

OPERATOR'S MANUAL

**Model LM27P5
27 Band 1/3 Octave RTA**

OPERATORS MANUAL MODEL LM27P5

GENERAL:

The Gold Line model LM27P5 is a complete audio spectrum analysis system contained in a single rack space. It is capable of displaying the quality of any audio system instant by instant as if it were a bank of peak reading VU meters with a separate meter for each 1/3 octave.

Pink Noise: The LM27P5 features an internal Pink Noise Generator which turns on when the unit is turned on. Access is via a ¼" phone jack on the rear panel. Pink noise is a sound that has equal amount of energy per octave of bandwidth and sounds like an ocean roar. By inputting pink noise to the sound system you are certain that the system is receiving a "flat" signal source and therefore any readings that are not flat are a product of the system or the room. Pink noise is the basic reference for all measurements and adjustments of the system. Pink noise normally is flat to ± 2 dB with random waves that are higher or lower.

The Microphone: A calibrated microphone (Model MK8A) is included with the LM27P5 and can be used with any length of standard shielded microphone cable. This electret microphone is internally equalized to be flat to ± 1 dB from 20Hz - 20kHz. The microphone circuitry is phantom powered through the XLR connector on the front panel of the LM27P5.

The Display: The display consists of 27 columns 5 LEDs high (a full 135 LEDs). In order to make the display more visible from a distance, the display is in three colors. The bottom two rows of LEDs are green, the 0dB reference row is yellow and the top two rows are red. In either the 3dB/row or the 6dB/row range, when frequencies do not light they are below the range of the window, and it will be necessary to raise the sensitivity by adjusting the reference control until several frequencies appear. An over-range condition is indicated by lighting all 5 LEDs in one column at the same time.

The Controls:

Range Switch: A range selector is available on the front panel allowing selection of either 3dB/row or 6dB/row. The 6dB range offers a 21dB window with 5 turn on thresholds indicated to the right of the display window. The thresholds are: -12, -6, 0, +6, and +9dB. The 6dB range is designed to let you see the big picture. You can pink noise the room and see those frequencies that are much too high and those that are too low. This range is ideal for finding feedback.

The 3dB Range offers a 12dB window with 5 turn on thresholds indicated to the left of the display window. The thresholds are: -6, -3, 0, +3, +6dB. This range is ideal for fine frequency adjustment. When used in conjunction with pink noise some LEDs will light above and below the 0dB reference line. This is due to the random nature of pink noise and is normal. Most room equalization will be done in the 6dB range and fine tuned in the 3dB range.

Input Sensitivity: The input sensitivity of the LM27P5 is controlled by a reference level potentiometer on the front panel. When the sensitivity is set at maximum (turned fully clockwise), the 0dB reference line is at 55dB. With the sensitivity at minimum the 0dB reference line is at about 129dB. When adjusting the reference level try to set the level for the approximate level where the system will be used.

The Line Input: The LM27P5 has a ¼" line input jack on the front panel. A handy system check can be made by patching the output from the pink noise generator into the line input. Set the analyzer for SLOW decay and set the range switch to the 6dB mode. Adjust the reference level to bring the signal to the 0dB reference line. A flat display indicates that both the analyzer and the pink noise generator are operating properly.

Decay Time: The decay time selector switch is located on the rear panel. You can select either FAST or SLOW decay. The response to a sudden increase in level is called the attack time which is very fast in both FAST or SLOW mode. When monitoring music or speech and you want to see the rapid level

changes, use FAST. When using pink noise, SLOW should be used to provide a more stable display on the analyzer.

TO ELIMINATE FEEDBACK:

Gold Line real time audio analyzers are the most effective way to prevent feedback.

1. Feed pink noise into the line input of the system and set the volume for a moderate level from the speakers.
2. Turn up the gain on the main microphone input until feedback starts.
3. With the analyzer, look for one band to be peaking above the others. Increase the sound level if necessary.
4. Adjust the equalizer to put in just enough cut in that band to stop the feedback. Set a parametric equalizer to minimum bandwidth.
5. Continue to increase volume and cut where indicated.
6. When feedback occurs in 3 or more bands the practical limit of feedback control with the minimum effect on the overall sound has been reached.
7. Open other microphones that will be on at the same time and change settings as needed for best performance.
8. As a final adjustment, performers should stand at the microphones in their normal positions, the proximity can cause some changes in feedback modes.

