

# PROMAX NEWSLETTER

15 / 2006



*TV EXPLORER* ✓

*Field strength meters* ✓

*Cable television and data analyser* ✓

*Monitoring systems* ✓

*DVB-T Modulator* ✓

*Optical fibre* ✓

*Wireless test equipment* ✓

*Test and measurement* ✓

*Electronic training equipment* ✓



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## Datalogger function

Since its launch, the **TV EXPLORER** has become the industry's standard instrument. It combines very reduced dimensions with an impressive data processing capacity, making measurements in a way that are most transparent to the user.

### Datalogger

**PROMAX** pioneered and perfected the principal of providing an easy method of performing, collecting and collating literally thousands of signal measurements. The **Datalogger** function is been used in all the **PROLINK Premium** series instruments and now it is been improved and made available to the **TV EXPLORER** as well.

Installers are required to collect a lot of data to provide their customers or supervisors with reports. **PROMAX** has promoted since many years the outbox idea, so that measurements are acquired in the field and then transferred to the computer.

### Start a datalogger

With this new function, the **TV EXPLORER** not only becomes an instrument capable of automatically **EXPLORE** the band and **IDENTIFY** the signals, but it can also measure all the parameters that determines the signal quality such as signal level,



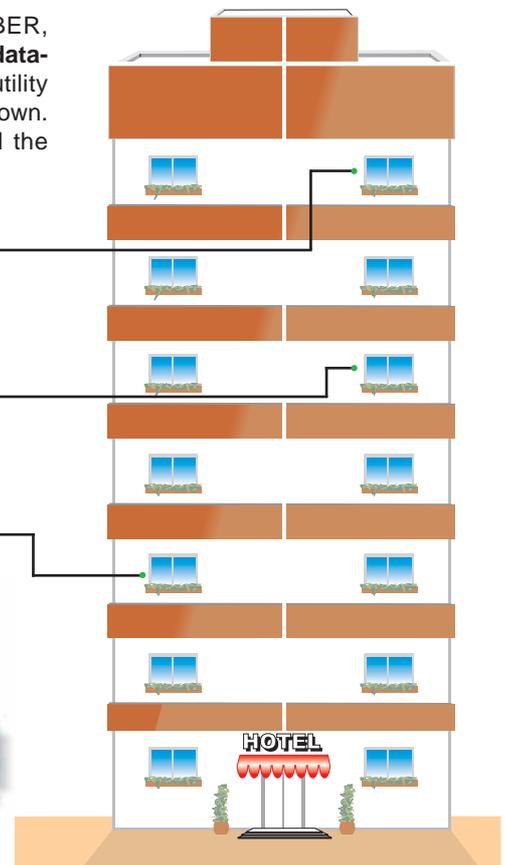
channel power, carrier/noise, BER, MER, etc. and store them. The **data-logger** is accessible from the utility menu and it mostly works on its own. You press the key, wait and all the data is collected.



Test point 1  
"Room 1"

Test point 2  
"Room 2"

Test point 3  
"Room 3"



## Datalogger function

### One Logger, several Test points

Every acquisition becomes in fact a Test Point inside a LOGGER and both the LOGGER and the TEST POINT can be personalised.

For instance, the LOGGER can be given the name of the site, building or installation and the TEST POINT, the specific place where test is made, for instance bedroom, apartment 1, apartment 2, apartment 3, etc.

### View ALL CHANNELS on a Test Point or ONE CHANNEL in each Test Point?

Data stored is all the data related to the signal either analogue or digital. Data can be easily viewed with the VIEW DATALOGGER.

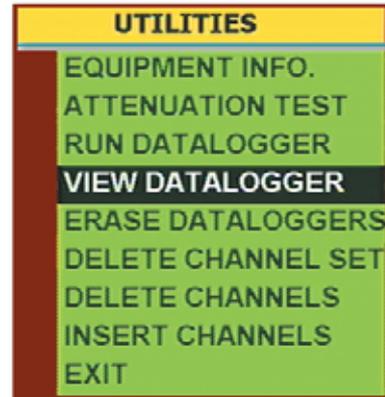
If the cursor is set over the CHANNEL, when turning the encoder you can VIEW the measurements of all channels on the actual TEST POINT.

If the cursor is set over the TEST POINT when turning the encoder you

can VIEW the measurements of the actual channel in all the test points. This function is specially useful to check the signal drop along the system.

#### Test point "room 1"

Measures for CH 21  
Measures for CH 22  
Measures for CH 23  
... etc



#### Test point "room 1"

Measures for CH 21  
Measures for CH 22  
Measures for CH 23  
... etc



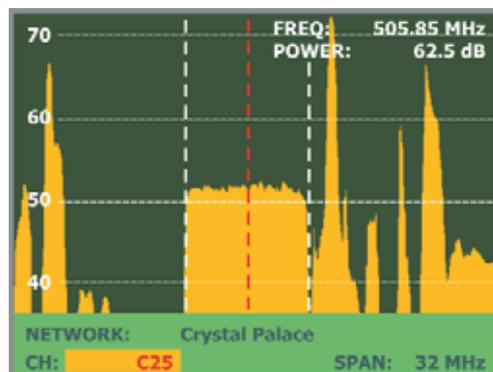
## Auto identification function (What satellite is this?)

### Tells information

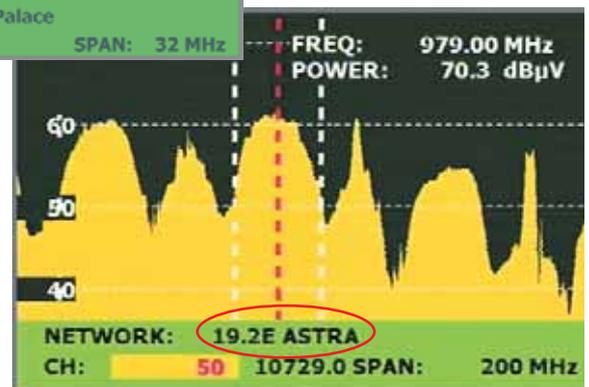
When using **AUTO-IDENTIFICATION** function from spectrum analyser or antenna alignment modes the **TV EXPLORER** does what no other meter can do. It tells information about the origin of the signal, what satellite or what transmitter is it coming from!!! This is obtained from network identification data contained in the transport stream.

This works for all digital channels, satellite, broadcast TV and Cable TV.

This is particularly useful to locate a satellite. Go to antenna alignment mode, move the dish until you receive some signals, press AUTO-ID and you know what satellite you are on.



This new function is downloadable via the Internet and comes with the TV Explorer firmware version 4.02



## Automatic detection of saturation

The objective of this function is to indicate by means of an icon if the signal that arrives at the **TV EXPLORER** is saturated. It is a very useful function to determinate the correct adjust of analogue channel amplifiers.

When the gain in the head-end of a SMATV system is too high, it can cause saturation. This function allows the adjustment of the maximum levels of the analogue signals coming from the amplifiers. When the level of a certain analogue channel is over the maximum level, the equipment detects its saturation and the symbol 'detection of saturation' appears in screen.



This icon also appears when the burst signal (transporting the information about the color) does not contain information and therefore the images are in black and white.

In summary, this function is very useful, to identify problems related to the distortion or excess of amplification, that can occur in the mast, system or distribution amplifiers.

### Safety margin

While carrying out gain adjustments at the antenna amplifiers on analogue channels, the amplifier could be saturating the signal. When this happens, the icon will appear in the left top corner on the screen.

In this case, it is necessary to reduce the gain of the amplifier and to reduce it until the icon disappears completely. Then it is recommendable to take reading of the signal level and to readjust the amplifier 3 dB below the value previously read.

This procedure will provide a sufficient safety margin to guarantee the adjustment of each analogue amplifier to avoid saturation. Furthermore, it allows to determine the maximum gain to equalise the installation correctly. In this way, there will be a margin to avoid saturation conditions in case of an unexpected increase in the entrance signal level.



## TV EXPLORER and HDTV

### HDTV: A Short description

**High Definition Television** is a new TV format that intends to display video information with higher resolution than conventional TV.

After a long period of time with confusing technical information about HDTV, the industry has now agreed on the exact meaning of HDTV.



TV sets, based on CRT, TFT or plasma technologies, are compatible with HDTV and can consequently carry the label "HD READY" only if they are compliant with the certain technical requirements (see below).

HDTV is broadcast using digital television techniques only. The HDTV video signal must be processed to prepare it for transmission.

### Technical requirements for HDTV

- Minimum vertical resolution of 720 lines in 16:9 format
- Inputs for HDTV signal via:
  - YPbPr (analogue components)

- DVI or HDMI
- HDTV inputs must accept minimum following video formats:
  - 1280x720 @ 50 and 60Hz with progressive scan ("720p")
  - 1920 x1080 @ 50 and 60Hz with interlaced scan ("1080i")

### Transmission processes for HDTV

#### Digital compression.

Signal is converted into digital and compressed to reduce the amount of bandwidth required for transmission. Two techniques are used, MPEG-2 and MPEG-4. As a result we obtain a TS (Transport Stream).

#### Modulation.

The TS is prepared to be broadcasted over the transmission channel.

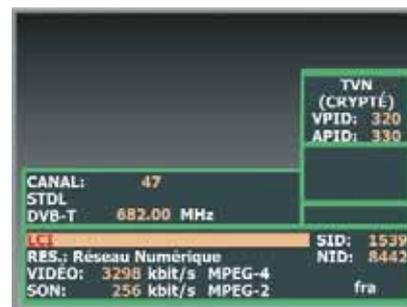
- Terrestrial: DVB-T COFDM
- Cable: DVB-C QAM
- Satellite: DVB-S QPSK, DVB-S2 QPSK or 8PSK

MPEG-2 or MPEG-4. The service list will indicate the presence of HDTV services.

