DT-800 CONTROL MODULE

DIGITAL TV HEADEND

SAFETY NOTES

Read the instruction 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.

TABLE OF CONTENTS

English

CONTROL MODULE

DT-800

DIGITAL TV HEADEND

1. GENERAL

1.1 Description

The **DTTV** system (**Digital to TV**) is based on a TV headend that receives television signals from different sources. It processes them for its integration into an output signal in Digital Terrestrial (**DVB-T**) format.

In this way, the signal can be distributed on a TV network with multiple receivers, keeping the original wiring installation but distributing in high-quality format. This system is applicable to hotels, hospitals, shopping centers, universities, etc. that is, local distribution networks that want to distribute content in digital quality.

DT-800 is the control and power module, therefore is the most important module of the **DTTV** system. The **DT-800** controls the **DTTV** headend, which would be made up to a maximum of seven modules. Two cable bus connect the control module to the other modules of the headend. The **DT-800** allows individual control and configuration of each module.

The user can manage the **DT-800** in two different ways: in local mode or in remote mode. In local mode, the module is managed via the keypad and the LCD screen placed on the frontal. In remote mode, the control module is connected to a computer through a network cable and is managed by using the specific software control (RM).

1.2 Specifications

MODULE

Control/Power	Up to 7 modules **DT-XXX**.
Auto-config	Auto-detection of connected modules.
Auto-link	Auto-detection of interconnection between modules.
Local Interface	LCD screen. Navigation keypad (6 keys). 2x information LEDs: Line On/Error. Intuitive Navigation Menu (tree type menu).

English

COMMUNICATIONS

Ethernet	10/100Mb. Via virtual serial port.

MODULES CONFIGURATION

Local	Through local interface.
Remote	Through Ethernet port (PC software supplied).

POWER SUPPLY

Network voltage	90 - 250 V AC
Network frequency	50 - 60 Hz.
Consumption	6 A / 3A maximum for a range lower / higher at the input voltage.
Output Connector	JST B08P-XL-HDS.
Amount	2
Output voltage	+12 V, 10 A max. +5 V, 14 A max.

OPERATING ENVIRONMENTAL CONDITIONS

Altitude	Up to 2000 m
Temperature range	From 5°C to 50°C
Max. Relative humidity	80% (31 °C), decreasing lineally up to 20% to 50 °C.

MECHANICAL FEATURES

Dimensions	W. 50 x H. 262 x D. 230 mm.
Weight	1.85 kg.

ACCESORIES SUPPLIED

1 x CA005	Mains cord.
1 x CC043	Cable Alim. 3 mod.
1 x CC044	Cable Alim. 4 mod.
1 x 0 MI1787	Manual de Instructions **DT-800**.

OPTION

OP-800-P	Power Option.
Output voltage	+12 V, 18 A max. +5 V, 14 A max.

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

* **The safety could not be assured if the instructions for use are not closely followed.**

* Use this equipment connected **only to systems with their negative of measurement connected to ground potential or isolated from the network**.

* This is a **Class I** equipment, for safety reasons plug it to a supply line with the corresponding **ground terminal**.

* This equipment can be used in **Overvoltage Category II** installations and **Pollution Degree 1** environments.

* When using some of the following accessories **use only the specified ones** to ensure safety.

  Power cord.

* Observe all **specified ratings** both of supply and measurement.

* Remember that voltages higher than **70 V DC** or **33 V AC rms** are dangerous.

* Use this instrument under the **specified environmental conditions.**

* The user is not allowed to perform changes inside the equipment. Any change on the equipment must be done exclusively by specialized staff.

* When using the power adaptor, the **negative of measurement** is at ground potential.

* **Do not obstruct the ventilation system** of the instrument.

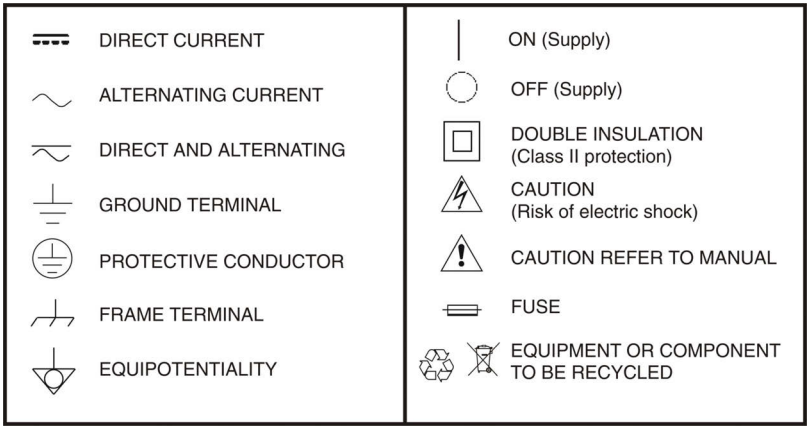
* Use appropriate low-level radiation cables for Input / output signals, especially on high level signals.

* Remote configuration cables <3m.

* Follow the **cleaning instructions** described in the Maintenance paragraph.

English

* Symbols related with safety:



2.2 Descriptive Examples of Over-Voltage 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 DT-900 Sub-rack

The **DT-900** is a metallic casing (sub-rack), where the **DTTV** modules are installed (Fig. 1).

Supplied accessories allow the subrack to be set up in two ways: Installing it in a 19 " rack cabinet (Fig. 2) or anchoring it on a wall.

The wall anchoring system allows, through a tilting system, accessing the rear of the subrack, where the connectors are placed (Fig. 3).

One subrack can contain up to 8 modules. One of them must be the control module **DT-800**.

The sub-rack **DT-900** is supplied with an user's manual, which describes in detail the steps to complete the assembly.

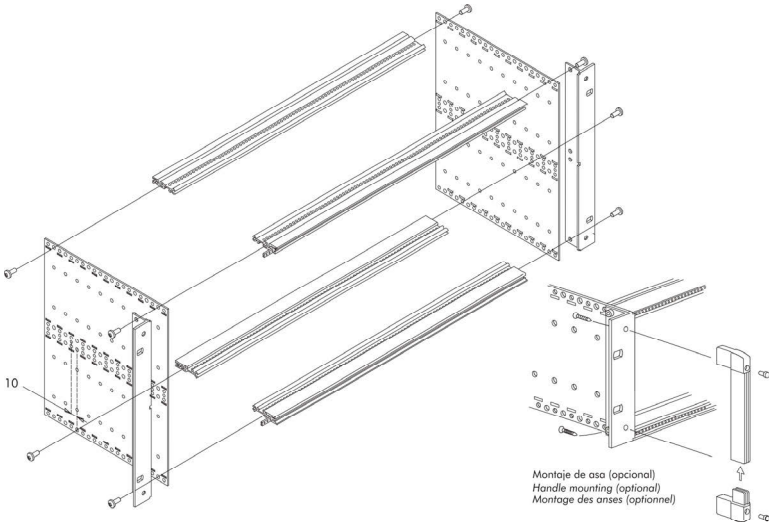


Figure 1.- Subrack Assembly **DT-900**.

