PRODIG-1+

Test Equipment Depot
1-800-517-8431

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

SATELLITE HUNTER

PROMAX

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SATELLITE HUNTER
PRODIG-1+

1. GENERAL

1.1 Description

The arrival of Digital TV boosted the installation of Direct To Home satellite TV systems. The continuous release of new packages or 'bouquets' and services such as Internet, affordable connection fees and subsidised boxes require new simplified installation procedures that are capable of guaranteeing received signal quality.

Because of the range of services offered by modern satellites and the ever increasing signal density, different tests have been developed from those available in classic satellite detectors and meters. There is a need to discern among different satellites, to adjust the skew and to check digital signal quality.

The **PRODIG-1+** responds to the need for an installation tool that might allow making the job fast and including all necessary measurements to secure quality of reception. Nevertheless, measurements are information that needs to be compared with known references. Comparison takes time in order to analyse the data for each installation.

The **PRODIG-1+** has been designed to guarantee the maximum number of installations with the best possible quality, thereby helping the installer to evaluate the results.

The instrument directly determines if signal quality is of a sufficient level for reception. This is done on the basis of the internal BER measurement and the signal noise ratio (SNR).

The **PRODIG-1+** processes all the information and gives to the installer **just the information he requires**, thereby making his work as easy as possible.

The **PRODIG-1+** is a very easy to use instrument that guides the user through 3 steps, enabling the desired satellite to be located, guaranteeing its identification and accurately adjusting the receiver antenna to obtain the best possible signal quality.

In the **PRODIG-1+**, the ultimate measurement to determinate the signal quality is the Signal/Noise ratio (SNR), this is directly related to the BER (Bit Error Rate). The instrument displays 'BER' when the BER is < 2x10E-4 (equivalent to good quality) and 'ber' when the BER is > 2x10E-4 (equivalent to poor quality). This threshold may be reprogrammed according to the signal quality level specified by each operator.

The instrument is a useful tool when installing either a specific service or satellite, or a series of services or satellites. Its specific use is determined by the instrument programming, which in turn depends on the country or geographical area.

The **PRODIG-1+** has been specially designed to stand rough working conditions, it includes a back-light display and offers long battery life and short charging times.

1.2 Specifications

TUNING	
Frequency range	900 MHz to 2150 MHz.
Measurement points	16 maximum.
RF INPUT	
Impedance	75 Ω.
Connector	Universal, including BNC and F interchangeable adapter.
Level range	30 dBµV to 90 dBµV.
Maximum signal level	120 dBµV**.**
QPSK SIGNAL PARAMETERS	
Symbol rate	1000 to 30000 kbauds.
Code rate	Auto and 1/2, 2/3, 3/4, 5/6, 6/7, 7/8.
Spectral inversion	Automatic.
Quality level for acceptance	Definable by user.
Initial values	IDENTIFY : BER = $2x10^{-4}$ ADJUST : SNR = 5 dB
Displayed information	Satellite's Azimuth, if it is detected. Service name, network or bouquet, if it is detected.
Configuration of measurement points	By means of serial connection to PC. (Cable and program included).
EXTERNAL UNITS POWER SUPPLY	Through the RF input connector.
Output voltage	13 V, 18 V. ± 1 V.
Maximum output current	300 mA.
22 kHz signal	Selectable.
Voltage	0.6 V ± 0.2 V.
Frequency	22 kHz ± 4 kHz.
BACK-LIGHT DISPLAY	On, Off.

POWER SUPPLY

Battery	7.2 V 1.5 Ah Ni-MH battery.
Low battery indication	Acoustic indication and a message on the display.
Charger	Built-in. It disconnects the powering when the charging process ends.
Autonomy	70 min. typically, powering a universal LNB and identifying a signal continuously.
Charging time	70 min. approx. starting from a complete discharge (instrument off), within the margin of tolerated temperatures.
Temperature of charge beginning between 5 and 45 ºC	Outside this margin of temperature, the charger will not initiate the charging process. With high ambient temperatures, the charging process will not be carried out of continuous way since the charger circuit has a heat-protection device that disconnects this circuit when surpassing 45°C, returning to connect itself when low of 40°C.
Mains Adapter	90 - 250 V/50-60 Hz/18W (included).
Maximum consumption	18 W.

