

# 5.1 Audio Toolkit

## **Title 4**

### **Gold Line Information**



**Chapter 1: Introduction**

**Chapter 2: Sound Level Meters**

**Chapter 3: Real Time Analyzers**

**Chapter 4: Equalizers**

**Chapter 5: Test Signal Generators**

**Chapter 6: Miscellaneous Test Devices**

**Chapter 7: Microphones and Accessories**

**Chapter 8: Test Kits**

**Chapter 9: TEF Audio Analyzers**

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## **Gold Line Information**

### **Chapter 1: Introduction**

Gold Line is a Manufacturer of high value Professional Audio Test and Analysis Equipment, CB Radio, Marine Electronics & Amateur Radio Accessory Equipment.

Proudly made in the USA, Gold Line products cover the full spectrum of audio calibration products and measurement tools. In addition to sound level meters and signal generators, Gold Line also offers Spectrum analyzers (TEF and RTA), precision test microphones, digital equalizers, and many more.

The following information shows Gold Line products that are directly relevant to the user of this 5.1 Audio Toolkit DVD. Please consult the website [www.gold-line.com](http://www.gold-line.com) or contact Gold Line at the address below for further information.

- Chapter 1: Introduction**
- Chapter 2: Sound Level Meters**
- Chapter 3: Real Time Analyzers**
- Chapter 4: Equalizers**
- Chapter 5: Test Signal Generators**
- Chapter 6: Miscellaneous Test Devices**
- Chapter 7: Microphones and Accessories**
- Chapter 8: Test Kits**
- Chapter 9: TEF Audio Analyzers**

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# Title 4

## Gold Line Information

### Chapter 2: Sound Level Meters

#### **SPL120/120L/162**

Hand Held Sound Pressure Level Meter.

Gold Line Sound Pressure Level Meters are precision instruments designed to measure continuous sound. They feature a digital numeric display which can easily be read from a distance. Sound level readings are based on ANSI S1.4 published standards.

Sound level readings can be weighted in either Flat, IECA or C mode. The SPL120 is designed for general field use such as sound system calibration or measurements of levels produced by environmental and industrial noise.



#### **SPL120/120L/162 Basic specifications**

##### **MEASUREMENT RANGE:**

- **SPL120 - Mic Input :** 47dB - 123dB SPL
- **SPL120L - Mic Input :** 35dB - 123dB SPL
- **SPL162 - Mic Input:** 100dB - 162dB SPL
- **SPL120/120L - Line Input:** -70dBm - +5dBm
- **SPL162 - Line Input:** -60dBm - +10dBm

##### **INPUTS:**

- **SPL120/162 - Microphone:** Built-in omnidirectional electret condenser.
- **SPL120L - Microphone:** Detachable 600 ohm omnidirectional electret condenser. Model MK8.
- **SPL120/120L/162 - Line:** Unbalanced 3.5mm jack. 10kohm impedance.

##### **DISPLAY (SPL):**

- 3 digit via 7 segment display.

##### **RANGE SWITCH:**

- SPL for normal response; HI SPL to capture highest SPL measured.

##### **WEIGHTING:**

- IEC A, C and FLAT.

##### **TIME WEIGHTING:**

- RMS Fast.

##### **ATTACK TIME:**

- 0.15s

##### **POWER REQUIREMENTS:**

- Batteries - Eight AA alkaline or nicad.
- External - 12Vdc @ 240mA via 2.5mm jack

##### **SIZE (W x H x D); WEIGHT:**

- 3¼" x 8" x 2¼"; 12 oz.

**CASE MATERIAL:** • High impact ABS.

# Title 4

## Gold Line Information

### Chapter 3: Real Time Analyzers

#### DSP30 / DSP30A

The DSP30 is a portable analyzer that combines the power of digital processing with a wide 85dB dynamic window, precise filters, resolution to 1/4dB, a computer interface, and a long list of expansion functions. The DSP30 inputs are XLR microphone and 1/4 inch line level, and it is supplied with an MK8A electret condenser measurement microphone.



