TV & SAT LEVEL METER

PROLINK-7

1 GENERAL INFORMATION

1.1 Description

The **PROLINK-7** is the most advanced of the **PROMAX** level meters. The range of frequencies covered - 5 to 862 MHz and 920 to 2150 MHz - makes it an excellent instrument for **FM radio**, **terrestrial TV**, **cable TV** (**CATV**, 'Community Antenna Television', where the subband tuning margin, from 5 to 45 MHz, enables the user to carry out tests on the return channel), **satellite TV**, **MMDS microwave links**, **VSAT** ('Very Small Aperture Terminal') **systems**, **digital TV** and **intermediate frequency** analysis (38.9 MHz).

The **PROLINK-7 includes the main TV standards: M, N, B, G, I, D, K and L,** 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**, **SECAM** and **NTSC**) and allows the user to work directly with **digital TV** signals for which it provides directly the measuring of power, carrier-to-noise ratio (**C/N**) and bit error rate (**BER**) (this last according to the required modulation: QPSK, QAM or OFDM). 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.

Its design featuring a microprocessor-based **intelligent control system** along with the **OSD** ('On Screen Display') function that displays on screen the different functions and parameters configured by the user, enables him to adapt its **advanced capabilities** with **remarkable ease**.

A modern **µP** automatically handles a large part of the operations necessary to optimise the process of measurement; for example, continuous frequency **synthesis**, the correction of linearity and flatness errors, the appropriate selection of the attenuators, and the automatic cut-off after the device has been inactive for a certain period of time. To enhance its convenience of use, it has **99 memories** to store the different measuring configurations: name of broadcasting station, frequency, units of measurement, standard, power supply to external units, frequency of the sound subcarrier and kind of measurement (level, V/A or digital carrier). Moreover, the **DATALOGGER** function permits the acquisition and storage of up to **9801 measures** (99 configurations x 99 different signals) that makes it much easier to test systems in which a large number of measurements have to be made, and enables further processing of all the information acquired.

The signal level measured is indicated numerically on an LCD display, 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 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 that provides the indication of the bit error rate (**BER**) and the type of sound received (STEREO/DUAL). Moreover, the possibility to commute the channel that is delivered to the loudspeaker enables the user to check the sound stereo and dual.

The **PROLINK-7** is a highly advanced instrument in which the measuring of level is only one of its multiple functions. **Teletext**, **spectrum analyser function**, display of the **line synchronism pulse** are some of the possibilities provided.

A **EUROCONNECTOR** has been also included with input/output of audio/video. The output of satellite video on base band allows the use of D2-MAC decoders and others.

The instrument is mains powered or with a rechargeable battery, and it is also possible 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 + 22kHz** satellite TV).

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 measurements.

Its construction is based on **IMI** ('Intelligent Module Interconnection') technology, developed by the PROMAX R & D team, that allows easy updating of the instrument by incorporating new functions and optional cards with a high degree of flexibility.

1.2 Specifications 

TUNING	Digital frequency synthesis. Continuous tuning from 5 to 862 MHz and from 920 to 2150 MHz.			
Spectrum bands				
Sub-band	Sub-band	5	-	45 MHz
VHF	LOW band	45	-	170 MHz
	HIGH band	170	-	450 MHz
UHF	UHF band	450	-	862 MHz
SAT	SAT TV 1st IF	920	-	2150 MHz
FM	FM band	87	-	109 MHz
IF input	38.9 MHz			
Tuning modes	Frequency, channel or memory. On demand channel table			
Indicator	LCD alphanumeric display			
Resolution	62.5 kHz in TV and FM 500 kHz in SAT			
Automatic search	Selectable threshold			
Memory	99 configurations			
Data Logger function	9801 measurements			
LEVEL MEASUREMENT				
Measurement range				
Terrestrial TV & FM bands	20 dBµV to 130 dBµV (10 µV to 3.16 V)			
Satellite TV band	30 dBµV to 120 dBµV (31.6 µV to 1 V)			
SPECTRUM mode				
Satellite band	30 dBµV to 120 dBµV (31.6 µV to 1 V)			
Terrestrial bands	20 dBµV to 130 dBµV (10 µV to 3.16 V)			
Bandwidth				
Variable span				
Terrest. bands	100 kHz, 230 kHz or 1 MHz selectable			
Satellite band	100 kHz, 230 kHz or 4 MHz selectable			
Full span				
Terrestrial	1 MHz			
Satellite	4 MHz			
Reading	Auto-range or manual selection			
Digital	Absolute value calibrated in dBµV, dBmV, dBm or V			
Analogue	Relative value: analogue bar on the screen			
Attenuators				
Terrestrial bands	0 to 80 dB, AUTO (10 dB steps)			
Satellite band	0 to 70 dB, AUTO (10 dB steps)			
Input impedance	75 Ω (BNC)			
Measurement bandwidth	230 kHz (terrestrial bands) ■ 4 MHz (satellite band) (maximum band ripple 1 dB).			
IF bandwidth	300 kHz (TV) ■ 27 MHz (SAT)			
Audible indicator	A tone that varies with the signal level			
Accuracy				
Sub-band	±1.5 dB (50-120 dBµV and 5-45 MHz) (22ºC ± 5ºC)			
Terrestrial bands	±1 dB (30-120 dBµV and 48.25-861 MHz) (22ºC ± 5ºC)			
Satellite band	±1 dB (40-100 dBµV and 920-2050 MHz) (22º C ± 5ºC)			
RF output	75 Ω (BNC)			
Insertion losses	22 dB typical, with 10 dB RF INPUT attenuator			

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Maximum signal	
RF input	
From DC to 100 MHz	50 V rms (powered by the mains supply) 30 V rms (not powered by the mains supply)
From 5 to 2150 MHz	130 dBµV
Video input	3 Vpp

MONITOR DISPLAY	
CRT	B/W, 5 ½ inches
Synchronism and Burst	Display through displacement of the picture
Spectrum function	Variable span in selected band
Monitor type	B/W TV, according to the standards M,N,B,G,I,D,K,L
Sensitivity	40 dBµV for correct synchronism
50/60 Hz synchronism	
Satellite band	Selection of frame frequency between 50 and 60 Hz
Terrestrial band	Selection according to the standard

VIDEO SIGNAL	
External video input	BNC, Euroconnector (automatic selection)
Sensitivity	1 Vpp (75 Ω) positive video
Video output	BNC, Euroconnector (75 Ω)
Base band video SAT output	
	BNC, 1 Vpp (75 Ω)

IF OUTPUT	BNC (75 Ω)

SOUND	
Input	Euroconnector
Output	Speaker, Euroconnector, external headphone
Demodulation	AM, FM, TV and NICAM, selectable
De-emphasis	50µs
Subcarrier	Digital frequency synthesis
Variable	From 4 to 9 MHz, 10 kHz resolution
Fixed	According to the standard selected: 4.50, 5.50, 5.80, 6.00, 6.50, 6.65, 5.74, AM, FM, LV, OFF.

TELETEXT	Decodes at 1.5 level

INTERFACE RS-232C

POWER TO EXTERNAL UNITS	
	Through the RF input connector
Terrestrial TV	External or 13/15/18/24 V
Satellite TV	External or 13/15/18 V
22 kHz signal	Selectable
Voltage	0.6 V ±0.2
Frequency	22 kHz ±4
Maximum power	5 W

POWER SUPPLY	
Battery	12 V / 6 Ah
Autonomy	Better than 1 h 30 minutes (without external units powering)
Recharging time	From 7 to 8 hours starting from a complete discharge
Mains	100 to 250 V AC/50-60 Hz
Consumption	95 W

OPERATING ENVIRONMENTAL CONDITIONS

Max. altitude	2000 m
Temperature range	From 5 to 40 ºC
Max. relative humidity	80 % (up to 31 ºC), decreasing lineally up to 50% at 40 ºC

MECHANICAL FEATURES

Dimensions	W. 305 x H. 145 x D. 334 mm
Weight	11 kg

ACCESSORIES INCLUDED

DC-243 Carrying bag
CA-05 Power cord
ZB-75 75 Ω (BNC) load
VI-17 Viewing hood
CB-068 12 V, 6Ah, rechargeable battery
AD-051 BNC/M-"F"/F adapter
BNC/TV BNC/M-ANT/H adapter
1 spare fuse 5x20 mm - 2.5 A - F - 250 V - IEC127

OPTIONAL ACCESSORIES

CI-23 Portable serial printer

OPTIONS

OPT-107-15 Carrying case
OPT-107-61 Channel plans programming
OPT-107-71 BER measurements for QPSK signals
OPT-107-72 BER measurements for QAM signals
OPT-107-73 BER measurements for COFDM signals
OPT-107-91 Eastern Europe Teletext
OPT-107-92 Arab and Hebrew Teletext
OPT-107-93 Turkish and English Teletext

2 SAFETY RULES 

* Use this equipment connected **only to systems with their negative of measurement connected to ground potential**.

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

* This equipment can be used in **Category II** installations and **Pollution Degree 2** environments.

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

  Rechargeable battery
  Power cord

* 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:

  Replace the battery
  Replace the mains fuse, which should be of the specified type and value

  On the Maintenance paragraph the proper instructions are given. Any other change on the equipment should be carried out by qualified personnel.

* 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 leads.

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

* Symbols related with safety:

DIRECT CURRENT

ALTERNATING CURRENT

DIRECT AND ALTERNATING

GROUND TERMINAL

PROTECTIVE CONDUCTOR

FRAME TERMINAL

EQUIPOTENTIALITY

ON (Supply)

OFF (Supply)

DOUBLE INSULATION
(Class II Protection)

CAUTION
(Risk of electric shock)

CAUTION REFER TO MANUAL

FUSE

3 INSTALLATION

3.1 Power Supply

The **PROLINK-7** is a portable instrument powered by a 12 volt built-in battery. Before taking any measurements, the battery charge must be checked. If it is low (a voltage lower than 11.0 V), a blinking LOW BATTERY message will appear on the display [14].

If the battery is very weak, the battery cut-off circuit will prevent the device from functioning. In such a situation the battery must be recharged immediately. If the battery is completely discharged, it is advisable to recharge the battery for a period of half and hour before putting the instrument into operation again.

3.1.1 Operating on the electrical mains supply

Although the device is designed for use as portable equipment, it can also operate when connected to the mains power supply.

Connect the device to the mains and press the power-on switch ⏻ [20]. The field meter is now in operation and the battery will slowly recharge.

When the unit is connected to the mains, the light indicator **LINE** remains on.

The instrument can be powered by mains voltages of 100 to 250 V AC 50-60 Hz without a voltage selector.

3.1.2 Operating on the battery

For the device to operate on the battery, disconnect the power cable and press the power-on switch ⏻ [20]. The fully charged battery can power the equipment for more than one hour non-stop, and depending on the mode of operation, it can be powered for up to three hours. When the LOW BATTERY indicator appears, the battery must be recharged immediately.

NOTE
When operating on the battery the PROLINK-7 has no protection fuses accessible to the user. The power-supply system has a set of electronic safety devices to ensure its proper functioning. If the instrument stops functioning, it must be taken directly to the nearest technical assistance service to be checked.

3.1.2.1 Charging the battery

To fully recharge the battery, connect the device to the mains supply **without pressing** the power-on switch ⏻ [20]. The length of time it takes to recharge it depends on the condition of the battery. If it is very low (the LOW BATTERY indicator has lit) the recharging period is about 7 hours. The **LINE** [22] indicator should remain lit.

> ***IMPORTANT***
> ***The lead battery of the instrument must be kept fully charged during periods when it is not in use. To ensure the best results, the battery must always be fully charged. If the equipment is in storage or is used only occasionally for a long period of time, it is ABSOLUTELY NECESSARY to check the full-charge functions periodically (every six months, for example), and to compensate for the self-discharging effect of the battery. The rate at which a fully charged battery self-discharges depends on the temperature. For example, at an ambient temperature of 20º C, the battery suffers a 50% loss after 16 months, and at 40º C it loses the same charge in only 5 months. If the battery remains very weak for a period of several days, it cannot be recharged since the plates are sulphated and must be replaced.***

3.2 Installation and start-up

The **PROLINK-7** field meter is designed for use as a portable device. A carrying case is supplied to simplify transport and to allow the user to take measurements conveniently in any type of installation.

When the ⏻ [20] 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.

Automatic power-off mode may be deactivated by holding down the ⏻ [20] key for one or two seconds when turning the instrument on. The MANUAL POWER OFF indication appears on the display.

4 OPERATING INSTRUCTIONS

This instruction manual describes instruments with a 3.23 program version or later

4.1 Description of the controls and elements

Front Panel

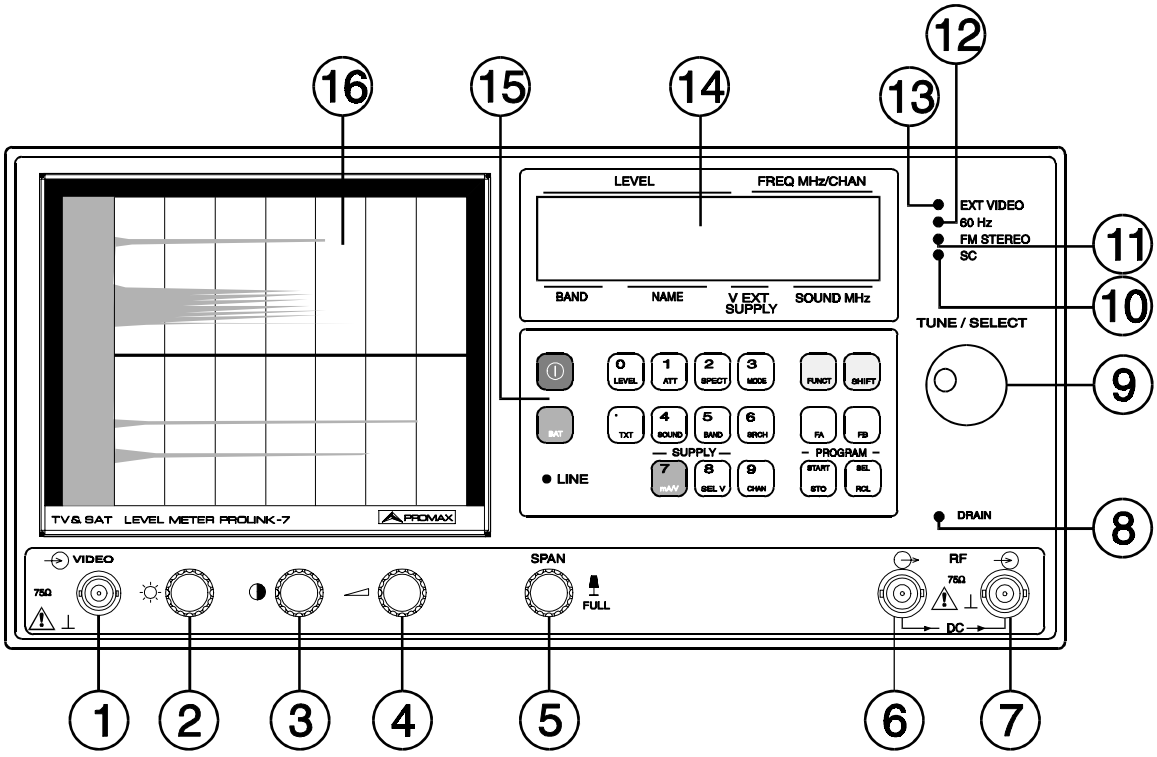

Figure 1.- Front panel.

