

A RAY OF HOPE FOR TEST EQUIPMENT SCHIZOPHRENICS

BY: JAMES GUNDLACH OF GUNDLACH AND ASSOCIATES INC.
617 LINCOLN WAY EAST
MORRISON, IL 60563

Until very recently, almost all test equipment was based on analog circuitry. This meant, by and large, that for every test measurement to be made, dedicated analog circuitry had to be designed and put in a separate box. This resulted in bulky and expensive test equipment. The audio industry is now beginning to utilize digital signal processing technology in many areas that were analog strongholds from the beginning.

There are many advantages, and of course some disadvantages, to the utilization of DSP technology rather than analog circuitry. One of the strong advantages is that once a piece of test equipment is capable of making one type of measurement under DSP software, it frequently requires only additional software for that piece of test equipment to be able to make a second type of measurement. The task of writing the additional software is not trivial and certainly not without cost, but that additional software typically does not add hardware cost to the piece of equipment nor does it add weight or additional size to that piece of equipment. This means that one piece of test equipment can, in a very cost efficient manner, replace multiple pieces of test equipment which were based on analog circuitry.

One manufacturer has been quietly increasing the functionality of its test equipment over the last few years. Gold Line, of West Redding, Connecticut, began selling its DSP30 real time analyzer a few years ago. The original premise behind the instrument was that mountains of very costly analog filters could be replaced by one DSP engine, backed up with a microprocessor control. This resulted in a reasonably sized 1/3 octave analyzer which was capable of arithmetic functions such as adding or subtracting two or more measurements all at a reasonable cost. Being microprocessor based, it was not too difficult for Gold Line to add a direct printer output so that hardcopy of the tests could be made at the job site on a inexpensive dot matrix printer. An RS232 communications port was added to allow the data to be dumped to a computer so that more sophisticated software could allow tailoring of the printouts. Please note that "tailoring" does not imply altering the data but being able to annotate the report with job name, date, etc. Even the basic real time displays became easier to read because automatic scaling was added. Such functions as various weighting curves, including a custom curve which the user can input, various attack times, continuous averaging, and peak holds, are built into the unit.

As the software was expanded, a reverberation measurement capability was added. This is becoming a pretty powerful little beast.

The most recent functions which have been added to the DSP30 are THD distortion measurement capability and a loudspeaker timing function. The distortion measurement capability runs from approximately .03% to 9.99%. While this does not qualify it as a laboratory instrument, it certainly tells you what you need to know about the functioning of a sound reinforcement system in terms of total harmonic distortion.

Loudspeaker timing is measured in 3 ranges, 0 to 30 milliseconds, 0 to 300 milliseconds, and 0 to 3 seconds. No, it doesn't give you all of the acoustic data that you can get from a TEF analyzer but it does allow you to accurately determine the timing for delayed underbalcony loudspeakers and the option costs only a few hundred dollars.

The DSP30 performs the measurement functions of several pieces of analog test equipment which in the past were bulky, heavy, and expensive. Gold Line also manufactures a cost effective pink noise generator, loudspeaker and microphone polarity tester, and a unit which combines the functions of an audio oscillator, ACVTM, impedance meter, and frequency counter. In the remainder of this article, we will concentrate on the DSP30 and its capabilities.

The DSP30 is fundamentally a 1/3 octave real time analyzer. There are a lot of other analyzers on the market, however, a few things jump out at you when you first see and hold the unit. First, it only weighs 3 ¼ lb.. including its batteries and microphone. The handle adjusts to serve as a stand. The LEDs are very bright and easy to read. The digital readout is also bright and the numerals are large enough to see from reasonable distances. The unit has a built-in line input so external adapters and attenuators are not necessary to make line level measurements.

There are several things about the operation of the DSP that are unique and very convenient. First, the configuration of the unit at turn on can be predetermined by the operator. This means that when you turn it on it will come up with the filters, scaling, etc. that you prefer as an operator. The unit has an auto-scaling mode which always keeps the highest 1/3 octave band reading at the top of the scale each time the LED readout is refreshed. This means that the maximum amount of information is always on scale rather than being hidden off scale. The weighting can be set for A, C, and a user definable weighting. The level steps per LED in the display can be set to one of 7 different ranges going from .25 dB to 5 dB per step. You can see the display in peak or average and there is a peak hold mode which is equivalent to some manufacturers accumulate mode.

Data held in memory can be summed or subtracted from memory to memory for easy comparisons between measurements. The memory's hold the entire 85 dB worth of level data. The memories are not limited to what is shown in the display window at any given time. There is an automatic summing mode available. In this mode, the unit continuously takes new readings, sums them to the total of all the previous readings, and presents an average on the screen. Note that this is an entirely different concept than the peak hold function described above.

As an option the unit is capable of performing RT60 reverberation decay time measurements. Gold Line offers an inexpensive gated pink noise generator which presents pink noise to excite the room and then remains silent for a user adjustable period of time. With this gated pink noise generator and the DSP30, it is very convenient to measure reverberation decay time. The DSP30 displays RT60 in its display window. Two user selectable high pass filters are available. Unlike many units which only provide broadband information you can view any of twelve octave bands and see their individual decay rates. Two or more measurements can be averaged with the results being displayed.

An optional THD measurement software package is available. This allows measuring THD from .03% to 9.99%. While this is not the level of resolution or range that one would expect from a dedicated laboratory distortion analyzer, it is just about what "the Dr. ordered" for sound system installation measurements and only costs a couple hundred dollars.

Another option available allows you to time delayed loudspeakers. This option relies on the RT60 software and, therefore, you must have the RT60 option before you can add the timing option which also only costs a couple hundred dollars.

The printer option, again inexpensive, allows the DSP30 to drive a dot matrix printer directly. This means you can get hardcopy, in the field, of any measurement made on the DSP30 using a portable printer. Since the memories hold all of the measurement data, not just what is displayed in the read out, the printouts show the full 85 dB range of the instrument.

Another option allows the DSP30 to communicate directly with an IBM compatible computer. Once the data is in the computer, you can fill out the rest of the form through the keyboard and end up with the kind of presentation that is shown in figure 2. Both field and computer generated printouts are essentially identical except that the computer generated version allows modification of the printout and inclusion of additional annotation and comment.

A well equipped DSP30 along with its companion gated pink noise generator costs well under \$2700.00. Given their low cost and the diversity of measurements that are possible with this combination, it is hard to see how a contractor can justify not having at least one such package in his test equipment "arsenal".



Gold Line
Box 500, West Redding, Ct 06896
Tel: 203-938-2588; Fax: 203-938-8740

<http://www.gold-line.com> E-mail: goldline@i84.net