#### DSP30 Main features:

- Portable 30 channel **digital** 1/3 Octave Analyzer.
- DSP30 microphone measurement range is 31dB to 123dB.
- DSP30A microphone measurement range is 65dB to 160dB.
- Captures full 85dB window with scales from 1/4 to 5dB.
- Filters **exceed** ANSI specs.
- Comes with RS232 computer interface.
- Automatic Sum & Average function to normalize readings and stabilize pink noise.
- 6 active memories expandable to 30 with available EEPROM.
- IEC Flat, A, C or User designated curves.
- A Sum mode to sum and average response curves.
- A Subtract mode to subtract one memory from another.
- Keypad selectable filters: ANSI triple tuned or sharper for notching applications.
- Scales from 1/4dB to 5dB.
- Multiple plot function.
- Export file function.
- Available in **Rack Mount** (DSP30RM) and **Computer Interface Only** (DSPCIW) models.
- **All** DSP series units can be interfaced with a computer using the RS232 port and available software

#### Optional Expansion Features for the DSP series

- [OPT PRT](#) - Parallel printer port
- [OPT NVM](#) - Non-volatile memory (30)
- [OPT 106](#) - 1/6th octave resolution
- [OPT 112](#) - 1/12th octave resolution
- [OPT DAS](#) - Distortion analysis
- [OPT DOSE](#) - Dosimeter measurements for OSHA compliance
- [OPT IMP](#) - Impedance measurements
- [OPT NC](#) - Noise Criteria measurements
- [OPT OVL](#) - Compare captured curve with active screen
- [OPT RT60](#) - RT60 analysis
- [OPT STA](#) - Speaker timing analysis

## DSP30RM



The DSP30RM is a rack mount version of the DSP30 series. It shares all the same features as the DSP30 portable unit and fits standard 19" rack space.

## DSPCIW

The DSPCIW “Black Box” is a computer driven version of the DSP30 portable analyzer. It does not incorporate an LED display, and is therefore more compact. It is ideal if you plan to have a PC laptop computer

### Main features:

- Identical performance and functions to the DSP30
- Uses the power of your IBM compatible computer
- Windows software included
- Rack mount adapters available.



Computer not included.

# Title 4

## Gold Line Information

### Chapter 4: Equalizers

#### EQ2™ Digital Parametric Equalizer with Digital Delay



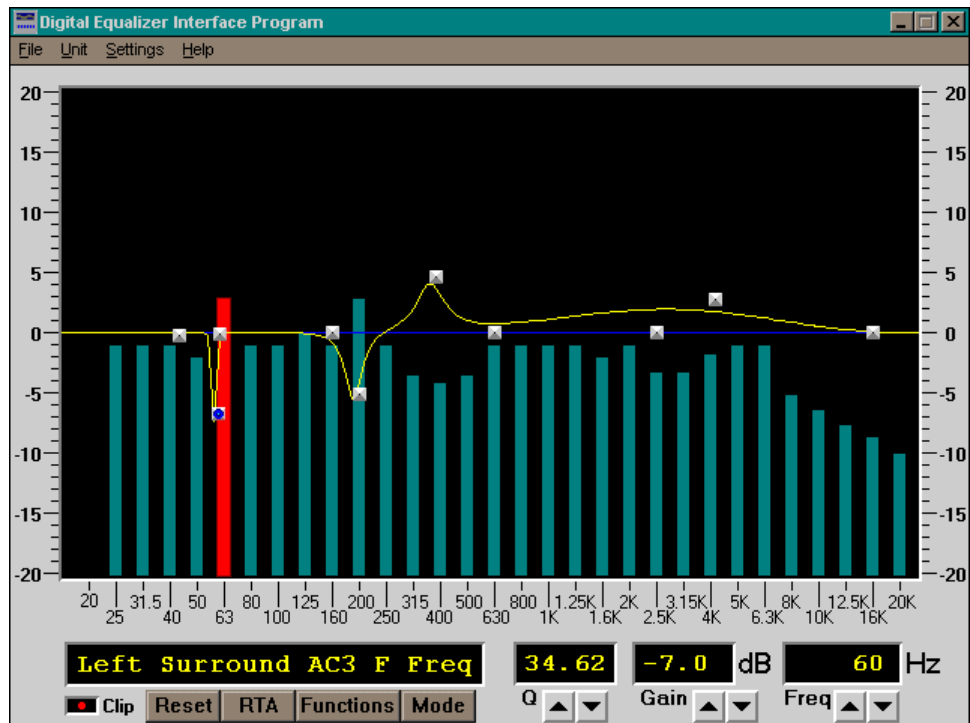
The **EQ2™** is a two channel digital equalizer for high-end consumer and professional audio applications. Providing 10 bands of parametric filters per channel, high pass and low pass filters, shelving filters and two discrete delay lines, the unit is suited for correction of acoustical problems in all size rooms. Multiple EQ2 equalizers can be programmed from a single computer via an included RS232 serial port. After programming the user may select preset curves via a faceplate mounted push button. The unit is provided with either XLR balanced inputs and outputs, or with gold plated RCA connectors.