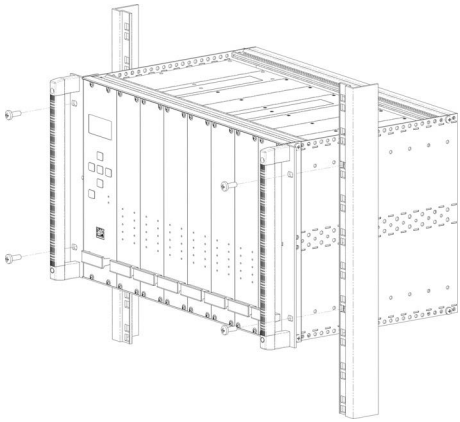


Figure 2.- Assembling a **DT-900** in a Rack Cabinet.

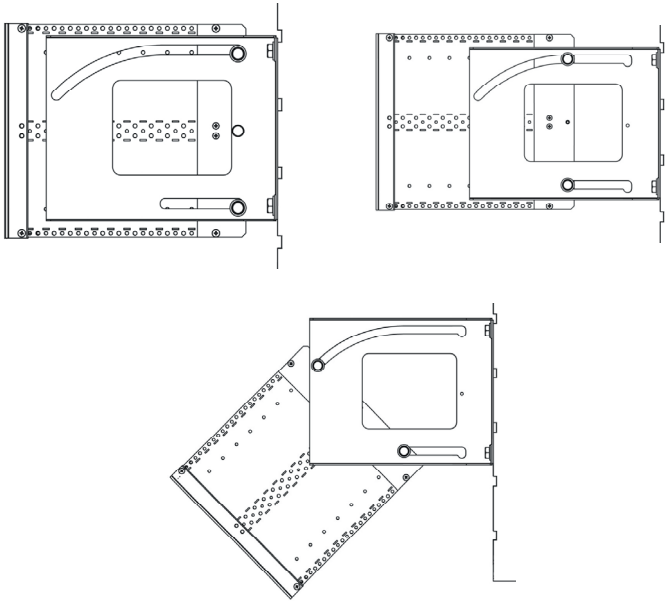


Figure 3.- Tilting System.

3.2 Instalación de los módulos en el DT-900.

To install a module in the subrack, you should slide the module into the subrack, screwing it to the frontal guide (Fig. 4).

In order to get a tidy installation of the modules you should follow the next advises:

- Place the **DT-800** at the left end of the sub-rack.
- Place the **DT-700** and / or **DT-710** at the right end of the sub-rack.
- Place the **DT-101/102** and the **DT-301/302** side by side in the case they were paired.
- Place the rest of the modules together, without leaving a gap between them.

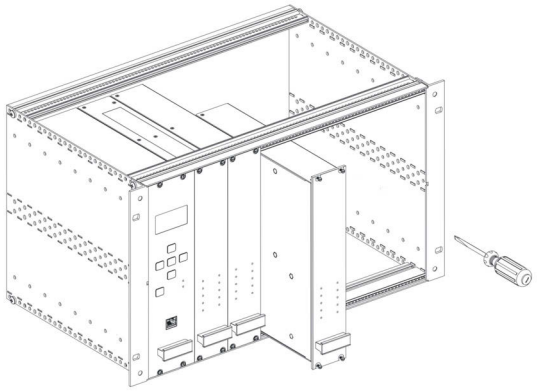


Figure 4.- Installation of the modules into the sub-rack.

Following these advises you will achieve a tidy installation and the best configuration for later maintenance or new modules addition.

3.3 Connecting wires

The modular composition of the **DTTV** headend makes it flexible to adapt it to customer needs. The **DT-800** control module is able to control up to 7 modules.

The **DT-800** module has an IEC C14 inlet connector to power directly from the mains. It has a selector switch to choose the voltage supply between 120 and 240 V. The **DT-800** has two power outputs for the control and power of the rest of modules. They work equally and can be used for any module. Along with the **DT-800** module are supplied the control and power cables. One of them has 3 output connectors and the other one 4 output connectors.

It does not exist a standard configuration for a **DTTV** headend. Depending on the use you want for it, the configuration and position of the modules would change, and therefore it will change the connection between them. Each module is supplied with interconnecting cables, which are needed to carry out any possible combination between modules.

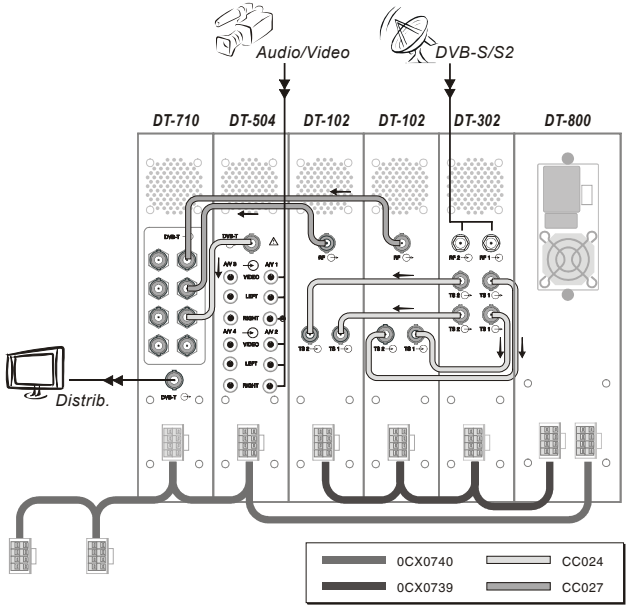


Figure 5.- Application example **DTTV**.

The wiring must be done when the **DT-800** module is off. You do not have to turn it on until **ALL** connecting work is done (on one hand control cables between the **CPU** and the modules and on the other hand, TS cables between modules). This is because during the starting up, the **CPU** scans all the modules, in order to determine the relation among them. If you turn it on before connecting, you will have to spend additional time defining the links by hand because the **CPU** can not detect the connections made in real time.

