99 Washington Street Melrose, MA 02176 Fax 781-665-0780 TestEquipmentDepot.com

USER'S MANUAL. PROLINK-2 Premium



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ADVANCED TV & SAT LEVEL METER PROLINK-2 Premium



1 GENERAL

1.1 Description

The result of uniting PROMAX ELECTRONICA's long experience in the design of TV signal analysers with the latest in technological progress, the **PROLINK-2** *Premium* brings together the functions installers seek most, all in one **small**, **light-weight**, portable instrument.

Special attention has been given to creating a level meter that has advanced features, but which is also **easy to use**. Three features in particular are a result of this: a universal keyboard, each function represented by a graphic icon, so that after a brief period of introduction to the instrument, access to any function becomes almost intuitive. Secondly, the meter has been entirely designed as an *On Screen Display* (OSD) instrument so that, when a function is selected, it appears on the monitor listing all the various parameters the user has chosen. Finally, there is a rotary selector-button used for navigation across the different on-screen menus, to alter parameters and to validate them at the touch of a button.

The range of frequencies covered, from 45 to 862 MHz and from 900 to 2150 MHz, makes PROLINK-2 *Premium* an excellent instrument for FM radio, terrestrial TV (MATV 'Master Antenna Television'), cable TV (CATV, 'Community Antenna Television'), satellite TV, MMDS microwave links, VSAT ('Very Small Aperture Terminal') systems and digital TV. Furthermore, its high resolution frequency, 50 kHz, makes FM measurements much easier.

1 Bigital Video Trade Mark of the DVB Digital Video Broadcasting Project (2301)

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The PROLINK-2 Premium includes the main TV standards: B, G, I, D, and K, adopting, apart from the characteristic parameters of the standard, the correcting automatic system to obtain in all the cases an accurate measuring of the input signal level. It admits any TV system (PAL, and SECAM) and allows the user to work directly with digital TV signals and directly measuring the power, carrier/noise ratio (C/N), the bit error rate (BER) and the modulation error ratio (MER) of the digital signals. It is also capable of analysing the MPEG-2 / DVB Transport Stream and identifying received Wrong Packets. Being a multistandard instrument, it can be efficiently used in any country of the world. Its accuracy and reliability meet the needs of the most demanding users.

A powerful microprocessor automatically handles a large part of the operations necessary to optimise the process of measurement; for example, continuous frequency synthesis, measurement correction, the appropriate selection of the attenuators and the automatic cut-off after the device has been inactive for a certain period of time.

The signal level measured is indicated numerically in absolute values and, optionally, on an analogue bar shown superimposed on the monitor image, that facilitates the detection of the maximum level. Moreover, in the LV sound mode, the loudspeaker emits a tone whose frequency depends on the level of the signal received, which is very useful when installing antennas. It is also possible to display on screen the line synchronism pulse like on an oscilloscope screen.

The **Spectrum Analyser** mode enables all the signals on a band to be viewed on the monitor at the same time to measure analogue channels level, C/N ratio referenced to a noise frequency defined by the user and digital channels power using an integration method. The bandwidth of the measuring filter can be modified to improve frequency resolution. This is an indispensable feature, as high channel density is present on all transmission systems today. Spectrum display can be varied between full span (the entire band) and 8 MHz terrestrial or 4 MHz satellite. In addition, there are two markers in order to locate and list frequencies, to read signal level and frequency difference, and the level between both.

In the satellite band, the **PROLINK-2** *Premium* incorporates a new function for the analysis of the narrow band signals. Il offers two additional **span** levels of 8 MHz and 4 MHz with a resolution of 50 kHz.

All functionality in spectral mode has been improved adding the possibility of extending the graphical presentation vertically. With this aim a new function has been introduced that allows to set a variable **Dynamic Range** from 10-5-2 dB/div.

The **PROLINK-2** *Premium* incorporates a specific function to test satellite signals distribution networks. The use in combination with a IF generator allows to carry out an easy verification of the installations before the operation beginning.



The selection of sound subcarrier is automatic, depending on the standard, or tunable between 4 and 9 MHz. When decoding TV sound it is possible to choose between the NARROW and WIDE filter to obtain the best carrier discrimination. It includes a NICAM decoder (with BER measurement); the possibility to commute the channel that is delivered to the loudspeaker enables the user to check the sound stereo and dual. Also it allows to access to the associated information to the FM transmissions that incorporate by the radio data system (RDS).

To enhance its convenience of use, it has 99 memories to store the different measuring configurations: name of the configuration, frequency, TV system, type of measurement, external units powering, units of measurement and sound.

Also, the level meter incorporates the teletext function, a DiSEGC² command generator and permits to supply different voltages to the external unit (13 V / 15 V / 18 V / 24 V terrestrial TV, and 13 V / 15 V / 18 V / 13 V + 22 kHz / 15 V + 22 kHz / 18 V + 22 kHz satellite TV).

Furthermore, the instrument comes with an EUROCONNECTOR, or Scart connector, for audio/video input/output.

The **PROLINK-2** *Premium* is powered by rechargeable battery or connected to the mains through the supplied external DC power charger.

It also incorporates a RS-232C interface which enables the user to connect the instrument to a PC for data recording, remote-control of the instrument and to a printer in order to print out the spectrum.

Specifications /! 1.2



CONFIGURATION FOR MEASURING LEVEL AND POWER

TUNING Digital frequency synthesis. Continuous tuning from

45 to 862 MHz and from 900 to 2150 MHz

Tuning modes Frequency, Channel or Memory.

Channel plan configurable on demand

Resolution 45-862 MHz: 50 kHz

900-2150 MHz: 500 kHz

50 kHz

Automatic search Threshold level selectable

Memory 99 positions for measurement configurations

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² DiSEgCTM is a trademark of EUTELSAT.



RF INPUT

Impedance **75** Ω

Connector Universal, with BNC or F adapter

Maximum signal 130 dBµV

Maximum input voltage

DC to 100 Hz 50 V rms (powered by the AL-103 power charger) 30 V rms (not powered by the AL-103 power charger)

130 dBuV 5 MHz to 2150 MHz

LEVEL MEASUREMENT

Measurement range

Terrestrial TV & FM bands 20 dBµV to 120 dBµV (10 µV to 1 V) 30 dBμV to 120 dBμV (31.6 μV to 1 V) Satellite TV band

Auto-range, reading is displayed on an OSD window Reading Digital Absolute value calibrated in dBµV, dBmV or dBm Analogue Relative value through an analogue bar on the screen 230 kHz (Terrestrial band) ■ 4 MHz (Satellite band) Measurement bandwidth

(maximum band ripple 1 dB).

Audible indicator LV audio. A tone with pitch proportional to signal

strenath.

Accuracy

Terrestrial bands \pm 1.5 dB (30-120 dBµV, 48,25-861 MHz) (22°C \pm 5°C) Satellite band \pm 1.5 dB (40-100 dB μ V, 900-2150 MHz) (22°C \pm 5°C)

↑. ↓ Overrange indication

MEASUREMENTS IN TV MODE

Terrestrial bands

Level, Video-Audio ratio and Carrier-Noise ratio (Auto Analogue channels

and Referenced).

Channel power (Auto) and Carrier-Noise ratio (Auto Digital channels

and Referenced) and Bit Error Rate (BER) for

COFDM modulated signals.

Satellite band

Analogue channels Level and Carrier-Noise ratio (Auto and Referenced) Digital channels Channel power (Auto) and Carrier-Noise ratio (Auto

and Referenced) and Bit Error Rate (BER) for QPSK

modulated signals.

SPECTRUM ANALYSER MODE

Satellite band 20 dBµV to 120 dBµV (10 µV to 1 V) Terrestrial bands 20 dBμV to 120 dBμV (10 μV to 1 V)

Measurement bandwidth

Terrestrial 50 kHz, 230 kHz, 1 MHz selectable Satellite 50 kHz, 230 kHz, 4 MHz selectable



Span

Terrestrial Full span (full band), 500, 200, 100, 50, 32, 16, 8 MHz

selectable.

Satellite Full span (full band), 500, 200, 100, 50, 32, 16, 8,

4 MHz selectable.

Markers 2 with level, frequency, level difference and frequency

difference indications.

Detection By peak or average.

Measurements

Terrestrial bands

Analogue channels Level and Carrier-Noise ratio (Referenced)

Digital channels Channel power (Integration method) and Carrier-

Noise ratio (Referenced).

Satellite band

Analogue channels Level and Carrier-Noise rate (Referenced)

Digital channels Channel power (Integration method) and Carrier-

Noise ratio (Referenced).

MONITOR DISPLAY

Monitor B & W 4 ½ inches.

Colour system PAL, SECAM and NTSC

TV standard B, G, I, D, K and L

Synchronism and Burst Graphic representation over the picture

Spectrum mode Variable span dynamic range, and reference level

Sensibility 40 dBµV for correct synchronism

Synchronism 50/60 Hz Automatic selection according to the system

VIDEO SIGNAL

External video inputScart (automatic or selectable)Sensibility1 Vpp (75Ω) positive video

Video output Scart (75Ω)

SOUND

Input Scart

Outputs Built in speaker, Scart

Demodulation AM, FM, TV and NICAM (for PAL B/G, PAL I and

SECAM L standards), selectable

De-emphasis 50 µs

Subcarrier Digital frequency synthesis

Variable From 4 to 9 MHz, 10 kHz resolution

Fixed

Terrestrial According to the active standard: 4.50 - 5.50 - 5.74 -

6.00 - 6.26 - 6.50 - AM - FM - LV - OFF.

Satellite 5.80 - 6.50 - 6.65 - 6.80 - 7.02 - LV - OFF

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CONFIGURATION FOR MEASURING DIGITAL PARAMETERS

TUNING:

COFDM: from 40 to 862 MHz.

Resolution: 166 kHz (BW = 8 MHz) / 125 kHz (BW = 7 MHz and

6 MHz).

QPSK: from 950 MHz to 2150 MHz.

Resolution: 500 kHz.

LEVEL RANGE

COFDM: 45 dBμV to 100 dBμV. **QPSK:** 44 dBμV to 114 dBμV.

IMPEDANCE 75Ω

MEASUREMENTS

COFDM:

Parameters: BER after Viterbi. MER selectable.

CSI (Channel Status Information) selectable. Qualitative measurement about channel quality. Measures from 0 to 100 %. 0 % value corresponds

to maximum quality.

Presentation: Numeric and level bar.

QPSK:

Parameters: BER before Viterbi.

BER after Viterbi.

Presentation: Numeric and level bar.

WRONG PACKETS Number of non-correctable packets accumulated

during the measurement time, and indicates when

the fault was produced.

Identification according to levels 1.1, 1.2, 1.3 and

2.1 of TR 101 290 FTSI standard.

COFDM SIGNAL PARAMETERS

Carriers 2k / 8k (Selected by the user).

Guard Interval 1/4, 1/8, 1/16, 1/32 (Selected by the user).

Code Rate 1/2, 2/3, 3/4, 5/6, 7/8.

Modulation QPSK, 16-QAM, 64-QAM.

Spectral inversion Selectable: ON, OFF.

Hierarchy Indicates hierarchy mode.

FEC Reed-Solomon (204, 188) and Viterbi.

QPSK SIGNAL PARAMETERS

Bandwidth IQ signals variable: 10 MHz to 30 MHz in 2.5 MHz steps.

Simbol rate 2 to 45 Mbauds.



Carrier frequency

deviation $\pm 0.05 \text{ x Symbol rate.}$

Roll-off (α) factor

of Nyquist filter 0.35.

Code Rate 1/2, 2/3, 3/4, 5/6, 7/8 and AUTO.

Spectral Inversion Selectable: ON, OFF

TELETEXT Decodes at 1.5 level

RS-232C INTERFACE

EXTERNAL UNITS POWER

SUPPLY Through the RF input connector
Terrestrial External or 13/15/18/24 V
Satellite External or 13/15/18 V

 22 kHz signal
 Selectable

 Voltage
 0.6 V ± 0.2 V

 Frequency
 22 kHz ± 4 kHz

Maximum power 5 W

DISEQC³ **GENERATOR** According to DISEQC 1.2 standard

POWER SUPPLY

Internal

Batteries 7.2 V 11 Ah Li-Ion battery **Autonomy** > 2 hours in continuous mode.

Recharging time 4 hours starting of completely discharged

(instrument off).

External

Voltage 12 V Consumption 30 W

Auto power off After 15 minutes without operating on any control.

Deactivable.

OPERATING ENVIRONMENTAL CONDITIONS

Altitude Up to 2000 m

Temperature range From 5 to 40 °C (automatic disconnection by

excess of temperature)

Max. relative humidity 80 % (up to 31°C),

decreasing lineally up to 50% at 40 °C.

MECHANICAL FEATURES

Dimensions 294 (W) x 100 (H) x 274 (D) mm (without holster)

Weight 5 kg

³ DiSEqCTM is a trademark of EUTELSAT.

Biologo is a trademark of Eo TEEOAT.

