

IT-081

TV LEVEL METER

OPERATING MANUAL



▶ PLANAR

Revision 1.1 of April 4, 2016

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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 needed 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, video-audio and carrier-noise ratios;

IT-082 DVB-S Signal Analyzer (MC-082 module plugged-in), 950 to 2150 MHz range. Measurement of BER and MER values for digital satellite (QPSK DVB-S). Powering LNB SAT. DiSEqC generator;

IT-083 DVB-S/S2 Signal Analyzer (MC-083 module plugged-in), 950 to 2150 MHz range. Measurement of BER and MER values for digital satellite (QPSK/8PSK DVB-S/S2). Powering LNB SAT. DiSEqC generator;

IT-084 TDR Cable Reflectometer (MC-084 module plugged-in) for identification and precision fault location in cables up to 1,600 m in length. Resolution 0.11 m;

IT-086 Optical Power Meter (MC-086 module plugged-in), measuring at -50 dBm to +20 dBm range and wavelengths 1310 and 1550 nm.

IT-087 DVB-C Signal Analyzer (MC-087 module plugged-in), 45 to 865 MHz range. Support of DVB-C and ITU-T ANNEX A/C. Measurement of carrier level, C/N and V/A ratios, channel power, MER, BER, and constellation diagram.

IT-088 DVB-T Signal Analyzer (MC-088 module plugged-in), 45 to 865 MHz range. Support of DVB-T and DVB-H with COFDM modulation. Measurements for analog channels: carrier level, C/N and V/A ratios and for digital channels: channel power, MER, BER, and constellation diagram.

IT-089 DVB-T/T2 Signal Analyzer (MC-089 module plugged-in), 45 to 900 MHz range. Support of DVB-T/T2 modulation. Measurements for analog channels: carrier level, C/N and V/A ratios and for digital channels: channel power, MER, BER, constellation and echo diagrams. Powering of antenna amplifier.

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)
Keypad.....	made of rubber
Display	color graphic LCD 320x240 pixels with backlight
Power supply	
internal.....	NiMH AA rechargeable batteries, 2100 mAh (6 pcs)
external.....	12V/0.8A mains adapter
PC compatible interface.....	USB port
Operating temperature.....	-10 to +40 °C
User software update... through USB interface from PC or the 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 and servicing of the IT-081 TV Level Meter (Meter).

The IT-081 is designed for control and adjustment of television and broadcasting distribution networks as well as of separate components of such networks, or other electronic devices. The Meter allows measurement of channel power and parameters of TV signal.

The Meter can be used both in laboratory, powered by an external power source, and in field, powered by batteries. The Meter can also operate as a part of Return Path Test and Measurement Set.

The reliability of the IT-081 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:

- PC - Personal Computer;
- CD - Compact Disk;
- LCD - Liquid Crystal Display;
- ADC - Analog-to-Digital Converter;
- IF - Intermediate Frequency.

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 Meter.

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

CAUTION Tuning the Meter and replacement of the components that influence the accuracy of measurements without service personnel is strictly prohibited, since the components used in the Meter are purpose-made and their replacement will result in inaccurate operation of the Meter. To exclude the possibility of mechanical damage to the IT-081, the instructions regarding the storage and transportation (see Sections 7 and 8) of the Meter must be observed.

2.3. Function

The IT-081 TV Level Meter belongs to the family of IT-08 measurement instruments and is intended for measurement of the video carrier level of standard TV signal.

The Meter offers the following measurement modes for analog channels: video carrier to audio carrier (V/A) ratio, and video carrier to noise (C/N) ratio. For digital channels the measurement modes are the following: channel power and C/N ratio.

The IT-081 can be connected to a personal computer to access additional modes. The IT-081 operates in spectrum analyzer mode displayed on the built-in LCD. The Meter allows measuring direct and alternating voltage of the remote power supply of the TV and broadcasting distribution networks.

The appearance of the Meter and its components are displayed in figures 2.1 and 2.2.



Figure 2.1



Figure 2.2

This Operating Manual is made in accordance with the hardware version 02.80.01 for MB-08 Base Unit and software version 1.2.x.x/1.2.x.x for IT-081.

2.4. Environmental Conditions

Normal operating conditions:

- a) ambient temperature $(23\pm 5) ^\circ\text{C}$;
- b) relative air humidity $(55\pm 25)\%$;
- 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 $40 ^\circ\text{C}$;
- b) relative air humidity not greater than 90% at $25 ^\circ\text{C}$ 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-081 Removable Module 1 pc;
- c) Carrying Case..... 1 pc;
- d) NiMH, AA Batteries 6 pcs;
- e) TAV03-1201200 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-081 Removable Module 1pc;
- b) "F"- "F" Adapter..... 1pc;
- c) Operating Manual 1pc.

2.6. Specifications

Operating frequency range	5 to 900 MHz
Resolution	125 kHz
Channel allocation standard	China, PAL B/G, PAL Ireland, PAL UK, Secam D/K, France, NCTA, Australian

Input parameters:



a) input impedance within operating frequency range: 75 Ohm;

b) 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 value of AC and DC input voltage for frequencies under 5 MHz: 150 V.

Built-in attenuator	20, 40 dB
Input mismatch attenuation	
- Input attenuator off	14 dB
- Input attenuator on	18 dB
Level measurement range with manual attenuator setting	
- Input attenuator off	30 to 90 dB μ V
- Input attenuator 20 dB	50 to 110 dB μ V
- Input attenuator 40 dB	70 to 126 dB μ V
Measurement level resolution	0.1 dB
Accuracy within 30-126 dB μ V level range	± 1.5 dB
Accuracy at operating temperature	± 2.2 dB
Measurement channel passband for -3 dB level	230 \pm 60 kHz
Frequency indication	6 characters on LCD
Channel number indication	3 characters on LCD
Signal level indication	4 characters on LCD
Warm-up time	10 min.
IT-081 can be powered by	
- AC circuit with 110-240 V voltage, 50 \pm 0.5 Hz frequency with no more than 5% harmonic content, via PS12/0.8 Mains Adapter;	
- external DC source with 12 \pm 0.6 V voltage, and no more than 0.5 V ripple;	
- batteries with capacity at least 2100 mAh;	
Current consumed from external power source or batteries	0.8 A
Continuous stable operation under normal conditions (when powered by external source)	24 hrs
Battery duration under normal conditions (2100 mAh battery capacity)	6 hours
Mean time between failures, no less than	10000 hours
Average lifetime, no less than	5 years
Dimensions	200x90x55 mm
Shipping dimensions	400x300x90 mm
Weight	0.6 kg
Weight in package	2.2 kg

2.7. Design and Operation Overview

2.7.1. Principle of Operation

The TV Level Meter is a super heterodyne receiver with triple frequency conversion (auto or manual frequency tuning). Channel power is measured by means of analog-to-digital converter (ADC) after signal peak detection at output of logarithmic detector of the amplifier of the third IF. The principle of spectrum analyzer is based on sequential analysis method with spectrum indication on the LCD of the Meter or on PC.

The view displayed on the screen in the spectrum analyzer mode is the signal frequency bar-graph. The mode of signal level measurement in a frequency point displays the numeric value of the signal level, V/A and C/N ratios.

2.7.2. Block Diagram

The block diagram of IT-081 is shown in figure 2.3.

