

SPECTRUM MONITOR

MC-277B

1 GENERAL INFORMATION

1.1 Description

The **MC-277B** field level meter is designed to take the required measurements in a collective antenna and/or satellite system. It covers the television, hyperband and FM bands, the cable television S channels, as well as the satellite intermediate frequency in the K/C band, up to 2050 MHz. Therefore, all necessary measurements can be taken in each of the three parts of the system: the antenna, the amplifier system and the distribution system.

The **MC-277B** is equipped with a 20 dB RF attenuator for the satellite band, and one of 10 dB and two of 20 dB for the terrestrial bands, which enables the user to measure signals up to 100 dB μ V in the satellite band and up to 130 dB μ V (3 volt) in the terrestrial band with no need for additional external attenuators. The frequency indication is performed by a digital frequency meter with 10 kHz resolution in terrestrial television and 100 kHz in satellite. The level meter can supply the necessary voltage to power the antenna previous amplifiers and the LNB with 13 or 18 V, as well as with the 22 kHz switching signal, added to the voltage in order to switch the polarization, the band or signal switches.

The meter bandwidth is 180 kHz in terrestrial TV and 27 MHz in satellite TV. This allows the user to measure the chrominance and sound carrier level in a television channel. In the satellite band the measurement calibration maintains, also in the maximum sweeping position.


The main measurement scale is calibrated in dB μ V and is linear in a range of 60 dB, which facilitates the calculation of gains and losses in each element of the system.


The **MC-277B** has two main operation modes: Monitor mode (MON) and Spectrum Analyzer mode (SPEC).


In the spectrum analyzer mode, on the monitor screen appears an electronic scale, with divisions each 5 dB. The vertical continuous lines correspond to 10 dB divisions, which absolute value is shown in the top of the monitor screen. The dotted lines correspond to 5 dB divisions. This operation mode offers us a panoramic presentation of the frequencies (channels) or the interferences present within the selected band and the measurement of absolute and relative levels. The zero span option helps the user to distinguish between frequencies that are very close together.


In the monitor mode the unit demodulates the TV signal which permits to identify and observe the reception of a terrestrial or satellite television channel. In addition, the monitor enables the user to examine the line synchronism pulse, in terrestrial bands, on the upper central screen section, without image displacement. This pulse gives us a valuable information about a possible amplifier saturation. In the monitor mode the signal level is shown by an analogue bar on the top of the screen, which length varies proportionally to the received power. The analogue bar and the synchronism pulse display can be removed from the monitor in order to identify better the tuned channel.

The wide dynamic range on the monitor screen (60 dB) allows us a direct measurement of the video carrier to TV signal subcarriers ratio. A so wide dynamic range allows the user to detect possible interferences just with a glance.

The built-in speaker allows the user to monitor the TV sound and to select the variable tone. When the volume control  is pushed, it activates the TV sound demodulation, there are two possibilities:

- a) With the  TUNING [24], key pushed, in the terrestrial bands the sound corresponds to the internal filter according to the standard; whereas in the satellite bands, the audio tuning margin is between 5 and 8 MHz.

- b) Pulling out the audio tuning key  TUNING [24], a variable audio tuning is selected both in the terrestrial and satellite bands. The tuning margin is between 4.5 and 6.5 MHz for the different terrestrial TV standards, except in the L standard and in version MC-277B/1, TV M/N standard, where this function is not operative.

By pulling out the volume control  it is selected the acoustical signal level indicator: a tone whose frequency varies with the received signal power can be heard. This feature facilitates the peak signal search by eliminating the need for continuous observation of the equipment.

The device is powered by an internal 2.1 Ah, 12 Volt battery, which can power the **MC-277B** for about 1 hour of non-stop operation in terrestrial bands and without previous amplifiers powering.

There is also a battery protection circuit. If the battery charge is very low, the circuit automatically cuts off the device.

A battery test is available to check the current battery charge.

To recharge the battery the meter is equipped with a built-in charger that may be connected directly to the electrical mains supply. It takes from 4 to 8 hours to recharge the battery, depending on the battery charge level, so the recharging periods can easily be rotated with the normal working day. It can also operate when connected to the mains power supply. In this way the battery will recharge up to a 90% of its capacity.