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INCLUDED ACCESSORIES

1x CB-047 (or equivalent) Rechargeable Li+ battery 7.2 V, 11 Ah

 1x
 AD-055
 "F"/F-BNC/F adapter

 1x
 AD-056
 "F"/F-"DIN"/F adapter

 1x
 AD-057
 "F"/F-"F"/F adapter

 1x
 AL-103
 External DC charger

 1x
 DC-261
 Carrying bag

 1x
 CA-005
 Mains cord

OPTIONAL ACCESSORIES

CI-23 Portable printer

RM-104 Remote control software RM-204 Monitoring and alarm software

RM-304 Monitoring and alarm system via SMS



2 SAFETY RULES 🔨

2.1 General safety rules

- * Use this equipment connected only to systems with their negative of measurement connected to ground potential.
- * The AL-103 external DC charger 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 2 environments.

 External DC charger can be used in Overvoltage Category II, installation and Pollution Degree 1 environments.
- When using some of the following accessories use only the specified ones to ensure safety.

Rechargeable battery External DC charger

- * Observe all **specified ratings** both of supply and measurement.
- * Remember that voltages higher than 60 V DC or 30 V AC rms are dangerous.
- * Use this instrument under the **specified environmental conditions**.
- * The user is only authorized to carry out the following maintenance operations:

Battery replacement

On the Maintenance paragraph the proper instructions are given.

Any other change on the equipment should be carried out by qualified personnel.

- * When using the power adaptor, the **negative of measurement** is at ground potential.
- * Do not obstruct the ventilation system of the instrument.
- * Use for the signal inputs/outputs, specially when working with high levels, appropriate low radiation cables.

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- * Follow the **cleaning instructions** described in the Maintenance paragraph.
- * Symbols related with safety:

| | DIRECT CURRENT | | | |
|-------------------|--|--|--|--|
| \sim | ALTERNATING CURRENT | | | |
| $\overline{\sim}$ | DIRECT AND ALTERNATING | | | |
| | GROUND TERMINAL | | | |
| | PROTECTIVE CONDUCTOR | | | |
| | FRAME TERMINAL | | | |
| \downarrow | EQUIPOTENTIALITY | | | |
| | ON (Supply) | | | |
| \bigcirc | OFF (Supply) | | | |
| | DOUBLE INSULATION (Class II Protection) | | | |
| <u>A</u> | CAUTION (Risk of electric shock) | | | |
| <u> </u> | CAUTION REFER TO MANUAL | | | |
| | FUSE | | | |



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

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3 INSTALLATION

3.1 Power Supply

The **PROLINK-2** *Premium* is a portable instrument powered by one 7.2 V - 11 Ah Li-lon battery. There is also an external DC charger provided for mains connection and battery charging.

3.1.1 Operation using the External DC Charger

Connect the external DC charger to EXT. SUPPLY [38] on the PROLINK-2 Premium side panel. Connect the DC charger to the mains. Then, press the

PROLINK-2 *Premium* on/off key [1]. The level meter is now in operation and the battery is slowly charged. When the instrument is connected to the mains, the CHARGER indicator [7] remains lit.

3.1.2 Operation using the Battery

For the device to operate on the battery, disconnect the power cable and press the on/off key [1]. The fully charged battery can power the equipment for more than 2 hour non-stop.

If battery is very weak, the battery cut-off circuit will prevent the device from functioning at the same time the beeper will be heard. In such a situation battery must be recharged immediately.

Before taking any measurements, you have to check the charge state of the battery by checking the battery charge level indicator **BATTERY** [8] on the front panel, or **Battery & Lnb** function on the TV mode functions menu (see section '4.9.2.3 Batteries and External Units Power Supply').

The **BATTERY** [8] led indicates, whenever the equipment is off and connected to the external DC charger, in a qualitative manner the battery charge condition. For battery charge levels close to 100% it remains lit in green colour; for charge level higher to 50% it remains amber and it appears in red to indicate the empty battery condition. When the instrument indicates a Low Battery (led lit in red colour) the battery must be charged immediately. When the low battery level is reached, the monitor momentarily displays the message VERY LOW BATTERY and the beeper sounds.



3.1.2.1 Battery Charging

To fully charge the battery, connect the instrument to the external DC charger

without pressing the on/off key [1]. The length of time it takes to recharge it depends on the condition of the battery. If they are very low the recharging period is about 4 hours. The **CHARGER** [7] indicator should remain lit in amber colour.

When the battery charging process is completed with the instrument off, the fan stops.

IMPORTANT

The instrument battery needs to be kept charged between 30% and 50% of its capacity when not in use. The battery needs to be fully charged for best results. A fully charged battery suffers temperature-related discharge. For example, at a room temperature of 20 °C, it can lose up to 10% of its charge over 12 months.

3.2 Installation and Start-up

The **PROLINK-2** *Premium* level meter is designed for use as a portable device.

When the [1] key is pressed, the instrument is in the *automatic power-off* mode; that is, the device is automatically disconnected fifteen minutes after the last time a key has been pressed. When turning on the unit, automatic power-off mode may be

deactivated by holding down the [1] key until you hear two acoustic indications, later "MANUAL POWER" message will appear on the lower side of the monitor. When the device is operating, it is also possible to select the manual power-off mode by means of the Manual power function of the TV functions menu.

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4 OPERATING INSTRUCTIONS

4.1 **Description of the Controls and Elements**

Front panel

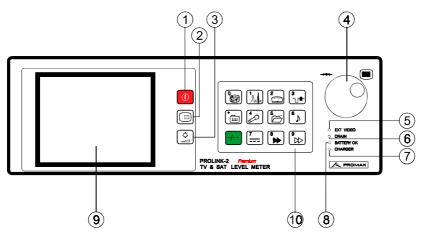


Figure 1.- Front panel



On / Off key. This turns on the instrument, and the user can select either manual or automatic power-off.



[2]

OSD key. Enables the measurement information format displayed on-screen in TV mode (level measurement) to be selected.

It allows also to visualize the TV image corresponding to the input digital signal. Activation / deactivation of teletext **Zoom** function.



[3]

Activation of VOLUME, CONTRAST, BRIGHTNESS control menus.

[4] Rotary selector-button. This has many different functions: tuning control, moving between the various on-screen menus and sub-menus, and validation of the different options.

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Tuning purposes: turning it clockwise frequency increases while turning it anticlockwise frequency decreases.

To **shift along the on-screen menus**: turning it clockwise active option moves downwards while turning it anticlockwise active option moves upwards.

In **TV mode**, press the rotary selector-button to display the first sub-menu containing different functions, some are dependent on the band and the standard:

Band switching Permits to change from terrestrial (45-862 MHz) to

satellite band (900-2150 MHz) and vice versa.

System & Standard Selects the colour system (PAL or SECAM) and the TV

standard (B/G, D/K, I, L, or Digital).

Battery & Lnb Displays battery voltage and external units power supply

voltage and current (V Ext and I Ext).

Channel set Selects active channels table.

Channel BW (Satellite band or digital channels). Defines channel

bandwidth. Indispensable for measuring digital channels

and satellite band channel C/N.

Teletext Sets teletext information.

DISEQC (Only satellite channels). Defines a sequence of DiSEqC

commands and permits to send them.

Reference noise (Only in *C/N Reference noise* mode). Defines the

frequency where measure the noise level.

Press Next for the second sub-menu:

Input Video Enables Scart commutation signals to be activated,

deactivated or set to automatic/subordinate mode.

C/N setup Defines the C/N measuring method between *Auto* or

Referenced.

Nicam channel (Only analogue channels). This selects the NICAM sound

channel that is sent to the loudspeaker.

Search level Selects the threshold level of the automatic station search

function.

Lnb local osc (Only satellite band). It defines the frequency of the local

oscillator (L.O.) of the LNB.

Video polarity (Only satellite band, analogue channels). This selects the

polarisation of the video carrier.

Sat IF Test (Only satellite band, analogue channels). This selects the

function for testing satellite distribution networks.

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Press Previous for the first sub-menu or Next to access the third one:

Units Selects the measuring units: $dB\mu V$, dBmV or dBm.

Manual power Sets power-off as Manual or Automatic.

Language Selects the language between DEUTSCH, ENGLISH,

ESPAÑOL, FRANÇAIS, and ITALIANO. Should you have accidentally chosen the wrong language, you can return automatically to the language menu by means the reset

process.

Beep Activates (ON) / deactivates (OFF) the beeper.

Initial screen It shows a logo of the manufacturer as well as basic

information about the instrument description (version,

manufacturer and model).

Equipment info. Displays information on the instrument: serial number,

version of control software, included set-up, etc.

Exit Exits from the function menu.

Finally, press **Previous** for the second sub-menu or **Exit** to quit the function menu.

IMPORTANT REMARK

In case of erroneous selection of a language, the user must follow the following steps to accede again to the language selection menu (Language, Idioma, Sprache, Lingua o Langue):

From the TV mode, press the rotary selector, it will appear the first sub-menu of functions (Functions, Funciones, Funktionen, Funzioni, Fonctions), turn the rotary selector to move the cursor to the position (Next, Siguiente, Nächst, Seguente or Suivant) and press it to accede again to the second sub-menu. Repeat the operation to accede to the third sub-menu. Finally, move the cursor to the fourth line of the sub-menu and press the rotary selector to accede to the language selection menu.

Also you can access to the language selection menu activating the reset process, for it the reset button [38] must be pressed when the instrument is off.

In **Spectrum Analyser mode**, the first sub-menu displays the following functions:

Band switching Permits to switch from terrestrial (45-862 MHz) to satellite

band (900-2150 MHz) and vice versa.

Span Defines the frequency range displayed between **Full** (the

entire band), 500 MHz, 200 MHz, 100 MHz, 50 MHz, 32

MHz. 16 MHz. 8 MHz and 4 MHz.

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Reference level Defines the reference level between 10 and 130 dBµV in

10 dB steps.

Dynamic range Defines a selectable dynamic range between 2, 5 and 10

dB/div.

Dual marker (Only analogue channels, level measurement mode and

single marker mode). Enables dual markers to be shown

on the displayed spectrum.

Marker B→A (Only in dual marker mode). Selects marker A as the

active marker (tuneable).

Marker A→B (Only in dual marker mode). Selects marker B as the

active marker (tuneable).

Single marker (Only in *dual marker* mode). Activates the single marker

on the displayed spectrum.

Carrier→Ref. Noise (Only in C/N measurements). Permits to define the

frequency where noise level will be measured (see Ref.

Noise → Carrier function).

Ref. Noise → Carrier (Only when measuring *C/N Referenced* and after defining

the Carrier→Ref. Noise). Permits to change the tuning

frequency by means of the rotary selector.

Marker→Channel BW (Only in Channel Power measurements). Permits to define channel bandwidth (see Channel BW→Marker

define chamile bandwidth (see Chamile DW Financi

function).

Channel BW→Marker (Only when measuring Channel power and after defining

the Marker→Channel BW). Permits to change the tuning

frequency by means of the rotary selector.

Sweep Offers a choice of spectrum mode sweep rates: **Fast** (fast

sweep, low accuracy), **High Resolution** (slow sweep, high accuracy) and **Antenna Alignment** (tool for faster sweep antenna alignment without numeric data representation).

Measure bandwidth Selects the bandwidth of the spectrum measuring filter

from among:

Terrestrial channels: 50 kHz, 230 kHz or 1 MHz. Satellite channels: 50 kHz, 230 kHz or 4 MHz.

Acquisition mode Offers three acquisition modes: Maximum Hold, Minimum

Hold and Continuous (default).

Detection mode Offers two detection modes: Average and Peak (default).

DISEqC (Only satellite channels). Defines a sequence of DiSEqC

commands and permits to send them.

System & Standard Selects the colour system (PAL or SECAM) and the TV

standard (B/G, D/K, I, L or Digital).

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Battery & Lnb Displays battery voltage and external units power supply

voltage and current (V Ext and I Ext).

Channel set Selects active channels table.

Print Prints the spectrum shown on the screen. (See '4.14

Printing the Spectrum, the Measurement and Memories').

Press **Next** for the second sub-menu, and from there to the third (you will see the same functions as those appearing in the second and third sub-menus in **TV mode**).

[5] EXT VIDEO. Video signal presence light indicator It lights up when video on screen is coming through the SCART connector [39].

[6] DRAIN

External units power supply indicator. Lights up when the **PROLINK-2 Premium** supplies a current to the external unit.

[7] CHARGER

External DC charger operation indicator. When batteries are installed the battery charger is automatically activated.

[8] BATTERY

Battery charge level indicator. When the instrument is switched off and connected to the mains, the battery has three states: red if the battery charge level is below 50%, amber if it is greater than 50% and green if the battery is fully charged.

[9] MONITOR

[10] MAIN KEYBOARD

12 keys to select functions and entering numeric data.

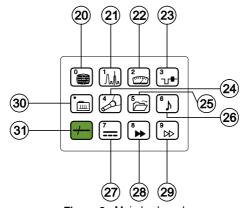


Figure 2.- Main keyboard

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DIGITAL - ANALOGUE MODE SWITCHING

Switches between analogue and digital mode. Key number 0 to enter numeric data.



SPECTRUM/TV MODE SWITCHING

Enables switching between the TV and the Spectrum Analyser operation mode, and back again.

Key number 1 to enter numeric data.



[22]

MEASURE

Enables the type of measurement to be selected. The types of measurements available depend on the band, the standard, the options included and the operating mode.

Key number 2 to enter numeric data.



[23]

TV MODE

Selects the information displayed on-screen in TV operation mode (LV measurement).

Key number 3 to enter numeric data.