[1] **VIDEO. Standard signal input of 1 Vpp external video**
3 Vpp maximum level. The signal is detected automatically and the monitor switches for the screen display of the external video.

[2] **Control of the CRT brightness**

[3] **Control of the CRT contrast**

[4] **Control of the sound volume**

[5] **SPAN. Amplitude of frequency sweep control in spectrum mode.**
When pulled out, **FULL SPAN**, the sweep of the entire band is selected.
When pressed in, **SPAN VARIABLE**, it is possible by rotating it to vary the

amplitude of sweep.

[6] **RF ⊖ RF output to the internal unit.**
The LNB or antenna amplifier is supplied through this connector. BNC connector with an output impedance of 75 Ω.

WARNING
When supplying the External Unit (LNB or antenna previous amplifiers) through the Internal Unit (Receiver), make sure that the cable connected to the RF ⊖ [6] connector corresponds to the Internal Unit, and that the RF ⊕ [7] connector is connected to the External Unit. If the Internal Unit is connected to RF ⊕ [7] and an External Unit voltage is selected, the PROLINK-7 and the Internal Unit will be connected to the opposite power supplies, which may damage one of the two pieces of equipment.

[7] **RF ⊕. RF signal input.**
Maximum level: 130 dBµV. BNC connector with an input impedance of 75 Ω.

ATTENTION
Note the importance to protect the RF ⊕ [7] input signal with an accessory to block 50 Vpp AC, used in CATV cables (needed to feed the amplifiers) and remote mode.

[8] **DRAIN. External units powering light indicator**
It lights when the **PROLINK-7** is powering the External Unit.

[9] **TUNE/SELECT. Rotary selector.**
Used for continuous tuning control or to select the options associated to each key.

[10] **SC. Sound carrier light indicator**
It indicates that a sound carrier at the selected frequency has been detected in the tuned transmission.

[11] **FM STEREO. Stereo FM audio light indicator**
It indicates that a stereo FM transmission has been tuned.

[12] **60 Hz. Frame frequency light indicator**
It indicates that a 60 Hz frame frequency has been selected.

[13] **EXT VIDEO. Video signal presence light indicator**
It lights up when an external video signal is present through either the ⊕ VIDEO [1] connector or through the EUROCONNECTOR [46].

[14] **Alphanumeric display**
LCD of two lines of sixteen characters and back lighting. It indicates the level, frequency/channel, band, name of the broadcasting station, external units power supply voltage, the sound system, etc.

[15] **Keyboard**
19 keys for function selection and numerical data input.

[16] **SCREEN**
Cathode ray tube of the monitor.

Keyboard

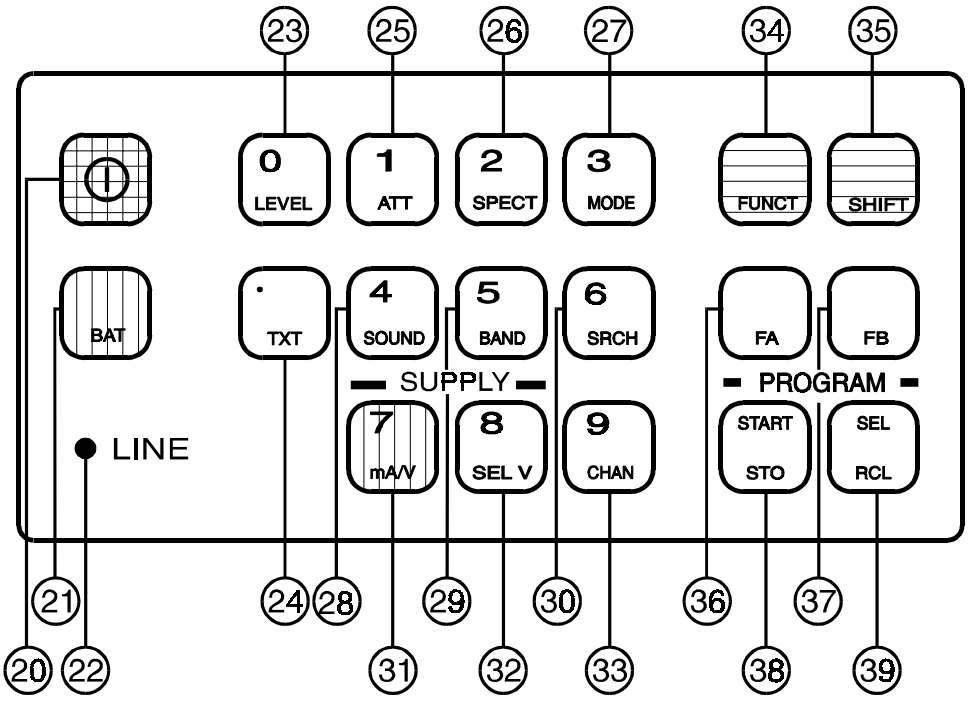

Figure 2.- Keyboard.

Each key is coded with the colour indicating the related type of operation:

Red: On and off. Maximum priority.

Green: Alphanumeric data entry. This switches the keyboard in such a way that successive pressing of the keys is interpreted according to the numerical value associated with each key.

Blue: Momentary operation. This is only active while the key is held down.

[20] **POWER** ⏻
This turns on the instrument, and the user can select either manual or automatic power-off.

[21] **BAT. Battery voltage**
This indicates the battery power on the display [14] in volts. Momentary operation

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[22] **LINE**

Light indicator which indicates whether the instrument is connected to the mains.

[23] **LEVEL / 0**

This key allows the user to select any of the different modes of measurement. They vary according to the standard, the band, and whether or not there is an optional card (QPSK, QAM, OFDM).

In the terrestrial bands the following measurement modes may be selected:

Analogue channels:

LEVEL	Measurement of the video carrier level
VIDEO/AUDIO	Measurement of the video-to-audio carrier ratio
CARRIER/NOISE	Video carrier-to-noise ratio

Digital channels:

DIGITAL CARRIER	Measurement of the digital channel power
CARRIER/NOISE	Digital channel carrier-to-noise ratio
BIT ERROR RATE	Measurement of the bit error rate for QAM and OFDM modulations (only OPT-107-72 and OPT-107-73)

In the satellite band the following measurement modes may be selected:

Analogue channels:

LEVEL	Measurement of the video carrier level
CARRIER/NOISE	Carrier-to-noise ratio

Digital channels:

DIGITAL CARRIER	Measurement of the digital channel power
CARRIER/NOISE	Digital channel carrier-to-noise ratio
BIT ERROR RATE	Measurement of the bit error rate for QPSK modulations (only OPT-107-71)

When the user selects the **VIDEO/AUDIO**, **CARRIER/NOISE, DIGITAL CARRIER** or **BIT ERROR RATE** modes, the information on these measurements is displayed on the screen.

Number **0** in SHIFT mode.

[24] **TXT / •**

This selects the Teletext information. As the Teletext circuit is optional, this function is activated only if the µP detects its presence.

Decimal point the SHIFT mode

[25] **ATT / 1**

This selects the attenuation in the RF input, from 0 to 80 dB on terrestrial bands, and from 0 to 70 dB on the satellite band, in intervals of 10 dB. There is also an AUTO position that selects the most appropriate attenuation according to the input signal level, in order to centre the value of reading in the optimum scale.

Number **1** in SHIFT mode.

[26] **SPECT / 2**

This allows the user to switch to the TV operating mode from spectrum operating mode and vice versa.

Number **2** in the SHIFT mode.

[27] **MODE / 3**

This key selects the operating mode of the **PROLINK-7** monitor. The following different modes are available:

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. The line synchronizing pulse appears with a lateral displacement of the picture if a TV carrier is tuned, or if there is an external video signal input through the VIDEO ⊖ [1] connector or the Euroconnector [40]. The analogue bar level indicator shown on the screen has been calibrated and corresponds to the value indicated in the display.

LV: Indication of the **signal level** on the screen (the analogue bar).

OFF: Deactivates the monitor.

Number **3** in the SHIFT mode

[28] **SOUND / 4**

This selects the type of sound. The options available in each case depend on the **band** and the **standard** selected.

4.50: Sound carrier 4.50 MHz above the picture carrier.
5.50: Sound carrier 5.50 MHz above the picture carrier.
5.74: Selects the second carrier in DUAL or STEREO transmissions, at 5.74 MHz of the picture carrier.
5.80: Sound carrier 5.80 MHz above the picture carrier.
6.00: Sound carrier 6.00 MHz above the picture carrier.
6.50: Sound carrier 6.50 MHz above the picture carrier.
6.65: Sound carrier 6.65 MHz above the picture carrier.
7.02: Sound carrier 7.02 MHz above the picture carrier.
NTUN: Sound detection narrow filter: 110 kHz (satellite bands)
BTUN: Sound detection broad filter: 240 kHz (terrestrial and satellite bands).
AM: AM demodulation.
FM: FM demodulation.
LV: Tone whose frequency varies with the input signal level.
NICA: Nicam decoding
OFF: Suppresses the audition of the sound carrier in the speaker and headphones.

Number **4** in the SHIFT mode

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[29] **BAND / 5**

Selects the band.

Although the tuning is continuous between 5 and 862 MHz and between 920 and 2150 MHz, a band select is included which limits the spectrum display to the commercial bands presently in use and to select a few special cases, such as FM or IF.

SUB: SUB-BAND. From 5 to 45 MHz
VLO: VHF LOW. From 45 to 170 MHz
VHI: VHF HIGH. From 170 to 450 MHz
UHF: UHF. From 450 to 862 MHz
SAT: Satellite TV. From 920 to 2150 MHz
IF: Intermediate frequency 38.9 MHz
FM: FM. From 87 to 109 MHz

Number **5** in the SHIFT mode

[30] **SRCH / 6**

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 can be defined by the **SEARCH LEVEL** function.
The search function halts the search process when the end of the band being used is reached, if it is in frequency mode, or when any key is pressed. The sound is deactivated during the search process. This function cannot be used on FM and IF bands.

Number **6** in SHIFT mode.

[31] **mA/V / 7**

This indicates on the display [14] the voltage and current being supplied to the LNB or external amplifier.

Number **7** in the SHIFT mode.

[32] **SEL V / 8**

This selects the voltage supplied to the external units (LNB or previous amplifiers) from the **PROLINK-7**. The available voltages are: EX, 13 V, 15 V, 18 V and 24 V on terrestrial bands , and EX, 13 V, 15 V, 18 V, 13 V + 22 kHz, 15 V + 22 kHz and 18 V + 22 kHz on the satellite band. In the EX position no voltage is supplied to the external unit, making it possible to supply it with an external power source through the RF [6] connector.

Number **8** in the SHIFT mode.

[33] **CHAN / 9**

This switches the display indication [14] from channel to frequency. In channel mode the selection of the tuning frequency is adjusted to the selected channel set (CCIR, OIRT, etc.). See the channel-frequency tables in the A appendix at the end of this manual.

Number **9** in SHIFT mode.

[34] **FUNCT**
This selects the functions. When this key is pressed, a function menu with the following fields appears on screen:

TV STANDARD
The user can select any of the various TV standards available, as a function of the band: **B/G, D/K, I, L, M, N** or **DIG** (digital channels) for the terrestrial band channels and **DIG** (digital channels) or **ANL** (analogue channels) for the satellite band channels.

UNIT S: dBµV, dBmV, dBm, Lin
This selects the units of measurement in which the signal level is shown on the display [14]. The units may be linear (µV, mV, V) or logarithmic (dBµV, dBmV, dBm).

CHANNEL SET
This selects one of the available channel tables.

MEASURE BW
This selects the bandwidth of the spectrum display filter between:
Terrestrial channels:
100 kHz, 230 kHz or 4 MHz.
Satellite channels:
100 kHz, 230 kHz or 1 MHz.
Note: This filter is only effective in the variable SPAN mode. In the FULL SPAN mode the filter is always:
4 MHz: terrestrial band channels
1 MHz: satellite band channels

NICAM CHANNEL
This selects the NICAM sound channel that is sent to the loudspeaker.

SAT VIDEO POL
This selects the polarisation of the video carrier: positive or negative.

LNB LOCAL OSC
It defines the frequency of the local oscillator (L.O.) of the LNB used in the receiving installation which is being studied. In the satellite band, this parameter must be defined in order to be able to tune in the channel mode in accordance with the satellite channel-tables described in the A appendix at the end of this manual.

CHANNEL BW
Selects the bandwidth of the digital channels. This parameter must be defined in order to measure the power or the carrier-to-noise ratio on digital channels.

BEEP
Activates/deactivates the beeper.

AGC MODE
Activates/deactivates the automatic gain control.

DATA LOGGER
It enables the acquisition, storage and printing of up to 9801 measurements (99 memories x 99 test points). The measurements may be taken in a fully automatic way.

NEXT PAGE
It gives access to the next page in the function menu.

EXIT
Exit from the function menu.

CLOCK
Date and time setting.

ALARM
Selects a date and a time for automatic power on.

SEARCH LEVEL
Selects the threshold level of the automatic station search function: SEARCH

FRAME
This permits to choose the frame frequency between 50 and 60 Hz.

PREVIOUS PAGE
It gives access to the previous page.

[35] **SHIFT**
It enables the user to tune directly the desired frequency with the numerical keyboard. When the second decimal figure is introduced, confirmation is established. It also enables the cursor to be displaced within the menus that appear on screen.

[36] **FA**
Key for direct function assignment.

[37] **FB**
Second key for direct function assignment.

[38] **START / STO**
This key stores a configuration and takes measurements and/or makes print-outs with the DATA LOGGER function.

[39] **SEL / RCL**
This retrieves a measuring configuration and activates/deactivates lines/columns in the DATA LOGGER function.