OPERATING ENVIRONMENTAL CONDITIONS

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

MECHANICAL FEATURES

Dimensions	195 mm (W) x 101 mm (H) x 44 mm (D)
Weight	480 g

INCLUDED ACCESSORIES

AA-012	Car lighter adapter.
AL-101	Mains power adapter.
AD-055	"F"/H-BNC/H adapter.
AD-057	"F"/H-"F"/H adapter.
CA-005	Mains cord CEE-7.
CB-075	Rechargeable battery Ni-MH 7.2 V, 1.5 Ah.
DC-259	PRODIG-1+ carrying case.
DC-287	Carrying belt.
RM-001	Configuration software for PRODIG-1+

OPTIONS

OP-001-11	Rechargeable battery Lithium-ion, 7.2 V, 2.2 Ah. (CB-074)

2. SAFETY RULES

2.1 General

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

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

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

  Rechargeable battery
  Mains power adapter
  Car lighter adapter
  Mains 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 authorised to** carry out the following maintenance operations:

  Battery replacement

  On the Maintenance paragraph the proper instructions are given.

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

* 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

2.2 Specific Precautions

* The **AL-101** mains adapter is a **Class I** equipment, for safety reasons plug it to a **supply line with the corresponding ground terminal**.

* When using the **AL-101** mains adapter, the **negative of measurement is at ground potential.**

2.3 Descriptive Examples of Over-Voltage Categories

Cat I Low voltage installations isolated from the mains.

Cat II Portable domestic installations.

Cat III Fixed domestic installations.

Cat IV Industrial installations.

3. INSTALLATION

3.1 Power Supply

The **PRODIG-1+** is a portable instrument powered by a rechargeable battery. The instrument comes with a mains adapter enabling the **PRODIG-1+** to be connected to the mains for operation and battery charging.

3.1.1 Operation Using the Mains Adapter

Connect the mains adapter to the **PRODIG-1+** using the external power connector 12 V ⎓ [4] (see figure 7) located on the left side panel. Connect the adapter to the mains, thereby automatically starting the battery charging process. The instrument will emit an acoustic indication and the information on battery charging (see *'3.1.3 Battery Charging'*) will be shown on the display. If the battery is already charged, the instrument will automatically disconnect. To halt the charging process, press any of the three keys ([1], [2] or [3], see figure 6) for more than 2 s (the battery-charging screen will disappear).

To start operation, keep any of the three instrument keys ([1], [2] or [3], see figure 6) pressed down for more than 1 s. Under these conditions the instrument starts up. Battery charging process will stop if the instrument is used during the process.

CAUTION

*Before using the mains adapter, make sure that it is the appropriate one for your mains system: Mains power adapter model **AL-101**.*

The mains adapter is exclusively designed for indoor use.

3.1.2 Operation Using Batteries

The instrument may be powered using a 7.2 V and 1.5 Ah Ni-MH battery (CB-075).

For the instrument to work using the battery, you need only press any instrument key ([1], [2] or [3], see figure 6) for more than 1 s. With the battery fully charged, the **PRODIG-1+** has an approximate autonomy of 70 minutes uninterrupted operation.

When the battery is flat, you will hear an acoustic indication, the screen will show the message 'BATTERY LOW' and, afterwards, the instrument will automatically switch off.

3.1.3 Battery Charging

To fully charge the battery with the **PRODIG-1+** switched off, connect the mains adapter to the external power supply input 12 V ⎓ [4] (see figure 7). Then connect the adapter to the mains. The charging process starts automatically. The instrument will emit an acoustic indication and the display will show the battery voltage level, the charge percentage and how long the battery has been charging.

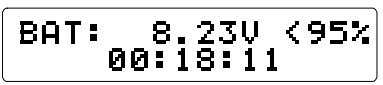

Figure 1.- Battery charging.

