Software Release Notes

MLSSA version 10WI Rev 9

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Windows XP, 2000, NT — Analysis Mode Only
MLSSA version 10WI Rev 9 will run under Windows XP, 2000 and NT in analysis mode only. You cannot perform actual measurements under these Windows versions but you can load and analyze TIM and FRQ data files. Whenever *MLSSA* detects it is running under Windows XP, 2000 or NT it automatically enters analysis mode. Note that under Windows XP, 2000 and NT printing is significantly slower than under Windows 98SE, both when printing direct from *MLSSA* and when using the *Pizazz 5* printer driver. In addition, *MLSSA* only runs full screen on these Windows versions but can be minimized to allow you to run other Windows programs without having to Quit *MLSSA*. WARNING: If you create a shortcut to *MLSSA* under XP, DO NOT select the Full Screen option under the Screen tab of the shortcut Properties as that will result in *MLSSA* not starting successfully: Use the default Window option only.

Male & Female STI Updated — Third Edition (2003-03) of IEC 60268-16
MLSSA version 10WI Rev 9 updates the Calculate STI Men and Calculate STI Women commands to conform to IEC 60268-16 Third Edition (2003-03). There are two changes. First, the absolute threshold of hearing is accounted for. Thus, STI values will decrease with decreasing signal levels at the listening position, even in cases where there is negligible interfering noise. Second, the auditory masking correction factor now depends upon the absolute SPL level in each octave band at the listening position. In prior versions, the auditory masking correction factor was not a function of the absolute SPL level within each octave band but depended only upon each octave band level *relative* to the next lower octave band level. Because both changes require knowledge of absolute SPL levels at the listening position, that is, where the measurement microphone is positioned, you must use the Library Microphones command to enter your microphone sensitivity and preamp gain and you also need to select this microphone/preamp combination prior to performing measurements. If no microphone/preamp combination was defined and selected prior to performing measurements, the Calculate STI Men and Calculate STI Women commands will refuse to perform the analysis. In cases where you have archived old TIM files that do not contain microphone calibration data, use the Library Microphones Modify-file command to enter, as best as can be determined from memory or from notes, your best estimate of the microphone sensitivity and microphone preamp gain existing at the time when the original measurement was performed. Whenever the Calculate STI Women or Calculate STI Men commands are executed, the second row in the MTF matrix previously labeled “m-correction” (masking-correction) is replaced by the new label “m/thresh-cor” (masking/threshold-correction). This new label indicates that the displayed

correction factors now include two corrections: the new more sophisticated auditory masking correction as well as the absolute hearing threshold correction, both according to IEC 60268-16 Third Edition. The Calculate STI Full and Calculate STI Rapid commands are not affected by these changes: Both commands operate the same as in prior versions and therefore do not require microphone calibration data.

Last Filename Recall — Speeds Creation of QC limits Files
MLSSA commands such as Transfer Load and Transfer Save have long offered a time saving feature using the Up arrow key. When these commands are prompting you to enter a filename, pressing the Up arrow key causes the last filename you had loaded or saved the last time to be re-entered for you. *MLSSA* version 10WI Rev 8 adds this feature to the Transfer Import and Transfer Export commands in both the time and frequency domains. This feature was also added to the Waterfall Text-export-file command, the QC-limits Load command as well as *MLSSA SPO* commands: Export, QC Limits Load and QC File Open. The last filename recall feature is useful for the various Save and Export commands if you need to continually overwrite the same TIM, FRQ or TXT file with new measurement data. Another application is in the creation of the QC upper and lower limit curves, as specified within QC limits files. Since *MLSSA* normally uses cubic spline interpolation when loading QC limits curves (and also when importing text files into the frequency domain), there is a possibility of overshoot or ringing if too few data points are specified to describe the desired curve near sharp changes in its slope. To add more data points from Windows minimize *MLSSA* by pressing Alt-Space-bar then start Notepad (Programs Accessories Notepad) to load and edit the QC-limits file in question. After editing, click File then Save but do not exit Notepad. Click on *MLSSA* to maximize then execute QC-limits Load followed by the Up and Enter keys to re-load the modified QC limits file. Next, execute QC-limits Compare to see if your changes solved any ringing or overshoot problem. If not, simply minimize *MLSSA* once again, go back to Notepad, make further changes and save again. Repeat as many times as needed until the displayed limit curves are what you want, then exit Notepad. When running under DOS, the procedure is a little more involved: From *MLSSA* execute DOS Shell and use a DOS text editor such as EDIT to edit the QC limits file. Exit the text editor with changes saved and from DOS type Exit followed by the Enter key to resume *MLSSA*. Execute QC-limits Load followed by the Up and Enter keys to re-load the modified QC limits file. Execute QC-limits Compare to see if the limit curves are what you expected.