Programming of the EQ2 is via PC computer serial interface, thus eliminating user errors after calibration. The PC interface can simultaneously display the EQ2 settings and the DSP30 response charts for faster calibration.

##### Main Features

- Powerful Digital “DSP” Filters
- Easy to Use Windows Interface
- 2 Delay Lines with up to 170msec of delay per channel
- Selectable Low Pass and High Pass Filters
- Selectable Shelving Filters
- Non-Volatile Memories & Settings
- Metered Input and Output Level Controls
- Simultaneous EQ2 and DSP30 Real Time Analyzer Control Display

- Affordable



Screen shot of Windows display showing simultaneous DSP30 RTA and EQ2 settings



# Title 4

## Gold Line Information

### Chapter 5: Test Signal Generators

#### PN2 Pink Noise Generator

Pink Noise Generator providing continuous pink noise. Pink noise has an equal amount of energy per octave of bandwidth and is an excellent test signal for sound system debugging and calibration.

**OUTPUT:** Unbalanced ¼" jack, impedance 620 ohms

**OUTPUT LEVEL:** Continuous @ 83dB - 85dB ref; 97dB SPL, 55mV

**FREQUENCY RANGE:** 20Hz - 20kHz

**POWER REQUIREMENTS:** 9V battery

**SIZE (W x H x D); WEIGHT:** 1.75" x 2.75" x 1.75"; 2 oz

**CASE MATERIAL:** High impact ABS; **FRONT PANEL:** Anodized Aluminum.



#### PN2W Pink/White Noise Generator

Random noise generator providing continuous pink or white noise. White noise has an equal amount of energy per Hz of bandwidth. Pink noise has an equal amount of energy per octave of bandwidth.

**OUTPUT:** Unbalanced RCA jack, impedance 620 ohms

**OUTPUT LEVEL:**

Pink noise - Continuous @ 83dB - 85dB ref, 98dB SPL, 62mV

White noise - Continuous @ 83dB - 85dB ref, 98dB SPL, 62mV

**FREQUENCY RANGE:** 20Hz - 20kHz

**POWER REQUIREMENTS:** 9V battery

**SIZE (W x H x D); WEIGHT:** 1-3/4" x 2-3/4" x 1-3/4"; 2 oz.

**CASE MATERIAL:** High impact ABS; **FRONT PANEL:** Anodized Aluminum.



## PN3A Gated Pink Noise Generator

Pink Noise Generator providing pink noise in continuous or burst format. Pink noise has an equal amount of energy per octave of bandwidth. The gating function is for use in RT60 Reverberation measurements and loudspeaker timing adjustments.

