

GPS-01

RETURN PATH PILOT GENERATOR

OPERATING MANUAL



25.04.2012

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1. GENERAL DESCRIPTION AND SPECIFICATIONS

1.1. Application

GPS-01 Return Path Pilot Generator is designed for return path adjustment in television and radio broadcast receiving distribution networks as a component of Return Path Test and Measurement Set, which also engages CIU-01 Head-End Return Path Monitor and IT-081 TV Level Meter. The Generator offers three operating modes: generation of continuous baseband signal, frequency hopping digital data transmission (pilot signal generation), and frequency scanning mode intended for frequency response measurement in RF channels over return path frequency range. You can perform the Generator setting in stand-alone mode as well as by means of IT-081 TV Level Meter or external PC.



Figure 1.1

1.2. Environmental Conditions

Normal operating environment:

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

Operating environment:

- a) environment temperature: -10 to $+40^{\circ}\text{C}$;
- b) relative humidity: up to 90% at 25°C ;
- c) atmospheric pressure 84 to 106 kPa (630 to 795 mm Hg);

1.3. Generator and Accessories Supplied

Generator package contains:

- a) GPS-01 Return Path Pilot Generator..... 1 ps;
- b) Mains cable..... 1 ps;
- c) Operating Manual 1 ps;
- d) "F-F" Adaptor 1 ps.

1.4. Specifications

GPS-01 Generator operating modes:

- continuous baseband generation;
- frequency hopping digital data transmission;
- frequency scanning over operating range.

| | |
|--|----------------------|
| GPS-01 operating Frequency | 5 to 65 MHz |
| Frequency resolution | 125 kHz |
| Frequency setting basic error, not greater | ± 10 kHz |
| Automatic frequency tuning time, not greater | 1 msec. |
| Output impedance over operating frequency range | 75 Ω |
| Mismatch attenuation at output, at least | 18 dB |
| Output signal voltage level..... | 72 to 118 dB μ V |
| Output signal voltage level resolution | 0.753 dB |
| Output signal voltage level setting basic error, not greater | ± 0.5 dB |
| Output signal voltage level error at environment temperature from -10 to +40 ⁰ C, not greater | ± 0.25 dB |
| Baseband signal noise content, not greater..... | -60 dB |
| Output signal incidental amplitude modulation after frequency stabilization, not greater..... | 0.6% |
| Operating mode setting, not longer..... | 10 min |
| GPS-01 powered from: | |
| - 220 \pm 22 V and 50 \pm 0,5 Hz AC power source with harmonic content not greater than 5%; | |
| - or built-in battery. | |
| GPS-01 continuous operation when powered from built-in battery under normal environmental conditions, at least..... | 4 hours |
| Power input from mains supply, not greater..... | 10 VA |
| Mean time between failures, at least | 10,000 hours |
| Average service life, at least | 2 years |
| Generator overall dimensions, not greater | 160x85x155 mm |
| Generator weight, not greater | 2.5 kg |

1.5. Generator Configuration

GPS-01 Return Path Pilot Generator is implemented in metal divisible housing with overall dimensions of 160x85x155 mm, which incorporate elements of both printed and three-dimensional wiring.

Front panel of the Generator is equipped with 75-Ohm BNC-connector (Fig.1.1. ref. 1), LCD display (Fig. 1.1, ref. 2), control knob (Fig. 1.1, ref. 3), mains voltage and battery charge level LED indicator (Fig. 1.1, ref. 4), and power switch (Fig. 1.1, ref. 5). On the side panel there are mains cable connector, PC compatible connector, and ground connector.

2. PREPARATION FOR USE

Perform exterior check of your Generator for mechanical damage.

When you accept the Generator check its package for completeness using the list of items given in Generator and Accessories Supplied (section 1.3).

3. OPERATING PROCEDURE

3.1. Connectors, Location and Purpose:

- a) "Output 5-65 MHz" connector (Fig. 1.1, ref. 1) – RF signal output, BNC-connector;
- b) "RS232" connector (Fig. 3.1, ref. 1) PC and IT-081 TV Level Meter compatible;
- c) "220V" connector (Fig. 3.1, ref. 2) mains cable compatible;
- d) ground connector (Fig. 3.2) labeled "⏏", ground wire compatible.