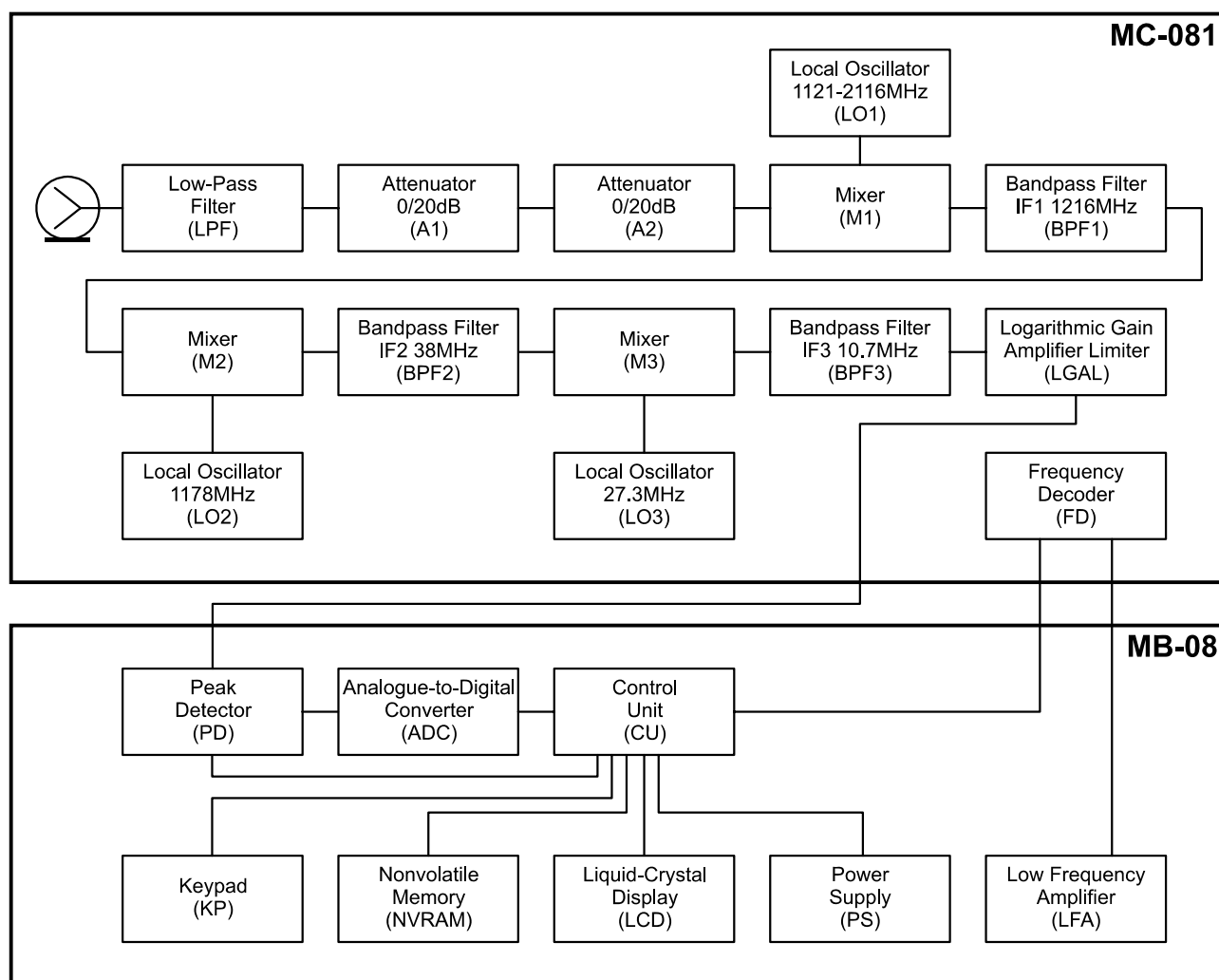


Figure 2.3

After the Low-Pass Filter (LPF), the input signal if necessary is reduced by the two Attenuators (A1) and (A2). Then it is transformed into the first IF signal by the Mixer (M1) and adjustable Local Oscillator (LO1). The first IF is 1216 MHz. Then the signal is passed through the Bandpass Filter (BPF1). Local Oscillator (LO1) is implemented according to circuit of the frequency synthesizer with phase lock loop.

The signal of the first IF is converted by the 1178 MHz Local Oscillator (LO2) and the Mixer (M2) to the second IF, and is further filtered at 38 MHz frequency by BPF2. The signal of the second IF is converted by the 27.3 MHz Local Oscillator (LO3) and the Mixer (M3) to the third IF, and further filtered at 10.7 MHz frequency by BPF3, which defines the receiver frequency band.

Logarithmic Gain Amplifier Limiter (LGAL) performs logarithmation and signal detection.

Peak Detector (PD) allows measuring the video carrier level by means of Analog-to-Digital Converter (ADC). The digital code of the input signal peak level logarithm is defined as real value and is corrected in accordance with the calibration matrix of the Control Unit (CU) microcontroller.

The Control Unit receives the commands from the user entered via Keypad, 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 Logger records, and firmware utilities.

The Power Supply (PS) forms the required voltages either from batteries or from an external power source.

In the sound check unit the signal limited by FM is transmitted from the LGAL output to Frequency Decoder (FD). Then the low frequency signal from the FD output is amplified in the Low Frequency Amplifier (LFA) and goes to the built-in speaker.

2.7.3. Component Arrangement

The IT-081 is made up of two components. Both modules are contained within plastic shockproof Sectional housings. MC-081 Removable Module is plugged in the Base Unit and connected to it via specific connector.

The front panel of the Base Unit contains a keypad and a color graphical display. The right panel has a USB port and an external power source connector. The Removable Module connector is located on the back panel. The Removable Module has a 75-Ohm input "F" connector and the connector for connection to the Base Unit.

3. PREPARATION FOR OPERATION

Perform external examination to make sure your IT-081 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-081 has been kept in the environment other than the rated operating conditions, leave your Meter in facilities with normal operating conditions for at least 2 hours prior to operation.

4. OPERATION PROCEDURE

4.1. Controls and Indicators

The location of controls, indicators and connectors is shown in figures 2.1 and 2.2. These elements have the following functions:

- a) **F1, F2, F3, F4** functional keys are intended for enabling the commands corresponding to the icons shown on the screen of the IT-081;
- b) **ⓘ** key toggles powering of the Meter on/off. Lighting of the key indicates the power supply from an external power source;
- c) **AUX** key opens the menu with additional set of functions for **F1, F2, F3,** and **F4** keys;
- d) **MENU/ENTER** key selects the current command or returns to the previous menu level;
- e) **▲, ▼, ◀, ▶** arrows allow editing in the current operation mode;
- f) alphanumeric keypad allows entering text or numeric data;
- g) **--Ⓢ+12VDC** connector provides connection to an external power source;
- h) **USB** port provides connection to computer;
- i) **INPUT** connector is for the test signal input, "F"-type connector.

4.2. Preparation for Measurements

Before you start to operate your IT-081 make sure to carefully read this Operating Manual as well as to inspect the location of the controls and indicators of the Meter (see Section 4.1).

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

- a) unlock the Carrying Case and take the Meter and the Mains Adapter out;
- b) connect the MC-081 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-081 and then to the power source;
- d) press and hold down the **ⓘ** key until the LCD backlight turns on.