**OUTPUT:** Unbalanced ¼" jack, impedance 620 ohms

**OUTPUT LEVEL:** Continuous @ 95dB - 97dB ref, 110dB SPL, 245mV

RT60 burst: 11s

STA (loudspeaker timing) pulse: 9ms

Time off control: 10 - 150s

**FREQUENCY RANGE:** 20Hz - 20kHz

**POWER REQUIREMENTS:** 9 V battery

**SIZE (W x H x D); WEIGHT:** 2½" x 4" x 1½"; 6 oz.

**CASE MATERIAL:** High impact ABS.



## TS3 - The "Rattler"



The Gold Line TS3 "*Rattler*" is a handheld low to middle frequency audio oscillator designed to test speakers and speaker applications. It can drive speakers hard enough to detect vibration and rattles in the speaker's field. Perfect for fine-tuning your commercial or home theatre application.

### SPECIFICATIONS

**OUTPUT:** Unbalanced gold plated RCA jack, impedance 1ohm

**OUTPUT LEVEL:** Continuous @ -10dBv, (0.316V RMS)

**FREQUENCY RANGE:** 15Hz - 2kHz

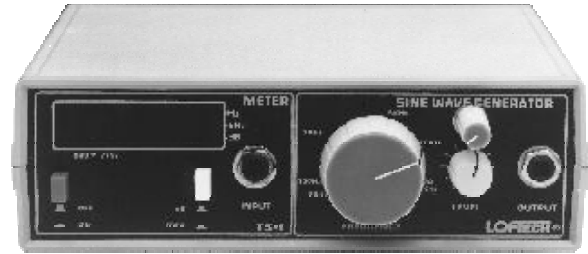
**POWER REQUIREMENTS:** 9 V battery

**SIZE (W x H x D); WEIGHT:** 2½" x 4" x 1½"; 6 oz.

**CASE MATERIAL:** High impact ABS.

## TS1 Audio Test Set

The TS-1 is a sinewave oscillator combined with a frequency counter and level meter in one package for convenience and precision.



### TS1 Features:

#### Low Distortion Oscillator:

A current controlled, state-variable true sine wave oscillator incorporating a fast AGC circuit. Distortion components are typically 0.1% 2nd and 0.05% 3rd which are low order and not audible making the TS1 & TS2 useful for listening tests where a higher distortion function generator would generate undesirable, audible side effects. Full frequency sweeps can be made from 20Hz - 20kHz in a single range. The TS1 has no amplitude changes over the entire frequency range.

#### Frequency Counter:

The frequency counter is internally connected to the internal oscillator and displays the oscillator frequency. If a signal is plugged into the input connector it displays the frequency of the input signal. This unique combination allows absolute precision in setting frequencies.

#### The dB AC Voltmeter:

The dB meter is a wideband average responding AC voltmeter. The circuit output is converted to dB for display. Direct reading dB greatly simplifies alignment procedures. The reference 0dB is preset for the standard 0.775mV (0dBm)

## TS2 Audio Test Set

The TS-2 is similar to the TS-1 plus includes a compact AC impedance measurement function.

#### Impedance Meter:

The impedance meter measures complex impedance in ohms. It allows the user to set up and validate studio equipment, measure components, develop equipment, test loudspeakers and enclosures and to measure and validate distributed loudspeaker systems. The impedance meter will read impedance from 1 to 1000 ohms in the frequency range from 20Hz to 20kHz

## TS1RMX Rack Mount Audio Test Set

The TS1RMX is a rack mount version of the TS1. All functions and performance are identical.

# Title 4

## Gold Line Information

### Chapter 6: Miscellaneous Test Devices

#### APT2 Polarity/Phase Analyzer

The APT2 utilizes state of the art signal processing to accurately determine absolute polarity which is unimpaired by passive crossovers or signal waveform distortions produced by the device under test. The APT2 works on tweeters, mid-ranges, woofers, subwoofer speakers and cabinets, equalizers, amplifiers and crossovers. With this handy instrument an entire speaker system can be checked in only seconds.



The Polarity/Phase Detector (APT) and Pulse Generator (PG) are supplied as separate units.

