



RP-110

SIX RF-TONE GENERATOR



SAFETY NOTES

Read the user's manual before using the equipment, mainly " SAFETY RULES " paragraph.

The symbol  on the equipment means "SEE USER'S MANUAL". In this manual may also appear as a Caution or Warning symbol.

Warning and Caution statements may appear in this manual to avoid injury hazard or damage to this product or other property.

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SIX RF - TONE GENERATOR

RP-110

1 GENERAL

1.1 Description

The **RP-110** pilot generator is an instrument designed to certificate sections of coaxial cable and related devices in all bands where coaxial cable works: CATV and SMATV. It generates six continuous wave (CW) signals in a band from 5 to 2150 MHz. This allows testing lines or sections of lines and devices both in Upstream and Downstream.

The output level is selectable from 80 to 110 dB μ V and independently for each pilot signal. It is an ideal equipment for both installing new lines and to inject reference signals on networks already operative.

This equipment allows automatic equalized measurements on the FI band for telecommunications installations, if working with analysers with this feature.

This equipment is powered by the means or by an internal rechargeable battery.

The integration of all this functions in a lightweight, ergonomic and robust instrument, makes the **RP-110** a powerful tool to work on site.

1.2 Specifications

FREQUENCY

Carriers frequency range

- P1:** 5.00 MHz to 10.00 MHz.
- P2:** 55.00 MHz to 100.00 MHz.
- P3:** 460.00 MHz to 540.00 MHz.
- P4:** 800.00 MHz to 1000.00 MHz.
- P5:** 1450.00 MHz to 1750.00 MHz.
- P6:** 1850.00 MHz to 2150.00 MHz.

Resolution

25 kHz.

Accuracy

± 50 ppm (at 25 °C).

CARRIERS LEVEL¹

Signal level resolution

80 to 110 dB μ V (selectable in 1dB steps).

Signal level accuracy

1 dB.

± 2 dB (at 25 °C).

¹ For **P4**: 83 to 110 dB μ V.

Impedance	75 Ω .
Flatness in a band	2 dB.

COMMUNICATIONS

USB Interface	For remote control and firmware upgrading.
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POWER SUPPLY

Battery	7,4 V Li-Ion.
Low battery indication	Graphical indicator on the screen: 
Autonomy	More than 5 hours.
Battery charge	Through fast internal charger.
External	
Voltage	12 V DC.
Power	15 W.
Mains adapter	From 90 V to 250 V, 50-60 Hz (included).

ENVIRONMENTAL CONDITIONS

This equipment could be used on the following environmental conditions, in these conditions the specifications could also be applied:

Altitude	Up to 2000 metres.
Temperature range	From 5 °C to 40 °C.
Maximum relative humidity	80 % (up to 31 °C), decreasing lineally up to 50% at 40 °C.

MECHANICAL FEATURES

Dimensions	180 (W) x 95 (H) x 50 (D) mm.
Weight	400 g. (including battery and protective bag).

ACCESSORIES INCLUDED

AL-101B	Mains adapter 90 - 250 V AC.
CA-005	Mains cord CEE - 7.
AA-012	Car lighter adapter cable.
AD-055	F/h – BNC/h Adapter.
AD-057	F/h – F/h Adapter.
CC-030	F/F Coaxial Cable.
DC-269	Transport case.
CC-041	USB Cable.

OPTIONAL ACCESORIES

DC-270	Transport suitcase.
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RECOMMENDATIONS ABOUT THE PACKING

It is recommended to keep all the packing material in order to return the equipment, if necessary, to the Technical Service.

2 SAFETY RULES

2.1 General safety rules

- * **Safety can not be assured if instructions are not closely followed.**
- * The external DC charger is a **Class I** equipment, for safety reasons plug it to a supply line with the corresponding **ground terminal**.

