

LABGEAR

DAT103

DVB-T SIGNAL ANALYZER

Operating Manual



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1 GENERAL INFORMATION

1.1 Introduction

This operating manual introduces the design, functions and basic instructions for operation of the LABGEAR DAT103 Digital and Analogue Television analyzer.

DAT103 is designed to permit optimal testing and adjustment of complete television and broadcast distribution networks, network components and related electronic products. The analyzer allows measurement DVB-T Digital and Analogue TV signals.

DAT103 can be useful in a laboratory, or in the field thanks to flexible powering options that includes an internal re-chargeable Li-ion battery.

In this manual the following abbreviations are used:

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

1.2 Safety precautions

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

WARNING Only trained service personnel should attempt to repair this analyzer.

CAUTION Tuning the analyzer and replacement of the components that influence the accuracy of measurements without service personnel is strictly prohibited, since the components used in the Analyzer are purpose-made and their replacement will result in inaccurate operation of the Analyzer. To exclude the possibility of mechanical damage to the DAT103, the instructions regarding the storage and transportation (Sections 7 and 8) of the analyzer must be observed.

Take care to keep coax braid wire cuttings away from your analyzer. Just one piece inside can be expensive to locate and remove and may even cause permanently damage.

2 GENERAL DESCRIPTION AND PRINCIPLE OF OPERATION

2.1 Functions

The DAT103 offers measurement of the following parameters:

- Analog channels: video carrier level, V/A ratio, and C/N ratio.
- Digital channels: signal level measured in channel power.
- DVB-T signals: measurement of reception quality parameters:
- Modulation Error Ratio (MER)
- Bit Error Ratio (BER) before and after Viterbi decoder
- Error packets after Reed-Solomon decoder counter
- Constellation diagram.

DAT103 settings including channel frequency, subcarriers number, subcarriers modulation type, guard interval, code rate and spectrum inversion are set automatically. The DAT103 can be connected to a personal computer to access additional functions. The analyzer also measures DC and AC voltages of line power supplies in TV and broadcasting distribution networks.

Front and bottom views of the analyzer are shown in Figure 1.1. and Figure 1.2.



Figure 1.1

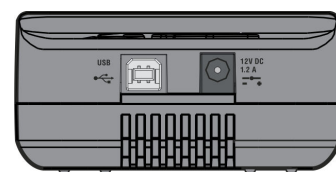


Figure 1.2

2.2 Environmental conditions

Normal operating conditions:

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

Rated operating conditions:

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

2.3 Package contents

The analyzer package includes:

- a) DAT103 DVB-T Signal Analyzer 1 pc;
- b) Impact resistant holster 1 pc;
- c) Li-ion battery (internal) 1 pc;
- d) "F"- "F" adapter 1 pc;
- e) 12V/1.2A charger 1 pc;
- f) Compact disc 1 pc;
- g) Reference plastic card 1 pc;
- h) Operating Manual 1 pc.

2.4 Specification

Operating frequency range 45 to 900 MHz
Frequency Resolution 125 kHz
Channel plans Australia, New Zealand
and one, Customized plan loaded from Personal Computer (section 4.9.6)

Input parameters:



input impedance within operating frequency range 75 Ohm
input impedance for frequencies up to 50 Hz at least 200 kOhm
AC input voltage range for frequencies over 5 MHz 3 V
AC and DC input voltage range for frequencies under 100Hz 30V

Signal level measurement range, Analogue 30 to 120 dBµV
Measurement level resolution 0.1 dB
Accuracy within 30 – 120 dBµV level range ±1.5 dB
Accuracy at operating temperature ±2.2 dB
Measurement channel bandwidth for -3 dB level 230 ± 60 kHz
Frequency indication 6 character LCD
Channel number indication 3 character LCD
Signal level indication 4 character LCD
Input signal parameters
Channel bandwidth 7 or 8 MHz
Modulation type COFDM
Subcarrier modulation type QPSK, QAM16, QAM64
Subcarrier number 2k, 4k or 8k

Guard interval.....	1/32, 1/16, 1/8, 1/4
Hierarchical modulation type	$\alpha=1, \alpha=2, \alpha=4$
Code rate.....	1/2, 2/3, 3/4, 5/6, 7/8
Channel power range, Digital.....	30 to 110 dB μ V
MER measurement range (for QAM64, code rate 3/4)	14 to 35 dB
MER measurement resolution	0.1 dB
MER measurement accuracy at operating channel power.....	± 2.0 dB
BER measurement range	
preBER.....	1.0×10^{-1} to 1.0×10^{-8}
postBER	1.0×10^{-2} to 1.0×10^{-8}
Channel power threshold (postBER less than 2×10^{-4})	
For QAM64, code rate 3/4, SNR=46 dB	40 dB μ V
Frequency auto tuning range	± 0.500 MHz
Warm-up time, less than	5 min
DAT103 powering options:	
AC mains via 90-264V 50/60 Hz 12V/1.2A charger included	
10 to 14 V DC external source, with ripple level no greater than	0.5 V
internal Li-ion battery of 1500 mAh capacity	
Current consumed from external power source or batteries, not greater than ...	0.6 A
AMP power supply voltage settings.....	12V or 24V
AMP power supply power, no more than.....	3 W
Power from external DC continually for no more than	24 hrs
Typical battery charge life under normal conditions (1500 mAh capacity).....	3 hrs
Mean time between failures, no less than.....	10,000 hours
Average life expectancy.....	exceeds 5 years
Dimensions	193 x 94 x 53 mm
Package dimensions.....	255 x 180 x 70 mm
Weight.....	0.5 kg
Weight in package	0.95 kg

2.4.1 Construction

The DAT103 is a quality handheld electronic instrument built in a tough plastic field case that fits snugly in its matching soft shockproof holster.

