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1. Introduction

This Operating Manual is intended to represent the design and principle of operation of CIU-01 Headend Return Path Monitor (Monitor) and to ensure proper operation, maintenance and shipment of this instrument by the user.

The reliability of the Monitor is ensured by means of implementing regular maintenance procedures. The types and intervals of maintenance procedures are described in section 5.

WARNING! Only dedicated service personnel aware of the hazard involved should perform repair of the Monitor in the specialized facilities. Before operating the Monitor make sure to read carefully the Safety Instructions detailed in section 4.2.

CAUTION! Do not tune the CIU-01 or replace its components affecting the accuracy of the operation as the Monitor adjustment requires tailored equipment. To avoid mechanical damage observe the instructions relating to storage and transportation of the Monitor (see sections 6 and 7).

In this Manual the following abbreviations are used:

- ADC - analog-to-digital converter;
- GPS - Pilot Signal Generator;
- LCD - liquid-crystal display;
- IF - intermediate frequency;
- Fig. - figure;
- pos. - position.

The physical configuration of the CIU-01 is shown in Figure 1.1:

2. General description and specification

2.1. Application

The CIU-01 is intended for operation as a part of the Return Path Test and Measurement Set, and allows for measurement of frequency response in CATV distribution networks, as well as adjustment and control of the cable network performance in forward and return paths.

CIU-01 general application:

- a) RF signal power level measurement;
- b) RF TV signal parameter measurement;
- c) operation in spectrum analyzer mode (offline, or controlled by PC).

Apart from that operating as a part of the Return Path Test and Measurement Set (which consists at least of the following items: CIU-01, IT-081 TV Level Meter and GPS-01 Return Path Pilot Generator) the Monitor can be applied for:

- a) GPS-01 pilot-signal level measurement;
- b) GPS-01 digital information reception;
- c) frequency response measurement in cable network segment in return path;
- d) pilot signal detection in return path;
- e) all the Monitors measurement results transmission to the IT-081 TV Level Meter via forward path (108 - 135 MHz);
- f) all measurements information transmission onto PC, when ordered

2.2. Environment Conditions

Normal operating conditions:

- a) ambient temperature $(20 \pm 5) ^\circ\text{C}$;
- b) relative air humidity (30-80)%;
- c) atmospheric pressure 84-106 kPa (630 to 795 mm Hg);

Rated operating conditions:

- a) ambient temperature from 0 to $40 ^\circ\text{C}$;
- b) relative air humidity not greater than 90% at $25 ^\circ\text{C}$;
- c) atmospheric pressure 84-106 kPa (630 to 795 mm Hg)

2.3. Package Contents

The CIU-01 package includes:

- a) CIU-01 Headend Return Path Monitor 1 pc;
- b) Power Cord 1 pc;
- c) Operating Manual 1 pc;

2.4. Specifications

2.4.1. Operating frequency range:

- a) input frequency range for forward path measurement: 46 to 865 MHz;
- b) input frequency range for return path measurement: 5 to 65 MHz;
- c) output frequency range of digital path transmitter: 108 to 135 MHz.

2.4.2. Input:

- a) input impedance within operating frequency range: 75 Ohm
- b) input impedance for DC: 10 kOhm

2.4.3. Output:

- a) output impedance within operating frequency range: 75 Ohm ;
- b) signal level: 60 to 120 dBuV;
- c) frequency-modulated signal deviation: ± 50 kHz.

2.4.4. Rated AC voltage at input: 3 V.

2.4.5. Rated DC voltage at input: 50 V.

2.4.6. Built-in input attenuator: 20 dB, 40 dB.

2.4.7. Mismatch attenuation at input, at least: 16 dB.

2.4.8. Level measurement range:

- 30 to 90 dBuV at turned off attenuator ;
- 50 to 110 dBuV at 20 dB attenuation;
- 70 to 126 dBuV at 40 dB attenuation.

2.4.9. Level measurement resolution: 0.1 dB.

2.4.10. Measurement basic relative accuracy at the set frequency: ± 2.0 dB.

2.4.11. Passband for -3 dB level measurement: 260 ± 30 kHz.

2.4.12. Low-pass filter stopband signal attenuation in return path, at least 40 dB.

2.4.13. Time parameters for operation with GPS:

- 2.4.13.1. GPS signals measurement time, not greater than: 1.2 sec;
- 2.4.13.2. New GPS detection time, not greater than: 60 sec;
- 2.4.13.3. Return path spectrum measurement time, not greater than: 15 sec;
- 2.4.13.4. Delay time of pilot signal frequency removal from the active GPS list: 30 sec;
- 2.4.13.5. Time of GPS text line (encoded and carried by the pilot signal) readout: 5 min.
- 2.4.14. Warm-up time, not greater than: 10 min.
- 2.4.15. PC connection interface: 9-pin RS-232.
- 2.4.16. Powered by: 220 V \pm 22 V AC power source with harmonic content not greater than 5%.
- 2.4.17. Mean time between failures, at least: 10,000 hours.
- 2.4.18. Dimensions, not greater than: 483x156x133 mm.
- 2.4.19. Weight, not greater than: 3.2 kg.

2.5. Configuration Overview

CIU-01 Headend Return Path Monitor is implemented in MEC297 standard 19" housing (Fig. 1.1). Its overall dimensions are 483x133x156 mm. The housing is metal.

The front panel of the Monitor is equipped with LED operation indicator (Fig. 1.1, pos. 1), power switch (Fig. 1.1, pos. 2), LCD display (Fig. 1.1, pos. 3), keyboard (Fig. 1.1, pos. 4), control knob (Fig. 1.1, pos. 5), measurement input (Fig. 1.1, pos. 6), and transmitter output (Fig. 1.1, pos. 7). On the rear panel there is 220V mains connector (Fig. 2.1, pos. 1), ground connector (Fig. 2.1, pos. 2), and PC compatible connector (Fig. 2.2).

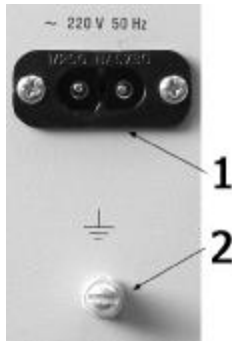


Figure 2.1



Figure 2.2

3. Preparation for use

- 3.1.1. Perform external examination to make sure your CIU-01 is free from any visible mechanical damage.
- 3.1.2. Upon the receipt of the package, verify the items contained in it with the list provided in section 2.3.
- 3.1.3. Verify the presence of quality control department mark in "Evidence of Acceptance".
- 3.1.4. If the CIU-01 has been kept in the environment other than the rated operating conditions, leave your Monitor in facilities with normal operating conditions at least for 4 hours prior to operation.