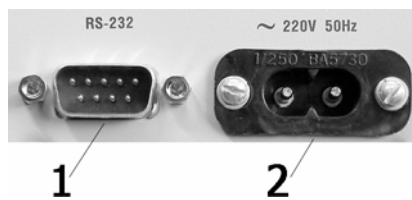


Figure 3.1



Figure 3.2

3.2. Controls, Location and Purpose:

- a) power switch (Fig. 1.1, ref. 5) allows GPS-01 On/Off switching;
- b) LED (Fig. 1.1, ref. 4) indicates mains voltage and battery charge level. The LED will light red or green when mains cable is connected and mains voltage is available. The LED will light red if battery charge level is low and the battery is charging. When the battery is fully charged the LED light will turn to green;
- c) display (Fig. 1.1, ref. 2) is intended for parameter indication during setup in stand-alone mode.

3.3. Safety Instructions

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

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

3.4. Generator Operating Modes

3.4.1. General Information

The Generator offers three operating modes: continuous baseband generation, frequency hopping digital data transmission (pilot signal generation), and frequency scanning. Pilot signals generation and frequency scanning operating modes are employed when the Generator is operating as a component of the Return Path Test and Measurement Set.

3.4.2. Continuous Baseband Generation

Operating in continuous baseband generation mode the Generator injects harmonic signal at the assigned frequency and level. The frequency and level are set either by adjustments performed with integrated encoder and display, or by means of external devices (PC, IT-081) connected via Generator's serial port.

3.4.3. Frequency Hopping Digital Data Transmission

Operating in frequency hopping digital data transmission mode the Generator injects frequency-modulated RF signals (pilot signals) at the assigned frequencies. The injection is performed by packets of pilot signals over different frequencies (from 1st to 4th). Packet period is 44 ms, pilot signal duration is 8.94 ms. The pilot signals are generated at the preset level, but during the intervals between signals the Generator output amplifier is off and the output level is then less than 15 dB μ V. The pilot signals carry encoded information about the Generator number and programmable 16-character note that can be set from an external device (PC, IT-081). The pilot signals are injected in increasing order of frequency, and can be of any frequency within the operating frequency range.

3.4.4. Frequency Scanning

Operating in frequency scanning mode the Generator is successively tuning with 125 kHz resolution within operating frequency range. This mode is intended for return path frequency response monitoring. The Generator completes a full sweep in around 2.2 sec. The whole operating frequency range (from 5 to 65 MHz) is subdivided into 4 bands 15 MHz each. First sweep is performed over 5 to 20 MHz range, then over 20 to 35 MHz range, and so on. When the frequency of 64.875 MHz is achieved, the full sweep is completed and a new sweep begins from 5 MHz frequency. Sweeping of every band is started with generation of a short synchronizing signal, which is used by CIU-01 Head-end return path monitor to be in sync with generator. The synchronizing signal frequency can be set in a range of 4.875 to 65 MHz.

3.5. Generator Operating Mode Setting

3.5.5. General Information

You can perform settings of your Generator either in stand-alone mode by control knob located on the front panel (Fig.1.1, ref. 3), or by programming carried out by means of an external device via RS232 connector.

In stand-alone mode you can tune the following settings: pilot signal frequency, Generator output level, and operating mode. When you program your Generator using an external device you will also be able to set 16-character note and the Generator number.

3.5.6. Stand-Alone Generator Setting

In stand-alone mode you can perform settings using control knob and display (Fig. 1.1, ref. 2). When Generator is running the display will indicate the line showing the Generator number (Fig. 3.3).

You should push the control knob to enter setup mode and to select the parameter to be set. The Generator will automatically exit setup mode in 6 sec. after the last setting was performed.



Figure 3.3

In setup mode the parameters will appear in succession shown in Fig.3.4.

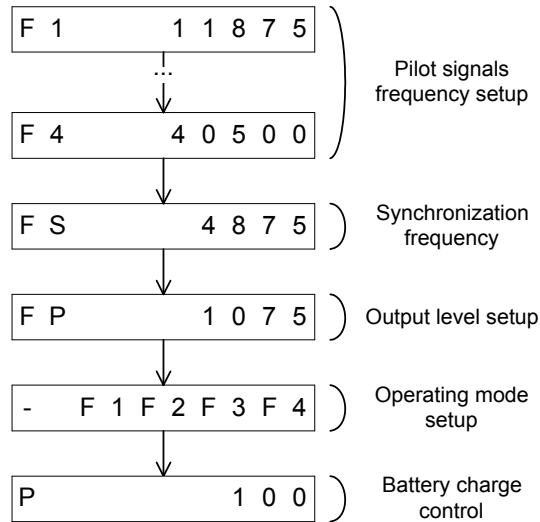


Figure 3.4

The first four parameters are the 1st to 4th pilot signal frequencies. The display will indicate messages in the format shown in Fig.3.5.