If you change connection cables between modulators and receivers, you should reboot the system so that the CPU will do a new assignment, otherwise you will should modify assignments manually using the setup menu of the **DT-800** module.

If there is any pair of **DT-101/102** and **DT-301/302** linked, NO place each one in a different sub-rack controlled by different control modules because it would not work properly.

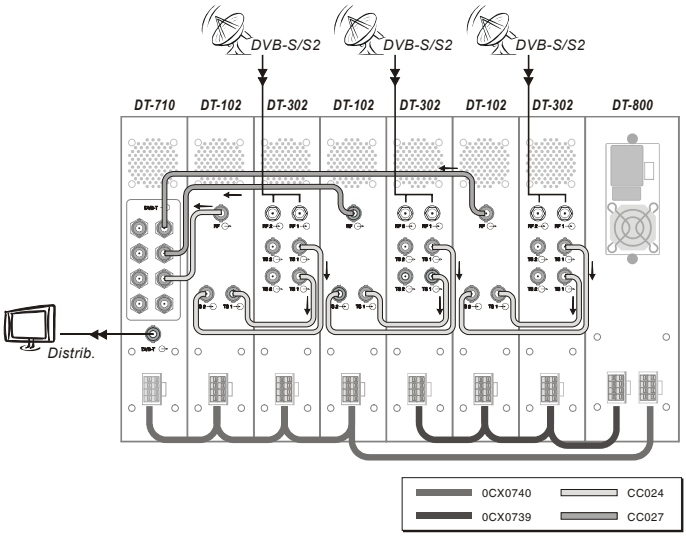


Figure 6.- Application example **DTTV**.

The **DT-800** has an electric current sensor that prevents it from starting up when it is not connected to any module. Therefore the control module will not be ON if at least one connection is made previously.

The combiner modules **DT-700** and **DT-710** are supplied with some resistors to balance the inputs/outputs not used and unbalanced. You should also bear in mind that the module **DT-800** does not control these two modules. The **DT-700** is also a passive module combiner that does not need to be powered.

The necessary devices to connect the antenna or signal sources to the headend (Splitters, cables, connectors, etc.) are not supplied with the **DTTV**. In the same way, if you want to combine an output **DTTV** signal with other signals already existing, such as **DTT**, the installer will must provide the necessary connectors.

English

For an optimal use of the capabilities of the **DTTV**, it is advisable to use an universal LNB with independent outputs or an universal LNB with dual polarity (V/H) and dual band (L/H), both with a switchable splitter for satellite, in order to be able of distributing simultaneously signals in differents bands and polarisations.

It is not advisable to use an universal LNB with only one output and a satellite splitter because in that case all the modules would be tuned at the same polarisation (V or H) and band (L or H).

3.4 Instruccions for installation

After identifying the elements that make up a **DTTV** installation, now we are going to explain the basic procedure for installing and starting-up:

1. Assemble the **DT-900** subrack. Follow the assembling steps described on the manual supplied with the sub-rack.
2. Depending on your needs and available space, put the subrack on a wall or inside a rack cabinet.
3. Install the modules inside the subrack and their connecting wires. Follow the specific instructions provided with each module.
4. Before running the headend you should check that you are receiving input signals properly (satellite TV, analogue, etc...).
5. Check that all modules are wired properly, especially the power cord from the control module to the modules and the wiring between them.
6. Set the voltage selector switch at the voltage supplied by the mains in your area (240 V or 120 V).
7. Start up the system using the switch placed at the rear of your control module.
8. Wait for a few seconds until the control module finishes sweeping and detects all the modules. After that, all them will receive the default configuration data.
9. Verify that the modules detected by the control module and appearing on the screen correspond to the ones installed. Also, you should check there is not any error message on the screen (Note: On one hand, the modules **DT-700** and **DT-710** are not detected by the control module and on the other hand, dual modules appear as two independent units).
10. Set up each module according to your needs.
11. If you have changed the configuration, you should save and restart the control module in order to apply the changes on the modules.
12. At the end of the process all **LED**s should be **GREEN** or off. If there is any **LED** in **RED**, check the configuration and wiring of each module according to the error description showed on the screen.
13. Connect the **DTTV** output to a receiver device, then tune the signal and check you are receiving the TV programmes and services.

4. INSTRUCCIONES DE UTILIZACIÓN

4.1 Description of the Controls and Elements

The only element of control is the **DT-800** module. The rest of modules refer to their status by LEDs place on the front of the module.

Frontal Panel

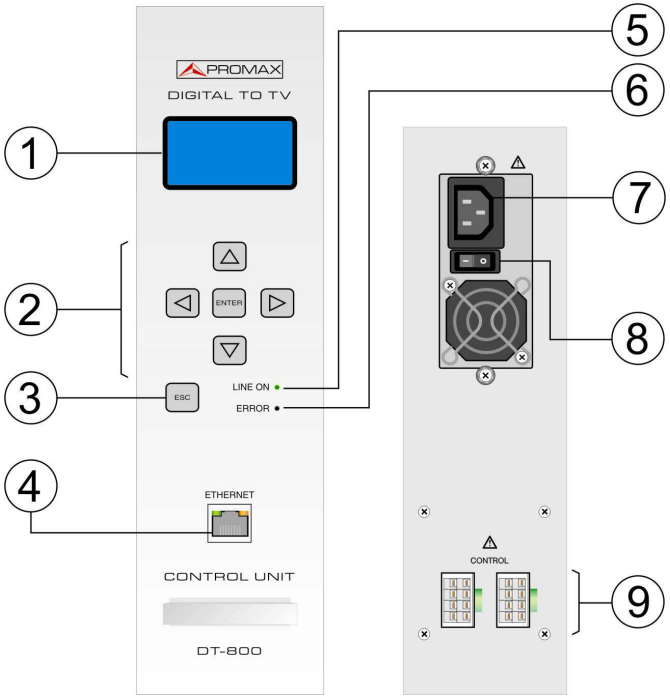


Figure 7.- Front Panel **DT-800**.

[1] **Display.**

[2] **Control Keys**

[3] **Escape Key**

[4] **Ethernet RJ-45 Connector**

[5] **Online LED**

[6] **Error LED**

[7] **Power Connector (IEC C14).**

[9] **Power Switch**

[10] **Power and Control Output**

4.2 Arrows and Function Keys Description

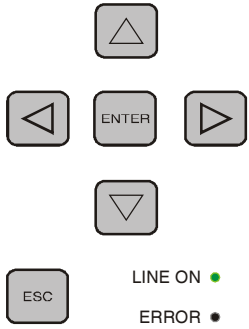


Figure 8.- Function Keys.

