SonoLab 7 Frequently Asked Questions
Treatment Parameters

How does an acoustic treatment work?

AFA treatments consist of very high frequency acoustic signals occurring in a series of "bursts" with each burst followed by a zero power state, as illustrated below. Treatments are defined by the following parameters:

- Cycles per Burst – the number of acoustic oscillations contained in each burst. The illustration shows five cycles in each burst.
- Duty Factor – the percentage of active burst time in the acoustic treatment. The illustration shows a Duty Factor of 20%.
- Peak **Incident** Power – the power, in Watts, **being emitted from the transducer** during each burst.
- Average Incident Power - Peak Incident Power multiplied by the Duty Factor.

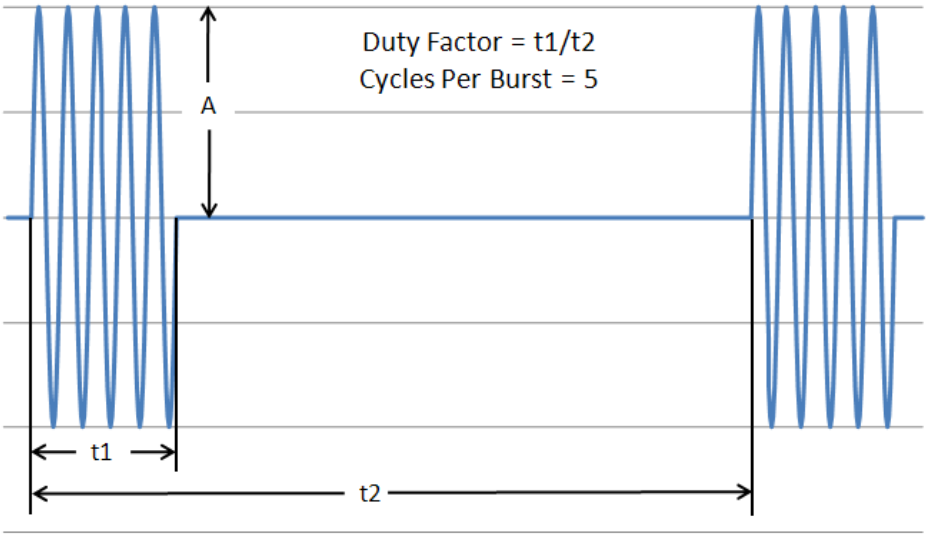

Figure 1 - Duty Factor and Cycles Per Burst

What happened to Duty Cycle (as employed in previous versions of SonoLab)?

Duty Cycle has simply been renamed Duty Factor to prevent any confusion with the Cycles per Burst parameter. Duty Factor remains the percentage of "on" time of each acoustic burst.

What happened to Intensity (as employed in previous versions of SonoLab)?

In SonoLab 7, Intensity has been replaced by Peak Incident Power to better represent acoustic treatment conditions.

In the S2 and E210 instruments, Intensity served as a dimensionless proxy for the power emitted from the transducer during each acoustic burst, with Intensity 10 corresponding to approximately 350 Watts of Peak Incident Power. New generation instruments operating under SonoLab 7 are capable of delivering up to 500 Watts of Peak Incident Power. Rather than invent a new dimensionless scale, Covaris chose, in SonoLab 7, to specify Peak Incident Power in true Watts.

The use of Watts for Peak Incident Power (in place of Intensity) actually clarifies the setup of acoustic treatments. If 250 Watts of Peak Incident Power are employed with a 20% duty cycle, then the average, nominal power emitted from the transducer is simply 20% of 250, or 50 Watts.

How do I convert a method developed on an S2 or E210 for use with SonoLab 7?

S2 or E210	**SonoLab 7**
Cycles Per Burst	Cycles Per Burst
Duty Cycle	Duty Factor
Intensity	Use table below to determine best initial estimate for Peak Incident Power

Intensity	50 cpb	100 cpb	200 cpb	500 cpb	1000 cpb
10	325	300	275	250	230
9	290	275	260	240	220
8	260	250	240	225	205
7	230	225	220	210	185
6	200	200	200	190	165
5	175	175	175	165	140
4	140	140	140	135	115
3	105	105	105	100	90
2	70	70	70	65	60
1	35	35	35	33	32
0.5	17.5	17.5	17.5	17	16
0.1	3.5	3.5	3.5	3.5	3.5

Table 1 - S2 Intensity to SonoLab 7 Peak Incident Power

How does Average Incident Power relate to Measured Power as reported by SonoLab 7?

Average Incident Power emitted from the transducer is simply the Peak Incident Power multiplied by the Duty Factor. It is the time-averaged power **emitted from the transducer**, as illustrated below:

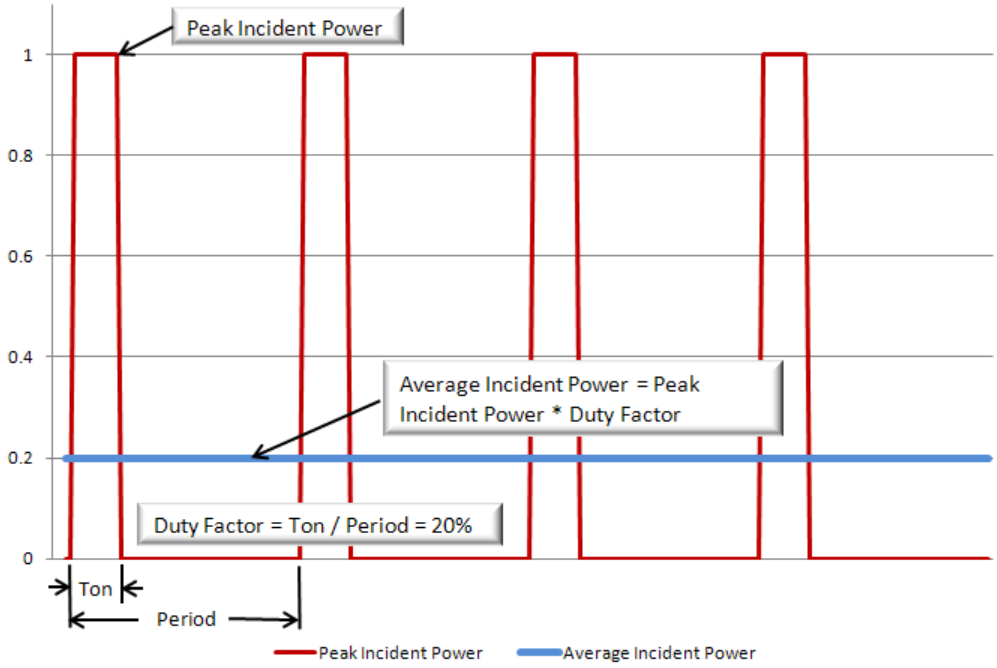

Figure 2 - Peak Incident Power and Average Incident Power

It is important to note that the Measured Power reported by SonoLab 7 may differ from Average Incident Power by as much as ± 40%. Measured Power combines power emitted from the transducer (incident power) and reflections returning from the sample vessel to the transducer (reflected power). The transducer frequency, shape and type of sample vessel, distance between the transducer and the vessel, sample volume, sample material properties, water temperature and water quality influence Measured Power as reported by SonoLab 7.

The phase of reflections, relative to the phase of the incident waves, sets up either constructive or destructive interference which determines whether the Measured Power will be less than or greater than the Average Incident Power. To minimize positional sensitivities, Covaris instruments utilize Frequency Sweeping to vary the phase relationship, bringing Measured Power into line with the Average Incident Power.