The front of the Analyzer includes a silicon keypad and a graphical Liquid Crystal Display (Figure 1.1). The bottom panel has a USB PC connector and an external power source connector (Figure 1.2). The 75-Ohm RF input on the top panel is an “F”-male connector to which an “F” female – female adapter should be used, which makes the RF input connector replaceable.

3 PREPARING TO OPERATE






When you first receive your instrument, check the contents against the list provided (Section 2.3). Check the outside of your instrument to make sure your DAT103 is free from any signs of mechanical damage.

If the DAT103 has been stored in an extremely humid, hot or cold environment, allow it to acclimatize for at least for 2 hours before powering up.

4 PREPARING PROCEDURES

4.1 Controls and indicators


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

- a) **F1, F2, F3** keys enable functions that correspond to the on screen icons;
- b)  key allows you to return to the previous menu level;
- c) ***** key enables AMP power supply control;
- d) **▲, ▼, ◀, ▶** arrows allow you to edit the current operation mode;
- e)  key allows selection of an item from a list;
- f)  key switches the Power of on/off;
- g)  **+ 12V DC 1.2A** connector is for an external power source;
- h) **USB**  is for connection to a host computer;
- i) **«INPUT»** is an “F”-male connector for RF signal input.

4.2 Preparing for measurement

Before operating your DAT103, read this Operating Manual carefully, identifying the location of the controls and indicators (Section 4.1).

For operation with the external power source, connect the charger to the DC connector on the bottom panel of the DAT103 and then to mains power.

Default DAT103 power for stand-alone operation is the internal battery. Push and hold the  key until the LCD backlight turns on to start.

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



Figure 4.2.1

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

4.3 Measurement procedure

4.3.1 General information

The Analyzer features on-screen menus for selection of modes of operation. The icons of the menu correspond to various functions. The Main menu (see Figure 4.3.1) will appear on the screen after the Analyzer has completed its power up sequence.

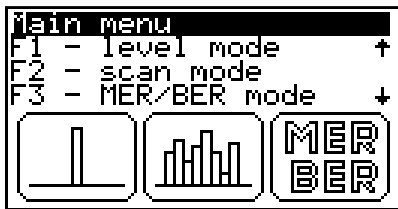


Figure 4.3.1

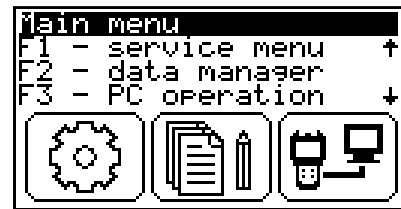








Figure 4.3.2

The Main menu is divided into 2 halves, to step between press the ▲ or ▼ arrow. You will see the other Main menu options (Figure 4.3.2). To return to the previous line press the ▲ or ▼ arrow again. Function of menu are selectable with the function keys **F1**, **F2** and **F3**, which are located under each icon. To return to the Main menu from any function, press **↶** key.

The 6 Main menu functions are accessed with the following icons:

- a) LEVEL measurement.....  ;
- b) SCAN measurement.....  ;
- c) MER/BER measurement.....  ;
- d) Service menu.....  ;
- e) Data manager menu.....  ;
- f) PC connection.....  ;



When  is chosen from the Main menu, the Service menu appears on screen (Figure 4.3.3), and when  is chosen, the Data manager menu appears (Figure 4.3.4).








Figure 4.3.3



Figure 4.3.4

Function of service menu and data manager menu are selectable with function keys **F1**, **F2** and **F3**, which are under the relevant icons. To return to previous menu from the selected function, press **↶** key. To return to the Main menu press **↶** again.

The 5 Service menu and data manager functions are accessed with the following icons:


- a) Setup.....  ;
- b) Self-test.....  ;
- c) Identification.....  ;
- d) Channel plans manager.....  ;
- e) Data log manager.....  ;

The Analyzer offers six modes to measure TV signal parameters:

- 1- TV channel signal level and power selected by frequency, V/A and C/N ratios, as well as AC and DC voltages at the input of the Analyzer in LEVEL mode;
- 2- TV channel level in SCAN mode;
- 3- TV channel level ripple in RIPPLE mode;
- 4- Signal spectrum view in SPECTRUM mode;
- 5- DVB-T signal quality parameters in MER / BER mode;
- 6- DVB-T relative constellation diagram in CONSTELLATION mode.

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

4.3.2 LEVEL measurement mode

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

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

You will see the following data on the screen:

- 1 – Channel number
- 2 – Channel level measured in dB μ V, dBmV or dBm
- 3 – Selected frequency in MHz
- 4 – Vision to Audio carrier ratio in dB for Analogue, D indicates Digital signal detected.
- 5 – Command line with commands activated by **F1**, **F2** or **F3** keys
- 6 – Channel name (when working with selected channel plan)
- 7 – Direct voltage or effective alternating voltage at the input of the Analyzer, at 50/60 Hz frequency, in V
- 8 – Status of AMP power supply (Section 4.3.8)
- 9 – Carrier to Noise ratio in dB.

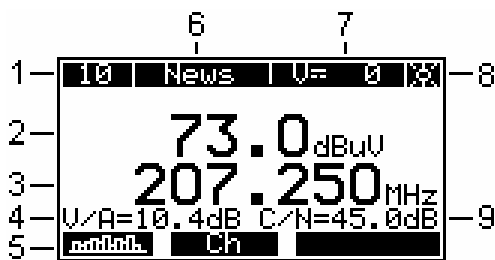


Figure 4.3.5

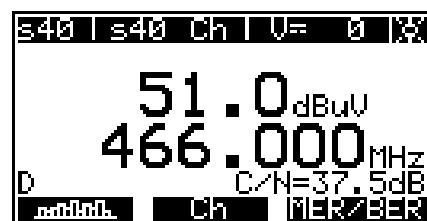


Figure 4.3.6

When a digital channel is detected the analyzer will show 'D' in place of 'V/A'.