4. Operating procedure

4.1. Connectors, Location and Purpose

- a) "Input " connector (Fig. 1.1, pos. 6) - RF signal input, BNC-connector.

- b) "Output" connector (Fig. 1.1, pos. 7) - digital data output, BNC-connector.
- c) "RS-232" connector (Fig. 2.2) - for connection to PC by means of null modem cable, 9-pin connector.
- d) "~ 220 V" connector (Fig. 2.1, pos. 1) - for Power Cord.
- e) Ground connector (Fig. 2.1, pos. 2), "⏚" labelled, ground wire compatible.

4.2. Safety Instructions

There are AC 220 V hazardous voltages in CIU-01. Therefore, when you operate, check or perform maintenance on your Monitor always strictly observe the following precautions:

- a) before you connect the CIU-01 to AC mains supply make sure the Power Cord is defect-free, and ground wire is connected to the ground connector. Never use your CIU-01 if it is not grounded!**
- b) when you use the CIU-01 as a part of a setup ensure to have every instrument of the setup securely grounded.**

4.3. Controls, Location and Purpose

The location of controls is shown in Fig. 1.1, pos. 4 and 5. The controls have the following functions:

- a) "Frequency.", "Scale", "Options" keys recall the corresponding menus to the screen;
- b) "F1", "F2", "F3", "F4" keys select the parameters in the menus of spectrum and frequency response display screens;
- c) "1", "2", "3", "4", "5", "6", "7", "8", "9", "0" numerical keys as well as "." and "_" keys enter numerical values;
- d) "Enter" key brings the user to the next level of the menu or completes the numerical values entering operation;
- e) "Esc" key brings the user to the previous level of the menu or aborts from numerical value entering operation;
- f) "↑", "←", "→", "↓" keys allow for navigation in the menu, scrolling through the parameter values, and cursor movements;
- g) "⏏" key enables same functions as "Enter" key;

h) control knob (Fig. 1.1, pos. 5) moves the cursor and scrolls through some parameters in spectrum and frequency response display modes (can be rotated in both directions without limitations).

4.4. Main Menu

After the CIU-01 has been turned on the main menu appears (Fig. 4.1). In the main menu you can select the mode of operation. Navigation in all the menus should be performed as follows: using "↑", "↓" keys select the desired item or parameter and press "Enter" or "↵" key. To abort from the current menu into the previous one use "Esc" key.

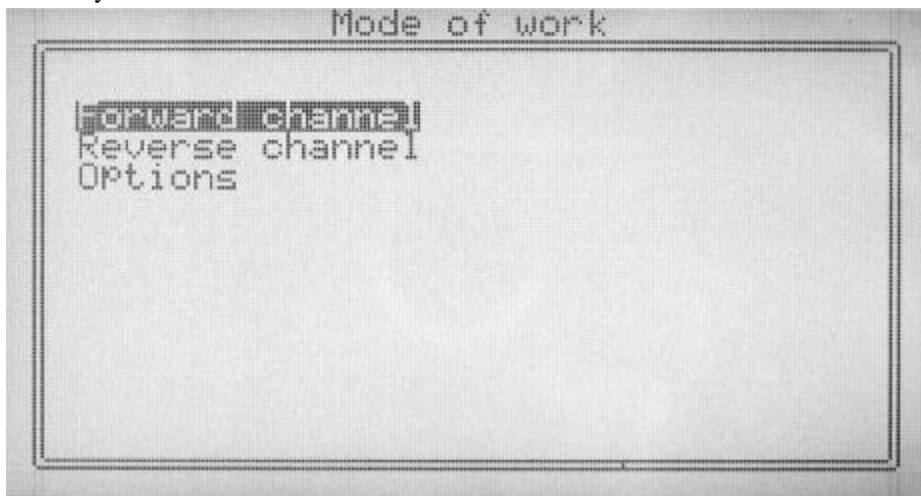


Figure 4.1

In the main menu you can select the following modes:

- a) "Forward channel" - forward path operating mode;
- b) "Reverse channel" - return path operating mode;
- c) "Options" - readout and editing of Monitor settings.

4.5. Forward Path Operation

Selecting "Forward channel" in the main menu you access the menu where you can select the forward path display mode (Fig. 4.2). The forward path frequency range is 46 to 865 Mhz, attenuation setting is performed manually. The "Histogram" mode offers measurement of video carriers for all the channels as well as measurement of

Carrier/Noise and Video/Audio ratios in the selected channel. The "Spectrum" mode offers measurement of RF signal spectrum.



Figure 4.2

4.5.1. HISTOGRAM Operating Mode

In this mode the video carrier levels of all the TV channels are represented as vertical bar graph. The screen view is shown in Fig. 4.3. Position 1 indicates the number of channel, which is pointed by the marker (pos. 3). The marker is indicated as a vertical dashed line. The numerical value of the level of this video carrier is shown in position 4. The RF TV signal parameters are displayed in position 5 (Video/Audio ratio) and position 6 (Signal/Noise ratio).

To select a TV channel you can move the marker rotating the control knob or using "←", "→" keys. To abort from "Histogram" mode back to the menu press "Esc" key. To access "Spectrum" mode directly, omitting the menu, press "ζ".

To determine the ratio between the levels of video and audio carriers the Monitor performs measurements in two frequency points: in the video carrier frequency and audio carrier frequency (6.5 MHz higher than the video carrier frequency).

To determine the Signal/Noise ratio the Monitor performs measurements in two frequency points: in the video carrier frequency and in the frequency 6 MHz higher than the video carrier frequency. You should note that for these measurements for default attenuation of 0 dB the Monitor inherent noise level is 20 to 25 dBuV, and the maximum measured level is 80 dBuV. Therefore, if video carrier level e.g. is 60

dBuV, the measured S/N ratio will be not greater than 35 to 40 dB. These considerations are also true for other input attenuation values of the Monitor: 20 dB, 40 dB. The difference will only be in measurement dynamic range offset by 20 and 40 dB higher correspondingly. This should be remembered as the actual value of the parameter may be more than the one displayed by the Monitor.