Figure 3.5

The number of the pilot signal whose frequency being set is indicated in ref. 1 position. Frequency value is represented in kHz (ref. 2). To tune the frequency use the control knob, to raise the value rotate it clockwise, to lower the value rotate it counterclockwise. To turn a pilot signal off keep on reducing the frequency value until display indicates the message of "F_x -----" view.

The next parameter is the synchronization signal frequency, which is used in frequency scanning mode during GPS-01 operation as a part of the Return Path Test and Measurement Set.

The default value of the signal frequency is 4.875 MHz. If necessary you can choose any value within the range from 4.875 to 65 MHz. The synchronization frequency will be indicated on the display as "FS xxxxx" message. To tune the frequency rotate the control knob.

The following parameter to be set is output level (Fig. 3.6). The value can be set within the range of 72 dB μ V to 118 dB μ V. The resolution is 0.753 dB μ V, therefore the level value appears reduced to tenth order. The integer part of the signal level value (represented in dB μ V) is indicated in ref. 1 position; the level value fractional part (tenths of dB μ V) is indicated in ref. 2 position.



Figure 3.6

The next parameter to be set is the Generator operating mode.



Figure 3.7



Figure 3.8

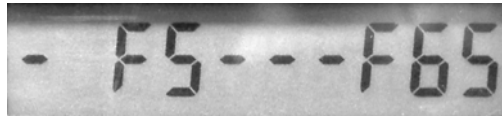



Figure 3.9

You can select the desired mode by control knob rotating. Each operating mode is assigned an individual identification code. These designations are shown in Figs 3.7, 3.8, 3.9 respectively: pilot signals generation, continuous baseband generation, and frequency scanning operating mode.

3.5.7. Generator Setting by IT-081 TV Level Meter

Choose  icon in the IT-081 main menu. GPS-01 programming screen view is shown in Fig. 3.10:

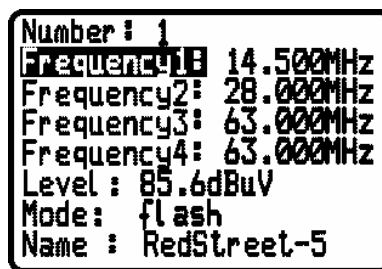


Figure 3.10

To start the programming procedure connect your GPS-01 to IT-081 by means of the COM-port compatible cable supplied with IT-081. Power up the Generator and then set the IT-081 to GPS-01 programming mode. You will see a table of parameters without values on the screen. After that, IT-081 will start communication with GPS-01. If the communication passed successfully parameter values will appear in the table. Select a parameter using “▲” and “▼” buttons. Then adjust its values using “◀” and “▶” buttons. The GPS-01 parameters are as follows:

- a) GPS-01 number (“Number”). The parameter can assume the values 1 to 8.
- b) Pilot signal frequencies (“Frequency1” to “Frequency4”). The programmable limits are from 5 to 65 MHz with 0.125 MHz resolution. To turn a pilot signal off set the value of 5 MHz and push “◀” button. The turned off signal has the message “off” instead of a frequency value. To turn a pilot signal on push “▶” button. The pilot signal frequencies can be programmed in any succession independently of the frequency values;
- c) Pilot signal level (“Level”). Programmable limits are from 72 dB μ V to 118 dB μ V with 0.75 dB μ V resolution. This way you set the output voltage level;
- d) Generation mode (“Mode”). The programmable modes are “Pulse” – pulse generation of pilot signals in increasing order of frequency; “continuous” – continuous generation at first pilot signal frequency, “freq. scan” – sweep-by-sweep operation of GPS-01 allowing for return path frequency response monitoring;

- e) Notes (“Note”). To edit the line up to 16-characters long push “▶” button.
Perform the desired changes in the editing screen.

3.5.8. Generator Setting by External PC

To perform generator setting by PC use “GPS-01_configure.exe” program. It can be downloaded from the manufacturer internet server: www.planar.chel.ru. From the main page you should go to: “Products” > “Measurement instruments” > “TV meters” > “Return path analysis set” > “GPS-01 Return path pilot generator”:

http://www.planar.chel.ru/products/measurement-instrument/tv-level-meters/Return%20path%20analysis%20set/generator-pilot-signalov-gps-01/generator-gps-01/view?set_language=en

The generator is controlled by a configuration program via a standard null-modem cable (it is not applied in a bundle).

The view of a configuration program window is shown in Fig. 3.11.