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

When the LEVEL function is activated, the DAT103 measures the parameters of the TV channel, which was last selected in one of the measurement modes. This mode will be indicated by **Ch** shortcut in command line. Digital or analog modulation type corresponds

to the selected channel plan. If a channel plan has not been selected, the modulation type is detected automatically.

Three analog channel parameters are measured. Video carrier level at the frequency tuned. If a channel plan has been selected, the frequency tuned will follow the selected plan. Vision to Audio ratio is determined by also measuring the audio carrier level and subtracting this value from the video carrier. The V/A value will be displayed on the screen in position 4 (Figure 4.3.5).

To measure analogue Carrier to Noise ratio the Analyzer compares a measurement at the tuned frequency with the lowest content of the useful components of RF signal within the channel bandwidth. C/N ratio will appear in position 8 (Figure 4.3.5).

For digital channels, the Analyzer measures signal power within the channel bandwidth and C/N ratio. To measure C/N ratio, the Analyzer compares a measurement at the tuned frequency with the lowest content of the useful components of RF signal outside the channel bandwidth. C/N ratio will appear in (Figure 4.3.6).

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

To measure channel parameters, select the required channel by ◀ and ▶ arrows.

If no channel plan is selected, using ◀ and ▶ arrows you can switch to any channel in accordance with the channel template (Section 4.7).

Once a signal is detected, the Analyzer will automatically determine the channel type. The measurements will be performed in accordance with these parameters.

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

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

Signal level measurement mode tuned by frequency is shown in Figure 4.3.7.

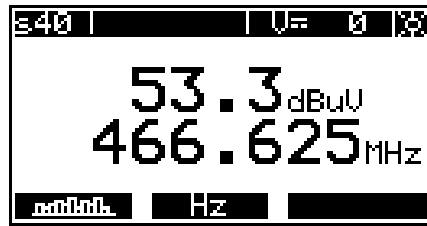


Figure 4.3.7

In this mode neither the digital **D**, analogue **V/A** ratio or **C/N** ratio indicators display.

In the signal level measurement mode, a signal level is measured at the tuned frequency. This mode is indicated by a **Hz** message in the command line. Tuning by frequency is performed in 125 kHz steps by ◀ and ▶ arrow keys.

By toggling the **F2** key you have the option to measure by **Hz** or **Ch**

To control AMP power supply, enable the corresponding mode by briefly pressing the * key (section 4.3.8).

4.3.3 SCAN measurement mode



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

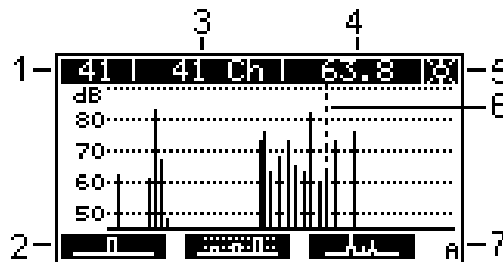


Figure 4.3.8

On the screen you will see the following data:

- 1 – Channel number indicated by marker
- 2 – Command line with commands activated by **F1**, **F2** and **F3** keys
- 3 – Channel name (when working with selected channel plan)
- 4 – Measured level of channel indicated by marker, in dBmV, dBμV or dBm
- 5 – Status of AMP power supply (Section 4.3.8)
- 6 – Marker
- 7 – Channel status: **A** – analog, **D** - digital.

You can navigate the marker by means of ◀ and ▶ keys.

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

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

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

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

To control AMP power supply, enable the corresponding mode by a short pushing on the * key (section 4.3.8).

4.3.4 RIPPLE measurement mode

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

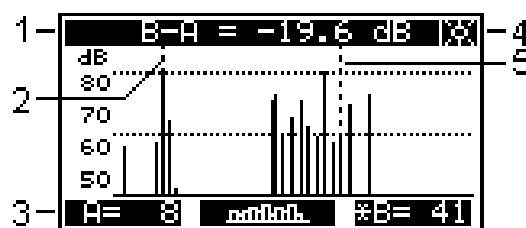


Figure 4.3.9

On the screen you will see the following data:

- 1 – Channels ripple value between A and B markers
- 2 – A marker
- 3 – Command line with commands activated by **F1**, **F2** and **F3** keys
- 4 – Status of AMP power supply (Section 4.3.8)
- 5 – B marker

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

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

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

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

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

AMP power supply, is controlled by pressing the * key briefly (section 4.3.8).

4.3.5 EXPANDED SPECTRUM measurement mode

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

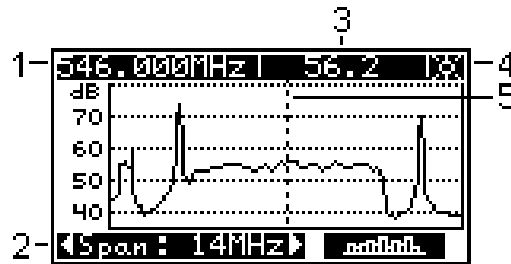


Figure 4.3.10

On the screen you will see the following data:

- 1 – Frequency point indicated by the marker
- 2 – Command line with commands activated by **F1**, **F2** and **F3** keys
- 3 – Measured signal level of the frequency point indicated by the marker, in dBmV, dBμV or dBm
- 4 – Status of AMP power supply (Section 4.3.8)
- 5 – Marker


Adjust the marker position by ◀ and ▶ arrows. Select frequency range scale with **F1** and **F2** keys from the following list:

- a) **14MHz**. Spectrum diagram shows a span resolution of 14MHz frequency range.
- b) **28MHz**. Spectrum diagram shows a span resolution of 28MHz frequency range.
- c) **55MHz**. Spectrum diagram shows a span resolution of 55MHz frequency range.
- d) **110MHz**. Spectrum diagram shows a span resolution of 110MHz frequency range.

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

AMP power supply, is controlled by pressing the * key briefly (section 4.3.8).