ENTER	**Enter the menu / Validate / Select / Deselect.**
▽	**Go to the upper level menu / Increase a number.**
△	**Go to a lower level menu / Decrease a number.**
▷	**Go to the menu on the right / Go to the number on the right.**
◁	**Go to the menu on the left / Go to the number on the left.**
ESC	**Exit without validating.**

4.3 LEDs Table

The **LEDs** of each module indicate a certain status depending on the colour.

The **LEDs** are placed on the front panel of the module.

In the case of a dual module, there will be two columns of LEDs, one per each module.

Name	Status	Description
ON	GREEN	The module is receiving voltage and working.
	OFF	Off / Does not work.
ERROR	GREEN	It is working properly.
	RED	There is an error in the process.
IP	RED	There is not Ethernet connection.
	INTERMITTENT	Ethernet connection established but there is not data traffic to the module.
	OFF	Ethernet connection established and there is data traffic to the module.
TS-IN	GREEN	Transport Stream received correctly.
	RED	There is a problem in the reception of the Transport Stream (too fast, TS wrong...).
DVB-T	GREEN	DVB-T output signal is correct.
	RED	Problem at the output.
PROGRAM	INTERMITTENT GREEN	DT-800 is programming the unit.
	ASYNCHRONOUS INTERMITTENT GREEN	The DT-800 have not received communication from the module for more than 60 seconds.
	OFF	No programming.
LOCKED	GREEN	Locked signal.
	RED	It was not posible to tune.
SERVICE LIST	GREEN	Service List detected.
	RED	It was not able to read the service list.
TS-OUT	GREEN	Proper TS output.
	RED	Problems at the TS output.
A/V	GREEN	Audio and video processing is working properly.
	RED	Error during the process / Encoder broke down.
MUX	GREEN	Proper Multiplexing.
	RED	Error during multiplexig. / Multiplexer broke down.

Table 2.-Table of **LEDs** description.

4.4 DT-800 Starting Up

Turn on your computer through the switch, which is placed on the rear panel of the module [9].

English

After starting up, the **DT-800** scans the modules connected to it in order to detect how many and what modules are and if there is any problem.

During the scan, the control module carries out the assignment of bus addresses and after that an **AUTOLINK**, which consists in identifying those receivers / modulators paired (eg **DT-301/302** with **DT-101/102**). This function is essential for a proper definition of the **SERVICES LIST.** In order to this assigment works, is necessary to make the wire connections before starting up. Otherwise you will should made assigments manually, with the consequent loss of time.

The scanning process takes about ten seconds. After it, it displays on the screen a list of all the modules identified. If the process takes longer, maybe there is a problem with the wiring or the CPU.

4.5 Main Screen

The main screen shows the list of all the modules identified.

At the top of the screen the text **MODULES FOUND** indicates the number of modules detected and below a list with the names of each one of the modules.

If the modules detected are more than four, the list is rotating, that is, it rotates on a sequential order to show all the elements.

The modules are identified as follows:

DT-XXX-SY-MZ

Where:

XXX Indicates the name of the module.

SY **S** means **SLOT** and **Y** is a number equal to the slot position in the subrack case. This position is the one the module assigns automatically every time you turn it on. If it does not correspond to the actual position can be changed manually, but it does not affect the operation for practical purposes.

MZ **M** means **MODULE** and **Z** is a number that identifies the receiver or modulator module (1 for the first module, 2 for the second one).

The bottom of the screen shows the current **STATUS** of the modules. If everything is correct it shows the message "**OK. PRESS ENTER TO SETUP**" (Fig. 9).

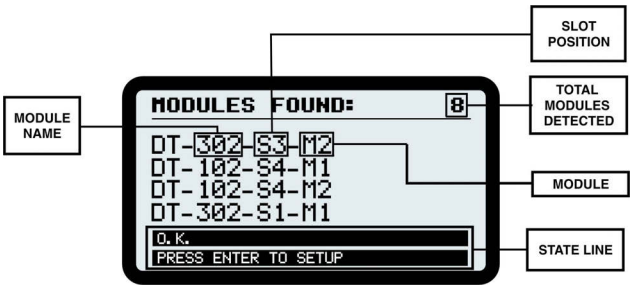


Figure 9.- Main Screen.

The automatic position assignment does not have any practical effect. Each time you restart the **DTTV**, the control module will assign different positions to each module. If you do not like this way to assign, Then you can create and save your own assigment. In this way, your assigment will remain unchanged.

Verify that the modules appearing in the list correspond with the installed and its status is **OK**.

Note that dual modules, such as the **DT-102** or **DT-302**, are treated as two separate units that must be configured independently.

In contrast, the module **DT-7XX**, will not appear on the list even if they are installed in the headend.

If there is some problem, it will appear the name of the module in the **STATUS** line and in the line below a brief description of the problem (Fig. 10.-).

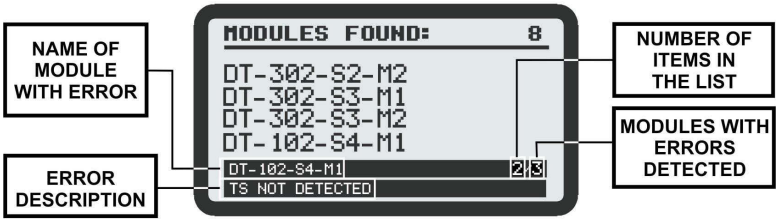


Figure 10.-

If there are more than one module working wrong, the names of these module will appear sequentially at the bottom of the screen. Next to the name is shown a number indicating the order of the module for total modules with errors.

If any of the modules is not listed or its status is not **OK**, check the connections, especially the control and power cord, which is what connects the control unit with the modules, and by which is transmitted the power supply and the identification data and settings.

If the problem persists, adjust the settings or contact our customer service.

If you want to pass to the setup menu, enter the password and press **ENTER** ENTER.

The system has a "**TIME OUT**", which makes the screen again, after a certain time without touching any keys.

4.6 PASSWORD

Access to the configuration of the equipment is protected by a **password** (**PASSWORD**) to prevent improper access by unauthorized persons.

After starting up and scanning, press **ENTER** ENTER key from the frontal equipad in order to get into the **PASSWORD** screen.

The default password is "2008".

Figure 11.- Password.

To enter the password follow the steps below to **EDIT** a **NUMERIC** value. You can apply these steps in order to edit any numeric value.

1.- Press **ENTER** ENTER to get into the **PASSWORD** option.

2.- Press **RIGHT** ▷ or **LEFT** ◁ to move among the numbers, from units to thousands.