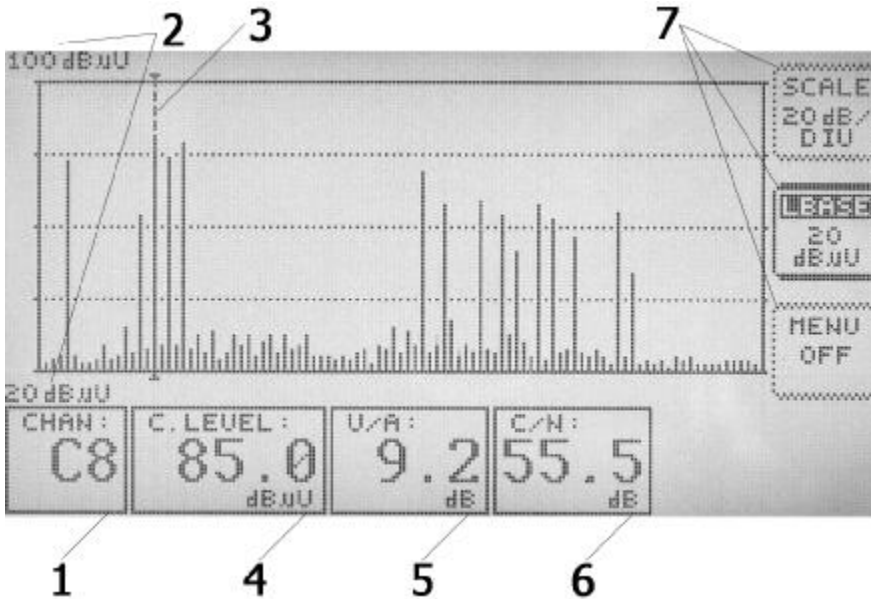


Figure 4.3

4.5.2. SPECTRUM Operating Mode

In this mode the CIU-01 performs measurement of a spectrum region and displays it on the screen. The screen view is shown in the Fig. 4.4. The initial frequency of the sweep is indicated in position 2, the final frequency of the sweep is indicated in position 7. Position 5 indicates the value of the frequency, which is pointed by the marker (pos. 4). The marker is indicated as a vertical dashed line. The numerical value of the RF signal level in this frequency point is shown in position 3. Position 6 displays the TV channel number of this frequency point.

To select the frequency point, without changing parameters of the sweep span, use "←", "→" keys. Also you can move the marker rotating the control knob, except for the cases when "Frequency" menu is displayed (Fig. 4.4, pos. 8) and "START" or "C.FR." parameters have been selected.

To abort from "Spectrum" mode back to the menu press "Esc" key. To access "Histogram" mode directly, omitting the menu, press "Z".

The sweep span and its location you can set in "Frequency" menu (Fig. 4.4, pos. 8), which you can access by pressing "Frequency" key. To set the initial frequency of the sweep span select "START" parameter by pressing "F1" key. Then using "↑", "↓" keys, control knob, or entering the frequency by pressing numerical keys (from "0" to "9") set the desired value.

Selecting "C.FR." parameter you can set the frequency pointed by the marker. To change this parameter select it by pressing "F2" key and using "↑", "↓" keys, control knob, or entering the frequency by pressing numerical keys (from "0" to "9") set the desired value.

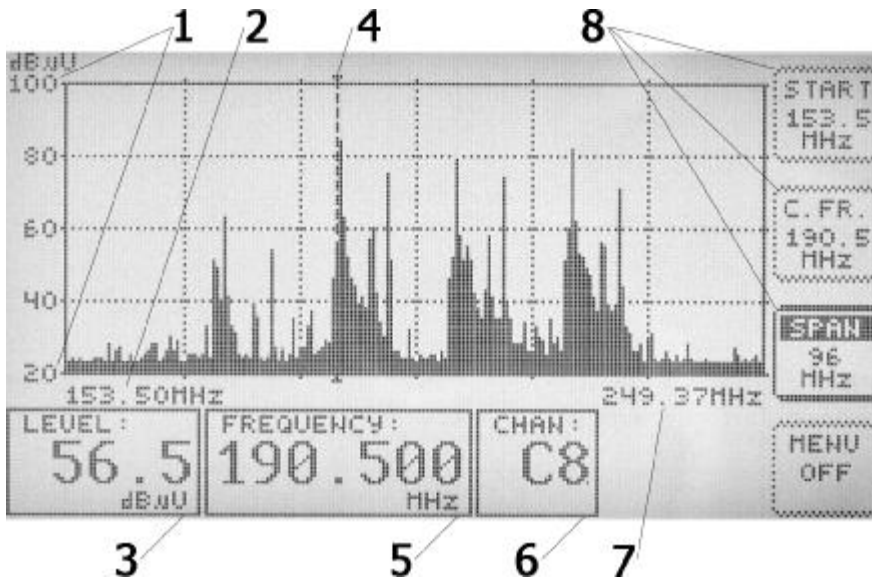


Figure 4.4

Selecting "SPAN" parameter you can set the frequency sweep span. To select it press "F3" key and using "↑", "↓" keys set the desired value (among available 24, 48, 96, 144 and 192 MHz). If the selected span is more than 24 MHz, each scale division of the horizontal axis will indicate more than one frequency point, as the sweep step is always 125 kHz. In this case the maximum signal level of the frequency range of each horizontal axis division is displayed on the screen.

You can enter frequency using numerical keys only when the "Frequency" menu is displayed and "START" or "C.FR." parameters have been selected. To start entering the frequency value press one of the numeric keys. The frequency is displayed in MHz. If you need to set the frequency accurate to kHz, after you have entered the integral part of the value enter the decimal point "." and then the value in kHz by numeric keys. The position of the number to be entered will be indicated as an underline character (Fig. 4.5). If you entered a wrong number and want to delete it press "_" key. This will backspace the last entered number. To abort from this mode without saving the entered frequency press "Esc". To complete the setting and save the frequency press "Enter" or "↵".

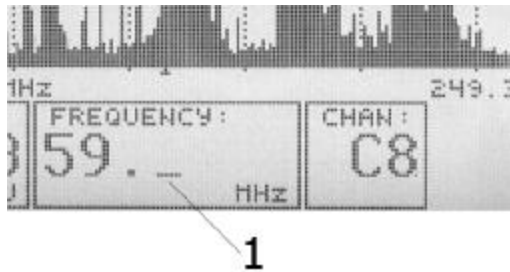


Figure 4.5

The vertical axis is the signal level (Fig. 4.4). Minimum and maximum values of the level are displayed in position 1. You can change the vertical scale of the graph. To set the scale press "Scale" key for the menu (Fig. 4.3, pos. 7) to be displayed. In this menu you can set the value of the scale deviation and the base level. To set the scale deviation value select "SCALE" by pressing "F1" key and using "↑", "↓" select the desired value (among available 20, 10, 4 and 2 dB/div.). To set the base level select "LBASE" by pressing "F2" key and using "↑", "↓" keys select the desired value.

In the menu "Options", which you can access by "Options" key, the following parameters are available: measurement type "MEAS." and Monitor input attenuation "ATTR.". The measurement type parameter can take on two values: normal "NORM" and quasi-peak "PEAK". In normal measurement mode the displayed signal level is updated with every sweep cycle. In quasi-peak mode the law of the level display variation is the following: if the signal amplitude is rising the current value will be updated by the new value, if otherwise the displayed level will be diminished by 2%. To set the measurement type select "MEAS." by pressing "F1" key and using "↑", "↓" keys select the desired value. To set the input attenuation select "ATTR." by pressing

"F2" key and using "↑", "↓" keys select the desired value (among available 0, 20, 40 dB).

