

IT-19C

QAM SIGNAL ANALYZER OPERATING MANUAL



 **PLANAR**

Revision 1.0 of 06.2019

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1 Introduction

This Operating Manual is intended for introducing the design, functions, and basic instructions related to operation and servicing of the IT-19C QAM Signal Analyzer (Analyzer).

Reliability of IT-19C is ensured by fulfilment of regular maintenance procedures. These procedures and their intervals are described in Section 5.

Repair of the Analyzer should be performed at the factory of origin or in places with special equipment by people with special training who are familiar with the device and its principle of operation. During the start-up process the special equipment is used, therefore the adjustment of the Analyzer or replacing elements that affect the measurement accuracy is prohibited.

Follow the rules of storage and transportation in sections 7 and 8 in order to avoid any mechanical damage of the Analyzer.

In this manual the following abbreviations are used:

- AC – alternating current;
- BER - Bit Error Ratio;
- DC – direct current;
- MPEG - Motion Pictures Expert Group (the name of the video and audio compression standard);
- PC - Personal Computer;
- PER – Packet Error Ratio;
- RF - radio frequency;
- TV – television;
- USB – Universal Serial Bus.

The appearance of the Analyzer and its components are displayed in Figure 1.1 and Figure 1.2.

The Analyzer has a plastic impact-resistant collapsible housing. IT-19C Analyzer's overall dimensions are 193x94x53 mm.

There is a keypad and a graphic display on the top panel of the base module (Figure 1.1). On the front panel, there is a connector for connecting the device to a computer and a connector for connecting an external power source (Figure 1.2). There is a 75 input "F-male" connector on the back panel .

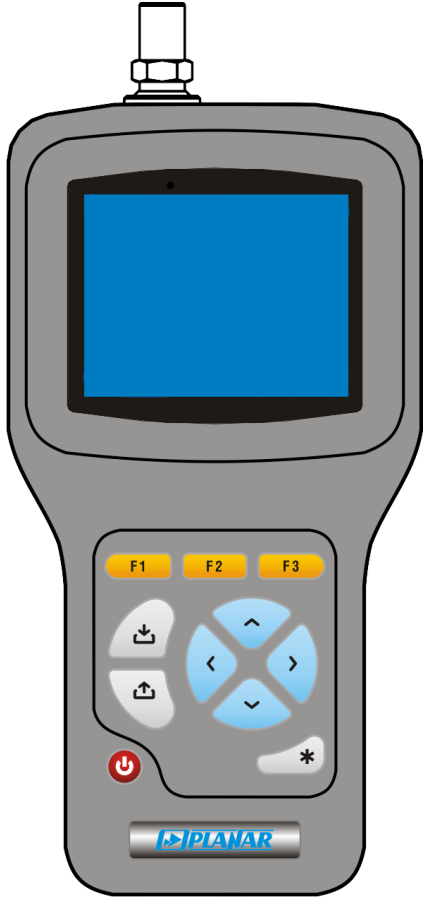


Figure 1.1

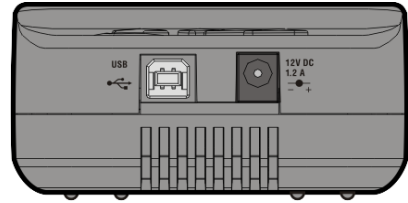


Figure 1.2

This Operating Manual is made for the 02.019.02 hardware version of IT-19C Base Unit, software version 01.01.XX.XX of IT-19C and ViewIt19C software version for PC.

2 General Description and Principle of Operation

2.1 Function

The DVB-C IT-19C signal Analyzer is designed for measuring parameters of TV channels with analog modulation: video level, video level to sound level ratio, video level to noise level ratio. You can also measure power of TV channel with digital modulation.

For signals of DVB-C and J.83 Annex B digital cable television standards, the Analyzer allows to measure parameters of reception quality — Modulation Error Ratio (MER), Bit Error Ratio (BER), the number of wrong MPEG stream packets, the noise immunity margin (MARGIN), and the constellation diagram (on PC screen).

IT-19C provides with the automatic settings detection mode (channel frequency, symbol rate, modulation type). There is a spectrum analysis mode aimed at searching for any unwanted signal. The Analyzer can be connected to a PC for additional service modes. The Analyzer allows you to measure the direct and alternating voltage of remote distribution receiving systems of TV and radio broadcasting network power supply.

2.2 Environmental Conditions

Normal operation conditions:

- 1) ambient temperature (23 ± 5) °C;
- 2) relative air humidity (55 ± 25) %;
- 3) atmospheric pressure 84-106 kPa (630-795 mm Hg);
- 4) voltage transmitters correspond to CAT. II installation category.

Rated operation conditions:

- 1) ambient temperature -10 to 50 °C;
- 2) relative air humidity 90% to 25 °C temperature;
- 3) atmospheric pressure 84-106 kPa (630-795 mm Hg).

2.3 Package Contents

The Analyzer package includes:

- 1) The IT-19C Analyzer 1 pc.;
- 2) Rubber boot 1 pc.;
- 3) Li-Po battery 1 pc.;
- 4) F-F RF adapter 1 pc.;
- 5) 12V/1.2A charger 1 pc.;

6) Reference card 1 pc.;

7) Quick start guide 1 pc.;

8) Operating manual is available for download from <http://www.planarchel.ru>.

2.4 Specifications

Operating frequency range 5 to 1006 MHz

Frequency resolution 125 kHz

Input parameters:

- input impedance within operating frequency range:..... 75 Ohm;

- input impedance for frequencies up to 50 Hz:..... at least 200 kOhm.

Allowed resulting value of AC input voltage for frequencies over 5 MHz:...3 V.

Allowed resulting value of AC and DC input voltage for frequencies

under 100 Hz: 150 V.