[24]

SEARCH

This is the function for automatic station search. Starting at the present frequency or channel, it searches until finds a station with an adequate level. The threshold level (search level) can be defined by means of the TV mode functions menu between 30 and 99 dB μ V.

Key number 4 to enter numeric data.



[25]

STORE/RECALL

This key enables the measurement configuration to be stored/recalled. Each configuration has the following information: name assigned to memory, memory number, Channel or frequency (**Freq**), TV system (**TV Sys**), measurement mode (**Meas**), external units power supply (**V Lnb**), measurement units (**Units**) and **Sound**. The memory can store up to 99 measurement configurations (numbered from 1 to 99).

Key number 5 to enter numeric data.

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[26]



SOUND

This selects the type of sound. The options available in each case depend on the band and the standard selected (see section 4.11 Selecting the Sound Mode).

Key number 6 to enter numeric data.



[27]

EXTERNAL UNITS POWER SUPPLY

Enables selecting the power supply to the external units. Available voltages are: External, 13 V, 15 V, 18 V and 24 V for the terrestrial band and External, 13 V, 15 V, 18 V, 13 V + 22 kHz, 15 V + 22 kHz and 18 V + 22 kHz for the satellite band.

Key number 7 to enter numeric data.



[28]

DIRECT ACCESS KEY

Direct access key which can be assigned to any function on any menu. Key number 8 to enter numeric data.



[29]

DIRECT ACCESS KEY

Direct access key which can be assigned to any function on any menu. Key number 9 to enter numeric data.



[30]

TUNING BY CHANNEL OR FREQUENCY

Switches tuning mode between channel and frequency. In channel mode the tuning frequency is defined by the active channels table (CCIR, OIRT, ...). See channel-frequency tables in Appendix A.

Decimal point key to enter numeric data.

[31]



MANUAL FREQUENCY SELECTION / SHIFT

Enables the desired frequency to be directly tuned using the numeric keyboard. Also acts as a SHIFT key for moving across different fields on some screens.



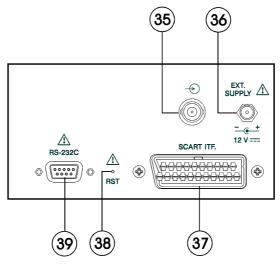


Figure 3.- Side panel connections.

[35] RF RF signal input.

Maximum level 130 dB μ V. Universal connector for F/F or F/BNC adapter, with input impedance of 75 Ω .

ATTENTION /

Note the importance to protect the RF (37) input signal with an accessory to block the AC voltages used in CATV cables (needed to feed the amplifiers) and remote mode.

[36] External 12 V power supply input

[37] Scart socket

[38] **RESET button**

Enables the user to restart the instrument if there is any irregularity in its functioning. If it is necessary to reset the instrument, press the reset button with the instrument turned off.

[39] Connector RS-232C

Enables the remote control of the **PROLINK-2** *Premium* from a personal computer, as well as data dumping to a printer.

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4.2 Adjustment of Volume and Monitor Parameters

Repeatedly pressing key [3] sequentially activates the VOLUME, CONTRAST and BRIGHTNESS. On activation of a menu for a specific parameter the screen displays a horizontal bar whose length is proportional to the parameter level, to modify this value simply turn the rotary selector [4]. To exit the menu and validate the new value press the rotary selector [4].

4.3 Selecting the Operation Mode: TV / Spectrum Analyser

The **PROLINK-2** *Premium* has two basic operation modes: **TV** and **Spectrum Analyser**. To switch from one operation mode to the other press key [21].

In the **TV operation** mode the demodulated television signal is shown on-screen; this is the default operation mode, various functions can be selected, as shown in the following paragraphs.

In the **Spectrum Analyser** operation mode the screen displays the spectrum of the active band (terrestrial or satellite). The *span*, the *reference level* and the *measuring filter bandwidth* are variable as will be shown in paragraph '4.10 Spectrum Analyser Operation Mode'.

4.4 RF Band Selection: 45-862 MHz / 900-2150 MHz

Tuning is continuous between 45 and 862 MHz (terrestrial band) and between 900 and 2150 MHz (satellite band). There are three ways of changing the active band:

- Press the rotary selector [4] to accede to the functions menu, if necessary turn it to select the **Band switching** function and then press it again. The RF band will be switched automatically.
- Press key [31] and select a frequency on the new band using the numeric keyboard. The fifth digit and second decimal act as confirmation. For example, if the active band is the 900 to 2150 MHz band and you wish to tune the 49 MHz frequency (belonging to the 5/45 to 862 MHz
 - band), press key [31] and then enter **49.00** or **049.0** using the numeric keyboard.

Alternatively, the rotary selector [4] can be pressed to indicate the end of the numerical entry.

3) Recall a memory with a tuning frequency belonging to the band you wish to access. (See section '4.12 Measurement Configuration Memories').



4.5 Channel Tuning / Frequency Tuning

Pressing key [30] the **PROLINK-2** *Premium* switches from frequency tuning to channel tuning and back again.

In **channel tuning mode** turning the rotary selector [4] sequentially tunes the channels defined in the active channels table (see the **Channel set** function in the TV mode functions menu, section '4.9.2.7 Selecting the Channels Table'). When turning it clockwise frequency increases while turning it anticlockwise frequency decreases.

In **frequency tuning mode** there are two ways of tuning:

1. Turning the rotary selector [4].

Turning the rotary selector [4] selects the desired frequency (tuning is continuous from 45 to 862 MHz and from 900 to 2150 MHz). When turning it clockwise frequency increases while turning it anticlockwise frequency decreases.

2. Using the keyboard.

Press key [31] (the frequency listing will disappear), next enter the frequency value in MHz using the numeric keyboard, the fifth digit, to press the rotary selector [4] or the second decimal act as confirmation. The **PROLINK-2** *Premium* will calculate the tuneable frequency closest to the entered value and then display it on-screen.

4.6 Automatic Transmission Search

In the TV mode, by pressing the [24] key search starts at the present frequency or channel until it finds a transmission with a level higher than the search level. The threshold level is defined by means of the **Search level** function of the TV mode functions menu (see paragraph '4.9.2.16 Search Level.).

The **Search** function halts the search process when the end of the present band is reached, if it is in frequency mode, or when a key is pressed. In channel mode, the search process is halted when the last channel of the group selected is reached (see Appendix A). The sound is deactivated during the search process.

4.7 Selecting Analogue / Digital Mode

Measuring the characteristics of a channel depends, in the first place, on the type of modulation: analogue or digital.

Use key [20] to switch between analogue and digital channels. When switching to a new modulation, the **PROLINK-2** *Premium* activates the last measurement configuration used for that modulation.

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Also it is possible to switch between analogue and digital modes by means of System & Standard from function menu.

4.8 **External Units Power Supply (EXT. SUPPLY)**

The **PROLINK-2** *Premium* can supply the voltage needed to power the external units (antenna preamplifiers, in the case of terrestrial TV, LNB in the case of satellite TV. or IF simulators).

/!\ Maximum input levels

50 V rms (powered by the AL-103 power charger) DC to 100 Hz 30 V rms (not powered by the AL-103 power charger)

45 MHz to 2150 MHz 130 dBµV

To select the supply voltage of the external units, press key [27], and the screen will display a functions menu labelled EXT. SUPPLY listing the choice of voltages (which will depend on the band being used). Turn the rotary selector [4] to the desired voltage and press to activate it.

| The following | table shows | the | choice of | of sur | vlac | voltages: |
|---------------|-------------|-----|-----------|--------|------|-----------|
| | | | | | | |

| Band | Powering voltages |
|-------------|-------------------|
| SATELLITE | External |
| | 13 V |
| | 15 V |
| | 18 V |
| | 13 V + 22 kHz |
| | 15 V + 22 kHz |
| | 18 V + 22 kHz |
| TERRESTRIAL | External |
| | 13 V |
| | 15 V |
| | 18 V |
| MATV | 24 V |

Table 1.- External units powering voltages.

In the External power supply mode the unit powering the amplifiers before the antenna (terrestrial television) or the satellite TV receiver (house-hold or community) also powers the external units.

The **DRAIN** [6] indicator lights when current is flowing to the external unit. If any kind of problem occurs (e.g., a short circuit), an error message appears on the monitor ('SUPPLY SHORT'), the acoustic indicator will be heard and the instrument will cease to supply power. The PROLINK-2 Premium does not return to its normal operating state until the problem has been solved.

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4.9 TV Operating Mode

4.9.1 Selecting the Measurement Mode (MEASURE)

The types of measurements available depend on the band, the standard and the operating mode.

Terrestrial band - Analogue channels:

Level Level measurement of the currently tuned carrier.

Video / Audio Video carrier to audio carrier level ratio.

C/N Ratio between the modulated signal power and the

equivalent noise power fora same bandwidth. There are two methods to make this measurement (selectable through the

C/N setup function):

Auto: In-channel measurement. Noise level is measured at a frequency where modulation contents is minimum. After a small period of time, minimum measured level corresponds

to noise level.

Referenced: The user defines the frequency where noise level will be measured (by means of the **Reference noise** function). This frequency will be used to measure noise

level for all channels.

Terrestrial band - Digital channels:

Channel power Automatic method: channel power is measured assuming

that power spectral density is uniform throughout channel bandwidth. To measure it correctly it is indispensable to

define the Channel BW.

C/N Two methods selectable through the **C/N setup** function:

Auto: Out-channel measurement. Noise level is measured at $f_{noise} = f_{tuning} - \frac{1}{2} Channel BW$. To measure it correctly

digital channel must be tuned at its central frequency.

Referenced: The user defines the frequency where noise level will be measured (by means of the **Reference noise** function). This frequency will be used to measure noise

level for all channels.

BER (COFDM) Obtains the error rate for the signal found in the tuned

channel. After processing for a few seconds, the screen on the PROLINK-2 Premium shows the type of modulation, the CSI (Channel Status Information) or the MER measurement (modulation error ratio) selectable by means of the option COFDM Setup from functions menu, as well as the BER (error rate) for the digital signal after error correction (BER after Viterbi), the latter two are shown in

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analogue form as a bar graph. The instrument also shows the channel or frequency with the corresponding deviation, the number of wrong packets received during the measurement time (W.P.) and information on the type of digital *Multiplex* detected (MPEG2, Network, Provider, Bouquet) which appears cyclically on the screen.

Satellite band - Analogue channels:

Level Level measurement of the currently tuned carrier.

C/N Ratio between the modulated signal and the equivalent

noise power for a same bandwidth (Auto or Referenced).

Satellite band - Digital channels

Channel power Automatic method.

C/N Ratio between the modulated and the equivalent noise

power for a same bandwidth (Auto or Referenced).

BER (QPSK) Obtains the error rate for the signal found in the tuned

channel. After processing for a few seconds, the screen on the PROLINK-2 Premium shows the type of modulation, the BER (error rate) for the digital signal before error correction (BER before FEC) or the MER measurement (modulation error ratio) selectable by means of the option QPSK Setup from functions menu, as well as the BER after error correction (BER after Viterbi), the latter two are shown in analogue form as a bar graph. The instrument also shows the channel or frequency with the corresponding deviation and information on the type of digital Multiplex detected (MPEG2, Network, Provider, Bouquet) which appears cyclically on the screen.

To change the measurement mode press key [22]. The screen will display a menu with the measurement modes which can be selected.



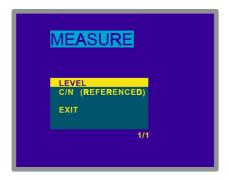


Figure 4.- Measuring mode selection (satellite band, analogue channels).

To select a measurement mode turn the rotary selector [4] until it is marked (e.g., *Level* in the previous figure), then press the rotary selector [4] or key [22] to activate the selected measurement mode.

4.9.1.1 Measuring the Video Carrier Level (Level)

If you select the **Level** measurement mode, the screen shows a window with the signal level, when selected with the OSD key [2] (see next section).

WARNING

If a sudden signal level increase is produced at the RF input, and it is beyond the total signal levels of:

Terrestrial band: 95 dBμV Satellite band: 105 dBμV

the tuning circuit may become out of control, giving as a result wrong level measurements.

If this situation occurs, disconnect the input signal, change to Spectrum Analyser mode and select a Reference Level of 130 dB μ V. Then connect the signal again and modify the Reference Level according to present signals.

Similar effects can be observed when at the RF input appears an important number of carriers with a high level. To be able to determinate the equivalent level of a carrier group (with similar levels) at the RF input, it is possible to use the expression:

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$L_{f}=L + 10 \log N$

L_t: equivalent total level

L. average level of the carriers group

N: number of carriers

So, if there are ten carriers with a level around 90 dBµV, their equivalent level will be:

 $90 dB\mu V + 10 log 10 = 100 dB\mu V$

Observe that in this case, loss of tuning by overload of the RF input may occur besides other effects such as tuner saturation and generation of intermodulation products that may mask the spectrum visualization.

4.9.1.1.1 Changing the measurement information format

In TV operation mode, the measurement information format to be displayed on-screen is selected by pressing key [2]. Three possibilities are offered, selected cyclically:

- TV image with a window in the lower part of the screen displaying the signal level and frequency/channel.
- TV image with a window displaying information on the name assigned to memory, power supply to external units, sound, colour system, TV standard, level and frequency/channel.
- TV image only.