Currently, power and C/N measurements can be carried out on TXD's using DVB-S2. No digital measurements such as MER, CBER, VBER can be made at present. However, because of the nature of satellite transmission, measurements taken at neighbouring channels can also be representative.

### MPEG-4 Identification

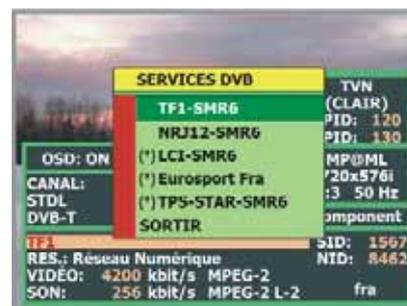
Another example we found in France where some of the DTT services use MPEG-4 coding. In the picture you can see like a **PRODIG-5 TV EXPLORER** identifies the service without any problem and even it measures the video bit rate.



### HDTV & the TV Explorer

The **PRODIG-5 TV EXPLORER** is compatible with DVB-S so it can **make measurements on HDTV channels** using this modulation scheme.

This is the case of TXD's 116 and 2 and is independent of whether the programmes are compressed in



				POW	C/N	MER	BER	VID	AUD	V-RES	PID	V-BITR	A-BITR
DVB-S	MPEG-2	SD	FREE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			COD	✓	✓	✓	✓				✓	✓	✓
	MPEG-4	HD	FREE	✓	✓	✓	✓			✓	✓	✓	✓
			COD	✓	✓	✓	✓				✓	✓	✓
DVB-S2	QPSK	HD	(as DVB-S)										
	8PSK	HD		✓	✓								

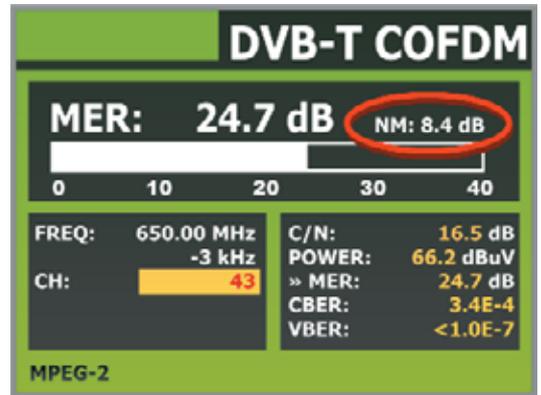
• POW (Power), • VID (MPEG video decoding), • AUD (MPEG audio decoding), • V-RES (X-Y video resolution), • PID (video and audio service), • V-BITR (video bit rate), • A-BITR (Audio bit rate)

## Noise margin measurement function

Another function is been added to the **TV EXPLORER**.

**Noise Margin** value indicates how many dB's you could degrade the MER of a signal in order to reach VBER equal to QEF ( $2.10^{-4}$ ) or in other words how far we are from the QEF in terms of MER.

The MER of the signal in this picture, could still be degraded additional 8.4 dB to get to the VBER limit of acceptance  $2.10^{-4}$ .



## IF Test

The **IF TEST** function allows to check buildings cabling system before the antennas and head-end systems are operative. For this application **PROMAX** has specially designed **RP-050** and **RP-080** signal generators.

The procedure allows to evaluate the frequency response of a whole TV signals distribution network by means of two steps.

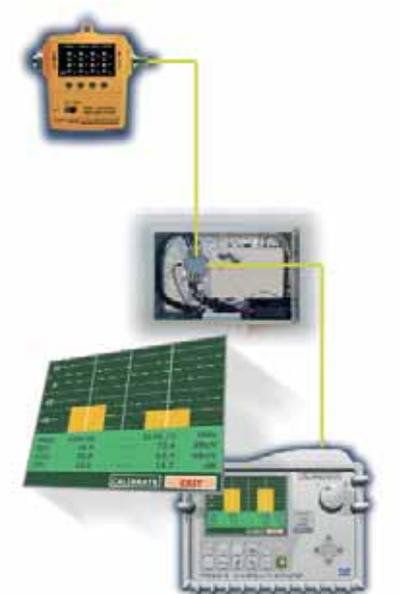
### Step 1: Calibrating with TV Explorer

Connect the **RP-080** directly to the **TV EXPLORER** and power on the

**RP-080** through the **EXPLORER**'s RF output. Now access the **ATTENUATION TEST** in **CALIBRATE** mode. The system compensates all the cable and conector drops and sets all three frequencies to zero.

### Step 2: Measure pilots throughout the network

Once calibrated, start to make level measurements in each outlet. On the screen will appear the attenuation values for the three pilot frequencies measured in the different testing points.



## FM peak deviation measurement function



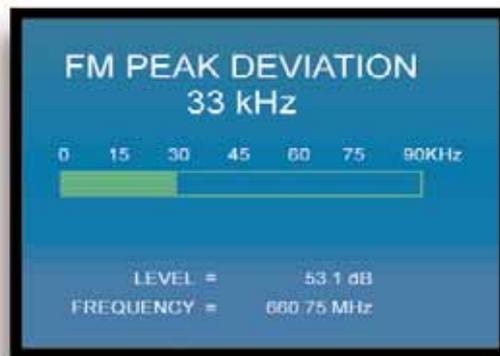
Now, after including with the **PROLINK-4 Premium** the **OP-004 FM** option, it is possible to measure the frequency deviation of any FM-modulated carrier. This new function allows monitoring the frequency peak deviation for FM signal carriers.

This feature has been designed for the test of analogue transmissions, like TV and Radio broadcasting services, and allows to determine the peak deviation, along with the signal level and frequency of the carrier. The measurements are made after applying to the corresponding de-emphasis and expansion filters, being updated in real-time.

When the equipment measures according to a standard list of TV channels (Channel Plan), it will test automatically at the sound carrier frequency specified by the TV standard previously selected.

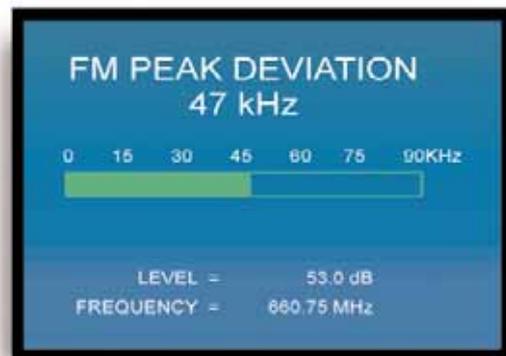
Once this function is activated, the equipment carries out the measurement and display the results with a numerical value and a graphical bar.

If the meter is being used in the frequency-tuning mode (FM band), it directly makes the measurement at the frequency selected. The deviation peaks appear on the screen in order to observe if they overpass the limit suitable for both, the receiver and the transmitter in a transmission system.



FM carrier peak deviation

Frequency tuning  
FM band



## Identifies satellites and DVB-S services SKYHUNTER

The arrival of Digital TV has boosted the installation of Direct To Home satellite TV systems. The continuous release of new packages or services and the low cost fees required demand for equipment and tools to make the installation easier, faster and more reliable.

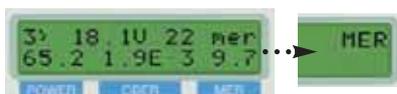


### Maximum number of installations

The **SKYHUNTER** responds to the need for an installation tool that might allow making the job fast and including all necessary measurements to secure quality of reception.

The **SKYHUNTER** has been designed to guarantee the maximum number of installations with the best possible quality, thereby helping the installer to evaluate the results.

The instrument directly determines if signal quality is of a sufficient level for reception. This is done on the basis of the internal BER (CBER) measurement and the modulation error ratio (MER). The **SKYHUNTER** processes all the information and gives to the installer the information he requires, thereby making his work as easy as possible.



The instrument is very easy to use instrument, it guides the user through 3 steps, enabling the desired satellite to be located, guaranteeing its identification and accurately adjusting the receiver antenna to obtain the best possible signal quality.

### Long operation time

The **SKYHUNTER** has been designed to allow continuous supply to universal LNB for over one hour with standard Ni-MH batteries and over 2 hours with Li-Ion batteries (OP-001-11). The charging time is short; just one hour for a nearly-complete charge (3 hours with OP-001-11) and it can be made from the mains or from the car lighter adapter.



### Selective identification

If properly programmed according to the needs of a determined area, it can be used as an automatic installation tool for specific satellites or program packages.

### Detection of short circuits

The equipment detects LNB consumption as well as short circuits, cable cuts or LNB malfunctions.



### Easy to use

#### 1.-Detection of satellite.

It works as a wide band detector indicating power of all satellites present on the trajectory of the antenna.



#### 2.- Identification.

The instrument tunes to preset test points, reads the Transport Stream and displays the identification of the service on the display. It allows identification of one specific service or satellite. The BER measurement is presented in two different ways, as it displays "ber" when the quality is below DVB quality standards and "BER" when it is above it.



#### 3.- Optimisation.

Based on measurements made on the demodulated signal user can optimise the skew and fine-tune the dish.



### Robust Construction

The equipment is built into a tough ABS box with a fully watertight front panel. Now with back light display. The input connector is replaceable and the instrument is shipped with BNC and F connectors. The equipment includes a carrying bag with a belt, freeing the installer's hands for carrying out readings.

## Cable TV & data analyser PROMAX-26

**PROMAX-26** is an analyser for the installation, configuration and maintenance of video and high speed data interactive services over TV networks based on the EuroDOCSIS and DOCSIS 2.0 standard. It allows the qualification of VoIP services.

### Upstream and Downstream

The **PROMAX-26** communicates with the CMTS and shows the most important information related to the transmission: frequencies assigned in the upstream and downstream, signal quality in the downstream (power, BER, MER), power transmitted by the modem and attenuation in the return band.



