mAh (6 pcs)
external	12V/0.8A mains adapter
PC compatible interface	USB 2.0 serial
operating temperature	-10 to +40 °C
user firmware update	via USB interface from PC or from MC-08x Removable Module

## 2. GENERAL DESCRIPTION AND PRINCIPLE OF OPERATION

### 2.1. Introduction

This Operating Manual is intended for introducing the design, functions and basic instructions related to operation, service and transportation of the IT-083 DVB-S/S2 Signal Analyzer (Analyzer).

The IT-083 is designed for control and alignment of satellite dishes for digital or analog satellite television. The Analyzer provides the measurement of reception quality parameters, such as modulation error ratio (MER) and bit error rate (BER) before and after Viterbi/LDPC decoder.

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

The reliability of the IT-083 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 Digital Converter;
- CD - Compact Disk;
- PC - Personal Computer;
- LCD - Liquid Crystal Display;
- DL - Data Logger;
- IF - Intermediate Frequency;
- QPSK - Quadrature Phase Shift Keying;
- 8PSK - 8 Phase Shift Keying;
- LNB - Low Noise Block;
- DiSEqC- Digital Satellite Equipment Control;
- MPEG - Motion Pictures Expert Group;
- ETSI - European Telecommunications Standard Institute;
- DVB - Digital Video Broadcasting;
- FEC - Forward Error Correction;
- LO - Local Oscillator;
- AGC - Automatic Gain Control;
- MER - Modulation Error Ratio;
- BER - Bit Error Rate;
- ONID - Original Network Identifier;
- TSID - Transport Stream Identifier.

## 2.2. Safety Precautions

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 avoid mechanical damage of the IT-083, the instructions regarding the storage and transportation (see Sections 7 and 8) of the Analyzer must be observed.

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## 2.3. Function

The IT-083 DVB-S/S2 Signal Analyzer belongs to the family of IT-08 measurement instruments and is designed for adjustment of the reception systems of digital (DVB-S/S2) or analog satellite television. It allows for the antenna positioning in the spectrum analysis mode, and performing measurements at a single point for one LNB. To simplify the alignment of a dish, audio indication level measurement mode can be used. IT-083 provides the measurement of reception quality parameters, such as modulation error ratio (MER) and bit error rate (BER) before and after Viterbi/LDPC decoder. Constellation diagram allows estimating the type of noise in data transmission channel. IT-083 provides automatic identification of setup parameters (transponder frequency, symbol rate, FEC, polarization).

The Analyzer feeds power to the LNB and supports DiSEqC command system according to level 2.1 specification.

The IT-083 can be connected to a personal computer to access additional modes. The appearance of the Analyzer and its components is shown in Figures 2.1 and 2.2.



Figure 2.1



Figure 2.2

This Operating Manual complies with 02.80.01 hardware version of the MB-08 Base Unit and 1.3.0.1 version of IT-083 software.

## 2.4. 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 in compliance with installation category CAT. II.

Rated operating conditions:

- a) ambient temperature -10 to 40 °C;
- b) relative air humidity not greater than 90% at 25 °C ambient temperature;
- c) atmospheric pressure 84-106 kPa (630-795 mm Hg).

## 2.5. Package Contents

The Meter package includes:


- a) MB-08 Base Unit ..... 1 pc.;
- b) MC-083 Removable Module ..... 1 pc.;
- c) Carrying Case ..... 1 pc.;
- d) NiMH, AA Batteries ..... 6 pcs;
- e) PS12/1.2 Mains Adapter ..... 1 pc.;
- f) "F"- "F" Adapter ..... 1 pc.;
- g) USB cable ..... 1 pc.;
- h) Rubber Holster ..... 1 pc.;
- i) Operating Manual ..... 1 pc.

The Removable Module (if supplied separately) package includes:

- a) MC-083 Removable Module ..... 1pc.;
- b) "F"- "F" Adapter ..... 1pc.;
- c) Operating Manual ..... 1pc.

## 2.6. Specifications

Operating frequency range: ..... 950 - 2150 MHz  
 Frequency resolution ..... 1 MHz

	Input parameters: - input impedance within operating frequency range 75 Ohm - allowed resulting value of DC and AC input voltage 2 V
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Level measurement range ..... 40...100 dBµV  
 Level measurement resolution ..... 0.1 dB  
 Accuracy within 40...100 dBµV level range ..... ± 2.5 dB  
 Measurement channel passband for -3 dB level ..... 1-65 MHz  
 Frequency indication ..... 5 characters on LCD  
 Signal level indication ..... 4 characters on LCD  
 Warm-up time ..... 5 min.  
 Input signal modulations  
     DVB-S ..... QPSK  
     DVB-S2 ..... QPSK, 8PSK  
 Symbol rate ..... 1 to 45 Msps  
 FEC ..... 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 7/8, 8/9, 9/10  
 LNB frequency error ..... ±10 MHz  
 MER measurement range ..... 4 to 18 dB



BER measurement range before Viterbi decoder .....	$10^{-1}$ to $10^{-5}$
BER measurement range after Viterbi decoder .....	$10^{-3}$ to $10^{-8}$
BER measurement range before LDPC decoder .....	$10^{-2}$ to $10^{-5}$
BER measurement range after LDPC decoder .....	$10^{-8}$ to $10^{-9}$
Input DC voltage measurement range .....	3 to 30 V
LNB supply voltage .....	13, 18 V
LNB supply current .....	300 mA
LNB current consumption control range.....	50 to 350 mA
DiSEqC command system support .....	DiSEqC 2.1
IT-083 can be powered by:	
- AC circuit, 85-265 V, 50-60 Hz, 5% harmonic content, via PS12/1.2 Mains Adapter	
- external DC source with $12 \pm 0.6$ V voltage and 0.5 V ripple	
- batteries with capacity of 2100 mAh	
Current consumed from external power source or batteries .....	1.2 A
Continuous stable operation under normal conditions	
(when powered by external source) .....	8 hours
Battery duration under normal conditions	
(2300 mAh battery capacity, LNB current 150 mA).....	1 hour
Mean time between failures .....	10000 hours
Average lifetime .....	5 years
Dimensions .....	200x90x55 mm
Package dimensions .....	400x300x90 mm
Weight.....	0.6 kg
Weight in package .....	2.2 kg

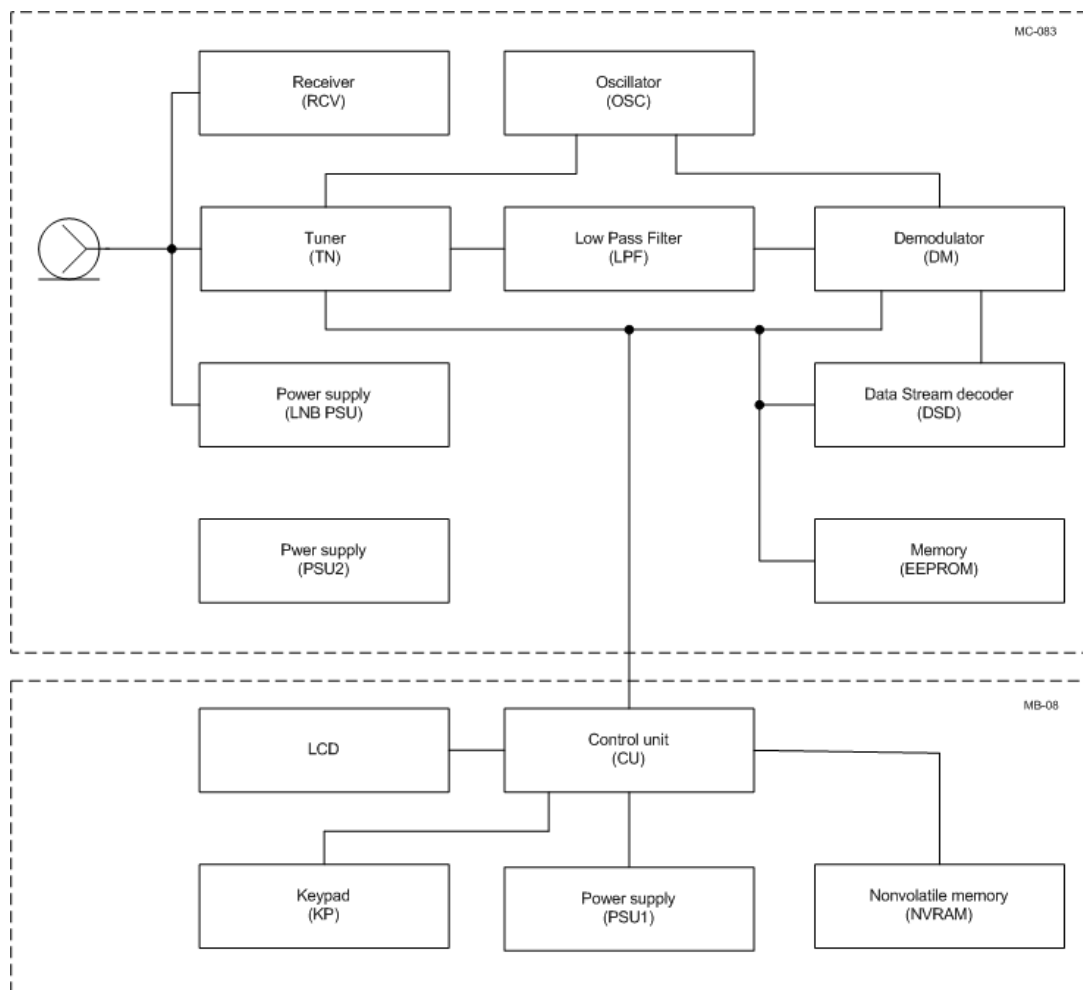


Figure 2.3

## **2.7. Design and Operation Overview**

### **2.7.1. Principle of Operation**

IT-083 DVB-S/S2 Signal Analyzer is a receiver of DVB-S/S2 signals with demodulation of the traffic stream to MPEG-2. MER and constellation diagram are measured during demodulation of the QPSK/8PSK signal based on vector analysis of the signal. BER in the digital stream is determined by analyzing the operation of Viterbi/LDPC and Reed-Solomon/BCH decoders. The signal level measurement is implemented by means of a digital automatic gain control system. The principle of spectrum analyzer operation is based on sequential analysis with spectrum being displayed either on the Analyzer LCD or on the screen of the external computer.