4.9.1.1.2 Selecting TV Mode: TV, LV, SY (TV MODE)

In addition to operating as a television set, the monitor of the PROLINK-2 **Premium** can act as an analogue level indicator, and can display the line synchronising pulse just as it would appear on a screen of an oscilloscope.

To change the TV mode press key [3], and the following screen will appear:

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Figure 5.- TV mode selection.

Turn the rotary selector [4] to choose the information you want to be displayed on-screen. Press the rotary selector [4] or key [23] to activate the selected display mode.

The operation modes available are:

TV: Monitor operating as a conventional **television set**.

TV+LV: Monitor operating as a conventional **television set**, with a **level indicator** on the upper part of the screen (the analogue bar).

TV+LV+SY: Monitor operating as a conventional television set, with a level

indicator and the line synchronizing pulse displayed on the

screen.

LV: Signal level indication on the upper part of the screen (analogue

bar).

Operation in TV+LV+SY Mode

This function permits to display the line synchronising pulse corresponding to a tuned signal on the monitor.

To view the synchronisation pulse press key [23], turn the rotary selector [4] to TV + LV + SY mode, and then press key [23] or the rotary selector [4] again.

The monitor is divided into three sections. In the top section an analogue bar appears which indicates the level of the signal received (59 dB μ V in figure 6 example). On the left side the line synchronising pulse is represented as it would appear on the screen of an oscilloscope. On the lower side the TV picture is shown.

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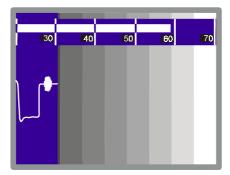


Figure 6.- Line synchoronism + level + TV (TV+LV+SYNC)

Starting from the line synchronism representation, it is possible to perform a qualitative analysis of the TV picture delivered to the end user.

4.9.1.2 Measuring the Video / Audio Ratio (V/A)

In the Video/Audio measurement mode, the screen displays the following information:



Figure 7.- Video/Audio rate measurement

In addition to the video carrier / audio carrier level ratio (15.0 dB in previous figure) this also shows the frequency or channel, depending on the tuning mode selected, and the level of the video carrier and audio carrier.



4.9.1.3 Measuring the Carrier / Noise Ratio (C/N)

The **PROLINK-2** *Premium* offers two ways to make this measurement:

Auto: The PROLINK-2 Premium defines the frequency where

noise level is measured automatically.

Reference noise: The user defines the frequency where noise level is

measured (by means of the **Reference noise** function). This frequency will be used to measure noise level for all

channels.

To select the measuring method activate the TV mode functions menu by pressing the rotary selector [4], then turn it to select **C/N setup** function and finally press it again. The monitor will show a screen displaying two possibilities: **C/N (Auto)** and **C/N (Reference noise)**, then turn the rotary selector to select the desired option and finally press it to confirm.

When selecting the **C/N** (**Reference noise**) mode it is necessary to define the noise frequency: access the functions menu and now turn the rotary selector to select **Reference noise** function and finally press it again. A screen titled REFERENCE NOISE will be displayed showing the noise frequency in use. To change it press key

[31], the current frequency value will disappear and, using the keyboard, you will be able to enter the new reference noise frequency in MHz and with two decimals figures. This frequency also can be modified in the Spectrum operation mode (see 4.10.2.2. C/N (Referenced) Measurement).

The **PROLINK-2** *Premium* carries out C/N ratio measurement in four different ways, according to the carrier type and the band in use:

A) Terrestrial band, analogue carrier

Carrier level is measured using a quasi-peak detector (230 kHz BW). Noise level is measured with an average detector and corrected to refer it to channel equivalent noise bandwidth (according to the standard in use).

B) Terrestrial band, digital carrier

Both measurements are done with an average detector (230 kHz) and the same corrections are introduced on them (bandwidth corrections).

C) Satellite band, analogue carrier

Carrier level is measured using a quasi-peak detector (4 MHz BW). Noise level is measured with an average detector (4 MHz) and corrected to refer it to channel bandwidth.

D) Satellite band, digital carrier

Equivalent to case B but now using the 4 MHz BW filter.

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On selecting the Carrier / Noise measurement mode the screen displays the following information:

```
C/N (AUTO)
      20.1 dB
VIDEO CARRIER
   FREQUENCY = 1345.5 MHz
NOISE:
   CHANNEL BW = 32.0
```

Figure 8.- Carrier-to-noise ratio measurement (Auto mode).

As well as the video carrier / noise level ratio (20.1 dB in previous figure), the frequency or channel (depending on the tuning mode selected) and the level of the video carrier and noise level are also shown.

When measuring channels in the satellite band or digital channels, to measure the C/N ratio correctly, the bandwidth of the channel must be defined previously, using the **Channel BW** function on the TV mode functions menu.

IMPORTANT REMARK

To measure digital channels C/N ratio in **Auto** mode it is indispensable to tune channel at its central frequency.

In the case of the presence of adjacent digital channels, these could mask the noise level measurement when operating in Auto mode. Therefore, you are recommended to use the **Referenced** mode.

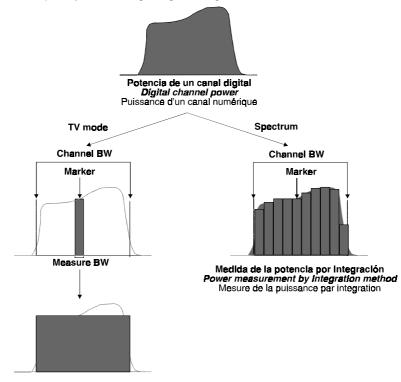
IMPORTANT REMARK

In the case of an analogue terrestrial signal, when C/N (Auto) mode is selected, the PROLINK-2 Premium performs an in-channel measurement, this involves that C/N value will take several seconds to stabilize (six seconds at the most). An arrow below the C/N readout represents the measurement cycle and it is necessary to wait the arrow passes twice on the same point to guarantee a correct measurement.



4.9.1.4 Measuring the Power of Digital Channels (Channel power)

The **PROLINK-2** *Premium* offers two different methods to measure digital channels power, according to the active operation mode: *Automatic method* in **TV mode** and *Integration method* in **Spectrum mode**. The **Automatic method** measures digital channel power in the measurement filter bandwidth and estimates total channel power assuming that spectral density is uniform throughout channel bandwidth. On the other hand, the *Integration method* takes into account signal spectral distribution so measurement is more accurate but slightly slower (see *4.10.2 Selecting the Measurements Mode*). The obtained measurements using these methods may differ some dBs, specially when the digital signal is degraded.



Medida de la potencia método automático Power measurement by the automatic method Mesure de la puissance par le mode automatique

Figure 9.- Measuring digital power.

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On selecting the **CHANNEL POWER** measurement mode, the screen displays the following information:



Figure 10.- Digital channel power measurement.

In addition to the power of the digital channel (45.8 dB μ V in previous figure) this also shows the tuning frequency or channel, depending on the tuning mode selected, and the parameters regarding bandwidth: *Channel BW* and measuring filter bandwidth (*Measure BW*).

For the power measurement of a digital channel to be correct it is essential to have previously defined the channel bandwidth using the **Channel BW** function, in the TV mode functions menu (see section '4.9.2.11 Channel Bandwidth').

4.9.1.5 BER measurement mode selection

The **PROLINK-2** *Premium* offers three ways to measure the error rate (**BER**) of digital signals depending on the type of used modulation.

To select the BER measurement mode:

- Select the TV operating mode. If present operating mode is the spectrum analyser mode press key [21].
- Select the terrestrial band for the measurement of COFDM modulated signals or the satellite band for the measurement of QPSK modulated signals. Available frequency ranges are:

COFDM signals 40 MHz to 862 MHz QPSK signals 950 MHz to 2150 MHz

3) Select the **DIGITAL** operating mode by means of the key



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4) Select the **BER** measurement mode: to do this press key [22] and turn the rotary selector [4] to select the BER measuring mode, next, to activate it press the rotary selector [4] or key [22].

Before measuring the BER or analysing the *Wrong Packets* in the **Transport Stream** MPEG-2 / DVB is necessary to define some parameters concerning the digital signal, which are described in the following section (see section '4.9.1.5.1. Measuring BER of QAM Digital Channels (QAM)'). To see its present value or to modify it, being in the BER measuring screen, press the rotary selector, it will appear a multiple-choice menu showing the functions relative to the BER measurement on the screen.

4.9.1.5.1 Measuring BER of COFDM Digital Channels (COFDM)

Press the rotary selector to access the COFDM signals parameters that must be defined by user and that are described below:

1) Carriers

It defines the number of modulation carriers between **2k** and **8k**. To modify its value, place the marker over the **Carriers** field by turning the rotary selector and then press it: a menu will appear on the screen. Turning the rotary selector select the desired value for the Carriers parameter and finally press it again to validate.

2) Guard interval

The **Guard Interval** parameter corresponds to the time dead between symbols, its purpose is to permit a correct detection in multi-path situations. This parameter is defined according to the symbol length: 1/4, 1/8, 1/16, 1/32. To modify its value, by turning the rotary selector, place the marker over the **Guard Interval** field and then press it: a menu with the available values will appear. Turning the rotary selector select the desired value and finally press it to validate. If **Guard Interval** parameter is not known it is possible to assign the **Auto** option for its automatic detection.

3) **Channel BW** (channel bandwidth)

Enables the channel bandwidth to be selected between 8 MHz, 7 MHz and 6 MHz. The selection of this parameter is essential for the correct operation of the tuner, as it affects the frequency separation of the carriers.

4) **Spectral Inv.** (spectral inversion)

This option enables spectral inversion to be applied to the input signal, though in the majority of cases it should be in the OFF position (not inversion).

5) Attenuator

It permits to select attenuation between 0 and 30 dB. It is advisable to activate the 30 dB attenuator under that measurement conditions where the signal level is near to the maximum input level (approximately starting from 20 dB under the maximum level) and it is possible that the tuner becomes saturated. Under no-saturation conditions, when increasing the attenuation value the BER measure must to maintain or to increase (insufficient signal level) but never to decrease.

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This configuration menu shows, besides the user definable COFDM signal parameters, the value of the rest of COFDM signal parameters detected automatically:

Code Rate Also known as Viterbi ratio, defines the ratio between the data bits

number and the total number of bits transmitted (the difference corresponds to the number of control bits for the error detection and

recovery).

Modulations Carriers modulation. It also defines the system noise immunity.

(QPSK, 16-QAM and 64-QAM).

Hierarchy The DVB-T norm contemplates the possibility to make a TDT

transmission with hierarchical levels, it is to say a simultaneous transmission of the same program with different image qualities and noise protection levels, in order the receiver can exchange to a signal of smaller quality when the reception conditions are not optimal.

Once you have defined the COFDM signal parameters, it will be possible to measure the **BER**. When the **BER** measuring mode is selected, the monitor will show a picture like the following:

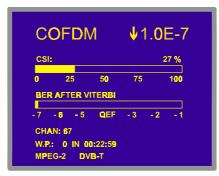


Figure 11.- BER measuring screen for COFDM-modulated signals

Two measures are shown:

 CSI: Channel status information (or MER: Modulation error ratio)

2) BER after Viterbi

The **CSI** measure (*Channel Status Information*) is a qualitative measure about channel state, between 0 and 100%. The optimum value corresponds to 0%. This measure permits to look for the best situation even in those measuring conditions where the measured BER is best than the minimum readout (in this way, in the example of the previous figure, the measured BER is lower that the minimum readout, 1.0x10⁻⁷, but the CSI measurement, 27%, still can be improved).

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Next it is shown the **BER after Viterbi** measurement both in numeric and graphic bar format.

In a reception system of terrestrial digital signal, after the COFDM decoder two error correction methods are applied. Obviously, each time we apply an error corrector to the digital signal, the error rate changes, therefore if we measure the error rate at the output of the COFDM demodulator, at the output of the Viterbi decoder, and at the output of the Reed-Solomon decoder, we obtain nothing more than different error rates. The **PROLINK-2** *Premium* provides the *BER after Viterbi* and the number of *Wrong packets* received after Reed-Solomon.

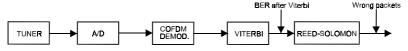


Figure 12.- COFDM reception system.

The BER measurement is provided in scientific notation (i.e. 3.1 E-7 means 3.1×10^{-7} , that is to say 3.1 wrong bits of each 10000000) and through a graphic bar (as its length is smaller the signal quality will be better). The analogue representation is done on a logarithmic scale (not linear), that is to say, the bar divisions correspond to the exponent of the measurement.

With the aim to have a reference about the signal quality, it is considered that a system has a good quality when it decodes less than one non-correctable error for every transmission hour. This border is known as **QEF** (**Quasi-Error-Free**) and it corresponds approximately to a BER after Viterbi of **2.0E-4 BER** (2.0x10⁻⁴, that is to say 2 wrong bits of each 10000). This value is marked on the measurement bar of the BER and therefore, BER for acceptable signals must be at the **left** side of this mark.

In the lower line of the screen it appears the **W. P.** counter (Wrong Packets counter). This counter shows the number of non-correctable packets received after Reed-Solomon during the measuring time. This counter is automatically activated when the unit detects an MPEG-2 signal.

If at any time, the received signal stops to satisfy the requirements of the MPEG-2 standard, this counter will deactivate, that is to say it will keep the number of non-correctable packets received and the measuring time, later, if an MPEG-2 signal is received again, it will activate with no reset.