The upstream attenuation is a very important parameter and the installer must verify if this parameter is within the specified range.

### MER and Constellation

These measurements are decisive for the early detection of excessive noise in the system or intermodulation problems in the downstream.



In general, a lower MER can mean system operating problems, as well as a slow speed due to the packets loss and interruptions.

The display of the constellation diagram and the bit error rate (BER) are other key measurements to evaluate the performance of the downstream.

### SCAN and level measurement function

The instrument also can be used to measure the RF level of analogue and digital signals. The signal level measurement can help us to determine if the system does not work right in order to allow the communication between the **PROMAX-26** and the CMTS.

The **PROMAX-26** incorporates a powerful spectrum analyser, which allows the visualisation of the full



frequency band (FULL SCAN) and the each tuned channel (ZOOM SCAN). That is useful to analyse with detail any co-channel or adjacent channel interference.



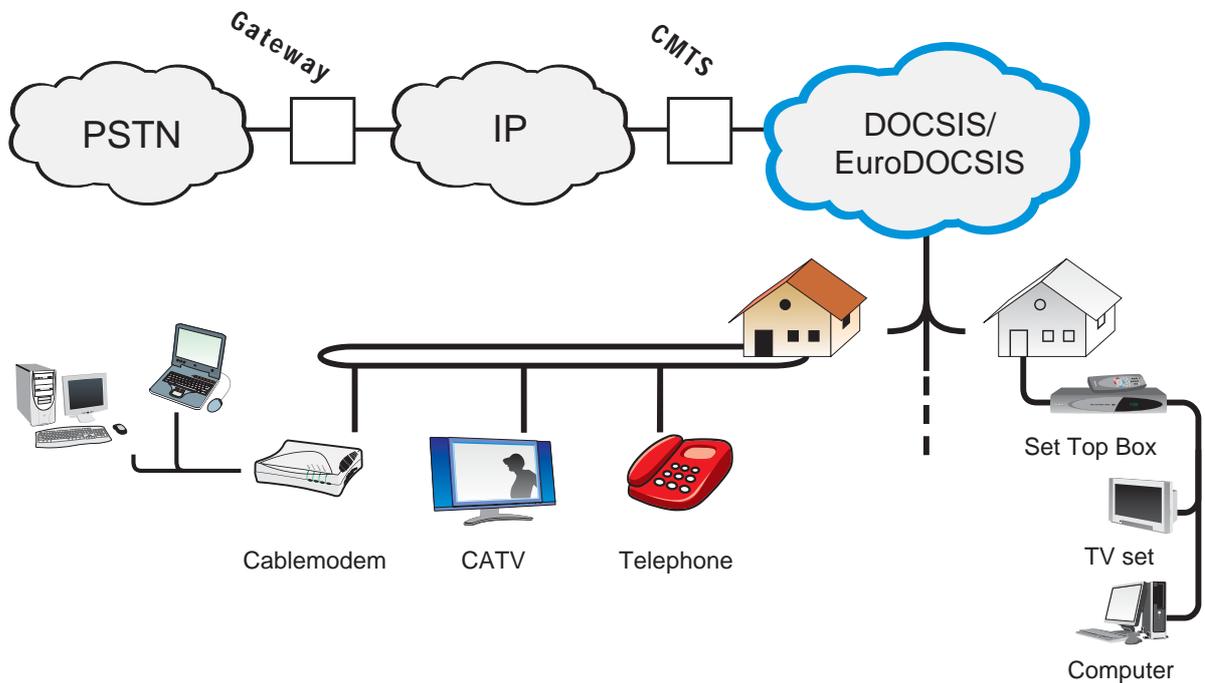
### Packet loss ratio

When the **PROMAX-26** operates in registered mode, it can communicate in the network and can show useful data related to the IP addresses allocation and the form in which the packets flow throughout the network.

The instrument calculates the ratio of packages received (PLR) which represents a statistical measurement about the traffic effectiveness through the network, as well as the maximum and minimum times for those receptions. This will allow to evaluate the network capability to support certain transport services (e.g. voice on IP) and to determine the global performance of the overall system.



## Cable TV and data analyser PROMAX-26



### Channel Searching

This function carries out an exploration of all **EURODOCSIS / DOCSIS** channels, collecting them in a list.

For each channel it shows the power level received, the MER and the corresponding upstream channel identifier.

be transferred to a personal computer (PC) to be processed later or to be included in the automated measurement reports.



### Channel Qualification

The **PROMAX-26** includes a signal generator, a pilot signal with selectable level, frequency, modulation and symbol rate. It can be programmed to continuous or TDM mode in order to evaluate the quality of the upstream channel.

### Datalogger mode

Most of the measurements both for the upstream and for the downstream (including IQ constellation) can be stored in the internal memory by means of the Datalogger function with up to 30 positions of capacity. All these data can

The **PROMAX-26** is capable of the following measurements:

#### Downstream:

- Channel power
- MER and BER
- Constellation diagram
- Full band power
- Frequency, channel and active channel plan
- Modulation type and symbol rate

#### Upstream:

- Power
- Attenuation at CMTS
- Frequency and bandwidth
- Modulation and symbol rate
- Communications test

#### Communications Test (in Registered mode):

- IP report
- Ping test
- Ratio of lost packets

## Multicarrier generator RP-250

### To check the television cable networks

The pilot generator **RP-250** is an instrument designed for the verification of coaxial wirings and associate devices. It is the ideal instrument for the generation of reference signal in order to equalise bands as much in the downstream channels as in the return path, as the DTV antenna facilities, cable, ISM (Wireless Bluetooth) and satellite band. Connection to the local area network to be integrated in a monitoring system for quality maintenance.

### Analysis of ICT facilities

The equipment allows to carry out automatic equalisation measurements for the IF band in ICT distribution networks, when it is used jointly with an analyser which provides this function.

The equipment works connected to the mains or to batteries, being very suitable also for solving field problems.

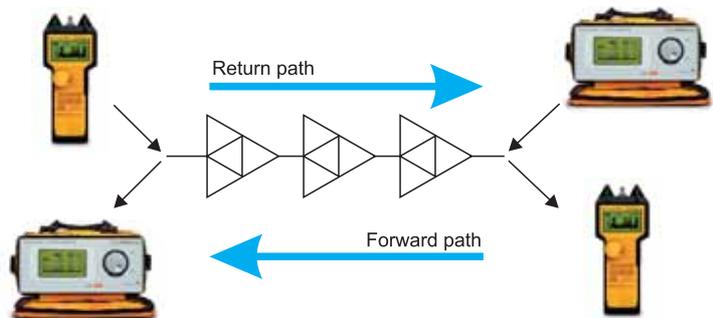


#### Key features

- Carrier frequency margin, from 5 to 2500 MHz (3 in UHF and VHF band), 3 in SAT band), (1 in sub band from 5 to 100 MHz) and (1 in ISM band)
- Resolution 10 kHz
- Carrier level from 90 to 110 dBmV

- Level resolution 1 dB
- Level accuracy  $\pm 2$  dB
- Impedance 75  $\Omega$ .
- Flatness 1 dB
- Communications. **RS-232C** and ETHERNET
- HTTP and SNMP protocols

## Multicarrier generator RP-200



### Testing cable TV networks

The **RP-200** pilot generator has been designed to test cable networks and their associated devices. It generates reference signals for band equalisation of both downstream and upstream channels.

Using **PROMAX-10 Premium** or **PROMAX-8 Premium** in conjunction with **RP-200**, level differences can be adjusted with the TILT function.

### Remote control (Web Server)

**RP-200** allows the control of the equipment through a PC connected to a local area network. It's possible to access the Web Server using a browser and program any frequency or level value.

### Full band

The **RP-200** is able to provide up to four continuous wave (CW) signals in the band from 5 to 900 MHz. This allows to test line or line sections and devices in both the forward and the return band.

### Low-level harmonics

Output level can be selected from 90 to 110 dB $\mu$ V and independently for each carrier. The level of harmonics is -60 dB and therefore produces no interference into adjacent channels. It is an ideal equipment to install new lines and to test existing ones.

The equipment is battery operated which makes it appropriate for testing trunk amplifiers.



## Spectrum monitoring ProWatch DEIDE3

**ProWatch DEIDE3** offers key solutions in the scope of measurement, supervision and monitoring of digital & analogue TV/ Radio signals.



### Monitoring systems

**ProWatch DEIDE3** consists of a remote monitoring system, based on three basic elements:

- Client Equipment with browser
- Remote Control Unit (RCU)
- Measurement Unit (MU)

A key part of this system is the use of communication standard protocols so that a client can accede to any MU from any place by means of a standard web browser without requiring the installation of proprietary software. The characteristics that offer the new **ProWatch DEIDE3** equipments, allow the design of a centralised system through a Remote Control unit able to manage the different Stations or Measurement Units.

The system **ProWatch DEIDE3**, is able to detect and to identify analogue and digital signals, besides it can carry out an automatic spectrum monitoring with possibility of remote control. Thanks to the versatility of its design, the system offers a wide range of possibilities.



The unit of measurement is constituted by a **PROLINK-4C Premium**, which offers the most advanced features including a processor to perform a network connection using the SNMP protocol. This one station is called Measurement Unit (MU).

