Definitions and a Guide to the Detailed Sheets

At the top left of the detail sheet you have "Test Setup" showing what was metered.

Dry or Wet? refers to whether an ablative material was used. Adding a couple of drops of water or a very small bit of grease in a pistol suppressor can dramatically lower the dBs and eliminate first round pop.

Below that is "Location & Weather". The calculated speed of sound is useful if you have a borderline subsonic load that is going supersonic occasionally.

SilencerCo Sparrow - S&W M&P C - CCI SV - 22 LR

Test Setup		
Suppressor	SilencerCo Sparrow	
Host	S&W M&P C	
Ammo	CCI SV	
Caliber	22 LR	
Dry or Wet?	Dry	
Location & Weather		
Date	22-May-2022	
Location	Range 1	
Elevation (Feet ASL)	611	
Time	12:05	
Wind Low - High	5	10
Temperature F*	78	
Humidity %	71%	
Pressure In Hg	30.14	
Speed of Sound FPS	1138	

Further down is a Consolidated Results table showing the averaged data for all three mic locations.

Consolidated Results			
Results	Muzzle	Left Ear	Right Ear
Unsuppressed	155.7	151.1	150.6
Suppressed	118.7	118.1	120.8
NSR	37.0	32.9	29.8
FRP (#1 - Avg)	1.1	0.0	0.8
Avg w/o FRP	118.6	118.1	120.7
Min	116.8	116.0	117.5
Max	121.8	122.1	125.9
Std Dev	1.6	2.0	2.5

- Muzzle is 1 meter to the left of the muzzle at a height of 1.6 meters.
- Left Ear and Right Ear were measured as close to the shooter's ears as possible while still allowing room to operate the firearm.
- Unsuppressed is an average of 3 unsuppressed shots.
- Suppressed is an average of 10 suppressed shots.
- NSR – Net Sound Reduction. People tend to look for the lowest absolute suppressed numbers, but since meter data can vary 1-2 dB A (decibels on the A scale) day to day due to atmospheric conditions, probably the most valuable numbers are the NSR. NSR is the unsuppressed average - suppressed average.
- FRP – First Round Pop. Some suppressors can have a noticeably louder 1st round due to unburned oxygen in the blast chamber. This oxygen is consumed on the 1st shot and so subsequent shots tend to be quieter. FRP is the 1st shot – the suppressed average.
- Avg w/o FRP is simply the average of shots 2 – 10.

- Min and Max are the lowest and highest shots in the suppressed string.
- Std Dev is the standard deviation of the suppressed string.

At the bottom left are the raw data that were taken from the three meters for each shot. Note the raw data must be scaled up depending on how the meters were calibrated and how far away the mics are from the muzzle. More on that in a minute. The point here is don't assume the 1st suppressed shot in the example below was actually 109.8 dBA.

Unsuppressed	Muzzle	Left Ear	Right Ear
Raw 1	145.4	130.6	130.4
Raw 2	145.8	131.3	130.4
Raw 3	145.8	131.3	130.9

Suppressed	Muzzle	Left Ear	Right Ear
Raw 1	109.8	98.1	101.6
Raw 2	106.8	96.8	101.1
Raw 3	109.0	98.9	100.0
Raw 4	107.4	96.0	101.0
Raw 5	110.3	100.6	105.9
Raw 6	109.4	97.4	98.0
Raw 7	107.4	96.9	103.1
Raw 8	108.3	102.1	100.5
Raw 9	106.9	96.1	97.5
10	111.8	98.4	99.0

Enter the Orange Fields
Light Gray Fields Are Calculated
Green Fields Are Info Only

At the top right of the sheet are the Meter Settings.

Meter #1			
Mic Position	Muzzle		
Cal Base	114		
Cal Actual	104	*Adds 10 dB*	
Cal Offset	10		
Weighting	A		
Octave Filter	None		
ISO Freq band	N/A		
Mic Distance (M)	1.0	*Adds 0 dB*	
Distance Scaling Factor	0.00		
160 dB Option	Yes		160 Max
Meter dB Range	100-160		100-160
Effective dB Range	110-170		
Meter SN	0190		
Meter|Mic|Calibrator	L-D 800B	B&K 4938	CA250
Protocol	MIL-STD-1474D		

The example above shows the setup for a Larson-Davis 800B meter with the (rare) 160 dB feature. This meter has a built-in 20 dB pre-scaler that allows the meter to directly read up to 160 dB.

- Cal Base is the output of the calibrator used to set up the instrument before use.
- Cal Actual is what I told the meter it was hearing. This is a cool trick. If you calibrate normally using 114 dB and set the meter to read 114 then the maximum you can measure is 160 dB. If you calibrate the meter to read *104* instead

of 114 you now can measure up to 170 dB. That's why the raw data in the previous table have to be scaled. The other two meters are calibrated at 94 so we add 20 dB to the raw data.

- Cal Offset is the amount to be added to the raw measurement.
- Weighting is the scale applied to the data. The industry has always used the A scale even though it is more technically correct to use the Z or unweighted scale.
- Octave Filter and ISO Freq Band allow measuring a single frequency range. Not used here.
- Mic Distance (M) is the distance in meters from the muzzle. Very loud rifles or those with brakes can be over 170 dB. The way to handle this is to move the mic further from the muzzle and do the math to add a scaling factor. For instance, if the mic is 3 meters from the muzzle you need to add 9.54 dB to the raw measurement. The calculation is 20 x log10(distance). In this case the mic was the standard 1 meter away so no factor is needed.
- 160 dB Option and Meter dB Range document the setting used. The meters have a number of range settings.
- Effective dB Range shows that while the meter was set to the 100 – 160 range, we're actually measuring 110 – 170.
- The remaining fields are model numbers and the serial number, along with the Mil Standard used.

The last section shows the Actual scaled dB used in the calculations, along with the Averages calculated two different ways. The color backgrounds make it easier to find the lowest (green) and highest (red) shots in the strings.

Calculated Results	Avg (Linear)	Avg (Log)
Unsuppressed	155.7	155.7
Suppressed	118.7	119.0
NSR	37.0	36.7
FRP (#1 - Avg)	1.1	0.8
Avg w/o FRP	118.6	118.9
Min	116.8	
Max	121.8	
Std Dev	1.6	

Unsuppressed	Raw dB	Actual dB
1	145.4	155.4
2	145.8	155.8
3	145.8	155.8

Shot	Raw dB	Actual dB
1	109.8	119.8
2	106.8	116.8
3	109.0	119.0
4	107.4	117.4
5	110.3	120.3
6	109.4	119.4
7	107.4	117.4
8	108.3	118.3
9	106.9	116.9
10	111.8	121.8

The industry calculates averages using the usual total / number of shots, and that's what's in the Avg (Linear) column. The engineers reading this will know you really can't do this with log10 data, so I've included the "correct" logarithmic averages calculated using the process described on the Cirrus Research site.

The only time the two averages differ very much is when you have a shot that is wildly different from the rest of the string, so the industry standard method is OK. This is just a nod to the engineers in the audience.

Stan