### **2.7.2. Block Diagram**

The block diagram of IT-083 is shown in Figure 2.3. Input signal is supplied to the tuner (TN), which is a heterodyne receiver with a quadrature mixer and zero intermediate frequency. Low pass filter (LPF) forms satellite television signal reception and measurement bands at IF bandwidth. DVB-S/S2 signal demodulation, reception quality and level measurement is performed by QPSK/8PSK demodulator (DM). As the transport stream in MPEG-2 format exits the DM, it immediately enters the data stream decoder (DSD), which is used to isolate identification data. Reference clock rate frequency formation required for the operation of the tuner and QPSK/8PSK demodulator is produced in the reference oscillator (OSC).

LNB power supply unit (LNB PSU) forms supply voltage for LNB that supports DiSEqC commands. Input signals of DiSEqC protocol are processed by the receiver (RCV). EEPROM stores user program and a correction coefficients table. The second power supply unit (PSU2) supplies power to the elements of the Removable Module.

The Removable Module is controlled by the signals coming from the control unit CU located inside the Base Unit. The control unit also receives user commands entered from the keypad, converts data and displays it on the LCD screen. NVRAM stores all the correction coefficients specified by the manufacturer, data loggers and operation information. PSU1 forms all the required voltages either from the batteries or from the external power source.

### **2.7.3. Component Arrangement**

The IT-083 is made up of two modules. Both modules are manufactured in plastic shockproof sectional housings that also include printed and three-dimensional wiring. MB-08 Base Unit dimensions are 200x90x55 mm. MC-083 Removable Module dimensions are 70x57x26 mm; it is plugged into the Base Unit via specific connector.

The front panel of the Base Unit contains a keypad and LCD. The right panel has a serial port connector and mains adapter connector. The Removable Module connector is located on the back panel. The Removable Module has an 75-Ohm input F-type connector, a Base Unit connector and a cooling fan.

## **3. PREPARATION FOR OPERATION**

Perform external examination to make sure your IT-083 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 (see Section 2.5).

If the IT-083 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 before passing 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, F4** functional keys enable the commands corresponding to the icons shown on the Analyzer screen;
- b) **I** key switches the Analyzer on/off. The key backlight indicates that the power is supplied from an external power source;
- c) **AUX** key activates an alternative set of functions for **F1, F2, F3, F4** functional keys;
- d) **MENU/ENTER** key is intended for selection of the current command or for returning to the previous menu level;
- e) **▲, ▼, ◀** and **▶** arrows allow for adjustment of the current operation mode;
- f) alphanumeric keypad allows entering text or numeric data;
- g) **--⚡+12V DC** connector provides connection to an external power source;
- h) **USB** connector provides connection to computer;
- i) **INPUT** connector provides connection of measured cable, via F-type connector.

### 4.2. Preparation for Measurements

Before you start to operate your IT-083, make sure to carefully read this Operating Manual as well as to check the location and functions of the controls and indicators of the Meter (see Section 4.1).

To prepare your Analyzer for operation with the external power source proceed as follows:

- a) unlock the Carrying Case and take the Analyzer and the Mains Adapter out;
- b) connect the MC-083 Removable Module to the MB-08 Base Unit, if they were stored separately;
- c) connect the Mains Adapter to the connector located on the side panel of the IT-083 and then to the power source;
- d) press and hold down the **I** key until the display is lit.

To prepare your IT-083 for operation in stand-alone mode, powered by the batteries, proceed as follows:

- a) unlock the Carrying Case and take the IT-083 out;
- b) connect the MC-083 Removable Module to MB-08 Base Unit, if they were stored separately;
- c) press and hold down the **I** key until the display is lit.

If the Removable Module firmware version differs from the firmware installed, then IT-083 will start the program installation process automatically after the Analyzer is switched on. The loading process is indicated by corresponding messages on the Analyzer screen.

---

**CAUTION** Do not switch the power off while the firmware is being loaded! If you do this, you may not be able to load the firmware onto your Analyzer without the use of a PC further on.

---

If the Removable Module firmware version does not differ from the firmware installed, then the IT-083 will start checking the Removable Module after switching the power on. After the check is successfully completed, the following startup screen (see Figure 4.2.1) will appear:





Figure 4.2.1

The screen displays the name and type of the Analyzer. In a second, the screen will switch to either the main menu for operating mode selection (main menu) as shown in Figure 4.2.2, or the last used measurement mode, in case if quick access to measurement modes is enabled (see Section 4.7.3).



The Analyzer menu represents a number of icons, each icon referring to a certain mode. The view of the main menu is shown in Figure 4.2.2.



Figure 4.2.2



The Analyzer has two sets (tabs) of icons. The first tab (, Main modes) includes icons of the most frequently used measurement and setting modes. The second tab (, Additional modes) shows less frequently used modes. Use ◀ and ▶ keys to switch between the tabs. To select a mode, set its icon in the bottom line of the screen. The titles of the modes will be indicated on the functional keys. Use the corresponding functional key to select the required mode. Use **MENU/ENTER** to exit the mode and enter the main menu.

To make sure that the Analyzer is operating properly, follow the procedure described below.

Select the  tab with additional modes and enter  **Regional Settings** mode. Using ▲ and ▼ keys, select the line with the required parameter, and use ◀ and ▶ keys to set the following parameter values:

**Language:** Russian (can be optionally set to English)

**Level units:** dBμV


Press **MENU/ENTER**. Use ◀ and ▶ to select the  tab with main modes and set the  icon at the bottom of the main screen using ▲ and ▼ keys. Press the corresponding functional key.

The input signal spectrum will be shown on the screen as in Figure 4.4.5. Press **F1/Setting** key. Use ▲ and ▼ to select the line with the required parameter and ◀ and ▶ keys to set the following parameter values:

- Span:** 100 MHz
- Scale:** 10 dB/div
- Ref. level:** auto
- Max. level:** OFF

To set the parameters, select a required one using ▲ and ▼ keys. Change the parameter value using ◀ and ▶ keys. When a parameter is set, press **MENU/ENTER**. After that the spectrum analyzer diagram with 100 MHz span will be displayed. Press **MENU/ENTER** to return to the main menu.

### 4.3. Quick LNB Setting

In the process of operating the Analyzer and performing measurements the current LNB settings can be changed manually. Quick LNB setting mode is intended for this purpose. The  icon in the main mode corresponds to this mode. This mode allows for quick setting of the LNB parameters. The screen view is shown in Figure 4.3.1.

13.0°E HotBird		05:06	
Parameter	Value		
Management	auto		
LNB profile	Universal		
LNB Select	LNB 1		
Satellite LNB1	13.0°E HotBird		
Satellite LNB2	not selected		
LO Select	Low		
Pol Select	V		
Exit			

Figure 4.3.1

The table includes seven parameters which can be edited:

1. **Management.** Managing LNB. Possible values:

**OFF:** LNB is turned off, it is not powered or controlled.

**Manual:** LNB is turned on, LO and Polarization values are selected manually according to the table.

**Auto:** LNB is turned on, parameters are set automatically during transponder setting.

2. **LNB Profile.** Selecting current LNB profile from the number of preset profiles in the table (see Section 4.6.2).

3. **LNB Select.** Selecting current LNB, if it is not the only one in the profile.

4. **Satellite LNB1** and **Satellite LNB2.** The name of the satellite from the Satellite Data Logger (see Section 4.6.3) corresponding to LNB1 or LNB2, if the selected profile has two LNBs.

5. **LO Select.** Selecting local oscillator, if it can be selected in the current LNB.

Possible parameter values:

**Low:** Lower LO

**High:** Upper LO

6. **Pol Select.** Selecting polarization. Possible parameter values:

**L/R:** left or right circular

**H/V:** horizontal or vertical linear

If LNB management is off (**Management: OFF**), LNB power is not supplied and the LNB is not controlled. Tuning in all the measurement modes is performed only by the

Analyzer input frequency (satellite IF). In this case other table parameters are not available for editing.

If LNB management is in manual mode, then all table parameters are available for editing. In this you should set the current **LO** and **Polarization** values according to the parameters of the selected transponder.

In automatic management mode, the **LO** and **Polarization** parameters are not available for editing. The Analyzer will automatically control the parameters when tuning to a required transponder according to transponder parameters table.

If a satellite is not specified for the current LNB (**Satellite LNB1: Not selected**), then tuning in all the measurement modes can be performed only by frequency. Tuning by transponders is not implemented in this case.

The LNB is powered only in the following cases: if one of the measurement modes is selected, in automatic LNB management mode (transponder frequencies/parameters are determined automatically), and in DiSEqC commander mode. In all other modes the power is not supplied to the LNB.

#### 4.4. Measurement Procedure

##### 4.4.1. General Information

The IT-083 offers four measurement modes:

- a) measurement of signal level at frequency point and DVB-S/S2 signal parameters in **Level** mode;
- b) dual LNB dish alignment in **Level 2** mode;
- c) measurement of signal spectrum in **Spectrum** mode;
- d) measurement of DVB-S/S2 signal reception quality parameters in **MER/BER** mode.