Side panel

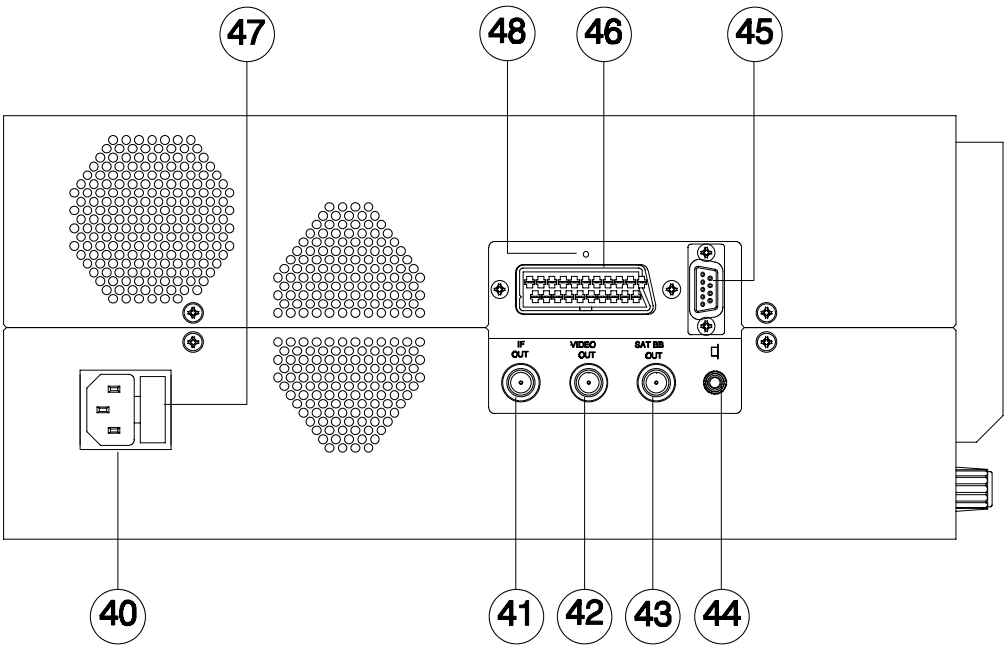

Figure 3.- Side panel.

[40] **Mains input**
Voltages from 95 to 250 V 50-60 Hz.

[41] **IF OUT. IF output at 38.9 MHz.**
BNC connector with an output impedance of 75 Ω.

[42] **VIDEO OUT. Composite video output**
Amplitude of 1 Vpp and positive polarity. In the satellite band it is possible to work with positive and negative video signals. The correct selection of this function enables the user to view signals of either polarity. BNC connector with an output impedance of 75 Ω.

WARNING
This signal should not be connected at circuit points with voltage, only to standard video signal inputs with 75 Ω impedance. Any damage to the instrument as a result of ignoring this precaution is not covered in the warranty.

[43] **SAT BB OUT. Base band satellite signal output**
The triangular modulation dispersal or Buergg is not removed. BNC connector with an output impedance of 75 Ω.

[44] **Output jack for stereo sound**

[45] **RS-232C connector**
Enables the remote control of the **PROLINK-7** from a personal computer, as well as data dumping to a printer.

[46] **Euroconnector**

[47] **Fuse holder**
Support for the mains fuse.

[48] **RESET buttom**
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.

Display

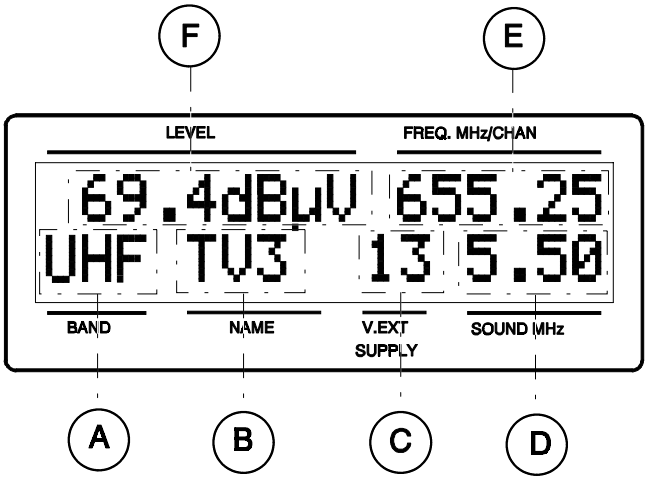

Figure 4.- Display.

The alphanumeric display consists of two lines. The top line provides the principal information.

[E] Working frequency or channel.
[F] Input signal level.

The second line provides supplementary information.

[A] Present RF band.
[B] Name assigned to the configuration memory. This information is only displayed if there has been no change in the parameters of the selected configuration.
[C] LNB or external unit voltage supply.
[D] Type of sound or frequency of the selected carrier.

The numbers [17], [18] and [19] do not correspond to any part of the instrument and have purposely been omitted from this list.

Possibly, other error messages or indications for the user may appear on the lower line.

4.2 Using the PROLINK-7

4.2.1 Selection of the RF band

Press the **BAND/5** [29] key. By turning the **TUNE/SELECT** [9] rotary selector, the different RF bands will appear on the alphanumeric display [14] in sequential order. When the desired band appears, press the **BAND/5** [29] key again.

Although the tuning is continuous between 5 and 862 MHz and between 920 and 2150 MHz, a band selection is included which limits the spectrum display to the commercial bands presently in use and to select some special cases, such as FM or IF.

The following are the selectable bands:

Name	Corresponding band	Frequency (MHz)
SUB	SUB-BAND	5-45
VLO	VHF LOW	45 to 170
VHI	VHF HIGH	170 to 450
UHF	UHF	450 to 862
SAT	SATELLITE TV	920 to 2150
IF	Intermediate frequency	38.9
FM	FM	87 to 109

Table 1.- Frequency bands.

4.2.2 Automatic transmission search

By pressing the **SRCH/6** [30] key search starts at the present frequency or channel until it finds a transmission with a level higher than the threshold level previously established with the **SEARCH LEVEL** function.

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.

This function cannot be used in the FM bands nor in the IF ones. In the satellite band, the search process is only available in frequency mode.

4.2.3 Frequency selection

When the **CHAN/9** [33] is pressed, tuning by frequency switches to channel and vice versa. Select tuning by frequency (the tuned frequency appears in the upper right-hand corner of the alphanumeric display [14]. There are two methods for selecting the frequency:

1. **Entering via TUNE SELECT [9] selector**
   With the **TUNE/SELECT** [9] rotary selector, select the desired frequency (tuning is continuous from 5 to 862 MHz and from 950 to 2150 MHz).

2. **Entering via keyboard**
   Press the **SHIFT** [35] key (the frequency indication disappears). Then select the value of the desired frequency in MHz, with **two decimal figures** (the second figure acts as a confirmation). The **PROLINK-7** will work out the synthesised frequency closer to the value keyed and shows it on the alphanumeric display. If the entered frequency corresponds to a different band from the programmed, the band will be changed to the correct value for the new frequency.

4.2.4 Channel selection

With the **CHAN/9** [33] key, select the channel tuning mode (in the upper right-hand corner of the alphanumeric display [14]). The name of the tuned channel will be displayed. By means of the **TUNE/SELECT** [9] selector we select the desired channel.

4.2.5 Measuring mode selection

Using the **PROLINK-7**, the user can take different kinds of measurements, depending on the standard, the band and the available options:

Terrestrial bands:

Analogue channels:

LEVEL	Measurement of the video carrier level
VIDEO/AUDIO	Measurement of the video-to-audio carrier ratio
CARRIER/NOISE	Video carrier-to-noise ratio

Digital channels:

DIGITAL CARRIER	Measurement of the digital channel power
CARRIER/NOISE	Digital channel carrier-to-noise ratio
BIT ERROR RATE	Measurement of the bit error rate for QAM and OFDM modulations (only OPT-107-72 and OPT-107-73, respectively)

Satellite band:

Analogue channels:

LEVEL	Measurement of the video carrier level
CARRIER/NOISE	Carrier-to-noise ratio

Digital channels:

DIGITAL CARRIER	Measurement of the digital channel power
CARRIER/NOISE	Digital channel carrier-to-noise ratio
BIT ERROR RATE	Measurement of the bit error rate for QPSK modulations (only OPT-107-71)

To select a particular measuring mode, press the **LEVEL/0** [23]. On the right part of he display the mode in use will blink, and may be changed by means of the **TUNE/SELECT** [9] selector. When the desired operating mode appears on the display [14], press the **LEVEL/0** [23] key again.

When the **VIDEO/AUDIO** ratio measuring mode is selected the following information appears on the [16] monitor:

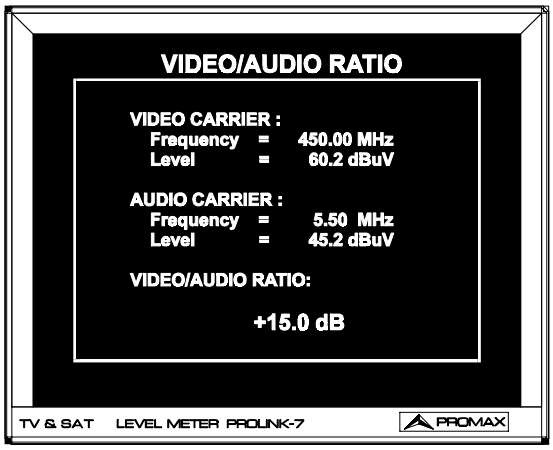

Figure 5.- Video/Audio ratio measuring mode

When the **CARRIER/NOISE RATIO** measuring mode is selected the following information appears on the [16] monitor:

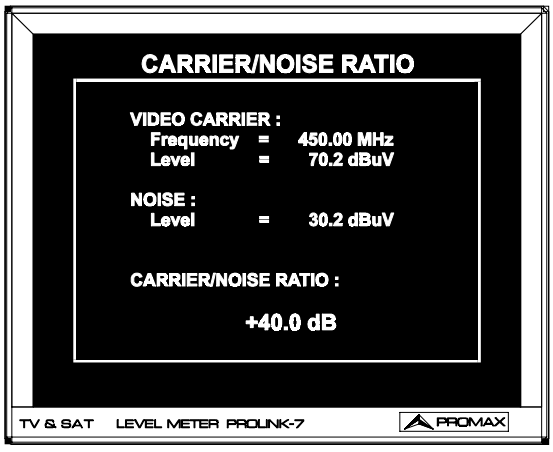

Figure 6.- Carrier/Noise ratio measuring mode

The user should be aware that the measurement will take several seconds to stabilize (six seconds at the most). Each time the unit ends a measurement, an asterisk will appear at the right side of the measurement (when a dot appears, it means the unit is processing the measurement).

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 functions menu. The **PROLINK-7** takes the carrier measurement in the centre of the channel (the frequency tuned) and the noise measurement at the frequency tuned plus half the bandwidth of the channel, and applies the necessary bandwidth and signal detector corrections automatically.

When the **DIGITAL CARRIER** measuring mode is selected the following information appears on the [16] monitor :

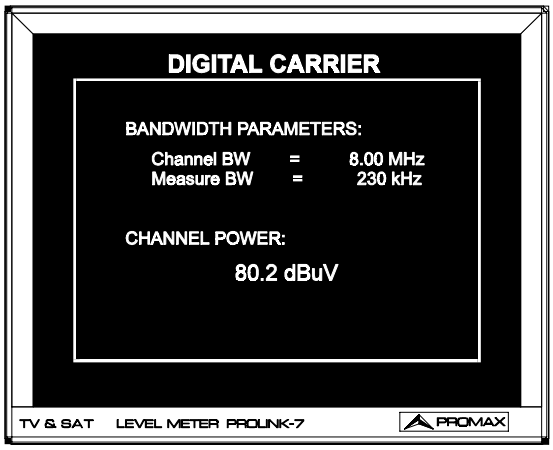

Figure 7.- Power measuring mode for digital channels

4.2.6 Selection of the TV mode

In addition to operating as a television set, the monitor of the **PROLINK-7** 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.

Press the **MODE/3** [27] key. By turning the **TUNE/SELECT** [9] rotary selector, the user can choose the function of the monitor. On the display [14] the different TV modes will appear one after the other. Pressing the **MODE /3** [27] key again activates the selected display mode.

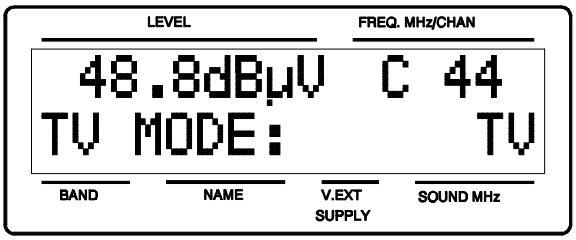

Figure 8.- Selection of the display mode.

The basic 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: Indication of the **signal level** on the screen (the analogue bar).

OFF: Deactivates the monitor.

4.2.6.1 Operation in SYNC mode

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

To select the SYNC (synchronising) function, press the **MODE/3** [27]. By turning the **TUNE/SELECT** [9] rotary selector the different displaying modes will appear on screen (choose the TV + LV + SY mode). Press the **MODE/3** [27] key again.

The monitor is divided into three sections. In the top section an analogue bar appears which indicates the level of the signal received. On the lower left-hand side the line synchronising pulse is represented as it would appear on the screen of an oscilloscope. On the lower right-hand side the TV picture is shown, shifted to the right,

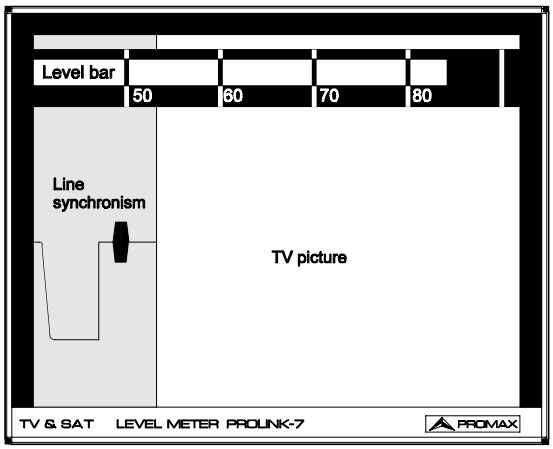

Figure 9.- Line synchronism + level bar + TV

The **SYNC** function shows on the monitor the line synchronising pulse; starting from this signal it is possible to perform a qualitative analysis of the TV picture delivered to the end user.

The study of the line synchronism pulse facilitates the detection of possible problems like: saturation of signal, lack of chroma in the amplitude of the burst or possible double-image produced by indirect beams captation (as it is shown in figure 10).

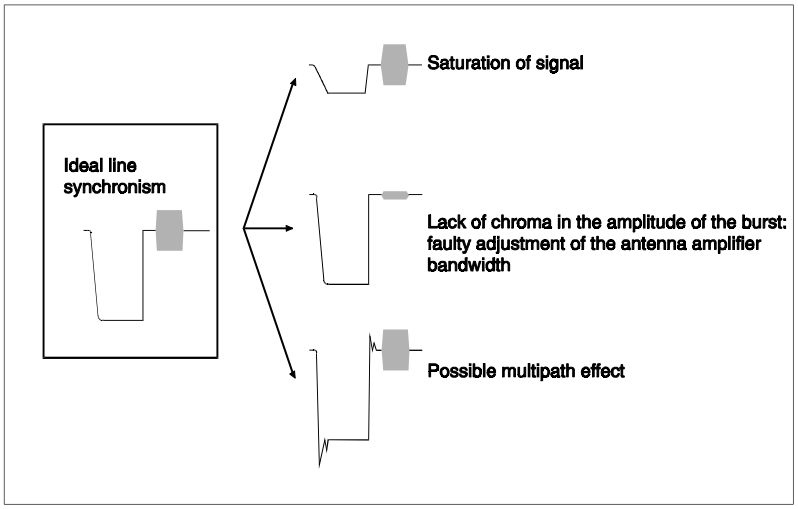

Figure 10.- Line synchronism

4.2.6.2 Operation as a spectrum analyzer

To select the Spectrum Analyser function press the **SPECT/2** [26] key with the monitor activated. The monitor will display the spectrum mode screen as it is shown in figure 11.