To prepare your IT-081 for operation in stand-alone mode, powered by the batteries, proceed as follows:

- a) unlock the Carrying Case and take the IT-081 out;
- b) connect the MC-081 Removable Module to MB-08 Base Unit, if they were stored separately;
- c) press and hold down the **ⓘ** key until the LCD backlight turns on.

If the Removable Module software version is other than the software installed, the IT-081 will start the program installation process automatically once the Meter is switched on. The loading process is indicated by corresponding message on the Meter screen.

CAUTION Do not switch the power off while the software is being loaded! This may lead to the loss of capability of loading the software onto your Meter without the use of a PC.

If the Removable Module software version is the same as the installed software, the IT-081 will start to check the Removable Module after the power has been switched on. After successful check, the following message (see figure 4.1) will appear on the screen:



Figure 4.1

The screen will show the name and type of the Meter. After approximately 1 second, either the main mode-selection menu (main menu) will appear on the screen (see figure 4.2), or the last previously used measurement mode, if the quick access option has been enabled (Section 4.5.3).

Select the operating mode using the interactive menu on the the LCD screen. This 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.

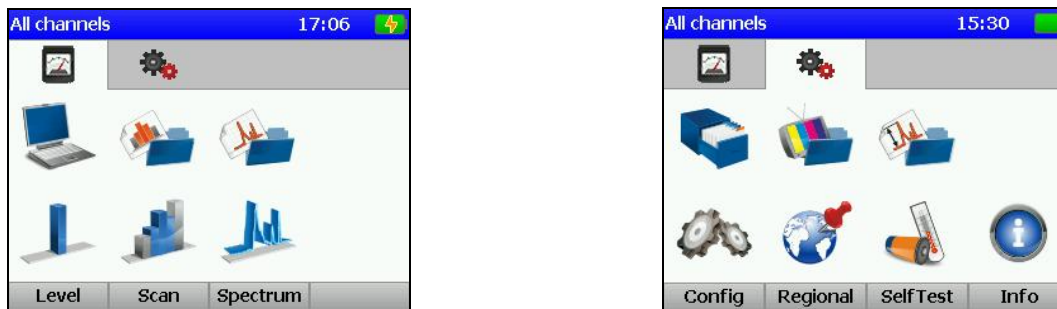



Figure 4.2


There are two sets (tabs) of icons: measurement icons and configuration icons. You can switch between the tabs using ◀ and ▶ keys. To select the required mode, set the corresponding icon at the bottom of the screen. The names of the modes will appear above each functional key. Press the required functional key to enter the mode. To return to the main menu, press the **MENU/ENTER** key.



To make sure that the Meter is operating properly, perform the procedure described below.

In the main menu select the tab with configuration icons  in the main menu and

enter **Regional**  mode. Select the row with the required parameter using ▲ and ▼ arrows, and set the following values by ◀ and ▶ keys:

- **Language:** **English (or Язык: Русский);**
- **Ch template:** **Secam D/K;**
- **Level unit:** **dBuV.**

Press **MENU/ENTER**. Then enter **Ch.plan** mode . Select the first row, **All channels**, using ▲, ▼ keys and press **F4/Select**. Press **MENU/ENTER** key again.

In the main menu select the tab with the icons of measurements  by ◀ and ▶ arrow keys and set the **Level**  icon at the bottom of the main menu screen using ▲ and ▼ keys. Press the corresponding functional key.. The screen of the signal level measurement in frequency point will appear (figure 4.4). Press **F1/Settings** key. Select the row with the required parameter using ▲, ▼ keys and then set the following values by ◀ and ▶ keys:

- **Attenuator:** **Auto;**
- **Tuning:** **Chan;**
- **Ref.level:** **Auto;**
- **Scale:** **10dB;**
- **Max level:** **Off;**
- **Averaging:** **Off;**
- **Sound:** **Off;**
- **Volume:** **30%.**

Set the measurement frequency to the frequency of the video carrier of the 25th TV channel by successive pressing the 2, 5, MENU/ENTER keys. The frequency value will show 503.250 MHz, and the channel number will show CH 25. To return to the main menu, press MENU/ENTER key.

4.3. Measurement Procedure

4.3.1. General Information

The IT-081 offers five following measurement modes:

- measurement of signal level in the frequency point and of TV signal parameters, as well as measuring alternating and direct voltage at the input of the Meter in **Level** measurement mode;
- signal spectrum measurement in **Spectrum** mode;
- TV signal parameter measurement in **Scan** mode;
- TV signal level tilt measurement in **Tilt** mode;
- TV signal level ripple measurement in **Ripple** mode.

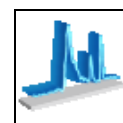
The c), d) and e) modes refer to **Scan** measurement group. Pressing ▲ and ▼ arrows in the main menu (figure 4.2), move the icon of the required mode at the bottom of the screen. The icons correspond to the modes as follows:



Level



Scan



Spectrum

To complete the selection of the mode, press the functional key, which is under the required icon. Press **MENU/ENTER** key to return to the main menu. In all the measurement modes the screen view has common elements and configurations, see figure 4.3.



Figure 4.3

The top panel on the screen shows the selected channel plan name, current time and the battery remaining indicator. If the channel plan is not selected, the line will show **All channels** title, and in this case the channel modulation type is determined automatically. In other case, all the channel parameters are taken from the selected channel plan.

The lower left part of the panel shows the current mode settings and TV signal parameters. The name of the channel and its number are represented successively in the right part of this panel.

In the panel of functional keys, **F1** key opens the settings menu, **F2** key is for activating the additional auxiliary functions, **F3** and **F4** are for quick switching between the measurement modes.

AUX key opens the menu with additional set of functions. You can activate any of these functions by pressing **AUX** and successively pressing the corresponding functional key. After 3 seconds the menu with usual set of functions appears on the screen again.

To adjust the settings of the measurement modes, press **F1/Settings**. The pop-up menu contains the list of parameters which can be changed. Use ▲ and ▼ arrow keys to select the required parameter, and set the value by ◀ and ▶ keys. The list of parameters and their available values is as follows:

1. **Attenuator.** Selecting the input attenuation value.

- 0 dB : Input attenuator off;
- 20 dB : Input attenuator 20 dB;
- 40 dB : Input attenuator 40 dB;
- Auto : Automatic selection of the input attenuation value.

2. **Tuning.** Setting the frequency tuning mode.

- Chan.:** Frequency tuning by channels;
- Freq. :** Tuning by frequency with 125 kHz step.

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

- Manual:** The scale position is set manually by ▲ and ▼ keys;
- Auto :** The scale position is set automatically.

4. **Scale.** Setting the division value of magnitude scale.

- 2 dB :** 2 dB per division;
- 5 dB :** 5 dB per division;
- 10 dB:** 10 dB per division.

5. **Max level.** Showing the maximum level on the graphic indicator.

- Off :** The maximum level is not shown;
- On :** The maximum level is additionally shown above the level bar.

6. **Averaging.** Showing of the signal level value after averaging.

- Off :** Averaging off;
- x4 :** Averaging over last 4 measurement reports;
- x8 :** Averaging over last 8 measurement reports.

4.3.2. Level Measurement Mode

In this mode the signal level in the frequency point and parameters of the TV channel are displayed on the screen. You can see the screen view in figure 4.4:

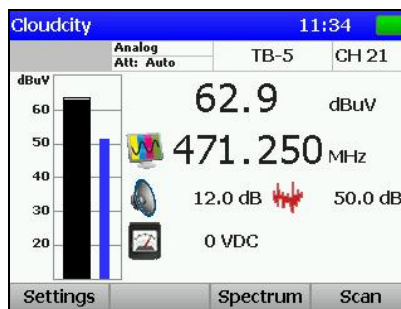


Figure 4.4

The screen displays the channel tuning frequency, the measured level value in graphical and digital representations, and also the channel parameters.