When a charging process is carried out within the allowed temperature margin with the equipment switch off, it appears on the display the previous indications, in opposite case is shown the message "*please wait...*", and the process stops when activating the heat-protection circuit. If after some minutes the message does not disappear from screen, is advisable to disconnect the mains adapter for two or three minutes before connecting it to the equipment again. The charging process would have to begin normally.

When charging is completed, the instrument is automatically disconnected while you hear two acoustic indications and the display will show how long the battery has been charging. In the case of charging process stops due to heat-protection activation, this one will be started again automatically when the internal temperature returns to the allowed margin for a normal battery charging.

Charging time depends on the state of the battery. If the battery is very flat, charging will be some 70 minutes (40 minutes to achieve 60% total capacity). When the battery is fully charged, the instrument automatically disconnects.

IMPORTANT REMARK

Due to the battery technology the reading of charge percetage will not be correct until after about 5 minutes of beginning the charging process.

IMPORTANT REMARK

When starting the battery charging process and when using the instrument for a long period of time, a heating of the instrument can be observed. This heating is normal in the power margin that must be dissipated, according to the battery charge status and the LNB consumption.

3.2 Installation and Start-Up

The **PRODIG-1+** satellite hunter has been designed for use as a portable instrument.

Press any of the three keys (

[1], 

[2], 

[3], see figure 6) for more than 1 s and the instrument starts up in Auto Power OFF mode. In other words, the instrument will automatically switch off if none of the keys have been pressed after 5 minutes. If you wish to cancel the automatic power off, keep the key pressed down for more then 2 s when starting up the instrument.

On starting up, you will see the instrument presentation screen (see figure 2).

Figure 2.- Instrument presentation screen.

Next, a screen appears showing the name of the company and user (figure 3).

Figure 3.- Company and user name screen.

Afterwards, you see a screen saying whether the instrument automatic disconnection is on ('AUTO POWER OFF') or not ('MANUAL POWER OFF'):

Figure 4.- Automatic disconnection indicator.

Finally, you see the detection function (1> DETECT) screen.

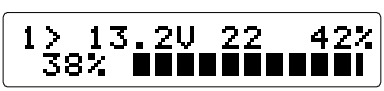

Figure 5.- Example of detection function screen.

4. OPERATING INSTRUCTIONS

4.1 Description of the Controls and Elements

Front panel

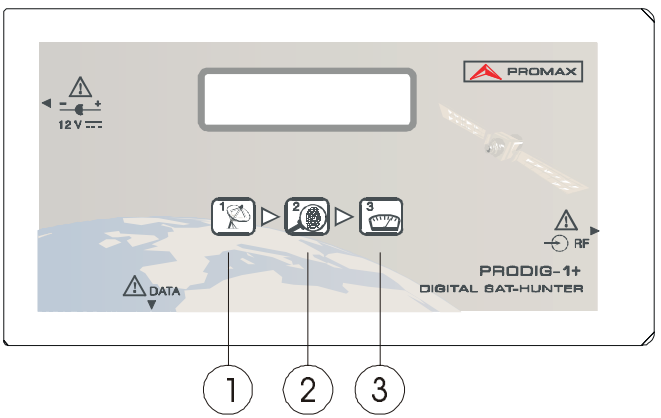

Figure 6.- Front panel.

[1] **DETECT**

Activates the detect function for any satellite signal, both digital and analogue. Enables the instrument to be switched on or off.
Pressing repeatedly the key it allows to activate or deactivate the display back-light function.

[2] **IDENTIFY**

Activates the identification function to see if the detected satellite is one already memorised by the instrument. Enables the instrument to be switched on or off.

[3] **ADJUST**

Activates the precision adjustment function in order to fine adjust the antenna for optimum signal reception. Enables the instrument to be switched on or off.

