The Gold Line ASA10 Audio Spectrum Analyzer will perform many valuable tasks for you, and its usefulness will be greatly increased by your careful reading of the following instructions.

FUNCTION Switch: In ON, the analyzer is set for normal operation, and the sound energy will be indicated in each of the ten filter bands, from 31 Hz to 16 kHz. In BROADBAND, the 31Hz filter channel is made broadband, responding to sound energy across the audio band.

DECAY TIME Switch: In FAST, any level indication at 0 dB will fall to -10dB in from 2 seconds (31 Hz) to 0.5 second or less (500 Hz and above) if the sound is turned off. In SLOW, the decay or fall time for 10 dB is about 20 seconds at 31 Hz, decreasing to about 6 seconds at 500 Hz and above. The response to a sudden increase in level, the attack time, is short in both FAST and SLOW. When monitoring music or speech, and you want to see the rapid level changes, use FAST. If you are going to run any sort of test that is going to use pink noise, SLOW must be used to get a steady, stable display on the analyzer. HOLD is used to capture the display of a particular moment, from FAST or SLOW, providing time to make notes on the display.

GAIN Control: With the GAIN at minimum (knob rolled down), the ASA10 gives a 0 dB indication at about 105 dB SPL (sound pressure level). With the GAIN at maximum (knob rolled all the way up), the 0dB indication is at about *65* dB SPL. When making a measurement, if there is no display, increase the gain (or turn up the amplifier). If the clipping indicator is on, reduce the gain (or turn the amplifier down).

CLIPPING Indicator: When the level into any one of the ten filter bands is higher than the upper limit for the +5dB indication, the CLIPPING LED (light emitting diode) will be turned on. If this happens, reduce the analyzer gain or the sound system volume to get in range indications.

The DISPLAY of the ASA10 is what delivers the valuable information that is processed with the analyzer's circuitry. The display consists of a matrix of 70 LEDs: a column for each of the ten filter bands, and *7* LEDs in each column for *2.5* dB steps from -10 dB to *+5* dB. Each row of LEDs has precise thresholds to ensure that there is accurate indication of sound energy in each of the bands. The screen of the display is a dull, non-reflective surface, which aids in using the analyzer in rooms with normal lighting. Try to position the unit to minimize the effects of any reflections. Add some shielding for measurements outside: make certain not to block the microphone in the end of the analyzer.

The MICROPHONE in the end of the ASA10 is behind a screen to protect it from damage. When checking the performance of a sound system, hold the analyzer so that the microphone points at the loudspeaker.

EXT LINE IN Jack: This input is for feeding in line - level signals for analysis. A 0dB indication will occur over the range from 20 millivolts (0.020 v) to about 0.8 V, depending upon the setting of the gain control. The microphone is automatically disconnected with plug insertion. The input impedance is 33K ohms, and the plug type is Switchcraft 780 Tini-Plug.

EXT POWER Jack: The analyzer is normally powered with eight AA cells, and this is the most convenient arrangement for hand-held measurements. The cells can be either alkaline or NiCad rechargeable: do not use any "regular" types. At a nominal 12 volts, the ASA10 draws about 40mA (milliamperes) with no LEDs on in the display to about 80 mA with a LED on in each filter band. If the unit is going to be used in a stationary position, such as on a table, it will be worthwhile to power the analyzer with an external supply or battery eliminator, such as the Gold Line BE1. (Source requirements: at least 80 mA at 8 to 15 volts, 12 volts nominal. Matching plug is Switchcraft 850 Micro-Plug.) Please note that plugging in a battery eliminator automatically disconnects the internal batteries. Any NiCad batteries installed must be removed if there is a need for recharging. Access to the batteries is gained by removing the four screws holding on the back case. Replacement (or NiCad recharging) is required when there is a noticeable drop in the brightness of the LEDs in the display.

GENERAL GUIDELINES FOR USE OF THE ASA10 ANALYZER

The sound energy in each of the ten octave bands is shown simultaneously and continuously - that's RTA, or Real Time Analysis. Many tests are most easily run with a pink noise source (Gold Line PN2) which puts equal energy into each of the filter bands, if it is fed directly to the unit, resulting in a straight line display. With the pink noise fed through a sound system, any deviations from flat response will be shown on the analyzer.

SOUND SYSTEM EQUALIZATION

Because the ASA10 has its own built-in microphone, you can measure the sound output from any type of sound system: high fidelity, band or sound reinforcement. The response will be shown in the ten filter - band display whether the tests are made in a room, at a club, or even outdoors.