In the main menu (see Figure 4.2.2), use ▲ and ▼ keys to move the icon of the required mode at the bottom line on the screen. The icons correspond to measurement modes as follows:



Level



Level 2



MER/BER



Spectrum

Press the functional key which is below the required icon to select the measurement mode. Press **MENU/ENTER** to return to the main menu.

In all measurement modes the screen has similar elements and settings, as shown in Figure 4.4.1.



Figure 4.4.1

The top panel of the screen shows the selected satellite name, current time and battery remaining capacity. In case a satellite is not selected, **Not Selected** message is displayed and the tuning by transponder number is not available. Under the top panel the current settings/ mode status panel is located.

In the functional keys panel, **F1** key is used to activate the mode settings menu and **F2** is used to activate LNB settings menu.

LNB settings menu contains a list of parameters, which are selected by using **▲** and **▼** keys and adjusted using **◀** and **▶** keys. The list of parameters and their possible values is the following:

1. **LNB Current**. Consumed LNB current (this parameter cannot be edited).

2. **LNB Select**. Selecting an active LNB.

**LNB 1**: LNB 1 is active.

**LNB 2**: LNB 2 is active (this is available if LNB profile has two LNBs).

3. **LO**. Selecting the local oscillator for LNB.

**Low**: Lower LO.

**High**: Upper LO.

4. **Polarization**. Selecting the LNB polarization.

**H/V**: Horizontal/vertical linear.

**L/R**: Left/right circular.

The **AUX** key activates the menu with additional set of functions. First press **AUX** and then one of the functional keys. The main set of functions will reappear on the screen in 3 seconds.

Using the **AUX** key in **Level**, **MER/BER** and **Spectrum** modes, you can access the menu of additional mode settings. To enter this menu, press **AUX** and then **F1** key. This menu contains the following parameters:

1. **Motor Control**. Selecting the mode of DiSEqC positioner control.

**off**: DiSEqC positioner control off.

**on**: DiSEqC positioner control on.

2. **Motor Mode**. Selecting the mode of positioner movement.

**step**: movement by steps.

**continuous**: continuous movement.

If you turn on the DiSEqC positioner control mode in the above mentioned measurement modes, **F1-F4** keys will change the functions both in the main and additional set of functions. In the main set of functions these keys will activate the following commands: **F1** – move westwards, **F2** – move eastwards, **F3** - stop, **F4** – menu of positioner commands. The menu of positioner commands contains the following commands:

1. **Go Home**. Setting the positioner to zero position.

2. **Go to Position nn**. Driving the positioner to satellite position nn.

3. **Position nn**. Saving the current position under nn number.

4. **Set East limit**. Setting the Eastern limit.

5. **Set West limit**. Setting the Western limit.

6. **Limits off**. Removing the limits.

Commands activated by the functional keys in additional set of functions, except for **F1**, depend on the measurement mode. By pressing **F1** key, you can access the menu of additional mode settings.

#### 4.4.2. Single LNB Dish Alignment Mode

Screen view and data displayed in this mode are shown in Figure 4.4.2.

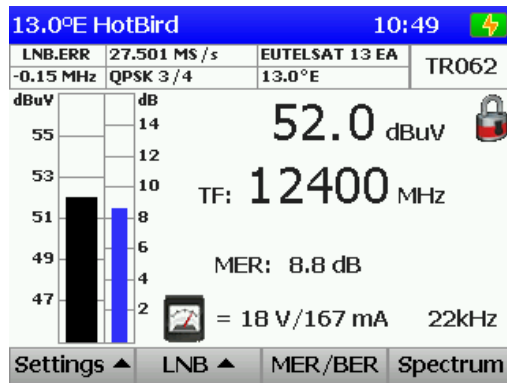


Figure 4.4.2

In this mode the following information is indicated on the screen: signal level in frequency point and MER (signal quality parameter) in digital form and in the form of vertical bars. The measured signal level can be indicated in dB relative to 1  $\mu$ V, relative to 1 mV or relative to 1 mW (see Section 4.7.2).

The current settings/mode status panel (see Section 4.4.1) indicates the following signal parameters (from left to right) after synchronization (🔒 icon): frequency setting error of LNB local oscillator, symbol rate, FEC, modulation, and network name and orbital position (if these data are available in digital stream). The bottom screen line displays LNB consumed current.

The indicator of synchronization with transponder signal can have the following states:

1. 🔒 synchronization achieved.
2. 🌀 synchronization not stable. Low signal with much noise.
3. no icon. No transponder signal or incorrect Analyzer settings.

To perform tuning by transponders, frequency or modulation, use ◀ and ▶ keys. To directly enter the number of transponder, frequency (in MHz) or symbol rate (in Msps), select the corresponding setting mode (**Tuning mode**) and use alphanumeric keys. Press **MENU/ENTER** when the number is entered. When you enter the transponder frequency, there is an option of fast selection of polarization value. To do this, press ◀/▶ for horizontal polarization or ▲/▼ for vertical polarization instead of **MENU/ENTER**. If the entered parameter value is not correct, then the previous parameter value will be restored after pressing **MENU/ENTER**. To enter the **FEC** value, use alphanumeric keys. The correspondence of numerical keys with FEC values is as follows: **1** is 1/2, **2** selects 2/3, **3** selects 3/4 and 3/5, **4** selects 4/5, **5** selects 5/6, **7** selects 7/8, **8** selects 8/9 and **9** selects 9/10.

To change the mode settings, press **F1/Settings**. A list of parameters will appear in the drop-down menu. Use ▲ and ▼ to select the parameter and ◀ and ▶ to set its value. The list of parameters and their possible values is as follows:

1. **Tuning mode**. Selecting the tuning mode.

**TR**: Tuning by transponder number from the transponder table. This mode is available only if an active satellite is selected.

**TF**: Tuning by transponder frequency. This mode is available only if an active LNB profile is selected.

**IF**: Tuning by intermediate frequency.

**MOD**: Entering modulation.

**SR**: Entering symbol rate.

**FEC**: Entering FEC value.

2. **Scale**. Setting amplitude scale

**2 dB**: 2 dB per division



- 5 dB:** 5 dB per division
- 10 dB:** 10 dB per division
- 3. **Ref. level.** Setting the amplitude scale position.
- Manual:** Manual setting by ▲ and ▼ keys.
- Auto:** Automatic setting
- 4. **Max. level.** Displaying maximum level on LCD
- OFF:** Not displayed
- ON:** Additional maximum level is displayed above the level column
- 5. **Sound indication.** Selecting sound indication of parameters
- OFF:** Sound indication off.
- Tone:** Audio tone frequency is proportional to parameter value.
- 6. **Indication param.** Selecting parameters to be accompanied by sound indication.
- Level:** Sound indication of level
- MER:** Sound indication of MER
- 7. **Indication logic.** Selecting the logic of sound indication.
- Always:** Sound indication always on
- AfterLock:** Sound indication on only after synchronization

To reset the maximum level on the indicator, use **F4/Reset** key in the additional set of functions which is activated by pressing **AUX**. Use **F3** and **F4** keys to enter **MER/BER** and **Spectrum** measurement modes accordingly.

To turn on the DiSEqC positioner control mode, press **AUX** key to activate the additional set of functions, and then use **F1/Add.sets** to enter the additional settings menu (see Section 4.4.1).

If you press **F2/CrossPol** key in additional set of functions, the screen will display the signal level from different polarizations at the tuning frequency (see Figure 4.4.3).

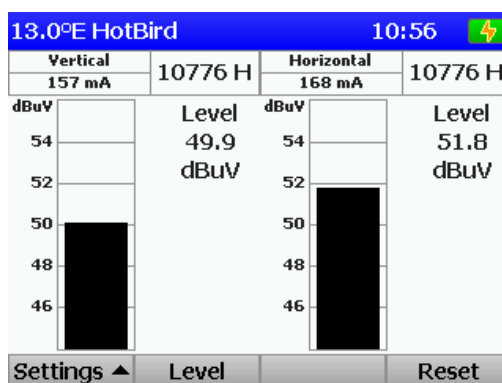


Figure 4.4.3

Use ◀ and ▶ arrows to select the adjacent transponder. Also you can enter the transponder frequency and polarization directly by using the alphanumeric keypad.

To return to the **Level** mode, press **F2** or **MENU/ENTER** keys.

You can change the mode settings by pressing **F1/Settings▲** key. The following parameters are available for editing:

1. **Scale.**
2. **Ref. level.**
3. **Max. level.**

To reset the maximum level on the indicators, use **F4/Reset** key.

#### 4.4.3. Dual LNB Dish Alignment Mode

In this mode the Analyzer screen shows the signal levels and C/N ratios for two LNBS simultaneously. The screen view is represented in Figure 4.4.4.

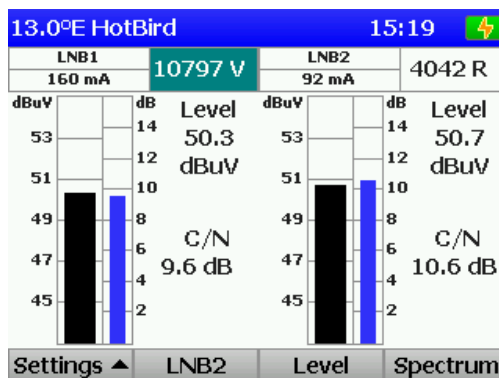


Figure 4.4.4

Use ◀ and ▶ keys to perform tuning by transponders. Also you can directly enter the transponder frequency and polarization (see Section 4.4.2) from the keypad.

You can change the mode settings by pressing **F1/Settings**▲ key. The following parameters are available for editing:

1. **Scale.**
2. **Ref. level.**
3. **Max. level.**

You can see the description of these parameters and list of their available values in section 4.4.2.