Side panels

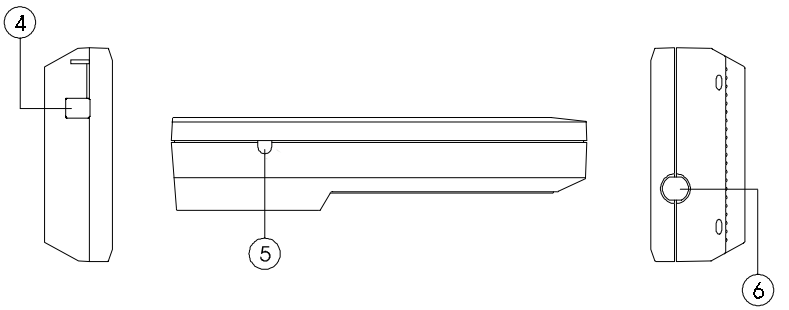

Figure 7.- Side panels.

[4] **External 12 V power input.**

[5] **DATA.** Connector for data transfer, for instrument calibration and configuration by a PC.

[6] **RF**. **RF signal input.**
Maximum level 120 dBµV. Universal connector for F/F or F/BNC adapter, input impedance of 75 Ω.

4.2 Antenna Adjustment for Optimum Reception

The **PRODIG-1+** has been designed to adjust the orientation of a satellite antenna so that it achieves the optimum reception of the digital satellite signal for a memorised satellite.

The adjustment process consists of three steps:

1 Satellite detection and localisation: **1> DETECT**
2 Identification of localised satellite: **2> IDENTIFY**
3 Precise antenna adjustment for optimum signal quality. **3> ADJUST**

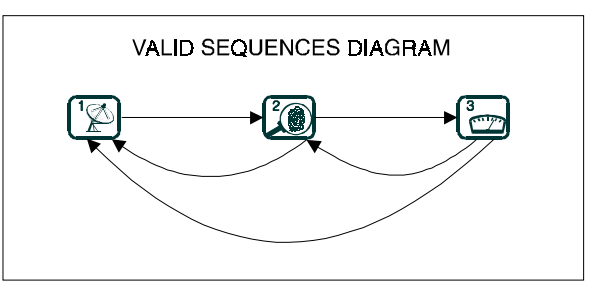

Figure 8.- Valid sequences diagram.

During the entire process the instrument monitors the state of the cable, the connector and LNB. Therefore, if it detects that the noise level is below a reference level (standard value: 100 mV), the display will show the message 'NO LNB?' indicating that the LNB is not detected.

Figure 9.- DETECT function screen when no LNB is detected.

If the measured LNB power supply voltage falls 1 V below the nominal value (for example 12 V when the nominal value is 13 V) the instrument displays the message 'CABLE SHORT' (short-circuit) and temporarily switches off the power source to prevent overloads. After 3 s, it switches on the power supply again to see if the short-circuit has disappeared.

This may occur due to a temporary fall in voltage when connecting or disconnecting the instrument from the rest of the installation. The message may also appear when the power supply overloads on using an LNB with excessive consumption.

4.2.1 Satellite Detection and Localisation (1> DETECT)

This function is directly accessed on starting the instrument. If this is not the active function, press key [1] to select it.

The purpose of this function is to detect when the antenna is pointing to a satellite (detection).

On connecting the instrument to the low-noise amplifier located in the antenna focus, the passage of any radio-frequency source (the satellite) is shown by a bar-graph and an acoustic indication. To produce this indication, the instrument measures the energy received across the entire satellite band.

In the case of no detection, the bar remains to the left of the display. When a satellite is detected, the bar moves to the right of the display in proportion to the power of the detected signal.

On moving the antenna from one end to the other (for example, from east to west) you can count the different geostationary satellites detected.

The bar indication is percentage, relative to the maximum signal level that may be measured by the detector. So that for the same type of antenna and LNB, you will obtain approximately the same detection value.

The bar-graph scale dynamically adapts to the maximum and minimum levels being detected, thereby optimising the sensitivity of the bar-graph.

The screen also shows the measured value of the voltage supplied to the LNB and displays if the 22 kHz signal is being applied (see figure 10).