When during any measuring time interval the counter has been deactivated, in other words the signal has not satisfied the MPEG-2 synchronism, the presentation of this counter will alternate with another counter titled **FAIL**. This second counter shows the time that the detected signal has not fulfilled the MPEG-2 standard requirements (12 seconds in the example of the following figure) and the number of signal cuts (2 in the example of the following figure). To reset the counter it is necessary to change any of the detection

parameters, for example tune again the signal or push twice the [22] key.

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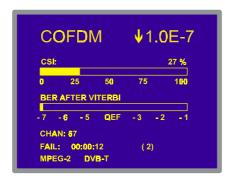


Figure 13.- Signalling two MPEG-2 signal cuts with a total length of 12 seconds.

Finally it is shown a status line with information about the detected signal. The possible messages that can appear and its meaning are showing the following list. The messages are exposed from less to more fulfilment of the MPEG-2 standard:

No signal received

No signal has been detected.

Timing recovered

Only it is possible to recuperate the symbol time.

AFC in lock

The system automatic frequency control can identify and lock a digital transmission (TDT) but its parameters can not be obtained. It can be due to a transitory situation previous to the TPS identification (*Transmission Parameter Signalling*) or well to a TDT transmission with an insufficient C/N ratio.

TPS in lock

The TPS (*Transmission Parameter Signalling*) are decoded. The TPS are carriers (17 in the 2k system and 68 in the 8k system) modulated in DBPSK, containing information related to the transmission, modulation and codification: Modulation type (QPSK, 16-QAM, 64-QAM), Hierarchy, Guard Interval, Viterbi Code Rate, Transmission mode (2k or 8k) and Number of the received frame.

MPEG-2

Correct detection of a MPEG-2 signal.

In case of detecting a DVB signal, message MPEG-2 DVB-T.

The **PROLINK-2** *Premium*, also offers the possibility of measuring the modulation error ratio (**MER**) for COFDM signals. Once the COFDM signal parameters have been defined, you can access to the digital mode function menu by pressing the rotary selector [4], then turn it to select **COFDM setup** function and finally press it again. The monitor will show a screen displaying two possibilities: **CSI** and **MER**, then turn the rotary selector [4] to select the desired option and finally press it to confirm.

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Figure 14.- MER measuring screen for COFDM-modulated signals.

IMPORTANT REMARK

DVB-T channels tuning may require an adjusting process. It is recommended to follow next procedure:

- 1.- From the **spectrum analyser** mode, tune the channel at its central frequency.
- 2.- Switch to **TV mode**, **BER** measuring mode.
- 3.- If in the lower line of the screen does not appear MPEG-2 message (and consequently BER is unacceptable), by turning the rotary selector deviate the tuning frequency until MPEG-2 message appears. Finally tune channel again to minimize the frequency deviation which optimizes the BER and therefore minimize the BER.

If it is not possible to detect any MPEG-2 channel, make sure that digital signal parameters are correctly defined and if signal level is too low, check that the 30 dB attenuator is not activated (**Attenuator 0 dB**).

4.9.1.5.2 Measuring BER of QPSK Digital Channels (QPSK)

Press the rotary selector to access the QPSK signals parameters that must be defined by user and that are described below:

1) Symbol Rate

It is possible to choose between the following values: **30000**, **27500**, **22000**, **20000**, **19995**, **6110**, **6000**, **5998**, **5632**, **5062**, **4340**, **4000** kbauds, or well to define any other value (*Other*).

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When selecting the Other option, a screen titled QPSK SYMBOL RATE will

appear. This screen shows present value, to modify it press key enter the new value through the keyboard. The unit accepts any number with 5 figures between 2000 and 35000 kbauds (fifth figure acts as validation). For example, to select a symbol rate of 8200 kbauds it must be entered: 08200.

2) Code Rate

Also known as Viterbi ratio. It defines the ratio between the number of data bits and actual transmission bits (the difference corresponds to the control bits for error detection and correction).

It permits to choose between 1/2, 2/3, 3/4, 5/6, 7/8 and Auto. If Code Rate parameter is not known it is possible to assign the Auto option.

3) Spectral Inv.

If necessary, activate the **Spectral inversion**. Reception will be bad if spectral inversion has been incorrectly selected.

4) Attenuator

It permits to select attenuation between 0 and 30 dB. It is advisable to activate the 30 dB attenuator under that measurement conditions where the signal level is near to the maximum input level (approximately starting from 20 dB under the maximum level) and it is possible that the tuner becomes saturated. Under nosaturation conditions, when increasing the attenuation value the BER measure must to maintain or to increase (insufficient signal level) but never to decrease.

Once you have defined the QPSK signal parameters, it will be possible to measure the BER. When the BER measuring mode is selected, the monitor will show a picture like the following:



Figure 15.- BER measuring screen for QPSK modulated signals.



Two BER measurements are shown:

1) **BER before FEC** (Forward Error Corrections)

(or **MER**: Modulation error ratio)

2) BER after Viterbi

In a digital reception system for satellite signals, after the QPSK decoder two different correction methods are applied (see figure 18). Obviously, each time we apply an error corrector to a digital signal, the error rate changes, therefore if we measure in a digital satellite television system, for example, the error rate at the output of the QPSK demodulator, at the output of the Viterbi decoder, and at the output of the Reed-Solomon decoder, we obtain nothing more than different error rates. This is the reason because the BER measurement is provided before FEC, after Viterbi.



Figure 16.- Digital reception system via satellite.

The BER measurement is provided in scientific notation (i.e. 2.0 E-3 means 2.0×10^{-3} , that is to say two incorrect bits of every 1,000) and through an analogue bar (as its length is smaller the signal quality will be better). The analogue representation is done on a logarithmic scale (not linear).

With the aim to have a reference about the signal quality, it is considered that a system has a good quality when it decodes less than one non-correctable error for every transmission hour. This border is known as **QEF** (**Quasi-Error-Free**) and it corresponds approximately to a BER after Viterbi of **2.0E-4 BER** (2.0x10⁻⁴). This value is marked on the measurement bar of the BER after Viterbi and therefore, BER for acceptable signals must be at the **left** side of this mark.

Next it is shown the tuning frequency and the frequency deviation in MHz between the tuned frequency and the one which optimizes the BER (i.e. Freq: 1777.0 + 1.2 MHz).

Finally it is shown a status line with information about the detected signal. The possible messages that can appear and its meaning are shown in the following list. The messages are exposed from less to more fulfilment of the MPEG-2 standard:

No signal received

Any signal has been detected.

Signal received

A signal is detected but it can not be decoded.

Carrier recovered

A digital carrier has been detected but it can not be decoded.

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Viterbi synchronized

A digital carrier has been detected and the Viterbi algorithm is synchronized, but too many frames arrive with non correctable errors. It is not possible to quantify the BER.

MPEG-2

Correct detection of a MPEG-2 signal.

In case of detecting a DVB signal, message MPEG-2 DVB-S.

The **PROLINK-2** *Premium*, also offers the possiblity of measuring the modulation error ratio (**MER**) for QPSK signals. Once the QPSK signal parameters have been defined, you can access to the digital mode function menu by pressing the rotary selector [4], then turn it to select **QPSK setup** function and finally press it again. The monitor will show a screen displaying two possibilities: **BER before FEC** and **MER**, then turn the rotary selector [4] to select the desired option and finally press it to confirm.



Figure 17.- BER measuring screen for QPSK-modulated signals

IMPORTANT REMARK

DVB-S channels tuning may require an adjusting process. It is recommended to follow next procedure:

- From the spectrum analyser mode, tune the channel at its central frequency.
- 2.- Switch to TV mode, BER measuring mode.
- 3.- If in the lower line of the screen does not appear MPEG-2 message (and consequently BER is unacceptable), by turning the rotary selector deviate the tuning frequency until MPEG-2 message appears. Finally tune channel again to minimize the frequency deviation which optimizes the BER and therefore minimize the BER.

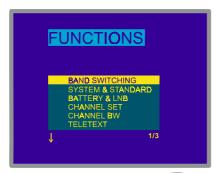
If it is not possible to detect any MPEG-2 channel, make sure that digital signal parameters are correctly defined and if signal level is too low, check that the 30 dB attenuator is not activated (**Attenuator 0 dB**).

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4.9.2 TV Mode Functions Menu

In TV operation mode, press the rotary selector [4] to access the functions menu of the TV mode:





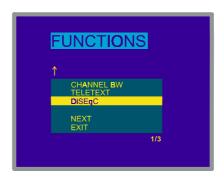


Figure 18.- TV mode functions menu.

Turn the rotary selector [4] to choose the different functions: turning it clockwise active option moves downwards while turning it anticlockwise active option moves upwards. The downwards or upwards facing arrow at the bottom or top-left hand side of the functions menu indicates there are more menus which can be accessed by turning the rotary selector clockwise or anticlockwise, respectively.

Below we describe the use of each function and its range of values.

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4.9.2.1 Selection of the RF Band: (Band switching)

Permits to switch from terrestrial (45-862 MHz) to satellite band (900-2150 MHz) and viceversa.

4.9.2.2 Selection of the TV System and Standard (System & Standard)

This function enables the television system and standard to be changed. The standards which can be selected depend on the band in use (terrestrial or satellite channels). To change the standard access the TV mode functions menu, then turn the rotary selector [4] to the **System & Standard** function and press the rotary selector again [4]. A fold down menu will appear listing the following options:

| Terrestrial bands | Satellite band |
|-------------------|----------------|
| PAL-B/G | PAL |
| PAL-D/K | SECAM |
| PAL-I | Digital (PAL) |
| SECAM-B/G | · , , |
| SECAM-L | |
| SECAM-D/K | |
| Digital (PAL) | |

Turn the rotary selector [4] to the desired standard and press to activate it.

If a **digital** channel is selected, whether terrestrial or satellite, for the measurement of the level and the carrier-to-noise ratio to be correct, the bandwidth of the channel must be defined, using the **Channel BW** function of the functions menu.

In order to change the standard of the digital signals previously you must select the corresponding analogue standard.

The following table shows the features of the analogue terrestrial channel standards.

| System | Lines/ frame | Channel Bandwidth | Video/sound separation | Video Mode | Audio Mode |
|--------|-----------------|----------------------|------------------------|---------------|---------------|
| В | 625/50 | 7 MHz | 5.5 MHz | Neg | FM |
| D | 625/50 | 8 | 6.5 | Neg | FM |
| G | 625/50 | 8 | 5.5 | Neg | FM |
| Н | 625/50 | 8 | 5.5 | Neg | FM |
| I | 625/50 | 8 | 6.0 | Neg | FM |
| К | 625/50 | 8 | 6.5 | Neg | FM |
| L | 625/50 | 8 | 6.5 | Pos | AM |

Table 4.- Selectable terrestrial analogue standards and their characteristics.

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4.9.2.3 Battery and External Units Power Supply (BATTERY & LNB)

This function allows you to check the charge state of the batteries, as well as the supply current and voltage of the external units. From the TV operation mode, simply press the rotary selector [4], select the **BATTERY & LNB** function and press the rotary selector [4] again. You will see a screen like the following one:



Figure 19.- Battery & Lnb function.

The top part of the screen displays the battery voltage (7.3 V in previous figure), both numerically and with a bar graph. The arrow labelled **Low** below the horizontal bar signals the low battery level where the battery should be charged. When batteries are fully charged, battery voltage indication is 7.4 V or higher.

The bottom of the screen shows the voltage supplied to the external units (**V EXT**, 18.5 V in the figure above) and the current supplied (**I EXT**, 200.0 mA in the example).

To leave this function press the rotary selector [4].

4.9.2.4 Input Video

The **Input video** function enables Scart connector signals to be controlled. There are four possibilities:

Scart AutoNormal Scart operationScart InInput video operation modeScart OutOutput video operation mode

Scart Off Scart deactivated

To select the Scart operation mode, access the TV mode functions menu, turn the rotary selector [4] to the *Input video* function and press to activate it. The monitor will show a screen labelled **INPUT VIDEO** displaying the four available options (as well as the Exit option). Turn the rotary selector [4] to the mode you require, then press to activate it.

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4.9.2.5 Selecting the Channels Table (Channel set)

The PROLINK-2 Premium comes with eighteen stored channel tables as standard (four for terrestrial television and fourteen for satellite), for greater adaptability to the selection requirements of different countries or zones. See the channel-frequency table in appendix A of the manual.

To modify one channel table, access the TV mode functions menu, turn the rotary selector [4] to the Channel set function and press to activate it. The monitor will then show the CHANNEL SET screen. Turn the rotary selector [4] to the desired table and then press the rotary selector [4] again to activate.

4.9.2.6 **Measurement Units**

The PROLINK-2 Premium offers three measurement units to measure level and channel power: dBuV. dBmV and dBm.

To select the units of measurement, access the TV mode functions menu, turn the rotary selector [4] to select the Units function and press to activate it. The monitor will show a screen labelled UNITS displaying the three available options (as well as the Exit option). Turn the rotary selector [4] to the units you require, then press to activate it.

4.9.2.7 Power Off Mode (Manual power)

The PROLINK-2 Premium offers two power-off modes: Manual and Automatic (unit disconnects automatically after 15 minutes without operating on any control).