Measurement level range 30 to 120 dB μ V

Measurement level resolution 0.1 dB

Level measurement accuracy at 23 °C operation temperature ± 1.5 dB

Level measurement accuracy at rated operating temperature ± 2.0 dB

Level measurement channel passband..... 230 \pm 60 kHz

Frequency indication..... 6 characters

Channel number indication..... 3 characters

Signal level indication..... 4 characters

Digital TV standards ITU-T J.83 ANNEX A/B/C

Modulation types..... QAM 64, 128, 256

Symbol rate 5.0 to 7.2 MSps

MER measurement range 28 to 40 dB

MER measurement resolution 0.1 dB

MER measurement accuracy at the digital channel power value not less than 60 dB μ V ± 2.0 dB

BER measurement range 4.0×10^{-3} to 1.0×10^{-9}

Digital channel power limit, which provides quasi error-free decoding 45 dB μ V

Automatic frequency adjustment in the digital channel parameters changing mode..... ± 0.25 MHz

Warm-up time 2 minutes

IT-19C can be powered by:

- AC circuit with 220 ± 22 V voltage, 50 ± 0.5 Hz frequency with no more than 5% harmonic content, via 12V/1.2A Charger;
- external DC source with 11 to 13 V voltage, and no more than 0.25 V ripple;
- built-in battery.

Current consumed from external power source or battery, not more than..... 1.2A

Continuous stable operation under normal conditions
(when powered by external source), not less than 24 hours

Battery life, not less than 5 hours

Dimensions:

- analyzer 193x94x53 mm

- package 255x180x70 mm

Weight:

- analyzer 0.5 kg

- analyzer in a package 1.0 kg.

2.5 Application Area

IT-19C analyzer can be used when checking and setting the networks of distribution and receiving the TV and radio broadcasting, individual network elements and other electronic devices. The Analyzer allows you to measure the voltage level of a radio-frequency signal, parameters of a TV radio-frequency signal with analog and digital modulation of the DVB-C and J.83 Annex B standards. The Spectrum measurement mode makes it possible to search for any unwanted signal. The Analyzer can be used both in laboratory conditions with power supply from an external power source, and in outdoors being powered by the in-built battery or from the vehicle electrical system.

3 Preparation for Operation

Perform external examination to make sure your IT-19C has no visible mechanical damage.

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











If the IT-19C has been kept in the environment other than the rated operating conditions, leave your Analyzer in the environment with normal operating conditions for at least 2 hours before operation.

4 Operation Procedure

4.1 Controls and Indicators

The location of controls, indicators and connectors is shown in Figure 1.1.

Functions of the elements are the following:


- 1) «F1», «F2», «F3» functional keys are designed for enabling the commands corresponding to the icons displayed on the screen of the Analyzer;
- 2) The «» key allows you to go to the previous level of the menu;
- 3) The «» key is used to confirm the command;
- 4) «», «», «» and «» arrows allow editing in the current operation mode;
- 5) The «» key provides additional features;
- 6) The «» key turns the Analyzer on and off;
- 7) The « 12V DC 1.2A» connector provides connection to an external power source;
- 8) The «USB » connector provides connection to the PC;
- 9) The «INPUT» connector is designed for the signal input, “F-male”-type connector.

4.2 Preparations for Measurement




Before you operate your IT-19C, make sure to read this Operating Manual carefully, as well as to inspect the location of the controls and indicators of the Analyzer (Section 4.1).





To prepare your Analyzer for operation with the external power source, do the following:

- 1) connect the power source to the connector located on the side panel of IT-19C;
- 2) turn on the power source.


To prepare your IT-19C for operation in stand-alone mode, powered by the battery, press and hold down «» until the display lights up.

The name and type of the Analyzer will be shown on the screen. After 1 second, either the main mode-selection menu (main menu) will appear (Figure 4.1), or the last measurement mode used before turning the power supply off (Section 4.5).

When you first turn on the analyzer, you need to configure the basic operation parameters. To perform the setting, select the settings tab  in the main menu mode using «» и «» and

set the  icon in the bottom line of the screen using «» и «». Press «F1». In the parameter table that appears, select the required ones in turn and set the parameter values using the «»

and «▶». For the proper functioning of the analyzer, the following parameters must be configured:




- **Language** . Used language for user interface. Possible values are: **English(USA)**, **Русский**.
- **Level units**. Level units of measure. Possible values are **dBuV**, **dBmV**, **dBm**.
- **Channel template**. Channel allocation standard. Possible values are **OIRT**, **CCIR**, **Australian**, **Australian SBAND**.

The purpose of the remaining parameters is described in section 4.5. After setting the parameters, press the «F1/Save» to save the settings or «F3/Cancel» to restore the old values.

4.3 Measurement Procedure

4.3.1 General Information

IT-19C analyzer offers three measurement modes:

	Channel	TV channel parameter measurement
	Scan	Channel level, ripple and tilt measurement
	Spectrum	Radio-frequency signal spectrum measurement

Set the icon of the required mode at the bottom of the screen by pressing ▲ and ▼ in the main menu (Figure 4.1).

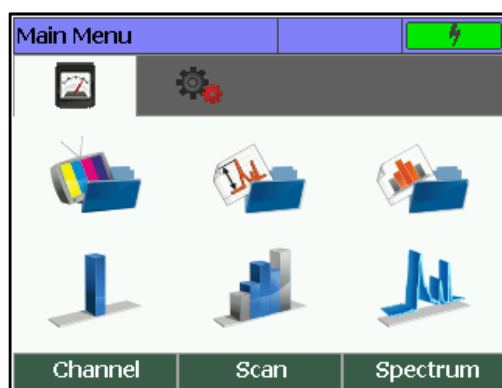



Figure 4.1

Press one of the buttons of the functional group (**F1**, **F2**, **F3**), above which there is the desired icon for selecting the measurement mode. Return to the selection menu by pressing . For a quick switch between measurement modes (without entering the menu) press *****. The line of the function buttons (**F1**, **F2**, **F3**) will display names of measurement modes on a yellow background. Click the desired button.

When selecting the measurement mode, the name of the selected channel plan (Section 4.4.2) is displayed in the status bar for a few seconds.



In measurement modes, the measured constant voltage (VDC) value or the alternating voltage (VAC) value of the cable network is displayed at the top of the screen.



4.3.2 Channel Measurement Mode

In this mode, the measurement of TV channel parameters and the voltage level applied to the input of the device is performed. The view of the screen for a channel with analog modulation is shown in Figure 4.2.