**U.S. PATENT 5,319,714**

#### GL60 RT60 Reverberation Time Meter

The GL60 is a Stand alone RT60 Reverberation time meter with built-in microphone. It is ultra compact and measures the following frequencies: 125, 250, 500, 1000, 2000, 4000 Hertz. It displays the RT60 time in seconds from 0.1 to 10secs with 1/100s resolution. The GL60 provides fast data on reverberation and is battery powered.



# ZM1 Impedance Meter

The Model ZM1 is a unique product that is useful to every sound contractor or installer.

The ZM1 measures the impedance of loudspeakers and entire distributed loudspeaker systems as well as individual components (resistors, capacitors, inductors). It will also calculate the wattage that will be produced on an installed loudspeaker system.

This is a rugged hand held battery powered instrument with special circuitry to prolong battery life. It comes complete with high quality test leads.

**U.S. Patent 6,064,702**



# Title 4

## Gold Line Information

### Chapter 7: Microphones and Accessories

Gold line offers several accessories for its range of measurement devices. These include microphones, microphone stands, microphone calibrators, and multiplexors.

**MK8** - Instrument quality mini-microphone rated to 123dB SPL.

**MK8A** - Instrument quality microphone rated to 123dB SPL.

**MK10** - Instrument/Calibration quality microphone rated to 128dB SPL.

**MK160** - Instrument quality microphone rated to 160dB SPL.

**MK30** - Instrument quality microphone rated to 123dB SPL.

**EZ STAND** - Light weight microphone stand.



MK10 Microphone

EZ Stand



## Precision Microphone Calibrators

Gold Line is pleased to offer Professional Quality Microphone Calibrators from Larson - Davis to satisfy your calibration needs.

Item	Specifications
CAL200	Type 1L calibrator with output of 94 or 114dB @ 1kHz. ½" opening with ¼" adapter provided.
CAL250	Precision calibrator with output of 114dB @ 250 Hz. Constant level between 2000 and 50000 ft. altitude. 1" opening with ½" adapter provided. 1/8", 1/4", 3/8" adaptors available.

**CAL200**



**CAL250**

## MX4 Microphone Multiplexer

- Expands the capability of single channel RTA's
- Averages up to four microphone positions
- Allows spatial averaging
- Analyzes overall response



A multiplexer is a device that allows a single channel Real Time Analyzer to average information from up to four microphone positions in a single test. When this information is processed by an analyzer that has "time averaging", the resulting curve is called "spatially averaged". Spatial averaging is recommended by all of the major film studios, cinema chains,

and home theater installation organizations, including Lucasfilm THX, and Dolby Laboratories.

The advantage of multiplexing is that the resulting curve on the real time analyzer reflects the overall response of the room across the entire seating area, rather than only the acoustics of a single point in the room.

The MX4 allows the user to enable single channels or any combination of channels, allowing for comparison of individual microphone locations versus the spatially averaged data from multiple microphone tests. Each of the four channels has a gain control to allow the user to match the input level from different locations.

The MX4 can be used with all Gold Line 1/3 octave Real Time Analyzers and with most other popular models. The MX4 is provided with three DSP30 model MK8A reference microphones. If you have a DSP30, use your RTA microphone as the fourth microphone. Additional microphones are available from Gold Line.



# Title 4

## Gold Line Information

### Chapter 8: Test Kits

#### EZ TEST SYSTEMS



An **EZ TEST SYSTEM** is a lightweight assortment of measurement instruments in a rugged carrying case that allows the user to make the most frequently required audio measurements.

**Model EZ TEST 2:** - Includes **Model DSP30** Audio Spectrum Analyzer; **Model TS2** test set which incorporates a dB meter, sine wave generator, frequency meter and impedance meter; **Model PN3A** gated pink noise generator; **Model MK8A** instrument microphone; **Model BE1** 110Vac to 12Vdc @ 500mA power source and a rugged padded black nylon **carry case** with adjustable dividers for the test instruments, and a separate compartment large enough for a laptop computer. The case has zippered closures and adjustable straps for hand or shoulder carry.