Press **F2/LNB1(2)** key to select the required LNB and change the transponder frequency. The selected LNB will be highlighted on the screen in the area of transponder frequency.

To switch to **Level** and **Spectrum** measurement modes, press **F3** and **F4** functional keys accordingly. To enter **MER/BER** mode, use **F3** key in additional set of functions which is activated by pressing **AUX**.

To reset the maximum level on the indicator, use **F4/Reset** key in additional set of functions.

#### 4.4.4. Spectrum Analyzer Mode

In this mode the Analyzer screen displays the signal spectrum. Screen view and information displayed are shown in Figure 4.4.5:

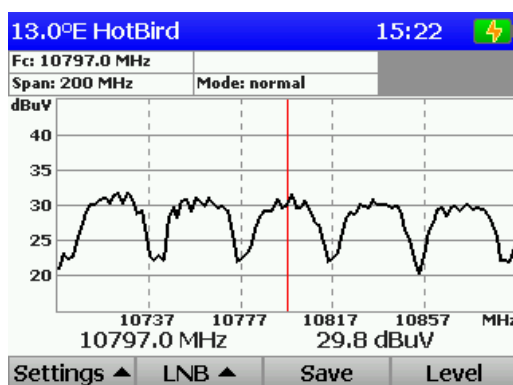


Figure 4.4.5

The marker position is set using ◀ and ▶ keys. You can also directly enter the frequency value using alphanumeric keys. When frequency in MHz is entered, press **MENU/ENTER**. After this the entered frequency will be displayed in the center of the screen.

To access the mode settings, press **F1/Settings**. The following parameters are available for editing:

1. **SPAN**. Frequency scanning range

**100/200/500/1200/Quick1200 MHz**: Possible values of scanning range. In Quick1200 mode the scanning of the whole frequency range is quicker than in 1200 MHz mode, but the rated level measurement accuracy is not ensured.

2. **Scale**. Setting amplitude scale

**5 dB**: 5 dB per division

**10 dB**: 10 dB per division

**20 dB**: 20 dB per division

3. **Ref. level**. Setting the amplitude scale position

**Manual**: Manual setting by ▲ and ▼ keys.

**Auto**: Automatic setting.

4. **Add.trace**. Showing of additional trace with maximum level on the screen

**OFF**: Disabled

**Max**: Displaying trace with max level

5. **Horiz.scale**. Selecting horizontal scale indication type

**IF**: Displaying IF frequencies on the horizontal scale

**TF**: Displaying satellite frequency range. This setting is only available if active LNB profile is selected (see Section 4.3).

**TR**: Displaying transponder intervals on the horizontal scale. This setting is only available if active satellite is selected (see Section 4.3).

When additional trace is enabled (**Max** value is selected), you can reset the maximum value by using **F4/Reset** in additional set of functions which is activated by **AUX** key.

To save the displayed spectrum band in the Data Logger, use **F3/Save** key. Use **F4** to enter **Level** measurement mode.

To turn on the DiSEqC positioner control mode, press **AUX** key to activate the additional set of functions, and then use **F1/Add.sets** to enter the additional settings menu (see Section 4.4.1).

#### 4.4.5. DVB-S/S2 Signal Parameters Measurement in MER/BER Mode

In this mode the measured parameters of DVB-S/S2 signal reception quality are indicated on the screen in the digital form and in the form of vertical bars. Constellation diagram mode is also used. The screen views are shown in Figure 4.4.6.

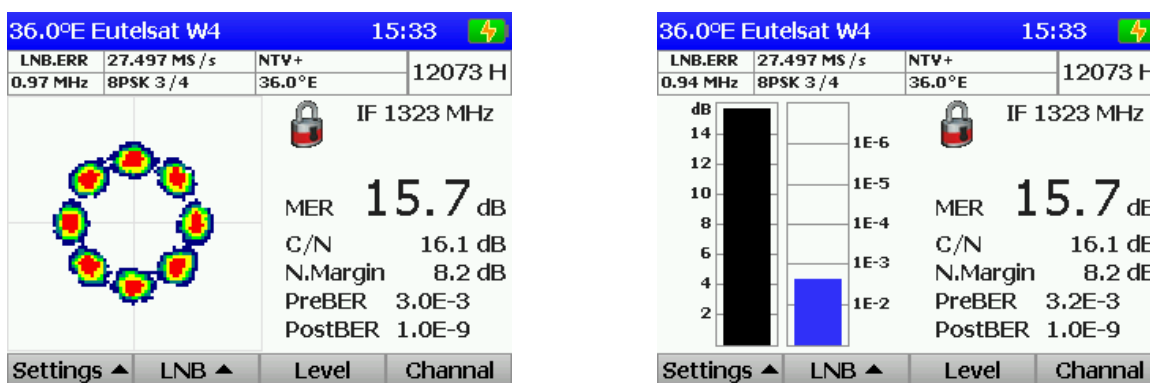


Figure 4.4.6

The following data will be indicated on the screen: tuning frequency, offset frequency and the measured parameters such as modulation error ratio (**MER**), Carrier-to-noise ratio (**C/N**), Noise Margin (**N.Margin**), bit error rate before Viterbi/LDPC decoder (**preBER**) and after Viterbi/LDPC decoder (**postBER**). The following information will be displayed on the screen in the graphical form: MER and one of the selected BER values in **MER/BER** mode or constellation diagram in **Constellation** mode.

Tuning in this mode is performed by the transponder number or frequency using ◀ and ▶ keys or these values can be entered directly using alphanumeric keys. The tuning mode is shown in the right side of the current settings/status panel and can be changed using **F1/Settings** key in **Single LNB Dish Alignment** mode (see Section 4.4.2). When you enter the transponder frequency, there is an option of quick selection of polarization value. To do this, press ◀/▶ for horizontal polarization or ▲/▼ for vertical polarization instead of **MENU/ENTER**.

When transponder setting is complete, the Analyzer determines modulation parameters and synchronizes with the digital stream. This process will be indicated on the current settings/status panel. The parameter values will appear on the screen as soon as they are measured.

To access the mode settings, press **F1/Settings**. The following settings are available:

1. **Indication**. Selecting the indication mode.

**MER/BER**: Indication of MER and BER values as bars

**Constell.:** Indication of constellation diagram

2. **Max.level**: Enabling/disabling max MER and BER level parameters indication

3. **BER Graph**: Selecting one of BER values for graphical indication

To reset the maximum level on the indicator, use **F4/Reset** key in the additional set of functions, which is activated by pressing **AUX**. To save the measured parameters in the Data Logger, use **F3/Save** in the additional set of functions. To view one quadrant of constellation diagram, use **F2/Zoom** in the additional set of functions. To return to **Level** measurement mode, use **F3** key.

To turn on the DiSEqC positioner control mode, press **AUX** key to activate the additional set of functions, and then use **F1/Add.sets** to enter the additional settings menu (see Section 4.4.1).

You can enter the transponder channels table mode by pressing **F4/Channels** key. The screen view of this table is shown in Figure 4.4.7.

This mode is available only when the synchronization with the transponder signal is achieved. The process of loading of the information about the channels is indicated on the screen and can take up to 1 minute. Once the information is received, you will see the channel list. Maximum 40 channels can be displayed in this list. No records in this table indicates that there is no information about channels in the transport stream.

The channel table contains the following parameters (their names are given in the table in short form):

1. **No.** Number of channel in the list.

2. **Name**. Channel name.

3. **Type (T)**. Service type. The following values are available:

**TV (V)**: TV channel;

**radio (A)**: radio channel;

**data (D)**: data;

**reserved (r)**: reserved service;

**not defined (-)**: service type not defined.

4. **Status (S)**. Service status. The following values are available:

**running (R)**: running;

**not running (N)**: not running;

**reserved (r)**: reserved service;

**not defined (-)**: service state not defined.

5. **Coding (C)**. Service coding. The parameter may have the following values:

**no (-)**: channel is not coded;

**yes (+)**: channel may be coded.

6. **V-PID**. Video packet ID.

7. **A-PID**. Audio packet ID.

13.0°E HotBird				14:17		🔋	
LNB.ERR	27.501 MS/s	RAI			10993 V		
0.02 MHz	QPSK 2/3	13.0°E					
ONID: 318		TSID: 12400		CH: 12			
No	Name	T	S	C	V-PID	A-PID	
3	Rai 2	V	R	-	513	695	
4	Rai 3	V	R	-	514	697	
5	Rai 4	V	R	+	523	604	
6	Rai News	V	R	-	520	690	
7	Rai radiof4	A	R	-		673	
8	Radio OM unica	A	R	-		54	
Details		TR ◀		▶ TR		Exit	

Figure 4.4.7

13.0°E HotBird				14:17		🔋	
LNB.ERR	27.501 MS/s	RAI			10993 V		
0.02 MHz	QPSK 2/3	13.0°E					
ONID: 318		TSID: 12400		CH: 1/12			
Parameter	Value						
Name	Rai Movie						
Type	dig.television						
Status	running						
Coding	yes						
V-PID	200						
A-PID	800(ita) (1 more)						
Exit		Basic		Streams		Coding	


Figure 4.4.8

To view the detailed information about a channel, select the required one and press **F1/Details** key. **F2/TR ◀** and **F3/▶ TR** keys allow switching between transponders without exiting the mode. Press **F4/Exit** or **MENU/ENTER** keys to exit the mode.

Also the following identifiers are shown in this mode: **ONID** – original network ID, and **TSID** –transport stream ID. These identifiers are shown on the screen before the list of channels is loaded and can be used for additional identification of the transponder.