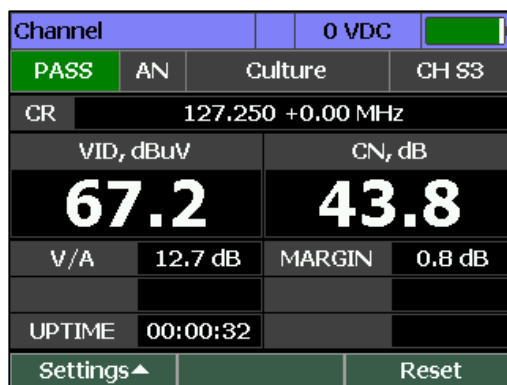


Figure 4.2

The following information is shown on the screen:

- express-test result: **PASS/FAIL** if a quick scan is on (Section 4.4.3);
- Name and number of the channel;
- **CR**: video level frequency and offset;
- **VID**: video level;
- **CN**: signal/noise value;
- **V/A**: video level to sound level ratio;
- **MARGIN**: signal/noise value margin;
- **UPTIME**: measuring time.

If a quick check of parameters is enabled (Section 4.4.3), the parameter with failed value is highlighted in red.

To measure the signal-to-noise ratio, the Analyzer carries out measurements at the point with the lowest level of useful components of the radio-frequency signal in the channel band. The frequency of noise measurement is determined automatically by searching for the best possible point in the frequency range with the video level offset from - 1.5 to 6.0 MHz.

The screen view for a channel with digital modulation is shown in Figure 4.3.

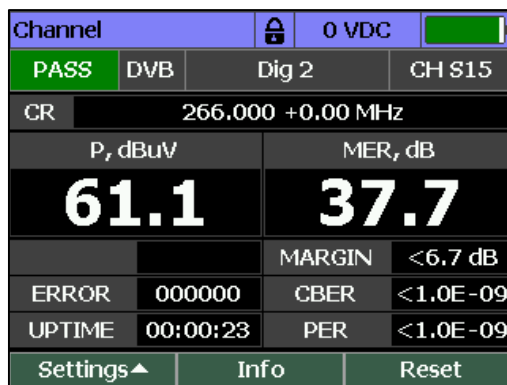


Figure 4.3

The following information is presented on the screen:

- express-test result: **PASS/FAIL** if a quick scan is on (Section 4.4.3);
- channel synchronization icon;
- name and number of the channel;
- **CR**: channel frequency and offset;
- **P**: channel power;
- **MER** value;
- **MARGIN**: MER margin;
- **ERROR**: the number of unrepaired packets of the MPEG stream;
- **UPTIME**: parameter measurement time;
- **CBER**: BER channel value (preBER);
- **PER**: MPEG stream Packet Error Ratio.

Input voltage level measurement is carried out in the range from 10 to 100 V. The typical value of absolute measurement accuracy shall not exceed ± 1.5 V. The value of voltage level measured at the input connector of the device is displayed at the top line of the screen. If the voltage is constant, the value is displayed as **50VDC**. If the voltage is altering, the value is displayed as **50VAC**.

Tune to the desired channel using «◀» and «▶» to measure channel parameters. In case of working without a channel plan, you can tune to any channel according to the selected Channel template (Section 4.5) using «◀» and «▶». If there is a TV signal, the Analyzer automatically determines the channel type. When working with the selected channel plan (Section 4.4.2), re-tuning is carried out through channels from this plan.

4.3.3 Scan Measurement Mode

In this mode the screen displays signal levels as a bar-graph. It is presented in Figure 4.4:

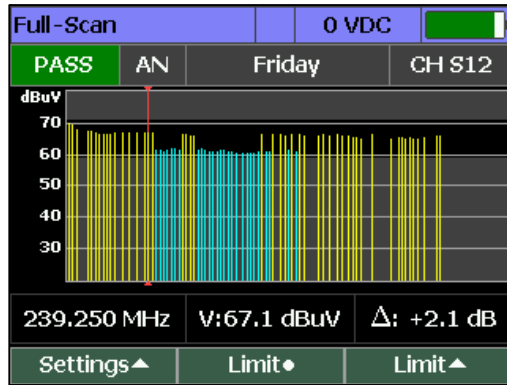


Figure 4.4

The screen shows:

- express-test result: **PASS/FAIL** if a quick scan is on (Section 4.4.3);
- channel type;
- the name and the number of the channel;
- TV channel frequency;
- **V**: TV channel level or **P**: digital TV channel power;
- deviation of the value level from the nominal value.

The level, frequency, and level deviation values correspond to the channel at the marker position. The marker's position can be changed by pressing «**◀**» and «**▶**». The analog channel bar is yellow, the digital channel bar is blue.

The Scan measurement mode has two display options: ripple measurement (**Limit** option) (Figure 4.4) and tilt measurement (Figure 4.5). To select an option for the display, press «**F2**».

To adjust the mode parameters, press «**F1/Settings**». Two parameters will appear in the drop-down menu:

- **Level scale**. Possible values are **2, 5, 10 dB** per division;
- **Averaging**. Possible values are **Off, Low, Medium, High**.

The level scale can be adjusted with «**▲**» and «**▼**», going to the setup menu is not needed.

In the ripple measurement mode, the display shows boundaries of required channel levels. To adjust the boundaries, press «**F3/Limit**» and adjust the base level value and the ripple value in the drop-down menu.

While working without a channel plan, when entering the mode, the channel types are detected automatically. Channel type automatic detection is also performed after the signal appears at the input of the device (if there was no signal before). Work is conducted on all channels of the TV system. When working with one of the channel plans, scanning is performed only on the selected channels. Tuning the marker is made through the channels of the channel plan.

In the tilt measurement mode (Figure 4.5), the display shows levels of TV channels and the slope line between the peaks of the two selected channels. To select channels, press «F3/Marker» and adjust the position of the first and the last channels in the drop-down menu.