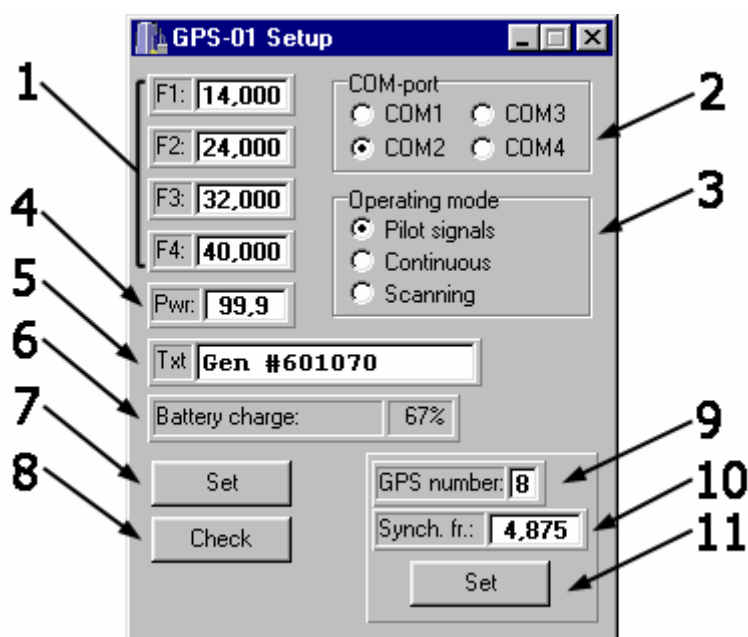


Figure 3.11

After you have started the program select the COM-port (ref. 2) to which the Generator is connected.

Select the GPS-01 operating mode in the “Operating Mode” field (ref. 3).

Set the pilot signal frequencies in “F1:”, “F2:”, “F3:”, and “F4:” fields (ref. 1). The programmable limits of the value are from 5.000 MHz to 65.000 MHz with 0.125 MHz resolution. Also you can set 0 value. If you set 0 in one of “Fx:” fields for Pilot Signals Generation Mode the corresponding signal will not be injected. If you set 0 in “F1:” field for Continuous Baseband Generation Mode the Generator will not form the output signal. “Fx:” value makes no effect on operation in Frequency Scanning Mode. Set the output level in “Pwr:” field (ref. 4).

In the “Synch. fr.” field (ref. 10) the frequency of the synchronizing signal for frequency scanning mode is set.

When you set frequency and level you can use either numeric keys or “↑”, “↓” keys to raise or lower the current value.

Enter the GPS-01 notes in “Txt:” field (ref. 5).

The settings pass on to the GPS-01 as soon as you click on “Set” button. (ref. 7). To check the settings, which have already been loaded on to the Generator you can click on “Check” button (ref. 8).

“Battery charge” field (ref. 6) indicates the battery charge level in percent. The battery charge level information is updated every time you click on “Check” button.

“GPS number” field (ref. 9) indicates the GPS-01 number. The Generator number is verified every time you click on “Check” button. You can set the number clicking on “Set” button (ref. 11).

3.6. Software Updating

The GPS-01 offers the capability to update the integrated software without employment of any additional equipment. The manufacturer goes on with development of the Generator and keeps on working out new software versions providing new features.

New firmware files are put on the manufacturer internet server: www.planar.chel.ru. From the main page you should go to: “Products” > “Measurement instruments” > “TV meters” > “Return path analysis set” > “GPS-01 Return path pilot generator”:

http://www.planar.chel.ru/products/measurement-instrument/tv-level-meters/Return%20path%20analysis%20set/generator-pilot-signalov-gps-01/generator-gps-01/view?set_language=en

To update your software proceed as follows:

- a) connect your Generator to the serial port of PC by means of a null-modem cable;
- b) create a new folder, e.g. GenUpdate. Copy SoftLoader application into this folder from our web site (this program is available on a floppy supplied with the Generator). The SoftLoader program is Windows98, Windows2000 and WindowsXP compatible. The SoftLoader supports communication with the Generator and downloads the updated software on to it;
- c) copy a new software version into the folder GenUpdate from our web site (file name containing the number of program version with extension .bsk, e.g. 1_0_0_1.bsk) and a file describing changes in the program (file name containing number of program version with extension .doc);
- d) start SoftLoader program on your PC. Select serial port of PC, which connects it to the Generator, by clicking (ref. 1) in the program window, as shown in Fig. 3.12;