The bottom line of the screen shows the value of the direct or effective alternating voltage at the input (frequency 50 Hz of remote cable power supply). Additionally to the general settings, you can enable sound indication by **Sound** and adjust the sound volume by **Volume** in the LEVEL measurement mode.

To perform tuning by channels or frequency, use ◀, ▶ arrows. To enter the channel number or frequency from the keypad, select the corresponding tuning mode and use the

alphanumeric key set. To enter special channels, first press **C** key. After you have entered the number, press **MENU/ENTER**. If the number is incorrect, the previously saved channel number value will be restored after you pressed **MENU/ENTER** key. To enter the frequency value in MHz, use the alphanumeric keypad. After you have entered the number, press **MENU/ENTER**.

NOTE Pressing ◀ and ▶ keys when channel plan is selected (4.4.2) will scroll the channels of the plan. You can tune to any channel by entering its number from the alphanumeric keypad. In this case, if the channel does not belong to the selected channel plan, its name will not be shown, only the number of the channel will be indicated on the screen.

Tuning to the channels and their numbering will be fulfilled in accordance with the selected channel template (Section 4.5.2).

The measured level is shown according to the selected measurement units: in dB related to 1 μ V, 1 mV or 1 mW (Section 4.5.2). To define V/A and C/N ratios for analog channels the IT-081 performs measurements in three frequency points. The first one is the video carrier frequency (or the frequency your Meter is set to). The second frequency point is the audio carrier frequency (for Secam D/K template this point is 6.5 MHz shifted up from audio carrier frequency). The third one is the point 1.125 MHz shifted down from the first one. The measured V/A and C/N ratio will be indicated on the screen.

While operating by channel plan, the IT-081 offers the capability of selecting the frequency point for optimization of noise measurements (4.4.2.2).

For digital channels your Meter will perform measurement of actual channel power within the channel frequency band.

While performing measurements for digital channels it is recommended to apply the mode of calculating the measured value with maximum averaging: **Averaging: x8**

This method ensures more consistent results for wideband signals.

To reset the maximum level value, press **AUX** key to open the menu with additional set of functions, and then press **F4/Reset** key.

The remote cable power supply voltage is measured from 10 to 100 V. The absolute error of the measurement is lower than ± 1.5 V. The measured value and type of the voltage at the Meter's input are indicated on the screen in VDC units for direct current, and in VAC units for alternating current.

When sound indication is enabled and the tuning by channels is carried out, the adjustment is performed by audio carrier frequency.

To switch to **Spectrum** and **Scan** measurement modes, use **F3** and **F4** keys.

4.3.3. Spectrum Measurement Mode

This mode displays the signal spectrum. See figure 4.5 for the representation of the screen view:

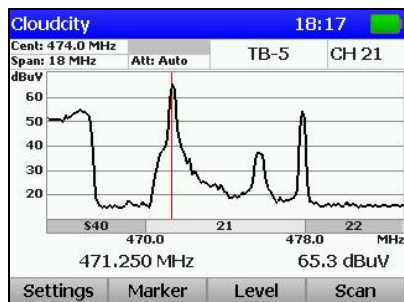


Figure 4.5

You can navigate the marker by means of ◀ and ▶ keys, if **F2** key value is represented on the screen as **Marker**.

To enter the channel number or frequency directly, use the alphanumeric keypad. After you have set the frequency in MHz, press **MENU/ENTER**. After you pressed this key, the selected channel will be placed in the middle of the screen. You can set the position of spectrum scan screen by ◀ and ▶ keys after setting the **Center** value for **F2** key.

In addition to general parameters, you can also edit the following parameters to adjust this mode settings:

1. **Hold level.** Showing of an additional trace with minimum or maximum level on the screen.
 - Off** : No trace is shown;
 - Max**: Trace with maximum level is shown;
 - Min**: Trace with minimum level is shown.
2. **Span.** Setting of the frequency scanning range.
 - 18/36/72 MHz**: Available values of the scanning range.
3. **Scan mode.** Selecting of the scanning mode.
 - Quick**: Quick scanning;
 - Precision**: Slow scanning that ensures maximum accuracy of the level measurements;
 - Single**: Single scanning sweep. To start this sweep, press **AUX** key to open the menu with additional set of functions, and then press **F2/Run** key.

If additional trace showing option is turned on (**Min** or **Max** values are selected for **Hold level** parameter), press **AUX** key to open the menu with additional set of functions, and then press **F4/Reset** key.

4.3.4. Scan Measurement Mode

This mode displays the signal levels as a bar-graph. The screen view is presented in figure 4.6:

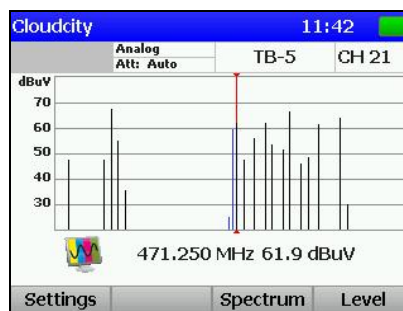


Figure 4.6

The tuning frequency and the channel level value indicated by the marker are shown under the level bar-graph. You can navigate the marker by means of ◀ and ▶ keys. You can set the marker position directly by entering the channel number using the alphanumeric keypad. After you have entered the number, press **MENU/ENTER**.

In addition to general parameters, you can also set the following parameters to adjust the mode configurations:

1. **Hist. type.** Selecting one of the **Scan** mode types.
2. **Scan**: Measuring of the channel level.
3. **Tilt**: Measuring of the tilt between the channels.
4. **Limit**: Measuring of the ripple of channel levels.

The screen view of **Tilt** mode is presented in figure 4.7.

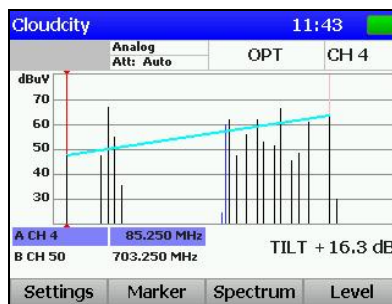


Figure 4.7

The **Tilt** mode displays the tilt line between two selected channels (markers A and B) and the difference between their levels. To choose the marker, press **F2/Marker**.

The screen view of **Limit** mode is presented in figure 4.8.

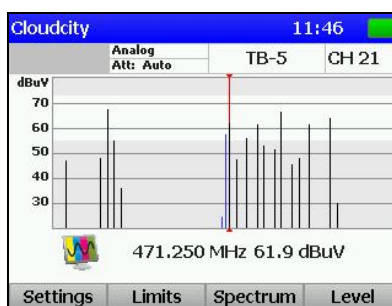


Figure 4.8








The **Limit** mode additionally displays the upper and lower limits of the channel levels. Upper and lower limits can be edited via pop-up menu that appears after pressing **F2/Limits** key.