In the other end of the connection is located the RCU. A computer, properly authorised and a management application compose

this station. This last one specifically includes functions developed in accordance with the end-user. Based on this configuration, the RCU can carry out numerous actions:

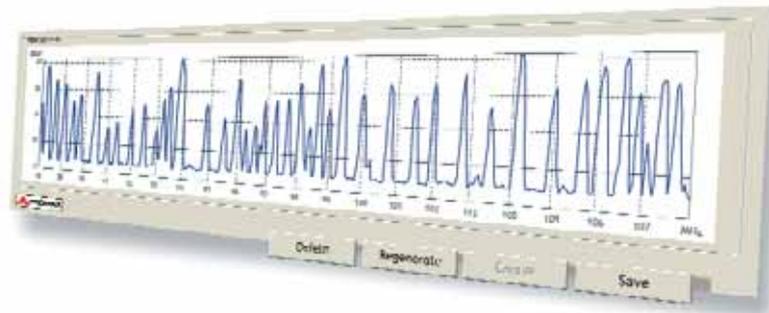
- Obtain status information about the Measurement Unit.
- System task scheduler, single or periodically measurements are programmed.
- Datalogger in real-time and statistics of measuring processes. (Historical).
- Real-time measurements.
- Measuring process control (varying operation parameters).
- Display data results (alarms, historical, system status...).
- Remote and automatic updating manager: Downloading new versions for MU applications (Updates).
- Video and audio data streaming for TV/radio tuned signals.
- Alarm generator via email.
- RCU and MU access control.
- MU priority manager and users group generation.
- Secure Module (Watchdog).



## Spectrum monitoring ProWatch DEIDE3

### Monitoring the radioelectric spectrum

A special case of great interest is the monitoring of the radioelectric spectrum that allows the detection of **new signals or nonauthorised**, as well as the verification of the **transmission quality** for all carriers. The measurement unit MU, alert right away of anyone of these assumptions on the basis of definable limits.



Radioelectric spectrum exploration in continuous mode

### How it works?

- The system performs a spectrum reference sweep.

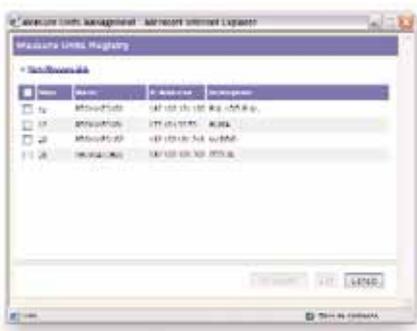
(The type and origin of each one of the carriers is identified and stored in a Database as a spectrum-reference).

- Later, continuous spectrum sweeps are done.

(The results of each one of these sweeps will be match with the reference one in order to generate alarms when anomalies are detected).

By means of the automatically comparison of sweeps of the electrical spectrum radio, the database of previously identified stations and the pre-established quality limits during the process, can yield to one of these events:

- A new carrier is detected.  
(If it is not identified in the reference sweep, the system generates an alarm).
- The level of one or several carriers fluctuates.  
The system registers the affected transmitter or transmitters and generates an alarm. The system can be set so that it sends warnings using the email.

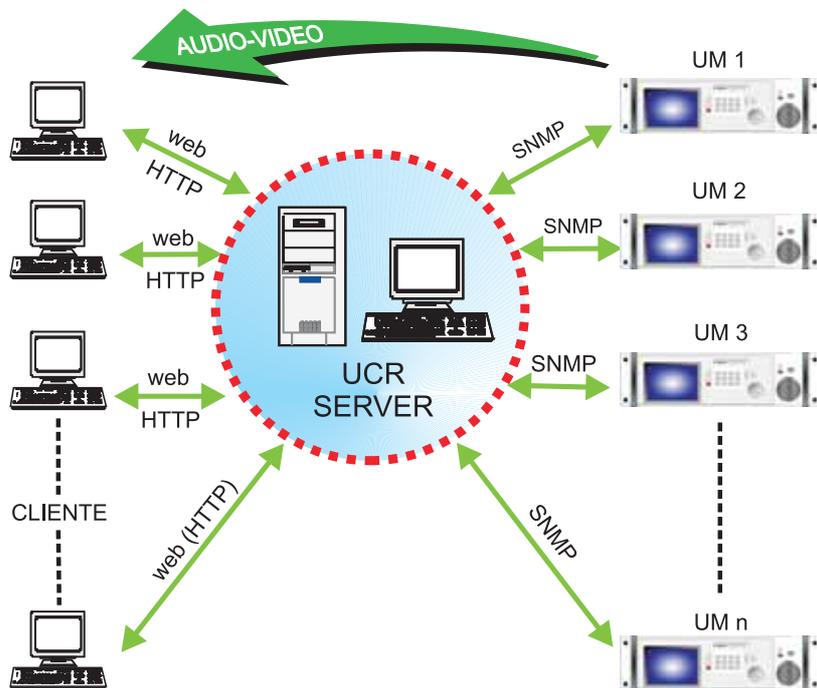


### Remote control

Several MU can be managed from the Remote Control unit even when are located thousand km far away by using the different protocols based on TCP/IP (SNMP, HTTP, MAIL (SMTP), FTP...).

In this graph, it is possible to observe the Measurement Units operating connected through a network by

MU and reports accurate data to locate system application measurements. Thanks to the global positioning system included in the **ProWatch DEIDE3** equipments, it is possible to know in real-time, and with a highest accuracy, in which geographic world point, is placed each one of the measurement equipments. This is a very interesting characteristic in those cases that are generated alarms.



means of HTTP (Web) protocol between the client and RCU and SNMP between the RCU and the Measurement Unit that manage them and receive the required data.

The use of the **GPS** is optional in the **ProWatch DEIDE3** system. When the application includes the control by GPS position, the operation can be activated or be deactivated, modifying the configuration of the system.

The system **ProWatch DEIDE3** allows to connect a GPS unit through a USB port, which uses NMEA protocol. This GPS unit is a part of the

## Spectrum monitoring ProWatch DEIDE3

### Measurement Units

The Measurement Unit is designed for 19" rack assembling. It has built-in: the power supply general system, the measurement equipment, a processor based on an industrial PC and a device to digitalize and compress video and audio.

The processor has available several peripherals, which are necessary to the system control: hard disk, USB ports, Ethernet and serial port, keyboard adapter, and display and interface for the control of the specific hardware to capture audio and video.

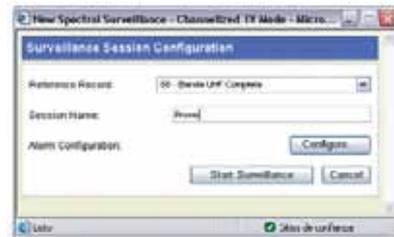
The processor is based on an Embedded PC of high performance and very low consumption. This allows an easy use with portable units or those applications in which the equipment set must be powered through a battery system.



### Monitoring Points

The Measurement Unit can be optionally used in local mode, adding to it a display and a keyboard. This possibility allows that the **ProWatch DEIDE3** system be deployed in portable units or monitoring points attended by technicians, facilitating the daily task of anomalies detection, and without discard the possibility of providing data to a centralised control system (RCU).

The number of Measurement Units, which can be managed by the **ProWatch DEIDE3** system, depends only on the network capacity and the application type executed in the RCU.



### Customized application

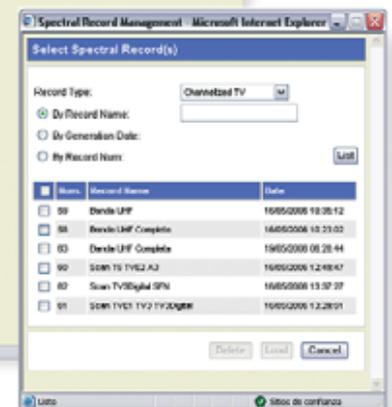
The control application has several software modules on which the customized final application is made up. These basic modules determine the type of applications to be run.

- Equipment measurement control module:  
It does available for the application all the remote control commands included in the **PROLINK-4 Premium** measurement equipment.
- MySQL Database manager:  
It allows the remote access to the MU to be managed through basic functions: SETH, GET and TRAP. It is the base for the Measurement Unit remote control.

- HTTP web server: Provides the services required to manage the UM by means of a web browser.

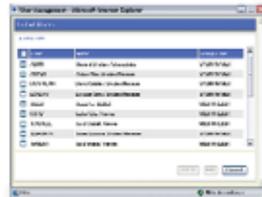


- SNMP Agent: It allows the remote access to the MU to be managed through basic functions: SETH, GET and TRAP. It is the base for the Measurement Unit remote control.
- MIB Files: Together with SNMP agent, they determine the MU remote control capacities. It has three basic files: The MIB of direct access to the database, a MIB of direct access to measurement equipment and a MIB to accede to the Autonomous Management Module generated in according to each application.



## Spectrum monitoring ProWatch DEIDE3

- Task scheduler module (CRON): It manages the accomplishment of the diverse tasks corresponding to programmed measurements and monitoring, in a single or periodically form.
- Secure Module (WATCHDOG): It provides the capacity to reinitiate the **ProWatch DEIDE3** equipment Operating System periodically with the possibility of carrying out backups of data.
- Versions management: The system is able to download via FTP the update files in a remotely and automatically form.