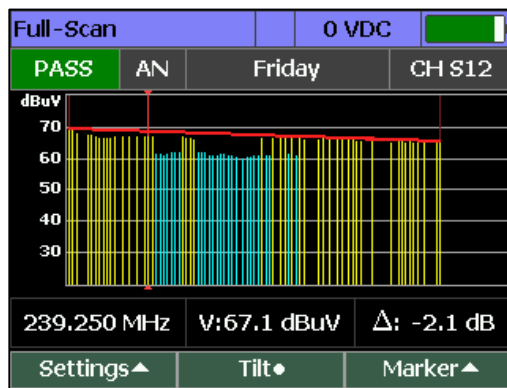


Figure 4.5

4.3.4 Spectrum Measurement Mode

This mode displays the signal spectrum. The screen view is presented in the Figure 4.6:

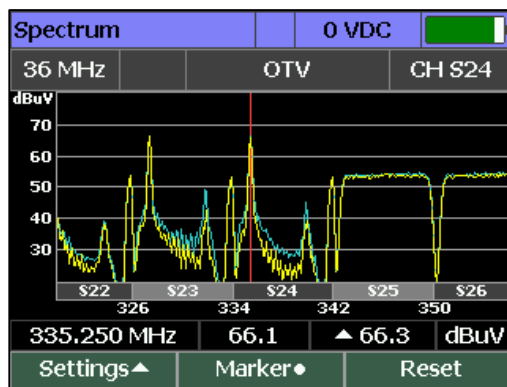


Figure 4.6

The screen shows:

- span window;
- the name and the number of the channel;
- marker position frequency;
- the signal level at the point where the marker is located;
- max or min signal level at the point where the marker is located.

The current spectrum trace is yellow. The additional trace line of the max or min values is blue. To reset the line, press «F3/Reset».

Marker's location can be changed by pressing «◀» and «▶» with the indication of «F2/Marker». If the button has the value of «F2/Channel», the position of the scan window changes.

To adjust the mode parameters, press «**F1/Settings**». Four parameters will appear in the drop-down menu to select:

- **Level scale.** Possible values are **5, 10 dB**;
- **Span.** Span range. Possible values are **18, 36, 72 MHz**;
- **Averaging.** Possible values are **Off, Low, Medium, High**;
- **Hold.** Additional trace display. Possible values are **Off, MIN, MAX**.


The level scale can be adjusted with «▲» and «▼», going to the setup menu is not needed. To move a marker or scan window quickly, press «*» and one of the arrows «◀» or «▶» simultaneously.

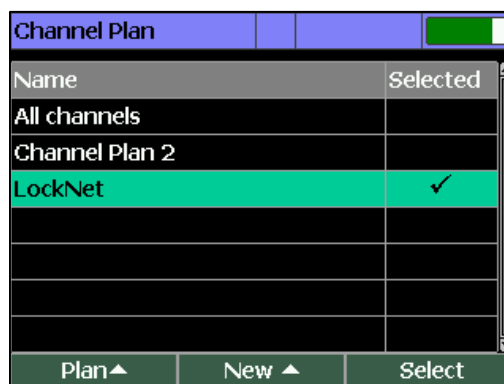
4.4 Data Logger Function

4.4.1 General Information

Data Logger is intended for automation of the procedure of recording the measurement results. The memory capacity allows to save up to 64 channel plans, up to 16 limit plans, up to 250 channel data logger pages with maximum number of channels. The Analyzer allows viewing the saved data off-line or by means of a computer (Section 4.8.2).

4.4.2 Channel Plan List

In the main selection menu, the icon  corresponds to the mode. 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 4.7. The table contains 2 columns. The first column is a channel plan name. The second column shows the status of the channel plan. To select a channel plan, use the «▲» and «▼» buttons. Select the required channel plan and press the "F3/Select" button.



Channel Plan	
Name	Selected
All channels	
Channel Plan 2	
LockNet	✓
Plan ▲	New ▲
	Select

Figure 4.7

4.4.2.1 Editing Channel Plan

To view and edit the channel plan, select the required one and press "**F1/Plan**". In the pop-up menu, select **Edit**. The screen view of the channel plan table is shown in the Figure 4.8:

Channel Plan			
Ch	Name	F, MHz	Type
11	Home	215.250	Analog
S11	TV3	231.250	Analog
S12	Friday	239.250	Analog
S13	Star	247.250	Analog
S14	Dig 1	258.000	DVB-C
S15	Dig 2	266.000	DVB-C
S16	Dig 3	274.000	DVB-C

Channel ▲ Info Save

Figure 4.8

The table contains the channel number, channel name, channel frequency and type (analog or digital). For general information about the channel plan, press «F2/Info».

To edit the channel, press «F1/Channel». The pop-up menu shows the possible commands with the channel:

- 1) **New**. Adding a channel;
- 2) **Edit**. Editing channel parameters;
- 3) **Delete**. Deleting a channel.

In channel editing mode, a table with parameters will appear on the screen. The screen view is shown in the Figure 4.9:

Channel Plan	
Parameter	Value
Type	Analog
Number	S11
Frequency	231.250 MHz
Name	TV3
Standard	D
System	Auto
SNR method	On

◀ Ch Save Ch ▶

Figure 4.9

The editing table contains 7 parameters for an analog channel:

- 1) **Type**. Channel type: **analog**.
- 2) **Number**. Channel number.
- 3) **Frequency**. Video carrier frequency.
- 4) **Name**. Channel name. It can be edited in ViewIt19C.
- 5) **Standard**. The parameter determines the channel bandwidth.
- 6) **System**. It determines the channel color system.

- 7) **SNR method.** Measurement mode of the Signal/Noise parameter. Possible values: **On and Off.**

6 parameters are provided for digital channels with unsupported digital modulation:


- 1) **Type.** Channel type: **digital.**
- 2) **Number.** Channel number.
- 3) **Frequency.** The center frequency of the channel.
- 4) **Name.** Channel name. It can be edited in ViewIt19C.
- 5) **Bandwidth.** The parameter determines the channel bandwidth.
- 6) **SNR method.** Measurement mode of the Signal/Noise parameter. Possible values: **On and Off.**

6 parameters are provided for digital channels with Annex B or DVB-C modulation:

- 1) **Type.** Channel type: **DVB-C или J.83-B.**
- 2) **Number.** Channel number.
- 3) **Frequency.** The center frequency of the channel.
- 4) **Name.** Channel name. It can be edited in ViewIt19C.
- 5) **Modulation.** The parameter determines a type of modulation.
- 6) **Symbol rate.** The parameter determines the value of the symbol rate.