4.4. Data Logger Function

4.4.1. General Information

Data Logger is intended for automation of the procedure of recording the measurement results. There are four data logger directories: Channel Plan List, Limit Plan List, Channel Data Logger, and Spectrum Data Logger. The data logger memory is common for all the directories and is of a dynamic type. The memory capacity allows to save up to 32 channel plans, up to 8 limit plans, up to 130 channel data logger pages (with maximum number of channels), and up to 130 spectrum data logger pages. The Meter allows viewing the saved data off-line or by means of a computer. To check the data logger memory, the IT-081 offers memory manager mode. This mode allows testing, free resources determination, and formatting of the memory.

To select between the data logger modes, use arrows and functional keys. In the main menu select the required page with icons by ◀ and ▶, then set the icon of the required mode at the bottom of the screen by ▲ and ▼ arrows, and press the corresponding functional key. The icons correspond to the modes as follows:


 Measurement tab		 Configuration tab		
 Ch. test	 Sp. test	 Ch. plan	 Limit plan	 Files

4.4.2. Channel Plans

4.4.2.1. Channel Plan List

This mode allows performing all the operations with channel plans: viewing, editing, deleting, and creation of new pages. See the view of the screen in figure 4.10.

The table contains the plan name and the date of its creation or editing. The channel plan installed in the Meter is marked by sign. The plans in the table are sorted by name. The top row of the table always contains **All channels** plan, which corresponds to the channel allocation standard. If this plan is not installed, the Meter will be operating without the channel plan.



Name	Sel	Modified
All channels	<input checked="" type="checkbox"/>	
Clouddcity	<input type="checkbox"/>	30.03.11
NorthernNET	<input type="checkbox"/>	30.03.11
SouthernNET	<input type="checkbox"/>	15.02.12
	<input type="checkbox"/>	
	<input type="checkbox"/>	
	<input type="checkbox"/>	

Plan ▲ Add Select

Figure 4.10


Press **F1** to open the pop-up menu with the list of available commands:

1. **Edit.** Viewing and editing of the selected channel plan;
2. **Rename.** Editing of the channel plan name;
3. **Delete.** Deleting of the selected channel plan.

Also you can add a new channel plan by pressing **F2/Add**, and install the selected plan by **F4/Select**.

4.4.2.2. Editing Channel Plan

The screen view of the channel plan table is shown in the figure 4.11:



Num	Ch. name	F, MHz	Type
4	OPT	85.250	Analog
6	MTV	175.250	Analog
8	PTP	191.250	Analog
10	CTC-Meta	207.250	Analog
12	TB-3	223.250	Analog
S39	MULT1	458.000	Digital
S40	DataCh	466.000	Digital
21	TB-5	471.250	Analog

Edit Add Delete

Figure 4.11

The table contains the channel number, channel name, tuning frequency and modulation type.

The following commands can be accessed by the functional keys:

1. **Edit.** Select by **F1**. Editing of the selected channel;
2. **Add.** Select by **F2**. Adding of new channel;
3. **Delete.** Select by **F3**. Deleting of the selected channel.

The screen view of the channel parameter editing mode is shown in the figure 4.12:

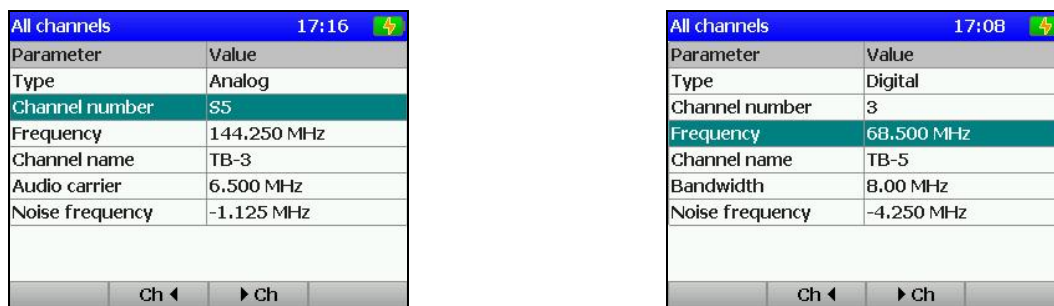


Figure 4.12

The sets of channel parameters depend on the modulation type.

For channels with analog modulation the following parameters are available for editing:

1. **Type:** analog.
2. **Channel number:** channel number.
3. **Frequency:** tuning frequency.
4. **Channel name:** channel name.
5. **Audio carrier:** frequency of the audio carrier. Can be selected from the following values: **4.5/5.0/5.5/6.0/6.5 MHz**. If you select **Off** value, V/A parameter for the channel will not be measured.
6. **Noise frequency:** frequency shift for C/N ratio measurement. The available range is from **-8000** up to **+8000 kHz** with 125 kHz step. The zero value is shown as **Off**. In this case the C/N parameter for the channel will not be measured.

For channels with digital modulation the following parameters are available for editing:

1. **Type:** digital.
2. **Channel number:** channel number.
3. **Frequency:** tuning frequency.
4. **Channel name:** channel name.
5. **Bandwidth:** channel frequency bandwidth. The available range is from **5.00** up to **8.00 MHz** with 250 kHz step.
6. **Noise frequency:** frequency shift for C/N ratio measurement. The available range is from **-8000** up to **+8000 kHz** with 125 kHz step. The zero value is shown as **Off**. In this case the C/N parameter for the channel will not be measured.

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

To fine tune a parameter, select it by ▲ and ▼ keys, and then scroll to the required values by ◀, ▶ keys, or enter them using the keypad.

Using **F2** and **F3** keys you can scroll through the channels without exiting the channel parameter editing mode.

4.4.2.3. Creating New Channel Plan

To create a new channel plan in auto mode, supply the signal to the Meter input and press **F2/Add**. Enter the plan name in the dialog and press **ENTER**. After the Meter has completed scanning all the TV channels, it will switch to channel plan editing mode. After you have edited the channel parameters and exited this mode, save it into the memory. You can also edit the channel plan name, if necessary.

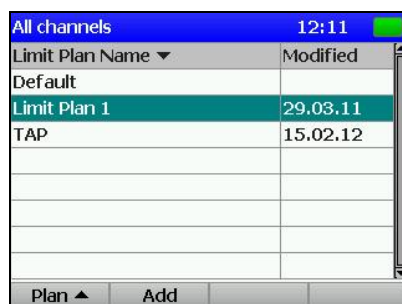
4.4.3. Limit Plans

4.4.3.1. Limit Plan List

Limit plans contain the criteria for checking the channel parameters and are employed during measurements in Channel data logger mode.

This mode allows performing all the operations with limit plans: viewing, editing, deleting, and creation of new pages. See the view of the screen in figure 4.13.

The table contains the limit plan name and the date of its creation or editing. The plans in the table are sorted by name. The top row of the table always contains the **Default** plan, which is not available for editing.



Limit Plan Name	Modified
Default	
Limit Plan 1	29.03.11
TAP	15.02.12

Figure 4.13

Press **F1** to open the pop-up menu with the list of available commands:

1. **Edit.** Viewing and editing of the selected limit plan;
2. **Rename.** Editing of the limit plan name;
3. **Delete.** Deleting of the selected limit plan.

Also you can add a new limit plan by pressing **F2/Add**.

4.4.3.2. Editing Limit Plan

The screen view of the limit plan is shown in the figure 4.14:



Parameter	Value
Min Video Level (dBuV)	50
Max Video Level (dBuV)	85
Min V/A (dB)	5
Max V/A (dB)	20
Min C/N (dB)	off
Max Adj. Channel Delta (dB)	5
Max Level Delta (dB)	25
Max An/Dg Delta (dB)	25

Figure 4.14

The table contains the TV channel parameters and upper and lower limits which are compared with the measured parameters in the channel data logger.