A screen like the one below appears on the display:

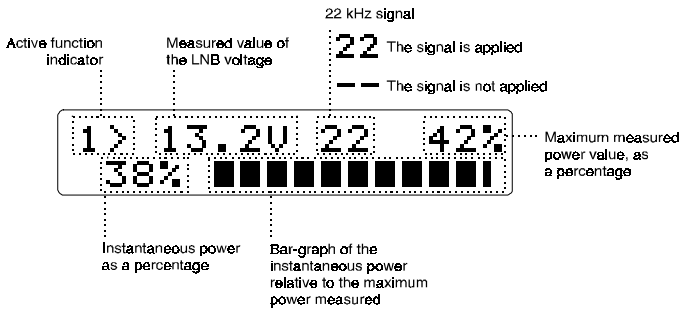

Figure 10.- DETECT function screen.

If no antenna is detected, the display shows the message 'No LNB?' (see figure 9) and no acoustic indication is emitted.

4.2.2 Satellite Identification (2 > IDENTIFY)

Once a satellite has been detected (by localising a power maximum), check if the received signal corresponds to some memorised satellite. Select the memorised satellites identification function 2> IDENTIFY by pressing key [2]. Once selected, try the different satellite detection points.

The identification system is based on a previously loaded satellite data table. Consult the configuration sheet supplied with the instrument for further information on the satellites that your instrument can detect.

The instrument can memorise up to sixteen combinations of frequencies and polarisations (16 detection points). The number of active points (selectable) may be configured. A greater or lesser number of satellites can be identified depending on the number of active points and what you wish to assign to each satellite. Therefore, for example, if you assign one frequency and the two possible polarisations to each satellite (i.e. 2 points for each satellite) and you only activate 14 points, the instrument will be able to identify a total of 7 different satellites. See the configuration sheet delivered with the instrument for further information. Each detection point has a name of up to 4 letters assigned to it, these are momentarily shown on the display when selected (see figure 12).

Note: You are recommended to assign two test points to each satellite, one with vertical polarisation and another one with horizontal polarisation, to guarantee satellite identification.

As shown in figure 11, key [2] enables the selected detection point to be changed sequentially. Therefore, the selected test point changes every time that you press this key. To select a specific detection point, repeatedly press this key until the display shows the name assigned to the required point.

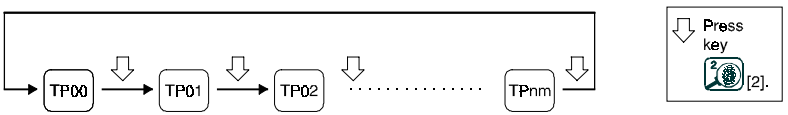

Figure 11.- Rotation of active detection points.

When you select a satellite detection point, the name (four letters maximum) assigned to that point is momentarily displayed.

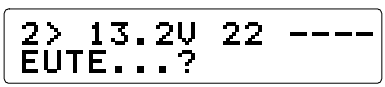

Figure 12.- Initial satellite identification screen.

Afterwards, and if a signal with a valid transport stream is detected in the frequency (or frequencies) assigned to this satellite, then the instrument shows the message 'lock' on the screen and attempts to obtain the orbital position of the satellite to which the antenna is pointing to. When this information is detected, it is shown on the display. Sometimes this may cause a reduction of the identifying text characters number.

If the provider does not use the field corresponding to the orbital position data, '0O' will be shown on the display.

ATTENTION

The signal provider is the exclusive responsible of the orbital position accuracy. PROMAX ELECTRONICA, S.A. only extracts and shows the information contained in the detected signal.

Later, the instrument attempts to obtain the Service Provider, Network and Bouquet. If it is not possible to determine the Service Provider, it attempts to show the Network name. If it cannot determine that too, it will attempt to show the Bouquet. If it still has trouble identifying the signal but detects a valid transport stream, it will show the message "MPEG-2 ... DATA?"

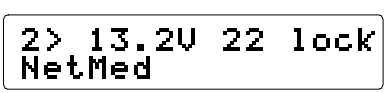

Figure 13.- Identifying a memorised satellite.

You may find that the instrument does not manage to initially determine any of the three parameters and that it shows the message "MPEG-2 ... DATA?", to subsequently obtain one of the previous parameters and alter the on-screen message.