To save the channel parameters, press «**F2/Save**» button. To exit the function without saving, press «».

4.4.2.2 Deleting a Channel Plan

To delete a channel plan, select the required one and press «**F1/Plan/Delete**» then press «». A confirmation dialog will appear.


4.4.2.3 Creating New Channel Plan

To create a new channel plan in auto mode, press «**F2/New/Scan**». After scanning all the TV channels, the analyzer switches to the channel plan editing mode (Section 4.4.2.1). Edit the channel plan parameters if necessary and save them into memory.

To create a new channel plan without scanning, press «**F2/New/Empty**». The device will enter the channel plan editing mode, where you can manually create a new channel plan.

4.4.3 List of Limit Plans

Limit plans are designed to perform checks of the measured channel parameters while scanning the channel data logger, as well as during a quick check in the Channel and Scan measurement

modes. In the main selection menu, the icon  corresponds to the mode.

This mode allows performing all operations with limit plans: viewing, editing, deleting, creating a new one. The screen view is shown in Figure 4.10. The table contains the names of the limit plans and their status. To select the desired plan limit and enable quick check of parameters, press **«F3/Select»**.



Name	Selected
Switched off	
Limit Plan 1	✓

Plan New Select

Figure 4.10

To work without checking, select **«Switched off»**.

To edit the selected limit plan or delete it, press **«F1/Plan»**. In the pop-up menu, select the appropriate command. To create a new limit plan, press **«F2/New»**.

In the editing mode, there are four tables with limit plan parameters, which can be selected in the pop-up menu by pressing **«F1/Type»** (Figure 4.11).



General parameters	Min	Max
Δ Level, dB		30
Δ Analog/Digital, dB	-6	11
Δ Adj. Ch., dB		3
General		
Analog channels		
DVB-C/1.83 channels		
Digital channels		

Type ▼

Figure 4.11

1) General parameters:

- **Δ Level, dB** Maximum value of channel levels ripple;
- **Δ Analog/Digital, dB** The minimum and maximum difference between levels of analog and digital channels;
- **Δ Adj. Ch., dB** The maximum difference between adjacent channel levels.

2) Parameters for analog channels:

- **Video level, dBuV** Minimum and maximum value of channel levels;
- **Video/Audio, dB** The minimum and maximum value of V/A ratio;
- **C/N, dB** Minimum value of C/N ratio.

3) Parameters for DVB-C/J.83 channels:

- **Power, dBuV** Minimum and maximum channel power values;
- **MER/QAM64, dB** Minimum MER value for QAM64 modulation;
- **MER/QAM128, dB** Minimum MER value for QAM128 modulation;
- **MER/QAM256, dB** Minimum MER value for QAM256 modulation;
- **preBER** The maximum value of the preBER parameter.

4) Parameters for digital channels (with unsupported modulation):

- **Power, dBuV** Minimum and maximum channel power values;
- **C/N, dB** Minimum value of C/N ratio.

To enable or disable checking one of the parameters, press «**F2/Enable/Disable**». The parameter will display the corresponding status. To look through the parameters, use the «**▲**» and «**▼**» buttons. To change the parameters, use the «**◀**» and «**▶**» buttons.

4.4.4 Channel Data Logger

4.4.4.1 General Information

The Channel Data Logger is intended for measuring TV channel parameters on one of the channel plans, checking cable network parameters for compliance with the selected limit plan and documenting the check results in the analyzer's memory. The Channel Data Logger allows viewing the measurement results and errors in different parameters and uploading the data into your PC for further processing and report preparation.

4.4.4.2 List of Channel Data Logger Pages


In the main selection menu, the icon  corresponds to the Channel Test mode. This mode allows performing all possible operations with the Channel Data Logger: viewing, deleting and creating a new page. The screen views are shown in figures 4.12 and 4.13.



Figure 4.12

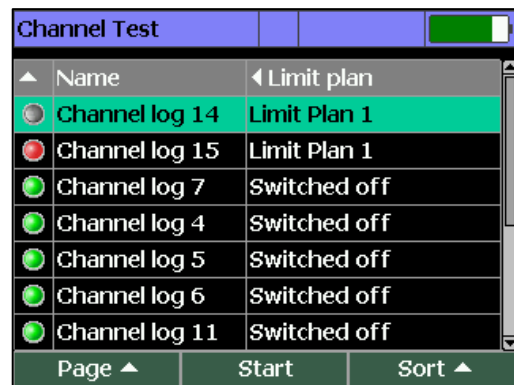





Figure 4.13

The screen displays a list of channel data logger pages with pages names, and also the channel and limit plans related to the name. For each page in the first position of the row there is a status indicator.

Indicator	Page status of the Channel Data Logger
	Page is created, but not scanned.
	Page is scanned, no errors are found.
	Page is scanned, errors are found.

The bottom row contains a list of commands that are selected using the function buttons. The buttons «◀» and «▶» switch the screen view. Use the «▲» and «▼» buttons to select the Channel Data Logger page.

List of possible commands:

- 1) **F1/Page** Operations with the selected Channel Data Logger page.
 - **New** Creating a new page;
 - **Delete** Deleting a page;
 - **Info** Viewing current page information;
 - **Open** Viewing page content;
- 2) **F2/Start** Start scanning the selected channel Data Logger.
- 3) **F3/Sort** Sorting the table by Status, Name of the Channel Data Logger, Channel Plan or Limit Plan.

4.4.4.3 Creating New Channel Data Logger Page

To create a new page, press «**F1/Page**» and select New. A table for preparing a new page will appear on the screen (Figure 4.14).



Parameter	Value
Page name	Channel log 16
Channel plan	LockNet
Limit plan	Limit Plan 1
Measure	All parameters
Precision/Speed	Normal
Ok	Cancel

Figure 4.14

The name of the page is assigned automatically. In the table it is necessary to select a channel plan and a limit plan from those prepared in advance. The page will be associated with the selected plans. When deleting or editing these plans, the Channel Data Logger page will be deleted from memory.