You can see the view of the detailed channel information screen in Figure 4.4.8. By default the screen shows the basic channel parameters in full form (**F2/Basic** key). By using **F3/Streams** and **F4/Coding** keys you can also see the detailed information about the streams and applied systems of conditional access accordingly. Press **F1/Exit** or **MENU/ENTER** keys to return to the channel table mode.

#### 4.5. DiSEqC Control Mode

The  icon in the main menu corresponds to this mode. This mode allows sending/receiving arbitrary DiSEqC commands. In this mode, the Analyzer runs as a DiSEqC master device. The screen view is represented in Figure 4.5.1. The screen is divided into two parts:

1. **Commands** – commands sent by the master device (up to five last commands);
2. **Response** – responses of the slave device to the master device commands (up to five last responses).

13.0°E HotBird				14:18		🔋	
Commands		Response					
Sn	Ad	Cm	D0	D1	D2	FR D0 D1 D2	
E0	10	38	F4	--	--		
E0	10	38	F4	E4			
E0	10	38	F4				
Reception status:				Ok			
Send+Rec		SelCom					

Figure 4.5.1

13.0°E HotBird		15:50		🔋	
DiSEqC Command	Parameters				
Switch (1.0)	◀ Input 1 ▶				
Switch (1.1)	◀ Input 1 ▶				
Halt (stop movement)					
Go Home					
Go East (contin.)					
Go West (contin.)					
Go East (steps)	◀ 1 ▶				
Go West (steps)	◀ 1 ▶				
Set East limit					
Exit					

Figure 4.5.2

The bytes of the master device commands and the slave device responses are grouped according to functions they fulfill. The description of the groups is given below:

1. **Sn**. Sync byte, shows data transfer direction. The possible values are:
  - E0...E3** – command from master device;
  - E4...E7** – response from slave device.
2. **Ad**. Address byte.
3. **Cm**. Command code byte.
4. **D0 – D2**. Data bytes.

The **Reception status** field will help you to understand the slave device response. Once the response from a slave device is received, you will see the message about command reception status in this field. It can show the following messages:

1. **Ok, no errors.** Slave device successfully accepted the command.
2. **Not supported.** Slave device does not support this command.
3. **Parity error.** Slave device received the command with an error, the command should be repeated.
4. **Not recognized.** Slave device does not recognize the command, it should be repeated.

To enter a command, use alphanumeric keys from **0** to **9** or **◀/▶** arrows. The edited symbol will be blinking on the screen. Commands are entered in hexadecimal code. Use **▲** and **▼** arrows to enter characters from A to F. To complete a command, press **MENU/ENTER**.

When you press **F1/Send+Rec** key, the master device sends a command to the slave device, and then receives a response from the latter. To clear the field of the last sent/received commands, press **AUX** key to activate the additional set of functions and then press **F3/Clear** key.

By pressing **F2/SelCom**, you can select and enter a DiSEqC command from the list of the most frequently used ones. The screen view of this list is shown in Figure 4.5.2. Use **▲/▼** arrows to scroll through the list, and **◀/▶** arrows to change the command parameters. The list contains the following commands:

1. **Switch (1.0).** Command of DiSEqC 1.0 switch control. Contains only one editable parameter – input number (Input1 – Input4).
2. **Switch (1.1).** Command of DiSEqC 1.1 switch control. Contains only one editable parameter – input number (Input1 – Input16).
3. **Halt (stop movement).** Stopping the positioner movement.
4. **Go Home.** Setting the positioner to zero position.
5. **Go East (contin.).** Starting continuous positioner movement eastwards.
6. **Go West (contin.).** Starting continuous positioner movement westwards.
7. **Go East (steps).** Driving the positioner eastwards to the specified number of steps (from 1 to 127).
8. **Go West (steps).** Driving the positioner westwards to the specified number of steps (from 1 to 127).
9. **Set East limit.** Setting the Eastern limit.
10. **Set West limit.** Setting to Western limit.
11. **Limits off.** Removing limits.
12. **Go to Position nn.** Driving the positioner to satellite position nn.
13. **Save Position nn.** Saving the current position under nn number.

To confirm a command selection, press **MENU/ENTER**. Press **F2/Exit** to exit the list without confirming any command.






Sending the DiSEqC commands is available only if in Quick LNB setting mode you have set **Manual** or **Auto** values for the **Management** parameter (see Section 4.3). The LNB power supply is turned off 1 minute after you exit the DiSEqC commander mode.

## 4.6. Data Logger Function

### 4.6.1. General Information

Data logger is intended for storing the setting profiles and for automation of the procedure of recording the measurement results. The Analyzer has four types of data logger directories: LNB Profile Table, Satellite Data Logger, Measurement Reports Table and Spectrum Data Logger. The data logger memory is common for all the directories and


is of a dynamic type. It allows saving up to 50 LNB profiles (see Section 4.6.2), up to 100 pages of satellite parameters, each page containing up to 223 transponders (see Section 4.6.3), up to 100 pages of reception quality measurement reports and up to 100 pages of spectrum data logs. The Analyzer allows viewing the saved data in standalone mode or using an external computer (see Section 4.7). To control the data logger memory, the IT-083 offers Memory Manager mode. This mode allows determining available space, deleting files and formatting the memory. The icons correspond to the Data Logger modes as follows:

Main modes		Additional modes		
				
LNB Profiles Table	Satellite Data Logger	Measurement Reports Table	Spectrum Data Logger	Memory Manager

## 4.6.2. LNB Profiles Table

### 4.6.2.1. General Information

LNB profile tables are used to simplify the Analyzer application within a specific system containing receiving satellite dish, one or two LNBs and access systems (for example, DiSEqC switch), which allow reception from the specific LNB. The table allows setting the LNB parameters, polarization control and local oscillator selection methods, as well as LNB access procedure.

The  icon in the main menu corresponds to this mode. The mode allows performing all operations with LNB profile tables. The screen view is shown in Figure 4.6.1.

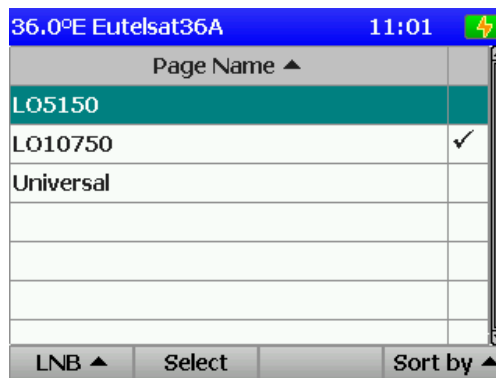


Figure 4.6.1

Profile name is indicated in the table. The currently selected LNB profile is marked in the table with  icon. In case if no profiles are selected, the Analyzer will operate in tuning by IF mode.

After pressing **F1/LNB** key, select one of the operations with LNB profile in the drop-down menu:

1. **New.** Creating and adding new profile (see Section 4.6.2.2)
2. **Open.** Viewing and editing the selected profile (see Section 4.6.2.2)
3. **Delete.** Deleting the selected profile
4. **Name.** Renaming the selected profile

Use **F2/Select** to select the current profile. LNB profiles can be arranged according to the name or marking. The type of arrangement is selected in the drop-down menu after pressing **F4/Sort by**.

#### 4.6.2.2. Creating and Editing Profile

The screen view of LNB profile editing mode is shown in Figure 4.6.2.

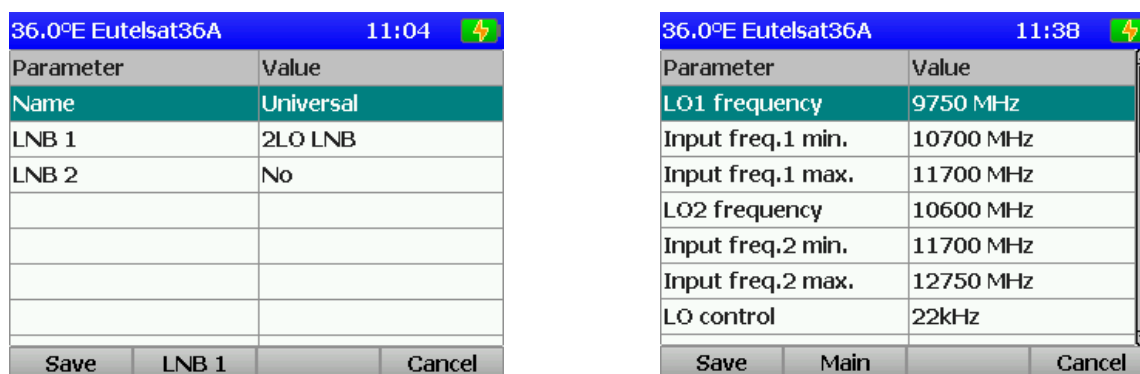


Figure 4.6.2

The **Main** tab contains the following parameters:

1. **Name**. LNB profile name
2. **LNB 1** and **LNB 2**. LNB type. The following values are available:  
**No**: LNB is not connected (except LNB 1).  
**1LO LNB**: LNB has one LO  
**2LO LNB**: LNB has two LOs  
**4LO LNB**: LNB has four LOs

**LNB 1** and **LNB 2** tabs have a changeable set of parameters depending on their type:


1. **LO Frequency**. Local oscillator frequency in MHz
2. **Input freq. min.** Minimum frequency within LO frequency range in MHz
3. **Input freq. max.** Maximum frequency within LO frequency range in MHz
4. **Polariz.control**. Selecting the type of LNB polarization switching. Possible values:  
**No**: Polarization cannot be switched  
**13/18V**: Switching by the supply voltage  
**DiSEqC**: Switching by DiSEqC command
5. **LO control**. Selecting the method of LO switching. Possible values:  
**No**: LNB has one LO  
**22kHz**: Switching by modulation with 22 kHz frequency  
**DiSEqC**: Switching by DiSEqC command  
**13/18V**: Switching by the supply voltage
6. **Switch Input**. Setting the type of access to LNB in the profile. If the LNB is connected via a switch, then the input to which it is connected is determined. Possible values:  
**No**: LNB is connected without a switch  
**LNB 1**: LNB is connected to Channel 1  
**LNB 2**: LNB is connected to Channel 2  
**LNB 3**: LNB is connected to Channel 3  
**LNB 4**: LNB is connected to Channel 4