If the instrument does not detect a signal with a valid transport stream, then the 'lock' message does not appear on the screen and it continues to show the name that has been assigned to that satellite detection point (see figure 12).

Signal Quality

The IDENTIFY function also shows the information regarding the signal quality. Now, when a signal with a valid transport stream is detected, the **PRODIG-1+** shows 'lock' on the display and proceeds to measure the BER. Once measured (approximately 5 s later) the 'lock' indication changes to 'BER' if the BER is < 2x10E-4 (equivalent to good quality) or 'ber' if the BER is > 2x10E-4 (equivalent to poor quality). BER measurement will be repeated every 5 s.

The QPSK demodulator circuit tends to measure better as time passes due to the fact that it includes an input signal tracking and adaptation algorithm. Therefore, to ensure a correct signal quality reading, you are recommended to wait until a few measurements have been taken.

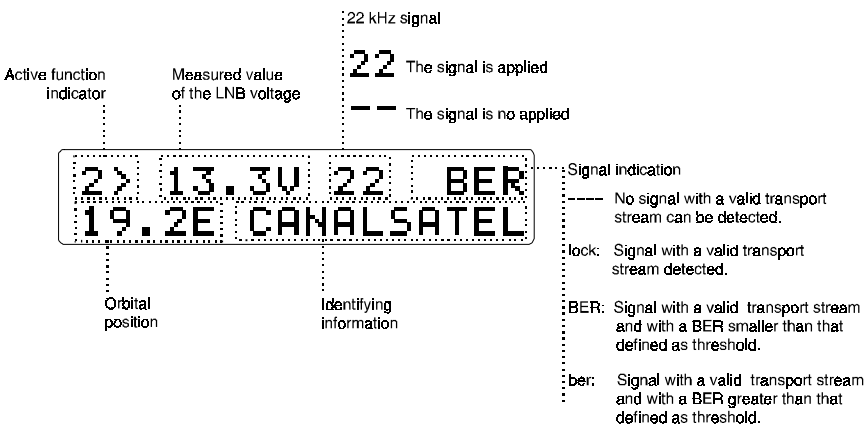

Figure 14.- IDENTIFY function screen.

4.2.3 Antenna Adjustment for Optimum Signal Quality (3> ADJUST)

Once the antenna has been positioned so that it receives maximum power and checked that it is pointing to the right satellite, you should adjust the antenna so that it produces optimum reception quality. Press button [3] to select the 3> ADJUST function. This function measures the signal noise ratio SNR at the digital demodulator output and shows the measured value on the screen both numerically (in dB) and graphically.

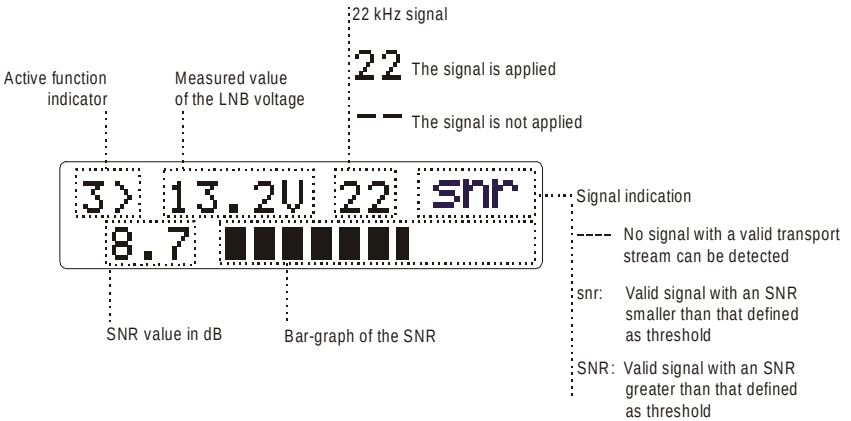

Figure 15.- Measuring SNR.

The top line of the screen shows the measured LNB voltage and whether the 22 kHz are present (see figure 15). It also shows whether a signal with valid transport stream is detected at the frequency (or frequencies) assigned to a specific satellite (in which case 'snr' or 'SNR' appears on screen).