To select the power-off mode, access the TV mode functions menu, turn the rotary selector [4] to select the Manual power function and press to activate it. The monitor will show a screen labelled POWER OFF displaying the two available options (as well as the *Exit* option). Turn the rotary selector [4] to select the power-off mode you require, then press to activate it.

4.9.2.8 C/N setup

To measure C/N the PROLINK-2 Premium offers two different modes in TV mode:

C/N (Auto) The **PROLINK-2** *Premium* defines automatically the frequency where noise level is measured, according

 $f_{\text{noise}} = f_{\text{tuning}} - \frac{1}{2}$ Channel BW.

C/N (Reference noise) The user defines the frequency where noise level is measured (by means of the Reference noise

function). This frequency will be used to measure

noise level for all channels.

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To select C/N mode, access the TV mode functions menu, turn the rotary selector [4] to the *C/N setup* function and press to activate it. The monitor will show a screen labelled **C/N SETUP** displaying the two available options (as well as the *Exit* option). Turn the rotary selector [4] to the mode you require, then press to activate it.

4.9.2.9 Channel Bandwidth (Channel BW)

To measure the power and C/N ratio of digital channels, as well as the C/N ratio of satellite band channels, you first need to define the channel bandwidth.

To modify the bandwidth access the TV mode functions menu and select the **Channel BW** function, press the rotary selector [4] to activate it. The **CHANNEL**

BANDWIDTH screen will be displayed. To alter the bandwidth value press key [31], the bandwidth will disappear and, using the keyboard, you will be able to enter the new digital channel bandwidth in MHz and with two decimals.

4.9.2.10 LNB Local Oscillator Frequency (Lnb local osc)

This option only affects reception of satellite band signals when using the channel tuning mode. This function defines the LNB local oscillator frequency used in the installation where the **PROLINK-2** *Premium* has been connected. Given that the **PROLINK-2** *Premium* satellite channel tables have been defined in the Ku band and the **PROLINK-2** *Premium* tunes in IF (like all satellite receivers) the LNB local oscillator frequency has to be defined to correctly tune the channel mode.

To modify this parameter access the TV mode functions menu (satellite band), turn the rotary selector [4] to the *Lnb local osc* function and press to activate it. The monitor will show a screen labelled **LNB LOCAL OSCILLATOR** displaying the current

value of the LNB local oscillator frequency. To alter this value press key [31], the current value will disappear and the new value can now be entered using the keyboard.

The frequency of the LNB local oscillator is expressed in MHz, with 5 figures for the whole part, a decimal point and a decimal figure (which acts as confirmation). For example, to select 9 GHz the number **9000.0** has to be entered. Values must be defined between 8000.0 and 12000.0.

4.9.2.11 Video Polarity

This option affects reception of SAT (satellite) band signals. It allows selection of either negative and positive video polarity.

To modify the polarity access the TV mode functions menu (satellite band), select the *Video Polarity* function, and press the rotary selector [4] to activate it. The monitor will show a screen labelled **POLARITY** displaying two possibilities: *Positive Video* and *Negative Video*. Turn the rotary selector [4], mark the option you require and finally press to activate.

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4.9.2.12 Verification of distribution networks (SAT IF Test)

This application allows to verify easily the TCI features (Telecommunications Common Infrastructures) before the antennas and the head-end devices are operative. The procedure allows to evaluate the frequency response of a whole FI distribution network by means of two steps:

NOTE: For this application the use of **PROMAX**'s **RP-050** FI simulator is suggested, for which it has been specially designed.

1.- CALIBRATION

Connect the RP-050 directly to the PROLINK-2 Premium using the BNC-F adapter.

Power on the **RP-050** through the **PROLINK-2** *Premium*, it is necessary to set the **External supply** function (see section '4.8 *External Units Power Supply*') pressing key [27], and the rotary selector [4] for setting a voltage of 13 V.

Finally, select the **SAT IF TEST** application on **FUNCTIONS** menu from TV mode and SAT band, when it appears the screen from figure 21, press the rotary selector [4] to accede to the **FUNCTIONS** menu and using the rotary selector [4] to accede to the **Calibrate** function (figure 22). Wait for some seconds until the calibration process is completed shown by a white square crossing through the three pilot frequencies.

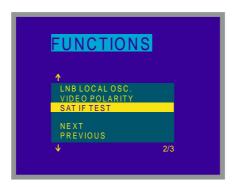


Figure 20.- Sat IF test selection, (satellite band, analogue channels).



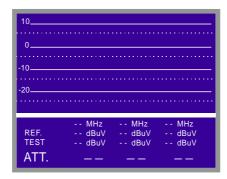


Figure 21.- Sat IF test.

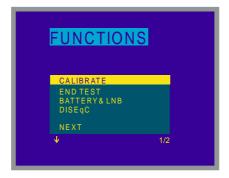


Figure 22.- Calibrate function selection for Sat IF Test.

2.- MEASUREMENT OF THREE PILOTS THROUGHOUT THE NETWORK

Once **PROLINK-2** *Premium* has been calibrated, connect the **RP-050** to the point where it will be connected the satellite dish (signal source) and start to take level measurements in the different distribution outlets using the **PROLINK-2** *Premium*. On the screen will appear the attenuation values for the three pilot frequencies measured in the outlet plug (see the following figure).

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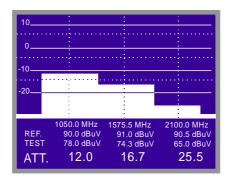


Figure 23.- Attenuation measurements in a plug.

In order to finish of measuring, press the rotary selector [4] and select from **FUNCTIONS** menu the **End Test** option.

4.9.2.13 NICAM Channel

Use this function to verify NICAM sound modulations in stereo and dual, you can also select the sound channel coming over the speaker.

To change the decoded channel access the TV mode functions menu, select the *Nicam channel* function, and press the rotary selector to activate it. The monitor will show a screen labelled **NICAM** offering two possibilities: *Channel A* and *Channel B*. Turn the rotary selector [4] to the desired option and finally press to activate.

4.9.2.14 Search Level

Use this function to modify the threshold level of the automatic station search. To change the level place the cursor on the **Search level** field and press the rotary selector [4]. The monitor will display a window showing the current value of the search

level, to alter it press key [31] and enter the new value on the keyboard. Confirmation is automatic on entering the second digit.

4.9.2.15 Teletext

When the *Teletext* function is selected, Teletext information appears on the monitor if a transmitter with this information is tuned. The first page to appear on the screen is always page 100. If Teletext data is received, a counter located on the upper edge of the screen indicates the page that is being processed. To change active page

press key [31] and introduce the new number using the numeric keyboard (third digit acts as confirmation).



If the page requested is not included in the Teletext service of the transmitter, the search will continue indefinitely. In such a situation the user can halt the search process, either by entering a new page number or by exiting the Teletext function pushing any control relative to another function.

The Teletext function is especially valuable for the final optimization process in TV installations. Any interference or reception through indirect beams generates digital in the digital information of the Teletext, which are highly visible as erroneous characters on the screen.

4.9.2.16 DiSEgC Command Generator

DiSEqC⁴ ('Digital Satellite Equipment Control) is a communication protocol between the satellite receiver and the accessories of the installation (switches, LNBs, etc.) proposed by Eutelsat, with the aim to standardize the diversity of switching protocols (13 - 15 - 18 V, 22 kHz, 60-400 Hz) and to satisfy the demands of the digital TV installations.

To define and/or to send a DiSEqC commands sequence, from the TV operation mode, press the rotary selector [4], select the **DiSEqC** function and press it again. A screen like next one will appear:



Figure 24.- DiSEqC programs screen.

This screen shows a list containing up to 10 **DiSEqC** programs (appearing as UNTITLED by default) which may be edited for execution.

To edit a program, turn the rotary selector placing the pointer over the program editing position and press to access the **DiSEqC** commands editing screen.

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⁴ DiSEqCTM is a trademark of EUTELSAT.





Figure 25.- DiSEqC commands screen.

DiSEqC screen is divided in 3 areas: the field to edit the **DiSEqC commands** sequence (only command *Sat A/B* in previous figure), **Send/Clear** functions and **Exit**.

Fill in the **LABEL** field with the program name: turn the selector to display the different characters in alphanumerical order and press to pick the character you need.

To define the **DiSEqC commands sequence** press key [31] repeatedly until cursor is positioned on one line of the commands sequence (the line will blink). If cursor has been placed on the first empty line, *Sat A/B* command will appear (first DiSEqC command of table 5). To select a different command turn the rotary selector until the desired command appears and then press it.

Some DiSEqC commands need to define an associated parameter (i.e. On/Off, a numerical value, A/B...), when any of these commands is selected first option for the associated parameter appears automatically at its right, to change it turn the rotary selector and to validate it press the rotary selector (see DiSEqC commands table).

Once the DiSEqC command is defined, the cursor will pass to the following line, if you want to define a new command proceed as for the first one, if you do not want to add any command press key [31].

After the commands sequence is created it is possible to modify it. To modify

the sequence press key [31] repeatedly until you have positioned the cursor on the command you want to make the change and then press the rotary selector [4]: *Insert* function will appear on the screen, by turning the rotary selector it is possible to select *Delete* and *Edit* functions. Once the desired function appears on the screen (*Insert*, *Delete* or *Edit*) press the rotary selector. If you select *Delete* function the command will be removed from the sequence, if you select *Insert* or *Edit* functions, you must define the new command as previously described.



Once commands sequence is defined, to send it to the peripherals press key

[31] repeatedly until you have selected the **Send** function and then press the rotary selector [4]. At the same time as DiSEqC commands are sent these appear on the lower side of the monitor. If **Send** function does not appear on the monitor, place the cursor over the **Clear** function and turn the rotary selector.

It is possible to delete the whole of the commands sequence, to do this press key [31] repeatedly until you have selected the *Clear* field and then press the rotary selector [4]. If *Clear* function does not appear on the monitor, place the cursor over the *Send* function and turn the rotary selector.

To exit DiSEqC function place the cursor over the *Exit* field and then press the rotary selector [4].

REMARK: When disconnecting the unit, the commands sequence will NOT be lost.

It is possible to execute a specific **DiSEqC** program using a direct access key (see '4.13 Direct Access to Functions'). This enables you to change specific configurations from the **Spectrum Analyser Mode**, useful during the parameter adjustment process in an installation.

It is also possible to execute **DiSEqC** programs using the **Datalogger** function if their names are included in the automatic reading acquisition sequence (see '4.12.1 Storing a Measurement Configuration (STORE)').

Next table shows the DiSEqC commands available:

| Character | Command | Associated parameter |
|--------------------|------------------|----------------------|
| General | Sat A/B | A/B |
| | Reset | |
| | Power on | |
| | Standby | |
| Assigned Switch | L.O. frequency | High/Low |
| | H/V polarisation | H/V |
| | Position A/B | A/B |
| | Sw. option A/B | A/B |
| Assigned Switch | Switch 1 | A/B |
| | Switch 2 | A/B |
| | Switch 3 | A/B |
| | Switch 4 | A/B |

| Character | Command | Associated parameter |
|------------|------------------|----------------------|
| Positioner | Halt | |
| | Disable limits | |
| | Enable limits | |
| | Limit East | |
| | Limit West | |
| | Drive E. seconds | 1 to 127 |
| | Drive E. steps | 1 to 128 |
| | Drive W. seconds | 1 to 127 |
| | Drive W. steps | 1 to 128 |
| | Store position | 1 to 255 |
| | Goto position | 1 to 255 |

Table 5.- DiSEqC commands.

4.9.2.17 Beep

This function allows the user to switch the audible indicator ON and OFF. To do this, first select the TV mode functions menu, then choose the *Beep* function using the rotary selector [4] and press. The monitor will show the *BEEP* screen and by turning the rotary selector it will be possible to select between *Beep ON* or *Beep OFF*. To validate press it again.

4.9.2.18 Equipment Information

This function displays information on the instrument. To activate it, press the rotary selector [4] while in the TV operation mode. Turn the rotary selector [4] to the **Equipment Info.** function and press. The monitor will show the **EQUIPMENT INFO.** screen listing several informations such as the instrument serial number (Serial Number), the version of the control program (Version), etc.

To exit the function press the rotary selector [4].

4.9.2.19 Exit

Exits from the TV functions menu.

4.10 Spectrum Analyser Operating Mode

The Spectrum Analyser mode allows the user to discover the signals present in the frequency band in quickly and easily and to make measurements at the same time.

To select it press key [21]. The monitor will show a picture like the one described in the next figure.

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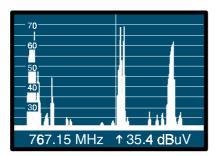


Figure 26.- Spectrum Analyser mode.

The horizontal lines define the signal level, the broken lines being separated a distance equals to the half value defined by the dynamic range (See function Dynamic Range). The level of the top line (70 dBuV in previous figure), named the Reference Level, can be altered using the Reference level function in the Spectrum Analyser mode functions menu over a range from 10 dBµV to 130 dBµV by steps of 10 (section 4.10.1.3).

The signal level for each frequency is displayed vertically, the lower frequencies appearing at the left of the screen and the higher ones at the right. The amplitude of the lobes is calibrated. In the example in previous figure the noise level is at around 20 dBuV and the lobe with the highest signal level (second from the right) is at 69 dBuV.