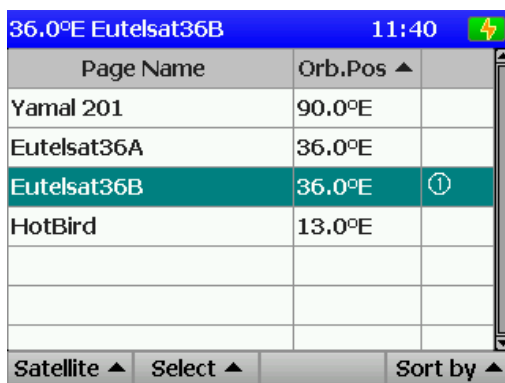


### 4.6.3. Satellite Data Logger

#### 4.6.3.1. General Information

Satellite Data Logger is designed for quick tuning of the Analyzer to the transponder frequency for the selected satellite in the current LNB profile. The Data Logger stores the satellite parameters (name, orbital position, frequency range), as well as the parameters of transponders (frequency, polarization, modulation, symbol rate, FEC).

The  icon in the main menu corresponds to this mode. It allows performing all operations with the satellite parameters. The screen view is shown in Figure 4.6.3.



36.0°E Eutelsat36B		11:40	
Page Name	Orb.Pos ▲		
Yamal 201	90.0°E		
Eutelsat36A	36.0°E		
<b>Eutelsat36B</b>	36.0°E	①	
HotBird	13.0°E		

Satellite ▲ Select ▲ Sort by ▲

Figure 4.6.3

The table on the screen contains satellite name, orbital position and corresponding LNB. Satellite correspondence to one of the LNBs is marked by ① and ②. If the corresponding LNB is not set in the measurement mode, then tuning by the transponder number will not be available.

After pressing F1/Satellite, select one of the operations with satellite entries in the drop-down menu:

1. **New**. Creating and adding new satellite (see Section 4.6.3.2)
2. **Open**. Viewing and editing selected satellite (see Section 4.6.3.2)
3. **Delete**. Deleting selected satellite
4. **Name**. Renaming selected satellite

The correspondence of the satellite to LNB1/LNB2 can be selected in the drop-down menu after pressing **F2/Select**.

Satellite entries can be arranged in the data logger according to the name, orbital position or corresponding LNB. The type of arrangement is selected in the drop-down menu after pressing **F4/Sort by**.

#### 4.6.3.2. Creating and Editing Satellite Entry

The screen view of satellite editing mode is shown in Figure 4.6.4.



36.0°E Eutelsat36B		11:42	
Parameter	Value		
<b>Name</b>	Eutelsat36B		
Position	36.0°E		
Band	Ku		
Transponders	26		
Updating date	18.06.12		
Save	Tr.list		Cancel

Figure 4.6.4

Satellite entry contains 5 parameters:

1. **Name.** Satellite name
2. **Position.** Satellite orbital position value in degrees from 0 to 180 of eastern (E) or western (W) longitude
3. **Band.** Broadcast band of satellite transponders. Possible values:  
**Ku:** Ku-band  
**C:** C-band  
**C/Ku:** Satellite has transponders of C and Ku-bands
4. **Transponders.** Number of transponders in the satellite entry (cannot be edited).
5. **Updating date.** Date of creation/revision of satellite entry (cannot be edited, saved automatically).

Use **F1/Save** to save changes when exiting the mode, and **F4/Cancel** to exit the mode without changes. Transponder entries can be edited after pressing **F2/Tr. list** in the transponder table mode (see Figure 4.6.5).

#	▲ Freq	P	SR	FEC	Constl
1	11787	R	27.501	3/4	QPSK
2	11863	V	27.501	3/4	QPSK
3	11882	H	27.501	3/4	QPSK
4	11902	V	27.501	3/4	QPSK
5	11921	H	27.501	3/4	QPSK
6	11940	V	27.501	3/4	QPSK

Buttons: New, Open, Delele, Sort by ▲

Figure 4.6.5

Parameter	Value
Frequency	11787 MHz
Polarization	R
Symbol rate	27.501 MSps
System	DVB-S
Constellation	QPSK
FEC	3/4

Buttons: Save, TR ◀, ▶ TR

Figure 4.6.6

The table displays the transponder number in the list, frequency, polarization, symbol rate, FEC, and modulation type.

Using the functional keys, you can perform the following operations with transponder entries:

1. **New.** Selected by F1 key. Creating and adding new entry.
2. **Open.** Selected by F2 key. Opening and editing entry.
3. **Delete.** Selected by F3 key. Deleting the entry.
4. **Sort by.** Selected by F4 key. Selecting the sorting type. Transponder entries in the table can be arranged according to the number, frequency, polarization, symbol rate or modulation.

Using the **AUX** key, you can activate the menu with additional functions:

1. **Shift ▲.** Selected by F1 key. Shifting a highlighted entry up one line.
2. **Shift ▼.** Selected by F2 key. Shifting a highlighted entry down one line.
3. **Save order.** Selected by F3 key. Saving the sequence of transponder entries in the satellite entry.

#### 4.6.3.3. Creating and Editing Transponder Entry

Screen view in transponder entry editing mode is shown in Figure 4.6.6. Transponder entry contains 6 parameters:

1. **Frequency.** Transponder signal frequency
2. **Polarization.** Transponder signal polarization
3. **Symbol rate.** Symbol rate
4. **System.** Broadcast standard: DVB-S or DVB-S2.
5. **Constellation.** Transponder signal modulation.
6. **FEC.** Transponder signal code rate.

Press **F1/Save** to save changes without opening the transponder table. Use **F2/TR4** and **F3/ ▶TR** to switch between the transponder entries without opening the transponder table.

#### 4.6.3.4. Searching Transponders and Determining their Parameters

This mode is designed for automatic determination of transponder frequencies and parameters. The screen view is shown in Figure 4.6.7.


13.0°E HotBird		05:11 	
Parameter	Value		
LNB Profile	Universal		
LNB Select	LNB 1		
LO Select	Low&High		
Pol Select	H&V		
SR mode	All		
Fstart	10700 MHz		
Fstop	12750 MHz		
Start			Exit

Figure 4.6.7

The following parameters are available for editing:

1. **LNB Profile**. Selecting the current LNB profile from the list of prepared profiles in the table (see Section 4.6.2).

2. **LNB Select**. Selecting the current LNB, if several are available in the profile.

3. **LO Select**. Selecting the local oscillator for scanning. See the available parameter values in Section 4.4.1. Also you can set the following values:

**Low+High**: scanning both local oscillators.

4. **Pol Select**. Selecting the LNB polarization. See the available parameter values in Section 4.4.1. Also you can set the following values:

**H+V**: scanning both horizontal and vertical linear polarizations.

**L+R**: scanning both left and right circular polarizations.

5. **SR mode**. Selecting the range of determined symbol rate. The following values are available:

**all**: all transponders.

**High SR**: transponders only with high symbol rate.

6. **Fstart**. Scanning start frequency.


7. **Fstop**. Scanning stop frequency.

To reduce the scanning time we recommend you to set a certain range of symbol rate. If the symbol rate is unknown, you can set the maximum range.

To start scanning, press **F1/Start** key. You will see the progress indicator on the screen. To stop scanning, press **MENU/ENTER** or **F4/Exit** keys. Once scanning is finished, you will see the transponder table on the screen (see Figure 4.6.5) if at least one transponder has been found. In other case the Analyzer will switch to scanning parameters setting mode (see Figure 4.6.7).

### 4.6.4. Measurement Reports Table

#### 4.6.4.1. General Information

The  icon in the main menu corresponds to this mode. It allows performing all possible operations with reception quality parameters reports (measurement reports): reading, deleting, name editing. Screen view is shown in Figure 4.6.8:

36.0°E Eutelsat36B		11:50	
Page Name ▲	Date		
Data log 1	25.05.12 11:35		
Open	Rename	Delete	Sort by ▲

Figure 4.6.8

The table displays measurement report name and date/time of measurement saving. Using the functional keys, you can perform the following operations with measurement reports:

1. **Open.** Selected by F1 key. Viewing reports (Figures 4.6.9 and 4.6.10).
2. **Name.** Selected by F2 key. Changing the report name.
3. **Delete.** Selected by F3 key. Deleting reports.
4. **Sort by.** Selected by F4 key. Selecting the sorting type. Measurement reports in the table can be arranged according to the name and date/time.

Two screens are available for viewing measurement reports:

1. Measurement viewing screen (Figure 4.6.9).
2. Transponder parameters viewing screen after measurement (Figure 4.6.10).

Use ◀ and ▶ to switch between the screens. Use ▲ and ▼ keys to scroll along the measurement reports without opening the measurement reports table.

36.0°E Eutelsat36B		11:50	
Page Name	Data log 1		
Date	25.05.12 11:35		
Level	61.6 dBuV		
PreBER	7.0E- 3		
PostBER	1.2E- 5		
MER	9.1 dB		
Netw.Name	CYFRA+		
Orb.Posit	13.0°E		
Exit			Tr.Info ▶


Figure 4.6.9

36.0°E Eutelsat36B		11:51	
Page Name	Data log 1		
Date	25.05.12 11:35		
Frequency	10719 MHz		
Polarization	V		
Symbol rate	27.500 MSps		
System	DVB-S		
Constellation	QPSK		
FEC	5/6		
Exit			◀ Back

Figure 4.6.10

## 4.6.5. Spectrum Data Logger

### 4.6.5.1. General Information

The  icon in the main menu corresponds to this mode. This mode allows performing all operations with the spectrum data logger pages: reading, deleting and name editing. The screen view is shown in Figure 4.6.11.