4.3.6 MER/BER measurement mode

The  icon in the Main menu refers to MER/BER measurement mode. Here we see the DVB-T signal quality table of parameters. The screen view shows in Figure 4.3.11:

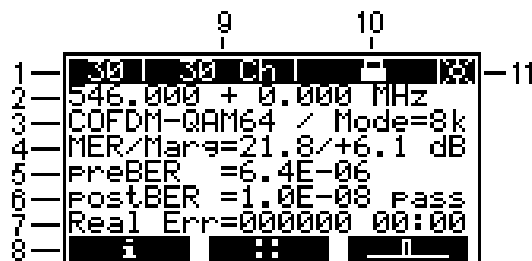



Figure 4.3.11


On the screen you will see the following data:

- 1 – Channel number
- 2 – Selected frequency and frequency offset in MHz
- 3 – Signal modulation parameters (subcarrier modulation type and subcarriers number)
- 4 – MER and Margin values in dB

- 5 – PerBER value
- 6 – PostBER value
- 7 – Erroneous packets after the Reed-Solomon decoder counter
- 8 – Command line with commands activated by **F1**, **F2** and **F3** keys
- 9 – Channel name (when working with selected channel plan)
- 10 – Demodulator status
- 11 – AMP power supply status (Section 4.3.8).

When this mode is activated or a channel is selected, the Analyzer will start the input signal synchronization process, indicated by a progress bar in position 10. The lock icon  will appear in position 10 once synchronization is achieved. Subcarrier modulation type and subcarrier number will be presented in position 3. Shortly thereafter MER, Margin, preBER, postBER and damaged packet measured values will appear in positions 4, 5, 6 and 7. If the preBER value is lower than 2.0E-04 and postBER value is lower than 1.0E-07, then the meter will display a «**pass**» message, otherwise if the errors are too high a «**fail**» message will be displayed.

Digital TV Signal Quality measurements are BER and MER. An understanding of the powerful error correction systems in every receiver are important if you are to get the best out of your meter. This information can be found by careful Internet search or by reading Digital TV titles at your local library.

If the signal level value of the selected channel is insufficient, a low level icon  will blink in position 10. Channel synchronization in this case is not possible. If signal level is OK, but synchronization hasn't been achieved within 5 seconds, either in-channel modulation impairments or high noise level from the antenna system must be resolved.


To measure channel parameters, select the required channel by ◀ and ▶ arrows.

If no channel plan is selected, using ◀ and ▶ arrows you can switch to any channel in accordance with the selected channel template (Section 4.7). Once a signal is detected, the Analyzer will automatically determine the channel parameters: frequency offset, spectrum inversion, subcarriers number, subcarriers modulation type, guard interval and code rate.

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

NOTE! When working without a channel plan selected, the Analyzer can only synchronize a DVB-T signal with bandwidth that matches the selected channel in the channel template (Section 4.7)

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

When you press , measurement is interrupted and the demodulator starts channel synchronization again.

You can access other measurement modes using the function keys. **F2** key activates CONSTELLATION measurement mode (Section 4.3.3). **F3** key opens LEVEL measurement mode (Section 4.3.2).

Press **F1** key to get detailed channel parameter information. The channel parameter table shows in Figure 4.3.12.

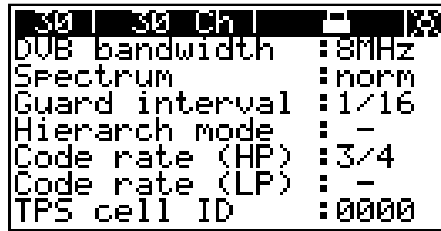


Figure 4.3.12

On the screen you will see the following parameters:

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

Press **↑** key to return to MER/BER measurement mode.

AMP power supply, is controlled by pressing the ***** key briefly (section 4.3.8).

4.3.7 CONSTELLATION measurement mode

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

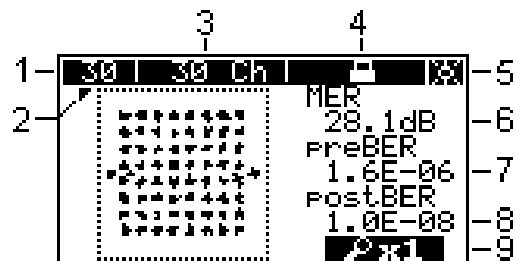


Figure 4.3.13

On the screen you will see the following data:

- 1 – Channel number
- 2 – Quadrant marker
- 3 – Channel name (when working with selected channel plan)
- 4 – Demodulator status
- 5 – Status of AMP power supply (Section 4.3.8)
- 6 – MER value in dB
- 7 – preBER value
- 8 – postBER value
- 9 – Diagram zoom scale choosing key

When there is no synchronization with the channel, constellation diagram is empty. After synchronization is achieved, quadrature modulation points is displayed on the diagram. For example: for QAM64 subcarrier modulation 64 points of data subcarriers and

4 points of pilot subcarriers will be displayed. Viewing of the constellation diagram allows to determine distortion behavior in the channel.

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

With ▲, ▼, ◀, and ▶ keys you can select the quadrant to be zoomed for better resolution. Choosing with the arrow (position 2) and activate the zoom view mode by pressing the **F3** button. Press **F3** button once again to return to full view mode.

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

AMP power supply, is controlled by pressing the * key briefly (section 4.3.8).

4.3.8 AMP Power Control

The AMP power supply is used to line power mast and distribution amplifiers, etc. directly and autonomously from your DAT103. This simplifies testing of an antenna with a preamplifier in line, to locate the best available signal in a deep fringe or poor signal area. Current is supplied to the devices via the input F-connector. AMP power supply mode provides voltage, status information and control. Press the * key briefly to access, whilst in a measurement mode, in the process of creating a channel plan or a data logger page.

The screen view is shown in figure 4.3.14.