Use the mains adapter in **Overvoltage Category II** and **Pollution Degree 1** installations. To use **INDOOR**.
- * When using some of the following accessories **use only the specified ones** to ensure safety:
 - Rechargeable battery
 - Mains adapter
 - Power cord.
- * Observe all **specified ratings** both of supply and measurement.
- * Use this instrument under the **specified environmental conditions**.
- * **The user is not allowed** to carry out the following maintenance operations:

Any change on the equipment must be carried out exclusively by technical staff.
- * Use proper cables with low radiation levels for signal input / output, specially when working with high signal levels.
- * Follow the **cleaning instructions** described in the Maintenance paragraph.

* Symbols related with safety:

	DIRECT CURRENT		ON (Supply)
	ALTERNATING CURRENT		OFF (Supply)
	DIRECT AND ALTERNATING		DOUBLE INSULATION (Class II protection)
	GROUND TERMINAL		CAUTION (Risk of electric shock)
	PROTECTIVE CONDUCTOR		CAUTION REFER TO MANUAL
	FRAME TERMINAL		FUSE
	EQUIPOTENTIALITY		EQUIPMENT OR COMPONENT TO BE RECYCLED

2.2 Descriptive Examples of Over range Categories

- Cat I** Low voltage installations isolated from the mains.
- Cat II** Portable domestic installations.
- Cat III** Fixed domestic installations.
- Cat IV** Industrial installations.

3 INSTALLATION

3.1 Power Supply

The **RP-110** is a portable instrument powered by a rechargeable Li-Ion battery. The instrument comes with a mains adapter which enables the **RP-110** to be plugged to the mains for operation and battery charging. On the screen there is a real-time battery indicator.

3.1.1 Operation Using the Mains Adapter

Connect the mains adapter to the **RP-110** through the external power connector [5] (see figure 2.-) placed at the right side of the instrument.

Then, connect the adapter to the mains to start up battery charging. When the battery is full, the charging process finish automatically.

Next, press the **ON / OFF**  [1] key. Then the instrument starts working.

CAUTION

Before using the mains adapter make sure that it is the appropriate one for your mains voltage.

3.1.2 Operation Using the Battery

Press the key **ON / OFF**  [1] to start the instrument powered by the battery.

The instrument works powered by a Li-Ion battery of 7.4 V and 2.2 Ah.

When the battery is full loaded, the **RP-110** has an autonomy aprox. of 5 hours of continuous work.

3.1.3 Battery Charging

First switch off the **RP-110** in order to charge the battery. Then connect the power input [5] to the mains adapter. Now connect the adapter to the mains. The charging process starts automatically. Charging time depends on the state of the battery. If the battery is flat, the battery charging time is 3 hours aprox.

3.1.4 Recommendations using the battery

If anticipating a long period of inactivity for your instrument, it is advisable to store it with the battery fully charged and at temperatures below 25 °C.

It is also advisable in these cases to carry out a cycle of charging / discharging and a subsequent half charge (i.e. 50 %) every 3 months.

4 OPERATING INSTRUCTIONS

4.1 Description of Controls and Elements

Front Panel

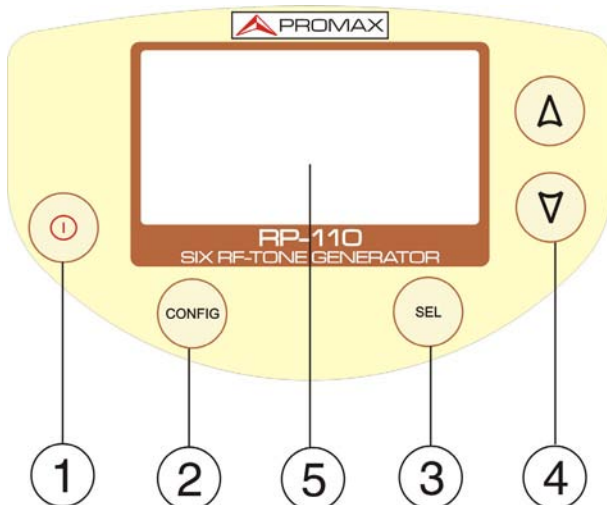


Figure 1.- Front View.

- [1]  **ON / OFF**
It turns ON or OFF the instrument.
- [2]  **CONFIGURATION**
It access or exits the configuration menu.
- [3]  **SELECTION**
It allows you to scroll down the configuration options and move between the active fields than define the signal parameters.