1.2 Specifications

FREQUENCY RANGE

VHF	LOW VHF Band 48.25 to 168.25 MHz HIGH VHF Band 175.25 to 447.25 MHz
UHF	UHF Band 455.25 to 855.25 MHz
SAT	IF Satellite Band 950 to 2050 MHz

INDICATION

Type	Digital frequency meter
Display	LCD, 5 digits
Resolution	10 kHz, VHF and UHF 100 kHz, SAT

INPUT

Impedance	75 Ω
Connector	BNC
Peak signal	130 dB μ V (3.16 V)

MEASUREMENT

Sensitivity	
TV Bands	20 dB μ V to 130 dB μ V (10 μ V - 3.16 V)
SAT Bands	30 dB μ V to 100 dB μ V
Reading	Scale calibrated in dB μ V (linear)
Scale range	60 dB
IF bandwidth	180 kHz (TV) and 27 MHz (SAT)
RF Attenuators	In TV bands: 50 dB in steps of 10 dB and 20 dB In SAT bands: 20 dB

Total accuracy (25 °C ± 5 °C)**TV bands** ± 4 dB (20 dBμV to 130 dBμV)**Satellite band** ± 6 dB (40 dBμV to 100 dBμV)

Using the correction table

Acoustical Indicator A tone whose frequency varies with the received signal level.**SPURIOUS SIGNALS****Maximum input without****Attenuation** (spurious < 20 dBμV)**LOW VHF** 65 dBμV**HIGH VHF** 65 dBμV**UHF** 70 dBμV**SAT** 65 dBμV (spurious < 30 dBμV)**MONITOR** 4.5" Screen**Monitor Mode****Type** B/W. B, G, H and /L norms in accordance with CCIR standards.**VER/1** B/W. M and N/L norms in accordance with CCIR standards.**VER/2** B/W. D, K/L norms in accordance with CCIR standards.**VER/4** B/W. I/L norms in accordance with CCIR standards.**Sensitivity** > 40 dBμV for correct synchronism in TV bands.**Spectrum Analyzer Mode****SPAN** Panoramic presentation of the frequency spectrum around the tuned frequency.**MAX** Spectrum of the entire selected band, with a marker on the tuned frequency.**Monitor controls** Brightness and contrast**Power to LNB** 0/13/18V / 350 mA. Indicator of consumption higher than 50 mA and short circuit and 50 VAC protection.**22 kHz** ON/OFF. Selectable switching signal.

TV bands power To power antenna amplifiers. 0/13/18 V, 350 mA. The same as the LNB power supply.

SOUND

Demodulation

TV

Monaural, tuning between 5 and 8 MHz in satellite bands, and between 4.5 and 6.5 MHz or according to norm in terrestrial bands, except for the L and M/N standards.

Level indication

Acoustical tone according to the received signal power.

Output power

0.2 W

Volume control

Built-in speaker

POWER

Battery

Voltage

12 V - 2.6 Ah

Autonomy

>1 hour without external units powering (at 30% stop/start).

40 minutes approximately with external units powering (at 30% stop/start).

Recharging time

About 8 hours (starting from a total discharge).

Safety devices

Low battery indicator

Minimum charge automatic cut-off.

Mains supply

Voltage

AC 110-125-220-230/240 V \pm 10% 50-60 Hz with voltage selector.

Consumption

55 W

OPERATING ENVIRONMENT CONDITIONS

Max. altitude

2000 m

Temperature range

From 5 °C to 40 °C

Max. relative humidity

80% (up to 31 °C)

decreasing lineally up to 50% at 40 °C

MECHANICAL FEATURES

Dimensions	W. 280 x H. 95 x D. 250 mm (without case)
Weight	4.8 Kg (battery included)

ACCESSORIES INCLUDED

P/N	Description
90900015	BNC/M-ANT/F IEC adaptor - BNC/TV
90900051	BNC/M- "F"/F adaptor --- AD-051
90903236	Carrying case DC-236
90901105	Power cable CA-005
90909139	12 V, 2.6 Ah rechargeable battery CB-041 1 spare fuse 3.15A T 250 V IEC 127

OPTIONAL ACCESSORIES

P/N	Description
90900052	BNC-TV Adaptor AD-052
90900011	75 Ω (BNC) / 300 Ω (TV) Adaptor MC75/300
90900030	Dipole Antenna AMC/1
90900091	5-50 MHz Converter CV-550
90900050	20 dB Attenuator AT-20 MS
90900078	20 dB Amplifier LN-370B
90900090	Noise Generator NG-282
90900071	20 dB Low Noise Generator LN-370

OPTIONS

OPT-10	dBmV scale
OPT-277/63	Extension to 2100 MHz in satellite band.