The spectrum analyser function allows the user to discover the signals present in each band he is working in quickly and easily.

The frequency spectrum analysis may be conducted in the entire band selected in **FULL SPAN** mode or in the proximity of the present tuning frequency in **variable SPAN** mode.

In variable SPAN mode it is possible to choose the display spectrum filter by using the **MEASURE BW** option of the function menu. It is possible to select the display spectrum filter bandwidth between:

Terrestrial bands: 110 kHz, 230 KHz or 1 MHz
Satellite band: 110 kHz, 230 KHz or 4 MHz

In **FULL SPAN** mode this filter is always 1 MHz for the terrestrial bands and 4 MHz for the satellite band.

In the spectrum analyser mode, a vertical base bar appears on the left-hand side of the monitor screen and the lobes representing the signals are shown horizontally, with the higher frequencies in the upper section of the screen and the lower frequencies in the lower section. The distance with respect to the base bar or the amplitude of the lobe represents its power and is proportional to the level that would be measured with the level meter tuning every frequency.

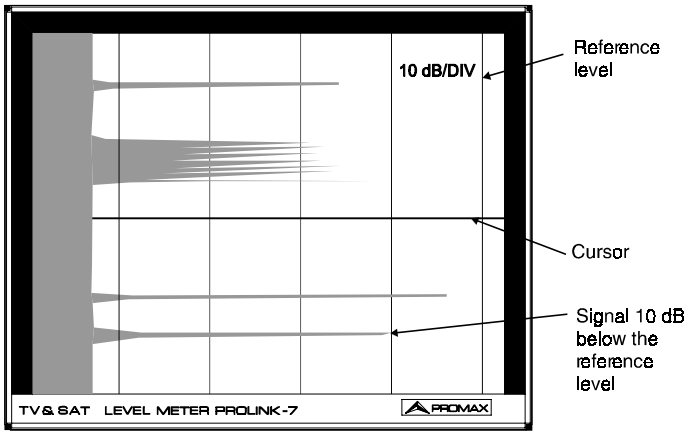

Figure 11.- Spectrum analyzer.

When the Spectrum Analyser mode is selected, the display eliminates the level indication to display a reference value (REF. LV) which corresponds to a marker on the screen. This reference level is 70 dBµV by default, and it can be modified using the **ATT/1** [25] key. The subdivisions that appear on the screen represents 10 dB each. In the spectrum analyser mode the presentation of the tuning frequency remains deactivated on the display [14].

Select the **FULL SPAN** mode by pulling out the **SPAN** [5] control; the frequency spectrum analysis is executed in the entire band selected. A black horizontal line or marker representing the tuning frequency appears on the screen. As the user moves the **TUNE/SELECT** control [9], the marker will move through the entire spectrum, allowing an approximate pre-tuning of the frequency corresponding to the lobe that coincides with the marker.

Select the variable **SPAN** function by leaving the **SPAN** [5] potentiometer in he rest position (pressed in). The frequency spectrum analysis is conducted in the proximity of the tuning frequency, that can come to zero SPAN. In that case, the entire screen coincides with the same tuning frequency.

By choosing a specific SPAN and varying the tuning with the **TUNE/SELECT** [9] control, the user can slowly sweep the entire selected band of frequencies.

When the **SPECT/2** [26] key is pressed, the **PROLINK-7** backs to its normal operation, the monitor displays the tuned frequency and the display indicates the value of the frequency or channel at the position of the cursor and the level measured at that point.

One of the applications of the **PROLINK-7** 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.

4.2.7 Configuration memory

To facilitate measurement, the **PROLINK-7** 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.

If the battery is changed, the stored configurations are saved for an indefinite period. If not, the present configuration of the instrument is saved only as long as the battery remains connected.

The following parameters are stored in each configuration: the name assigned to the memory, band, frequency or channel number, the measurement units of the level, TV standard, supply voltage (VLNB), sound and type of measurement.

The different measuring configurations can be retrieved with the DATA LOGGER function, in order to conduct different data acquisitions in a completely automatic way and store them in the memory for later print-out or processing.

4.2.7.1 Storing a configuration (MEMORY STORE)

To store a particular configuration, follow this procedure:

1. Input the parameters of the desired configuration in the **PROLINK-7** (frequency/channel, band, etc.).

2. Press the **START/STO** [38] key. The **MEMORY STORE** screen will appear on the monitor. With the **TUNE/SELECT** [9] selector or using the numeric keyboard, select the memory number in which the configuration will be stored. During the process of adjusting the instrument, a single initial configuration is stored in all the memories by default.

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

3. Assign a name (label) to the memory location (optional). Press the **SHIFT** [35] key. By turning the **TUNE/SELECT** [9] selector the different characters will appear cyclically in the first position of the configuration name. Once the first character is selected, press the **SHIFT** [35] key again and choose the second character. Repeat this process up to a maximum of 4 characters. Once all the necessary characters have been selected, the user must press the **START/STO** key [38] to accept the name.

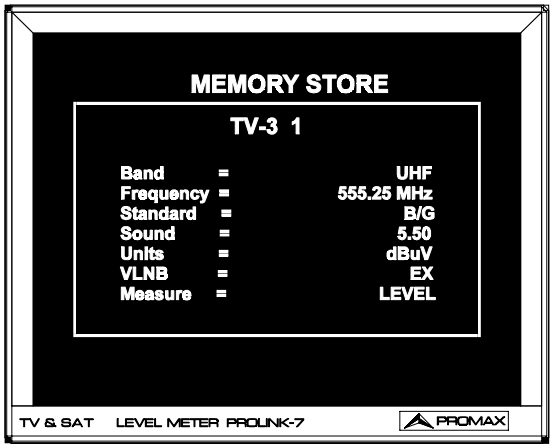

Figure 12.- MEMORY STORE screen

4. Finally, press **START/STO** [38] and the configuration will be stored. If any other key is pressed, an error will be indicated and the memory will not be updated.

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4.2.7.2 Retrieving a configuration (MEMORY RECALL)

Press the **SEL/RCL** [39] key. The screen **MEMORY RECALL** will appear on the monitor which shows the different parameters of each measuring configuration stored. With the **TUNE/SELECT** [9] selector or the numeric keyboard, select the configuration to be retrieved (a number between 1 and 99). Pressing the **SEL/RCL** [39] key again will retrieve the configuration.

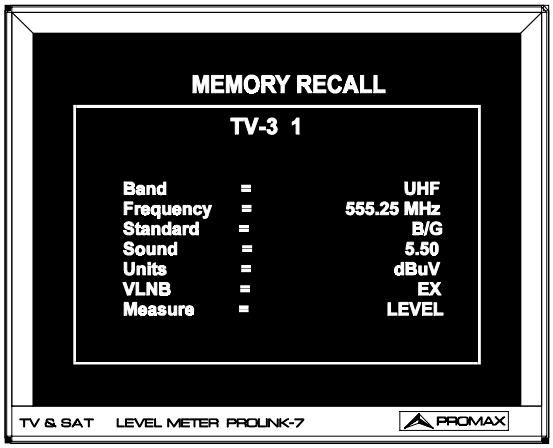

Figure 13.- MEMORY RECALL Screen

4.2.8 Selecting the attenuators

Press the **ATT/1** [25] key. The selected attenuation will appear on the display. By turning the **TUNE/SELECT** [9] rotary encoder, the user can select the attenuation in the **RF** [7] input, from 0 to 80 dB in TV, or from 0 to 70 dB in SAT, in intervals of 10 dB. Press the **ATT/1** [25] key again to activate the selected attenuation.

There is an AUTO position which selects the most appropriate attenuation as a function of the input signal level, in order to centre the value of the reading in the optimum scale.

If the spectrum analyser mode (SPECTRUM) is selected, this key affects the reference level (see section 4.2.6.2).

WARNING
The use of the attenuator automatic selection mode, is limited by the signal maximum level applied at the input of the equipment. If a sudden signal level variation is produced at the RF input, and it is beyond the total signal levels of:

TV: 95 dBµV
SAT: 105 dBµV

(typical values) the tune circuit may become out of control (PLL synthesized) giving as a result wrong level readings.

If this situation occurs, disconnect the input signal and select an attenuation of 60 dB or higher.

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:

$$L_t = L + 10 \log N$$

L_t: total level
L: average level of the carrier group
N: number of carriers

So, if there are ten carriers with a level near to 85 dBµV, its equivalent level will be:

$$85\ dB\mu V + 10 \log 10 = 95\ dB\mu V$$

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

The global result of this effects is, in the automatic attenuation mode, the difficulty to find the correct measurement scale or the presentation of incorrect measurements.

4.2.9 Selection of the sound mode

Press the **SOUND/4** [28] key. The selected sound mode will blink on the alphanumeric display [14]. By turning the **TUNE/SELECT** [9] rotary selector, the user can chose the type of sound. Pressing the **SOUND/4** [28] key again activates the selected sound type. The table 2 shows the possible values of the sound mode.

Type	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	SAT
6.00	Sound carrier 6.0 MHz above the picture carrier	Terrestrial
6.50	Sound carrier 6.5 MHz above the picture carrier	Terrestrial SAT
6.65	Sound carrier 6.65 MHz above the picture carrier	SAT
7.02	Sound carrier 7.02 MHz above the picture carrier	SAT
NTUN	Narrow sound detection filter, 110 kHz	Satellite
BTUN	Broad sound detection filter, 240 kHz	Terrestrial Satellite
NICA*	NICAM decoding	Terrestrial
AM	AM demodulation	FM/TER
FM	FM demodulation	FM/TER
LV	Tone whose frequency varies with the signal level	All
OFF	Suppresses the sound	All

Table 2.- Sound modes

When the **LV** function is selected, the speaker of the **PROLINK-7** emits 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 display of the field meter, and therefore he can devote his full attention to the orientation process.

Selecting the AM and FM options enables the user to hear signals resulting from AM or FM modulation.

When the **NICAM** option is selected on the display, information about the NICAM type and the error rate will be shown in this format:

'N' + error + type

error = quality indication of the error rate:

"**<**": error rate < 1e-5
"**5**": 1e-5 < error rate < 1e-4
"**4**": 1e-4 < error rate < 1e-3
"**3**": 1e-3 < error rate < 2.7 e-3
"**>**": error rate > 2.7 e-3

type = NICAM type:

"**--**": no NICAM is detected
"**du**": dual NICAM
"**st**": stereo NICAM
"**mo**" mono NICAM

Therefore, for example, from the indication in figure 14 it has to be interpreted that NICAM sound is selected, the error rate is between 1 e-5 and 1 e-4 and the NICAM detected is dual.

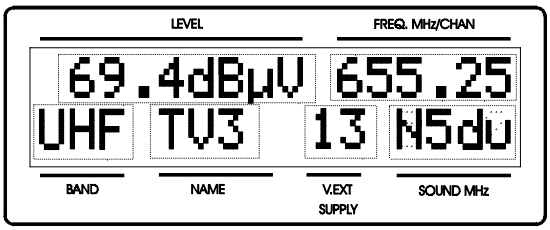

Figure 14.- NICAM sound

4.2.10 External units power supply

The **PROLINK-7** can supply the voltage needed to power the external units (antenna preamplifiers, in the case of terrestrial TV, or LNB, in the case of satellite TV).

The **PROLINK-7** has two different operating modes, depending on whether or not it supplies the external units.

RF input

From DC to 100 Hz	**50 V rms (powered by the mains supply)**
	30 V rms (not powered by the mains supply)
From 5 to 2150 MHz	**130 dBµV**

4.2.10.1 EX power supply

In this operating mode the power supply of antenna preamplifiers (terrestrial TV) or the satellite TV receiver (domestic or community) supplies the external unit.

The **PROLINK-7** is connected in series in the line that links the external unit and the satellite TV (domestic) or SMATV **heading** (community), as shown in figure 15.

In this configuration, the EX supply mode of the external units to the **PROLINK-7** has to be used. For this, press the **SEL V/8** [32] key. Turn the **TUNE/SELECT** [9] rotary selector until the **EX** mode appears on the alphanumeric display [14]. Pressing again the **SEL V/8** [32] key again activates the external supply mode.

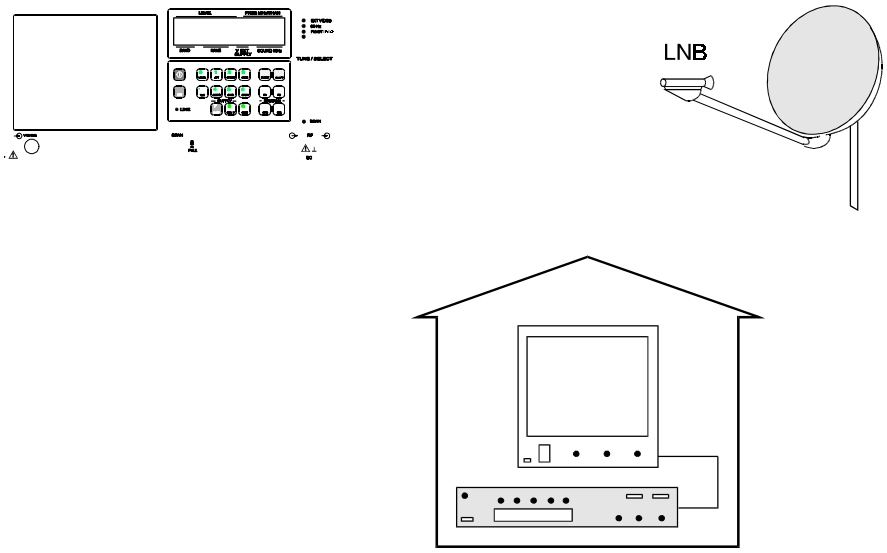

Figure 15.- EXT power supply of the external unit.

WARNING

When supplying the external unit through the internal unit, make sure that the cable connected to the RF ⊖→ [6] connector corresponds to the internal unit, and that the RF →⊖ [7] connector is connected to the external unit. If the internal unit is connected to RF →⊖ [7] and an external unit voltage is selected, the PROLINK-7 and the internal unit will be connected to the opposite power supplies, which may damage one of the two pieces of equipment.

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4.2.10.2 Internal power supply

The **PROLINK-7** can supply the voltage needed to power the External Unit. In this case, the user can select several power voltages from the panel, depending on whether it is a terrestrial or Satellite band. The maximum load is 5 W, in continuous loading.

Type of Television	Power voltages
SATELLITE	EXT, 13 V, 15 V, 18 V *
TERRESTRIAL	EXT, 13 V, 15 V, 18 V, 24 V

Table 3.- Power voltages to the external unit.