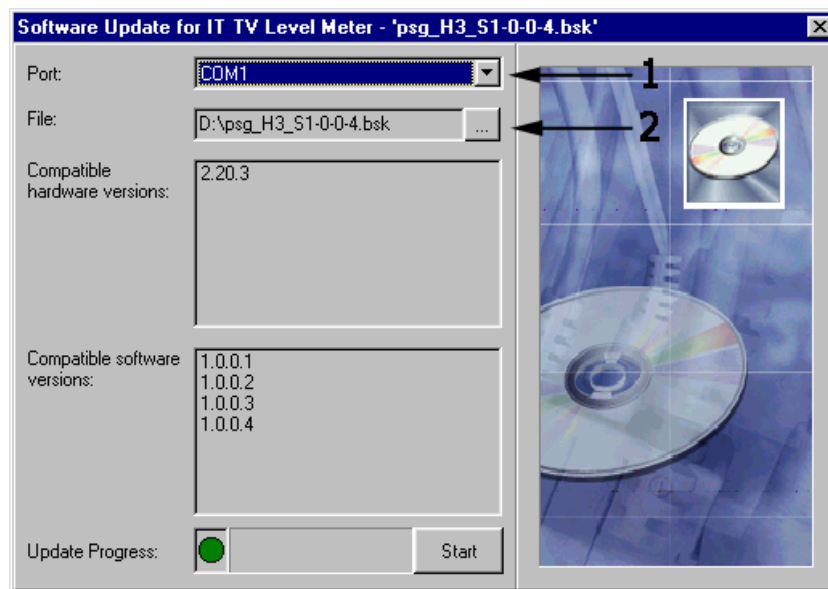


Figure 3.12

- e) in the next field select the file with new version of Generator program by clicking (ref. 2), a standard Windows file location dialog box will appear, find the required file and click OK;
- f) click Start and follow the instructions of the program. First, a warning notice will appear advising you to power off your Generator and check the

connection of the cable to the PC serial port. Then another message window will appear; follow its instructions;

- g) if your Generator 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 Generator will automatically start. After the download is over the pop-up window will announce that the task has been successfully completed, and the Generator will reboot and start operating as if it has been powered up.

CAUTION: Do not interrupt the process of software download on to your Generator. This can cause it to malfunction. But still, if the interruption occurred repeat the software update procedure all over again.

3.7. Battery Operation

GPS-01 can be powered by a built-in 12 V Lead Acid Battery. No particular servicing is required for this type of battery during its whole lifespan.

The battery is being charged automatically every time you connect your GPS-01 to power supply independently of the power switch position. After complete discharge, your built-in battery will need about 14 hours of full charge time.

Time of continuous operation depends on the battery condition, mode of operation, and environment temperature. Battery charge level is indicated on the Generator front panel by LED light (see section 3.2), or in setup mode (switching to this mode is described in section 3.5.6). In setup mode to see the charge level, switch message display to battery charge level indication (select the message pushing the control knob). The message representation is showed in Fig. 3.13.

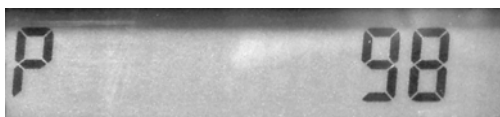


Figure 3.13

Battery charge level is displayed in percent. When during operation the charge level drops to zero the display will show the following message:

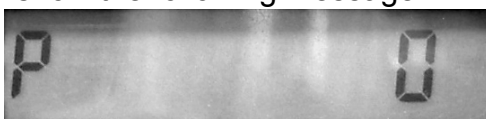


Figure 3.14

Generator shows the message during one minute and after that stops operation and switches to power-down mode. To restart the Generator, turn it off and on again.

CAUTION: Do not leave the battery discharged. This will shorten your battery life.

4. SERVICE

Required servicing is reduced to observation of instructions related to proper operation, storage, and shipment, which are stipulated in this Manual, and also minor faults elimination.

Perform preventive inspections covering check of controls and secure attachment of the Generator elements after the warranty period has expired and annually since then.

5. STORAGE

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

6. SHIPMENT

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

7. MANUFACTURER'S WARRANTY

The manufacturer certifies that the GPS-01 meets specifications stated in this Manual. The warranty period is 12 months from the date of sale.

During the warranty period, the manufacturer will repair the products, which proved to be defective, subject to submission of this Operating Manual with the mark about sale.

No warranty shall apply to the following defects:

- a) resulted either from rough handling or operation of the Generator with violation of the instructions contained in this Manual;
- b) the Generator was repaired by some other company than manufacturer;
- c) the Generator has mechanical damage.

WARRANTY CARD

Serial no.....

Date of manufacture.....

Date of sale.....