Note: For the final step of precise adjustment and signal quality optimisation, it is important to select the test point where the signal is at its most critical. This guarantees the quality of the other points with more favourable conditions.

If a signal with a valid transport stream presents a signal/noise ratio (SNR) greater than the value internally defined by the instrument as the threshold for a good quality signal, then the screen shows the message 'SNR'. Otherwise, if the value is below this threshold, the screen will show the message 'snr'. The instrument is delivered already configured with a quality threshold of 5 dB. This value corresponds to the DVB recommendation for a CODE RATE = 3/4. Nevertheless, the user can alter this value to adapt it to his own quality specification. (see section '4.3 Instrument Configuration').

If, on moving the antenna, the signal noise ratio value exceeds the quality reference, then the instrument will emit a high-pitched acoustic signal. On the other hand, if the value is below the quality reference then the instrument emits a low-pitched signal.

If you wish to measure the signal/noise ratio for other satellites memorised by the instrument and you know that the antenna is correctly oriented, you can change satellites by pressing key [3] until you have selected the right one.

4.3 Instrument Configuration

The various parameters and information stored in the **PRODIG-1+** may be modified by entering the Service Mode and using the **SH.EXE** PC program. This program is supplied with the instrument (**RM-001**).

The instrument allows you to define the number of measuring points (up to 16), the different parameters for each point (frequency, signal characteristics, LNB voltage, etc.) and the text messages shown on the display, among others.

To enter the Service Mode start up the instrument by simultaneously pressing keys  [1] and  [3].

All the necessary information for configuring the instrument and using the **SH.EXE** configuration and control program can be found in the manual accompanying the program.

To switch off the instrument, as in the normal operating mode, simply press any of the three instrument keys ( [1],  [2] or  [3]) for more than 2 s.

5. MAINTENANCE ⚠

5.1 Replacing the Battery

The battery (CB-075) should be replaced when you notice that its capacity, when fully-charged, has fallen below 60% of its nominal value.

Replace the old battery by another CB-075 battery. The battery can be bought in your habitual PROMAX supplier. Explosion or fire hazard can occur if other battery type is used.

CAUTION

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

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

To replace the battery, please follow the process below:

1. Switch off the instrument.
2. Remove the battery-compartment lid on the rear panel, by extracting the 2 retaining screws.
3. Disconnect the battery cable and the NTC sensor cable from the instrument.
4. Replace the battery with a new one.
5. Connect the battery to connector J6 next to the battery receptacle, as well as the NTC sensor cable to connector J8 (see figure 16). Each connector has only one position.
6. Place and secure the battery compartment lid using the 2 screws.

CAUTION

All the components of the Ni-MH battery included in the CB-075 ensemble are recyclable. Return as soon as possible the used battery to PROMAX ELECTRONICA S.A. or to an authorised recycling centre of this type of batteries. If any doubt, consult directly PROMAX ELECTRONICA,S.A.

Keep them out of the reach of the child.

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

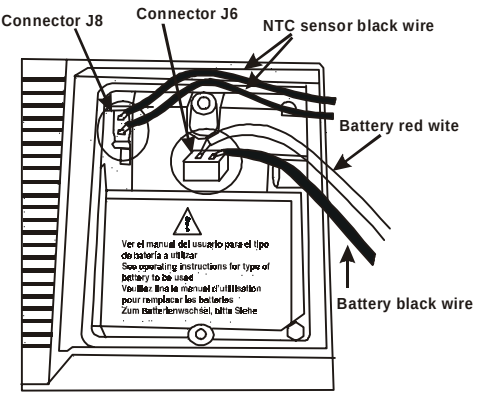

Figure 16.- Battery receptacle.

5.2 Cleaning Recommendations

CAUTION

To clean the cover, take care the instrument is disconnected

CAUTION

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

The cover should be cleaned by means of a light solution of detergent and water applied with a soft cloth.

Dry thoroughly before using the system again.

CAUTION

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