The following parameters are represented in the table:

1. **Min Video Level.** The minimum possible value of analog channel level.
2. **Max Video Level.** The maximum possible value of analog channel level.
3. **Min V/A (dB)** The minimum possible value of V/A ratio.
4. **Max V/A (dB)** The maximum possible value of V/A ratio.
5. **Min C/N (dB)** The minimum possible value of C/N ratio.
6. **Max Adj. Channel Delta (dB).** The maximum possible value of difference between adjacent channel levels.
7. **Max Level Delta (dB).** The maximum possible value of difference between channel levels.
8. **Max An/Dg Delta (dB).** The maximum possible value of difference between the levels of digital and analog channels.

9. **Min Digital Level.** The minimum possible value of signal level for digital channels.
10. **Max Digital Level.** The maximum possible value of signal level for digital channels.
11. **Min Digital C/N (dB).** The minimum possible value of C/N ratio for digital channels.

To fine tune a parameter, select it by ▲ and ▼ keys, and then scroll to the required values by ◀, ▶ keys. You can switch off checking of any limit plan parameter in the channel data logger by setting it to **OFF**.

4.4.3.3. Creating New Limit Plan

To create a new limit plan, press **F2/Add**. Enter the plan name in the dialog and press **ENTER**. Edit the limit plan parameters or its name, if necessary.

4.4.4. Channel Data Logger

4.4.4.1. General Information

The Channel Data Logger is intended for TV channel parameter measurement in accordance with one of the channel plans, and for checking their correspondence to the selected limit plan. The Meter allows saving the measurement and check results into the memory with time and date thereof. Channel Data Logger allows viewing the measurement results and errors in different parameters, and uploading the data onto your PC for further processing and report preparation.

4.4.4.2. List of Channel Data Logger Pages

This mode allows performing all the available operations with channel data logger pages: viewing, deleting and creating of a new page. See the screen views in figure 4.15:



Figure 4.15

The screen shows the list of channel data logger pages. For each page the following information is presented: status, page name, date and time of updating, the names of the connected channel and limit plans.

Press **F1** to open the pop-up menu with the list of available commands:

1. **Open.** Checking of the selected page;
2. **Graph.** Viewing of the selected page in Scan mode;
3. **Delete.** Deleting of the selected plan.

Press **F2/Add** to add a new page, press **F3/Run** to start the page scanning (measurement), and press **F4/Sort** to select the page sorting type (by the date of the last updating, by status or by the page name) in the table.

The status sign shows the page state:

- | | | |
|---|-----------------|--------------------------------|
|  | Grey indicator | Page created, but not scanned; |
|  | Red indicator | Page scanned, errors found; |
|  | Green indicator | Page scanned, no errors found. |

4.4.4.3. Viewing and Checking Channel Data Logger Page

When viewing the contents of a channel data logger page, the data table has the same view as in the figure 4.16. The table contains the channel number, name and frequency, and also the measured parameters. If any errors are found in the channel parameter values, this channel number will be shown against the red background.

If the current channel is digital, the **dig** value will be shown in V/A parameter field. Dashes in the value field mean that this parameter measurement is not measured for this type of channel. Empty field means that this parameter measurement is turned off in the channel plan.

Ch	Ch name	F, MHz	Lev	V/A C/N
4	OPT	85.25	57.2	12 38
6	MTV	175.25	57.4	6 23
8	PTP	191.25	78.7	11 46
10	CTC-Meta	207.25	65.9	12 50
11	TB-3	223.25	47.2	1 29
39	MULT1	458.00	66.2	---
40	DataCh	466.00	65.3	---

Figure 4.16

The following commands can be accessed by the functional keys:

1. **Info**. Select by **F1**. Viewing of the detailed channel data.
2. **Graph**. Select by **F2**. Viewing of the table in Scan mode.
3. **Run**. Select by **F3**. Scanning of the channel data logger page.

To identify the errors after the limit test, open the table of the detailed channel data (**F1** key). The test parameter table will appear on the screen (figure 4.17).

Parameter	Min	Meas.	Max
Video Level, dBuV	48	6.5	85
V/A, dB	5	12	15
C/N, dB	30	50	
Adj. Chan Delta, dB			10
Ch. Level Delta, dB		2.9	25
An/Dg Delta, dB		0.6	25

Parameter	Min	Meas.	Max
Digital Level, dBuV	50	25.2	70
C/N, dB	31		
Adj. Chan Delta, dB		0.2	3
Ch. Level Delta, dB		0.2	15
An/Dg Delta, dB		9.8	15

Figure 4.17

In this table you can see the parameters for the measured data to be verified with according to the limit plan, and also the measured parameters. The parameter value field is highlighted in red if it failed the limit test. The value will not be shown in case the parameter is disabled for measurement in channel plan. The limit fields will show OFF if the parameter is disabled in limit test.

Using ◀ and ▶ keys you can scroll through the channels without exiting the test parameter table. To switch between the channels with errors, use **F2** and **F3** keys.

4.4.4.4. Deleting Channel Data Logger Page

To delete a channel data logger page, select **Delete** command in the pop-up menu. The confirmation request screen will appear. After confirmation the page will be deleted from the Meter memory.

4.4.4.5. Creating New Channel Data Logger Page

To create a new channel data logger page, press **F2**. The page creation window will appear on the screen (see figure 4.18).



Figure 4.18

To create a page, it is necessary to enter its name, select the channel and limit plans, and select the input attenuator mode.

4.4.5. Spectrum Data Logger

4.4.5.1. General Information

Spectrum data logger is intended for measuring the signal spectrum in the defined frequency band and recording the measurement results to the Meter memory with date and time thereof. Spectrum data logger allows viewing the measurement results and uploading the data to your PC for further processing and report preparation.

4.4.5.2. List of Spectrum Data Logger Pages

This mode allows performing all the operations with the spectrum data logger pages: viewing, deleting and creating of a new page. See the screen views in the figure 4.19.

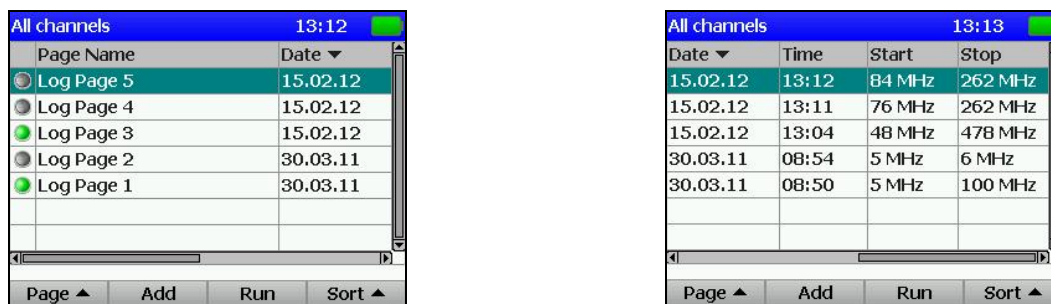


Figure 4.19

The screens show the list of spectrum data logger pages. For each page the following information is presented: status, page name, date and time of updating, and frequency scanning range.

Press **F1** to open the pop-up menu with the list of available commands:

1. **Graph**. Viewing of the selected page.
2. **Delete**. Deleting of the selected page.