3.- If you want to change a number, press **UP**  to increase or **DOWN**  to decrease.

4.- Once the value is edited, press **ENTER**  to confirm the entered value.

After entering the password and if it is correct, you will access the setup menu.

If the password is not correct, you can make a new attempt.

4.7 CONFIGURATION

After turning on the unit, wait until the checking of all the units connected to the control unit is done.

After the checking, press **ENTER**  on the frontal equipped to get into the **CONFIGURATION** login screen.

After entering the **PASSWORD** you will access the settings.

From the starting screen, you can select the module you want to access in order to edit its settings (Fig. 10.-). To do it, use the keys **LEFT**  or **RIGHT**  to move among the available modules.

4.7.1 Description of the initial setup screen

At the top of the screen appears "**SELECT MODULE**" and at the top right corner a fractional number indicating the position of the currently selected option over the total amount of menu options.

At the central area of the screen it appears the name of the module (Fig. 12.-), on the figure is the **DT-800** control unit. Note that the system counts the double modules like two different units and the configurations of them are independent.

At the bottom area, the first line shows the message "**LINK TO**: ..." and then the name of a module. This message indicates the modules the unit control is connected to and have been detected during the scan after starting. The second line shows the number of modules found, excluding the control unit.

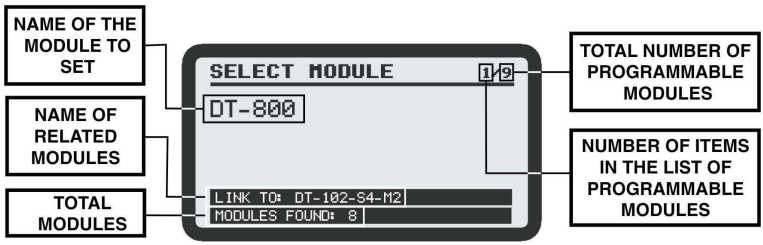


Figure 12.- Initial setup screen.

The first module that appears after entering the **CONFIGURATION** menu, is the control unit **DT-800**. The order of appearance of the rest of modules may vary depending on the location and connection of the modules at the rack and the automatic assigment made by the control unit when booting.

To get into the available settings of a particular module, press **ENTER** ENTER when the module is displayed on the screen.

Every time you see a display module, the **LED** program of this module began to blink.

4.7.2 Browsing the SETUP menu

1.- From the **SETUP** screen, pressing **LEFT** ◁ or **RIGHT** ▷ you can see what modules are available.

2.- When you have the module you want to configure on the screen, press **ENTER** ENTER.

3.- Once inside the setup menu, press the Arrow keys **LEFT** ◁ or **RIGHT** ▷ to move through the module setup options.

4.- When the menu option you want to access is displayed, press **ENTER** ENTER or **DOWN** ▽

5.- An arrow on the left-side of the selected option, means that you are into the menu (Fig. 13.-). Now you can change the value displayed on the screen or move to another menu.

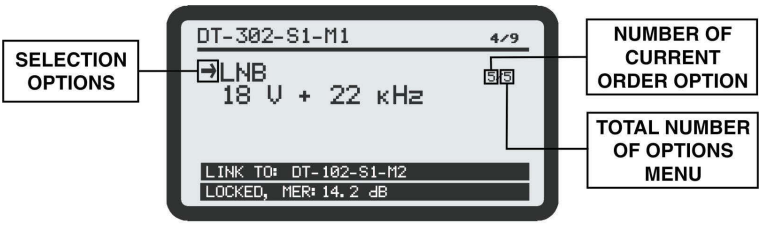


Figure 13.-

4.7.3 Entering, Editing and Selecting values

- **Selecting values**

  In case you want to **SELECT** a value among the available ones, use the arrows **LEFT** ◁ or **RIGHT** ▷ to move among them. When the screen displays the wanted value, press **ENTER** ENTER to confirm it and exit.

- **Submenu**

  In case you access a **SUBMENU**, you could move through the options available using the **LEFT** ◁ and **RIGHT** ▷ arrows, until the appropriate option appears and then press **ENTER** ENTER. When you want to leave the submenu, press **UP** △ or **ESCAPE** ESC.

- **Numeric Field Editing**

  In case you have to **EDIT** the numeric value, follow these steps:

  1.- Press **ENTER** ENTER to enter the menu item.

  2.- Use **LEFT** ◁ or **RIGHT** ▷ to move among the numbers.

  3.- To change the value of a number press **UP** △ / **DOWN** ▽.

  4.- Once the value is edited, press **ENTER** ENTER to confirm the value.

English

- **Editing text field**

  In case you have to **EDIT** the text, follow these steps:

  1.- Press **ENTER** 

to enter the menu item.

  2.- To the right of the edit text appears one letter and one number. The number indicates the position of the character is changing. The letter beside the number indicates the type of character that is being used ("A" for capital letters, "a" for lowercase letters, "@" for symbols and "1" for numbers).

  3.- To move between characters press the **RIGHT**  or **LEFT**  . To delete a character do a long press (1 s) by pressing **RIGHT**  or **LEFT**  **.**

  4.- To change a character press the **UP**  or **DOWN**  . To vary the type of character (uppercase and lowercase letters, symbols or numbers) make a long press (1 s) with the **UP**  or **DOWN**  key.

  5.- When you are finished editing press **ENTER** 

to validate the text and exit the menu.

WARNING!

To VALIDATE a value after changing it you must press ENTER 

or UP  **. If you press ESCAPE** 

the value will not be accepted.

For the changes were applied, you must **SAVE** previously the settings. There are two different ways to save the settings made:

On one hand you can save your settings using the **SAVE** option on each module. On the other hand you can save the settings of all modules at once using the **SAVE ALL** option, which is on the **DT-800** menu.

4.7.4 DT-800 Configuration

The **DT-800** is the control and power module, and therefore is the most important module of the **DTTV**. The **DT-800** controls the **DTTV** headend, which its compose by up to seven modules. Two wire-bus connect the control module to the remaining modules of the headend. The **DT-800** allows the control and configuration of each module in a separate way.

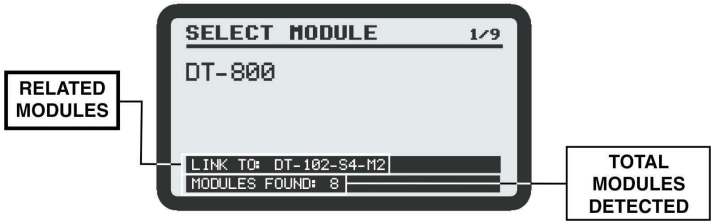


Figure 14.- DT-800 configuration.