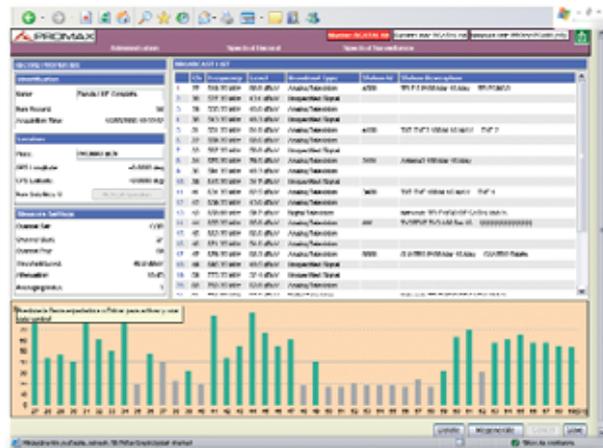
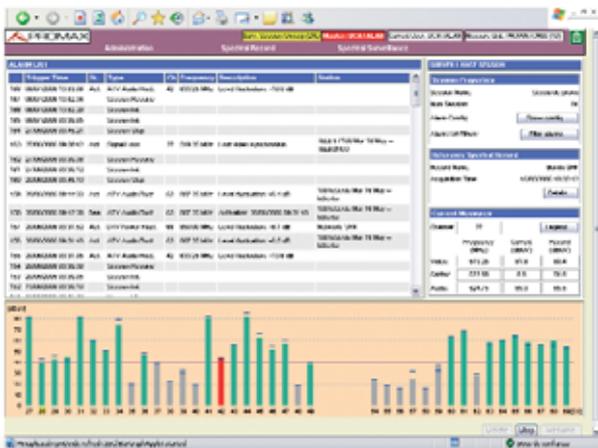


- MAIL manager module (SMTP): It provides the capacity to send electronic mail messages based on the detected alarms and set by the user.
- Users manager module: It allows to register the users login/logout, as well as to modify their priorities. The users can be grouped and be classified according to their responsibilities and system access level.

### Identification of the carriers detected in the band

During the spectrum monitoring, at any moment it appears a spectrum representation or a graph representing the levels of all the carriers, according to the user preferences.

In the graph appears, followed by a color code, all band channels, including the busy channels and those that shows any problem (transmission nonidentified, reception low quality due to some problem, etc).



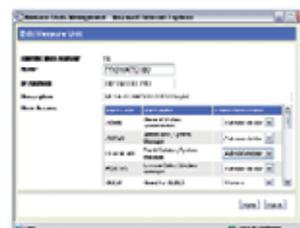
### Selection, tuning and visualizing

It's possible to access to the service list from a digital multiplex and to select any desired channel. Through the display and the loudspeaker built-in you can watch and hear the aerial transmission. The remote control mode allows transmissions of audio (VoIP) and video (Streaming Video) through the network for any channel under test as well as to supervise it from a control centre.

### Network full supervision.

In order to use the **PROWATCH** equipment remote control mode it is necessary to have previously registered in a database all the control network equipments.

Each one of the equipments must have a unique address IP and a descriptive name to allow the connection using the network.



## Testing DVB-T & DVB-H MO-170

The **MO-170** is a multi-purpose DTT modulator providing a complete test suite which can be used to perform measurements at different points on the DVB-T signal chain. The wide selection of test options available in the **MO-170** makes it the perfect companion for anybody interested in checking and validating a variety of critical aspects throughout the DVB-T system.



- 6, 7 and 8 MHz channel bandwidths (user-selectable)
- 2k & 8k modes
- Master and slave operation
- Hierarchical modes
- Frequency agility (1 Hz step)
- High MER

- In addition to the more common test modes such as:

- Internally generated test TS.
- Carrier blanking.
- Single carrier generation.
- Controlled insertion of errored bits to emulate a given BER before or after the Viterbi decoder.

- The **MO-170** includes other novel features as an option (**OP-170-E**):

- Addition of white Gaussian noise with selectable C/N.
- Simulation of fixed and mobile multipath channels with up to 6 taps of variable amplitude, delay, phase and Doppler frequency.

- **DVB-H** is also possible as an option

These and other features present in the **MO-170** simplify the set-up of complex test systems and allows measurements over real conditions without having to spend a fortune.

### Test Transport Stream

When out-of-service tests are required the **MO-170** can be used standalone, internally generating a test TS



Sample of a test signal with PRBS payload data

consisting of NULL packets filled up with PRBS payload data. If the tests do not involve displaying a picture on a monitor, no external transport stream input is needed. The **MO-170** automatically synthesises the bit rate needed to operate the modulator depending on the DVB-T parameters in use.



When a moving picture is required the **GV-998** can be used to supply a test pattern through the ASI or SPI input.

### Signal level alignment and in-band noise measurements (OP-170-E option)

Blanking a set of contiguous carriers within the COFDM spectrum can help in measuring the levels of in-band noise (intermodulation products, Gaussian noise). The **MO-170** allows to vary the width of the spectrum hole as well as its location within the channel.

COFDM signal power is measured by taking the average of the power within the channel. To simplify the process of aligning signal levels across a transmission or reception chain, the **MO-170** can generate a single central carrier whose peak power is 3 dB above the average power of the DTT signal.



Spectrum hole unveiling the presence of intermodulation products within the channel

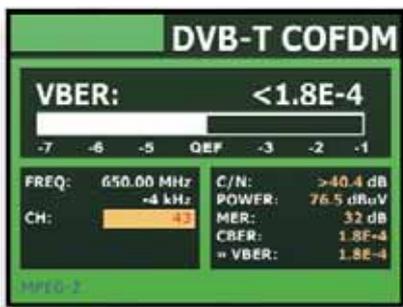
### Getting your Bit Error Ratios right

A unique feature of the **MO-170** is the insertion of bit errors in different stages of the DVB-T modulation

## Testing DVB-T & DVB-H MO-170

chain. This can help to check the accuracy of the BER estimation algorithms implemented in high-end professional receivers.

A Channel BER (CBER or BER before the Viterbi decoder) ranging between  $7.6 \times 10^{-6}$  and  $1.25 \times 10^{-1}$  is generated by modifying the sequence of bits at the input to the constellation mapper. Analogously, the **MO-170** is able to generate a Viterbi BER (VBER or BER after Viterbi) going from  $3.7 \times 10^{-9}$  to  $6.2 \times 10^{-2}$  by properly processing the bits at the output of the Reed-Solomon encoder. The main advantage of this technique when compared with varying the C/N to get the desired CBER or VBER, is its high resolution and unparalleled accuracy.



MENU: back PUSH: select TURN: next/prev  
TEST VBER Value: 2.0E-4

QEF VBER insertion in the MO-170 and BER measured by the TV EXPLORER

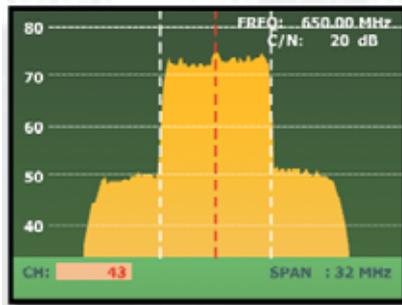
### Start making noise

(OP-170-E option)

A traditional set-up for measuring DVB-T performance versus C/N typically includes a source of wide-band white Gaussian noise, an RF power meter plus selective channel filter or a spectrum analyser, and a varying number of high-precision variable attenuators and directional couplers. The C/N generation function available in the **MO-170** makes this kit no longer required and allows a much simpler configuration.

In the **MO-170**, white Gaussian noise

with twice the bandwidth of the DVB-T signal is digitally added to the



MENU: back PUSH: select TURN: next/prev  
NOISE C/N: 20.0 dB

QEF VBER insertion in the MO-170 and BER measured by the TV EXPLORER

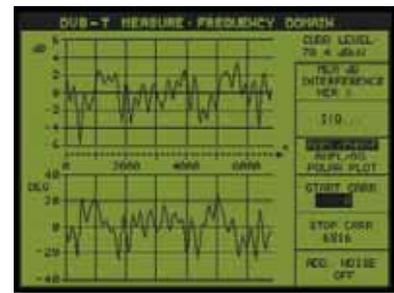
COFDM signal. C/Ns between 3 and 40 dB in steps of 0.1dB can be selected. In addition, the RF signal level (COFDM and noise combined) can be further attenuated from 0 to 60 dB in 1 dB steps. This provides the means to either keep the signal power constant whilst varying the C/N (e.g. to plot the BER vs. C/N of a demodulator), or to keep the C/N constant whilst varying the signal power (e.g. to find the sensitivity of a receiver).

The DVB-T signal may be switched off while the noise is still on, and vice versa. This way, noise and signal average powers can be measured externally using the appropriate equipment so as to verify the selected C/N reading. The fact that both noise and signal are digitally synthesised has the added benefit of generating C/Ns **with a precision that is difficult to achieve in a traditional assorted test set-up.**

### Fixed/mobile multipath channels, SFN/MFN simulation and more (OP-170-E option)

**COFDM** was the modulation chosen for digital terrestrial TV broadcasting because of its superior performance in dynamic and static multipath channels.

A **novel feature** in the **MO-170** is the possibility of simulating channels with up to 5 echoes (plus the main path) of variable attenuation (0 to 40 dBc in 0.1 dB steps), delay (0 to 445 ms), phase ( $0^\circ$  to  $359.9^\circ$  with resolution of  $0.1^\circ$ ) and Doppler frequency (zero for fixed channels and ranging between -830 Hz and +830 Hz in 0.1 Hz steps for mobile channels).



Amplitude and phase of fixed Ricean channel F1 simulated with the MO-170

Among other applications, the channel simulator can be successfully used to simulate the following scenarios:

- Pre-echoes in a SFN or, in general, any power delay profile found in practice in single (MFN) & multiple transmitter (SFN) networks.
- Static channels corresponding to roof-top fixed and portable reception. In particular, good 6-ray approximations can be generated for the F1 and P1 channels defined in Appendix B of document ETSI EN 300 744. Other 6-path profiles are those defined in Appendix K.2 of document ETSI TR 101 290.
- Mobile channels with pure Doppler shift. An example of this is the 0 dB echo profile proposed in Appendix K.3 of document ETSI TR 101 290.

The channel simulator may be used in conjunction with the C/N generator to evaluate the performance of a DVB-T system for a pre-defined multipath channel as a function of the amount of additive noise present in the channel.

## Optical spectrum analyser PROLITE-60



The **PROLITE-60** is the first optical spectrum analyser truly portable, rough and battery operated available in the market at an attractive price. It is suitable for many applications.