* The supply voltages in Satellite allow to superpose a square signal of 22 kHz with the object to realise switching functions. **This signal becomes active when you select the wanted underlined voltage polarization.**

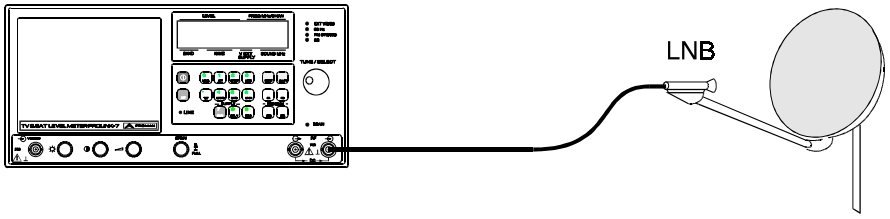

Figure 16.- External unit power supplying by the **PROLINK-7**.

It is possible to supply the double band LNB's and the polarity switching LNB's by changing the power voltage.

The **DRAIN** [8] 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 display [14] and the instrument ceases to supply power. The **PROLINK-7** does not return to its normal operating state until the problem has been solved.

When the **mA/V/7** [31] key is held down, the lower line of the display [14] indicates the real voltage and current being supplied to the external unit. This measurement is taken even when an external supply has been selected.

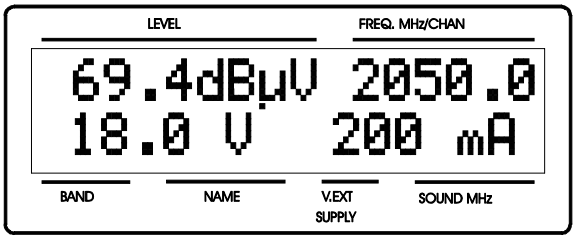

Figure 17.-

WARNING
When the external unit is powered with one of these voltages, particulary 18 V or 24 V, it is not advisable for the instrument to function for more than three minutes non-stop. Since the total consumption is very high, the duration of the battery charge is shortened considerably. It is advisable to disconnect the instrument when it is not taking measurements.

4.2.10.3 Selecting the voltage supplied to the external unit

Press the **SEL V/8** [32] key and use the **TUNE/SELECT** [9] dial to select the voltage supplied to the LNB or external unit. Press the **SEL V/8** [32] key again to activate the selected voltage.

4.2.11 Teletext

When the **TXT/·** [24] key is pressed, 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. Using the **TUNE/ SELECT** [9] selector the user can choose the page of Teletext to be displayed.

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 exiting the Teletext function through the **TXT/·** [24] key or by entering a new page number with the [9] **TUNE/SELECT** rotary selector.

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.

4.2.12 Selection of advanced functions

The **FUNCT** [34] key gives access to the advanced function menu, as selection of TV standard, changing the units of measurement, channels table, bandwidth of the measuring filter, etc.

When the FUNCT [34] key is pressed the following menu appears on the monitor.

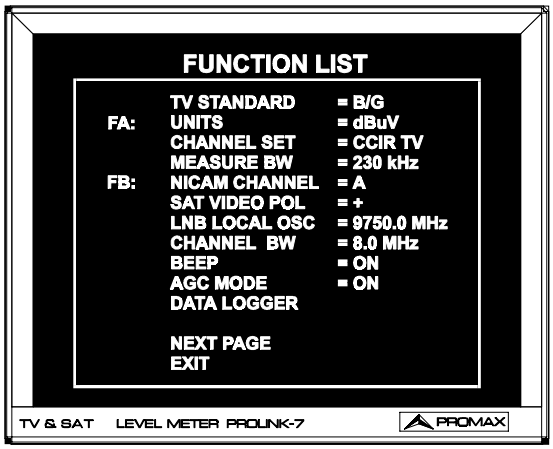

Figure 18.- Function menu, first page.

Through the **TUNE/SELECT** [9] selector it is possible to move the cursor within the different fields. To select a function, place the cursor on it and then press the **FUNCT** [34] key.

The **NEXT PAGE** field gives access to the second page of the function menu.

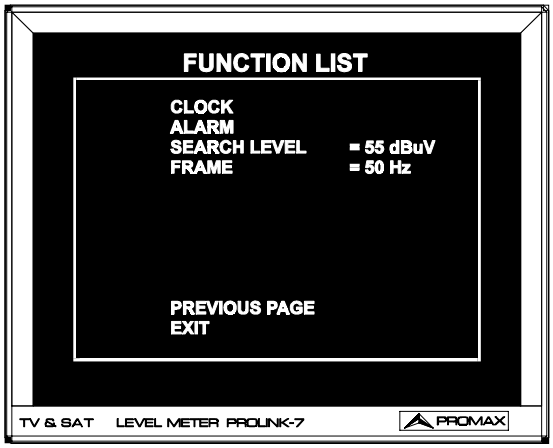

Figure 19.- Function menu, second page.

To exit the function menu, place the cursor on the **EXIT** field by using the **TUNE/SELECT** [9] rotary encoder. Then press the **FUNCT** [34] key.

4.2.12.1 Selection of the TV standard

This function allows the user to change the television standard. Different standards are available, depending on the band selected (terrestrial or satellite channels). To change the standard, press the **FUNCT** key [34]. Turn the rotary selector **TUNE/SELECT** [9] to position the cursor in the **TV STANDARD** field and then press the **FUNCT** key [34]. A pull-down menu will appear with the following options:

Terrestrial bands

B/G, D/K, I, L, M, N, **DIG** (digital channels), as shown in Figure 20.

Satellite band

ANL (analogue channels), **DIG** (digital channels), as shown in Figure 21.

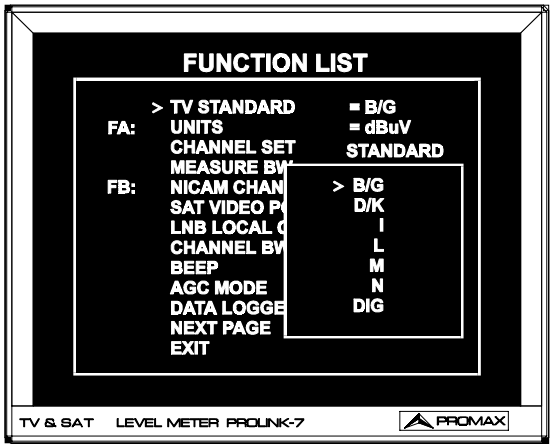

Figure 20.- Selection of the standard, terrestrial channels.

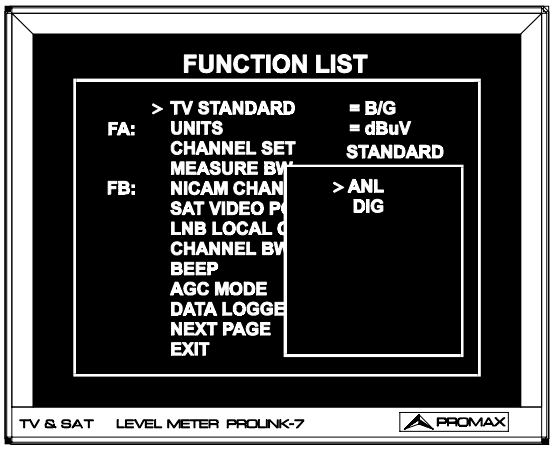

Figure 21.- Selection of the standard, satellite channels.

By turning the **TUNE/SELECT** [9] rotary selector, the user can select the desired standard. Press the **FUNCT** [34] key again to confirm the 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
B	625/50	7 MHz	5.5 MHz	Neg	FM
D	625/50	8 MHz	6.5 MHz	Neg	FM
G	625/50	8 MHz	5.5 MHz	Neg	FM
H	625/50	8 MHz	5.5 MHz	Neg	FM
I	625/50	8 MHz	6.0 MHz	Neg	FM
K	625/50	8 MHz	6.5 MHz	Neg	FM
L	625/50	8 MHz	6.5 MHz	Pos	AM
M	525/60	6 MHz	4.5 MHz	Neg	FM
N	625/50	6 MHz	4.5 MHz	Neg	FM

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

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.

4.2.12.2 Selection of units of measurement (UNITS)

Press the **FUNCT** [34] key. The function menu will appear on screen. Place the cursor on the **UNITS** field by turning the **TUNE/SELECT** [9] rotary selector. Press the **FUNCT** [34] key and the units of measure menu will appear. The user can select the units of measure, either dBµV, dBm, dBmV or linear units (µV, mV or V). Finally press the **FUNCT** [34] key again to select the desired option.

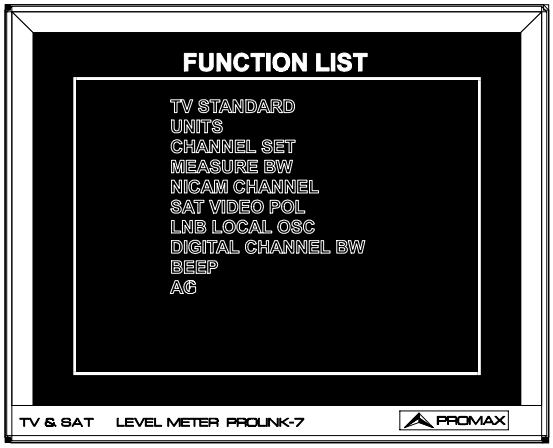

Figure 22.- Selection of units of measurement.

4.2.12.3 Selection of the channel set (CHANNEL SET)

Stored in standard form, the **PROLINK-7** has twelve sets of channels (four for terrestrial television and eight for satellite television) so that the unit can be adapted to the needs of each country or selection area. See the channel-frequency tables in the A appendix at the end of this manual.

Press the **FUNCT** [34] key to select a channel set. A functions menu will appear on screen. By turning the **TUNE/SELECT** [9] rotary encoder, place the cursor on the **CHANNEL SET** function. By pressing the **FUNCT** [34] key, the menu of the available channel set will appear.

By using the **TUNE/SELECT** [9] rotary encoder, place the cursor on the desired set and finally press the **FUNCT** [34] key again to select the set.

4.2.12.4 Selection of the measuring bandwidth in spectrum mode (MEASURE BW)

With the spectrum analyser function in **SPAN VARIABLE** mode, it is possible to choose the bandwidth of the measuring filter between 100 kHz, 230 kHz and 1 MHz for the terrestrial bands and 4 MHz for the satellite band. For this, press the **FUNCT** [34] key. The functions menu will appear on screen. By turning the **TUNE/SELECT** [9] rotary selector, place the cursor on the **MEASURE BW** function. By pressing the **FUNCT** [34] key the measuring bandwidth selection menu will appear. With the **TUNE/SELECT** [9] rotary encoder place the cursor on the desired bandwidth (100 kHz, 230 kHz or 1 MHz for terrestrial channels and 100 kHz, 230 kHz or 4 MHz for satellite channels) and press the **FUNCT** [34] key to activate it.

For terrestrial television channels the default filter is the 230 kHz, while the default filter for satellite television channels is 4 MHz.

Note: In the **FULL SPAN** function the measuring bandwidth is always
1 MHz in the terrestrial bands
4 MHz in the satellite band

4.2.12.5 Selection of the NICAM channel (NICAM CHANNEL)

With this function, the user can check NICAM sound modulations in stereo and dual and select the sound channel emitted by the loudspeaker.

To do this, press the **FUNCT** [34] key. A functions menu will appear on screen. By turning the **TUNE/SELECT** [9] rotary encoder, place the cursor on the **NICAM** function. Press the **FUNCT** [34] key again. The channel emitted by the loudspeaker (A or B) is switched automatically.

4.2.12.6 Selection of the video polarity (SAT VIDEO POL)

Press the **FUNCT** [34] key. The function menu will appear on screen. By turning the **TUNE/SELECT** [9] rotary encoder, place the cursor on the **SAT VIDEO POL** field. On the right-hand side there will be the polarity presently selected (positive or negative). To change the polarity, press the **FUNCT** [34] key.

This option concerns the reception on the SAT (satellite) band.

4.2.12.7 Frequency of the LNB local oscillator (LNB LOCAL OSC)

This parameter must be defined in order to be able to tune in the satellite band in channel mode in accordance with the channel tables described in the A appendix at the end of this manual. To define it procedd as it follows: Press the **FUNCT** [34] key. The functions menu will appear on screen. By turning the **TUNE/SELECT [**9] rotary selector, place the cursor on the **LNB LOCAL OSC** field. On the right-hand side there will be the frequency presently selected. If the **FUNCT** [34] key is pressed, that frequency will be erased and the user can assign a new frequency 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 (which acts as confirmation). For example, to select 9 GHz the number `9000,0` has to be entered.

This option concerns the reception of signals on satellite band.

4.2.12.8 Measuring bandwidth with digital channels (DIGITAL CH BW)

The **PROLINK-7** permits the direct measurement of the power of the digital channels, as well as the carrier-to-noise ratio. If these measurements are to be correct, the bandwidth of the digital channel must be defined previously.

Press the **FUNCT** [34] key to establish the bandwidth. A function menu will appear on screen. By turning the **TUNE/SELECT** [9] rotary selector, place the cursor on the **DIGITAL CH BW** field and press the **FUNCT** [34] key. Use the keyboard to enter the bandwidth in MHz of the digital channel (the activation is produced when entering the decimal figure).

This option affects the measuring of digital channels.

4.2.12.9 BEEP

This function allows the user to switch the audible indicator ON and OFF. To do this, first press the **FUNCT** key [34]. Turn the rotary selector **TUNE/SELECT** [9] to position the cursor in the **BEEP** field and press the **FUNCT** key [34]. The operating state of the audible indicator signal will switch automatically.

4.2.12.10 Automatic gain control (AGC MODE)

This function allows the user to activate (ON) and deactivate (OFF) the automatic gain control. In this way the intermodulation of signals with a level greater than 85 dBmV is reduced. It is not possible to display the input level measurement in this functioning mode, since the gain of the tuner varies as a function of the input level.

The main purpose of this functioning mode is to enable the user to improve the picture quality in situations when the tuner is near saturation.

To switch the **AGC** on and off, press the **FUNCT** key [34]. Turn the rotary selector **TUNE/SELECT** [9] to position the cursor in the **AGC MODE** field and press the **FUNCT** key [34]. The operating state of the AGC will switch automatically.

4.2.12.11 DATA LOGGER

The **DATA LOGGER** function allows the user to carry out, store and/or print out up to 9801 measurements in a fully automatic way. It may be understood as a matrix whose columns address the 99 memories of measuring configurations and lines permit to store 99 measurements for every measuring configuration (conducted in different points of the system or in the same point on different times).

Before to proceed to take measurements by means of the DATA LOGGER function it is necessary to store the measuring configuration/s in the memory by using the **MEMORY STORE** function.

Press the **FUNCT** [34] key to select the **DATA LOGGER** function. A function menu will appear on screen. By turning the **TUNE/SELECT** [9] rotary encoder place the cursor on the **DATA LOGGER** field and press the **FUNCT** [34] key. Following this, the **DATA LOGGER** screen will appear.