Calculate Acoustic-center command — Speed of sound in REVERB.INI
The Calculate Acoustic-center command is a frequency domain command which, when applied to the measured excess phase curve, determines the acoustic center of loudspeaker drivers relative to the measurement microphone position. The result is displayed as both a distance in meters and as a delay in milliseconds shown in parentheses. In prior *MLSSA* versions, the speed of sound was assumed constant and could not be changed. This could lead to a significant error in the displayed acoustic-center distance if the air temperature is significantly above or below 22 °C, and/or when the distance to the measurement microphone is large. The speed of sound in air varies somewhat with temperature and much less so with relative humidity. *MLSSA* version 10WI Rev 8 allows you to change the speed of sound *MLSSA* uses for the Calculate Acoustic-center command. The speed of sound is now stored near the end of text file REVERB.INI located in the main *MLSSA* directory. Therefore, you can edit REVERB.INI and enter a more accurate value for the speed of sound that applies to your particular circumstances. Several calculators are available on the Internet that determine the speed of sound based on temperature and/or humidity inputs.

MLSSA SPO Automatically Initiates DC Resistance Calibration

MLSSA SPO version 4WI Rev 8 automatically calibrates itself for accurate DC resistance measurements whenever necessary. In previous versions, when in the Measure DCR mode and when executing the Go or Calc commands for the first time, *SPO* would respond with the message "Execute DCR-mode Calibrate Auto". Thus, the user needed to manually execute the DCR-mode Calibrate Auto command in order to calibrate *SPO* for accurate driver DC resistance measurements. In *MLSSA SPO* version 4WI Rev 8, this calibration cycle is entered automatically whenever such calibration is deemed necessary by *SPO*, thus saving time and keystrokes. When issuing a Go or Calc command for the first time while in the Measure DCR mode, you will be prompted to open and then to short your test leads. The first step allows *SPO* to measure the exact DC gain of the signal path. Shorting your test leads allows *SPO* to measure their residual DC resistance. (Note if the *MLSSA RCAI* is connected, you will only be prompted to short your test leads briefly to measure their residual series resistance; the *RCAI* is automatically configured to measure the DC gain.) After completing these steps, the Go command will next prompt you to reconnect your test leads to the driver terminals in order to measure its DC resistance and then its impedance to determine its T/S parameters. Further Go or Calc commands will not initiate a new DCR calibration cycle unless something in the *MLSSA* setup was changed (e.g. a new reference measurement). In addition, if the DC resistance of your test leads measures over 3 ohms an error will be issued and the calibration aborted. This resistance check was added to avoid possibly erroneous DC resistance measurements that will result if the test leads were accidentally left open or, left connected to the driver during the calibration step requiring they be shorted. A high residual test lead resistance reading could also indicate a poor electrical connection due to an internal wire break or due to corrosion or residue on the test clips. If you receive this error, repeat the command being careful to follow all prompts exactly. Note also that you can get a high test lead resistance reading due to the test clips not being fully open during that step of the calibration. If the calibration is still unsuccessful, check all connections and clean the test clips with acetone or similar solvent to remove any oils or other non-conductive residue. If no problem is found you may need to substitute heavier gauge test leads in order to reduce the total series resistance of your test leads and test clips down to less than 3 ohms.