The first and may be the most interesting today is **WDM/CWDM** telecom system test but using the various options and accessories available it is adequate for reflectometry, analysis of materials, fibre sensors, testing of photonic devices such as filters, attenuators, couplers, isolators and other optical components.

### The optical spectrum analyser

Until the arrival of WDM systems, the spectrum analysers were basically laboratory equipments, non portable and high cost. WDM systems demand multitude of field optical measurements and the laboratory optical analysers are not suitable for outdoor measurements.

The priority for the worldwide telecommunication operators is to make profitable the already existing optical networks. For it the first step is to increase its capacity. Current DWDM systems, can increase in one or two orders of magnitude the capacity from an already existing fibre.

In order to analyse the individual carriers optical spectrum analysers with resolutions below 1 nm are required. In the most advanced facilities,

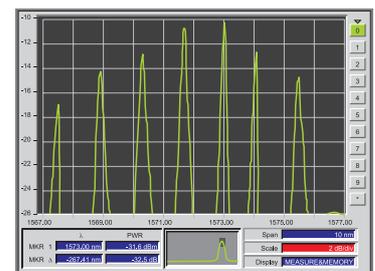
the separation between carriers goes from 0.8 nm (100 GHz of spacing channel) to 0.2 nm (25 GHz).



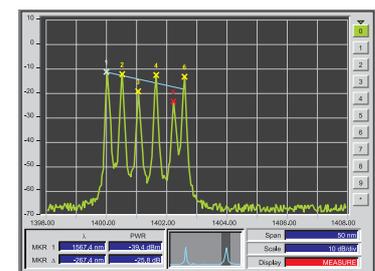
### PROLITE-60 The first truly portable

These measurements based on a high resolution optical spectral analysis and also with high accuracy have to be able to be carried out in any point of the network. By all it, the equipment for measuring, and more specifically, the spectrum analyser that is oriented to applications in WDM networks, must be a portable instrument, robust, fast and easily of operating and with a moderate price.

Based on a spectrum analyser platform, the **PROLITE-60** allows to carry out automatic measurements in all the scopes of application, such as the analysis of the WDM signal in any point of the network or the characterisation of network components: Filters, amplifiers, multiplexers, DFB lasers, FB lasers and LEDs.



Spectrum of a measured WDM system using a **PROLITE-60** from **PROMAX**



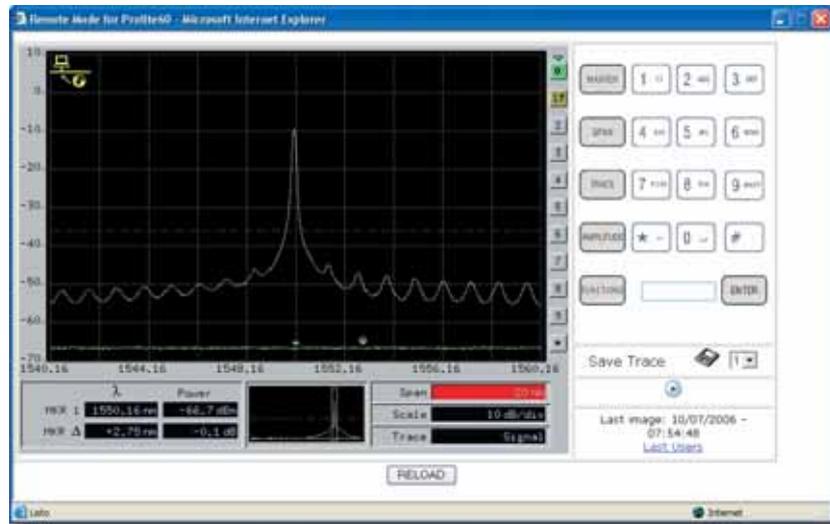
Automatic measurement of a WDM system using a **PROLITE-60**

The spectral analysis in optical fibre networks is more and more necessary. WDM systems convert optical fibres to freeways of information with capacities up to 1Tb/s ( $1 \times 10^{12}$  b/s). Thanks to the spectrum available in the optical band, at the moment up to 200 lasers of different wavelength can be transmitted in a same fibre. For the test and maintenance of these networks it is fundamental to handle portable equipment. A new generation of field optical measuring equipment is now raising.

## Optical spectrum analyser PROLITE-60

### Remote control (Web Server)

**PROLITE-60** allows the control of the equipment through a PC connected to a local area network. It's possible to access the Web Server using a browser and program any frequency or level value.



## Optical power meter PROLITE-23

### Ideal tool for both laboratory and field applications

The **PROLITE-23** optical power meters are compact, lightweight and easy-to-use instruments for optical fibre network, with unique characteristics of quick testing. Widely favored for their quality, value, reliability, accuracy and safety, The pocket-size **PROLITE-23** can support accurate testing of single mode and multimode optical fibre systems, with features of large LCD display, damp and shock proof design and dual-way powering system.



The internal microprocessor and

lineal amplifier technology ensure the long-time accuracy. Besides, **PROLITE-23** has a large memory capacity of 3200 records and can transfer the measurement data to a PC for editing and printing.

Ideal for both laboratory and field applications by using concise function keys to implement quick, high accuracy testing. Under the situation of laboratory, LANs, WANs and CATV as well as long-distance optical network, the Optical Power Meters, together with a stabilized laser source, can be used to identify optical fibre, measure optical attenuation, verify continuity and evaluate fibre link transmission quality.

- Pocket-size, large LCD display, easy to use
- Fast response, no warm up
- Measure six wavelengths through a single connector
- Direct loss measurements units in dB
- Absolute power measurement units in dBm and W (or  $\mu$ W)
- Interchangeable fibre-optics connectors
- (FC/PC, or optional SC, ST)
- Dual-way powering system (9V battery or an optional power adapter)
- Damp, dust and shock proof design
- PC software available for testing data collection and report generation
- Auto off function conserving battery life

## Micro OTDR PROLITE-50

### A fault locating and analyzing tool

The **PROLITE-50** series are optical fault locating and analyzing tools for optical fibre network, and feature hand-held, compact, lightweight, easy-to-use, intelligent and quick test. The Large colour LCD display design makes testing work more comfort and convenient no matter during daytime or at night.

As a fault locating and analyzing tool the **PROLITE-50** are easier, smaller and more economical than typical equipments of its class, with higher



user value. Besides, **PROLITE-50** can save and transfer the measurement curves data to a PC by the provided software for further analyzing, reporting and printing.

According to the ergonomics, the **PROLITE-50** are designed to fully embody the user's convenience with its large LCD display and graphical interface. The user can activate the measurement operations easily by the push of only one button. The **PROLITE-50** will become the indispensable and ideal tools that all builders, and maintenance personnel of optical fibre networks should have in their tool kit.

- Lightweight, portable, easy-to-use and economical
- Fast test, and large LCD display
- Colour LCD display
- Measure the length and defects of coiled optical fibre
- Large memory capacity (300 test curves)
- RS-232 / USB data upload port & PC Software
- Interchangeable fibre-optic connectors (FC/PC or optional SC, ST)
- Dust, damp and shock proof design for field application
- LCD indicators for battery charging, and LD lasing status
- Built-in NiMH rechargeable batteries for 4 hours continuous operations

## Optical fibre identifier PROLITE-30

### Detecting optical signals

The **PROLITE-30** series are handheld, easy-to-use optical test instruments that identify optical fibres without any damage by detecting the optical signals being transmitted through the fibers. By non-destructive macroband detection technology & mechanism damp technology, it avoids opening the fiber at the splice point for identification and interrupting service.

The **PROLITE-30** can accurately detect the optical signals, signal directions and the presence of 2 kHz modulated tone. It can test all kinds of



fibres, including fibres of 250 um and 900 um as well as jacketed fibers of 2 mm and 3 mm.

With its wide dynamic range, **PROLITE-30** can efficiently identify the wide-spectrum signals, such as signals in CATV system and EDFA. Therefore it can be used in all the physical layer testing of SONET/SDH & DWDM systems.

- Handheld, easy to use
- Equipped with corresponding adapter for bare fibre and tail fibre
- Intensity display of optical signal
- Low battery indication
- Buzz indication function
- Display of transmission direction of light

## Visual Fault Locator PROLITE-11



**PROLITE-11** Visual Fault Locator is equipped with a 650-nm high power visible laser diode, can be operated in CW (continuous) or MOD (1 Hz modulation) mode.

There are two LED indicators RED and GREEN: The RED one shows the operating mode of the Laser Diode output signal, and the GREEN one indicates low battery level.

## Wi-Fi Networks analyser PROFI-70

**Wi-Fi networks are enjoying a boom. They are rapidly growing and gaining importance everywhere in the world. The advantages of the wireless networks are clear: They allow mobility and easy access with a minimum investment in the access point. Wi-Fi networks are an open gateway to Internet.**

### The consequences of the overflow of networks

Indeed the easiness to install **Wi-Fi** systems is what eventually will drive us to the overflow of wireless networks. The saturation of the portion of the spectrum where the **Wi-Fi** channels are allocated will



become a nightmare for installers. Networks will interfere with each other even when using different channels.

As a result, network users will suffer a progressive working speed reduction and eventually the network will become inaccessible.

In fact this is what happened during the CeBIT exhibition in Hannover (Germany). The massive number of live wireless systems on show caused a collapse. It became impossible to browse on Internet through many of the existing **Wi-Fi** access points.

### Wi-Fi Network analyser PROFI-70

In this scenery a relocation of channels in the ISM radio-frequency spectrum might become necessary. The ISM band is a free band occupied by 11 Wi-Fi channels but also but many other items



like wireless telephones, door entry systems, etc.

**PROMAX** has developed the **PROFI-70**, a new Wi-Fi analyser that will help to the unstoppable deployment of Wi-Fi networks in professional, urban and private environments

The **PROFI-70** can be used both to monitor the levels of the signals available in each of the channels and to measure the power emitted by the network's access points. It is also a very useful instrument for the alignment of antennas in point to point radio links.