4.6. Return Path Operation

4.6.1. General Information

If you select "Reverse channel" in the main menu (Fig. 4.1) your Monitor will start operating in return path measurement mode. In this mode the following Monitor functions are available:

- a) measurement of GPS-01 pilot signal level;
- b) receipt of GPS digital data;
- c) measurement of return path spectrum;
- d) search for pilot signals in return path frequency range;
- e) transmit results of all the measurements in digital form via forward path frequency range (108 to 135 MHz) for receipt by the IT-081;
- f) measurement of frequency response in return path in a cable network segment (operating in "Network analysis" mode).

The GPS pilot signal is a frequency-modulated pulse with deviation of 50 kHz and duration ~9 msec. containing encoded GPS number and operation information. The injection of pilot signals is performed by packets. The number of pulses in one packet can be from 0 to 4. The packet period is ~44 msec., pilot signal duration is ~11 msec. The frequencies of the pilot signals in the packet are arbitrary within the GPS operating frequency range.

When the CIU-01 receives a pilot signal it performs its decoding and measures level of each pulse in the packet. The Monitor supports measurement of up to 8 pilot signals with the number of pulses from 1 to 4. Therefore, 8 Pilot Signal Generators can simultaneously operate in pilot signal generation mode in such cable network. To ensure steady reception and measurement of the GPS pilot signals the following conditions are necessary:

- a) GPS operating in one network should not have same numbers;
- b) frequency spacing of GPS signals in the network must be at least 250 kHz.

Also to ensure better pilot signal search algorithm it is recommended to set the Monitor to automatic attenuation mode (see section 4.7.3).

In frequency response measurement mode (see section 4.6.4) CIU-01 performs measurement of the frequency scanning signal injected by the GPS. The required

condition for proper operation of all the Test and Measurement Set in this mode is that the scanning signal is generated by one GPS only.

4.6.2. Measurement Results Indication Modes

The Fig. 4.6. shows the menu, which appears after the Monitor has turned to return path measurement mode. To view the measurement results use the "Spectrum", "Network analysis", and "Generators" modes. In "Spectrum" mode you will see return path spectrum (as in "Spectrum" mode for forward path, section 4.5.2). The "Generators" mode is intended for display of GPS table and pilot signal levels. In "Network analysis" mode the Monitor performs measurement and display the frequency response in the return path. In "Freq. maps of generators" mode you can set the frequency plans of the pilot signal generators. The "Network analysis options" menu allows for setting the function of the Monitor automatic switchover to return path frequency response measurement mode.

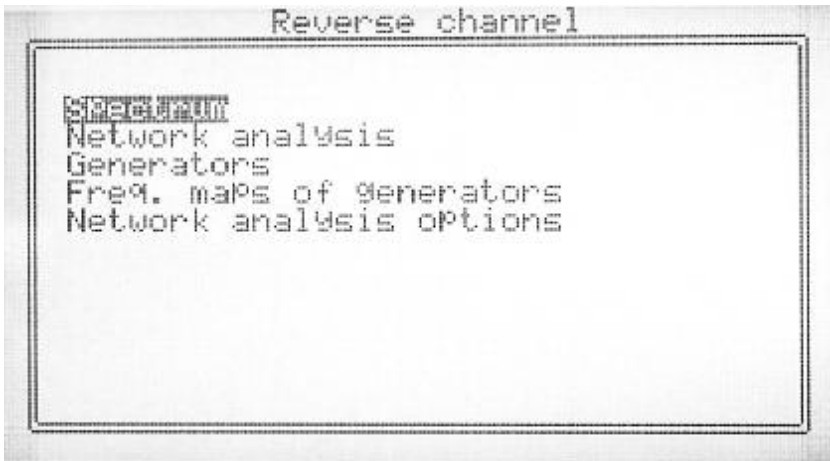


Figure 4.6

4.6.3. SPECTRUM Operating Mode

In this mode the Monitor displays the return path spectrum on the screen. The screen view is shown in Fig. 4.7. Position 3 indicates the initial and final frequencies of the spectrum span displayed. Position 5 indicates the frequency, which is pointed by the marker (pos. 2). The marker is indicated as a vertical dashed line. The numerical value of the level of this frequency is shown in position 4.

To select a frequency point, without changes to the displayed spectrum parameters, you can move the marker by means of "←" and "→" keys. Also you can

move the marker rotating the control knob, except for the cases when "Frequency" menu is displayed (fig. 4.4, pos. 8) and "START" or "C.FR." parameters have been selected.

To abort from "Spectrum" mode back to the menu press "Esc" key.

The spectrum span and its location you can set in "Frequency" menu (Fig. 4.4, pos. 8), which you can access by pressing "Frequency" key. To set the initial frequency of the spectrum span select "START" parameter by pressing "F1" key. Then using «↑», «↓» keys, control knob, or entering the frequency by pressing numerical keys (from "0" to "9") set the desired value.

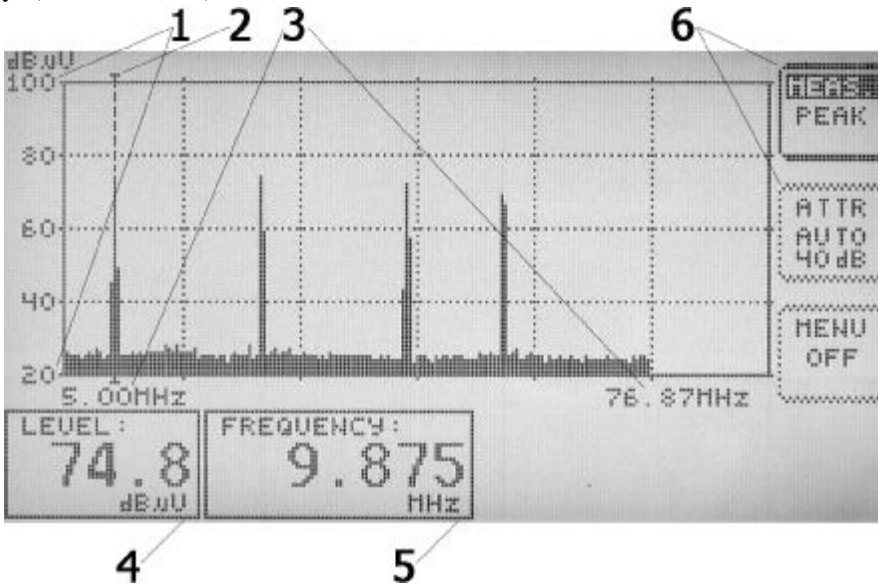


Figure 4.7

Selecting "C.FR." parameter you can set the frequency pointed by the marker. To change this parameter select it by pressing "F2" key and using "↑", "↓" keys, control knob, or entering the frequency by pressing numerical keys (from "0" to "9") set the desired value.