2 SAFETY RULES



2.1 General safety rules

- * Use this equipment connected **only to devices or systems with their common at 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 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.

- * **Do not obstruct the ventilation system**

- * 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 PROTECTED (Class II Protection)
	CAUTION (Risk of electric shock)
	CAUTION REFER TO ACCOMPANYING DOCUMENTS
	FUSE

2.2 Specific safety rules

If the instrument is powered by the electrical mains supply it is suitable to be out of its carrying case.

3 INSTALLATION



The **MC-277B** field level 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 during the installation of the antenna.

3.1 Operating on the electrical mains supply

Although the device was 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 start switch **I/O** [5]. The field meter is now in operation and the battery will recharge slowly.

3.2 Selecting the mains operating voltage



This equipment requires a mains power source of 110-125-220 or 230/240 V AC 50 to 60 Hz. Mains operating voltage can be selected at the mains base.

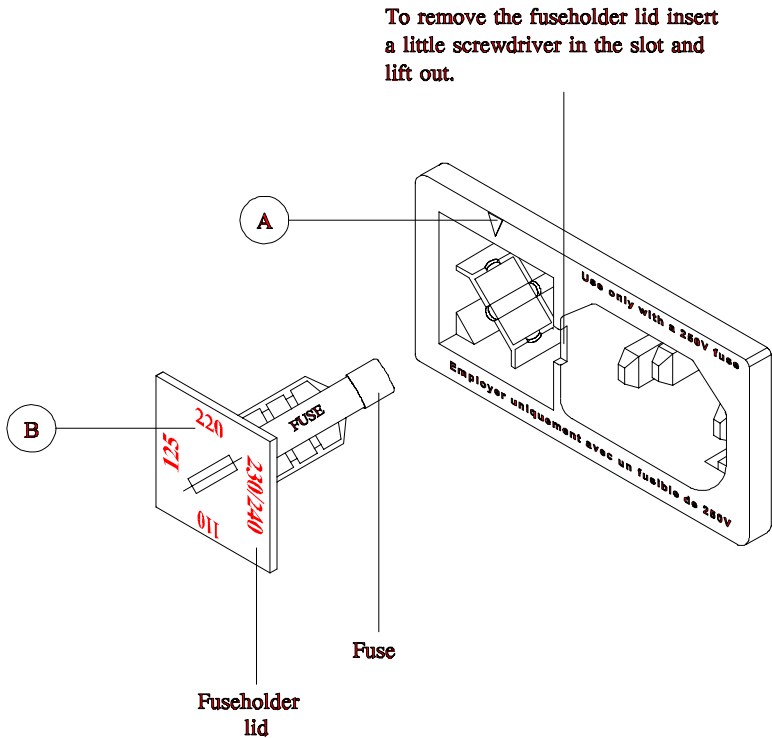


Figure 1.- Selection of mains voltage.

- 1.- Pull out the fuseholder lid.
- 2.- Insert the fuseholder lid so the [A] pointer faces the desired mains voltage display [B].

CAUTION:
THE EQUIPMENT IS FACTORY SET FOR 220 V OPERATING VOLTAGE.

BEFORE SWITCHING ON THIS INSTRUMENT, SET THE VOLTAGE SELECTOR TO THE PROPER POSITION AND BE SURE THAT THE FUSE VALUE IS ACCORDING TO THE MAINS VOLTAGE.

FUSE TYPE SHOULD BE 5 x 20 mm., 250 V AND:

2 A	T	FOR 220, 230/240 V
3.15 A	T	FOR 110 AND 125 V

AVOIDING THIS DIRECTIONS COULD DAMAGE THE EQUIPMENT

3.3 Operating on the battery

The **MC-277B** is a portable device powered by a 12 volt internal battery. Before taking any measurements, the battery charge must be checked. If the battery is low (a voltage lower than 11.2 V) two points (:) will appear blinking on the display of the frequency meter.