### The security

An issue that should not be forgotten in the design of any network is the security. In wireless networks it becomes even more sensitive. Many Wi-Fi networks use a configuration that is of deficient or even null security. This allows non authorised users to share their resources.

With the **PROFI-70** it is possible to determine the level of security of the system and also to detect the presence of intruders in the network.

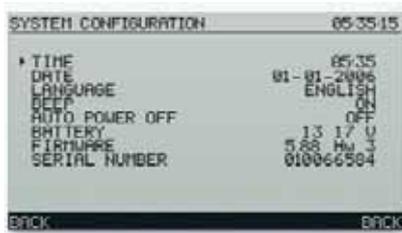
The **PROFI-70** is a precise, practical and easy to use instrument. A simple alphanumeric keyboard allows the direct access to the different modes from operation and a RS-232 interface allows computer and printer interface.



### Facilitates the re-location of the radio-electric spectrum

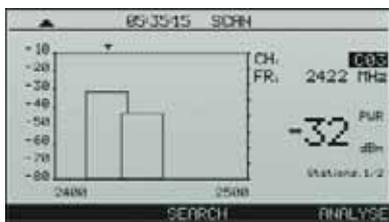
Using the **PROFI-70** wireless networks analyser when installing and setting up the different network access points, will ease its planning. It gives the installer information on how to best distribute the frequencies and the transmitted channels within the ISM band. In this way, it will be possible to control and stop congestion of certain channels due to the concentration of Wi-Fi stations.

## Wi-Fi Networks analyser PROFI-70



Configuration of internal parameters

The **SCAN** function that sweeps the band is a very powerful tool. It allows a graphical representation for the complete spectrum of the band. The analysis of this screen will make it possible to anticipate potential problems that occur when increasing the simultaneous traffic of signals. This is an important test due to the incessant increase in number of interconnected stations or the possible occasional interferences of other signals that operate in the ISM band such as DECT telephones, household appliances like microwave ovens, etc.



Band scanning

### Test of the access points

Connecting the **PROFI-70** to each of the access points in the wireless network, it is possible to easily adjust the emitting power to the required nominal levels. This is made using the **ANALYSE** function that represents the power through a bar graph in the screen of the analyser. The **SEARCH** function allows then to test the coverage of these access points

CH	SSID	PKG	PWR	GR
03	INTERNEC	0002203E9208	-32	28
06	SHC	0004E204691A	-46	134

Channels searching

and provides a complete list of all the active channels in the ISM band.

### Test records and reports (Datalogger)

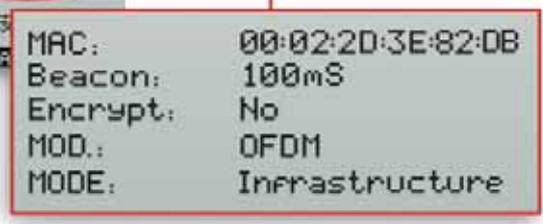
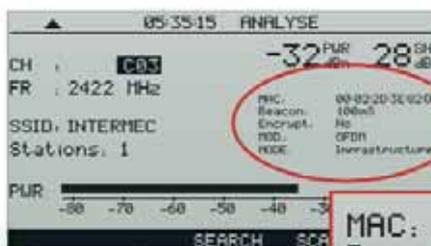
The equipment can store the data and measurements collected during the sessions in its memory. This information can be recalled and displayed in the same screen of the analyser, being directly printed in paper, or transferred to a personal computer by means of a software program. In this way the installer keeps a report of the data acquired on the field.



Storing a logger

### Antenna alignment

The **PROFI-70** facilitates the precise alignment of Wireless antennas. It is specially useful in the case of the 2.4 GHz radio link, point to point systems as it allows to warrant the



higher efficiency. In a first step, the **SCAN** function identifies all the channels. Later a fine adjustment will allow to find the optimal alignment of the antenna by using the **SCAN** and **ANALYSE** functions.

### Analysis of the security in the network

The **PROFI-70** analyser detects the level of security of all the transmitting stations present in the area. That is to say, using the **ANALYSE** function for each of the active channels, the instrument identifies all the present stations both public and non declared. It also specifies if the transmissions are encrypted, as well as the type architecture of the network itself. In this way the user has knowledge of the security level that accepts when acceding into a certain network.



ANALYSE function

## Poliscope OS-782

### Two instruments just in one

Due to the continuous increase of repairs needs, the in-situ maintenance test and the complexity of these operations, causes that it is essential on the part of the technicians a tool that can fulfill all the analysis necessities.

The **OS-782** poliscope has been designed to cover these necessities since it integrates a complete two-channels oscilloscope and a useful multimeter. This join of two instruments allows the technician to make measurements and simultaneously to be able to verify the signal waveform. All is built-in on a portable equipment so small and weight that will allow the technician to accede to zones in which it would turn out complicated to do it with a conventional equipment.

In addition, has a LCD color display LCD with backlight that allows

to carry out easy readings and visualizations when operating in low illumination environments. The technician will be able store up to four waveforms and to dump them to the PC quickly using the included software in order to obtain all measured data required by official reports.

The equipment is shipped with an attractive metallic briefcase in which



in addition are placed all the necessary accessories: probes, test leads, battery charger, etc.



## Dual digital tachometer MR-275

### Fast sampling time

The **MR-275** is mechanical-optical dual tachometer that will allow the user to make revolutions per minute (RPM's) and speed (m/min.) measurements. Can be used with any motor or device. It offers a high accuracy (0.005%) up to 1 m distance (without contact).

Small size and battery powered make it and easy and portable instrument. In addition its ergonomic design allows to be used comfortably with a single hand.



- World's patent, Multi-functions, one instrument combine Photo Tach.( RPM ) & Contact Tach. ( RPM, m/min., ft/min. ).
- Laser light beam for photo tachometer, long measuring distance up to 100 cm at least.
- Wide measuring range from 0.5 to 100,000 RPM.
- 0.1 RPM resolution for the measured value < 1000 RPM.
- High precision with 0.05% accuracy.
- The last value, max., value, min. value will be stored into the memory automatically & can be obtained by pressing MEMORY CALL BUTTON.
- Large LCD display
- High visible LCD display gives RPM reading exactly with no guessing or errors & saves battery energy.

## Industrial series PD-160, PD-180

Its rugged construction, double-injected combined with the rubber holster,



makes these multimeters highly resistant instruments front any shock

Panoramic display of up to 20,000 points, the analogue bar and backlight, allows an easy measurement reading with a precision up to 0.05%. The technicians will be able to make any type of measurement: (voltage, current, resistance, capacity, frequency, temperature etc.) for DC/AC signals and with the true effective values (True RMS).

In addition, the **PD-160** multimeter series is shipped with a magnet belt allowing to be hung. So, it provides to the technician a full hands-free operating capability.

In order to satisfy all the safety measurements, the current inputs are protected by means of fuse and fulfill the CAT III 600 V (**PD-160**) and CAT III 1000 V (**PD-180**) protection norms.



## Digital multimeter MD-200B



The **MD-200B** digital multimeter brings together the basic features of a professional instrument such as high accuracy, reliability and a wide range of measurements.

The reading system using an LCD display and ease of handling means it can be used both in laboratories and on production lines. Its reliability of use also makes it very suitable for training.

It will allow measurements to be

taken of current up to 10 A and reading of direct voltage diode drops. It includes functions such as HOLD, continuity sound signal, AUTO and manual range among others. Rear illuminated display makes reading comfortable even in the dark.

Input connectors are separated by the measurements of V/Ω and A respectively.

It can be powered both through the mains supply and by battery.

- 4000 count large scale display
- 42 segment analog bargraph
- Auto-ranging and manual selection
- Backlight
- AC/DC Dual Power Sources
- Data Hold
- Diode and Continuity Test
- Frequency counter, Capacitance
- Min/Max Hold
- Relative Mode
- Auto Power Off
- 6 kV transient protection on 660 VAC feeders
- MSD overrang Indication
- Light weight

## Universal programmer PR-875C

Capable of programming any DIL device with up to 48 pins without the need for adapters

The **PR-875C** is a universal programmer which works via a parallel port or USB of your PC, enabling you to program, read, copy or check any DIL device with up to 48 pins without the need for adapters.

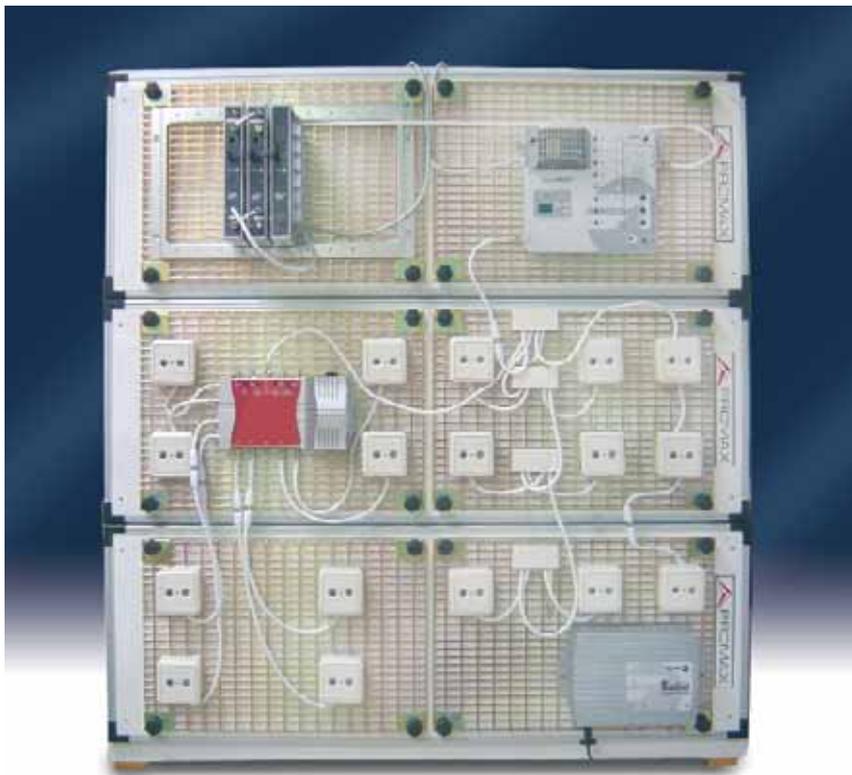
The **PR-875C** accepts more than 3000 different devices, including logic devices (PAL, GAL, CEPAL, PEEL, FPLA, EPLD, FPGA), memories (PROM, EPROM, E2PROM, Flash, and PROM series) and single-chip microcontrollers.