Selecting "SPAN" parameter you can set the frequency span displayed. To set it press "F3" key and using "↑", "↓" keys select the desired value (among available 24, 48, and 72 MHz). If the selected span is more than 24 MHz, each scale deviation of the horizontal axis will indicate more than one frequency point, as the sweep step is

always 125 kHz. In this case the maximum signal level of the frequency span of each horizontal axis division is displayed on the screen.

You can enter frequency using numerical keys only when the "Frequency" menu is displayed and "START" or "C.FR." parameters have been selected. To start entering the frequency value press one of the numeric keys. The frequency is displayed in MHz. If you need to set the frequency accurate to kHz, after you have entered the integral part of the value enter the decimal point "." and then the value in kHz by numeric keys. The position of the number to be entered will be indicated as a underlined character (Fig. 4.5). If you entered a wrong number and want to delete it press "_" key. This will backspace the last entered number. To abort from this mode without saving the entered frequency press "Esc". To complete the setting and save the frequency press "Enter" or "↵".

The vertical axis is the signal level (Fig. 4.7). Minimum and maximum values of the level are displayed in position 1. You can change the vertical scale of the graph. To set the scale press "Scale" key for the menu (Fig. 4.3, pos. 7) to be displayed. In this menu you can set the value of the scale division and the base level. To set the scale division value select "SCALE" by pressing "F1" key and using "↑", "↓" select the desired value (among available 20, 10, 4 and 2 dB/div.). To set the base level select "LBASE" by pressing "F2" key and using "↑", "↓" keys select the desired value.

In the menu "Options", which you can access by "Options" key, the following parameters are available: measurement type "MEAS." and Monitor input attenuation "ATTR.". The measurement type parameter can take on two values: normal "NORM" and quasi-peak "PEAK". In normal measurement mode the displayed signal level is updated with every sweep cycle. In quasi-peak mode the law of the level display variation is the following: if the signal amplitude is rising the current value will be updated by the new value, if otherwise the displayed level will be diminished by 2%. To set the measurement type select "MEAS." by pressing "F1" key and using "↑", "↓" keys select the desired value. To set the input attenuation select "ATTR." by pressing "F2" key and using "↑", "↓" keys select the desired value (among available 0, 20, 40 dB and "AUTO").

4.6.4. NETWORK ANALYSIS Operating Mode

In this mode CIU-01 performs measurement of return path frequency response. The principle of measurement is the following: pilot signal generator should be hooked up to the network and set to "Frequency Scanning" mode. GPS injects synchronization signal followed by the packet of non-modulated harmonic signals of different

frequencies with 125 kHz step. The Monitor having detected the GPS synchronization signal starts to synchronously tune to the GPS frequency and measure the signal level. The return path frequency range is subdivided into 4 bands. The time of the full sweep over the entire return path range is about 2.2 sec.

When operating in "Network analysis" mode the Monitor suspends all other functions in the return path: GPS signal detection and measurement, return path spectrum scanning. Having aborted from this mode the Monitor retrieves all the above mentioned function in full.

The screen view of the CIU-01 in this mode is shown in the Fig. 4.8.

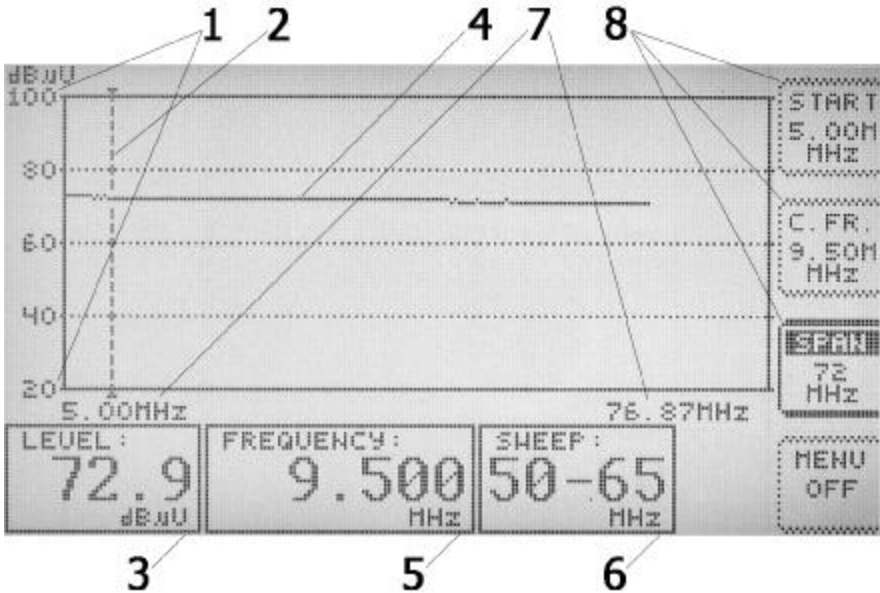


Figure 4.8

Position 7 indicates the initial and final frequencies of the frequency response measurement range. Position 5 indicates the frequency, which is pointed by the marker (pos. 2). The marker is indicated as a vertical dashed line. The numerical value of the level of this frequency is shown in position 3. The measured frequency response is indicated on the graph as a dotted line (pos. 4). Position 6 displays the band, the frequency response of which is being currently measured. When the Monitor does not detect the synchronization signal from the GPS, in position 6 you will see "———" instead of the frequency band.

To select a frequency point, without changes to the frequency response display parameters, you can move the marker by means of "←" and "→" keys. Also you can move the marker rotating the control knob, except for the cases when "Frequency" menu is displayed (Fig. 4.8, pos. 8) and "START" or "C.FR." parameters have been selected.

To abort from "Network analysis" mode back to the menu press "Esc" key.

The frequency response span to be displayed and its location you can set in "Frequency" menu (Fig. 4.8, pos. 8), which you can access by pressing "Frequency" key. To set the initial frequency of the frequency response span select "START" parameter by pressing "F1" key. Then using "↑", "↓" keys, control knob, or entering the frequency by pressing numerical keys (from "0" to "9") set the desired value.

Selecting "C.FR." parameter you can set the frequency pointed by the marker. To change this parameter select it by pressing "F2" key and using "↑", "↓" keys, control knob, or entering the frequency by pressing numerical keys (from "0" to "9") set the desired value.