Procedure:

1. Turn off the sound system before making connections, and put all tone controls, etc., to the flat positions. Set volume to zero.
2. Connect a high - quality pink noise source (Gold Line PN2) to a line level input to one channel only.
3. Turn the amplifier/system and noise generator on.
4. Advance the volume to a medium - high sound level. Do not overdrive!
5. Put the ASA10 to SLOW decay time, and turn it on.
6. Take a position in the center of the listening area.
7. Increase the gain of the analyzer to put the majority of the filter band responses near 0 dB. Make certain the unit is pointed at the speaker. Take note of the levels in each of the octaves.
8. In the lowest bands there can be great deviations from flat response caused by speaker and room characteristics. Usually it is impossible to make the changes in room shape and size that might be desirable, but changes in speaker position are usually quite feasible.
9. Try different speaker positions along and up and down the back wall and also try various distances from the wall. Use the combination that gives the best results, that is, the flattest response.
10. The high - frequency response of the system will be greatly affected by the speaker pointing - how it is angled back and forth and also its pointing up or down. Make such adjustments as necessary for maximum output in the highest frequencies.
11. After completion of the above two steps, move around in the listening area while observing the analyzer display. Take note of any large shifts in the response. HOLD may help making comparisons.
12. Adjust the systems equalizers, tone controls, etc. to the positions expected to obtain the flattest response in the listening area. Do not try to boost out deep notches in the response, such as might be caused by a poor crossover. In general, limit the amount of boost used to prevent overdriving amplifiers and speakers. Do use cut to bring down peaky areas.
13. Recheck system response with the ASA10 and trim adjustments for the best compromises over all of the bands and for all important listening areas.
14. Repeat steps 6 to 13 for the other channel.
15. The liveness in a room will have an effect on the system response, primarily in the medium and high frequencies. Rugs, stuffed furniture, drapes and people are all absorbers of sound, and deader rooms will require more sound from the speakers, and there will probably be a need for more boost of medium/high frequencies.

ELIMINATING FEEDBACK (For Band or Other Sound Reinforcement Systems)

1. Feed pink noise (such as from Gold Line PN2) into a line input, and set volume for a medium - high level from the speakers.
2. Turn up gain on main microphone input until feedback just starts.
3. With the analyzer, look for evidence of one filter band peaked above all of the others. Increase level if necessary.
4. Adjust equalizer to put in just enough cut in that band to stop the feedback. A parametric EQ should be set at minimum bandwidth.
5. Increase level and continue to trim EQ to control feedback.
6. When second feedback frequency appears, use ASA10 to determine the adjustment needed. Increase level further, and trim EQ.

7, When there is feedback appearing at three or more frequencies with further increases in level, the practical limit of feedback control with minimum effect on the music has been reached, The adjusted system will have higher output and be easier to operate.
8. Open other mikes that will be on at the same time, and change settings as needed for best overall performance.
9. For a final adjustment, performers should stand at the microphones as their proximity can cause some shift in feedback modes.

TAPE RECORDER ALIGNMENT

1. Clean and demagnetize all heads.
2. Connect one channel of the recorder output to the analyzer EXT LINE IN. Turn ASA10 on with decay time switch on SLOW.
3. Play a pink noise alignment tape (This must be of high quality!) with the recorder monitor switch on Tape. Adjust analyzer gain and/or recorder output level for a display at 0 dB.
4. Following the recorder manufacturer's instructions, adjust the azimuth of the play head for maximum output in the 16kHz channel.
5. If the display is erratic, check for proper tape wrap and head tilt. Adjust if necessary and repeat azimuth check.
6. If there are play equalization adjustments, make these while observing the effects on the levels in all ten filter channels.
7. Change output connections and check alignment on other tracks.
8. Make play equalization adjustments similarly for all other tracks.
9. Repeat steps 2 to 8 for other tape speeds if necessary.
10. Select tape type and length most frequently used, and set the bias and EQ switches to correspond. Select tape speed.
11. Feed a pink noise generator, such as the Gold Line PN2, to the recorder line input. Set record level to -10 VU for open reel recorders at 7 - 1/2 ips and to -20 VU for cassette decks.
12. If the unit is a three head machine, record the pink noise, and simultaneously monitor the playback output with the analyzer. First, adjust the record head azimuth for maximum output in the 16kHz band. If the bias is adjustable, reduce it to near minimum and then increase it slowly. Stop where the outputs in the 500Hz and 1kHz bands reach a maximum. Trim the high end response with record equalization, if possible. A fine bias adjustment can be made to get the best overall record/playback response.
13. Check the results on other tracks, making necessary adjustments.
14. Repeat adjustments for other tape speeds and tape types if need be.
15. If the recorder is a two head unit, the approach is similar, but it is necessary to record, rewind and play after each adjustment is made. Make small changes to facilitate removing any errors made.
16. If the heads are worn, the responses may be down noticeably at i6 kHz. You will still want to adjust the heads for the maximum output, but bias and EQ adjustments will provide but limited correction for heads that are quite worn. Do not reduce bias so much as to decrease the 500Hz level (and increase distortion) in an effort to try to force the high end up.
17. You will find that alignment with the analyzer and pink noise is much faster and better than other methods.

OTHER EQUIPMENT TESTS

By using the line input capability of the analyzer, sometimes in combination with measurements with the microphone, it is possible to pin down the response of tone controls and equalizers before the feed to the loudspeakers. Looking at the output of pre-amps, mixers and other line level devices is very easy with the ASA10. It is also possible to connect the analyzer to the output of a power amplifier, but BE CAREFUL! First of all, make any connections with the power amplifier turned off. Make certain that the amplifier, or the control section feeding it, is set to minimum gain. Power amplifiers can put out voltages much higher than the maximum level handled by the ASA10, so extra caution is in order. With the analyzer gain at minimum, increase amplifier gain slowly until the display is close to 0 dB, where analyzer gain control can be used.

IN SUMMARY

The application of audio spectrum analyzers such as the Gold Line ASA10 is continually being broadened. Your own imagination may suggest some of the new areas of use for this versatile unit.