Next, you need to select the parameter measurement mode. You can set the following measurement parameters:

- **All parameters** Measurement of all parameters;
- **Level only** Measurement of channel levels only;
- **Level+CN/MER.** Measurement of channel levels and C/N ratio for analog channels and MER for digital.

To set the page scan time, set the **Precision/Speed** profile:

Profile	Parameter averaging	BER measurement limit
Fast	by 1 value	1E-6
Normal	by 2 values	1E-7
Precise	by 4 values	1E-8

4.4.4.4 Viewing the Measured Data of the Channel Data Logger

To view the Channel Data Logger page, press «**F1/Page**» and select **Open**. A table of general data of the Channel Data Logger page will appear on the screen (Figure 4.15).

Channel Test			
Page name	Channel log 15		
Measured	75 / 75		
State	Errors found		
Parameter	Min	Measured	Max
Defective an. ch.		2 / 48	
Defective dig. ch.		2 / 27	
Δ An. ch., dB		66.8	30
Δ Dig. ch., dB		1.5	30
Δ An./Dig., dB	-6	-58.0	11
Start	Map		

Figure 4.15

The table contains:

- **Page name** Name of the Channel Data Logger page;
- **Measured** Number of channels. Measured /Total;
- **State** Test result;
- **Defective an. ch.** Number of analog channels, with errors/total number;
- **Defective dig. ch.** Number of digital channels, with errors/total number;
- **Δ analog,dB** Ripple value for analog channels and permissible limit;
- **Δ digital,dB** Ripple value for digital channels and permissible limit;
- **Δ analog/digital,dB** Maximum level difference between analog and digital channels and permissible limit.

If the parameter analysis is disabled in the limit plan, then in the table its status is marked as **Off**.

To view the general results of the Data Logger measured data, press «F2 /Map». The screen will display the list of channels in a graphical format (Figure 4.16).

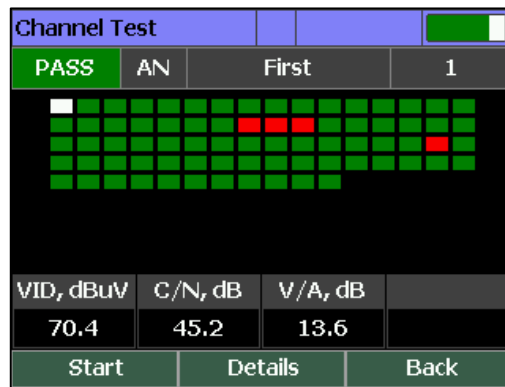






Figure 4.16

Each rectangle corresponds to a definite channel from the channel plan, which color determines its status.

Indicator	Status
	Channel parameters are not measured yet
	No channel errors are detected
	There are errors in the channel parameters
	The cursor is located on the channel.

Using the navigation buttons you can select the channel, which number and name are displayed at the top, and also the measured parameters in the bottom row. For more information, press «F2/Details» to enter the detailed information mode. In this mode, the measured data with permissible limits are displayed in a table (Figure 4.17).

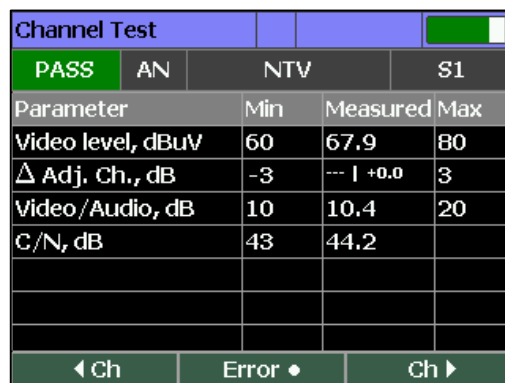


Figure 4.17

To go through the channels, use the navigation buttons «◀», «▶» or «F1», «F3». To go through only channels with errors, press «F2/Error».

4.4.4.5 Scanning Channel Data Logger Page

To start scanning the selected Channel Data Logger page (Section **Ошибка! Источник ссылки не найден.**), press the «F2/Start». A table for preparing scan data (Figure 4.12) will appear on the screen where you can tune the measurement parameters and scan speed. Press «F1/Ok» to confirm the start. The scan progress table will appear on the screen. After the scan is complete, you can save the results and go to the data view mode.

4.4.4.6 Deleting Channel Data Logger Page

To delete the selected Channel Data Logger page, press «F1/Page» and select **Delete**. A confirmation dialog will appear on the screen. You can cancel or confirm page deletion.

4.5 General Settings



The General Settings mode is designed to set the modes of the analyzer's overall operation. To start the mode in the main selection menu, select the icon set  and using «▲» and «▼» set the icon in the bottom row of the screen. Use «F1/Config» to start the mode (Figure 4.18).




Figure 4.18

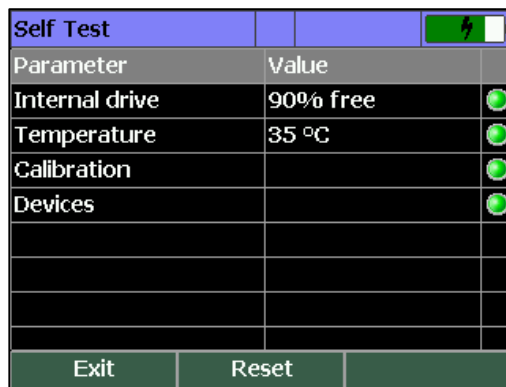
The table contains 7 parameters for selecting the operating mode:

Language 	Selecting a Graphical user interface language.
Color theme	Selecting a color set of the graphical interface.
Key sound	Key sound indication control.
Auto Power Off	Setting Analyzer automatic switch-off. Power off after the last button press.
Auto light off	Setting automatic backlight switch-off mode.

Quick start	Setting Analyzer switch-on behavior. The analyzer starts with the selection menu, or with the mode at the last power off.
Level units	Possible values: dBuV , dBmV , dBm .
Channel Template	Selecting channel allocation standard.