Selecting "SPAN" parameter you can set the frequency span displayed. To set it press "F3" key and using "↑", "↓" keys select the desired value (among available 24, 48, and 72 MHz). If the selected span is more than 24 MHz, each scale deviation of the horizontal axis will indicate more than one frequency point. In this case the maximum frequency response level of the frequency span of each horizontal axis division is displayed on the screen.

You can enter frequency using numerical keys only when the "Frequency" menu is displayed and "START" or "C.FR." parameters have been selected. To start entering the frequency value press one of the numeric keys. The frequency is displayed in MHz. If you need to set the frequency accurate to kHz, after you have entered the integral part of the value enter the decimal point "." and then the value in kHz by numeric keys. Figure 4.5 shows the frequency entering screen view. The position of the number to be entered will be indicated as a underline character (pos. 1). If you entered a wrong number and want to delete it press "_" key. This will backspace the last entered number. To abort from this mode without saving the entered frequency press "Esc". To complete the setting and save the frequency press "Enter" or "↵".

The vertical axis of the frequency response graph is the signal level (Fig. 4.8). Minimum and maximum values of the level are displayed in position 1. You can change the vertical scale of the graph. To set the scale press "Scale" key for the menu (Fig. 4.3, pos. 7) to be displayed. In this menu you can set the value of the scale deviation and the base level. To set the scale deviation value select "SCALE" by

pressing "F1" key and using "↑", "↓" select the desired value (among available 20, 10, 4 and 2 dB/div.). To set the base level select "LBASE" by pressing "F2" key and using "↑", "↓" keys select the desired value.

In the menu "Options" (Fig. 4.7, pos. 6), which you can access by "Options" key, the following parameters are available: measurement type "MEAS." and Monitor input attenuation "ATTR.". The measurement type parameter can take on two values: normal "NORM" and quasi-peak "PEAK". In normal measurement mode the displayed signal level is updated with every sweep cycle. In quasi-peak mode the law of the level display variation is the following: if the signal amplitude is rising the current value will be updated by the new value, if otherwise the displayed level will be diminished by 2%. To set the measurement type select "MEAS." by pressing "F1" key and using "↑", "↓" keys select the desired value. To set the input attenuation select "ATTR." by pressing "F2" key and using "↑", "↓" keys select the desired value (among available 0, 20, 40 dB and "AUTO").

4.6.5. GENERATORS Operating Mode

In this mode you can view the condition of the pilot signal generators as well as pilot signal levels. The screen view is shown in Fig. 4.9.

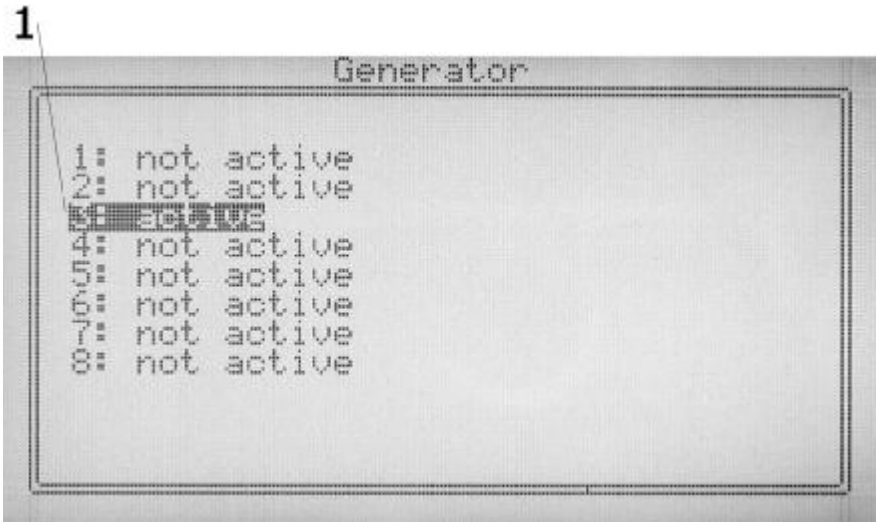


Figure 4.9

The screen displays the current condition of all pilot signal generators. The Return Path Test and Measurement Set can support up to 8 simultaneously operating

GPS. Each generator has its individual number, which as a digital mark is transmitted within a pilot signal. Detecting this number the CIU-01 can distinguish between the generators.

The Monitor is searching for the pilot signals from GPS continuously over the entire return path frequency range. Once a pilot signal from an inactive generator is detected the CIU-01 adds this generator to the list of active generators and starts to permanently measure its pilot signal. A GPS can successively generate pilot signals with up to 4 different frequencies. In the process of searching for pilot signals the CIU-01 will detect all the GPS frequencies and will add them to the list of active frequencies of the corresponding generator. The measurement of pilot signal is performed for every active frequency. As long as GPS has at least one active frequency this generator is considered active by the CIU-01. The frequency is removed from the list of active frequencies if no signal thereof can be detected for more than 30 seconds.

A pilot signal apart from encoded GPS number carries a text line of up to 16 characters long. This line is readout once the GPS is detected and being updated every 5 min.

To view the GPS frequencies with levels and the text line you need to activate the generator data viewing mode. Select the required GPS using the cursor (4.9, pos. 1) and press "Enter" or "↵". The screen of the generator data viewing mode is shown in Fig. 4.10.

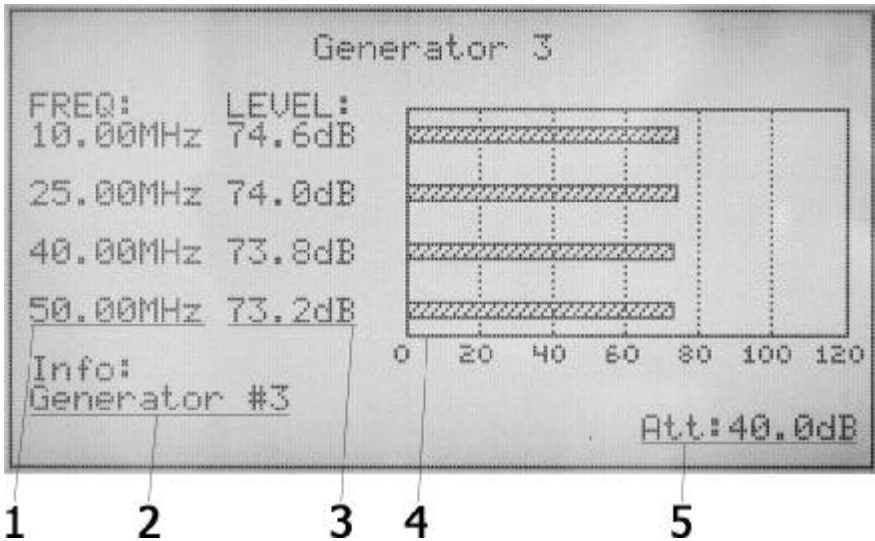


Figure 4.10

Pilot signal frequencies are displayed in position 1. Position 3 contains signal levels at specified frequencies in digital format. Pilot signal levels are also displayed as horizontal histograms (pos. 4). The GPS text line appears in position 2. The current input attenuation of the CIU-01 is displayed in position 5.

