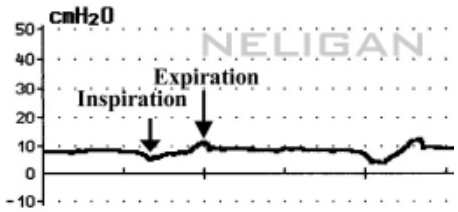
A System for Analysing Ventilator Waveforms

Start with the airway pressure screen

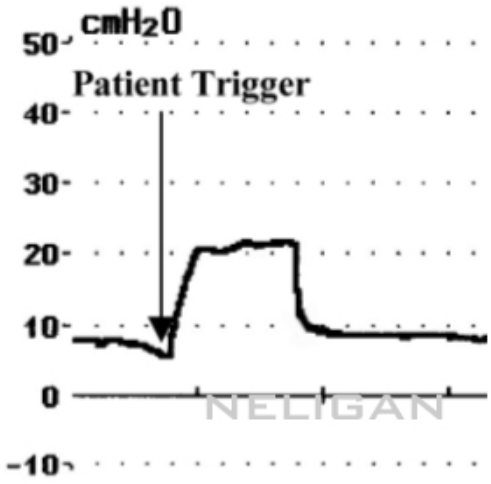
Step 1: -determine the CPAP level

– this is the baseline position from which there is a downward deflection on, at least, beginning of inspiration, and to which the airway pressure returns at the end of expiration.



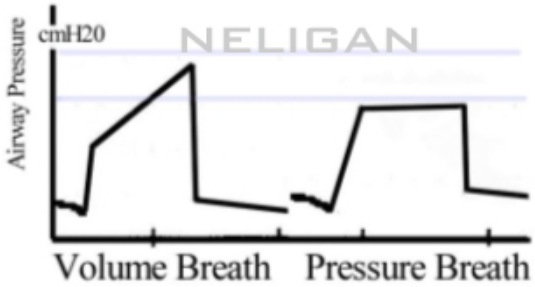
Step 2: is the patient triggering?

There will be a negative deflection into the CPAP line just before inspiration.



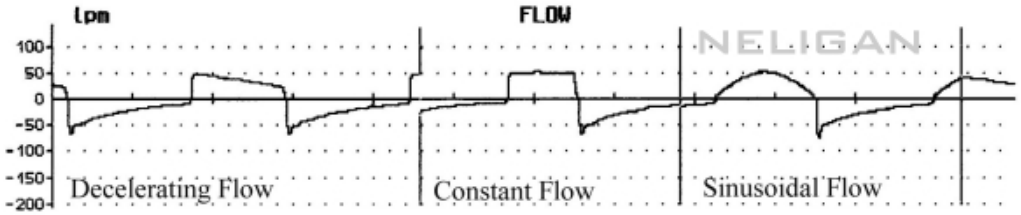
Step 3: what is the shape of the pressure wave?

If the curve has a flat top, then the breath is pressure limited, if it has a triangular or shark's fin top, then it is not pressure limited and is a volume breath.

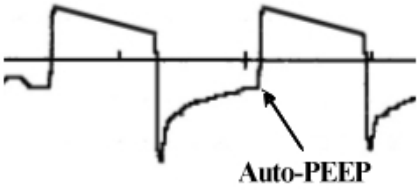


Look at the flow screen:

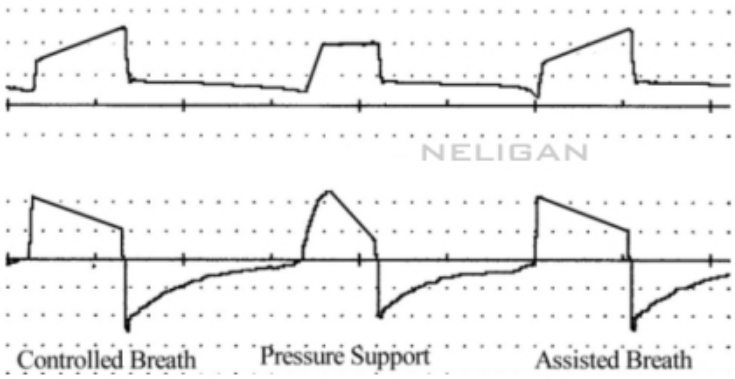
Step 3: what is the flow pattern? – If it is constant flow (square shaped) this must be volume controlled, if decelerating, it can be any mode.



Is the patient gas trapping? – expiratory flow does not return to baseline before inspiration commences (i.e. gas is trapped in the airways at end-expiration).

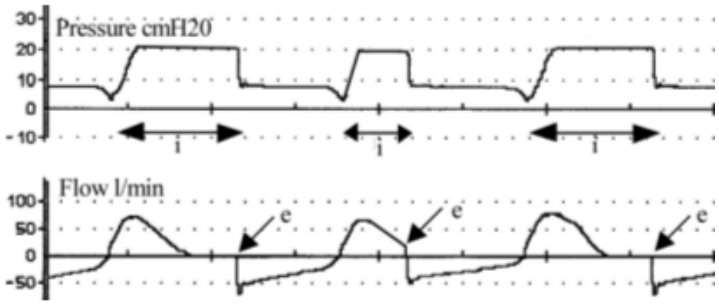


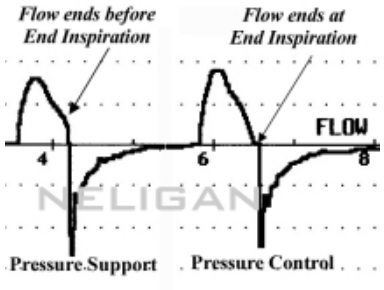
Step 4: the patient is triggering – is this a pressure supported or SIMV or VAC breath? This is easy, the pressure supported breath looks completely differently than the volume control or synchronized breath: the PS breath has a decelerating flow pattern, and has a flat topped airway pressure wave. The synchronized breath has a triangular shaped pressure wave.



Step 5: the patient is triggering – is this pressure support or pressure control?

The fundamental difference between pressure support and pressure control is the length of the breath – in PC, the ventilator determined this (the inspired time) and all breaths have an equal "i" time. In PS, the patient determined the duration of inspiration, and this varies from breath to breath.





Step 6: is the patient synchronizing with the ventilator?

Each time the ventilator is triggered a breath should be delivered. If the number of triggering episodes is greater than the number of breaths, the patient is asynchronous with the ventilator. Further, if the peak flow rate of the ventilator is inadequate, then the inspiratory flow will be "scooped" inwards, and the patient appears to be fighting the ventilator. Both of these problems are illustrated below