- [4] **CURSOR**
It allows you to change the configuration options and the signal parameters.

- [5] **DISPLAY**
It is the display with backlight.

Side Panels

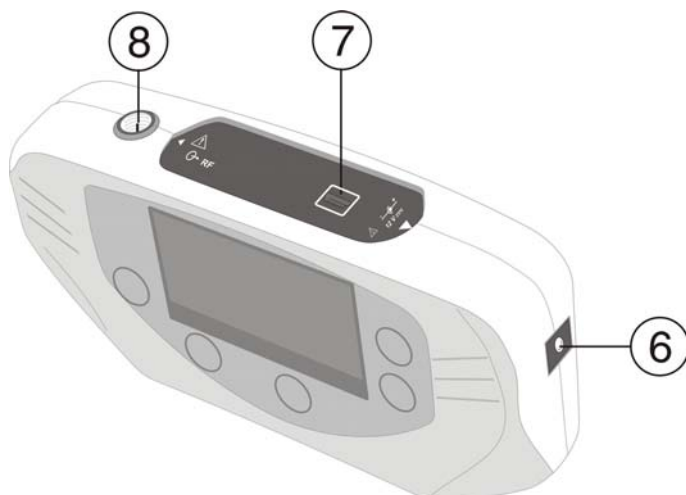


Figure 2.- Side Panels.



- [6] 12 V  DC power adapter input.

- [7] **DATA.** USB connector for data transferring and to control the instrument via PC.



- [8] **F Connector** to connect F-F adapter (F-BNC or F-IEC), for output signals that have been activated.

4.2 Operating instructions

The **RP-110** has the following operating modes:

1. **FUNCTION CONFIG:** It allows you to set several parameters of the instrument, such as language, backlight, contrast, etc.
2. **FUNCTION GENERATOR:** It sets the characteristics of the signals generated by the instrument. It can active or deactivate the signal in order to check the transmission channel. This function is selected by default when starting.

Press the key **SEL**  [3] to move between parameters.

Press the key **UP** or **DOWN**   [4] to change a parameter.

4.2.1 Internal parameter configuration (CONFIG)

Press the key **CONFIG**  [2] to access the configuration menu.

Press again the key **CONFIG**  [2] to exit the configuration screen. Parameters are automatically stored.



Figure 3.- Internal Configuration Parameters (**CONFIG**).

The configuration menu has the following options:

- a) **LANGUAGE**
This field allows you to select the language between **Spanish**, **English**, **French** and **German**.

b) BEEP

This field allows you to activate (**ON**) or deactivate (**OFF**) the acoustic indicator. This indicator sounds when pressing any key.

c) BACKLIGHT MODE

This field allows configuring the lighting on the screen. If YES, then the backlight is always ON. If NO, then the backlight is always OFF. If AUTO, then the backlight is activated if any key is pressed and after 5 seconds with no activity the backlight turns OFF again.

d) UNITS

It allows you to select Level output unit between **dBmV**, **dBμV** y **dBm**.

e) LCD CONTRAST

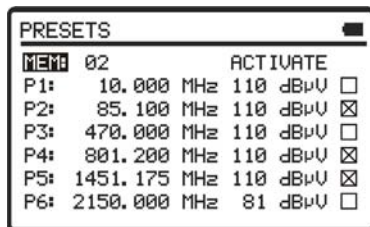
It allows you to select the level of contrast of the display.

f) LOCK PILOTS

It allows you to enable or disable locking signal parameters. When is locked (YES) you cannot edit the parameters. When it is locked it appears a padlock icon .

g) PRESETS

This option allows you to set the parameters of the six pilot signals (See Figure 4.-) and to save them grouped in one of the 8 memories of the instrument. Once stored, the user can load a specific memory as needed.



PRESETS			
MEM	02	ACTIVATE	
P1:	10.000 MHz	110 dBμV	☐
P2:	85.100 MHz	110 dBμV	☒
P3:	470.000 MHz	110 dBμV	☐
P4:	801.200 MHz	110 dBμV	☒
P5:	1451.175 MHz	110 dBμV	☒
P6:	2150.000 MHz	81 dBμV	☐

Figure 4.-

Press **UP** or **DOWN**   [4] to move between parameters or to change the value of a parameter.