To abort from the generators mode press "Esc".

4.6.6. FREQ. MAPS OF GENERATORS Operating Mode

In this mode you can set the frequency maps of the pilot signal generators. The frequency maps are used in cases when GPS frequencies are known and constant. This way CIU-01 does not have to search for the pilot signals, what reduces the time between the moment of GPS hook-up to the network to the measurement results readout.

The GPS frequency map contains the list of frequencies and the corresponding generator number. The list of frequencies can contain up to four values out of the return path span. The GPS number can range from 1 to 8. Only one frequency map can correspond to one generator.

The screen view of this mode is shown in Fig. 4.11. The frequency maps are organized in table by rows.

FREQ. MAPS OF GENERATORS

N	F1	F2	F3	F4	GEN
1	6.00	10.12	25.00	58.62	3
2	----	----	----	----	-
3	7.50	12.50	----	----	4
4	----	----	----	----	-
5	----	----	----	----	-
6	----	----	----	----	-
7	----	----	----	----	-
8	----	----	----	----	-

Figure 4.11

The first column of the table (Fig. 4.11) displays the map reference number, the following four columns contain the frequencies (Fig. 4.11, pos. 1), and the last column contains the GPS number. If some parameter of the map has no value, "----" will be displayed in the corresponding cell of the table.

To move between the rows of the table use "↑" and "↓" keys. The cursor will highlight the selected row (Fig. 4.11, position 3). To select a parameter to be edited press "Enter" or "↵", and then using "←" and "→" keys move the cursor along the row. To abort from the parameter selection function press "Esc". To activate parameter editing function press "Enter" or "↵".

Use numeric keys to enter the new parameter values. The frequency is displayed in MHz. If you need to set the frequency accurate to kHz, after you have entered the integral part of the value enter the decimal point "." and then the value in kHz (hundredths and tenths) by numeric keys. Set the GPS number, which can take on only the values from 1 to 8. If you entered a wrong number and want to delete it press "_" key. This will backspace the last entered number. To abort from the parameter editing mode without saving the entered values press "Esc". To complete the setting and save the values press "Enter" or "↵". To delete a parameter value point the cursor to the required cell and press "_".

After the GPS number has been set in its frequency map, the corresponding generator is added to the list of active generators and CIU-01 starts to measure the signals of it on the frequencies specified in the map. The GPS having frequency map is always on the list of active generators. For such generators CIU-01 does not search for

signals other than those specified in the map. When the frequency map is deactivated the GPS is being transferred to the list of "not active" generators.

4.6.7. Auto Switching to Frequency Response Measurement Function

This function ensures the ability of the CIU-01 to automatically turn to frequency response measurement mode (section 4.6.4) when detecting the signal of the GPS-01 Return Path Pilot Generator performing frequency scanning.

This auto switchover function is active only when the CIU-01 is in "Generators" mode (section 4.6.5) and in generator details view mode (Fig. 4.10). After the auto switchover the CIU-01 will be in frequency response measurement mode until it detects the Generator signal scanning the frequency. Then the CIU-01 returns to the mode it was before turning to frequency response measurements.

The auto switchover function is controlled by means of the settings located in menu "Auto start netw. analysis". To edit the settings select "Network analysis options" from the menu of the return path "Reverse channel" (Fig. 4.6) by pressing "Enter" or "↵" key. The screen view of this setting is represented in Fig. 4.12.

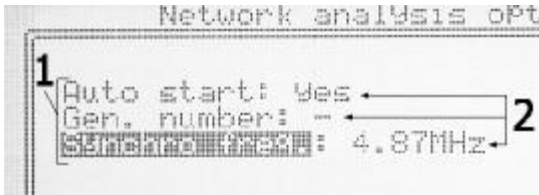


Figure 4.12

"Auto start" setup (pos. 1) controls the activation of the function of auto switchover and can be set to "no" or "yes". If it is set to "no" the auto switchover will not occur, and if it is set to "yes" the auto switchover will occur.

"Gen. number" setup (pos. 1) allows for setting the Pilot Generator number, from which the frequency scanning signal is expected. It can be set to "1" to "8" numerical values, or "-". In the latter case the CIU-01 will automatically switch over independently of the reference number of the Pilot Generator performing frequency scanning. If this parameter is set to some numerical value the switchover will occur only when Pilot Generator with the corresponding number is detected.

"Synchro freq." setup (pos. 1) sets the frequency on which monitor searches for Generator's working in "Frequency scanning" mode signal. The default value of frequency is 4,875 MHz. But in the case when this frequency is not in the network's

return path frequency range you are free to set any value within the 4,875 - 65 MHz range.

You can change the settings in the following way. Using "↑", "↓" keys select the desired setting. To enter the edit mode press "Enter" or "↵" key. In the edit mode the field currently available for editing (pos. 2) will be blinking. To change the field value use "↑", "↓" keys. To quit editing and save the new settings press "Enter" or "↵" key. To quit editing without saving changes press "Esc" key.

4.7. CIU-01 Setting

To change the settings of your CIU-01 select OPTIONS in the main menu. The screen view in this mode is shown in Fig. 4.13. Option "Date and Time" allows for setting of the current date and time; option "Fwd. ch. tr." allows for setting of output level and digital data transmitter signal frequency; option "Attenuation" allows for setting of input attenuation



Figure 4.13

4.7.1. Date and Time Setting

To read and set date and time select option "Date and Time" in OPTIONS menu (Fig. 4.13) by pressing "Enter" or "↵" key. The screen view will be as shown in Fig. 4.14.

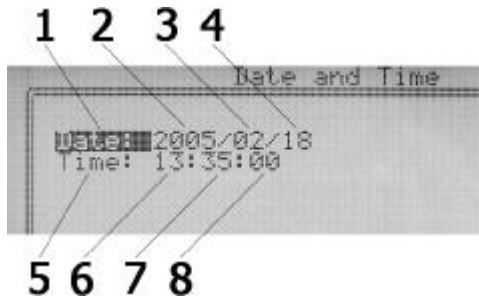


Figure 4.14

Positions 2, 3, 4 point at the positions of year, month and day indication respectively. Positions 6, 7, 8 point at the positions of hour, minutes and seconds indication respectively.