For the device to operate on the battery, disconnect the power cable and press the start switch **I/O** [3]. The fully charged battery can power the equipment for one hour non-stop in TV mode. When the low battery indicator appears, the battery must be recharged immediately.

If the battery is very low, the cut-off circuit will prevent the device from functioning. In such a situation the battery must be recharged immediately.

3.4 Recharging the battery

To recharge the battery, connect the device to the mains supply without pressing the start switch **I/O** [3]. The length of time it takes to recharge depends on the condition of the battery. If it is very low (the low battery message appears) recharging period is 7-8 hours. The indicator light **LINE** [16] should remain lit.

IMPORTANT

The battery charge must always exceed the minimum cut-off charge.

To ensure the best results, the lead battery in this device must always be fully charged. If the equipment has been in storage or 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 20 °C, the battery suffers a 50% loss after 16 months and at 40 °C it loses the same charge in only 5 months (these are reference data). If the battery remains very low for a period of 4 weeks or more, it will not accept recharging since the plates are sulphated and must be replaced.

4 OPERATING INSTRUCTIONS

4.1 Description of the Controls and Elements

Front Panel

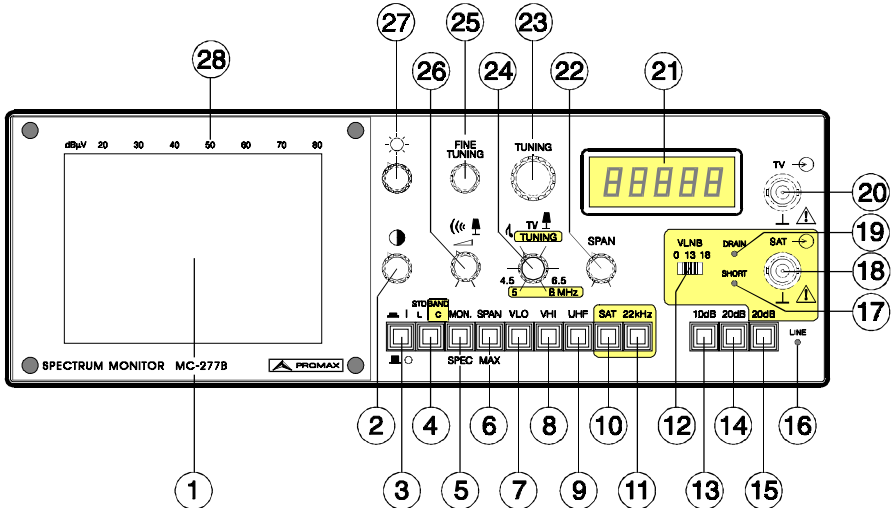



Figure 2.- Front Panel.

- [1] **SCREEN**
Monitor cathode ray tube
- [2] 
Control of the CRT contrast
- [3] **I/O**
Turn on and turn off key
- [4] **STD L / BAND C**
Double function key depending on the active band.
In terrestrial bands. With the key pushed in, it selects the "L" system. With the key pushed out it selects **B/G, I** and **D/K** systems.

In satellite band. With the key pushed in it selects the inverted video for the **C BAND**. With key pushed out it selects the normal video for the **K BAND**.

[5] **MON/SPEC**

Operation mode selector: Monitor (pushed in) or Frequency Spectrum Analyzer (pulled out). In Monitor mode shows on the **SCREEN** [1] the demodulated TV signal while in Frequency Spectrum Analyzer mode it shows a figure showing the different signals within the sweep and the selected band.

[6] **SPAN/MAX**

Changes the frequency sweep between the expanded and the entire band. Only operative in SPEC mode.

[7] **VLO**

Selects the **LOW VHF** band

[8] **VHI**

Selects the **HIGH VHF** band

[9] **UHF**

Selects the **UHF** band

[10] **SAT**

Selects the IF satellite band

[11] **22 kHz**

Activates the 22 kHz switching signal added to the LNB supply voltage.