**Model EZ TEST 4:** - Identical to **EZ TEST 2** except that the **Model DSP30** is replaced with the **Model DSPCIW Black Box RTA**.

**Model EZ TEST T:** - Identical to **EZ TEST 2** except that the **Model TS2** is replaced with the **Model MX4 Multiplexer**.

# PROkits Test Kits

A **PROkit** is an acoustic analyzer and its most commonly used accessories in a rugged carry case. Everything you need for setting up a room; The Analyzer, A Flat Calibration Microphone, A Noise Source, Software and More, is in the kit.

**PROkit30:** - Includes **Model DSP30** Audio Spectrum Analyzer; **Model MK10** instrument microphone; **Model PN3A** pink noise generator; **Model GL1K** microphone tester; **Model BE1** 110Vac to 12Vdc @ 500mA power source and a rugged suitcase style **carry case** made of aluminum with foam padding. The case has key locks and an adjustable shoulder strap. Included software is OPTRT60 and OPTNVM.

**PROkitCI:** - Includes **Model DSPCIW** Audio Spectrum Analyzer; **Model MK10** instrument microphone; **Model PN3A** pink noise generator; **Model GL1K** microphone tester; **Model BE1** 110Vac to 12Vdc @ 500mA power source and a rugged suitcase style **carry case** made of aluminum with foam padding. The case has key locks and an adjustable shoulder strap. Included software is OPTRT60.



# Title 4

## Gold Line Information



## Chapter 9: TEF Audio Analyzers

### The Power Platform

The TEF20 is a dedicated instrument designed to perform Time, Energy and Frequency (TEF®) measurements using the science of Time Delay Spectrometry (TDS).

The power of the TEF platform lies in its ability to join specialized software and the TEF20 analyzer with your computer to form a complete measurement system.

The TEF20 features a powerful DSP device with the speed and power to execute millions of instructions per second enabling it to accurately process complex acoustical data.

Sound contractors, consultants and engineers rely on the TEF when they design, install and verify sound systems and solve problems associated with various aspects of room evaluation.

Optional software packages perform such functions as real time analysis, precision equalization, noise level analysis to name a few.

An invaluable tool, the TEF analyzer enables the sound professional to see and measure existing acoustical problems while evaluating each change as it is made. When it comes to system design, verification and validation, nothing comes close to a TEF.

**TDS and SLX are available as Windows based programs.**

Time Delay Spectrometry, "TDS", and Sound Lab Xtras, "SLX", are the most widely used TEF Programs. They are now available as Windows based applications which run in all of the current Windows programs - 95, 98, Me, 2000 and NT. Based on modern 32 bit code, they are easy to use and combine modern Windows functions with a look and feel that is still recognizable to current TEF users.

# TEF 20 SHIP Analyzer

## Sound Solutions for acoustical problems



**The TEF analyzer and acoustics software make a powerful platform**

### **Main Features:**

Digital signal processor Motorola XSP56001,  
Memory RAM 64K x 24 bits  
Digital-to-analog converter 16 bits, 8 times over-sampled  
Analog-to-digital converter 16 bits, 64 times over-sampled (synchronously sampled 2-channel)  
Data format IEEE floating point, 8-bit mantissa, 24-bit exponent  
Data sample rate 48 kHz, fixed

Dynamic range 96 dB

THD + noise -85 dB at 1 kHz (0.006%)

RS-232 Serial communication interface

Host (HI) Industry standard architecture, requires an HI-PC card installed in an 8-bit expansion slot

Parallel 8-bit standard or bidirectional parallel port (LPT1 or LPT2)

Frequency response 10 Hz to 21 kHz, +0.2 dB, dc coupled

Phase response 10 Hz to 21 kHz, +1.0°, dc coupled

Input impedance 2 M, dc coupled 1 M, ac coupled

Maximum input voltage 1 volt rms

TEF 20 has two XLR microphone-level inputs on the front panel. Either input can be selected from software.