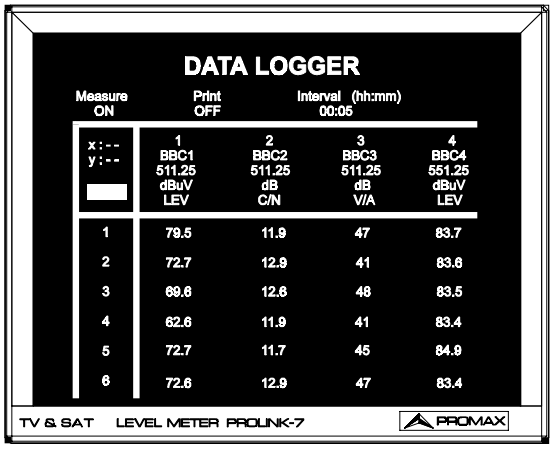

Figure 23.- DATA LOGGER screen

First of all, the user must indicate whether he wants to take measurements or to print them, or to do both at the same time. For this, press the **SHIFT** key [35] repeatedly (this is analogous to the tabulator in the Windows environment) until positioned in the **MEASURE** field. Then turn the rotary selector **TUNE/SELECT** [9] to activate (ON) or deactivate (OFF) the measurement function. The next step is to activate or deactivate the measurement printing function. To do this, use the **SHIFT** key [35] to position the cursor in the **PRINT** field and activate it (ON) or deactivate it (OFF) with the rotary selector **TUNE/SELECT** [9].

Secondly, select the desired time interval in which the measurements/print-outs have to be done. For this, press the **SHIFT** [35] key several times until the part relative to time (hh:mm) of the **INTERVAL** field is activated. By turning the **TUNE/SELECT** [9] rotary selector choose the hours. Then press the **SHIFT** [35] key again to access to the minutes field and choose the desired number.

The third operation is to activate the memory/ies or measurement configuration/s (that is, the frequency, the standard, the mode, the units of measurement, etc.) on which we want to take measurements. The heading of each column describes the most important parameters of each memory (measurement configuration), the name allocated to the memory location, the frequency, the units of measurement and the measurement mode (LEV, C/N, V/A or BER if the corresponding option is available). Use the **SHIFT** key [35] to position the cursor in the columns field and then turn the rotary selector **TUNE/SELECT** [9] to position it in the desired column (memory). Activate it or deactivate it with the **SEL/RCL** [39] key. The activated columns are brighter than those that are not activated.

Finally, the user must select the row/s where he wants to store the measurements. For this, use the **SHIFT** key [35] to position the cursor on the desired row and activate it by pressing the **SEL/RCL** [39] key.

To take the measurements, three possibilities exist:

a) Position the cursor on a column. **Temporal acquisition.**
   The measurements are taken on this memory (column) in all the rows that are activated. If no row has been selected, the error message 'NO ITEM SELECTED' will appear on the display.

b) Position the cursor on a row. **Acquisition of different types of measurements at the same time.**
   The measurements are taken on this row in all the activated columns. If no column has been selected, the error message 'NO ITEM SELECTED' will appear on the display.

c) Place the cursor in the corner. **Multiple acquisitions.**
   The measurements are taken for all the rows and all the columns activated. If no item has been selected, the error message 'NO ITEM SELECTED' will appear on the display.

Once the user has defined all the parameters of the DATA LOGGER function and selected the measurements he wants to take, there are two methods of execution: immediate and scheduled.

Immediate execution

If the user wants to take the measurements (and/or print them) immediately, he must press the **START/STO** key [38] to proceed to measurement and storage. During the execution of the measurement, two arrows will appear in the upper left-hand corner of the array (the '**x**' and '**y**' coordinates direct the measurement/printing in progress). To abort the DATA LOGGER operation, press the **FUNCT** key [34]. To exit the DATA LOGGER function, press the **FUNCT** key [34].

Scheduled execution

If the user wants to schedule the instrument to take the measurements (and/or print them) at a particular time, he will have to schedule the alarm (see point 4.2.12.13 Alarm). At the time set in the alarm, the instrument will power on (if it is off), or will automatically switch to the DATA LOGGER mode (if it is on) in order to take or print the measurements. If the DATA LOGGER has been programmed to take more than one measurement in the time domain and if the logging interval is longer than four minutes, each time a measurement is logged, the instrument will reschedule the alarm for the next measurement and it will power on three minutes ($t_{warm-up}$) before the time defined in the Interval field, in order to ensure maximum accuracy. If the DATA LOGGER function is accessed while it is active, two blinking arrows (>>) will appear in the upper left-hand corner of the array. To exit the DATA LOGGER screen, the user must press the **FUNCT** key [34]. If any other key is pressed, the DAT LOGGER function will abort.

This function has multiple applications, as equalizating channels in every outlet or measuring signal attenuation in every outlet.

Measuring the fluctuations in the signal level in one particular outlet (temporal acquisition).

Define the interval between acquisitions (1h, for example) and activate such a number of lines that enables to carry out a study during 24 h (24 lines in the example). The obtained report will permit to guarantee a correct working of the system.

Equalisation of channels in a particular outlet (frequential acquisition)

For this application a noise generator must be used. Activate several memories, each one with different measuring frequencies. For example, to test the VHF band, for every one of the measuring modes (level, video/ audio, video / carrier), carry out a frequency sweeping from 45 to 450 MHz every 50 MHz.

4.2.12.12 Clock (CLOCK)

An internal clock permits to record date and hour of data acquisitions.

Access to the second page of the function menu to change the hour and select the **CLOCK** menu using the **TUNE/SELECT** [9] rotary encoder and the **FUNCT** [34] key. The present data and hour will appear on the display. Press the **SHIFT** key and the HOURS field will blink. Turn the **TUNE/SELECT** [9] rotary encoder to modify it. Press the **SHIFT** [35] key again to access to the remaining hours fields (MINUTES and SECONDS) and set the value using the rotary encoder. Proceed in a similar way to modify the date (DAY-MONTH-YEAR). Once the date and hour are correct, press the **FUNCT** [34] key to validate them.

4.2.12.13 Alarm

The **PROLINK-7** allows the user to define the time and date of the automatic power on and the data logging if the DATA LOGGER function has been activated. The alarm can be scheduled for a maximum of one year in advance.

Access to the second page of the function menu to activate or deactivate the alarm and select the **ALARM** menu by turning the **TUNE/SELECT** [9] rotary selector and the **FUNCT** [34] key. The display indicates whether the alarm is activated (ON) or not (OFF) as well as the date (DAY-MONTH) and time (HOUR-MINUTES-SECONDS) selected. Press the **SHIFT** [35] key and the ON-OFF field will blink. Turn the **TUNE/SELECT** [9] rotary selector to change it. In order to modify the date and/or the hour, press the **SHIFT** [35] key until the field to modify blinks and turn the **TUNE/SELECT** [9] rotary encoder until obtain the desired value. Once all the parameters are correct, press the **FUNCT** [34] to validate them.

4.2.12.14 Search level

With this function it is possible to modify the threshold level of the station automatic search. Access to the second page of the function menu to modify this level. Place the cursor on the **SEARCH LEVEL** field. On the right side of the field the level in use will be displayed. Press the **FUNCT** [34] and introduce a new level by using the alphanumeric keyboard. When the second figure is introduced the confirmation is produced automatically.

4.2.12.15 Frame

This function permits to modify the frame frequency. For this, access to the second page of the function menu. At the right-hand side of the **FRAME** field appears the frame frequency presently in use. If the user wishes to modify this frequency, place the cursor on this field and press the **FUNCT** [34] key. Its value will change automatically from 50 to 60 Hz or vice versa.

4.2.13 Direct access to functions

The **FA** [36] and **FB** [37] keys give access to any of the functions of the **PROLINK-7**. To establish the relation between the direct access key and a function, access to the function menu, place the cursor on the desired function and press the **FA** [36] or **FB** [37] key. From now on, when one the **FA** or **FB** keys is pressed, the access to this function will be direct.

4.2.14 Printing measurements or memories

By connecting the instrument to a printer it is possible to obtain a printed report of a sequence of measurements just at the moment they are taken, or later, if they are recorded with the **DATA LOGGER** function. This enables the user to keep a file about the state of the system and provide the documents related to the level measurements for analysis purposes.

The installation process is reduced to connecting the printer, by means of the connection cable provided, to the serial connector of the **PROLINK-7**. Before that, switch off the pieces of equipment.

The serial connector is on the side-hand panel of the **PROLINK-7**, as it is shown in the [45] connector in figure 3.

To print out the measurements press the **FUNCT** [34] key, turn the **TUNE/SELECT** [9] rotary selector up to place the cursor on the **DATA LOGGER** field. By pressing the **FUNCT** [34] key the **DATA LOGGER** screen will appear on screen.

First, the printing field has to be activated. For this, press several times the **SHIFT** [35] key until place the cursor on the **PRINT** field. Use the **TUNE/SELECT** [9] rotary encoder to activate it (ON).

Select the desired measuring configuration (columns) as it is explained in the section **4.2.12.11 DATA LOGGER** and the lines (TEST POINT). To print out (and measure if it has been established) only pressing the **START/STO** [38] key is necessary. When pressing the **START/STO** [38] key, if the cursor is in the 'corner' ,all the measurements of the intersection with activated lines and columns will be printed out. On the contrary, if only a measurement is required, when pressing the **START/STO** [38] key the cursor has to be on the corresponding line.

As example, the following figure shows the outcome of printing out two different measuring modes (<01> and <02>) with two lines activated (test points 1 and 2).

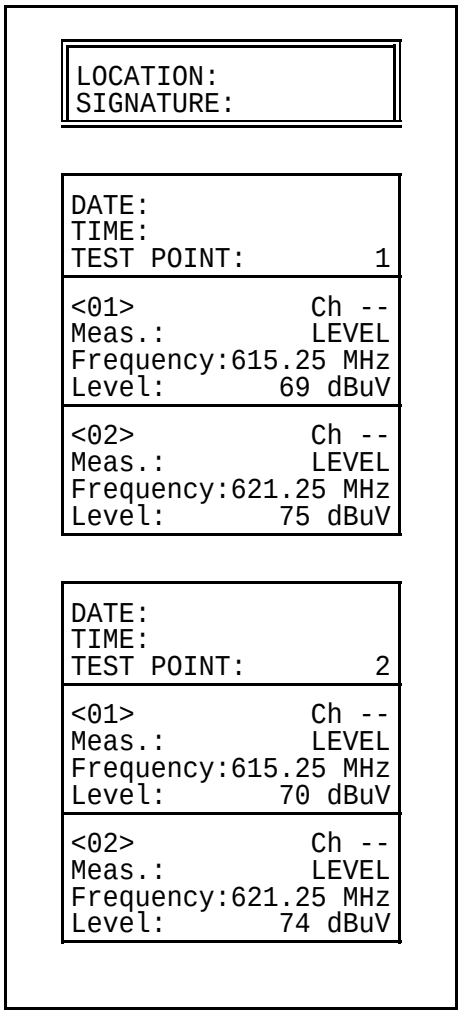

Figure 24.- Printing measurements.

4.2.14.1 Handshake and control lines

Next is described the handshake and control lines used by the **PROLINK-7**:

- 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 *4.2.14.2 CI-23 set-up.*

- The control lines used are:

    - DATA TRANSMIT (PROLINK-7 pin 3):
      To send data to the printer.

    - CLEAR TO SEND (PROLINK-7 pin 8) :
      Data transfer control. Data are sent only when this line is active.

    - DATA TERMINAL READY (PROLINK-7 pin 4)
      This line is permanently active in order to indicate the establishment of the communication.

Connections

The cable between the **PROLINK-7** and the printer must have the following connections:

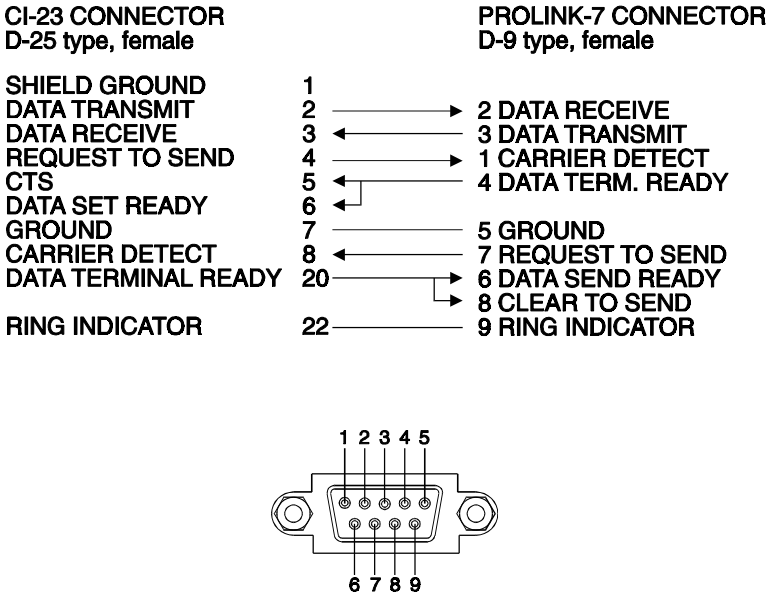

Figure 25.- PROLINK-7 RS-232C connector. Pins numbering.

4.2.14.2 CI-23 Set-up

This point explains how to modify the **CI-23** printer set-up. Figure 26 shows the printer keyboard:

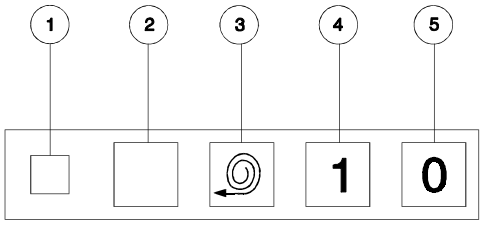

Figure 26.- CI-23 keyboard

[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.

The figure 28 shows a correct configuration for the CI-23 serial printer.

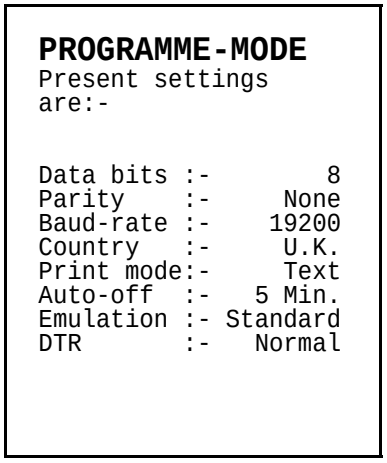

Figure 28.- CI-23 configuration

5 DESCRIPTION OF THE INPUTS AND OUTPUTS

5.1 RF input

The RF input is through the RF ⊖ [7] connector on the front panel. The peak signal level should never exceed 130 dBµV. This is a BNC connector, and the input impedance is of 75 Ω.

5.2 RF output

The RF output to the receiver or internal unit is the RF ⊕ [6] connector on the front panel. This is a BNC connector, and the output impedance is of 75 Ω.

This connector allows the flow of a DC voltage from the internal unit which powers the LNB, without interrupting the RF. Therefore, it is possible to take measurements and still receive signals. The user must take account of the fact that at the output through this connector, the signal is attenuated in approximately 20 dB (see the specifications).

5.3 IF OUT output

This is a 38.9 MHz IF output. It is a BNC connector, and the output impedance is of 75 Ω.

5.4 Composite video input

The composite video input is the VIDEO ⊖ [1] connector on the front panel. This is a BNC connector and the input impedance of 75 Ω.