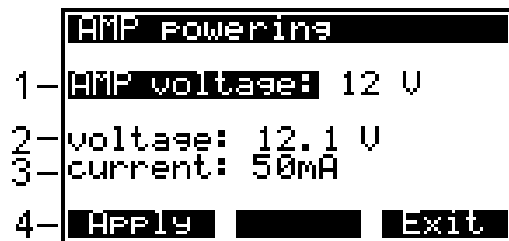


Figure 4.3.14

The following data is shown on the screen:

1 – Voltage, values: **off**, **12V**, or **24V**.

2 – Voltage measures the value of the voltage delivered to your AMP. If the connected cable already carries power, the warning: **Vext** will appear on the screen.

3 – Current measures the current being drawn by your AMP. If the current exceeds the 3 watt limit, an: **Overload** warning will appear on screen.

4 – command line is activated by **F1** and **F3** keys.




12V or 24V DC can be selected by pressing ◀ or ▶ keys, and then **F1/Apply**. Voltage and current measurements will show on screen. Press **F3/Exit** to exit the sub-menu.

AMP power operates only in measurement modes. In all service modes AMP power is off.

The Analyzer checks the input connector for presence of voltage before supplying AMP power. If voltage is present the power supply will not turn on. When the power supply is on, the Analyzer monitors the load current, switching supply off if the current exceeds the allowed level. The Analyzer will make these checks and attempt to turn the power supply on every 3 seconds.

AMP power supply status in measurement modes is indicated in the upper right-hand corner of the screen.

The following status indicators are provided:

-  - Power supply off.
-  - Power supply on, parameters are OK.
-  - Flashing with alarm sound – Power supply failure.


WARNING!!! Be careful while working with power. AMP power at the Analyzer input can damage connected devices, unless they are designed for it. Power from the coaxial cable can also damage the Analyzer.

4.4 Data manager

4.4.1 General information

Data manager provides automation of measurement and result recording procedures. The Analyzer offers two tools: Channel plan manager and Data log manager. The memory capacity allows you to save up to 16 channel plans (up to 112 channels per plan), and up to 130 data log pages (with maximum number of channels). The DAT103 allows you to view the saved data in stand-alone mode or by means of a computer.

4.4.2 Channel plan manager

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

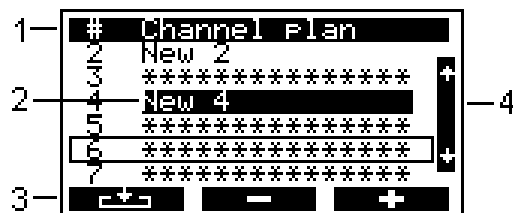


Figure 4.4.1

On the screen you will see the following data:

- 1 – table header line
- 2 – channel plan selected for the measurement
- 3 – command line with commands activated by **F1**, **F2** and **F3** functional keys
- 4 – scroll bar

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

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

The list of available commands:

- a) **F1** key to view and edit the selected channel plan;
- b) **F2** key to delete the selected channel plan;
- c) **F3** key to create a new channel plan in automatic mode.

4.4.2.1 Channel plan editing

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

#	Ch	Type	Name
00	06	D	06
01	07	D	07
02	08	D	08
03	09	D	09
04	00	D	00
05	01	D	01

1 – table header line
 2 – selected line
 3 – command line with commands activated by **F1**, **F2** and **F3** functional keys
 4 – scroll bar

Figure 4.4.2

On the screen you will see the following data:

- 1 – table header line
- 2 – selected line
- 3 – command line with commands activated by **F1**, **F2** and **F3** functional keys
- 4 – scroll bar

The table represents a list of channels from the channel plan. The top line divides the table into columns. The first column is the index of channel (from 1 to 112). The second column is a channel number. The third column is the channel modulation type: **A** or **D** (analog or digital). The fourth column is the channel name of up to 6 characters. The bottom line shows the commands that can be activated by the functional keys. These commands are as follows:

- a) **F1** key to view and edit the selected frequency point;
- b) **F3** key to delete the selected frequency point.

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

Channel	: 29
Type	: Analog
Frequency	: 535250kHz
SNR meas.	: on

Figure 4.4.3

Channel	: 30
Type	: Digital
Frequency	: 546000kHz
SNR meas.	: on
Band width	: 7750kHz
COFDM	: QAM64
Spectrum	: norm

Figure 4.4.4

There are two groups of parameters:

General parameters:

- a) **Channel** – channel number;
- b) **Type** – channel type: analog or digital;
- c) **Frequency** – frequency of the video carrier for analog channel or central frequency for digital channel;
- d) **SNR meas.** - Activating of C/N measurement. You can turn off the C/N measurement for a channel by setting “**off**” value.

Digital channel parameters:

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

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


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

- a) For analog channels: frequency is set to video carrier frequency of the channel.
- b) For digital channels frequency is set to central frequency of the channel. If the Analyzer is synchronized on DVB-T signal, then the real channel central frequency will be set. Channel bandwidth is set according to channel template (Section 4.7). DVB-T channel parameters are detected automatically.

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

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

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

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

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

4.4.2.2 Channel plan erasing

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

4.4.2.3 Channel plan creating


To create a new channel plan in auto mode, supply signal to the RF input of the Analyzer, select position of the plan in the table and press **F3**. If required, set an AMP power supply voltage in the screen that appears, as described in section 4.3.8, and then press **F3/Exit**. After the Analyzer has completed scanning all the channels of the channel template, it will switch to channel plan editing mode (Section 4.4.2.1). Edit the channel plan parameters if needed, and save the plan into the memory.