GENERAL PROCEDURES FOR EQUALIZATION:

1. Turn off the sound system before making connections, and put all controls to flat. Set volume to zero.
2. Connect the pink noise source to a line level input for one channel only. Turn on the system.
3. Advance the volume to a moderate level loud enough to overcome ambient noise. Do not overdrive.
4. Set the LM27P5 to SLOW decay and with low sensitivity.
5. Place the microphone in the center of the listening area.
6. Set the RANGE to 6dB and adjust the SENSITIVITY of the LM27P5 to put the majority of the response curve near 0dB reference. Make sure the microphone is pointed at the speaker. Record the levels.
7. In the lower frequencies there can be great deviations from flat caused by speaker and room characteristics. Usually it is impossible to make changes in room shape and size but speaker positions can be changed.
8. If inside, try different speaker positions along and up and down the back wall. Also try varying distances from the wall. Each response can be store in memory for later comparison. Move the microphone around the room to see where differences occur.
9. The high frequency response of the system will be greatly effected by the speaker's angular position; how it is pointed relative to the room. Make adjustments for maximum output in the highest frequencies.
10. After making changes, move around the room while observing the analyzer's display taking note of changes in response.
11. Adjust the system's equalizers, tone and tweeter controls, etc., to obtain the flattest response. Do not try to boost out deep notches which might be caused by poor crossover. To much boost can overdrive the entire system.
Use cut to reduce problem areas. Try to use tone controls or other broad shelving type EQs to reduce the extent of narrow-band EQ.
12. Recheck the system response with the analyzer and trim adjustments for the best compromises over all bands.
13. Repeat the above steps for other channels.
14. With channels equally driven, touch up low frequency EQ for flat response in the listening area up to 250Hz.
15. The liveliness of a room will have an effect primarily in the medium/high frequency areas. Rugs, furniture, drapes and people absorb sound which could cause a need to boost medium/high frequencies.
16. **CAUTION- DO NOT** use extreme amounts of bass boost with small speakers. They could be destroyed. Try to find the best speaker to wall distance to minimize the need for boost.

SPECIFICATIONS

MEASUREMENT RANGE: Microphone input: 55dB - 129dB SPL
Line input: -65dBm to +9 dBm
(0.44mV to 2.18V rms)

INPUTS: Microphone: XLR 3 pin receptacle.
Line: Unbalanced ¼" phone jack. 10kΩ impedance

OUTPUTS: Pink noise: ¼" unbalanced phone jack.

MICROPHONE: 600Ω omnidirectional electret condenser; Model MK8A.

CENTER FREQUENCIES: ISO 1/3 octave between 40Hz - 16kHz

CENTER FREQUENCY ACCURACY: Typically ±1%

RELATIVE FLATNESS CHANNEL TO CHANNEL: ±1.0dB

FILTERS: ANSI Class II

DISPLAY: 27 Channel, 12dB window in 3dB steps.
21dB window in 6dB steps.

RANGE SWITCH: 2 Position, 3dB or 6dB per row.

INPUT SENSITIVITY/GAIN CONTROL: Variable potentiometer.

WEIGHTING: IEC Flat.

DECAY RATE @ 500Hz: SLOW 2.2dB/s, FAST 18dB/s.

PINK NOISE: Continuous, 20Hz-20kHz @ 85-87dB ref, 100dB SPL, 77mV

POWER REQUIREMENTS: 115Vac or 220Vac.

SIZE (W x H x D); WEIGHT: 19" x 1-3/4" x 8½"; 3 lbs.

CASE MATERIAL: Painted Aluminum.

Notes:

WARRANTY and Factory Service

GOLD LINE products are proudly made in the USA and are covered by a one year limited warranty. For details of this warranty, consult the enclosed warranty registration card or your local dealer.

GOLD LINE Customer Service will help you get the most from your new analyzer. For answers to questions regarding use of the unit, or for information not covered in this manual, please write us. If you are experiencing difficulties with your analyzer, please consult your dealer regarding factory service. If factory service is needed, you may call or fax us between 9:00am and 4:30pm US Eastern Time for instructions and a return authorization.

Enter your serial# _____ date of purchase _____



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