Press **SEL**  [3] to enter, go next and exit an editable field.

To activate a memory, first select on the field **MEM** the memory number, select the **ACTIVATE** field and press **SEL**  [3].

Once selected, signals are loaded into the instrument and on the right bottom appears a label **[MEM XX]** with the number of memory used (See Figure 5.-).

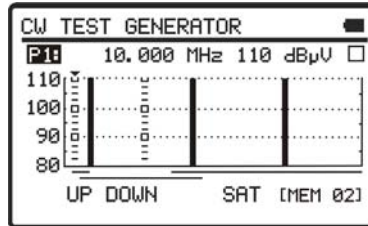


Figure 5.-

If the user changes any parameter of a signal when it is in operational mode, the instrument gets out of the memory state and the user must have re-activate it. To keep the memory state the user must enable the option **LOCK PILOTS**.

Press the key **SEL**  [3] to move between parameters.

Press the cursor key **UP** or **DOWN**   [4] to change the status of a parameter.

4.2.2 Signals Generator

Through this function the user defines the parameters of the pilot signal that the **RP-110** emits in the working frequency band (from 5 to 2150 MHz) in order to characterize the transmission channel. It is possible to select the following parameters: pilot signal, frequency, level and enable or disable the signal.

When starting the **RP-110**, the last working session parameters are recovered and they are shown on the screen.

At the graph on the screen the six pilot signals appears simultaneously.

Signals emitting are in continuous black colour. Discontinuous signals are not in emission.

Frequency is represented by the horizontal axis of the graph.

Power level is represented by the vertical axis of the graph.

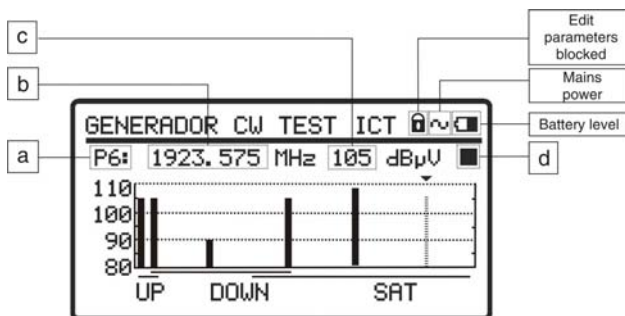


Figure 6.- Main screen.

At the top of the screen appears a line with the parameters of the selected signal. In shaded the editable parameter.

Press the key **SEL**  [3] to move between parameters, until the field you want to edit is shaded.

Press the cursor key **UP** or **DOWN**   [4] to change the status of a parameter.

Parameters are:

a) PILOT

It allows you to select the pilot signal from 1 to 6. This arrow at the top of the graph indicates what is the selected signal. Each pilot signal works in a specific frequency range. They are the following ones:

- P1:** 5.00 MHz to 10.00 MHz.
- P2:** 55.00 MHz to 100.00 MHz.
- P3:** 460.00 MHz to 540.00 MHz.
- P4:** 800.00 MHz to 1000.00 MHz.
- P5:** 1450.00 MHz to 1750.00 MHz.
- P6:** 1850.00 MHz to 2150.00 MHz.

b) FREQUENCY

It defines the frequency at which the selected pilot signal is emitted.

Frequencies are divided into three bands:

Upstream channel band: From 5 to 100 MHz.

Downstream terrestrial band CATV: From 55 to 1000 MHz.

Downstream satellite band - IF SAT: From 800 to 2150 MHz.

Three lines below the horizontal axis of the graph indicate the range covered by each one of the frequency bands listed above.

Press the key **SEL**  [3] to move from a digit to another.

Press the cursor key **UP** or **DOWN**   [4] to change the digit.

c) POWER LEVEL

It defines the power to which the selected pilot signal is emitted.

Press the key **SEL**  [3] to move from a digit to another.

Press the cursor key **UP** or **DOWN**   [4] to change the digit.