Input impedance 6.81 k with phantom power selected 100 k without phantom power

Weight 10 lbs. 7 oz. (4.73 kg)

Dimensions 17" x 12 3/8" x 1 3/4" (43.2 cm x 31.4 cm x 4.4 cm)

### **Computer requirements**

Applications software will run on any MS-DOS-based system, version 5.0 or higher, with VGA graphics. For a system with acceptable performance levels, we make the following suggestions:

Microprocessor 20 MHz 386 with math coprocessor

RAM Eight megabytes recommended, four megabytes minimum

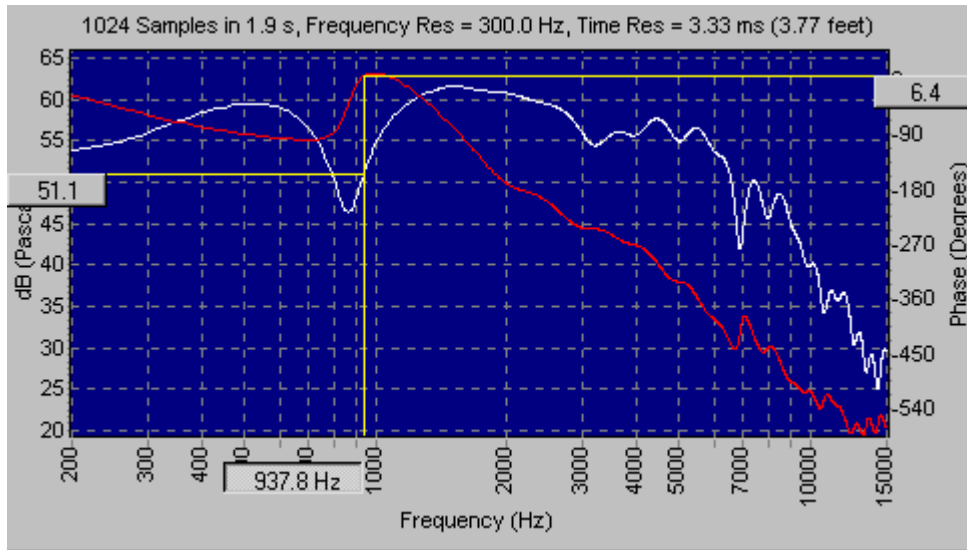
Monitor VGA required, color recommended

Hard disk 80 megabytes recommended, 40 megabytes minimum

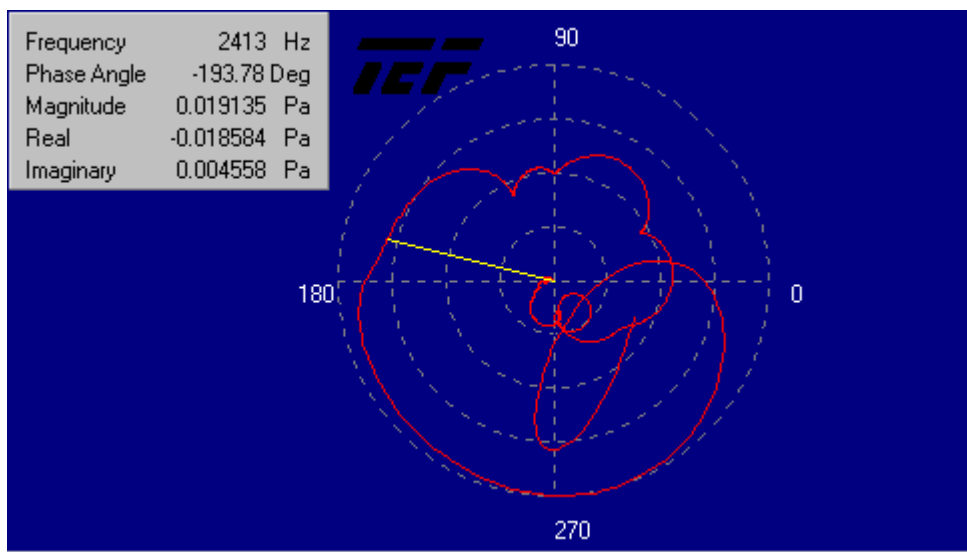
Interface, serial One RS-232 serial port, capable of operating at 57.6 kilobaud. Must be assigned as COM1 or COM2.