Press **F2/Add** to add a new page, press **F3/Run** to start the page scanning (measurement), and press **F4/Sort** to select the page sorting type (by the date of the last updating, by status or by the page name) in the table.

The status sign shows the page state:



Grey indicator

Page created, but not scanned;

Green indicator

Page scanned.

4.4.5.3. Creating New Spectrum Data Logger Page

To create a new spectrum data logger page, first press **F2** key. Parameter selection screen will appear (figure 4.20). It is necessary to enter the page name, the scan limits, attenuation value, and the type of the saved trace.

The scan limits can be set by frequency or by channel numbers . You can select the way of scan limit setting by **F3**. You can either select the limits by ▲ and ▼ keys, or enter the required values by alphanumeric keypad. The **Detector** parameter determines the type of the spectrogram: instantaneous (**Sample**), mean (**Average**), maximum (**Max**) or minimum (**Min**) spectrum values can be determined.

After tuning of all the parameters is finished, press **F1**. To cancel the page creation, press **F4**.



Figure 4.20

4.4.6. Memory Manager

4.4.6.1. General Information

The IT-081 is equipped with nonvolatile NVRAM device for the storage of various data of the Data Logger. The memory can contain different types of files. For IT-081 Meter these are: channel plan list, limit plan list, channel data log, and spectrum data log. 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, and also formatting the memory (erasing all files).

CAUTION Perform operations with memory manager with caution. Incorrect actions may lead to partial or total data loss.

4.4.6.2. Operating Memory Manager



The icon in the main menu corresponds to the memory manager mode. See the view of the memory manager screen in the figure 4.21:

All channels		13:13	■
Free memory: 202496b (79%)			
#	File type	Files	
8	No	0	
9	Cable	3	
10	Reflect	3	
11	CATV lim.plan	4	
12	No	0	
13	No	0	
			Format

Figure 4.21


The table displays the file types and the number of files of each type.

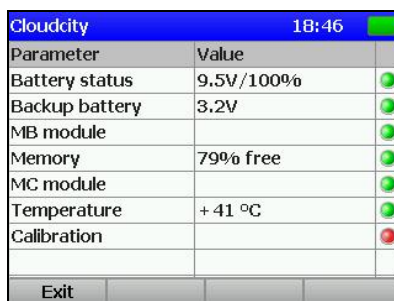
Press **F1** to delete all the files of the same type, and press **F4** to format (clear) all the memory.

4.5. Self-Test and Configuration Modes

4.5.1. Self-Test

4.5.1.1. General Information

To check the performance of the components of IT-081 and their functional conditions, self-test mode can be used. The  icon in the main menu corresponds to this mode. See the screen view in the figure 4.22:










Cloudcity		18:46	
Parameter	Value		
Battery status	9.5V/100%		
Backup battery	3.2V		
MB module			
Memory	79% free		
MC module			
Temperature	+ 41 °C		
Calibration			
Exit			

Figure 4.22

The table displays the following parameters to be checked:

1. **Battery status.** Voltage and remaining capacity of the battery.
2. **Backup battery.** Voltage of the standby battery.
3. **MB module.** Condition of the Base Unit.
4. **Memory.** Remaining capacity of the Data Logger NVRAM.
5. **MC module.** Condition of the Removable Module.
6. **Temperature.** Temperature inside the Removable Module.
7. **Calibration.** Condition of correction factor tables.

4.5.1.2. Battery Condition

The voltage and remaining capacity parameters are intended for checking the battery condition. Check the battery condition when operating in off-line mode (power supply switched off). If the measured battery voltage is greater than 6.6 V, the green indicator will be displayed in the status position. If the voltage is less than 6.6 V, then the indicator will be red. 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 Meter to operate. You should consider that with decrease of air temperature, the battery capacity also decreases. This should be taken into account when estimating the operating time of the Meter.

4.5.1.3. Standby Battery Voltage

Standby 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 greater than 2.5 V, the indicator in the line will be green. If the voltage is less than 2.5 V, then the indicator will be red. The battery is intended for power supply of the system clock and of the memory (for saving the current Meter settings). If red indicator appears, the IT-081 should be sent to repair service to have its battery replaced.

4.5.1.4. 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 position. If an error has been detected, the indicator will be red, and in this case the Meter should be sent to repair service to have the defects corrected.

4.5.1.5. Checking Data Logger NVRAM

This program checks the condition of the Data Logger nonvolatile memory, NVRAM. If the remaining capacity is more than 5%, the green indicator will be displayed in the status field. If the remaining capacity is less, the indicator will be red. In this case you should delete the unnecessary files from the memory.

4.5.1.6. Checking Removable Module

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


4.5.1.7. Removable Module Temperature

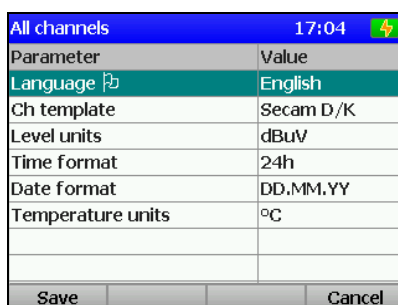
The parameter is intended for checking the temperature inside the Removable Module. Temperature is the main environmental factor, which influences the accuracy of measurements. To check the accuracy of measurements of the signal level, use the temperature parameter. If the temperature value is within the allowed range (from – 10 to + 50 °C), then the green indicator will be displayed in the status field. If the temperature is beyond this allowed range, then the indicator will be red.

4.5.1.8. Calibration

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

4.5.2. Setting Regional Parameters

Regional parameter setting is intended for the Meter configuration in accordance to the local conditions and for the user convenience. The  icon in the main menu corresponds to this mode. The screen view is shown in figure 4.23.




Parameter	Value
Language 	English
Ch template	Secam D/K
Level units	dBuV
Time format	24h
Date format	DD.MM.YY
Temperature units	°C
Save	Cancel


Figure 4.23

The table contains the following parameters which are available for editing:

1. **Language**. Selecting of the user interface language.
2. **Ch template**. Selecting of the channel allocation standard.
3. **Level units**. Selecting of the signal level measurement units.
4. **Time format**. Selecting of the date representation format.
5. **Date format**. Selecting of the time representation format.
6. **Temperature units**. Selecting of the temperature measurement units.

Use ▲ and ▼ keys to select the required parameter, and set its value by pressing ◀ and ▶ keys.

4.5.3. User Interface Setting

The operating parameter configuration program is intended for modifying the general parameters of the Meter operation. The  icon in the main menu corresponds to this program. See the parameter configuration screen view in the figure 4.24:

All channels		13:15
Parameter	Value	
Theme	theme 2	
Key sound	type 2	
Volume	20%	
Date	15.02.2012	
Time	13:15:31	
Clock adjustment	+ 0.0 sec/day	
Auto power off	off	
Auto backlight off	off	
Save		Cancel

Figure 4.24

The following parameters in the table are available for editing:

1. **Theme**. Selecting of the colors for the user interface elements.
2. **Key sound**. Setting of the key pressing sound or turning the sound off.
3. **Volume**. Adjusting of the audio indication volume.
4. **Date**. Setting of the date.
5. **Time**. Setting of the time.
6. **Clock adjustment**. Adjusting of the clock.
7. **Auto power off**. Setting of the mode of the Meter automatic switching off.
8. **Auto backlight off**. Setting of the automatic backlight switching off mode.
9. **Quick start**. Setting of the Meter switching on.