The acceptable range of values are from 80 to 110 dB μ V in 1 dB steps.

d) ENABLED / DISABLED SIGNAL

It allows you to enable or disable the emission of the signal.

Press the cursor key **UP** or **DOWN**   [4] to switch from enabled signal  to disabled.

When a pilot signal is enabled it appears on the screen with a solid color. When it is disabled it appears with dashed lines.

For example, to change the settings of the pilot signal number three (P3), you should press the selection button  [3] until the first field of the parameters list is shaded. Then press the cursor keys **UP** or **DOWN**   [4] until selecting the pilot signal number three (**P3**). Press again the selection key  [3] to select the parameter you want to change and enter the new value using the cursor keys **UP** or **DOWN**   [4].

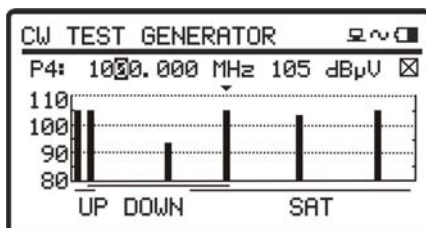


Figure 7.- Pilot signal parameters (P4).

4.3 Connecting to the computer.

The instrument can be connected to a computer through the **USB** connector in order to configure frequencies and levels and to update the firmware.

For more information see chapter 5 about the control program for the **RP-110**.

5 CONTROL SOFTWARE RP-110

5.1 Description

This software is a program developed to allow the communication between a computer and the **RP-110**.

It allows you to set up the test signals in a very easy and quick way, and sending or receiving them from the instrument. It can also update the firmware of the instrument.

5.2 Hardware and software requirements

In order to be able to use the program correctly, the following requirements need to be met:

- **Hardware requirements**

Minimum configuration:

- * IBM-compatible computer, Pentium or higher.
- * 10 Mbytes available on the hard disk (variable, depending on the files of data available).
- * Pointing device or mouse (not essential, but highly recommended).
- * USB port available.

- **Software requirements**

In order to be able to run the acquired software it is essential to have, Windows® 95/ 98/ ME/ 2000/ XP/Vista/7 operating system.

5.3 Installation

5.3.1 Installation of the software

VERY IMPORTANT REMARK

If a previous version of **RP-110 Control** has been installed, it will be necessary to completely remove it before installing present version.

The installation file for the **RP-110** software is contained in a **CD-ROM** supplied with the instrument. Before proceeding to install the program, read the following instructions.

1. Insert the installation CD into the **CD-ROM** drive of your computer.
2. Double click on the file "**Setup.exe**" which is into the folder "**SOTWARE**" of the CD-ROM.
3. The install wizard will start automatically, which will help you during the installation process.
4. The installation program creates, by default, a new directory in **C:\Program Files\PROMAX\RP-110Control**, where it copies all files of the application. It also puts a shortcut on the desktop.
5. Double click on the shortcut icon **RP-110** on the desktop to run the program.
6. In the section "*Operation Instructions*" is explained in detail the program operation.

5.4 LEGAL CONDITIONS

Read the contract carefully in its entirety before you install the program. Installing the program means that you have accepted the following terms and conditions.

1. **SUBJECT.** The subject matter of this Contract is the grant to the end user by **PROMAX ELECTRONICA, S.A.** a non-exclusive and non-transferrable personal license to use this version of the **RP-110 CONTROL SOFTWARE** program for an indefinite period of time.
2. **LICENCE.** The Licence of Use granted hereby refers exclusively to the end user, who shall be considered legitimised to use the program only.
3. **OWNERSHIP OF THE SOFTWARE.** The end user acknowledges that the program referred to in this Contract is the exclusive property of **PROMAX ELECTRONICA, S.A.** The end user may only acquire the personal and non-transferrable right to use the software that is the subject matter of this Contract for the purposes herein expressed.

Since the program granted is protected by industrial and intellectual copyright, infringements by the user of these aforementioned obligations will give rise to the corresponding liabilities in accordance with the legislation in force.

4. **RESOLUTION.** The licence or authorisation of use is granted for an indefinite period of time. However, in the event of non-compliance by the end user with any of the clauses hereof, the Contract may as of right be terminated without any legal formality.