### Ultra-fast programming speed

The intelligent control system of the **PR-875C** reduces the complexity of the system to a minimum. The **PR-875C** is much faster than its competitors (it only takes 8.5 seconds to program a 1 Mbit EPROM), and so is much more productive with today's high density devices.



## Universal antenna training system EA-815 F



### Totally configurable

The Trainer of Antennas **EA-815F** is a system of integral education destined to the learning, demonstration and experimentation of the theory and the practice of the facilities of:

- Analogical and Digital MATV (Masters Antenna Television).
- Analogical and Digital SMATV (Satellite Masters Antenna Television) by FI and RF.
- CATV (Cable Television).

as well as to the development of the skills of installation and assembly.

One is a totally configurable trainer, based on a structure composed by white slate panels, consisting each panel of two extraibles universal plates of fast fixation, that allows that the student installs, forms, fits, modifies and analyzes any type of real installation of MATV, SMATV and CATV.

## Flat screen television trainer ET-892

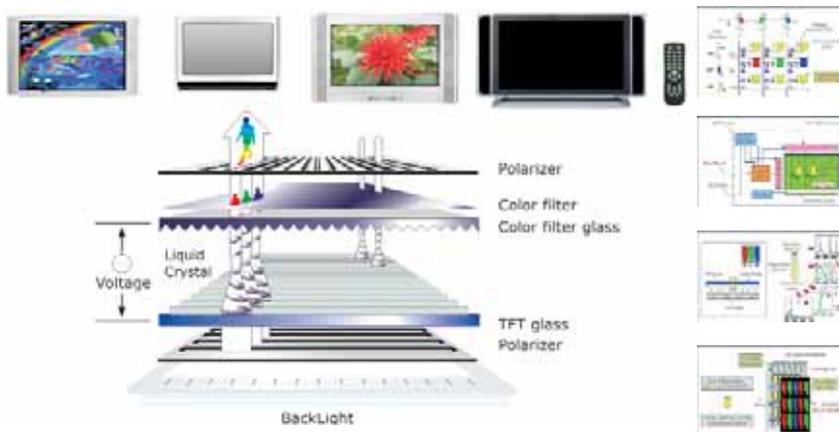
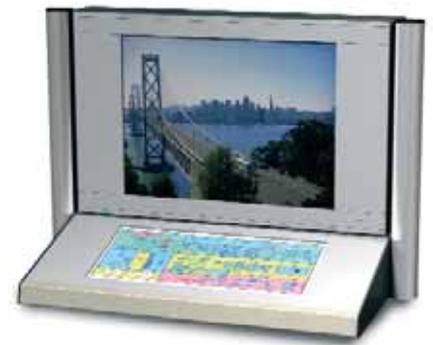
### TFT-LCD and Plasma

The **ET-892** is a suitable equipment for the learning of the flat screen television sets operation equipped with TFT-LCD and Plasma technology that allows the student to become familiar with the more advanced technological innovations, as well as in the audio reception by means of stereo/dual through analogue (Zweitton) and

digital (Nicam) systems. The trainer includes a failures generation module.

The **ET-892** block diagram shows through an intuitive way the different stages that compounds the flat screen receiver.

With a wide number of test points, makes possible a thorough analysis and tracking of the electrical signals



in the different blocks from the receiver.

All the points of test are protected against accidental short-circuits. By means of the failures module it is possible to simulate the more frequent failures than they can take place in the receiver in order that the student learns to carry out methods of diagnosis and trouble-shooting.

Specially attention has been dedicated to develop a fully functional design with a small size.

## Universal digital receiver trainer EU-850

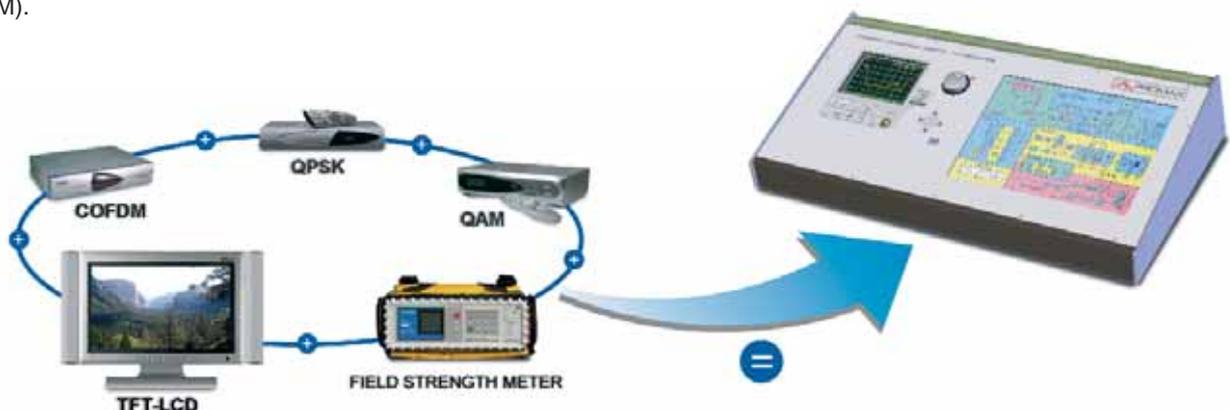
### Analysis of the signals

The Trainer Universal Digital TV Receiver **EU-850** is a didactic equipment oriented to the learning of the theoretical and practical contents about the operation of the digital television receivers (satellite, terrestrial and cable) as well as the basis and the processes related to the transmission, reception and distribution of the digital television (COFDM, QPSK and QAM).

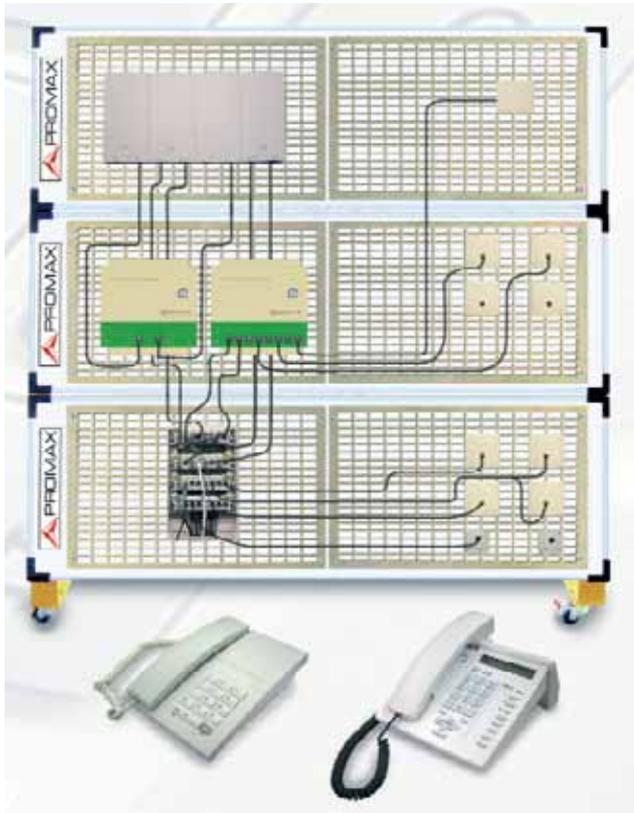
In order to make easy the learning and understanding process, the trainer includes a block diagram which represents a generic structure of a modern digital television universal receiver, with an extensive set of test points that allow the analysis of the signals that take part in the different reception processes.

The trainer also allows to play a wide real-failure series, that can be activated by the teacher through a pass-

word, using the trainer keyboard. With this module it is possible that the student carries out a tracking of the signals in the block diagram until locating to the stage cause of the failure. Thus, the student by himself learns to develop a methodology of diagnosis and rational trouble-shooting, while the teacher evaluates the process followed to determine the level of assimilation of the concepts explained in the Manual of Practises.



## Telephony training system ET-836



### A fully configurable trainer

Telephony Trainer **ET-836**, is an educational integral system destined to the learning of the theory and the practise of PABX stations, the indoor telephony networks and the telephony systems, as well as to the development of the skills of installation and assembly.

This is a fully configurable trainer, based on a white slate support with removable universal panels of fast fixation, composed by the following elements:

- Last generation of PABX station, with 2 external analogue lines, 4 indoor analogue lines and 4 ISDN lines (basic access So: B+B+D).

- Urban Central module (which incorporates tariffication circuits controlable the user) that provides 2 external lines, simulating an urban analogue central telephone office, and allows the generation of failures.

- Canalisation Module that allows the generation of failures on the internal telephone lines and the variation of its parameters.

- Telephone distributor, for the interconnection and allocation of lines.

Also telephone bases for the connexion of the analogue terminals and RDSI are included, cables, connectors and tools to implement any typology of telephony network.