4.4.3 Data log manager

4.4.3.1 General information

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

4.4.3.2 Data log pages

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

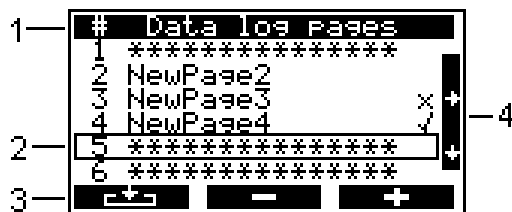


Figure 4.4.5

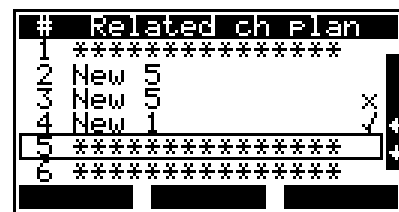


Figure 4.4.6

On the screen you will see the following data:

- 1 – table header line
- 2 – selected line
- 3 – command line with commands activated by **F1**, **F2** and **F3** functional keys
- 4 – scroll bar

The top row of the table (position 1) divides the table into columns. The first column represents the page numbers form 1 to 130. The second column is the page name. The third column is the result of check against the plan limits (no icon – page not measured yet, ✓ - no errors, ✕ - some errors). Figure 4.4.6 represents the list of the channel plan names, which are related to data log pages. The bottom line (position 3) contains the list of commands that can be activated by the functional keys. Press ◀ and ▶ arrows to switch between the views of the screen. (Figure 4.4.5 & 4.4.6) Press ▲, ▼ keys to select the required page. The selection will be framed (position 2).

The list of available commands:

- a) **F1** key to view, update and check against the limit plans the selected page;
- b) **F2** key to delete the selected page or clear all the page;
- c) **F3** key to create a new data log page.

4.4.3.3 Data log pages operation

To view a data log page, press **F1** or . Page data table will appear on the screen (Figures 4.4.7, 4.4.8 or 4.4.9).

Ch	Name	MHz	LEU
20	12	223.2	-15
33	S23	330.0	-2
50	S40	466.0	4
51	21	471.2	15
53	23	487.2	4
56	28	511.2	6

Figure 4.4.7

Ch	CN	VA	MER	Pre
20	27	1	---	---
33	---	---	39	1E-8
50	---	---	---	---
51	43	11	---	---
53	---	8	---	---
56	41	27	---	---


Figure 4.4.8

Ch	MER	Pre	Post
20	---	---	---
33	39	1E-8	1E-8
50	---	---	---
51	---	---	---
53	---	---	---
56	---	---	---

Figure 4.4.9

On the screen you will see the following data:

- 1 – table header line
- 2 – selected line
- 3 – channel information
- 4 – command line with commands activated by **F1**, **F2** and **F3** functional keys
- 5 – scroll bar

Three views of the table are available, for basic and additional parameters. You can switch between these views by ◀ and ▶ arrows. The top line of the table (position 1) divides the table into columns. In basic parameters screen (Figure 4.4.7) the first column is the channel number. The second column is the channel name. The third column is the video carrier frequency for analog channels or central frequency for digital channels (with rounding up to 0.1 MHz). The fourth column is video carrier level or digital channel level in dBμV, dBmV or dBm depending on the preset units. In the next additional parameters screen (Figure 4.4.8) the first column is the channel number, the second column represents C/N ratio (in dB). The third column is V/A ratio (in dB). The fourth column displays MER (in dB) and the fifth column displays preBER values. In the last additional parameters screen (Figure 4.4.9) the first column is the channel number, the second column represents MER (in dB). The third and fourth columns are preBER and postBER values accordingly. For digital channels you will see «--» in the C/N and VA columns, and for analog channels «--» in the MER and BER columns. If the noise measurement has been disabled for one of the analog or digital channels, «--» will display in the second column for this channel. If DVB-T demodulator synchronization with digital channel has not been achieved during its measurement, the unlocked icon  will appear in the MER and BER columns.

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

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

The list of available commands:

- a) **F1** key to start the data log of the plan selected
- b) **F2** key to view the measurement results in SCAN measurement mode (Section 4.3.3);
- c) **F3** key to view and edit the plan limits.

To start data logging, press the **F1** key. Set the desired AMP power supply voltage in the screen that appears, as described in section 4.3.8, and then press **F3/Exit**. Measuring process will be indicated by a progress bar. After the measuring is completed, the new values will appear in the measurement result field of the screen. If the channel name is highlighted in inverse color (position 3), this indicates that the errors have been detected in this channel during the check against the plan limits. Incorrect parameters are also highlighted in inverse color.

To identify the errors, activate the plan limit manager (**F3** key). The table of plan limit parameters will appear on the screen (Figure 4.4.10).

```

Lev Vid min:0dBmV
Lev Vid max:15dBmV
Lev Dig min:-10dBmV
Lev Dig max:15dBmV
Video/Audio min:10dB
Video/Audio max:17dB
Video/Noise min:43dB
dL adjacent max:3dB

```

Figure 4.4.10

This table represents the parameters for the measurement results to be verified with. The table contains 13 parameters:

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

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

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


4.4.3.4 Data log page erasing

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

4.4.3.5 Data log page creating

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

4.5 Setup

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

```
Ch Plan :
  ch template
Language :English
Unit     :dBuV
Contrast :50%
Display  :normal
Sound    :type3
Power off :5 min
```

Figure 4.5.1

Choose parameter for editing with **▲** or **▼** keys. Then scroll parameter with **◀** and **▶** keys.

The table represents the following settings:

- a) **Ch plan**. Select channel plan from the available (Section 4.4.2). If a channel plan is not selected, **ch template** will be displayed;
- b) **Language**. Select language. Available settings: **English**;
- c) **Unit**. Select measurement units for the signal level. Available settings: **dBuV**, **dBmV**, **dBm**;
- d) **Contrast**. Set LCD contrast from 0 to 100%;
- e) **Display**. Select display mode. Available settings: **normal** – white characters in the blue background; **revers** – blue characters in white background;
- f) **Sound**. Select key pressing sound. Available settings: **off** – silent; **type1**, **type2**, **type3** – three types of sound;
- g) **Power off**. switches power off automatically after 5 or 15 minutes with no keys pressed. Available settings: **off**, **5 min**, or **15 min**
–only active when battery powered;
- h) **Beeping**. an audible indication of signal level measured. Available settings: **on**, **off**;
- i) **Ch template**. Select channel template from the list.