5. **EXPLANATORY PROVISION.** Notwithstanding the accuracy of the software granted, **PROMAX ELECTRONICA, S.A.** is fully exempt of liability for consequences arising from any possible omission existing in the program or from improper use by the end user of any of the information it contains and generates. Nor can **PROMAX ELECTRONICA, S.A.** be held liable for the suitability or accuracy of the data obtained for particular purposes or functions, since the only obligation of the latter, under this Contract, is the provision of means and not of results.
6. **FINAL CLAUSE.** The use of this software referred to herein signifies the tacit and unconditional acceptance of its conditions.
7. **JURISDICTION.** Both parties, explicitly waiving any rights that may correspond to them, agree to submit all controversies that may arise from this Contract to the jurisdiction and competence of the Judges ad Courts of Barcelona.

5.4.1 Connection between RP-110 and PC.

The connection between **RP-110** and **PC** is done via the data transmission cable USB (mini – USB) supplied with the instrument.

Firstly turn off the instrument **RP-110**. Then connect the USB connector to a free **USB** port of your PC. Finally connect the cable to the **mini-USB** port of the **PROMAX** instrument.

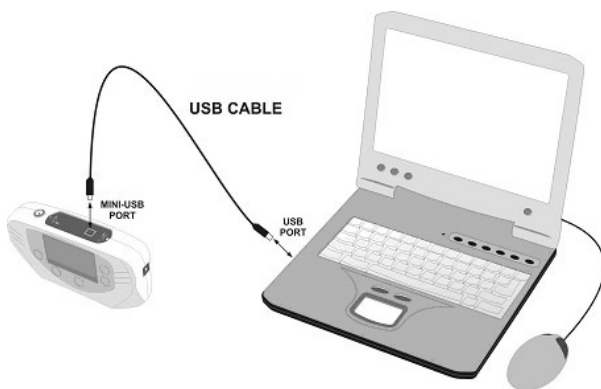


Figure 8.- Connection between **RP-110** and **PC**.

When the instrument connects to the PC, the instrument shows the message **"Synchronizing USB with PC"** (Figure 9.-).

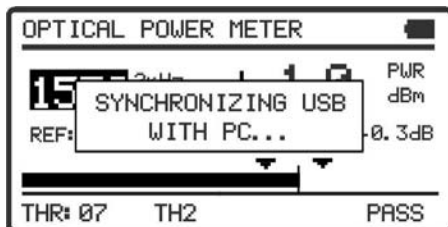


Figure 9.-

If the instrument detects the control program is not running, it will give the message **"PC software is not detected"** (Figure 10.-). The program must be started before connecting the instrument.

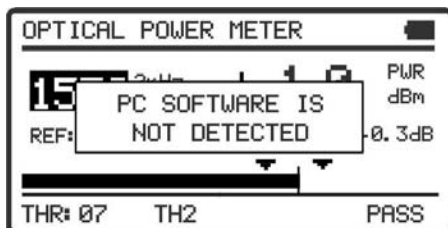


Figure 10.-

6 INSTRUCTIONS FOR USE

6.1 General considerations

The software provided on the programming package **RP-110**, works only under Windows, so is assumed to experience handling of applications under Windows. Anyway, there is certain terminology to explain, so that this manual may be as clear as possible.

Click: Press the left-hand button of the mouse once.

Double click: Press the left-hand button of the mouse twice in succession, with a certain rhythm.

In order to move around the different options on the program menus, there are four ways to select orders:

1. By situating the mouse over a menu and pressing the left-hand button of the mouse.
2. Through the combination of keys "ALT + Initial of the chosen option". (For example: ALT + C selects the Config menu).
3. By pressing the combination of keys associated with the order to be made. (For example: Exit = ALT + F4).
4. By selecting the icon corresponding to the order to be made.

There are two ways to select one option of several appearing in a window:

1. By situating the mouse over the corresponding option and clicking.
2. The tab-control key (TAB) moves through the different options in the active window of the program. Likewise, the combination of keys SHIFT + TAB (hold the SHIFT key down and press the TAB key) moves through the options in the opposite direction.