The first line at the bottom of the screen shows the modules linked to it. The second line shows the total amount of modules that the control module has detected, itself excluded.

4.7.4.1 Menu Tree

The diagram attached shows how to access the **DT-800** menu setup and the options available on it.

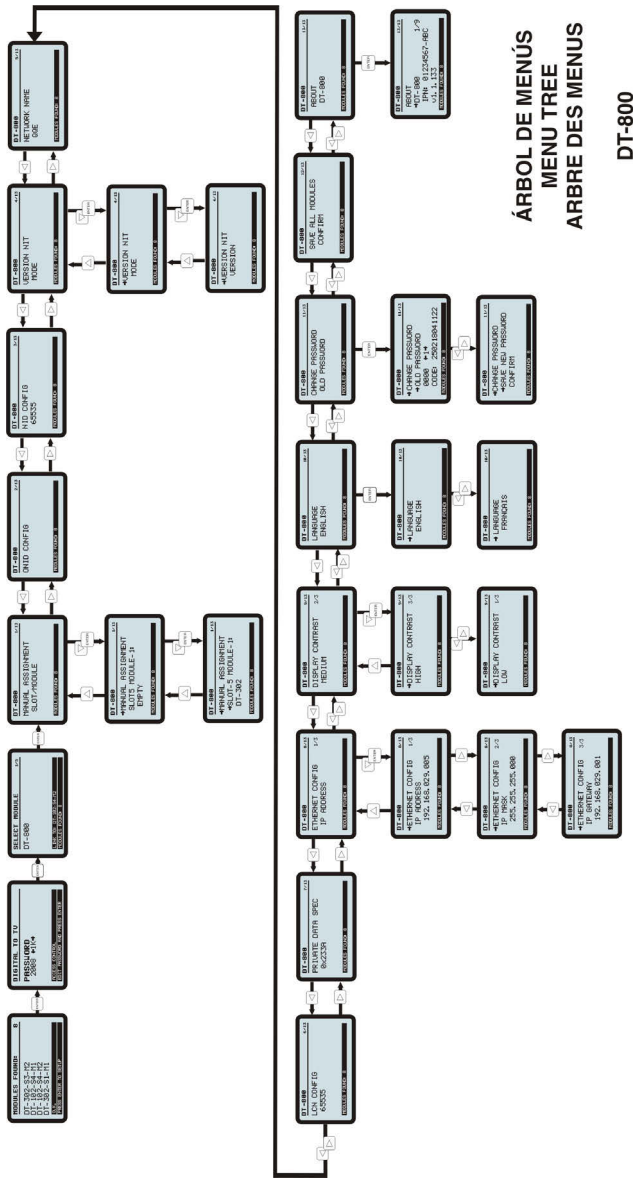


Figure 15.- Menu tree **DT-800**.

4.7.4.2 Configuration options DT-800.

The options of the menu **CONFIGURATION** at the module of control **DT-800** are:

- **Manual Assigment.**

  If the Auto assigment done automatically by the system when starting does not match the actual location of the modules in the rack, this option allows you to change this assigment manually.

  1.- Press **ENTER** (ENTER) to get into the menu. With **RIGHT** (▷) and **LEFT** (◁) arrows you can see the correspondence between the current location assigned (second line) and the modules (third line).

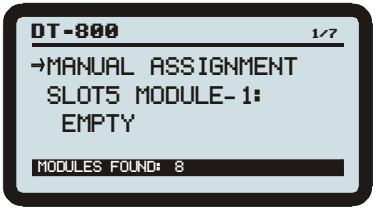


Figure 16.- Manual assignment.

  2.- Press **ENTER** (ENTER) again. The second line is selected (it shows an arrow next to it) and you can move the third one, which is the name of the modules, using **LEFT** (◁) and **RIGHT** (▷) arrows.

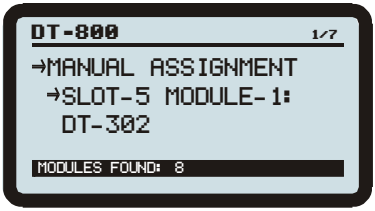


Figure 17.- Change of placement module.

  3.- Make assigment manually, one by one and press **ENTER** (ENTER).

English

4.- When finished press UP  .

- **ONID Config**

- **NID Config (Network Identifier Configuration).**

- **NIT VERSION**

  It is a private table about information of the Network This menu has two options: MODE and VERSION NUMBER. When MANUAL mode is selected then the version number of the NIT table chosen at the menu VERSION NUMBER by the user is fixed. When AUTO mode is selected then the version of the NIT table increments as the contents of the NIT changes.

- **Network Name**

  It allows you to assign a name to the distribution network. It is a text field.

- **LCN Config (Logical Channel Number Configuration).**

  It allows you to change the logical channel number. This is the number from which programmes are stored in the TV receiver. It is a numeric field.

- **Private Data Specifier**

- **Ethernet Config.**
  It allows you to modify the parameters of connection to the data network. It contains a sub-menu with some options to define the parameters of the network: IP address, mask and gateway. All these fields are numeric.

- **Display Contrast.**

  It allows you to change the display contrast of the control module among these values: Low , Medium and High.

- **Language**

  It allows you to select the language displayed on the configuration menu (English or French).

- **Save All Modules.**

  It saves all changes made and validated of all the modules. After entering, press **ENTER** 

to confirm you want to save your changes.

ATTENTION!

If you do not save these changes will be lost when you turn off the control module!

- **About.**

It is an information option. It shows technical information of all the modules, as the firmware version or the IPN (Identifier Product Number). Press **ENTER** and then left or right to see information of all the modules.

4.8.2 PkUpdate

The program **PkUpdate** allows you to update the **firmware** your headend **DTTV**. In the case of new versions of firmware, you will need this program **PkUpdate** to transfer the update file from your computer to the **DTTV** microprocessor.

Steps to follow:

1.- Install the software **PkUpdate** on your computer. Double-click on the executable located in the folder "PkUpdate" which is in the CD supplied with the unit **DT-800**.

2.- Once installed, run the program from the icon 

PkUpdate that has been created on the desktop. Previously, make sure the computer is connected to the module **DT-800**.

3.- Click on the shortcut icon "**Load Update configuration file**"  and through the browser window that opens, find the updating file that you should have been previously downloaded.

4.- Click on the updating file and press "**Open**."