4.6 Self-test



The diagnostics in the Service menu, can check the performance of your DAT103, components, and its functional condition. The screen view shows in Figure 4.6.1.

```
Temperature:+28°C Ok
Bat voltage:7.87V Ok
Bat charge : 78%
Program mem: Ok
Calib table: Ok
ChPlan mem : 81% free
DataLog mem: 97% free
Devices : Ok
```

Figure 4.6.1

The following parameters are checked in the diagnostics table:

Temperature: inside the Analyzer.

Temperature is the main environmental factor, which influences the accuracy of measurements. If the internal temperature value is within the allowed range of -10 to 50°C , then **Ok** status will display at the end of this parameter line. If the temperature is outside this range, then status will not display. Alternately if temperature value «---» displays, the temperature measuring device should be repaired by our service center.

Bat voltage. Voltage of the battery.

Bat charge. Charge level status of battery.

DAT103 is powered by a built-in 7.4 V 1500 mAh Lithium-ion battery. Voltage and charge status parameters allow you to check battery condition. Remember to disconnect any external power supplies first! If the measured battery voltage is higher than 6.8 V, then status will show as **Ok**, if the voltage is below 6.8 V **Low** status indicates. Battery level status is calculated in percentage, to help you to estimate the time remaining that the Analyzer will operate. Please note that with decrease of ambient temperature the battery capacity also decreases.

As soon as DAT103 is connected to an external power source, the charging process begins. Charging may continue up to 4 hours, depending on the remaining battery charge level. When this period of time is over the process will stop. If battery voltage drops below 8.02 V, the charging process will resume. Charging current is around 0.6 A

The battery charge circuit automatically stops when the battery voltage exceeds 8.5 V.

Before storing for a long period, a partial charge can help keep the battery serviceable.

CAUTION! DAT103 is shipped with nonstandard Lithium-ion battery. If it expires or malfunctions, it must be replaced with a new battery by the LABGEAR service center to ensure reliable Analyzer operation continues.

Program mem. Firmware status.

This function checks the firmware status of your DAT103. If no errors detected, the **Ok** status is displayed. If an error has been detected, the **Error** status is displayed. In this case, the firmware must be reinstalled (Section 4.9.5).

Calib table. Calibration table status.

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

ChPlan mem. Channel plan memory status.

DataLog mem. Data log memory status.


This function shows the free memory in percent for each memory type.

Devices. Internal devices status.

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

4.7 Identification



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

```
Model      :DAT103
HW ver.    :15.02.01
FW ver.    :14.02.00.01
S/N        :10120002

channel template
Australian
```

Figure 4.7.1

Your DAT103 data are displayed in the upper part of the screen:

- Model** – Analyzer model;
- HW ver.** – Analyzer hardware version;
- SW ver.** – Analyzer firmware version;
- S/N** – Analyzer serial number.

In the lower part of the screen, you will find the name of the channel template, which is selected in Setup mode (Section 4.5).

4.8 PC communication

4.8.1 General information

You can operate your DAT103 via PC. For connection to PC use **USB**  on the bottom panel of the Analyzer. The **DAT Tools** software allows the following:

- measurement of video carrier level, C/N ratio and V/A ratio for analog channels and channel power for digital channels;
- measurement of spectrum within scaleable frequency band (from 45 to 900 MHz);
- measurement of DVB-T signal reception quality;
- viewing and creating data log pages;
- editing of channel plans;

- f) editing of channel template;
- g) saving and documenting of measurement results.

You can find all the files necessary for software installation as well as the DAT Tools Manual on the CD delivered with the instrument.

4.8.2 Software installation

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

4.8.3 USB driver installation

Please, install **DAT Tools** software (Section 4.9.2) before the USB driver installation.



Follow the steps:

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

When the driver is successfully installed you can communicate your DAT103 with **DAT Tools** software.

4.8.4 PC communication launch

To launch communication between DAT103 and your Personal Computer please follow these steps:

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

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

4.8.5 Firmware update

The DAT103 offers the capability to update its firmware without use of any additional equipment. Each version of the firmware has its unique identification number, e.g. 13.0.0.3. The Analyzer firmware version is displayed in the Identification mode (section 4.7).

Before firmware updating make sure **DAT Tools** software and DAT103 USB driver have been installed on your PC.

To update the Analyzer’s firmware proceed as follows:


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



Figure 4.9.1

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

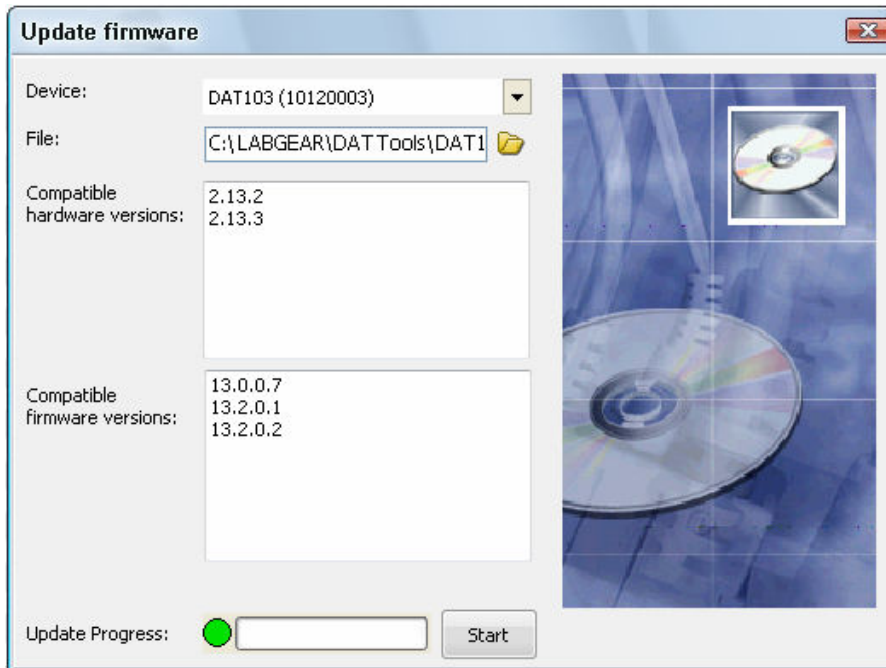


Figure 4.9.2

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

If your Analyzer functions properly, USB port cable connected correctly and the firmware updating file is compatible with the DAT103, the process of program updating onto your Analyzer will automatically start. **The Analyzer must be powered from an external power source.** When the download is complete the pop-up window will confirm that the operation has been successfully completed. The DAT103 will reboot and start operating, as it would when first powered up.