4.6 Analyzer Self-Test

To check the correct functioning of the analyzer individual components and the operating conditions, the device self-test mode is intended. The icon  in the main selection menu corresponds to the mode. The self-test screen view is shown in Figure 4.19:








Self Test		
Parameter	Value	
Internal drive	90% free	
Temperature	35 °C	
Calibration		
Devices		
Exit	Reset	

Figure 4.19

The table contains the following verifiable parameters:

Internal drive	Remaining capacity of the Data Logger memory.
Temperature	Temperature inside the analyzer.
Calibration	State of calibration coefficients tables (faultless or failed).
Devices	Faultless operation of analyzer internal parts.

Each parameter is followed by a status at the end of the row. If the icon color is green, then the parameter is normal. If red, it means a problem is detected.


If there is not enough free memory, which is indicated by the error indicator, then unnecessary files should be deleted from the memory of the Data Logger. If the error does not disappear, then contact the service center.

If the temperature inside the analyzer is out of tolerance, then this may lead to additional measurement errors or failure of the device.

In case of an error indication of the Calibration tables or internal Devices, it is necessary to contact the service center.

4.7 Identification Data Readout

The identification data readout program is intended for determining the serial number of the

Analyzer, their modifications and software versions. The  icon in the main menu corresponds to this mode. The screen view is shown in the Figure 4.20:

Information	
Model	IT-19C
Serial number	PSW190700003
Hardware version	02.019.02
Build number	190429
Firmware version	01.00.02.00
Checksum	AD43F177
Exit	

Figure 4.20

4.8 Operation Controlled by PC

4.8.1 General Information

You can control your IT-19C QAM Signal Analyzer via PC that connects via USB. **ViewIt19C** and **SoftManager** software can be downloaded from <http://www.planarchel.ru>.

4.8.2 ViewIt19C Software

ViewIt19C makes it possible to:

1) measure the following (for channels with analog modulation):

- video carrier level;
- video to audio carriers ratio;
- video carrier to noise ratio.

2) measure the following (for channels with digital modulation):

- channel power;
- channel power to noise ratio;
- MER, CBER, PER for J.83 Annex A/B/C modulated channel;

- constellation diagram.
- 3) carry out the spectrum measurement within the full frequency band;
 - 4) measure the channel level in accordance with the channel plan;
 - 5) view and save all measured data;
 - 6) view and save data logger pages;
 - 7) view, edit and save Channel plans;
 - 8) update the firmware.

The screen view of ViewIT19C is shown in Figure 4.21.



Figure 4.21

4.8.3 SoftManager PC Software

SoftManager is intended for updating the device firmware (Section 4.9). The software can be installed separately, it can also be installed as a part of the **ViewIT19C** software and be called from it. The appearance of the program is shown in Figure 4.22.

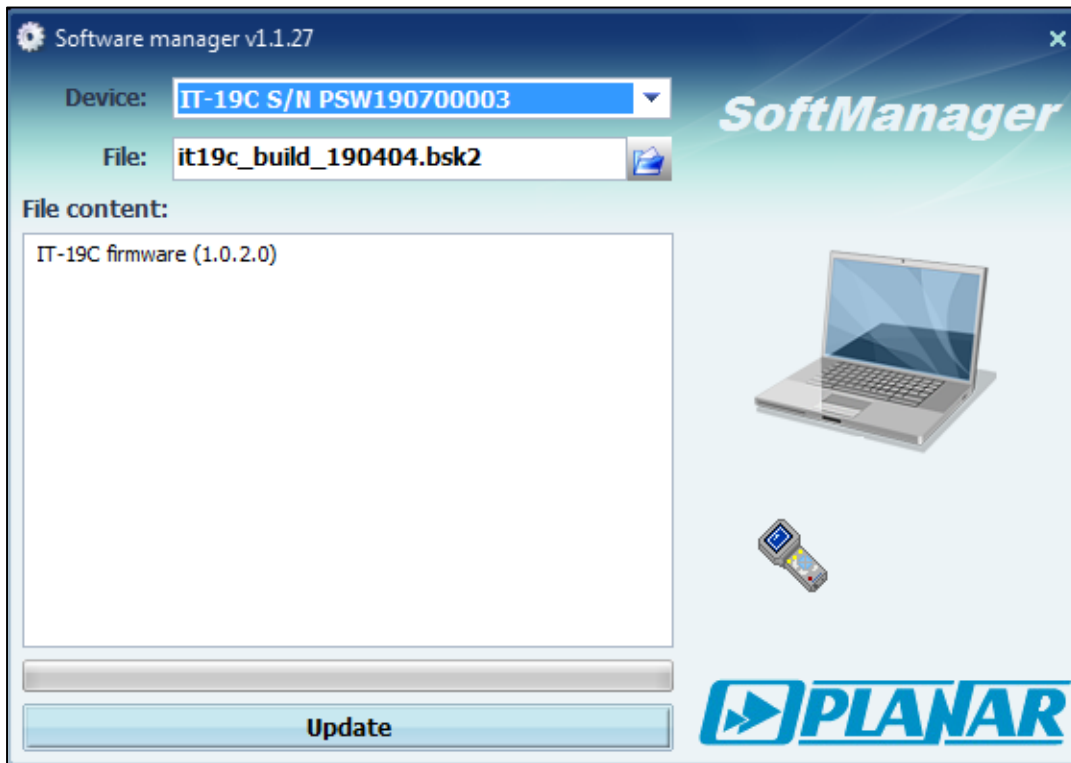



Figure 4.22

4.8.4 Connection to a PC

To connect the Analyzer to a PC, perform the following:

- 1) Turn on the Analyzer and connect it to the PC via USB interface.
- 2) In the analyzer, enter to computer mode (the mode corresponds to the  icon in the main menu).
- 3) Install the software for PC (**ViewIt19C** or **SoftManager**) and a USB driver. USB drivers and software installation instructions are provided in the **readme_rus.txt** file that is distributed with the programs.
- 4) Run the PC program and find the IT19C in the device list by serial number.

4.9 Updating Firmware

4.9.1 General Information

The device offers the capability to update its firmware. We go on with development of the devices and keep on working out new firmware versions that provide new features. Each firmware version has its unique number, e.g. 01.00.01.03. The firmware version is displayed in the identification data reading mode (Section 4.7).