ATTENTION
Maximum level in this input should not surpass 3 Vpp

5.5 Composite video output (BNC)

The composite video output is through the VIDEO OUT [42] connector on the side panel. This signal has a positive polarity and negative synchronisms, in a black level of 0 V. It is a BNC with an output impedance of 75 Ω.

WARNING 
This signal should not be connected at any circuit points with voltage, only to standard video signal inputs with 75 Ω impedance. Any damage to the instrument as a result of ignoring this precaution is not covered in the warranty.

5.6 Satellite BB OUT output

Through this BNC connector located on the side panel of the **PROLINK-7**, a base band TV signal is obtained without eliminating the low frequency triangular modulation known as "Energy dispersal". This signal, obtained directly from the tuner is an appropriate D2-MAC detector circuit input. The detector output can be introduced in the VIDEO ⊖ [1] video input to monitor the channel detected. This is a BNC connector, and the output impedance is of 75 Ω.

5.7 Euroconnector (DIN EN 50049)

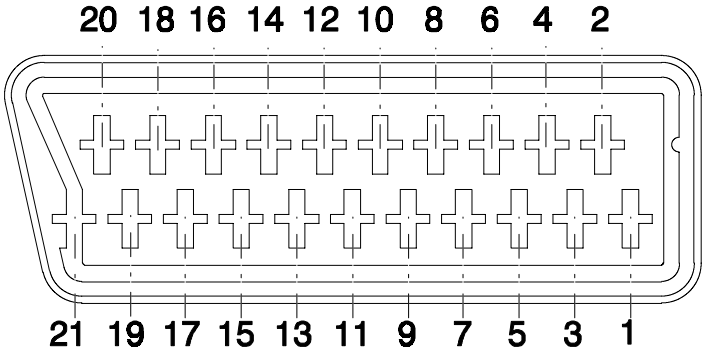

Figure 29.- Euroconnector (external view).

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

PIN No.	SIGNAL	CHARACTERISTICS
1	Right channel audio output	
2	Right channel audio input	
3	Left channel audio output	
4	Audio grounding	
5	Blue grounding (B)	
6	Left channel audio input	
7	Blue output (B)	
8	Switching voltage	(not connected)
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 5.- Description of the Euroconnector.

5.8 RS-232C Interface

Through the RS-232C connector it is possible the control of the **PROLINK-7** through a remote controller (personal computer), the printers connection, etc. The signals in this connector are described in Table 6.

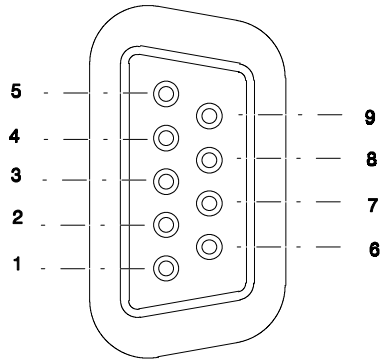

Figure 30.- RS-232C connector. External view.

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

Table 6.- Description of the RS-232C connector.

5.9 Headphones output

It is located on the side panel of the instrument and it is a Jack connector. The output is monaural except for the NICAM case, where the audition can be momo, stereo or dual, depending on the received NICAM. When this output is used, the speaker of the **PROLINK-7** is automatically deactivated.

If the user has selected the LV sound mode, a tone is emitted 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 display of the field meter, and therefore he can devote his full attention to the orientation process.

As a modulated signals monitor: the user can hear the signals resulting from AM or FM modulation by selecting the appropriate sound mode.

In both cases, control ◿ [4] enables the user to vary the sound volume.

6 REMOTE CONTROL WITH A PC

6.1 introduction

The design of **PROLINK-7**, based on a microprocessor, allows data to be exchanged between the equipment and a remote controller (personal computer) via an RS-232C connector. It is thus possible to obtain data as well as remote control of the **PROLINK-7** (measurement mode, sound type, attenuators state, etc) for maintenance purposes and monitoring of installations.

6.2 Protocol for communication between the PROLINK-7 and a PC

This protocol is controlled by software and uses a RS-232C connector. Data and information are exchanged using messages consisting of ASCII alphanumerical characters. This method ensures easy carrying between different types of personal computers.

To ensure error-free communication between the two devices, the communication parameters of the series port must be selected on the Remote Controller (personal computer) as described in the following lines:

Rate:	**19200 bauds**
Data bits:	**8**
Parity:	**None**
Stop bits:	**1**

PROLINK-7 accepts remote commands at any time at which the instrument is on, except when in print mode. That is, it is not necessary to put the instrument in a special remote control mode; rather, this mode is selected immediately when it detects a complete command during the time necessary for its execution.

In normal circumstance, **PROLINK-7** transmits a XON code (code 11h) every second. The aim is to indicate to any possible remote device that the equipment is ready to receive data. The moment it receives a '*' character indicating the start of a remote command, the XON transmission stops until it receives a CR (carriage return, code 0Dh). At that moment, **PROLINK-7** understands that it has received a complete remote command, identifies it and executes it. To indicate to the control equipment that it is in busy status, it sends a XOFF (code 13h).

If the command received is identified as valid, an ACK (acknowledge, code 06h) is transmitted and if not valid, a NAK (not acknowledged, code 15h) followed by a CR (carriage return, code 0Dh).

If the command has been recognised as valid, it is executed and the required response is returned (if the command so requires) followed by a new CR.

A typical communication chronogram would be as follows:

	PC (Remote controller)		**PROLINK-7**
1)		<------	XON
2)	*?BA<CR>	------>	
3)		<------	XOFF
4)		<------	ACK
5)		<------	*BA3<CR>
6)	wait ...		
7)		<------	XON

In print mode, as the same port is used as for the data dump to the printer, all data received is rejected and no XON character is transmitted until leaving this mode.

Commands should always be sent in capital letter and cannot be edited on-line, i.e., once a character is received it is stored in the **PROLINK-7** buffer and cannot be rectified by sending an erase code.

Commands in remote control are divided into two groups, orders and interrogations. Order modify a variable or the equipment status. Interrogations respond with information concerning equipment status or the value of a variable. For interrogative command, it is necessary to add the character '?' after the '*' character.

6.3 Remote orders

NOTE 1: The (') character should not be sent; it is only included in the description in order to define the string that makes up the remote command.

NOTE 2: The values given in small letter are parameters that change in value depending on the function to be executed. These values are always decimal or hexadecimal ASCII characters. For example, to transmit the value "1", we must send the hexadecimal code 31 the corresponds to this character. Consult the text for acceptable value margins. The transmission of erroneous parameters or contradictory information may cause **PROLINK-7** to stop operating correctly. In this case it is necessary to reset the equipment by momentarily switching it off.

'AG' Selects / interrogates the AGC mode.

Syntax:

Selection: **'*AGd<CR>'**
Interrogation: **'*?AG<CR>'**
Response: **'*AGd<CR>'**

Where:

d: AGC Mode
1 = OFF
0 = ON

'AL' Selects / interrogates the alarm

Syntax:

Selection: **'*ALd0hh:mm:ss,dd/mm<CR>'**
Interrogation: **'*?AL<CR>'**
Response **'*ALd0hh:mm:ss,dd/mm<CR>'**

Where:

d= Alarm state
0: On
1: Off
hh: Hours (2 digits in decimal notation).
mm Minutes (2 digits in decimal notation).
ss Seconds (2 digits in decimal notation).
dd Day (2 digits in decimal notation).
mm Month (2 digits in decimal notation).

'AT' Selects / interrogates the attenuator value.

Syntax:

Attenuator selection: '***ATa<CR>**'
Attenuator interrogation: '***?AT<CR>**'
Response: '***ATa<CR>**'

Where:

a = attenuator according to the following:
0: 0 dB
1: 10 dB
2: 20 dB
3: 30 dB
4: 40 dB
5: 50 dB
6: 60 dB
7: 70 dB
8: 80 dB
9: AUTO

Example:

'***AT5<CR>**' Sets the attenuator to 50 dB.

ENGLISH

'**BA**' Selects and/or interrogates the band.

Syntax:

Band selection: '***BAb<CR>**'
Band interrogation: '***?BA<CR>**'
Response: '***BAb<CR>**'

Where:
b = band associated to the frequency in accordance with the following:
0: UHF
1: VLO
2: VHI
3: FM
4: IF
5: SAT
6: SUBBAND

Example:

'***B5<CR>**' Sets the satellite band

'BV' Interrogates the value of the battery voltage

Syntax:

Interrogation '***?BV<CR>**'
Response: '***BV[$d_3d_2d_1$] d_0<CR>**'
Where:
d = Battery voltage level in tens of volt, in hexadecimal notation.

'BW' Selects / interrogates the measurement filter bandwidth

Syntax:

Selection of the bandwidth '***BWb<CR>**'
Interrogation of the bandwidth '***?BW<CR>**'
Response: '***BWb<CR>**'
Where:
b = Measurement filter bandwidth
0: 100 kHz
1: 230 kHz
2: 4 MHz
3: 1 MHz

Example:
'***BW1<CR>**' Selects the 230 kHz measurement filter.

'CF' Activates / deactivates and interrogates the channel/frequency mode

Syntax:

Selection: '***CFd<CR>**'
Interrogation: '***?CF<CR>**'
Response: '***CFd<CR>**'
Where:
d: **1** = Frequency mode
0 = Channel mode

'CH' Selects / interrogates a television channel

Syntax:

Channel selection: **'*CHc_1c_0<CR>'**

Channel interrogation: **'*?CH<CR>'**

Response: **'*CHc_1c_0 <CR>'**

Where:

c_1c_0 = Channel (number it occupies on the list) in hexadecimal notation

c_1: High nibble

c_0: Low nibble

In the response, if

c='!!' Indicates that the channel does not exist

Example:

'*CH01<CR>' Selects channel 1.

'*?CH<CR>' -> **'*CH12<CR>'** The channel now selected is the 18 (in decimal notation)

'CI' Provides information on a channel

Syntax

Interrogation **'*?CIc_1c_0 s_1s_0<CR>'**

Where:

c_1c_0 = Channel number (number it occupies in the list in hexadecimal notation)

c_1: High nibble

c_0: Low nibble

s_1s_0 = Set number (number that it occupes in the list in hexadecimal notation)

s_1: High nibble

s_0: Low nibble

Response1: ***CI !!<CR>**

The selected channel does not exist.

Response2: ***CI $l_3l_2l_1l_0$ $p_3p_2p_1p_0$ [,$m_1m_0d_n..d_0$, $m'_1m'_0d'_n..d'_0$, ...] <CR>**

Where:

l = Channel name

$p_3p_2p_1p_0$ = PLL value (in hexadecimal notation)

p_3: High nibble

p_0: Low nibble

[,$m_1m_0d_n..d_0$, $m'_1m'_0d'_n..d'_0$, ...] = Commands associated with the channel (the brackets '[' ']' mean that these are optional parameters).

m_1m_0 : The command to execute

$d_n..d_0$: The parameters associated to the command

Example:

'*?CI0000 <CR>' Queries on channel 0 of the channel set 0

-> *CIE02S0572,ST0<CR>

Where: **E02S** = Channel name

0572 = PLL value in hexadecimal

ST0 = It has associated the B/G standard

ENGLISH

'CK' Selects / interrogates the hour and the date

Syntax:

Selection: **'*CKhh:mm:ss,dd/mm/aaaa<CR>'**
Interrogation: **'*?CK<CR>'**
Response **'*CKhh:mm:ss,dd/mm/aaaa<CR>'**

Where:

hh: Hours (2 digits in decimal notation).
mm: Minutes (2 digits in decimal notation).
ss: Seconds (2 digits in decimal notation).
dd: Day (2 digits in decimal notation).
mm: Month (2 digits in decimal notation).
aaaa: Year (4 digits in decimal notation).

'CW' Selects / interrogates the channel bandwidth

Syntax:

Bandwidth selection: **'*CW $d_3d_2d_1d_0$<CR>'**
Bandwidth interrogation: **'*?CW<CR>'**
Response: **'*CW $d_3d_2d_1d_0$<CR>'**

Where:

d = Filter bandwidth in kHz **decenas**, in hexadecimal notation.
d_3: High nibble
d_0: Low nibble

'DL' Returns the measurements performed with the DATALOGGER.

Syntax:

Command: '*?DLm_1m_0 t_1t_0<CR>'
Response: '*DL$csl_2l_1l_0$<CR>'

Where:

m_1m_0 = (measured memory or DATA LOGGER matrix column in hexadecimal notation)
m_1: High nibble
m_0: Low nibble
t_1t_0 = (measured test point or DATA LOGGER matrix row in hexadecimal notation)
t_1: High nibble
t_0: Low nibble
$csl_2l_1l_0$= Measured level (see the LV command format).

Example:

(PC) **'*?DL0101<CR>'**
(Prolink-7) **'*DL=+355<CR>'** (85.3dBµV for the level LEVEL case)

'DS' Activates / Deactivates or indicates the state of the memories and the test points in the DATA LOGGER function.

Syntax:

Activation/Deactivation: **'*DSbd$_1$d$_0$ s<CR>'**

Where:

b = (memory or test point indication)
- **M**: Memory activation/deactivation (column of the DATA LOGGER function)
- **T**: Test point activation/deactivation (row of the DATA LOGGER function)

d$_1$d$_0$ = (memory or test point number, in hexadecimal)
- **d$_1$**: High nibble
- **d$_0$**: Low nibble

s =
- **0**: Activates
- **1**: Deactivates

State interrogation: **'*?DSbd$_1$d$_0$<CR>'**

Response: **'*DSs<CR>'**

Where:

bd$_1$d$_0$ = (same format as in the activation/deactivation)

s =
- **0**: Memory or test point activated
- **1**: Memory or test point not activated

Example

'*DSM001<CR' Activates the first memory in the Data Logger function.

'FR' Selects / interrogates the frequency (with the consequent change of the band if necessary).

Syntax:

Frequency selection: **'*FRbd$_3$d$_2$d$_1$d$_0$<CR>'**

Frequency interrogation: **'*?FR<CR>'**

Response: **'*FRbd$_3$d$_2$d$_1$d$_0$<CR>'**

Where:

b = band associated to the frequency according to the following:
- **S**: Satellite band
- **T**: Terrestrial band
- **M**: FM band
- **I**: Intermediate frequency (38.875)

d$_3$d$_2$d$_1$d$_0$ (d) = PLL hexadecimal divider
- **d$_3$**: High nibble
- **d$_0$**: Low nibble

The synthesized frequency is related with the PLL divider according to the following expressions:

f (MHz) = 0.125d - 479.5 for the satellite band
f (MHz) = 0.0625d - 38.875 for the rest of the bands
(*all are decimal values)*

Example:

'***FRM0816<CR>**' Synthesizes the 90.5 MHz frequency in the FM band.