CAUTION Do not interrupt the firmware updating process. This can lead to malfunction of the Analyzer. If this does occur, repeat the firmware update process.

4.8.6 Channel template edit

DAT Tools software allows you to edit the Analyzer's channel template. To access channel template manager press the icon with the Globe on the navigation bar (Figure 4.9.3).



Figure 4.9.3

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

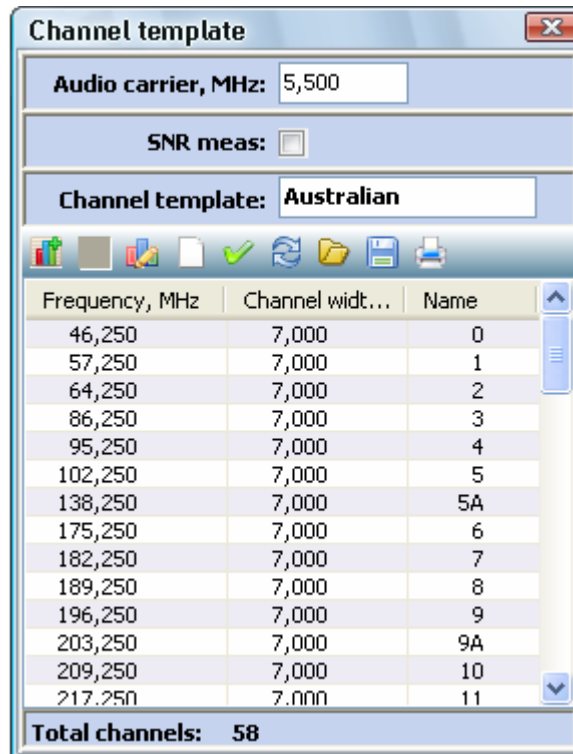


Figure 4.9.4

Channel template manager allows you to:

- Create Channel templates;
- Edit Channel templates;
- Load or Save Channel templates from file. Standard 7847901 channel templates: for Australia, New Zealand, OIRT and CCIR are distributed with the **DAT Tools** software. You will find them in the folder "TvSystems" in the place all user data are stored;
- Load or Save Channel templates to DAT103.

Channel templates include the following parameters:

- Audio carrier.** Audio carrier frequency offset from channel video carrier. Uses for V/A ratio measurement.
- SNR meas.** C/N ratio is measured for channel when the parameter is enabled.
- Channel template.** The name of the channel template. You can see it in the Information mode (section 4.7).
- Frequency.** Video carrier frequency is set for every channel.
- Width.** Channel bandwidth assists measuring digital channel power and determining centre frequency of each channel.
- Name.** Identity number of the channel being measured, set for every channel.

5 MAINTENANCE

Take care of the condition of antenna input adapter and any test leads you use. Quality connectors and test leads are a sound investment in long reliable analyzer life.

Clean Annually; remove your DAT103 from its soft plastic holster, hold upside down and brush gently with a small dry horsehair or similar brush - so that any foreign materials fall away. Wipe thoroughly with a moist cloth. Cleaning products should be tested on a small unobtrusive area to ensure the product does not damage the analyzers finish, and then used sparingly. Wipe over the plastic holster, inside and out. Allow the Analyzer and holster to dry slowly before reassembling.


Take care to keep coax braid wire cuttings away from your Analyzer. Just one piece inside your meter can be expensive to locate and may even cause permanent damage.

6 TROUBLESHOOTING

Defect detected: The DAT103 fails to switch on in stand-alone mode.

Possible reason: Extremely low charge or defective battery.

Methods of correction: Connect an external 12V DC power adapter. When the Analyzer

switches on, check the battery voltage in self-test  mode (Section 4.6.3). Less than 6.8 V confirms that the battery is discharged or malfunctioning. More than 8.5 V can also indicate battery malfunction. The battery should be charged if it is low (Section 4.8) or replaced in the service center if it is malfunctioning.


Defect detected: DAT103 is switched on in stand-alone mode but instead of displaying the Main menu it displays the message «**Bootloader**».

Possible reason: The Analyzer's firmware is damaged.

Methods of correction: Reinstall analyzer's firmware (Section 4.9.5).

Defect detected: DAT103 does not react to pressing of any of keys.

Possible reason: The Analyzer's firmware may be frozen.

Methods of correction: Press and hold  key for 5 seconds to reset. Then switch on The Analyzer.

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

Possible reason: Increased wear of the RF input adapter or your test lead.

Method of correction: Replace the RF input adapter with a quality one.

Possible reason: Incorrect channel plan setting, DAT103 is not tuned correctly.

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

Possible reason: Incorrect channel template selection.

Method of correction: Check the parameters of the channel template (Section 4.9.6).

Defect detected: When measuring DVB-T channel parameters «**Demodulator error**» message appears on the DAT103 screen.

Possible reason: Demodulator malfunction.

Method of correction: Please contact the service center.

7 STORAGE

Store your DAT103 under the following conditions: environment temperature from -20 to +40 °C, relative humidity up to 90 % (at 30 °C).

8 TRANSPORTATION

The DAT103 should be shipped in enclosed vehicles 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 DAT103 should be free from any traces of cement, coal, chemicals, etc. When shipped by air the products should be kept in aircraft sealed compartments.

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