You can select the parameters using ▲ and ▼ arrows, and set their values by ◀ and ▶ keys.

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

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. This mode allows saving the battery energy.

Quick start parameter is for selecting the mode of the Meter switching on. If the parameter value is **off**, the **Main menu** appears on the screen after the Meter is switched on. If the parameter value is **on**, then the last previously used measurement mode appears on the screen after the Meter is switched on.

4.5.4. Identification Data Readout

Identification data readout program is intended for determining the serial numbers of the modules of the Meter, their modifications and software versions. The  icon in the main menu corresponds to this mode. The screen views are shown in the figure 4.25:

All channels		13:16
Module	Base ▶	
Module type	MB-08C	
HW version	02.80.01	
Serial number	11070001	
Application	01.00.00.00	
Operating system	01.00.01.02	
Exit		

All channels		17:11
Module	◀ Removable	
Module type	MC-081	
HW version	02.81.06	
Serial number	112002	
Exit		

Figure 4.25

You can switch between the information screens for the Base Unit and Removable Module using ◀ and ▶ keys.

4.6. Operation Controlled by PC

4.6.1. General Information

You can control operation of your IT-081 TV Level Meter via PC. For connection to PC use **USB** connector on the right panel of your Meter. The IT-081 package contains the cable for connection to PC and a CD with the software, which allows performing the following operations:

1. Measuring of the video carrier level, carrier to noise (C/N) ratio, video to audio (V/A) ratio within TV signal spectrum for TV channels specified by the channel plan.
2. Measuring of the spectrum within an arbitrary frequency band (from 5 to 900 MHz).
3. Viewing and saving of data logger pages.
4. Editing of channel plans.
5. Saving and documenting of measurement results.
6. Viewing and editing of the limit plans.

4.6.2. PC Configuration Requirements

Minimal system requirements for your PC:

1. Microsoft Windows XP or higher operating system;
2. RAM capacity: 128 MB;
3. 25 MB of hard drive free space;
4. USB 2.0 support.

4.6.3. Software Installation

The installation of the required software is executed by **Install ViewIt08C.exe** program, which performs all the actions necessary for saving of the program to the computer hard drive:

- a) before installation, close the active application if it has been installed before. 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. Press **Install ViewIt08C** when the disk menu appears. If you received the software in some different way, just run the **Install ViewIt08C.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 Meter program files. By default, the files are saved into **C:\Program Files\PLANAR\IT08C\ViewIT08C**. To save the files into a different folder, click **Browse** button. Select the required path and click **OKB**;
- e) the following steps will be fulfilled 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 folder **PLANAR\IT08C\ViewIT08C** containing a shortcut for accessing the program will be created in the **Start** menu.

4.6.4. Starting the Program

Connect the Meter to PC using the cable supplied in the package. Switch the power of the Meter on and select in the main menu the mode of operation controlled by PC. The



icon corresponds to this mode.

During the first connection of the Meter 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 Meter program directory (by default the path is:

C:\Program Files\PLANAR\IT08C\ViewIT08\Driver). During installation select this folder for the required driver search.

To start the program on your PC, perform the following:
find **PLANAR\IT08C\ViewIT08C** folder in Windows program menu;
select **ViewIT08C** program.

4.7. Updating Software

4.7.1. General Information.

The device 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 in the section that describes the corresponding device from IT-08 family.


The device 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 4.7.2). 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 4.7.3).

Both the operating system and Removable Module application have their unique version numbers of **X.X.X.X** format (e.g. 1.0.0.2). 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 February 28, 2012 will have the following name: **it081_build_120228.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 4.5.4).

4.7.2. Updating Software via PC

To update your device firmware, proceed as follows:

- a) copy the archive with new firmware version from our website (e.g. *it081_build_120228.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 v4.1**;

- d) start **SoftwareManager** 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 4.26);
- f) click **Update** to start the updating.



Figure 4.26

If your IT-08 functions properly, USB-port cable is connected correctly, and the software to be downloaded is compatible with the Meter hardware, the process of program download onto your Meter will automatically start, and its progress will be indicated on the screen. After the download is over, the pop-up window will announce that the task has been successfully completed. The IT-081 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 Meter. But, if this does occur, repeat the process of program update.

4.7.3. Updating Software from Removable Module

The device features the possibility of saving the firmware into the memory of the 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 device 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.

4.8. Battery Operation

The IT-081 is powered by a built-in power source with 6 NiMH AA batteries of 14.5x49.5 mm dimensions and no less than 2100 mAh capacity.

To determine the residual capacity of the batteries, use the Self-test program of the Meter (see Section 4.5.1). When the effective charge level of the battery drops to a critical point, you will hear the warning beep. This signifies that the time of operation until total battery discharge is approximately 5 minutes.

To charge the batteries in an appropriate charger, remove IT-081 from its Carrying Case. Make sure the Meter is switched off. 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 lead to damage to the Meter or to the batteries.

To charge the batteries without removing them from the Meter, connect the external DC power source included in the set, and power it. The batteries will keep recharging even if the IT-081 is switched off. The backlight of **①** indicates that the power from the source is being supplied. In this case the full recharge will take from 12 to 14 hours. It is highly recommended to only recharge the batteries that are fully run-down. You should charge batteries using the external power source once every 2 – 3 months in order to equalize the charge of batteries and thus increase their useful 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 minor defects correction.

Perform preventive inspections covering check 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-081 is switched on, nothing is displayed on the screen and there is no backlight.

Possible reason: Extremely low charge, malfunction, or lack of one or more of the batteries.

Methods of correction: In order to check the IT-081 condition, connect the mains adapter. If the Meter switches on, then the battery voltage has to be tested by means of the self-test function (Section 4.5.1.2). Low voltage (< 6 V) is evidence that a battery (or a number of batteries) is discharged. Voltage that is higher than normal (> 9V) indicates malfunction or lack of one or more batteries. The batteries have to be charged in case they are low (Section 4.8) or replaced if they are malfunctioning.

Possible reason: Firmware failure.

Methods of correction: Update the firmware from your computer (Section 4.7.2).

Defect detection: When the IT-081 is switched on, the following message is displayed: **Removable Module not plugged in.**

Possible reason: Firmware failure in Removable Module.

Methods of correction: Update the firmware applicable to the corresponding Removable Module from the external computer (Section 4.7.2).

Defect detection: High error at signal level measurements.

Possible reason: Incorrect setting of the input attenuation value.

Method of correction: Check the attenuator settings (Section 4.3.2). We recommend setting the mode of automatic selection of input attenuation.

Possible reason: Increased wear of the RF input adapter.

Method of correction: Replace the input adapter by the proper one.

Possible reason: Incorrect setting of channel plan or channel allocation standard (template), which makes the IT-081 to tune to offset video carrier point. This can be tested in spectrum analyzer mode.

Method of correction: Readjust the channel plan (Section 4.4.2). Check if the channel template is set correctly (Section 4.5.2).

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

Possible reason: Firmware failure.

Method of correction: Press and hold the ⓘ key till device turns off.

7. STORAGE

Store your IT-081 under the following conditions: environment temperature from -20 to +40 °C, relative humidity up to 90 % (at 30 °C).

8. TRANSPORTATION

The IT-081 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 IT-081 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 readout program (see Section 4.5.4).

10. WARRANTY INFORMATION

The manufacturer warrants the IT-081 TV Level Meter 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 IT-081 TV Level 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.