[12] **0/13/18 V**

Selects the voltage supplied to the LNB


[13] **10 dB**

Selects 10 dB attenuation in the terrestrial bands

- [14] **20 dB**
Selects 20 dB attenuation in the terrestrial bands
- [15] **20 dB**
Selects 20 dB attenuation in the terrestrial and satellite bands
- When controls [13], [14] and [15] are selected simultaneously, the RF attenuation is 50 dB in terrestrial bands.
- [16] **LINE**
Light indicator. Indicates whether the instrument is connected to the mains.
- [17] **SHORT**
LNB over consumption or short circuit indicator
- [18] **SAT**
Satellite IF RF input. The LNB is powered through this connector (0/13/18 V + 22 kHz).
- [19] **DRAIN**
Indicates the LNB normal consumption
- [20] **TV**
RF signal input in terrestrial bands and antenna previous amplifier supply (0/13/18 V). **Maximum input level 130 dB μ V**
- [21] **Frequency meter display**
Five digits display for the digital presentation of the tuned frequency (in **MHz**). In SPEC - MAX the digital presentation of the frequency is deactivated.
- [22] **SPAN**
Controls the amplitude of the frequency sweep

[23] **TUNING**


Tuning potentiometer

[24]  **TUNING**


Allows to monitor the TV sound. When pulled out the tuning is variable between **4.5** and **6.5 MHz**, except for the **L** and **M/N** terrestrial TV standards. Pushed in, in terrestrial bands the sound corresponds to the internal filter whereas in satellite bands the tuning range is between **5** and **8 MHz**.

[25] **FINE TUNING**

Allows a fine tuning adjustment

[26] 

Audio volume control. When pulled out, the variable-tone acoustical indicator is selected and in monitor mode eliminates the level bar and the synchronism pulse. When pushed in, it selects the TV sound demodulation.

[27] 

Control of the CRT brightness

[28] **dB μ V scale or dBmV scale for OPT-10 option**

Allows to measure the signal level.

Lateral

[29] Power supply input for voltages of 110-125-220-230/240 V, 50-60 Hz with voltage selector and fuse.

4.2 Using the Field Level Meter

4.2.1 Start-up

Press the **I/O** [3] key. In the frequency meter display [21] will appear the tuned frequency in MHz, unless the unit is the Spectrum Analyzer mode and with the MAX function selected.

4.2.2 Operation

Select the desired frequency band with the **VLO** [7], **VHI** [8], **UHF** [9] and **SAT** [10] keys.

In terrestrial bands, if necessary, supply the antenna previous amplifiers by means of the [12] **0/13/18V** selector.

In satellite band, if necessary, supply the LNB by means of the [12] **0/13/18V** selector and the [11] **22 kHz** key, in order to switch from low band to high band in case of universal LNB or well to switch the LNB if we have a relay for this purpose.

Tune the desired frequency using the **TUNING** [23] control.

To facilitate tuning, principally in UHF, use also the **FINE TUNING** [25] control.

Using the **10 dB** [13], **20 dB** [14] and **20 dB** [15] controls, select the desired attenuation of the signal to be measured.

Using the **MON/SPEC** [5] key, select the desired operation mode

In the Monitor operation mode, in the upper part of the screen appears an horizontal bar which length corresponds to the tuned signal level approximately. In the terrestrial bands, under the level bar, on the upper central TV image, appears the line synchronism pulse which gives a valuable information about a possible amplifiers saturation. Figure 3 shows the different types of information in monitor mode:

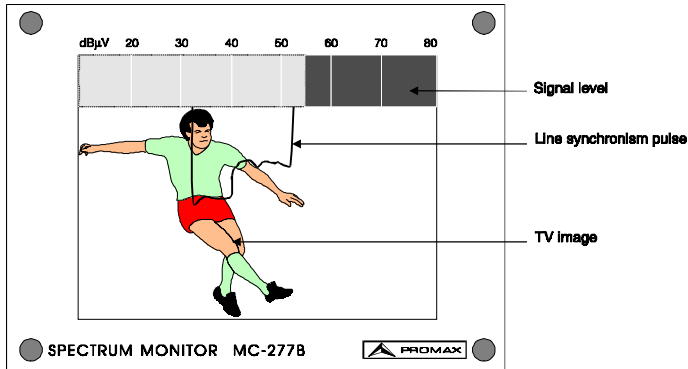


Figure 3.- Monitor operation mode.