ENGLISH

'JI' Provides information on a set of channels

Syntax: **'*?JIs$_1$s$_0$<CR>'**

Where:

s$_1$s$_0$ = Set number (number which it occupies on the list) in hexadecimal notation

s$_1$: High nibble

s$_0$: Low nibble

Response1: **'*JI !! <CR>'**

The requested channel set cannot be found

Response2:

'*JIl$_7$l$_6$l$_5$l$_4$l$_3$l$_2$l$_1$l$_0$t$_1$t$_0$bo$_4$o$_3$o$_2$o$_1$o$_0$c$_1$c$_0$k$_3$k$_2$k$_1$k$_0$[,m$_1$m$_0$d$_n$..d$_0$,m'$_1$m'$_0$d'$_n$..d'$_0$,...]<CR>'

Where:

l = Label (name) of the set of channels

t$_1$t$_0$ = Channel number (hexadecimal notation)

t$_1$: High nibble

t$_0$: Low nibble

b = The channelling band (code '7' = terrestrial band. For other codes see the **'BA'** command).

o$_4$o$_3$o$_2$o$_1$o$_0$ = The value of the LNB local oscillator (hexadecimal)

o$_4$: High nibble

o$_0$: Low nibble

c$_1$c$_0$ = The channelling identification code (hexadecimal).

c$_1$: High nibble

c$_0$: Low nibble

k$_3$k$_2$k$_1$k$_0$ = The channelling checksum

k$_3$: High nibble

k$_0$: Low nibble

[,m$_1$m$_0$d$_n$..d$_0$, m'$_1$m'$_0$d'$_n$..d'$_0$, ...] = Commands associated with the channelling (the brackets [,] mean that these are optional parameters).

m1m0 : Command to execute

dn..d0: Parameters associated with the command

Example **'*?JI00 <CR>'** Interrogates about the channel set 0

->*JICCIR 65T00000010274,LB0

Where: **CCIR** = Channelling name

65 = The number of channels in hexadecimal

T = The channelling band (terrestrial).

00000 = Hexadecimal value of the local oscillator of the LNB (in this case, as it is a terrestrial channel this parameter is irrelevant)

01 = Channel code

0274 = Channel checksum

LB0 = LNB = EX.

'LB' Selects/ interrogates the external unit power supply

Syntax:

Voltage Selection: **'*LBl<CR>'**
Voltage interrogation: **'*?LB<CR>'**
Response: **'*LBl<CR>'**

Where:

l = **0: EX**
1: 13 V
2: 15 V
3: 18 V
4: 24 V
5: 13 V + 22 kHz
6: 15 V + 22 kHz
7: 18 V + 22 kHz

Example:

'*LB0<CR>' Selects the external power supply.

'LO' Selects / interrogates the value of the LNB local oscillator.

Syntax:

Frequency selection: **'*LO$d_4d_3d_2d_1d_0$<CR>'**
Bandwidth interrogation: **'*?LO<CR>'**
Response: **'*LO $d_4d_3d_2d_1d_0$<CR>'**

Where:

d = The value of the LNB local oscillator in hundreds of kHz, in hexadecimal notation.
d_4: High nibble
d_0: Low nibble

This command is only operative in the satellite band.

'LV' Provides the absolute level in decimals of dBµV (for the LEVEL and DIGITAL CARRIER measurement mode) and in dB decimals (in the VIDEO/AUDIO and CARRIER NOISE RATIO measurement mode).

Syntax:

Command: **'*?LV<CR>'**
Response: **'*LVcs$l_2l_1l_0$<CR>'**

Where:

c =
=: Correct measurement
>: Overrange
<: Underrange
!: Measurement can not be carried out

s=
+: Positive measurement
-: Negative measurement

$l_2l_1l_0$ = Hexadecimal measurement in dBµV decimals (in the LEVEL and DIGITAL measurement mode) or in dB decimals (in the VIDEO/AUDIO and CARRIER NOISE RATIO measurement mode).
l_2: more significative nibble
l_0: less significative nibble

Example:

(PC) '*?LV<CR>'
(Prolink-7) '*LV=+355<CR>' (85.3dBµV for the LEVEL case)

ENGLISH

'ME' Selects / interrogates the measurement mode.

Syntax:

Measurement mode selection: '***MEb<CR>**'
Measurement mode interrogation: '***?ME<CR>**'
Response: '***MEb<CR>**'

Where

b =

0: Level measurement (LEVEL)
1: Video to audio ratio measurement (V/A)
2: Digital channel power measurement (DIGITAL CARRIER)
3: Carrier to Noise ratio measurement mode

Example:

'*ME0<CR>' Selects the level measurement mode

'NI' Interrogates the value of the external unit current.

Syntax:

Interrogation **'*?NI<CR>'**
Response: **'*NI[$d_3d_2d_1$] d_0<CR>'**

Where:

d = external unit current in mA, in hexadecimal.

'NL' Interrogates the value of the external unit voltage.

Syntax:

'*?NL<CR>'
Response: **'*NL[$d_3d_2d_1$] d_0<CR>'**

Where:

d = external unit voltage in tens of volts, in hexadecimal notation.

'OF' Turns off the unit

Syntax: **'*OF<CR>'**

'RC' Configurates the unit according to the contents of a program memory

Syntax

Memory selection **'*RCn_1n_0'**

Where

n The memory number in hexadecimal notation. The valid values are from 01h to 63 h (01 to 99 in decimal notation)
n_1 High nibble
n_0 Low nibble

'SC' Selects / interrogates a channel set

Syntax:

Channel set selection: **'*SCs_1s_0<CR>'**

Channel set interrogation: **'*?SC<CR>'**

Response: **'*SCs_1s_0 <CR>'**

Where:

s_1s_0 = Channel number (number that occupies it in the list) in hexadecimal notation

s_1: High nibble

s_0: Low nibble

In the response of the channel set, if

s= '!!' Indicates that the channel set does not exist or that it is not activated.

Example:

'*SC01<CR>'	Selects channel set 1.
'*?CH <CR>' -> *CH00<CR>	The channel set currently selected is the 0.

ENGLISH

'**SO**' Selects / interrogates the sound type.

Syntax:

Sound selection: '***SOt$n_2n_1n_0$<CR>**'

Sound type interrogation: '***?SO<CR>**'

Response: '***SOt$n_2n_1n_0$<CR>**'

Where:

t = sound type according to the following:

- **0**: AM sound
- **1**: FM sound
- **2**: LEVEL sound
- **3**: OFF sound
- **4**: TUNE (NARROW) sound
- **5**: 4.50 sound
- **6**: 5.50 sound
- **7**: 5.74 sound
- **8**: 6.00 sound
- **9**: 6.50 (FM) sound
- **A**: 6.50 (AM) sound
- **B**: 5.80 sound
- **C**: 6.65 sound
- **D**: NICAM sound
- **E**: 7.02 sound
- **F**: TUNE (BROAD) sound

$n_2n_1n_0$ (n) =

For the TUNE option: PLL hexadecimal divider (between 5BEH and 7B2H).

n_2: High nibble

n_0: Low nibble

The frequency is related with the PLL value according to:

f(MHz)=0.01n - 10.7

(all values in decimal notation)

For the Nicam case and as the equipment response:

n_2 = 0

n_1:

- **1**: error="<"
- **2**: error="5"
- **3**: error="4"
- **4**: error="3"
- **5**: error=">"

n_0:

- **1**: type="--"
- **2**: type="mo"
- **3**: type="st"
- **4**: type="du"

'SP' Selects and interrogates the spectrum

Syntax:

To set: **'*SPd<CR>'**

To interrogate: **'*?SP<CR>'**

Response **'*SPd<CR>'**

Where:

d: **1** = Spectrum mode OFF

0 = Spectrum mode ON

'SR' Selects / interrogates the contents of a program memory

Syntax:

Selection

'*SR$s_1s_0t_3t_2t_1t_0bco_3o_2o_1o_0fv_1v_0k_3k_2k_1k_0n_1n_0ulmxyz_3z_2z_1z_0w_3w_2w_1w_0r_4r_3r_2r_1r_0$<CR>'

Interrogation

'*?SRs_1s_0<CR>'

Response:

'*SR$s_1s_0t_3t_2t_1t_0bco_3o_2o_1o_0fv_1v_0k_3k_2k_1k_0n_1n_0ulmxyz_3z_2z_1z_0w_3w_2w_1w_0r_4r_3r_2r_1r_0$<CR>'

Where:

s_1s_0 = Number of the memory in hexadecimal

s_1: High nibble

s_0: Low nibble

$t_3t_2t_1t_0$ = Memory label (name) in ASCII.

b = Channelling band (code '7' = terrestrial band. For other codes see the **'BA'** comman).

c = TV standard (see the **'ST'** command).

$o_3o_2o_1o_0$ = The value of the PLL divider in hexadecimal notation (see the **'FR'** command)

o_3: High nibble

o_0: Low nibble

f = The channel/frequency mode (see the **'CF'** command)

v_1v_0 = The channelling identification code (number it occupies on the list in hexadecimal).

$k_3k_2k_1k_0$ = Channelling table checksum in hexadecimal notation (the one which returns the **'JI'** command)

k_3: High nibble

k_0: Low nibble

n_1n_0 = Channelling identification code (hexadecimal).

n_1: High nibble

n_0: Low nibble

u = Measurement units (see the **'UN'** command)

l = External unit power supply (see the **'LB'** command)

m = Measurement mode (see the **'ME'** command)

x = Frame frequency (see the **'VP'** command)

y= Sound type (see the **'SO'** command)

$z_3z_2z_1z_0$= The value of the local oscillator of the sound subcarrier frequency (see the **'SO'** command)

z_3 : High nibble

z_0 : Low nibble

$w_3w_2w_1w_0$ = Channel bandwidth in tens of kHz , in hexadecimal notation.

w_3 : High nibble

w_0 : Low nibble

$r_4r_3r_2r_1r_0$ = LNB local oscillator frequency in **centens** of kHz, in hexadecimal

r_4: High nibble

r_0: Low nibble

ENGLISH

'**ST**' Selects / interrogates the TV standard.

Syntax:

Standard selection: '***STs<CR>**'
Standard interrogation: '***?ST<CR>**'
Response: '***STs<CR>**'

Where:
s = (TV standard)
0: B/G
1: D/K
2: I
3: L
4: M
5: N
6: DIGITAL
7: ANALOGUE

Example:
'***ST4<CR>**' Selects the M standard.

'**SV**' Selects / interrogates the satellite video polarization.

Syntax:

Polarity selection: '***SVp<CR>**'
Polarity interrogation: '***?SV<CR>**'
Response: '***SVp<CR>**'

Where:
p =
1: Positive
0: Negative

Example:
'***SV1<CR>**' Selects the positive satellite video polarization

'**TV**' Selects / interrogates the TV mode.

Syntax:

TV mode selection: '***TVt<CR>**'
TV mode interrogation: '***?TV<CR>**'
Response: '***TVt<CR>**'

Where:
t = (TV mode)
0: TV_OFF
1: TV
2: TV+LV
3: TV+LV+SYNC
4: LV

Example:

'***TV2<CR>**' Selects the TV+LV mode

'TX' Selects the telextext.

Syntax:

a) To activate the teletext: **'*TX $d_2d_1d_0$<CR>'**

b) To deactivate the teletext: **'*TX000<CR>'**

Where:

d: Page (in hexadecimal notation)

d_2: high nibble

d_0: low nibble

Example:

'*TX64<CR>' Activates the teletext and sets page 100 (in decimal notation).

'UN' Selects / interrogates the measurement units

Syntax:

Units selection **'*UNu<CR>'**

Units interrogation **'*?UN<CR>'**

Response: **'*UNu<CR>'**

Where:

u = (units)

0: dBµV

1: dBmV

2: dBm

3: Lin

Example:

'*UN0<CR>' Selects the dBµV units.

'VE' Returns the version.

Syntax:

Interrogation: **'*?VE<CR>'**

Response: '**$*VEm_4m_3m_2m_1m_0/s_4s_3s_2s_1s_0$CR>**'

Where:

$m_4m_3m_2m_1m_0/s_4s_3s_2s_1s_0$= Corresponds to a character string which indicates the version.

Example:

(PC) '*?VE<CR>'

(Prolink-7) '*VE2.08 / 1.03<CR>'

ENGLISH

'VP' Selects / interrogates the frame frequency for the satellite band

Syntax:

Frequency selection:	**'*VPd<CR>'**
Frequency interrogation:	**'*?VP<CR>'**
Response	**'*VPd<CR>'**

Where:

d= (frequency)

1 : 50 Hz

0 : 60 Hz

NOTE:

The **PROLINK-7** incorporates a system to detect incompatible options and so it only will accept the options described in this paragraph if they are compatible with its state. For example if you try to fix the sound to 5.5 when you have selected previously the FM band, you will obtain as an answer a 'NOT ACKNOWLEDGE' code.

7 MAINTENANCE

7.1 Replacing the fuses

7.1.1 Replacing the mains fuse

The fuse compartment is placed in the mains base (see fig. 3).

To substitute the fuse disconnect the power cord.

With an appropiate screwdriver remove the fuse compartment cover.

Substitute the melt fuse for another of **2.5 A - F - 250 V**.

7.1.2 Internal fuses which user cannot replace

F1 DC/DC conversor **6 A - T - 250V**
F1 Battery charger **2 A - F - 250V**

7.2 Replacing the Battery

The average life of the battery is 4 years if it has been kept in optimum operating conditions. Therefore, it must be replaced every four years or whenever the capacity of the fully-charged battery is noticeably diminished. To change the battery, follow the procedure indicated in figure 31.

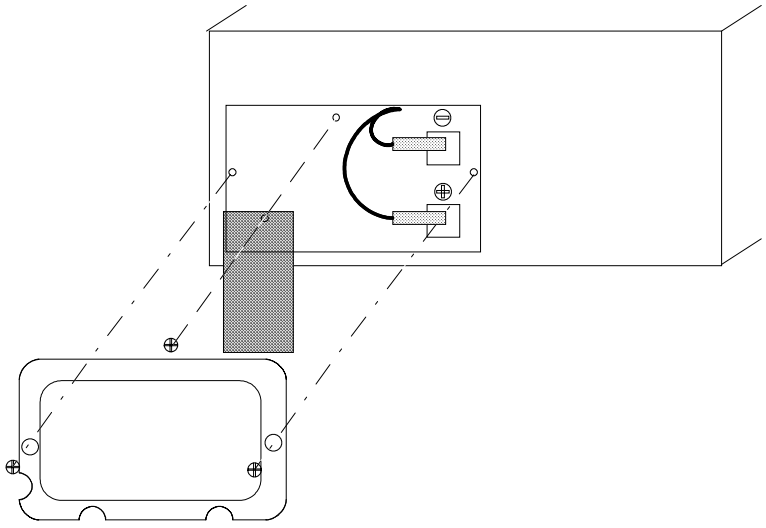

Figure 31.- Replacing the battery.

- Remove the attachment screws from the top cover of the battery compartment which is located in the rear of the device.

- Remove the battery compartment cover.

- Remove the screw from the attachment flange of the battery and take it out.

- Disconnect the connection terminals of the battery and replace it with a new one. Take care with the polarity (red-positive, black-negative) of the terminals.

WARNING
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 attachment flange again and tighten the screw.

- Replace the rear cover and attach it with the corresponding screws.

7.3 Cleaning the cover

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.

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