MLSSA SPO Configures RCAI for Z Measurements — QC Driver Response + T/S Parameters

MLSSA SPO version 4WI Rev 8 automatically configures the *MLSSA RCAI* to measure impedance whenever *SPO* is entered and *MLSSA* is currently *not* in the Impedance FFT mode. This feature can be used to perform QC PASS/FAIL testing of driver frequency response followed immediately by QC PASS/FAIL testing of the same driver's T/S parameters via *SPO*. For example, suppose *MLSSA* and the *RCAI* are both configured to measure speaker driver frequency response using a microphone and the pink-MLS stimulus. Upon entering *SPO* the *RCAI* is automatically re-configured to measure impedance using the white-MLS. Therefore, upon entering *SPO* you can straight away perform driver T/S parameter measurements even if you were previously measuring driver frequency response. Upon exiting *SPO*, the *RCAI* is restored to its original state, thus allowing you to immediately resume measuring driver frequency response or, whatever measurement *MLSSA* was configured to perform prior to entering *SPO*. You can also fix the *SPO* analysis window frequency range in order to free up the marker and cursor for other purposes, such as to define the QC PASS/FAIL frequency range for QC testing of driver frequency response. To set and store the *SPO* analysis window, execute Go Impedance to measure the driver's impedance. Set the marker and cursor positions for the desired *SPO* analysis window frequency range and execute Library Parameters to enter *SPO*. *SPO* will respond with a high-pitched beep and the message: “SPO analysis window stored: ” followed by the analysis window frequency range you had selected using the marker and cursor. Press Esc to return to the frequency domain. Execute Go Once to perform a frequency response or other non-impedance measurement. From this point, you can set the marker and cursor as desired for any other purpose without affecting the *SPO* analysis window, as long as you enter *SPO without* a displayed impedance curve that was previously measured using the Go Impedance command. Note that when *MLSSA* is displaying an impedance curve loaded from disk or, even one previously measured by *SPO* itself, the current marker and cursor positions are ignored by *SPO,* thus preventing inadvertent changes to the *SPO* analysis window. To set a new *SPO* analysis window, execute Go Impedance, set the marker and cursor positions for the new analysis window frequency range and then enter *SPO* again to store the new analysis window. Choose an FFT size large enough to ensure sufficient frequency resolution for accurate *SPO* measurements. The recommended setup file is LOUDS-Z.SET, which programs a 20 kHz measurement bandwidth and a 16,384-point FFT. This setup file optimally configures *MLSSA* for both acoustic frequency response measurements up to 20 kHz, as well as T/S parameter measurements via *SPO*. If a *MLSSA RCAI* is not connected, *SPO* operates as before, that is, *MLSSA* must already be in the impedance FFT mode upon entering *SPO* to perform T/S parameter measurements.

MLSSA SPO Documentation Update — Test Box Volume Corrections for Closed-Box Method

For highest accuracy using the closed-box method you should account for the volume of the mounting hole in your test box as well as the volume enclosed by the driver cone. The driver should be mounted to the test box with its magnet assembly located outside of the test the box to facilitate these corrections. The opening hole into the test box should have a diameter large enough to completely clear the driver’s surround but small enough to ensure a good seal to the driver’s mounting face. The volume added by the mounting hole is simply the volume of a cylinder, which is calculated as the product of the area of the mounting hole and the thickness of the box material. To this must also be added the enclosed volume of the frustum of a cone formed between the driver’s opening face and its dust cap. This cone frustum volume can be calculated according to:

$$V_{cone} = \tfrac{1}{3} h\left(S_O + S_C + \sqrt{S_O S_C}\right)$$

In this equation, So is the area of the driver’s cone. The value of So is calculated from a measurement of the cone diameter that excludes all of the surround material. Sc is the area of the driver’s dust cap, which is calculated from a measurement of the dust cap’s diameter. Finally, h is the depth of the dust cap relative to opening face of the driver. The value of h can be found by placing a flat reference, such as a ruler, across the face of the driver. Use calipers to measure perpendicular from the bottom of this reference surface down to the top of dust cap. It is suggested that all linear measurements be in centimeters with the result that the calculated volume will be in units of cubic centimeters (cc). Multiplying the result by 1000 yields liters. In summary, the total effective volume of the test box is the sum of the basic internal test box volume plus the volume of the mounting hole plus the volume enclosed between the driver’s opening face and its dust cap. Enter this total effective volume of your test box into the Library Parameters Method Box-loaded command to ensure the highest degree of accuracy for the closed-box method.