To observe and identify better the tuned channel, it is possible to eliminate the level bar and the synchronism pulse by pulling out the control \triangleleft [26].

Following point explains the spectrum analyzer operation mode.

Adjust the brightness and contrast of the CRT screen with the \odot [27] and \bullet [2] controls.

Adjust the sound volume with the \triangleleft [26] control.

4.2.3 Operation as a Spectrum Analyzer

The spectrum analyzer function offers a quick, convenient way to discover the signals present in each band of a zone or region. To select this operation mode pull out the **SPEC** [5] control.

Vertical continuous and dotted lines appear on the monitor screen, and form an electronic reticulum which divisions correspond to 10 and 5 dB respectively, in accordance with the scale [28] in the top of the monitor screen [1]. Also a vertical base bar appears on the left side of the monitor screen and lobes representing the signals extend horizontally, with the highest frequencies in the upper section of the screen and the lower frequencies in the lower section. The distance respect to the base bar, or lobe amplitude, represents its power, and its value can be read with the electronic reticulum. A signal in terrestrial bands with a level below 20 dB μ V will not appear in the spectrum, and a signal with a level higher than 80 dB μ V will be presented with a maximum amplitude, near the right edge of the screen.

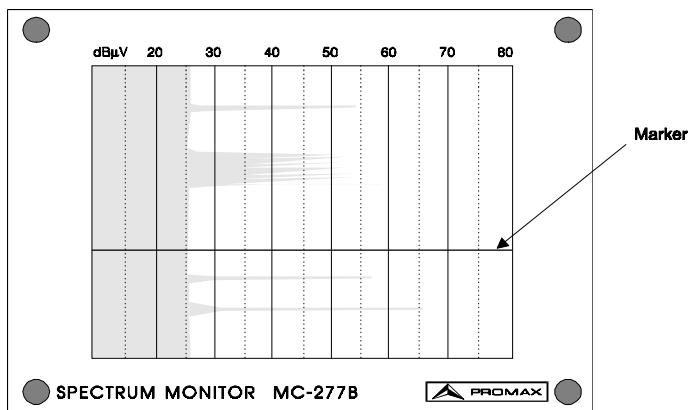


Figure 4.- Spectrum analyzer operation mode. Function MAX.

When several channels with amplitudes of about 75-80 dB μ V are present at the input, to avoid saturation the RF attenuators must be used in order to eliminate possible errors in the measure.

The frequency spectrum analysis may be done in the entire band selected, function MAX, with the **SPAN/MAX** [6] control pulled out, or in the proximity of the present tuned frequency, variable SPAN function, with the **SPAN/MAX** [6] control pushed in and using the **SPAN** [22] control.

When selecting the function MAX (**SPAN/MAX** [6] key pulled out) a white horizontal line (marker) representing the present tuning frequency appears on the screen. As the user moves the **TUNING** control [23], the marker will move through the entire spectrum, allowing an approximate pre-tuning of the frequency which corresponds to the lobe that coincides with the marker. When working with this function (MAX) the presentation of the tuned frequency through the frequency meter [21] remains deactivated.

The variable SPAN function is selected by pushing the **SPAN/MAX** [6] key. The frequency spectrum analysis is conducted in the proximity of the tuning frequency. The range controlled by the **SPAN** [22] control varies from about 1/3 of the band to zero SPAN.

By choosing a specific span and varying the tuning with the **TUNING** [23] control, the user can slowly sweep the entire band of the selected frequencies. The frequency meter will indicate the approximate tuned frequency. The accuracy depends on the SPAN range; it will be exact at zero SPAN.

One of the applications of the **MC-277B** functioning as a spectrum analyzer is to search for the best direction and location of the receiving antenna for terrestrial TV and mainly in satellite band.

In the satellite band, the equipment is very useful to obtain the best location and direction of the receiving antenna, because with the **MC-277B** is possible to detect a satellite signal although the received signal is lower than the minimum necessary to obtain an image.

It is essential for the exact mechanical adjust of the LNB, adjusting it to obtain the peak rate between the Horizontal/Vertical polarities.