5.- Use the key "**MODEL**" 

in order the program detects the **DT-800** module. If it does not comunícate then check the communication parameters by pressing the setup key  . Check also the cable network is working properly.

6.- Use the button "**Update**" 

to begin the process. The updating progress can be watch through the status bar.

7.- The time took by the process is relative. It is depends on the size file and the number of units to update.

8.- The program will update all units of the same type in the head end, that is, if the firmware affects units DT-30X, and there are more than one in the head end, they all will be updated.

9.- When the progress bar reaches 100%, it pops-up a window with the message box "Update process successful".

10.- Once the process is finished, quit the program and restart the module **DT-800**.

For more details please, read the manual that is supplied with the CD or visit our website:

5. PRACTICAL EXAMPLES OF SYSTEMS DTTV

The owner of a hotel in Menorca, Mr. Ferrer, wants to give the hotel a touch of distinction over the competition, so he has decided to install flat TV screens with built in **DTT** tuner in each room and a satellite dish. He wants an installation of digital quality, but without spending too much money and using the analog distribution network already installed. He also wants to add some international channels to the TV services, in addition to the national ones already available, because often there are Italian and German customers. How can the system **DTTV** fulfill his wishes? Read next...

1.- Current infrastructure.

Firstly, it should be clear to you the purpose of your installation and the existing telecommunications infrastructure in your establishment. In this specific case:

- Analogue TV Distribution network via coaxial cable.
- DTT receivers with built-in tuner.
- Satellite dish.
- Terrestrial antenna receiving digital and analogue signal.

2.- TV Services to distribute.

You should decide what channels and services you want to distribute at your hotel. In this specific case:

- All national **DTT** channels.
- Two Italian satellite channels (Canale 50 and TV7 Lombardia).
- Two German satellite channels (Das Erste and RTL 2 Schweiz).

3.- With these initial data, you can get an idea of what you need for your **DTTV** installation.

- To tune 2 channels of different frequencies, you need a dual receiver, therefore, use a **DT-302**.
- To convert 2 signals to digital, you need a **DT-102**.
- To combine the resulting signals and obtain a single output, you need a combiner **DT-710**.

4.- Translating the installation to a diagram block:

Figure18

And the electrical connections scheme.

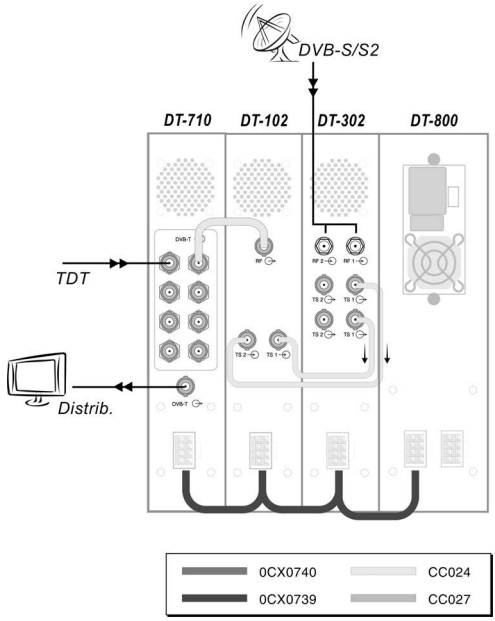


Figure 19 .-

5.- Search data for the tuning of the channels and services.

The tuning data for the channel where are the Italian services "Canale 50" and “TV7 Lombardia” are:

Frequency: 11.541.
Polarization: Vertical.
Symbol Rate: 22000.
FEC: 5 / 6.
Standard: DVB-S QPSK.

The tuning data for the channel where are the German services “Das Erste” y “RTL 2 Schweiz” are:

Frequency: 11,604.
Polarization: Horizontal.
Symbol Rate: 22000.
FEC: 5/6.
Standard: DVB-S QPSK.

6.- After obtaining the data, the DT-302 dual module is configured in order to tune the channels selected. Turn on the and enter, step by step, all the settings. Due to it is a dual module, each unit has to be set separately.

Receiver 1:

LNB Local Oscillator: According to the data collected, it is a vertical polarization. Therefore is 9750 MHz.

DL-Frequency: 11,541.

DL-Band: For the European area is Ku-band.

LNB: For vertical polarization, 13V.

Standard: It is a normal digital channel, therefore DVB-S.

Symbol Rate: 22000.

Service List: Select the services: "Channel 50" and "TV7 Lombardia (Although it has capacity for many more).

Receiver 2:

LNB Local Oscillator: This is a horizontal polarization. It is therefore 10,600 MHz

DL-Frequency: 11,604.

DL-Band: For the European area is Banda C.

LNB: For horizontal polarization, 18V.

Standard: This is a normal channel of digital quality, it's DVB-S.

Symbol Rate: 22,000

Service List: Select the services "Das Erste" and "RTL 2 Schweiz." (Although it has capacity for many more).

7.- Once set the **DT-302**, you should set the **DT-102** in order to adjust the output frequency of the channel.

8.- The output signals of the **DT-102** is the combination of the two inputs from the **DT-302**, therefore you will get a single RF output with services of the German and Italian channels. Now only rests to mix it with the DTT signal from the national broadcasters.

9.- The **DT-710** is used to combine the signal from the **DT-302** and the DTT signal. The combiner mixes both two and get the result.

10.-Now it only rests to connect the resultant signal to the TV distribution network and tune all the TV sets with the new services.

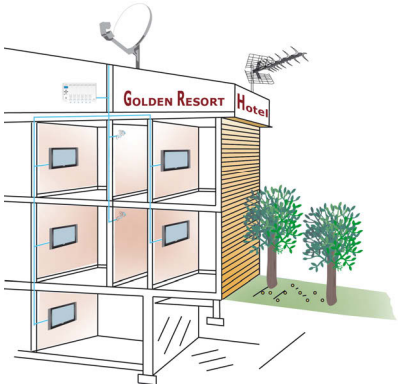


Figure 20.-

After a few months, Mr. Ferrer is very pleased. German and Italian clients appreciate having channels in their own language at the hotel, and they feel more comfortable. The number of bookings has been increased. In addition, few days ago french customers started to call, asking for information, references and about services in the hotel, and those include televisión services. And even currently there is no French channel service, he knows that he can easily set the headend to accommodate new channels, using the remote control software. After hang up, Mr. Ferrer congratulates himself for having invested in the installation of the DTTV system.

