BLF22 Technical Note

Use of the Time Constants for Tissue Perfusion Monitors

Before beginning a recording session using either the standard analog ports or USB port it is necessary to set the time constant of output filter. The rear panel has time constant switches with settings of 0.1, 1.0 and 3.0 seconds. The primary reason to use this switch is to allow for recording of instantaneous data with pulsatility (0.1 sec), or data averaged over one or three seconds which will show the mean flow. The 0.1 time constant will show the heart beat synchronous to pulsatility of the flow. The impact of the time constant on recordings can be seen in Figure 1 below:

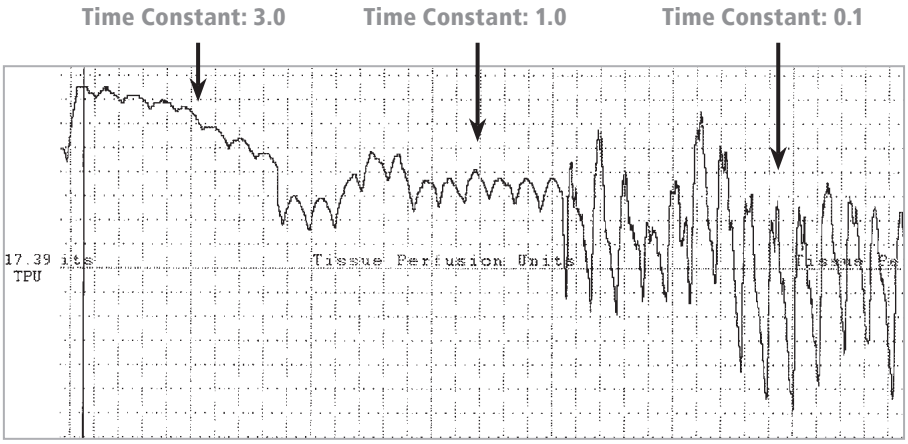

Fig. 1: Index finger blood flow using Type R Probe first with time constant switch on 3.0, then 1.0 and finally 0.1 sec.

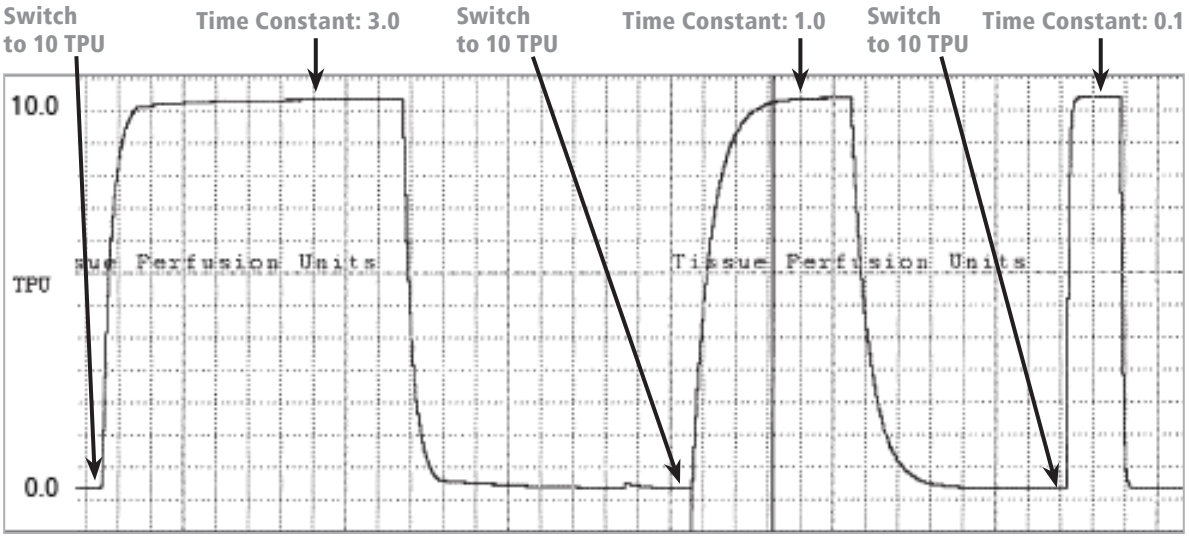

Fig. 2: Recorded by switching to calibration mode (10 TPU), allowing the output to maximize and then switching the mode back to "0" then allowing the signal to fall , for each of the three time constants. This shows the effect of time constant setting on signal output. Note the time required for the signal to reach full scale.

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Time Constants Continued

Figure 2 on the previous page shows the effect of the three time constant settings on the responsiveness of the output voltage to changes in Monitor measurements. While this was recorded on a BLF21, the same responsiveness applies to the BLF22 Monitors. The "events" recorded here are switching the Mode from "0" to "10 TPU" (analogous to "0 CAL" and "+ CAL" for the BLF22) for each of the time constant switch settings.

In effect, the time constant switch selects one of the capacitance filters on the output Exponential curves describe the charging or discharging of the capacitance filters. From Figure 3 we see the theoretical curves closely resemble the actual curves in Figure 2.

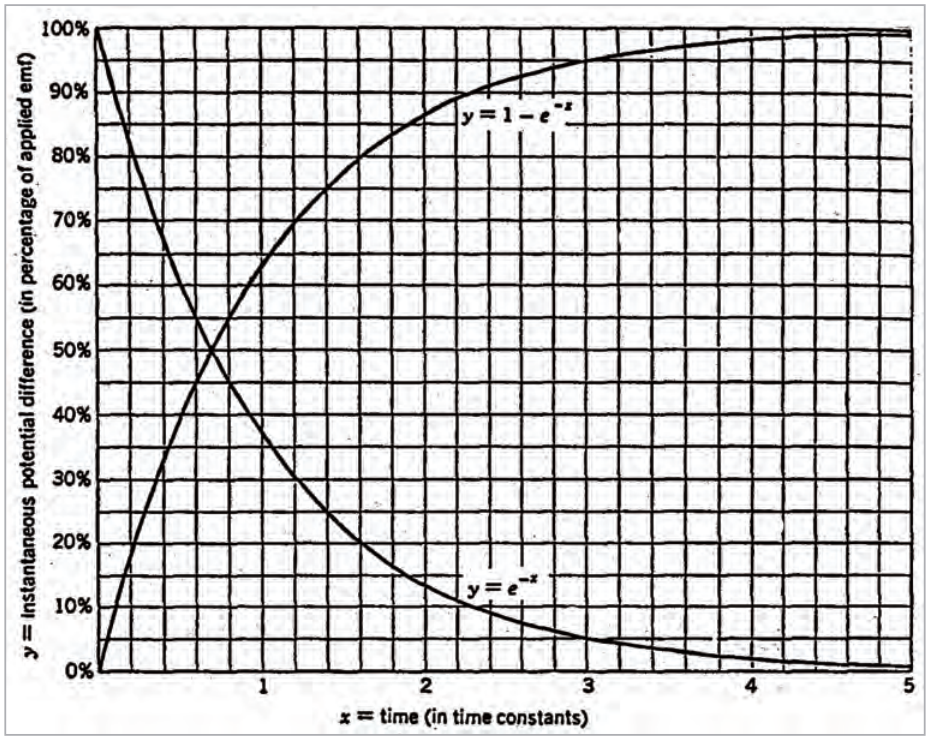

Fig. 3: Universal exponential curves for the graphical solution of the charge and discharge of capacitors in DC circuits[1].

[1]Reference: Jackson, HW, Introduction to Electrical Circuits. Prentice-Hall Inc. Englewood Cliffs, NJ, p. 228, 1959.

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