Firmware update can be carried out in two ways:

- 1) Via Internet, with automatic availability verification of a new firmware version (Section 4.9.2).

- 2) Manually, selecting the file with the new firmware version (Section 4.9.3). New versions come available for free download from our website <http://www.planarchel.ru/> in the section that describes IT-19C analyzer.

4.9.2 Updating Firmware Via Internet

To use this function, the device firmware update check must be enabled in the **ViewIt19C** settings.

To update the firmware via Internet:


- 1) Connect the device to the **ViewIt19C** program (Sections 4.8.2, 4.8.4).
- 2) After connecting the Analyzer, the program will automatically check for updates. If a new firmware version is detected, it will offer to update. To perform the update, follow the wizard.

If the process was interrupted while loading the program to the Analyzer, you should repeat the program update process.

After the update is completed, there will be a message on the computer screen claiming the update completion success. The Analyzer will reboot and start working as if it has just been turned on.

4.9.3 Manual Firmware Updating



To update the Analyzer firmware manually, follow the steps below:

- 1) connect the device to the **SoftManager** program (Sections 4.8.3, 4.8.4). To start **SoftManager** from **ViewIt19C**, switch to firmware update mode in PC software.
- 2) Select the file with the device firmware (*.bsk2): click  (Figure 4.22) and select the file in a standard Windows file selection window.
- 3) Click «**Update**» button and wait for the update to complete.

If the process was interrupted while loading the firmware to the Analyzer, you must repeat the firmware update process.

The update process completion is the same as during the updating via Internet.

4.9.4 Emergency Firmware Update

An emergency software update procedure is provided if the main device program is damaged and does not allow the user to enable the PC mode . To call out the update procedure, make sure that the device is switched off, press and hold «*», turn on the power by pressing «» or by applying external power. The program status bar update mode will appear on the display:







IT-19C Bootloader v1.1.

To update the device firmware, perform actions described in section 4.9.3.

4.10 Battery Operation

IT-19C is powered by in-built LiPo batteries of 43x56x14mm dimensions and 1450 mAh capacity.

To determine the residual capacity of the battery, look at the top right corner of the screen.

Icon	Status
	External power supply. The battery is charged.
	The battery is charging. Approximately 75% charged.
	Battery power supply. 100% charged.
	Battery power supply. 50% charged.
	Battery power supply. 25% charged.
	Battery power supply. Less than 10% remaining.

If the capacity indicator is red, critical charge balance is indicated. In this case, you should charge the battery.

To charge the battery, connect an external power source of 12 V or connect IT-19C to the vehicle power supply of 12 V. The Analyzer will turn on in operating mode. Fast battery charge will occur in the main menu mode. When you turn on any measurement mode, the device switches to the slow battery charging mode.

Charge the battery when the ambient temperature is from 0 to + 45 ° C. A full charge in fast charging mode takes about 2 hours. The battery charges up to 50% in 30 minutes and up to 90% in 1 hour. In the slow charging mode (when the one of measurement mode is on), the charging process takes approximately twice as long.

You should charge battery using the external power source once every 3 months in order to equalize the charge of battery and thus increase their life time.

5 Maintenance

Required maintenance is limited to observation of rules related to proper operation, storage, and transportation set forth in this Manual and also minor fault elimination.

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

6 Troubleshooting

Fault occurrence: The analyzer doesn't turn on in battery operation.

Possible reason: Extremely low charge or malfunction of the battery.


Methods of correction: To check, you need to connect an external power supply. If the device turns on, charge the battery. If, after charging, the analyzer still doesn't turn on in battery operation, contact the technical support service center to replace the defective battery or repair.

Possible reason: Firmware failure.

Methods of correction: Update the firmware from an external computer (Section 4.9).

Fault occurrence: The analyzer does not turn off in battery operation (display backlight is on).

Possible reason: Program is "is hanging up".

Methods of correction: Press and hold «» approximately for 5 second until the display switches off. After releasing the key, turn on the analyzer.

Fault occurrence: High error in measuring the level of all channels or in a separate frequency range.

Possible reason: Increased wear of the RF input adapter.

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

Possible reason: Incorrect setting the channel plan, as a result, when measuring, the analyzer is tuned with frequency offset.

Method of correction: Set up the channel plan (Section 4.4.2.1).

Possible reason: Incorrect channel allocation standard (channel template).

Method of correction: Check the value of the Channel template parameter in the general settings mode (Section 4.5).

7 Storage

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

8 Transportation

The analyzers must be shipped in any closed vehicles at temperature from -20 to +40° C, relative humidity of 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, used for transportation should be free from any traces of cement, coal, chemicals, etc. When shipped by air, the analyzers should be kept in aircraft sealed compartments.

9 Labeling

The labeling of the analyzer is made in accordance with the standards. The serial number, which contains the sequential number and the date-of-manufacture code, is stamped on the back panel of the analyzer and can be viewed on the display in the identification data readout program (Section 4.7).

10 Warranty Information

The manufacturer warrants that the IT-19C QAM Signal Analyzer conforms to the specifications of this Manual when used in accordance with the operating regulations detailed in this Manual. The manufacturer or regional representative shall, at his discretion, repair or replace, for free, any Meter, recognized as faulty within the warranty period, which is twenty-four (24) months from the date of purchase. Should the user fail to submit a document confirming the date of purchase, the warranty period will be determined by the date of manufacture.

The warranty is invalid if:

- a) a defect or damage is caused by improper storage, misuse, careless handling, improper maintenance or accident;
- b) the product was modified or repaired by an unauthorized person;
- c) the product seals are tampered;
- d) the product has mechanical damage.

The warranty does not cover built-in batteries.

Transport risks and costs associated with delivery from the manufacturer or authorized service centers are borne by the buyer.

The manufacturer is not responsible for direct or indirect damage of any kind to people or goods caused by the use of the product and/or suspension of use as a result of possible repair.

When returning a defective product, please provide exact details of this product and a clear description of the failure. The manufacturer (regional representative) reserves the right to check the product in their laboratories to verify the validity of the claim.