6.2 Installation Guide

6.2.1 Starting

VERY IMPORTANT REMARK

Do not disconnect the instrument from the **USB** port while you are upgrading. Before starting to upgrade, you should check that the battery is charged.

Follow these steps to start using the software **RP-110 Control**:

1. Check the instrument is **ON**.
2. Check the connection cable between the instrument and the computer.
3. Run the program by clicking twice on the **RP-110 Control** icon, which should be on the desk of the computer.
4. It appears the main window of the program (see figure below).

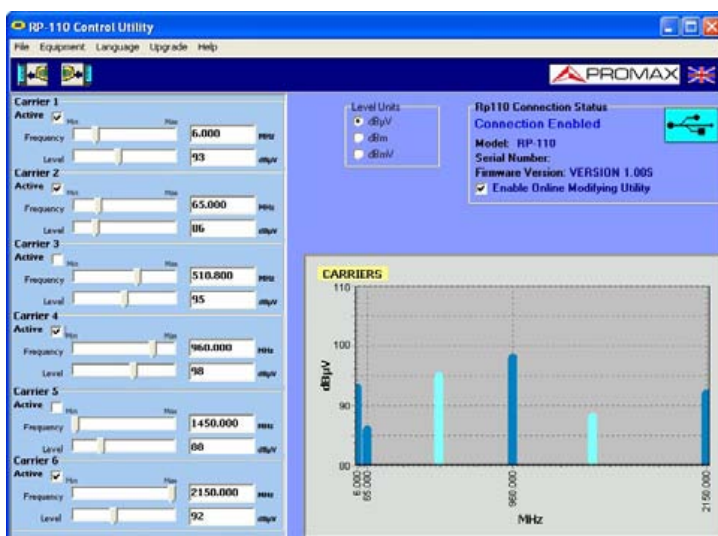


Figure 11.- Main Screen **RP-110 Control**.

The main window consists of a menu bar at the top. Below this, it is the tool bar with two shortcuts icons. At the top right corner there is a flag that symbolizes the language in use.

At the left side there is a window with the parameters to change the test signals. At the right side appears a window with graphical representation of test signals. At this area there is a window with the measurement units, the connecting status, the serial number and the model.

5. The program checks the **USB** devices connected to your computer. If the **RP-110** is identified then it is shown serial number and model.

LEGAL NOTICE

Under no circumstances **PROMAX ELECTRONICA, S.A.** is liable for data loss or any damages that may be caused directly or indirectly by this program. Although we have done our outmost to develop a program that is both useful and reliable, it is understood that the use of the program and of the data and information that are generated with it are the sole responsibility of the user.

6.3 Menu Bar

The options in the menu bar of the **RP-110** are:

- File:** It contains the general options of the configuration.
- Equipment:** It contains the options to receive and send data.
- Language:** It contains the options to select the languages.
- Update:** It contains the options to update the firmware of the instrument.
- Help:** It contains information about firmware version.

In the following sections are detailed each one of these menus.

6.3.1 File

This menu contains the option **Output**.

The option **Output** closes the program (Without confirmation).

6.3.2 Equipment

The options contained in this menu are the following ones:

Receive: It receives the configuration of the test points of the equipment. You can access directly to this option by pressing the icon on the tool bar .

Send: You can directly access this option by clicking the icon bar tools. You can access directly to this option by pressing the icon on the tool bar



Edit

Presets: It allows you to set the parameters of the six pilot signals (See Figure 12.-) and to save them grouped in one of the 8 memories of the instrument.

By clicking on the **Send** button it sends the selected memory to the device.

By clicking on the **Receive** button all signals are received from the device.

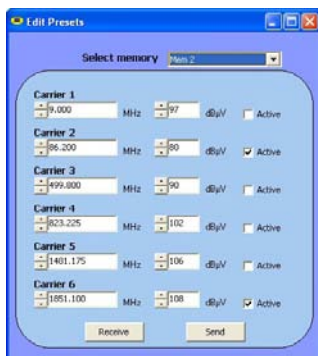


Figure 12.- PRESETS Edition.