The data logger displays the spectrum entry name and saving date/time. Using the functional keys, you can perform the following operations with spectrum logs:

1. **Open.** Selected by F1 key. Viewing the entry (Figure 4.4.5).
2. **Name.** Selected by F2 key. Changing name of the entry.
3. **Delete.** Selected by F3 key. Deleting the entries.

**Sort by.** Selected by **F4** key. Selecting the sorting type. The entries in the table can be arranged according to the name and date/time.

Page Name ▲	Date
Spc file 1	25.05.12 11:37
Spc file 2	28.05.12 12:08

Open    Rename    Delete    Sort by ▲

Figure 4.6.11

#### 4.6.6. Memory Manager

The IT-083 is equipped with nonvolatile memory (NVRAM) for storage of various data of the Data Logger. The Analyzer memory contains different types of files. These are: LNB profile table, satellite data logger, measurement reports table and spectrum data logger. Different configurations of IT-08 may have other file types located in the memory.

The memory manager allows viewing the list of file types and the number of files pertaining to each type, as well as formatting the memory (erasing all files). Be careful working with the memory manager. Incorrect actions may lead to data loss.

The  icon in the main menu corresponds to this mode. Manager screen view is shown in Figure 4.6.12:

Free memory: 204800b (80%)

#	File type	Files
2	ch.log IT-081	0
3	sp.log IT-081	0
4	lnb.file IT-082	3
5	sat.file IT-082	4
6	ms.log IT-082	1
7	sp.log IT-082	2

Delete    Format


Figure 4.6.12

The table shows the types of files and the number of files pertaining to each type. You can delete all files of a certain type using **F1/Delete** or format (clear) the memory using **F4/Format**.

### 4.7. Self-Test and Configuration Modes

#### 4.7.1. Self-Test Mode

##### 4.7.1.1. General Information

To check the performance of the components of IT-083 and their functional conditions, self-test mode can be used. The  icon in the main menu corresponds to this mode. See self-test mode screen in Figure 4.7.1:








36.0°E Eutelsat36B		11:54	
Parameter	Value		
Battery status	8.5V		
Backup battery	3.2V		
MB module			
Memory	80% free		
MC module			
Temperature	+ 34°C		
Calibration			
Exit			

Figure 4.7.1

The table displays the following parameters to be checked:

**Battery status** – Voltage and remaining capacity of the battery

**Backup battery** – Voltage of the standby battery

**MB module** – Condition of the Base Unit

**Memory** – Remaining capacity of the Data Logger NVRAM

**MC module** – Condition of the Removable Module

**Temperature** – Temperature inside the Removable Module

**Calibration** – Condition of correction factor tables

#### 4.7.1.2. Battery Condition

The voltage and remaining capacity parameters are intended for checking the battery condition. The battery condition can be checked while operating in off-line mode (power supply is switched off). If the measured battery voltage exceeds 6.6 V, then the green indicator is displayed in the status field. If the voltage is less than 6.6 V, then the red indicator is displayed. The voltage will then be recalculated into the remaining battery capacity value in percent, which will help you to estimate the time remaining for the Analyzer to operate. You should consider that the battery capacity decreases when the ambient temperature becomes lower. This should be taken into account when estimating the operating time of the Analyzer.

#### 4.7.1.3. Standby Battery Voltage

Backup battery voltage parameter is intended for checking the built-in battery. The standby lithium battery has a rated value of 3 V. If the measured battery voltage is higher than 2.5 V, then the green indicator is displayed in the status field. If the voltage is less than 2.5 V, then the red indicator is displayed. The battery is used for power supply of the system clock and of the memory for saving the current Analyzer settings. If the red indicator appears, the IT-083 should be sent to the repair service to have its battery replaced.

#### 4.7.1.4. Checking Base Unit

This program checks the condition of the Base Unit components. If the test does not detect any error, the green indicator is displayed in the status field. If an error has been detected, the red indicator is displayed. In this case the Analyzer should be sent to the repair service to have the defects corrected.

#### 4.7.1.5. Checking Data Logger Memory

The program checks the available space of the Data Logger nonvolatile memory. If the remaining capacity is greater than 5 %, then the green indicator is displayed in the status field, and if it is less than this value, the indicator is red. In this case you have to delete the unnecessary files from the memory.

#### 4.7.1.6. Checking Removable Module

This program checks the condition of the Removable Module components. If the test does not detect any error, the green indicator is displayed in the status field. If an error has been detected, then the indicator will be red. In this case the Analyzer should be sent to the repair service to have the defects corrected.


#### 4.7.1.7. Removable Module Temperature

The parameter is used for checking the temperature inside the Removable Module. Temperature is one of the ambient factors, which affect the accuracy of measurements. If the temperature value is within the permissible range (from – 10 to 50 °C), then the green indicator is displayed in the status field. If the temperature is beyond this permissible range, then the indicator is red.

#### 4.7.1.8. Calibration

The program checks the condition of correction factor tables. If the test does not detect any errors, the green indicator is displayed in the status field. If an error has been detected, the indicator will be red. In this case the Analyzer should be sent to the repair service to have the defects corrected.

### 4.7.2. Setting Regional Parameters

Regional parameter setting mode is intended for the Analyzer configuration in accordance to the local conditions and for the user convenience. The  icon in the main menu corresponds to this mode. Regional parameter setting screen is shown in Figure 4.7.2.



36.0°E Eutelsat36B		11:54	
Parameter	Value		
Language 	English		
Level unit	dBuV		
Time format	24h		
Date format	DD.MM.YY		
Temperature units	°C		
Save			Cancel

Figure 4.7.2

The table includes the following parameters which can be edited:

**Language** – Selecting graphical interface language

**Level unit** – Selecting level measurement units


**Time format** – Selecting time display format

**Date format** – Selecting date display format

**Temperature unit** – Selecting temperature measurement units

Use ▲ and ▼ to select the required parameter. The parameter value can be changed using ◀ and ▶ keys.

### 4.7.3. User Interface Setting

The operating parameter configuration program is intended for modifying the general parameters of Analyzer operation. The  icon in the main menu corresponds to this program. Parameters configuration screen is shown in Figure 4.7.3:

36.0°E Eutelsat36B		11:55	
Parameter	Value		
Theme	theme 2		
Key sound	type 1		
Volume	5%		
Date	22.06.2012		
Time	11:55:10		
Clock adjustment	+ 0.0 sec/day		
Auto power off	off		
Auto backlight off	5min		
Save			Cancel

Figure 4.7.3

The following parameters are available for editing:

**Theme** Selecting a color pattern for user interface

**Key sound** Selecting the sound of key pressing or switching the sound off

**Volume** Adjusting the sound volume

**Date** Setting current date

**Time** Setting current time

**Clock adjustment** Adjusting of the clock

**Auto power off** Setting of the mode of the Analyzer automatic switching off

**Auto backlight off** Setting of the automatic backlight switching off mode

**Quick start** Setting the Analyzer switching on


You can select the parameters using ▲ and ▼ keys. And ◀ and ▶ keys are used to change the parameter values.

The **Auto power off** parameter allows the user to set the automatic Analyzer power switching off after the selected time interval from the moment of the last pressing of any key.

The **Auto backlight off** parameter is for setting of automatic decreasing of the LCD backlight brightness after the selected time interval from the moment of the last pressing of any key.

The **Quick start** parameter selects a method of switching the Analyzer on. If the parameter value is **OFF**, the Analyzer will be switched on in the Main Menu mode. If this parameter is **ON**, then the Analyzer will be switched on in the last previously used measurement mode.

#### 4.7.4. Viewing Identification Data

Identification data viewing program is intended for determining serial numbers of the modules of the Analyzer, their modifications and firmware versions. The  icon in the main menu corresponds to this mode. Identification data viewing screen is shown in Figure 4.7.4.

13.0°E HotBird		15:55	
Module	Base ▶		
Module type	MB-08		
HW version	02.80.01		
Serial number	12060234		
Application	01.03.00.01		
Operating system	01.02.00.09		
Exit			

13.0°E HotBird		05:13	
Module	◀ Removable		
Module type	MC-083		
HW version	02.83.02		
Serial number	306002		
Exit			

Figure 4.7.4



Use ◀ and ▶ keys to select the screen with data for Base Unit or Removable Module.

## 4.8. Operation with PC

### 4.8.1. General Information

You can control operation of your IT-083 via external PC. For connection to PC use **USB** connector on the right panel of your Analyzer. The Analyzer package includes the cable for connection to PC and a CD with the software, which allows the following:

- measuring level and satellite signal parameters;
- viewing signal spectrum at the Analyzer input;
- viewing constellation diagram;
- viewing transponder channels list;
- viewing and editing satellites data logger in the Analyzer;
- viewing and editing LNB profiles table in the Analyzer;
- viewing saved spectrum data logger; documenting and viewing the measured spectra in detail;
- viewing and editing measurement reports table for the received signal;
- saving and operating local copies of tables and data loggers of the Analyzer;
- saving and documenting measurement reports.