The frequency range displayed (called span from hereon) can also be altered using the Spectrum Analyser mode functions menu.

Also, it is possible to define the detection mode (peak or average) by means of the **Detection Mode** function, it affects the form in which the spectrum appears in screen. The Peak mode is used for the detection of analogue modulations whereas the average mode is more suitable to detect the digital modulations.

A vertical broken line, called marker, appears on the spectrum display to identify the tuned frequency.

One of the applications of the PROLINK-2 Premium operating as Spectrum Analyser is in the search for the best orientation and position of the receiving antenna. This is particularly important in UHF. Because such frequencies are involved, with wavelengths ranging from 35 cm to 65 cm, if the antenna is shifted only a few centimetres, the relationship between the picture, chrominance and sound carrier frequencies change, affecting the quality of the picture in the receiver.

If there is an excess of sound carrier, tearing or 'moiré' may appear on the screen due to the frequency beats between the sound, chrominance and the picture frequencies.



If there is a chrominance carrier defect, then the television colour amplifier must function at maximum gain, which could result in noise appearing all over the television screen with points of colour that disappear when the saturation control is reduced; in an extreme case, loss of colour may occur.

4.10.1 Spectrum Analyser Mode Functions Menu

In the Spectrum Analyser operation mode, pressing the rotary selector [4] leads you to the next functions menu.



Figure 27.- Spectrum Analyser mode functions menu.

When turning the rotary selector clockwise active option moves downwards while turning it anticlockwise active option moves upwards.

The downward pointing arrow at the bottom left of the menu means that there are more functions available, to view these turn the rotary selector clockwise. Below we describe the use of each function and its range of values.

4.10.1.1 Band Switching

Permits to switch from terrestrial (5-862 MHz) to satellite band (900-2150 MHz) and vice versa.

4.10.1.2 Span

This function enables selecting the displayed screen frequency range in Spectrum Analyser mode between *Full* (the entire band), *500 MHz*, *200 MHz*, *100 MHz*, *50 MHz*, *32 MHz*, *16 MHz*, *8 MHz* and *4 MHz* (the latter one only in terrestrial bands).

To alter the **span**, select the functions menu, then turn the rotary selector [4] to the **Span** function and press it. The screen will show a window with the spans which can be selected. Turn the rotary selector [4] to the required span and activate it by pressing the selector again.

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In **Full** mode the measuring filter bandwidth used to display the spectrum is always 1 MHz for terrestrial bands, and 4 MHz for satellite band. For the other spans you can select the bandwidth using the **Measure Bandwidth** function on the same functions menu. (See section '4.10.1.10 Bandwidth of the Spectrum Measuring Filter').

4.10.1.3 Reference Level

The reference level corresponds to the level marked by the top horizontal line appearing on the Spectrum Analyser mode screen. This function enables the reference level to be defined between 10 and 130 dB μ V in 10 dB steps. The default reference level is 70 dB μ V.

To alter the value of the reference level select the Spectrum Analyser mode functions menu, turn the rotary selector [4] to select the *Reference level* function and press it. The screen will show a window with the values which can be selected. Turn the rotary selector [4] to the desired reference level and activate it by pressing the selector again.

4.10.1.4 Dual Marker/Single Marker

(Only for level measurements) This function enables two tuning markers (*Dual marker*) to be seen on the spectrum display. When you choose this option you can select the active marker (*Marker B* \Rightarrow *A* or *Marker A* \Rightarrow *B*) or return to using only one marker (*Single marker*).

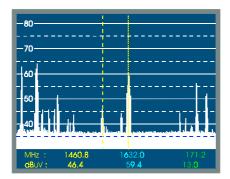


Figure 28.- Spectrum Analyser mode with two tuning markers.

When you select the **Dual marker** function, the bottom of the screen displays the frequency of each of the two markers, the signal level for each frequency and, on the far right, the frequency difference and the level between them.

4.10.1.5 Sweep

It offers the possibility of selecting the Spectrum mode sweep rate: **High Resolution** (slow sweep, high precision), **Fast** (fast sweep, low precision) and **Antenna Alignment** (for faster sweep antenna alignment without numeric representation).

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To modify the sweep speed select the Spectrum Analyser mode functions menu, then turn the rotary selector [4] to the **Sweep** function and press. The screen will show a window containing all the values which may be chosen. Turn the rotary selector [4] to the desired speed and activate it by pressing the selector again.

4.10.1.6 Reference Noise (Carrier → Ref. Noise)

(Only in *C/N* measurements). Permits to define the frequency where noise level will be measured.

To modify the frequency where you want to measure noise level, accede to the menu functions and select the *Carrier* → *Ref. noise* function then, again in the Spectrum mode, turn the rotary selector to place the marker on the frequency where

you want to measure the noise level or well, press key [31], current reference noise frequency will be erased and using the keyboard introduce the new value. Finally accede to the functions menu again and execute the *Ref. Noise → Carrier* function so that you can tune new carrier frequencies by turning the rotary selector.

4.10.1.7 Channel Bandwidth (Marker → Channel BW)

(Only in Channel Power measurements). Permits to define channel bandwidth.

To modify the channel bandwidth, that is to say the power integration limits, accede to the menu functions and select the *Marker* → *Channel BW* function then,

again in the Spectrum mode, turn the rotary selector to modify it or well press key [31], current channel bandwidth will be erased and using the keyboard introduce the new value. Finally accede to the functions menu again and execute the **Channel BW** → **Marker** function so that you can tune new carrier frequencies by turning the rotary selector.

4.10.1.8 Marker (Channel BW → Marker)

(Only when measuring *Channel power* and after defining the *Channel bandwidth*). Permits to change the tuning frequency by means of the rotary selector.

4.10.1.9 Carrier (Ref. Noise → Carrier)

(Only when measuring *C/N Referenced* and after defining the *Reference noise*). Permits to change the tuning frequency by means of the rotary selector.



4.10.1.10 Bandwidth of the Spectrum Measuring Filter (Measure bandwidth)

The frequency resolution of the Spectrum Analyser mode is determined by the bandwidth of the measuring filter when displaying the spectrum. This parameter is fundamental given the increasing density of channels present in all TV transmission systems.

To alter the bandwidth of measurement select the Spectrum Analyser functions menu, then turn the rotary selector [4] to the *Measure bandwidth* function and press. The screen will show a window displaying the values which can be selected. Turn the rotary selector [4] to the chosen bandwidth and activate it by pressing the selector again.

The choice of bandwidth is:

Terrestrial channels: 50 kHz, 230 kHz ó 1 MHz Satellite channels: 50 kHz, 230 kHz ó 4 MHz

Filters with the greatest bandwidth (4 MHz y 1 MHz) allow you to take more stable measurements, as well as being able to distinguish between analogue and digital carriers. The 4 MHz filter is ideal for level measurements on the satellite band. The 230 kHz filter is recommended for measuring terrestrial television, cable television and MMDS signals. It also allows you to identify smaller bandwidth signals such as NICAM sound carriers (terrestrial analogue channels), to detect the beacon signal on VSAT, the separation between the audio FM carrier, and between the stereo sub-carriers in television.

4.10.1.11 Selecting the Channels Table (CHANNEL SET)

See 4.9.2.7 section.

4.10.1.12 Batteries and External Units Power Supply (BATTERY & LNB)

See 4.9.2.3 section.

4.10.1.13 Exit

Exits from the Spectrum Analyser function menu.

4.10.2 Selecting the Measurement Mode

The Spectrum Analyser mode permits to make different measurements at the same time you see the signals present in the band. The types of measurements available are:

Terrestrial band - Analogue channels:

Level Level measurement of the currently tuned carrier.

C/N Video carrier to noise ratio referenced to a *noise frequency*

defined by the user through the **Reference Noise** function.



Terrestrial band - Digital channels:

Channel power Integration method. It consists of scanning the entire

channel, calculating the contribution of each portion of the

spectrum to the whole.

C/N Referenced: Channel level to noise ratio referenced to a

noise frequency defined by the user through the Reference

Noise function.

Satellite band - Analogue channels:

Level Level measurement of the currently tuned carrier.

C/N Video carrier to noise ratio referenced to a *noise frequency*

defined by the user through the *Reference Noise* function.

Satellite band - Digital channels

Channel power Integration method.

C/N Referenced: Channel level to noise ratio referenced to a

noise frequency defined by the user through the Reference

Noise function.

Like in the TV mode, to select the type of measure, press key [22] then turn the rotary selector [4] until desired mode is marked and finally press the rotary

selector [4] or key [22] to activate the new measurement mode.

4.10.2.1 Measuring Carrier Levels (Level)

(Only for analogue channels). When selecting this mode on the lower part of the image appears the tuned frequency (or channel) and the signal level at this frequency. If dual marker function is selected, tuned frequency and signal level are showed for each one of the markers and, on the far right, the frequency difference and the level between them.

4.10.2.2 Measuring the Carrier / Noise ratio (C/N Referenced)

The Carrier/Noise ratio in Spectrum mode is always referenced to a noise frequency defined by the user.

Imagine a situation like the one shown in the next figure: a digital channel (8 MHz BW) adjacent to an analogue channel. When measuring C/N for the digital channel in TV mode using the *Auto setup*, the analogue channel may interfere in the noise measurement (given that the noise level is measured at $f_{noise} = f_{tuning} = \frac{1}{2}$ * Channel BW = 650 MHz - 4 MHz = 646 MHz), so under this situation it is recommended to make the measurement in **Spectrum Analyser** mode and to define manually the frequency where we want to measure noise (obviously a frequency where no signal is present); i.e. in the next figure noise is defined to be measured at 655 MHz.

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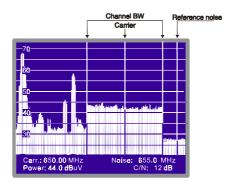


Figure 29.- Carrier to Noise measurement in Spectrum mode (digital channel).

To define the frequency to measure the noise, select the *Reference noise* function in the Spectrum functions menu and press the rotary selector. Next, again in the Spectrum mode, turn the rotary selector to place the marker on the frequency where

you want to measure noise level or press key [31], current reference noise value will be erased and using the keyboard introduce the new value. Finally accede to the functions menu again and execute the *Carrier* function so that you can tune new carrier frequencies by turning the rotary selector.

When C/N measuring mode is selected, on the lower part of the image appears the tuned frequency/channel (*Carr.*), the noise frequency (*Noise*), the carrier *Level* (if analogue mode is selected) or the channel *Power* (if digital mode is selected) and the carrier to noise ratio (*C/N*).

4.10.2.3 Measuring the Power of Digital Channels (Channel Power)

In the Spectrum Analyser mode the **PROLINK-2** *Premium* measures digital channel power using an **Integration method** between channel limits which are defined by the user. To show the interest of this method, imagine a spectral distribution like the one shown in the following figure (channel bandwidth is 8 MHz defined by the markers). If channel power is measured in TV operation mode different readouts will be obtained depending on the tuned frequency (measurement filter bandwidth is 230 kHz), if tuning is shifted from 759 MHz to 762 MHz reading will increase in several dB.



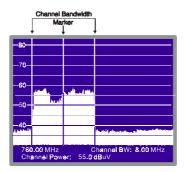


Figure 30.- Channel power measurement in Spectrum Mode.

When measuring Channel power, on the lower part of the image appears the tuned frequency (or channel), the channel bandwidth (*Channel BW*) and the *Channel Power*.

To measure the channel power, first of all it is necessary to define channel bandwidth, that is to say to set the limits of the integration: select the *Channel bandwidth* function in the functions menu and then, again in the Spectrum mode, turn

the rotary selector to modify it or well press key [31], current channel bandwidth will be erased and using the keyboard introduce the new value. Finally accede to the functions menu again and execute the *Marker* function in order you can tune new carrier frequencies, then when turning the rotary selector, the tuning marker and the channel bandwidth limits will shift together.

IMPORTANT REMARK

To measure digital channels power correctly it is indispensable to tune channel at its central frequency and to define **channel bandwidth**.

4.11 Selecting the Sound Mode (SOUND)

From the TV operating mode, analogue mode, press key [26]. The screen will show the **SOUND** menu with the types of sound available. Turn the rotary

selector [4], choose the type of sound you wish and then press key [26] or the rotary selector [4] to activate it. Table 4 shows the different options for the sound mode.



| Туре | Function | Band |
|------|--|--------------------------|
| 4.50 | Sound carrier 4.5 MHz above the picture carrier | Terrestrial |
| 5.50 | Sound carrier 5.5 MHz above the picture carrier | Terrestrial |
| 5.74 | Selects the second carrier in DUAL or STEREO transmissions, at 5.74 MHz of the picture carrier | Terrestrial |
| 5.80 | Sound carrier 5.8 MHz above the picture carrier | Satellite |
| 6.00 | Sound carrier 6.0 MHz above the picture carrier | Terrestrial |
| 6.50 | Sound carrier 6.5 MHz above the picture carrier | Terrestrial Satellite |
| 6.65 | Sound carrier 6.65 MHz above the picture carrier | Satellite |
| 7.02 | Sound carrier 7.02 MHz above the picture carrier | Satellite |
| NTUN | Continuous tuning (4.00 a 9.00 MHz) with narrow sound detection filter (110 kHz) | Terrestrial Satellite |
| BTUN | Continuous tuning (4.00 a 9.00 MHz) with broad sound detection filter (240 kHz) | Terrestrial Satellite |
| NICA | NICAM decoding | Terrestrial |
| AM | AM demodulation | Terrestrial |
| FM | Demodulación FM | Terrestrial |
| LV | Tone whose frequency varies with the signal level | Terrestrial Satellite |
| OFF | Suppresses the sound | Terrestrial Satellite |

Table 6.- Sound modes.