Interface, host One 8-bit ISA expansion slot for (HI-PC card)  
 Interface, parallel One bidirectional 8-bit parallel port. Must be assigned as LPT1 or LPT2.  
 Operating system MS-DOS version 5.0 or newer

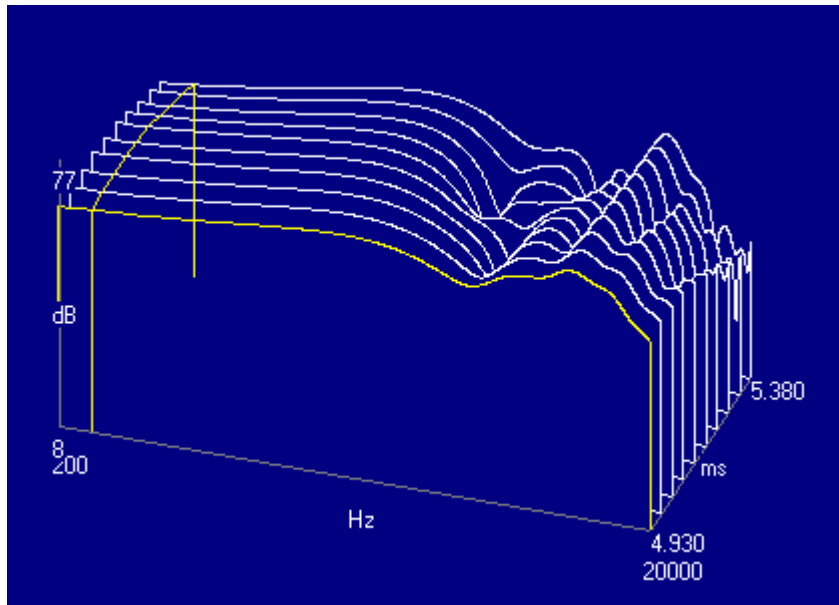
Following are sample measurement plots:



MAGNITUDE AND PHASE DISPLAYS AVAILABLE IN SOUND LAB TDS, MLS OR SLX SOFTWARE



THE NYQUIST IS AN ALTERNATIVE VIEW OF MAGNITUDE AND PHASE, AND IS AVAILABLE IN SOUND LAB TDS, MLS AND POLAR SOFTWARE



SOUND LAB TDS CAN GENERATE 100 CURVE 3D WATERFALL DISPLAYS

1,424,678 and 1,732,027

## Sound Lab Measurement Software

- [Time Delay Spectrometry \(TDS\) 5.2.1 for Windows](#) Electroacoustic measurement software using Time Delay Spectrometry technology.
- [Sound Lab Extras \(SLX\) 5.2.1 for Windows](#) Advanced measurements including impedance, distortion, harmonics, and "rub & buzz" test.
- [Maximum Length Sequence \(MLS\) 2.1a](#) Electroacoustic measurement software using Maximum Length Sequence Technology.
- [Real Time Analysis \(RTA\) 2.1b](#) Real time dual channel spectral analysis software provides 1, 1/2, 1/3, 1/6 or 1/12 octave displays.
- [Noise Level Analysis \(NLA\) 2.1](#) Noise Level Software displays Leq, Ln, Ldn, Lden, Lmin, and Lmax data gathered over any time interval from one minute to twenty-four hours.
- [Polar Energy-Time Curves \(PET\) 2.0a](#) Generates polar coordinate plots from Energy Time Curve data, reporting the magnitude, time of arrival, and direction of the reflecting surface relative to the microphone placement.

- **Polar (PLR) 2.1c** Uses TDS to make time, energy and frequency measurements. A set of frequency response is gathered, and then processed into the polar display.
- **Precision Equalization (PEQ) 2.1** TDS-based precision equalization software compares system EQ with direct sound arrival.