6.3.3 Language

It allows you to select a language between Spanish, English, French or Catalan.

The active language is identified through the identificative flag at the right side of the tool bar.

6.3.4 Help

It contains information of the equipment version and contact data of the company.

6.3.5 Update

The **Update** menu allows you to update the firmware of the instrument **RP-110** by means of upgrading files that can be obtained from the **PROMAX** website. This menu contains the following options:

The option **Firmware** opens an explorer window in order to select the upgrading file (with rp110b extension) which is necessary to update the instrument.

6.4 Main screen

The main screen, as you see on the figure below, has two separate areas: at the left there are six test signals and their parameters and at the right there are these six signals represented on a graph, where X axis represents frequency and Y axis represents power.

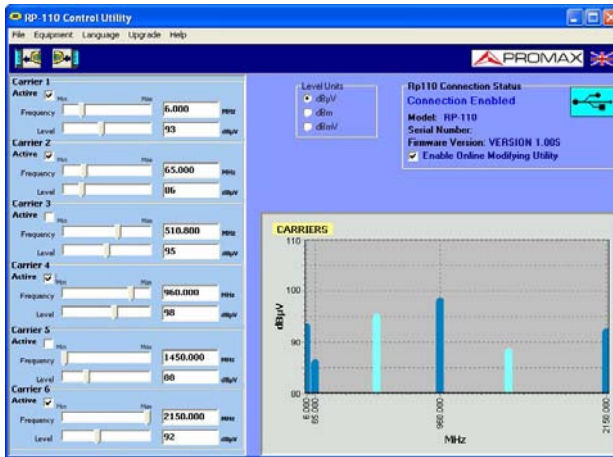


Figure 13.- Main Screen.

The parameters that appear in each one of the four signals are:

- Active:** If you tick this checkbox the signal becomes active, that is, the instrument emits the signal. On the graph you can know what signal is enabled (dark blue) or disabled (light blue) by the colour.
- Frequency:** It defines the frequency you want to emit at (in MHz). It should be into the range of working values for each signal. It can be defined numerically by typing the value on the box or analogically by dragging the marker at the bar.
- Level:** It defines the signal power level into the range of possible values. It can be defined numerically by typing the value on the box or analogically like the frequency. The measurement unit is selectable between dBμV, dBm ó dBmV.

At the upper right corner there is a box with information about the connection. If there is not connection with the **RP-110**, that box will be disabled. If there is connection, that box will show data about the model, serial number and firmware version. In this box it is also the option "Enable Online Modifying Utility".

When you tick the option “Enable Online Modifying Utility”, changes made on the signals through the program are transferred immediately to the **RP-110**. If changes are made with that option disabled, to send the data on the screen, you should have to click on the option “Send” at the menu program.

7 MAINTENANCE

This part of the manual describes the maintenance procedures and the location of faults.

7.1 Instructions for returning by mail

Instruments returned to repair or calibrate, either within or out of the guarantee period, should be send with the following information: Name of the Company, name of the contact person, address, phone number, receipt (in the case of coverage under guarantee) and a description of the problem or the service required.

7.2 Maintenance instructions

The maintenance steps to follow by the user consist of cleaning the cover and changing the battery. All other operations must be carried out by authorised agents or by qualified personnel.

7.2.1 Cleaning the cover.

CAUTION

Do not use scented hydrocarbons or chlorized solvents. Such products may attack the plastics used in the construction of the cover.

The cover should be cleaned by means of a light solution of detergent and water applied with a soft cloth. Dry thoroughly before using the system again.

CAUTION

To clean the contacts, use a dry cloth. Do not use a wet or damp cloth.

CAUTION

Do not use for the cleaning of the front panel and particularly the viewfinders, alcohol or its derivatives, these products can attack the mechanical properties of the materials and diminish their useful time of life.

7.3 Components which user can not replace

7.3.1 Not replaceable fuses by user

To be replaced by qualified personnel. Its position identifier and characteristics are:

F1:	FUS 2.5 A	T 125 V
F2:	FUS 7 A	T 125 V