When you select the **NTUN** (continuous tuning using a narrow detection filter) and BTUN (continuous tuning using a broad detection filter) options the screen displays a window showing the frequency deviation of the sound carrier, this is variable between 4.00 MHz and 9.00 MHz. To define it turn the rotary selector [4] to the desired frequency deviation and press to validate.



4.11.1 FM function, access to RDS service

The **FM** function, allows to access to the information associated with the **Radio Data System** (**RDS**), in case of emitting in the frequency of selected demodulation. This technique offers data in the receiver screen relative to the identification of tuned transmitters network (**Service of Program - PS**), as well as after few seconds, short messages (**Radio TEXT - RT**), the program type (**PTY**), the traffic announcements (**TA**), the program identification (**PI**) and traffic program identification (**TP**) that emits each service.

The **PROLINK-2** *Premium* also shows the level of the received signal and tuned **FM** frequency as well as the balance of the number of received erroneous blocks (**EBB**) (See figure 31).



Figure 31.- RDS service information.

4.11.2 Tone function

When the **LV** function is selected, the speaker of the **PROLINK-2** *Premium* permits a tone whose frequency depends on the level of the signal received. This is very useful when installing antennas, since the user can locate the peak signal without having to look continually at the monitor of the level meter.

4.11.3 Selecting NICAM sound

When the **NICAM** option is selected, it is possible to measure the Bit Error Rate of the modulation. To obtain this measurement, from the **TV** operating mode, level

measurement, press key [2] in order to activate the mode of maximum measurement information displayed on the screen (name assigned to memory, power supply to external units, sound, colour system, TV standard, level and frequency/channel). In the position relative to the type of **Sound** will appear the information about the type of NICAM according to:

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Sound: Type + Error

Type = NICAM type:

"--": no NICAM is detected

"du": dual NICAM
"st": stereo NICAM
"mo" mono NICAM

Error = indication of the bit error rate:

"**E** ↓": error rate < 1e-5

"E5": 1e-5 < error rate < 1e-4
"E4": 1e-4 < error rate < 1e-3
"E3": 1e-3 < error rate < 2.7 e-3
"E↑": error rate > 2.7 e-3

Therefore, for example, the indication **Sound:** duE↓ has to be interpreted as NICAM sound is selected, the detected NICAM is dual and the error rate is below 1 e-5.

4.12 Measurement Configuration Memories

To facilitate measurement, the **PROLINK-2** *Premium* is able to store up to 99 configurations in an internal memory. In this way, it is possible to select the most common transmissions in a work area with their corresponding configurations quickly and easily.

The following parameters are stored in each configuration: the name assigned to the configuration, frequency or channel number, TV system, type of measurement, external units supply voltage (VLNB), measurement units, sound parameters, LNB-oscillator frequency, channel bandwidth (digital), symbol rate (digital), code rate (digital) and spectral inversion (digital).

It is possible to associate a specific measurement configuration with the execution of a previously edited DiSEqC program (see '4.9.2.18 DiSEqC Commands Generator').

4.12.1 Storing a Measurement Configuration (STORE)

The process of storing a measurement configuration is the following:

- Select the configuration you want on the PROLINK-2 Premium (freq./channel, band, etc.).
- 2. Press key [25] until the monitor displays the **STORE** screen. Check the configuration parameters. Then turn the rotary selector [4] to the memory number that you wish to store the configuration in (from 1 to 99). This number corresponds to the column headings of the Datalogger function.

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If a configuration is stored in a memory location already containing information, that data will be lost.

- 3. (Optional) If you wish to assign a name to a memory position press key [31], the fist character of the name will blink, turn the rotary selector [4] and the different characters will appear in the first position of the configuration name. When you have chosen the first character press the rotary selector again [4] to automatically move on to the second character. Repeat the process for a maximum of four characters
- (Optional) A memory position may be assigned to the name of a previously edited DiSEqC program, thereby associating it with the execution of the memorised measuring configuration.

Whenever it is established a satellite configuration will appear the DiSEqC

parameter. In order to activate it, accede by means of the key [31] and pressing the rotary selector [4] to view the list of edited programs (See section '4.9.2.18 DiSEqC Command Generator') and select the program to execute.



Figure 32.- STORE screen, storing a measuring configuration.

5. Finally, press [25] key or the rotary selector [4] and the configuration will be stored. If any other key is pressed, an error will be indicated and the memory will not be updated.

4.12.2 Retrieving a Configuration (RECALL)

Press the [25] key. The screen **RECALL** will appear on the monitor which shows the different parameters of each measuring configuration stored. Turning the rotary selector [4] select the configuration to be retrieved (a number between 1 and 99).

Pressing the [25] key again or the rotary selector [4] will retrieve the configuration.





Figure 33.- RECALL screen, retrieving a measurement configuration.

4.13 **Direct Access to Functions**

Kevs [28] and [9] [29] give direct access to any of the functions on the TV and Spectrum Analyser mode functions menus. To establish a relationship between the direct access key and a function, access the functions menu, select the function you wish to access directly and press key [28] or [29]. From then on when you press kev [28] or [29] the function will be accessed directly.

To directly execute a previously edited DiSEqC program, pressing the key assigned to the program will execute the memorised command.

4.14 **Printing the Spectrum**

By connecting the instrument to a serial printer it is possible to obtain the spectrum showed on screen. This enables the user to keep a file about the state of the system and provide the documents related for analysis purposes. The CI-23 portable printer is a PROLINK-2 Premium optional accessory.

The installation process consists of simply using the data transfer cable to connect the printer to the RS-232C connector [37] on the PROLINK-2 Premium (see section '4.14.1 Handshake and control lines'). Switch off the power to both instruments before connecting.

To print the spectrum showed select the function **Print** on the function menu in the Spectrum Analyser mode.



4.14.1 Handshake and Control Lines

Next is described the handshake and control lines used by the **PROLINK-2 Premium**:

The following parameters are used for printing through the serial port:

Rate: 19,200 bauds
Data bits: 8 bits
Parity: None
Stop bits: 1

To modify the printer parameters see 4.14.2 CI-23 Set-up.

- The control lines used are:
 - DATA TRANSMIT (PROLINK-2 Premium pin 3): To send data to the printer.
 - CLEAR TO SEND (PROLINK-2 Premium pin 8): Data transfer control.
 Data are sent only when this line is active.
 - DATA TERMINAL READY (PROLINK-2 Premium pin 4): This line is permanently active in order to indicate the establishment of the communication.

Connections

The cable between the **PROLINK-2** *Premium* and the printer must have the following connections:

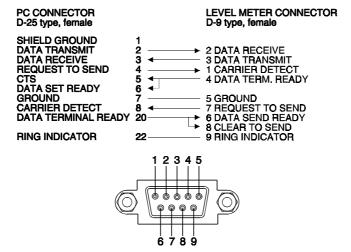


Figure 34.- Connector RS-232C PROLINK-2 Premium. Pins numbering.

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4.14.2 CI-23 set-up

This point explains how to modify the CI-23 printer set-up.

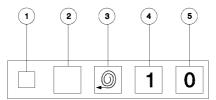


Figure 35.- CI-23 keyboard

[1] POWER LED [2] SET-UP [3] FEED [4] ON [5] OFF

To initiate the set-up mode push the [2] SET-UP and the [4] ON keys. The [1] POWER ON LED will flash until set-up mode is turned off. The current parameter status will be printed. The status of the DATA BITS parameter will be printed in order to modify it if necessary.

To select the status of the resting parameters (PARITY, BAUD-RATE, COUNTRY, PRINT MODE, AUTO-OFF, EMULATION and DTR) push the [3] FEED key. These parameters are selected in a sequential way. To modify the status of any parameter push sequentially the [2] SET-UP key. Example:

SERIAL BAUD RATE: 300, 600, 1200, 2400, 4800, 9600, 19200, 300...

When all the necessary changes have been made, push the [2] **SET-UP** and [3] **FEED** keys to update the configuration of the printer. If no key is pressed for 15 seconds the set-up mode will be terminated without changing the original parameters.

```
PROGRAMME-MODE
Present setting are:-
Data bits :-
                    8
Parity :-
                Nome
Baud-rate :-
               19200
Country :-
                U.K.
Print mode:-
                 Text
Auto-off :-
               5 Min.
Emulation :- Standard
DTR
               Normal
```

Figure 36.- CI-23 setup



5 DESCRIPTION OF THE INPUTS AND OUTPUTS

5.1 RF input

The RF input is through the RF \longrightarrow [37] connector on the side panel. The peak signal level should never exceed 130 dB μ V.

5.2 RS-232C serial port

The **PROLINK-2** *Premium* incorporates an RS-232C serial port for data exchange with a PC, a serial printer (i.e. our model **CI-23**) or to other devices. The signals in this connector are described in Table 7.

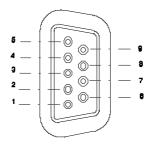


Figure 37.- RS-232C connector. External view.

| PIN No. | SIGNAL | CHARACTERISTICS |
|---------|---------------------------|-----------------|
| 1 | Carrier detect | (not connected) |
| 2 | Data Receive (RxD) | |
| 3 | Data Transmit (TxD) | |
| 4 | Data Terminal Ready (DTR) | Fixed at +12 V |
| 5 | Ground (GND) | |
| 6 | Data Set Ready (DSR) | (not connected) |
| 7 | Request to Send (RTS) | |
| 8 | Clear to Send (CTS) | |
| 9 | Ring Indicator | (not connected) |

Table 7.- Description of the RS-232C connector.



Scart (DIN EN 50049) 5.3

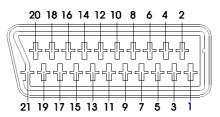


Figure 38.- Scart socket (external view).

Also known as PERITEL connector (in conformity with standard NF-C92250). The signals in this connector are the following:

| PIN number 1 2 3 4 5 6 7 8 | Righal Right channel audio output Right channel audio input Left channel audio output Audio grounding Blue grounding (B) Left channel audio input Blue output (B) Switching voltage | CHARACTERISTICS |
|-----------------------------|---|-----------------|
| 9 | Green grounding (G) | |
| 10 | Digital bus interface | (not connected) |
| 11 | Green output (G) | |
| 12 | Digital bus interface | (not connected) |
| 13 | Red grounding (R) | |
| 14 | Digital bus reserved | (not connected) |
| 15 | Red output (R) | |
| 16 | Blanked signal | (not connected) |
| 17 | Composite video grounding | |
| 18 | Blanked return | (not connected) |
| 19 | Composite video output | |
| 20 | Video input | |
| 21 | Connector shield grounding | |

Table 8.- Description of the Scart.



6 MAINTENANCE

6.1 Internal fuses which user cannot replace

The following fuses are found on the base board. Their location identifier and characteristics are the following:

F001 and F002 7 A S 125 V SMD

6.2 Replacing the Battery

Battery must be replaced whenever the capacity of the fully-charged battery is noticeably diminished. To change the battery, follow next procedure:

IMPORTANT REMARK

In case of the battery appears to be damaged, you must send the equipment to an authorised Technical Service without trying to replace it.

Replace the old battery by another CB-047 battery. The battery can be bought in your habitual PROMAX supplier. Explosion or fire hazard can occur if other battery type is used.

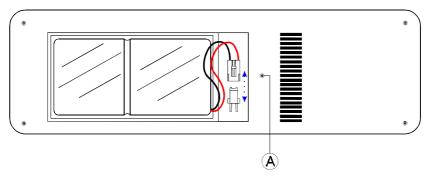


Figure 68.- Battery compartment.

CAUTION

The battery used can present fire or chemical burn hazard if it is severely mistreat.

Do not disassembly or cremate or heat the battery above 100 °C under no circumstances.

Test Equipment Depot - 800.517.8431 - 99 Washington Street Melrose, MA 02176



- Switch off the instrument.
- Remove the rear holster, if in place.
- The battery compartment is located in the rear panel of the instrument. Remove the securing screw (A) and washer from the compartment cover as shown in the previous figure (it shows the battery compartment once the cover and connector linking the battery to the board have been removed).
- Disconnect the battery connector strip from the board, and replace the battery with a new.

IMPORTANT NOTICE

The configuration data and all data stored in the memories will be lost when the battery is disconnected.

- Place and connect the battery to the board using the connector.



Avoid any type of short circuit among the cables connected to the battery, since the resulting high current may cause serious damage to the instrument.

- Insert the battery compartment cover in the rear panel of the **PROLINK-2**Premium and lock in place with the securing washer and screw (A).
- If you wish, replace the holster.

CAUTION

All the components of the Lithium-ion battery included in the CB-047 ensemble are recyclable. Return as soon as possible the used battery to PROMAX ELECTRONICA S.A. or to an authorised recycling centre of this type of batteries. If any doubt, consult directly PROMAX ELECTRONICA,S.A.

Keep them out of the reach of the child.

If in any doubt, please contact our Customer Service Centre before undertaking any operation.



6.3 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.