### 4.8.2. PC Configuration Requirements

Minimal system requirements to your PC:

Microsoft Windows XP or later versions of operating system

RAM capacity: minimum 128 MB

25 MB of hard drive available space

USB 2.0 support

### 4.8.3. Software Installation

The installation of the required software is executed by **Install ItToolsSatellite08C.exe** program, which saves the program to the computer hard drive.

a) Before installation, close all active applications. To proceed with installation you should log in under administrator's rights.

b) If you are using a CD for installation, place the CD into the disk drive. Click **Install ItToolsSatellite08C** when the disk menu appears.

If you received the software on a different installation media, just run the **Install ItToolsSatellite08C.exe** file.


c) After you have started the installation program, the installation wizard window will appear. Click **Next** to initialize installation.

d) Then select the folder where you want to save the Analyzer program files. By default, the files are saved into **C:\Program Files\PLANAR\ItToolsSatellite08C**. To save the files into a different folder, click Browse button. Select the required path and click Next.

e) The following steps will be executed automatically. If everything is correct, the information window indicating successful installation will appear on the screen. Click **Finish** to complete the installation.

After the installation has been completed, a new **PLANAR\ItToolsSatellite08C** folder containing the shortcut for accessing the program will be created in the **Start** menu.

### 4.8.4. Starting the Program

Connect the Analyzer to PC using the cable supplied in the package. Switch the power of the Analyzer on and select the PC operation mode in the main menu. The  icon corresponds to this mode.

During the first connection of the Analyzer to PC it is necessary to perform the USB driver installation. To proceed with installation, you should log in under administrator's rights. Driver installation is performed by standard Windows application. The driver files are located in the **Driver** folder of the program installation directory (by default the path is: **C:\Program Files\PLANAR\ItToolsSatellite08C\Driver**). During the installation select this folder to search for a required driver.

To start the program on your PC:

- a) find **PLANAR\ItToolsSatellite08C** folder in Windows main menu;
- b) select **ItToolsSatellite08C**.

## 4.9. Updating Firmware

### 4.9.1. General Information

The IT-083 offers the capability to update its firmware using personal computer. We go on with development of the devices and keep on working out new firmware versions that provide new features. These new firmware versions come available for free download on our website [www.planar.chel.ru](http://www.planar.chel.ru) in the section that describes IT-083.

The firmware includes the operating system and Removable Module application. The operating system is stored in the device Base Module and can be updated from PC (see Section 4.9.2). The Removable Module application is stored in the Removable Module and also can be updated from PC. Availability of the application on the Removable Module allows for its quick replacement without connecting the device to PC (see Section 4.9.3).

Both the operating system and Removable Module application have their unique version numbers of **X.X.X.X** format (e.g. **1.3.0.1**). File with the firmware build for downloading has the **itXXX\_build\_YYYYYY.bsk2** format, where **XXX** is the device type, and **YYYYYY** is the identification number of the build. For example, the file with the firmware build for IT-081 Analyzer dated June 21, 2012 will have the following name: **it081\_build\_120621.bsk2**. Also the file name may contain the reference of the firmware application to a certain device hardware version, and other data. The versions of the operating system and Removable Module application are displayed in Identification Data Readout mode (see Section 4.7.4).

### 4.9.2. Updating Firmware via PC

To update your firmware, proceed as follows:


- a) Copy the archive with new firmware version from our website (e.g. **it083\_build\_130101.zip**). This archive contains the firmware and accompanying information describing changes to it;
- b) Connect the device to USB port of your PC;
- c) Switch the power of the device on and select the mode of Operation Controlled by PC in the main menu ( icon corresponds to this mode). If you cannot enter this mode, start the device in the mode of compulsory firmware updating. To run this mode, first press and hold “.” button, then turn the device on while still holding this button. If the loader is started successfully, the following message will appear at the top of the screen:  
IT-08 Bootloader v4.2;
- d) Start Software Manager program;
- e) In Device drop-down list select the required device to update its firmware, and in File window select the file with the new firmware version. The File content window with the list of available firmware versions will appear on the screen. To view the information about the required program (description, compatible hardware and software versions), click on its name. Then you will see the program information window (Figure 4.9.1);
- f) click Update to start updating.



Figure 4.9.1

If your IT-083 functions properly, USB cable is connected correctly, and the firmware to be downloaded is compatible with the Analyzer hardware, the program download onto your device will automatically start, and its progress will be indicated on the screen. After the download is over, the pop-up window will appear indicating that the process has been successfully completed. The IT-083 will reboot and start operating similar to when it has been powered up.

---

**CAUTION** Do not interrupt the loading process. This can lead to malfunction of the device. But, if this does occur, repeat the process of program update.

---

### 4.9.3. Updating Firmware from Removable Module

The IT-083 features the possibility of saving the firmware into the memory of the MC-083 Removable Module. The firmware is saved to the Removable Module automatically in the process of the Base Unit firmware updating from PC. Further on, when another Removable Module is plugged into the Base Unit, the device will automatically load the firmware from this Module in case the device has been operating with the Module of another type or if the versions of the Removable Module applications are different. The IT-083 will indicate the firmware loading process from the Removable Module by messages on the screen. After the firmware loading is finished, the device switches to the normal operating mode.

### 4.10. Battery Operation

The IT-083 is powered by a built-in power source of 6 NiMH AA batteries (14.5x49.5 mm) the capacity of 2100 mAh.

To determine the residual capacity of the batteries, use the Self-test function of the Meter (see Section 4.7.1). When the effective charge level of the battery drops to a critical point, you will hear a warning beep. This indicates that the time of operation until total battery discharge is approximately 5 minutes.

To charge the batteries in an external battery charger, remove IT-083 from its Carrying Case.

Check the position of the power switch. It must be in **Off** position.

Open the cover of the battery compartment. Carefully remove the batteries. The batteries must be charged in a charger, which is appropriate to the type of the batteries you are using.

When installing the batteries into the battery compartment, make sure that the polarity of batteries is correct. Close the battery compartment.

---

**WARNING** Incorrect installation of the batteries may cause damage to the Analyzer or to the batteries.

---

To charge the batteries without removing them from the Analyzer, connect the external DC mains adapter included in the package, and power it. The batteries will be recharged even if the IT-083 is switched off. The backlight of **ⓘ** button indicates that the power is being supplied from the mains adapter. In this case the full recharge will take from 12 to 14 hours. It is highly recommended to recharge only the batteries that are completely discharged. You should charge batteries using the mains adapter once every 2–3 months in order to equalize the charge of batteries and thus increase their service life.

## 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 correction of minor defects.

Make sure to carry out preventive maintenance covering inspection of controls, reliability of the assembly and the keypad condition after the warranty period has expired and annually since then.

## 6. TROUBLESHOOTING

**Defect detection:** After the IT-083 is switched on, nothing is displayed on the screen and there is no backlight.

**Possible reason:** One or several batteries are discharged, damaged or missing.

**Methods of correction:** Connect the mains adapter. If the Analyzer switches on, check the battery voltage using the Self-test function (see Section 4.7.1). Low voltage (below 6 V) indicates that one or several batteries are discharged. High voltage (over 6 V) indicates that one or several batteries are damaged or missing. In case the batteries have low charge, charge them (see Section 4.10) or replace the damaged batteries.

**Possible reason:** Firmware failure.

**Methods of correction:** Update the firmware via PC (see Section 4.9.2).

**Defect detection:** When the Analyzer is switched on, the following message is displayed on the screen: **Removable Module not plugged in.**

**Possible reason:** Removable Module firmware failure.

**Methods of correction:** Update the firmware compatible with the Removable Module via PC (see Section 4.9.2).

**Defect detection:** High error at signal level measurement.

**Possible cause:** Input RF adapter is worn out.

**Defect correction:** Replace the adapter.

**Defect detection:** The Analyzer does not turn off after short pressing on the **ⓘ** key.

**Possible reason:** Firmware failure.

**Methods of correction:** Press and hold down **ⓘ** key down until the power is switched off.

## **7. STORAGE**

Store your IT-083 under the following ambient conditions: ambient temperature from -20 to +40 °C, relative air humidity up to 90 % (at 30 °C).

## **8. TRANSPORTATION**

The IT-083 must be shipped in any closed vehicle at ambient temperature from -20 to +40 °C, relative humidity 90% (at 30 °C) and atmospheric pressure from 84 to 106.7 kPa (630 to 800 mm Hg).

Cargo holds, railway cars, containers, and truck beds, used for shipment of the IT-083, should be free from any traces of cement, coal, chemicals, etc. When shipped by air, the products should be kept in aircraft sealed compartments.

## **9. LABELING**

The serial numbers of Base Unit and Removable Module, which contain index number and date-of-manufacture code, can be found on the bottom panel of the respective item and also can be viewed on the display in identification data viewing mode (see Section 4.7.4).

## **10. WARRANTY INFORMATION**

The manufacturer warrants the IT-083 DVB-S/S2 Signal Analyzer to conform to the specifications of this Manual when used in accordance with the regulations of operation detailed in this Manual.

The manufacturer will repair or replace without charge, at its option, any Meter found defective in manufacture within the warranty period, which is twelve (12) months from the date of purchase. Should the user fail to submit the warranty card appropriately certified by the seller with its stamp and date of purchase the warranty period will be determined by the date of manufacture.

The warranty is considered void if:

- a) the defect or damage is caused by improper storage, misuse, neglect, inadequate maintenance, or accident;
- b) the product is tampered with, modified or repaired by an unauthorized party;
- c) the product's seals are tampered with;
- d) the product has mechanical damage.

The batteries are not included or covered by this warranty.

Transport risks and costs to and from the manufacturer or the authorized service centers are sustained by the buyer.

The manufacturer is not liable for direct or indirect damage of any kind to people or goods caused by the use of the product and/or suspension of use due to eventual repairs.

When returning the faulty product please include the accurate details of this product and clear description of the fault. The manufacturer reserves the right to check the product in its laboratories to verify the foundation of the claim.