6. GLOSSARY OF TERMS

MODULATOR: In telecommunications, the modulation is the process of varying a periodic waveform, i.e. a tone, in order to use that signal to convey a message. Normally a high-frequency sinusoid waveform is used as carrier signal. The three key parameters of a sine wave are its amplitude ("volume"), its phase ("timing") and its frequency ("pitch"), all of which can be modified in accordance with a low frequency information signal to obtain the modulated signal. A device that performs modulation is known as a modulator and a device that performs the inverse operation of modulation is known as a demodulator (sometimes detector or demod). A device that can do both operations is a modem (short for "Modulator-Demodulator").

QPSK: Phase-shift keying (PSK) is a digital modulation scheme that conveys data by changing, or **modulating**, the phase of a reference signal (the carrier wave). Any digital modulation scheme uses a finite number of distinct signals to represent **digital data**. PSK uses a finite number of phases, each assigned a unique pattern of binary bits. Usually, each phase encodes an equal number of bits. Each pattern of bits forms the symbol that is represented by the particular phase. The demodulator, which is designed specifically for the symbol-set used by the modulator, determines the phase of the received signal and maps it back to the symbol it represents, thus recovering the original data. This requires the receiver to be able to compare the phase of the received signal to a reference signal — such a system is termed coherent (and referred to as CPSK). Depending on the number of possible phases to take, are given different names. The most common is to codify a number of bits per symbol, then the number of phases to take is equal to an number which is a power of two. In the case of QPSK (Quadrature Phase-Shift Keying), uses four phases, displaced each other 90 degrees. Normally are used as a phase jumping values 45 degrees, 135 degrees, 225 degrees and 315 º. Each symbol gives 2 bits. The constellation diagram shows 4 symbols equally distributed.

MULTIPLEXER: In the field of telecommunications, the multiplexer is a device that can receive and transmit multiple inputs by a shared transmission medium. To do this it divides the transmission medium into multiple channels, so that several nodes can communicate simultaneously. A signal that is multiplexed must be de-multiplexed at the other end. There are several types of multiplexing depending on how it is performed this division of the transmission medium: frequency division multiplexing, time division multiplexing, code division multiplexing and wavelength division multiplexing.

COFDM: Coded Orthogonal Frequency Division Multiplexing is the modulation system used in the radio and televisión systems. Unlike other systems that modulate in a single carrier frequency with a very high rate of symbols, COFDM modulates information in many carrier frequencies, where each one has a very low rate of symbols.

MPEG-2: Moving Pictures Experts Group 2 (MPEG-2) is the designation for a set of standards for encoding audio and video agree by **MPEG** (a group of experts in moving images), and published as a ISO 13818 standard. **MPEG-2** is usually used to encode audio and video for transmisión signals, including digital terrestrial television, by satellite or cable. With some modifications, is also the encoding format used by **DVD** `s commercial films.

DVB-T: **DVB-T** is an abbreviation for Digital Video Broadcasting Terrestrial; it is the **DVB** European-based consortium standard for the broadcast transmission of digital terrestrial television. This system transmits compressed digital audio, video and other data in an **MPEG** transport stream, using **COFDM** modulation.

DVB-S: Digital Video Broadcasting by Satellite (DVB-S) is a system that allows increasing the transmission capacity of digital television and data via satellite using MPEG2 format. The structure allows mixing in a stream a large number of video services, audio and data. For transmissions via satellite the QPSK encoding is adopted, with a binary variable flow from 18.4 to 48.4 Mbits / s. DVB-S format is widely used in European countries.

TS-ASI: (Transport Stream - Asynchronous Serial Interface): It is a protocol especially designed for transmitting in media sensitive to noise and used in the DVB standard (Digital TV distribution protocol) for the transmission of compressed digital television signals. It is also used as an interface of input and / or output multiplexers, MPEG-2 encoders, etc. ASI interface was created especially for transporting MPEG transport streams, is extremely flexible and can carry data at any speed from zero to over 200 Mbit / s.

LNB: The Low Noise Block amplifier or LNB is a device consisting of a low noise amplifier and a frequency converter (RF to IF). The reason for use a universal LNB is motivated because it can get all the bandwidth (the low-band, from 10.7 to 11.7 GHz, and the high-band, from 11.7 to 12.75 GHz). This allows the reception of all analogue channels with an analog receiver, and all digital channels with a digital satellite receiver. The universal LNB selects the low-band or the high-band, when activating a tone switch of 22 kHz generated by the digital receiver. Horizontal and vertical polarization is selected by applying 13 or 18 volt to the power supply.

MER: It is the Modulation Error Rate. It is a measure that allows knowing how good a modulated digital signal is. It is the equivalent of the information provided by the signal/noise rate in the analog modulations.

DL-FREQUENCY: It is the downlink frequency from a satellite to the Earth. It is equivalent to adding local oscillator frequency plus intermediate frequency of a signal.

SYMBOL RATE: In digital communications, symbol rate, also known as baud or modulation rate; is the number of symbol changes (signalling events) made to the transmission medium per second using a digitally modulated signal or a line code. The Symbol rate is measured in baud (Bd) or symbols/second. In the case of a line code, the symbol rate is the pulse rate in pulses/second. Each symbol can represent or convey one or several bit of data. The symbol rate is related to but should not be confused with gross bitrate expressed in bit/s. A symbol is a state or significant condition of a channel of communication that persists for a period of time. The transmiter instrument puts the symbols in the channel at a known rate of symbols, and the receiving device has to identify the sequence of symbols in order to rebuild the data transmitted.

NID:

LCN: It a number that identifies the Logical channel number.

PID: It is the Packet IDentification, a number that identifies a service of a program.

CAM: A conditional access module (CAM) is an electronic device, usually incorporating a slot for a smart card, which equips an Integrated Digital Television or set-top box with the appropriate hardware facility. This enables you to view conditional access content that has been encrypted using a conditional access system. There is not an unique CAM that allows working with all the existing formats encrypted, it depends on the system of encrypted digital platform you are using.

FIRMWARE: Firmware is a term sometimes used to denote the fixed, usually rather small, programs that internally control various electronic devices. Typical examples range from end user products such as remote controls or calculators, via computer parts and devices like harddisks, keyboards, TFT screens or memory cards, all the way to scientific instrumentation and industrial robotics. Also more complex consumer devices, such as mobile phones, digital cameras, synthesisers, etc., contain firmware to enable the device's basic operation as well as implementing higher level functions.

TID: The information, in accordance with the MPEG format, is divided into several packets that are transmitted. Each of these packets have the same table TID or identification table in order to be subsequently identified by the receiver.

7. MAINTENANCE

7.1 Cleaning Recommendations

CAUTION

To clean the cover, take care the instrument is disconnected.

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

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.

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