4.3 Measurement

The first step in installing a collective antenna system is to measure the field intensity value in the place where the antenna is to be installed. This value can be calculated by using an antenna with established characteristics.

PROMAX can supply an AMC/1 reference antenna which can be used to measure the existing field value in the area and thus determine the most appropriate type of antenna and the best location for its installation.

Follow the procedure explained below to measure the value of the signal received:

- Push the start/stop control **I/O** [3]. If the battery is low, two decimal points (:) will blink on the frequency meter display [21].
- Push the key corresponding to the band of the channel in which measurement is to be taken: **VLO** [7], **VHI** [8], **VHF** [9] or **SAT** [10].
- Select the Monitor operation mode (**MON/SPEC** [5] key). With the aid of the [21] frequency meter display, search the frequency of the desired channel. Once the correct channel is tuned, switch to Spectrum Analyzer mode by pulling out the **MON/SPEC** [5] key.
- Read the signal level on the display (20-80 dB μ V). If it is very near to 80 dB μ V or surpasses this value, the signal must be attenuated through the RF attenuators:

On terrestrial bands the [13] **10 dB**, [14] **20 dB** and [15] **20 dB** attenuation keys must be pressed in order to obtain the signal level into the scale. The total attenuation is the addition of the keys pressed.

On the satellite band the [15] **20 dB** attenuation key must be pressed.

- Signal level is calculated as follows:

dB μ V level = reading (dB μ V) + RF (dB) attenuator value (if it is necessary) + correction chart value (dB).

Correction value (dB) depends on the measure frequency and it is read in the correction chart that is enclosed to each field level meter.

- The level readout for a well-tuned signal (searching the maximum value with **FINE TUNING** [25] control) must always be inside the scale range. Otherwise there is the risk to saturate the tuner and give a poor picture quality, losing the correct synchronism level amplitude (except in the standard L, where saturation shows up as white level), with failure of the line and frame synchronism, distorting the sound to the image.
- To measure signals which are not video carriers (sound carriers and radio signals) Monitor operation mode should not be used. It is necessary to use the spectrum mode and the SPAN function.
- The MAX function (entire band) must not be used to carry out precise measurements. **The maximum precision is obtained with the SPAN near to zero and the measure must be done on the frame lobe pulse. In the L standard, the signal level measurement will be performed on the maximum amplitude in spectrum mode, which corresponds to the white video level.**
- In Monitor mode, the level bar is a useful tool to find the best tuning (which corresponds to the maximum level) although the level reading has not the exactitude obtained in the SPAN mode.

5 MAINTENANCE



5.1 Replacing the fuses

5.1.1 Replacing the mains fuse

The fuseholder lid is placed in the mains base (see figure 1) and it is the voltage selector.

To substitute the fuse, disconnect the power cord.

With an appropriate screw driver remove the fuseholder lid.

Substitute the melt fuse for another with following characteristics:

250 V, T, 5x20 mm AND:

2 A	FOR 220, 230/240 V
3.15 A	FOR 110 AND 115 V

When inserting the fuseholder lid be careful that the voltage selector is in the correct position according to the mains.

5.1.2 Internal fuses which user cannot replace

Following fuses are in the main board of the equipment. Its position identifier and its characteristics are the following:

F1	5 A	F 63 V SMD
F2	400 mA	F 63 V SMD

5.2 Replacing the battery

The average life of the battery is 4 years. It must be replaced when the capacity of the fully-charged battery is appreciably reduced. To change the battery follow this procedure:

- Turn off the instrument and disconnect the power cord.
- Remove the attachment screws from the top and lower covers. Remove the covers.
- * Disconnect battery terminals.
- Remove the screws which fix the battery attachment flange.
- Remove the antiacid protector and replace the battery by a new one. Be very careful with its position to avoid a polarity inversion.
- * Replace the antiacid protector and the battery attachment screws.
- * Connect the battery.
- Finally, put back the covers and attach them with the screws.

VERY IMPORTANT



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

5.3 Cleaning recommendations

CAUTION

TO CLEAN THE COVER, TAKE CARE THE INSTRUMENT IS

CAUTION

DO NOT USE SCENTED HYDROCARBONS OR CHLORIZED SOLVENTS. SUCH PRODUCTS MAY ATTACK THE PLASTICS

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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