You can change the parameters completing the following procedure. Select the desired parameter (position 1 or position 5) using "↑", "↓" keys. Pressing "Enter" or "↵" key will turn on the edit mode. In the edit mode the field currently available for editing (positions 2, 3, 4 or 6, 7, 8) will be blinking. To shift from one field of the same parameter to another use "←", "→" keys. To change the field value use "↑", "↓" keys. To quit editing and save the new settings press "Enter" or "↵" key. To quit editing without saving changes press "Esc" key.

4.7.2. Transmitter Parameters Setting

To read and set output level and transmitter frequency select option "Fwd. ch. tr." in the OPTIONS menu (Fig. 4.13) by pressing "Enter" or "↵" key. The screen view will be as shown in Fig. 4.15



Figure 4.15

"Output level" parameter (position 1) determines transmitter signal output level in relative units (position 3). The minimum value of this parameter is 0, the maximum

value is 100. The minimum value corresponds to the output level of 58 dBuV, the maximum value corresponds to the level of 120 dBuV.

"Frequency" parameter (position 2) determines transmitter signal frequency. You can set the frequency within the range mentioned in section 2.4.3, with resolution of 125 kHz.

You can change the parameters completing the following procedure. Select the desired parameter (position 1 or position 2) using "↑", "↓" keys. Pressing "Enter" or "↵" key will turn on the edit mode. In the edit mode the field currently available for editing (position 3 or position 4) will be blinking. To change the field value use "↑", "↓" keys. To quit editing and save the new settings press "Enter" or "↵" key. To quit editing without saving changes press "Esc" key.

4.7.3. Attenuation Setting

To set input attenuation select option "Attenuation" in the OPTIONS menu (Fig. 4.13) by press "Enter" or "↵" key. The parameter value will start blinking what indicates that it is available for editing. Select the desired value using "↑", "↓" keys. To quit editing and save the new settings press "Enter" or "↵" key. To quit editing without saving changes press "Esc" key.

4.8. Software Update

The CIU-01 offers the capability to update the integrated software without employment of any additional equipment. The manufacturer goes on with development of the Monitor and keeps on working out new software versions providing new features. These new software versions are put available on our website www.planar.chel.ru on the page representing the corresponding product (CIU-01).

To update your software proceed as follows:

- a) connect your CIU-01 to the serial port of PC by means of a null-modem cable;
- b) create on your PC a new folder, e.g. SoftLoader. Copy SoftLoader application into this folder from our website. The SoftLoader program is Windows98, Windows2000 and WindowsXP compatible. The SoftLoader supports communication with the CIU-01 and downloads the updated software on to it;
- c) copy a new software version into the folder SoftUpdate from our website (file name containing the number of program version with extension '.bsk', e.g. 'CMU_H1_S1-0-0-7.bsk') and a file describing changes in the program

(file name containing number of program version with extension '.doc' or '.txt');

d) start SoftLoader program on your PC. Select serial port of PC, which connects it to the CIU-01, by clicking (position 1) in the program window, as shown in Fig. 4.16;

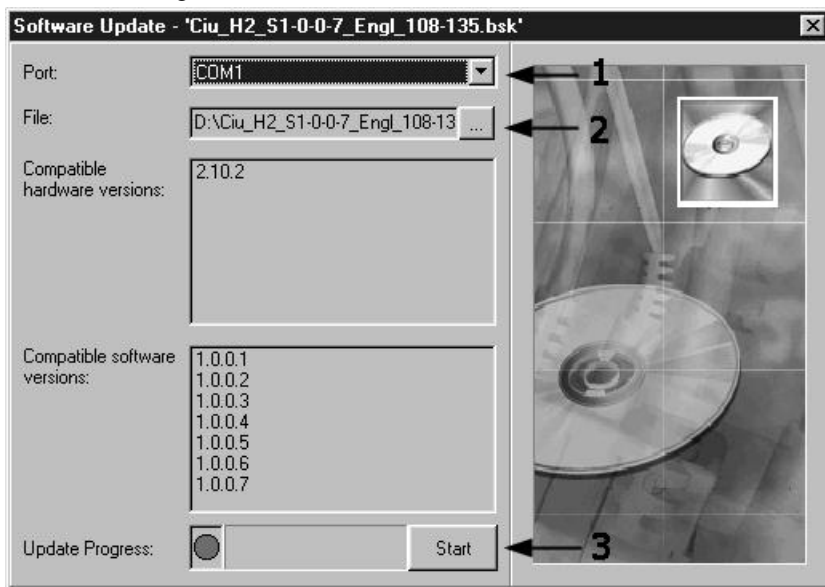


Figure 4.16

e) in the next field select the file with new version of CIU-01 program by clicking (position 2), a standard Windows file location dialog box will appear, find the required file and click OK;

f) Click "Start" (position 3) and follow the instructions of the program. First, a warning notice will appear advising you to power off your CIU-01 and check the connection of the cable to the PC serial port. Then another message window will appear; follow its instructions;

g) if your CIU-01 functions properly, COM-port cable connected correctly, you have selected the appropriate serial port, and the software to be downloaded is compatible with the hardware-based software, the process of program download on to your CIU-01 will automatically start. After the download is over the pop-up window will announce that the task has been

successfully completed, and the CIU-01 will reboot and start operating as if it has been powered up.

5. MAINTENANCE

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

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

6. STORAGE

Store your CIU-01 under the following conditions: environment temperature from 5 to 40 °C, relative humidity up to 80 % (at 25 °C).

7. SHIPMENT

The CIU-01 can be shipped in any closed vehicles at the temperature from -20 to +50 °C, relative humidity 98% (at 35 °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 CIU-01 should be free from any traces of cement, coal, chemicals, ets. When shipped by air the products should be kept in aircraft sealed compartments.

8. LABELLING

The markings indicating description and type of the product are made on the front panel of the CIU-01.

The CIU-01 Serial Number comprised of the index number and date-of-manufacture code is indicated on the screen every time you switch on your CIU-01.

9. WARRANTY INFORMATION

The manufacturer warrants the CIU-01 to conform to the specifications of this Manual when used in accordance with the regulations of operation detailed in this Manual.

The manufacturer will repair or replace without charge, at its option, any CIU-01 found defective in manufacture within the warranty period, which is twelve (12) months from the date of purchase. Should the user fail to submit the warranty card appropriately certified by the seller with its stamp and date of purchase the warranty period will be determined by the date of manufacture.

The warranty is considered void if:

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

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

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

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

Warranty card

Serial number _____

Date of manufacture _____

Date of purchase _____

Manufacturer's contact information:

PLANAR, LLC

Elkina Str. 32,

Chelyabinsk, 454091

RUSSIA

tel/fax: +7 (351)266-70-82, 266-70-83

E-mail: welcome@planar.chel.ru

Internet: <http://www.planar.chel.ru>